Appendix 1-A:
Conceptual Caltrain Station Parking Structure

FEHR PEERS

MEMORANDUM

Date: April 5, 2012

To: Alan Fishman, ASLA, William Hezmalhalch Architects, Inc.

From: Franziska Church, AICP and Sohrab Rashid, P.E., Fehr & Peers

Subject: ***Multi-Modal Access and Circulation Review for the Proposed Morgan Hill/VTA Parking Garage in Downtown Morgan Hill, California***

SJ11-1245

This memorandum summarizes our multi-modal access and circulation findings and recommendations for the proposed Morgan Hill/VTA parking garage at the existing Caltrain Station in Morgan Hill, California. Our review is based on the February 23, 2012 parking garage design prepared by Watry Design, Inc. The proposed garage would be located in downtown Morgan Hill on existing surface parking lots on the west side of the existing Caltrain tracks off Deport Street, approximately between East 2nd Street and East 3rd Street. The new parking garage is intended to replace the existing surface lot on the east side of the tracks, which is slated for redevelopment with transit-supportive land uses.

Access to the new parking garage would be provided at the East 2nd Street/Deport Street intersection, where the garage driveway access would form the east leg of the intersection. Secondary access to a 27-space short-term parking area would be provided just south of the East 3rd Street/Depot Street intersection.

The purpose of the multi-modal review is to ensure that autos, transit vehicles, bicyclists, and pedestrians will be able to adequately access the Caltrain station and parking areas. Specifically, our review and recommendations focus on transit loading areas, bicycle parking, bicycle and pedestrian facilities serving the new parking garage, and the location of parking access points. **Figure 1** attached to this memorandum illustrates the proposed garage location and summarizes our recommendations.

PROJECT BACKGROUND

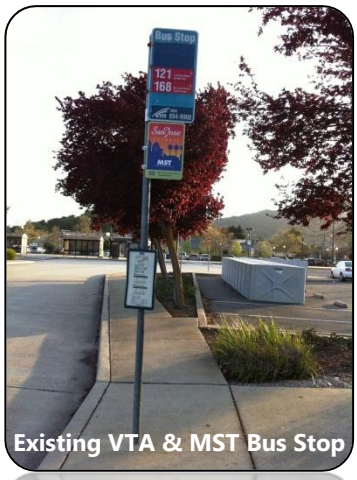
The Valley Transportation Authority (VTA) Joint Development Policy and Implementation Plan identified Morgan Hill Caltrain Park-and-Ride as being well-suited for transit-oriented development. To free up the land for development, a specific number of parking spaces must be relocated and reserved for Caltrain patrons. Although the existing Park-and-Ride lot capacity is 486 spaces, the replacement parking for the Caltrain station need only satisfy the 2035-forecasted parking demand, which based on information provided by VTA, is currently modeled at 233 spaces.

Since the Caltrain station is located in downtown Morgan Hill, the City also has an interest in increasing parking supply for the downtown area to meet future demand. Fehr & Peers evaluated the City's *Downtown Specific Plan*, which included a detailed parking demand and supply analysis for the downtown. Based on the data presented in the *Specific Plan*, the downtown area will have a future parking demand of between 300 and 800 vehicles that is not met by the current parking supply.[1] It is not the intent of the proposed garage to accommodate all of the future parking demand and based on conversations with City of Morgan Hill staff, a parking garage with a total supply of 300 to 350 spaces would be appropriate for this location. As proposed, the three-story parking garage would supply a total of 381 parking spaces; this includes 233 spaces for the Caltrain/VTA requirement and 148 City public spaces. Based on parking occupancy conducted in May 2011, the current Park-and-Ride lot has a parking demand of approximately 110 spaces, so in the near-term approximately 271 spaces would be available for downtown patrons until the parking demand for Caltrain increases in the future.

CALTRAIN PLATFORM RELOCATION

Part of the parking garage plan includes the Caltrain platform relocation from the east side of the tracks to the west side; thus the new platform would be located directly adjacent to the proposed garage. With the new garage and potential development of the existing Park-and-Ride lot, most Caltrain patrons will access the station from the west side of the tracks. The intent of the platform relocation is to minimize the pedestrian and bicycle crossings of the tracks and focus activity closer to the downtown core. Currently an at-grade pedestrian crossing is provided at the south end of the station.

Existing Morgan Hill Caltrain Station

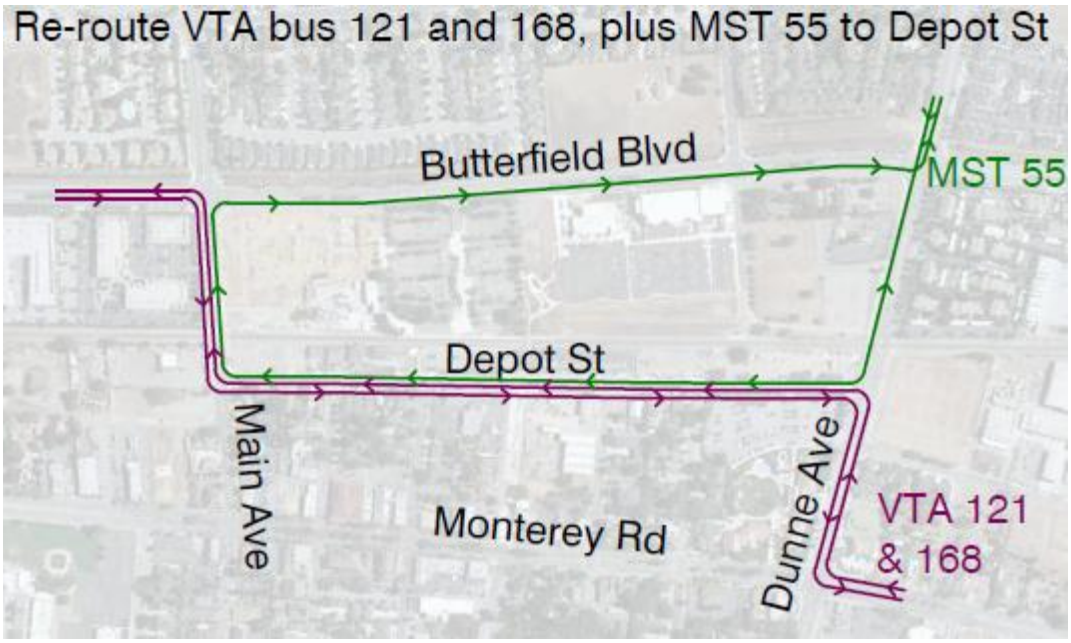


Existing VTA & MST Bus Stop

BUS ROUTING

Currently the Morgan Hill Caltrain station is served by VTA bus routes 121 and 168, plus Monterey Salinas Transit (MST) Route 55. All three of these bus routes only provide weekday morning and evening peak commute period service and include bus stops at the existing Caltrain Park-and-Ride lot on the east side of the station. With the potential redevelopment of the Park-and-Ride lot and to provide more direct access to the Caltrain station, the VTA and MST bus routes would need to be rerouted to Depot Street. The image below shows how the bus routes could be rerouted to Depot Street. The rerouting of these routes would have minimal impacts on travel times for the bus routes.

[1] The level of parking demand is dependent on the intensity of land uses provided and if new development will be required to provide part of their parking demand on-site.



In the future, the at-grade Caltrain rail crossing at Dunne Avenue will be grade separated. This improvement and resulting roadway modifications at Dunne Avenue near Depot Street could limit the ability of buses to turn left from Dunne Avenue onto Depot Street; however the City is considering re-aligning Depot Street with Church Street, which would shift the Depot Street/Dunne Avenue approximately 250 feet to the west of its current location; thus, the impact from the future grade-separation project at Dunne Avenue would be minimized.

BUS STOPS

With the proposed rerouting of the VTA and MST bus routes to Depot Street, new stops would need to be provided to provide convenient access to the Caltrain station.

Northbound Depot Street

As shown in **Figure 1**, a bus stop will be provided in the northbound direction on Depot Street south of the proposed garage adjacent to the proposed park. The bus stop in the northbound direction would serve morning peak period buses for VTA Routes 121 and 168, which travel in the northbound directions towards San Jose and Mountain View. Additionally, this bus stop would serve MST Route 55, which accesses Morgan Hill from US 101 via Dunne Avenue. As proposed, the northbound bus stop will include a duckout. Based on VTA design standards, the duckout would need to include a minimum of 50 feet each for the approach and departure taper, in addition to 55 feet for the bus (for a total of a 155-foot bus stop). This assumes an approach speed of 20 miles per hour (mph), which is appropriate for downtown core areas and local streets. The provision of the duckout is feasible in the northbound direction given the its location next to the proposed park. Additionally, the northbound Depot Street bus stop has a higher likelihood of multiple buses accessing the stop; since it serves the VTA bus routes in addition to MST (the southbound stop will only serve VTA Bus Routes 121 and 168). It should be

noted that the provision of the duckout will eliminate approximately six existing on-street parking spaces.

Southbound Depot Street

To accommodate the evening peak period services for VTA Routes 121 and 168, a bus stop needs to be provided in the southbound direction on Depot Street. We propose that a far side stop without a duckout be provided on the southwest corner of the East 3rd Street/Depot Street intersection. Based on VTA design standards the curbside bus stop would need to include 55 feet for the bus stop, plus an additional 50 feet where parking would be restricted (for a total of 105 feet). **Figure 1** illustrates the proposed stop location.

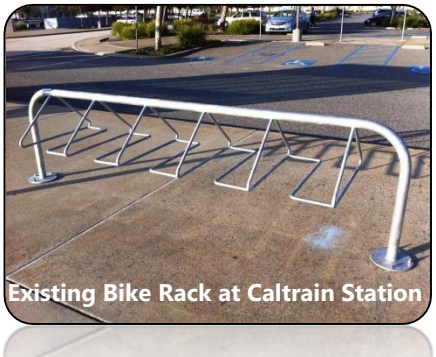
Given that the southbound Depot Street bus stop will only serve evening commute period service for two VTA express buses and that Depot Street includes low travel speeds (posted 25 mph) and relatively low volumes (200 PM peak hour southbound volumes), it is not necessary to provide a bus duckout at this location and the curbside bus stop is sufficient to meet the anticipated bus service.

BICYCLE ACCESS AND BICYCLE PARKING

To promote bicycle access to the Caltrain station, as well as downtown and around the parking garage sufficient bicycle facilities and amenities need to be provided. Currently Class II bike lanes are provided in both directions on Depot Street and this will not change with the proposed garage.

The existing Park-and-Ride lot on the east side of the tracks provides approximately 10 bike lockers (see image to right), which would need to be relocated with the proposed project. Bike lockers are classified as Class I bicycle parking facilities and are suitable for long-term bicycle parking such as at transit centers. A Class II bicycle rack is provided towards the south end of the station adjacent to the eastern platform (see image below).


Existing Bike Lockers at Caltrain Station


Existing Bike Rack at Caltrain Station

Caltrain's Design Criteria (April 2007) generally recommends that one (1) locker and one (1) bike rack be provided for every 100 passengers; though the amount may vary due to local demand and ridership which will be provided by Caltrain. Based on the 2011 Caltrain Annual Counts, the Morgan Hill Caltrain station has just over 100 boardings, which would technically require one bike locker and one bike rack. We recommend that the total existing count of 10 bike lockers and one bike rack be maintained with the proposed project.

In terms of location, the Caltrain *Design Criteria* specifies that

bike lockers and racks shall not be located near the one-third end of a platform north entrance and should be located in a well-lighted area and in a highly visible location within view of the public and police patrols. A minimum clear distance of six (6) feet shall be maintained around bike lockers and racks. Clear signage shall be provided directing users to them. No bike racks or lockers are to be located on the platform.

As shown in **Figure 1**, we recommend that the majority of bicycle lockers and racks be located in the Pedestrian Arcade Area opposite East 3rd Street with some additional bicycle parking to be provided by the new park, as well as on the east side of the tracks where some bicyclists from eastern Morgan Hill will continue to access the station.

