

# ***TRANSIT GAP STUDY***



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## Executive Summary

This Transit Gap Study was prepared in response to a settlement agreement between the City of Stockton, the Sierra Club, and the California State Attorney General regarding the City of Stockton's 2035 General Plan. The overall aim of the settlement agreement is to reduce greenhouse gas emissions in the City which contribute to global climate change. The intent of the transit gap study is to identify deficiencies in the public transit network that contribute to public transit being a less than competitive travel mode to the single occupant vehicle. A further purpose of the transit gap study is to identify strategies and develop guidelines for improvement, to increase public transit usage in the City of Stockton, thereby reducing dependence on private automobile travel and reducing overall greenhouse gas emissions.

The gap study analyzes deficiencies in four primary areas that are essential in developing a successful transit market. These areas include geographic gaps, transit service quality gaps, policy gaps, and funding gaps. Each part depends on the others to create an environment where transit is a competitive travel mode for a majority of trip purposes. The key points of each element are addressed as follows:

- **Geographic Gaps.** These occur when transit does not effectively cover the service area, making transit inconvenient for customers to access.
- **Transit Service Quality Gaps.** Service quality gaps occur where transit is not delivered effectively enough to encourage customers to ride. Transit customers respond to fast, frequent, reliable service which is easy to understand and navigate. These elements are combined in bus rapid transit service (BRT).
- **Policy Gaps.** Effective policy encourages the provision of local transit and promotes it as a competitive (or preferred) travel mode. Policy gaps occur where existing City policies do not adequately encourage the provision of both transit service and transit-friendly land development.
- **Funding Gaps.** Funding gaps occur when sufficient funds are not available to provide for transit's operational and capital needs.

The data and analysis presented in this study comes from the City of Stockton, the San Joaquin Council of Governments, and the San Joaquin Regional Transit District (RTD). RTD recently underwent a comprehensive operational analysis of their current bus services, which included extensive data-gathering and analysis techniques.

The transit service improvements laid out in this gap study will require additional sources of revenue beyond RTD's current available budget. The study will discuss the future revenue needs and possible sources of sustainable funding.

Key findings in the gap study include:

- Geographic coverage of the service area is adequate to serve the demand. Aside from future development and addressing certain geographic barriers, no existing areas in the RTD system require additional transit coverage. Resources should be invested in improving service quality.

- Positive qualities of transit service in Stockton include the current Metro Express BRT route, service provided at appropriate times of the day or week, and high-quality passenger information. Areas for improvement include overall infrequent service, low service reliability, and complicated bus routes. These areas for improvement should be addressed to improve the attractiveness of the service to potential passengers.
- General Plan policies address the role of transit but may not go far enough in stressing the importance of a robust local transit network. General Plan development policies should also lay out more specific information regarding transit-friendly urban design strategies.
- Current transit funding sources are dwindling and are not adequate to provide for improvements necessary in the network. The City should look to increase sustainable transit funding, either by assessing fees on new development or other tax measures.

The gap study provides the key principles necessary to provide quality transit service and design transit-friendly cities and neighborhoods. It also provides direct recommendations about where to prioritize improved transit service.

The overall theme of the gap study is that transit does not need to be provided everywhere to be effective; transit works best where it can be provided quickly, frequently, and reliably along dense, mixed-use corridors. Both transit investment and land development should be directed towards key areas of the system to provide convenient travel opportunities, lowering the need for private automobile transportation.

# 1 Introduction

***What is the purpose of a transit gap study?*** The purpose of a transit gap study is to identify areas of deficiency in a public transit network and provide a fundamental set of strategies necessary to address these deficiencies. The gap study can evaluate the “gaps” between a City’s current and future transit environment to determine the potential for providing efficient and effective transit service and to address existing and future population growth. These gaps can occur in various forms, including transit service-based gaps, land use-based gaps, policy and funding gaps. A gap study will lay out the challenges and opportunities for transit within a City market, and recommend a series of actions to make transit an efficient and effective travel option, ideally providing competition with automobile travel.

***Why is Stockton doing a gap study?*** In agreement with the Sierra Club and State Attorney General, the City of Stockton is performing a transit gap study as part of an overall Climate Action Plan to decrease greenhouse gas (GHG) emissions from a variety of sources, including private automobile travel. The transit gap study will provide the basis for development of an overall Transit Program that addresses public transit deficiencies to make transit a more viable travel mode, thereby decreasing vehicle miles traveled by private automobile.

***What will be the results of the gap study?*** The gap study will provide:

- An assessment of the current transit service in Stockton;
- Identification of “gaps” in the transit environment under the current and future Stockton 2035 General Plan conditions;
- Guiding principles to create a more transit-friendly environment within the City; and
- Recommendations for improvements to the public transit system and strategies to increase transit usage and reduce automobile vehicle miles traveled.

The results of the transit gap study will be utilized and provide the basis for the development of an overall transit program to implement the policies and fund the desired improvements to transit service in Stockton.

## 1.1 Background

***Settlement Agreement*** On December 11, 2007, the City of Stockton approved the 2035 General Plan, infrastructure studies, Bicycle Master Plan, Final Environmental Impact Report and Statement of Overriding Conditions. In 2008, the Sierra Club filed a Petition of Writ of Mandate with the San Joaquin County Superior Court alleging that the City’s General Plan and subsequent Environmental Impact Report (EIR) failed to incorporate adequate, enforceable measures to minimize GHG emissions. The State Attorney General also raised concerns that the EIR failed to comply with Assembly Bill 32, the Global Warming Solutions Act of 2006. This Bill involves a statewide mandate that GHG emissions in 2020 should not exceed 1990 levels, and sets out enforceable measures for compliance. All parties agreed on the need to reduce GHG emissions in a meaningful, constructive manner. The suit resulted in a settlement agreement between the City of Stockton, the Sierra Club, and the State Attorney General which requires detailed strategies for GHG reduction.

The settlement agreement requires that the City submit a Climate Action Plan as an element of the General Plan. The Climate Action Plan will include:

- Inventories of current, 1990, and projected 2020 GHG levels and strategies to reduce 2020 levels to 1990 levels;
- Requirements for green building practices;
- A transit program based on the transit gap study;
- Additions or amendments to General Plan policies regarding land development and transportation; and
- A monitoring program to review and measure the efficacy of the strategies.

The agreement states that the transit gap study “shall analyze, among other things, strategies for increasing transit use in the City, and shall identify funding sources for BRT and other transit, in order to reduce per capita VMT throughout the City.” The agreement suggests strong interest in bus rapid transit (BRT) as a way to increase transit usage in the City. It also states that the study may be coordinated with local and regional transportation agencies.

A key component of the agreement states that new housing or other development projects of a certain size (designated as “master development plans” or “specific plans” within the General Plan) shall be designed to allow convenient access for vehicles, transit, bicycles, and pedestrians. These projects must also involve densities supportive of transit use, and provide financial and/or other support for transit. The gap study will include Principles for transit-friendly development design.

## **1.2 Key Players**

Three forums guide the creation of the gap study: the City of Stockton, RTD, and the Climate Action Plan Advisory Committee (CAPAC).

**City of Stockton** Stockton is a city of approximately 300,000 residents in northern California, south of Sacramento and east of San Francisco. It is the largest city in San Joaquin County, which also includes the areas of Lodi, Tracy, Manteca, Lathrop, Ripon, and Linden. Stockton includes a river port, a downtown district, a large university and community college, and major shopping destinations. Surrounding uses are largely agricultural. Stockton is not a major employment district, and has approximately three times the amount of residents as jobs. Many residents commute to work in larger cities such as Sacramento, San Francisco, or San Jose.

The City of Stockton’s 2035 General Plan is the focus of the settlement agreement and will be discussed throughout the gap study. The General Plan is a comprehensive document that lays out goals and policies to shape the city’s future. The topics covered include Land Use, Housing, Economic Development, Community Design, Districts and Villages, Transportation and Circulation, Public Facilities and Services, Recreation and Waterways, Health and Safety, Youth and Education, and Natural and Cultural Resources. Discussion will largely focus on the Transportation and Circulation elements of the

General Plan, as well as Land Use and Community Design elements which have implications for transit service.

The gap study was developed in coordination with the City's Community Development department, which establishes long-range policies and goals to provide for the growth of the Stockton community. The Community Development department includes Building, Planning and Engineering Services Divisions and oversees development within the City.

***San Joaquin Regional Transit District (RTD)*** As the regional transit provider for San Joaquin County, RTD operates transit services within Stockton and to surrounding cities. RTD operates approximately 300,000 hours of service annually and carries roughly 4 million passenger trips. RTD services are divided into two basic groups, Metro and County services.

Metro services are operated within the Stockton Metropolitan Area and do not serve other cities. Metro services include:

- **Metro Express.** This is RTD's BRT route serving central Stockton.
- **Metro Local.** These are standard Local bus services running on major corridors throughout the City. RTD currently operates 30 Local routes, ten of which operate limited hours of the day.
- **Trolley.** RTD operates two routes with trolley-type buses. These operate as short-distance shuttles or special events services.
- **Metro Hopper.** Recently implemented, the seven Metro Hopper routes follow a designated route but can deviate for up to a mile if passengers wish to access their destinations directly. Hopper services cater to those who cannot ride regular fixed route transit.

The gap study analysis will largely focus on Metro services, since they serve the central Stockton area.

County services include long-distance routes that run from Stockton to other cities and regions. County services include:

- **Interregional.** These seventeen routes run long distances to serve areas such as Sacramento, San Jose, and BART stations. They serve commuters and run limited hours.
- **Intercity.** These three routes run from Stockton to the nearby cities of Lodi, Lathrop, Tracy, and Manteca, and run throughout the day.
- **Hopper.** Like the Metro Hopper service, County Hopper service may deviate from established routes to serve passenger needs. The three Hopper routes serve Lodi, Tracy, Manteca, and Ripon.

RTD service is based around two major hubs. The Downtown Transit Center (DTC) is the focal point of the RTD network, and is served by 24 Metro routes and 6 County routes. DTC is the largest boarding location in the RTD system. The Mall Transfer Station near Sherwood Mall is the second largest boarding location in the system, with 23 Metro routes and 4 County Routes.

***Climate Action Plan Advisory Committee (CAPAC)*** The CAPAC was created to oversee the development of the Climate Action Plan mandated in the settlement agreement. The committee is made up of one representative from each of several interests: environmental, non-profit community organization, labor, business, and developers. The CAPAC monitors the City's compliance with the agreement and recommends funding and other measures to assure that the proposals are implemented.

### **1.3 RTD Comprehensive Operational Analysis**

RTD decided to perform a Comprehensive Operational Analysis (COA) in 2009. The COA process collects detailed information about current transit service and ridership, as well as market area demographics and demand patterns. This process provides a comprehensive data set which is used to recommend changes to improve the quality of the transit network. The end result of the COA is a phased implementation plan for changes, as well as the associated financial impacts of the recommendations. Due to the correlation between the COA process and the necessary gap study analysis, the City of Stockton participated in funding the COA.

The RTD COA will include the following elements:

- Existing Service Analysis – detailed analysis of transit system performance
- Market Analysis – current and future population levels, demographics, and land uses
- Service Framework – service classifications, guidelines for service changes, service standards
- Preferred Service Plan – recommendations for improvements to transit network
- Implementation and Financial Plan – timeline and financial implications of Preferred Service Plan

Transit system and ridership data was collected in spring 2009 through an on-board ridecheck of RTD services. Checkers were placed on buses to count the number of passengers boarding and alighting at each stop, as well as the times in which the buses arrived and departed from stops. Each RTD trip was sampled once. Checkers also passed out passenger surveys on board the buses, which gathered detailed information about the types of passengers riding and how they used the system.

The COA market analysis and ridecheck data forms the basis of the analysis shown in this gap study. RTD underwent a major service change in October 2009, so the routes and schedules currently in place are not quite the same as those studied within the COA. Gap study analysis focuses on the 25 Metro routes running at the time of the ridecheck and running throughout the day.

### **1.4 Gap Study Structure**

Gaps related to public transit were identified and evaluated in four primary areas. Each of the areas is listed below and contains a range of issues and opportunities for transit improvement.

- Geographic Gaps, where transit does not effectively cover the service area.
- Service Quality Gaps, where transit is not sufficiently attractive as a travel mode to compete with automobile transportation.

- Policy Gaps, where transportation- and development-related policies fail to encourage transit use.
- Funding Gaps, where insufficient revenue results in a less competitive transit network.

Each section will include a discussion of key principles, an assessment of current conditions, and recommendations for improvements.

## 2 Geographic Gaps

Geographic gaps exist where transit does not effectively cover the service area. The existence of these gaps may be due to funding limitations, changing land use or demographic patterns, or simple oversight. Geographic gaps include:

- Areas which have no transit service present within an acceptable walking distance
- Missing linkages between prominent origin-destination patterns, and
- Geographic barriers to effective transit service.

### 2.1 Principles

Many transit systems have basic guidelines for area coverage, which are linked to population density. Higher-density areas involve a variety of trip purposes and support a robust network of transit service, whereas lower-density areas support less service. The widely-accepted coverage standard is for transit service to be provided within a maximum of ½ mile walking distance to most residents in the system, with high-density areas warranting more service (up to ¼ mile walking distance). Sometimes, transit systems specify a density standard below which no transit service is required.

Demographics are also important considerations for transit service coverage. Several demographic groups are considered “core” groups of transit ridership, including students, seniors, and low-income populations. These groups include people who for various reasons cannot drive their own cars and depend on transit on a daily basis. Presence of these groups in concentrations signals the need for transit service.

The key message in these standards is that coverage should be supplied proportionally to the amount of potential transit ridership likely to benefit. Providing service within walking distance of all residents in the service area is not financially effective and diverts resources from more intense areas of the system. In lower-density, largely residential areas of the system, transit may not be an effective travel option. The following table shows basic guidelines between density and level of transit service.

Density Level	Transit Potential
<b>0-3 people per acre</b>	Very low density. No requirement necessary for transit service.
<b>3-12</b>	Low to medium density. Service provided along major corridors and to key destinations.
<b>12+</b>	Medium to high density. Service provided within ½ mile walking distance of most residents.

