16. TRANSPORTATION AND CIRCULATION

This chapter describes the regulatory framework and existing conditions for the General Plan Planning Area related to transportation, and the potential impacts of the project on transportation.

16.1 REGULATORY FRAMEWORK

This section summarizes federal agencies and regulations that pertain to transportation in the City of Hollister (the "City" or "Hollister").

16.1.1 FEDERAL AGENCIES AND REGULATIONS

16.1.1.1 Federal Highway Administration

The Federal Highway Administration (FHWA) is the agency of the United States Department of Transportation (DOT) that is responsible for the federally funded roadway system, including the interstate highway network and portions of the primary State highway network, including Highway 25 (SR 25) and Highway 156 (SR 156). FHWA funding is provided through the Fixing America's Surface Transportation Act (FAST Act). FAST Act can be used to fund local transportation improvements in Hollister, such as projects to improve the efficiency of existing roadways, traffic signal coordination, bikeways, and transit system upgrades.

16.1.1.2 Americans with Disabilities Act

The Americans with Disabilities Act (ADA) provides comprehensive rights and protections to individuals with disabilities. The goal of the ADA is to assure equality of opportunity, full participation, independent living, and economic self-sufficiency. To implement this goal, the United States Access Board has created accessibility guidelines for public rights-of-way. The guidelines address various issues, including roadway design practices, slope and terrain issues, pedestrian access to streets, sidewalks, curb ramps, street furnishings, pedestrian signals, parking, and other components of public rights-of-way.

16.1.2 STATE ENTITIES AND REGULATIONS

This section summarizes State agencies, regulations, and policies that pertain to transportation in Hollister.

16.1.2.1 California Department of Transportation

California Department of Transportation (Caltrans) is the primary State agency responsible for transportation matters. One of its duties is the construction and maintenance of the State highway system. Caltrans has established standards for roadway traffic flow and has developed procedures to determine if State-controlled facilities require improvements. For projects that may physically affect facilities under its administration, Caltrans requires encroachment permits before any construction work may be conducted. For projects that would not physically modify facilities but may influence traffic flow and levels of service at such facilities, Caltrans may recommend measures to mitigate the traffic impacts of such projects. Caltrans facilities within the Hollister study area include SR 25 and SR 156.

Additionally, the following Caltrans procedures and directives are relevant to transportation improvements in Hollister:

California Transportation Plan 2050. Caltrans' California Transportation Plan 2050 (CTP 2050) is a statewide, long-range transportation plan that establishes a policy framework for all levels of government to address future mobility needs and reduction of greenhouse gas (GHG) emissions. The CTP is updated every five years pursuant to state and Federal law, offering an opportunity to identify new and innovative solutions to the most pressing transportation challenges. Transportation goals identified in the CTP 2050 include improving multi-modal mobility and accessibility for all people and preserving the multi-modal transportation system. Policies related to these goals include operating an efficient transportation system; strategic investment; providing multi-modal choices; sustainable and preventative maintenance strategies; including life cycle costs in decision making; and adapting the transportation system to reduce impacts from climate change.

Caltrans Vehicle Miles Traveled-Focused Transportation Impact Study Guide (TISG). These guidelines were published in May 2020 and describe Caltrans' traffic study methodology for vehicle miles traveled (VMT) on Caltrans facilities. As a result of Senate Bill (SB) 743, California Environmental Quality Act (CEQA) has adopted VMT as a threshold for analyzing significant transportation impacts rather than intersection level of service (LOS), consistent with the SB 743 VMT requirements and the Governor's Office of Planning and Research (OPR) recommendations. The TISG is used by Caltrans' Local Development-Intergovernmental Review (LD-IGR) program for land use projects' environmental review. Goals identified in the TISG include reducing single occupancy vehicle trips, providing a safe transportation system, reducing per capita VMT, increasing accessibility to destinations through alternatives modes of transportation, and reducing GHG emissions.

Caltrans Project Development Procedures Manual. This manual outlines pertinent statutory requirements, planning policies, and implementing procedures regarding transportation facilities. It is continually and incrementally updated to reflect changes in policy and procedures.

Traffic Operations Policy Directive 13-02. Caltrans policy regarding applicable traffic controls has recently been expanded based on Traffic Operations Policy Directive 13-02. This directive requires that Caltrans consider the relative merits of alternative traffic controls when it becomes necessary to stop traffic on state highways. Roundabouts are the default intersection control, but all-way stops and traffic signals are to be considered. The policy directive requires preparation of an Intersection Control Evaluation to determine the preferred traffic control.

Caltrans Director's Policy 22. This policy establishes support for balancing transportation needs with community goals. Caltrans seeks to involve and integrate community goals in the planning, design, construction, and operations and maintenance (O&M) processes, including accommodating the needs of bicyclists and pedestrians.

Caltrans Deputy Directive 64. This directive requires Caltrans to consider the needs of non-motorized travelers, including pedestrians, bicyclists, and persons with disabilities, in all programming, planning, maintenance, construction, operations, and project development activities and products.

Caltrans Deputy Directive 64-R2. This directive requires Caltrans to provide for the needs of travelers of all ages and abilities in all planning, programming, design, construction, operations, and maintenance activities and products on the State highway system. Caltrans supports bicycle, pedestrian, and transit travel with a focus on "complete streets" that begins early in system planning and continues through project construction as well as O&M.

Caltrans Encroachment Permit. Caltrans requires an encroachment permit for improvements made to the state highway by private parties or local agencies. The permit process requires the submission of a Standard Encroachment Permit Application (TR-0100), along with supporting documentation consisting of site plans, location, map, letter of authorization, applicable fees, etc., to the Caltrans office which has jurisdiction over the encroachment site. Caltrans has up to 60 calendar days to review the application and provide a determination.

16.1.2.2 California Assembly Concurrent Resolution 211

Assembly Concurrent Resolution 211, enacted in 2002, acknowledges the importance of bicycling and walking to the State of California. The Resolution directs all cities and counties, including Hollister, to accommodate bicyclists in transportation projects and the United States DOT's design guidance document on integrating bicycling and walking when building their transportation infrastructure.

16.1.2.3 Complete Streets Act of 2008

The California Complete Streets Act (Assembly Bill 1358) requires cities and counties, when updating their general plans, to ensure that local streets meet the needs of all users. Beginning January 2011, any substantive revision of the circulation element in the general plan of a California local government will include complete streets provisions.

16.1.2.4 Senate Bill 743

On September 27, 2013, SB 743 was signed into law. The legislature found that with the adoption of the Sustainable Communities and Climate Protection Act of 2008 (SB 375), the State had signaled its commitment to encourage land use and transportation planning decisions and investments that reduce VMT and thereby contribute to the reduction of GHG, as required by the California Global Warming Solutions Act of 2006 (Assembly Bill 32). In December 2018, the Governor's OPR finalized guidelines on evaluating transportation impacts in CEQA based on the criteria of VMT.

The implementation of SB 743 eliminated the use of criteria such as auto delay, LOS, and similar measures of vehicle capacity of traffic congestion as the basis for determining significant impacts as part of CEQA compliance. The SB 743 VMT criteria promotes the reduction of GHG emissions, the development of multimodal transportation networks, and a diversity of land uses.

16.1.2.5 Executive Order N-79-20

In September 2020, California Governor Gavin Newsom signed Executive Order N-79-20 directing the State to require that, by 2035, all new cars and passenger trucks sold in California be zero-emission vehicles. Transportation currently accounts for more than 50 percent of California's GHG Emissions. Zero-emission vehicles are a key part of California's clean and innovative economy and is already California's second largest global export market. This Executive Order also directs the State to take more actions to tackle the dirtiest oil extraction and support workers and job retention and creation as we make a just transition away from fossil fuels.

16.1.3 REGIONAL ENTITIES AND REGULATIONS

16.1.3.1 Association of Monterey Bay Area Governments

The Association of Monterey Bay Area Governments (AMBAG) is the transportation planning, coordinating, and financing agency for the Monterey Bay Area, which includes Monterey, San Benito, and Santa Cruz counties. AMBAG is a federally designated metropolitan planning organization (MPO). Among AMBAG's many functions, it also authors the Metropolitan Transportation Plan and maintains the region's travel demand model, which incorporates regional housing, population, and employment forecasts. AMBAG is primarily funded from state and federal transportation funds and planning grants.

Metropolitan Transportation Plan

AMBAG is the federally designated MPO for the counties of Monterey, San Benito, and Santa Cruz. As the MPO, AMBAG develops the Metropolitan Transportation Plan and the Sustainable Communities Strategy (MTP/SCS) and updates it every four years through a bottom-up process involving numerous stakeholders. Transportation investments in the Monterey Bay Area that receive state and federal funds or require federal approvals must be consistent with the MTP/SCS.

The 2040 MTP/SCS is a living document that must be updated to reflect the most current information and conditions and remain relevant and useful. Updating the MTP/SCS requires an examination of the progress the region is making, not just in terms of delivering projects, but also in terms of meeting the region's vision, goals, and objectives. The 2040 MTP/SCS further specifies a detailed set of investments and strategies throughout the region to maintain, manage, and improve the surface transportation system, specifying how anticipated federal, State, and local transportation funds will be spent. Projects funded all or in part with regional funds (e.g. federal funds, State Transportation Improvement Program funds, bridge tolls) must consider the accommodation of bicycle and pedestrian facilities, as described in Caltrans Deputy Directive 64. These recommendations do not replace locally adopted policies regarding transportation planning, design, and construction. Instead, these recommendations facilitate the accommodation of pedestrians, including wheelchair users, and bicyclists into all projects where doing so would be consistent with current adopted regional and local plans. Transportation projects that use regional funds in the Hollister study area are subject to this policy.

16.1.3.2 Council of San Benito County Governments

The Council of Governments (COG) is San Benito County's regional transportation planning agency. COG addresses regional issues facing the County, as well as Cities of Hollister and San Juan Bautista.

COG's Board of Directors has five members- two representatives each from the San Benito County Board of Supervisors and the Hollister City Council, and one representative from the San Juan Bautista City Council. The actions of COG are governed by its Joint Powers Agreement, Transportation Development Act (TDA) regulations, the California Administrative Code, and Memorandums of Understanding with Caltrans.

As a primary function, COG prepares a county-wide Regional Transportation Plan (RTP) every four years. The RTP considers future growth and the transportation investments needed to support the planned expansion of residential, commercial, and industrial sectors. The RTP sets forth policy over the next 20 years.

San Benito County Transit Network Expansion

San Benito County Local Transportation Authority (LTA) conducted the *Analysis of Public Transit Network Expansion Projects for Congestion Relief of Highway 25 Corridor, Kimley-Horn, June 2020.* This study evaluated three scenarios to improve transit options for those traveling between Hollister and areas to the north including Gilroy and the Bay Area using the SR 25/rail corridor. The scenarios were:

1. Bus-On-Shoulder
2. Bus-Beside-Rail
3. Passenger Rail

Bus-On-Shoulder would improve SR 25 to enhance the shoulders to accommodate buses, allowing them to by-pass traffic congestion, making the service more convenient for commuters looking for a faster, less stressful trip. Bus-Beside-Rail would provide a new facility exclusive for buses beside the rail corridor. Passenger rail service would include a new rail station in the City of Hollister with train service to the Gilroy station, directly connecting with Caltrain.