PEDESTRIAN ACCESS

The project area provides good pedestrian connections between the Caltrain Station and surrounding land uses, including the Morgan Hill downtown area. Crosswalks are currently provided on all legs of the Depot Street intersections with East 2nd Street, East 3rd Street, and east 4th Street with the exception of the south leg of the 4th Street intersection. We recommend that this crosswalk be provided to further enhance pedestrian access in the area when the existing surface parking lot south of the station area is converted to a park.

With the construction of the new garage, a minimum clear sidewalk width of six feet should be maintained in front of the garage to allow for sufficient room for pedestrians to walk. This width should be in addition to areas accommodating pedestrian furniture and other amenities, such as trees/tree wells.

With the proposed project, pedestrian and bicycle access should be maintained to Butterfield Avenue with the new development. The connection can be maintained at the existing path network at the southeast end of the existing Caltrain station. Our pedestrian access recommendations are illustrated in **Figure 1**.

KISS AND RIDE

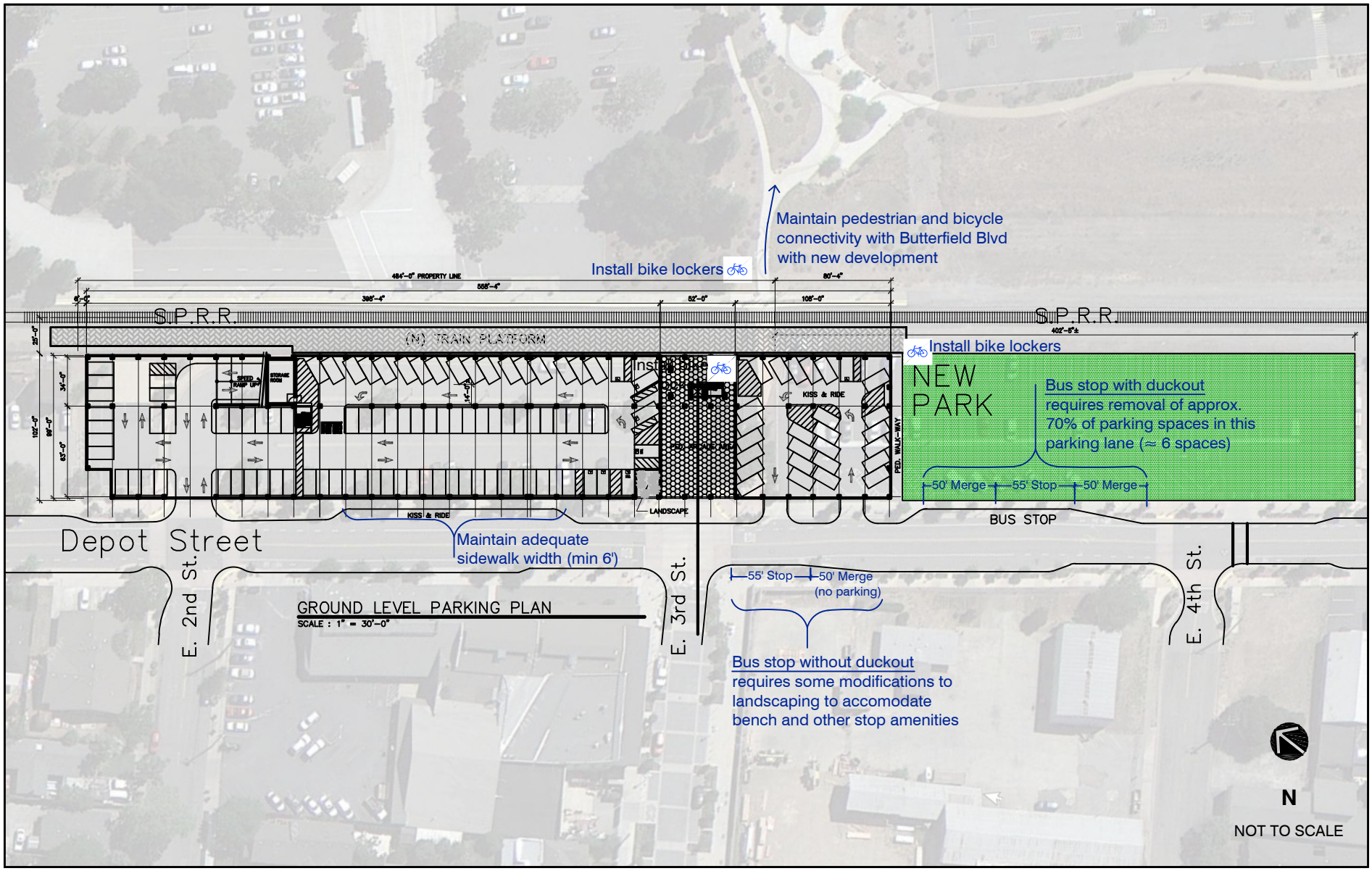
Two areas are proposed for kiss-and-ride (i.e., passenger loading/unloading) locations: 1) on the east side of Depot Street between East 2nd Street and East 3rd Street in front of the proposed garage, and 2) within the south end of the garage. We recommend that the kiss-and-ride area along Depot Street be designated for passenger loading during the peak morning and evening commute periods (Monday through Friday, 5:00 am to 9:00 am and 3:00 pm to 7:00 pm) when the station has the rail service and to allow for regular 2-hour parking during the rest of the day and on weekends. The kiss-and-ride area inside the garage should be designated as such at all times.

GARAGE DRIVEWAY ACCESS AND CIRCULATION

Primary access to the garage is provided at the East 2nd Street/Depot Street intersection, which is a side-street controlled intersection. This configuration will be sufficient to meet the garage's near-term demand. However, the City should monitor this location once the garage is open to evaluate if all-way

stop control is warranted. The final garage design should allow drivers in exiting vehicles to see pedestrians approaching on the adjacent sidewalk to minimize the potential for conflicts. Alternatively an audible and visual warning system should be installed to let pedestrians know of approaching vehicles.

Within the garage appropriate signage/pavement markings should be provided to delineate right-of-way and to indicate areas with one-way circulation. While dead-end aisles are located on each floor of the garage and are not ideal from a circulation perspective, these areas serve a limited number of spaces and should be signed accordingly.



FEHR PEERS

Morgan Hill Caltrain
Multi-Modal Access Recommendations

Mar 13, 2012 FPA
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Figure 1

Appendix 1-B:
Caltrain Station Rank by Weekday All-Day Passenger Boardings

Caltrain Station Rankings based on Average Weekday Boardings[1]

Station	Rank[2]	NB Ons	SB Ons	Total
San Francisco	1	0	14,769	14,769
Palo Alto	2	4,663	2,761	7,424
San Jose Diridon	3	4,524	188	4,712
Mountain View	4	4,075	584	4,659
Redwood City	5	2,314	1,500	3,814
Millbrae	6	610	2,995	3,605
Sunnyvale	7	2,888	302	3,190
Hillsdale	8	1,803	1,155	2,958
San Mateo	9	1,069	1,110	2,179
Menlo Park	10	1,070	725	1,795
22nd Street	11	47	1,668	1,715
California Ave.	12	1,102	526	1,628
San Carlos	13	779	695	1,474
Tamien	14	1,268	15	1,283
Santa Clara	15	1,025	68	1,093
Burlingame	16	552	502	1,054
San Antonio	17	758	184	942
Lawrence	18	744	157	901
San Bruno	19	306	411	717
Belmont	20	350	315	665
South SF	21	183	288	471
Hayward Park	22	220	207	427
Bayshore	23	41	212	253
Morgan Hill	24	182	1	183
Gilroy	25	178	0	178
Blossom Hill	26	123	4	127
San Martin	27	77	0	77
Capitol	28	62	3	65
College Park	29	25	32	57
TOTAL		31,039	31,377	62,416

[1]Ons and Offs are averaged over five days and rounded
[2]Rank based on total boardings

Appendix 1-C:
Caltrain Ridership Analysis

CALTRAIN RIDERSHIP ANALYSIS

An analysis was conducted to evaluate and compare Caltrain ridership at the Morgan Hill station with other Caltrain stations to assess the potential for increased Caltrain ridership and service. The analysis used Caltrain 2016 passenger data, Caltrain schedules, Association of Bay Area Governments (ABAG) population and employment data, and mobile device data to evaluate the following:

- the numbers of boarding passengers per train at each station on an average weekday
- population and employment (and densities) per station
- proportion of Morgan Hill morning worker trip destinations near Caltrain stations

Passengers per Train

Caltrain provided passenger boarding data for each station from surveys conducted in February 2016. The numbers of northbound ons and southbound ons on an average weekday were summed to obtain the total number of boarding passengers at each station. The results ranged from 57 at the Capitol station to 14,769 at the San Francisco station. Morgan Hill has 183 boarding passengers.

The totals were then divided by the number of trains serving each station to account for increased Caltrain service generating increased ridership. Stations south of the Tamien station, including Morgan Hill, are served by six trains each weekday with three in the northbound direction in the morning and three in the southbound direction in the evening. In contrast, the San Jose Diridon and San Francisco stations are served by 91 weekday trains.

The resulting boardings per train, presented in Table C-1, were then color coded to show their relative ranking with green representing the highest number of boardings per train and red the lowest number. The San Francisco station has the highest boardings per train with 91. Morgan Hill is in the middle with 31 boardings per train.

Population and Employment Data

ABAG land use data (population and employment figures) from *Projections '13* and the numbers of Caltrain stations were used to estimate station population and employment in each city on the Catrain corridor and the results were color coded. The results are presented in Table C-2. San Jose and San Francisco have the highest population and employment figures per station while Morgan Hill is in the middle.

The geographic size of each city was then used to estimate average population and employment densities per station in each city. This approach creates some counter-intuitive results as some cities have large sections with low population and employment densities, such as San Jose and Redwood City, which skew the results. The results of this analysis also show Morgan Hill in the middle of the ranking.

Morgan Hill Work Place Locations

Mobile device data was used to identify the probable work locations of people traveling out of Morgan Hill during the morning peak period on an average weekday. The percentage of locations near each Caltrain station was then used to estimate potential new Caltrain riders.

The data is provided in one-kilometer square areas, or cells. Cells were selected to approximate the areas within a half-mile and one-mile buffer of each Caltrain station as on Figures C-1 and C-2. The data in the cells were aggregated and the results are:

- 7% of the locations are within a half-mile of a station
- 18% of the locations are within one-mile of a station

Conclusions

Based on the numbers of passengers per train, population and employment per station, and population and employment densities per station, Morgan Hill ranks in the middle of all stations. Many of the other similarly ranked stations are located between San Francisco and San Jose where service is less expensive to provide.

The Morgan Hill work place location analysis results and data on the number of residents who work outside of Morgan Hill were used to estimate potential new Caltrain riders. According to the American Community Survey, 69% of Morgan Hill residents work outside of Morgan Hill. There are 18,100 eligible workers 16 years and older in Morgan Hill, so approximately 12,500 of them commute outside of the city limits. Therefore, the potential number of people traveling from Morgan Hill and working in areas near Caltrain stations are:

- Within a half mile: 880 people
- Within one mile: 2,260 people

People with work locations within a half-mile are more likely to be potential Caltrain riders as they can reach their destination by walking from the station. People with work locations between a half-mile and one mile are less likely because they would need a bike, bus, shuttle, or TNC (i.e. Uber or Lyft) to reach their destination. The number of potential Caltrain riders was estimated as 15% of those within a half-mile of a station and 5% of those between a half mile and one mile, or 200 people (200 average weekday boardings). These percentages are based on studies used to estimate ridership at other Caltrain stations.