Geographic transit coverage and urban design should be considered as interrelated concepts. While geographic coverage supplies transit to the population, designing centrally-located, fairly dense residential and commercial development brings population to areas of good transit service. From a VMT reduction standpoint, quality service provided in certain locations is more effective than a low level of service provided evenly across the service area. Quality transit service will be discussed in detail in Section 3.

## 2.2 Current Geographic Coverage

The City of Stockton has grown substantially and is predicted to do so in future. According to the US Census, the population of Stockton surpassed 290,000 people in 2006, an estimated 38% increase since 1990. Furthermore, the population of the greater Stockton area is expected to reach 390,000 residents by 2020 (SJCOG Population Projections). This population growth must be met with greater development and employment opportunities. Future residents of Stockton will likely require increased travel capacity for more trips to work, shopping and recreation. In order to avoid traffic congestion issues while potentially reducing vehicle miles traveled and subsequently greenhouse gases, transit access must be readily available as an alternative transportation mode.

Map 2.1 shows 2006 population density (SJCOG) as well as service coverage. Transit service seems fairly evenly spread across the service area, concentrated around downtown and the Downtown Transit Center (DTC). Most of RTD's Metro routes touch at least one of the two major hubs, DTC and the Mall Transfer Station (MTS), which facilitates transfers and helps provide convenient service throughout the Stockton area.

Map 2.2 shows 2009 ridecheck data. The circles on the map correspond to the amount and location of boardings throughout the system. Ridership is heavily concentrated in the City of Stockton data as opposed to outlying areas. Within Stockton itself, the largest amounts of boardings appear between downtown Stockton and Hammer Lane, along the Metro Express BRT corridor. Certain high schools (especially Franklin and Cesar Chavez High Schools) also show high levels of transit activity. This map shows that transit ridership Stockton is concentrated in certain areas, rather than spread evenly throughout the service area.

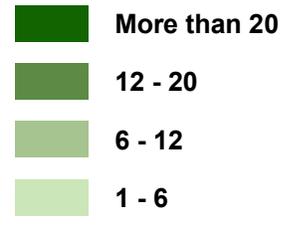
Stockton does not have the concentrated population density of a large city like San Francisco, which may sustain levels of over 80 people per acre in certain areas. Still, many areas of Stockton have basic transit-supportive densities of over 12 people per acre, and in some locations, over 20 per acre. Areas with the greatest population density include downtown and its surrounding area, as well as areas north of Hammer Lane. Pockets of medium to high density are scattered throughout the service area, and all of these areas are served by current RTD service. There appear to be no major coverage gaps in the current Stockton service area.

**Residential Transit Orientation Index** In order to properly assess the geographic markets that have high transit ridership potential, a residential transit orientation index (RTOI) has been calculated based on 2000 demographic data (see Map 2.3). The RTOI provides an effective tool to identify residential areas with a high propensity to use transit. Developed for use in transit restructuring studies, this index can conveniently summarize the demographic characteristics of a particular route's service area.

The RTOI compares Transportation Analysis Zones (TAZs) within the Stockton area with respect to five key demographic variables associated with transit use: the elderly population, the youth and college

# 2006 Population Density

## Population per Acre



Bus Network



Stockton

Port of Stockton

4

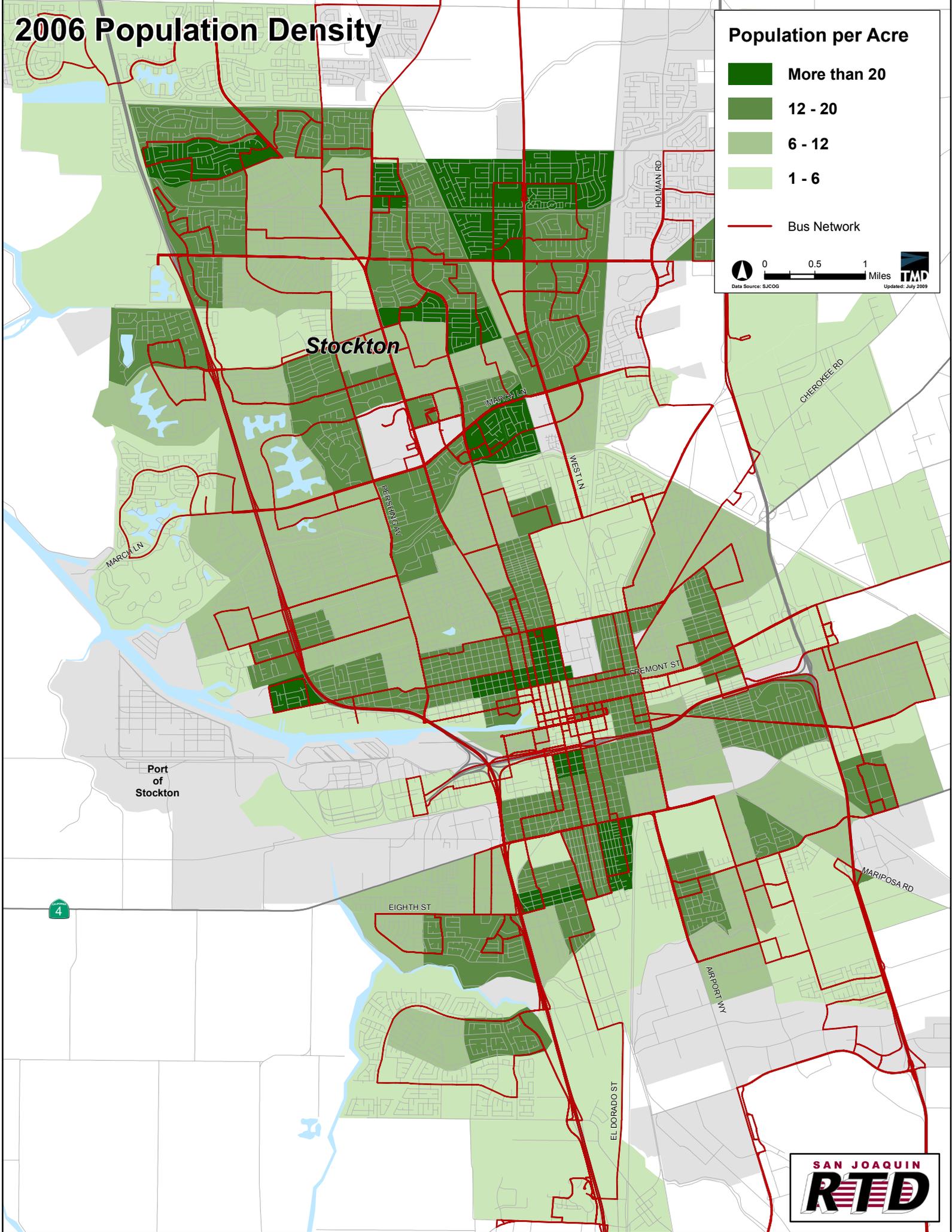
EIGHTH ST

FREMONT ST

ELDORADO ST

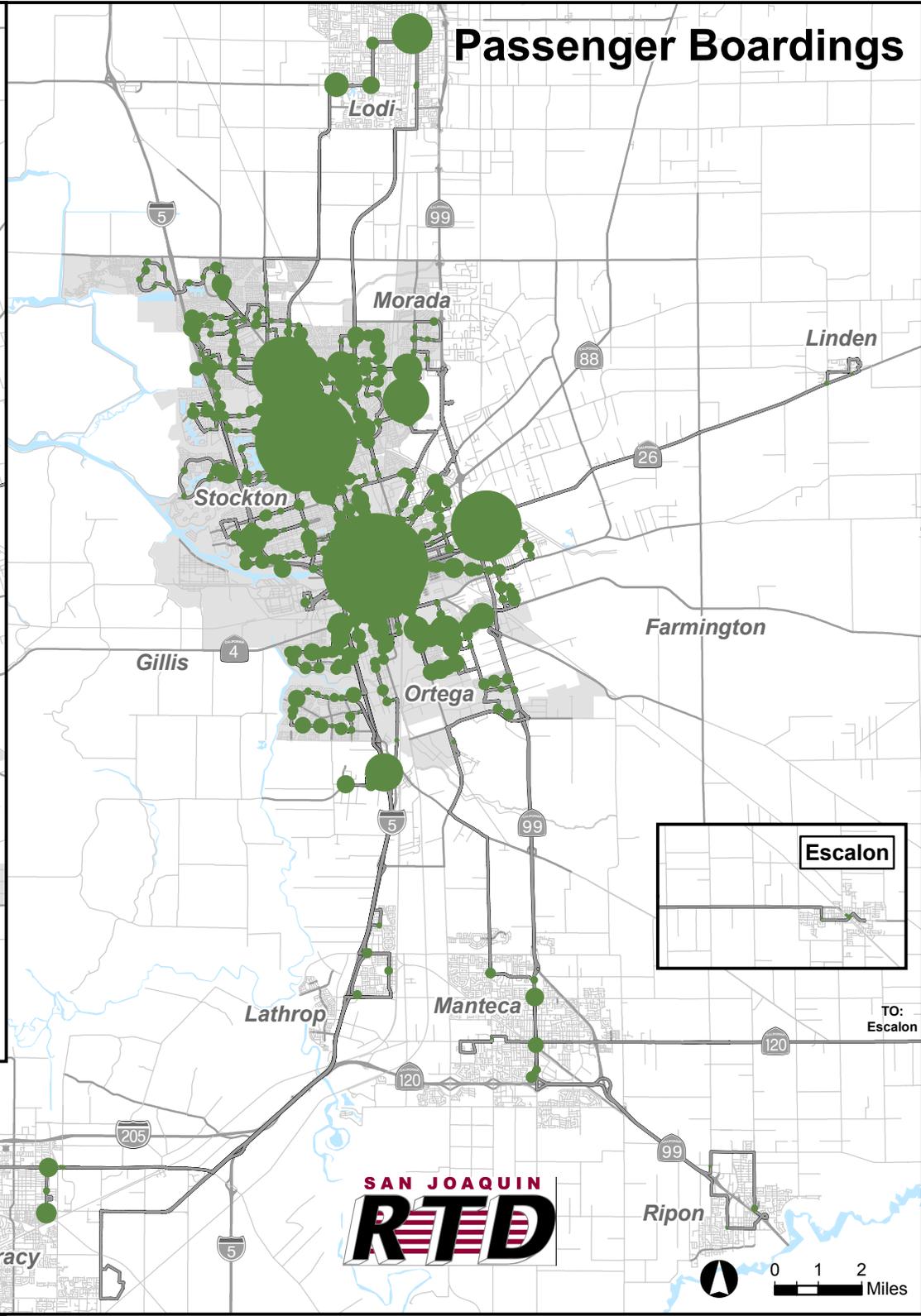
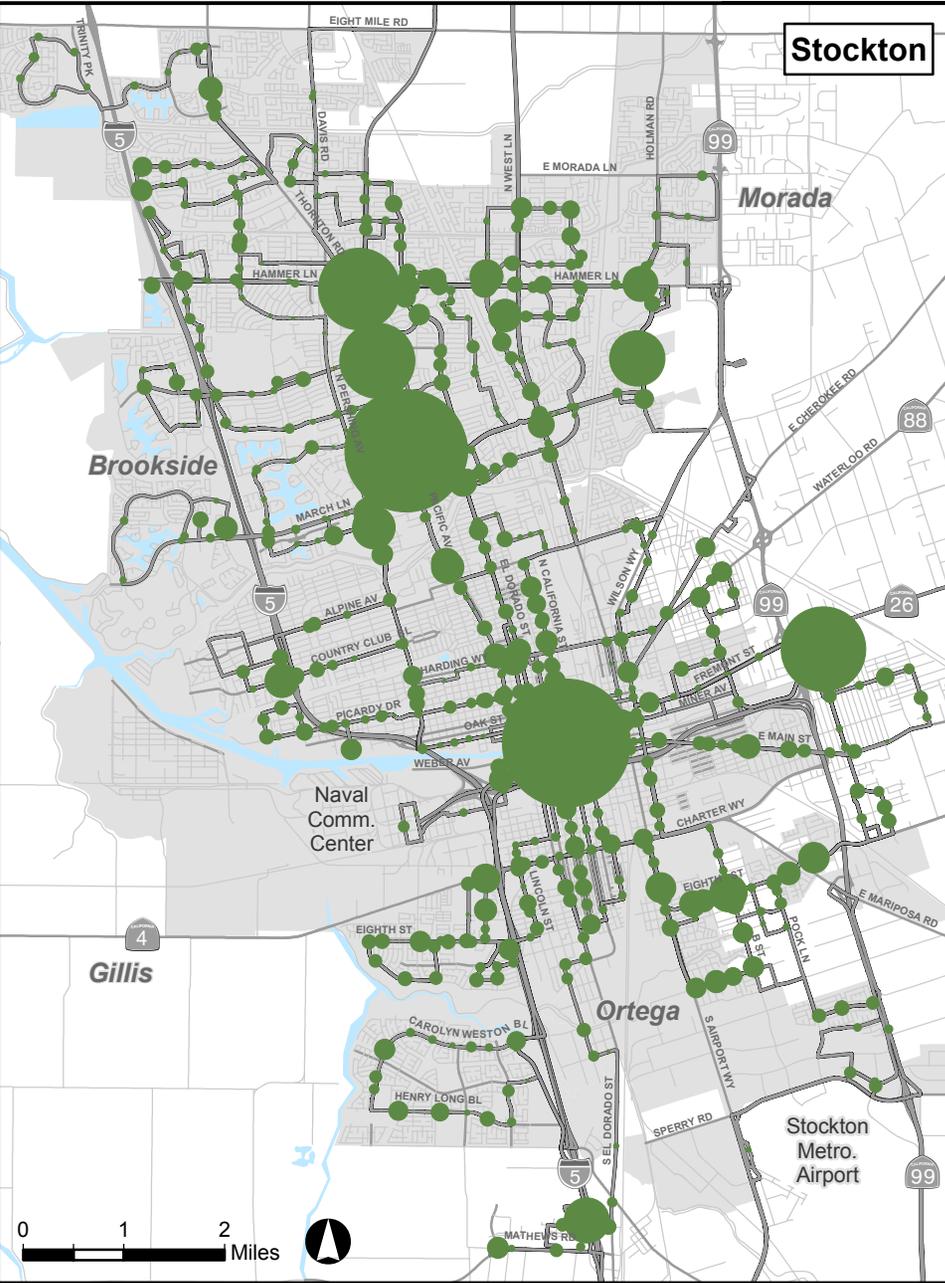
AIRPORT WY

