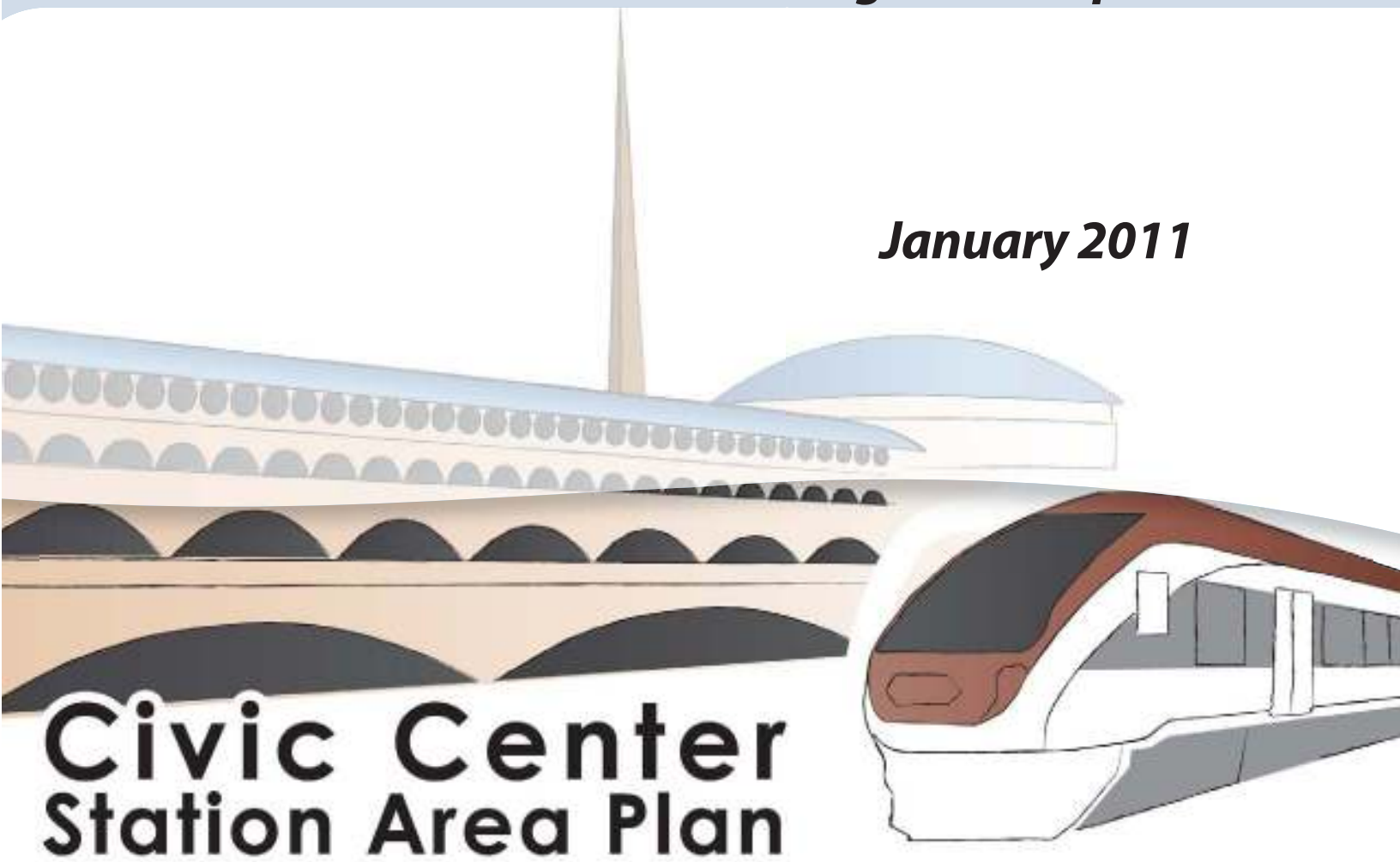
San Rafael Civic Center SMART Station Area Plan

Background Report

January 2011



This project is funded in part through the Metropolitan Transportation Commission's Station Area Planning Program. The preparation of this report has been financed in part by grants from the U.S. Department of Transportation. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

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JANUARY 2011

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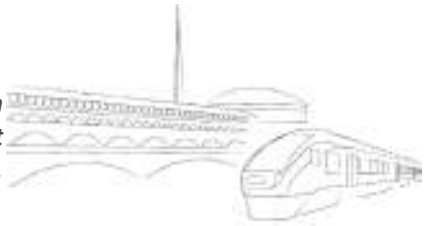


CHAPTER 1. INTRODUCTION

For decades, Marin County's transit system has relied on buses and, in some cases, ferries[1] to move people within the County and throughout the Bay Area. The Sonoma-Marin Area Rail Transit (SMART), which would provide commuter rail service between Cloverdale and the Larkspur Ferry Terminal, has been in the planning stages for over 20 years. The proposed rail corridor will follow tracks along an existing rail line through North San Rafael to Downtown San Rafael on its way to Larkspur from Santa Rosa. Leveraging transit-oriented development opportunities and multi-modal transportation connections can maximize ridership and make the proposed Civic Center SMART station a successful project.

This document presents the background information for the eventual Station Area Plan for the vicinity of the SMART Civic Center Station. This background document will lay the groundwork for the Station Area Plan by summarizing previous planning efforts in the study area and presenting a comprehensive existing conditions report.

1.1 REPORT GOALS AND OBJECTIVES

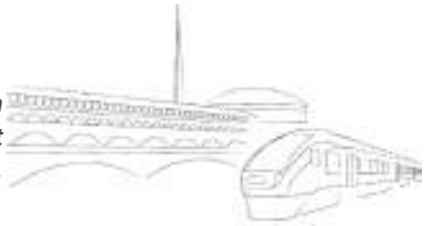
This background report describes the existing land use, design, and transportation circulation conditions for the Civic Center Station Area Study. The area of influence of the future station, as shown in **Figure 1.1** is generally bounded by Manuel T. Freitas Parkway to the north, Civic Center Drive and the vicinity there of to the east, North San Pedro Road to the south, and Northgate Drive/Los Ranchitos Road to the west. This report will provide a framework for determining the land use and transportation opportunities to support a successful rail system. The land use component of the report will identify existing land uses, zoning, and development potential. The transportation component of the report will document the existing street network, pedestrian and bicycle facilities, and transit service. This will provide a structure to engage the community to determine the modifications needed to support development around the Civic Center SMART Station Area and fulfill the vision and goals identified in previously developed planning documents. Mobility constraints and opportunities for pedestrians, bicyclists, transit operations, and roadways within the study area will also be discussed at a later time based on this document and a series of public engagement events.

1.2 PROJECT SUMMARY

The SMART project is the culmination of an extensive multi-jurisdictional effort to implement passenger/commuter rail service in the North Bay. The corridor that will be served by SMART is approximately 70 miles and connects Larkspur to Cloverdale.[2] There will be 14 rail stations, two in San

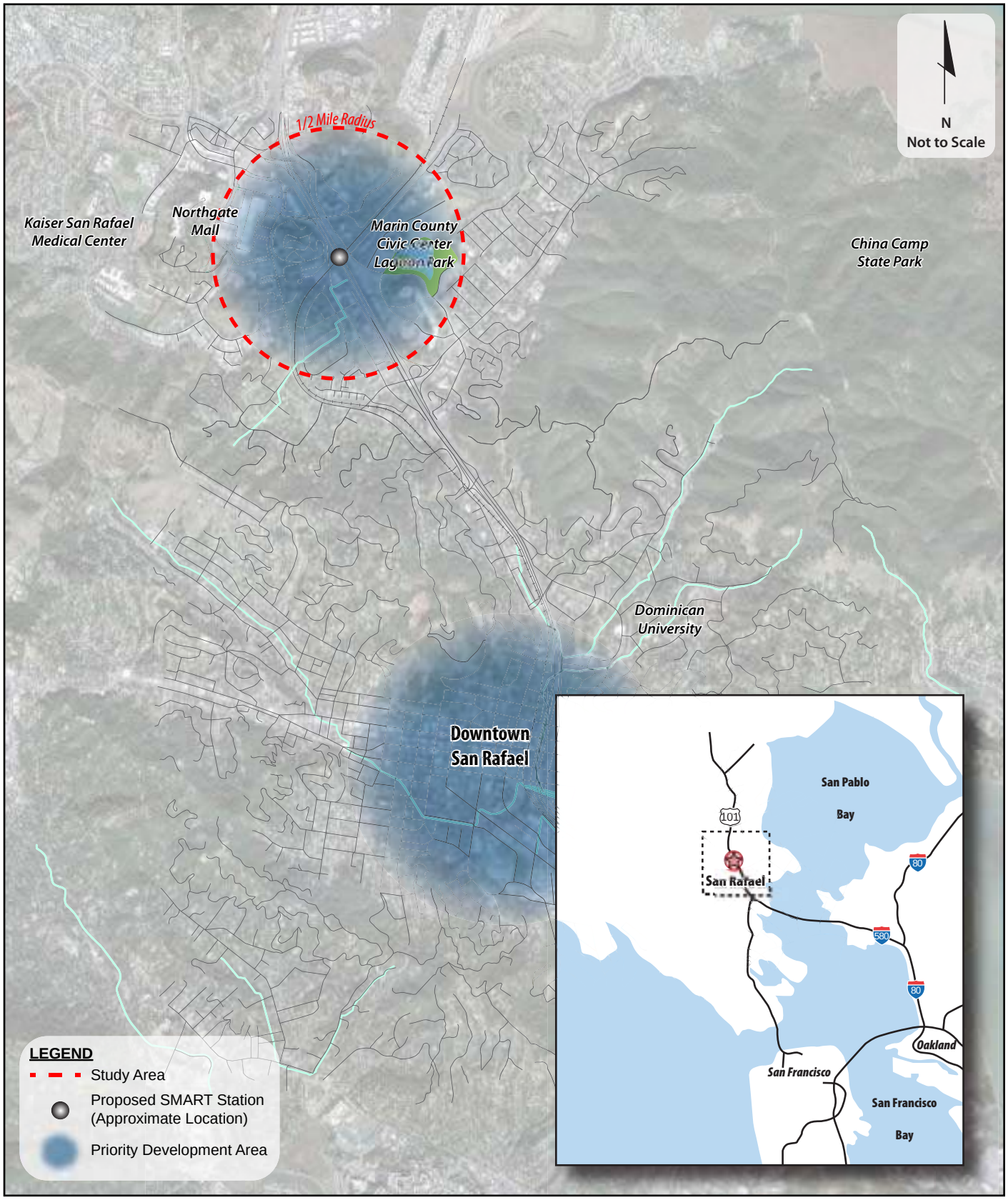
[1] Ferry service in Marin County is operated by Golden Gate Bridge Highway and Transportation District.

[2] Phase 1 of the project would connect Santa Rosa to Downtown San Rafael. The Civic Center station is the next station heading north from Downtown San Rafael.



Rafael. This particular report focuses on the Civic Center Station Area in northern San Rafael (location shown on **Figure 1.1**). Project planners and the community have focused on implementing parallel bicycle and pedestrian facilities within or adjacent to the rail corridor. In total, the SMART project includes proposals to construct 54 miles of Class I pathway and 17 miles of Class II pathway improvements.

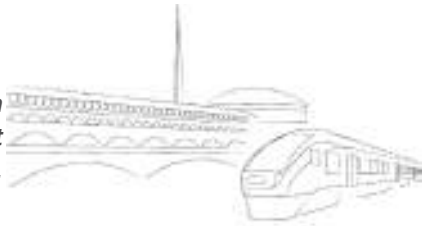
This particular planning effort to plan the Civic Center Station Area will be built upon an extensive public outreach effort in order to develop a plan that represents the desires of the surrounding community. It will focus heavily on key pedestrian and bicycle connections along with critical transit connections and the effect that these improvements may have on automobile operations. Additionally, transit-oriented land use opportunities will be evaluated to leverage rail ridership consistent with the desires of the community and with a complete understanding of the potential effects of increased development on the transportation system and surrounding land uses.



San Rafael Civic Center SAP

CIVIC CENTER AREA LOCATION

FIGURE 1.1



1.3 SUMMARY OF OTHER RELEVANT PLANS

There are several planning documents that drive and guide development within the study area. One of the most relevant plans is the North San Rafael Vision documents, which include the Promenade Conceptual Plan and Design Features (Promenade Plan). The North San Rafael Vision has land use Town Center policies that have been adopted by the General Plan, such as recommendations for bikeways and pathways, promenade amenities, and unifying design themes. The Promenade Plan includes general design guidelines and a series of recommendations for providing a continuous pedestrian and bicycle connection between the Northgate Mall and the Marin County Civic Center. This Plan can form a general framework for establishing recommendations for pedestrian and bicycle connectivity to the proposed Civic Center Station in later stages of this process. In addition, there are a number of other relevant plans and policies related to development and design of the study area. The influential categories of relevant documents on the Civic Center Station Area are summarized below in **Table 1.1**. A detailed summary of the document review is provided in **Appendix A**.

1.4 KEY STAKEHOLDERS

The City of San Rafael staff coordinated a team of stakeholders that are an integral part of planning a successful station area. These stakeholders ensure that the interests of the community and focus groups are met. There are four primary groups: the Steering Committee, the Joint Project Team, the Civic Center Station Advisory Committee, and the community itself. The groups are described below:

- The Project Steering Committee (SC) comprises the executive directors of the participating agencies: City of San Rafael; County of Marin; SMART; Marin Transit; Golden Gate Bridge, Highway and Transportation District; and TAM. This group meets bimonthly to monitor progress and resolve any interagency issues.

- The Joint Project Team (JPT) includes at least one staff from each participating agency and from the Association of Bay Area Governments (ABAG). This group meets monthly to track progress, review draft documents, and provide direction and recommendations on project tasks.

- The Civic Center Station Area Plan Advisory Committee (SAC) includes 16 members appointed by the City Council. They assist in preparing the Civic Center Station Area Plan, providing oversight of the development of the recommendations. Members for this committee were selected by the San Rafael City Council in July 2010 and meet monthly. Also, six ex officio non-voting members from the Planning Commission, Design Review Board, Golden Gate Bridge Highway and Transportation District, Bicycle and Pedestrian Advisory Committee, and Las Gallinas Valley Sanitary District.

- The community will play an integral part in developing the Station Area Plan. There will be two public workshops at critical points in the planning process in which the community will be invited to provide feedback, input, and guidance regarding the station area.

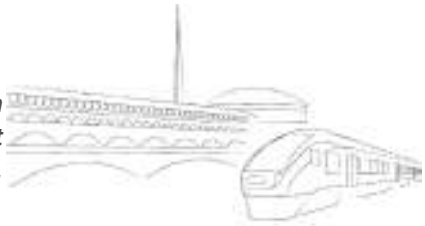
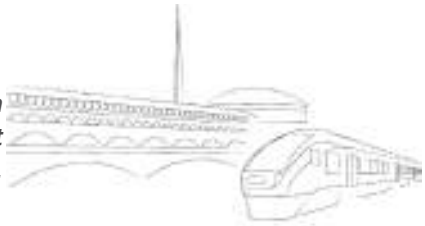


TABLE 1.1
DOCUMENT REVIEW INFLUENCE MATRIX

Document	Provides General Development Guidelines	Identifies Specific Locations for Development	Provides General Transportation Planning Guidelines	Identifies Specific Modal Project Improvements	Provides General Guidance for Aesthetic/ Architectural Details	Identifies Specific Aesthetic/Architectural Guidelines
1. City of San Rafael General Plan 2020	✓	✓	✓	✓	✓	
2. Zoning Map	✓				✓	
3. Marin Countywide Plan	✓					
4. SMART Environmental Impact Report				✓		
5. North San Rafael Vision Promenade Conceptual Plan and Design Features			✓	✓	✓	✓
6. San Rafael Design Guidelines	✓		✓		✓	✓
7. The Marin Center Master Plan		✓		✓		
8. Marin County Civic Center Master Design Guidelines	✓	✓	✓	✓	✓	✓
9. Marin Civic Center Open Space Ordinance	✓				✓	
10. Court Facilities Master Plan		✓				
11. County of Marin RFP for a Partner to Operate and Improve a Farmers' Market		✓				
12. Vision North San Rafael	✓		✓			
13. Golden Gate Short-Range Transit Plan			✓	✓		
14. Marin Transit's Final Short Range Transit Plan			✓	✓		
15. TAM – TPLUS Pedestrian and TOD Toolkit	✓		✓		✓	
16. Miller Creek Road/Las Gallinas Avenue Corridor Study				✓		
17. City of San Rafael Bicycle/ Pedestrian Plan				✓		
18. Walk Bike Marin				✓		
19. Economic Vision 1997	✓		✓			
20. Transportation 2035 Plan (MTC RTP)			✓	✓		

Shaded cells indicate City documents developed by the City of San Rafael.
Source: Fehr & Peers, 2010



1.5 REPORT ORGANIZATION

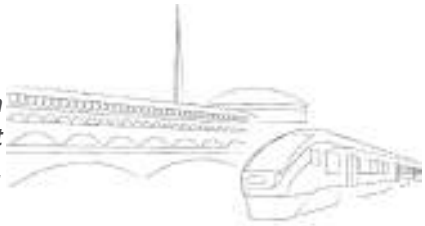
The remainder of this report is divided into three chapters that present the existing land use and transportation conditions, and summarizes the next steps to develop the Station Area Plan, including the public process:

- **Chapter 2: Existing Conditions – Land Use and Urban Design** presents the existing land uses and site conditions. Additionally, regulatory context, other planned developments, and vacant or underutilized sites are also discussed.

- **Chapter 3: Existing Conditions – Transportation** describes the access, circulation, and operating conditions of the existing transportation network in the Project vicinity. This includes the roadway network, transit network, bicycle facilities, pedestrian facilities and current on- and off-street parking conditions.

- **Chapter 4: Next Steps** discusses briefly next steps likely to occur in the station area planning process.

The attached Appendix includes additional descriptions of transportation facilities, calculations, and a summary of relevant planning documents.



CHAPTER 2. EXISTING CONDITIONS – LAND USE AND URBAN DESIGN

Supportive land uses and transportation facilities are the two most critical elements to achieve a vibrant and successful Station Area Plan, which in turn, can help realize a thriving Civic Center Station. This chapter describes the land use and urban design characteristics that currently comprise the Civic Center Station Area, including: 1) the existing site conditions, land uses, and population; and 2) the urban design character, including development patterns and visual character.

2.1 HISTORICAL BACKGROUND

Marin and southern Sonoma County were originally inhabited by the Coast Miwok, whose villages were most often sited on major creeks. Spanish settlers arrived in San Rafael in the early 1800s, and built the Mission San Rafael Archangel in 1817. The Mission grazed their herds of cows, sheep and horses across most of what is now Marin County. When Mexico became independent of Spain in 1821, the Spanish became aliens in Mexican territory, and after a few years the Mission was secularized, and its land divided up among citizens loyal to Mexico. In 1846, the United States signed a treaty with Mexico, forming the independent California Republic. By 1874, the small town of San Rafael was incorporated. The original city was 160 acres in size and had a population of 600. Six years later the population had grown to 2,276. The seat of Marin County's government and commerce, the town of San Rafael continued to grow to a population of 8,570 in 1940. North San Rafael remained largely ranch and grazing land until the 1950s. During the 1950s and 1960s, the Terra Linda Valley and Northgate east of Highway 101 developed rapidly. Much of this area was originally in County jurisdiction, but was later annexed to the City. Development during this time included residential, the Northgate Industrial Park, Northgate Mall, and the Frank Lloyd Wright-designed Marin County Civic Center. In 1972, the community voted to preserve the surrounding hills as open space in perpetuity. By the 1990s, North San Rafael was largely built out, with a variety of residential, civic, commercial and retail developments.

2.2 LAND USE

Land uses in the vicinity of transit stations are most effective at supporting ridership and the success of the system if they are transit-supportive or transit-oriented. Transit-oriented development is consistent with good town planning and comprises the following elements:

- A development pattern and accompanying circulation framework that supports access via walking, bicycle, transit and vehicle to areas of living, working and services
- A mix of land uses, such as housing, office, retail, and civic and cultural institutions that support transit ridership. A mix of uses supports ridership and alternative modes of transportation by making various land uses accessible in a single short trip from the rail station.
- Sufficient densities of development to support transit and create an attractive, usable, accessible, and enjoyable environment.

2.2.1 Existing Land Uses, Population and Jobs

EXHIBIT 2-1 Marin County Civic Center is a regional icon that is listed as a national historic landmark

According to SMART's Environmental Impact Report (EIR), the proposed SMART Civic Center station is located in north San Rafael adjoining McInnis Parkway and Civic Center Drive, just east of Highway 101. This section discusses the general land use characteristics within both a ¼ and ½ mile radius of the proposed station. Recent studies of commuter travel patterns have shown that travelers are much more willing to consider taking transit for a trip to work if they live within ½ mile walk of a transit station and work within ¼ mile of a station. In other words, commuters are not typically willing to walk more than ½ mile to access transit, and not willing to walk more than ¼ mile from transit to reach their workplace. The areas within these boundaries include a wide variety of uses (see **Figure 2.1**). Within the ½ mile radius of the station lies one of Marin County's largest employers, the County of Marin, as well as several other large office buildings, a medical facility, a shopping mall, and single-family and multi-family housing.. The Civic Center is home to the county fair, special events, and a thriving farmer's market. At the same time, however, there are extensive parking lots and the wide freeway right-of-way that also occupy key portions of the study area.

For purposes of discussion, the area can be subdivided into four quadrants, two to the east of Highway 101 and two to the west.

Land Uses East of 101

The southeast quadrant of the study area is dominated by the Marin County Civic Center, which is bounded by Highway 101 on the west, N. San Pedro Road and residential neighborhoods on the south and east, and Avenue of the Flags on the north. The Civic Center was master planned by famed architect Frank Lloyd Wright in 1957. The Civic Center includes the Marin County Hall of Justice Administration Building, Jail, General Services Building, Armory, Memorial Auditorium, and Exhibit Hall, as well as the lagoon and Lagoon Park. The Frank Lloyd Wright-designed Administration Building, Hall of Justice, and surrounding area, were designated a national historic landmark in 1991 (see Exhibit 2-1). The Civic Center facilities host a variety of events including the County Fair, concerts, and conferences. A vibrant farmers market occupies the Memorial Auditorium parking lot on Thursdays and the parking lots west of Memorial Drive on Sundays. Surface parking lots dominate the edges of the Civic Center site, especially on the west along the Highway 101 right-of-way and along Avenue of the Flags north of the lagoon. The Marin County Civic Center includes a sizeable amount of open space, including the lagoon and Lagoon Park, the landscaped areas around the County Jail, Hall of Justice, and Administration Building, and several undeveloped areas currently used for the Marin County Fair and overflow parking. Overall, the Civic Center encompasses approximately 128 acres of which roughly 10 are occupied by buildings, 90 by open space (including roads), and 30 by surface and overflow parking lots.

North of the Civic Center site, along McInnis Parkway, is a zone of commercial uses, including two office buildings occupied by Autodesk and an Embassy Suites hotel. The residential neighborhood, Marin Lagoon, lies at the eastern end of McInnis Parkway, just beyond the ½ mile radius from the station location. A linear wetland area runs between the railroad tracks and McInnis Parkway.

The northeast quadrant, north of the rail line and east of Civic Center Drive and Redwood Highway Frontage Road, is characterized by a mix of large-and small-scale office and institutional uses, housing and hillside open space. Along Civic Center Drive are large office and institutional uses including an additional Autodesk office building, a Sutter Terra Linda Urgent Care facility and related medical offices. This area is a major employment center and is Autodesk's world headquarters. Further north where Civic Center Drive becomes Redwood Highway Frontage Road, and along Professional Center Parkway, the uses are a mix of small-scale office, commercial, assisted living facilities, and multi-family housing. To the east of Autodesk and Sutter Terra Linda are the small hillside residential neighborhood of Vista Marin, the small multi-family development of the Gables, and a large area of hillside open space. Further north lay additional small scale office, commercial and hillside residential uses. A large portion of the hillside has been preserved as open space. The existing development has been sited to retain the hillside's natural beauty and character.

