



CREATING CONNECTIONS IN "THE CITY DIFFERENT:" SIMPLIFYING PUBLIC TRANSIT IN SANTA FE

An Interactive Qualifying Project submitted to the faculty of Worcester Polytechnic Institute in partial fulfillment of the requirements for the Degree of Bachelor of Science

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EXECUTIVE SUMMARY

Since 2008, the United States has been facing an economic recession that has affected all levels of society. The government has responded by cutting excess programs, such as public transportation. In general, the public transportation industry does not see profits and is funded mostly by grants, federal money, and taxes. Minimal funding options make performing improvements and maintenance difficult for transportation agencies. To apply even more pressure to the nation’s public transportation system, tight wallets have led to a new clientele – the non-user. Citizens, who never before considered public transportation, now see it as a viable option. We believe that many non-users will become more accepting as gas price continue to rise.

We have assisted the Santa Fe Metropolitan Planning Organization in creating a more user-friendly public transportation system by making the current information available to the public easily understandable and accessible.



FIGURE 1: MPO LOGO

DATA	
✓	Frequency of Service
✓	Location of Routes & Stops
✓	Fares
✓	Ridership Statistics
✓	Resources of the System
	# of vans/cars, drivers/operators, etc.
✓	Peak Hours & Resources Used At Those Times
	Budget*

FIGURE 2: DATA COLLECTED FROM SERVICES

First, we met with the public transportation agencies and collected a specific list of information about each. Data collected included frequency of service, location of routes and stops, fares, ridership statistics, resources of the system (number of vans/cars, drivers/operators, etc.), peak hours and resources used at those times, and, if possible, budget information. The consolidation of this data led the team to agree upon focusing the next portions of our project on the Santa Fe Trails city bus system

because the entire system is confined within the city limits and it is the main transportation system offered in the city.

To gain a better understanding of what Santa Fe Trails users wanted from their bus system we distributed a survey. The two-sided survey included bus use, bus stop visibility, smart phone application, origin and destination, customer satisfaction, residential status, and comments portions. Some questions were borrowed from a 2006-2007 survey distributed by Santa Fe Trails while other questions were created by the team to address other issues. After surveying 149 users on Routes 2 – Cerrillos Road, 4 - Southside, and 6 – Rodeo, we found that the majority were dependent upon the bus system to get to a variety of destinations throughout the week. Additionally, only half of the users were interested in a smart phone application. The majority of customers were satisfied with the current level of service. Comments included many requests to keep the current routes and extend service hours at night and on Sundays.

FIGURE 3: SANTA FE TRAILS SURVEY

While conducting the survey, we collected ridership counts, specifically noting the stops where riders got on and off the bus. While performing these counts, we found that many stops were underutilized. This led us to perform a bus stop analysis for Route 6. We found that most of the stops on the route were not being utilized. Using Transportation Research Board bus stop spacing guidelines, we recommended eliminating two loops: Rodeo Park Drive & Brothers Road. According to our analysis, elimination of these loops would save ten minutes decreasing the Route 6 trip time from 47 minutes to 36 minutes. Eliminating these loops would also lead to the removal of stops on those loops. However, users would only have to walk a maximum distance of 0.4 miles to reach bus stops located on the main roads adding only ten minutes to their total commute.

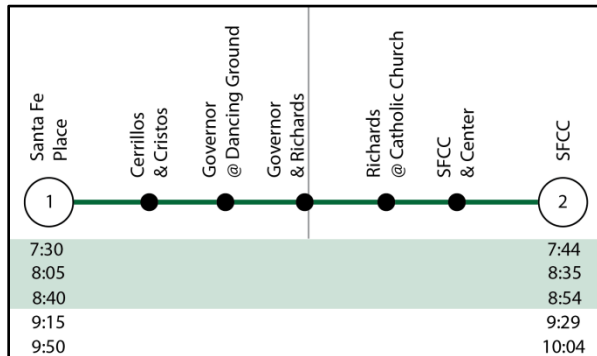


FIGURE 4: ROUTE SCHEMATIC MAP

Observations made by the team after acquainting ourselves with the bus system led to the creation of a route schematic map and a transfer point schedule. The route schematic map was designed to increase awareness of the 400 bus stops that are not printed in the current Santa Fe Trails schedule and map brochure.

Time points where more than one bus route stops were called main transfer points. Main transfer point schedules were created to make users aware of the multiple bus lines and what times they are arriving and departing at that particular stop instead of looking at multiple schedules.

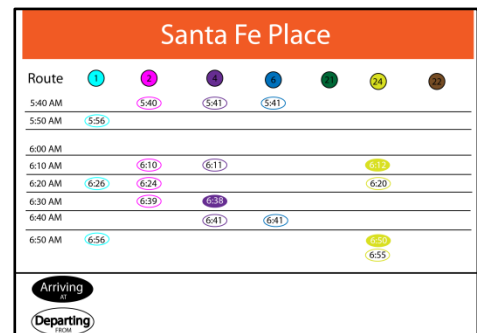


FIGURE 5: TRANSFER POINT SCHEDULE

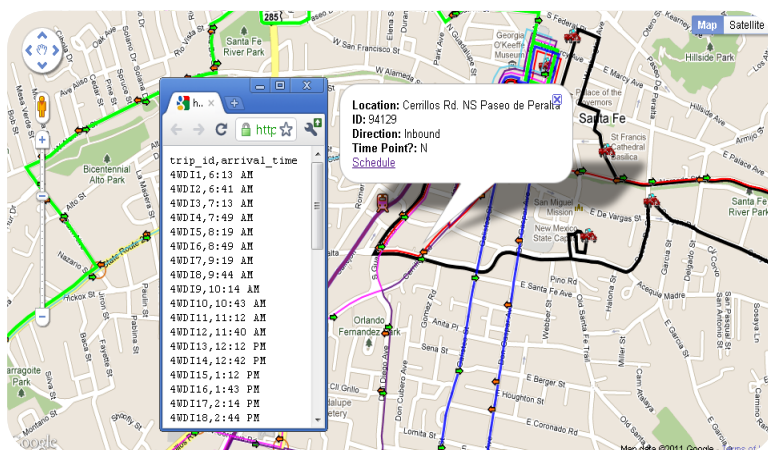


FIGURE 6: INTERACTIVE MAP

Our biggest contribution to improve user-convenience is the building blocks for an interactive map and a trip planner using Google Transit. This map allows users to look at maps and schedules for Santa Fe Trails, Santa Fe Pick-Up and the New Mexico Rail Runner Express. Users are able to manipulate the information provided so that user-friendliness is maximized. The map combines the abilities of a normal map that provides

geographical, spatial information with the time and location information that a schedule provides. It does this by allowing the user to zoom in on areas of interest, as well as select any point of interest for an informational “balloon” containing scheduling information.

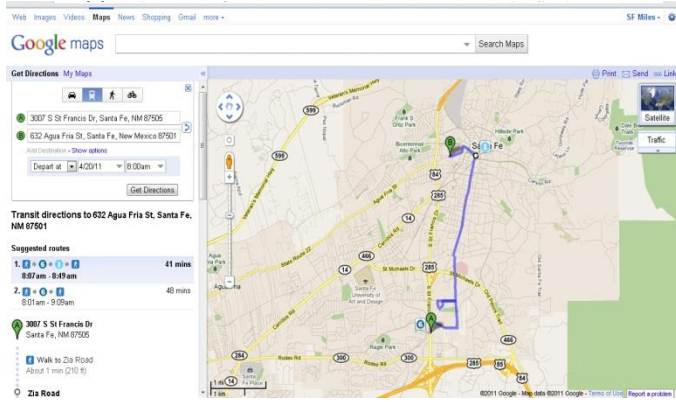


FIGURE 7: TRIP PLANNER

Our Santa Fe specific trip planner utilizes the capabilities of Google Transit. Google Transit currently does not serve the Santa Fe area because the information required for its services have not been submitted. After organizing, formatting, and submitting the information Google Transit requires, users will be able to utilize a convenient, user-friendly interface. There they can type in a current location and final destination and receive step-by-step directions using only public transit. These directions are also plotted on a map alongside the listed directions.

The city of Santa Fe is making strides to improve their public transportation infrastructure. The team has done extensive research on each public transportation system within the city and county. All of our findings are included in detail in the report.

1. INTRODUCTION

Choosing a method of transportation is a personal decision. Every day before someone walks out of his or her front door they consciously make the choice to drive, walk, bike, or take public transportation to their desired destination. Ten years ago, the majority of Americans would have chosen to drive daily. Now Americans are putting more thought into their transportation choice due to the current state of the economy. When city governments face budget reductions, public transportation services are one of the first amenities to be cut. However, the demand for public transportation has recently been at a historic high in the United States. In 2008, Americans took 10.7 billion trips on public transportation. Since 1995, transit ridership has been growing at nearly triple the rate of the population and almost twice as fast as the number of miles driven. This has led to a 4% rise in transit ridership and a 3.6% decrease in the total number of miles driven in 2008.¹

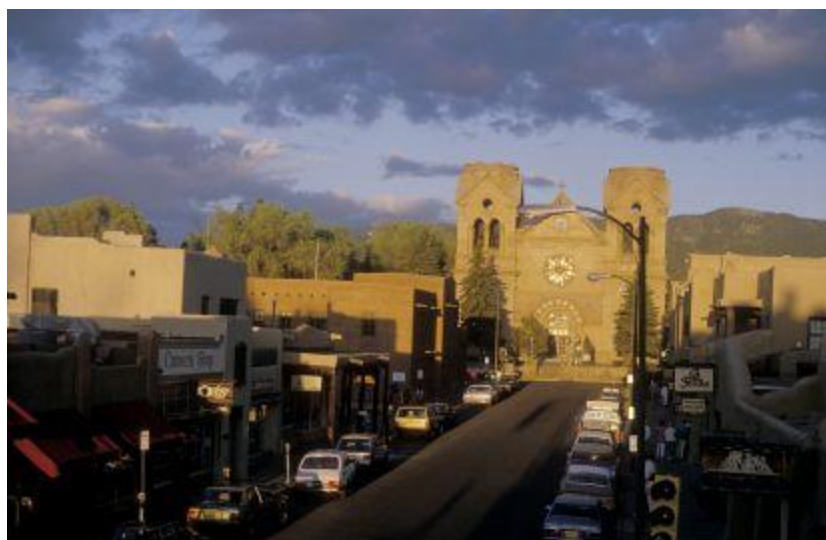


FIGURE 8: DOWNTOWN SANTA FE

The city of Santa Fe is filled with places of interest, but public transportation is not often considered as an option by residents and visitors. Finding a way to integrate transportation systems is an issue that has been brought to everyone's attention because of the troubled economic times. However, finding a solution that pleases everyone seems to be a never-ending battle with no resolution in sight. Mr. Jon Bulthuis, the Director of Santa Fe Trails, told us that some local residents do

not even realize that the city has a public bus system.² On the other hand, while we were administering our survey, most native customers could not imagine their lives without the bus system. The contrast is undeniable. Some citizens believe that the city already has a public transportation system that is easily accessible, understandable, and user-friendly, while others believe that the public transportation system does not exist and is not necessary.

The city's government has put forth an effort to understand the transportation system from a social, economic, and political perspective. One of the forerunners in the campaign to improve public transportation is the Santa Fe Metropolitan Planning Organization, or MPO. They release a long-term Metropolitan Transportation Plan every five years analyzing the current transportation problems and proposing possible solutions based on budget constraints. The most recent report stated that because of budget constraints the ability to make transportation improvements would have to be approached at a later date. Despite this major roadblock, the MPO has managed to work with city and county agencies to develop the New Mexico Rail Runner Express, a commuter rail service that makes stops between the cities of Albuquerque and Santa Fe. Although the Rail Runner has only been running for five years, it is a progressive program that connects rural communities with major metropolitan destinations.³

Although the MPO has worked with organizations at the county, city, and state levels to consolidate public transportation systems, there appears to be some lack of information about each service provided to the public. The MPO has produced a Transit Connections brochure but it only points out connections to the Rail Runner and negates the connections between the other four transportation systems that serve Santa Fe County. A brochure cannot be easily updated and is only advertised at Rail Runner stations. In order to improve public awareness, information should be readily available and easily updatable.



FIGURE 9: MPO LOGO

Our group has assisted the Metropolitan Planning Organization of Santa Fe, New Mexico to promote innovative mobility solutions that connect public and private transportation and encompass all parts of a trip. We began by collecting pertinent information about each transportation system that serves Santa Fe city and county. After collecting this information, we chose the systems for which we must analyze the routes and riders. After completing our assessment, we improved the information available to the public. Finally, we created an interactive interface that allowed users to view all system schedules in one location and plan a trip using different modes of transportation.

2. BACKGROUND

Santa Fe, the capital city of New Mexico, is nestled at the foot of the Sangre de Cristo Mountains at 7,199 feet above sea level making it the highest capital city in the United States.⁴ The city and county of 144,170 people boast a culture and landscape that attract millions of visitors each year and compel residents to live in and take pride in their city.⁵

Although Santa Fe was not officially settled until 1608, there are records of Pueblo Indian inhabitants dating back to 1050.⁶ It was not until 1608, after the appointment of Don Pedro de Peralta as governor of New Mexico, then a Spanish territory, that Santa Fe began to take shape. The territory's original capital was located 25 miles north at San Juan Pueblo.⁶ However, instructions from Spain dictated a plan for "La Villa Real de la Santa Fe" or "The Royal City of the Holy Faith."⁷

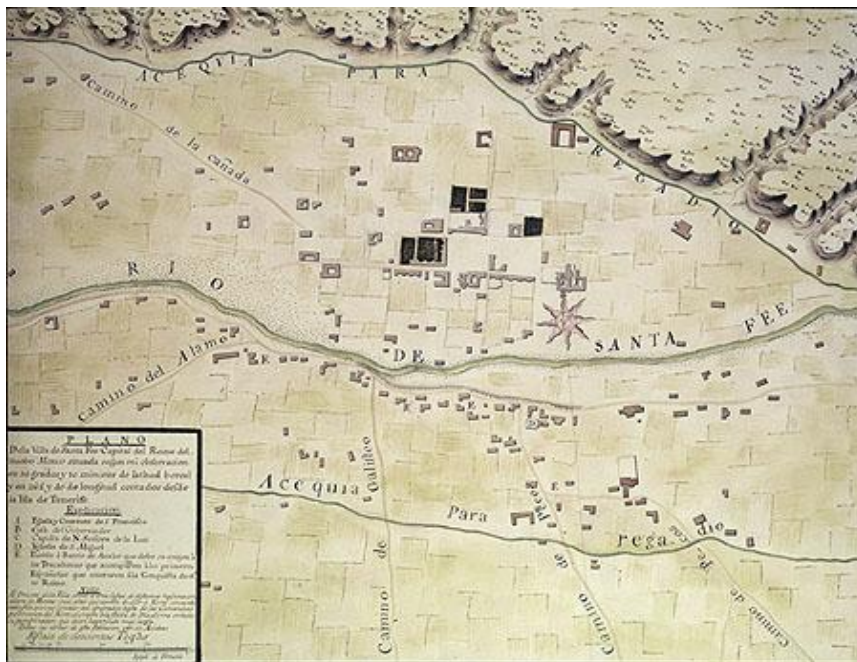


FIGURE 10: 1767 MAP OF SANTA FE

These instructions included first, a plan to establish the city at its present day location, and second, a guide as to how the city should be laid out. This guide was known as the "Laws of the Indies, City Planning Ordinances," which were established by King Philip II on July 3, 1573.⁸ The plan called for a city to be built around a main plaza. The rest of the city would then be divided into a series of blocks radiating out with all roads made to lead to the plaza.⁷ Figure 10 clearly displays the rectangular plaza located in early Santa Fe.

Santa Fe became a popular trading post with the help of El Camino Real and the Santa Fe Trail, two major roads that ended in the Santa Fe Plaza. El Camino Real was the only road into New Mexico from the southern Spanish territories.⁹ However, the Spanish severely restricted trade with outsiders.⁷ In 1821, New Mexico gained its independence from Spain. This coincided with the opening of the Santa Fe Trail. The Santa Fe Trail was the first road to connect New Mexico with the United States.⁹ This new route brought many traders straight into the heart of Santa Fe. However, it was not until Santa Fe came under American control that the city began to flourish. This, coupled with the development of the railroad, ushered in a new era of growth.

2.1 SANTA FE AND THE RAILROAD

New Mexico officially came under American control in 1848.⁷ Curious travelers began exploring the territory and settling into this new area. Between 1850 and 1880, Santa Fe experienced a population increase of 39%.⁷

During this time, the Atchison, Topeka and Santa Fe Railway Company was in the process of developing new rail lines throughout the west. The addition of Santa Fe as a stop on the railroad had immediate effects on the city, the first being increased industrialization. Construction of a rail yard and depot began immediately. A water tank, windmill, coalhouse, engine house, and other structures soon followed.⁷

The first train arrived in Santa Fe Depot on February 8, 1880 and regular service began on February 16th.⁸ The new railroad brought an influx of visitors to Santa Fe and invigorated the city's economy. Even locals could not resist the excitement happening downtown. The rail yard became a social center, blending residents with visitors. The inviting area even turned some visitors into residents.

2.2 SANTA FE COUNTY GROWTH

Santa Fe experienced its greatest amount of growth during the period following World War II. This growth was so intense that housing in the city became scarce for a time. Eventually, more housing was built to the southwest, extending away from the plaza. This created new centers of development and took some of the attention away from the plaza. The development of the automobile made this move possible. Also at this time, Santa Fe was gaining attention as a tourist attraction due to its artistic and cultural offerings. The bustling city was now seen by residents as crowded and distracting while the quiet surrounding county became more and more desirable. More residents began moving to Santa Fe County. This pattern continued into the 1980s, during which the county's population was growing at double the rate of the city.⁷

The invention of the automobile provided many opportunities for residents of Santa Fe. Once able to afford one, residents flocked to the county to avoid the city's rising house prices. The growth of Santa Fe created an attractiveness, or for some, a necessity of living outside of the city.⁷ Often, the poorest families would save up for an automobile and move outside of the city limits in order to keep their job located within the city.

Santa Fe's establishment as a cultural destination fueled the city's development. Tourists drawn to Santa Fe for its picturesque landscape found a thriving artistic and cultural center. In an effort to attract visitors, the city developed attractions such as the Santa Fe Opera, Museum of New Mexico, and multiple ski resorts. The large number of visitors led to the construction of hotels in Santa Fe's downtown area, close to where all of the action was taking place. The growth in the county area continued into the late 20th century. Figure 11 displays a GIS layer containing population growth data for Santa Fe for the years 1990-2000. As you can see, the greatest amount of growth is occurring in the most southwest portion of the map.

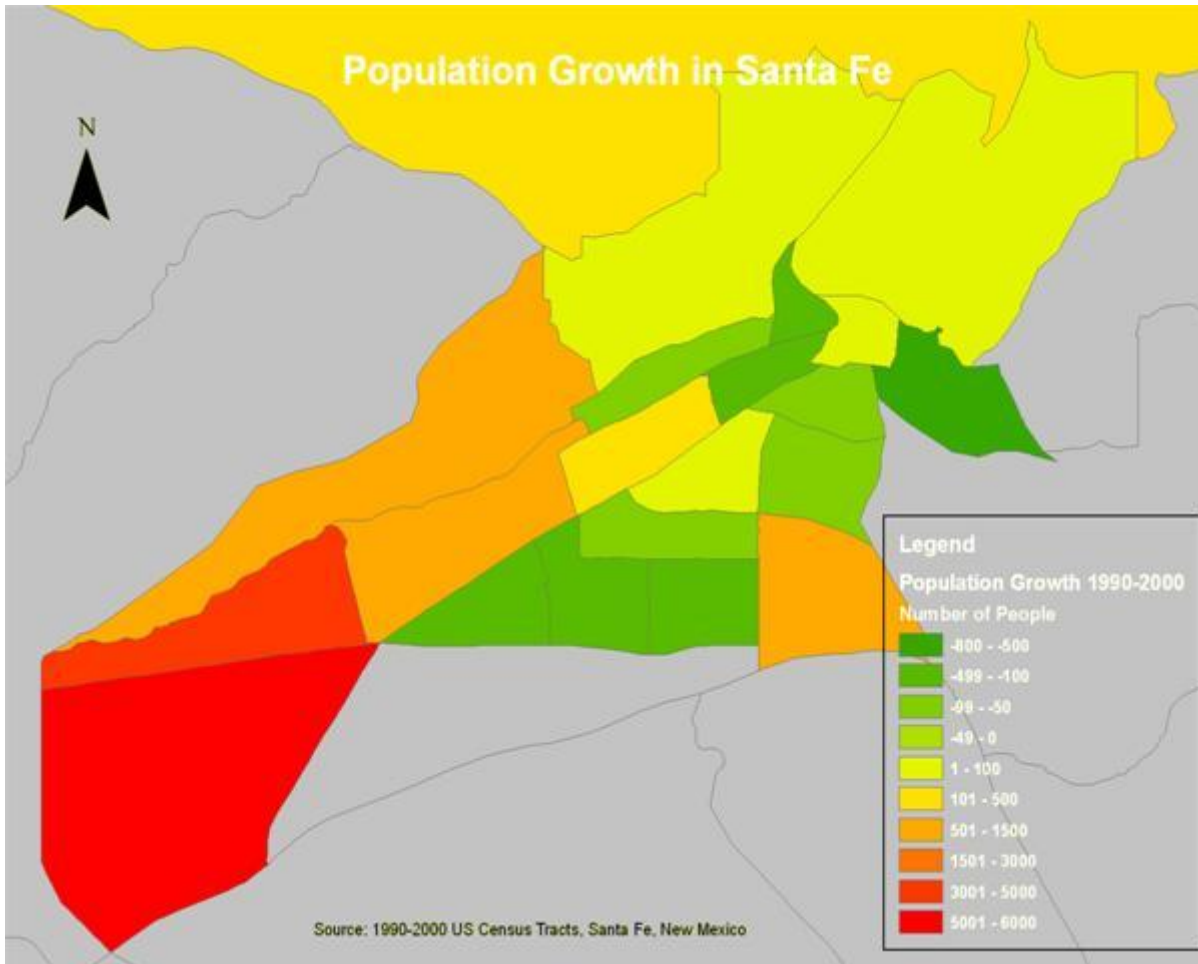


FIGURE 11: GIS MAP OF POPULATION GROWTH IN SANTA FE (1990-2000)

2.2.1 CAR USAGE

The Santa Fe Metropolitan Planning Organization has successfully organized and completed projects to improve all aspects of the current transportation system, as well as to encourage more users to use public transportation more often. However, highway congestion is still a problem due to the rising population in Santa Fe County. Recent statistics from the 2009 United States Census American Community Survey suggest that even more people are driving to work alone than in 2000.

As you can see in Figure 12, the number of people driving alone increased by almost 10,000.