MARIPOSA RD

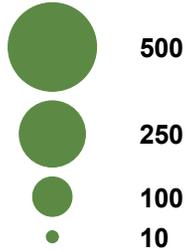


Stockton

# Passenger Boardings



## Daily Boardings - Weekday



— SJRTD Network



Data Source: 2009 Rider Survey Updated: October 2009



TO: Escalon

# 2000 Transit Demand Potential

## Residential Transit Orientation Index

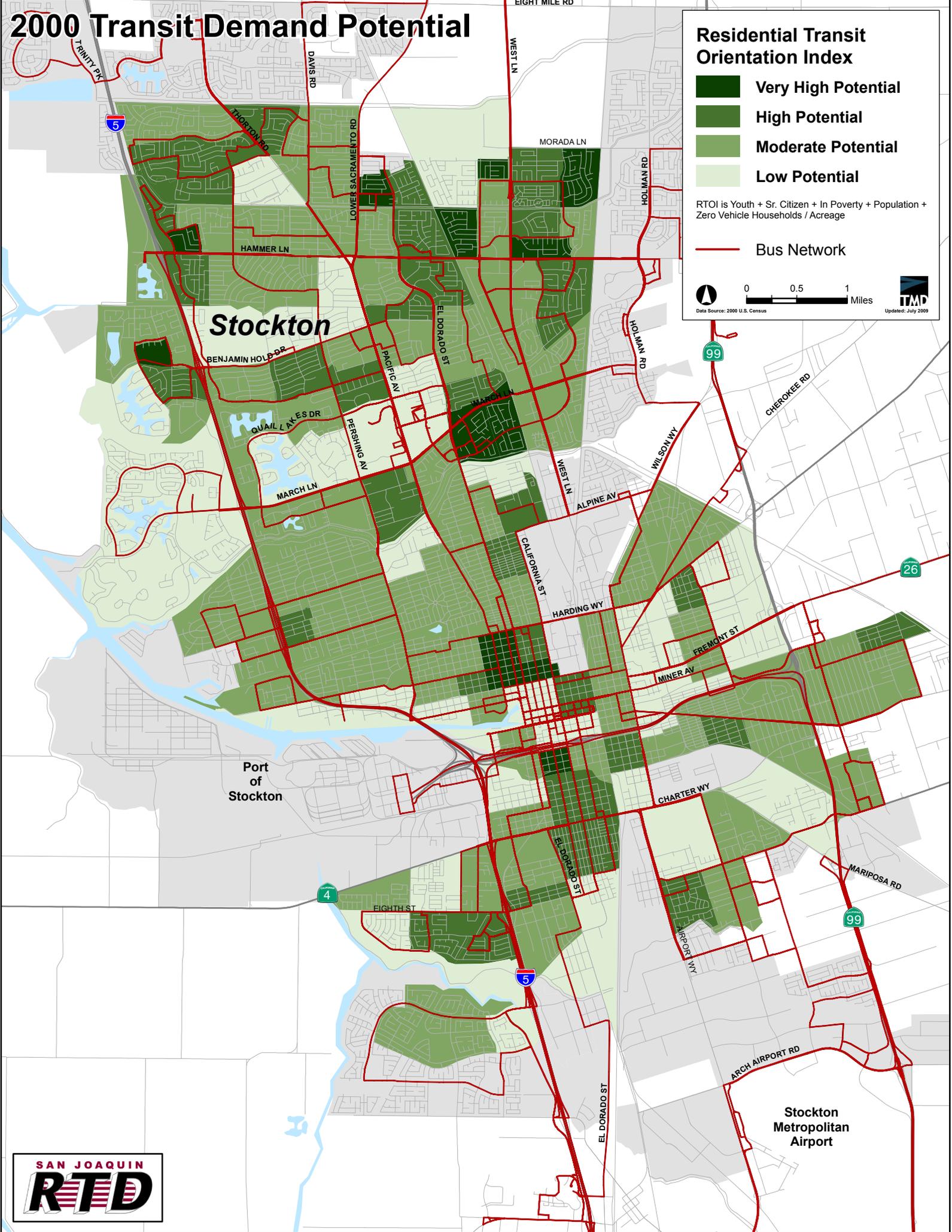
- Very High Potential
- High Potential
- Moderate Potential
- Low Potential

RTOI is Youth + Sr. Citizen + In Poverty + Population + Zero Vehicle Households / Acreage

Bus Network


0    0.5    1  
Miles

Data Source: 2000 U.S. Census
 Updated: July 2009



**Stockton**

Port of Stockton

Stockton Metropolitan Airport



age population, the financially disadvantaged population, zero vehicle households, and residential density. For each variable a score is assigned to each TAZ based upon how that variable compares to the countywide average. The score is then derived using a comparative probability estimation. A composite score is then obtained for each TAZ by summing the scores for each of the four individual variables. These composite scores are then ranked and assigned to one of five transit orientation groups (very high, high, moderate, low, and other) based upon how each compares to the average score for the county as a whole. In general, a higher score reflects a greater propensity to use transit.

The RTOI can be used to assess unmet needs in particular neighborhoods, or used as a measure of transit orientation within the service area of each of the routes. Stockton displays moderate levels of transit demand potential with numerous pockets of very high transit demand, particularly surrounding the downtown center and also in the northern region of the city. However, the current RTD system adequately covers areas with high ridership potential.

A significant portion of the current riding population lives within the immediate vicinity of the RTD transit network. High levels of employment density are also adjacent to current bus service alignment. High densities along Hammer Lane and Pacific Avenue, for example, are accommodated by service traveling to major points throughout the City. In addition, future levels of residential and commercial development appear to intensify within the immediate vicinity of current RTD service.

***Geographic Barriers to Service*** Stockton's unique geography and infrastructure make it so that there are many barriers to through service. There are many canals and waterways, and railroad tracks that bisect the city. For this reason few through north/south streets exist, and in south Stockton, few east/west streets. Much local travel occurs on the interstate freeway and other highways.

These barriers make transit service challenging. While the Stockton service area appears to have no major service coverage gaps as a result of these barriers, the existing service coverage area could be served more efficiently by addressing them. Bus routes must sometimes be circuitous in order to penetrate into neighborhoods and still serve major destinations. Some of the key barriers include:

- MLK/Charter is the only east/west street in Stockton which has a grade separation with the rail line. Eighth Street is a major thoroughfare which could also use a grade separation to provide through service. Connecting Sperry Road with French Camp Road would also provide a valuable connection in South Stockton. Among other things, these connections would provide a more convenient trip for many residents of South Stockton to the San Joaquin General Hospital. The Arch-Sperry connection is a currently planned project within the City of Stockton, and should be funded and expedited as quickly as possible to provide needed connections.
- No north/south street west of Pershing (besides I-5) provides through service due to canals and waterways above Shimzu Drive and between River Drive and Brookside Road. A north/south connection would enable more efficient service of these neighborhoods. Providing a linkage for minimal cost may involve creating a bridge for transit, bicycles and pedestrians only, reducing the lane space needed and providing an incentive to use these modes of transportation. A likely corridor is Alexandria Place, midway between I-5 and Pershing Avenue.

Many streets within the newer neighborhoods in Stockton (such as those north of Hammer Lane) are designed in a disjointed/disconnected manner which requires lengthy, complex transit service. Street networks should be designed to be as simple and connective as possible (See Section 4, Policy Gaps).

### 2.3 Future Geographic Gaps

As Stockton's population grows as predicted over the next 10 to 20 years, the increasing population will require new development. From a transit perspective, the most efficient and cost-effective way to accommodate new development is through infill, which may increase population along existing transit corridors. This way, additional travel demand can be accommodated through increased frequency rather than extending or adding new routes.

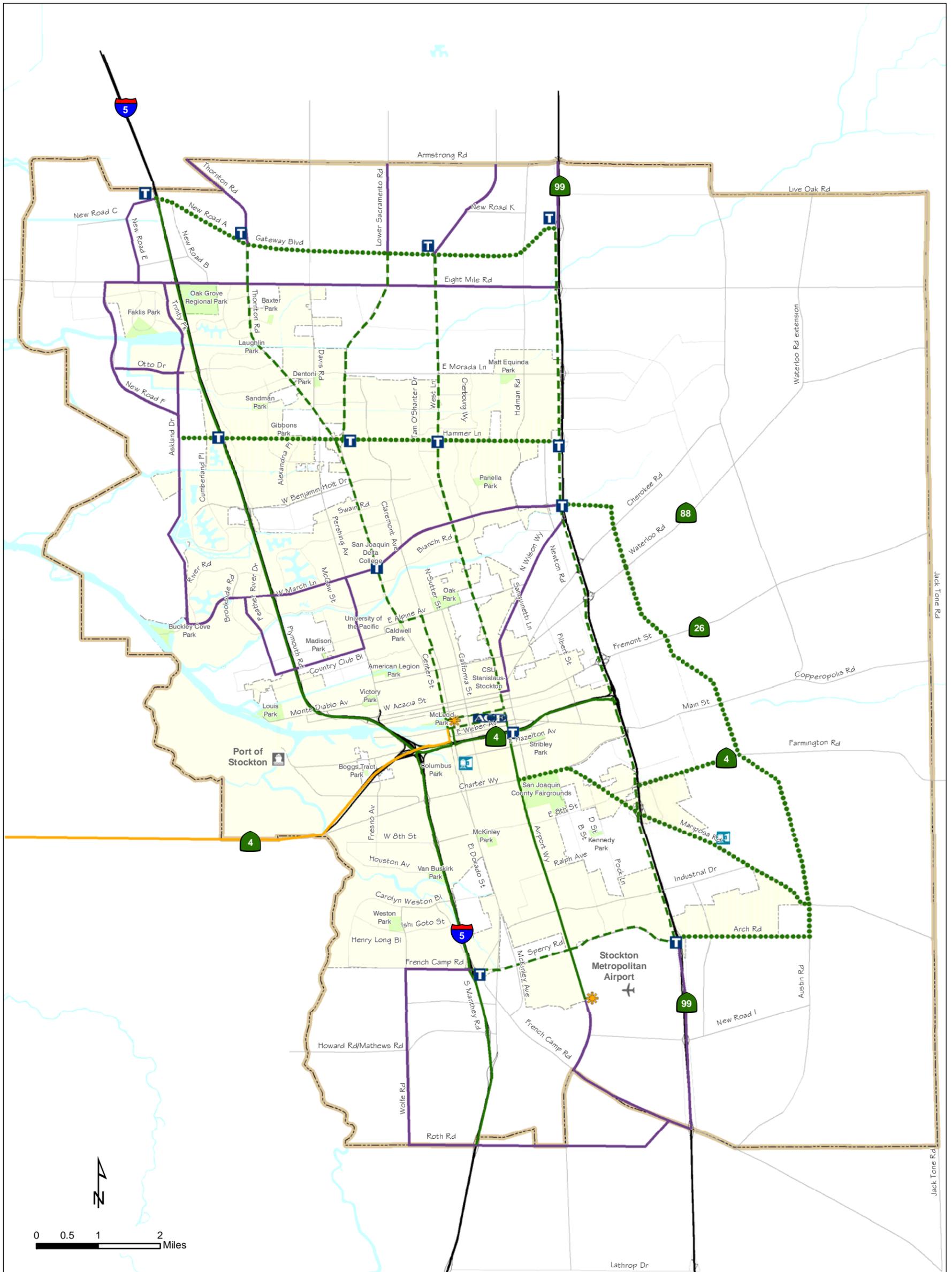
New development on the outer fringes of the Stockton area is planned to be accommodated as "village" type development. These villages will mirror inner city neighborhoods by maintaining a mix of residential, commercial, school, public, and recreational uses (thereby providing for a variety of needs and reducing VMT). These villages are proposed to be located in the following locations:

- Northern Stockton north Eight Mile Road and also south of Eight Mile Road between Lower Sacramento Road and West Lane
- Along the waterfront west of Interstate 5 near Hammer Lane
- South of downtown just south of Wolfe Road and west of Stockton Airport
- Eastern Stockton just south of State Route 4 and north of Mariposa Road

The overall goal of this village concept is to reduce vehicle dependency and promote alternative transportation modes, thus creating new transit ridership potential for RTD. Future system resources should ensure proper access to transit to these proposed villages in order to avoid increases in vehicle miles traveled into the city center and between villages. Service to the villages should be provided in context with the population density of the development, and designed to provide direct service (minimal deviation) to the village itself.

The Stockton 2035 General Plan includes a Future Transit Network Map (Map 2.4) which lays out the probable need for future enhanced transit service, such as BRT. It divides the type of transit needed into classifications of BRT type 1, 2, and 3 based on the intensity and need along the corridor. It is notable that much of the BRT development is planned **on the outskirts of current RTD service area**, such as Gateway Boulevard in the north, Sperry Road in the south, and Mariposa Road in the east. This enhanced service is designed to accommodate the new development in these areas.

While these outer areas may warrant increased transit service to serve new development, the General Plan should emphasize improving transit service within the core of the system. The vast majority of current ridership occurs within the central Stockton area, and many of the existing transit routes warrant improved service (discussed more thoroughly in the Section 3). Investing in better transit in the core of the system works well with a policy of encouraging infill development, where additional demand is located where transit already exists.