Land Uses West of 101

The southwest quadrant, south of the rail line and west of Highway 101, is characterized by commercial, civic and multi-family housing alongside the highway, and single-family housing further west. The Redwood Highway frontage road is lined with auto-oriented commercial uses, such as McDonalds, A&W, Chevron, a pizzeria and restaurant, and small retail outlets, as well as several vacant buildings (see Exhibit 2-2).

EXHIBIT 2-2 Retail uses along the Redwood Highway frontage road looking south

San Rafael Civic Center SAP

EXISTING DEVELOPMENT

November 2010

FIGURE 2.1

EXHIBIT 2-4 Multi-family housing along Merrydale Road

EXHIBIT 2-3 Residential street of single-family homes in the San Rafael Meadows neighborhood.

The commercial parcels are abutted at the rear by multi-family housing which is accessed from Merrydale Road. The Rafael Meadows neighborhood (see Exhibit 2-3) is bounded by the rail line, North San Pedro Road, and Merrydale Road and includes a neighborhood of single-family homes with multi-family apartments along Merrydale Road (see Exhibit 2-4). On the corner of Merrydale Road and El Prado Avenue is the Dandy Market and a bicycle shop, the only commercial uses west of Merrydale Road in this quadrant.

At the north end of Merrydale Road, just south of the rail line, is Public Storage, a large self-service public storage facility. Adjacent to Public Storage is Marin Ventures, a community services facility providing educational and social services for adults with developmental disabilities.

The northwest and southwest quadrants are divided by the rail line right-of-way. Backyards adjoin the railroad right-of-way (see Exhibit 2-5).

EXHIBIT 2-5 An informal trail runs along the railroad tracks

The northwest quadrant is the commercial heart of North San Rafael and home to the major retail and commercial center for the North San Rafael community. This area lies north of the rail line and is dominated by several large scale land uses, the most prominent of which is Northgate Mall (see Exhibit 2-6). Northgate Mall is a large partially enclosed regional shopping mall surrounded by surface parking, adjacent to Las Gallinas Avenue and Los Ranchitos Road. Recent improvements to the mall include more active retail uses around its edges, such as RiteAID and H&M, as well as site landscaping and signage. The first section of the three-mile San Rafael Promenade bike and pedestrian path was completed in April 2010, and runs along the edge of Northgate Mall. Auto supply stores, banks, office uses and additional retail and parking lie to the north and east of Northgate Mall along Las Gallinas Avenue. Southeast of the intersection of Merrydale Road and east of the Mall is the Mount Olivet Cemetery, occupying a 20-acre hillside site. Immediately south of the cemetery is the main campus of Guide Dogs for the Blind, an organization that provides guide dogs for the visually impaired. Northgate Security Storage is on the west side of Merrydale Road where it dead ends at the railroad tracks.

The remainder of this area to the south and west is occupied by single family neighborhoods, some multi-family housing, several senior living communities, and some hillside open space.

EXHIBIT 2-6 Northgate Mall

2.2.2 Vacant and Underutilized Sites

There are two small vacant sites in this area, both located south of North San Pedro Road, just west of Highway 101, and just outside the ½ mile walking radius. They are both challenging sites, and are zoned Public/Quasi-public. (See Figure 2.2 for locations.)

Two vacant buildings, the former Breuner's Furniture and the former Sizzler's Restaurant, are located on the Redwood Highway frontage road within a ¼ mile of the station. The Breuner's building is under renovation to reopen as Hudson Street Design, a window and casement store.

EXHIBIT 2-7 There are some vacant and underutilized buildings and sites along the Redwood Highway frontage road

Other parcels may be considered underutilized and may therefore present development opportunities. For example, the Public Storage and the Northgate Security Storage sites on Merrydale Road at the railroad tracks, are both adjacent to the proposed station (see Exhibits 2-8 and 2-9).. The storage units generate little activity and take up a significant amount of space. The best uses for land in close proximity to a rail station would be a dense mix of retail, residential, and office.

2.2.3 Land Use Plans and Policies

Appendix A includes a summary of relevant plans and policies which are listed in Table 1.1. Regarding land use, it can be noted that while policies encourage transit-supportive infill and development, current maximum allowable housing densities (43 units/acre), height limits (36 feet), and Floor Area Ratio (FAR) (0.30) are at the low end of transit-supportive densities. FAR is a commonly utilized measure of development density that indicates the ratio of building gross square footage (floor) to the land area

EXHIBIT 2-8 The Northgate Storage facility on Merrydale Road north of the railroad tracks

EXHIBIT 2-9 The Public Storage facility on Merrydale Road south of the railroad tracks

associated with the building (area). Thus a 1.0 FAR indicates a 10,000 square foot building on a 10,000 square foot site. At one story, the building occupies the entire site; at two stories the building occupies one-half of the site; at four stories the building occupies one quarter of the site, and so on. FAR is only one indicator of development character, but it does provide a useful benchmark of intensity of building development.

2.2.4 Population and Jobs

Within the ½-mile radius around the proposed SMART Station, the total population is 2,450, with a total household count of 1,522. Total jobs in the area far exceed that, at 4,900. Table 2.1 provides current data and 2035 planning assumptions for the ½-mile radius area.

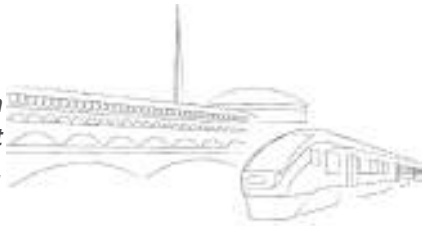


TABLE 2.1
DEMOGRAPHIC INFORMATION FOR THE AREA WITHIN A ½-MILE RADIUS OF THE PROPOSED SMART STATION

	2000 (1)	2035 – Local Planning Assumptions
Population	2,450	4,584
Household Population	1,522	2,003
Total Housing Units	1,056	1,976
Single-family	307	574
Multi-family	749	1,402
Persons per Unit	2.32	2.32
Employed Residents	809 (2)	NA
Mean Household Income	67,619	NA
Total Jobs	4,900 (3)	8,000

Notes:

1. 2009 numbers not available
2. 2000 U.S. Census shows 34% of residents in census tracts commuted 15 minutes or less.
3. Estimated Station Area Dwelling Unit & Employment Buildout

(http://www.mtc.ca.gov/planning/smart_growth/tod/analyses/SMART)_Station_Area.pdf)

Data Sources: MTC Resolution 3434 Case Study Corridor Evaluation – SMART Corridor Station Area Analysis 2005; 2000 Census; MTC TOD Policy Implementation & Evaluation 2006.

2.2.5 Summary

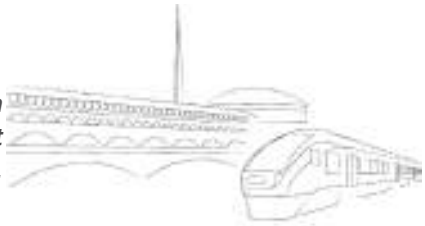
TheCivic Center station site is not immediately adjoined by medium to high density housing or employment uses, which are commonly associated with Transit Oriented Development. However, there are many office and residential areas within a reasonable walk of the station.

The Marin County Civic Center offers the largest ridership opportunity, while Autodesk, Sutter Terra Linda Urgent Care, Northgate Mall, and other nearby offices, banks and retail are also potential sources of transit riders.

Station access is good for some uses, such as Autodesk, given its proximity to the station, but improvements to the pedestrian circulation system (including sidewalk and walkway improvements and connectivity) may be required to support ridership from other area employers.

Similarly, especially on the west side of Highway 101, there is a range of residential densities, however, pedestrian connections to the station are not complete, are poorly lit, and/or lack sidewalks, crosswalks and other amenities. In addition, direct access to the station from the Northgate Mall and future town center is limited by large sites occupied by Mt. Olivet Cemetery and Guide Dogs for the Blind.

In the long term, there can be further transit-supportive development in the area, either through the development of existing parking lots or through the redevelopment of existing low density buildings. This, as well as identifying a complete system of pedestrian and bicycle connections to the station, will be the



focus of the next steps in the Station Area Planning process. **Figure 2.2** presents the existing land use designations and **Figure 2.3** presents the current zoning map.

2.3 DEVELOPMENT FORM

Just as the types and densities of uses within the study area are key to understanding the potential for supporting a new transit station, so are less tangible elements, such as the development patterns and visual character of land uses. This section summarizes the key components of the development patterns, also referred to as the urban design character, in the plan area.

2.3.1 Development Pattern

There are two key elements that characterize the development pattern in the immediate vicinity of the proposed Civic Center Station site: the scale of development and the pattern of developable blocks and streets, which constrains connectivity.

This area of San Rafael began to develop rapidly in the 1950s from an area of ranches to the community it is today. The development pattern found in the study area is typical of that era – suburban residential developments with cul de sacs and a predominance of single family units, strip commercial and shopping malls with a decided auto-orientation and generous parking, and large civic and community-serving sites developed with low scale buildings and plenty of surface parking.

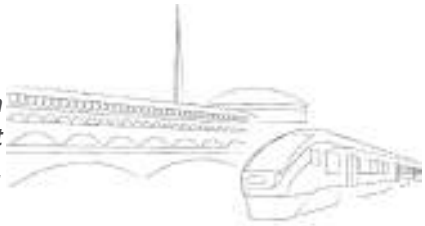
East of 101, the scale of development in the vicinity of the station is quite large. With the exception of two residential communities, the area is dominated by a few large facilities. These large facilities are surrounded by large parking lots, with some dedicated open space also provided. Two large areas of open space, Lagoon Park and the hillside open space, occupy a significant portion of this area. Outside of the 1/2 mile radius a more typical residential-scale pattern with some smaller commercial prevails.

West of Highway 101, a similar scale of suburban development dominates in the north with Northgate Mall, a retail strip mall, and office uses with their respective parking lots. The open space of Mt. Olivet Cemetery and the larger Guide Dogs sites relieve the urban fabric but are a barrier to movement toward the station. Along Highway 101 on Redwood Highway Frontage Road, development consists of individual commercial buildings. The east side of Merrydale Road is lined with close-set, multi-family residential buildings. West of Merrydale Road, the lower-density residential neighborhoods form a smaller scale development pattern.

Figure 2.4 shows the pattern of buildings within the study area. In some areas a fine grained pattern of neighborhood development is contrasted with the larger scale of the Civic Center, Northgate Mall, and the major office, cultural and health care uses that tend to be large buildings on significant sites surrounded by surface parking. In addition, the hillsides on the east side, within the Civic Center, and at the Mt. Olivet Cemetery are important open spaces that lend character and visual relief to the area; note that the topography of the area is not represented on the figure.

The overall development pattern is distinguished by the lack of connectivity between parcels and neighborhoods. Residential neighborhoods are typically organized in patterns with limited numbers of entries and cul de sacs, limiting access through to adjoining areas. The rail and freeway rights-of-way limit potential connections and the ability to develop a more connected pattern of parcels and streets that can facilitate walking and bicycling. Streets, such as Merrydale and Redwood Highway west of US101 end at the rail tracks, limiting connectivity. At the station site, the freeway overpass itself is a significant visual and physical barrier between the west and east sides of this part of San Rafael.

Many streets within the study area, such as Veterans Memorial Drive, the south side of McInnis Parkway, edges of the Northgate Mall site, and various residential areas have an attractive character and are nicely



landscaped. However, portions of Civic Center Drive, Redwood Highway, both north and south of the rail line, and Merrydale Road are poorly landscaped and lacking in an attractive character that encourages pedestrian use. Generally, however, streets are not overly wide and are not in and of themselves barriers to movement.

2.3.2 Summary

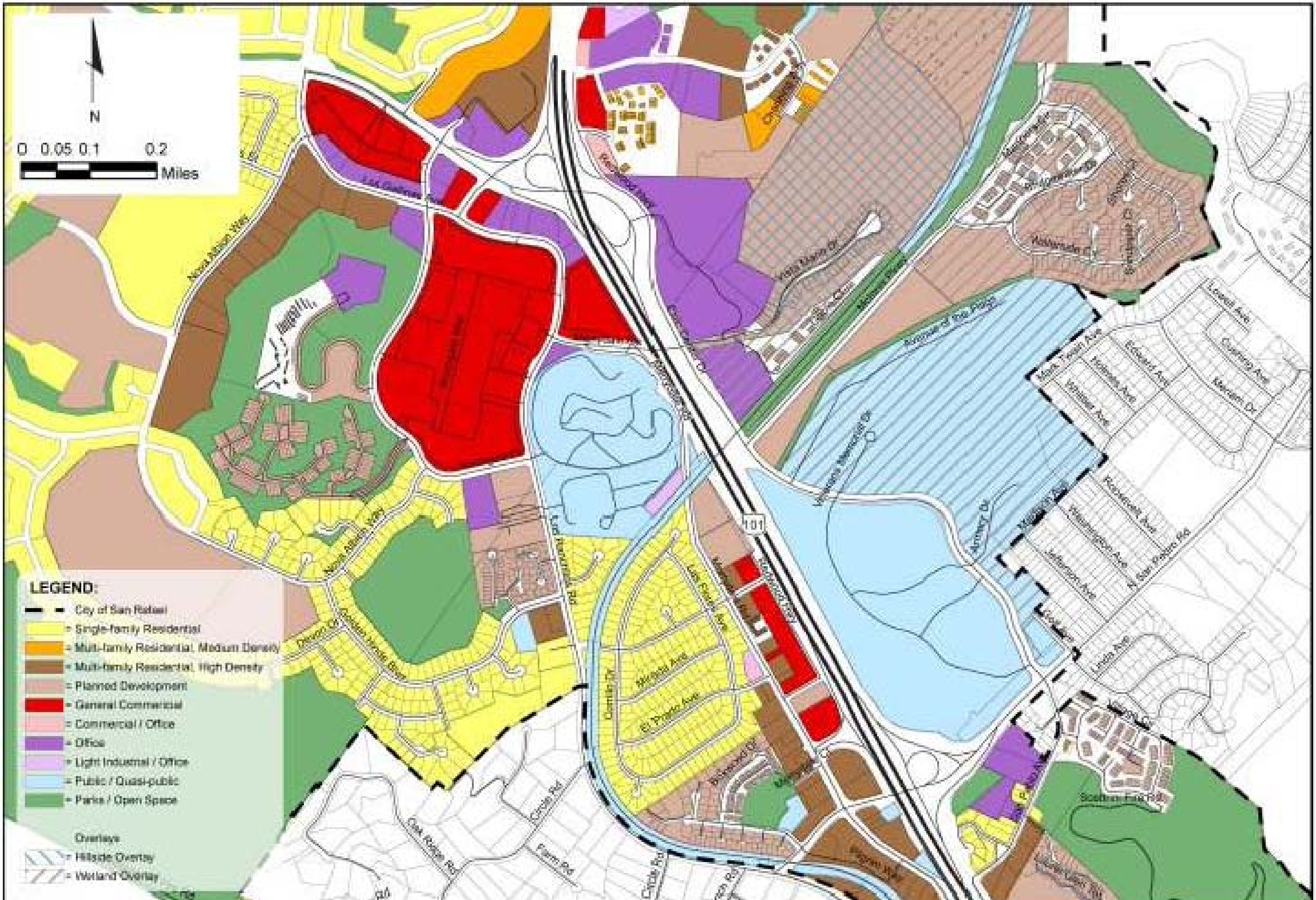
The study area was developed in a suburban pattern with the resulting auto-dependence and lack of pedestrian connectivity. The area is characterized by a low scale of development and single use buildings.

Connectivity in the area is difficult due to 1) the major infrastructure that divides the study area, especially the US101 right-of-way and the rail corridor, and 2) several large land uses that present barriers to pedestrian movement, particularly the Mt. Olivet Cemetery and Guide Dogs for the Blind sites, but also the large office complexes and Northgate Mall.

The area does, however, have significant employment, venues for major events, and is a destination in the region for shoppers, visitors, and others. It is also a visually significant part of the City of San Rafael, with important architecture and visually appealing hillsides and open spaces.

San Rafael Civic Center SAP

EXISTING LAND USE



San Rafael Civic Center SAP

EXISTING ZONING MAP

FIGURE 2.3

FEHR & PEERS
TRANSPORTATION CONSULTANTS

BMS

November 2010

FEHR & PEERS
TRANSPORTATION CONSULTANTS

BMS
DESIGN GROUP

San Rafael Civic Center SAP

EXISTING DEVELOPMENT PATTERN

November 2010

FIGURE 2.4

2.3.3 Visual Character

Views

The area is dominated by the elevated freeway over the railroad tracks and accompanying embankment. Despite this visual barrier, the site enjoys scenic views to the east along Gallinas Creek (see Exhibit 2-10) and the hillsides and open space that follow the rail tracks north of the Civic Center. Long views of the Hall of Justice and Administration Building, the historic structures designed by Frank Lloyd Wright, and surrounding hillsides to the south and west are significant to this area of San Rafael. The rail undercrossing is relatively narrow and dark, although the structural column spacing does not impede visibility (see Exhibit 2-11).

EXHIBIT 2-10 Wetlands

Architectural Character

The Civic Center is the dominant architectural feature of the area and is a notable resource. Elsewhere, architectural character is typical of development in the 1950's through the 1970's. Recent improvements to Northgate Mall have improved its visual character, adding more active uses and transparent facades. Uses along the west side of 101 on Redwood Highway are of the poorest character with few features and site amenities (e.g. narrow sidewalks, minimal landscaping, and poor lighting).

Landscape Character

The Civic Center Lagoon and Lagoon Park are tremendous community resources (see Exhibit 2-12). These well landscaped features provide activity areas and visual amenities for special events and everyday use. Apart from the Autodesk and Embassy Suites sites, much of the east of Highway 101 area is dominated by parking lots with little in the way of site amenities such as street trees, other site landscaping, or benches. There is, however, a multi-use path along McInnis Parkway that can provide access to the station (see Exhibit 2-13). Similarly, the commercial zones along Redwood Highway west of Highway 101 and Merrydale north of the tracks lack site amenities, landscaping, pedestrian lighting or other improvements that help create an attractive pedestrian environment. Merrydale Road south of the railroad tracks only has sidewalks on one side of the street (see Exhibit 2-14). Recent improvements around the periphery of Northgate Mall have improved the streetscape character in this area.

EXHIBIT 2-11 Underpass

EXHIBIT 2-12 Lagoon Park at the Marin County Civic Center

EXHIBIT 2-13 A multi-use path parallels McInnis Parkway and would provide access to the station site

EXHIBIT 2-14 Merrydale Road looking south

CHAPTER 3. EXISTING CONDITIONS – TRANSPORTATION

A comprehensive, multi-modal, and well-connected transportation network will be essential to linking the Station Area land uses with the new Civic Center Station. This chapter describes the local and regional transportation network serving the Civic Center Station Area, both in terms of their overall adequacy and the degree to which they facilitate connections to the Civic Center Station. These facilities and systems include a network of roadways; local and regional bus lines; parking; and pedestrian and bicycle facilities.

This chapter describes: the transportation study area, existing transportation facilities and services that serve the study area, and existing transportation conditions.

3.1 ACCESS AND CIRCULATION

The transportation study area includes all aspects of the transportation network that may be affected by the proposed SMART Civic Center station or that may influence ridership at the station. The transportation study area is defined by travel corridors and by facilities such as transit stations, the freeway system and local streets, with sidewalks and bike lanes that residents, visitors, and commuters would use in traveling to and from the Station. **Figure 3.1** presents the transportation study area, which is generally bound by Los Ranchitos Road/Las Gallinas Avenue to the west, Civic Center Drive to the east, Manuel T. Freitas Parkway to the north, and North San Pedro Road to the south. These roadways also make-up the major connections surrounding the area that are within a ¼ mile radius of the proposed SMART station.

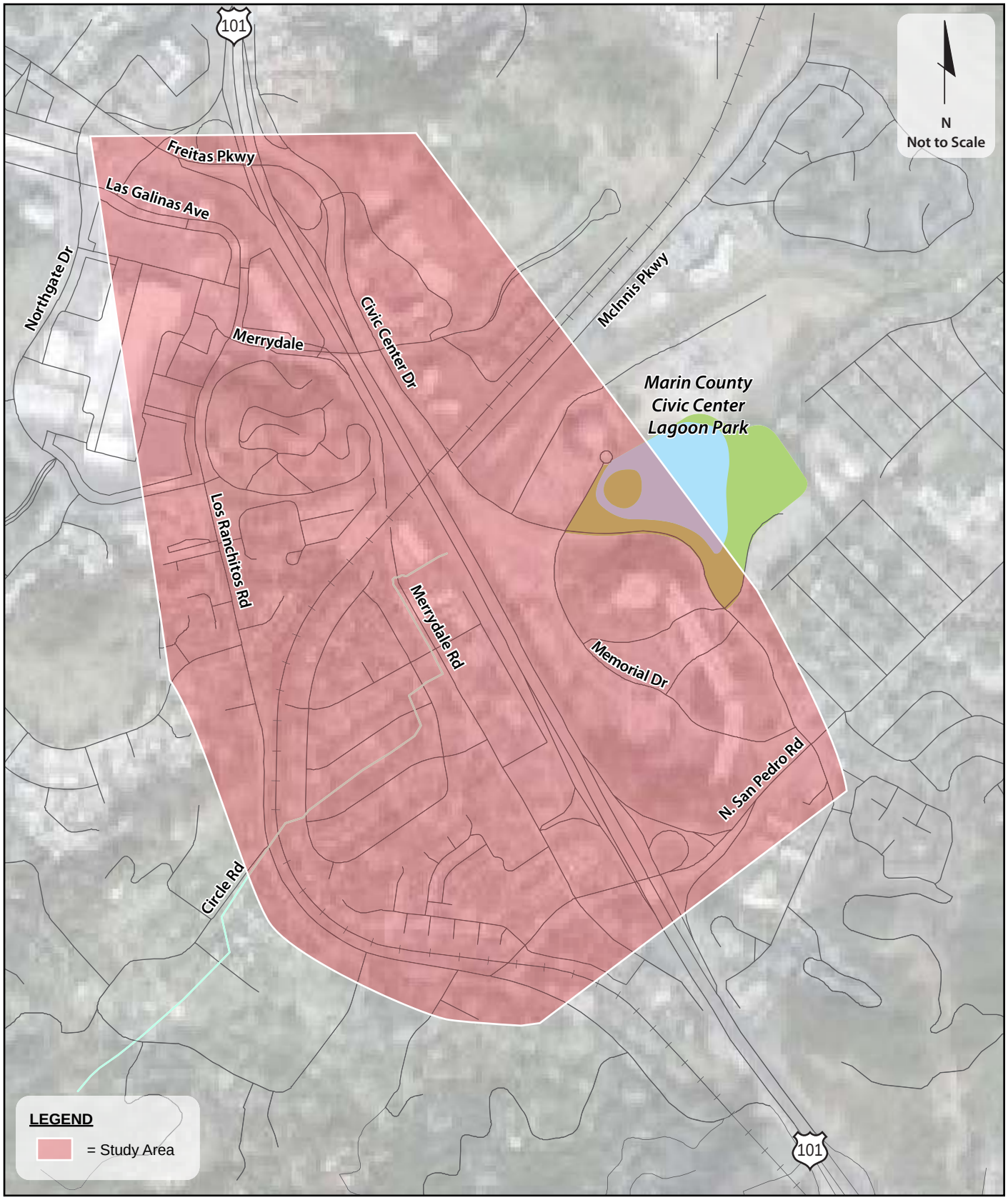
This section of the report provides a brief general summary of several key roadways in the study area, followed by a more detailed discussion of conditions for each transportation mode.

3.1.1 Roadways

This section provides a discussion of the existing roadway system in the Civic Center Station Area, including the roadway designation, number of travel lanes, and traffic flow directions.

US101 (shown in Exhibit 3-1) is the major freeway in the area, which connects to local streets and to regional freeways, such as State Route 37 (SR37) and Interstate 580 (I-580). Local motorists use US101 to travel to other destinations in the North Bay and south to San Francisco. In the vicinity of the Station Area, US101 carries approximately 180,000 vehicles per day on 9 lanes, two of which are high-occupancy vehicle (HOV) lanes. It becomes congested in the southbound direction in the morning peak period and in the northbound direction in the evening peak period as people commute to and from San Francisco. Regional transit routes also use US101 to travel between different transit hubs.