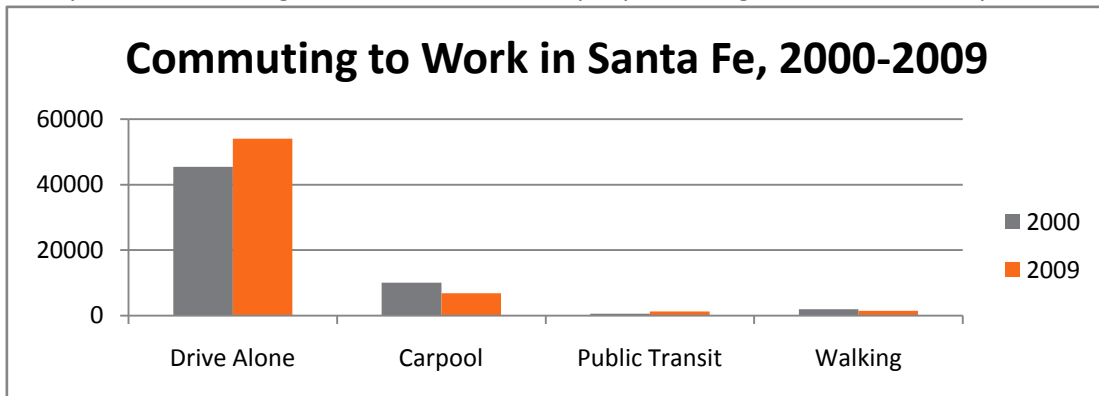


FIGURE 12: COMMUTING TO WORK IN SANTA FE

Carpooling decreased by almost half. Although public transit experienced an increase, it is obviously not growing as quickly as the use of private vehicles.⁵ There is a need to identify the reasons why public transportation is not considered by commuters so we can determine the best methods to encourage more frequent use.

In AAA's annual "Your Driving Analysis," completed in December 2010 for the year 2011, they determined that the cost of operating a car per month would be \$563. It is important to note that this figure only represents the cost of operating, not owning, a small sedan with a gas price of \$2.88/gallon.¹⁰ This cost would obviously increase if you take into account the cost of owning a car. The cost also increases with the size of the car and the rising gas prices. The current average gas price in Santa Fe is \$3.76/gallon.¹⁰



FIGURE 13: COST OF OPERATING CAR COMPARED TO PUBLIC TRANSIT

2.2.2 CONVENIENCE

Another issue that exists is that the many modes of public transportation offered in Santa Fe are not connected or integrated. Each public transportation service has its own website; however,

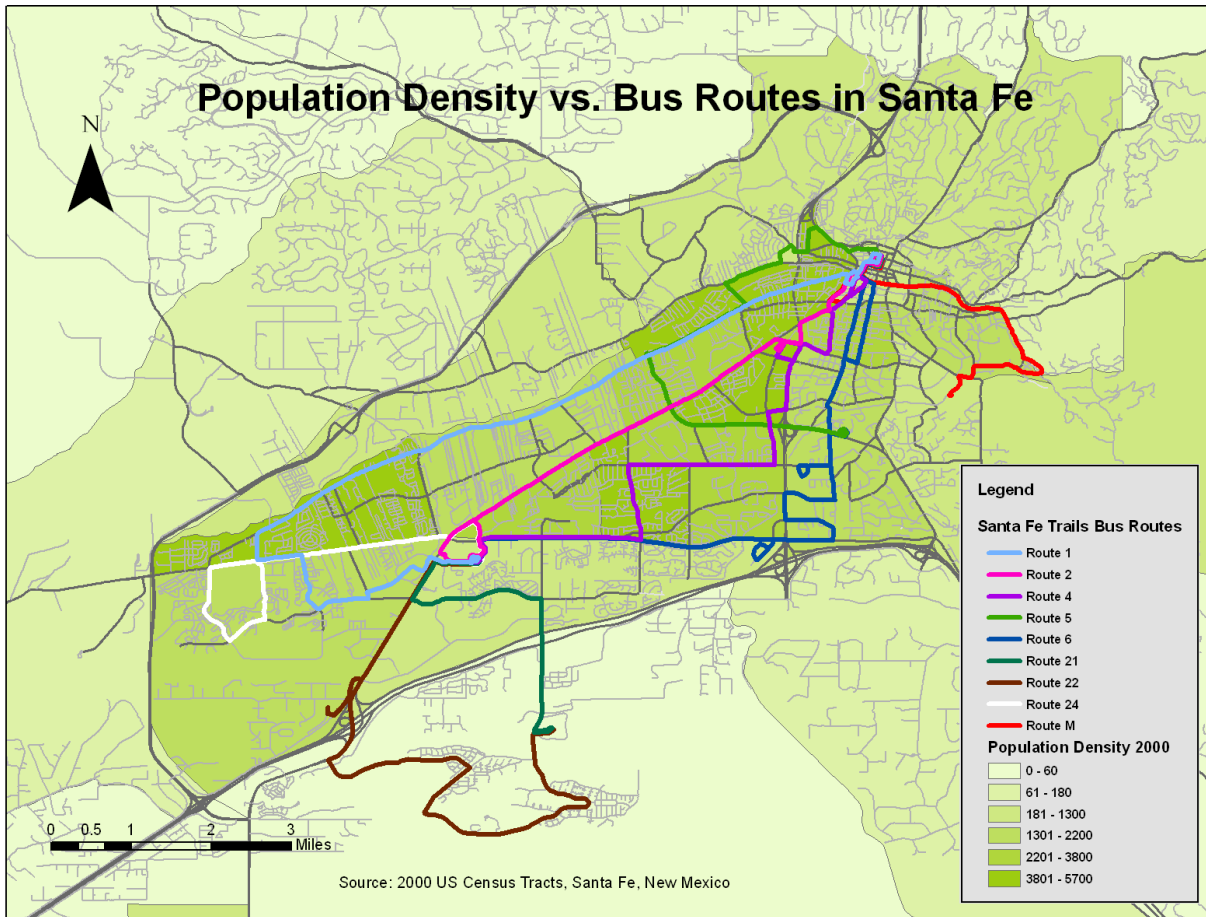


FIGURE 14: POPULATION DENSITY VS. BUS ROUTES IN SANTA FE

connecting and combining transit resources when planning a trip is difficult. Third party companies that provide directions and plan trips using public transportation such as Google, MapQuest, and Hopstop, do not cover Santa Fe's systems. The Santa Fe MPO has created "Santa Fe Connections" brochures to make travelers aware of bus and rail connections. Unfortunately, this brochure does not list all connections between each method of transportation, which a platform or program has the potential of doing. Also, a brochure does not allow for any user interaction or customization.

A lack of route convenience and information also exists. As you can see in Figure 14, the city's bus routes are shown overlaid on a population density GIS layer. There are some areas of dense population that are not served by these bus routes. This may be one of the reasons people are reluctant to begin and continue using public transportation.

2.3 EXISTING PUBLIC TRANSPORTATION IN SANTA FE

There are several systems of public transportation that operate within Santa Fe and the surrounding counties and suburbs. These transit systems are becoming more important as the economy weakens and people cannot afford to use private transportation as often. Due to the complexity and sheer scope of the existing transportation systems, we have limited our focus to the Santa Fe Trails bus service. In the following sections, we will present a brief overview of the Santa Fe Trails service, as well as other public transportation services that operate in Santa Fe. These are privately operated vanpool, carpool and taxi services, the New Mexico Park and Ride, the North Central Regional Transit District's Blue Bus, the New Mexico Rail Runner Express, the Santa Fe Pick-Up, and Santa Fe Trails. Each of these services plays a vital role in Santa Fe's public transportation system.

2.3.1 CARPOOL AND VANPOOL

Santa Fe City Ridefinders is a computerized carpool matching service. Carpooling is an arrangement in which two or more people contribute to the use and cost of a privately owned vehicle. The Ridefinders program promotes ridesharing in northern New Mexico in order to reduce air pollution, traffic congestion, and save energy resources.¹¹

The Safe Economical Commuting Alternatives (SECA) program was created in 1976 by a non-profit organization called the State Employees Commuter Association. This organization was founded by a group of commuters who needed a more affordable means of transportation to and from work. SECA provides a vanpool service through its website nmvanpools.org. The service has a total fleet of 33 15-passenger, 11-passenger, and 7-passenger vans. The service operates 11 routes during the work week. Routes are preplanned and riders must subscribe to the service in order to be considered. There are separate applications for potential drivers, vanpool coordinators, and new riders.¹¹ Some of the most popular routes have wait lists. If there is enough interest, new routes can be established by filling out an application form. SECA is currently the largest of five vanpool operators in New Mexico with over 400 registered riders.¹¹

2.3.2 CAPITAL CITY CAB, SHUTTLES, AND ZIPCARS

Capital City Cab is a 24-hour taxicab service that operates in Santa Fe. The service provides on-demand service to users that call in and request a vehicle. The service also delivers packages,



FIGURE 15: CAPITAL CITY CAB LOGO

documents, food, and beverages.¹² The fare is a base charge of \$3.00 and an additional \$3.00 for every mile traveled.

There are a few shuttles that operate throughout Santa Fe and the surrounding areas. The South Capitol Station shuttle is a convenient option for riders that arrive at South Capitol Station via the New Mexico Rail Runner or New Mexico Park and Ride services. The shuttle operates one route and stops at seven locations, including the hospital, Alta Vista, and Rodeo Park. The shuttle is free for users with a valid Rail Runner, Park and Ride, or Santa Fe Trails pass. Otherwise the fare is \$1.00.¹³

The NM 599 Station shuttle is a similar shuttle service. The shuttle service has one route that makes seven stops, including Rancho Viejo, the New Mexican Plaza, and Santa Fe Place. Fare options are the same as the South Capitol Station shuttle, free with a valid pass or \$1. Both the South Capitol and NM 599 shuttle services run only on weekdays, with the exception of a few holidays. Both of these shuttles run in conjunction with the New Mexico Rail Runner Express schedule.¹³

The Sandia Shuttle Express is a shuttle service that provides transportation between Santa Fe and the Albuquerque International Airport. The shuttle makes 30 trips every day and picks-up and drops-off at all hotels, motels, bed and breakfasts, and colleges in Santa Fe. Users can book reservations online through the Sandia Shuttle website. Fares are flat rates of either \$27 one-way or \$47 for a round-trip.¹⁴

Currently, there are no zip car services offered in Santa Fe. However, there is a zip car service in Albuquerque. Albuquerque is the only location in the state of New Mexico that has zip car services.¹⁵

2.3.3 NEW MEXICO PARK AND RIDE

The New Mexico Park and Ride is an express bus service system that operates in Santa Fe and the surrounding counties. This service is part of the New Mexico Department of Transportation’s multi-modal vision for the state.

- **Routes in Santa Fe: 4**
- **Stops in Santa Fe: 7**
- **Peak Hours: 5-9 am, 4-8 pm**
- **Fare: \$2-\$3**
- **Frequency: 6 hours**

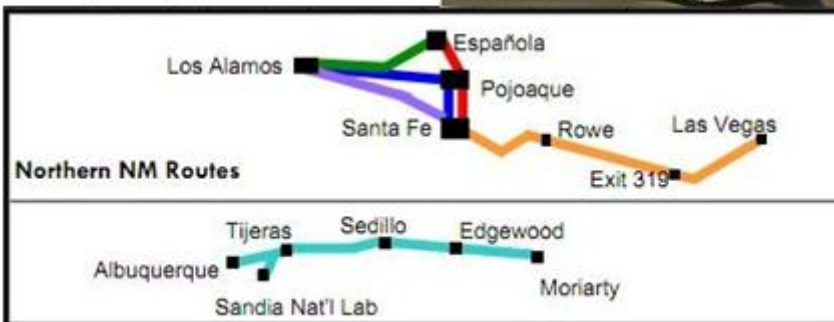


FIGURE 16: NEW MEXICO PARK AND RIDE OVERVIEW

The Park and Ride provides over 131 departures daily mainly during the morning and afternoon commute. It offers routes from Santa Fe to one of three New Mexican cities: Las Vegas, Española, or Los Alamos. It’s hours of operation are between 5 am – 8pm. The peak hours are between 5 – 9 am and 4 – 8 pm. Each route is available to the public with one-way fares of \$3.00, \$2.00, and \$3.00, respectively.¹³ There are currently seven stops

located in Santa Fe: Alta Vista, District 5, PERA, Santa Fe Lot, Sheridan/Palace, South Capitol Station, and the NM 599 Station.

The South Capitol Station is a major transfer center between the Park and Ride, the Rail Runner, and the Santa Fe Trails services. NM 599 Station is also a transfer point for the Park and Ride and the Rail Runner.¹³

2.3.4 NORTH CENTRAL REGIONAL TRANSIT DISTRICT (NCRTD) BLUE BUS

The North Central Regional Transit District, or NCRTD, was founded in 2004. The mission of the organization is to provide a “safe, secure, and effective public transportation within North Central New Mexico.” The NCRTD provides service to the four main member counties, which include Santa Fe, Rio Arriba, Los Alamos, Taos, and the five Pueblos. The NCRTD aims to provide public transportation from rural areas in the previously listed counties to centers of medicine, education, and employment. These trips are considered “critical lifetime services” and are indispensable trips.

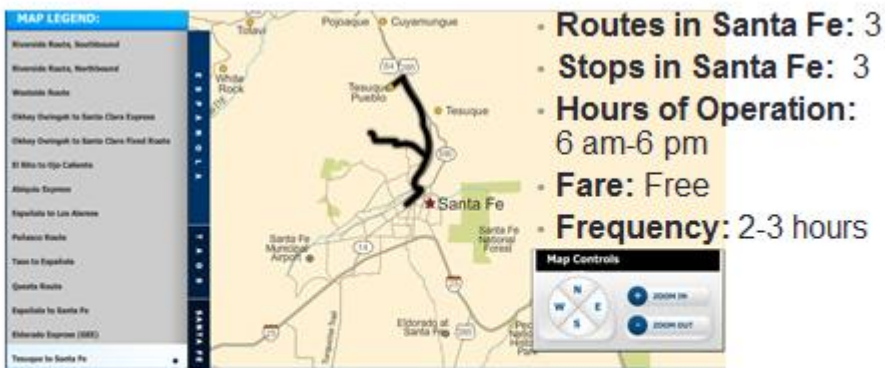


FIGURE 17: NCRTD BLUE BUS OVERVIEW

the service provided by the NCRTD is referred to as the Blue Bus. There are a total of 14 routes, and the service operates between 6:00 am and 6:00 pm and offers buses every 2-3 hours. There are three routes and three stops within the Santa Fe County area. The NM 599 Route stops at the NM 599 Rail Runner station, the Onate Military Complex, the NM Corrections Department, and the Santa Fe County Adult Detention Center. This route runs from 6:00 am until 4:30 pm. There is also the Projaque-Santa Fe Route, which runs from 7:00 am until 6:00 pm. Lastly, there is the Eldorado Route, which stops at the Downtown Transit Center, South Capitol Rail Runner station, and St. Vincent Hospital and operates from 7:56 am until 5:55 pm. More detailed schedules and maps are available on their website.¹⁵

2.3.5 NEW MEXICO RAIL RUNNER EXPRESS

The New Mexico Rail Runner is perhaps the most well-known public transit option available in Santa Fe. Inaugurated in July 2006, the Rail Runner is still a relatively new service. At first, the tracks only connected Albuquerque with the city of Belen to the south and Sandoval County to the north.¹⁶ Since then the system has expanded to include a connection between Santa Fe and Albuquerque which today makes up a very significant part of the Santa Fe transit system. The Rail Runner service caters primarily to commuters from surrounding rural communities into Santa Fe or Albuquerque.

The Rail Runner service runs from 4:00 am – 11:00 pm. However, trains mostly stop in Santa Fe between 6:00 and 9:00 am and 6:00 and 8:00 pm. Fares vary between \$3 and \$9 depending on the distance and the amount of trips you will be making. The Rail Runner offers a way to calculate fares and purchase tickets online.

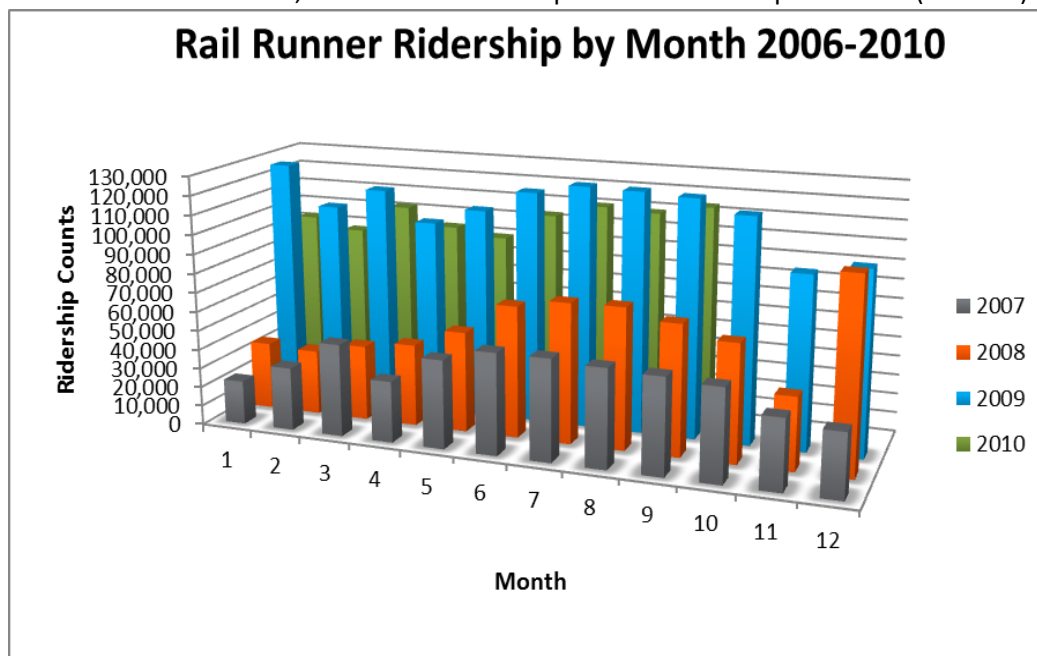
- **Fleet:** 20 cars, 5 sets of 4 cars
- **Routes:** 1
- **Stops in Santa Fe:** 3
- **Hours of Operation:** 4 am-11 pm
- **Peak Hours:** 5 am-8 am, 4 pm-6 pm
- **Fare:** \$3-\$9
- **Frequency:** 2-3 hours



FIGURE 18: NEW MEXICO RAIL RUNNER EXPRESS OVERVIEW

There are three Rail Runner stops in Santa Fe: Santa Fe Depot, South Capitol Station, and NM 599. Another stop, the Zia Station, is built but not currently in operation. During the Rail Runners peak hours, between 6:00 – 8:00 am and 4:00 – 6:00 pm, there are 5 trains, 4 sets of 5 cars in operation. There are two cars left in storage for maintenance purposes giving the Rail Runner a fleet of 22 cars. When cars are not in use they are stored at the base of operations located at the South Capitol Station in Santa Fe, adjacent to the NMDOT offices.

Mr. Tim Harris, the New Mexico Department of Transportation’s (NMDOT) Rail Manager, gave



us ridership data from the year 2006 – September 2010 for each month. Figure X is a graph showing the increase in ridership over the past 5 years.

FIGURE 19: RAIL RUNNER RIDERSHIP BY MONTH 2006-2010

2.3.6 SANTA FE PICK-UP

The Santa Fe Pick-Up shuttle service is operated and funded by the city's Parking Division. The Pick-Up shuttles passengers around the downtown Santa Fe area. This free service runs on weekdays from 6:30 am – 6:30 pm and on Saturdays from 7:30 am – 4:30 pm. There is no Sunday service. The pick-up and drop-off schedules are coordinated with the Rail Runner arrival and departure schedule.



FIGURE 20: SANTA FE PICK-UP OVERVIEW

- **Fleet:** 3 Airport Shuttles, 2 ADA Vans, 2 Passenger Vans
- **Routes:** 1
- **Stops:** 10
- **Hours of Operation:**
Weekdays: 6:30 am-6:30 pm
Saturday: 7:30 am-4:30 pm
- **Peak Hours:** Before/After Train Arrivals
- **Fare:** Free
- **Frequency:** 15-20 minutes

The entire route takes about 20 minutes to complete and makes stops at many downtown locations including the Capitol/PERA building, the Cathedral Basilica of St. Francis of Assisi, the Main Library/City Hall, the Santa Fe Community Convention Center/Santa Fe Plaza, the Eldorado/Hilton Hotels, Canyon Road, and the intersection of Alameda Boulevard and Paseo de Peralta.



FIGURE 21: SANTA FE PICK-UP ROUTE MAP
occupancy buses and smaller occupancy vans.

Each stop is marked with signs saying, "Pick It Up Here" which appears below the service's logo, a red pick-up truck. Below the logo users are informed that the next shuttle will be there to pick them up every 15 to 20 minutes.

The peak hours of operation are around lunchtime and before the Rail Runner train leaves the Santa Fe Depot station at 4:10 pm. There are a total of 5 shuttles running the same loop at any given time. The service uses 25 person

Our team rode the shuttle for 2 hours on a randomly chosen weekday to experience the service firsthand. The drivers greeted us with a smile and a friendly hello. We found out very quickly that the drivers are a wealth of information. Most of them are natives of Santa Fe and know all of the local spots: restaurants, galleries, nightclubs and sites. This is not advertised but if you tell the drivers that you would like to go to a specific stop, they will deviate from the posted route and drive directly to your desired stop location.

The majority of passengers are Rail Runner riders. We asked riders their opinions of the shuttle and the most popular words we heard were free, convenient, and friendly. Almost all riders were satisfied with the ease of use, shuttle frequency, and the friendliness of the drivers.¹⁷

2.3.7 SANTA FE TRAILS

Santa Fe Trails is the city’s bus service and has been in operation since January 1993. In 2009 alone, Santa Fe Trails made a total of 825,000 passenger trips. A “passenger trip” is defined as one passenger riding one direction only, including all transfers needed to reach a destination.

Santa Fe Trails offers 9 different routes throughout the city. Hours of operation vary among routes from 5:00 am – 10 pm. Schedules vary on weekends and some routes have no Sunday service. Each bus has an electronic sign on the front, and sometimes back, that allows riders to see which bus is assigned to which route. Fares for regular riders are \$1.00 per trip. Riders age 17 or under ride for free. Discounts are available for day or month passes. Fares may only be paid on the bus itself or at the Santa Fe Trails’ office. The system’s peak hours are from 7:00 – 9:00 am and from 4:00 – 6:00 pm. At peak hours, there are a total of 20 buses in operation. The entire fleet boasts 28 buses.

Due to limited ridership on Routes 22 and M, talk has heightened about eliminating one or all of those routes as well as Sunday service on all routes. Route M, the bus’ museum route, is the least utilized route with an average of only 27 riders per day in January 2011. According to the Figure 22, Route M makes up only 1% of Santa Fe Trails’ total service. Route 22 is in a similar state. It too only makes up 1% of the total ridership and is in danger of being eliminated.

