

Initial Study/Addendum
Mathilda Avenue Frontage Road Removal Project

Public Safety – Hazardous Materials	Potentially Significant Impact	Less than Sig. With Mitigation	Less Than Significant	No Impact	Source Other Than Project Description and Plans
64. Hazards and Hazardous Materials - Create a significant hazard to the public or the environment through the routine transport, use or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project Description
65. Hazards and Hazardous Materials - Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project Description
66. Hazards and Hazardous Materials - Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project Description Sunnyvale Zoning Map www.sunnyvaleplanning.com
67. Hazards and Hazardous Materials - Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result would it create a significant hazard to the public or the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project Description
68. Hazards and Hazardous Materials - Impair implementation of, or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Safety and Noise Chapter of the Sunnyvale General Plan www.generalplan.inSunnyvale.com

Further Discussion if "Less Than Significant" with or without mitigation: None required.

Initial Study/Addendum
Mathilda Avenue Frontage Road Removal Project

Community Services	Potentially Significant Impact	Less than Sig. With Mitigation	Less Than Significant	No Impact	Source Other Than Project Description and Plans
69. Public Services Parks? Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Land Use and Transportation Chapter of the Sunnyvale General Plan, Community Character Chapter of the Sunnyvale General Plan www.generalplan.inSunnyvale.com
70. Recreation - Would the project increase the use of existing neighborhood or regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Land Use and Transportation Chapter of the Sunnyvale General Plan, Community Character Chapter of the Sunnyvale General Plan www.generalplan.inSunnyvale.com
71. Recreation - Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Land Use and Transportation Chapter of the Sunnyvale General Plan, Community Character Chapter of the Sunnyvale General Plan www.generalplan.inSunnyvale.com

Further Discussion if "Less Than Significant" with or without mitigation: None required.

ENVIRONMENTAL SOURCES

Initial Study/Addendum
Mathilda Avenue Frontage Road Removal Project
Page 22 of 25

City of Sunnyvale General Plan:
Sunnyvale General Plan Consolidated in (2011)
www.generalplan.inSunnyvale.com

- Community Vision
- Land Use and Transportation
- Community Character
- Housing
- Safety and Noise
- Environmental Management
- Appendix A: Implementation Plans

City of Sunnyvale Municipal Code:
<http://sunnyvale.ca.gov/>

- Title 8 Health and Sanitation
- Title 9 Public Peace, Safety or Welfare
- Title 10 Vehicles and Traffic
- Title 12 Water and Sewers
- Chapter 12.60 Storm Water Management
- Title 13 Streets and Sidewalks
- Title 16 Buildings and Construction
 - Chapter 16.52 Fire Code
 - Chapter 16.54 Building Standards for Buildings Exceeding Seventy-Five Feet in Height
- Title 18 Subdivisions
- Title 19 Zoning
 - Chapter 19.28 Downtown Specific Plan District
 - Chapter 19.29 Moffett Park Specific plan District
 - Chapter 19.39 Green Building Regulations
 - Chapter 19.42 Operating Standards
 - Chapter 19.54 Wireless Telecommunication Facilities
 - Chapter 19.81 Streamside Development Review
 - Chapter 19.96 Heritage Preservation
- Title 20 Hazardous Materials

Specific Plans:

- Downtown Specific Plan
- El Camino Real Precise Plan
- Lockheed Site Master Use Permit
- Moffett Park Specific Plan
- 101 & Lawrence Site Specific Plan
- Southern Pacific Corridor Plan
- Lakeside Specific Plan
- Arques Campus Specific Plan

Environmental Impact Reports:

- Futures Study Environmental Impact Report
- Lockheed Site Master Use Permit Environmental Impact Report

- Tasman Corridor LRT Environmental Impact Study (supplemental)
- Kaiser Permanente Medical Center Replacement Center Environmental Impact Report (City of Santa Clara)
- Downtown Development Program Environmental Impact Report
- Caribbean-Moffett Park Environmental Impact Report
- Southern Pacific Corridor Plan Environmental Impact Report
- East Sunnyvale ITR General Plan Amendment EIR
- Palo Alto Medical Foundation Medical Clinic Project EIR
- Luminaire (Lawrence Station Road/Hwy 237 residential) EIR
- NASA Ames Development Plan Programmatic EIS
- Mary Avenue Overpass EIR
- Mathilda Avenue Bridge EIR

Maps:

- General Plan Map
- Zoning Map
- City of Sunnyvale Aerial Maps
- Flood Insurance Rate Maps (FEMA)
- Santa Clara County Assessor's Parcel
- Utility Maps
- Air Installations Compatible Use Zones (AICUZ) Study Map
- 2010 Noise Conditions Map

Legislation / Acts / Bills / Resource Agency Codes and Permits:

- Subdivision Map Act
- San Francisco Bay Region
- Municipal Regional Stormwater NPDES Permit
- Santa Clara County Valley Water District Groundwater Protection Ordinance
- Section 404 of Clean Water Act
- CA Assembly Bill 32 Global Warming Solutions Act

Lists / Inventories:

- Sunnyvale Cultural Resources Inventory List
- Heritage Landmark Designation List
- Santa Clara County Heritage Resource Inventory
- Hazardous Waste & Substances Sites List (State of California)
- List of Known Contaminants in Sunnyvale
- USFWS / CA Dept. F&G Endangered and Threatened Animals of California