EXHIBIT 3-1 US101 looking south



San Rafael Civic Center SAP

TRANSPORTATION STUDY AREA

FIGURE 3.1

Specifically, Golden Gate Transit routes 70 and 80 are major commuter bus routes that connect to San Francisco to the south and Santa Rosa to the north. They stop at the bus pads located on US101 at the Merrydale and Manueal T. Freitas Parkway interchanges.

EXHIBIT 3-2 Civic Center Drive looking south

Civic Center Drive (shown in Exhibit 3-2) is the principal north-south arterial, parallel to and just east of US101. Civic Center Drive extends from North San Pedro Road to its intersection with Manuel T. Freitas Parkway and Redwood Highway Frontage Road approximately 1/3 mile north of the proposed SMART station. It is the primary access route to key destinations on the east side of US101, including the Civic Center, Autodesk, and Sutter Terra Linda Urgent Care.

Civic Center Drive has a series of discontinuous sidewalks; however, the majority of the east side of the street provides pedestrian facilities. Bicyclists generally share the roadway with motorists.

Marin Transit routes 45, 45K, and 49 run along the length of Civic Center Drive and routes 233 and 259 travel around the Civic Center via Civic Center Drive, Memorial Drive, and Judge Haley Drive. There are bus stops on Civic Center Drive at McInnis Parkway and near both intersections with Memorial Drive and on Judge Haley Drive under the Hall of Justice Arch.

Manuel T. Freitas Parkway provides access to/from US101 via an interchange located north of the Merrydale Overcrossing. The existing configuration presents complicated auto, bus, pedestrian and bicycle interactions at the unsignalized intersection with Civic Center Drive. This makes the Merrydale Overcrossing the preferred east-west access to the Civic Center area. Manuel T. Freitas Parkway provides a westerly connection from Civic Center Drive to Northgate One, the Sheraton Hotel, Northgate Mall, and neighborhoods to the west of US101.

Merrydale Overcrossing (shown in Exhibit 3-3) provides a key connection across US101, north of the proposed SMART station, extending from Civic Center Drive to its intersection with Las Gallinas Avenue. It provides a direct link to the Northgate Mall and the community west of US101.

Merrydale Overcrossing has a continuous sidewalk on the north side of the street, but none on the south side. The lack of strong pedestrian-oriented facilities (such as continuous sidewalks on both sides of the roadway) on this road may make the pedestrian undercrossing near the railroad tracks a more attractive alternative. Further, the topography along the Merrydale Overcrossing and Civic Center Drive creates a more strenuous path compared to the

EXHIBIT 3-3 Merrydale Overcrossing looking west

undercrossing near the railroad tracks. Bicyclists have bike lanes on both sides of the roadway.

Marin Transit route 49 uses Merrydale Road to connect its service along Civic Center Drive to its stop at Northgate Mall.

North San Pedro Road provides a key connection across US101 south of the proposed SMART station, extending from China Camp State Park (east) to Los Ranchitos Road (west). The North San Pedro Road interchange is the major connection between the Civic Center and US101.

North San Pedro Road has a continuous sidewalk on the north side of the street, but a discontinuous facility on the south side. This can be frustrating for pedestrians who are walking on the south side of the street because North San Pedro Road is fairly wide, which is less desirable for pedestrians. Bicyclists generally share the roadway with motorists. Pedestrian and bicycle travel through the US101 interchange is challenging due to required crossings at unsignalized freeway ramps, where merging traffic is not required to stop. Regional bus services along US101 make freeway bus pad stops at this interchange, adding to the pedestrian traffic in the area.

Marin Transit routes 45, 45K, 233, and 259 all use North San Pedro Road between Los Ranchitos Road and Civic Center Drive. There is a bus stop at its intersection with Merrydale Road.

Los Ranchitos Road/Las Gallinas Avenue (shown in Exhibit 3-4) is the principal north-south arterial west of US101, extending from Las Gallinas Avenue and Merrydale Road, past North San Pedro Road, until it becomes Lincoln Avenue near the US101 ramps.

Los Ranchitos Road has a series of discontinuous sidewalks with a large void between Ranch Road and Walter Place, near the Las Gallinas Avenue pedestrian connection. Bicyclists also have inconsistent facilities ranging from bike lanes, to wide shoulders, to shared facilities.

Marin Transit routes 45, 45K and 259 and Golden Gate Transit regional route 38 operate on Los Ranchitos Road between Merrydale Road and North San Pedro Road with four stops within the segment.

The rest of this chapter provides a more detailed discussion of each transportation mode, including existing facilities and connectivity, and in some cases, a more detailed operational analysis.

EXHIBIT 3-4 Los Ranchitos Road looking north

3.1.2 Bicycles

According to the San Rafael General Plan 2020 and the 2000 Census, the bicycle commute mode share is 2.0%. The goal of the San Rafael Bicycle and Pedestrian Master Plan states that the goal is to “make San Rafael a model community for alternative transportation” and “aim for a 20 percent mode share of all utilitarian trips to be made by bicycling and walking by the year 2020.” The General Plan supports the goal identified by the Bicycle and Pedestrian Master Plan with the following policies:

C-11d. Bike to Work Day. Encourage City employees, other San Rafael workers and residents to participate in Bike to Work Days and similar programs and provide support services for the program.

C-11e. Reduction of Single Occupancy Vehicles. Encourage developers of new projects in San Rafael, including City projects, to provide improvements that reduce the use of single occupancy vehicles. These improvements could include preferential parking spaces for car pools, bicycle storage and parking facilities, and bus stop shelters.

Bicycle infrastructure and encouragement is also identified in section C-12. Transportation Demand Management, such as bicycling incentive programs. This includes free bikes, secure parking, restrooms and showers. Although bicycling currently represents only two percent of all work trips in San Rafael, according to the US Census, it is becoming a more popular mode of travel in the area and continues to be an important recreational mode of activity.

Bicycles are an important component of any City's transportation network. A variety of bicycle facilities are located in the study area. Bikeways are typically classified as Class I, Class II, or Class III facilities, as follows and shown in Exhibit 3-5:

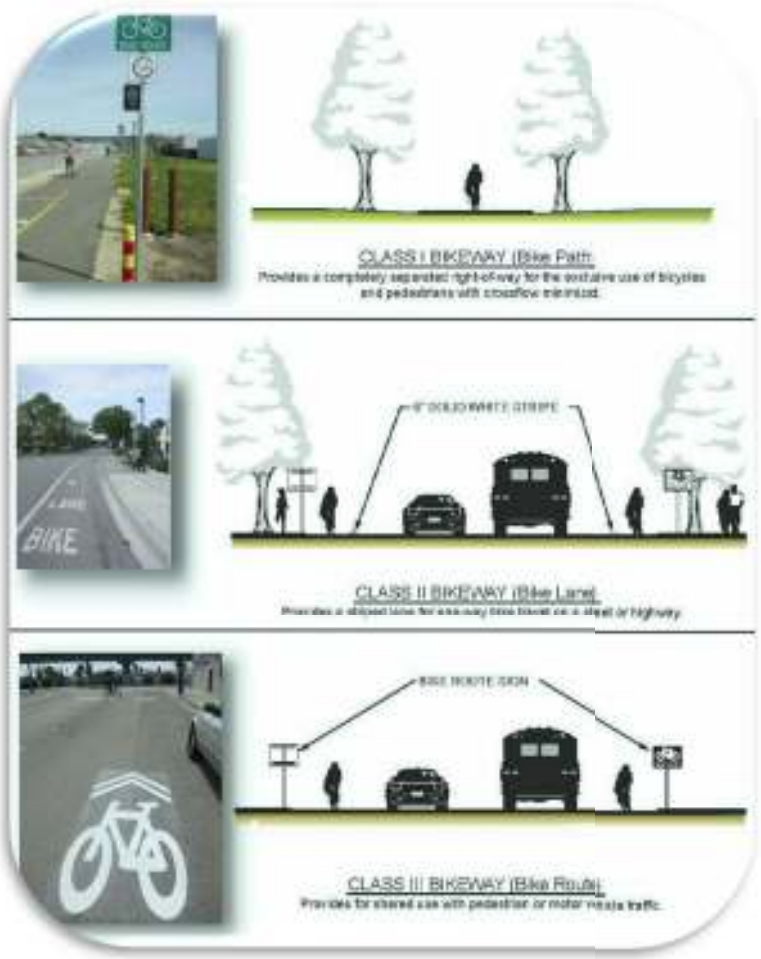
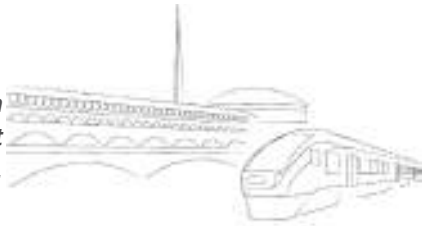


EXHIBIT 3-5 Bikeway Classification

- Class I Bikeway – bike paths within exclusive right-of-way, sometimes shared with pedestrians
- Class II Bikeway – bike lanes for bicycle use only that are striped within the paved area of roadways
- Class III Bikeway – bike routes are shared facilities, either with motor vehicles on the street. Class III bikeways may also be defined by a wide curb lane and/or use of a shared use arrow stencil marking on the pavement, known as a "sharrow".



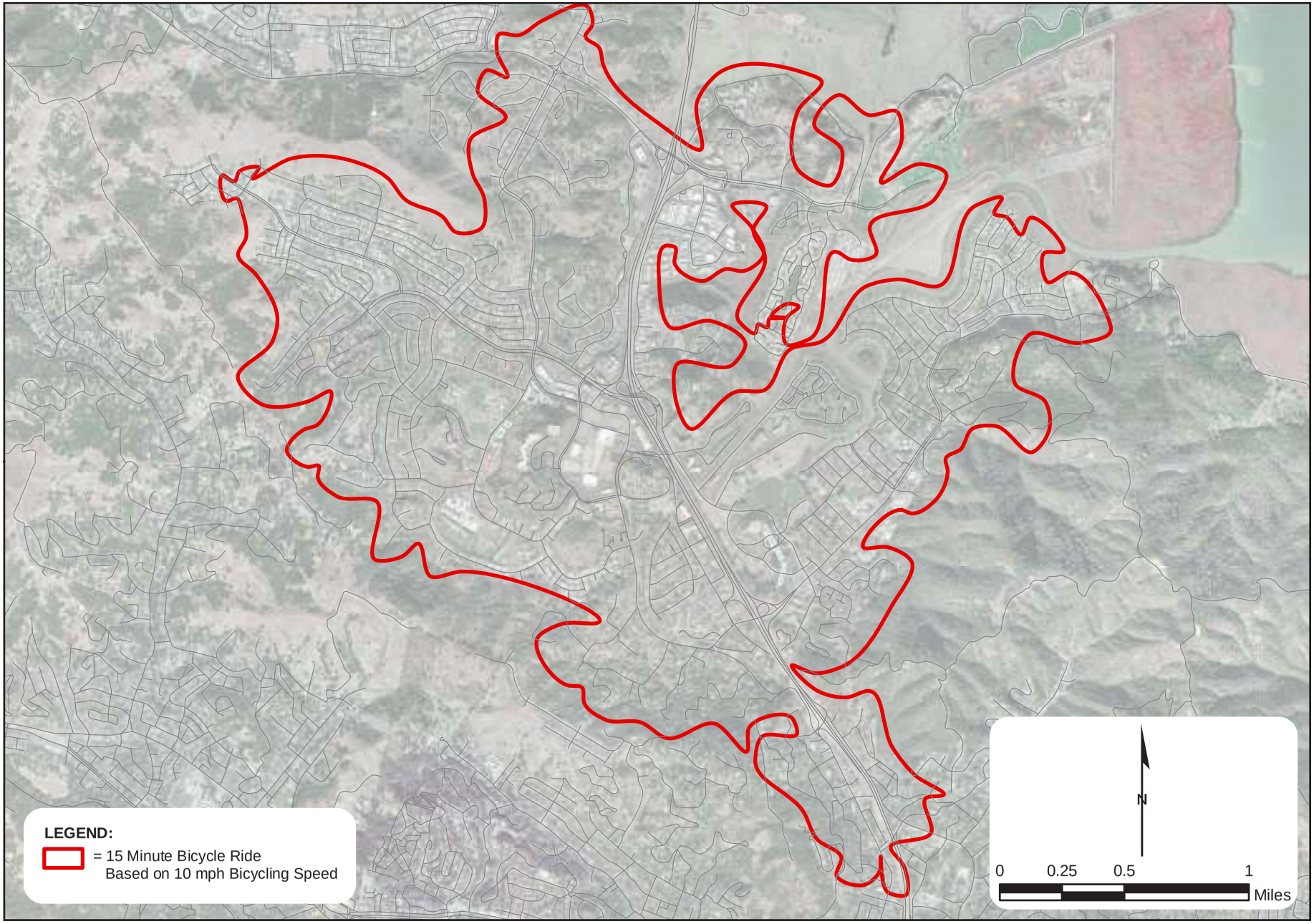
Bicycling activity relies heavily on the conditions of the existing roadway system, the connectivity of a bicycle network, and can be influenced by vehicular traffic volumes and speeds. **Figure 3.2** depicts the existing bicycle facilities in the Civic Center Station Area. As shown, the majority of the roadways in the study area are either Class III Bikeways or undesignated shared facilities. Class I facilities are provided on the north side of McInnis Parkway and around the north side of Northgate Mall; however the facilities are only 2/3 mile and 1/3 mile long, respectively.

Bicycle traffic is relatively low in the study area. However, as presented in **Figure 3.3**, the entire study area is easily accessible within a 15-minute bicycle ride, which means that with new transit service, bicycling may present an attractive option for potential transit riders who live within a reasonable bicycle trip of the station. Specific routes to select destinations are identified in **Table 3.1**.

San Rafael Civic Center SAP

EXISTING BICYCLE FACILITIES

FIGURE 3.2



San Rafael Civic Center SAP

15 MINUTE BICYCLE RIDE

TABLE 3.1
BICYCLE CONNECTIVITY FROM CIVIC CENTER STATION TO DESTINATION LOCATION

Destination	Description
Northgate Mall Vallecito Elementary School St. Mark's School Kaiser San Rafael Medical Center	Class III and Class II facilities connect the Civic Center Station to Northgate Mall and areas west of Los Ranchitos Road. The Merrydale Overcrossing has Class II bike lanes. The remainder of the connection is a shared roadway with no striped curb lane. There is no on-street parking between the Civic Center and Northgate Mall. There is on-street parking on local streets west of Los Ranchitos Road.
Civic Center	Although cyclists are allowed to share the roadway with motorists, Civic Center Drive south of the station is not designated as a Class III route.
Autodesk (McInnis Parkway) Residential (McInnis Parkway)	A Class I bike path runs along the north side of McInnis Parkway; however, a connection across McInnis Parkway to the commercial office buildings is not provided.

Source: Fehr & Peers 2010.

Some other key connections constructed within the station area provide linkages to key destinations:

Walter Place Pathway (shown in Exhibit 3-6): This pathway starts at the "T" intersection of Los Ranchitos Road and Walter Place, just south of Mt. Olivet Cemetery. This pathway is 180 feet long with a five to six foot width, and it crosses the Northwestern Pacific Railway right-of-way (shown in Exhibit 3-5). Although short in distance, the Walter Place Pathway provides a critical link between the residences to the east of Los Ranchitos Road and major land uses, such as the Northgate Mall, Terra Linda High School, and Vellecito Elementary School. This connection (shown on **Figure 3.2)** can save pedestrians and bicyclists from the neighborhood over a mile of additional travel. Patrons from the station can save approximately ½ mile of travel distance.

EXHIBIT 3-6 Walter Place Pathway looking east from Los Ranchitos Road

Merrydale Hill (Puerto Suello) Pathway: Unlike the Walter Place Pathway, which is a short connection of two otherwise disconnected neighborhoods, the Puerto Suello Pathway provides a much longer, but also crucial bicycle link between North San Rafael and Downtown San Rafael. This paved pathway connects North San Pedro Road to Lincoln Avenue to the south by way of Merrydale Road. The Class I pathway is a 12 foot wide paved path with a 2 foot dirt shoulder on either side. This provides a key connection to the south and downtown San Rafael via recently constructed Class I path between Highway 101 and the railroad tracks.

3.1.3 Pedestrian

The pedestrian network in the Civic Center Station Area has a moderate level of connectivity, though there are locations that lack continuity. The majority of the roadways provide a sidewalk on at least one side of the street, but streets frequently do not provide sidewalks on both sides. In addition, certain locations of Civic Center Drive and Memorial Drive near the Civic Center do not have sidewalks on either side. **Figure 3.4** presents the existing pedestrian network, and illustrates where sidewalks are provided on one or both sides, and where no sidewalks are provided.

As discussed in Section 2.2, commuters are not typically willing to walk more than ½ mile to access transit, and not willing to walk more than ¼ mile from transit to reach their workplace. **Figure 3.5** summarizes the portion of the study area within both a ¼ mile and ½ mile radius.

Although planning and designing transportation facilities always involves a series of trade-offs between modes, locations of specific pedestrian circulation challenges in the study area are identified below. The inclusion of these pedestrian challenges is not intended to suggest safety-related deficiencies related to the design of these facilities; rather, the challenges described are to efficient pedestrian circulation and a pedestrian-encouraging environment.

- No crosswalk on the north leg of the signalized Civic Center Drive/McInnis Parkway Intersection
- No sidewalks on the west side of Civic Center Drive from Manuel T. Freitas Parkway to east of Memorial Drive
- Informal pathways often used to cross from the west side of US101 to the east side (as shown in Exhibit 3-7)
- No sidewalks on either side of Memorial Drive between Civic Center Drive and Vera Schultz Drive
- Crosswalks only present on north and east leg of the Civic Center Drive/ Merrydale Overcrossing intersection (as shown in Exhibit 3-8)
- Sidewalk not provided on south side of Merrydale Overcrossing
- Merrydale Road (north of the tracks) is devoid of pedestrian facilities
- No crosswalk on the south leg of the Las Gallinas Avenue/Merrydale Road intersection

EXHIBIT 3-7 Informal pathway on west side of US101 underpass

EXHIBIT 3-8 Pedestrian signage at Merrydale Overcrossing and Civic Center Drive

Some improvements included in the ***Bicycle/Pedestrian Plan*** (August 2001) would provide greater connectivity in the study area. These projects include the following projects:

EXHIBIT 3-9 Rail undercrossing of US101

- Formalization of the connection between Merrydale Road to Civic Center Drive under the US101 overpass, which is currently used as an unofficial pathway as shown in Exhibit 3-9. Sidewalks on Civic Center Drive from Manuel T. Freitas Parkway to North San Pedro Road

- Sidewalks on North San Pedro Road from City Limit to Los Ranchitos Road

Additionally, the ***North San Rafael Vision Promenade Conceptual Plan*** is an element of the ***Vision North San Rafael in the Year 2010*** report. The plan proposes the following:

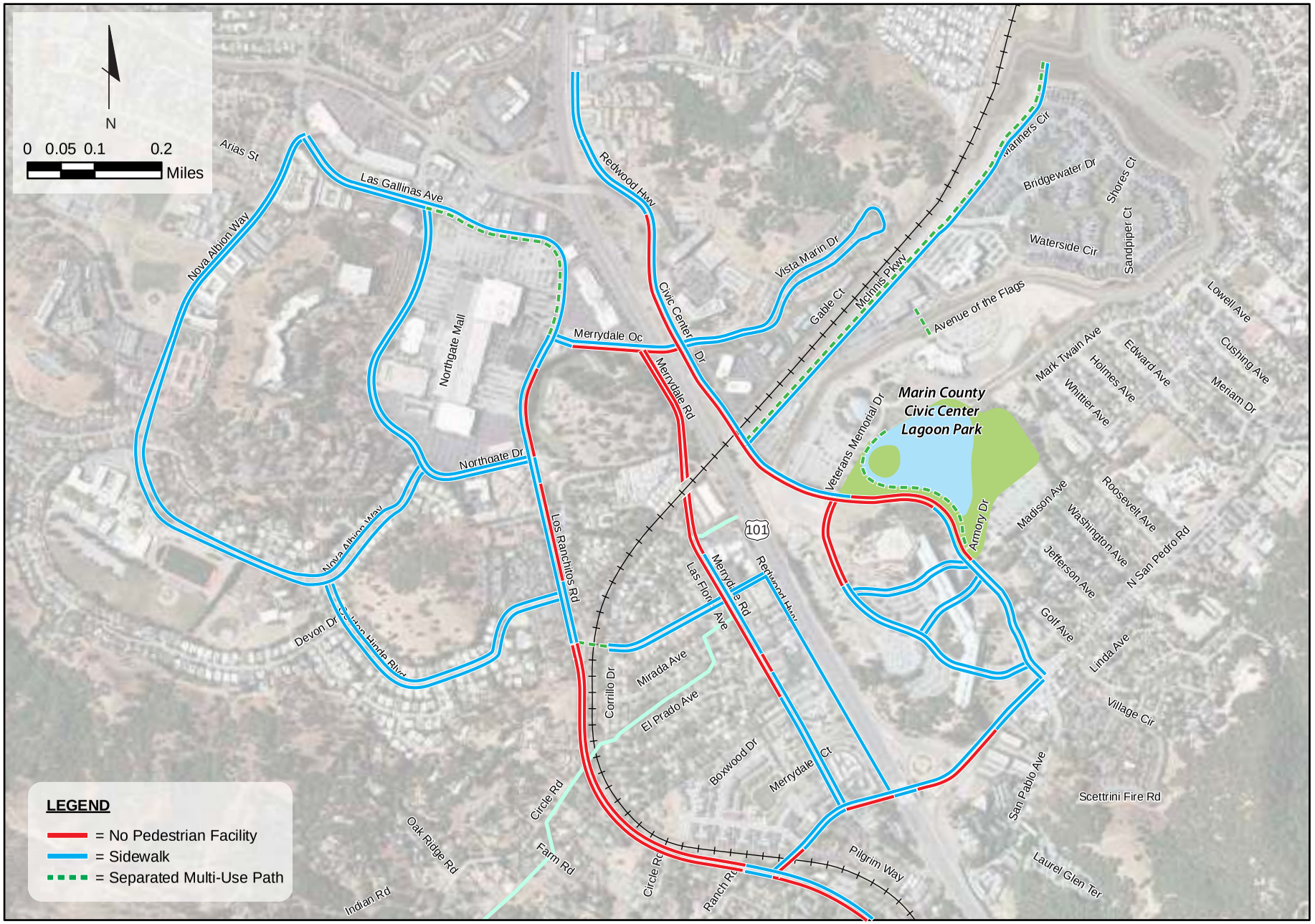
- The first section of the three-mile San Rafael Promenade bike and pedestrian path, was completed in April, 2010, and runs along the edge of Northgate Mall.