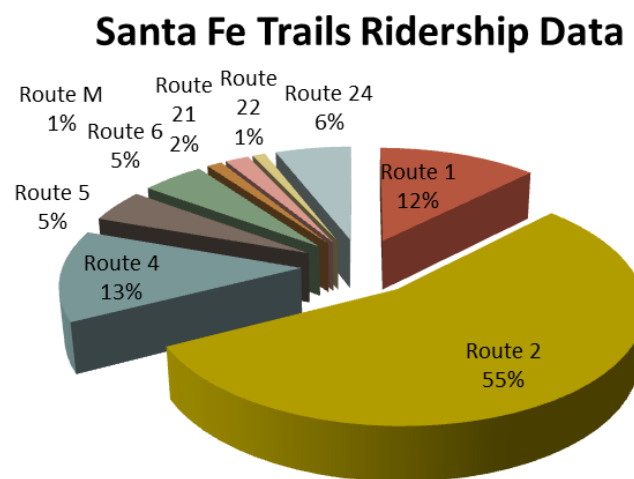


FIGURE 22: SANTA FE TRAILS RIDERSHIP DATA

- **Fleet:** 28 buses
- **Routes:** 9
- **Time Points:** 21
- **Stops:** 421
- **Hours of Operation:** 5 am – 10 pm
- **Peak Hours:** 7-9 am, 4-6 pm
- **Fare:** Free-\$1
- **Frequency:** 15-60 minutes



FIGURE 23: SANTA FE TRAILS OVERVIEW

Santa Fe Trails provides a unique customer call-in informational service. The number to call appears on all bus stop signs. All calls are directed to the Call Center located at Santa Fe Trails' main offices. From there, a staff of five operators help riders plan their trip using public transit. They reference each individual public transit schedule with service in

Santa Fe and the greater area and provide the rider with instructions on where to go, which service to use, and what time to use the service. This trip planning option can also be accessed by emailing the trip planning service on the Santa Fe Trails website. However, Mr. Jon Bulthuis, the Director of Operations at Santa Fe Trails, told us that 95% of their trip planning requests are received by phone.²

Santa Fe Trails current route schedules do not list times for all stops along the route. Each schedule lists only a handful of time points on each schedule even though there are numerous stops in between. The stops in between are considered interpolated stops. Figure 24 is a diagram to explain the difference between a time point and an interpolated stop. The small black circles were added to the figure in between time points to illustrate the interpolated stops. The time points are already public knowledge and have specific times associated with them. There are a total of 421 bus stops in operation across the 9 different routes. This number includes the time points and the interpolated stops. On average, each bus route has 5-7 time points listed on the schedule and 10-30 interpolated stops. Schedule and map brochures can be found on each bus.

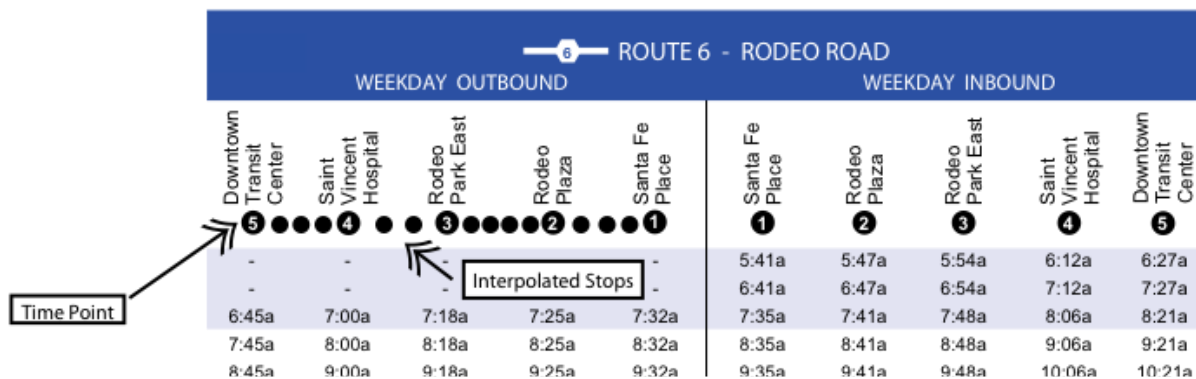


FIGURE 24: INTERPOLATED STOP EXPLANATION

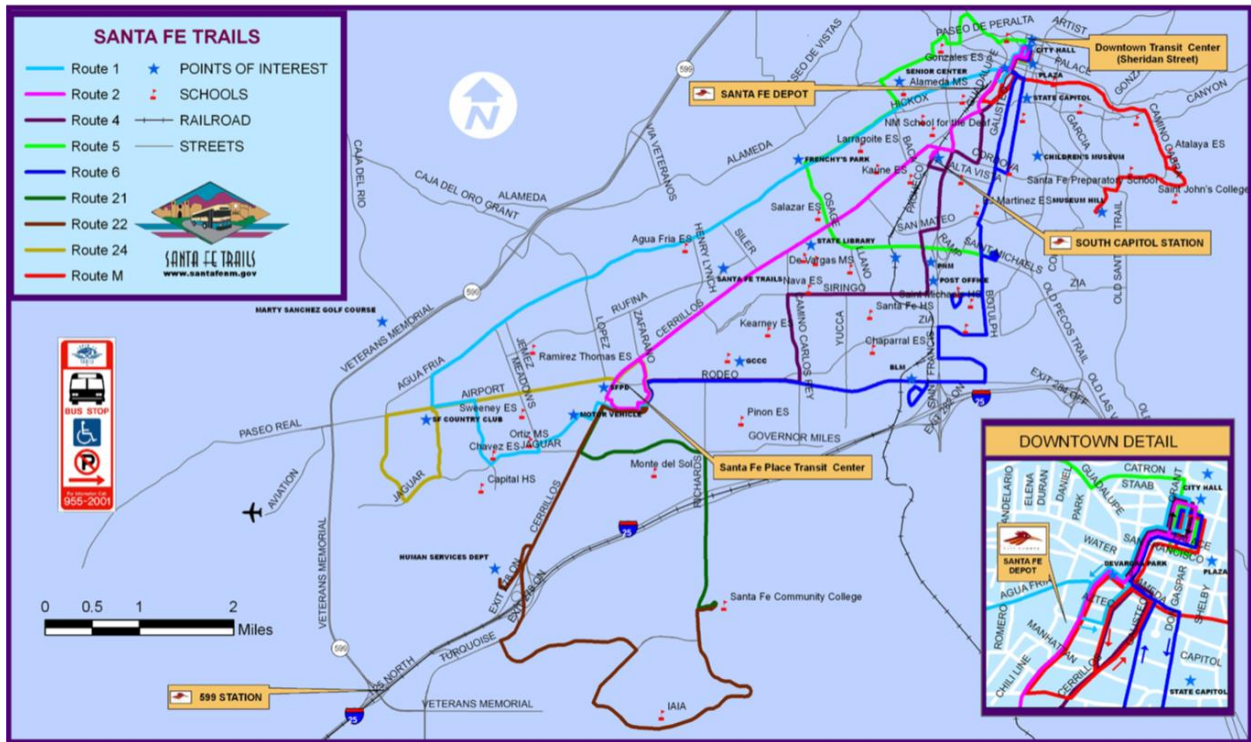


FIGURE 25: SANTA FE TRAILS ROUTE MAP

The bus stops throughout the city do not have a cohesive design. At the least, there is only a bus stop sign; at the most, there are bus benches and shelters. There are four main types of bus stops: benches with a simple bus stop sign, kiosks with cylindrical schedule signs, only a bus stop sign, and in some cases, stops do not have any marking that distinguishes them from the natural landscape. However, during the next year, Santa Fe Trails will be working with a local artist who will be designing a cohesive bus stop architecture, including furniture and signs. Also, Trails is still ardently working to make each stop ADA accessible.

Currently, there are seven time points where more than one bus route stops. An image showing these transfer points is shown in Appendix C. The time points are interspersed throughout the city. The two main transfer points are the Downtown Transit Center and the Santa Fe Place Mall. Almost every bus line stops at these points.

2.4 NEW MEXICO TRANSPORTATION AGENCIES

Public transportation in New Mexico would not exist without the establishment of governmental agencies. In New Mexico's case, there are transportation agencies at every level of government: state, county, and city. The following information about each organization has been narrowed down and each description includes only the basic functions of the organization and how each functions within the scope of our project. The individual organizations and their interactions with each other and the public transit systems are much more complicated and have a much larger scope than

what is included. Figure 26 displays all agencies that are described in this section and the level they govern and influence.

2.4.1 NEW MEXICO DEPARTMENT OF TRANSPORTATION (NMDOT)

The New Mexico Department of Transportation is a state agency. Its mission is to “plan, build, and maintain a quality state-wide transportation network which will serve the social and economic interests of our citizens in a productive, cost-effective and innovative manner.” The NMDOT promotes transit, rail, aviation and highway transportation. The department is guided by seven principles:

1. Multi-modal transportation
2. Partnership with tribal governments
3. Partnership with local governments
4. Environmental responsibility
5. Safety and security
6. Efficient use of public resources
7. Economic vitality

The NMDOT is divided into six districts. Santa Fe County is included in district 5. District 5 is “responsible for the construction and maintenance of state interstates and highways.” The NMDOT publishes a Statewide Transportation Improvement Program and a Statewide Multimodal Transportation Plan every five years. Each report includes recommendations for future projects and details about projects that are currently being funded.

The NMDOT is important to our project because they operate the Park and Ride and, through contracts and agreements with Rio Metro, they maintain and operate the Rail Runner Express.

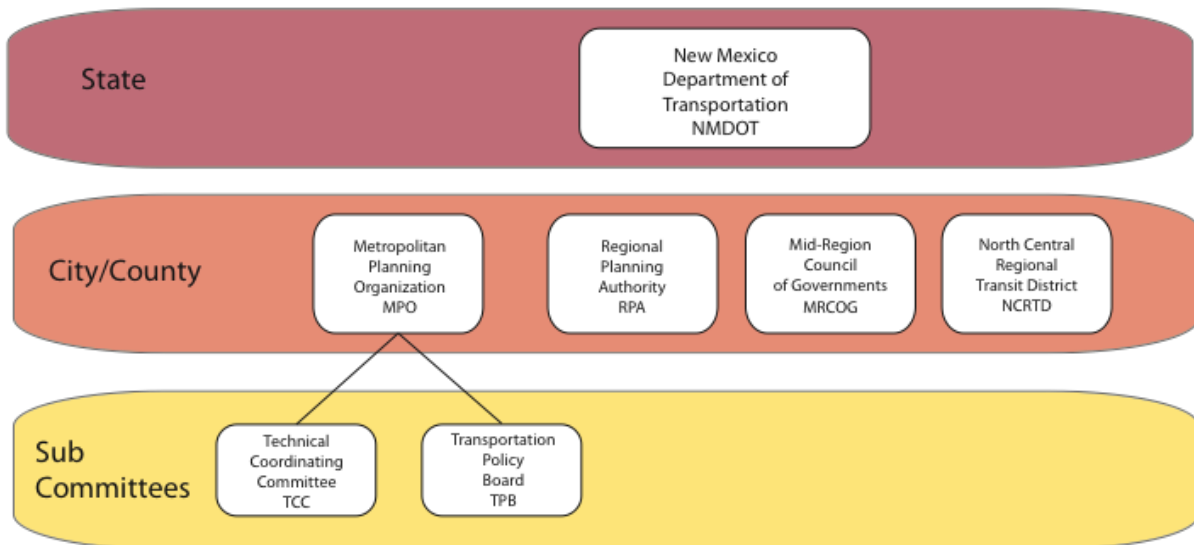


FIGURE 26: TRANSPORTATION AGENCIES

2.4.2 SANTA FE METROPOLITAN PLANNING ORGANIZATION (MPO)

The Santa Fe Metropolitan Planning Organization was our main contact throughout our project. The purpose of the MPO is to “create a forum for transportation decision making in the metropolitan planning area.” The MPO was established in 1982 by federal law when the population of Santa Fe’s metropolitan area reached 50,000. The metropolitan area encompasses the city of Santa Fe and the surrounding counties. Figure 18 is a map of the MPO’s planning area.

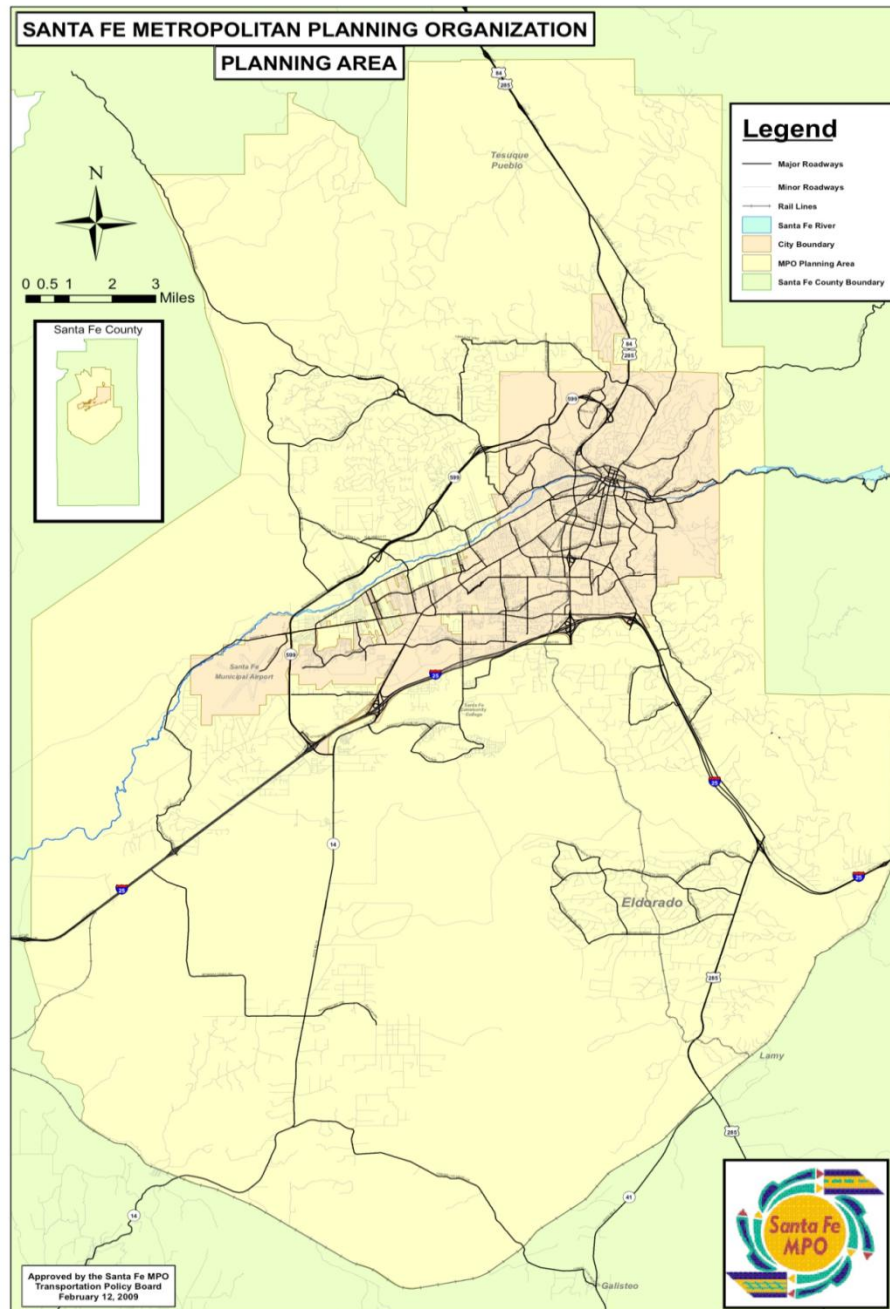


FIGURE 27: METROPOLITAN PLANNING AREA

The MPO publishes a Transportation Improvement Program annually, and a Metropolitan Transportation Plan and a Unified Planning Work Program every five years. Each report outlines future projects to be completed within the planning area in detail, including funding and a completion timeline.

The MPO is made up of the MPO Staff, a Technical Coordinating Committee, and a Transportation Policy Board. These bodies work together to put together the previously mentioned documents, approve legislation, and make decisions regarding transportation issues. The committee and board are made up of representatives from each of the districts in the planning area, which include the City of Santa Fe, Santa Fe County, Tesuque Pueblo, District 5 NMDOT, and the NCRTD.³

2.4.3 REGIONAL PLANNING AUTHORITY (RPA)

The Santa Fe City and County Regional Planning Authority is “responsible for allocating a portion of the TGRT revenues within Santa Fe and Santa Fe County.” The Transit Gross Receipts Tax (TGRT) is a tax that was passed by voters in November 2008. The money from this tax funds the New Mexico Rail Runner and all transit systems that offer connections to the rail service.³ The tax and how the funds are allocated are explained in further detail below in Section 2.5.1.

2.4.4 NORTH CENTRAL REGIONAL TRANSIT DISTRICT (NCRTD)

The NCRTD applies for and receives funds from federal, state, and local grants and contributions. The 2009-2010 proposed budget stated that the NCRTD would receive \$320,816 worth of funds from the Santa Fe City and County revenue. For more detailed information about all of the NCRTD’s services to the rest of the counties that the agency services please see the North Central Regional Transit District Service Plan 2008-2013, which is available on their website.³

2.4.5 MID-REGION COUNCIL OF GOVERNMENTS (MRCOG)

The Mid-Region Council of Governments provides metropolitan and rural transportation planning for the four-county area of Bernalillo County, Sandoval County, Tarrant County, Valencia County and the southern portion of Santa Fe County. They provide data collection for traffic monitoring, analysis of current conditions, and traffic forecasts. Their services are used by local and state agencies to develop and complete transportation projects. MRCOG releases a long-term Metropolitan Transportation Plan and a short-term Transportation Improvement Program every five years.

Most recently, MRCOG has partnered with Rio Metro to improve regional transportation. The New Mexico Rail Runner Express was the result of a partnership between MRCOG, NMDOT, and Rio Metro.³

2.5 FUNDING PUBLIC TRANSPORTATION IN SANTA FE

The current issues regarding Santa Fe’s city and county public transportation systems are various in nature and complexity. The following sections address issue regarding funding, specifically the distribution of the Transit Gross Receipts Tax.

2.5.1 TRANSIT GROSS RECEIPTS TAX

One of the main concerns when allocating funding for public transportation is how the Gross Receipt Tax (GRT) should be distributed. This tax was originally passed by voters in 2008. The distribution that was agreed upon is as follows: One eighth of the GRT is used to fund public transportation. The one eighth is then split in half. One sixteenth is used to finance the Rail Runner. The other sixteenth is given to Regional Transit Services. Not too long after this agreement was first implemented in 2009, Santa Fe County became concerned that the GRT funds were not being evenly distributed, and as a result, they withdrew from the NCRTD. The county rejoined under the condition that the one sixteenth that currently went to Regional Transit Services from the GRT would be split in this manner: 86% would go to Regional Transit Services inside of Santa Fe County and the remaining 14% would go to the NCRTD for administrative and connected services provided by them.³ Figure 28 shows the current breakdown of the GRT revenue.

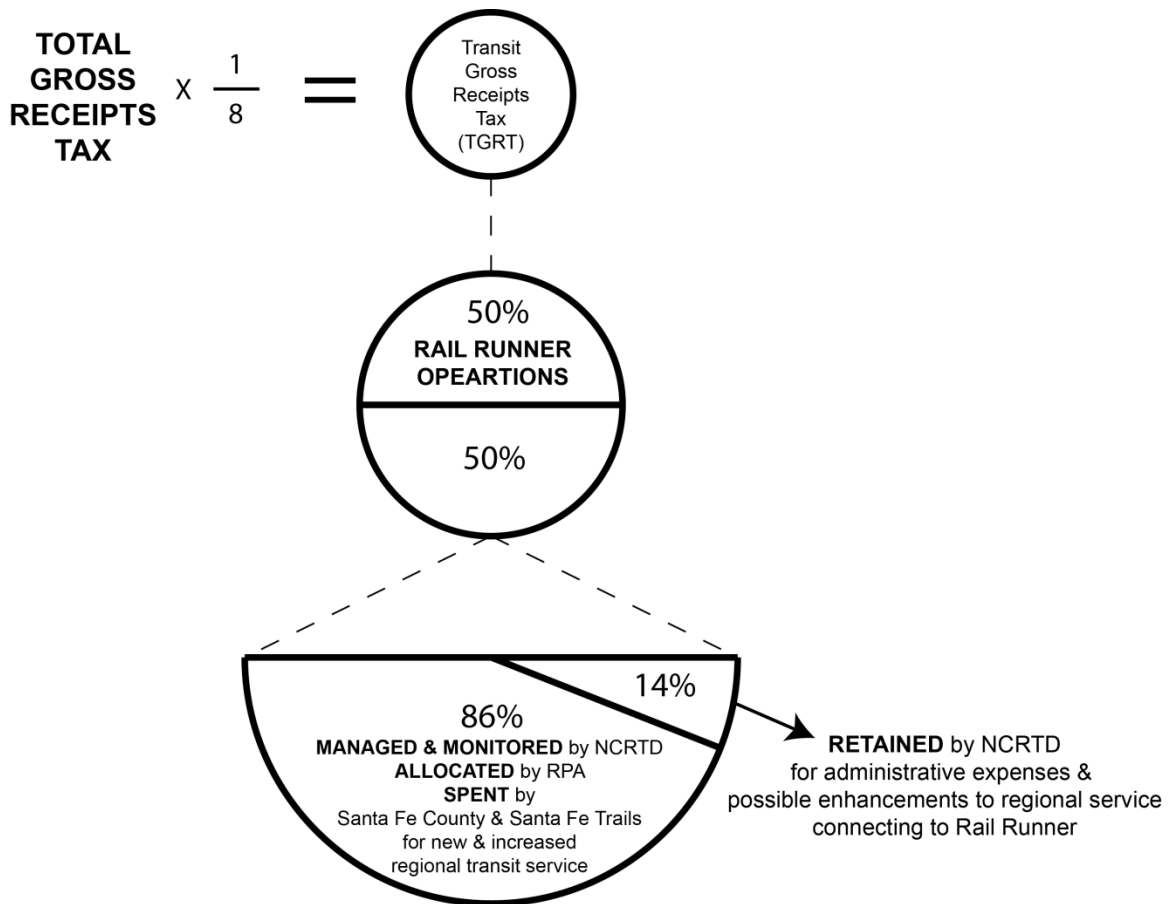


FIGURE 28: TRANSIT GROSS RECEIPTS TAX DISTRIBUTION

2.5.2 SANTA FE ANNUAL OPERATING BUDGET FIGURES

Figures 29 and 30 are charts depicting data taken from the Santa Fe Annual Operating Budget for fiscal year 2010-2011. The budget is approved by the City Council and then published and made viewable to the public. As you can see in Figure 29, in general, public transportation does not produce a net income. Instead public transportation requires subsidies from all levels of government: national,

state, county, and city. Currently, the public transportation system receives most of its funding from the City of Santa Fe and federal funding applied for by the MPO.³

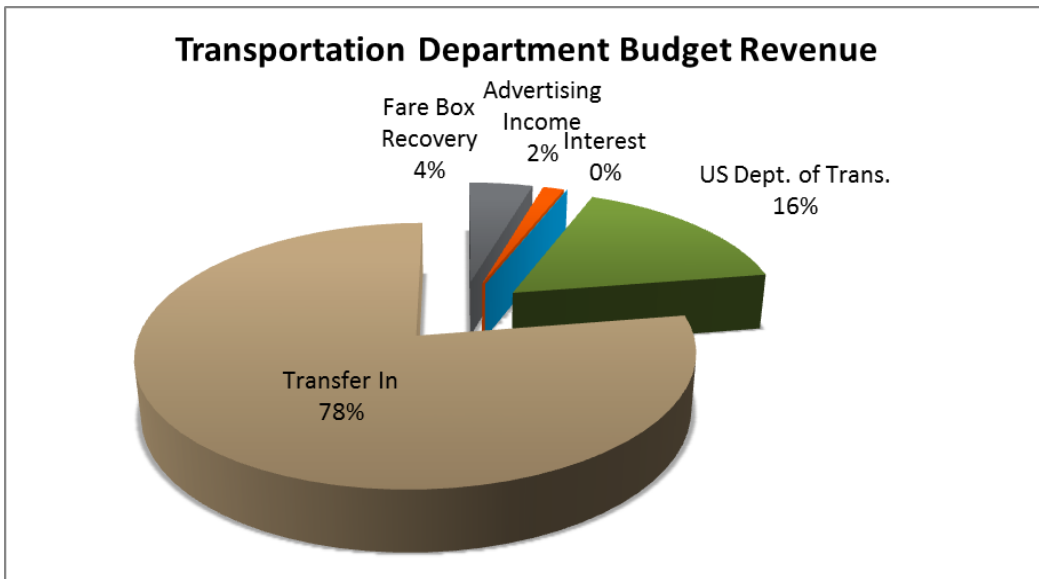


FIGURE 29: TRANSPORTATION DEPARTMENT BUDGET REVENUE

The breakdown of how this budget revenue is spent is depicted in Figure 30.

