



HEXAGON TRANSPORTATION CONSULTANTS, INC.

Memorandum

Date: December 6, 2023

To: Mr. Chris Ghione, City of Morgan Hill

From: Ollie Zhou, Shikha Jain
Robert Del Rio

Subject: Morgan Hill Roadway Regional Cut-Through Analysis

Hexagon Transportation Consultants, Inc. has completed a regional cut-through analysis of major roadway segments within the City of Morgan Hill. The purpose of this study is to 1) estimate the amount of regional cut-through traffic on major roadways within the City, and 2) identify the major cut-through routes.

Regional cut-through traffic, for the purpose of this study, is defined as traffic travelling on City of Morgan Hill roadways that does not have an origin or destination within the City. US 101 has been identified as congested in the peak directions during the peak commute periods. It is our understanding that Morgan Hill city staff and residents believe that vehicles are cutting through city roadways to bypass freeway congestion. The City of Morgan Hill has some north-south roadways that are parallel to US 101 and could be used by cut-through traffic. Hexagon conducted a similar study for the City in 2019. This study is an update to the 2019 study and presents post-Covid traffic conditions.

The term “cut-through” traffic is sometimes used to describe local traffic cutting through residential streets to avoid congestion on arterials/collectors. It should be noted that this analysis is limited to analyzing *regional* cut-through traffic on arterials and collectors with no origin or destination within the City of Morgan Hill.

Scope of Analysis

Hexagon analyzed percentages of regional cut-through traffic on 47 segments of City roadways (see Figure 1 and Table 1). These segments were selected to capture the likely routes of potential regional cut-through traffic.

Table 1
List of Study Roadway Segments

Segment #	Roadway Segment
1	Hale Ave. north of Llagas Rd.
2	Hale Ave. between Main Ave. and Llagas Rd.
3	Monterey Rd. north of Cochrane Rd.
4	Monterey Rd. between Main Ave. and Cochrane Rd.
5	Monterey Rd. between Dunne Ave. and Main Ave.
6	Monterey Rd. between Tennant Ave. and Dunne Ave.
7	Monterey Rd. between Watsonville Rd. and Tennant Ave.
8	Butterfield Blvd. between Main Ave. and Cochrane Rd.
9	Butterfield Blvd. between Dunne Ave. and Main Ave.
10	Butterfield Blvd. between Tennant Ave. and Dunne Ave.
11	Butterfield Blvd. between Monterey Rd. and Tennant Ave.
12	Watsonville Rd. between Sunnyside Ave. and Monterey Rd.
13	Dewitt Ave. between Edmundson Ave. and Dunne Ave.
14	Sunnyside Ave. between Watsonville Rd. and Tennant Ave.
15	Condit Rd. between Dunne Ave. and Main Ave.
16	Condit Rd. between Tennant Ave. and Dunne Ave.
17	Murphy Ave. north of Dunne Ave.
18	Murphy Ave. between Tennant Ave. and Dunne Ave.
19	Hill Rd. north of Dunne Ave.
20	Hill Rd. between Tennant Ave. and Dunne Ave.
21	Cochrane Rd. between Monterey Rd. and Butterfield Rd.
22	Cochrane Rd. between Butterfield Blvd. and US 101
23	Cochrane Rd. between US 101 and Mission View Dr.
24	Main Ave. between Monterey Rd. and Butterfield Blvd.
25	Main Ave. between Butterfield Blvd. and Condit Rd.
26	Main Ave. between Condit Rd. and Hill Rd.
27	Dunne Ave. between Dewitt Ave. and Monterey Rd.
28	Dunne Ave. between Monterey Rd. and Butterfield Blvd.
29	Dunne Ave. between Butterfield Blvd. and US 101
30	Dunne Ave. between US 101 and Murphy Ave.
31	Dunne Ave. between Murphy Ave. and Hill Rd.
32	Edmundson Ave. between Sunnyside Ave. and Monterey Rd.
33	Tennant Ave. between Monterey Rd. and Butterfield Rd.
34	Tennant Ave. between Butterfield Rd. and US 101
35	Santa Teresa Blvd. south of Watsonville Rd
36	Tilton Ave.
37	Madrone Pkwy.
38	Sutter Blvd. east of Butterfield Blvd.
39	Mission View Dr. south of Cochrane Rd
40	Half Rd. west of Mission View Dr.
41	Wright Ave. east of Hale Ave.
42	Wright Ave. west of Hale Ave.
43	Peak Ave. north of Main Ave.
44	Peak Ave. south of Main Ave.
45	Main Ave. west of Hale Ave.
46	Main Ave. east of Hale Ave.
47	Depot St.