- Improved bicycle and pedestrian linkages between the Terra Linda Recreation Center and Lagoon Park at the Marin County Civic Center

- Amenities such as improved public parks and new plazas

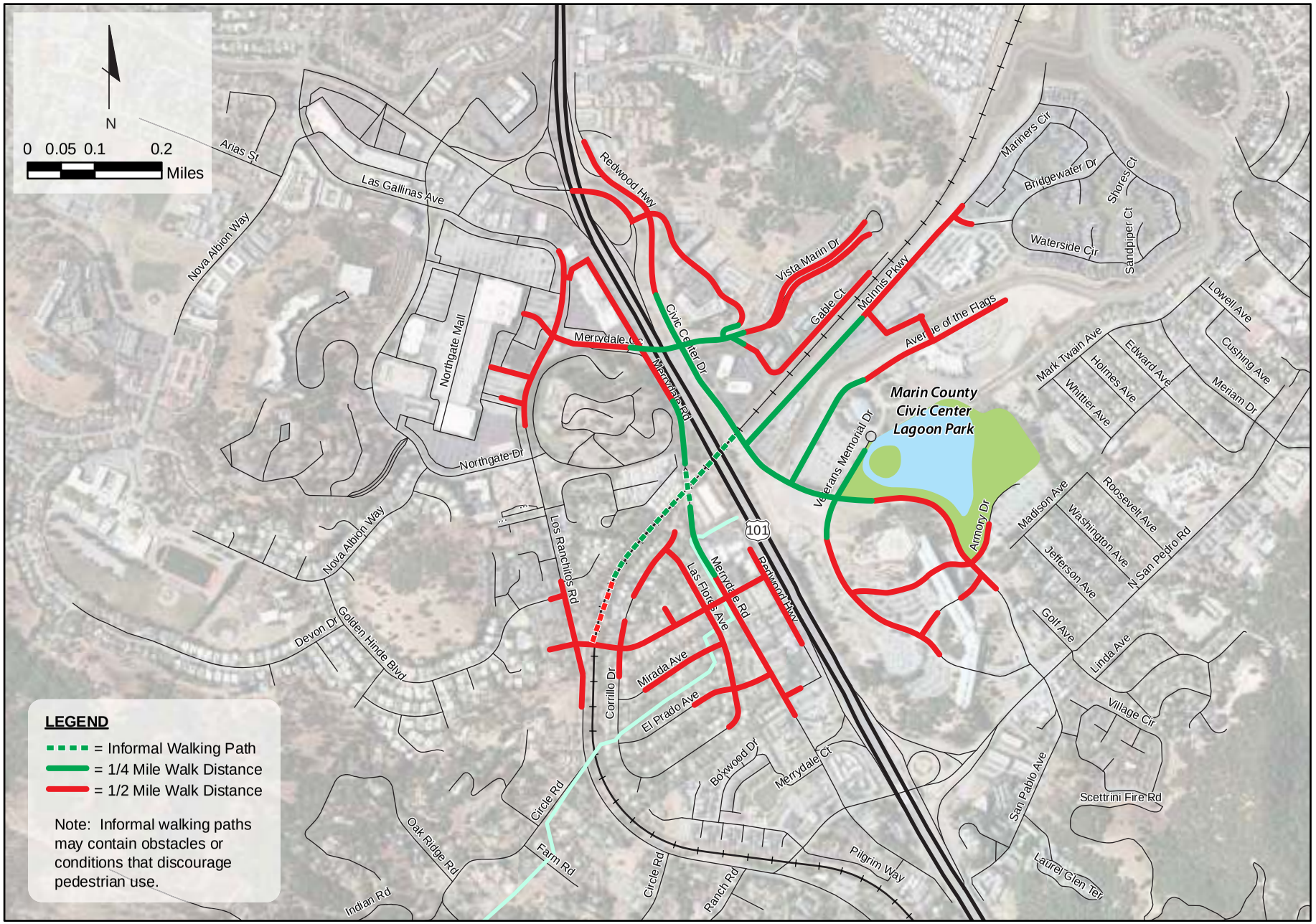
- A repeating and unifying theme which reflects cultural elements, people, local natural history and expresses the community identity of North San Rafael through use of consistent "theme details"

The plan presents a detailed list of pedestrian paths and bikeways, amenities, and unifying themes with specific cross-sections and design elements proposed (see Appendix A for greater detail).



San Rafael Civic Center SAP

EXISTING PEDESTRIAN FACILITIES

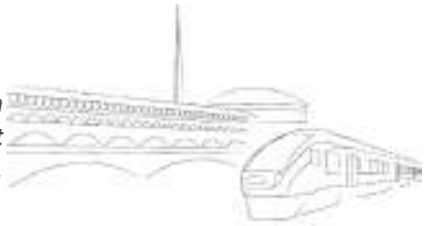


San Rafael Civic Center SAP

PEDESTRIAN CONNECTIVITY

January 2011

FIGURE 3.5



3.1.4 Transit

The study area is relatively well-served by public transit, with routes providing cross-town, downtown, and regional service. Service within the study area is provided by Marin Transit. The regional routes provide service as far north as Santa Rosa and as far south as San Francisco. A majority of the local routes passing through the Civic Center Station Area provide connections to the Bettini Transit Center in Downtown San Rafael, which is the major transit hub of the North Bay. Service is provided from Santa Rosa to downtown San Francisco, and east to El Cerrito. The routes that serve the Civic Center Station Area are described below.

Figure 3.6 presents the transit routes described below.

Marin Transit 45 - San Rafael / 45K Kaiser Hospital connects Kaiser Hospital, Northgate Mall, the Civic Center, and downtown San Rafael. During the weekdays, it runs on half-hour frequencies between 5:35 AM and 8:55 PM. Service on the weekends and holidays is limited to one-hour frequencies between 7:06 AM and 7:25 PM. There are two stops along Civic Center Drive at the County Civic Center, shared with Routes 49, 233 and 259, and a pair of stops shared with Route 49 directly adjacent to the proposed SMART station at the Civic Center Drive/McInnis Parkway intersection.

Marin Transit 49 - San Rafael/Ignacio connects Ignacio, Hamilton, the Civic Center, and downtown San Rafael. During the weekdays, it runs on one-hour frequencies between 7:00 AM and 6:49 PM. Service on the weekends and holidays also has one-hour frequencies between 7:04 AM and 7:55 PM. There are two stops along Civic Center Drive at the County Civic Center, shared with Route 45, 45k, 233 and 259, and a pair of stops shared with Route 45/45K, directly adjacent to the proposed SMART station at the Civic Center Drive/McInnis Parkway intersection.

Marin Transit 233 - Santa Venetia Shuttle connects Santa Venetia, the Civic Center, the Dominican University, and downtown San Rafael. During the weekdays, it runs on one-hour frequencies between 6:04 AM and 8:55 PM. Service is not provided on the weekends and holidays. There are three stops along Civic Center Drive at the County Civic Center, one of which is shared with Route 259, less than ¼ mile from the proposed SMART station at the Civic Center Drive/McInnis Parkway intersection.

Marin Transit 259 - Marinwood Shuttle connects Marinwood, Terra Linda, Northgate Mall, and the Civic Center. During the weekdays, it runs on one-hour frequencies between 7:41 AM and 5:41 PM. Service is not provided on the weekends and holidays. There are three stops along Civic Center Drive at the County Civic Center, one of which is shared with Route 233, less than ¼ mile from the proposed SMART station at the Civic Center Drive/McInnis parkway intersection.

Ridership information for each stop and for each route in the study area is summarized in **Table 3.2**.

As shown in Table 3.2, the busiest bus stop is located at the Las Gallinas Avenue/Merrydale Road intersection. This stop serves the Northgate Mall and other adjacent uses. The Marin Transit route 45/45K experiences 67 total boardings in the southbound direction during the PM Peak Hour. With 30 minute bus headways, this equates to an average of 34 boardings for each bus.

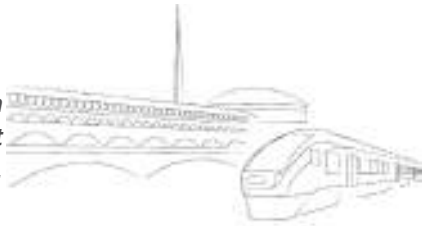


TABLE 3.2
BOARDINGS AND ALIGHTINGS AT CIVIC CENTER STATIONS - EXISTING CONDITIONS

Stop	Local Route	AM Peak Hour		PM Peak Hour	
		On	Off	On	Off
Civic Center Drive/ N. San Pedro Road (Northbound)	Marin Transit 45	0	11	0	12
	Marin Transit 45K	2	3	0	1
	Marin Transit 49	0	4	0	6
	Marin Transit 233	1	0	1	0
	Marin Transit 259	1	0	2	0
Civic Center Drive/ N. San Pedro Road (Southbound)	Marin Transit 45	2	1	15	2
	Marin Transit 45K	2	1	3	1
	Marin Transit 49	1	0	2	1
	Marin Transit 233	4	0	0	0
	Marin Transit 259	0	0	0	0
Civic Center – Hall of Justice Arch (Northbound)	Marin Transit 45	0	7	1	0
	Marin Transit 45K	0	4	0	0
	Marin Transit 49	0	1	1	1
	Marin Transit 233	0	1	3	1
	Marin Transit 259	1	0	2	0
Civic Center – Hall of Justice Arch (Southbound)	Marin Transit 45	1	0	6	1
	Marin Transit 45K	0	1	4	2
	Marin Transit 49	0	1	2	1
	Marin Transit 233	0	0	0	1
	Marin Transit 259	0	2	0	0
Civic Center Drive/ Memorial Drive (Northbound)	Marin Transit 45	0	0	0	0
	Marin Transit 45K	0	0	0	0
	Marin Transit 49	0	0	0	0
	Marin Transit 233	0	1	0	0
	Marin Transit 259	0	0	0	0
Civic Center Drive/ McInnis Parkway (Northbound)	Marin Transit 45	0	2	0	0
	Marin Transit 45K	0	2	0	0
	Marin Transit 49	1	1	0	0
Civic Center Drive/ McInnis Parkway (Southbound)	Marin Transit 45	0	0	1	0
	Marin Transit 45K	0	0	6	0
	Marin Transit 49	0	0	1	0
Las Gallinas Avenue/ Merrydale Road (Northbound)	Marin Transit 45	0	14	0	20
	Marin Transit 45K	0	15	0	12
	Marin Transit 49	2	6	5	4
	Marin Transit 259	0	0	0	0

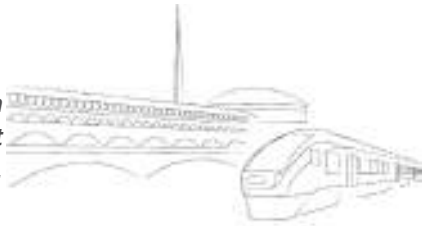


TABLE 3.2
BOARDINGS AND ALIGHTINGS AT CIVIC CENTER STATIONS - EXISTING CONDITIONS

Stop	Local Route	AM Peak Hour		PM Peak Hour	
		On	Off	On	Off
Las Gallinas Avenue/ Merrydale Road (Southbound)	Marin Transit 45	2	0	46	0
	Marin Transit 45K	2	0	21	0
	Marin Transit 49	0	1	5	0
	Marin Transit 259	0	0	0	0

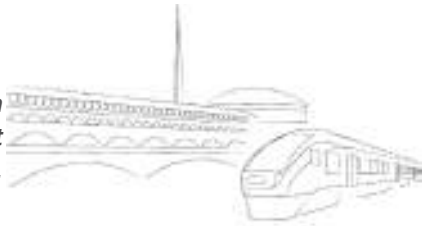
Source: Moore & Associates, 2010.

San Rafael Civic Center SAP

EXISTING TRANSIT SERVICE

January 2011

FIGURE 3.6



3.1.5 Traffic

Traffic conditions are typically at their most congested during the weekday AM and PM peak commute periods (7:00 to 9:00 AM and 4:00 to 6:00 PM). For this project, conditions were analyzed for the peak hour within the AM and PM peak periods (generally 7:30 to 8:30 AM and 5:00 to 6:00 PM) in the study area. **Figure 3.7** presents the study area analysis locations. The traffic analysis includes an assessment of intersection operating conditions and roadway corridors, as well as a summary of the area's parking conditions.

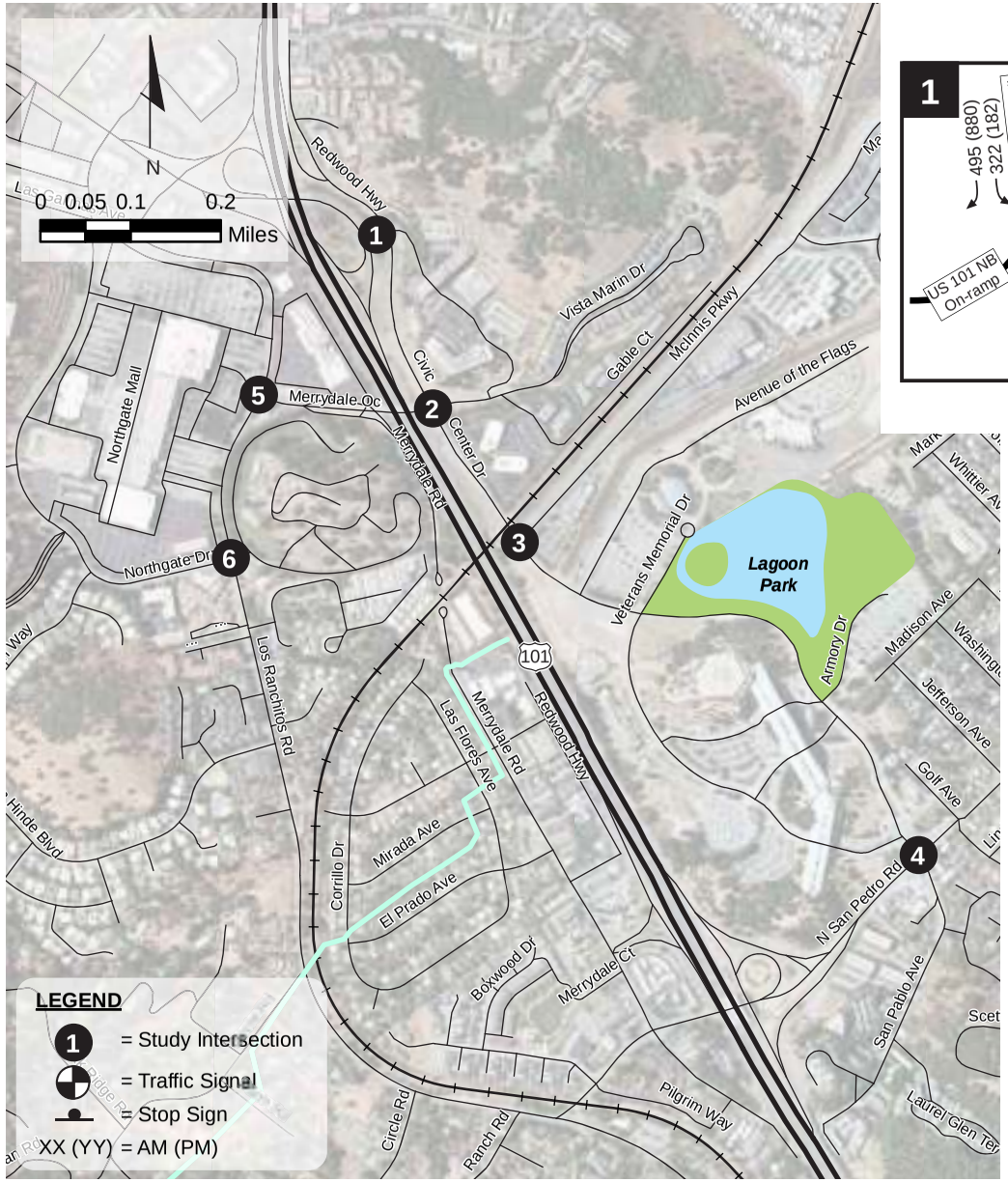
Intersection Analysis

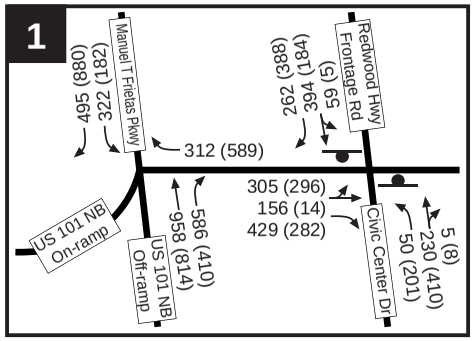
Traffic analyses are typically focused on a comparison between the capacity of the roadway system and the amount of traffic attempting to use it. In most cases, traffic analyses focus on the conditions at key intersections in the roadway network, because they often form key bottlenecks, and control the overall roadway capacity. Existing intersection operating conditions were evaluated for six intersections in the study area that are key locations in the Civic Center Station Area. Of the six study intersections, five are signalized and one is unsignalized. Current traffic volumes at the six study intersections are presented on **Figure 3.6** for the weekday AM and PM peak hours.

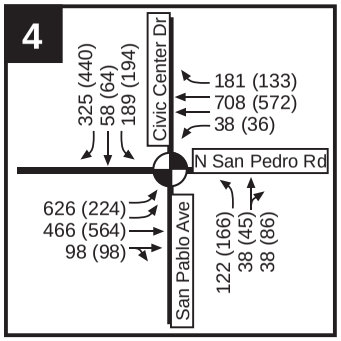
The operating characteristics of signalized and unsignalized intersections are described by the concept of Level of Service ("LOS"). LOS is a qualitative description of a facility's performance based on the average delay per vehicle. Intersection levels of service range from LOS A, which indicates free flow or excellent conditions with short delays, to LOS F, which indicates congested or overloaded conditions with extremely long delays. Per the San Rafael General Plan 2020, the citywide acceptable level of service is LOS D and better, except where noted, and applies only to signalized intersections. The Civic Center Drive/Manuel T. Freitas Parkway intersection was included in the analysis because it will be signalized in the future. Three intersections in the study area are allowed the exception of LOS E as an acceptable operation:

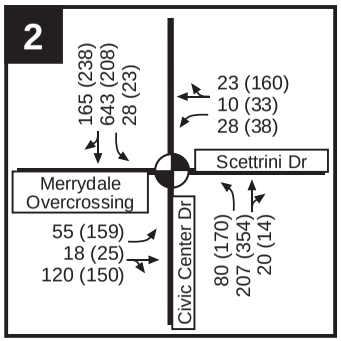
- Civic Center Drive / Freitas Parkway
- Civic Center Drive / Merrydale Road
- Los Ranchitos Road / Merrydale Road

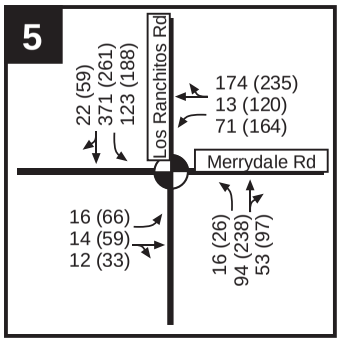
Table 3.3 presents the level of service definitions for signalized and unsignalized intersections.

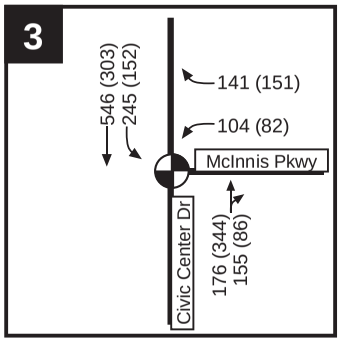


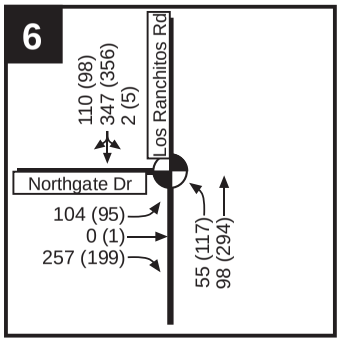












San Rafael Civic Center SAP

STUDY LOCATIONS AND EXISTING INTERSECTION CONFIGURATION, TRAFFIC CONTROL, AND AM AND PM PEAK HOUR TURNING MOVEMENT VOLUMES

January 2011

FIGURE 3.7

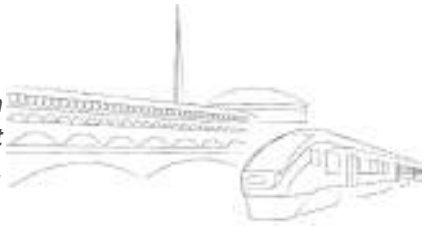


TABLE 3.3
LOS DEFINITIONS FOR SIGNALIZED AND UNSIGNALIZED INTERSECTIONS

Control/ LOS	Description of Operations	Average Control Delay (seconds per vehicle)
Signalized		
A	Insignificant Delays: No approach phase is fully used and no vehicle waits longer than one red indication.	< 10
B	Minimal Delays: An occasional approach phase is fully used. Drivers begin to feel restricted.	> 10.0 and ≤ 20.0
C	Acceptable Delays: Major approach phase may become fully used. Most drivers feel somewhat restricted.	> 20.0 and ≤ 35.0
D	Tolerable Delays: Drivers may wait through no more than one red indication. Queues may develop but dissipate rapidly without excessive delays.	> 35.0 and ≤ 55.0
E	Significant Delays: Volumes approaching capacity. Vehicles may wait through several signal cycles and long queues form upstream.	> 55 and ≤ 80
F	Excessive Delays: Represents conditions at capacity, with extremely long delays. Queues may block upstream intersections.	> 80.0
Unsignalized		
A	No delay for STOP-controlled approach.	< 10.0
B	Operations with minor delays.	> 10.0 and ≤ 15.0
C	Operations with moderate delays.	> 15 and ≤ 25.0
D	Operations with some delays.	> 25.0 and ≤ 35.0
E	Operations with high delays and long queues.	> 35.0 and ≤ 50.0
F	Operations with extreme congestion, with very high delays and long queues unacceptable to most drivers.	> 50.0

Source: ***Highway Capacity Manual – Special Report 209*** (Transportation Research Board, 2000).

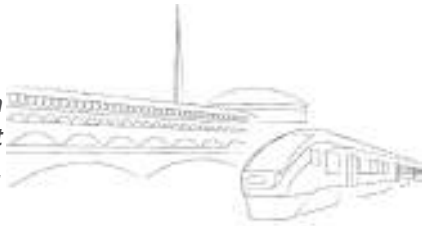


Table 3.4 presents the results of the intersection LOS analysis for the existing weekday AM and PM peak hour conditions.

TABLE 3.4
EXISTING INTERSECTION OPERATIONS

Intersection		Control	Weekday AM Peak Hour		Weekday PM Peak Hour	
			Del[1]	LOS	Del[1]	LOS
1	Civic Center Drive / Freitas Parkway	SSS[2]	>50 (NBTh)	F	>50 (NBTh)	F
2	Civic Center Drive / Merrydale Road	Signal	35	C	33	C
3	Civic Center Drive / McInnis Parkway	Signal	9	A	10	A
4	Civic Center Drive / San Pedro Road	Signal	21	C	13	B
5	Los Ranchitos Road / Merrydale Road	Signal	17	B	40	D
6	Los Ranchitos Road / Northgate Drive	Signal	12	B	13	B

Notes:

Technical Calculations provided in Appendix B.

1. Delay presented in seconds per vehicle. Intersections operating worse than the City's allowable standard are highlighted in bold**.**
2. SSS= side-street stop-controlled. Delay and LOS presented for worst approach. Worst approach indicated in parenthesis.

Source: Fehr & Peers, 2010

During the weekday AM and PM peak periods, one of the study intersections currently operates at LOS F. The remaining intersections operate at LOS D or better. The congestion at the Civic Center Drive/Manuel T. Freitas Parkway intersection is incurred by the northbound and southbound traffic who must stop and yield to traffic exiting from northbound US101.

3.1.6 Corridor Analysis

Although it can be helpful to identify specific bottleneck locations using an intersection analysis, as described above, it can be equally insightful to examine an entire corridor to understand the combined effect of a series of signals. A corridor analysis of Civic Center Drive was also conducted as a part of the roadway analysis. This is completed by assessing the intersections along a given corridor as a single system, instead of individual operations at each intersection. The procedure identifies delays over the length of the corridor and then considers travel time between intersections to assess the overall average travel speed through the corridor.

The operating characteristics of urban streets are also described by the concept of LOS. Similar to intersection analysis, the San Rafael General Plan identifies LOS D and better as acceptable corridor operations, and LOS E and LOS F are unacceptable operating conditions. **Table 3.5** presents the level of service definitions for a facility with uncongested speeds between 25 and 35 mph.