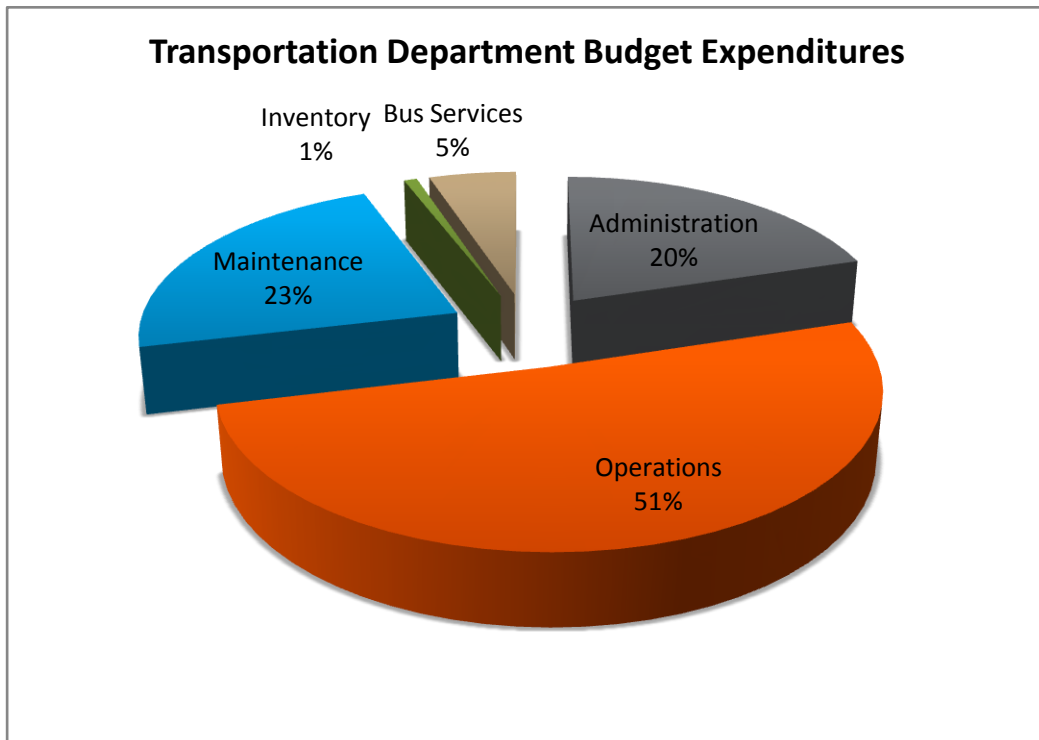


FIGURE 30: TRANSPORTATION DEPARTMENT BUDGET EXPENDITURES

3. METHODOLOGY

Our mission is to assist the Metropolitan Planning Organization of Santa Fe, NM to promote innovative mobility solutions that connect public and private transportation and encompass all parts of a trip.

The following objectives will help us to achieve this mission:

1. To collect and organize information on transportation resources in Santa Fe, NM
2. To assess bus routes and users of Santa Fe Trails
3. To improve public information of the Santa Fe Trails
4. To integrate information from chosen transportation systems

3.1 COLLECTING AND ORGANIZING INFORMATION ON TRANSIT RESOURCES

Our first objective is to collect and organize available information on private and public transportation resources that offer service Santa Fe. It was important that the information we collected helped us to develop an understanding of each system's infrastructure, as well as the resources available. The information we gathered about each system helped us determine which systems would benefit the most from being part of an integrated trip planning system.

The first step in completing this objective was to compile useful information on existing public and private transportation services. This included:

- Hours of operation
- Frequency of service
- Locations of routes and stops
- Fares
- Ridership statistics
- Resources of the system (number of vans/cars, drivers/operators, etc.)
- Peak hours and the resources used at those times

Although we collected much of this prior to arriving on site, we knew that information such as ridership statistics, resources, and peak hours would not be available until meeting with the coordinators of each system. The collection of this information ultimately occurred through interviews and email correspondence and our findings are described in detail in our background. The information that was collected via interviews is generally of a qualitative nature, rather than representing definitive quantitative data therefore the information is included in our background and not our methodology.

After assembling this information, we had to choose which transit systems to

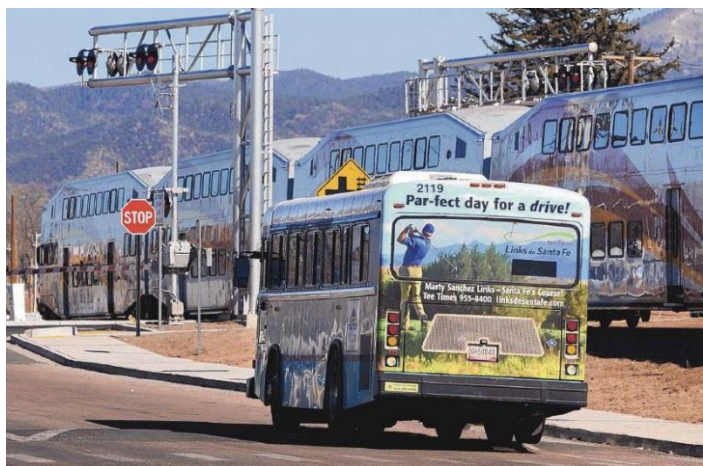


FIGURE 31: PUBLIC TRANSPORTATION IN SANTA FE

focus on improving and whose information is ultimately include in our trip planner application. We chose the services that best exemplified the following criteria:

- Amount of coverage within Santa Fe city and county
- Number of connections to other public transportation services within Santa Fe city and county

These criteria helped us to select services that serve the larger portion of the city and have the greatest possibility of coordinating with other existing services. These factors benefit the development of our public transit trip planner application for Santa Fe, which is described in detail under Objective 4.

Also, based on the information we collected, we chose to focus our next two objectives on assessing and making improvements to the Santa Fe Trails bus system. We chose Santa Fe Trails because it is the primary public transportations service provider for the city and its services cover the greatest area of the city.

3.2 ASSESSING BUS ROUTES AND USERS OF SANTA FE TRAILS

Our second objective is to assess the bus routes and users of Santa Fe Trails. We conducted a survey and performed ridership counts, on Routes 2 – Cerrillos Road, 4 – Southside, and 6 – Rodeo Road. The ridership counts were ultimately used in performing a bus route analysis for Route 6. By noting the underutilized stops and the distance between stops we determined bus stops that could potentially be eliminated to save time and money for Santa Fe Trails.

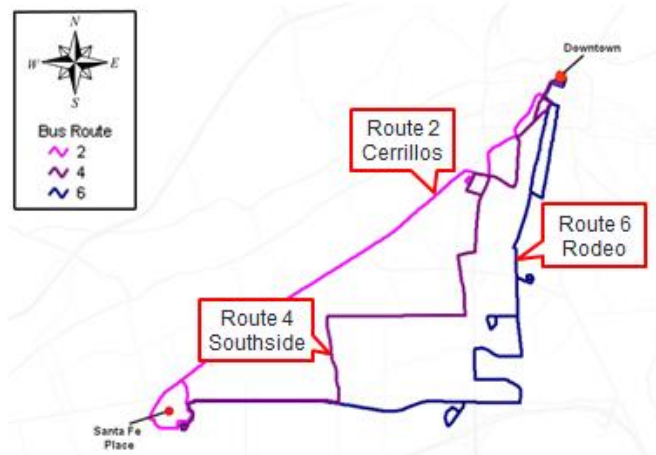


FIGURE 32: BUS ROUTE FOCUS

3.2.1 SANTA FE TRAILS SURVEY

Our survey for Santa Fe Trails was designed to provide several kinds of information. The first is general bus usage information such as reasons for using the bus, time of day and routes used, and frequency of use. The next questions address bus stop visibility, interest in a Santa Fe transit specific Smartphone application, and knowledge of connections to other public transportation systems. The next section inquires about riders' origins and destinations. It includes multiple choice and write-in response methods. These questions will determine whether there is a pattern in trips taken along respective routes. The next section asks questions regarding customer satisfaction with specific aspects of the bus system. The final question asks whether the rider is a Santa Fe permanent resident, temporary resident, or visitor. Space is left for additional comment and suggestions. A copy of our complete survey is located in Appendix A and B.

We spent one half day on each route distributing and collecting surveys. We printed 200 surveys in English and 50 in Spanish. We purchased clipboards and pens for riders to fill out surveys with. We also accommodated riders with disabilities by verbally distributing surveys when necessary.

3.2.2 SANTA FE TRAILS RIDERSHIP COUNTS

While we were collecting surveys on Santa Fe Trails, we also collected ridership data at each inbound and outbound stop. We noted which stop the riders got on or off at and whether the riders boarding or leaving were regular, senior, or youth riders. This data provided information regarding the most popular stops and which stops could be eliminated to save time on the route.

3.2.3 SANTA FE TRAILS BUS STOP ANALYSIS

After collecting bus stop information from the Santa Fe Trails surveys and ridership counts, we completed a bus stop analysis for Route 6 – Rodeo Road. This analysis focuses on which bus stops could potentially be eliminated to save time and money Route 6, and possibly increase service intervals. While performing background research, we learned of an on-demand service that Santa Fe Trails implemented in the past. Buses previously had shorter routes and only deviated when customers called in to request a bus at their local stop. Depending on the amount of time and money saved per route segment, we can suggest re-implementing this service.

To perform the bus stop analysis, we took into consideration the bus stops that were underused and the distances between each stop. The Transportation Research Board recommends the distance between each stop to be 800-1000 feet, or .15-.19 miles.¹⁸ On Route 6, there are a number of stops that fall below this spacing limit. While keeping these aspects in mind, we also made sure to keep a reasonable distance between each of the bus stops.

3.3 IMPROVING PUBLIC INFORMATION OF SANTA FE TRAILS

Our third objective is to improve public information of Santa Fe Trails. We first analyzed the quality of materials, i.e. schedules and route maps, currently available to the public. Any errors that we thought might cause confusion for current or potential riders, we worked to correct and make them more user-friendly. For Santa Fe Trails, we endeavored to design a new schedule and map.

3.3.1 IMPROVING SANTA FE TRAILS SCHEDULE

Santa Fe Trails' current schedule provides exact times for only the time points for each route. By providing the public with a map of all the bus stops, we must also provide them with an expected pick up or drop off time for each location. By using the existing time point times and distances between each stop, we will be able to calculate times for when a bus will be expected to arrive at each bus stop.

3.3.2 IMPROVING SANTA FE TRAILS MAP

Santa Fe Trails' current individual and entire route maps, in print and digital form, do not include all bus stops along each route. The maps only identify major time points that were previously determined by Santa Fe Trails. Also, many roads are eliminated or not clearly labeled on the route maps. This is confusing to tourists and visitors unfamiliar with Santa Fe who may want to take advantage of the city's bus system.

To eliminate this confusion, we attempted to design an improved bus route map. Using GIS layers, we are able to create individual route maps over actual street maps that include the exact GPS

locations of the bus stops for each inbound and outbound routes. We believe that these maps are more user-friendly and the public knowledge of these bus stops could increase ridership on all routes.

3.4 INTEGRATING INFORMATION FROM CHOSEN TRANSPORTATION SYSTEMS

A public transportation information platform that provides routes, stops, stations, and schedules in a user-friendly format was designed and created. This information was first provided in an online interactive map with individual map layers. These layers included each of the routes and stops, as well as their schedules. Also, a public transportation trip planning function was provided, where step-by-step directions are given using only public transportation.

3.4.1 CHOOSING A PLATFORM

When choosing the platform on which these maps and trip planning features would be created, a few online platforms were analyzed including HopStop, Mapquest, and Google Transit. Ultimately, Google Transit was chosen for its ability to constantly add updates and improvements and flexibility in customization maps.

3.4.2 ONLINE INTERACTIVE MAP

Google Maps Javascript API was used to create the interactive map. In order to overlay information on the map, KML layers that contained information for each bus, shuttle, and train were created. The information needed to create these layers included exact route directions and GPS (Global Positioning System) coordinates of each stop and station. These were acquired from the City's GIS (Geographic Information System) department. The route files were in ESRI shape file format, and were converted to KML files using GISCloud. The GPS coordinates of the stops were tabulated in Microsoft Excel and uploaded to Google Fusion tables, which then produced the coordinates in a KML layer. Fusion Tables also provided a preview of how the coordinates appeared on a map and allowed additional information for each coordinate to be displayed in a "balloon" (Figure 33) when it is selected with the cursor.

This information balloon can be configured and customized further.

The bus, train, or shuttle stop's identification and schedules were included inside of each information balloon. The stop coordinates

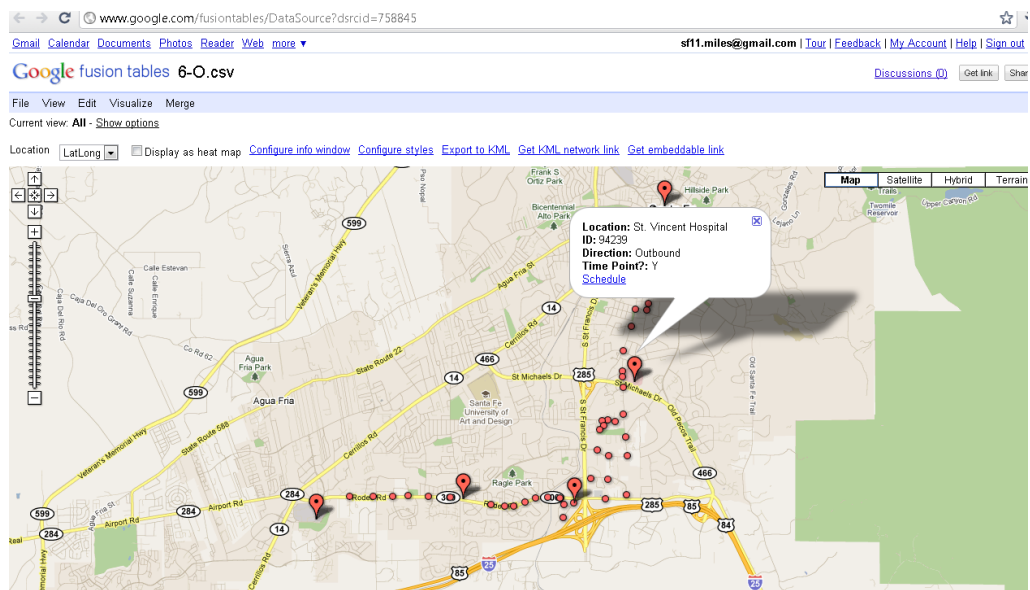


FIGURE 33: EDITING INFORMATION BALLOONS IN GOOGLE FUSION TABLES

were included in Fusion tables and referenced when a particular stop was selected.

A separate table was created to hold the schedule information. For Santa Fe Trails, the interpolated stop times were estimated using Excel spreadsheet. This spreadsheet was then uploaded to Fusion Tables. For each information bubble on the interactive map, the schedule and stop identification number information is referenced using Fusion Table's query system.

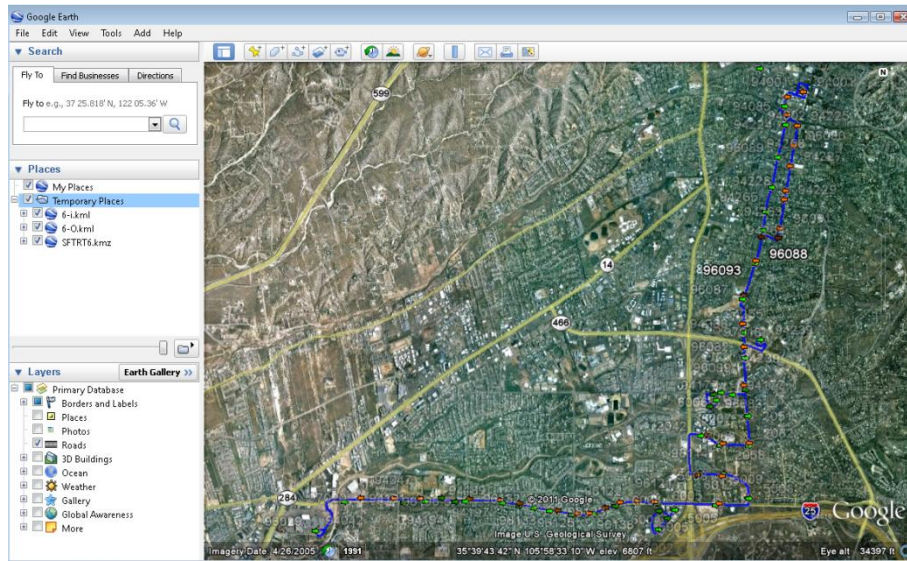


FIGURE 34: EDITING AND COMPILING KML LAYERS IN GOOGLE EARTH

The routes and their respective stops were then organized in Google Earth, where their colors and icons were manipulated and set and then published into one final KML layer (one per route). These layers were then set on top of a Google Maps API map embedded in a webpage.

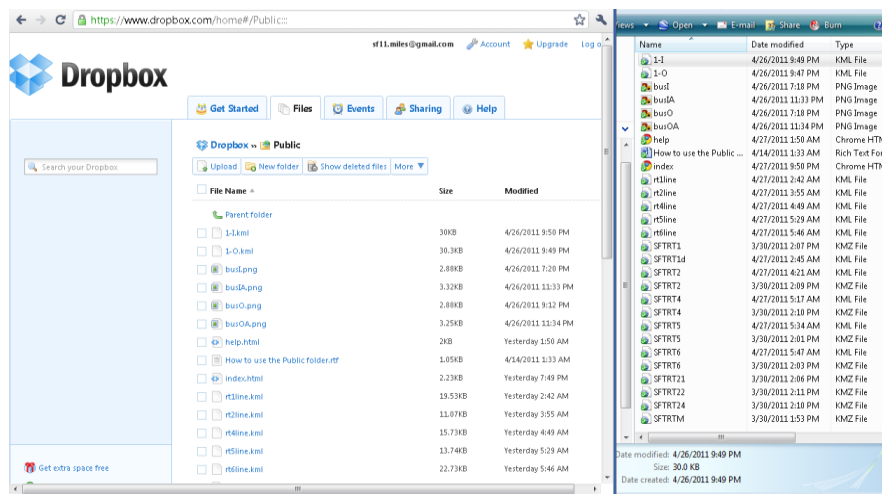


FIGURE 35: DROPBOX'S PUBLIC FILE ACCESS

All of the layers, as well as the HTML web page where the API map is embedded were saved in a Dropbox, a program and web upload feature that allows public access to files saved into a specific folder

on a personal or workspace computer. This folder is continuously updated online, allowing for changes to be reflected instantly in the contents of the embedded map or webpage.

The KML layers are then overlaid onto the embedded maps using Java Script.

3.4.2 TRIP PLANNING

To create the trip planning function, the spreadsheets for the database, or “feeds,” for Google Transit had to be created. Information required for these feeds included agency, route, stop, and schedule information. Santa Fe Trails is the largest system with the most information available and was chosen as the main focus for the Google Transit Feeds.

All of the routes, stops, and schedules were obtained from the City’s GIS department, as well as Santa Fe Trails management. However, all of the information was not in the format that the Google Transit feeds require. The stop information was converted from ESRI shape files to a spreadsheet of coordinates. Next, each stop’s coordinates were identified by its location and unique stop identification number. Using Excel, a final spreadsheet was created for each feed. Finally, these feeds must be submitted to Google Transit to be approved. After that a private preview would be available for final testing before it is released to the public.

4. RESULTS & ANALYSIS

The following data and subsequent results were collected between March 21st and April 22nd in Santa Fe, NM. The last two weeks were dedicated to analysis.

4.1 PUBLIC TRANSPORTATION RESOURCES IN SANTA FE

Our first objective involved compiling information on the public transportation systems that offer service in Santa Fe. While in Santa Fe, the team met with administrators and other employees of Santa Fe Trails, Santa Fe Pick-Up, Santa Fe Ride, New Mexico Rail Runner and New Mexico Park and Ride. These interviews were very helpful in obtaining detailed information on the administration, the budget, ridership and operations that could not be found in published literature. We decided as a team that we would focus on a few public transportation systems that we believed would benefit the most from our limited time. This new focus would allow us to create a progressive relationship with each chosen service allowing us to give them an in-depth results and analysis specifically catered to their needs.

We decided to focus mainly on Santa Fe Trails. We designated this service as our focus because it is the city's primary transportation system and because it serves a greater area of the city.

					
Fleet			20 cars, 5 sets of 4	3 airport shuttles/2 ADA vans/2 Passenger Vans	28 buses
Routes in Santa Fe	4	3	1	1	9
Stops in Santa Fe	7	3	3	10	421
Hours of Operation	5 AM - 8 PM	6 AM - 6 PM	4 AM - 11 PM	Weekdays: 6:30 AM - 6:30 PM, Saturday: 7:30 AM - 4:30 PM	5 AM - 10 PM
Peak Hours	5-9 AM, 4-8 PM	6-9 AM, 4-6 PM	5 - 8 AM, 4 - 6 PM	Before/After train arrivals	7-9 AM, 4-6 PM
Fare	\$2-\$3	Free	\$3 - \$9	Free	Free - \$1
Frequency	6 hrs	2-3 hrs	2 - 3 hrs	15 - 20 mins	15 - 60 mins

FIGURE 36: PRIMARY PUBLIC TRANSIT OVERVIEW

The team compiled information on both public and private transportation in the city of Santa Fe. This information is all included in our background, with details about each system of public transportation as well as details about private transportation programs. For public transportation, this includes the New Mexico Rail Runner Express, Santa Fe Trails, Santa Fe Pick-Up, New Mexico Park and Ride, and North Central Regional Transit District (NCRTD), South Capitol Station Shuttle, New Mexico 599 Station Shuttle, and Sandia Shuttle Express. Figure 36 provides a general overview of the information we collected from the five major transportation systems. For private transportation, we have information on Capital City Cab and carpooling programs currently established in the Santa Fe area. As stated already in our methodology, we have collected several types of information on these existing transportation services, including resources of each system, ridership statistics, and frequency

of service. The specific details of these organizations were included in the background and not the results section of this report because they are important background information for the reader.