ENVIRONMENTAL SOURCES

<http://www.dfg.ca.gov/biogeodata/cnndb/pdfs/TEAnimals.pdf>

- The Leaking Underground Petroleum Storage Tank List www.geotracker.waterboards.ca.gov
- The Federal EPA Superfund List www.epa.gov/region9/cleanup/california.html
- The Hazardous Waste and Substance Site List www.dtsc.ca.gov/SiteCleanup/Cortese_List.cfm

Guidelines and Best Management Practices

- Storm Water Quality Best Management Practices Guidelines Manual 2007
- Sunnyvale Citywide Design Guidelines
- Sunnyvale Industrial Guidelines
- Sunnyvale Single-Family Design Techniques
- Sunnyvale Eichler Guidelines
- Blueprint for a Clean Bay
- Santa Clara Valley Water District (SCVWD) Guidelines and Standards for Land Use Near Streams
- The United States Secretary of the Interior's Guidelines for Rehabilitation
- Criteria of the National Register of Historic Places

Transportation:

- California Department of Transportation Highway Design Manual
- California Department of Transportation Traffic Manual
- California Department of Transportation Standard Plans & Standard Specifications
- Highway Capacity Manual
- Institute of Transportation Engineers - Trip Generation Manual & Trip Generation Handbook
- Institute of Transportation Engineers - Traffic Engineering Handbook
- Institute of Transportation Engineers - Manual of Traffic Engineering Studies
- Institute of Transportation Engineers - Transportation Planning Handbook
- Institute of Transportation Engineers - Manual of Traffic Signal Design
- Institute of Transportation Engineers - Transportation and Land Development
- U.S. Dept. of Transportation Federal Highway Administration Manual on Uniform Traffic Control Devices for Street and Highways & CA Supplements
- California Vehicle Code
- Santa Clara County Congestion Management Program and Technical Guidelines
- Santa Clara County Transportation Agency Short Range Transit Plan
- Santa Clara County Transportation Plan
- Traffic Volume Studies, City of Sunnyvale Public Works Department of Traffic Engineering Division

Initial Study/Addendum
Mathilda Avenue Frontage Road Removal Project
Page 23 of 25

- Statewide Integrated Traffic Records System
- Sunnyvale Zoning Ordinance – Including Titles 10 & 13
- City of Sunnyvale General Plan – Land Use and Transportation Chapter
- City of Sunnyvale Bicycle Plan
- City of Sunnyvale Neighborhood Traffic Calming Program
- Valley Transportation Authority Bicycle Technical Guidelines
- Valley Transportation Authority Community Design & Transportation – Manual of Best Practices for Integrating Transportation and Land Use
- Santa Clara County Sub-Regional Deficiency Plan
- City of Sunnyvale Deficiency Plan
- AASHTO: A Policy on Geometric Design of Highways and Streets
- Santa Clara County ALUC Moffett Field Comprehensive Land Use Plan

Public Works:

- Standard Specifications and Details of the Department of Public Works
- Storm Drain Master Plan
- Sanitary Sewer Master Plan
- Water Master Plan
- Solid Waste Management Plan of Santa Clara County
- Geotechnical Investigation Reports
- Engineering Division Project Files
- Subdivision and Parcel Map Files

Miscellaneous Agency Plans:

- ABAG Projections 2010
- Bay Area Clean Air Plan
- BAAQMD CEQA Guidelines

Building Safety:

- California Building Code,
- California Energy Code
- California Plumbing Code,
- California Mechanical Code,
- California Electrical Code
- California Fire Code
- Title 16.52 Sunnyvale Municipal Code
- Title 16.53 Sunnyvale Municipal Code
- Title 16.54 Sunnyvale Municipal Code
- Title 19 California Code of Regulations
- National Fire Protection Association (NFPA) standards

ENVIRONMENTAL SOURCES

Initial Study/Addendum
Mathilda Avenue Frontage Road Removal Project
Page 24 of 25

OTHER :

Project Specific Information

- Mathilda Avenue Carriage Road Transportation Evaluation dated 7/26/13, see Appendix A.

LEAD AGENCY AND CONSULTANTS

Lead Agency:

City of Sunnyvale
Gerri Caruso, Principal Planner
Jack Witthaus, Transportation and Traffic Manager

Consultants:

David J. Powers and Associates, Inc.
Environmental Consultants and Planners
Akoni Danielsen, Principal Project Manager
Matthew Gilliland, Assistant Project Manager

Fehr & Peers, Inc.
Transportation Consultants

ENVIRONMENTAL SOURCES

**Initial Study/Addendum
Mathilda Avenue Frontage Road Removal Project
Page 25 of 25**

Appendix A

**Mathilda Avenue Carriage Road Transportation Evaluation dated 7/26/13
By Fehr & Peers**

FEHR & PEERS

MEMORANDUM

Date: July 26, 2013
To: Jack Witthaus, City of Sunnyvale
From: Matt Haynes, Sarah Peters and Alisar Aoun, Fehr & Peers
Subject: ***Mathilda Avenue Carriage Road Transportation Evaluation***

SJ12-1406

INTRODUCTION

This memorandum presents a transportation assessment of the proposed "carriage" road on the west side of Mathilda Avenue between Evelyn Avenue and Olive Avenue. The study evaluates operations with and without the proposed carriage road, assuming new land uses are developed along the corridor consistent with the Downtown Specific Plan and Year 2035 General Plan development assumptions.

The City of Sunnyvale's *Downtown Specific Plan* (2003) assumes the development of a one-way carriage road on the west side of Mathilda Avenue between Evelyn Avenue and Olive Avenue. The carriage road is intended to provide access and circulation needs for properties along the west side of Mathilda Avenue while limiting driveway access points off the arterial corridor of Mathilda Avenue.