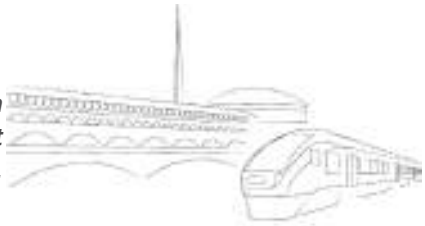


TABLE 3.5
LOS DEFINITIONS FOR URBAN STREET (CLASS IV)

Control/ LOS	Description of Operations	Average Travel Speed (mi/h) for Free-Flow Speed of 25-35 mi/h
Signalized		
A	Insignificant Delays: No approach phase is fully used and no vehicle waits longer than one red indication.	>25
B	Minimal Delays: An occasional approach phase is fully used. Drivers begin to feel restricted.	>19-25
C	Acceptable Delays: Major approach phase may become fully used. Most drivers feel somewhat restricted.	>13-19
D	Tolerable Delays: Drivers may wait through no more than one red indication. Queues may develop but dissipate rapidly without excessive delays.	>9-13
E	Significant Delays: Volumes approaching capacity. Vehicles may wait through several signal cycles and long queues form upstream.	>7-9
F	Excessive Delays: Represents conditions at capacity, with extremely long delays. Queues may block upstream intersections.	< 7

Source: ***Highway Capacity Manual – Chapter 15 Urban Streets*** (Transportation Research Board, 2000).

Table 3.6 presents the results of the corridor analysis. The Civic Center Drive corridor currently operates at an average speed of approximately 16 MPH (including stops at signals and other delays) during the AM and PM peak hours, which corresponds to LOS C.

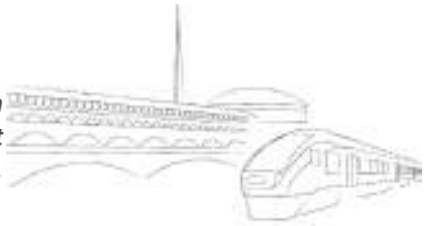


TABLE 3.6
CIVIC CENTER DRIVE CORRIDOR OPERATIONS

Cross Street	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Travel Time[1]	Arterial Speed[2]	Arterial LOS	Travel Time	Arterial Speed	Arterial LOS
Northbound Civic Center Drive						
North San Pedro Road	39.5	6.9	F	29.6	9.2	D
McInnis Parkway	107.1	20.7	B	106.5	20.8	B
Merrydale Overpass	41.5	15.4	C	48.0	13.3	C
Total	**188.1**	**16.6**	**C**	**184.1**	**17.0**	**C**
Southbound Civic Center Drive						
Merrydale Overpass	71.7	10.2	D	73.6	10.0	D
McInnis Parkway	36.8	17.3	C	33.6	19.0	C
North San Pedro Road	121.3	18.3	C	107.1	20.7	B
Total	**229.8**	**15.6**	**C**	**214.3**	**16.7**	**C**

Notes:
1. Travel Time reported in seconds
2. Arterial Speed reported in miles-per-hour and includes time stopped at signals.

Source: Fehr & Peers, 2010

3.2 PARKING SUPPLY AND DEMAND

Within a ¼ mile radius of the proposed SMART station, there are approximately 201 existing on-street parking spaces and 913 off-street parking spaces. Additionally, there are approximately 300 overflow parking spaces available in the vacant, unimproved lot in the southwest quadrant at the Civic Center Drive/Memorial Drive intersection (Lot A on **Figure 3.8**). Combined, this means there are approximately a total of 1,414 parking spaces within a ¼ mile radius of the SMART station. Lots C, D, and E on **Figure 3.8** account for 551 of the total parking spaces. These lots are private property and reserved for employees and/or patrons of the Autodesk buildings and the Embassy Suites. Although not available to the general public, they are included in this report for informational purposes. The remaining 362 off-street (not including the 300 overflow parking spaces) and 201 on-street parking spaces are available for the general public and are generally unrestricted, but there are several 30-minute zones within some lots. On-street parking on the west side of US101 is generally used by the local retail uses, as well as the residents from the multi-family housing on Merrydale Road and Las Gallinas Avenue.

Most of this parking serves commercial/institutional land uses. As a result, parking is more highly utilized during the day, when employees are at work, and less utilized during the late afternoon and early morning times. Weekday parking observations were conducted throughout the study area to determine general availability and occupancy. Field observations and a quantitative assessment were conducted on October 27, 2010, and again on January 11, 2011, during the peak midday hour (10:30 AM to 11:30 AM). **Figure 3.8** presents the existing on-street and off-street parking restrictions within the study area and the total supply and demand. Supply and demand are also summarized in **Table 3.7**. Generally, on non-event days, there is an abundance of available parking in the public County lots. When there are special events, such as the Farmers' Market, demand is increased substantially. Some overflow parking supply is also reduced. In general, parking is adequately served during these events.

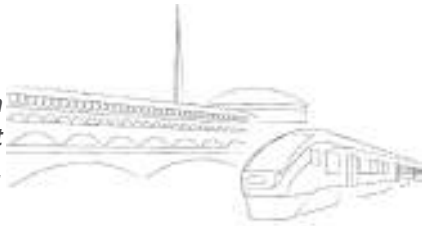
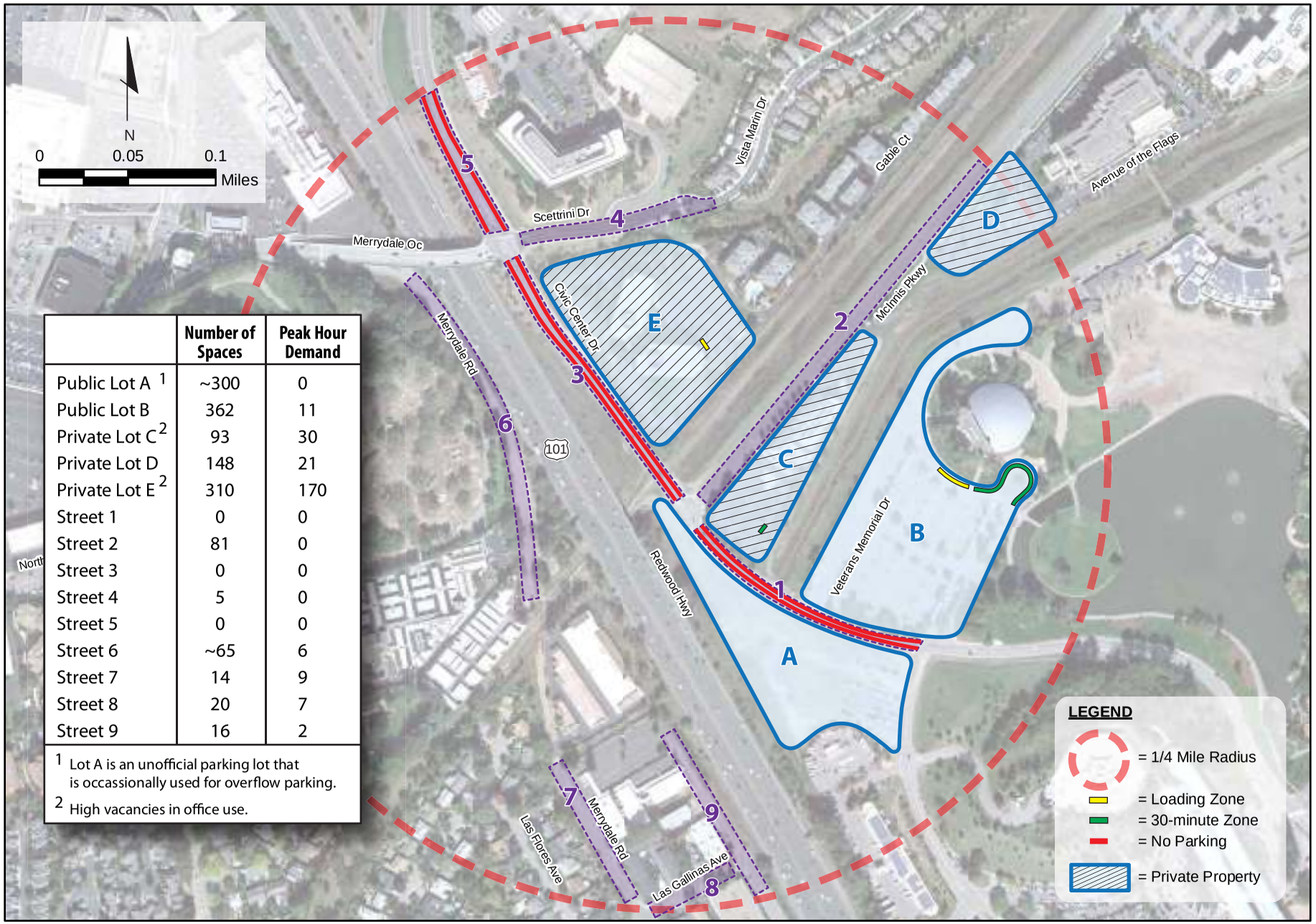


TABLE 3.7
MIDDAY PEAK HOUR PARKING CONDITIONS

Location	Description	Number of Spaces	Peak Hour Demand	Available Spaces
Public Off-Street Parking				
Lot A	Vacant lot in the southwest quadrant of the Civic Center/ Memorial Drive intersection	300	0	300
Lot B	Avenue of the Flags/Lagoon Parking Lot	362	11	351
	Total	**662**	**11**	**651**
Private Off-Street Parking				
Lot C	Parking lot in the southeast quadrant of the Civic Center Drive/McInnis Parkway intersection	93	30	63
Lot D	McInnis Parkway Autodesk Parking Lot	148	21	127
Lot E	Civic Center Drive Autodesk Parking Lot	310	170	140
	Total	**551**	**221**	**330**
On-Street Parking				
Street 1	Civic Center Drive from McInnis Parkway to Memorial Drive	0	0	0
Street 2	McInnis Parkway from Civic Center Drive to Autodesk	81	0	81
Street 3	Civic Center Drive from McInnis Parkway to Merrydale Overcrossing	0	0	0
Street 4	Scettrini Drive From Civic Center Drive to Residences	5	0	5
Street 5	Civic Center Drive from Merrydale Overcrossing to Manuel T. Freitas Parkway	0	0	0
Street 6	Merrydale Road between Merrydale Overcrossing and the railroad tracks	~65	6	59
Street 7	Merrydale Road between the railroad tracks and Las Gallinas Avenue	14	9	5
Street 8	Las Gallinas Avenue between Merrydale Road and Redwood Highway	20	7	13
Street 9	Redwood Highway (west of US101) within ¼ mile radius of station	16	2	14
	Total	**201**	**24**	**177**
	Grand Total	***1,414***	***256***	***1,158***

Source: Fehr & Peers, 2010



	Number of Spaces	Peak Hour Demand
Public Lot A [1]	~300	0
Public Lot B	362	11
Private Lot C [2]	93	30
Private Lot D	148	21
Private Lot E [2]	310	170
Street 1	0	0
Street 2	81	0
Street 3	0	0
Street 4	5	0
Street 5	0	0
Street 6	~65	6
Street 7	14	9
Street 8	20	7
Street 9	16	2

[1] Lot A is an unofficial parking lot that is occassionally used for overflow parking.

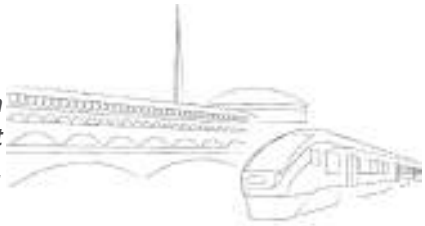
[2] High vacancies in office use.

San Rafael Civic Center SAP

EXISTING PARKING CONDITIONS

January 2011

FIGURE 3.8



CHAPTER 4. SMART CIVIC CENTER STATION

This Chapter introduces the SMART project and the Civic Center Station. This is a brief summary of the project description and what was identified in the EIR as it relates to the Civic Center Station. This will be detailed further in the ultimate Station Area Plan.

4.1 SMART PROJECT DESCRIPTION

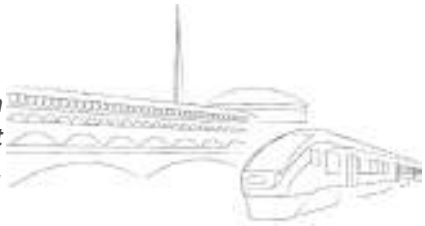
The SMART District is proposing implementation of passenger rail service along a 70-maile rail corridor extending from Cloverdale in Sonoma County to a station located near the Golden Gate Bridge Highway and Transit District Larkspur ferry terminal. SMART would utilize an existing rail corridor, commonly known as the Northwestern Pacific Railroad (NWP). The NWP generally parallels US101 running north-south through Sonoma and Marin Counties. The NWP corridor is owned by the SMART District from Healdsburg in the north, to a location south of the proposed Larkspur station in the Town of Corte Madera.

The total cost for the SMART project from Cloverdale to Larkspur is estimated at $695 million. A steep drop in sales tax revenue has resulted in a funding shortfall that will require the project to be constructed in phases. As recommended by MTC, the first phase of the project includes the Civic Center SMART station and would connect the Downtown San Rafael station to Railroad Square in Santa Rosa. Forecasts developed for the ***SMART Draft Environmental Impact Report*** (***Draft EIR***; SMART, 2005) estimate that 4,756 daily riders are projected to use the system in 2025 between Cloverdale and Larkspur following completion of the entire project.

The latest details regarding SMART's operating and service plans are published in ***Sonoma-Marin Area Rail Transit District, Passenger Rail & Pathway Project Description*** (***Project Description***; SMART, May 2010). Major components of the proposed project identified in the ***Project Description*** include:

- Implement passenger rail service utilizing a two-way "single-track" system with sidings (strategically placed sections of second track) and appropriate signal and communication systems.
- Rehabilitation of tracks and at-grade crossings (there are approximately 73 public at-grade crossings and numerous private crossings)
- Construction of 14 rail stations (9 in Sonoma and 5 in Marin)
- Park and ride lots at some station locations
- Operation of free shuttle service at selected stations
- A rail maintenance facility
- Train passing sidings, timber trestle and other bridge replacements, and drainage improvements
- Bicycle/pedestrian pathway generally located within or adjacent to the rail corridor and connecting the rail stations, including 54 miles of a separate multi-use pathway and 16 miles of Class II pathway (striped bike lanes)
- Use of either light or heavy diesel multiple units (DMUs)

DMUs are rail cars that contain both passenger accommodations and propulsion systems (diesel engines located below the passenger compartment). "Light" DMUs utilize lighter materials such as aluminum; "heavy" DMUs typically use steel car bodies. These two DMU types have different fuel consumption,



operating performance, and noise impacts. The Federal Railroad Administration (FRA) also has different time separation requirements for operating light or heavy DMUs on single-track facilities shared with freight rail. SMART plans to operate two to three car DMU train sets depending on passenger demand.

4.2 CIVIC CENTER STATION

The proposed Civic Center SMART station is located underneath US101 just north of the Marin County Civic Center and fairgrounds along Civic Center Drive. SMART's proposed weekday service includes 12 southbound and 12 northbound trains (24 total stops per weekday), while weekend service includes 4 southbound and 4 northbound trains (8 total stops per weekday). The peak hour timetable assumptions from the latest Project Description include the following:

- Weekday AM and PM frequency of two trains per hour in each direction
- Peak hour headways of 30 minutes in each direction (headway is the scheduled time between train arrivals)
- 30-second average dwell time

The EIR reported 2025 ridership forecasts for the Civic Center SMART station. These forecasts estimate 388 total daily boardings at the station, with approximately 103 boardings occurring during the peak hour. It was also identified that the peak parking demand for the Civic Center SMART station would be 50 parking stalls.

Although at the time of EIR preparation, the proposed station location was underneath US 101, SMART has recently produced conceptual design plans for two station alternatives:

1. East Platform: platform located on the east side of Civic Center Drive north of the railroad tracks
2. West Platform: platform located on the west side of Civic Center Drive under the freeway overcrossing (consistent with previous proposals)

Exhibits 4-1 and 4-2 show drawings obtained from SMART for the two station options. Two tracks are planned at the station along the length of the SMART right-of-way within the study area. The configuration of the platforms will affect the station footprint and the design and spacing of the tracks at the at-grade crossing with Civic Center Drive. Further analysis of the station, the effect of SMART service on the study area's parking supply, and the local circulation network will occur during the alternatives analysis phase of the Station Area Plan.

EXHIBIT 4-1 East Platform: located north of the wetlands and the railroad tracks

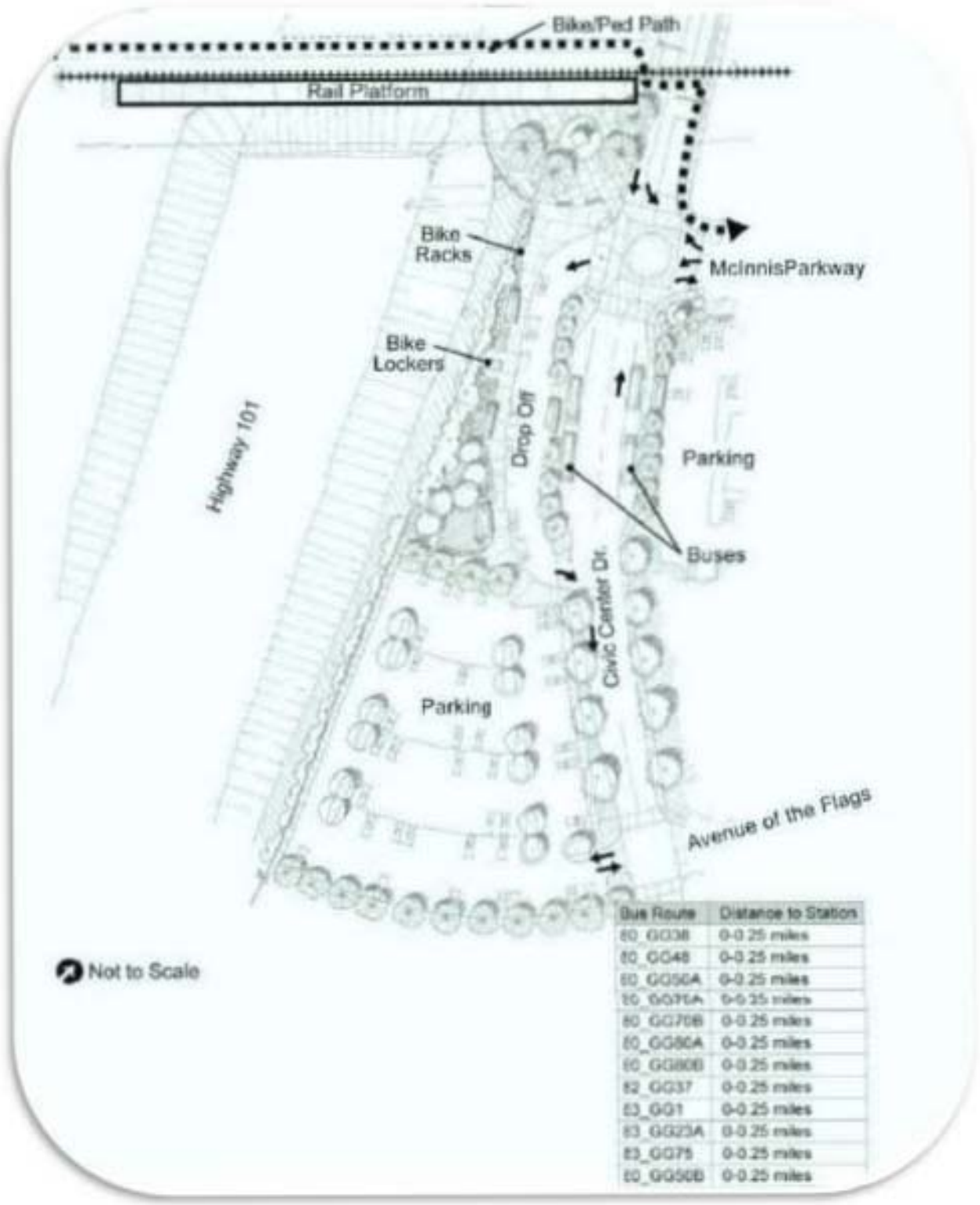
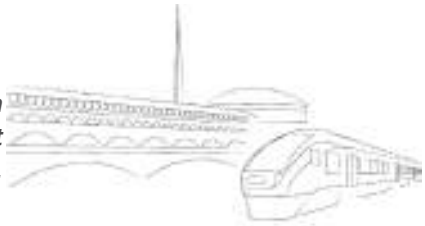


EXHIBIT 4-2 West Platform: EIR Concept showing platform under the US101 overcrossing



CHAPTER 5. NEXT STEPS

This report provides useful information regarding the current state of the area near the proposed Civic Center Station, with respect to both land uses and transportation. However, this represents only the first step in developing the Civic Center Station Area Plan. For any plan to be successful, key input from stakeholders, including neighbors and other members of the public must be incorporated. The next steps for development of the Station Area Plan are described below.

5.1 IDENTIFICATION OF OPPORTUNITIES AND CONSTRAINTS

Based on this background report, the project team and community will develop a summary of opportunities and constraints in regards to transportation circulation and land use, including potential housing opportunity sites, within the Civic Center Station Area.

5.2 COMMUNITY WORKSHOP #1

The project team and the Civic Center Station Area Plan Advisory Committee will facilitate a community workshop to discuss the existing conditions, identify issues and opportunities, and establish a community vision of what this area should be like in 2035. This workshop will be designed to be highly interactive, including activities such as visioning and small group discussions, to engage attendees and gain their insights into issues and opportunities in the study area.

5.3 ALTERNATIVE SCENARIOS ANALYSIS

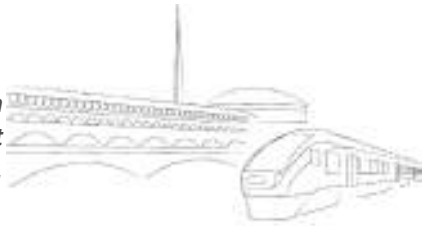
Based on input from the public at the first workshop, the project team will review the station area land uses, transportation facilities, and station access in the context of the overall vision. The team will develop alternative Plan concepts that aim to achieve the overall area vision for 2035. Alternatives will consist of various housing alternatives and transportation alternatives. The team will also conduct a detailed analysis of the alternatives with respect to transportation impacts and improvements to assist the overall choice of a preferred Plan alternative later on in the process.

5.4 COMMUNITY WORKSHOP #2

Based on the alternatives development and analysis, a second community workshop will be held. This workshop will be to review, discuss, and evaluate the plan alternatives with stakeholders and members of the public. This workshop will again be designed to be highly interactive to engage attendees and gain their insights.

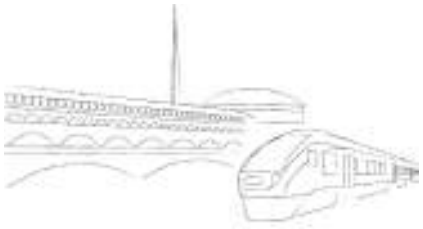
5.5 STATION AREA PLAN

Based on feedback from Workshop #2, the study team will develop a draft Civic Center Station Area Plan for public review. The Draft Station Area Plan will encompass methodologies, approach, findings and information from the approved scope of work. The implementation plan will include improvement measures, implementation time frame (near-term, medium-term, long-term), prioritization, responsible agency, and planning-level cost estimates. Once comments have been incorporated, a Final Plan will be prepared.

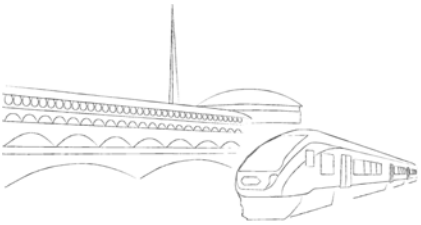


Ultimately, the final plan will include the following:

- Recommendations for land use, zoning, parking, and transportation circulation
- Transportation impact analysis, including the effects to increased development or other physical changes. If deemed consistent with the goals and objectives of the plan and/or feasible within the site context and cost constraints, improvements to offset the impacts of the Plan will be identified
- Multiagency Implementation Plan



APPENDIX A:
DETAILED DOCUMENT REVIEW SUMMARY



City of San Rafael General Plan 2020 (City of San Rafael, 2005)

The San Rafael 2020 General Plan serves as the comprehensive long-term plan for the community's growth and development.

The General Plan includes a few mentions of the SMART Civic Center Station. These include the following:

- In the Housing Element (H-22), the General Plan encourages infill near transit, allowing higher densities at transit hubs.
- In the Neighborhoods Element, the General Plan (NH-88) supports construction of the Civic Center SMART station, encouraging "a plan that provides higher density housing, bus transit connections, a parking lot, and incorporates pedestrian facilities and bicycle access (including bicycle storage facilities) consistent with the San Rafael Bike and Pedestrian Master Plan."
- The Neighborhoods Element also encourages use of the unused portions of the SMART right-of-way "to facilitate desired redevelopment of adjacent parcels and an easement for the North-South bikeway."