The study evaluated a number of benefits and the costs of each scenario to determine which investment would provide the most cost-effective opportunities. Table 16-1 summarizes the benefit / cost for each scenario. At this time, there is no funding in place for these improvements. COG will now pursue grant funding opportunities to conduct a detailed operational analysis.

16.1.4 LOCAL REGULATIONS

This section summarizes City policies and regulations that pertain to transportation and transit in Hollister.

16.1.4.1 Hollister General Plan

The General Plan Circulation Element offers mechanisms for making Hollister a safe and efficient place to travel, whether by train, bus, car, bike, or foot. It contains policies and actions to make the existing road

TABLE 16 -1 – TRANSIT SCENARIOS BENEFITS AND COSTS

	Scenario:	Bus-on-Shoulder (BOS)	Bus-Beside-Rail (BBR)	Passenger Rail
	Description:	Hollister and SR 25 Corridor BOS Improvements	Hollister and BBR Corridor Improvements	Track Improvement and Station Development
Benefits	2040 Annual Ridership	87,362	107,619	142,980
	Travel Time Savings	$1.9 M	$4.0 M	$8.7 M
	Crash Cost Savings	$0.4 M	$0.8 M	$2.4 M
	CO_2 Emissions Saved	4,247 T	8,651 T	20,652 T
Costs	Construction Cost	$32,270,000	$29,810,000	$74,120,000
	Soft Cost	$8,370,000	$10,440,000	$25,950,000
	Total Capital Costs	**$40,640,000**	**$40,250,000**	**$100,070,000**
	Annual Operations & Maintenance Cost	*$1,219,000*	*$1,126,000*	*$3,206,000*

*All values in 2019 dollars

network more efficient and user-friendly, ensure safe and appropriate operation of the transportation system, solve existing traffic and parking problems, and expand transit and non-motorized travel opportunities. These policies and actions are grouped under the following four goals:

Goal C1: Design and implement the City's circulation system to serve the planned residential and economic growth specified in the General Plan.

Goal C2: Provide a variety of pedestrian and bicycle facilities to promote safe and efficient non-motorized vehicle circulation in Downtown and throughout Hollister. Facilities should accommodate recreational and commuter circulation patterns.

Goal C3: Cooperate with Caltrans, COG, the County of San Benito and any other regional transportation authorities to ensure the funding and implementation of the transportation improvements specified in the San Benito County RTP.

Goal C4: Continue to implement a uniform set of standards for Hollister's transportation system including standard rights-of-way and typical sections. These standards may be amended as necessary in response to changes in technology and industry design standards.

16.1.4.2 Hollister Municipal Code

Title 10 of the Hollister Municipal Code establishes the City's vehicle and traffic regulations including traffic control, speed limits, authority to designate truck routes, etc.

Chapter 17.18 of the Code establishes off-street parking and loading requirements for vehicles and bikes, including requirements for the number of spaces based on the use and/or location, parking and loading space standards, and ADA requirements.

16.1.4.3 Hollister Resolution No. 2019-75

Resolution No. 2019-75, which was adopted by the City Council on April 15, 2019, has established that roundabouts may be considered at some intersections as it may improve intersection operations to increase pedestrian, bicycle, and vehicle safety.

16.1.4.4 Complete Streets Study

The City of Hollister is currently conducting a Complete Street Study along the following major corridors in the City:

- Buena Vista Road
- Santa Ana Road
- Meridian Street
- Memorial Drive

The goal of the study is to establish policy direction and guidelines for future pedestrian and bicycle improvements along these corridors. These guidelines can also be applied more broadly to citywide bicycle and pedestrian improvements along corridors throughout city.

The City of Hollister has also adopted the *Monterey Bay Area Complete Streets Guidebook, AMBAG, August 2013*. The goal of the guidebook is to provide resources and procedures to local agencies for complete streets projects.

16.1.4.5 Traffic Calming

The City is also embarking on traffic calming projects in several neighborhoods. This includes the following streets currently under investigation for traffic calming include:

- Central Avenue
- Ladd Lane
- Sally Street

16.2 EXISTING CONDITIONS

16.2.1 ROADWAY SYSTEM

Hollister is served by an extensive roadway network of freeways, arterials, and local roads. These roadways provide access to the surrounding municipalities and to local destinations, such as employment areas, shopping centers, schools, recreational opportunities, and residential communities.

The City of Hollister is responsible for planning, constructing, and maintaining local roadways within the City limits. The County of San Benito has similar responsibility for roads in unincorporated areas and expressways throughout San Benito County.

16.2.1.1 Functional Roadway Classifications

Roads are typically classified and defined by their function. Classification of roadways in the City of Hollister are as follows:

Freeways. Operated and maintained by Caltrans, these facilities are designed as high-volume, high-speed facilities for intercity and regional traffic. Access to these facilities (access points) is limited and only available via ramps and mobility (speeds) is high. No freeways are located within Hollister’s City limits. The nearest freeway to the City is US 101 and is located in San Benito County, approximately 9 miles to the west of the western City limits. US 101 is the primary access road to Silicon Valley and the greater San Francisco Bay Area, where many Hollister residents work.

Highways. Operated and maintained by the Caltrans within Hollister, these facilities are designed as high-volume, high-speed facilities for intercity and regional traffic. Access to these facilities (access points) is limited and mobility (speeds) is high. Unlike freeways, highways can be accessed via signal control or stop-sign controlled access points. SR 25 and SR 156 are examples of highways within and near the City limits.

Arterials. These facilities make up the principal network for through traffic within a community and often between communities. Arterials have between two and six traffic lanes and provide connections between residential neighborhoods, shopping areas, places of employment, parks and recreational facilities, and other places of assembly. Access to arterials is higher than freeways, but mobility is lower. San Felipe Road and San Benito Road are examples of arterials in Hollister.

Collectors. Typically, collectors (two-lane facilities) function as the main interior streets within neighborhoods and business areas and are designed to carry traffic between local roads and arterials. Collectors provide higher access than freeways and arterials, but lower mobility. Central Avenue and El Toro Drive are examples of collector roadways in the City.

Local. These are two-lane neighborhood streets that could be located in residential, commercial, industrial, and rural areas. Local roadways provide the highest access, but lowest mobility.

Figure 16-1 shows the City roadway network and the roadway’s classification.

16.2.1.2 Level of Service at Intersections

In 2020, Kimley-Horn analyzed traffic conditions at key study intersections for the weekday AM and PM peak hours of traffic. Key study intersections in the City are shown in Figure 16-2. The weekday AM peak hour traffic generally falls between 7:00 to 9:00 a.m. and the weekday PM peak hour generally falls between 4:00 to 6:00 p.m. On an average day, the most congested traffic conditions in the City occur during these times. Due to COVID-19 and the changes in traffic patterns that were caused by more work from home for businesses, closed schools, etc., historical traffic data was evaluated to determine appropriate traffic growth rates to estimate 2020 existing operations on the study roadways. StreetLight Data, Inc. (big data) was utilized in conjunction with historical count data to estimate 2020 existing traffic conditions. A white paper describing these methodologies in detail is included in Appendix A.