This study evaluates three access alternatives for the west side of Mathilda Avenue. Conditions in Year 2035 were evaluated with the proposed frontage road and for two scenarios without the proposed carriage road. The study scenarios are outlined below:

- 1. Existing (2012/2013) Conditions** – Conditions based on data collected in December 2012 and February 2013.
- 2. Year 2035 Without Carriage Road Conditions (Mathilda Avenue Access)** – No carriage road would be constructed. Primary access to the two blocks on the west side of Mathilda Avenue between Iowa Avenue and Washington Avenue would be via driveways on Mathilda Avenue. To maintain consistency with current development plans, primary access for the block between Olive Avenue and Iowa Avenue would be via Charles Avenue, with some access provided on Mathilda Avenue. Project trips are added to base volumes forecasted using the City of Sunnyvale's *existing General Plan for Year 2035 conditions*.

Jack Witthaus
July 26, 2013
Page 2 of 49



3. Year 2035 Without Carriage Road Conditions (Charles Street Access between Iowa Avenue and Olive Avenue)

No carriage road would be constructed; primary access to the blocks between Iowa Avenue and Washington Avenue would be via driveways on Mathilda Avenue. For the block between Iowa Avenue and Olive Avenue (Block 14 in the *Downtown Specific Plan*), primary access would be via Charles Avenue, with no driveways via Mathilda Avenue. Project trips are added to base volumes forecasted using the City of Sunnyvale's *existing General Plan*.

4. Year 2035 With Carriage Road Conditions

The carriage road as described in the *Downtown Specific Plan* (2003) would be constructed parallel to the southbound lanes of Mathilda Avenue. Primary access to the blocks on the west side of Mathilda Avenue, between Olive Avenue and Washington Avenue, would be via driveways on the carriage road. Project trips are added to base volumes forecasted using the City of Sunnyvale's *existing General Plan*.

Traffic operations at five study intersections along Mathilda Avenue were evaluated during the morning peak-hour occurring between 7:00 am to 9:00 am and evening peak-hour occurring between 4:00 pm to 6:00 pm. Additionally, traffic operations at two intersections on Charles Avenue were evaluated for the Charles Street Access scenario described above.

EXISTING CONDITIONS

Data Collection

Vehicle, pedestrian and bicycle counts were conducted in November 2012 during the AM (7:00 AM - 9:00 AM) and PM (4:00 PM - 6:00 PM) peak periods at the following five study intersections:

1. Mathilda Avenue and Washington Avenue
2. Mathilda Avenue and McKinley Avenue
3. Mathilda Avenue and Iowa Avenue
4. Mathilda Avenue and Olive Avenue
5. Mathilda Avenue and El Camino Real

Additional AM and PM peak period counts were conducted in February 2013 at the following two study intersections:

6. Charles Street and Iowa Avenue
7. Charles Street and Olive Avenue.

To measure existing traffic levels using driveways along Mathilda Avenue, driveway counts were also conducted in February 2013 at twelve driveways along Mathilda Avenue between Washington Avenue and Olive Avenue. **Figure 1** shows the locations of study intersections.

Jack Witthaus
July 26, 2013
Page 3 of 49



Field observations were conducted during the AM peak hour (8:00 AM – 9:00 AM) and PM peak hour (5:00 PM – 6:00 PM) in December 2012 to evaluate intersection operations and vehicle queuing and to confirm street geometry. Subsequent field observations were conducted in March 2013 to observe the influence of driveway operations on southbound vehicle traffic.

Observations confirmed that traffic flow along Mathilda Avenue is heaviest in the northbound direction during the AM peak hour and in the southbound direction during the PM peak period. During the AM peak hour, northbound vehicles were observed to occasionally slow after departing the intersection of Mathilda Avenue and Washington Avenue, which indicates that delay from intersections north of the study corridor are influencing traffic in the downtown area.



- Legend**
- Study Intersection
 - ⊙ Caltrain Station
 - ##### Railroad

Figure 1
Mathilda Carriage Road
Study Intersections

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Date: March, 2013



Jack Witthaus
July 26, 2013
Page 5 of 49



During field observations, the fourth northbound lane on Mathilda Avenue, which is used as a parking lane south of Olive Avenue, was largely unused, including during the AM peak hour when northbound traffic is heaviest. All three southbound travel lanes were heavily used during the PM peak hour.

Vehicles entering driveways on the west side of Mathilda Avenue were observed to cause some delay for southbound through vehicles. Depending on the density of southbound traffic, queues of up to four vehicles were observed to form behind vehicles entering driveways on the west side of Mathilda. Vehicles exiting driveways were not observed to cause delays, as drivers typically waited until platoons of southbound vehicles had cleared the driveway exit. No substantial queuing was observed at the intersections of Charles Avenue/Iowa Avenue and Charles Avenue/Olive Avenue.

During field observations in December, construction activity was observed east of Mathilda Avenue along McKinley Avenue. As a result, the second southbound left turn lane at Mathilda Avenue and Washington Avenue and the second eastbound left turn lane at Mathilda Avenue and McKinley Avenue were temporarily closed pending alterations to the median on Mathilda Avenue. These lanes were removed from the model to analyze Existing Conditions, but they were included for the Year 2035 analysis scenarios.