4.2 ANALYSIS OF BUS ROUTES AND USERS

By conducting our survey on Santa Fe Trails, we were hoping to gain an understanding as to exactly why people choose to use the bus. We also wanted to find out where they were coming from, where they were going to, and how they ultimately got to and from those places when they were not actually riding the bus. The ridership counts that were collected offered insight into the commonly used stops and the stops that were not used at all. Finally, the bus stop analysis gives Santa Fe Trails an option to increase service frequency and save money in the long run as they will no longer have to pay to upkeep the stops suggested for elimination.

4.2.1 SANTA FE TRAILS SURVEY

Our survey of Santa Fe Trails provided much insight into why current riders use the bus system. Below are the results and analysis for all of our survey questions.

BUS USAGE

- **Why do you use the bus?**

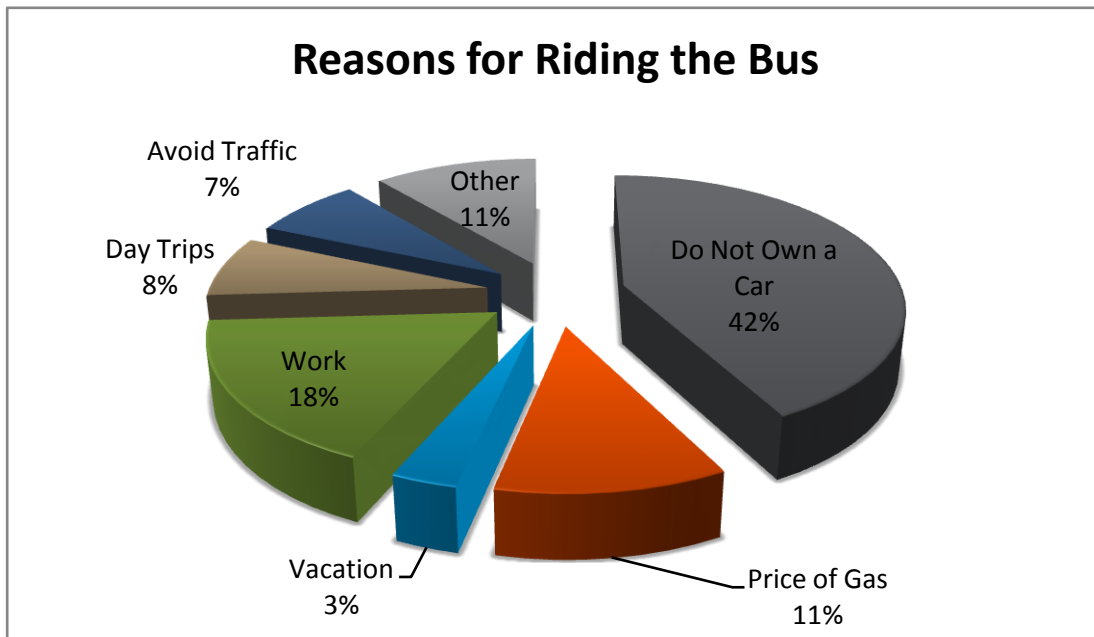


FIGURE 37: REASONS FOR RIDING THE BUS

We found that the majority of bus riders do not own a car and rely on Santa Fe Trails to be their primary mode of transportation.

- **What times do you usually use the bus?**

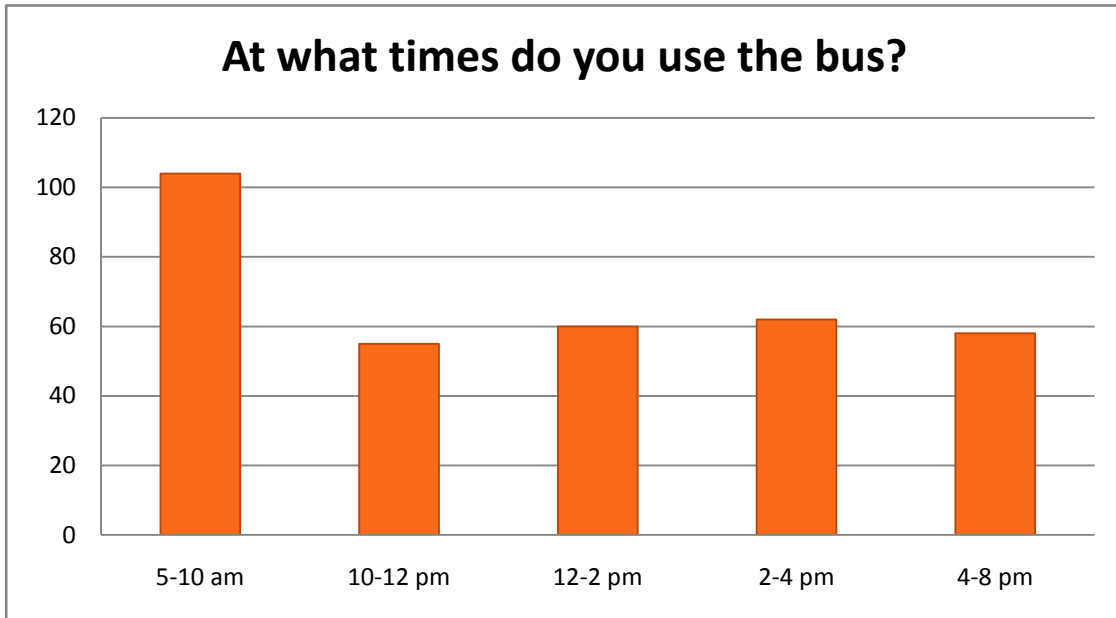


FIGURE 38: AT WHAT TIMES DO YOU USE THE BUS?

When asked during what time of day they typically use the bus, riders overwhelmingly said during the morning hours. The only problem with these results is that all of our surveys were conducted from the early morning until the mid-afternoon. We cannot be sure that this answer would stay the same if we had conducted surveys throughout the entire day.

- **Which bus routes do you take on a regular basis?**

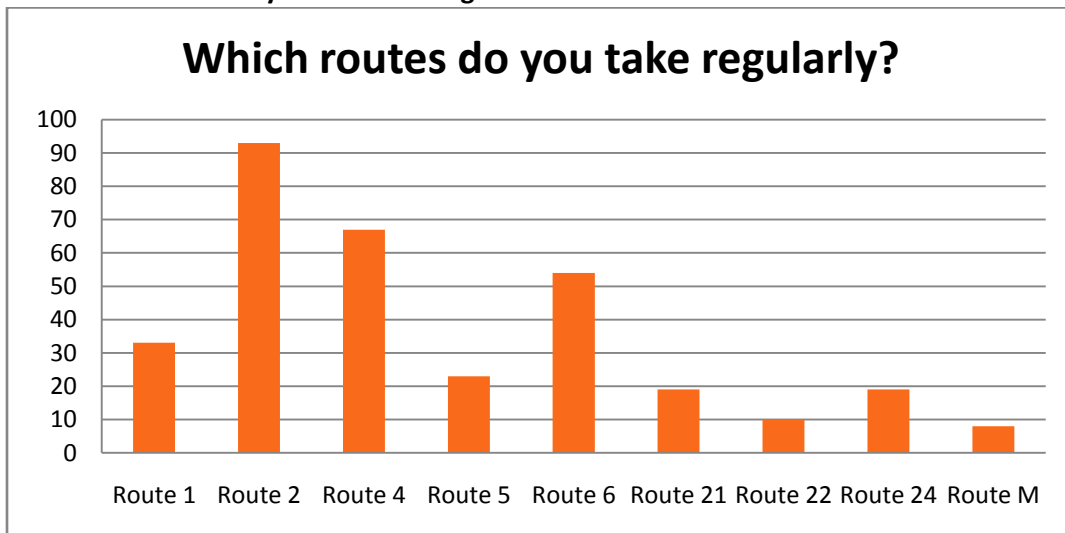


FIGURE 39: WHICH ROUTES DO YOU TAKE REGULARLY?

Even though we only surveyed 3 out of 9 routes, the results we received were very similar to route ridership counts we had been given by Santa Fe Trails.

- How many days per week do you use the bus?

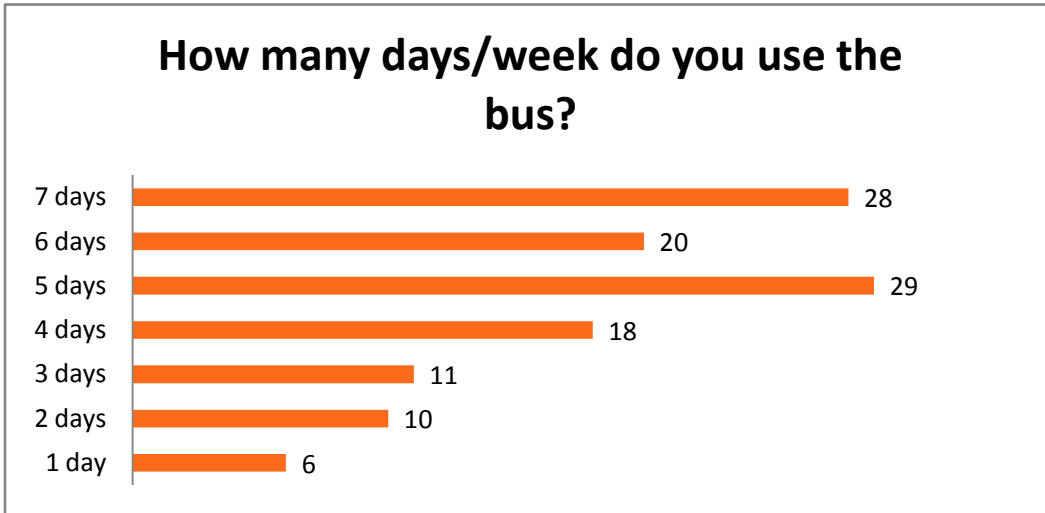


FIGURE 40: HOW MANY DAYS/WEEK DO YOU USE THE BUS?

Most riders answered 5 to 7 days a week. This reinforces the idea that many people are dependent on the bus, not only for work but for other weekend activities as well.

BUS STOP VISIBILITY

- Are the stops where you get on and off well marked?

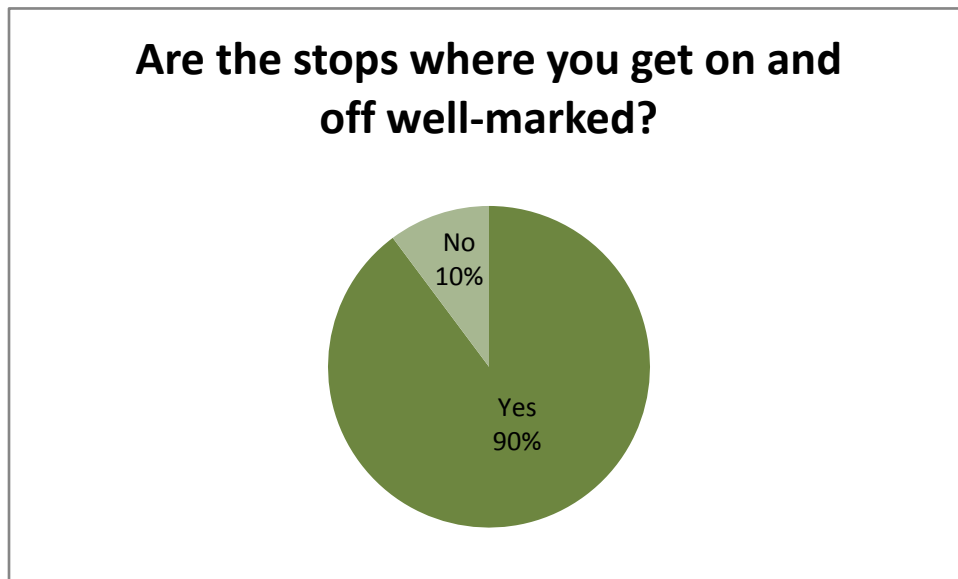


FIGURE 41: ARE THE STOPS WHERE YOU GET ON AND OFF WELL-MARKED?

- Do you sometimes have trouble finding the bus stops?

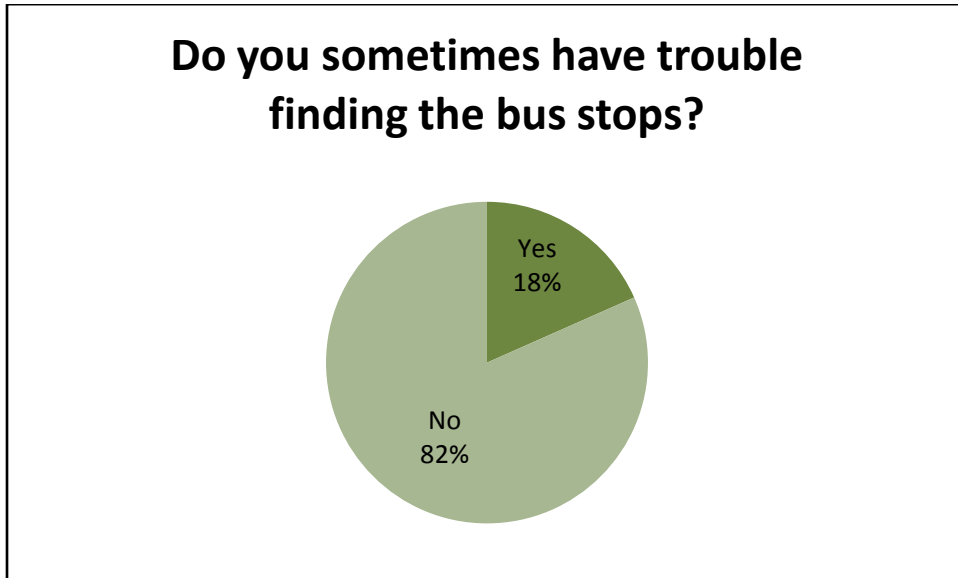


FIGURE 42: DO YOU SOMETIMES HAVE TROUBLE FINDING THE BUS STOPS?

While most riders believed that the stops were well marked and they did not have trouble locating bus stops, we did receive a few comments that stated bus stop signs should be double-sized and schedules and route maps should be displayed at every bus stop. The responses we received to these questions are flawed though because we did not target irregular bus riders who may have had trouble locating bus stops.

SMARTPHONE APPLICATION

- Do you own a smart phone?

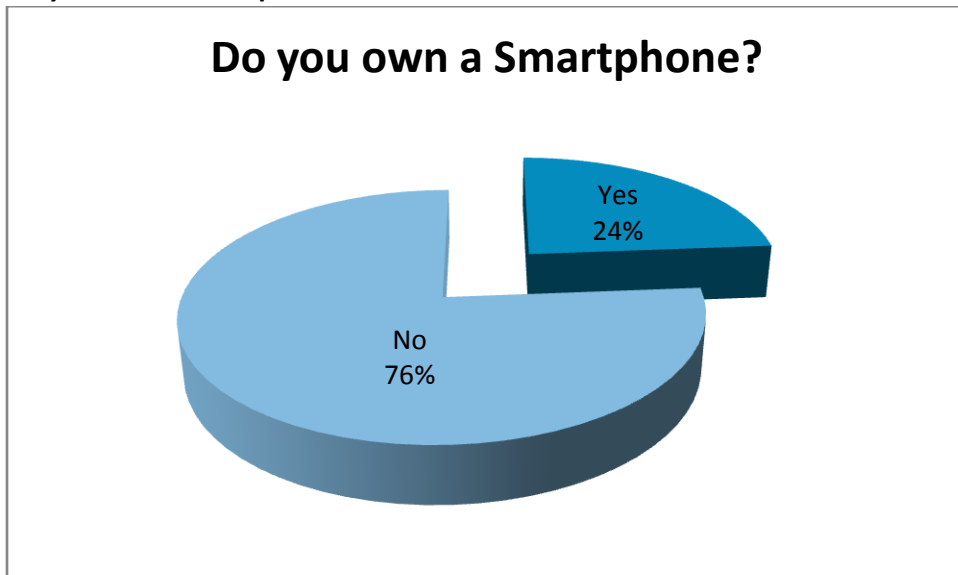


FIGURE 43: DO YOU OWN A SMARTPHONE?

- If 'Yes', would you use a smart phone 'Santa Fe Public Transit' application?

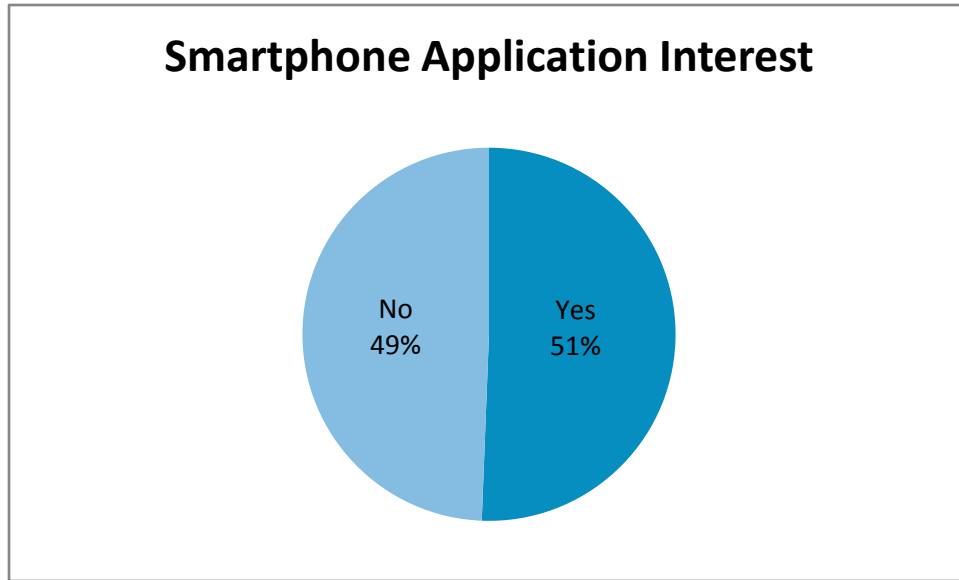


FIGURE 44: SMARTPHONE APPLICATION INTEREST

When asked whether or not they owned a Smartphone, over $\frac{3}{4}$ of the respondents replied "No." When asked if they would be interested in a Smartphone application, the responses were split almost half between "Yes" and "No." After seeing these responses, we decided that the city is not ready for a Santa Fe specific Smartphone application and we should focus on improving transit by other means.

CONNECTIONS

- Are you aware of the connections to the Rail Runner, Santa Fe Pick-Up, or Blue Bus?

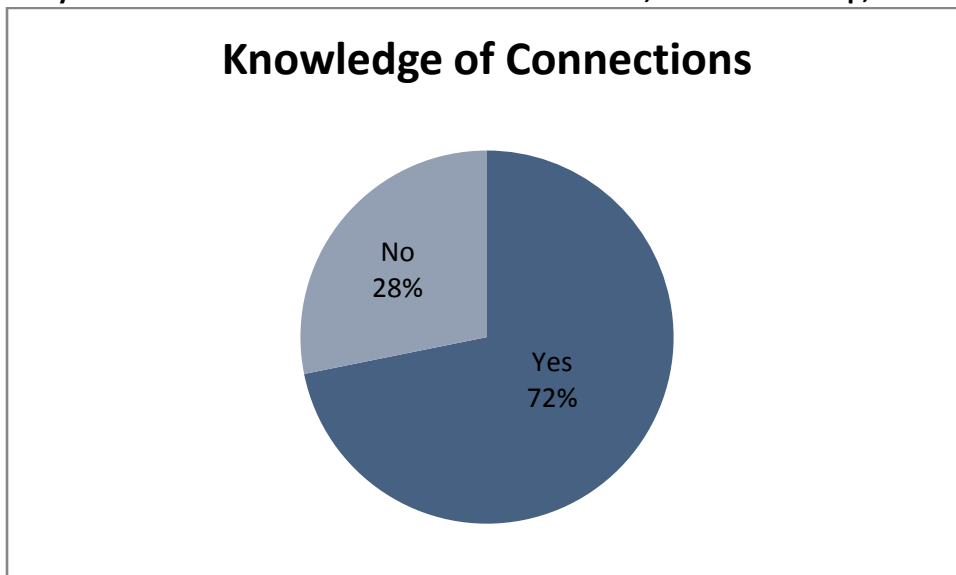


FIGURE 45: KNOWLEDGE OF CONNECTIONS

This question asked riders about their knowledge of Santa Fe Trails' connections to other transportation systems such as the Rail Runner Express, Santa Fe Pick-Up, and the NCRTD Blue Bus. Almost ¾ of respondents answered "Yes." However, rather than using our question to only confirm knowledge of the other transportation system connections, we could have also asked if they use them and how often.

- **Where are you coming FROM?**

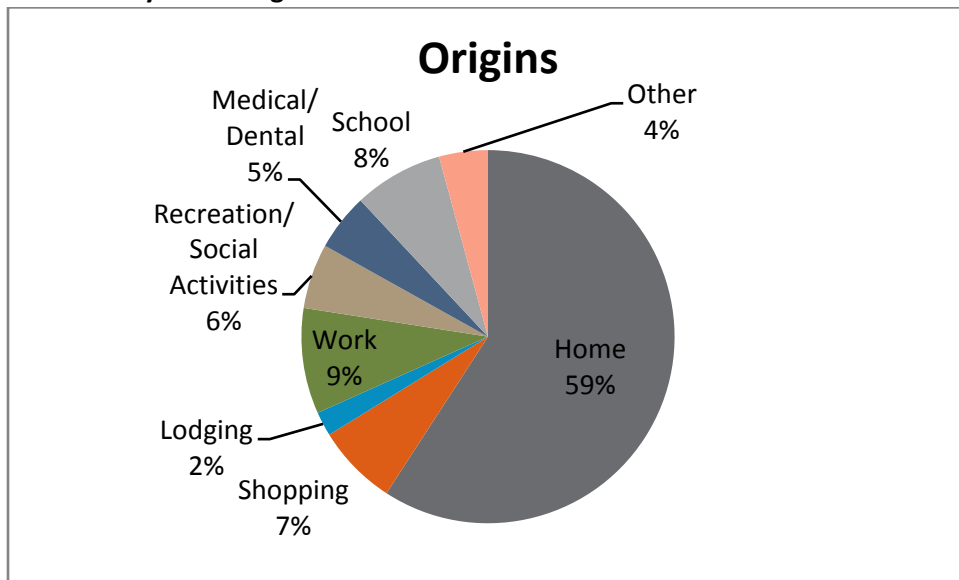


FIGURE 46: ORIGINS

When asked where they were coming from, most riders responded "Home." However, this data may be skewed because we performed all of our surveys in the morning hours. Perhaps this data would have changed had we also spent some time on the bus in the late afternoon or evening.