Notes:
Ave. = Avenue; Rd. = Road; Blvd. = Boulevard

Morgan Hill Transportation Plan

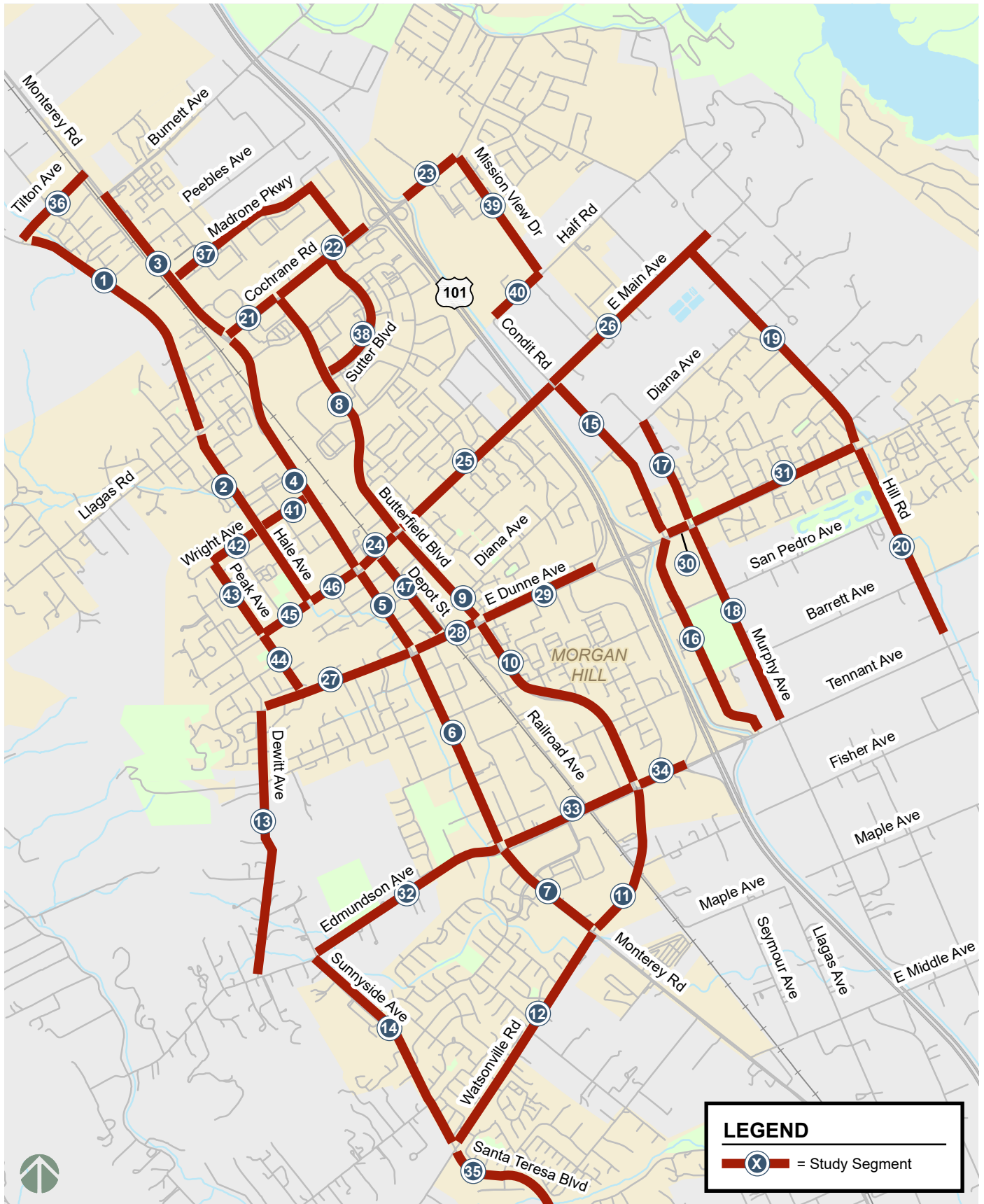


Figure 1: Study Segments

Data Source and Methodology

Hexagon utilized data provided by StreetLight Data, Inc. (“StreetLight”) to determine the percentages of regional cut-through traffic on City roadways. StreetLight metrics like volume estimates and trip patterns for different travel modes are derived and validated by Streetlight using a variety of data sources including connected vehicle data, GPS data, anonymized location data from mobile applications for personal cellular phones, vehicle, pedestrian, and bicycle sensors, land use and parcel data, census characteristics, and roadway network and characteristics from OpenStreetMap.

Hexagon queried StreetLight for trips that travel through Morgan Hill but do not have an origin or destination in Morgan Hill. These trips are defined as regional cut-through traffic. Hexagon analyzed regional cut-through traffic percentages from February 2022 to April 2022 (this is the most recent data provided by StreetLight at the time of this analysis) to determine post-Covid percentages of regional cut-through traffic on City roadways. The analysis included hourly data on only regular weekdays (Monday through Thursday). Peak levels of congestion typically occur during commute peak periods on these weekdays. By averaging the combined data obtained on a daily basis over the span of multiple months/years, it is assumed that the data presents a representative account of vehicle travel patterns. Furthermore, by estimating *percentages* rather than *number* of vehicles, it is assumed that potential data bias and inaccuracy in the data is minimized.

It should be noted that January 2022 and December 2021 data was not included in the analysis as traffic patterns during those months may be more irregular (due to holidays) than the other months. Furthermore, based on field observations conducted in the City, southbound PM peak hour congestion on Fridays is significantly worse than other days of the week. However, it is somewhat seasonal, therefore Fridays were not included in the analysis.

Peak Hour Roadway Regional Cut-Through Percentages

It is our understanding that Morgan Hill city staff and residents believe that vehicles are cutting through city roadways to bypass freeway congestion. To verify this, Hexagon compared the average hourly northbound regional cut-through percentage (cut-through as a percentage of all traffic on city roadways) against the average hourly northbound US 101 traffic volume near Morgan Hill during the same period (February 2022 to April 2022). A similar comparison was conducted for the southbound traffic. The average hourly northbound and southbound US 101 traffic volumes near Morgan Hill were obtained from Caltrans Performance Measuring System (PeMS) data.

As shown in Figures 2 and 3, regional cut-through traffic on city roadways peaks when US 101 is the most congested, which happens during the peak commute periods. Northbound regional cut-through traffic percentage peaked during the AM peak commute period between 6 AM and 8 AM, and southbound regional cut-through traffic percentage peaked during the PM peak commute period between 3 PM and 5 PM, when US 101 southbound serves the most traffic.