Street Geometry and Land Use

Mathilda Avenue runs for approximately half a mile through downtown Sunnyvale, from El Camino Real to the Caltrain tracks overcrossing north of Washington Avenue. Sunnyvale's Civic Center complex lies to the west of Mathilda Avenue, between Olive Avenue and El Camino Real; north of Olive Avenue, Mathilda Avenue's west side is bordered by single-family homes and small commercial developments. The east side of Mathilda Avenue contains a mixture of low-density residential development and small commercial enterprises south of Olive Avenue. North of Olive Avenue, Mathilda Avenue's east side is generally bordered by office buildings. East of Mathilda Avenue and north of Iowa Avenue, commercial developments include Macy's and Target department stores and the small businesses of the Murphy Avenue Historic District. The Sunnyvale Caltrain Station is located on Evelyn Avenue less than a quarter-mile east of Mathilda Avenue.

In the downtown area, Mathilda Avenue has three southbound lanes, a landscaped center median that narrows to accommodate left turn pockets, and four northbound lanes. Travel lanes vary in width between ten and fourteen feet, averaging a width of eleven feet. South of Olive Avenue, the fourth northbound lane is used as a parking lane. **Table 1** provides a schematic cross-section of Mathilda Avenue in the study area.

Sidewalks are continuous within the study area and are generally about five and a half feet wide, although they widen to ten feet north of Booker Avenue, adjacent to new development on Mathilda Avenue's east side. There are five bus stops on Mathilda Avenue within the downtown area; bus service is infrequent, with Valley Transportation Authority (VTA) buses arriving approximately twice per hour during the AM and PM peaks. **Figure 2** shows existing transit routes within the study area.

Within the study area, Mathilda Avenue does not currently have bicycle facilities. **Figure 3** shows existing bicycle facilities near the study area.

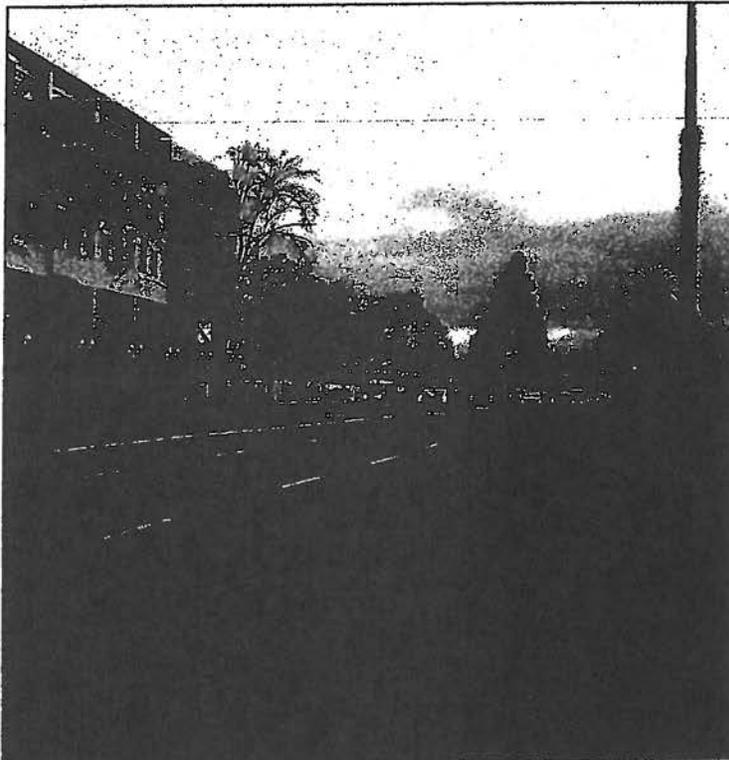
Jack Witthaus
July 26, 2013
Page 6 of 49



TABLE 1
MATHILDA AVENUE EXISTING STREET CONFIGURATION (SCHEMATIC)
(Dimensions in feet)

Sidewalk (feet)	Southbound lane	Northbound lane	Landscaped median (feet)	Shoulder (feet)	Shoulder (feet)	Shoulder (feet)	Shoulder (feet)	Shoulder (feet)	Sidewalk (feet)
5.5	11.0	11.0	11.0	32.0	11.0	11.0	11.0	11.0	5.5
Total Right of Way (ROW) = 111.5' Note: Roadway and lane widths vary along the Mathilda Avenue corridor.									

Source: Fehr & Peers, 2013.



Sidewalks on west side of Mathilda Avenue, south of Washington Avenue.

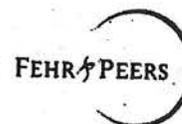
Traffic, Bicycle and Pedestrian Volumes

AM and PM peak hour turning movement volumes for the five study intersections were collected in November 2012. Automobile turning volumes at study intersections are shown in **Figure 4**; bicycle and pedestrian volumes are shown in **Figure 5**. A schematic illustration of driveway turning movements is shown in **Figure 6**.