Figure 16-1 Roadway Classifications

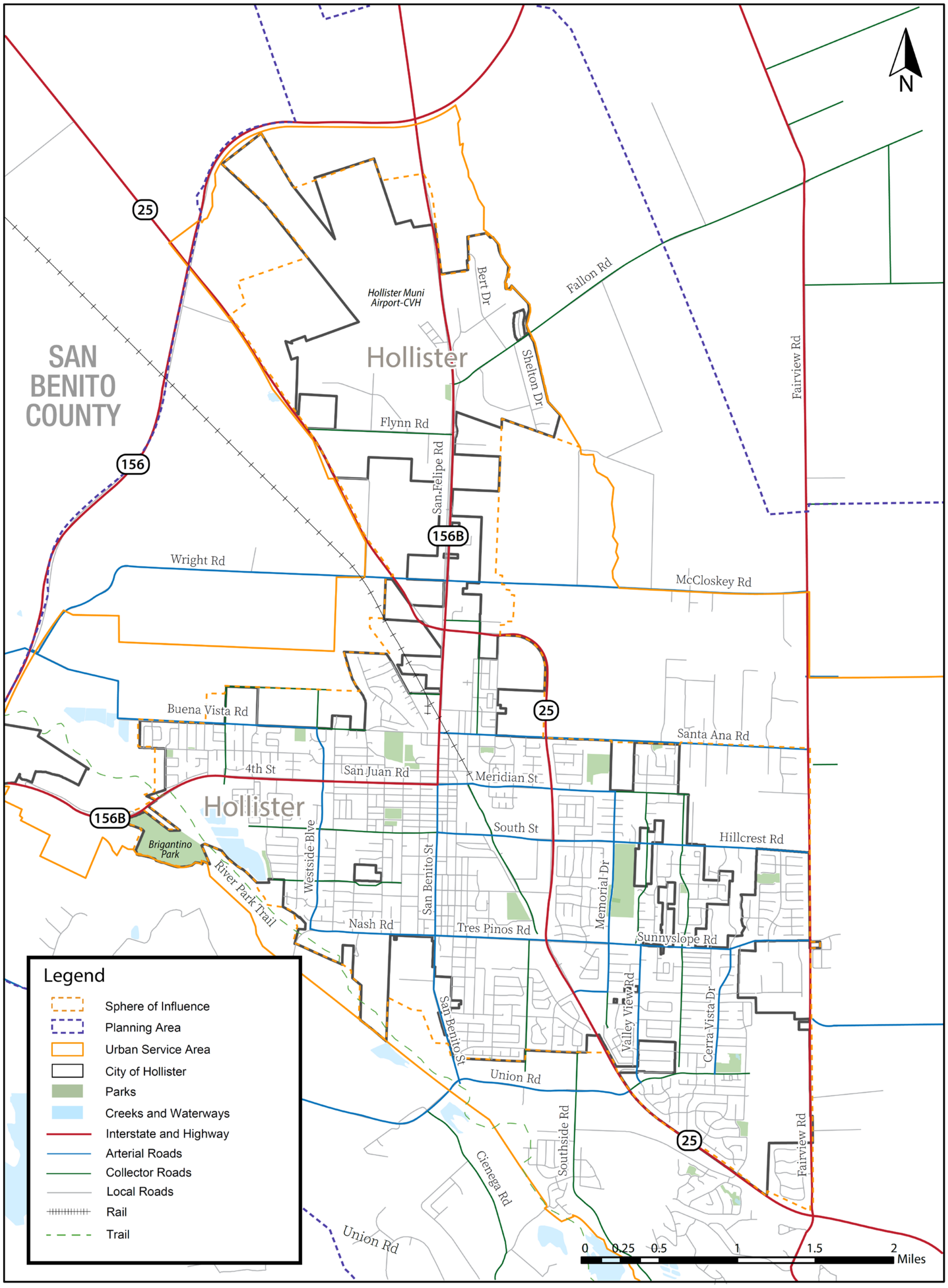
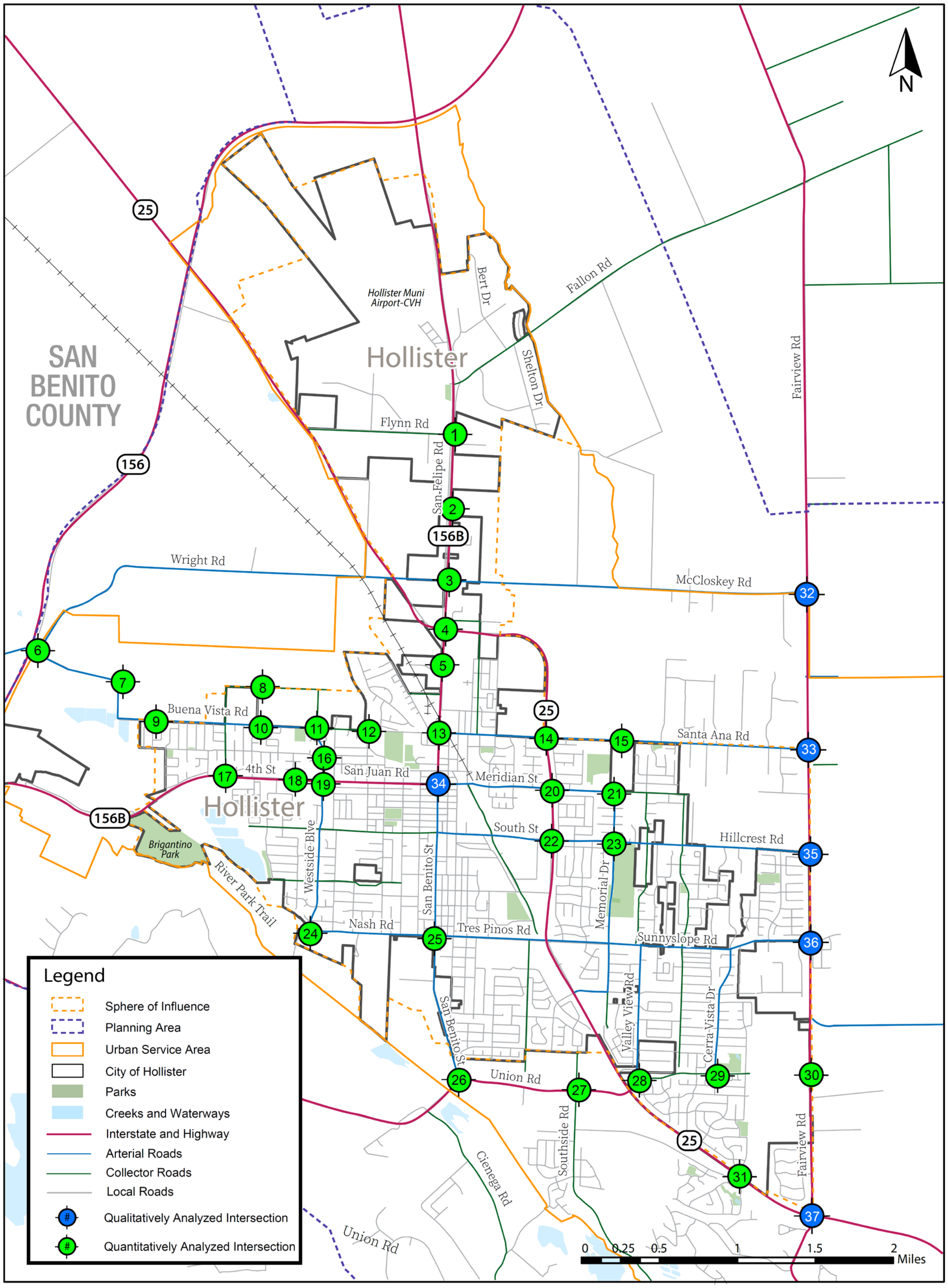


Figure 16-2 Study Intersections



Study intersections are summarized in tabular format in Table 16-2. Intersections 1 to 31 were evaluated quantitatively by determining LOS and delay while Intersections 32 to 37 were qualitatively discussed by describing its operations based on data from historical traffic studies.

TABLE 16 -2 – KEY STUDY INTERSECTIONS

#	Location	Existing Control	#	Location	Existing Control
1	San Felipe Rd & Flynn Rd	SSSC	20	Meridian St & SR 25	Signal
2	San Felipe & E-W Connector to SR 25 (Future)	-	21	Meridian St & Memorial Dr	AWSC
3	San Felipe Rd & Wright Rd/McCloskey Rd	Signal	22	Hillcrest Rd & SR 25	Signal
4	SR 25/Bolsa Rd & San Felipe Rd	Signal	23	Hillcrest Rd & Memorial Dr	AWSC
5	San Felipe & Pacific Way (Future)	-	24	Westside Blvd & Nash Rd	SSSC
6	SR 156 & Buena Vista Rd	SSSC	25	San Benito St & Nash Rd / Tres Pinos Rd	Signal
7	Buena Vista Rd & Westside Rd West (Future)	-	26	San Benito St & Union Rd	Signal
8	Miller Rd & Westside Rd (Future)	-	27	Union Rd & Southside Rd	Signal
9	Buena Vista Rd & Beresini Ln	SSSC	28	Union Rd & SR 25/Airline Hwy	Signal
10	Buena Vista Rd & Miller Rd	SSSC	29	Union Rd & Cerra Vista Dr	AWSC
11	Buena Vista Rd & Westside Rd East	SSSC	30	Union Rd & Fairview Rd (Future)	-
12	Buena Vista Rd & College St/Locust Ave (Future)	-	31	SR 25/Airline Hwy & Enterprise Rd	SSSC
13	North St/Santa Ana Rd & San Felipe Rd/San Benito St	Signal	32	Fairview Rd & McCloskey Rd[1]	SSSC
14	San Benito Rd/SR 25 & Santa Ana Rd	Signal	33	Fairview Rd & Santa Ana Rd[1]	Signal
15	Memorial Dr & Santa Ana Rd (Future)	-	34	San Benito St & San Juan Rd/4th St[1]	Signal
16	Westside Blvd & Central Ave	SSSC	35	Fairview Rd & Hillcrest Rd[1]	SSSC
17	4th St & New Driveway near S&S (Future)	-	36	Fairview Rd & Sunnyslope Rd[1]	Signal
18	4th St & Felice Dr	SSSC	37	Fairview Rd & SR 25[1]	Signal
19	Westside Blvd & San Juan Rd/4th St	Signal			

Source: Kimley-Horn, 2020.
Note: Signal = Signal Control, SSSC = Side-Street Stop Controlled, AWSC = All-way Stop Controlled.
[1] Intersection was analyzed qualitatively only.

16.2.2 EXISTING TRAFFIC CONDITIONS

16.2.2.1 Level of Service Analysis Methodology

Traffic conditions at the study intersections were evaluated using LOS. LOS is a qualitative description of operating conditions ranging from LOS A, which is free-flow conditions with little or no delay, to LOS F, which is jammed conditions with excessive delays. The correlation between average delay and LOS for signalized and unsignalized intersections is shown in Table 16-3. LOS for side-street stop-controlled intersections (SSSC) are defined as a function of the average control delay for the worst minor street movement or major street left-turn. Conversely, LOS for signalized and all-way stop-controlled (AWSC) intersections are defined as a function of the averaged control delay for the intersection as a whole.

TABLE 16 -3 – INTERSECTION LEVEL OF SERVICE DEFINITIONS

LOS	Description	Signalized	Unsignalized
A	Free flow with no delays. Users are virtually unaffected by others in the traffic stream	Less than 10	less than 10
B	Stable traffic. Traffic flows smoothly with few delays.	less than or equal to 10 to 20	less than or equal to 10 to 15
C	Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays.	less than or equal to 20 to 35	less than or equal to 15 to 25
D	Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours.	less than or equal to 35 to 55	less than or equal to 25 to 35
E	Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing.	less than or equal to 55 to 80	less than or equal to 35 to 50
F	Forced or breakdown flow that causes reduced capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing.	greater than or equal to 80	greater than or equal to 50

Source: Transportation Research Board, *Highway Capacity Manual 6th Edition*, National Research Council.

The General Plan's Circulation Element establishes the acceptable LOS at City intersections as LOS C. All signalized and unsignalized intersections within the City of Hollister are required to meet the City's LOS standard of LOS C. Intersections operating at LOS D or worse would therefore be considered deficient.

16.2.2.2 Existing Roadway Volumes

Kimley-Horn has estimate 24-hour volumes for each of the major local roadways within the City.

Table 16-4 presents key roadways in the City, number of lanes (in both directions), average daily traffic volumes (ADT), and posted speed limits of each roadway.

TABLE 16-4 – KEY ROADWAY VOLUMES, LANES, AND SPEED LIMITS

Roadway	Location	Number of Lanes	ADT (Both Directions)	Posted Speed Limit
San Felipe Rd	N of Flynn Rd	4	11800	55
San Felipe Rd	S of SR 25/Bolsa Rd	4	16300	40
San Felipe Rd	S of North St/Santa Ana Rd	4	16100	25
San Benito St	N of Nash Rd/Tres Pinos Rd	2	9900	30
San Benito St	S of Nash Rd/Tres Pinos Rd	2	8200	30
SR 25/Bolsa Rd	W of San Felipe Rd	2	14100	55
SR 25	N of Santa Ana Rd	4	14500	55
SR 25	Santa Ana Rd to Meridian St	4	16300	45
SR 25	Meridian St to Hillcrest Rd	4	17800	45
SR 25/Airline Hwy	N of Union Rd	2	15300	55
SR 25/Airline Hwy	Union Rd to Enterprise Rd	2	10600	55
SR 25/Airline Hwy	S of Enterprise Rd	2	8600	55
Buena Vista Rd	W of Beresini Ln	2	2800	30
Buena Vista Rd	W of Miller Rd	2	3400	30
Buena Vista Rd	W of Westside Rd	2	2800	30
Buena Vista Rd	E of Westside Rd	2	3900	30
Santa Ana Rd	E of San Felipe Rd/San Benito St	2	1300	25
Santa Ana Rd	E of SR 25	2	7100	40
4th St	W of Felice Dr	3	12300	40
San Juan Rd	E of Westside Blvd	2	12200	35
Meridian St	W of SR 25	4	7600	30
Meridian St	W of Memorial Dr	4	3000	30
Hillcrest Rd	W of SR 25	2	9500	35
Hillcrest Rd	W of Memorial Dr	4	7100	45
Nash Rd	W of Westside Blvd	2	2800	30
Nash Rd	W of San Benito St	2	12500	30
Nash Rd	E of San Benito St	3	8900	30
Union Rd	W of San Benito St	2	9900	55
Union Rd	W of Southside Rd	2	9500	55
Union Rd	W of SR 25/Airline Hwy	2	7100	55
Union Rd	E of SR 25/Airline Hwy	2	9500	35

Source: Kimley-Horn, 2020.