**LEGEND**

**Proposed Bus Routes**

- BRT Type 1  
(enhanced speed and reliability, shared lanes)
- - - - BRT Type 2  
(intersection priority, passenger information)
- BRT Type 3  
(dedicated lanes, greater frequency)
- Express Service
- Major Local/Feeder Service

- Park
- ▭ Plan Boundary
- ▭ City Limits
- ✱ Transit Hub

- ACE ACE Station
- Amtrak Station
- T Major Transfer Point

**FIGURE 8-2 - 2035 GP FUTURE TRANSIT NETWORK**

## 2.4 Recommendations

Stockton's service area is currently supplied with adequate transit coverage. Most residents within the medium- to high-density areas of the system have access to transit service within a reasonable distance. Inadequacies in the amount of service provided on these routes will be addressed in the Section 3, Service Quality Gaps.

**Recommendation 1:** Address geographic barriers. Improving connections would increase the efficiency and decrease the cost of serving existing areas, plus provide passengers a trip more suited to their needs. Improvements include:

- Increasing east/west connections in South Stockton, particularly Eighth Street and Sperry Road. All efforts should be made to complete the currently-planned Arch-Sperry connection.
- Providing a north/south connection (other than I-5) west of Pershing Avenue, such as a transit/bicycle/pedestrian connection along Alexandria Place.

**Recommendation 2:** Develop policies and programs to encourage infill development as much as possible, to direct population growth into areas where transit service already exists.

**Recommendation 3:** Provide efficient transit service to new Village development in the outskirts of the Stockton area. Service will be provided at levels appropriate to the population density of the development and designed to be as direct as possible.

### 3 Service Quality Gaps

Service quality refers to the attractiveness of transit service to current and potential passengers. Service quality gaps occur when transit is not delivered effectively enough to compete with other modes of transportation and reduce VMT. This issue is addressed in terms of transit frequency, service span, reliability, and simplicity. These attributes are combined in BRT design, which is discussed separately.

#### 3.1 Frequency

Frequency of service refers to how often buses operate on a given route. RTD routes operate as often as every 15 minutes and as infrequently as every two hours. Most of RTD's routes run every 60 minutes. A **headway** refers to the amount of time between buses (e.g. a route which operates every 60 minutes has a 60-minute headway).

##### 3.1.1 Principles

Frequency is a key element in making transit service attractive to passengers. Routes which run more frequently have a greater capacity to carry passengers, are more convenient to use, and are more visible in the environment. High frequency also facilitates transfer activity, by ensuring that customers will not have to wait long for their connecting trip. High frequency is provided on routes with the highest amount of ridership in the system. These lines can be considered the backbone of a transit network.

Transit frequency determines whether or not passengers must consult printed schedules when they ride. Industry research has shown that a 13-minute headway is the boundary in customers' minds between whether they can randomly arrive at a bus stop or whether they will consult a schedule. Therefore, at a 15-minute headway, more than half of passengers will consult a schedule, while at a 12-minute headway, more than half of passengers will arrive spontaneously.

Routes which run frequently enough so that passengers can arrive spontaneously are vastly more convenient to use and generate higher ridership. People with access to cars can travel at any time, so transit which provides the same ability to travel will attract a greater percentage of riders. The higher the frequency, the more likely that people who have other mobility options will ride. Due to the inconvenience of use, low-frequency routes generally cater to transit-dependent riders.

Transit customers also respond favorably to consistent headways that fit evenly into the span of an hour (often referred to as "clock-facing headways" or "memory schedules.") This includes headways of 5, 10, 12, 15, 20, 30, and 60 minutes. The bus arrives at the same time at a given bus stop, hour after hour. Customers can often commit these schedules to memory, which is not the case with other headway lengths. If the optimum headway will not fit into an hourly schedule (40 and 45 minute headways are common examples) they should at least be consistent throughout most hours of the day, and not vary by trip.

The following table shows the discussed levels of service and their appropriate market type.

Frequency Level	Appropriate Market
<b>15 minutes or better</b>	High-volume, high-capacity walk-up service for intense corridors. Suitable for all trips.
<b>30 minutes or better</b>	Acceptable volume for corridors with moderate transit potential. Suitable for most trip purposes.
<b>60 minutes or better</b>	Basic coverage for neighborhoods or other areas with low ridership potential. Caters largely to transit-dependent populations.
<b>Over 60 minutes</b>	Minimal service for transit-dependent riders in low-density areas, if service must be provided at all.

Like geographic coverage, transit frequency is linked to density and land use. Dense areas with substantial travel demand support higher levels of service. When prioritizing frequency improvements, dense areas with existing high frequency may warrant further improvements. Ridership levels often respond more favorably when existing high-performing lines are improved, than when low-frequency lines are improved. Strong route performance is often an indicator that increased service is necessary.

Increasing frequency requires increased resources and cost. Investment in frequency is directly proportional; upgrading from a 30-minute to a 15-minute headway doubles operating costs. High-frequency routes, such as those with 15-minute headways or better, are only applicable in certain high-density, high-volume locations which will provide maximum return on investment. *Investment in frequency should be proportional to the amount of population density, transit-friendly demographics, and key destinations available along a given corridor.*

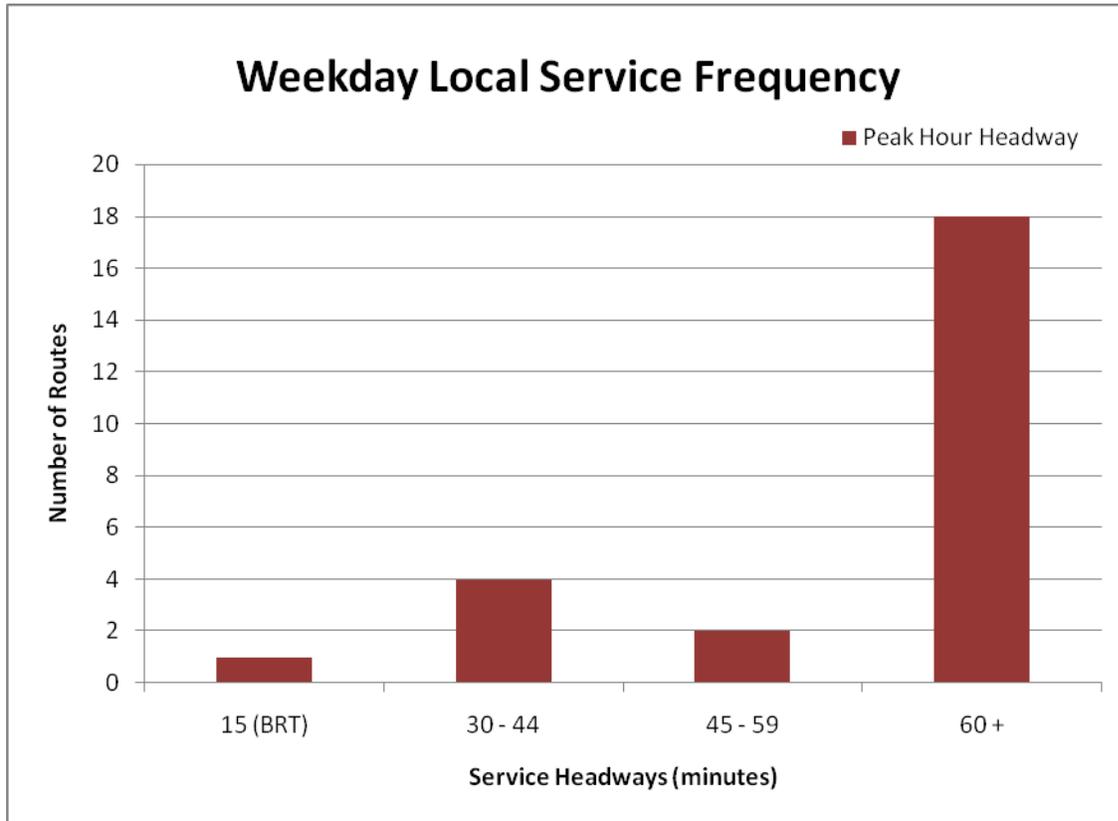
When revenue is limited (as it is for most transit systems), frequency and geographic coverage must compete for resources. In order to provide higher frequency in areas where it is warranted, it may be necessary to remove coverage from other, less intense areas of the system. Inversely, adding new coverage where necessary may require lowering frequency elsewhere in the system. The optimal result is a balance between frequency and coverage within the amount of revenue available to support the system.

**3.1.2 Current Conditions**

The recent COA took detailed inventory of RTD’s current service and how passengers use the network. This gap study presents the applicable findings of the Service Assessment, focusing on the 25 Metro routes which provide all-day service to the Stockton area.

RTD is largely a coverage-based system running at low overall frequency. Most routes run with 60-minute or higher headways. One route, RTD’s BRT route Metro Express, runs at 15 minutes headways throughout most of the day. RTD weekday service frequencies for the 25 Metro routes are shown in Figure 3.1 below, with each route’s best frequency displayed.

Figure 3.1



As this graph shows, most of RTD’s local routes provide low-volume, basic coverage. In many cases, the frequency provided is quite adequate to the market demand. The small amount of high-frequency routes, however, means that most travelers must plan their journey around schedules rather than arriving spontaneously. Low frequencies also suggest possible issues with transfer activity.

The following table shows the total number and percentage of RTD Local routes in each frequency category, and the associated percentage of ridership for the routes in that category.

Frequency Level	Number of Local Routes	Percentage of Local Routes	Percentage of Ridership
15-29 minutes	1	4%	18%
30-44 minutes	4	16%	29%
45-59 minutes	2	8%	4%
60 minutes or higher	18	72%	49%

Source: SJRTD COA 2009

RTD’s BRT route Metro Express, the only route which runs at 15-minute frequency, produces almost 20% of daily Local ridership (BRT discussed in more detail in Section 3.5). The four routes which have headways less than 45 minutes produce almost 30% of daily Local ridership, showing that *while only 5 routes run at headways less than 45 minutes, they produce roughly 50% of daily ridership in the Stockton*

area. The high productivity of these routes is likely due to a combination of corridor intensity and frequency.

### 3.1.3 Recommendations

Investment in frequency is necessary in certain key locations throughout the system where the market demand is large and has the potential to grow. These include areas which currently generate relatively high ridership, as well as areas where the RTOI discussed in the previous section show high transit demand potential. These corridors require higher frequency, now and/or in future, to provide improved service for passengers.

The corridors mentioned in this study are within the core of the Stockton area, not on the outskirts. *It is important to note that these frequencies are necessary along these corridors currently, with the amount of density and land uses along each corridor. With additional infill development in these areas, they will require higher frequencies, further increasing the service quality of each corridor.*

**Recommendation 1: South Airport Way in Southern Stockton.** Aside from the airport, this alignment includes high-density housing and employment destinations. It will also provide quick service into central Stockton from other areas south such as Manteca, Lathrop and Ripon. BRT service is planned for implementation in 2010.

**Recommendation 2: Hammer Lane.** This strong east-west corridor includes a variety of residential and commercial uses. Existing route performance is strong and the RTOI shows high levels of current market demand north and south of Hammer. Future growth predictions show increasing densities just north of Hammer Lane, incrementally intensifying the need for quality service. The demand on this route is appropriate for BRT service now and in future (as discussed in Section 3.5).

**Recommendation 3: California Street.** Although a relatively short corridor, California Street south of Alpine Avenue is a major ridership generator in the system. Currently, two routes combine to provide 30-minute service on this street, which must be improved to generate more trips.

**Recommendation 4: El Dorado Street.** The route which currently serves El Dorado Street is the second most productive route in the system, after Metro Express. This central corridor is a strong performer and a candidate for increased service levels. It is geographically close to the Metro Express, however, and does not warrant the same service levels.

**Recommendation 5: West Lane.** West Lane shows existing strong performance and is a popular north/south thoroughfare through the city. West Lane north of Hammer Lane has some of the highest densities within the RTD service area.

**Recommendation 6: Charter Way/MLK Boulevard.** This corridor is the only east/west through street in South Stockton, and includes a variety of land uses. RTD does not currently run a route which serves the corridor exclusively, but such a route is recommended.

Recommended frequencies are shown below.

Corridor	Current Weekday Frequency	Proposed Weekday Frequency	Current Weekend Frequency	Proposed Weekend Frequency
South Airport Way (BRT)	120	10/30 off-peak	60	30
Hammer Lane (BRT)	60	15	60	30
California Street	30	15	60	30
El Dorado Street	30	20	60	60
West Lane	60	30	N/A	60
Charter Way/MLK	N/A	30	N/A	60

### 3.2 Service Span

Service span refers to the days on which a transit route operates and amount of time that the route operates throughout the day. For example, a bus route might provide service from 5:00 am through 9:00 pm on weekdays. Service span gaps occur if service is not being provided for long enough periods of the day, or enough days of the week, to develop consistent ridership.

#### 3.2.1 Principles

Service span should be provided in relation to route performance, and the types of origins and destinations available along the route. All-purpose, high-ridership routes usually operate seven days a week from early in the morning to late at night to serve a variety of customers. Commute-based services only operate during peak commute hours on weekdays. Low-ridership, low-frequency routes generally start later in the morning and end earlier in the evening, and may only provide weekday service.

Limited service span is often a key complaint cited in surveys of transit customers. Patrons who work late-shift jobs or people interested for evening recreation may complain that transit is not available to take them home. People living near routes with no weekend service may be unable to access work or shopping using transit on weekends. The extent of service span differs from city to city; large metropolitan areas may provide service 24 hours a day, whereas in others, providing service until 11:00pm constitutes a comprehensive service span.