Figure 2
Mathilda Carriage Road
Existing Transit Routes

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Date: March, 2013



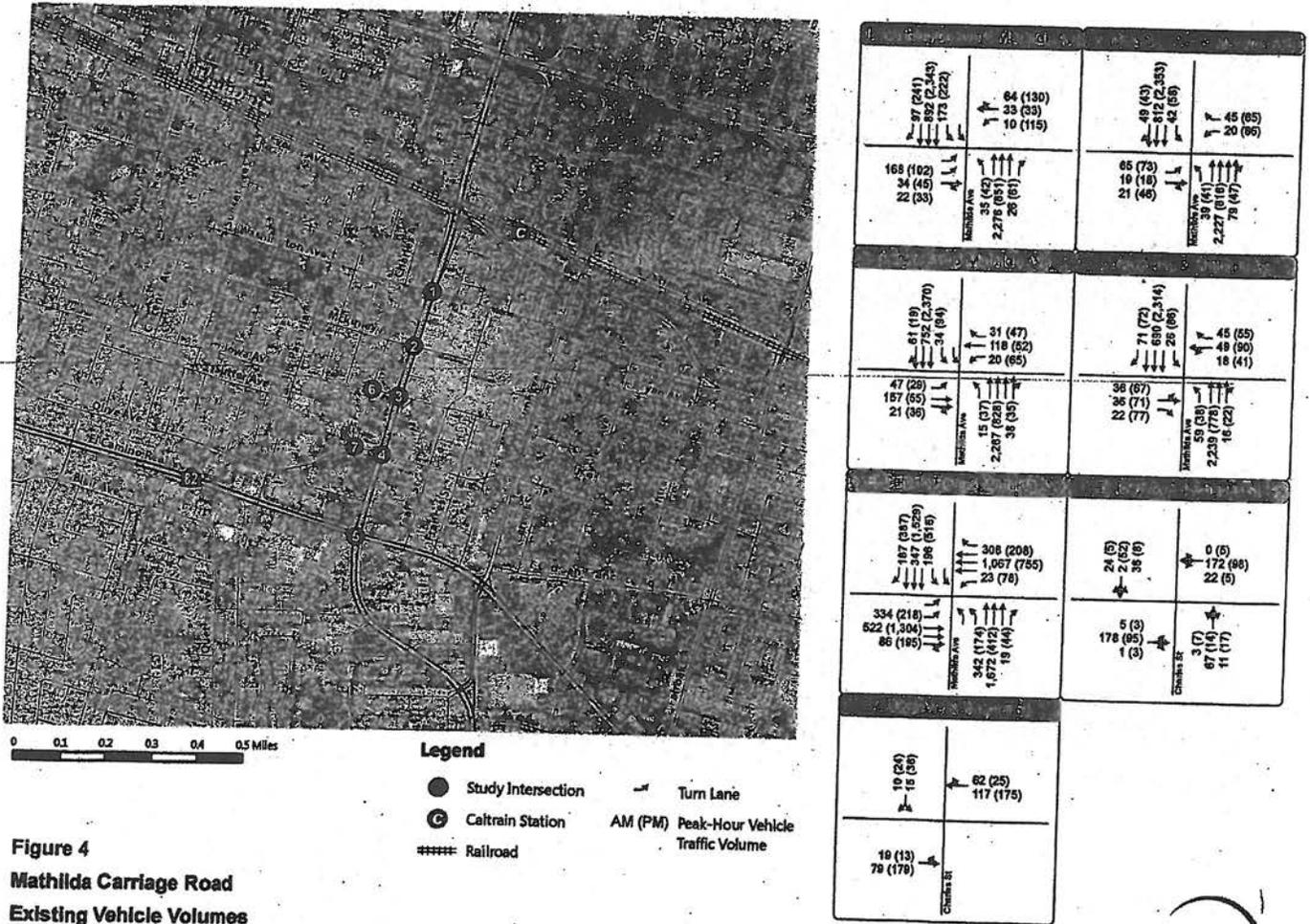


- Legend**
- Study Intersection
 - ⊙ Caltrain Station
 - ==== Railroad
 - Existing Bicycle Facilities**
 - Class II Bicycle Lane
 - Class III Bicycle Route
 - Proposed Bicycle Facilities**
 - - Class II Bicycle Lane
 - - Class III Bicycle Route

Figure 3
Mathilda Carriage Road
Existing & Proposed Bicycle Facilities

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Date: March, 2013







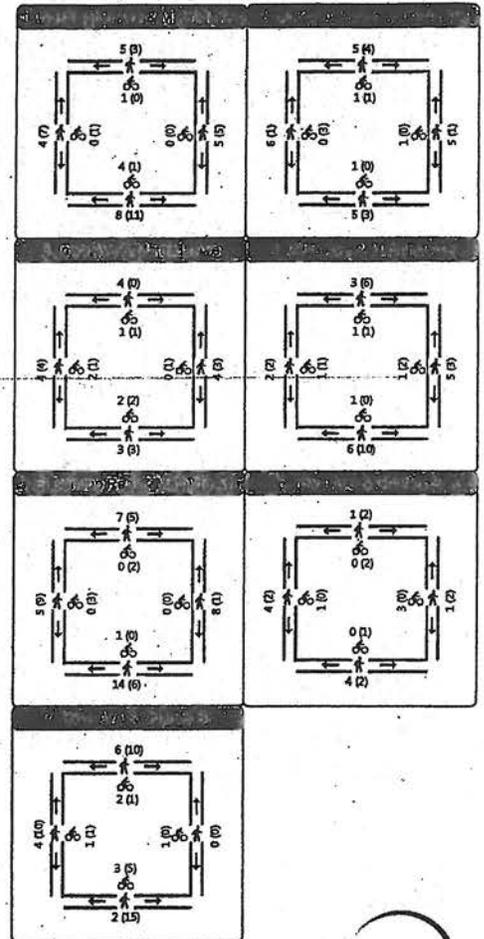
0 0.1 0.2 0.3 0.4 0.5 Miles

Legend

-  Study Intersection
-  Caltrain Station
-  Railroad
- AM (PM)  Peak-Hour Pedestrian Crossing Volume
- AM (PM)  Peak-Hour Bicycle Approach Volume