16.2.2.3 Existing Intersection Level of Service

The LOS analysis for existing 2020 conditions was conducted utilizing the existing traffic volumes, traffic control, and intersection geometries as described above for Intersections 1 to 31. Note that as previously discussed, 2020 LOS results presented in this analysis and report reflect forecasted 2020 traffic volumes (see previous discussion on methodology), and not COVID-19 affected volumes or operations. Intersection LOS analysis results are summarized in Table 16-5. The analysis results indicate that all study intersections currently operate at acceptable LOS when measured against the City of Hollister and Caltrans LOS standards, except for the following:

- Intersection 1 - San Felipe Rd & Flynn Rd (PM Peak Hour)
- Intersection 4 - SR 25/Bolsa Rd & San Felipe Rd (PM Peak Hour)
- Intersection 6 - SR 156 & Buena Vista Rd (PM Peak Hour)
- Intersection 11 - Buena Vista Rd & Westside Rd East (AM Peak Hour)
- Intersection 18 - 4th St & Felice Dr (PM Peak Hour)
- Intersection 28 - Union Rd & SR 25/Airline Hwy (AM & PM Peak Hours)

A previous traffic analysis conducted for the City was utilized to qualitatively discuss Intersections 32 to 37. Based on the *Chappell Road Area Pre-Zone and Annexation Traffic Impact Analysis (TIA)* conducted by Hexagon Transportation Consultants, Inc. and dated September 2016, Intersections 32 to 37 operated at the following LOS under the study's Existing (2016) Conditions and Background Conditions:

- Intersection 32 - Fairview Rd & McCloskey Rd
    - Existing AM Peak/PM Peak Hour – LOS B/LOS B
    - Background AM/PM Peak Hour – LOS C/LOS C
- Intersection 33 - Fairview Rd & Santa Ana Rd
    - Existing AM Peak/PM Peak Hour – LOS A/LOS A
    - Background AM/PM Peak Hour – LOS A/LOS A
- Intersection 34 - San Benito St & San Juan Rd/4th St
    - Existing AM Peak/PM Peak Hour – LOS C/LOS C
    - **Background AM/PM Peak Hour – LOS D/LOS D**
- Intersection 35 - Fairview Rd & Hillcrest Rd
    - Existing AM Peak/PM Peak Hour – LOS C/LOS B
    - **Background AM/PM Peak Hour – LOS F/LOS F**
- Intersection 36 - Fairview Rd & Sunnyslope Rd
    - Existing AM Peak/PM Peak Hour – LOS B/LOS B
    - Background AM/PM Peak Hour – LOS C/LOS B
- Intersection 37 - Fairview Rd & SR 25
    - Existing AM Peak/PM Peak Hour – LOS B/LOS B
    - Background AM/PM Peak Hour – LOS C/LOS B

TABLE 16 -5 – EXISTING CONDITIONS LEVELS OF SERVICE

#	Intersection	Maintaining Agency	LOS Standard	Control Type	Existing Conditions					
					AM Peak Hour			PM Peak Hour		
					Movement	Delay	LOS	Movement	Delay	LOS
1	San Felipe Rd & Flynn Rd	City	C	SSSC	-	2.4	A	-	2.8	A
	Worst Approach				EB	19.9	C	**EB**	**28.1**	**D**
2	San Felipe & E-W Connector to SR 25 (Future)	Caltrans	C	FUTURE INTERSECTION						
3	San Felipe Rd & Wright Rd/McCloskey Rd	City	C	Signal	-	21.9	C	-	30.1	C
4	SR 25/Bolsa Rd & San Felipe Rd	Caltrans	C	Signal	-	34.9	C	**-**	**40.1**	**D**
5	San Felipe & Pacific Way (Future)	City	C	FUTURE INTERSECTION						
6	SR 156 & Buena Vista Rd	Caltrans	C	SSSC	-	3.5	A	-	4.6	A
	Worst Approach				EB	18.2	C	**WB**	**28.1**	**D**
7	Buena Vista Rd & Westside Rd West (Future)	City	C	FUTURE INTERSECTION						
8	Miller Rd & Westside Rd (Future)	City	C	FUTURE INTERSECTION						
9	Buena Vista Rd & Beresini Ln	City	C	SSSC	-	1.0	A	-	0.8	A
	Worst Approach				NB	10.8	B	NB	10.2	B
10	Buena Vista Rd & Miller Rd	City	C	SSSC	-	2.7	A	-	1.8	A
	Worst Approach				SB	12.2	B	SB	11.0	B
11	Buena Vista Rd & Westside Rd East	City	C	SSSC	-	5.1	A	-	3.8	A
	Worst Approach				**NB**	**32.4**	**D**	SB	12.7	B
12	Buena Vista Rd & College St/Locust Ave (Future)	City	C	FUTURE INTERSECTION						
13	North St/Santa Ana Rd & San Felipe Rd/San Benito St	City	C	Signal	-	11.0	B	-	12.0	B
14	San Benito Rd/SR 25 & Santa Ana Rd	Caltrans	C	Signal	-	21.7	C	-	26.5	C
15	Memorial Dr & Santa Ana Rd (Future)	City	C	FUTURE INTERSECTION						
16	Westside Blvd & Central Ave	City	C	SSSC	-	5.1	A	-	5.4	A
	Worst Approach				WB	14.1	B	WB	12.4	B
17	4th St & New Driveway near S&S (Future)	City	C	FUTURE INTERSECTION						
18	4th St & Felice Dr	City	C	SSSC	-	0.7	A	-	0.9	A
	Worst Approach				SB	22.4	C	**SB**	**28.8**	**D**
19	Westside Blvd & San Juan Rd/4th St	City	C	Signal	-	23.3	C	-	19.3	B
20	Meridian St & SR 25	Caltrans	C	Signal	-	29.3	C	-	27.9	C
21	Meridian St & Memorial Dr	City	C	AWSC	-	15.9	C	-	9.6	A
22	Hillcrest Rd & SR 25	Caltrans	C	Signal	-	34.6	C	-	31.8	C
23	Hillcrest Rd & Memorial Dr	City	C	AWSC	-	12.5	B	-	15.2	C
24	Westside Blvd & Nash Rd	City	C	SSSC	-	6.3	A	-	5.9	A
	Worst Approach				SB	12.0	B	SB	11.1	B
25	San Benito St & Nash Rd / Tres Pinos Rd	City	C	Signal	-	19.2	B	-	28.6	C
26	San Benito St & Union Rd	City	C	Signal	-	14.7	B	-	12.1	B
27	Union Rd & Southside Rd	City	C	Signal	-	29.6	C	-	28.4	C
28	Union Rd & SR 25/Airline Hwy	Caltrans	C	Signal	**-**	**159.1**	**F**	**-**	**57.5**	**E**
29	Union Rd & Cerra Vista Dr	City	C	AWSC	-	10.4	B	-	8.3	A
30	Union Rd & Fairview Rd (Future)	City	C	FUTURE INTERSECTION						
31	SR 25/Airline Hwy & Enterprise Rd	Caltrans	C	SSSC	-	3.0	A	-	2.5	A
	Worst Approach				NB	15.7	C	NB	17.8	C

Source: Kimley-Horn, 2020. Notes:

1. *HCM 6th Edition methodology used for all LOS analyses unless indicated otherwise.*
2. *2000 methodology is used for intersections #3 and #27 due to HCM 6th limitations specific to these locations.*
3. *Intersection LOS results that are worse than the standard are **bolded**.*
4. *NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound*

Under the *Chappell Road Area Pre-Zone and Annexation TIA* Existing (2016) Conditions, all study intersections operated at acceptable LOS. However, several background projects have been constructed since 2016 which are accounted for in the Background Conditions of the TIA. It should be noted that some background projects in the Background Conditions of the TIA are yet to be built while others have been constructed. Under Background Conditions, Intersection 34 (San Benito Street and San Juan Road/4th Street) operated at an unacceptable LOS D in the AM and PM peak hour and Intersection 35 (Fairview Road and Hillcrest Road) operated at an unacceptable LOS F in the AM and PM peak hour.

In addition, the road diet project along San Benito Street between 4th Street/San Juan Road and South Street will convert the segment into a one-way corridor in the southbound direction to allow for additional street curb space for eating, shopping, and reverse-angle diagonal parking. The existing LOS shown in Table 16-5 does not reflect the changes in traffic operations resulting from this project. With the portion of San Benito Street reserved for one-way traffic, vehicles traveling in the northbound direction on San Benito Street are expected to divert to Monterey Street and East Street or avoid this area altogether (i.e. use the SR 25 bypass). Since these study intersections are located further from the San Benito road diet project study area, the project is expected to have minimal impacts on the intersection LOS.

16.2.2.4 Vehicle Miles Traveled

A common indicator used to quantify the amount of motor vehicle use is VMT. VMT represents the total number of miles driven per day by persons traveling to and from a defined area. Many factors affect VMT including the average distance people drive to work, school, and shopping, as well as the proportion of trips that are made by non-automobile modes. Areas that have a diverse land use mix and facilities for non-automobile modes, including transit, walking, and biking, tend to generate lower VMT than auto-oriented suburban areas where land uses are typically segregated. Further, cities and regions where the jobs/housing ratio is balanced generate a lower VMT than areas where most residents commute long distances to work. From an environmental perspective, development that generates less per capita VMT reflects less auto usage, and correspondingly, lower fuel consumption and production of GHG emissions.

In California, the use of VMT instead of LOS as a metric to assess transportation-related environmental impacts has been adopted as part of updates to CEQA. As a result, transportation-related environmental impacts are now based on the miles of vehicle travel associated with a project instead of the project's effects on traffic congestion. VMT also allows for an analysis of a project's impact throughout the jurisdiction rather than only in the vicinity of the proposed project allowing for a better understanding of the full extent of a project's transportation-related impact. It should be noted that SB 743 pertains to CEQA scope only and that local jurisdictions, including the City of Hollister, are permitted to use LOS for other planning purposes outside the scope of CEQA.

The City of Hollister is in the process of establishing the VMT significance thresholds. OPR Guidance advises jurisdictions set VMT thresholds at 15-percent below the average for the defining area. The City currently anticipates establishing the following thresholds:

- For residential projects, a project would cause substantial additional VMT if it exceeds existing Countywide average home-based VMT per capita minus 15 percent

- For office projects, a project would cause substantial additional VMT if it exceeds existing Countywide average work-based VMT per employee minus 15 percent
- For other employment-based VMT projects, a project would cause substantial additional VMT if it exceeds existing Countywide average Work VMT per employee for similar land uses minus 15 percent
- For regional retail and other customer-based VMT projects where the primary source of VMT is not employees, but customers, a project would cause substantial VMT if it results in a net regional change using the county as the basis or other area as determined appropriate by the City of Hollister.