- **Where is this PLACE?**

Many riders did not respond to this fill-in-the-blank question. This gave us an incomplete picture of the trips the riders were making and made it difficult to use much of that data?

- **How did you GET TO the bus stop?**

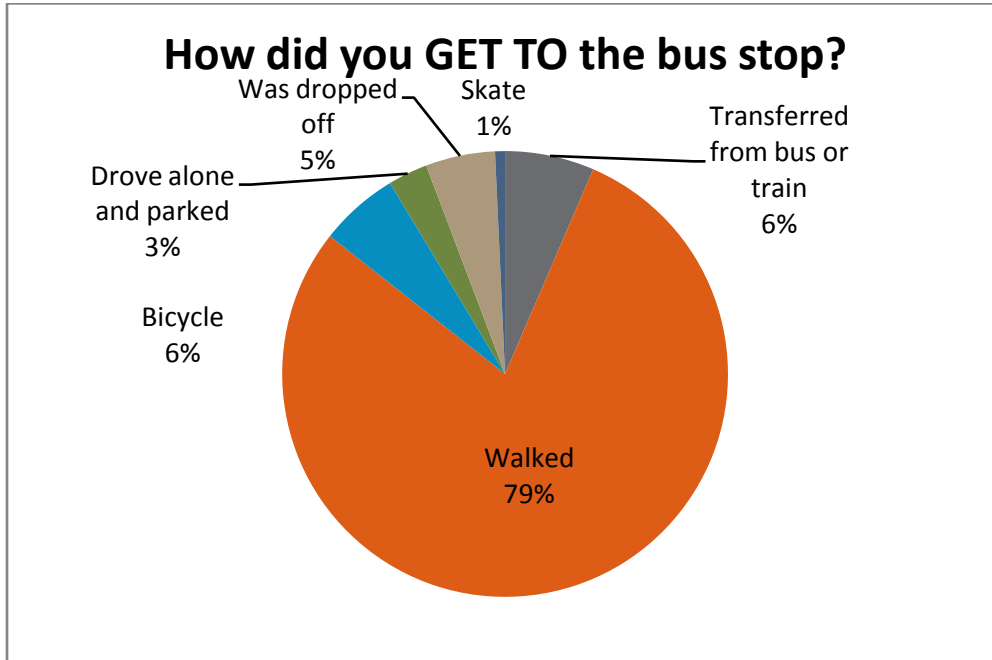
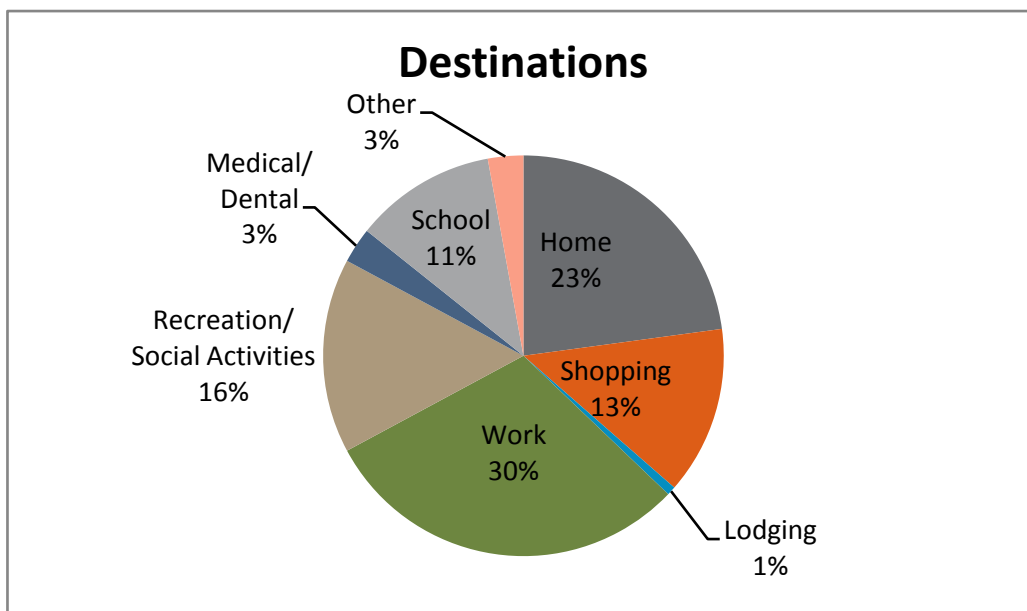


FIGURE 47: HOW DID YOU GET TO THE BUS STOP?

Most riders arrived at their first bus stop location by walking. This shows that riders might not utilize the bus transfer points as often as they could. Also, bike riding and taking the bus in the same trip is very uncommon.

- **Where are you going TO?**



When asked where they were headed, answers were very mixed. The multitude of answers shows that people use the bus for all sorts of reasons. This information is helpful to us when suggesting incentives programs. Employers are not necessarily the only ones that need to be targeted. Programs could be started with any of the many destinations.

- **Where is this PLACE?**

This second fill-in-the-blank question was as inconclusive as the first.

- **How will you GET TO your destination?**

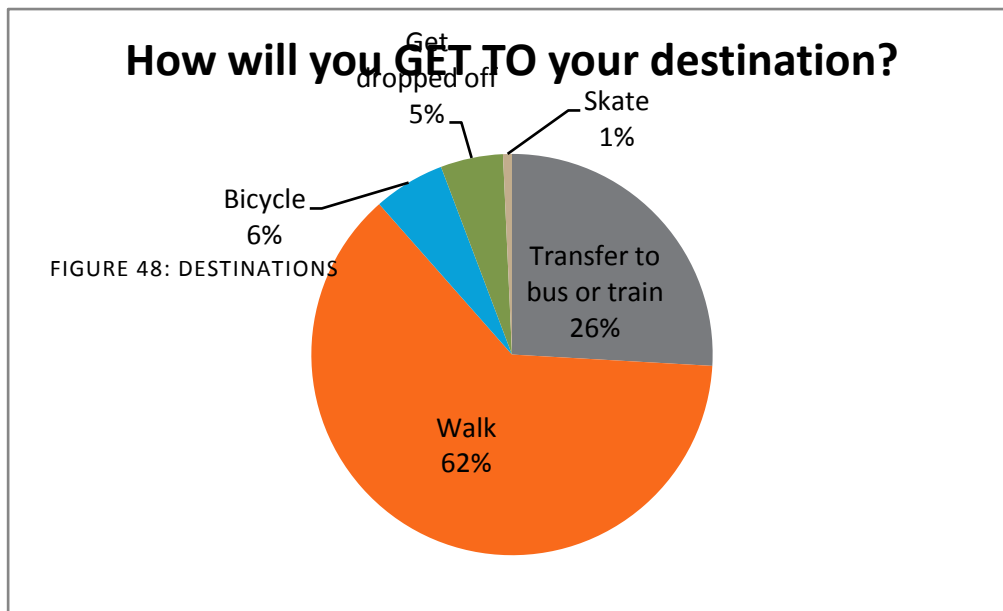


FIGURE 49: HOW WILL YOU GET TO YOUR DESTINATION?

Again, most riders chose walking as their primary means of getting to their destination.

- Customer Satisfaction Questions

	Poor		Neutral		Excellent
Fare	1	2	3	4	5
Service frequency	1	2	3	3.77	5
Conditions of bus	1	2	3	4	5
Transfer convenience	1	2	3	4	5
Bus being on schedule	1	2	3	4	5
Driver courtesy	1	2	3	4	5
Driver competence	1	2	3	4.32	5
Convenience of route	1	2	3	4	5
Safety on the bus	1	2	3	4	5
Safety at the bus stop	1	2	3	4	5

FIGURE 50: CUSTOMER SATISFACTION QUESTIONS

Unfortunately, the responses to these answers were not very definitive. All averages ranged 3.75 – 4.25. However, we could just take this that riders are reasonably satisfied with their experience on Santa Fe Trails.

- Residential Status

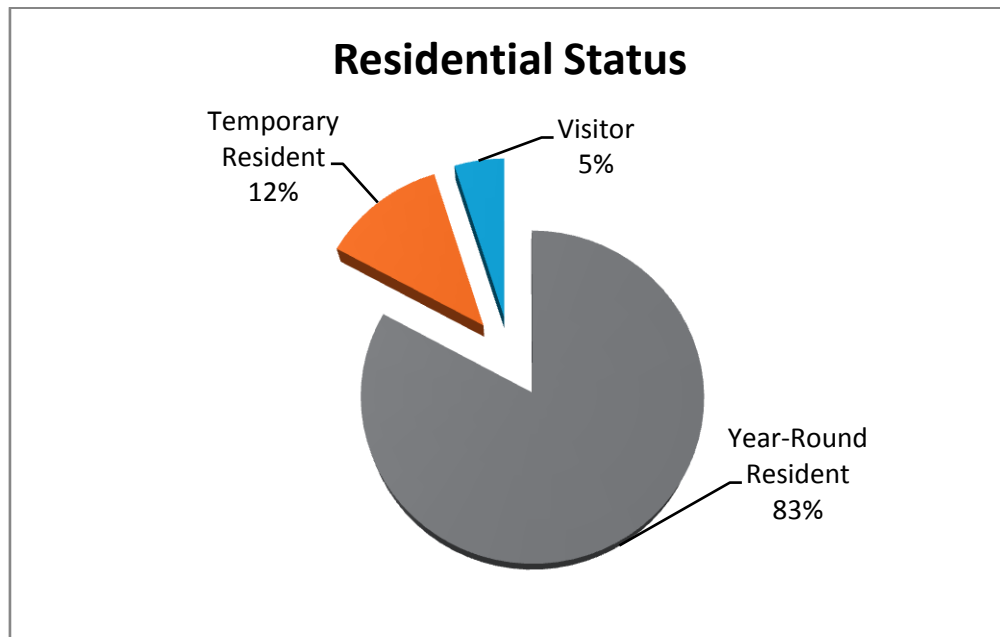


FIGURE 51: RESIDENTIAL STATUS

The next question asked if riders were permanent residents, temporary residents, or visitors to Santa Fe. Most were permanent residents.

- **Comments/Suggestions**

The size of the words in Figure X indicates the word's popularity in the responses. The words "route," "service," "need," and "keep" are a few of the largest words in the graphic. This means that all the respondents are enthusiastic about keeping the bus service. Also, the words "Sunday" and "night" are shown. Many riders requested more night and Sunday service for all bus routes.



FIGURE 52: WORDLE

4.2.2 SANTA FE TRAILS RIDERSHIP COUNTS

The ridership counts collected while surveying routes 2, 4, and 6 were used to determine which stops could be eliminated from the respective routes. Although we did not spend the entire day on the bus, we're confident that our half day gave us an accurate view of which stops are used more often. Also, the total riders were not as important to us as the stops that were not used. This is why all of the total counts are not included.

Route	ON			OFF		
	Regular	Senior	Youth	Regular	Senior	Youth
6 - I - 5:41AM	6	0	0	6	0	0
6 - I - 7:35AM	4	0	4	4	0	4
6 - I - 9:35AM	2	4	2	2	4	2
6 - O - 6:45AM	5	3	0	5	3	0
6 - O - 8:45AM	8	2	0	8	2	0
6 - O - 11:15AM	0	2	0	0	2	0

FIGURE 53: RIDERSHIP COUNTS – ROUTE 6

Figure 53 shows a portion of one of the ridership spreadsheets for Route 6. We noted which stop riders got on or off at and whether the particular rider was a regular, senior, or youth rider. One of the major things we learned during this data collection was that many stops, especially on Route 6, were underutilized.

4.2.3 SANTA FE TRAILS BUS ROUTE ANALYSIS

Using the ridership data we collected and the distance between each bus stop, the team was able to perform a bus route analysis on Route 6 – Inbound.

Route 6 – Rodeo – I	Original	New
Stops	48	28
Distance (miles)	10.8	9.4
Time (minutes)	47	36

FIGURE 54: ROUTE 6 BUS STOP ANALYSIS

We found that we were able to potentially eliminate 20 stops from Route 6. This is also a savings of 1.4 miles and 11 minutes. The complete potential new stop listing is available in Appendix D.

The time savings was calculated by using the overall new route distance and also deducting a 20 second dwell time for each eliminated stop.

Much of the distance savings was due to the elimination of two loops on Route 6. These are Rodeo Park Drive and Brothers Road off of Siringo.

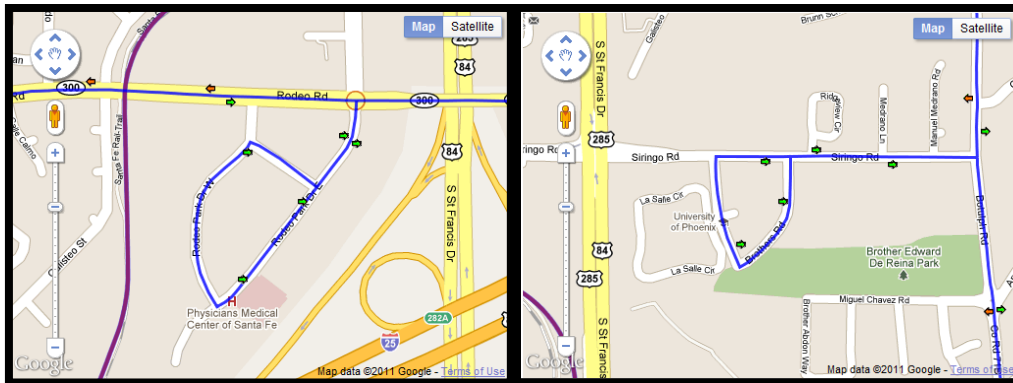


FIGURE 55: RODEO PARK DRIVE/BROTHERS LOOP

There are a total of five stops on Rodeo Park Drive and a sixth stop on Rodeo Road itself. There are two stops on Brothers Road and another on Siringo. Even though we suggested eliminating all of the stops on each of the loops, residents still do not need to walk very far to get to the closest bus stop. On Rodeo Park Drive, as Figure 56 shows, the total distance to walk by residents that live the furthest away from the stop is 0.4 miles. On Brothers Road, this distance is 0.2 miles.

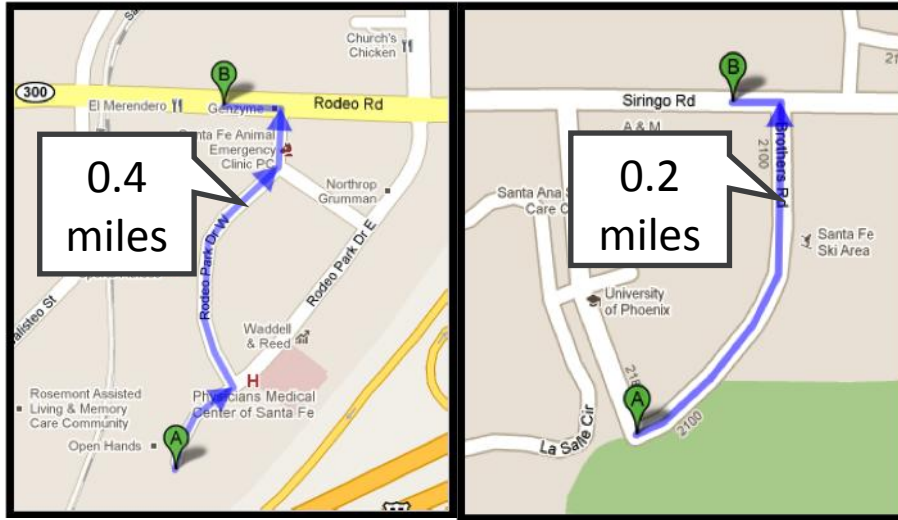


FIGURE 56: MAXIMUM WALKING DISTANCE

4.3 IMPROVED PUBLIC INFORMATION FOR BUS SYSTEM

We identified a broad range of improvements that could be made to the existing materials that Santa Fe Trails has made available to the public.

4.3.1 IMPROVED ROUTE SCHEDULES

Below is an excerpt from the Santa Fe Trails Route Schedule & Map that can be found on any bus, at the Santa Fe Trails Office on Rufina, at the Visitors Center, various other local businesses, and printed on main transfer points. It is a traditional schedule with stops and times listed in a grid pattern for easy readability. This current layout only shows a handful of the bus stops that actually make up the route. If you look at Figure 57, it appears that there are a total of seven different stops on this route beginning at the Downtown Transit Center and ending at Santa Fe Place. However, that is not true. There are actually a total of 30 stops on Route 2.

As mentioned previously we wanted to make the system user-friendly. To try to alleviate confusion, we included all of the stops along the route. Schematic maps, which included time points and interpolated time points were created.

ROUTE 2 - CERRILLOS ROAD													
WEEKDAY OUTBOUND							WEEKDAY INBOUND						
Downtown Transit Center	Santa Fe Depot	Santa Fe Central Station	South Capital Station	Centiles & Dodge	Centiles & Sike	Santa Fe Place	Santa Fe Place	Centiles & Sike	Centiles & Dodge	South Capital Station	Santa Fe Central Station	Santa Fe Depot	Downtown Transit Center
1	2	3	4	5	6	7	8	9	10	11	12	13	14
-	-	-	-	-	-	-	5:40a	5:51a	5:55a	5:58a	6:01a	6:09a	6:13a
-	-	-	-	-	-	-	6:10a	6:21a	6:25a	6:33a	6:39a	6:37a	6:41a
-	-	-	-	-	-	-	6:24a	6:36a	6:40a	6:43a	6:44a	6:50a	6:56a
-	-	-	-	-	-	-	6:39a	6:51a	6:55a	6:58a	7:01a	7:00a	7:13a
-	-	-	-	-	-	-	7:03a	7:15a	7:19a	-	7:21a	7:20a	7:33a
6:28a	6:32a	6:40a	6:42a	6:47a	6:51a	7:03a	7:00a	7:21a	7:25a	-	7:29a	7:37a	7:41a
6:50a	6:54a	7:02a	7:05a	7:07a	7:11a	7:23a	7:29a	7:41a	7:45a	7:48a	7:49a	7:57a	8:01a
7:12a	7:16a	7:24a	-	7:29a	7:33a	7:45a	7:50a	8:02a	8:06a	-	8:10a	8:18a	8:22a
-	-	-	-	-	-	-	8:05a	8:17a	8:21a	-	8:25a	8:33a	8:37a
7:30a	7:34a	7:42a	7:43a	7:48a	7:52a	8:04a	8:20a	8:32a	8:36a	-	8:40a	8:48a	8:52a
7:42a	7:46a	7:54a	-	7:59a	8:03a	8:15a	8:35a	8:47a	8:51a	8:54a	8:55a	9:03a	9:07a
7:57a	8:01a	8:09a	-	8:14a	8:18a	8:30a	8:50a	9:02a	9:06a	-	9:10a	9:18a	9:22a
8:12a	8:16a	8:24a	-	8:29a	8:33a	8:45a	9:05a	9:17a	9:21a	-	9:25a	9:33a	9:37a
8:27a	8:31a	8:39a	-	8:44a	8:48a	9:00a	9:20a	9:32a	9:36a	-	9:40a	9:48a	9:52a
8:42a	8:46a	8:54a	8:56a	9:01a	9:05a	9:17a	9:35a	9:47a	9:51a	-	9:55a	10:03a	10:07a
8:57a	9:01a	9:09a	-	9:14a	9:18a	9:30a	-	-	-	-	-	-	-
9:12a	9:16a	9:24a	-	9:29a	9:33a	9:45a	9:48a	10:00a	10:04a	-	10:08a	10:16a	10:20a
9:27a	9:31a	9:39a	-	9:44a	9:48a	10:00a	10:03a	10:15a	10:19a	-	10:23a	10:31a	10:35a
9:42a	9:46a	9:54a	-	9:59a	10:03a	10:15a	10:18a	10:30a	10:34a	-	10:38a	10:46a	10:50a
9:57a	10:01a	10:09a	-	10:14a	10:18a	10:30a	10:33a	10:45a	10:49a	-	10:53a	11:01a	11:05a
10:12a	10:16a	10:24a	-	10:29a	10:33a	10:45a	10:48a	11:00a	11:04a	-	11:08a	11:16a	11:20a
10:27a	10:31a	10:39a	-	10:44a	10:48a	11:00a	11:03a	11:15a	11:19a	11:22a	11:25a	11:33a	11:37a
10:42a	10:46a	10:54a	-	10:59a	11:03a	11:15a	11:18a	11:30a	11:34a	-	11:38a	11:46a	11:50a
10:57a	11:01a	11:09a	-	11:14a	11:18a	11:30a	11:33a	11:45a	11:49a	-	11:53a	12:01a	12:05a
11:12a	11:16a	11:24a	11:27a	11:29a	11:33a	11:45a	11:48a	12:00a	12:04a	-	12:08a	12:16a	12:20a
11:27a	11:31a	11:39a	-	11:44a	11:48a	12:00a	12:03a	12:15a	12:19a	12:22a	12:23a	12:31a	12:35a
11:42a	11:46a	11:54a	-	11:59a	12:03a	12:15a	12:18a	12:30a	12:34a	-	12:38a	12:46a	12:50a
11:57a	12:01a	12:09a	12:11a	12:16a	12:20a	12:32a	12:35a	12:47a	12:51a	-	12:55a	13:03a	13:07a
12:12a	12:16a	12:24a	-	12:29a	12:33a	12:45a	12:50a	13:02a	13:06a	-	13:10a	13:18a	13:22a
12:27a	12:31a	12:39a	-	12:44a	12:48a	13:00a	13:03a	13:15a	13:19a	-	13:23a	13:31a	13:35a
12:42a	12:46a	12:54a	-	12:59a	13:03a	13:15a	13:18a	13:30a	13:34a	-	13:38a	13:46a	13:50a
12:57a	13:01a	13:09a	-	13:14a	13:18a	13:30a	13:33a	13:45a	13:49a	-	13:53a	14:01a	14:05a
1:12a	1:16a	1:24a	-	1:29a	1:33a	1:45a	1:48a	2:00a	2:04a	-	2:08a	2:16a	2:20a
1:27a	1:31a	1:39a	-	1:44a	1:48a	2:00a	2:03a	2:15a	2:19a	-	2:23a	2:31a	2:35a
1:42a	1:46a	1:54a	-	1:59a	2:03a	2:15a	2:18a	2:30a	2:34a	-	2:38a	2:46a	2:50a
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2:12a	2:16a	2:24a	-	2:29a	2:33a	2:45a	2:48a	3:00a	3:04a	-	3:08a	3:16a	3:20a
2:27a	2:31a	2:39a	-	2:44a	2:48a	3:00a	3:03a	3:15a	3:19a	-	3:23a	3:31a	3:35a
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2:57a	3:01a	3:09a	-	3:14a	3:18a	3:30a	3:33a	3:45a	3:49a	-	3:53a	4:01a	4:05a
3:12a	3:16a	3:24a	-	3:29a	3:33a	3:45a	3:48a	4:00a	4:04a	4:07a	4:10a	4:18a	4:22a
3:27a	3:31a	3:39a	-	3:44a	3:48a	4:00a	4:03a	4:15a	4:19a	-	4:23a	4:31a	4:35a
3:42a	3:46a	3:54a	3:56a	3:59a	4:03a	4:15a	4:18a	4:30a	4:34a	-	4:38a	4:46a	4:50a
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4:12a	4:16a	4:24a	-	4:29a	4:33a	4:45a	4:48a	5:00a	5:04a	5:07a	5:10a	5:18a	5:22a
4:27a	4:31a	4:39a	-	4:44a	4:48a	5:00a	5:03a	5:15a	5:19a	5:22a	5:23a	5:31a	5:35a
4:42a	4:46a	4:54a	-	4:59a	5:03a	5:15a	5:18a	5:30a	5:34a	-	5:38a	5:46a	5:50a
4:57a	5:01a	5:09a	5:11a	5:14a	5:18a	5:30a	5:33a	5:45a	5:49a	5:52a	5:53a	6:01a	6:05a
5:12a	5:16a	5:24a	-	5:29a	5:33a	5:45a	5:48a	6:00a	6:04a	-	6:08a	6:16a	6:20a
5:27a	5:31a	5:39a	-	5:44a	5:48a	6:00a	6:03a	6:15a	6:19a	6:22a	6:23a	6:31a	6:35a
5:42a	5:46a	5:54a	-	5:59a	6:03a	6:15a	6:18a	6:30a	6:34a	-	6:38a	6:46a	6:50a
5:57a	6:01a	6:09a	6:11a	6:16a	6:20a	6:32a	6:35a	6:47a	6:51a	-	6:55a	7:03a	7:07a
6:12a	6:16a	6:24a	-	6:29a	6:33a	6:45a	6:48a	7:00a	7:04a	-	7:08a	7:16a	7:20a
6:27a	6:31a	6:39a	-	6:44a	6:48a	6:60a	6:51a	7:03a	7:07a	-	7:11a	7:19a	7:23a
6:42a	6:46a	6:54a	-	6:49a	6:53a	7:05a	7:08a	7:20a	7:24a	-	7:28a	7:36a	7:40a
6:57a	7:01a	7:09a	-	7:14a	7:18a	7:30a	7:33a	7:45a	7:49a	-	7:53a	8:01a	8:05a
7:12a	7:16a	7:24a	-	7:29a	7:33a	7:45a	7:48a	8:00a	8:04a	8:07a	8:08a	8:16a	8:20a
7:27a	7:31a	7:39a	-	7:44a	7:48a	7:60a	7:51a	8:03a	8:07a	-	8:11a	8:19a	8:23a
7:42a	7:46a	7:54a	-	7:49a	7:53a	8:05a	8:08a	8:20a	8:24a	-	8:28a	8:36a	8:40a
7:57a	8:01a	8:09a	-	8:14a	8:18a	8:30a	8:33a	8:45a	8:49a	-	8:53a	9:01a	9:05a
8:12a	8:16a	8:24a	-	8:29a	8:33a	8:45a	8:48a	9:00a	9:04a	-	9:08a	9:16a	9:20a
8:27a	8:31a	8:39a	-	8:44a	8:48a	9:00a	9:03a	9:15a	9:19a	-	9:23a	9:31a	9:35a
8:42a	8:46a	8:54a	-	8:49a	8:53a	9:05a	9:08a	9:20a	9:24a	-	9:28a	9:36a	9:40a
8:57a	9:01a	9:09a	-	9:14a	9:18a	9:30a	9:33a	9:45a	9:49a	-	9:53a	10:01a	10:05a
9:12a	9:16a	9:24a	-	9:29a	9:33a	9:45a	9:48a	10:00a	10:04a	-	10:08a	10:16a	10:20a
9:27a	9:31a	9:39a	-	9:44a	9:48a	10:00a	10:03a	10:15a	10:19a	-	10:23a	10:31a	10:35a
9:42a	9:46a	9:54a	-	9:59a	10:03a	10:15a	10:18a	10:30a	10:34a	-	10:38a	10:46a	10:50a
9:57a	10:01a	10:09a	-	10:14a	10:18a	10:30a	10:33a	10:45a	10:49a	-	10:53a	11:01a	11:05a
10:12a	10:16a	10:24a	-	10:29a	10:33a	10:45a	10:48a	11:00a	11:04a	-	11:08a	11:16a	11:20a
10:27a	10:31a	10:39a	-	10:44a	10:48a	11:00a	11:03a	11:15a	11:19a	11:22a	11:25a	11:33a	11:37a
10:42a	10:46a	10:54a	-	10:59a	11:03a	11:15a	11:18a	11:30a	11:34a	-	11:38a	11:46a	11:50a
10:57a	11:01a	11:09a	-	11:14a	11:18a	11:30a	11:33a	11:45a	11:49a	-	11:53a	12:01a	12:05a
11:12a	11:16a	11:24a	11:27a	11:29a	11:33a	11:45a	11:48a	12:00a	12:04a	-	12:08a	12:16a	12:20a
11:27a	11:31a	11:39a	-	11:44a	11:48a	12:00a	12:03a	12:15a	12:19a	12:22a	12:23a	12:31a	12:35a
11:42a	11:46a	11:54a	-	11:59a	12:03a	12:15a	12:18a	12:30a	12:34a	-	12:38a	12:46a	12:50a
11:57a	12:01a	12:09a	12:11a	12:16a	12:20a	12:32a	12:35a	12:47a	12:51a	-	12:55a	13:03a	13:07a
12:12a	12:16a	12:24a	-	12:29a	12:33a	12:45a	12:50a	13:02a	13:06a	-	13:10a	13:18a	13:22a
12:27a	12:31a	12:39a	-	12:44a	12:48a	13:00a	13:03a	13:15a	13:19a	-	13:23a	13:31a	13:35a
12:42a	12:46a	12:54a	-	12:59a	13:03a	13:15a	13:18a	13:30a	13:34a	-	13:38a	13:46a	13:50a
12:57a	13:01a	13:09a	-	13:14a	13:18a	13:30a	13:33a	13:45a	13:49a	-	13:53a	14:01a	14:05a
1:12a	1:16a	1:24a	-										