Since the Morgan Hill Caltrain ranks similarly to other stations with lower operating costs and has the potential of generating only 200 additional Caltrain daily riders, there is little evidence to support increasing Caltrain service to Morgan Hill. However, Morgan Hill can embark on a public outreach program to attract the projected additional Caltrain riders. Part of the outreach effort could be to determine the optimal train departure and arrival times to maximize ridership.

Morgan Hill could also enlist Gilroy and San Martin in their efforts for increased Caltrain service. Similar analyses could be conducted to estimate the potential added ridership of those communities as more riders would create a more compelling case for added service.

Ultimately Caltrain would need to decide whether the increased ridership generated by providing more service to the South County communities would offset the added costs and not negatively affect their ability to provide service on segments farther to the north where demand is exceeding capacity.

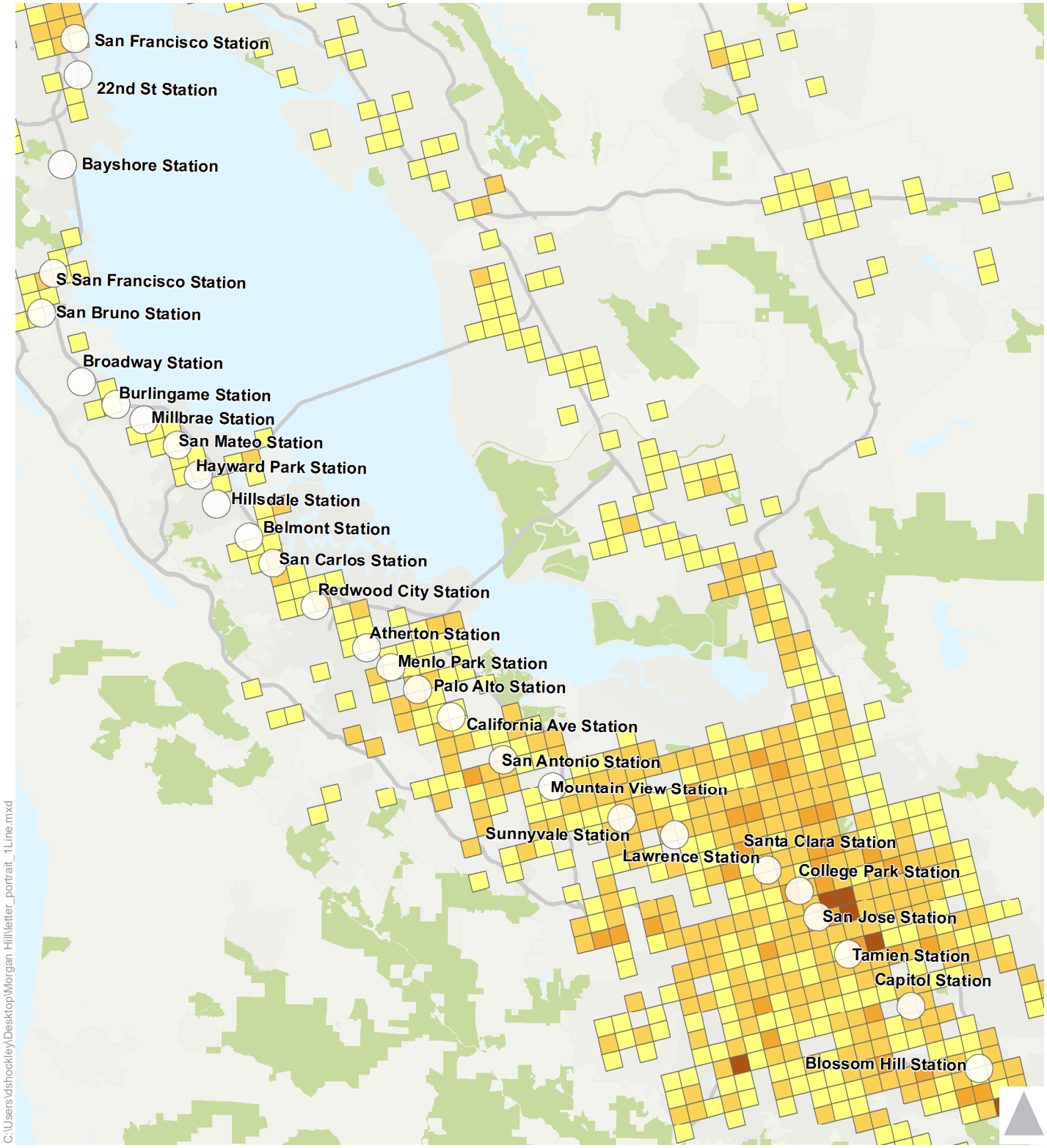


Figure C-1

Work Locations Within a Half-Mile of Caltrain Stations

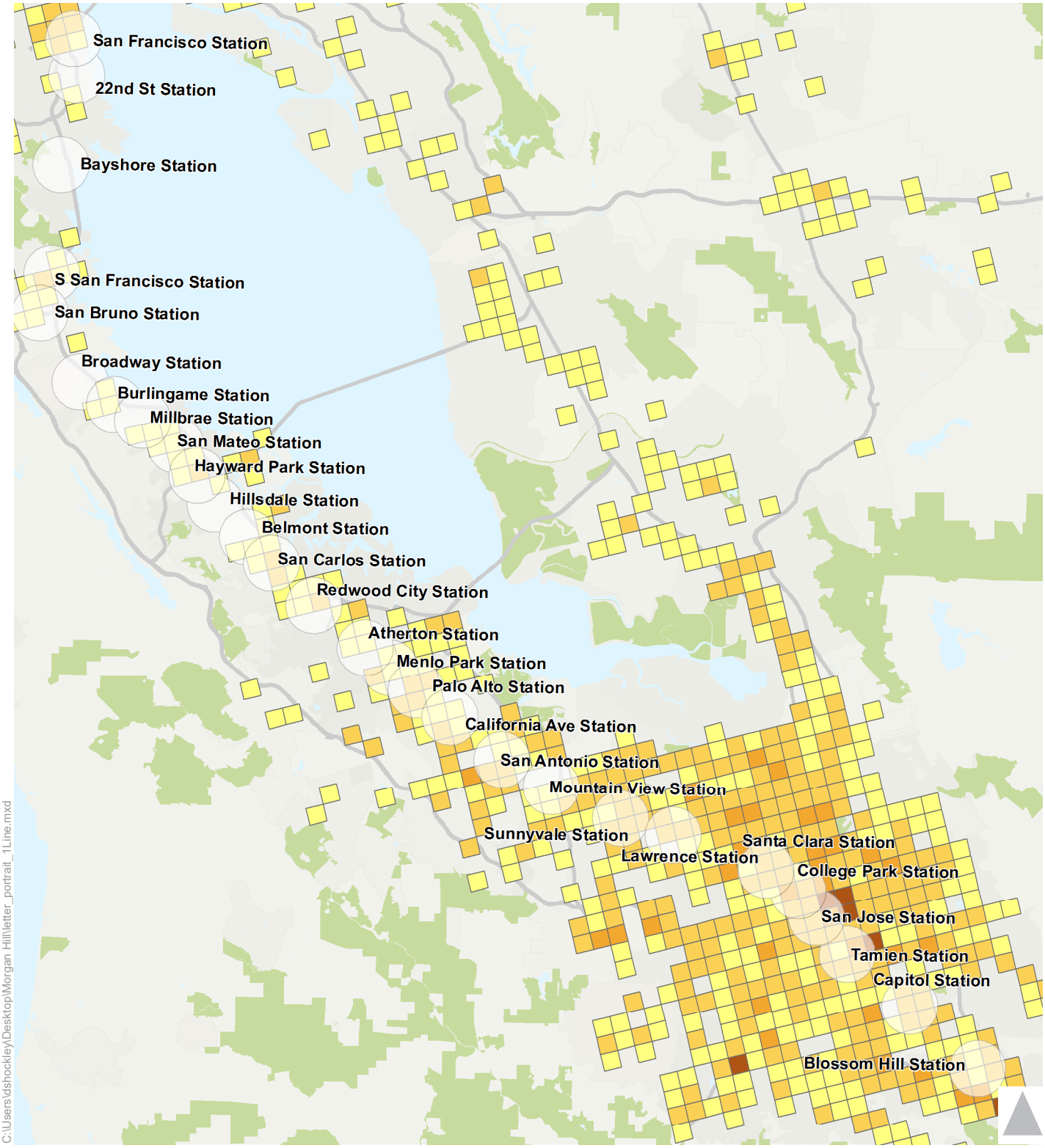


Figure C-2

Work Locations Within One Mile of Caltrain Stations

Table C-1

Caltrain Ridership Analysis - Boardings by Train

Station	Avg Weekday Passengers			Avg Weekday Trains	Boardings/ Train
	NB On	SB On	Total		
Gilroy	178	-	178	6	30
San Martin	77	-	77	6	13
Morgan Hill	182	1	183	6	31
Blossom Hill	123	4	127	6	21
Capitol	62	3	65	6	11
Tamien	1,268	15	1,283	40	32
San Jose Diridon	4,524	188	4,712	91	52
College Park	25	32	57	4	14
Santa Clara	1,025	68	1,093	58	19
Lawrence	744	157	901	56	16
Sunnyvale	2,888	302	3,190	62	51
Mountain View	4,075	584	4,659	80	58
San Antonio	758	184	942	46	20
California Ave.	1,102	526	1,628	53	31
Palo Alto	4,663	2,761	7,424	86	86
Menlo Park	1,070	725	1,795	65	28
Redwood City	2,314	1,500	3,814	73	52
San Carlos	779	695	1,474	64	23
Belmont	350	315	665	46	14
Hillsdale	1,803	1,155	2,958	74	40
Hayward Park	220	207	427	40	11
San Mateo	1,069	1,110	2,179	70	31
Burlingame	552	502	1,054	58	18
Millbrae	610	2,995	3,605	82	44
San Bruno	306	411	717	46	16
South SF	183	288	471	40	12
Bayshore	41	212	253	40	6
22nd Street	47	1,668	1,715	63	27
San Francisco	-	14,769	14,769	91	162
TOTAL	**31,039**	**31,377**	**62,416**		

Ons and Offs are averaged over five days and rounded
which may lead to single-digit discrepancies in On Board totals.