Kimley-Horn used the AMBAG Travel Demand Model (TDM) to determine the total VMT for trips to and from Hollister. VMT is a measure of total vehicular travel that accounts for the number of vehicle trips and the length of those trips.

Table 16-6 summarizes average VMT for San Benito County and the City of Hollister for the following land use types:

- VMT per Capita for Residential trips,
- VMT per Employee for the following land use types:
    - Agriculture
    - Construction
    - Industrial
    - Retail Service
    - Public Uses

As stated above, the City of Hollister anticipates selecting San Benito County as the basis for defining the area on which the VMT threshold will be based. The resultant thresholds are provided in Table 16-7. The averages and thresholds for the Hotel and Retail land use types are not included as those land use types are driven by the customer base rather than the employees and therefore any VMT analysis using these land use types would focus on the Net Change in VMT as provided for under the OPR Guidance rather than using an efficiency-based threshold (per/capita or per/employee).

TABLE 16 -6 – SAN BENITO COUNTY AND CITY OF HOLLISTER AVERAGE VMT BY LAND USE

Jurisdiction	VMT/Capita (Residential)	VMT/Employee (Agriculture)	VMT/Employee (Construction)	VMT/Employee (Industrial)	VMT/Employee (Service)	VMT/Employee (Public)
San Benito County (2015)	14.4	2.0	28.4	20.6	9.9	17.7
City of Hollister (2015)	11.9	1.8	27.7	19.4	9.1	17.2

Source: Kimley-Horn, 2020.

TABLE 16 -7 – CITY OF HOLLISTER EFFICIENCY-BASED THRESHOLDS

VMT/Capita (Residential)	VMT/Employee (Agriculture)	VMT/Employee (Construction)	VMT/Employee (Industrial)	VMT/Employee (Service)	VMT/Employee (Public)
12.2	1.7	24.1	17.5	8.4	15.1

Source: Kimley-Horn, 2020.

In addition to VMT by land use type, the total VMT for the City of Hollister was calculated for Existing Conditions. The total VMT was separated into three different categories, internal-internal trips (I-I) as defined by trips that both start and end within the City of Hollister, internal-external trips (I-X) as defined by trips that start within the City of Hollister and end outside the City, and external-internal trips (X-I) as defined by trips that start outside the City of Hollister and end inside the City.

Table 16-8 below summarizes the City's total VMT by trip type. As shown in Table 16-8, of the total daily VMT of 811,893 vehicle-miles, 67,769 vehicle-miles are related to I-I trips, 373,412 vehicle miles are related to I-X trips, and 370,712 vehicle-miles are related to X-I trips.

TABLE 16 -8 – CITY OF HOLLISTER VMT SUMMARY BY TRIP TYPE TABLE 3

Trip Type	VMT
I-I	67,769
I-X	373,412
X-I	370,712
Total	**811,839**

Source: Kimley-Horn, 2020.

16.2.3 PLANNED AND PENDING TRANSPORTATION PROJECTS

This section describes planned roadway and intersection capacity improvements within the City of Hollister.

The 2017 Transportation Impact Mitigation Fee Nexus Study identifies planned network improvements within the County, as well as the City of Hollister. The following list identifies improvements planned within the City:

- Memorial Drive South Extension: Meridian Street to Santa Ana Road
- Airline Highway/SR 25 Widening: Sunset Drive to Fairview Road
- Westside Boulevard Extension: Nash Road to Southside Road/San Benito Street Intersection
- North Street (Buena Vista), between College Street and San Benito Street
- Fairview Road Widening: McCloskey to SR 25
- Union Road Widening (East): San Benito Street to SR 25
- Union Road Widening (West): San Benito Street to SR 156
- Meridian Street Extension to Fairview Road: 185 feet east of Clearview to Fairview

- SR 25 Four-Lane Widening: Phases I and II (San Felipe Road to Santa Clara County Line)
- Memorial Drive North Extension: Santa Ana Road to Flynn Road/Shelton Road Intersection
- Flynn Road Extension: San Felipe Road to Memorial Drive north extension
- Pacific Way Extension (new road east-west collector): San Felipe Road to Memorial Drive

16.2.4 BUS TRANSIT SERVICES

San Benito County Express (County Express) provides convenient and affordable transportation service to the communities of Hollister, San Juan Bautista, and Gilroy. County Express also operates a complementary Dial-A-Ride service, as well as an intercounty service to Gilroy's Caltrain and Greyhound Stations, and Gavilan College with connecting service to the Santa Clara Valley Transportation Authority (VTA) bus system. The San Benito County LTA, established in 1990, administers and operates public transportation services (including maintenance and administration) in the County.

16.2.4.1 Existing Service and Frequency

Fixed Service Routes

County Express service routes and schedules within Hollister includes three routes – the Green Line, Blue Line, and Red Line. A route map showing the routes is included below in Figure 16-3. In response to COVID-19, Fixed Route services were suspended in March 2020. As of November 2020, LTA is reviewing a service restructure for implementation in 2021:

Dial-A-Ride

County Express provides Dial-A-Ride service, which is a ride that can be scheduled up to two weeks in advance or on the day of the ride, Monday through Friday 6:00 a.m. to 6:00 p.m. and Saturday and Sunday from 9:00 a.m. to 3:00 pm. Weekend service was suspended in response to COVID-19 in March 2020. The service area includes the City of Hollister city limits for trips within ¾ mile of Fixed-Route service.

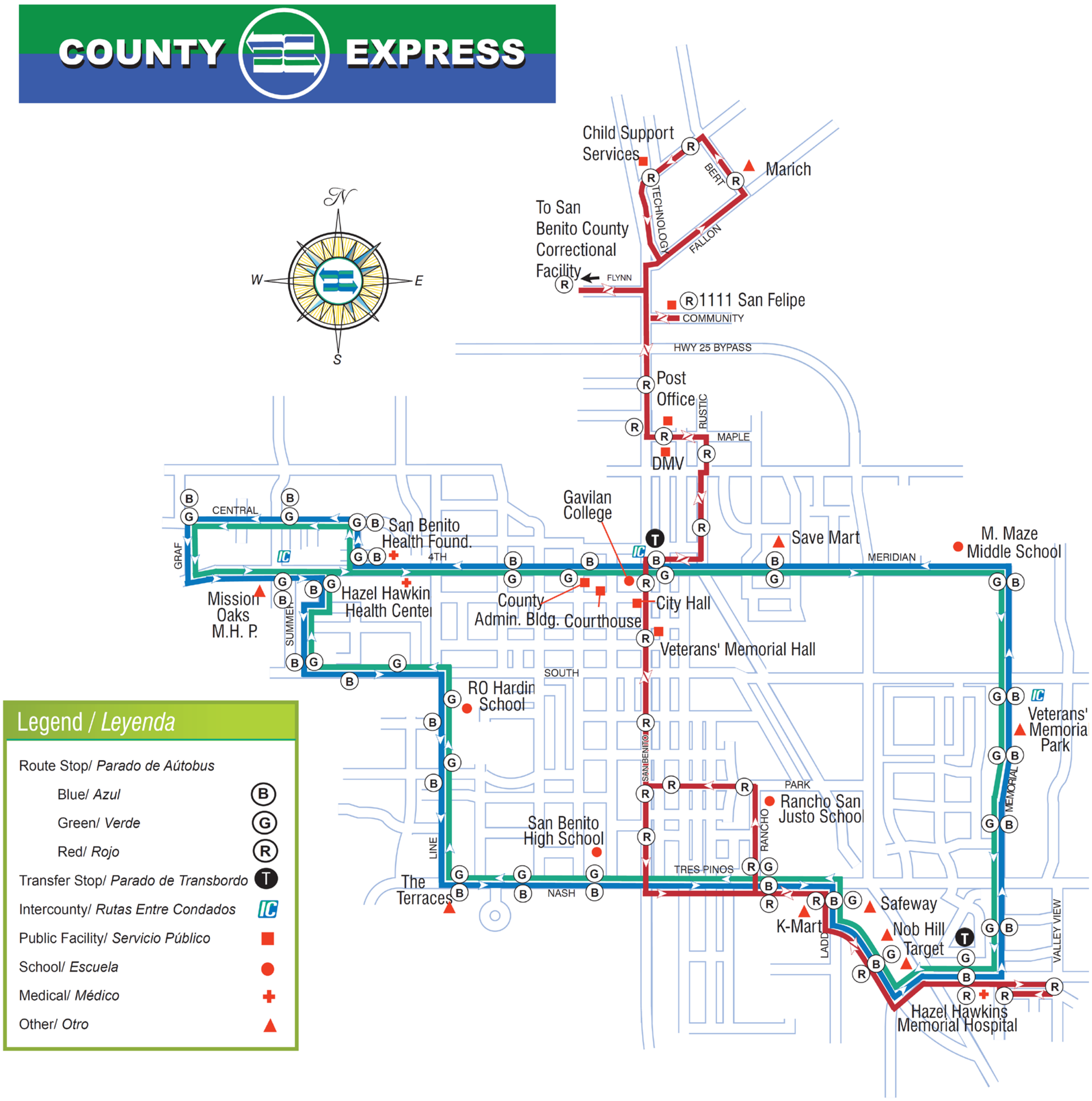
Paratransit

County Express provides Paratransit service for ADA certified travelers that are unable to ride Fixed Route service due to physical or cognitive disabilities. The service is available for trips within ¾ mile of Fixed Route service.

16.2.4.2 Planned Transit Projects

As discussed in the Regulatory Setting section, San Benito COG undertook a study to analyze potential transit improvements along the SR 25 corridor: bus on the SR 25 shoulder, bus along the existing rail corridor, and commuter rail. All options would start at Hollister and would extend to either the Gilroy Caltrain station or Gavilan College, depending on the type of service. These transit services would help alleviate congestion along SR 25 by providing more efficient and reliable transit services to commuters

Figure 16-3 County Express Fixed Route Map



traveling to/from the Bay Area. However, at this time, there is currently no funding in place for these improvements and it is uncertain when funding will become available.

As future development projects are proposed, the San Benito COG continuously reviews the transit network to determine future transit needs. In addition, the San Benito LTA is currently updating the San Benito County Short-Range Transit Plan (SRTP), which provides short-term plans to improve public transportation within the region based on the needs of current riders and would also replace the current gas-powered fleet with electric vehicles.

16.2.5 PEDESTRIAN NETWORK

This section describes existing pedestrian facilities in Hollister.