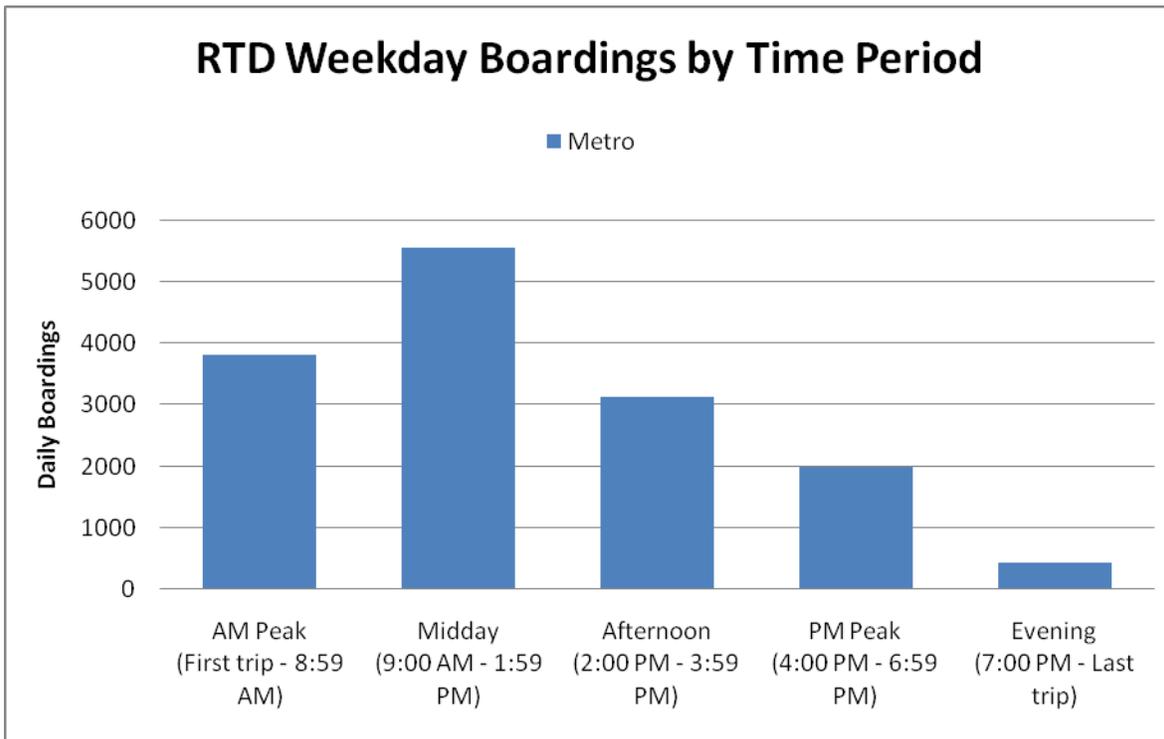
While providing a comprehensive service span is valuable to transit patrons, the vast majority of customers ride the system during normal business hours, roughly 7:00am to 7:00pm. Early and late service benefits some passengers but becomes expensive to provide when few people are riding. Longer service spans should be provided in key areas throughout the system, on high-volume routes, so that a basic level of service is provided during these hours but is not necessary everywhere.

### 3.2.2 Current Conditions

The majority of RTD routes run between 6:00 am and 8:00pm on weekdays. The Metro Express provides the most comprehensive service span in the system, from 5:00am to 11:00pm. The downtown trolley route has the shortest service span in the system, from 7:00am to 5:00pm. Sixteen of RTD’s 25 Metro routes provide weekend service.

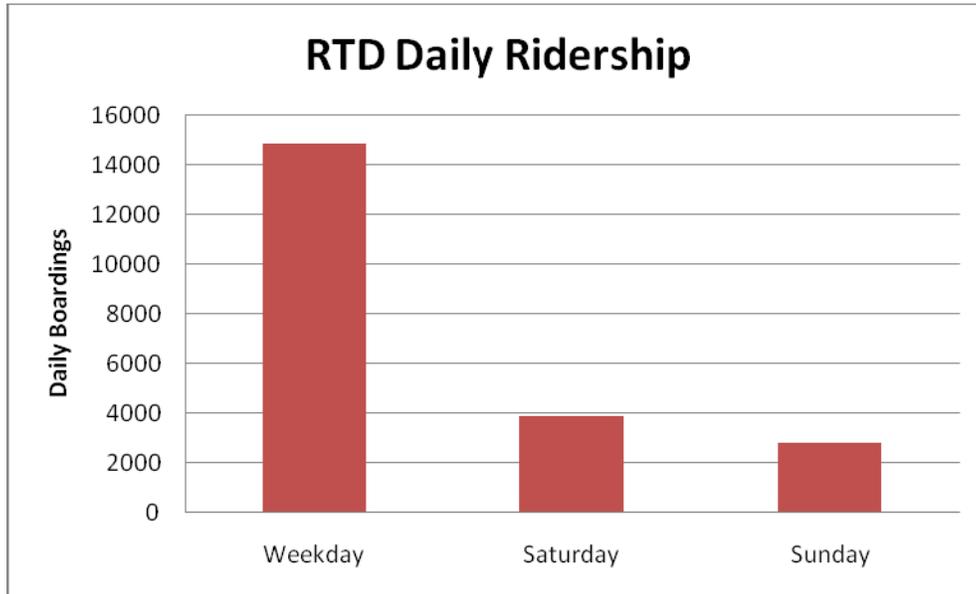
Figure 3.2 shows weekday ridership by time of day. The vast majority of ridership occurs between 6:00am and 6:00pm. Ridership after 6:00pm constitutes only 3% of total average weekday ridership.

**Figure 3.2**



Weekend ridership is substantially lower than weekday ridership. Weekday ridership is roughly four times higher than Saturday ridership, and five times higher than Sunday ridership. Considering that more than half of RTD routes offer weekend service (albeit at a lower frequency) the supply seems adequate to meet demand.

**Figure 3.3**



### **3.2.3 Recommendations**

Overall, RTD’s current service span is appropriate to the markets it serves. No current gaps are apparent in service span.

### **3.3 Service Reliability**

Transit is reliable when buses arrive at designated locations at the times shown on printed schedules. Transit is vastly more attractive to passengers when they can rely on it to arrive and carry them to their destinations on time. Unfortunately, poorly coordinated schedules, traffic delays, and other issues can cause buses to run early or late.

Service reliability is measured by how closely buses arrive to their scheduled times at designated timepoints. On-time performance is given as a percentage of the total amount of times that buses arrive on time at their designated timepoints.

#### **3.3.1 Principles**

Reliable service has two benefits. First, if passengers time their arrivals appropriately, they will not have a long wait at the bus stop. Industry research shows that transit customers perceive delay at roughly twice its actual value; therefore, a 5-minute wait at the bus stop will seem like 10 minutes. Any reduction in this delay will increase transit attractiveness.

The second benefit is that passengers can count on reliable service to deliver them to their destinations on time. While the casual transit user may not have a set schedule to access shopping or recreational destinations, reliable transit service appeals to employees and other customers with set schedules.

Many transit agencies have on-time performance goals of between 80 and 100 percent of trips arriving on time. Improving reliability may involve a combination of transit scheduling practices, driver training and supervision, and possible transit priority measures such as traffic signal priority or bus bypass lanes. Especially long routes, or routes which involve multiple deviations from a corridor, are especially prone to schedule adherence issues.

### **3.3.2 Current Conditions**

RTD considers “on time” service as being up to 5 minutes late from the printed schedule at designated timepoints. Buses which depart from a stop earlier than scheduled are not considered on time. Based on the ridecheck data applied to these parameters, RTD system average for on-time performance is approximately 60 percent. This means that at any given stop in the RTD system, there is a 60 percent chance that the bus will depart between 0 to 5 minutes late. This also means that 40 percent of the time, the bus will depart either early or more than 5 minutes late.

Of the 40 percent of trips not considered on time, 25 percent of trips were late and 15 percent were early. The large amount of late service suggests that many routes are scheduled to run faster than traffic conditions or ridership will allow, and the schedules may have to be adjusted.

Routes with exceptionally low on-time performance are scattered throughout the system, showing that schedule adherence issues are not attributable to any particular cause. Certain trends, however, were noted during analysis.

- Routes seemed to run slower than scheduled on the streets used to access the Mall Transfer Station at Yokuts and Pacific Avenue.
- The afternoon time period (2:00 to 4:00pm) seemed to include the slowest bus running times.
- Of the large corridors in the Stockton area, Hammer Lane, California Street, and West Lane seem to incur the most schedule adherence issues (mainly late service).

Service reliability on a route level is addressed within the COA.

### **3.3.3 Recommendations**

**Recommendation 1: Improve Schedule Adherence.** RTD must consistently analyze individual routes for schedule adherence issues, and provide an ongoing plan for improvement (detailed analysis is available in the COA). Improvement measures include rescheduling of routes or increasing road supervision to encourage drivers to keep to their schedules. In some cases, keeping routes on schedule at their designated frequencies may involve adding resources, such as extra buses during congested time periods. Such measures increase the cost of providing service.

**Recommendation 2: Expand Transit Priority.** Along congested corridors, RTD must increase the provision of transit priority features such as signal priority, queue jump lanes, and bus bulb stops. These measures ease the flow of transit vehicles through city streets help to improve reliability. Transit priority should be used to improve the performance of standard Local routes as well as BRT routes. These measures require capital funding to implement.

### **3.4 Simplicity and Ease of Use**

Customers are more likely to use transit if they can easily comprehend how to ride; gaps occur when complicated service design discourages potential passengers. Many factors are involved in creating a simple transit system, including clock-facing headways, simple route design, and passenger information.

#### **3.4.1 Principles**

Would-be transit customers often complain that transit service is confusing, which makes them reluctant to trust it for their daily trips. Some elements which make transit confusing include schedules which have the bus arriving at random intervals throughout the day, or routes with numerous deviations off of a central corridor. Sometimes in the name of serving as many customers as possible for the least cost, transit agencies develop routes with varying patterns (e.g. A, B, C routes) which run to different places during different times of the day, increasing the complexity of the system.

Guiding principles for designing simple, easy-to-understand service include:

- Design routes to be as direct as possible from origin to destination, with mid-route deviations only in case of substantial need. Deviations are confusing for passengers and make the trip slower.
- Minimize the use of different trip patterns on the same route. This practice makes it unclear to passengers where a route will take them at certain times of the day. If possible, routes should serve the same alignment throughout their service span. Different patterns can also make it difficult for drivers to remain on schedule.
- Implement consistent, clock-facing headways wherever possible. This makes it easier for passengers to commit schedules to memory.
- Provide appropriate passenger information at key locations. System maps, route schedules, fare policy, rider alerts, and other system information should be posted online and at high-volume stops in the network.

#### **3.4.2 Current Conditions**

RTD routes are generally designed around access to one of the few major transit locations in the network, mainly DTC or the Mall Transfer Station. As such, they are fairly direct. If RTD routes run into neighborhoods or other areas off of major corridors, it is usually at the end and not in the middle of the route. In the few cases where deviations might be an issue, route redesign should be evaluated in conjunction with the amount of passengers who currently use the deviation.

While the majority of RTD routes are fairly direct, they do include numerous trip patterns. *Fourteen of RTD's 25 Local routes involve at least two different patterns.* Some routes include three or four different patterns. Some corridors in the RTD system are served by single trips on 5 or 6 different bus routes. In many cases, these patterns serve local high schools at the beginning and end of the school day. While some patterns may be valuable, too many can make the system exceedingly complex.

Uneven headway lengths are often a product of having multiple trip patterns, where each pattern takes a different amount of time to run. Simplifying route structure can help in scheduling consistent headways.

RTD recently updated their website, including the full spectrum of passenger information (route maps, schedules, fares, and even a step-by-step How to Ride guide and an interactive Trip Planner). This kind of information makes transit more accessible to seasoned riders as well as new customers. For customers without internet access, the Downtown Transfer Center provides printed system maps and route schedules, as well as employees to answer questions.

### 3.4.3 Recommendations

**Recommendation 1: Simplify Route Design by Minimizing Patterns.** RTD must restructure individual routes to reduce or eliminate the use of multiple trip patterns. *When possible, buses should run the same alignment all day, every day.* This will increase the attractiveness of service to existing and potential passengers. It will also help implement consistent, clock-facing headways, and help the bus stay on time.

## 3.5 Bus Rapid Transit

Bus Rapid Transit can be considered as the highest form of bus transportation, which includes all the principles discussed in this section as well as others. The aim of BRT is to provide fast, frequent, reliable, and comfortable service for a large volume of passengers.

### 3.5.1 Principles

BRT accomplishes its goals through a “toolbox” of amenities which elevate it over traditional bus services. Several common amenities will be discussed in terms of speed, frequency, reliability, and visibility.

#### Speed

- **Limited stops.** Stops are placed further apart on BRT routes, which minimizes the time which buses spend loading and unloading passengers. It also means customers must walk further to access service.
- **Off-vehicle ticketing.** Many BRT services do not allow fare payment on the vehicle, but provide ticket vending machines at bus stops. This saves time by eliminating fare payment delay.
- **Transit signal priority.** Buses are given added green time at the beginning or end of a signal phase, or both, allowing them extra ability to get through intersections without stopping.

- **Lane configuration.** Some redesign of street lanes and parking lanes can help transit to progress smoothly. Queue jump lanes allow buses to bypass queues of cars at intersections and take advantage of signal priority. Bus bulb stop formations allow buses to access a stop without having to pull in and out of traffic.
- **Bus lanes.** In some cases, BRT may include its own dedicated lane so that it never competes with street traffic. This may be considered the purest and fastest form of BRT.

### Frequency

- BRT service should be provided frequently enough so that passengers do not have to consult schedules. BRT headways should be 15 minutes or better at most times of the day.

### Reliability

The same attributes which guarantee BRT speed also help to enhance reliability. Any priority measures which reduce bus conflict with street traffic help minimize delay and keep the bus on schedule.

- **Real-time information.** Some BRT systems include displays which show passengers how long they must wait for the next bus. This helps to remove the uncertainty of waiting at a bus stop and improves the perception of reliability. The displays are linked to Automatic Vehicle Location devices on buses.

### Visibility

- **Branding.** BRT vehicles and bus shelters often include modern design and striking colors which help them stand out on the street. The message conveyed is that the BRT line is a cut above ordinary transit.

Not all amenities must be present for routes to be considered BRT. The essential attributes of BRT are limited stops and high frequency. Beyond that, each transit agency must pick and choose those attributes which will be the most meaningful for the system. While BRT amenities are more costly to implement than traditional bus service, they are far less expensive than other types of high-profile transit (such as light rail or BRT in fully separated guideways).