Table C-2
Caltrain Ridership Analysis - Population, Employment, and Densities per Station

	Avg Weekday Passengers										Density per Caltrain Station		
Station	**NB Ons**	**SB Ons**	**Total**	**Stas per City**	**Pop.**	**Empl.**	**Pop. + Empl.**	**Pop. Per Station**	**Empl. Per Station**	**Pop. + Empl. Per Station**	**City Area in Square Miles**	**Pop.**	**Empl.**	**Pop. + Empl.**
Gilroy	178	-	178	1	50,700	18,790	69,490	50,700	18,790	69,490	16	3,137	1,163	4,300
San Martin[1]	77	-	77	1	7,050	3,120	10,170	7,050	3,120	10,170	12	608	269	877
Morgan Hill	182	1	183	1	39,900	18,820	58,720	39,900	18,820	58,720	13	3,098	1,461	4,559
Blossom Hill	123	4	127											
Capitol	62	3	65											
Tamien	1,268	15	1,283											
San Jose Diridon	4,524	188	4,712	4	1,004,500	414,380	1,418,880	251,125	103,595	354,720	180	1,395	576	1,971
College Park	25	32	57											
Santa Clara	1,025	68	1,093	2	122,500	121,950	244,450	61,250	60,975	122,225	18	3,327	3,312	6,639
Lawrence	744	157	901											
Sunnyvale	2,888	302	3,190	2	148,400	80,490	228,890	74,200	40,245	114,445	23	3,270	1,774	5,044
Mountain View	4,075	584	4,659	2	78,000	52,040	130,040	39,000	26,020	65,020	12	3,178	2,121	5,299
San Antonio	758	184	942											
California Ave.	1,102	526	1,628											
Palo Alto	4,663	2,761	7,424	2	67,400	96,900	164,300	33,700	48,450	82,150	26	1,307	1,879	3,185
Menlo Park	1,070	725	1,795	1	32,900	30,910	63,810	32,900	30,910	63,810	17	1,889	1,774	3,663
Redwood City	2,314	1,500	3,814	1	80,300	64,160	144,460	80,300	64,160	144,460	35	2,319	1,853	4,173
San Carlos	779	695	1,474	1	29,200	17,070	46,270	29,200	17,070	46,270	6	5,270	3,081	8,350
Belmont	350	315	665	1	26,400	8,790	35,190	26,400	8,790	35,190	5	5,703	1,899	7,602
Hillsdale	1,803	1,155	2,958											
Bay Meadows	-	-	-											
Hayward Park	220	207	427											
San Mateo	1,069	1,110	2,179	3	101,500	57,700	159,200	33,833	19,233	53,067	16	2,131	1,211	3,342
Burlingame	552	502	1,054	1	30,200	31,910	62,110	30,200	31,910	62,110	6	4,987	5,269	10,256
Millbrae	610	2,995	3,605	1	22,800	7,480	30,280	22,800	7,480	30,280	5	4,162	1,365	5,528
San Bruno	306	411	717	1	43,500	13,800	57,300	43,500	13,800	57,300	5	7,941	2,519	10,460
South SF	183	288	471	1	67,200	47,350	114,550	67,200	47,350	114,550	30	2,228	1,570	3,798
Bayshore	41	212	253											
22nd Street	47	1,668	1,715											
San Francisco	-	14,769	14,769	3	847,000	617,420	1,464,420	282,333	205,807	488,140	47	6,024	4,391	10,415
TOTAL	31,039	31,377												

1. San Martin does not have an ABAG projection- census data used to create an adjustment factor for jobs and population.
2. The densities are based on city jurisdctional area. The use of this metric could bias the results by not taking into account density variations within each city.
3. Population and Employment Data from ABAG projections

Ons and Offs are averaged over five days and rounded
which may lead to single-digit discrepancies in On Board totals.

Appendix 1-D:
Hexagon HSR Memorandum

HEXAGON TRANSPORTATION CONSULTANTS, INC.

Memorandum

Date: September 21, 2016

To: Tiffany Brown, City of Morgan Hill

From: Gary Black

Subject: Transportation, Land Use and Construction Impact Analysis of HSR

Hexagon Transportation Consultants, Inc. has reviewed the proposed three alignment design options for the High Speed Rail (HSR) project through Morgan Hill, California. The three alignment options are described as follows and also shown on Figure 1:

- **Option 1**: The proposed high speed rail tracks would run through the downtown area at-grade. Monterey Road would need to be realigned north of Cochrane Road. Railroad Avenue would need to be realigned between San Pedro Avenue and Maple Avenue. All of the streets that currently cross the Caltrain/UP tracks at-grade would need to be rebuilt as underpasses.
- **Option 2**: The proposed high speed rail tracks would be elevated through the downtown area. Monterey Road and Railroad Avenue would need to be realigned as described in Option 1. All of the streets that currently cross the Caltrain/UP tracks at-grade would remain as is.
- **Option 3**: The proposed high speed rail tracks would by-pass the downtown area and be elevated to run parallel to US 101 on the west side of US 101.
- **Option 4**: The proposed high speed rail tracks would by-pass the downtown area and be elevated to run parallel to US 101 on the east side of US 101.

Hexagon evaluated each design option and identified their land use impacts, transportation impacts, and construction impacts. Option 4 would have the same type of impacts as Option 3 but would be more expensive to build because the HSR tracks would need to cross US101 in two places. Therefore, this paper focuses on Option 3 as the more viable US 101 alignment.

Land Use Impacts

Under each proposed alignment design option, different numbers of properties would need to be acquired for the right-of-way of the high speed rail tracks when it runs at-grade level or for the columns required every 200 feet when the high speed rail track is elevated.

Option 1

With Option 1, the high speed rail tracks are proposed to run through the Morgan Hill downtown area at-grade parallel to, and immediately east of, the existing Union Pacific railroad tracks. A 70-foot right-of-way would need to be acquired adjacent to the existing Union Pacific right-of-way, which would affect most of the properties along the east side of the alignment (see Figures 2a, 2b, and 2c). Currently, Monterey Road runs directly adjacent to the Union Pacific railroad tracks north of Cochrane Road. With the 60 feet right-of-way for the proposed high speed rail tracks, this section of Monterey Road would need to be realigned, and all the properties along the revised alignment

would need to be acquired. Railroad Avenue south of San Pedro Avenue would also need to be realigned, and the properties long the revised alignment would need to be acquired.

Under Option 1, all existing at-grade street crossings of the UP and HSR tracks would be made into underpasses. The following streets in Morgan Hill would be depressed to go under the tracks:

- Main Avenue
- East Dunne Avenue
- San Pedro Avenue
- Tennant Avenue

The following streets that intersect these streets would also need to be partially depressed to maintain their connections or cul-de-saced: Depot Street, Church Street, and possibly McLaughlin Avenue. E. Middle Avenue is planned to be elevated over the tracks. The Butterfield Boulevard overpass would also need to be widened in order to provide enough space for the at-grade HSR tracks.

Either depressing or elevating streets affects the driveway connections of the surrounding properties. As an example, Figure 3 shows an illustration of the proposed underpass at Main Avenue between Monterey Road and Butterfield Boulevard. Figure 4 shows the additional properties and driveways that would be affected by the depressed section along Main Avenue. These affected properties would either be acquired, or their driveways would need to be regraded or removed.

Option 2

Under alignment design Option 2, the high speed rail track is proposed to run through the Morgan Hill downtown area with the same alignment as Option 1 but with the track being elevated. Therefore, all of the cross streets would remain as is. The UP railroad crossings would remain at-grade. The elevated high speed rail track would require one column every 200 feet. Therefore, the same property acquisition as Option 1 would be required for the alignment. Monterey Road would need to be relocated north of Cochrane. No underpasses are required for this option, and the Butterfield Boulevard overcrossing would not need to be widened.

Options 3 and 4

Under alignment Option 3, the high speed rail tracks would bypass the majority of Morgan Hill developed land. The rail tracks would be elevated and would run adjacent to US 101 (see Figures 5a and 5b for Option 3; Figures 6 for Option 4). Under both Options 3 and 4, properties along the alignment would also need to be taken because of the required columns every 200 feet. However, the land is generally less developed.

Transportation Impacts

Option 1

The impacts of each alignment option would be different on the Morgan Hill transportation system with the build-out of the high speed rail project. Under Option 1, the transportation system of Morgan Hill would benefit by the elimination of at-grade railroad crossings in the downtown area. The HSR preliminary design shows Tilton Avenue to be cul-de-saced and the connection to Monterey Road eliminated. This is not in conformance with the Morgan Hill General Plan, which calls for Tilton Avenue to be connected to Burnett Avenue. An overpass or underpass will be needed, as will a connection to the realigned Monterey Road. A The preliminary HSR design shows

the GP planned extension of Madrone Parkway to Hale Avenue with a connection to the realigned Monterey Road.

Option 2

Option 2 would have the same planned extension of Madrone Parkway and would need to also include the planned Tilton Avenue connection to Burnett Avenue. All of the at-grade crossings between the east-west streets and the Union Pacific railroad tracks would remain as is. While Monterey Road and Railroad Avenue would be realigned, their connectivity and function would remain the same. Thus, Option 2 would benefit the Morgan Hill transportation system by adding the new connection between Monterey Road and Hale Avenue at Madrone Parkway.

Options 3 and 4

Options 3 and 4would not result in any changes to the Morgan Hill motor vehicle transportation system. The space under the elevated tracks would provide an opportunity for a multiple-use trail for pedestrians and bicyclists. The City would need to work with the HSR Authority to design the crossings of the possible trail at the interchanges. At-grade crossings would not be safe, so the crossings will need to be under- or over-passes.

Construction Impacts

Construction of the HSR tracks would impact the Morgan Hill transportation system including street closures, lane closures, sidewalk closures, railroad crossing closures, and detours. The main impacts under each design option are described as follows:

Option 1

With Option 1, Monterey Road north of Cochrane Road would need to be realigned, which might result in closure of Monterey Road during construction. Currently, only Monterey Road and US 101 run directly through Morgan Hill. US 101 is already congested during peak times under existing conditions. No widening of US 101 is planned. Table 1 shows the forecasted average daily traffic (ADT) and corresponding roadway level of service (LOS) at several locations along Monterey Road under Year 2035 General Plan conditions. Three out of eight segments along Monterey Road are projected to serve ADT equivalent to unacceptable LOS F.

Table 1
Year 2035 General Plan Conditions Monterey Road Segment Analysis

	Roadway Segment	2035 General Plan Condition	
		ADT [1]	LOS [2]
1	Monterey Road between Kirby Avneue and Tilton Avenue	30,872	**F**
2	Monterey Road between Peebles Avenue and Madrone Parkway	33,269	**F**
3	Monterey Road between Cochrane Road and Old Monterey Road	19,584	D
4	Monterey Road between Wright Avenue and El Toro Street	17,164	C
5	Monterey Road between 3rd Street and 4th Street	13,503	C
6	Monterey Road between San Pedro Avenue and Cosmo Ln	26,140	D
7	Monterey Road between Vineyard Boulevard and Watsonville Rd	26,985	D
8	Monterey Road between Starswept Ln and East Middle Avenue	29,446	**F**

Note:
Source: Morgan Hill 2035 General Plan Update.
1. ADT = Average two-way daily traffic.
2. LOS = Level of service based on daily volume planning thresholds. Peak hour traffic operations may be worse than shown for daily conditions.

The 2035 General Plan includes improvements to enhance north-south connectivity and relieve some of the pressure off of Monterey Road. The following improvements should be provided if Monterey Road is to be partially or completely closed during certain periods of construction.

- Extension of Hale Avenue/Santa Teresa Boulevard as a 2-lane arterial between Main Avenue and Spring Avenue.
- Extension of Murphy Avenue/Mission View Drive as a 2-lane multi-modal arterial between Half Road and Dianna Avenue.
- Realignment of DeWitt Avenue as a 2-lane arterial with Sunnyside Avenue
- Extension of Hill Road/Peet Road as a 2-lane collector between Half Road and Main Avenue.

Before any partial or complete closure of Monterey Road during construction, a detour plan should be prepared and submitted to the City for approval. The detour plan should show the proposed times of closure, the proposed detour routes, and the capacity of the detour routes to accommodate increased traffic during the times of closure.

Building underpasses on the east-west street crossings of the HSR tracks would also result in street closures. Table 2 shows the forecasted average daily traffic (ADT) and corresponding roadway level of service (LOS) on these east-west streets under Year 2035 General Plan conditions. Based on the forecasted average daily traffic on these streets under Year 2035 General Plan conditions, all of the streets would operate at LOS C or D. Therefore, it would not be possible to close more than one east-west street at a time.

Table 2
Year 2035 General Plan Conditions East-West Street Segment Analysis

	Roadway Segment	2035 General Plan Condition	
		ADT [1]	LOS [2]
1	Cochrane Road between Adams Ct and Woodview Avenue	27,597	D
2	West Main Street between Hale Avenue and Del Monte Street	6,693	C
3	East Dunne Avenue between Depot Street and Butterfield Boulevard	19,838	D
4	Tennant Avenue between Vineyard Boulevard and Railroad Avenue	17,164	C

Note:
Source: Morgan Hill 2035 General Plan Update.
1. ADT = Average two-way daily traffic.
2. LOS = Level of service based on daily volume planning thresholds. Peak hour traffic operations may be worse than shown for daily conditions.

Option 2

The construction of Option 2 would create the same issues with potential closure of Monterey Road and the need to provide alternative routes. Since the tracks would be elevated over the east-west cross-streets, it is not known whether the cross-streets would need to be closed for construction. If they would need to be closed, only one cross-street should be closed at a time.