Figure 5
Mathilda Carriage Road
Existing Bicycle and Pedestrian Volumes

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 Date: March, 2013



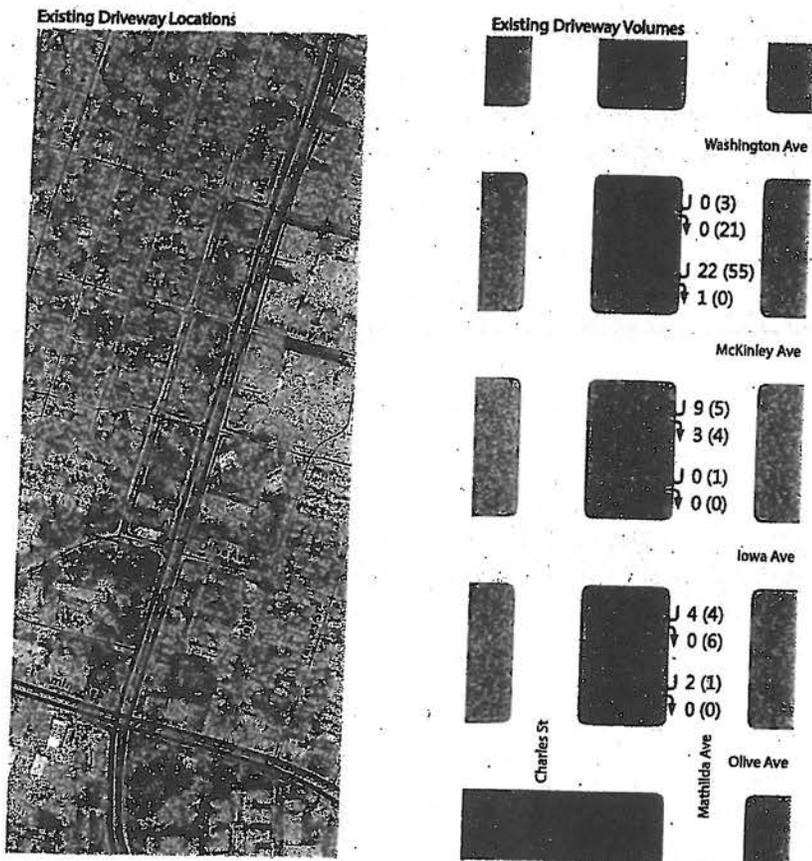


Figure 6
Mathilda Carriage Road
Existing PM Peak Period Driveway Volumes (Schematic)

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Date: March, 2013



Jack Witthaus
July 26, 2013
Page 12 of 49

Vehicle Collision History

Based on data taken from the City of Sunnyvale's Crossroads collision database, 180 vehicular collisions were recorded for the five year period between 2007 through 2011 along the Mathilda Avenue corridor. Almost 30 percent of these collisions were categorized as rear-end collisions. There were three documented collisions with bicyclists and none with pedestrians.

The corridor area nearest Mathilda Avenue and El Camino Real had the highest number of collisions, with ninety-nine total collisions, fifteen of which were rear-end collisions. The Washington, McKinley, Iowa, and Olive intersections follow with forty-six, fourteen, twelve, and nine collisions, respectively; about half of these were rear-end collisions. Although mid-block and rear-end collisions may occur as a result of conflicts between vehicles entering and exiting driveways and vehicles traveling along a street, there is not enough evidence to draw conclusions about whether the collisions observed along the Mathilda Avenue corridor were related to driveway access or the result of other factors.

The five-year vehicular collision history on the study corridor is summarized in **Table 2**.

**TABLE 2
MATHILDA AVENUE VEHICULAR COLLISIONS, 2007-2011**

Nearest Intersection	Total Collisions	Rear-end Collisions	Collisions with Bicyclists/Pedestrians
Mathilda/ Washington	46	18	0
Mathilda/ McKinley	14	10	0
Mathilda/ Iowa	12	5	1
Mathilda/ Olive	9	5	0
Mathilda/ El Camino Real	99	15	2
TOTAL	180	53	3

Source: City of Sunnyvale Crossroads Collision Database, 2013.

Jack Witthaus
July 26, 2013
Page 13 of 49



YEAR 2035 CONDITIONS

Trip Generation

Three blocks on the west side of Mathilda Avenue within the study area were evaluated under Year 2035 conditions. As defined in the City of Sunnyvale's *Downtown Specific Plan* (2003), the three blocks are as follows:

- **Block 14**, bounded by Mathilda Avenue, Olive Avenue, Charles Street and Iowa Avenue;
- **Block 15**, bounded by Mathilda Avenue, Iowa Avenue, Charles Street and McKinley Avenue;
- **Block 16**, bounded by Mathilda Avenue, McKinley Avenue, Charles Street and Washington Avenue.

The *Downtown Specific Plan* calls for high-density residential development on these blocks, with up to 173 units planned for Blocks 14 and 16 and 152 units for Block 15. Additionally, up to 10,000 square feet of ground-floor retail space is allowed, located on corners facing Mathilda (*Downtown Specific Plan*, page 84). The *Downtown Specific Plan* encourages below-grade or podium parking structures on these blocks, with entrances on the side streets (i.e. north and south-facing block faces) and limited access via Charles Street (page 85). Land use assumptions for Year 2035 conditions are summarized in **Table 3**.