BRT investment is justified where there is very high ridership demand. The amount of BRT possible in a city is determined by density, land use, and existing transit performance. The ideal BRT corridor is dense over its entire length and includes a mix of residential, commercial, and employment uses. Major destinations are good focal points from BRT, such as downtowns, regional shopping centers, and universities – places which people need to access on a daily basis.

Depending on the length of the corridor and the proposed frequency, BRT operating costs may range between \$1.5 and \$2.5 million annually.

### 3.5.2 Current Conditions

RTD's Metro Express BRT line includes many of the attributes discussed above.

- **Limited stops.** Metro Express includes 6 stops over its 5-mile length. Key destinations include DTC, the University of the Pacific, Sherwood Mall, and Delta College.
- **Frequency.** Metro Express runs at 15-minute frequency for most of the day.
- **Off-vehicle ticketing.** Fare payment is handled at ticket vending machines, while random checks of ticket-holding passengers help ensure that customers are not riding for free.
- **Transit signal priority.** Buses receive priority at major intersections.
- **Branding.** Metro Express vehicles are designed differently from other RTD buses, and BRT stops are larger and more visible than regular bus stops.

The Metro Express route is highly successful. Over 2,600 passengers ride the service on an average weekday, by far the highest in the system for a single route. It is also the most productive route on weekends. Key destinations include downtown Stockton, Sherwood Mall, the University of the Pacific, and Delta College. Metro Express has one of the best on-time performance levels in the system, at over 70 percent. On a per-passenger basis, the route also is the least expensive for RTD to provide. Metro Express can likely attribute its success to the combination of factors which make transit attractive – fast, frequent, reliable service which is easy to understand and simple to use.

RTD is planning to implement a second BRT route, which will run south from DTC along Airport Way to the Stockton Airport. This alignment includes a mix of residential and employment uses. It does not include the same types of all-day destinations as the current Metro Express (shopping malls, universities) and so may not require the same comprehensive service span. This BRT will likely serve passengers who live and work along the route or who wish to access the Stockton Airport.

As stated in the Geographic Gaps section, the 2035 General Plan lays out planned locations for future BRT service, including Airport Way, West Lane, and Hammer Lane. Other future BRT-type routes are planned for the outskirts of the Stockton area to accommodate new development, such as Sperry and Arch Road, Mariposa Road, and Gateway Boulevard in the north. While increased service may be warranted when new development occurs, BRT should be prioritized in central Stockton before outlying areas. BRT is successful when the corridor includes density and mixed uses over its entire length, which is less common when the corridors are far from a city's core area.

### **3.5.3 Recommendations**

BRT has shown itself to be highly successful on one corridor in Stockton, which suggests that there may be a market for additional BRT service. Currently, however, there are few areas in the City with the necessary mix of density and land use to support investment in BRT.

**Recommendation 1: Implement BRT Service on Hammer Lane.** BRT service is currently justified along Hammer Lane. Neighborhoods north and south of Hammer have some of the highest residential densities in the city, as well as the highest transit demand potential as described by the Residential Transit Orientation Index. Current service on Hammer Lane is productive despite running at low frequency. Additionally, future growth predictions show increasing densities just north of Hammer Lane, incrementally intensifying the need for a higher quality service. The demand on this route is appropriate for BRT service now and in future.

BRT service along Hammer Lane requires 10-minute peak (15 minute off-peak) frequency and transit priority features matching those implemented along the Metro Express route, including signal priority, off-vehicle ticketing, and high-profile vehicles. Based on the roughly 5-mile length of the corridor, approximately 5 stops (10 stations) could be planned along the corridor.

**Recommendation 2: Prioritize Future BRT Routes in Central Stockton.** BRT should be implemented along existing productive transit corridors (West Lane, Charter Way/MLK Boulevard, El Dorado Street, California Street) before corridors in the outskirts of the Stockton area. This is consistent with a policy of prioritizing and encouraging infill development. Increases in frequency, as described in Section 3.1.3, precede BRT implementation.

## 4 Policy Gaps

Transit-related policy includes City policies to provide quality transit service, as well as to encourage land development design that favors the use of public transit. Both types of policies are important for VMT reduction and are included in the City of Stockton's 2035 General Plan. Policy gaps occur where existing policies do not adequately encourage the provision of both transit service and transit-friendly land development.

### 4.1 2035 General Plan Transportation-Related Policies

The City of Stockton's 2035 General Plan Transportation Element includes policies related to streets and highways, public transit, pedestrians and bicycles, railroads, and air and water transportation. Its overall aim is to "develop an integrated transportation system that provides safe efficient movement of people and goods." Within the General Plan, transit is mentioned on its own, in conjunction with the larger transportation network, and in terms of its compatibility with land development.

The transit section of the Transportation Element includes language regarding SJRTD and ACE and Amtrak rail lines, and encourages efficient coordination between these providers. Improving public transportation is cited as a key part of VMT reduction. The overall goal of the transit section is "to develop an efficient, coordinated, integrated, and attractive public transit system that provides access to major activity centers in the City, and to the San Francisco Bay Area and Sacramento."

Transit policies in the General Plan include:

- **TC-4 Goal for Transit:** To develop an efficient, coordinated, integrated, and attractive public transit system that provides access to major activity centers in the City, and to the San Francisco Bay Area and Sacramento.
- **TC-4.1 Support and Plan for Bus and Rail Transit:** City shall work with San Joaquin Regional Transit District, Altamont Commuter Express, San Joaquin Council of Governments, Bay Area Rapid Transit (BART), Caltrans, AMTRAK, and other public transit providers to provide rail and bus service at level that offers alternative to automobile for both short and long distance commuters, and provides basic transportation to work, shopping, etc. especially for handicapped, elderly, youth and economically disadvantaged.
- **TC-4.2 Transit-Related Public Improvements:** City shall ensure transit-related public improvements are provided along arterial and major collector streets to encourage transit use.
- **TC-4.3 Clustering of Land Uses in Transit-Served Areas:** City shall encourage clustering of land uses that generate high trip volumes in areas that are served by existing or planned transit, especially when uses are complementary and can be adequately served by public transportation.
- **TC-4.4 Transit-Related Design Features:** City shall strongly encourage new development projects to incorporate the following transit-related design features:
  - A through roadway shall connect adjacent developments to permit transit circulation between developments.

- Parking shall be prohibited on collector and arterial streets to provide access to bus stops in major employment/commercial areas.
  - Where subdivision sound walls exist, appropriate designs shall be used to facilitate direct pedestrian access to transit stops.
  - Transit operators shall be encouraged to post route and schedule information in major employment/commercial areas.
  - Commercial and industrial developments shall have easy access to major arterials and transit stops.
  - Sheltered bus stops shall be provided with new development.
  - Medium and high-density development shall be located near transit services.
  - Residential areas shall be linked to transit stops via continuous sidewalks or pedestrian paths.
  - Park-and-ride facilities shall be strategically located in cooperation with transit providers to maximize transit use.
  - Park-and-ride facilities shall be designed to accommodate not only motorists but also other users of public transit and van or carpooling.
  - Major new developments shall be required to provide, operate and maintain park-and-ride facilities.
  - The City shall work with SJCOG, County transit providers and existing development to provide park and ride facilities within existing developed areas.
  - In major new development areas, project proponents shall be required to coordinate with transit operators in advance of discretionary project approvals and to provide an agreement for the timely provision of transit service.
- **TC-4.5: Extension and Integration of Transit Services:** City shall work with operators of public and private transportation services to provide convenient extension and integration of the public transit system.
  - **TC-4.6 Interregional Transit:** City shall support SJRTD Regional Bus Service, Altamont Commuter Express, and Amtrak’s San Joaquin Intercity Rail service and work with other local, regional and State agencies to explore other public transportation facilities.
  - **TC-4.7 Transit Right-of-Way Plans:** City shall preserve additional right-of-way (ROW) or transit uses when mapping adjacent development areas, designing new roadways, and improvements or existing roadways.
  - **TC-4.8 Bus Rapid Transit:** City shall support efforts to develop BRT within and beyond Stockton.
  - **TC-4.9 High-Speed Rail:** City shall support High-Speed Rail and other efforts to promote high-speed connections between Stockton and California’s other major urban centers.
  - **TC-4.10 Trolley Service:** City shall support efforts to expand use of low-cost trolley service or other forms of local circulation services in major shopping, employment, and pedestrian areas.
  - **TC-4.11 Abandoned Rail Lines:** When rail lines within the city are abandoned, City shall consider converting railroad corridors to high-capacity transit or other transportation corridors.

- **TC-4.12 Light Rail:** Implementation of BRT system should be designated to protect future right of way for light rail, and plans for the transition of BRT corridors to light rail in terms of right-of-way reservation, shall be investigated.
- **TC-4.13 Support Heavy Rail Passenger Connections:** City shall support SJRTD Regional Bus Service, Altamont Commuter Express, and AMTRAK’s San Joaquin Intercity Rail service and work with other local, regional and State agencies to explore other public transportation facilities. City shall work with and support ACE attempts to build tracks to bypass existing bottlenecks (e.g., the Union Pacific rail yards in South Stockton). As a high priority, City shall cooperate in studies to determine feasibility of additional rail connections with Bay Area and Sacramento, ex: connections with BART system and proposing rail between Stockton and Sacramento along California Traction and other rail corridors.

General Plan transit policies concentrate on integration of transit modes, and focus on high-profile forms of transportation such as BRT, light rail, high speed rail, and commuter rail. The goals regarding interregional transportation and the mention of connections to the Bay Area and Sacramento suggest a focus on long-distance transportation, a reaction to the fact that much of Stockton’s population works in these larger surrounding cities.

The transit section also explains in more detail the Future Transit Network map mentioned previously in the report. This map shows current and future BRT alignments throughout the Stockton area and discusses the classification system. Regular local bus transit is rarely mentioned in the discussion of the network map, as it states “While the diagram does not include all local bus routes, it is anticipated that an extensive network of local routes will provide connections within villages and between development areas and the major routes depicted.”

General Plan policies should recognize and support basic intra-city transit service. RTD’s Interregional services currently generate roughly 1,200 boardings per day, while Metro Local services generate 15,000 boardings per day. Since Local services contribute the vast majority of ridership, they should be encouraged along with long distance, multimodal transportation. Focusing on short-distance trips through local transit use will also help contribute to the overall goal of VMT reduction.

The following General Plan policies relate to transit’s role in the overall transportation network.

- **TC-1.1 Circulation:** City will utilize and maintain Circulation Diagram to designate classification for major roadways and designate significant transit and bicycle facilities.
- **TC-1.2 Integrated Transportation System:** City will continue to work cooperatively with various local, State, and Federal transportation agencies to maintain multi-modal transportation system that is well-integrated and interconnected, and that effectively accommodates planned land uses and related transportation needs, and that promotes the safe movement of people and goods and the efficient use of limited public resources.
- **TC-1.3 Multi-Modal Network:** City will work with its transportation partners to create and maintain a transportation system as a multi-modal network design to accommodate planned land uses and related transportation needs.

- **TC-1.4 Transportation Improvement Financing:** City to keep utilizing the City's capital improvement program, developer dedications, and the City's public facilities fees to finance transportation needs and improvements.
- **TC-1.5 Other Funding:** The City shall work with the County, SJCOG, Caltrans, SJRTD, and other jurisdictions and agencies to secure additional funding to meet transportation funding shortfalls for priority projects and other modes of transportation.
- **TC-1.6 New Funding Sources:** The City will work with other local jurisdictions and agencies to seek sources of funding to meet transportation funding shortfalls for priority projects and alternative modes of transportation.
- **TC-1.7 Road Improvements:** Land use planning and transportation decisions will be correlated so that planned land uses are supported by appropriate types of circulation service, levels of service, and timing of transportation improvements.
- **TC-1.8 Improvement of Existing Roadways:** City shall prioritize improvements to roadway system, ensuring that allocation of funding for transportation, maintenance, and improvement projects serving anticipated growth areas as specified by applicable environmental documents.
- **TC-1.9 Demand Reduction and Capacity Expansion:** Strategies to reduce vehicle demand on City roadways given consideration in conjunction with planned vehicle capacity expansion projects where they are demonstrated to achieve the same or similar outcome. City shall plan and consider financial assistance for Bus Rapid Transit and other non-auto related circulation systems as a way to address peak hour congestion within the City. City shall ensure all planned arterial and regional road capacity projects are justified based on environmental documentation in compliance with CEQA and cost efficiency.
- **TC-1.10 Provision of Transportation Infrastructure and Cost Sharing:** All new development projects required to pay their fair share of cost of constructing needed transportation and transit facilities, and contributing to ongoing operations and services. Including costs associated with mitigating new development impacts on the capacity of existing transportation facilities and services. All essential facilities and services installed prior to or concurrent with such new development or phased as specified in the applicable environmental documents. This requirement will be made condition of project approval.
- **TC-2.5 Multiple Transportation Modes:** City shall require significant trip-generating land uses be served by roadways and transit connections adequate to provide efficient access by multiple transportation modes with a minimum of delay.
- **TC-2.17 VMT Reduction:** To improve air quality and reduce congestion, the City shall reduce vehicle-miles-traveled per household by making efficient use of existing and planned transportation facilities; supporting policies are detailed in the City's adopted list of Reasonably Available Control Measures. These measures include: a. Promoting efficient arrangement of land uses. b. Improving public transportation and ridesharing. c. Facilitating more direct routes for pedestrians and bicyclists and other non-polluting modes.
- **Section 8.3 Transportation Demand Management:** Transportation demand management helps reduce congestion on existing and future roadways by encouraging alternative modes and alternatives to travel. Alternatives to travel may include off-peak work hours and

telecommuting, among other methods. Policies have been developed to encourage these alternatives: Focusing on strategies such as carpooling, flextime, parking options, and other transit-based options, City will create more opportunities for increased mobility and reduce impact of current travel patterns on existing roadways.

- **TC-3.1 Park and Ride Lots:** The City shall support the location of park-and-ride lots within the parking lots of commercial and/or office uses or at other appropriate locations, in consultation with SJRTD, San Joaquin County, SJCOG, Caltrans, and other agencies, and in compliance with the design features related to park-and-ride facilities that are specified in Policy TC-4.4.
- **TC-3.4 Subscription Bus Service:** City shall encourage provision of subscription bus service to major trip generators and special events.
- **TC-3.8 Downtown Transit Facilities/Services:** City shall enhance the Downtown's intermodal role by integration of mass transit facilities and service (Bus Rapid Transit).