Options 3 and 4

Under alignment Options 3 and 4, the high speed rail tracks would bypass the downtown area so there would not be any construction impacts to Monterey Road or the east-west cross-streets. However, there could be construction impacts to the three US101 freeway interchanges. Along US 101, the interchanges with Tennant Avenue, Dunne Avenue, and Cochrane Road provide access to most of the City of Morgan Hill. The level of service results under Year 2035 General Plan conditions show that the intersections at these three interchanges would operate at LOS D or better conditions (see Table 3). However, because of the importance of the interchanges for access to adjacent properties and the overall City of Morgan Hill, all three interchanges should be kept open during construction.

Table 3
Year 2035 General Plan Conditions Intersection Level of Services at US 101 Interchanges

	Roadway Segment	Peak Hour	2035 General Plan Condition	
			Delay (sec/veh)	LOS
1	US 101 SB Ramps and Dunne Avenue	AM	21.0	C
		PM	18.2	B
2	US 101 NB Ramps and Dunne Avenue	AM	12.9	B
		PM	14.7	B
3	US 101 SB Ramps and Tennant Avenue	AM	32.3	C
		PM	50.3	D
4	US 101 NB Ramps and Tennant Avenue	AM	12.9	B
		PM	11.3	B
5	US 101 SB Ramps and Cochrane Road	AM	14.4	B
		PM	21.1	C
6	US 101 NB Ramps and Cochrane Road	AM	13.6	B
		PM	13.1	B

Source: Morgan Hill 2035 General Plan Update.

Conclusions

As discussed above, with the build-out or during the construction process of the HSR tracks, each of the three proposed alignment options would have different impacts on the Morgan Hill transportation system and on the surrounding properties. Table 4 summaries these impacts of each option.

Table 4
Impacts Summary of the Proposed HSR Alignment Options

Alignment Options	Land Use Impacts	Transporation Impacts	Construction Impacts
Option 1 (Downtown at-grade)	- - - -	+ +	- - -
Option 2 (Downtown elevated)	- - -	+	- -
Options 3 (West of US 101 alignment)	- -	o	-
Options 4 (East of US 101 alignment)	-	o	-

Notes:
" - " represents negative impacts
" + " represents benefits
" o " represents no impacts