The Civic Center station study area has an FAR designation of 0.30, and a building height limit of 36 feet.

General Plan Land Uses

The study area incorporates several General Plan land use designations.

General Commercial

The General Commercial designation allows general retail and service uses, restaurants, automobile sales and service uses, and hotels/motels. Offices are permitted as a secondary use. Residential uses are allowed at a gross density of 15–32 units/acre.

Office

The Office land use category is intended to accommodate general offices, medical and professional offices, administrative or headquarter offices, and residential uses at a gross density of 15–32 units/acre.

Light Industry/Office

The light industrial/office designation allows for motor vehicle service, contractor uses and yards, light manufacturing, distribution, warehousing and storage, incidental employee-serving retail/service uses, and office uses.

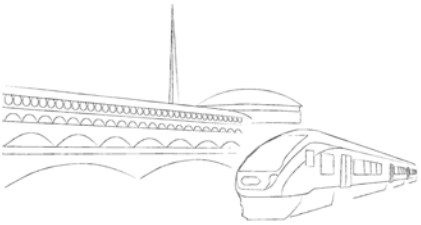
Public/Quasi-public

Public and civic uses, such as government, education, public safety, public utility and similar facilities owned or operated by public or non-profit agencies are included in this category. Residential is also permitted at a density of 15-32 units/acre.

Residential

In the study area, several residential land use categories apply. In addition, open space/conservation, parks and playgrounds, schools, churches, plant nurseries, group day care and large day care facilities are permitted in all residential categories. Public/quasi-public uses such as churches and schools are not to exceed a 1.0 FAR.

Low Density Residential



Single-family neighborhoods are typical of the low density residential category, with a gross density of 2–6.5 units/acre.

Medium Density Residential

Duplex, garden apartment and condominiums are permitted in this residential land use designation. In addition, hotels/motels, clubs and similar uses are allowed. Density is limited to 6.5–15 units/acre.

High Density Residential

Apartments typify the high density residential land use. Hotels/motels, clubs and similar uses are permitted in this category as well. The density permitted is 15–32 units/acre.

Parks

The Parks land use is used to designate the areas of parkland. Lagoon Park in the Civic Center is the largest example in the study area.

Open Space

In the study area, the Gallinas Creek right-of-way is designated open space. Other open spaces include hillsides to the north, south and west.

City of San Rafael Zoning Map (City of San Rafael)

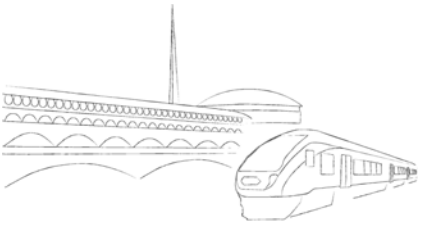
The San Rafael zoning code supports the General plan and sets the land use regulations and development standards for the city. In the study area, single-family residential building heights are limited to 30 feet, while all other uses have building height limits of 36 feet. At Northgate Mall, affordable housing units are afforded an additional two-story height bonus.

Two overlay districts apply in the area, Hillside and Wetland. The Hillside Overlay encourages the protection of natural hillsides, and protects public health and safety from hazards such as landslides and soil erosion, by requiring a larger percentage of lot are to remain in its natural state, limiting building heights, and avoiding visually significant ridgelines. The Wetland Overlay seeks to preserve and enhance the city's remaining wetlands by prohibiting development that would adversely affect the wetlands. Development in this district is required to provide a 50-100 foot setback, and prohibits filling of the wetland, invasive landscaping and increasing levels of stormwater runoff. See Figure 2.3.

Vision North San Rafael (City of San Rafael, 1997)

In the spring of 1996, the City of San Rafael initiated a community visioning process to plan for the future of city areas north of Puerto Suello hill, an area known as North San Rafael. The City Council and citizens started the effort to learn more about what the people who live, work, and play in North San Rafael would like for their community in the year 2010. ***Vision North San Rafael*** documents these efforts. People who live, work, shop or own property in the area helped shape the vision described in this document.

Below is a summary of community comments received during the public process phase, including the Partner Group sessions, school curriculum and the Vision festival.



We like:	We don't like:	Changes we'd like are:
• Location • Open spaces • Weather • Retail shops and services • Community feeling • Friendly, small town atmosphere • Sense of community • Excellent schools • Beauty of the area • Farmer's Market • Pleasant, clean and quasi-rural ambiance • Proximity to open space • Quiet • Parks and recreation • Feeling of safety • Low traffic levels • Nearby hiking trails • Airport and open space at Marin Ranch Airport	• Traffic congestion • The lack of a center, core or heart of the community • Dearth of social spots • Absence of gathering places • Insufficient landscape maintenance • Inadequate teen activities • Scarcity of safe pedestrian and bike ways • Lack of public transportation • Dangerous Freitas interchange • The idea of 'big box' retail on the now-vacant (Fairchild) site on Redwood Highway along the north side of the North Fork of Las Gallinas Creek.	• A center to the community which brings us together • More community events • Improved landscaping • A public library • More zoning flexibility for small businesses • Housing which is affordable so that people who work here can also live here • Improvements at the mall • More and better restaurants • More "hangout" places • More pedestrian and bike ways

The document identifies various actions and implementation strategies that guide the community in achieving their goals.

North San Rafael Vision Promenade Conceptual Plan and Design Features (The North San Rafael Vision in Action Committee, 2002)

The ***North San Rafael Vision Promenade Conceptual Plan*** is an element of the ***Vision North San Rafael in the Year 2010*** report. The plan proposes the following:

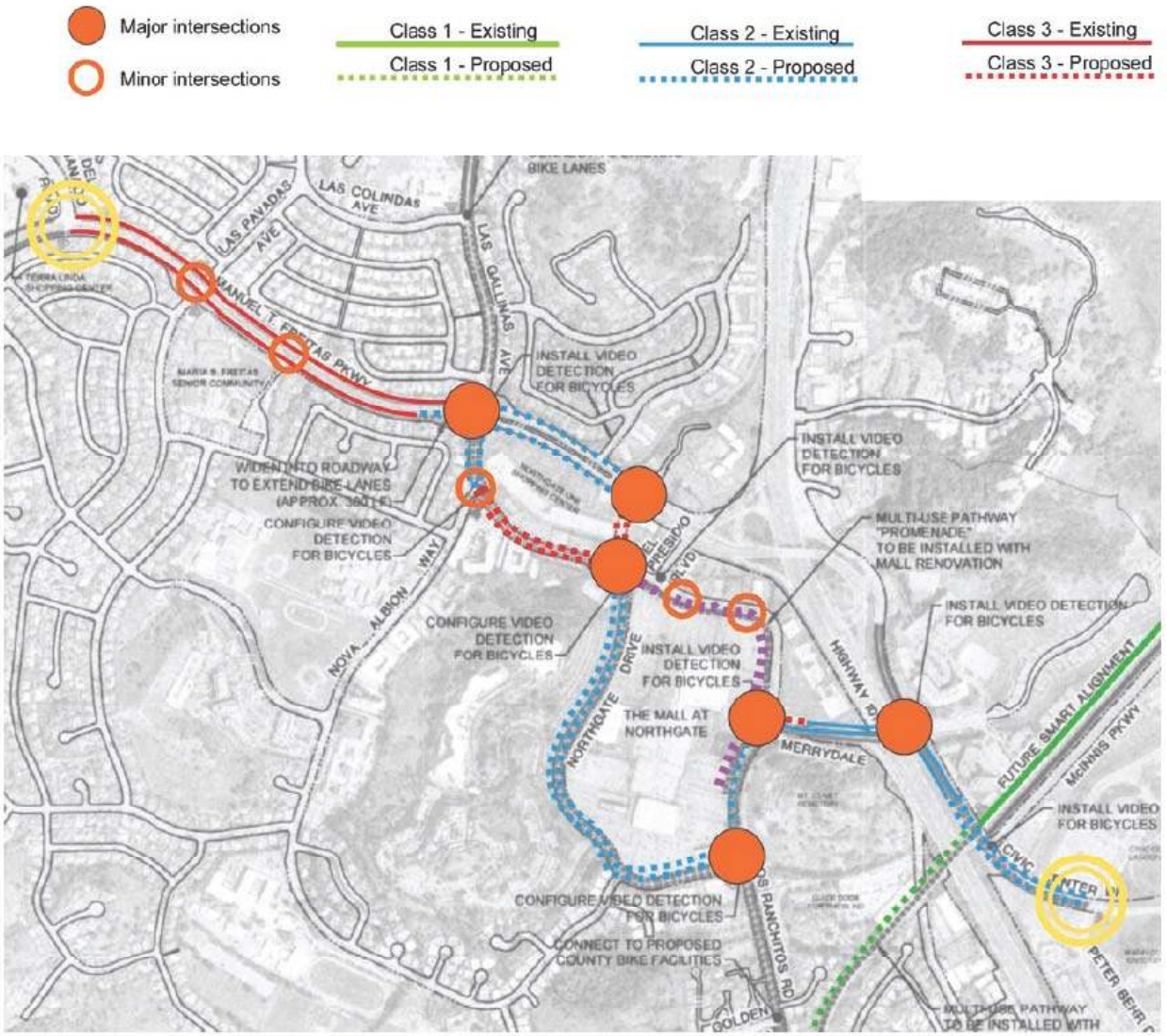
- Improved bicycle and pedestrian linkages between the Terra Linda Recreation Center and Lagoon Park at the Marin County Civic Center
- Amenities such as improved public parks and new plazas

- A repeating and unifying theme which reflects cultural elements, people, local natural history and expresses the community identity of North San Rafael through use of consistent "theme details"

The plan presents a detailed list of pedestrian paths and bikeways, amenities, and unifying themes with specific cross-sections and design elements proposed. The report was a result of an extensive public outreach effort and represents a community consensus. The mission of the plan reads as follows:

> ***To develop a bicycle/pedestrian Promenade that connects the east and west sides of North San Rafael and offers new recreational opportunities and enhanced community identity.***

The North San Rafael Promenade proposes to improve the pedestrian and bicycle route that runs east/west through Terra Linda from Freitas Parkway to the Marin Civic Center lagoon. The promenade varies from an on-street bicycle lane and sidewalk to a landscaped Class 1 multi-use path. The design features present a unified plan for enhancing the pedestrian and bicycle experience. **Exhibit 1-2** presents the proposed plan.



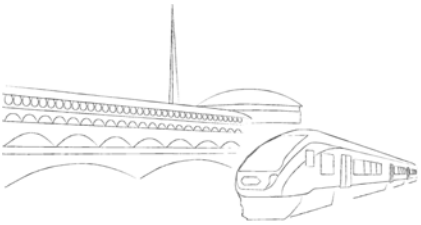


EXHIBIT 1-2 Proposed North San Rafael Promenade
Source: North San Rafael Promenade – Design Features; RHAA, December 2008

The plan then suggests different methods of planting and paving that embodies the history of the study area. This includes sand blasting oak leaf designs in the pavement and planting indigenous trees, in which an appropriate list is identified. A unification theme is also recommended through common signage, furniture, and lighting.

Economic Vision (1997) (City of San Rafael, San Rafael Chamber of Commerce, San Rafael Redevelopment Agency, 1997)

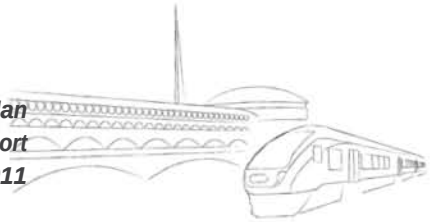
The Economic Vision and Strategies document outlines the high level vision for year 2010 of San Rafael's economic state and addresses several categories, including traffic and circulation. For the traffic and circulation category, the vision includes vigorously addressing the workforce, housing cost, and commuting problems through:

- Aggressively addressing regional transportation issues
- Supporting commute trip reduction measures, provide incentives / support for workforce housing, support businesses that generate local jobs, educate workforce to fill jobs in the community
- Supporting the HOV Gap Closure project
- Supporting a regional revenue generating measure to fund regional traffic improvements
- Using development generated City revenue, bond measure and assessment districts to finance for infrastructure improvements
- Maximizing use of transportation center and improve public transportation within City and County

SMART Environmental Impact Report (SMART, 2008)

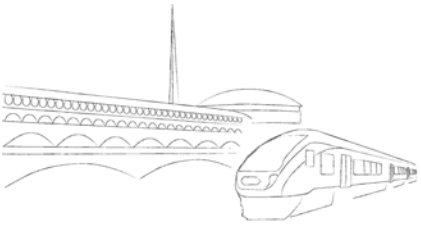
The Environmental Impact Report identified that traffic operations under 2025 proposed project conditions would worsen on various local roadways that serve as primary access routes to proposed stations compared to existing conditions. One of these roadways is southbound Civic Center Drive near the Marin Civic Center. The a.m. peak hour screen line results also indicate that the roadway segment would operate at LOS F worsening from LOS E in the future No-Project conditions. For purposes of the analysis, the impact was identified as potentially significant.

Southbound Civic Center Drive would require mitigations such as traffic signal modifications at Merrydale Road and Civic Center Drive, and possibly a short exclusive right turn lane for the drop off traffic into the site from southbound Civic Center Drive at the intersection of McInnis Parkway. These traffic operation improvements would provide improvement to expected operations with the proposed project and would maintain the traffic circulation within the project vicinity. Because the degree of improvement cannot be quantified until detailed studies are completed during the final engineering design phase of the project, the effectiveness of this mitigation measure cannot be determined. If implementation of the mitigation



measure would not improve LOS conditions to acceptable standards, the potential impact would be significant and unavoidable.

The remainder of the transportation related impacts were deemed beneficial or less-than-significant.

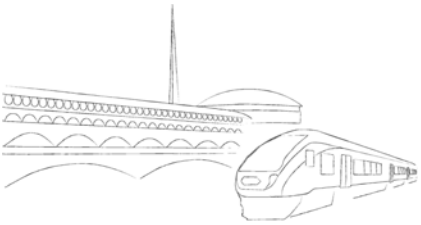


The Marin Center Master Plan (County of Marin, 2005)

The Marin Center Master Plan is also known as a "Vision" plan as it was completed through a public-private group called the Marin Center Renaissance Partnership. Note that the Board of Supervisors never formally adopted this Vision, no funding has ever been identified (estimated at the time to be $130-150 million), and no environmental review has been completed.

The Marin Center is located within the Marin County Civic Center, and is comprised of the Marin Veterans' Memorial Auditorium, Exhibit Hall, Showcase Theater, Fairgrounds and Lagoon Park. This 80-acre site is bound by Gallinas Creek to the north and the Civic Center Lagoon to the south. Gallinas Creek flows eastward to the San Francisco Bay.

The Marin Center Master Plan was completed in 2005 with the goal of establishing the Marin Center as the community center of the county. The preferred conceptual design discussed in the Master Plan proposes to eliminate the drop off area by the Auditorium building in order to increase the open space around the lagoon. The Avenue of the Flags will become the main entry to the site, and a new vehicular drop off area will be located adjacent to the auditorium and exhibit hall. The Master Plan also proposes to connect the Marin Veterans' Memorial Auditorium with the Exhibit Hall building with a new building. The SMART Civic Center Station Area site is called out in this plan.



San Rafael Design Guidelines (City of San Rafael)

The motivation behind the San Rafael Design Guidelines is to promote "pedestrian-friendly and people-oriented" design in new development. The guidelines are discretionary and are intended to assist projects in high-quality design. The City subsequently uses the guidelines to evaluate the quality of project design and to make recommendations regarding design review approval or denial. The guidelines below apply to residential and non-residential development in the study area.

Residential Guidelines

The residential guidelines provide general guidance on residential development aesthetics. They cover the following topics:

- Building Design – consistent streetscape, varied and articulated facades
- Scale – setbacks, stepped facades, varying rooflines
- Building Height – transitional elements
- Driveways and Parking Areas – minimize, parking placed in rear, avoid large paved areas
- Lighting – security and safety, prevent glare, architectural
- Building Entrances – well defined, street-oriented, porches
- Windows – proportion, street- or public area-oriented, consider privacy
- Roof Shapes – reduce visual impact of equipment and vents
- Front Landscaping and Fences – contribute to visual quality, detailed fencing, landscape adjacent to sidewalk
- Additions to Homes – relatable and proportional to original structure

Nonresidential Guidelines

The nonresidential guidelines provide general guidance on nonresidential development aesthetics. They cover the following topics:

- Parking Lots – logical, distributed to provide access, rear or side, maneuverability, screened, minimize curb-cuts, shade trees
- Lighting – security and safety, prevent glare, architectural
- Building Form – relate to pedestrians, spatial and visual relationship with adjacent buildings
- Towers – function, distinctive silhouette
- Awnings – enhance design, human scale, discourage translucent or illuminated awnings
- Landscaping – strong character, property lines, pedestrian areas, street trees
- Pedestrian Circulation – orientate buildings, well-defined walkways, visual design elements, gathering places, bicycle parking
- Entryways – well defined, pedestrian-oriented, architectural elements
- Arcades – weather protection for pedestrians, signage
- Materials and Colors – articulation, texturing, minimize reflectivity

In addition to residential and nonresidential development, the guidelines also provide direction on historic and architecturally significant buildings.

Marin County Civic Center Master Design Guidelines (County of Marin, 2005)

The Civic Center Master Plan Design Guidelines were created to provide a framework for future development at the Civic Center. A key component was analysis and recommendations of sites for future development, as shown in **Exhibit 1-1**. This report recommends that Sites 1-4 and 6 remain in consideration as locations for possible future development and for further evaluation. The Guidelines also outline approaches to enhance pedestrian and bicycle circulation, public transportation, vehicular circulation and parking. Recommendations include:

- Striped bike lanes on Civic Center Drive and other primary streets
- Additional bus service to the Civic Center on evenings and weekends
- Coordination with and support of the SMART project
- Restriping of Civic Center Drive / Peter Behr Drive

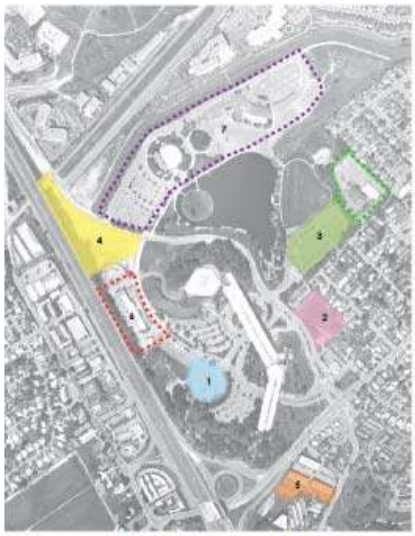
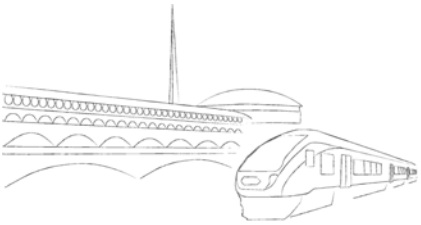


EXHIBIT 1-1 Civic Center Potential Future Development Sites
Source: Civic Center Master Plan; RHAA, December 2005

Marin Civic Center Open Space Ordinance (County of Marin, 2005)

The intent of the Marin Civic Center Open Space Ordinance, approved in 1992, is to preserve the aesthetic quality of the Frank Lloyd Wright Civic Center buildings and grounds. Any building construction at the Civic Center on the west side of Civic Center Drive is subject to approval by a majority vote of the County electorate. The ordinance does not prevent the County from: maintaining, repairing, restoring, or rebuilding the existing civic Center buildings; maintaining, repairing, altering or adding at-grade parking, pedestrian, or playground facilities; maintaining, altering, improving, or adding landscaping, utilities, or fencing; approving or constructing minor structures that do not exceed 250 square feet and that are incidental to the operation of the Civic Center facilities; or using temporary structures for the purpose of seasonal and temporary activities.



Court Facilities Master Plan (County of Marin, 2003)

In 2003, a 20-year Court Facilities Master Plan was developed to determine the need for renovations and additional facilities for the Superior Court of California, County of Marin. The county and the court were outgrowing their facilities and security was poor. Through the master plan process, the Court selected the option of building a new courthouse, to be constructed in two phases, on the Civic Center campus in the location of the existing General Services Building. In the short term, security upgrades and a modest expansion within the Civic Center were recommended. Note that this study was completed by the State Administrative Office of the Courts, and not the County. It has never been formally presented to the Board of Supervisors, although they are aware of it.

County of Marin Request for Proposal for a Partner to Operate and Improve a Farmers' Market (County of Marin, 2008)

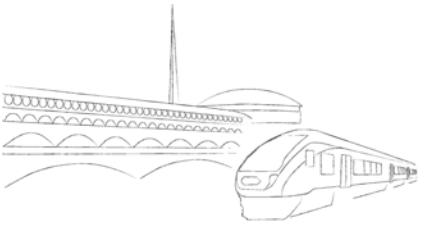
The Marin Center Master Plan includes a proposal for a permanent, multi-purpose site on which a farmers' market would take place. As part of the next steps of the Master Plan, a Research Report was completed in 2007 to assess the feasibility of this idea. The site is bounded by Civic Center Drive, Highway 101 and Peter Behr Drive. It is currently used for seasonal Christmas tree sales and for County Fair overflow parking and is known as the "Christmas Tree Lot". The northern-most area of this site was identified to house parking for the future commuter rail (SMART) project. The new farmers' market site would replace the two separate locations of the current Thursday and Sunday farmers' markets. Any infrastructure and safety improvements should connect with the planning effort for the SMART station area plan.

TAM – TPLUS Pedestrian and TOD Toolkit (Transportation Authority of Marin, 2007)

The Marin Pedestrian and Transit-Oriented Design Toolkit was developed as part of the Transportation and Land Use Solutions program in Marin County to help local planners, engineers, elected officials, and private citizens work together to develop new and coordinated approaches to addressing some of the County's most pervasive transportation and land use challenges. The toolkit provides guidance for density, mixed use, site and project design, building design, and parking design.

City of San Rafael Bicycle/Pedestrian Plan (City of San Rafael, 2001)

This plan proposes a continuous network of bikeways for travel within San Rafael and to surrounding communities. Routes are designated either "north-south" or "east-west." North-south routes have odd numbers, and east-west routes have even numbers. Two of the north-south routes connect San Rafael with other cities, as does one of the east-west routes. The other routes are primarily for travel within the City.



The Plan identifies seventeen north-south routes in San Rafael. Two connect San Rafael with cities to the north and south, and the rest provide connections within the city. North-south routes that connect with Novato through North San Rafael are described below:

01. From Novato to Bellam Blvd, via Las Gallinas, Northgate Dr, Los Ranchitos, Lincoln, Irwin, Woodland.

07. From Novato to Larkspur, via Northwestern Pacific Railway right-of-way through San Rafael.

(Sections of both of these routes are in the County-wide bicycle plan.)

Proposed new north-south routes primarily within North San Rafael

03. Los Gamos Dr from Lucas Valley Rd to Manual T Freitas Pkwy.

05. Redwood Hwy Frontage Rd and Civic Center Drive, from Smith Ranch Rd to North San Pedro Rd.

09. From North San Pedro Rd to the Richmond Bridge, via Hwy 101 shoulder, Villa Ave, Grand Ave & Francisco Blvd. East. (proposed alternative to Lincoln Ave. connection)

23. Nova Albion and Golden Hinde from Las Gallinas to Los Ranchitos.

25. Merrydale from Merrydale101 Overcrossing to Merrydale Pathway to Los Ranchitos/Lincoln Ave.

Proposed New East-West Bike Routes

Twelve east-west routes the Committee identified in San Rafael. One connects San Rafael with San Anselmo to the west and with San Quentin and the Richmond-San Rafael Bridge to the east, and the rest are important connections within the city.