16.2.5.1 Existing Facilities

Hollister has a well-established pedestrian network that includes sidewalks, crosswalks, pedestrian signals, and off-street paths. Sidewalks with raised curbs and gutters are typically provided along arterials and collectors, as well as in newer residential developments. Most major intersections in the City have marked crosswalks and countdown pedestrian crossing signals that can be activated by pedestrians. Existing gaps in the City's sidewalk network are shown in Figure 16-4.

A one-half mile, Class I multi-use pedestrian and bicycle path in the City is located along McCray Street between Tres Pinos Road and Hillcrest Road. No other Class I facilities exist in Hollister.

16.2.5.2 Planned Facilities

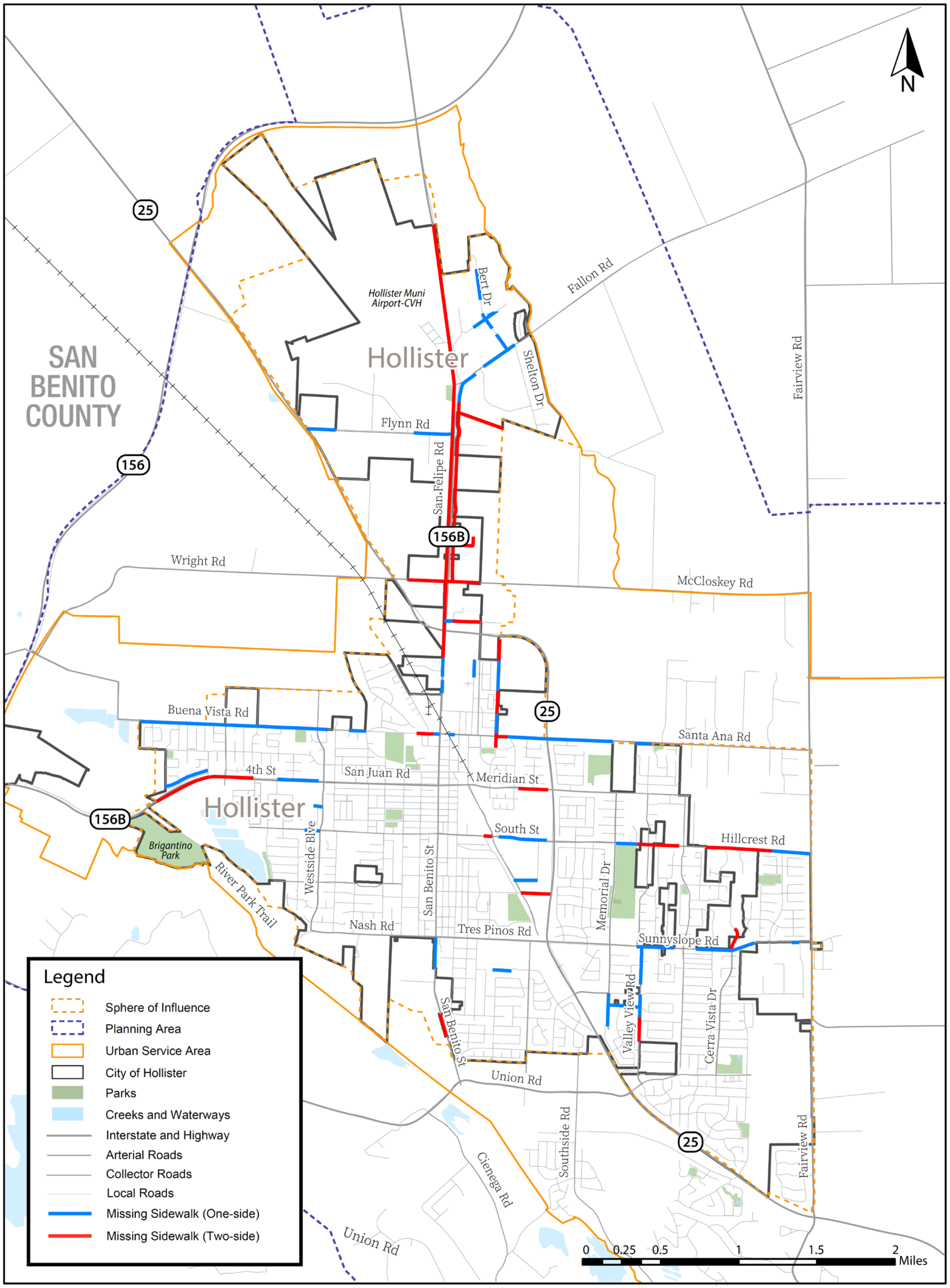
Pedestrian facility improvements, including high visibility crosswalks and traffic calming measures are planned along Central Avenue, Sally Street, Ladd Lane, and Buena Vista Street.

Notable planned bike facilities include the construction of a Class 1 multi-use path from the existing McCray Street path to the north along the existing rail-line. In addition, a Class 1 facility is planned along the San Benito River, west and south of the City.

16.2.5.3 Pedestrian Safety

Minimum sidewalk widths of 5 feet are required to meet ADA requirements. Depending on the land use type, wider sidewalks may be provided. Narrower sidewalks are allowed for residential areas as compared to commercial districts. Nonetheless, a 5-foot minimum of clear, uninterrupted area is required on all sidewalks.

Figure 16-4 Existing Sidewalk Gaps



16.2.6 BICYCLE NETWORK

The local bicycle network includes a range of facility types. The City uses the following classifications for its bikeway facilities:

Class I Bikeway (Bike Path). A Class I bikeway is completely separated from the road and is exclusively for bicyclists and pedestrians (including skaters, users of manual and motorized wheelchairs, and joggers).

Class II Bikeway (Bike Lane). A Class II bikeway is usually a striped lane that is intended for exclusive use by bicyclists but is not physically separated from the roadway or from traffic.

Class III Bikeway (Bike Route). A Class III bikeway means that cyclists use the same road and the same lane as motorists, but signs or permanent pavement markings indicate that the lane is shared.

Class IV Bikeway (Separated Bikeway). A Class IV separated bikeway is an on-street bike lane that is physically separated from motorist traffic and intended for exclusive use by bicyclists. Bicyclists use the same road as motorists, but signs, striping, and physical barriers protect bicyclists from motorists.

16.2.6.1 Existing Facilities

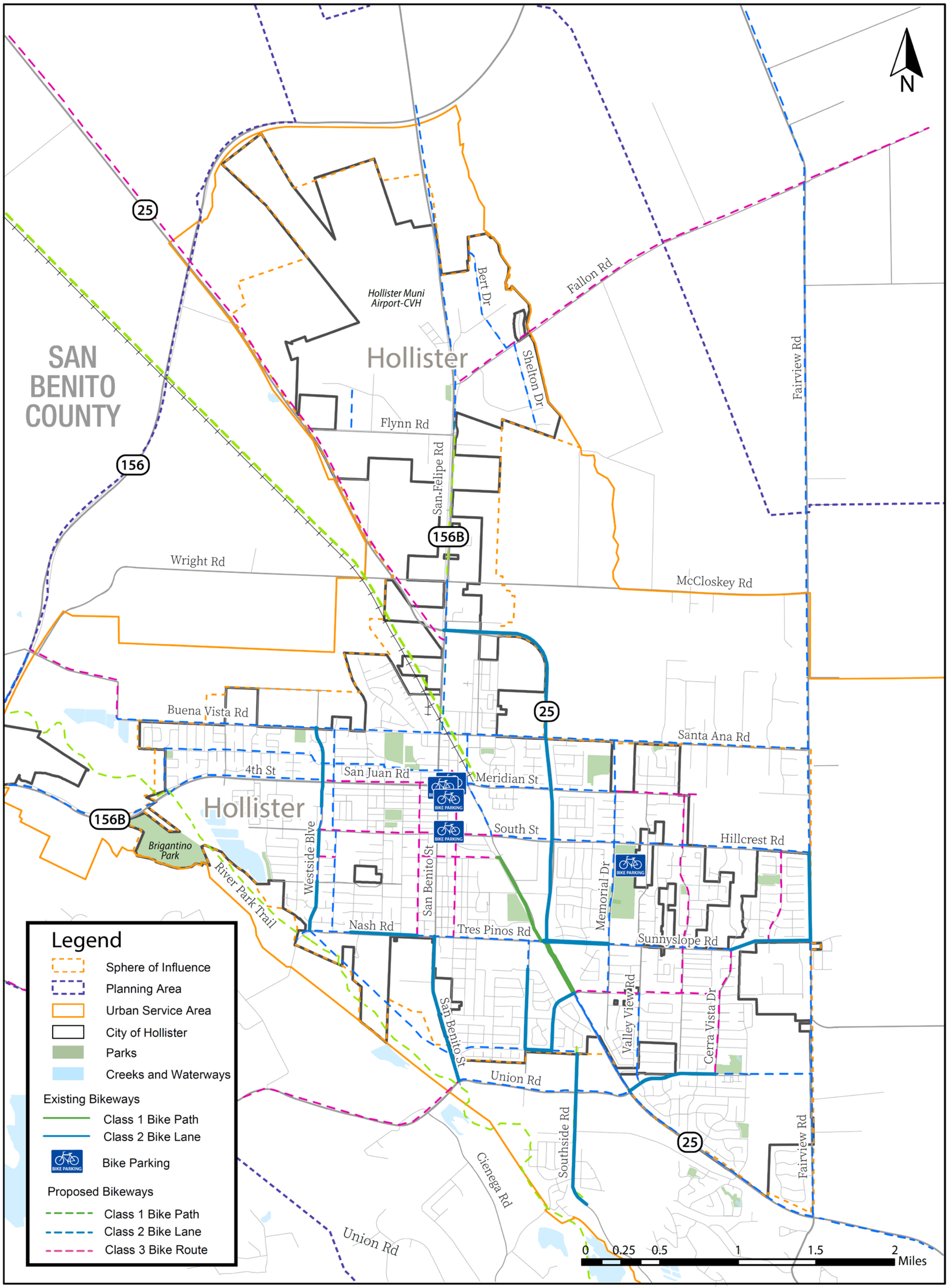
Given the relatively flat topography of Hollister, bicycling is a viable alternative to driving for both recreational and non-recreational trips. Bicycle facilities are provided throughout the City of Hollister on most arterials and major collectors, as illustrated in Figure 16-5. As shown in the figure, a one-half mile, Class 1 multi-use path in the City is located along McCray Street between Tres Pinos Road and Hillcrest Road. Class 2 bike lanes currently exist throughout the City.

16.2.6.2 Planned Facilities

Class 1, 2, and 3 bike facilities are planned throughout the City of Hollister, as shown in Figure 16-5.

Notable planned bike facilities include the construction of a Class 1 multi-use path from the existing McCray Street path to the north along the existing rail-line. In addition, a Class 1 facility is planned along the San Benito River, west and south of the City. Notable Class 2 bike lane facilities are planned along San Felipe Road, Buena Vista Road, Santa Ana Road, Fairview Road, Hillcrest Road, Nash Road, Tres Pinos Road, Union Road, and Airline Highway / SR 25.