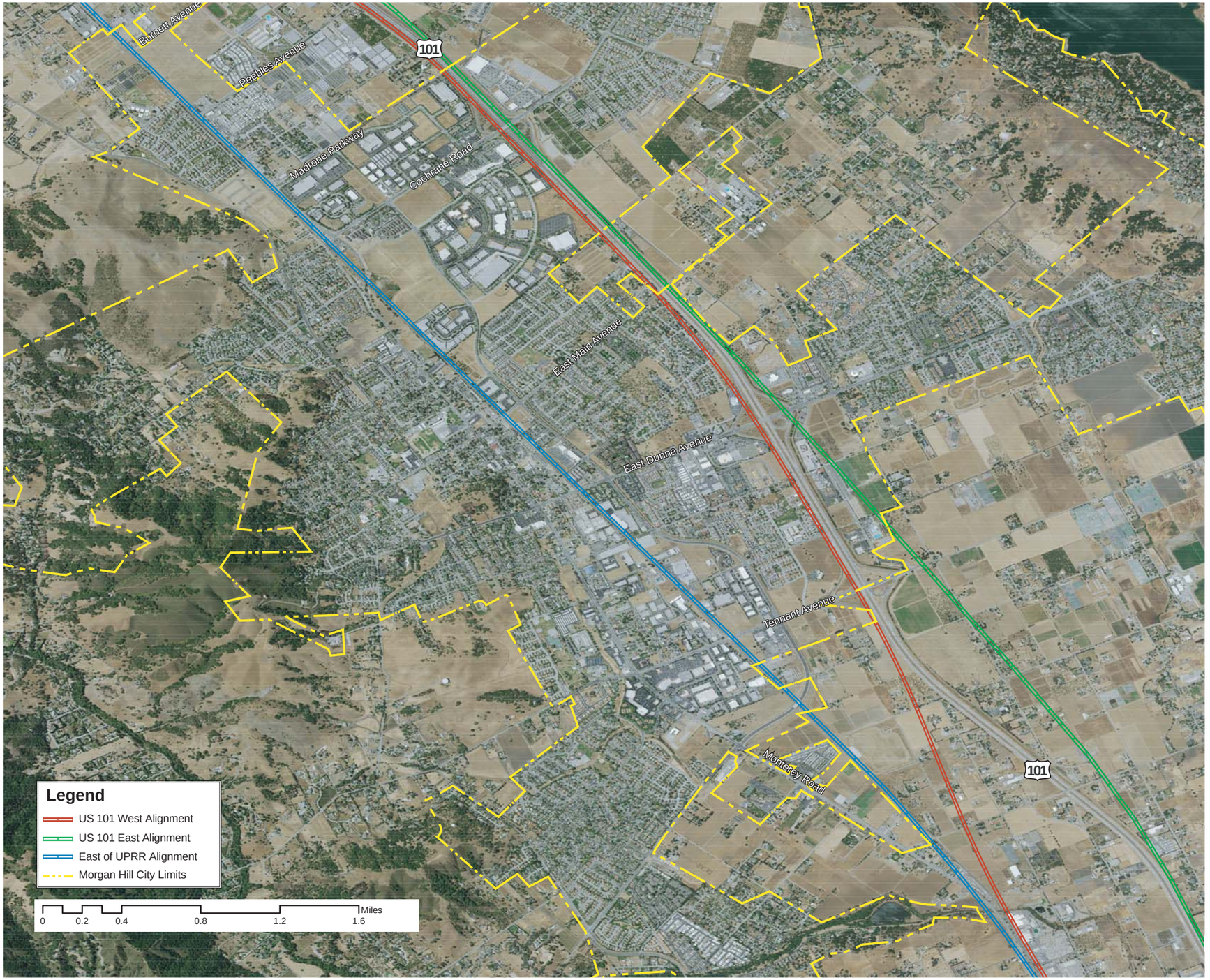


Figure 1
Alignment Options for the Proposed High Speed Rail Track

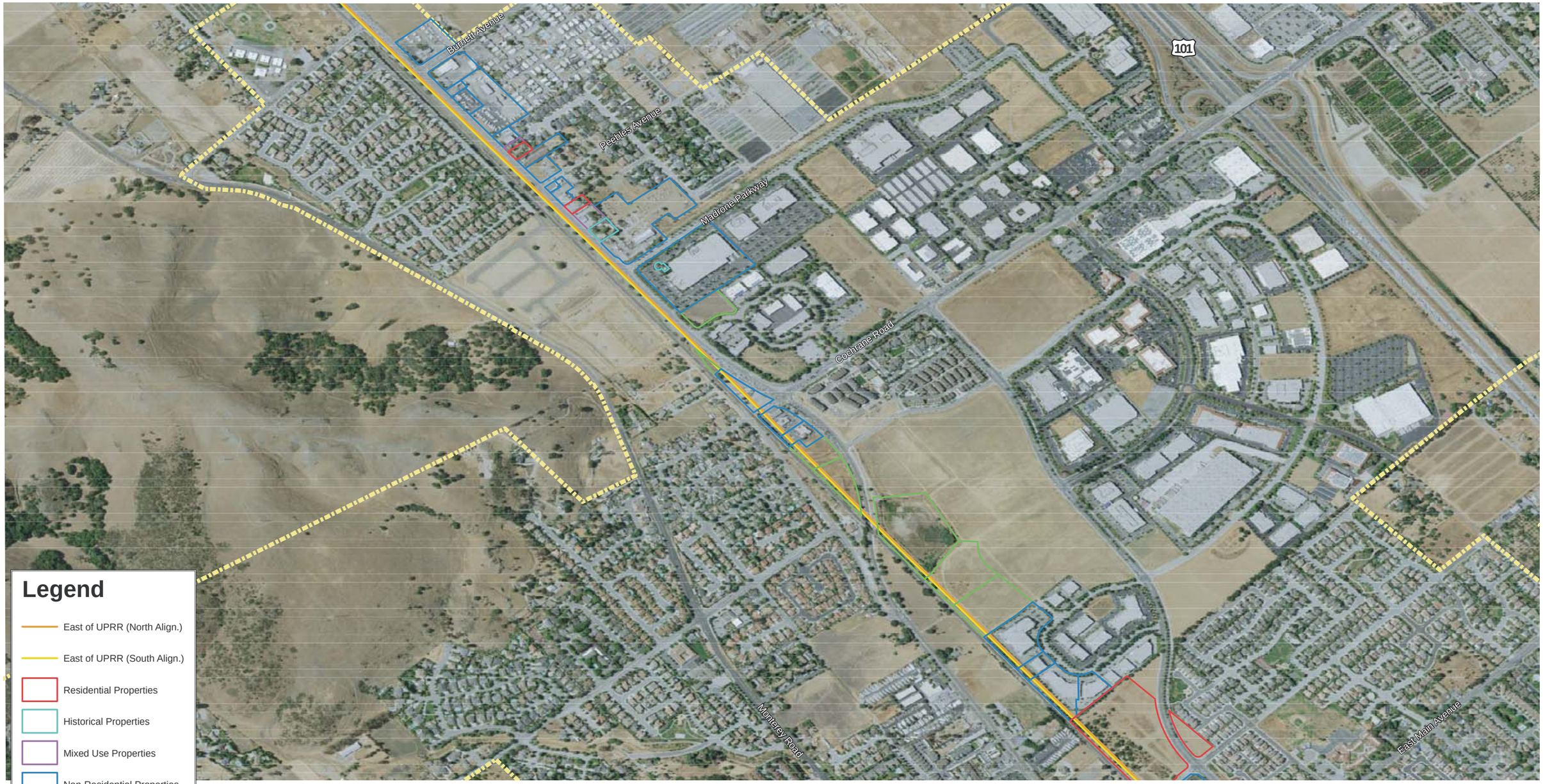


Figure 2a
Affected Properties by Option 1 (2) - East of UPRR Alignment

Figure 2b
Affected Properties by Option 1 (2) - East of UPRR Alignment

Figure 2c
Affected Properties by Option 1 (2) - East of UPRR Alignment

NORTH
Not to Scale

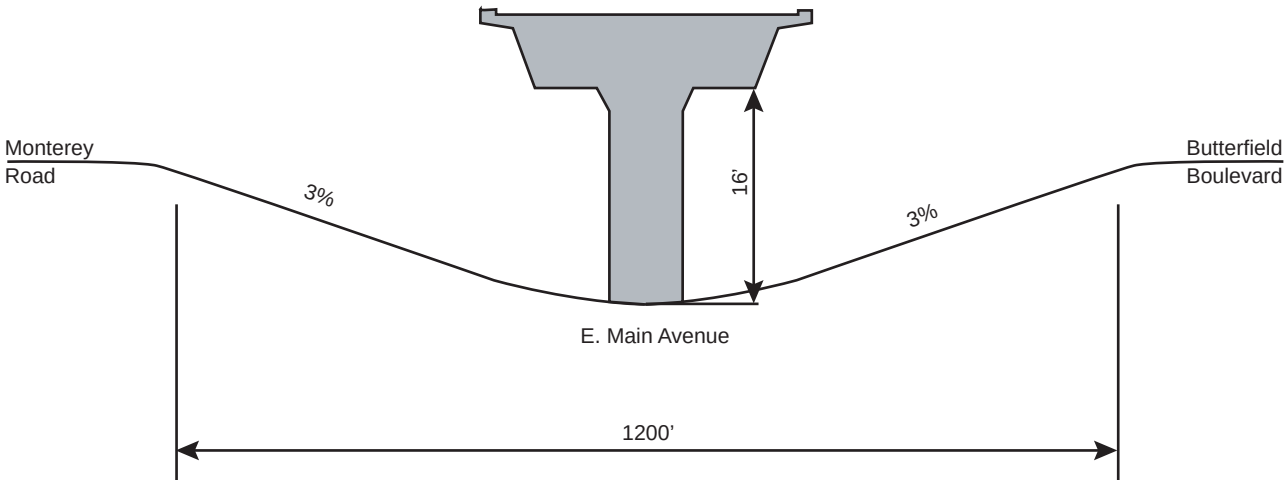


Figure 3
Proposed Underpass at Main Avenue

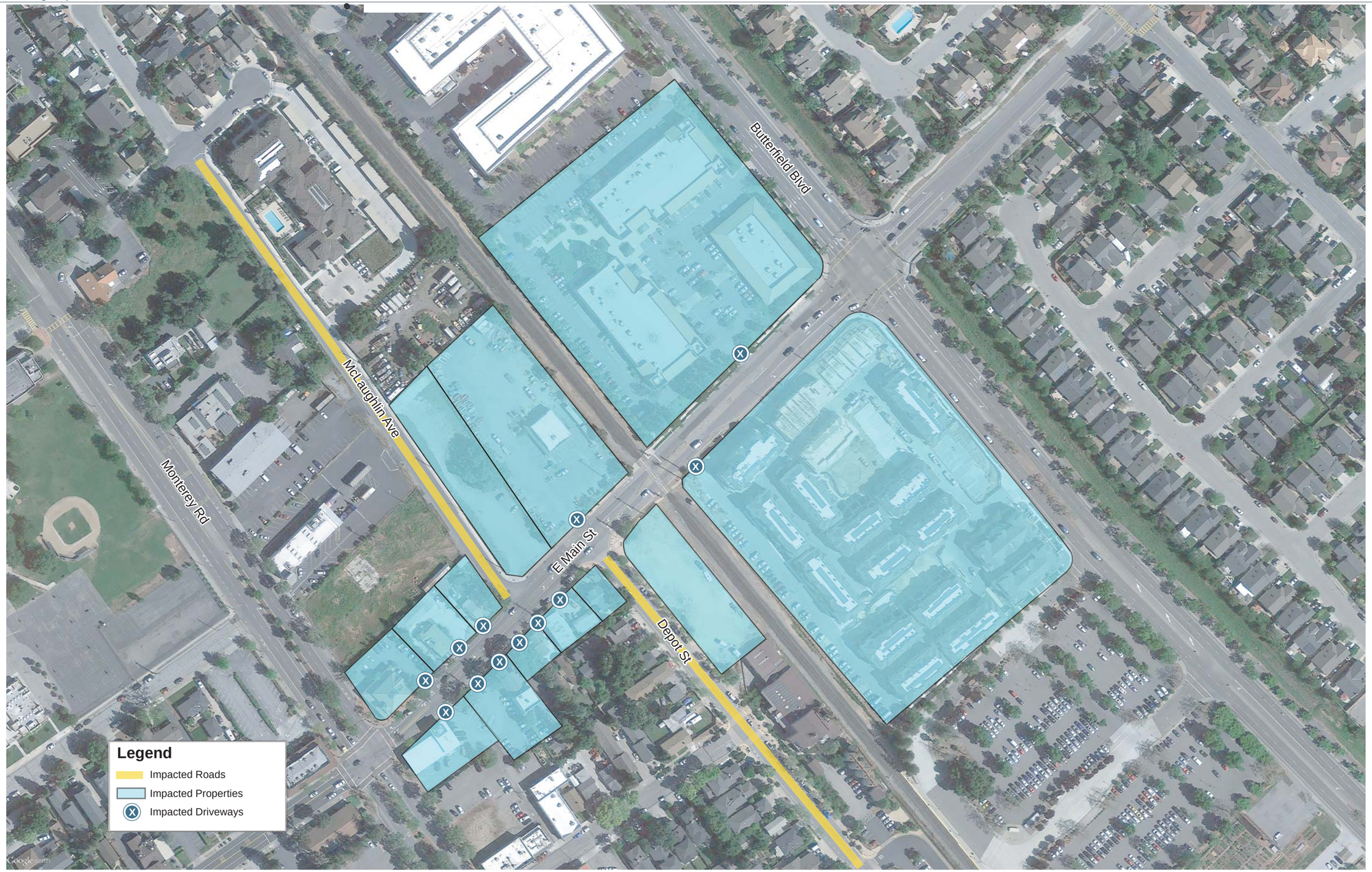


Figure 4
Affected Properties and their Driveways by the Proposed Underpass

NORTH
Not to Scale