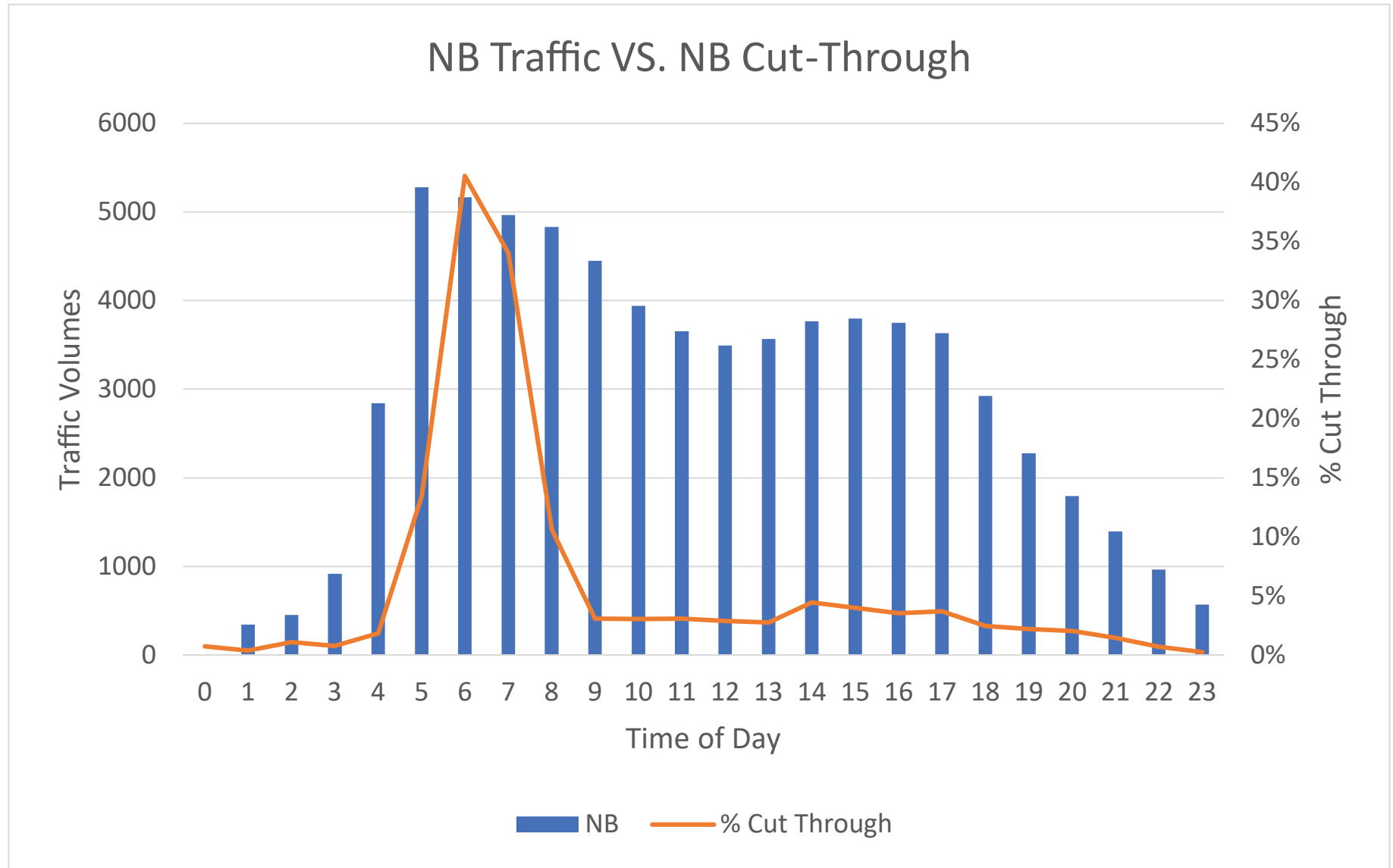


Figure 2: Northbound Traffic versus Northbound Cut-Thru

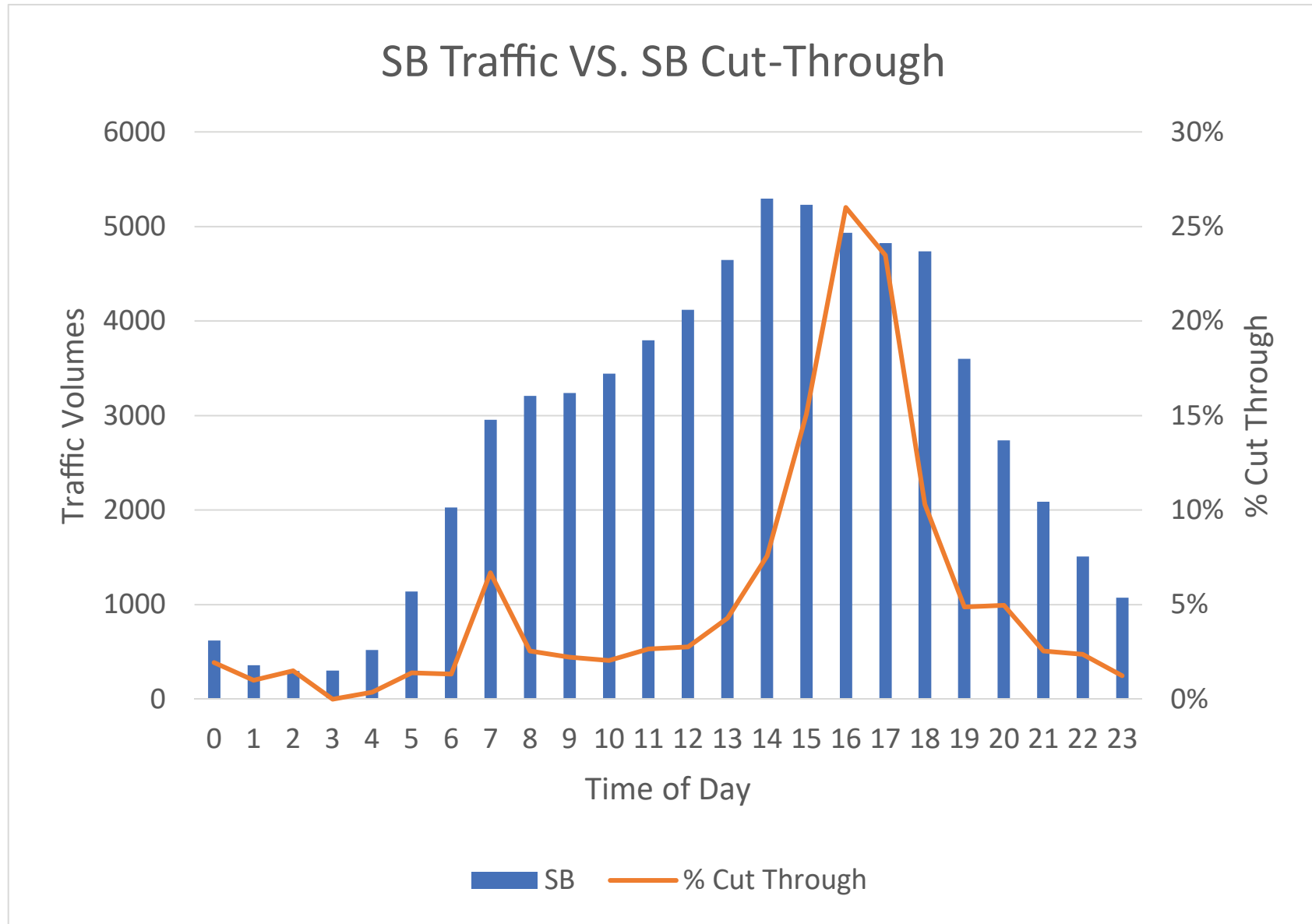


Figure 3: Southbound Traffic versus Southbound Cut-Thru

Tables 2 and 3 show regional cut-through traffic as a percentage of all roadway traffic on each of the study roadway segments for AM and PM peak hours, respectively. The tables provide the following characteristics for each study segment:

- **Peak Hour Volumes:** Counts collected in October 2023 are provided for each study segment as a range, i.e. less than 500 vehicles, between 500 and 1,000 vehicles (<1,000), between 1,000 and 1,500 vehicles (<1,500), between 1,500 and 2,000 vehicles (<2,000), and between 2,000 and 2,500 vehicles (<2,500). This information is provided to distinguish low volume segments from high volume segments and better represent cut-through traffic percentages, i.e. a low volume segment may indicate a high percentage of cut-through traffic but the cut-through traffic volumes on this segment maybe lower compared to other higher volume streets within the City.
- **Border segments:** Some study segments are wholly within Morgan Hill while some share a border with the County. The regional cut-through analysis methodology assumes that any traffic that has an origin and destination outside of Morgan Hill is regional cut-through traffic. Therefore, segments that share a border with the County are expected to have higher trips that do not have an origin and destination within Morgan Hill.

As shown in Table 2 and illustrated in Figure 4, the highest percentage of regional cut-through traffic during the AM peak hour on a study roadway segment that is wholly within Morgan Hill is along Dunne Avenue between US 101 and Murphy Avenue. Other segments that have a high percentage of regional cut-through traffic are along Dunne Avenue, Butterfield Boulevard, Wright Avenue, Hale Avenue, Tennant Avenue, and Monterey Road. Butterfield Boulevard, between Dunne Avenue and Main Avenue has a high volume of vehicles (between 1,500 and 2,000) of which 30 percent to 35 percent is regional cut-through traffic during the AM peak hour. Furthermore, Table 2 and Figure 4 show that border segments along Hill Road, Santa Teresa Boulevard, Condit Road, Butterfield Boulevard, Watsonville Road, Main Avenue, Mission View Drive, and Murphy Avenue have a high percentage (over 50 percent) of regional cut-through traffic volumes during the AM peak hour.

As shown in Table 3 and illustrated in Figure 5, the highest percentage of regional cut-through traffic during the PM peak hour on a study roadway segment that is wholly within Morgan Hill is along Wright Avenue, west of Hale Avenue. Other segments that have a high percentage of regional cut-through traffic are along Peak Avenue, Hale Avenue, Monterey Road, Main Avenue, and Cochrane Road. Monterey Road, north of Cochrane Road has a high volume of vehicles (between 2,000 and 2,500) of which 20 percent to 25 percent is regional cut-through traffic during the PM peak hour. Furthermore, Table 3 and Figure 5 show that border segments along Santa Teresa Boulevard, Dewitt Avenue, and Hale Avenue have a high percentage (between 30 percent to 35 percent) of regional cut-through traffic volumes during the PM peak hour.

Table 2
AM Peak Hour Regional Cut-through Traffic for Study Segments

Segment #	Roadway Segment	AM Peak Hour Trips ¹	AM Peak Cut-Through Traffic Percentages ²
Internal Segments			
30	Dunne Ave. between US 101 and Murphy Ave.	<1,000	>50%
31	Dunne Ave. between Murphy Ave. and Hill Rd.	<1,000	<50%
10	Butterfield Blvd. between Tennant Ave. and Dunne Ave.*	<1,500	<45%
42	Wright Ave. west of Hale Ave.	<1,000	<45%
2	Hale Ave. between Main Ave. and Llagas Rd.	<1,000	<45%
45	Main Ave. west of Hale Ave.	<1,000	<45%
34	Tennant Ave. between Butterfield Rd. and US 101	<1,500	<45%
23	Cochrane Rd. between US 101 and Mission View Dr.	<1,500	<40%
7	Monterey Rd. between Watsonville Rd. and Tennant Ave.	<1,500	<40%
6	Monterey Rd. between Tennant Ave. and Dunne Ave.	<1,500	<35%
22	Cochrane Rd. between Butterfield Blvd. and US 101	<1,500	<35%
8	Butterfield Blvd. between Main Ave. and Cochrane Rd.	<1,500	<35%
9	Butterfield Blvd. between Dunne Ave. and Main Ave.	<2,000	<35%
5	Monterey Rd. between Dunne Ave. and Main Ave.	<1,500	<35%
3	Monterey Rd. north of Cochrane Rd.	<2,000	<30%
44	Peak Ave. south of Main Ave.	<1,000	<30%
38	Sutter Blvd. east of Butterfield Blvd.	<1,000	<30%
4	Monterey Rd. between Main Ave. and Cochrane Rd.	<1,500	<30%
29	Dunne Ave. between Butterfield Blvd. and US 101	<2,000	<25%
43	Peak Ave. north of Main Ave.	<500	<25%
21	Cochrane Rd. between Monterey Rd. and Butterfield Rd.	<1,500	<20%
15	Condit Rd. between Dunne Ave. and Main Ave.	<1,000	<20%
33	Tennant Ave. between Monterey Rd. and Butterfield Rd.	<1,000	<15%
47	Depot St.	<500	<10%
28	Dunne Ave. between Monterey Rd. and Butterfield Blvd.	<1,500	<10%
41	Wright Ave. east of Hale Ave.	<1,000	<10%
46	Main Ave. east of Hale Ave.	<1,000	<5%
27	Dunne Ave. between Dewitt Ave. and Monterey Rd.	<1,000	<5%
25	Main Ave. between Butterfield Blvd. and Condit Rd.*	<1,000	<5%
24	Main Ave. between Monterey Rd. and Butterfield Blvd.	<1,500	<5%
Border Segments			
20	Hill Rd. between Tennant Ave. and Dunne Ave.	<1,000	>50%
35	Santa Teresa Blvd. south of Watsonville Rd	<1,500	>50%
16	Condit Rd. between Tennant Ave. and Dunne Ave.	<1,000	>50%
11	Butterfield Blvd. between Monterey Rd. and Tennant Ave.	<2,000	>50%
12	Watsonville Rd. between Sunnyside Ave. and Monterey Rd.	<1,500	>50%
26	Main Ave. between Condit Rd. and Hill Rd.	<500	>50%
19	Hill Rd. north of Dunne Ave.	<1,000	>50%
39	Mission View Dr. south of Cochrane Rd	<1,000	>50%
18	Murphy Ave. between Tennant Ave. and Dunne Ave.	<500	>50%
13	Dewitt Ave. between Edmundson Ave. and Dunne Ave.	<1,000	<50%
14	Sunnyside Ave. between Watsonville Rd. and Tennant Ave.	<1,000	<50%
32	Edmundson Ave. between Sunnyside Ave. and Monterey Rd.	<500	<45%
1	Hale Ave. north of Llagas Rd.	<1,500	<40%
36	Tilton Ave.*	<1,000	<30%
40	Half Rd. west of Mission View Dr.*	<500	<25%
17	Murphy Ave. north of Dunne Ave.	<500	<15%
37	Madrone Pkwy.*	<500	<5%
Notes: Ave. = Avenue; Rd. = Road; Blvd. = Boulevard *Less Than 500 Datapoints During Peak Period 1. Existing AM peak hour trips based on counts collected in October 2023. 2. Percentages were estimated using data provided by StreetLightData for Year 2022 (February to April).			