Overall themes of these policies include building a multimodal network with adequate provisions for all uses, encouraging public transit as an alternative to automobile transportation, recognizing transit's role in VMT reduction, and providing for appropriate transit facilities to make service successful. The policies recognize transit's role as a mobility provider in the network; they do not go so far, however, as to suggest that transit be considered the preferred form of mobility over the automobile.

In order to further promote the importance of transit in the City, the General Plan should include policies which require that transit be given preference as the desired mobility provider along certain designated corridors (such as the BRT corridors suggested in the previous section). Transit preference could include transit priority measures, dedicated lanes, or removal of on-street parking. This designation of hierarchy helps to elevate transit and promote transit-related infrastructure improvements.

The General Plan policies which relate to funding transit improvements (1.4, 1.6, 1.10) are purposely broad and nonspecific, and will need to be refined in the future to better address appropriate funding measures through the development of the Transit Program. Types of funding sources should be tied to the location and amounts of people/businesses benefitting from the improvements, and whether funding needs stem from current or future sources. This will better help to link the necessary improvements and the revenue used to fund them.

Land development policy and transportation are linked within the General Plan. Transportation-related land development policies in the General Plan include:

- **TC-3.9 Programs for Smart Growth/Transit-Oriented Development:** To facilitate development of transit-oriented development projects, City shall support and capitalize on existing and proposed "smart growth" or transit-oriented development (TOD) programs.
- **TC-4.3 Clustering of Land Uses in Transit-Served Areas:** City shall encourage clustering of land uses that generate high trip volumes in areas that are served by existing or planned transit, especially when uses are complementary and can be adequately served by public transportation.

- **HE-1.3 Transit Oriented Development:** City shall encourage higher density residential uses and high intensity non-residential uses to locate near main transportation routes to offer an alternative means of transportation to employment centers, schools, shopping, and recreational facilities.
- **Section 7, Districts and Villages:** The “Village” is concept used to provide an enhanced circulation system that encourages alternative forms of movement, including transit, bicycles, and pedestrians.
- **DV-1.3 Pedestrian and Transit Accessible:** An underlying organization feature of the districts and villages will be their scale and pattern of development. Each will be designed and implemented to be conducive to walking and using transit. Designs will incorporate block patterns, walking routes and edges, social orientation of buildings, and streetscapes provide for pedestrian comfort and interest.

Several other sections in the General Plan, including the Land Use, Housing, and Community Development sections, recognize the importance of higher-density development, infill development, and mixed-use development in minimizing urban sprawl and reducing VMT. The overall theme of these policies is to encourage relatively dense, varied, multimodal-friendly land uses as close to the urban core as possible.

These policies lay out a basic framework for encouraging transit-friendly development; however, they lack specific details as to how such development is accomplished in terms of subdivision and road design. Transit Oriented Development is mentioned within the General Plan without specific guidelines as to what this form of development actually entails.

#### **4.2 Transit-Friendly Development Patterns**

A number of design strategies can contribute to a “transit-friendly” environment. In such areas, transit is as accessible and easy to use as automobile transportation.

- **Dense development.** While “density” may be an unattractive concept to some, transit-supportive densities do not have to consist of high-rise development. Transit service is effective at densities of at least 10-12 people per acre, which corresponds to roughly 4 dwelling units per acre. Denser development, such as two- or three-story apartments or townhomes, are even better suited for transit provision.
- **Connective street patterns.** Grid-type street patterns which intersect regularly are easy for transit vehicles, passengers, pedestrians, and cyclists to understand and navigate. Disconnected or meandering street patterns, which include cul-de-sacs or other non-through streets, interrupt the flow of travel and are difficult to navigate.
- **Corridor-type development.** Transit works well where a variety of land uses are present on a single corridor, allowing passengers to access many destinations on a single transit route. The Metro Express corridor, for example, serves downtown Stockton, major shopping destinations, and two universities.

- **Minimal setbacks.** In many modern developments, homes or shopping are set back far from arterial streets, often with walls or parking lots in between the street and the ultimate destination. This kind of development favors the automobile and discourages transit. Keeping development close to the street helps make transit more convenient.
- **Minimal parking requirements.** Excessive development of parking lots takes up valuable space and does not contribute to the appearance or vibrancy of the city environment. Parking should be provided in reasonable amount for the types of land uses developed. Some transit oriented developments include maximum, rather than minimum, parking requirements so as to curtail automobile use and promote transit.

Current development in the City of Stockton includes a mix of design strategies, some transit-friendly and some which favor automobile transportation. The older, central part of the city (Figure 4.1) includes relatively dense development and grid street patterns. Commercial uses are found on major corridors while residential uses are found on neighborhood streets. This type of development can be served well with transit routes running along major streets and residents have an easy walk to access service.

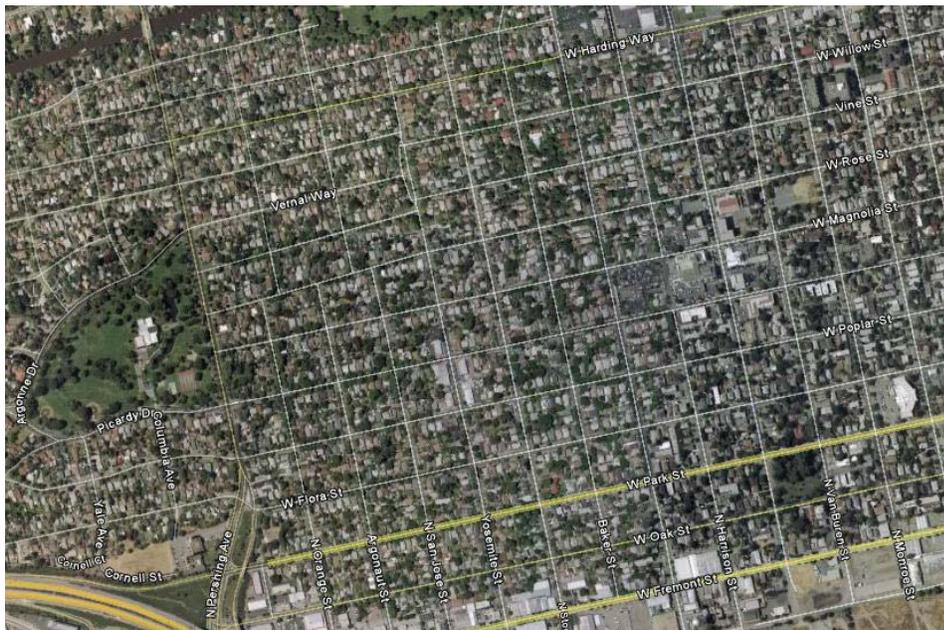


Figure 4.1, Northwest of Downtown Stockton.

In more recent years, residential development has trended towards lower-density development along meandering or disconnected street patterns. This type of development favors the automobile and is found in the areas further from downtown Stockton. Figure 4.2 of areas just north of March Lane shows many cul-de-sacs and few through streets. This area of March Lane also includes walls on each side of the street, making it difficult for potential passengers to access the service provided on March.



Transit oriented development (TOD) refers to a particular style of urban design which is meant to encourage transit use. Traditional TOD involves a complete neighborhood focused around a major transit stop or hub, on rail or BRT. Commercial uses and high-density residential development are located in the areas just surrounding the transit hub. Development at progressively lower densities is provided outside of the hub. This way, transit is central to the neighborhood and most residents are no more than a few blocks away from a major stop.

TOD is an appropriate design strategy for outer areas of a city, especially at the ends of high-volume transit corridors. It may relate well to the planned “village” developments outside of central Stockton. Infill development, however, may combine elements of TOD with the earlier stated principles of good neighborhood design – higher densities, connective streets, mixed uses. Zoning regulations should be provided for these types of developments.

Land development proposals should be reviewed for their adherence to the principles of transit-friendly urban design. Some key questions to ask when reviewing development proposals include:

- Are the densities proposed in this development conducive to transit service?
- Is the street pattern connective and easy to understand? Is there a clear and easy path available for transit to serve the area?
- How will the residents of this development access shopping and other commercial needs? Are mixed uses planned within the development or available nearby?
- Can people easily access major streets from homes or shops, or are there barriers such as parking lots or walls? Is the development pedestrian-friendly?

Future development in the Stockton area should concentrate on these key principles in order to facilitate the use of transit for most trip purposes.

#### **4.3 Recommendations**

**Recommendation 1: Encourage Local Transit Use.** The City of Stockton’s General Plan must stress the importance of local transit provision for short, every-day trips. The General Plan currently emphasizes longer-distance, higher profile forms of transit for longer trips, especially those traveling outside of the City, while the vast majority of transit service and ridership is within the City’s core area. Transit must be competitive for daily trips such as shopping, medical, or school trips.

**Recommendation 2: Implement Transit Priority Corridor Policies.** Transit priority corridors are corridors where transit is designated as the dominant mode of travel. Designating transit priority corridors provides policy-level encouragement for features such as signal priority, bus bulbs, bus lanes, and other measures which improve transit quality. These measures are sometimes implemented at the expense of convenience to automobile traffic, such as losing travel lanes or parking.

**Recommendation 3: Develop Funding Policies with Specific Guidelines.** The General Plan policies which relate to funding transit improvements are purposely broad and non-specific and will need to be refined in the future to better address appropriate funding measures through the development of the

Transit Program. Types of funding sources should be tied to the location and amounts of people/businesses benefitting from the improvements, and whether funding needs stem from current or future sources. This will better help to link the necessary improvements and the revenue used to fund them.

**Recommendation 4: Implement Development Policies and Zoning Compatible With Transit Use.** The City's General Plan must include more specific Principles for development, in order to provide a more transit-friendly environment. The General Plan must spell out specific requirements for Transit-Oriented Development. All development proposals must be reviewed for their compliance with Principles of density and urban design.

## **5 Funding Gaps**

Increased transit funding is required to provide for the increased frequency, reliability, and BRT recommended in this gap study. Transit funding gaps exist when transit fares and government subsidies do not cover the cost of providing quality, attractive service.

### **5.1 Principles**

Daily operational transit costs include bus drivers, fuel, maintenance, and other administrative staff. Transit systems generally recoup between 20 and 40 percent of daily operational costs through fare revenue, while the remainder is provided through a mix of Federal, State, and local government contribution.

Non-fare revenue has dwindled recently, for systems across the country. The downturn in the economy led to decreased tax revenue, which is used to fund transit. Many systems have had to cut service due to lack of funds, which decreases ridership and fare revenue.

Many government funding programs provide only for capital costs, including buying new buses, bus shelters, and other infrastructure improvements. These funds are one-time grants and do not offset the cost of providing service on a day-to-day basis. Funding for daily operations is necessary for quality, reliable, consistent service.

Capital funding is necessary for BRT routes, which may require upgraded vehicles, accessible stops and shelters, real-time information, transit priority systems, etc. Costs associated with the implementation of BRT service can be between \$10 and \$20 million per route. Once implemented, however, these routes also require sustainable sources of operational funding. BRT service may cost \$1.5 to \$2.5 million annually to operate.

To provide truly high-quality service for passengers, transit systems require dedicated sources of revenue which are not solely capital-related and cannot be used to pay for other automobile-related transportation improvements, such as highways.

Transit systems themselves must respond by providing service which gains a reasonable return on investment. Routes with low ridership are costly for taxpayers to subsidize and may divert resources from more intense areas of the system. Implementing standards for bus route performance helps to ensure that transit systems do not continue to run highly unprofitable service.

### **5.2 Current Conditions**

RTD currently receives funding from federal, state, and local sources in addition to traditional farebox revenue. Funding is provided by various Federal Transit Administration (FTA) programs, State programs including Proposition 1B and the State Transportation Improvement Program (STIP), and local sources including Measure K and local property tax.

The majority of State and local funding comes from gasoline and sales taxes within San Joaquin County, which are not reliable in economic downturns. Similar to other funding sources used to for RTD service development and operation, these funds can be shifted to other State departments in times of crisis. In recent years, California state-allocated funding for public transit has been “raided” to not only subsidize the costs of highway development and improvements, but also fill holes in the state’s General Fund.

SJRTD is currently undergoing a Comprehensive Operational Analysis (COA) process, which is designed to make more efficient use of existing funding by recommending adjustments to existing service. The COA aims to match transit investment to market demand, placing service where it will benefit the maximum number of people and cost proportionally less for RTD to provide. The COA Preferred Service Plan provides recommendations to improve service efficiencies; however, the recommendations are cost neutral and do not relieve resources that would enable increased service levels, such as adding BRT service operations.

Currently, roughly 20% of RTD operating costs are covered by fare revenue (not including ADA paratransit). While RTD fares are fairly standard, this cost recovery rate is low compared to other peers in the industry. Several RTD routes return under 10% of costs in fare revenue. These routes are being evaluated within the COA to improve cost recovery.

To implement proposed BRT service on South Airport Way, RTD applied for a Federal Very Small Starts grant which provides capital costs for transit improvements of under \$50 million. This grant helps offset start-up costs, but does not provide an ongoing source of funding.

RTD is likely to increasing funding shortages in the coming years as local and State revenues are reduced or eliminated. Along with improving unproductive service, RTD requires a sustainable source of funding to ensure a viable, attractive transit network.

### **5.3 Potential Funding Sources**

The gaps associated with transit funding may be addressed with several different types of programs. Although the scope of the gap study does not entail an evaluation or recommendation of specific funding programs or their nexus to finance transit improvements, some potential programs are described below that should be evaluated further during the development of the City’s Transit Program in combination with an evaluation of potential transit improvements. The programs differ in terms of the amount and type of funding they can generate, as well as the relative ease of their implementation.

*California Assembly Bill 2558/Fees to Reduce Emissions.* This bill calls for charging fees on everyday activities such as driving or shopping to pay for new transportation projects and to provide another funding source to replace the State Transportation Assistance Program. The bill in its present form would require referendum passage of any fee.