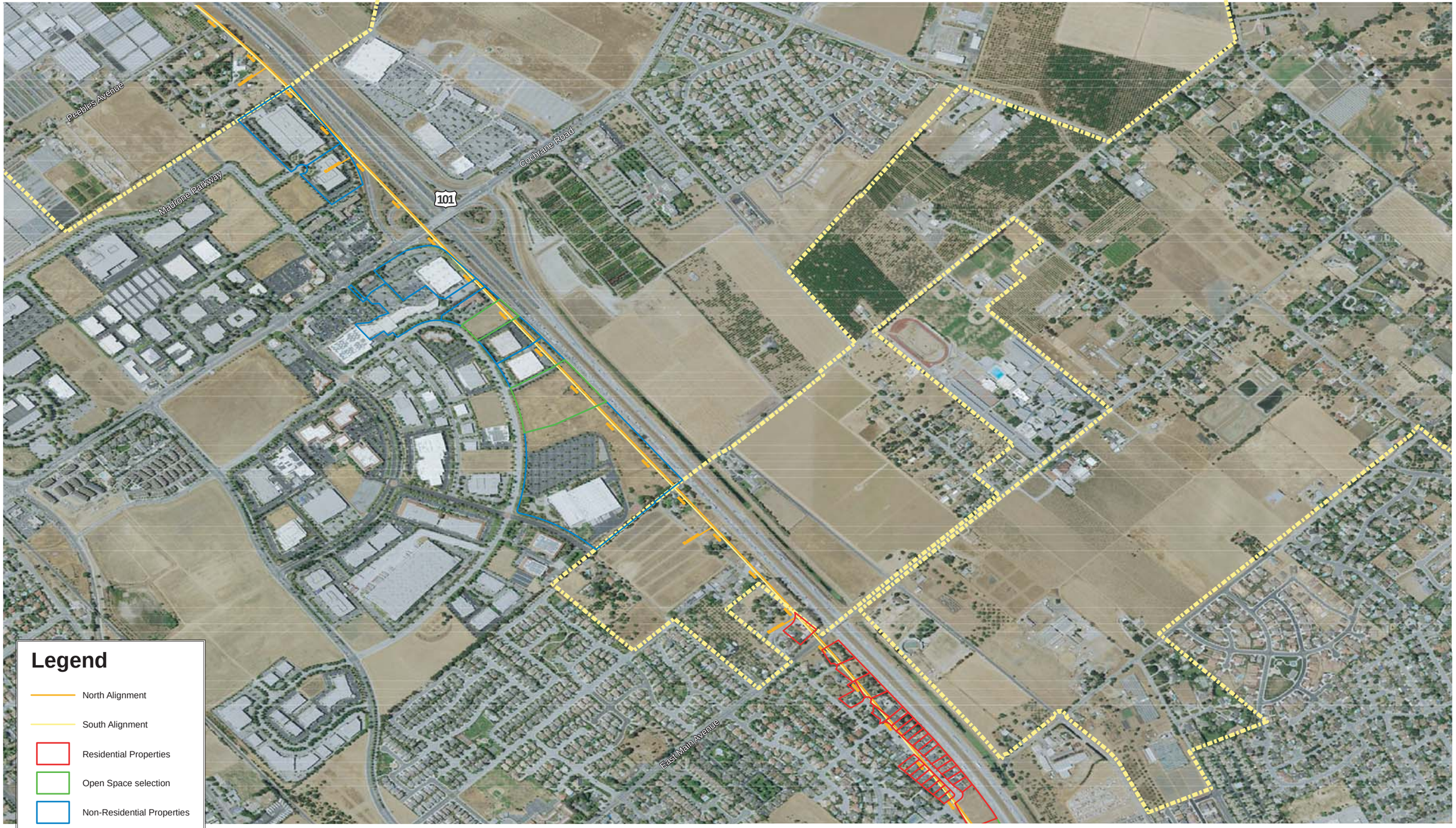


Figure 5a
Affected Properties by Option 3 - West of US 101 Alignment

Figure 5b
Affected Properties by Option 3 - West of US 101 Alignment

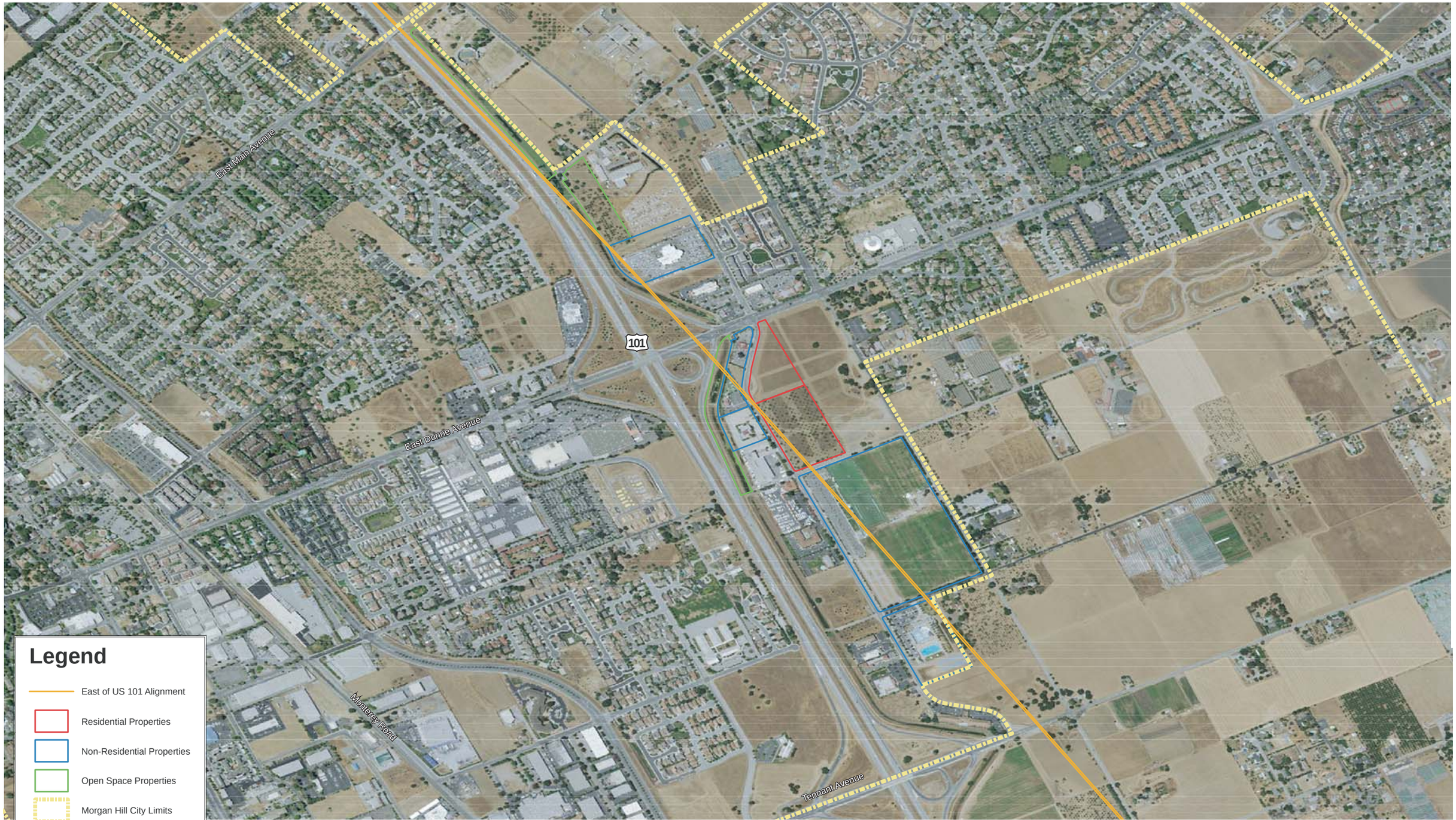


Figure 6
Affected Properties by Option 4 - East of US 101 Alignment

NORTH
Not to Scale

Appendix 1-E:
FRA Quiet Zone Flow Charts

Chart 2 - Creating a New Quiet Zone using SSMs

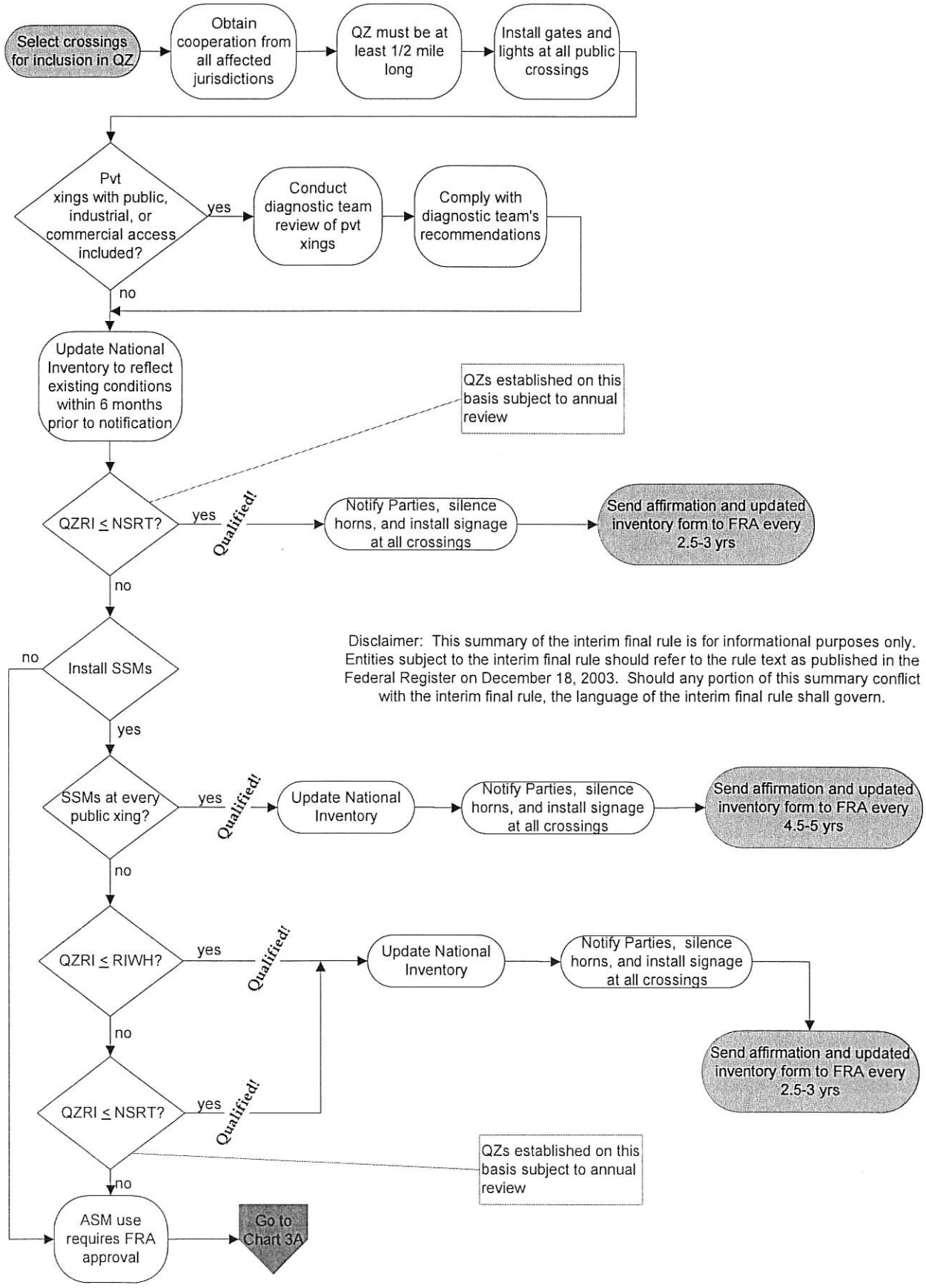


Chart 3A - Creating a Quiet Zone using Engineering ASMs (Modified SSMs)

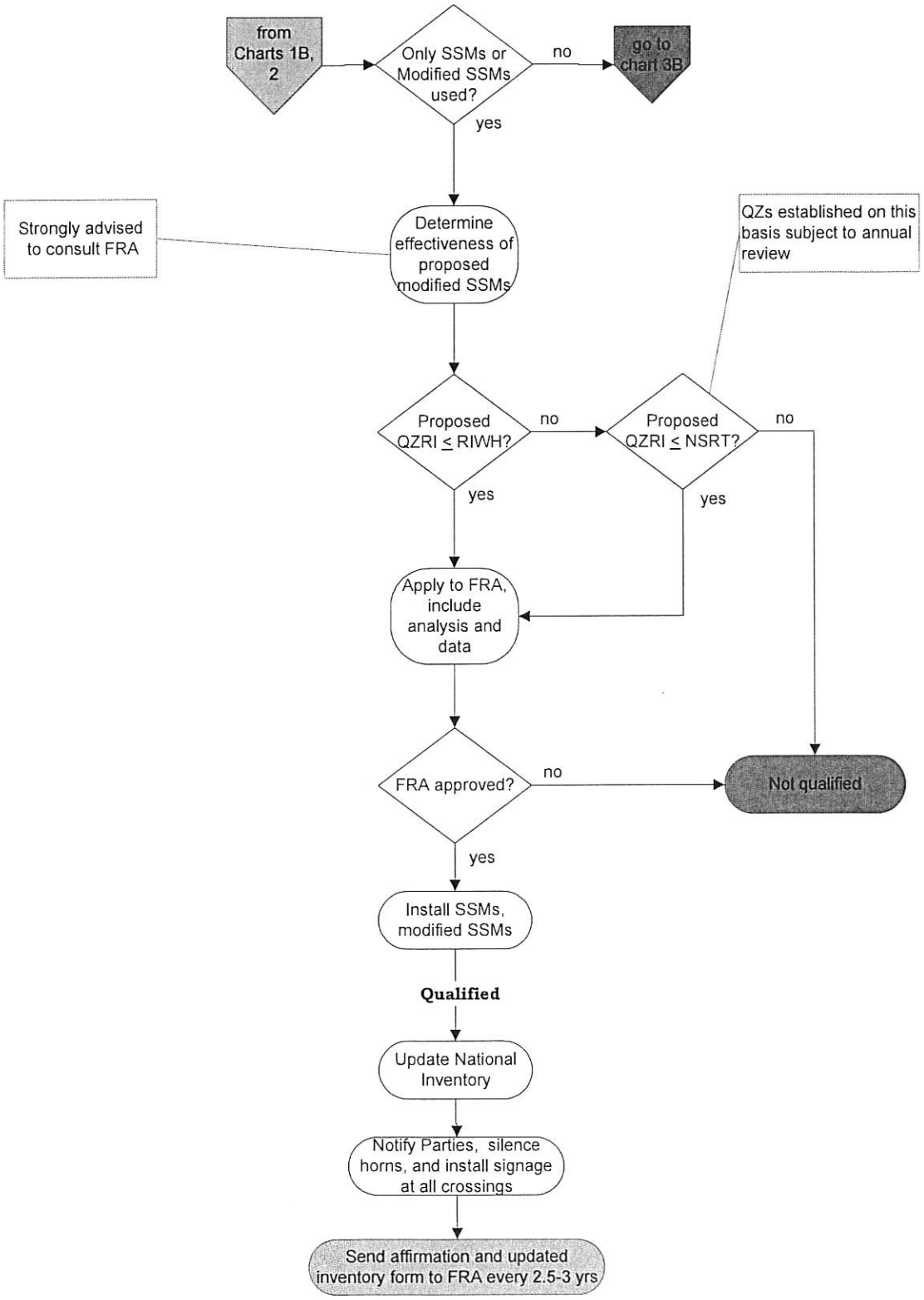
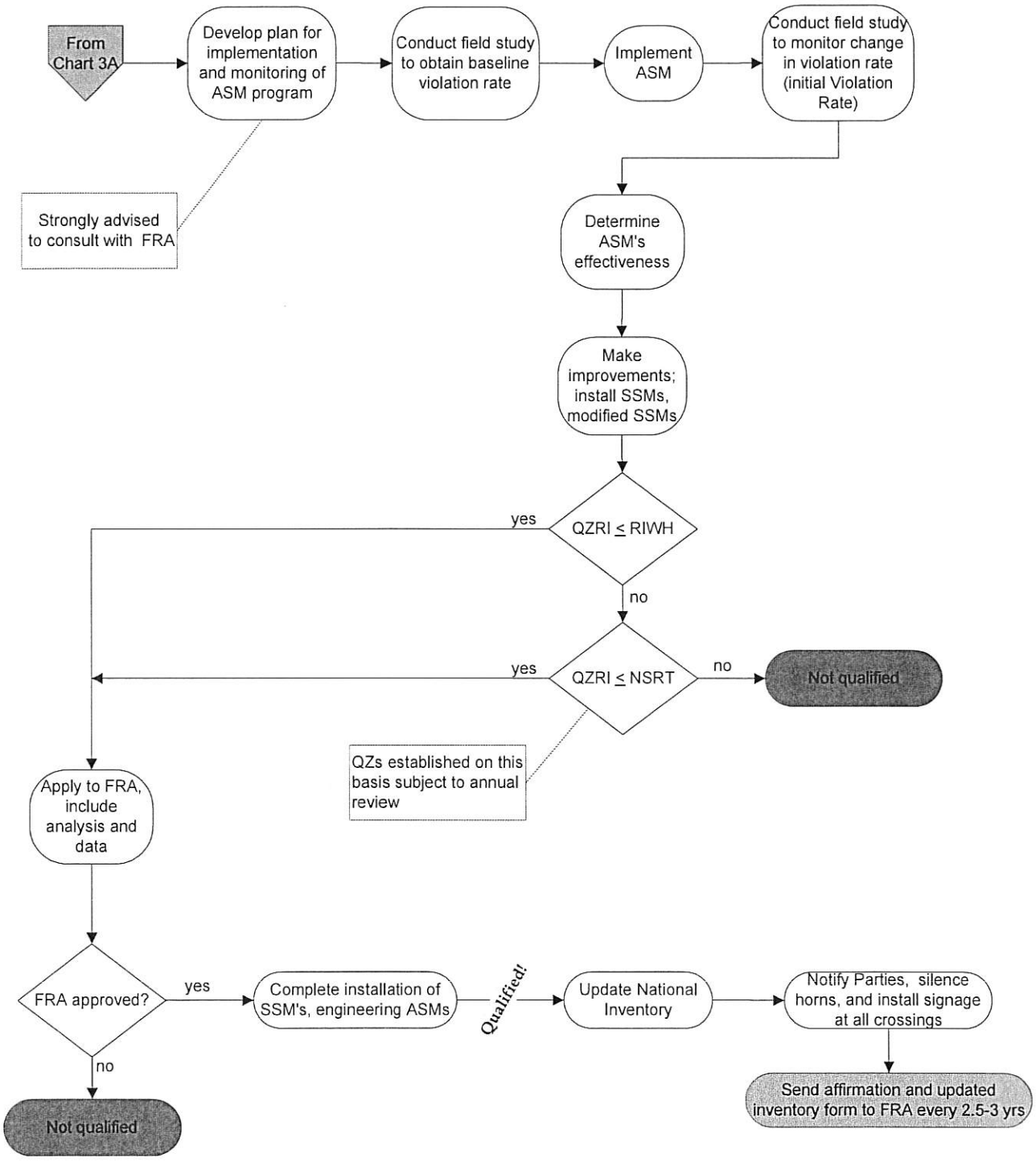