Table 3
PM Peak Hour Regional Cut-through Traffic for Study Segments

Segment #	Roadway Segment	PM Peak Hour Trips ¹	PM Peak Cut-Through Traffic Percentages ²
Internal Segments			
42	Wright Ave. west of Hale Ave.	<1,000	<40%
43	Peak Ave. north of Main Ave.	<500	<40%
2	Hale Ave. between Main Ave. and Llagas Rd.*	<1,500	<35%
3	Monterey Rd. north of Cochrane Rd.	<2,500	<25%
45	Main Ave. west of Hale Ave.	<1,000	<25%
21	Cochrane Rd. between Monterey Rd. and Butterfield Rd.	<2,000	<20%
7	Monterey Rd. between Watsonville Rd. and Tennant Ave.	<2,000	<20%
22	Cochrane Rd. between Butterfield Blvd. and US 101	<2,000	<20%
44	Peak Ave. south of Main Ave.	<1,000	<20%
6	Monterey Rd. between Tennant Ave. and Dunne Ave.	<2,000	<15%
10	Butterfield Blvd. between Tennant Ave. and Dunne Ave.	<1,500	<15%
5	Monterey Rd. between Dunne Ave. and Main Ave.	<2,000	<15%
4	Monterey Rd. between Main Ave. and Cochrane Rd.	<1,500	<15%
8	Butterfield Blvd. between Main Ave. and Cochrane Rd.	<2,000	<15%
34	Tennant Ave. between Butterfield Rd. and US 101	<1,500	<15%
9	Butterfield Blvd. between Dunne Ave. and Main Ave.	<2,000	<15%
23	Cochrane Rd. between US 101 and Mission View Dr.	<1,500	<15%
46	Main Ave. east of Hale Ave.	<1,000	<10%
33	Tennant Ave. between Monterey Rd. and Butterfield Rd.	<1,500	<10%
41	Wright Ave. east of Hale Ave.	<1,000	<10%
24	Main Ave. between Monterey Rd. and Butterfield Blvd.	<1,500	<5%
28	Dunne Ave. between Monterey Rd. and Butterfield Blvd.	<1,500	<5%
29	Dunne Ave. between Butterfield Blvd. and US 101	<2,000	<5%
38	Sutter Blvd. east of Butterfield Blvd.	<1,000	<5%
31	Dunne Ave. between Murphy Ave. and Hill Rd.	<1,000	<5%
30	Dunne Ave. between US 101 and Murphy Ave.	<1,000	<5%
27	Dunne Ave. between Dewitt Ave. and Monterey Rd.	<1,000	<5%
15	Condit Rd. between Dunne Ave. and Main Ave.	<1,000	<5%
25	Main Ave. between Butterfield Blvd. and Condit Rd.*	<1,000	<5%
47	Depot St.	<500	<5%
Border Segments			
35	Santa Teresa Blvd. south of Watsonville Rd	<1,000	<35%
13	Dewitt Ave. between Edmundson Ave. and Dunne Ave.	<1,000	<35%
1	Hale Ave. north of Llagas Rd.	<1,500	<35%
14	Sunnyside Ave. between Watsonville Rd. and Tennant Ave.	<1,000	<30%
36	Tilton Ave.	<1,000	<25%
11	Butterfield Blvd. between Monterey Rd. and Tennant Ave.	<1,500	<25%
12	Watsonville Rd. between Sunnyside Ave. and Monterey Rd.	<1,500	<25%
37	Madrone Pkwy.	<1,000	<20%
19	Hill Rd. north of Dunne Ave.	<1,000	<20%
20	Hill Rd. between Tennant Ave. and Dunne Ave.	<1,000	<20%
32	Edmundson Ave. between Sunnyside Ave. and Monterey Rd.	<500	<20%
26	Main Ave. between Condit Rd. and Hill Rd.	<500	<15%
39	Mission View Dr. south of Cochrane Rd	<1,000	<15%
18	Murphy Ave. between Tennant Ave. and Dunne Ave.*	<500	<10%
16	Condit Rd. between Tennant Ave. and Dunne Ave.*	<1,000	<5%
17	Murphy Ave. north of Dunne Ave.	<500	<5%
40	Half Rd. west of Mission View Dr.*	<500	<5%
Notes: Ave. = Avenue; Rd. = Road; Blvd. = Boulevard *Less Than 500 Datapoints During Peak Period 1. Existing PM peak hour trips based on counts collected in October 2023. 2. Percentages were estimated using data provided by StreetLightData for Year 2022 (February to April).			