Automobile trip generation estimates for Year 2035 conditions were developed using land use intensities described in the *Downtown Specific Plan* and vehicle trip rates from the 9th Edition of *Trip Generation* (2012), published by the Institute of Transportation Engineers (ITE). Trip rates for apartments (ITE Rate #220) were used to estimate trip generation from the residential development; trip rates for shopping centers (ITE Rate #820) were used to estimate trip generation from corner retail. In total, new land uses on Blocks 14, 15 and 16 are expected to generate 370 new AM peak hour vehicle trips and 711 PM peak hour vehicle trips. Trip generation for Year 2035 conditions is summarized in **Table 4**.

Jack Witthaus
July 26, 2013
Page 14 of 49



**TABLE 3
LAND USE ASSUMPTIONS FOR YEAR 2035 SCENARIOS**

Block	Driveway/Access	Block Face	Scenario		
			Midblock Road	Charles Avenue	Side Street Road
General Assumptions			Midblock parcels will be aggregated and redeveloped as high density residential possibly with ground-level retail. Corner retail may develop separately from midblock uses. Retail uses at corners will have driveways on side street (Iowa, Olive, Washington, McKinley). Cabbage road permits more access via Mathilda (reduces conflicts with arterial traffic).		
12	Mathilda Ave.	East	Primary residential access	No access	- Primary residential access - Some retail access
	Charles Ave.	West	Secondary residential access	Sole residential access	Secondary residential access
	Iowa Ave.	North	Driveway for north corner retail	Driveway for north corner retail	Primary driveway for north corner retail
	Olive Ave.	South	Driveway for south corner retail	Driveway for south corner retail	Primary driveway for south corner retail
13	Mathilda Ave.	East	Primary residential access	Primary residential access	- Primary residential access - Some retail access
	Charles Ave.	West	Secondary residential access	Secondary residential access	Secondary residential access
	McKinley Ave.	North	Driveway for north corner retail	Driveway for north corner retail	Primary driveway for north corner retail
	Iowa Ave.	South	Driveway for south corner retail	Driveway for south corner retail	Primary driveway for south corner retail
14	Mathilda Ave.	East	Primary residential access	Primary residential access	- Primary residential access - Some retail access
	Charles Ave.	West	Secondary residential access	Secondary residential access	Secondary residential access
	Washington Ave.	North	Driveway for north corner retail	Driveway for north corner retail	Primary driveway for north corner retail
	McKinley Ave.	South	Driveway for south corner retail	Driveway for south corner retail	Primary driveway for south corner retail

Sources: City of Sunnyvale Downtown Specific Plan, 2003; Fehr & Peers, July 2013.

Jack Witthaus
July 26, 2013
Page 15 of 49



**TABLE 4
EXPECTED YEAR 2035 TRIP GENERATION BY BLOCK**

Land Use	Street Type	AM		PM	
		In	Out	In	Out
Block 14					
Residential	173 apartments	8	71		40
Retail	10,000 s.f.	19	19	64	64
Total Vehicle Trips		37	90	137	104
Block 15					
Residential	152 apartments	16	62	66	35
Retail	10,000 s.f.	19	19	64	64
Total Vehicle Trips		35	81	130	99
Block 16					
Residential	173 apartments	8	71	73	40
Retail	10,000 s.f.	19	19	64	64
Total Vehicle Trips		37	90	137	104

Sources: City of Sunnyvale 2020 Downtown Specific Plan; Institute of Transportation Engineers, *Trip Generation*, 2012; Fehr & Peers, 2013.

Jack Witthaus
July 26, 2013
Page 16 of 49



The City of Sunnyvale's travel demand model was used to develop baseline volumes for the five study intersections for the Year 2035, based on land uses assumed in the City's current General Plan. Corridor volumes on Mathilda and intersection volumes for Mathilda and El Camino Real were based directly on model results, and side street volumes for the six remaining study intersections were forecasted using the "difference method" to account for traffic growth at these intersections.

Vehicle turning movements were also adjusted based on the expected locations of new land use developments on the Mathilda Avenue corridor. Trips from Blocks 14, 15 and 16 were added to these background volumes according to the trip distributions developed for each scenario.

Trip Distribution

Trip distribution for Year 2035 scenarios were developed from an analysis of peak hour turning movements at existing driveways and of likely parcels for redevelopment.

Peak hour turning movement counts at the twelve driveways that access Blocks 14, 15 and 16 are reported in **Table 5** below.

**TABLE 5
EXISTING DRIVEWAY TURNING MOVEMENTS ON MATHILDA AVENUE**

Block	Total Driveways	AM			PM		
		In	Out	Total	In	Out	Total
14	3	6	0	6	5	6	11
15	2	3	3	12	6	4	10
16	5	22	1	23	58	21	79
Total	12	31	4	41	69	31	100

Source: Fehr & Peers, 2013.

Turning movement counts for driveways on Mathilda Avenue are lower than estimated ITE trip generation for existing land uses on these blocks. Peak-hour entrances and exits at driveways on Mathilda Avenue account for approximately 10 percent of the total trip generation for the three blocks that would be expected from rates published in ITE's *Trip Generation* (9th edition), although the rate varies by driveway, in/out movement and AM or PM peak hour.

Jack Witthaus
July 26, 2013
Page 17 of 49



The discrepancy between expected and observed driveway turning movements indicates that driveway counts on Mathilda Avenue do not represent the total trip generation from existing land uses. This suggests other driveway entrances not on Mathilda account for most of the trips to and from these parcels. Since most parcels on these three blocks have frontages on at least one street in addition to Mathilda Avenue, and because the *Downtown Specific Plan* discourages access on Mathilda Avenue, it is likely that only a fraction of trips generated by future development will be distributed onto Mathilda Avenue.