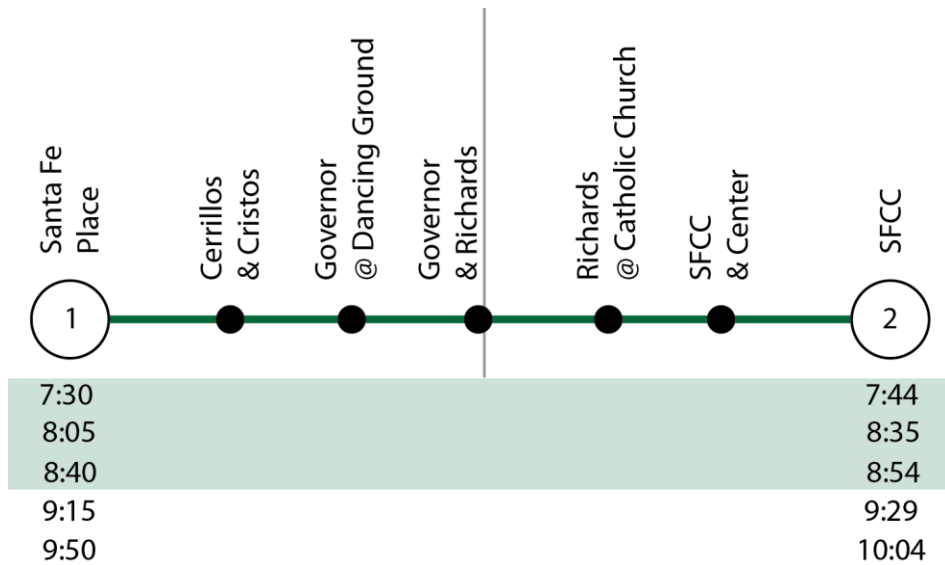


FIGURE 58: SCHEMATIC ROUTE 21 MAP

Figure 58 shows the schematic route map for Route 21. This route has a total of seven stops and only two time points. The numbered circles indicate time points, while the black circles represent interpolated time stops. The green line that runs through the entire image indicates that this is a schematic route map for Route 21. The grey line next to the “Governor & Richards” interpolated time stop means that this is a main intersection.

However, the majority of Santa Fe Trails bus routes have more than seven stops. Below is an example of a Route 2 schematic map which includes 30 stops. The increased number of stops makes the schedule somewhat cluttered and may deter users from reading it.

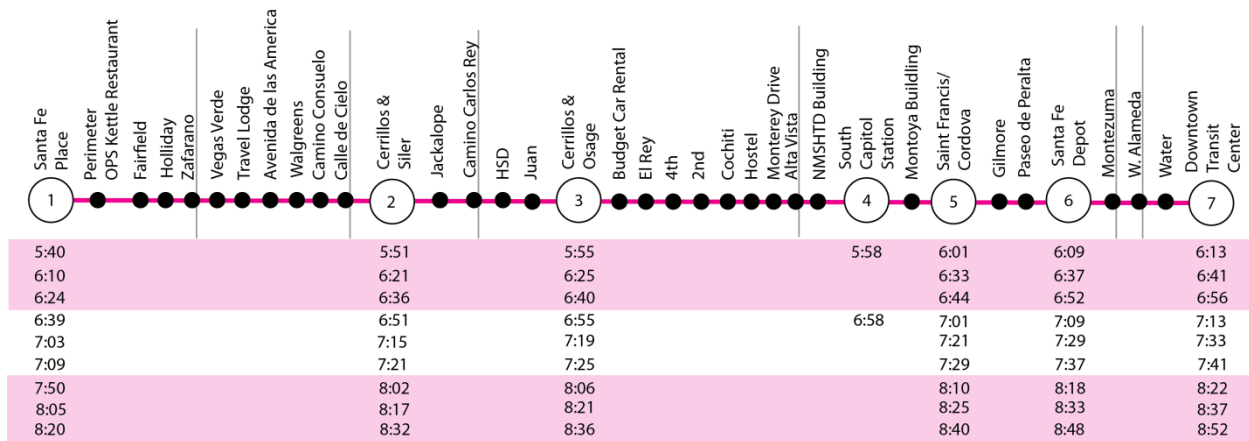


FIGURE 59: SCHEMATIC ROUTE 2 MAP

The problem with including every stop is the lack of space that is available on a paper schedule. As is, the figure is hard to see. Schematic maps, which include all of the stops along each bus route, could be created, but would reach their full potential online because space is unlimited. Therefore the majority of these maps could only be accessed online and would not be useful for the average bus clientele, who primarily rely on printed schedules.

Additionally, the above graphic is just a schematic. The stops that are on that line do not appear in a linear fashion on the actual route. Route 2 does not stay on one straight road for its entire trip. Therefore, this type of schedule would not only be hard to incorporate into the existing print form of the schedule but would not be spatially accurate.

The final problem with this route schematic is stop naming. Casey Padilla, Transit Specialist for Santa Fe Trails, sent us an excel spreadsheet of all of the stops identified in the system. There is no documented method for systematically naming and cataloguing stops. Some of the stops are designated by the intersection of two streets but are not at the corner of these intersections. Instead, their locations are only approximated by the name. Another example is the use of business names to designate the locations of stops. This method of naming is useful only if the landmark does not move.

Another issue arises with the stops that are not listed on the schedules. These stops do not have specific names but they also do not have any posted times. Right now, users have to approximate the time a bus will arrive at these 'interpolated stops.' Overall, the schematic route maps would not provide that much more information to bus users.

The team created another way of viewing the schedule. Instead of publishing each individual route with time points, the schedule would be posted at a main transfer point. This schedule would show all of the bus routes which arrive at that transfer point and when that specific route will be arriving and leaving that specific location. Below is an example of this type of transfer point schedule.

This is the transfer point schedule from the Santa Fe Mall transfer point. A total of 7 separate routes stop at this location. Each routes color matches the existing color scheme. The left column presents the time in 10 minute increments. To conserve space, the schedule only goes through until 7:50 AM but the last route that stops at this particular point runs until 10 PM. The ovals line up with the time and the route that they correspond to. The ovals that are fully colored in are arriving at Santa Fe Place Mall, while the ovals lacking a background color are departing from the Santa Fe Place Mall. The idea behind this labeling is reflected in the key at the top of the schedule to the right of the name of the transfer point.

There are a few majors problem associated with introducing a new type of schedule like this. The first, finding a way of educating the public and the existing population that rides the bus on how to use this schedule. In general, people do not respond well to change and might be discouraged to learn this new system. As previously stated above, the problem of not having enough space could be a factor. Printing a schedule like this would require increased page size and would not be easily integrated into the current brochure. Finally, and most importantly, these schedules would only be useful for the 7 transfer points. A schedule like this requires that more than one bus stops at that designated location. It would not alleviate the problem of finding stops. The user would have to have pervious knowledge of the city and the bus stop they would be arriving at or departing from.

Santa Fe Place

Route	1	2	4	6	21	24	22
5:40 AM		5:40	5:41	5:41			
5:50 AM	5:56						
6:00 AM							
6:10 AM		6:10	6:11			6:12	
6:20 AM	6:26	6:24				6:20	
6:30 AM		6:39	6:38				
6:40 AM			6:41	6:41			
6:50 AM	6:56					6:50	6:55



FIGURE 60: SANTA FE PLACE TRANSFER POINT SCHEDULE

4.3.2 IMPROVED ROUTE MAPS

We would also like to point out suggestions for the single route specific maps. We will be using the Route 1 map as a reference to the route specific maps in general. The Route 1 map includes bits and pieces from other routes in what appear to be random stretches of streets. In the present brochure there is a map that includes all of the routes. The residual pieces of the other bus routes in the Route 1 map are not necessary to include.

Additionally, the average day-tripper or tourist, who is unfamiliar with the city of Santa Fe, may be confused by the 'DOWNTOWN DETAIL.' The only words on the map indicating where the Downtown area of the city is are located in the pop-up rectangle, which says, "Downtown Transit Center (Sheridan Street)" and does not highlight a Downtown region, only a single street. The addition of lines or an arrow could eliminate this problem.

To alleviate the problem with the current maps, a simpler version, as shown in Figure 62, was created.

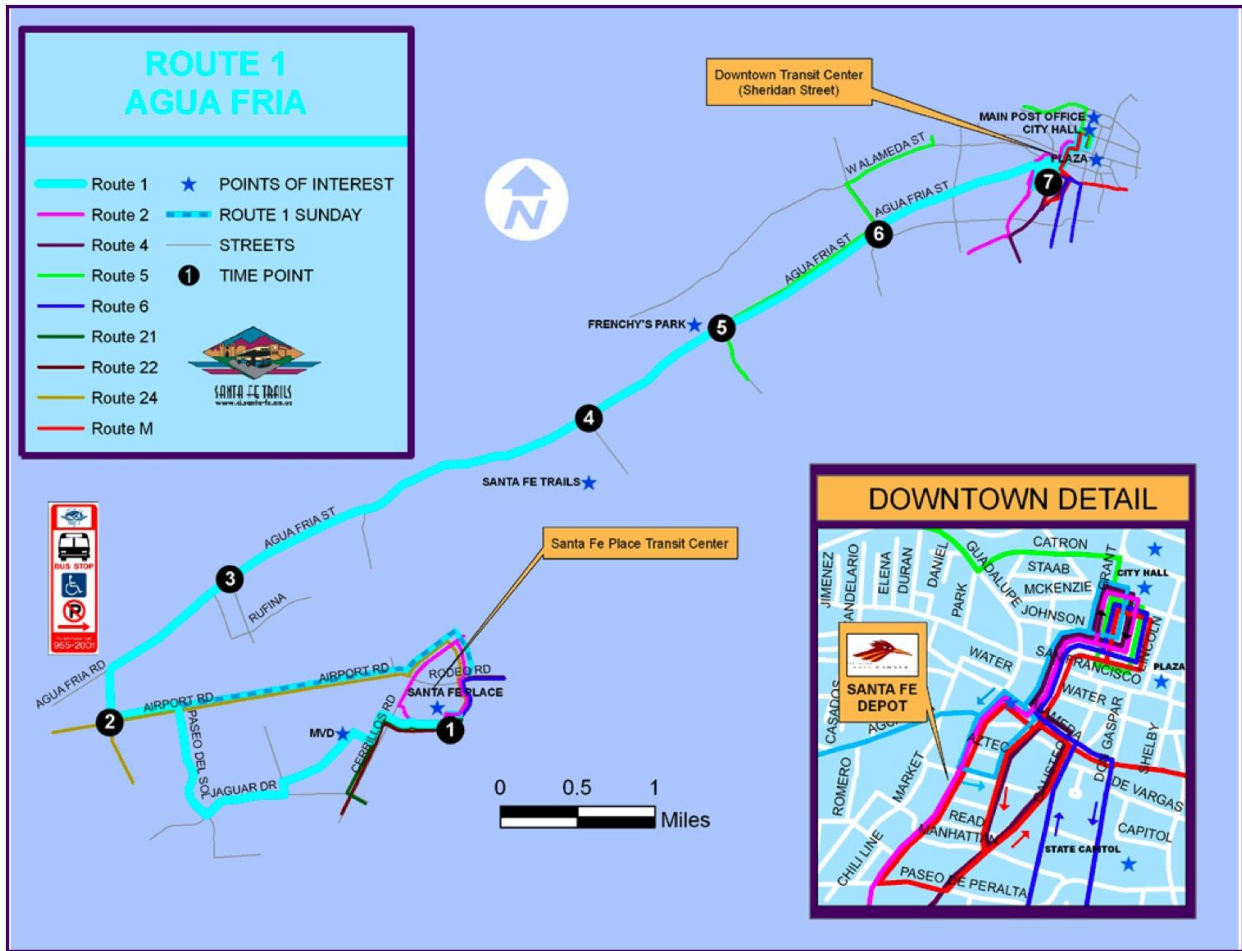


FIGURE 61: SANTA FE TRAILS ROUTE MAP

This idea was abandoned when the team realized that there were more than 400 bus stops. The schematic map would not be able to show each individual bus stop and would essentially be a simplified version of the pre-existing Santa Fe Trails route map. If each bus stop were to be included in the design it would look cluttered and would not be user-friendly.

Also, the schematic map was not spatially accurate. Each time point location, signified by numbered circles, was approximated using a distance calculated from Google Maps. This method of obtaining distances is not accurate enough. The GIS maps already produced and printed in the brochure would be an improvement over this map.

Being able to design a printable map that includes all of the information we would have liked to include would not be possible to distribute in a paper format. Instead, this led the group to put forth more effort into using Google Transit. This would allow a bus rider to access each stop, when the bus would arrive there and which line it would be.

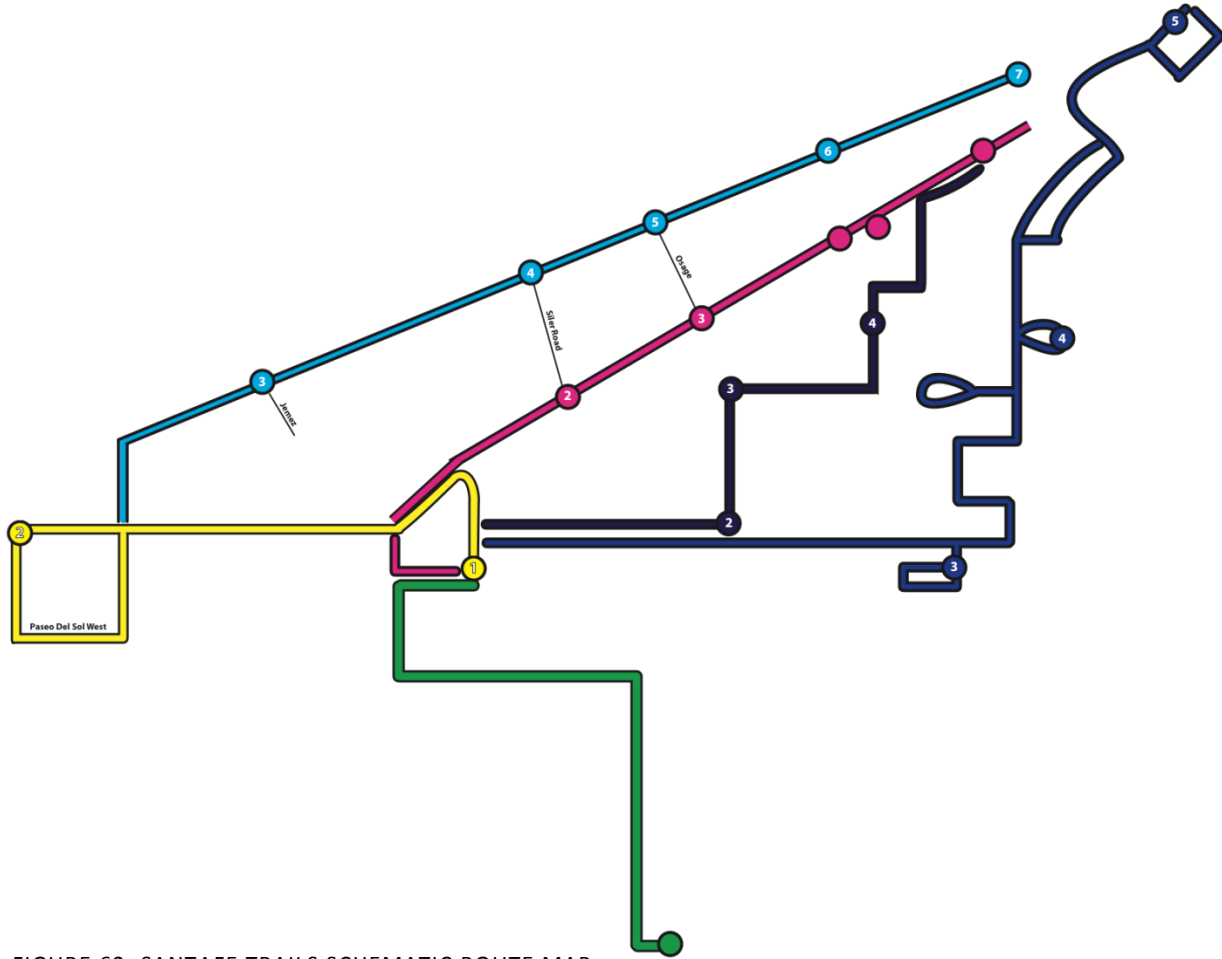


FIGURE 62: SANTAFE TRAILS SCHEMATIC ROUTE MAP

4.4 INTEGRATION OF INFORMATION FROM CHOSEN TRANSPORTATION SYSTEMS

The groundwork for an online interactive map and the “feeds” for Google Transit have been completed for this project. The interactive map has the functionality and features that were developed during its design process, though some refinements such as aesthetic improvements could be made. The Google Transit feeds are also completed and have been submitted for approval.

4.4.1 INTERACTIVE GOOGLE MAPS

The interactive map was created to include three transportation systems. Their distinctive icons are shown next to their names below.