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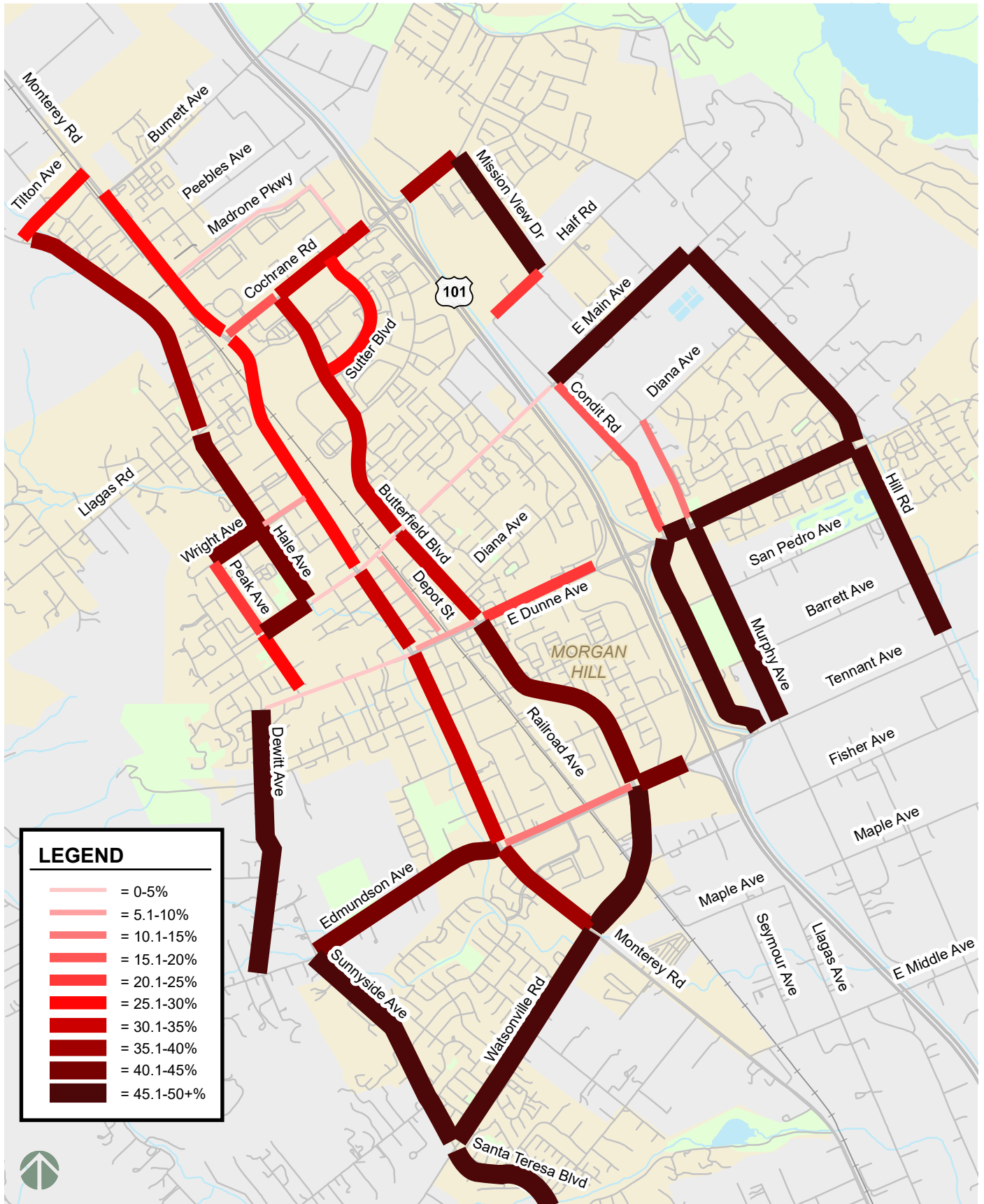


Figure 4: Roadway Regional Cut-through Percentages AM Peak Period

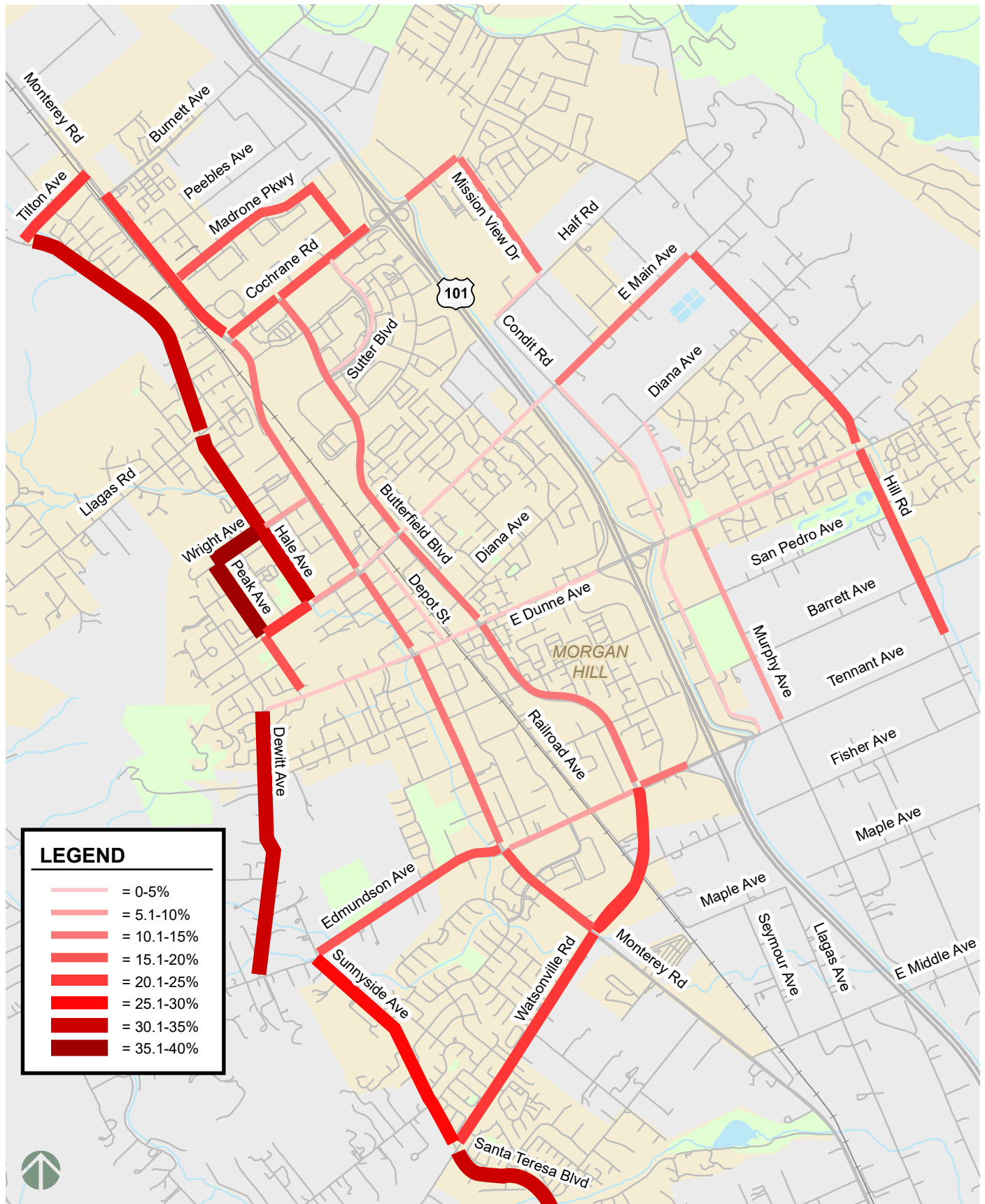


Figure 5: Roadway Regional Cut-through Percentages PM Peak Period

Regional Cut-Through Traffic Due to US 101 Congestion

Using available data, Hexagon quantified the percentages of northbound traffic on representative gateways during the AM peak period that originated south of the City travelling to north of the City that used City roadways as cut-through routes. Similarly, Hexagon quantified the percentages of southbound traffic on representative gateways during the PM peak period that originated north of the City travelling to south of the City that used City roadways as cut-through routes. The northbound direction during the AM peak period and the southbound direction during the PM peak period are analyzed because these are the peak directions of travel.