East-west routes primarily within North San Rafael are:

02. Lucas Valley Road from the Lucas Valley area to Redwood Hwy Frontage Rd, and Smith Ranch to McInnis Park.

04. West end of Freitas Parkway from city limit to Las Gallinas Ave.

06. North San Pedro Rd, Point San Pedro Rd, Bay Trail Spur, Third.

08. Bay Trail Extension (Recreational & Park access).

18. Gallinas Creek Pathway from Redwood to Smith Ranch Rd.

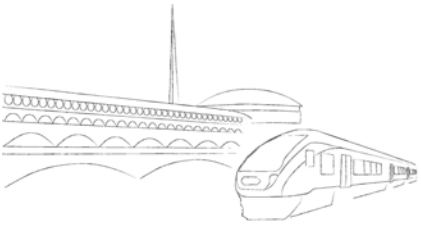
22. Walter Place and Las Gallinas from Corillo Dr. to Merrydale

Pedestrian Section

The Pedestrian Improvements section encompasses two elements:

- Sidewalk, intersection, and crossing improvements.
- Multi-use paths (Class I bikeways).

The plan provides a detailed description of proposed site-specific pedestrian improvements.



Walk Bike Marin (County of Marin, 2010)

Per walkbikemarin.org, there are two adopted and one completed projects which fall within the study area. Terra Linda – North San Rafael Improvements (project #2004) will include installation of Class II bicycle lanes, sidewalk improvements and intersection enhancements along Freitas Parkway from Del Ganado Road to Del Presidio Boulevard. The construction contract was awarded March 2010. The Northgate Gap Closure (project #2006) will include installation of Class II lanes on Las Gallinas Avenue south of Las Colindas Road and on Northgate Drive, closing an important gap in the North/South Bikeway. The estimated completion date for this project was August 2010. The Los Rachitos Connector (project #2008) completed construction of Class II bike lanes on Rachitos Road from North San Pedro Road to the Puerto Suello summit.

Golden Gate Short-Range Transit Plan (Golden Gate Bridge, Highway and Transportation District, 2007)

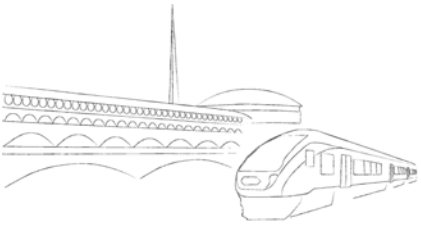
The Short Range Transit Plan identifies the goals that Golden Gate Transit operates under. The Core Goal states the following:

> ***To provide productive, effective, and cost-efficient regional transit services with available resources.***

GGBHTD expects bus transit operations to remain relatively stable in the short term with no large increases or decreases. Therefore, its approach to bus equipment and facilities planning is one of making these elements more effective and efficient. Major bus and paratransit vehicle replacement would occur to maintain a modern fleet of comparable size. The paratransit vehicle fleet may need to increase slightly to keep up with demand. The total active bus fleet is now 196 buses, plus another six leased for Club Bus (January 2007). GGT intends to acquire several additional 45-foot over-the-road coaches and 60-foot high-floor articulated buses to meet regional service requirements, and several additional 30-foot buses and 60-foot low-floor articulated buses to meet Marin local service requirements. In addition, the fleet requires new fareboxes and a new communication and information system to efficiently manage transit services and serve customers.

Marin Transit's Final Short Range Transit Plan (Marin Transit, 2009)

The Marin Transit Short Range transit Plan identifies that the service plan is financially constrained, and no funding is projected to be available for service expansion. Service reductions are needed in FY 2010/2011 to maintain a balanced budget. Service operated by Golden Gate Transit will be reduced by 7,660 hours (5.7%) in FY 2010/2011. This is the equivalent of rolling back service improvements made in FY2008/2009, which included frequency improvements on Route 17, Route 29, and Route 71. However,



these routes do not affect the study area. The resulting Golden Gate Transit service hours are still 4,500 hours over the FY2007/2008 service level.

To offset the impact of the service reductions, Marin Transit will continue to pursue opportunities for grant funded and cost neutral service improvements. The local initiative program, outlined in the 2006 Short Range Transit Plan, was designed to provide matching funds to local communities to develop new service. However, the program was suspended in FY 2009/2010 in an effort to minimize the impact of reduced funding on existing service levels. If additional funding is available this program would be restarted and may be a way to create new services.

Marin Countywide Plan (County of Marin, 2007)

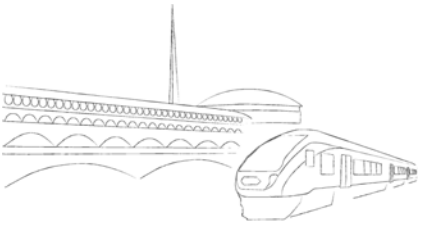
The Marin Countywide Plan was completed in 2007 with the theme of planning sustainable communities by focusing on the Three E's of sustainability: environment, economy, and social equity. The Countywide Plan includes subjects including climate change and social equity, and cultural issues such as public health, environmental justice, child care, the economy, and arts and culture. The Countywide Plan establishes a goal of providing a balanced mix of jobs and housing, and proposes infill development in areas near existing jobs and transit to support affordable workforce housing.

Transportation 2035 Plan (Metropolitan Transportation Commission, 2009)

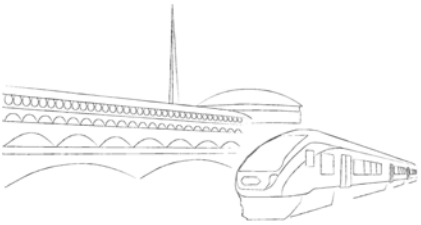
In April 22, 2009, the Metropolitan Transportation Commission (MTC) adopted the ***Transportation 2035 Plan for the San Francisco Bay Area***, which specifies how some $218 billion in anticipated federal, state and local transportation funds will be spent in the nine-county Bay Area during the next 25 years.

Line items that may influence the study area are identified below:

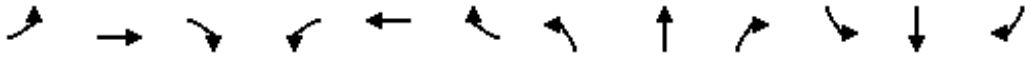
Reference Number	Project/Program	Total Project Cost (in millions)	Committed Funds	Discretionary Funds
22001	Implement Sonoma Marin Area Rail Transit District (SMART) commuter rail project (includes environmental, engineering, right-of-way, construction, vehicle procurement and operations)	$1,058.0	$1,058.0	$0.0
230688	Implement Sonoma Marin Area Rail Transit District (SMART) commuter rail project (includes environmental, engineering, right-of-way, construction, vehicle procurement and operations)	$212.2	$212.2	$0.0



Reference Number	Project/Program	Total Project Cost (in millions)	Committed Funds	Discretionary Funds
21302	Implement Marin County's bicycle and pedestrian program	$19.9	$19.9	$0.0
94563	Widen U.S. 101 for HOV lanes (one in each direction) from Lucky Drive to North San Pedro Road	$189.8	$189.8	$0.0
230516	Implement Marin County's Safe Routes to School Program	$43.0	$43.0	$0.0
Various	Various general improvements to roadway network, bicycle and pedestrian network, and transit service.	-	-	-



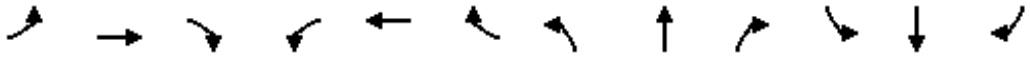
APPENDIX B:
INTERSECTION LEVEL OF SERVICE ANALYSIS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	305	156	429	0	0	0	50	230	5	59	394	262
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	339	173	477	0	0	0	56	256	6	66	438	291
Pedestrians		1			7			4			5	
Lane Width (ft)		16.0			0.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												8
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	5			654			1221	860	184	996	1337	6
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	5			654			1221	860	184	996	1337	6
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	79			100			0	0	99	0	0	73
cM capacity (veh/h)	1610			930			0	230	855	0	120	1071

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	512	477	56	261	794
Volume Left	339	0	56	0	66
Volume Right	0	477	0	6	291
cSH	1610	1700	0	234	5
Volume to Capacity	0.21	0.28	Err	1.12	152.46
Queue Length 95th (ft)	20	0	Err	294	Err
Control Delay (s)	5.8	0.0	Err	138.8	Err
Lane LOS	A		F	F	F
Approach Delay (s)	3.0		Err		Err
Approach LOS			F		F

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	107.4%	ICU Level of Service	G
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	16	12	11	12	12	11	12	12	12	11	12
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.97		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	0.89		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	1693		1621	1553		1621	1736		1676	1644	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1676	1693		1621	1553		1621	1736		1676	1644	
Volume (vph)	55	18	120	28	10	23	80	207	20	28	643	165
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	61	20	133	31	11	26	89	230	22	31	714	183
RTOR Reduction (vph)	0	114	0	0	23	0	0	2	0	0	4	0
Lane Group Flow (vph)	61	39	0	31	14	0	89	250	0	31	893	0
Confl. Peds. (#/hr)			3			11			6			6
Confl. Bikes (#/hr)						1			3			4
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	4.7	10.3		2.6	8.2		7.3	51.1		2.5	46.3	
Effective Green, g (s)	6.7	12.3		4.6	10.2		9.3	53.1		4.5	48.3	
Actuated g/C Ratio	0.08	0.14		0.05	0.12		0.11	0.61		0.05	0.56	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	130	241		86	183		174	1066		87	918	
v/s Ratio Prot	c0.04	c0.02		0.02	0.01		c0.05	0.14		0.02	c0.54	
v/s Ratio Perm												
v/c Ratio	0.47	0.16		0.36	0.08		0.51	0.23		0.36	0.97	
Uniform Delay, d1	38.2	32.6		39.5	34.0		36.5	7.5		39.6	18.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.1		0.9	0.1		1.1	0.0		0.9	22.9	
Delay (s)	39.2	32.7		40.5	34.0		37.5	7.6		40.5	41.4	
Level of Service	D	C		D	C		D	A		D	D	
Approach Delay (s)		34.5			37.0			15.4			41.4	
Approach LOS		C			D			B			D	

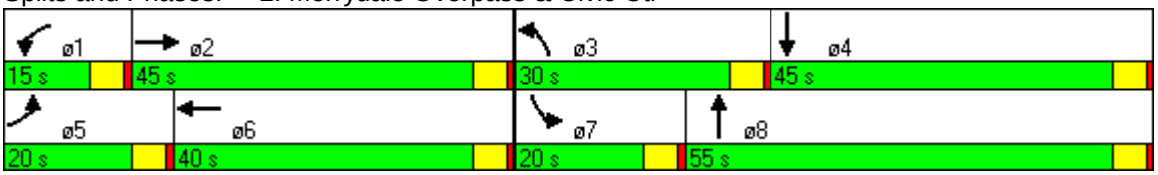
Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	86.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBT	NBL	SBT	EBL	WBT	SBL	NBT
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize								
Recall Mode	None	None	None	None	None	None	None	None
Maximum Split (s)	15	45	30	45	20	40	20	55
Maximum Split (%)	11.1%	33.3%	22.2%	33.3%	14.8%	29.6%	14.8%	40.7%
Minimum Split (s)	9	9	9	9	9	34	9	26
Yellow Time (s)	4	4	4	4	4	4	4	4
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	4	4	4	4	4	4	4	4
Vehicle Extension (s)	2	2	2	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)						7		7
Flash Dont Walk (s)						22		14
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	15	60	90	0	20	60	80
End Time (s)	15	60	90	0	20	60	80	0
Yield/Force Off (s)	10	55	85	130	15	55	75	130
Yield/Force Off 170(s)	10	55	85	130	15	33	75	116
Local Start Time (s)	45	60	105	0	45	65	105	125
Local Yield (s)	55	100	130	40	60	100	120	40
Local Yield 170(s)	55	100	130	40	60	78	120	26

Intersection Summary		
Cycle Length		135
Control Type	Actuated-Uncoordinated	
Natural Cycle		120

Splits and Phases: 2: Merrydale Overpass & Civic Ctr



Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	11	10	10	11	12	11
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1706	1359	1565	1706	1676	1405
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1706	1359	1565	1706	1676	1405
Volume (vph)	176	155	245	546	104	141
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	196	172	272	607	116	157
RTOR Reduction (vph)	0	131	0	0	0	124
Lane Group Flow (vph)	196	41	272	607	116	33
Confl. Peds. (#/hr)		5				11
Confl. Bikes (#/hr)		3				
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	5	4	
Permitted Phases		2				4
Actuated Green, G (s)	7.3	7.3	9.0	20.3	6.2	6.2
Effective Green, g (s)	8.3	8.3	10.0	21.3	7.2	7.2
Actuated g/C Ratio	0.24	0.24	0.29	0.62	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	5.0	2.0	2.0
Lane Grp Cap (vph)	410	327	454	1053	350	293
v/s Ratio Prot	0.11		0.17	c0.36	c0.07	
v/s Ratio Perm		0.03				0.02
v/c Ratio	0.48	0.13	0.60	0.58	0.33	0.11
Uniform Delay, d1	11.2	10.3	10.5	3.9	11.6	11.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1	1.4	1.2	0.2	0.1
Delay (s)	11.6	10.3	12.0	5.1	11.8	11.1
Level of Service	B	B	B	A	B	B
Approach Delay (s)	11.0			7.3	11.4	
Approach LOS	B			A	B	

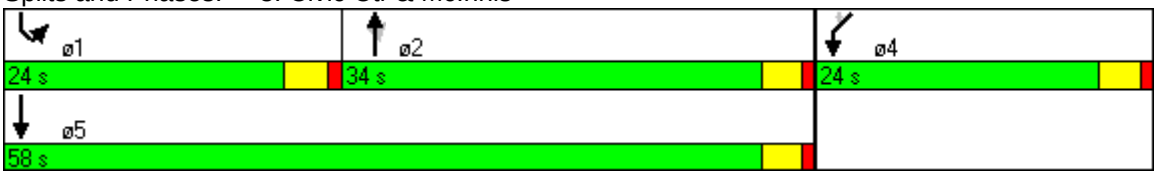
Intersection Summary			
HCM Average Control Delay	8.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	34.5	Sum of lost time (s)	6.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Phase Number	1	2	4	5
Movement	SBL	NBT	SWL	SBT
Lead/Lag	Lead	Lag		
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	24	34	24	58
Maximum Split (%)	29.3%	41.5%	29.3%	70.7%
Minimum Split (s)	8	21	21	9
Yellow Time (s)	3	3	3	3
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	4	7	4	5
Vehicle Extension (s)	2	2	2	5
Minimum Gap (s)	2	2	2	5
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		5	5	
Flash Dont Walk (s)		12	12	
Dual Entry	No	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	24	58	0
End Time (s)	24	58	0	58
Yield/Force Off (s)	20	54	78	54
Yield/Force Off 170(s)	20	42	66	54
Local Start Time (s)	58	0	34	58
Local Yield (s)	78	30	54	30
Local Yield 170(s)	78	18	42	30

Intersection Summary	
Cycle Length	82
Control Type	Actuated-Uncoordinated
Natural Cycle	60

Splits and Phases: 3: Civic Ctr & McInnis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	12	12	11	12	13	12	14	12	12	14	14
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3144	3235		1621	3353	1523	1654	1717		1671	1882	1565
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.72	1.00		0.68	1.00	1.00
Satd. Flow (perm)	3144	3235		1621	3353	1523	1245	1717		1205	1882	1565
Volume (vph)	626	466	98	38	708	181	122	38	38	189	58	325
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	696	518	109	42	787	201	136	42	42	210	64	361
RTOR Reduction (vph)	0	8	0	0	0	0	0	25	0	0	0	0
Lane Group Flow (vph)	696	619	0	42	787	201	136	59	0	210	64	361
Confl. Peds. (#/hr)			29			12	22		12	5		29
Confl. Bikes (#/hr)			8			9			8			6
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			8			4	
Permitted Phases						Free	8			4		Free
Actuated Green, G (s)	24.6	54.6		4.0	34.0	91.9	18.3	18.3		18.3	18.3	91.9
Effective Green, g (s)	26.6	56.6		6.0	36.0	91.9	20.3	20.3		20.3	20.3	91.9
Actuated g/C Ratio	0.29	0.62		0.07	0.39	1.00	0.22	0.22		0.22	0.22	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	1.0	1.0		1.0	3.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	910	1992		106	1313	1523	275	379		266	416	1565
v/s Ratio Prot	c0.22	0.19		0.03	c0.23			0.03			0.03	
v/s Ratio Perm						0.13	0.11			c0.17		0.23
v/c Ratio	0.76	0.31		0.40	0.60	0.13	0.49	0.16		0.79	0.15	0.23
Uniform Delay, d1	29.8	8.4		41.2	22.2	0.0	31.3	28.9		33.8	28.9	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.5	0.0		0.9	0.7	0.2	0.5	0.1		13.3	0.1	0.3
Delay (s)	33.3	8.4		42.1	23.0	0.2	31.8	29.0		47.1	28.9	0.3
Level of Service	C	A		D	C	A	C	C		D	C	A
Approach Delay (s)		21.5			19.3			30.7			18.7	
Approach LOS		C			B			C			B	

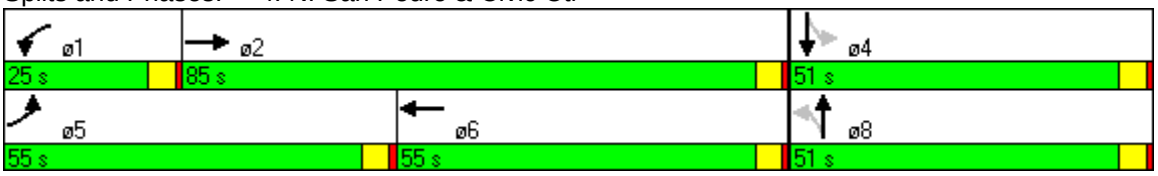
Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	91.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		

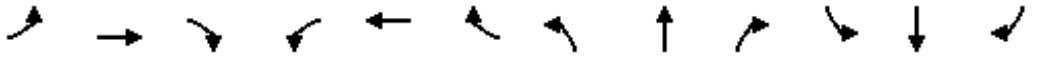
c Critical Lane Group

Phase Number	1	2	4	5	6	8
Movement	WBL	EBT	SBTL	EBL	WBT	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	None	None	None	None	None
Maximum Split (s)	25	85	51	55	55	51
Maximum Split (%)	15.5%	52.8%	31.7%	34.2%	34.2%	31.7%
Minimum Split (s)	12	50	46	12	50	46
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	1	1	1	1	1	1
Minimum Initial (s)	7	7	7	7	7	7
Vehicle Extension (s)	1	1	1	1	3	1
Minimum Gap (s)	1	1	1	1	3	1
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	7		7	7
Flash Dont Walk (s)		38	34		38	34
Dual Entry	No	Yes	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	25	110	0	55	110
End Time (s)	25	110	0	55	110	0
Yield/Force Off (s)	20	105	156	50	105	156
Yield/Force Off 170(s)	20	67	122	50	67	122
Local Start Time (s)	136	0	85	136	30	85
Local Yield (s)	156	80	131	25	80	131
Local Yield 170(s)	156	42	97	25	42	97

Intersection Summary	
Cycle Length	161
Control Type	Actuated-Uncoordinated
Natural Cycle	120

Splits and Phases: 4: N. San Pedro & Civic Ctr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1600	1700	1700	1600	1700	1700	1600	1700	1700	1600	1700	1700
Lane Width	11	12	12	11	11	12	11	12	12	11	11	12
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.86		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1441	1532		1441	1386		1441	1554		1441	1593	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1441	1532		1441	1386		1441	1554		1441	1593	
Volume (vph)	16	14	12	71	13	174	16	94	53	123	371	22
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	18	16	13	79	14	193	18	104	59	137	412	24
RTOR Reduction (vph)	0	11	0	0	158	0	0	13	0	0	1	0
Lane Group Flow (vph)	18	18	0	79	49	0	18	150	0	137	435	0
Confl. Peds. (#/hr)			1						10			23
Confl. Bikes (#/hr)			3						3			3
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	1.0	6.4		3.8	9.2		1.0	23.5		6.8	29.3	
Effective Green, g (s)	2.0	7.6		4.8	10.4		2.0	25.1		7.8	30.9	
Actuated g/C Ratio	0.03	0.13		0.08	0.18		0.03	0.44		0.14	0.54	
Clearance Time (s)	4.0	4.2		4.0	4.2		4.0	4.6		4.0	4.6	
Vehicle Extension (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	50	203		121	252		50	681		196	859	
v/s Ratio Prot	0.01	0.01		c0.05	c0.04		0.01	0.10		c0.10	c0.27	
v/s Ratio Perm												
v/c Ratio	0.36	0.09		0.65	0.19		0.36	0.22		0.70	0.51	
Uniform Delay, d1	27.0	21.8		25.4	19.9		27.0	10.0		23.6	8.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.1		9.2	0.1		1.6	0.1		8.5	0.2	
Delay (s)	28.6	21.9		34.7	20.0		28.6	10.1		32.1	8.5	
Level of Service	C	C		C	C		C	B		C	A	
Approach Delay (s)		24.5			24.1			11.9			14.2	
Approach LOS		C			C			B			B	

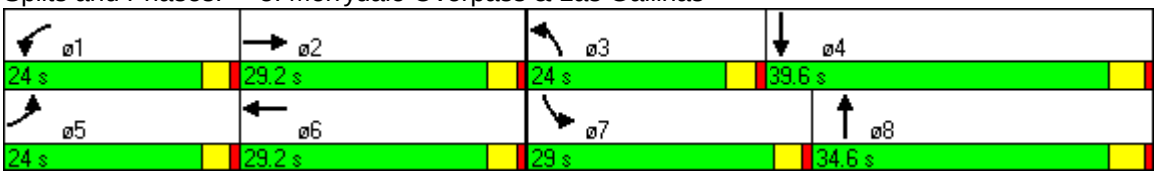
Intersection Summary			
HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBT	NBL	SBT	EBL	WBT	SBL	NBT
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize								
Recall Mode	None	None	None	Min	None	None	None	Min
Maximum Split (s)	24	29.2	24	39.6	24	29.2	29	34.6
Maximum Split (%)	20.5%	25.0%	20.5%	33.9%	20.5%	25.0%	24.8%	29.6%
Minimum Split (s)	12	9.2	12	25.6	12	26.2	12	22.6
Yellow Time (s)	3	3.2	3	3.6	3	3.2	3	3.6
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	8	5	8	7	8	8	8	6
Vehicle Extension (s)	1	1	1	1	1	1	1	1
Minimum Gap (s)	1	1	1	1	1	1	1	1
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)				7		7		7
Flash Dont Walk (s)				14		15		11
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	24	53.2	77.2	0	24	53.2	82.2
End Time (s)	24	53.2	77.2	0	24	53.2	82.2	0
Yield/Force Off (s)	20	49	73.2	112.2	20	49	78.2	112.2
Yield/Force Off 170(s)	20	49	73.2	112.2	20	34	78.2	112.2
Local Start Time (s)	92.8	0	29.2	53.2	92.8	0	29.2	58.2
Local Yield (s)	112.8	25	49.2	88.2	112.8	25	54.2	88.2
Local Yield 170(s)	112.8	25	49.2	88.2	112.8	10	54.2	88.2

Intersection Summary		
Cycle Length		116.8
Control Type	Actuated-Uncoordinated	
Natural Cycle		80