We assume that more trips would be routed onto Mathilda Avenue under the Carriage Road scenario than under the No Carriage Road scenario, because a carriage road would provide a buffer between faster moving traffic in the through travel lanes and slower traffic entering and exiting driveways. We also estimate that trip distribution percentages would be the same during AM and PM peak hours.

We assume that the majority of trips in all scenarios would enter and exit the study area via Mathilda Avenue rather than accessing the area via local streets to the west. However, it is likely that some trips traveling to and from areas west of Mathilda or via the Central Expressway would travel via Mary Avenue or Pastoria Avenue, which are parallel to Mathilda Avenue. Therefore, twenty-five percent of all trips were assumed to enter and exit the network via side streets and Charles Street without traveling on Mathilda. This is consistent with observed driveway counts on Mathilda Avenue, which are considerably lower than projected trip generation for these blocks.

Subject to the above constraints, up to half of the vehicles using side-street driveways were assumed to enter and exit the study area without traveling on Mathilda Avenue. Of trips not using Mathilda Avenue, the remainder was assumed to have origins and destinations on Charles Street driveways.

Year 2035 No Carriage Road (Mathilda Access)

The Year 2035 No Carriage Road (Mathilda Access) scenario assumes that the proposed carriage road will not be constructed. Primary access to the two blocks on the west side of Mathilda Avenue between Iowa Avenue and Washington Avenue would be via driveways on Mathilda Avenue; however, driveways would be provided on Olive Avenue, Iowa Avenue, McKinley Avenue and Washington Avenue to provide access to land uses adjacent to these streets. Some access would also be provided on Charles Street.

On the block between Olive Avenue and Iowa Avenue (Block 14 in the *Downtown Specific Plan*), where current development plans call for mid-block driveways on Charles Street only, primary access would be via Charles Street. Some access would also be provided on Mathilda Avenue, Iowa Avenue and Olive Avenue.

Vehicle access to retail uses would likely be via side-street driveways on Olive Avenue, Iowa Avenue, McKinley Avenue and Washington Avenue; access to residential uses would be via mid-block driveways on Mathilda Avenue or Charles Street. As described in the *Downtown Specific Plan*, future development within the study area will require consolidation of driveways on each block.

Under this scenario, the majority of trips would enter and exit via Mathilda Avenue or one of the side streets. This is consistent with the *Downtown Specific Plan*, which calls for limited access on Charles Street. Compared

Jack Witthaus
July 26, 2013
Page 18 of 49



to the No Carriage Road (Charles Access) scenario, this scenario would have slightly lower vehicle traffic on the primarily residential side streets.

Year 2035 No Carriage Road (Charles Access)

The Year 2035 No Carriage Road (Charles Access) scenario assumes that the carriage road proposed in the *Downtown Specific Plan* will not be developed, and that vehicle access to land uses within the study area will be primarily via driveways on Mathilda Avenue and side streets, with the exception of Block 14. On Block 14, there would be no vehicle access via Mathilda Avenue, and the majority of vehicle trips will enter and exit through driveways on Charles Avenue. This is consistent with current development proposals, which call for mid-block driveways on Charles Street only. This scenario differs from *Downtown Specific Plan* guidelines by providing greater levels of vehicle access via Charles Street than via Mathilda Avenue.

Compared to the No Carriage Road (Mathilda Access) scenario, this scenario would provide more access to Block 14 via Charles Street, less via Iowa Avenue and Olive Avenue, and none via Mathilda Avenue. For the blocks between Washington Avenue and Iowa Avenue (Blocks 15 and 16 in the *Downtown Specific Plan*), access is the same for both No Carriage Road scenarios.

Year 2035 Carriage Road

The Year 2035 Carriage Road (Charles Access) scenario assumes that the carriage road proposed in the *Downtown Specific Plan* will be developed. Vehicle access to land uses within the study area would be primarily via driveways on Mathilda Avenue, with some access via side streets and Charles Street. Vehicle access to retail uses would be via driveways on Mathilda Avenue and on side streets (Olive Avenue, Iowa Avenue, McKinley Avenue and Washington Avenue). Most residential trips would enter and exit via Mathilda Avenue.

Compared to the other scenarios, this option would reduce vehicle traffic on side streets by facilitating additional driveway access via the Mathilda Avenue frontage road.

To calculate intersection Level of Service (LOS) and travel times along the Mathilda Avenue corridor, trips to and from each block face were assigned to the street network. Trip distribution results for the three future year scenarios are summarized in **Table 6** and shown in **Figure 7**.

Jack Witthaus
July 26, 2013
Page 19 of 49



**TABLE 6
YEAR 2035 TRIP DISTRIBUTION**

Block	Driveways	Block Faces	Scenario		
			No Change Road (Vehicle Access)	No Change Road (Garage Access)	Percentage Road
14	Mathilda Ave.	East	45%	45%	60%
	Charles Ave.	West	15%	15%	10%
	Iowa Ave.	North	20%	20%	15%
	Olive Ave.	South	20%	20%	15%
15	Mathilda Ave.	East	45%	45%	60%
	Charles Ave.	West	15%	15%	10%
	McKinley Ave.	North	20%	20%	15%
	Iowa Ave.	South	20%	20%	15%
16	Mathilda Ave.	East	45%	45%	60%
	Charles Ave.	West	15%	15%	10%
	Washington Ave.	North	20%	20%	15%
	McKinley Ave.	South	20%	20%	15%

Source: Fehr & Peers, 2013.