AM Peak Period

During the AM peak period, northbound traffic on representative gateways originating south of the City travelling to north of the City (henceforth referred to as northbound regional traffic), Hexagon estimated that approximately 41% of the northbound regional traffic cut through city streets, and the remaining 59% stayed on US 101. Below is a breakdown of the representative gateways this cut-through traffic used as they entered City streets from the south:

- Foothill Avenue/Murphy Avenue/Hill Road: 19%
- US 101: 4%
- Railroad Avenue: 1%
- Monterey Road: 46%
- Santa Teresa Boulevard: 30%

Below is a breakdown of the representative gateways that the northbound regional cut-through traffic used after they exited City streets to the north:

- US 101: 72%
- Monterey Road: 20%
- Dougherty Avenue: 1%
- Hale Avenue: 7%

The above breakdowns of the roadways carrying the northbound regional cut-through traffic suggest that most of this traffic entered the City from the south through local roadways west of US 101 (77%) and exited the City onto US 101 (72%). As shown on Figure 6, the most utilized route for the northbound regional traffic was Butterfield Boulevard.

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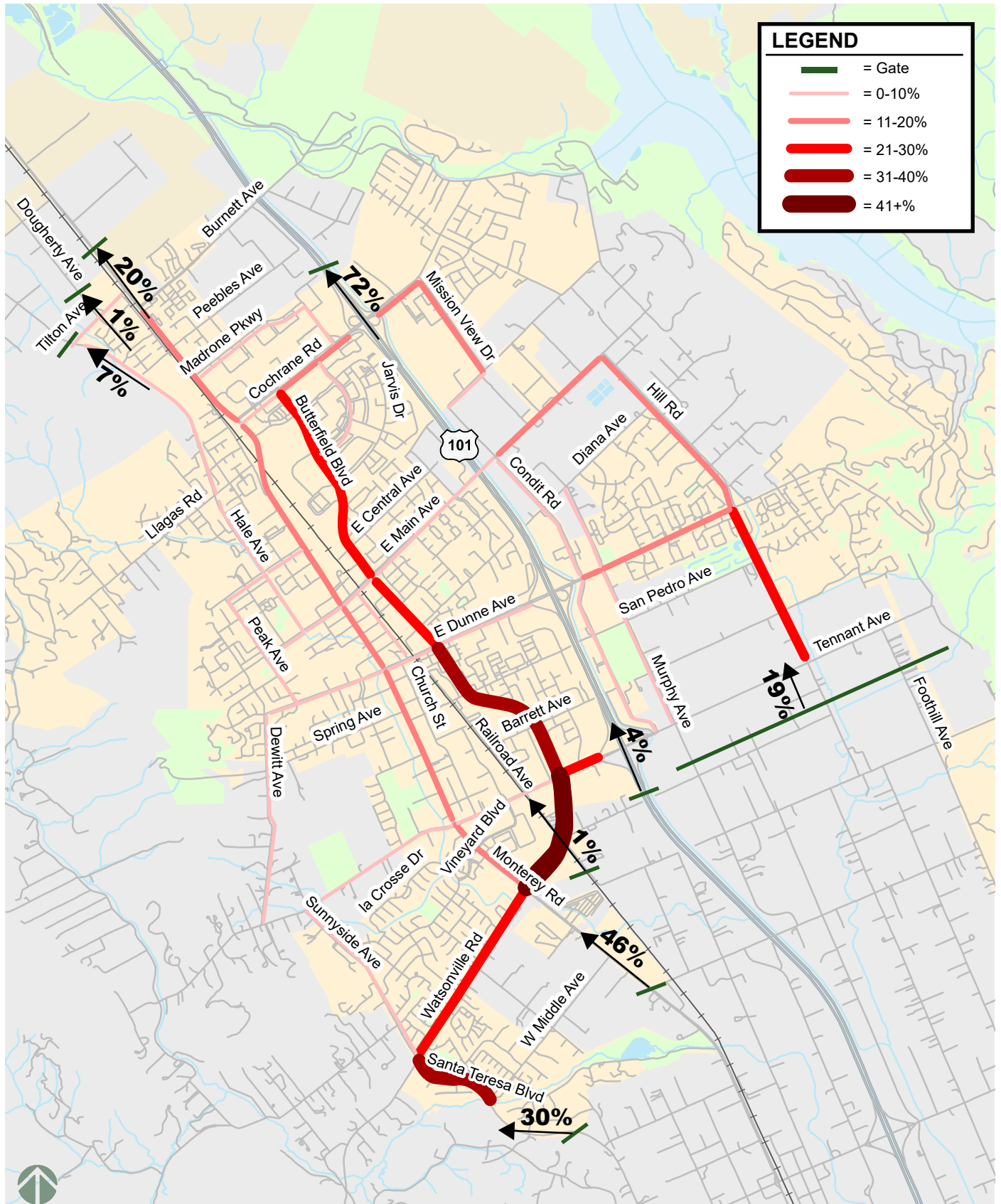


Figure 6: Route Choice for Northbound Regional Cut-Through Traffic – AM Peak Hour

PM Peak Period

During the PM peak period, of all southbound traffic on representative gateways originating north of the City travelling to south of the City (henceforth referred to as southbound regional traffic), Hexagon estimated that approximately 26% of the southbound regional traffic cut through city streets. Below is a breakdown of the roadways this cut-through traffic used as they entered City streets from the north:

- US 101: 12%
- Monterey Road: 60%
- Dougherty Avenue: 11%
- Hale Avenue: 17%

Below is a breakdown of the representative gateways that the southbound regional cut-through traffic used after they exited City streets to the south:

- Foothill Avenue/Murphy Avenue/Hill Road: 6%
- US 101: 44%
- Railroad Avenue: 1%
- Monterey Road: 32%
- Santa Teresa Boulevard: 17%

The above breakdowns of the roadways carrying the southbound regional cut-through traffic suggest that most of this traffic entered the City from the north through local roadways west of US 101 (88%). Approximately 50% of this cut-through traffic exited the City to the south still using local roadways west of US 101, and most of the remaining traffic exited the City onto US 101. Contrary to the AM northbound commute cut-through pattern where the majority of traffic entered the City via local roadways and exited the City onto US 101, the reverse is not observed during the PM peak period. As shown on Figure 7, the most utilized routes for the southbound regional traffic were Monterey Road and Butterfield Boulevard.