Splits and Phases: 5: Merrydale Overpass & Las Gallinas



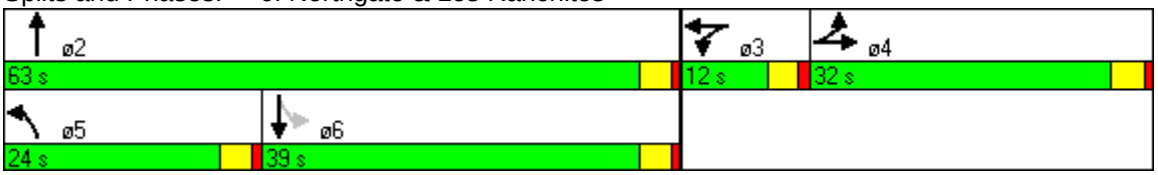
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	16	12	12	11	12	12	14	12	12	16	12
Total Lost time (s)	3.0	3.0			3.0		3.0	3.0			3.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	0.96			1.00		1.00	1.00			0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	0.85			0.93		1.00	1.00			0.97	
Flt Protected	0.95	1.00			0.98		0.95	1.00			1.00	
Satd. Flow (prot)	1494	1610			1552		1629	1829			1902	
Flt Permitted	0.95	1.00			0.98		0.95	1.00			1.00	
Satd. Flow (perm)	1494	1610			1552		1629	1829			1901	
Volume (vph)	104	0	257	1	0	1	55	98	0	2	347	110
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	116	0	286	1	0	1	61	109	0	2	386	122
RTOR Reduction (vph)	0	234	0	0	1	0	0	0	0	0	9	0
Lane Group Flow (vph)	116	52	0	0	1	0	61	109	0	0	501	0
Confl. Peds. (#/hr)			20									13
Confl. Bikes (#/hr)			3									2
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Split			Split			Prot			Perm		
Protected Phases	4	4		3	3		5	2			6	
Permitted Phases										6		
Actuated Green, G (s)	7.0	7.0			0.5		2.1	24.2			18.1	
Effective Green, g (s)	8.0	8.0			1.5		3.1	25.2			19.1	
Actuated g/C Ratio	0.18	0.18			0.03		0.07	0.58			0.44	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0			4.0	
Vehicle Extension (s)	0.5	0.5			2.0		1.0	0.5			0.5	
Lane Grp Cap (vph)	274	295			53		116	1055			831	
v/s Ratio Prot	c0.08	0.03			c0.00		c0.04	0.06				
v/s Ratio Perm											c0.26	
v/c Ratio	0.42	0.18			0.02		0.53	0.10			0.60	
Uniform Delay, d1	15.8	15.1			20.4		19.6	4.2			9.4	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.4	0.1			0.1		2.0	0.0			0.9	
Delay (s)	16.2	15.2			20.4		21.6	4.2			10.3	
Level of Service	B	B			C		C	A			B	
Approach Delay (s)		15.5			20.4			10.4			10.3	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	43.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

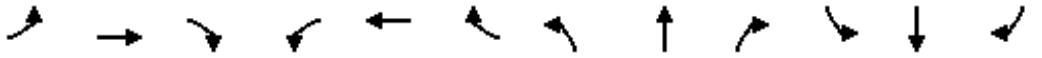
Phase Number	2	3	4	5	6
Movement	NBT	WBTL	EBTL	NBL	SBTL
Lead/Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize					
Recall Mode	Min	None	None	None	None
Maximum Split (s)	63	12	32	24	39
Maximum Split (%)	58.9%	11.2%	29.9%	22.4%	36.4%
Minimum Split (s)	8	8	28	8	35
Yellow Time (s)	3	3	3	3	3
All-Red Time (s)	1	1	1	1	1
Minimum Initial (s)	4	4	4	4	4
Vehicle Extension (s)	0.5	2	0.5	1	0.5
Minimum Gap (s)	0.5	2	0.5	1	0.5
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)			7		7
Flash Dont Walk (s)			17		24
Dual Entry	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	63	75	0	24
End Time (s)	63	75	0	24	63
Yield/Force Off (s)	59	71	103	20	59
Yield/Force Off 170(s)	59	71	86	20	35
Local Start Time (s)	0	63	75	0	24
Local Yield (s)	59	71	103	20	59
Local Yield 170(s)	59	71	86	20	35

Intersection Summary	
Cycle Length	107
Control Type	Actuated-Uncoordinated
Natural Cycle	80

Splits and Phases: 6: Northgate & Los Ranchitos



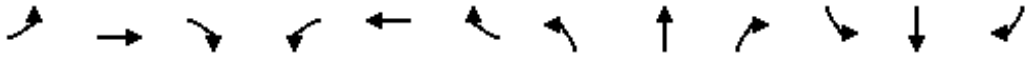
Intersection Sign configuration not allowed in HCM analysis.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	296	14	282	0	0	0	201	410	8	5	184	388
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	329	16	313	0	0	0	223	456	9	6	204	431
Pedestrians		1			8			4			10	
Lane Width (ft)		16.0			0.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			1	
Right turn flare (veh)												8
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	10			333			996	687	28	928	1001	11
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10			333			996	687	28	928	1001	11
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	79			100			0	0	99	0	0	59
cM capacity (veh/h)	1596			1222			0	290	1044	0	191	1060

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	344	313	223	464	641
Volume Left	329	0	223	0	6
Volume Right	0	313	0	9	431
cSH	1596	1700	0	294	453
Volume to Capacity	0.21	0.18	Err	1.58	1.41
Queue Length 95th (ft)	19	0	Err	690	780
Control Delay (s)	7.6	0.0	Err	308.0	223.6
Lane LOS	A		F	F	F
Approach Delay (s)	4.0		Err		223.6
Approach LOS			F		F

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	16	12	11	12	12	11	12	12	12	11	12
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	0.88		1.00	0.99		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	1702		1621	1493		1621	1751		1676	1532	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1676	1702		1621	1493		1621	1751		1676	1532	
Volume (vph)	159	25	150	38	33	160	170	354	14	23	208	238
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	177	28	167	42	37	178	189	393	16	26	231	264
RTOR Reduction (vph)	0	124	0	0	147	0	0	1	0	0	26	0
Lane Group Flow (vph)	177	71	0	42	68	0	189	408	0	26	469	0
Confl. Peds. (#/hr)	17					25			8	8		17
Confl. Bikes (#/hr)			5			2			10			5
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	13.1	24.6		4.4	15.9		15.3	52.5		2.6	39.8	
Effective Green, g (s)	15.1	26.6		6.4	17.9		17.3	54.5		4.6	41.8	
Actuated g/C Ratio	0.15	0.26		0.06	0.17		0.17	0.52		0.04	0.40	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	243	435		100	257		269	917		74	615	
v/s Ratio Prot	c0.11	0.04		0.03	c0.05		c0.12	0.23		0.02	c0.31	
v/s Ratio Perm												
v/c Ratio	0.73	0.16		0.42	0.27		0.70	0.44		0.35	0.76	
Uniform Delay, d1	42.5	30.1		47.1	37.4		41.0	15.4		48.3	26.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.9	0.1		1.0	0.2		6.6	0.1		1.1	5.0	
Delay (s)	51.4	30.2		48.1	37.6		47.6	15.5		49.4	31.9	
Level of Service	D	C		D	D		D	B		D	C	
Approach Delay (s)		40.3			39.3			25.7			32.7	
Approach LOS		D			D			C			C	

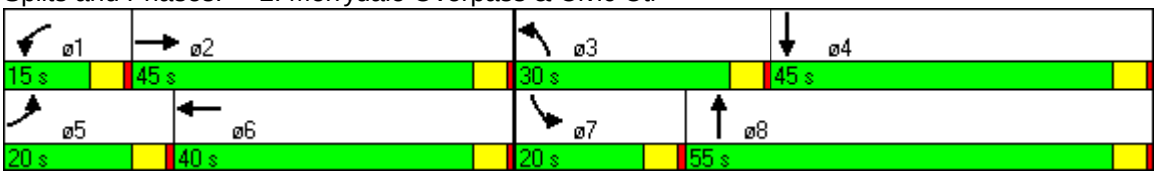
Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	104.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBT	NBL	SBT	EBL	WBT	SBL	NBT
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize								
Recall Mode	None	None	None	None	None	None	None	None
Maximum Split (s)	15	45	30	45	20	40	20	55
Maximum Split (%)	11.1%	33.3%	22.2%	33.3%	14.8%	29.6%	14.8%	40.7%
Minimum Split (s)	9	9	9	9	9	34	9	26
Yellow Time (s)	4	4	4	4	4	4	4	4
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	4	4	4	4	4	4	4	4
Vehicle Extension (s)	2	2	2	2	2	2	2	2
Minimum Gap (s)	2	2	2	2	2	2	2	2
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)						7		7
Flash Dont Walk (s)						22		14
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	15	60	90	0	20	60	80
End Time (s)	15	60	90	0	20	60	80	0
Yield/Force Off (s)	10	55	85	130	15	55	75	130
Yield/Force Off 170(s)	10	55	85	130	15	33	75	116
Local Start Time (s)	45	60	105	0	45	65	105	125
Local Yield (s)	55	100	130	40	60	100	120	40
Local Yield 170(s)	55	100	130	40	60	78	120	26

Intersection Summary		
Cycle Length		135
Control Type	Actuated-Uncoordinated	
Natural Cycle		90

Splits and Phases: 2: Merrydale Overpass & Civic Ctr



Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	11	10	10	11	12	11
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.95	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1706	1333	1565	1706	1676	1396
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1706	1333	1565	1706	1676	1396
Volume (vph)	344	86	152	303	82	151
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	382	96	169	337	91	168
RTOR Reduction (vph)	0	40	0	0	0	136
Lane Group Flow (vph)	382	56	169	337	91	32
Confl. Peds. (#/hr)		19	19			11
Confl. Bikes (#/hr)		7				3
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	5	4	
Permitted Phases		2				4
Actuated Green, G (s)	11.4	11.4	7.4	22.8	6.0	6.0
Effective Green, g (s)	12.4	12.4	8.4	23.8	7.0	7.0
Actuated g/C Ratio	0.34	0.34	0.23	0.65	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	5.0	2.0	2.0
Lane Grp Cap (vph)	575	449	357	1103	319	266
v/s Ratio Prot	c0.22		c0.11	0.20	c0.05	
v/s Ratio Perm		0.04				0.02
v/c Ratio	0.66	0.13	0.47	0.31	0.29	0.12
Uniform Delay, d1	10.4	8.4	12.3	2.9	12.8	12.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.2	0.0	0.4	0.3	0.2	0.1
Delay (s)	12.7	8.5	12.6	3.2	12.9	12.4
Level of Service	B	A	B	A	B	B
Approach Delay (s)	11.8			6.4	12.6	
Approach LOS	B			A	B	

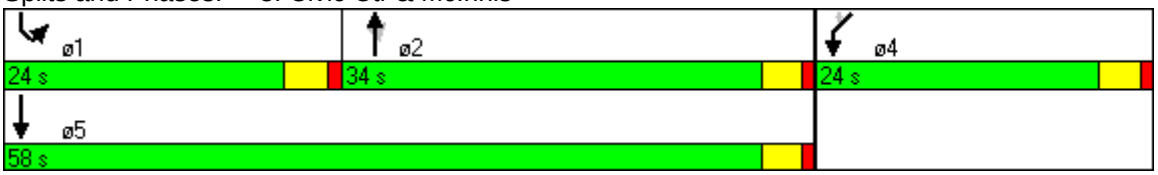
Intersection Summary			
HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	36.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Phase Number	1	2	4	5
Movement	SBL	NBT	SWL	SBT
Lead/Lag	Lead	Lag		
Lead-Lag Optimize				
Recall Mode	None	None	None	None
Maximum Split (s)	24	34	24	58
Maximum Split (%)	29.3%	41.5%	29.3%	70.7%
Minimum Split (s)	8	21	21	21
Yellow Time (s)	3	3	3	3
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	4	7	4	5
Vehicle Extension (s)	2	2	2	5
Minimum Gap (s)	2	2	2	5
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		5	5	
Flash Dont Walk (s)		12	12	
Dual Entry	No	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	24	58	0
End Time (s)	24	58	0	58
Yield/Force Off (s)	20	54	78	54
Yield/Force Off 170(s)	20	42	66	54
Local Start Time (s)	58	0	34	58
Local Yield (s)	78	30	54	30
Local Yield 170(s)	78	18	42	30

Intersection Summary	
Cycle Length	82
Control Type	Actuated-Uncoordinated
Natural Cycle	60

Splits and Phases: 3: Civic Ctr & McInnis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	12	12	11	12	13	12	14	12	12	14	14
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	0.98		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3144	3260		1621	3353	1513	1671	1656		1672	1882	1570
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.71	1.00		0.63	1.00	1.00
Satd. Flow (perm)	3144	3260		1621	3353	1513	1250	1656		1101	1882	1570
Volume (vph)	224	564	98	36	572	133	166	45	86	194	64	440
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	249	627	109	40	636	148	184	50	96	216	71	489
RTOR Reduction (vph)	0	9	0	0	0	0	0	43	0	0	0	0
Lane Group Flow (vph)	249	727	0	40	636	148	184	103	0	216	71	489
Confl. Peds. (#/hr)	6		15	8		32	8		33	7		14
Confl. Bikes (#/hr)			10			10			12			12
Turn Type	Prot			Prot		Free	Perm			Perm		Free
Protected Phases	5	2		1	6			8			4	
Permitted Phases						Free	8			4		Free
Actuated Green, G (s)	7.4	31.4		2.0	26.0	65.2	16.8	16.8		16.8	16.8	65.2
Effective Green, g (s)	9.4	33.4		4.0	28.0	65.2	18.8	18.8		18.8	18.8	65.2
Actuated g/C Ratio	0.14	0.51		0.06	0.43	1.00	0.29	0.29		0.29	0.29	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	1.0	1.0		1.0	3.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	453	1670		99	1440	1513	360	477		317	543	1570
v/s Ratio Prot	c0.08	c0.22		0.02	0.19			0.06			0.04	
v/s Ratio Perm						0.10	0.15			c0.20		0.31
v/c Ratio	0.55	0.44		0.40	0.44	0.10	0.51	0.22		0.68	0.13	0.31
Uniform Delay, d1	25.9	10.0		29.5	13.1	0.0	19.4	17.6		20.5	17.2	0.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1		1.0	0.2	0.1	0.5	0.1		4.7	0.0	0.5
Delay (s)	26.7	10.0		30.4	13.3	0.1	19.9	17.7		25.3	17.2	0.5
Level of Service	C	B		C	B	A	B	B		C	B	A
Approach Delay (s)		14.2			11.8			18.9			8.9	
Approach LOS		B			B			B			A	

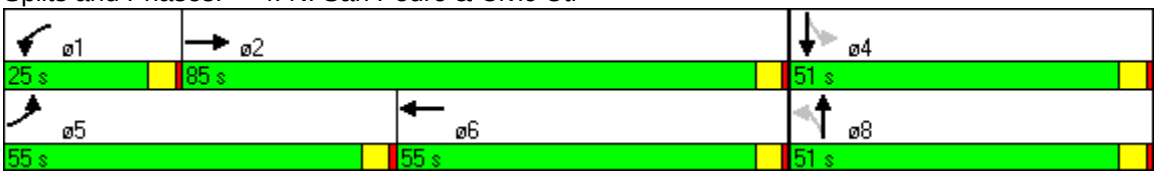
Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	65.2	Sum of lost time (s)	6.0
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Phase Number	1	2	4	5	6	8
Movement	WBL	EBT	SBTL	EBL	WBT	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	None	None	None	None	None
Maximum Split (s)	25	85	51	55	55	51
Maximum Split (%)	15.5%	52.8%	31.7%	34.2%	34.2%	31.7%
Minimum Split (s)	12	50	46	12	50	46
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	1	1	1	1	1	1
Minimum Initial (s)	7	7	7	7	7	7
Vehicle Extension (s)	1	1	1	1	3	1
Minimum Gap (s)	1	1	1	1	3	1
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	7		7	7
Flash Dont Walk (s)		38	34		38	34
Dual Entry	No	Yes	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	25	110	0	55	110
End Time (s)	25	110	0	55	110	0
Yield/Force Off (s)	20	105	156	50	105	156
Yield/Force Off 170(s)	20	67	122	50	67	122
Local Start Time (s)	136	0	85	136	30	85
Local Yield (s)	156	80	131	25	80	131
Local Yield 170(s)	156	42	97	25	42	97

Intersection Summary	
Cycle Length	161
Control Type	Semi Act-Uncoord
Natural Cycle	110

Splits and Phases: 4: N. San Pedro & Civic Ctr



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1600	1700	1700	1600	1700	1700	1600	1700	1700	1600	1700	1700
Lane Width	11	12	12	11	11	12	11	12	12	11	11	12
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.90		1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1441	1556		1441	1424		1441	1575		1441	1544	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1441	1556		1441	1424		1441	1575		1441	1544	
Volume (vph)	66	59	33	164	120	235	26	238	97	188	261	59
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	73	66	37	182	133	261	29	264	108	209	290	66
RTOR Reduction (vph)	0	17	0	0	54	0	0	12	0	0	6	0
Lane Group Flow (vph)	73	86	0	182	340	0	29	360	0	209	350	0
Confl. Peds. (#/hr)	4		5	5		4	23		5	5		23
Confl. Bikes (#/hr)			5						7			10
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.3	21.7		12.1	26.5		4.3	24.9		16.2	36.8	
Effective Green, g (s)	8.3	22.9		13.1	27.7		5.3	26.5		17.2	38.4	
Actuated g/C Ratio	0.09	0.25		0.14	0.30		0.06	0.29		0.19	0.42	
Clearance Time (s)	4.0	4.2		4.0	4.2		4.0	4.6		4.0	4.6	
Vehicle Extension (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	130	389		206	430		83	455		270	647	
v/s Ratio Prot	0.05	0.06		c0.13	c0.24		0.02	c0.23		c0.15	0.23	
v/s Ratio Perm												
v/c Ratio	0.56	0.22		0.88	0.79		0.35	0.79		0.77	0.54	
Uniform Delay, d1	40.0	27.3		38.6	29.3		41.5	30.0		35.4	20.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	0.1		32.2	8.6		0.9	8.5		11.9	0.5	
Delay (s)	43.2	27.4		70.7	38.0		42.5	38.6		47.3	20.5	
Level of Service	D	C		E	D		D	D		D	C	
Approach Delay (s)		34.0			48.3			38.8			30.4	
Approach LOS		C			D			D			C	

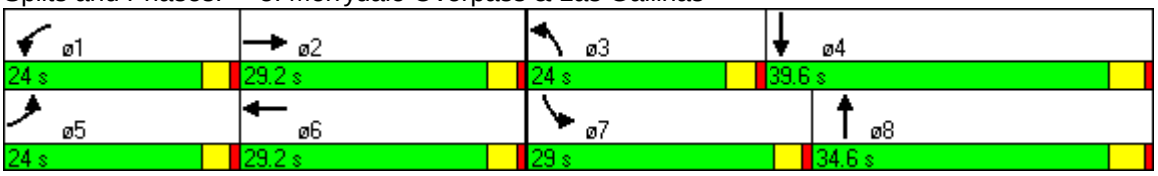
Intersection Summary			
HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	91.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		

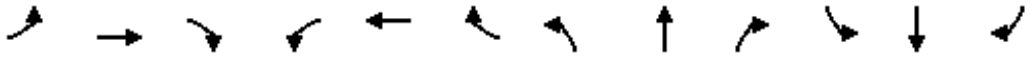
c Critical Lane Group

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBT	NBL	SBT	EBL	WBT	SBL	NBT
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize								
Recall Mode	None	None	None	None	None	None	None	None
Maximum Split (s)	24	29.2	24	39.6	24	29.2	29	34.6
Maximum Split (%)	20.5%	25.0%	20.5%	33.9%	20.5%	25.0%	24.8%	29.6%
Minimum Split (s)	12	9.2	12	25.6	12	26.2	12	22.6
Yellow Time (s)	3	3.2	3	3.6	3	3.2	3	3.6
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	8	5	8	7	8	8	8	6
Vehicle Extension (s)	1	1	1	1	1	1	1	1
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)				7		7		7
Flash Dont Walk (s)				14		15		11
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	24	53.2	77.2	0	24	53.2	82.2
End Time (s)	24	53.2	77.2	0	24	53.2	82.2	0
Yield/Force Off (s)	20	49	73.2	112.2	20	49	78.2	112.2
Yield/Force Off 170(s)	20	49	73.2	98.2	20	34	78.2	101.2
Local Start Time (s)	92.8	0	29.2	53.2	92.8	0	29.2	58.2
Local Yield (s)	112.8	25	49.2	88.2	112.8	25	54.2	88.2
Local Yield 170(s)	112.8	25	49.2	74.2	112.8	10	54.2	77.2

Intersection Summary		
Cycle Length		116.8
Control Type	Actuated-Uncoordinated	
Natural Cycle		80

Splits and Phases: 5: Merrydale Overpass & Las Gallinas





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	16	12	12	11	12	12	14	12	12	16	12
Total Lost time (s)	3.0	3.0			3.0		3.0	3.0			3.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	0.93			1.00		1.00	1.00			0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	0.85			0.86		1.00	1.00			0.97	
Flt Protected	0.95	1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1509	1586			1476		1676	1882			1927	
Flt Permitted	0.95	1.00			1.00		0.95	1.00			1.00	
Satd. Flow (perm)	1509	1586			1476		1676	1882			1922	
Volume (vph)	95	1	199	0	0	1	117	294	0	5	356	98
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	106	1	221	0	0	1	130	327	0	6	396	109
RTOR Reduction (vph)	0	189	0	0	1	0	0	0	0	0	7	0
Lane Group Flow (vph)	106	33	0	0	0	0	130	327	0	0	504	0
Confl. Peds. (#/hr)			22	7					7			15
Confl. Bikes (#/hr)			10									2
Turn Type	Split			Split			Prot			Perm		
Protected Phases	4	4		3	3		5	2			6	
Permitted Phases										6		
Actuated Green, G (s)	6.7	6.7			0.5		5.2	33.2			24.0	
Effective Green, g (s)	7.7	7.7			1.5		6.2	34.2			25.0	
Actuated g/C Ratio	0.15	0.15			0.03		0.12	0.65			0.48	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0			4.0	
Vehicle Extension (s)	0.5	0.5			2.0		1.0	0.5			0.5	
Lane Grp Cap (vph)	222	233			42		198	1228			917	
v/s Ratio Prot	c0.07	0.02			c0.00		c0.08	0.17				
v/s Ratio Perm											c0.26	
v/c Ratio	0.48	0.14			0.00		0.66	0.27			0.55	
Uniform Delay, d1	20.5	19.5			24.7		22.1	3.8			9.7	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.6	0.1			0.0		5.9	0.0			0.4	
Delay (s)	21.1	19.6			24.7		27.9	3.9			10.1	
Level of Service	C	B			C		C	A			B	
Approach Delay (s)		20.1			24.7			10.7			10.1	
Approach LOS		C			C			B			B	

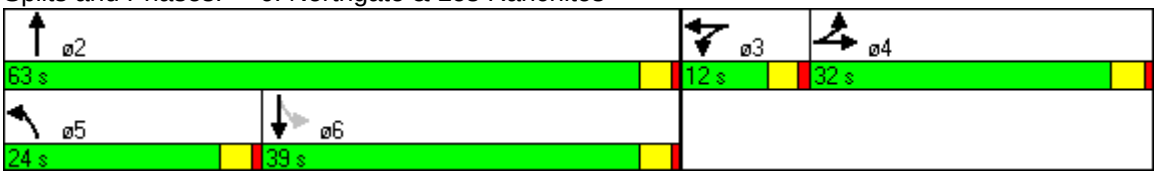
Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	52.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Phase Number	2	3	4	5	6
Movement	NBT	WBTL	EBTL	NBL	SBTL
Lead/Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize					
Recall Mode	Min	None	None	None	None
Maximum Split (s)	63	12	32	24	39
Maximum Split (%)	58.9%	11.2%	29.9%	22.4%	36.4%
Minimum Split (s)	20	8	28	8	35
Yellow Time (s)	3	3	3	3	3
All-Red Time (s)	1	1	1	1	1
Minimum Initial (s)	4	4	4	4	4
Vehicle Extension (s)	0.5	2	0.5	1	0.5
Minimum Gap (s)	0.5	2	0.5	1	0.5
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)			7		7
Flash Dont Walk (s)			17		24
Dual Entry	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	63	75	0	24
End Time (s)	63	75	0	24	63
Yield/Force Off (s)	59	71	103	20	59
Yield/Force Off 170(s)	59	71	86	20	35
Local Start Time (s)	0	63	75	0	24
Local Yield (s)	59	71	103	20	59
Local Yield 170(s)	59	71	86	20	35

Intersection Summary	
Cycle Length	107
Control Type	Actuated-Uncoordinated
Natural Cycle	80

Splits and Phases: 6: Northgate & Los Ranchitos



Intersection Sign configuration not allowed in HCM analysis.