Figure 16-5 Existing and Planned Bike Facilities



16.2.7 COLLISION HISTORY

16.2.7.1 Statewide Integrated Traffic Records System Crash History

Statewide Integrated Traffic Records System (SWITRS) data was accessed to review the five-year collision (crash) history within the City of Hollister. SWITRS is a web application where crash data from each traffic enforcement agency in California uploads crash data, which is then aggregated (and anonymous) and available for download. Collision history data in Hollister is currently available for the years 2015-2019, as summarized in Table 16-9.

TABLE 16 -9 SWITRS COLLISION HISTORY SUMMARY

Collision Types	Number of Collisions by Type of Users (2015-2019)						Total Injuries	Total Fatalities
	Auto	Truck	Pedestrian	Bicyclist	Motorcyclist	Total		
Head-On	26	-	2	7	2	37	-	3
Sideswipe	40	2	1	7	2	52	18	-
Rear End	96	5	1	-	5	107	16	-
Broadside	104	2	1	23	12	142	21	1
Hit Object	12	1	-	-	2	15	57	1
Overturned	6	-	-	-	1	7	5	-
Vehicle/Pedestrian	1	-	36	8	-	45	3	1
Other	1	-	2	3	5	11	31	1
Undetermined	-	-	-	-	1	1	7	-
Grand Total	**286**	**10**	**43**	**48**	**30**	**417**	**158**	**7**

A total of 417 collisions occurred between 2015 and 2019. Pedestrians and bicyclists are the most vulnerable users on the road and the data indicates that 43 of the collisions involved pedestrians and 48 collisions involved bicyclists. Of the total collisions occurring between 2015 and 2019, seven fatalities occurred. In addition, 34 people experienced severe injuries between 2015 and 2019.

16.2.7.2 California Office of Traffic Safety Crash Rankings

The California Office of Traffic Safety (OTS) provides crash rankings to evaluate how cities compare to one another. OTS data and rankings are only currently available for the 2017.

The City of Hollister's average population in 2017 places it in Group D, along with 94 other Californian cities, all with populations between 25,001 and 50,000. Table 16-10 below shows a summary of OTS ranking results by crash type.

TABLE 16-10 OTS CRASH RANKING SUMMARY

Type of Crash	Victims Killed & Injured	OTS Rankings
Total Fatal and Injury	120	29/94
Alcohol Involved	6	69/94
Had Been Drinking Driver < 21	0	66/94
Had Been Drinking Driver 21 – 34	1	81/94
Motorcycles	8	12/94
Pedestrians	8	44/94
Pedestrians < 15	1	51/94
Pedestrians 65+	0	83/94
Bicyclists	10	24/94
Bicyclists < 15	4	9/94
Overall Ranking	45	49/94

As shown in the table above, Hollister's composite rank is 49th out of the 94 cities in Group D, based on the most available OTS data (2017). This indicates there are opportunities to improve roadway conditions to enhance safety conditions for Hollister residents.

16.2.7.3 Implications for the General Plan Update

Based on information contained in this chapter, the General Plan Update process should address the following issues:

- Add goals, policies, and actions to be consistent with the requirements of the Complete Streets Act to support pedestrians, bicyclists, transit service, and travel for disabled persons in Hollister.
- Update the Circulation Element to incorporate the requirements of SB 743 and transportation demand management strategies.
- Develop a VMT Banking Project List.
- Prepare policy language to maintain the LOS standards in the City.
- As part of the General Plan Update, consider roadway improvements to enhance roadway safety, including recommendations for Safe Routes to Schools.
- Pursue grant funding to pursue projects that enhance roadway safety such as short-range and long-range safety plans, or a Vision Zero Plan.
- Develop a policy to require roundabouts for intersection control consistent with City Council Resolution No. 2019-75.
- Update the Regional Transportation Impact Fee Nexus Study and Fee Program in collaboration with COG.

APPENDIX A:

DATA COLLECTION METHODOLOGY

Kimley»Horn

Proposed Methodology for Developing Intersection Turning Movement Volumes Using Historical Counts and Big Data

MAY 2020

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INTRODUCTION

The purpose of this white paper is to establish an acceptable methodology for the development of accurate, affordable, and defensible turning movement volumes despite the existing and potentially long-term inability to collect new traffic count data due to COVID-19. This paper proposes an analytical approach to determining methodology based on the availability of historical data. Where data is outdated, limited, or unavailable, this paper discusses how a big data model can be applied to derive volume estimates. A decision tree is provided to help identify the most appropriate method for developing existing conditions turning movement volumes.

Background

On January 22, 2020, the U.S. reported its first domestic case of Coronavirus (COVID-19)[1]. Widespread infection over the next two months caused state and local officials to enact various public health initiatives to curb the spread of COVID-19. On March 3, 2020, California Governor Newsom declared a state of emergency for California. In response, many school districts and universities began to close or shift to distance learning. In addition, large tech firms in the San Francisco Bay Area began having employees work from home. On March 16, 2020, multiple county public health officials in the greater Bay Area enacted the country's first shelter-in-place orders, prohibiting all non-essential travel. On March 19, 2020, Governor Newsom signed an executive order for a California-wide shelter-in-place[2]. Transportation, traffic, and congestion saw immediate effects.

The effects of the statewide–and eventually nationwide–shutdown of all non-essential travel disrupted the typical methodology for execution of traffic studies. Namely, traffic volume data collected after March 3, 2020, may no longer be representative of typical roadway conditions. Traffic trends reported by Google[3] and INRIX[4], show a nationwide reduction in traffic of 30 percent with reductions as high as 50 percent in the San Francisco Bay Area.

As the spread of COVID-19 declines and travel restrictions lift, an initial increase in traffic can be expected. It is likely, however, that traffic volumes post-COVID-19 will remain lower than volumes observed in January and February of 2020 for a variety of reasons. These reasons include the fact that many local agencies plan to take a staged approach to raising restrictions, significant unemployment and other economic considerations, and potential changes in travel behavior (e.g., new preference for telecommuting, continued nervousness over the outbreak, etc.). It may take an extended period of months, or even years, for traffic volumes to return to or exceed what was observed immediately prior to COVID-19. Like the Great Recession of 2008, the current disruption will make for challenging infrastructure planning as current traffic volumes continue to be lower than historical count data, leaving agencies to determine the conditions and timing for when count data is appropriate for use in preparing operations analyses and making important infrastructure investments.

Purpose and Need

There is a need in the transportation planning and traffic operations field to analyze existing conditions scenarios at intersections with accuracy. The ability to analyze the future effects of ongoing or planned developments on our transportation infrastructure now hinges on our ability to produce intersection turning movement volumes that represent a pre-COVID-19 scenario, which cannot be accomplished by collecting new counts.

[1] https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html
[2] https://covid19.ca.gov/img/Executive-Order-N-33-20.pdf
[3] https://www.google.com/covid19/mobility/
[4] https://inrix.com/blog/2020/03/covid19-us-traffic-volume-synopsis/

The purpose of this white paper is to establish an acceptable methodology for the development of accurate, affordable, and defensible turning movement volumes despite the current inability to collect new traffic count data because of COVID-19.

Organization

This paper is organized into three chapters:

1. Introduction: introduces the need for a new methodology for determining existing turning movement volumes at intersections and a background for why this is necessary.
2. Data Collection Methods: discusses the merits and limitations of various methods for deriving turning movement volumes.
3. Proposed Methodology: proposes the preferred methodology for deriving turning movement volumes at intersections based on available historical data using a decision tree.

DATA COLLECTION METHODS

The purpose of this chapter is to provide a brief background on the available data collection methods that can be used to obtain turning movement volumes and the inherent variability and possible sources of error from each one. Understanding the limitations of collected data, regardless of source, is a prerequisite to using that data in an analysis.

Traffic Counts

Historically, existing conditions intersection turning movement volumes for analysis in a traffic study have been counted on-site during peak hours on a single representative day of the year, which is assumed to represent the average or most common and predictable traffic conditions. This approach typically counts a fair-weather Tuesday, Wednesday, or Thursday on a week without any holidays or major events while nearby schools are in session. The exception for this approach would be projects where peak trip generation is expected to occur at another time, such as on a weekend or holiday, and generate a large share of vehicle trips on the nearby roadways at its peak period of trip generation. A ski resort, regional park, event venue, or sports stadium are examples of this exception where a weekend, late evening, specific event, or holiday count may be needed to supplement or replace a weekday count.

Industry best practice is to calibrate the collected turning movement volumes using daily, monthly, and seasonal adjustment factors based on nearby continuous count locations (when such locations are available). Monthly averages for daily traffic can fluctuate by 15 percent or more from the annual average daily traffic[5] (AADT). However, adjustments to reflect AADT conditions are rarely applied during the normal course of data collection, resulting in inherent differences as compared to average annual conditions. This source of error is important when considering the validity and use of supplementary traffic count data such as big data.

The strength of this traditional count method is that an actual count of every vehicle (and often bicycle and pedestrian) is conducted on-site to establish an up-to-date snapshot in time of traffic conditions. Because these counts are conducted on-site, other qualitative observations can be made at the intersection regarding operations, delay, or queueing. Also, data can be collected at 5-minute or 15-minute granularities to inform proper calibration of traffic simulation models, or so that analyses can be performed on the peak 15-minute period. When available, this method of determining existing conditions intersection counts is the typical standard of practice.

Big Data

The widespread accessibility of geolocation services included in modern electronics like cell phones and vehicles allows for continuous sampling of a transportation network's users. While adhering to strict privacy laws that preserve the anonymity of individual users, this data can be extremely useful for transportation planners in understanding travel trends across space and time. While there may be many big data products useful for estimating traffic volumes, the methodology in this paper was developed based on StreetLight as a big data solution. This paper is not intended to exclude any other similar products. The main limitation of big data is that it does not sample 100 percent of the target population because not every vehicle on the road as geolocation services available or enabled for query. For example, an intersection turning movement count on a Thursday morning from 8:00 AM – 9:00 AM may show 100 vehicles making a northbound right turn. Of the 100 vehicles making that turn, it is likely that some do not have location services in their car, and likely that some drivers do not have location services on their cell phones. Of the vehicles that have location services in a vehicle or cell phone, depending on the permissions of the individual user in allowing use of their location data, even fewer vehicles may be counted. Therefore, big data may show only 15 counts making that

[5] https://dot.ca.gov/programs/traffic-operations/census

northbound right turn at that time. The error of big data volume estimates comes from the conversion of a big data "count" to total vehicle volume on a roadway.

There are many approaches to adjusting and modeling big data to derive traffic volumes at an intersection. The essence of the process is to develop control points where the population (volume) size is known, then determine ratios between sample size and population size, and finally to apply these ratios to other data. There are many geographic models and methodologies for performing this kind of conversion, but regardless of method, the accuracy of control point data and the assumptions built into applying this ratio to other locations are major factors for introducing error between estimated and "actual" average turning movement volumes.