*Tax Increment Financing.* Special financing districts can be established to collect value from the increase in property value due to public investment. This means that if RTD increases its services in specific

corridor, near Stockton's shopping malls for example, a district could be established to collect increased taxes, as this service would raise the value of the properties along that corridor.

*Transportation Development Districts.* Similar to Business Improvement Districts, these are geographically specific areas that are organized for the purpose of raising funds for transportation improvements.

*Local County Development Fees.* California State law allows for transit agencies to collect fees levied on new developments within counties that enact these fees. Revenues from these fees can only be used for capital projects within the districts in which the fees are collected. New real estate developments can share the continuing cost of providing public services required to accommodate traffic congestion and reduced air quality resulting from the specific development.

*Public Private Partnerships.* Instead of building facilities itself, RTD can seek to involve the private sector in the development of garages, park and rides and passenger amenities. This is mainly a source of capital funding.

Transit funding programs must demonstrate a clear link between the residents/businesses shouldering the burden and those receiving added benefit. According to California's Assembly Bill 1600, any fee assessed on new development must show a connection, or nexus, between the impact of the development and the mitigation fee. In some cases (Hammer Lane BRT is a good example), the recommended improvements are both warranted by existing uses and further necessitated by additional future development planned along the corridor. Funding for these improvements may involve some combination of programs to serve the intended purpose which can be determined through the preparation of a nexus study.

## 5.4 Required Funding

The recommended improvements described in this gap study, along with their approximate costs, are shown below.

### Operating Costs

Operating costs are determined based on approximate weekday and weekend frequency levels required along each corridor, as described in Section 3.1.3. Proposed costs are as follows, followed by the gap between proposed and current costs for these corridors.

Corridor	Weekday Peak Frequency	Weekend Frequency	Annual Service Hours <sup>1</sup>	Cost Per Service Hour <sup>2</sup>	Annual Cost
South Airport Way (BRT)	10/30 off peak	30	13,900	\$105.34	\$1,464,000
Hammer Lane (BRT)	15	30	18,400	\$105.34	\$1,938,000
California Street	15	30	9,300	\$105.34	\$980,000
El Dorado Street	20	60	13,800	\$105.34	\$1,454,000
West Lane	30	60	5,000	\$105.34	\$527,000
Charter Way/MLK	30	60	5,000	\$105.34	\$527,000
<b>Total</b>			<b>65,300</b>		<b>\$6,890,000</b>

Proposed Annual Cost	Current Annual Cost	Operational Funding Gap
\$6,890,000	\$2,396,000	<b>\$4,494,000</b>

### Capital Costs

Capital improvements are required to implement BRT service. Capital fund needs are shown for the corridors with proposed BRT service, South Airport Way and Hammer Lane, as described in Section 3.5.3. RTD applied for and received FTA Very Small Starts funding for the South Airport Way BRT. The costs are included here but not proposed to be included as part of the Transit Program.

BRT costs are divided into approximate station and vehicle costs, as determined within RTD's Very Small Starts application for the Airport BRT. Station costs include design, construction, ticket vending machines, and traffic signal priority.

BRT Corridor	Stations	Cost Per Station <sup>3</sup>	Vehicles	Cost Per Vehicle <sup>4</sup>	Total Cost
South Airport Way	14	\$379,400	6	\$443,000	\$7,970,000
Hammer Lane	10	\$379,400	5	\$443,000	\$6,009,000
<b>Total</b>					<b>\$6,009,000</b>

<sup>1</sup> Based on 252 weekdays and 113 weekend days per year.

<sup>2</sup> Based on 2008 cost per service hour. Costs will require inflation based on projected implementation dates.

<sup>3</sup> Based on 2008 cost

<sup>4</sup> Based on 2008 cost

## 5.5 Recommendations

The City of Stockton currently lacks a source of sustainable funding to cover the costs associated with developing a robust transit network, capable of competing with private automobile travel.

**Recommendation 1: Review Sustainable Funding Options.** The City of Stockton and RTD must assess the available funding programs which can provide a source of ongoing funding for capital transit improvements and operational costs. These programs must be reviewed for their compatibility with City policies, the ability to provide the amount of funding necessary to implement an identified level of improvements, and the connection or nexus between the funding sources and the recipients of the improvements. This assessment should be carried out during the preparation and development of the Transit Program portion of the Climate Action Plan.

**Recommendation 2: Implement Service Standards to Discourage Unproductive Service.** RTD must improve its use of existing revenue by improving, reducing, or discontinuing unproductive services. In a limited funding environment, resources must be allocated to the areas with the maximum amount of ridership potential. Implementing service productivity standards will set minimum thresholds for transit cost recovery.

## 6 Findings and Recommendations

The overall findings within the gap study are addressed in terms of key principles and recommendations.

### 6.1 Geographic Coverage

**Background:** In order to be effective, transit does not need to be present everywhere, but should be of high quality. Transit service should be provided in context with the density and uses along each corridor. Current RTD service coverage is appropriate for the area. All areas of medium- to high-population density are served by transit.

**Recommendation 1:** Address geographic barriers. Improving connections would increase the efficiency and decrease the cost of serving existing areas, plus provide passengers a trip more suited to their needs. Improvements include:

- Increasing east/west connections in South Stockton, particularly Eighth Street and Sperry Road. All efforts should be made to complete the currently-planned Arch-Sperry connection.
- Providing a north/south connection (other than I-5) west of Pershing Avenue, such as a transit/bicycle/pedestrian connection along Alexandria Place.

**Recommendation 2:** Develop policies and programs to encourage infill development as much as possible, to direct population growth into areas where transit service already exists.

**Recommendation 3:** Provide efficient transit service to new Village development in the outskirts of the Stockton area. Service will be provided at levels appropriate to the population density of the development and designed to be as direct as possible.

### 6.2 Service Quality

#### *Frequency*

**Background:** Frequency is a major component of transit service quality, with higher frequency routes providing better service to customers. Like coverage, frequency should be provided in context with the density and land uses along each corridor. Other than the Metro Express BRT route, most RTD routes run infrequently. Some RTD routes require increased frequency to supply demand, but current funding is inadequate to deliver the necessary service levels. These corridors are described below.

**Recommendation 1: South Airport Way in Southern Stockton.** Aside from the airport, this alignment includes high-density housing and employment destinations. It will also provide quick service into central Stockton from other areas south such as Manteca, Lathrop and Ripon. BRT service is planned for implementation in 2010.

**Recommendation 2: Hammer Lane.** This strong east-west corridor includes a variety of residential and commercial uses. Existing route performance is strong and the RTOI shows high levels of current market demand north and south of Hammer. Future growth predictions show increasing densities just north of

Hammer Lane, incrementally intensifying the need for quality service. The demand on this route is appropriate for BRT service now and in future (as discussed in Section 3.5).

**Recommendation 3: California Street.** Although a relatively short corridor, California Street south of Alpine Avenue is a major ridership generator in the system. Currently, two routes combine to provide 30-minute service on this street, which must be improved to generate more trips.

**Recommendation 4: El Dorado Street.** The route which currently serves El Dorado Street is the second most productive route in the system, after Metro Express. This central corridor is a strong performer and a candidate for increased service levels. It is geographically close to the Metro Express, however, and does not warrant the same service levels.

**Recommendation 5: West Lane.** West Lane shows existing strong performance and is a popular north/south thoroughfare through the city. West Lane north of Hammer Lane has some of the highest densities within the RTD service area.

**Recommendation 6: Charter Way/MLK Boulevard.** This corridor is the only east/west through street in South Stockton, and includes a variety of land uses. RTD does not currently run a route which serves the corridor exclusively, but such a route is recommended.

Corridor	Current Weekday Frequency	Proposed Weekday Frequency	Current Weekend Frequency	Proposed Weekend Frequency
South Airport Way (BRT)	120	10/30 off-peak	60	30
Hammer Lane (BRT)	60	15	60	30
California Street	30	15	60	30
El Dorado Street	30	20	60	60
West Lane	60	30	N/A	60
Charter Way/MLK	N/A	30	N/A	60

### ***Service Span***

**Background:** Transit service must be provided during appropriate times of the day and week in order to provide valuable service for customers. Most RTD routes run between 6:00am and 8:00pm on weekdays, and more than half provide weekend service. The Metro Express runs between 5:00am and 11:00pm. The vast majority of ridership occurs between 6:00am and 7:00pm, showing no current gaps in service span. No recommendations exist in terms of service span.

### ***Reliability***

**Background:** Customers must be able to rely on the transit system to deliver them to their destinations on time, with minimal time spent waiting. On average, RTD buses depart on time 60 percent of the time, meaning that 40 percent of the time, buses depart from stops either early or more than 5 minutes

late. This negatively impacts customer perception of service reliability and makes automobile travel a more attractive option.

**Recommendation 1: Improve Schedule Adherence.** RTD must consistently analyze individual routes for schedule adherence issues, and provide an ongoing plan for improvement (detailed analysis is available in the COA). Improvement measures include rescheduling of routes or increasing road supervision to encourage drivers to keep to their schedules. In some cases, keeping routes on schedule at their designated frequencies may involve adding resources, such as extra buses during congested time periods. Such measures increase the cost of providing service.

**Recommendation 2: Expand Transit Priority.** Along congested corridors, RTD must increase the provision of transit priority features such as signal priority, queue jump lanes, and bus bulb stops. These measures ease the flow of transit vehicles through city streets help to improve reliability. Transit priority should be used to improve the performance of standard Local routes as well as BRT routes. These measures require capital funding to implement.

### ***Simplicity***

**Background:** Customers are more likely to choose transit service which is simple and easy to understand. Most RTD routes have a straightforward, understandable basic route structure. Many of them, however, have different route patterns that they run at different times of the day, to serve schools or other destinations. This practice is confusing to passengers, and may lead to uneven headway lengths and poor on-time performance.

**Recommendation 1: Simplify Route Design by Minimizing Patterns.** RTD must restructure individual routes to reduce or eliminate the use of multiple trip patterns. *When possible, buses should run the same alignment all day, every day.* This will increase the attractiveness of service to existing and potential passengers. It will also help implement consistent, clock-facing headways, and help the bus stay on time.

### ***BRT***

**Background:** Metro Express has achieved considerable success in the RTD system through provision of fast, frequent, reliable, simple service. The same pattern of service may be replicated elsewhere in the Stockton area. BRT is only warranted, however, on fairly dense, varied, high-volume corridors.

**Recommendation 1: Implement BRT Service on Hammer Lane.** BRT service is currently justified along Hammer Lane. Neighborhoods north and south of Hammer have some of the highest residential densities in the city, as well as the highest transit demand potential as described by the Residential Transit Orientation Index. Current service on Hammer Lane is productive despite running at low frequency.

BRT service along Hammer Lane requires 10-minute peak frequency and transit priority features matching those implemented along the Metro Express route, including signal priority and off-vehicle ticketing.

**Recommendation 2: Prioritize Future BRT Routes in Central Stockton.** BRT should be implemented along existing productive transit corridors (West Lane, Charter Way/MLK Boulevard, El Dorado Street, California Street) before corridors in the outskirts of the Stockton area. This is consistent with a policy of prioritizing and encouraging infill development. Increases in frequency will precede BRT implementation.

### 6.3 Policy

**Background:** Effective policies promote transit as essential to a viable transportation system. They also recognize that certain forms of land development and urban design are more suited to transit use than others. The current General Plan views transit as an important link in the City's transportation system. Transit policies address bus, BRT, light rail, and commuter rail modes, as well as associated infrastructure and land uses.

**Recommendation 1: Encourage Local Transit Use.** The City of Stockton's General Plan must stress the importance of local transit provision for short, every-day trips. The General Plan currently emphasizes longer-distance, higher profile forms of transit for longer trips, especially those traveling outside of the City, while the vast majority of transit service and ridership is within the City's core area. Transit must be competitive for daily trips such as shopping, medical, or school trips.

**Recommendation 2: Implement Transit Priority Corridor Policies.** Transit priority corridors are corridors where transit is designated as the dominant mode of travel. Designating transit priority corridors provides policy-level encouragement for features such as signal priority, bus bulbs, bus lanes, and other measures which improve transit quality. These measures are sometimes implemented at the expense of convenience to automobile traffic, such as losing travel lanes or parking.

**Recommendation 3: Develop Funding Policies with Specific Guidelines.** The General Plan policies which relate to funding transit improvements are purposely broad and nonspecific and will need to be refined in future to better address appropriate funding measures through the development of the Transit Program. Types of funding sources should be tied to the location and amounts of people/businesses benefitting from the improvements, and whether funding needs stem from current or future sources. This will better help to link the necessary improvements and the revenue used to fund them.

**Recommendation 4: Implement Development Policies and Zoning Compatible With Transit Use.** The City's General Plan must include more specific Principles for development, in order to provide a more transit-friendly environment. The General Plan must spell out specific requirements for Transit-Oriented Development. All development proposals must be reviewed for their compliance with Principles of density and urban design.

### 6.4 Funding

**Background:** RTD is facing funding shortages due to decreased local and State revenue. Transit service requires a dedicated source of funding to address the improvements discussed in this gap study. RTD

also provides some services which have very low ridership and are costly to provide. Recommended improvements in service will require roughly **\$4.5 million** in increased operating costs and **\$6 million** in capital costs.

**Recommendation 1: Review Sustainable Funding Options.** The City of Stockton and RTD must assess the available funding programs which can provide a source of ongoing funding for capital transit improvements and operational costs. These programs must be reviewed for their compatibility with City policies, the ability to provide the amount of funding necessary to implement an identified level of improvements, and the connection or nexus between the funding sources and the recipients of the improvements. This assessment should be carried out during the preparation and development of the Transit Program portion of the Climate Action Plan.

**Recommendation 2: Implement Service Standards to Discourage Unproductive Service.** RTD must improve its use of existing revenue by improving, reducing, or discontinuing unproductive services. In a limited funding environment, resources must be allocated to the areas with the maximum amount of ridership potential. Implementing service productivity standards will set minimum thresholds for transit cost recovery.

**Appendix A: COA Report**