Chart 3B: Creating a Quiet Zone using Non-engineering ASMs



Appendix 1-F:
Parking Tables

Table F-1
Downtown Morgan Hill Parking Supply

	Private Lots			Public Lots/Structure			On-Street			Total	Grand
Block/Development	**Existing**	**Change**	**Total**	**Existing**	**Change**	**Total**	**Existing**	**Change**	**Total**	**Public**	**Total**
Downtown Core											
1	68	20	88	20	-20	0	28	0	28	28	116
Leal Vineyards[a]											
2	65	-50	15	0	0	0	38	0	38	38	53
Leal Vineyards[a]											
3	33	146	179	45	5	50	31	-8	23	73	252
Depot Station[b]											
Sunsweet[c]											
4	43	-19	24	271	0	271	38	0	38	309	333
Monterey and Third[d]											
5	43	-5	38	24	0	24	40	0	40	64	102
4th Street Wine Bar[e]											
6	0	0	0	240	0	240	42	0	42	282	282
7	11	40	51	74	0	74	28	0	28	102	153
Barley Place[f]											
8	0	0	0	93	-53	40	0	0	0	40	40
Depot Park[g]											
9	72	0	72	21	0	21	42	0	42	63	135
10	43	0	43	41	0	41	43	0	43	84	127
11	43	0	43	12	0	12	38	0	38	50	93
Edes Gallery[h]											
12	23	0	23	0	0	0	19	0	19	19	42
13	12	0	12	0	0	0	15	0	15	15	27
14	50	0	50	0	0	0	32	0	32	32	82
Subtotal	*506*	*132*	*638*	*841*	*-68*	*773*	*434*	*-8*	*426*	*1,199*	*1,837*
VTA and Courthouse Parking											
16	273	0	273	465	0	465	0	0	0	465	738
Grand Total	**779**	**132**	**911**	**1,306**	**-68**	**1,238**	**434**	**-8**	**426**	**1,664**	**2,575**

As of April 2017

Notes:

a. 20 spaces in Lot 8a converted from public to private on Block 1
Deleting 65 spaces in Lot 14 and add 15 spaces (net change is -50 spaces) on Block 2

b. Deleting 33 spaces in Lot 18. Adding 54 private spaces for residential (net change of 21 spaces). No spaces added for commercial.

c. Deleting 3 spaces on Third Street and 5 spaces on Depot Street, adding 125 private spaces and 5 excess (public spaces)

d. Deleting 19 spaces in Lot 23

e Deleting 5 spaces in Lot 32

f. Adding 32 residential and 8 retail spaces (net change of +40)

g. Deleting 53 spaces from Lot 40.

h. No parking changes.

Table F-2
Added Downtown Morgan Hill Public Parking Demand (Peak Period - Friday Evenings)

Block/Development	Provided Parking	Peak Demand	Add Public Demand
Downtown Core			
1 and 2			
Leal Vineyards[a]	65	195	130
3			
Depot Station[b]	55	69	14
Sunsweet[c]	19	5	14
4			
Monterey and Third[d]	0	34	34
5			
4th Street Wine Bar[e]	0	21	21
6			
7			
Barley Place[f]	40	47	7
8			
Depot Park[g]	0	0	0
9			
10			
11			
Edes Gallery[h]	0	28	28
12			
13			
14			
Subtotal	*179*	*399*	*248*
VTA and Courthouse Parking			
16	0	0	0
Grand Total	**179**	**399**	**248**

As of April 2017

Notes:

a. Demand estimate from *Morgan Hill Downtown Parking Conditions Study,* Hexagon, February 26, 2016

b. Demand estimate from M*organ Hill Downtown Parking Conditions Study* , Hexagon, February 26, 2016

c. Demand estimated as 6.8 ksf retail space X 2.8 spaces per ksf = 19 spaces
(Office demand = 0 on Friday evening, Residential demand accommodated by residential spaces)

d. Demand estimate from *Morgan Hill Downtown Parking Conditions Study* , Hexagon, February 26, 2016

e Demand estimated as (3.5 ksf + 0.5 X 7.8 ksf) X 2.8 spaces per ksf = 21 spaces

f. Demand estimate from *Morgan Hill Downtown Parking Conditions Study* , Hexagon, February 26, 2016

g. Parking demand already accounted for in existing parking counts

h. Demand estimated as 10 ksf retail/restaurant space X 2.8 spaces per ksf = 28 spaces

Appendix 1-G:
Intersection LOS Definitions

Intersection Level of Service Definitions

Signalized Intersections

The method described in Chapter 16 of the 2000 *Highway Capacity Manual* (HCM) (Special report 209, Transportation Research Board) was used to prepare the level of service calculations for the signalized intersections. This level of service method, which is approved by the City of Morgan Hill and VTA, analyzes a signalized intersection's operation based on average control delay per vehicle. Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay for signalized intersections is calculated using TRAFFIX analysis software and is correlated to a LOS designation as shown in Table G-1.

TABLE G-1: SIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS USING AVERAGE CONTROL VEHICULAR DELAY

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	≤ 10.0
B+ B B-	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 to 12.0 12.1 to 18.0 18.1 to 20.0
C+ C C-	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 23.0 23.1 to 32.0 32.1 to 35.0
D+ D D-	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, and high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 39.0 39.1 to 51.0 51.1 to 55.0
E+ E E-	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	55.1 to 60.0 60.1 to 75.0 75.1 to 80.0
F	Operations with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths.	> 80.0

Source: *Traffic Level of Service Analysis Guidelines*, VTA Congestion Management Program, June 2003; *Highway Capacity Manual*, Transportation Research Board, 2000.

Unsignalized Intersections

The operations of unsignalized intersections were evaluated using the method contained in Chapter 17 of the *2000 HCM*. LOS ratings for stop-sign-controlled intersections are based on the average control delay expressed in seconds per vehicle. At two-way or side-street-controlled intersections, the average control delay is calculated for each stopped movement, not for the intersection as a whole. For approaches composed of a single lane, the control delay is computed as the average of all movements in that lane. Table G-2 summarizes the relationship between delay and LOS for unsignalized intersections.

TABLE G-2: UNSIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS USING AVERAGE CONTROL VEHICULAR DELAY

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Little or no delay.	≤ 10.0
B	Short traffic delay.	10.1 to 15.0
C	Average traffic delays.	15.1 to 25.0
D	Long traffic delays.	25.1 to 35.0
E	Very long traffic delays.	35.1 to 50.0
F	Extreme traffic delays with intersection capacity exceeded.	> 50.0

Sources: *Traffic Level of Service Analysis Guidelines*, VTA Congestion Management Program, June 2003; *Highway Capacity Manual*, Transportation Research Board, 2000.

Appendix 1-H:
Collision Analysis

Collision Analysis

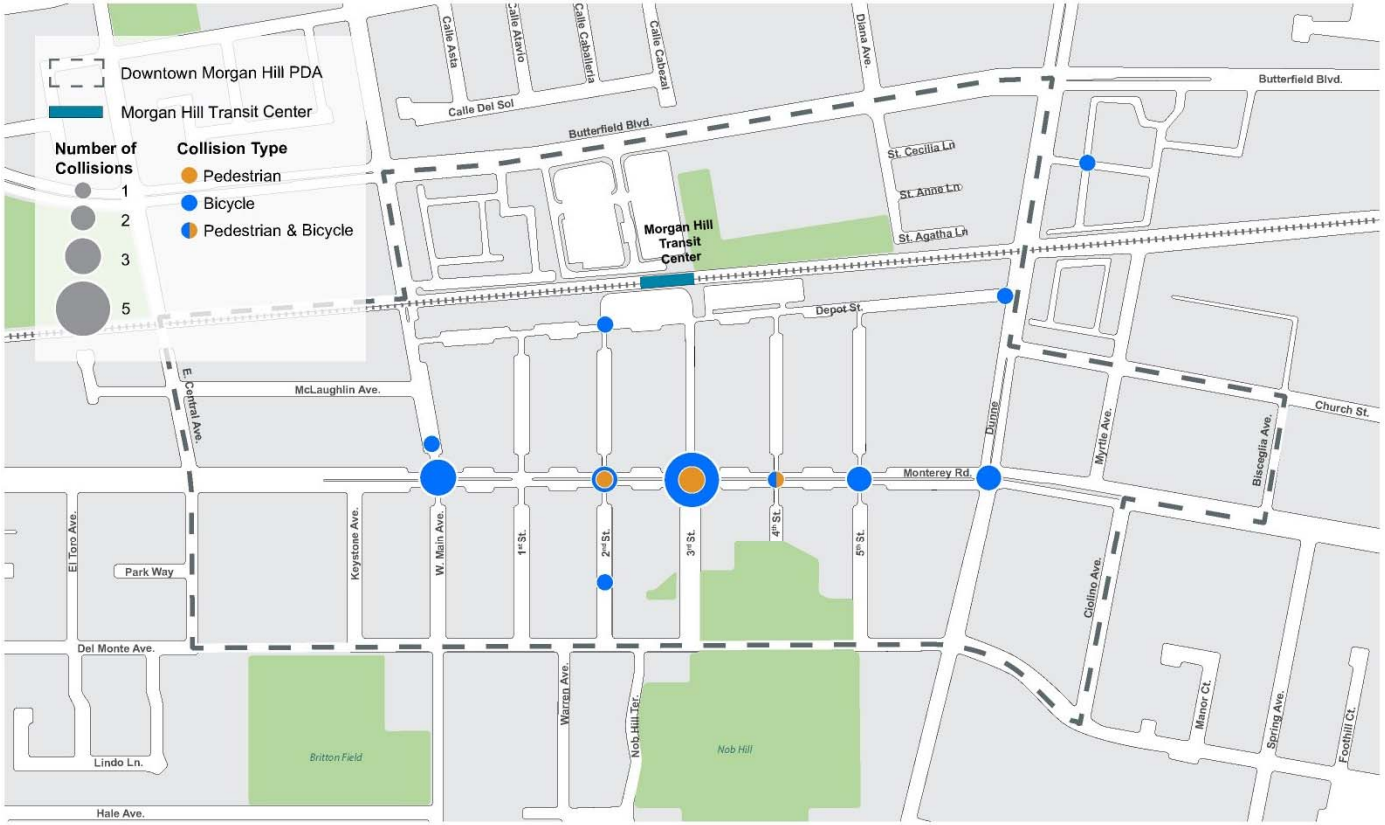
Collision data for the Downtown area was obtained from the City of Morgan Hill for the last several years from January 2013 through July 2016. The results are summarized in Table H-1 and presented on Figure H-1. An analysis was conducted solely to assess the number of collisions and their locations.

There have been four collisions involving pedestrians (one of them was a pedestrian/bike collision) and one collision with a vehicle and a bike in the 3½ year period. The location with the highest number of collisions is the intersection of Monterey Road and Third Street. One of the pedestrian-involved collisions at this location was a fatality. The City will be installing in-pavement flashers at this location to alert drivers of crossing pedestrians.

Table H-1: Collision Summary

Collision Type	2013	2014	2015	2016 (Jan – July)
Pedestrian	1	1	0	2
Bike	0	0	1	0
Vehicle	6	4	5	2
Total	7	4	6	4

Figure H-1: Collision Analysis (January 2013 – July 2016)



Collision Analysis (January 2013-July 2016)

City of Morgan Hill

cd+a COMMUNITY DESIGN + ARCHITECTURE

FEHR PEERS