- Santa Fe Trails



Inbound



Outbound

- Santa Fe Pick-Up
 - 
- New Mexico Rail Runner (only stops in Santa Fe)
 - 

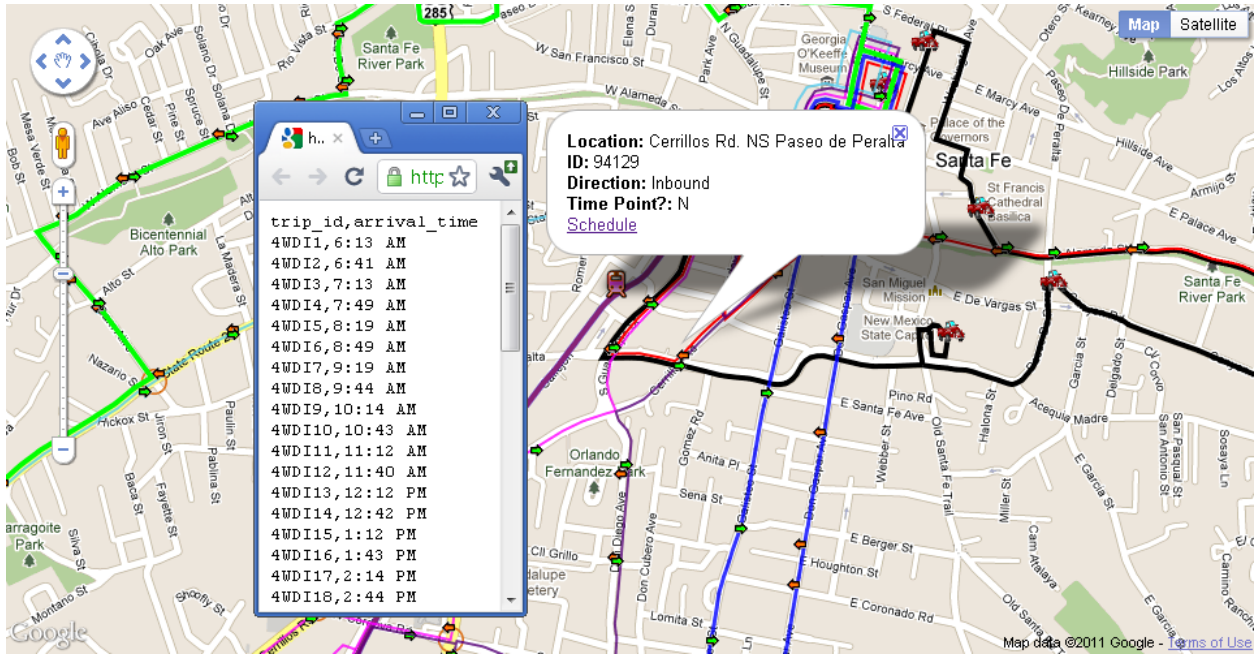


FIGURE 63: INTERACTIVE MAP WITH INFORMATION BALLOON AND SANTA FE TRAILS SCHEDULE

The map has many user-friendly features. The user has the ability to zoom in on any area of interest. The user can select any icon on the map and a “balloon” (Figure 63) will pop up with more information. When a stop is selected, the schedule for that particular stop can be seen by the user by clicking the schedule link. The only schedule currently available in this map is for the Santa Fe Trails bus service. The bus route and the service schedule can be identified using the “trip_id” provided in each schedule using the following system described in Figure 64:

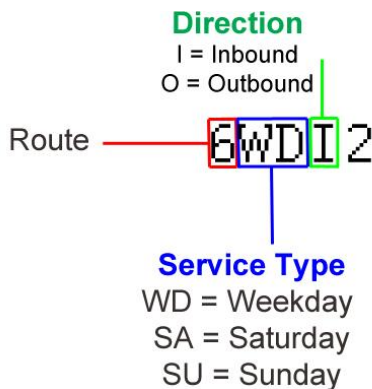


FIGURE 64: TRIP_ID BUS TRIP LABELING SYSTEM

4.4.2 GOOGLE TRANSIT TRIP PLANNING

The information required to submit the Google Transit feeds to provide step-by-step directions using the Santa Fe Trails bus system is listed below:

- Agency.txt, which describes the transit agency
- Stops.txt, a list of all of the bus stops, with their respective names and GPS locations
- Routes.txt, which defines all of the bus routes in the system
- Trips.txt, a list of all of the trips each bus takes for each route, as well as service types
- Stop_times.txt, the schedule of all of the buses assigned to each trip
- Calendar.txt, defines the service types and when they operate
- Fare_attributes.txt, displays the fare rules for the system

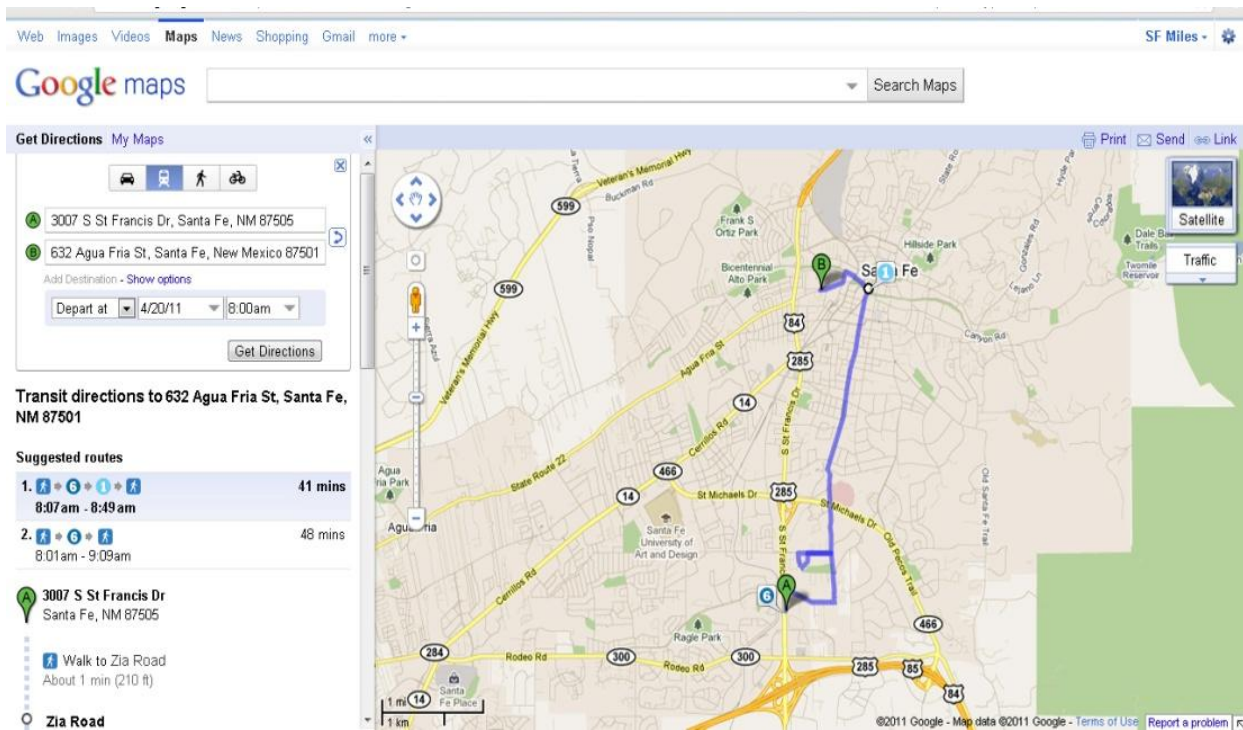


FIGURE 65: GOOGLE TRANSIT INTERFACE PREVIEW

Eventually users will be able to enter their origin and destination into Google Transit. They will also enter the date and time when they wish to “depart at” or “arrive by.” Google Transit will then calculate the available routes listing all transit options and travel time.

5. CONCLUSIONS AND RECOMMENDATIONS

Overall, the city and county of Santa Fe has a comprehensive public transportation system that has the potential to serve the entire community. However, increased cooperation from all transportation agencies is needed. This would potentially lead to a unified approach to the current transportation issues. Based on our analysis of the current public transportation situation in Santa Fe, we have compiled a set of recommendations to help continue to improve public transportation for the foreseeable future. It is important to provide useful suggestions for the Santa Fe Metropolitan Planning Organization and future WPI Santa Fe project groups. These recommendations provide useful insight towards building more connections between public transit services.

5.1 SANTA FE TRAILS BUS ROUTE CONSOLIDATION

The benefits of a bus route consolidation analysis were shown in our results. However, if Santa Fe Trails hopes to carry out such a consolidation we believe that they should conduct a complete ridership analysis for each bus stop. It is important to understand the complete picture before eliminating potentially useful stops. When eliminating stops, the bus service should focus on eliminating unused stops and maximizing the distance in between stops.

5.2 SANTA FE TRAILS SCHEDULES

There are several recommendations for improvement for the Santa Fe Trails bus schedules. The current schedules only include times points. However, the bus actually stops at places in between these time points. This knew public knowledge could potentially attract new users who were originally not aware of the proximity of stops to their places of employment or residence.

Transfer point schedules should be created for all seven transfer points. If these schedules were posted at these points, it would make on-the-go trip planning much simpler. Users would be able to see which bus routes they could catch from that particular stop.

If possible, we would recommend that a graphic design team be hired to look at different ways of implementing new schedules.

5.3 INTERACTIVE MAP SUGGESTIONS

The interactive map on Google Maps can be used to view schedules for each of the transit stops. This is very useful, as users are now able to see all transit stop locations in one place. The schedule available in the balloons should be reformatted so that the times are tabulated in a more aesthetically pleasing, readable fashion. The information balloons also require more web design and refinements, such as including the schedule table inside the actual balloon instead of opening a new browser window. Additionally, more public transportation systems should be added to map, along with their respective schedules.

5.4 GOOGLE TRANSIT SUGGESTIONS

When Google Transit is successfully installed for Santa Fe public transit services, people will be able to look up directions on how to travel from one place to another using the transit services available. Trip planning would become much more automated and easier, as people would no longer have to rely on the current calling service which can be quite time-consuming and problematic.

More transportation systems should be included in this service as well, which would require the creation of new feeds as each system is added. More information could be added to the Santa Fe Trails feeds to add to the accuracy of the route lines.

5.5 POTENTIAL TRANSIT INCENTIVES

Santa Fe businesses could definitely benefit from the program established by Rio Metro and ABQ RIDE. The Smart Partner Incentive program involves the community by promoting alternative transportation use. Currently, very few businesses in Santa Fe are involved in this program and their involvement is not highly publicized.¹⁹

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APPENDIX A: SANTA FE TRAILS TRANSPORTATION SURVEY

Official Use

RT

HR



Don't forget to answer the customer service questions on the back!

Space is also included on back for general improvement suggestions & comments.

Why do you use the bus?

Do Not Own A Car Price Of Gas Vacation
 Work Day Trips Avoid Traffic

Other: _____

What times do you usually use the bus?

Morning Mid-Morning Afternoon
 8-10 10-12 12-2

Mid-Afternoon Night
 2-4 4-8

Which bus routes do you take on a regular basis?

Route 1 Agua Fria	Route 2 Cerrillos	Route 4 Southside
Route 5 W. Alameda	Route 6 Rodeo Road	Route M Museum Hill
Route 21 Community College	Route 22 Rancho Viejo/IAIA	Route 24 Country Club

How many day(s) per week do you use the bus?

1 2 3 4 5 6 7

Are the stops where you get on and off well marked?

YES NO

Do you sometimes have trouble finding the bus stops?

YES NO

Do you have a smart phone? (i.e. Blackberry, Droid, Palm or iPhone)

YES NO

If 'Yes,' would you use a Smartphone 'Santa Fe Public Transit' application that would assist you with your trip?

YES NO

Are you aware of the connections to the Rail Runner, Santa Fe Pick-Up or Blue Bus?

YES NO

IMPORTANT: Please tell us about the ONE-WAY trip that you are making AT THIS TIME. If you have already completed a survey today, DO NOT complete another one.

Where are you coming FROM?

Home Shopping Lodging Work
 Recreation or social activities Medical/Dental

Other: _____

Where is this PLACE?

Please list the nearest intersection (For example: Cerrillos & Osage)
 OR name of unique location or landmark (For example: Santa Fe Place,
 St. Vincent Hosp., Target on Cerrillos, etc.)

Street & Cross Street

How did you GET TO the bus stop?

Transferred from bus or train Walked
 Bicycle Drove alone and parked
 Was dropped off Other: _____

Where are you going TO?

Home Shopping Lodging Work
 Recreation or social activities Medical/Dental

Other: _____

Where is this PLACE?

Please list the nearest intersection (For example: Cerrillos & Osage)
 OR name of unique location or landmark (For example: Santa Fe Place,
 St. Vincent Hosp., Target on Cerrillos, etc.)

Street & Cross Street

How will you GET TO your destination?

Transferred from bus or train Walked
 Bicycle Drove alone and parked
 Was dropped off Other: _____

TELL US HOW WE'RE DOING ...

1. How do you feel about your trip on this bus?

Please circle the number that best reflects your opinion.

	Poor		Neutral		Excellent
Fare	1	2	3	4	5
Service frequency	1	2	3	4	5
Conditions of bus	1	2	3	4	5
Transfer convenience	1	2	3	4	5
Bus being on schedule	1	2	3	4	5
Driver courtesy	1	2	3	4	5
Driver competence	1	2	3	4	5
Convenience of route	1	2	3	4	5
Safety on the bus	1	2	3	4	5
Safety at the bus stop	1	2	3	4	5

2. Are you a... (please circle one)

Santa Fe year round resident

Santa Fe temporary resident

Visiting

Comments/Suggestions:

APPENDIX B: SANTA FE TRAILS TRANSPORTATION SURVEY – SPANISH

Official Use

RT

HR



SANTA FE TRAILS

NECESITA SU AYUDA POR FAVOR LLENE
ESTA BREVE ENCUESTA
CÍRCULO DE TODO LO QUE CORRESPONDA

¡No te olvides de responder a la preguntas de servicio al cliente en la espalda!

El espacio también se incluye en la parte posterior para la mejora general sugerencias y comentarios.

¿Por qué utilizar el autobús?

No posee un automóvil Precio del gas De vacaciones
Trabajo Excursiones Evitar el tráfico Otro lugar

(Especifique: _____)

¿A qué horas sueles utilizar el autobús?

Manana A media mañana Tarde
8-10 10-12 12-2

Mediados de la tarde Noche
2-4 4-8

¿Qué rutas de autobús se toma de manera regular?

Route 1 Route 2 Route 4
Agua Fria Cerrillos Southside

Route 5 Route 6 Route M
W. Alameda Rodeo Road Museum Hill

Route 21 Route 22 Route 24
Community College Rancho Viejo/IAIA Country Club

¿Cuántos días a la semana utiliza usted el autobús?

1 2 3 4 5 6 7

¿Son las paradas donde subir y bajar bien marcado?

SI NO

¿A veces tiene problemas para encontrar las paradas de autobús?

SI NO

¿Tiene un teléfono inteligente? (es decir, Blackberry, Droid, Palm o iPhone)

SI NO

¿Si 'Sí,' se utiliza un Smartphone "Santa Fe Aplicación de Transporte Público" que ayudarle con su viaje?

SI NO

¿Es usted consciente de las conexiones a la Corredor ferroviario, Santa Fe autobús Pick-Up o azul?

SI NO

IMPORTANTE: Por favor cuéntos sobre el viaje en autobús que está haciendo ahora mismo. Si Ud. ya ha completado una encuesta hoy, NO complete otra.

¿DE dónde viene?

Casa Compras Hotel/Motel Trabajo

Recreativas o sociales Médico/Dentista Otro lugares

(Especifique: _____)

¿Dónde está este lugar?

Favor indique la intersección más cerana (por ejemplo: la esquina de Cerrillos y Osage) O indique un punto específico o punto de referencia (por ejemplo: Santa Fe Place, St. Vincent Hops., Target en Cerrillos, etc.)

Calle Y Calle de intersección

¿Cómo LLEGÓ a la parada donde subió a esta autobús?

Transferencia de otro bus de Santa Fe Trails Caminado

En bicicleta Manejando solo y estacionando

Mellevaron en auto Otro mundo (Especifique: _____)

¿A DÓNDE va?

Casa Compras Hotel/Motel Trabajo

Recreativas o sociales Médico/Dentista Otro lugares

(Especifique: _____)

¿Dónde está este lugar?

Favor indique la intersección más cerana (por ejemplo: la esquina de Cerrillos y Osage) O indique un punto específico o punto de referencia (por ejemplo: Santa Fe Place, St. Vincent Hops., Target en Cerrillos, etc.)

Calle Y Calle de intersección

¿Cómo LLEGÓ a la parada donde subió a esta autobús?

Transferencia de otro bus de Santa Fe Trails Caminado

En bicicleta Manejando solo y estacionando

Mellevaron en auto Otro mundo (Especifique: _____)

DEJENOS SABER CÓMO ESTAMOS HACIENDO ...

1. Por favor marque con un círculo el número que
mayor exprese su opinión sobre este viaje en autobús:

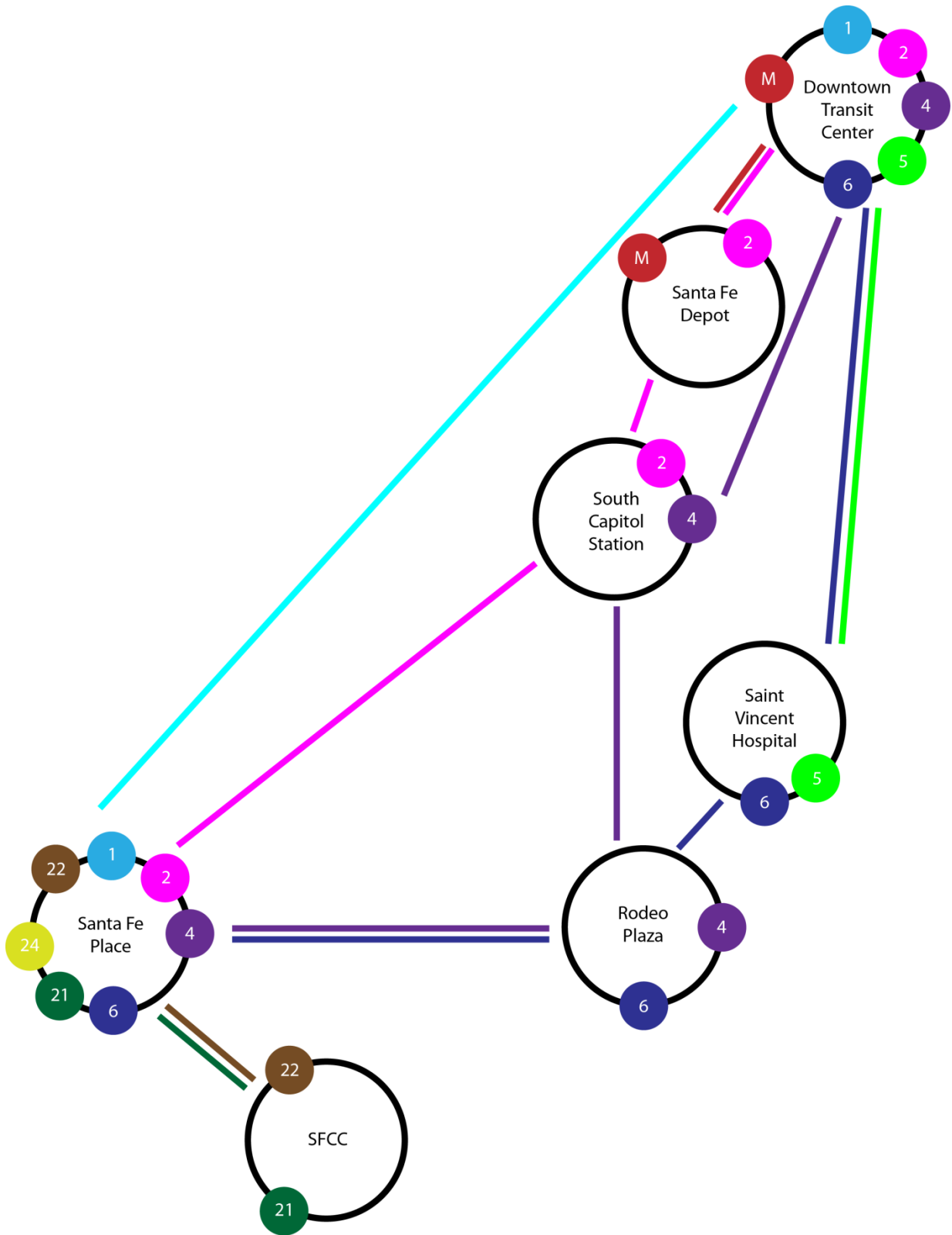
	Malo		Indiferente		Excelente
Tarifa	1	2	3	4	5
Frecuencia de servicios	1	2	3	4	5
Condiciones del autobús	1	2	3	4	5
Conveniencia de transferencias	1	2	3	4	5
Puntualidad	1	2	3	4	5
Condición del autobús	1	2	3	4	5
Abilidad del conductor	1	2	3	4	5
Conveniencia de la ruta	1	2	3	4	5
Seguridad en el autobús	1	2	3	4	5
Seguridad en las paradas	1	2	3	4	5

2. ¿Es usted...?

Residente ano redundo de Santa Fe Residente temporario de Santa Fe Está de visita

Por favor escriba otros comentarios aquí:

APPENDIX C: MAIN TRANSFER POINT SCHEMATIC



APPENDIX D: PROPOSED ROUTE 6 STOP LISTING

LOCATION	Total Trip Miles	Distance Between Stops
Santa Fe Place Mall - Transit Center	0	
Rodeo Rd. NS County Rd. 64A	0.5	0.5
Rodeo Rd FS Richards Ave	1	0.5
Rodeo Rd. FS Paseo de los Pueblos	1.5	0.5
Rodeo Rd. FS Zia Rd.	1.9	0.4
Rodeo Rd. FS Camino Carlos Rey	2	0.1
Rodeo Rd. FS Calle Delfino	2.3	0.3
Rodeo Rd. NS Yucca St.	2.5	0.2
Rodeo Rd. FS Calle Dulcinea	2.8	0.3
Rodeo Rd. NS Rodeo Business Park	3.1	0.3
Rodeo rd. @ Rainbow Vision	3.7	0.6
Sawmill Rd. OPS Ventoso	4.1	0.4
Sawmill Rd. OPS Pradera	4.3	0.2
Sawmill Rd. @ rancho Vizcaya	4.6	0.3
Zia Rd OPS Villa Real Apts.	5.1	0.5
Zia Rd. OPS Capshaw Jr. High School	5.3	0.2
Zia Rd. NS Botulph	5.5	0.2
Botulph Rd. NS Chavez Rd	5.7	0.2
Miguel Chavez Rd.FS Brothers Rd.	6.2	0.5
Siringo Rd. NS Brother Rd	6.4	0.2
Siringo Rd. @ St. Michael's High School	6.5	0.1
Botulph Rd. NS Calle Ojo Feliz	6.7	0.2
Botulph Rd. FS Botulph Lane	7.1	0.4
St. Vincent Hospital	7.4	0.3
Hospital Dr. @ Medical, Dental Center	7.7	0.3
Galisteo St. NS San Mateo Rd.	8	0.3
Galisteo St. NS Galisteo Lane	8.3	0.3
Galisteo St. OPS Lomita St.	8.8	0.5
Galisteo St. FS Santa Fe Ave.	9.2	0.4
Sandoval St. NS Water St.	9.7	0.5
Sheridan Transit Center	10	0.3