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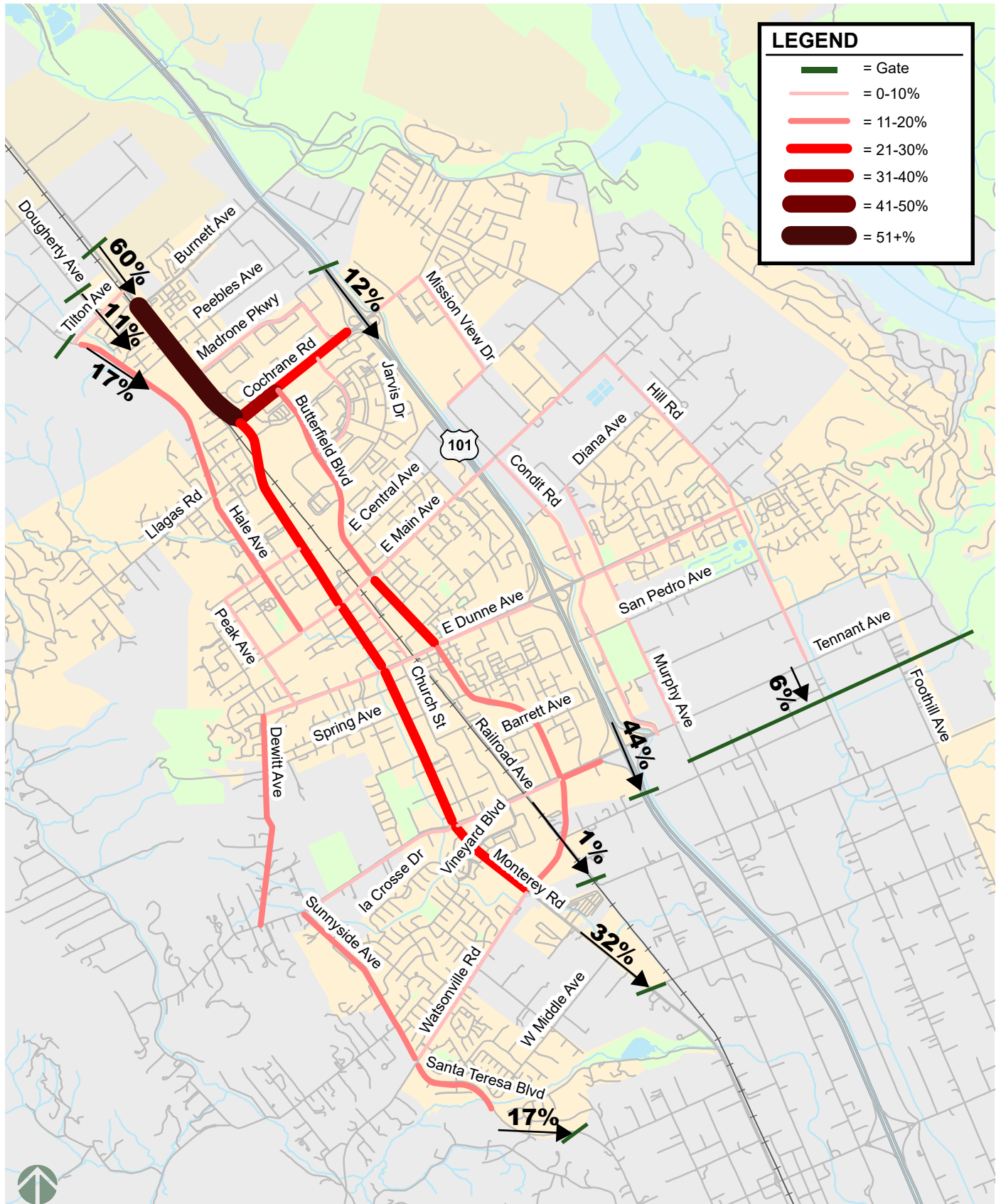


Figure 7: Route Choice for Southbound Regional Cut-Through Traffic – PM Peak Hour

Conclusion

The key takeaways from the regional cut-through analysis of major roadway segments within the City of Morgan Hill are:

- Regional cut-through traffic on city roadways peaks when US 101 is the most congested, which happens during the peak commute periods.
- Northbound regional cut-through traffic percentage peaks during the AM peak commute period between 6 AM and 8 AM, and southbound regional cut-through traffic percentage peaked during the PM peak commute period between 3 PM and 5 PM, when US 101 southbound received the most traffic.
- Study roadway segments that have a high percentage of regional cut-through traffic during the AM peak hour and are wholly within Morgan Hill are along Dunne Avenue, Butterfield Boulevard, Wright Avenue, Hale Avenue, Tennant Avenue, and Monterey Road.
- Study roadway segments that have a high percentage of regional cut-through traffic during the PM peak hour and are wholly within Morgan Hill are along Wright Avenue, Peak Avenue, Hale Avenue, Monterey Road, Main Avenue, and Cochrane Road.
- Study roadway segments that share a border between Morgan Hill and the County, generally have high percentages of regional cut-through traffic during both peak hours.
- Most of the northbound regional cut-through traffic during the AM peak hour enters the City from the south through local roadways west of US 101 and exits the City onto US 101. The most utilized route for the northbound regional traffic is Butterfield Boulevard.
- Most of the southbound regional cut-through traffic during the PM peak hour enters the City from the north through local roadways west of US 101. Approximately 50% of this cut-through traffic exits the City to the south still using local roadways west of US 101, and most of the remaining traffic exits the City onto US 101. The most utilized routes for the southbound regional traffic are Monterey Road and Butterfield Boulevard.