StreetLight Data

Every month, StreetLight collects and indexes anonymized location records. These records come from smart phones and embedded vehicle GPS devices. Using other contextual sources including census, parcel, and digital roadway network data, StreetLight refines the raw data to estimate complete transportation metrics. These metrics are further calibrated and validated using permanent traffic counters and embedded roadway sensors. Because StreetLight data is a continuous sample of existing traffic conditions, averages and estimates are not limited to peak hours on one typical count day. Instead, StreetLight aggregates average traffic patterns over an entire week, month, or year to develop an accurate AADT volume estimate at each study intersection.

A Word of Caution

When comparing results from traffic counts and big data models, the comparison of these two data sources may show even greater (or less) variability than is inherent in either model alone. Traffic count data shows volumes for a single day of the year and is assumed to represent average traffic conditions at an intersection for the entire year (although, as discussed previously, there is inherent error in this approach). A big data model meanwhile grows an average of small samples from the entire year and presents an estimate of average traffic conditions at an intersection. At the end of the day, both methods are estimates that have inherent error. A comparison of intersection volumes derived using both methods may show only one percent variation, but they may still be 10 (and nine) percent from the actual annual average. Similarly, a comparison could show a 20 percent variation; however, each source may only vary from the actual annual average volumes by 10 percent. The potential for the compounding of errors is an important consideration when evaluating big data's validity, especially given the common bias of transportation professionals to represent single day traffic count data as an accurate reflection of annual averages.

PROPOSED METHODOLOGY

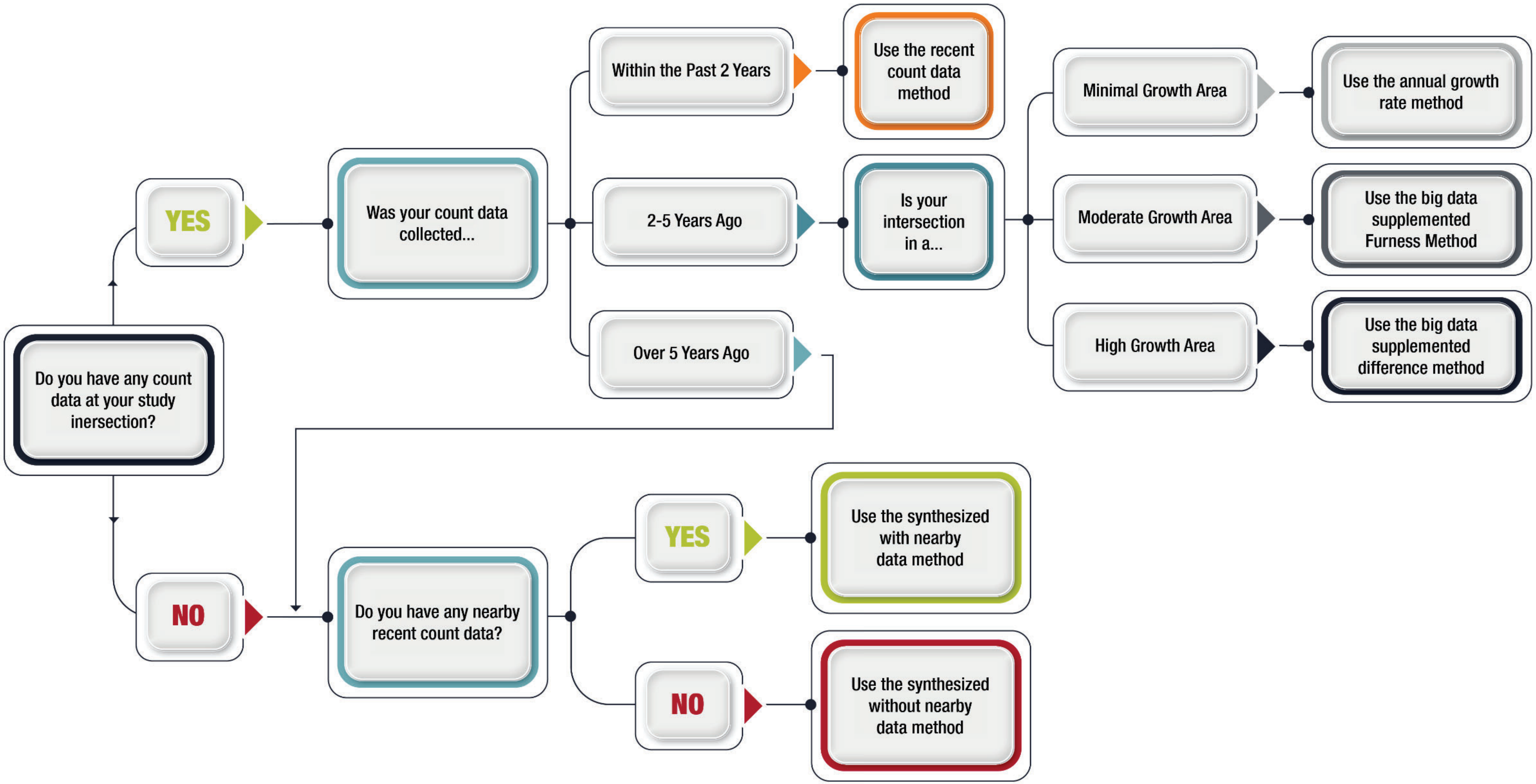
This chapter proposes methodologies for developing intersection turning movement volumes at a study intersection. The decision to use one method over another will depend on what data is available for the study intersection and how this data may need to be supplemented by a big data model. Exhibit 1 shows a decision tree to help identify the appropriate method for an analysis. A description of each method presented in the decision tree is also provided in this chapter.

The scenarios and methods described in this chapter are listed in order of preference. If a big data tool provides the capability to utilize calibration data, this is recommended to be undertaken to the extent possible. Generating specific hourly turning movement volumes "from scratch" (commonly referred to as "synthesizing") from a model is inherently difficult and the confidence in the model outputs directly correlates to the confidence in the data provided to the model for calibration.

Before undertaking the approach to synthesize traffic count data from big data, other sources of data should be reviewed. Depending on the circumstances, it may be preferable to use older traffic count data than would have been permissible prior to the COVID-19 outbreak. Possible sources of turning movement counts may include:

- Previous Studies – many intersections, especially in higher growth areas, have been studied recently and counted multiple times. Publicly available reports may already have counts at this location and be available at no additional cost.
- Local Jurisdiction Data – cities, counties, and state DOTs often collect turning movement counts for monitoring traffic conditions within their jurisdictional boundary. Master plans, TIFs, retiming studies, corridor studies, and other operations studies include count data. Requests to the governing jurisdictions should be made for any available data. This may include recent traffic studies completed and submitted to the jurisdiction by other firms. Because the data they provide can enhance the accuracy and quality of the study, most jurisdictions will not hesitate to provide this data.
- Local Count Firms – Many local count firms are offering to provide historical count data at reduced costs. If data cannot be obtained after exhausting previous studies and local jurisdiction resources, subconsultants and other industry partners should be considered.

Exhibit 1: Decision tree identifying appropriate methodology for derivation of existing conditions study intersection volume



Recent Count Data Method

For locations with recently collected intersection turning movement counts, it remains the best practice to use this data "as is" in a study. Many jurisdictions will allow the use of previously collected data if it's not older than two-years. However, this approach may vary, and as with any traffic study, confirmation from the governing jurisdiction for how recent a count must be to be used without adjustment should be obtained prior to using the count. The acceptable data time frame will likely be a range from one to three years.

If the accuracy of a recent count is called into question because of a change in circumstance, such as a new transportation improvement or the introduction of a major land use nearby between the time of the count and the present, there are several ways to adjust the count data including:

- In collaboration with the jurisdiction, identify all projects that have been completed and opened between the time of the count and the present where their studies added traffic to the study intersection. (Again, this is for recent counts taken within the past two-years. This list should be relatively short; otherwise, this method may become cost prohibitive). Add the opening day projected traffic added by these projects to the recent count using typical analyses methods.
- Identify growth using big data by comparing the volumes at the time of the count to the volumes in present conditions. If there is no growth shown, then this validates the use of the count "as is." If growth is shown, say one percent growth over 18 months, then this can be used to grow the recent count to an existing conditions volume.
- An agreed upon minimum annual growth rate can be applied to the count, conservatively increasing the counts to an acceptable existing conditions volume.
- In cases where travel patterns have changed in response to a new transportation facility, it is possible to use travel demand model data. This option, however, should be carefully considered, given that it would typically be preferential to use big data under these circumstances.

Peak hour factors, truck percentages, pedestrian, bicycle, and time of the peak hour should be taken from the recent count unless judgement suggests these have significantly changed (e.g., a new land use, like a school, could change these parameters).

Older Count Data Methods

If the big data source is available for a period of time less than desired (i.e., it doesn't date back to the count data year), it is acceptable to use a shorter time frame to determine a growth rate if it is determined to be representative of the conditions. Depending on the quality of the data, it may be appropriate to use daily volumes instead of peak period volumes as the basis for the growth rate. For locations where intersection turning movement counts collected in the past five years are available, the changing context of the area should inform the selection of the methodology. In the context of trip generation, determine if the surrounding area experienced a minimal growth, moderate growth, or high growth between the time of the two- to five-year-old count and present conditions. The definitions of these three categories are described as:

- **Minimal Growth Area –** An intersection in a minimal growth area will maintain the same context (urban, suburban, rural) and same land uses between the time of the old count and present day. While specific parcels and ownership may have changed, the zoning, land use intensity, and overall traffic have not changed. Any traffic volume growth at the intersection can be attributed to minimal infill development, or increased pass through traffic. Examples of a no growth area include a completely built-out area of a city with no increase in land use intensity, a completed suburban community with no densification, or a rural agricultural setting with no change in land use.

- Moderate Growth Area – A moderate growth area will maintain the same context (urban, suburban, rural) with increasing land use intensity and development between the time of the old count and present day. While traffic volumes are increasing due to new development near the intersection, the overall zoning and traffic distribution stays steady between the time of the count and present day. A growth area has already established urban/suburban/rural land uses and zoning that do not change; however, the region is also not yet fully developed.
- High Growth Area – A high growth area will have experienced a change in context (i.e., rural to suburban or suburban to urban), often resulting from rezoning of land for completely new development. Due to rezoning, traffic patterns at the intersection may significantly change with respect to time of day and directional distribution. Examples of high growth areas are vacant land being developed into a new master planned community, the recent construction of a major transit hub in a suburban area with resultant mixed-use development and high-density multifamily housing, or an old zoned industrial park rezoned and developed into a commercial retail city node.

Minimal Growth Area – Annual Growth Rate Method

In a minimal growth area, the recommended method for growing an older turning movement count is to apply a historical annual growth rate. While the annual growth in minimal growth areas is typically less than one percent per year in many areas, an annual growth assumption of one percent is a reasonable, albeit conservative, short-term growth basis. Because zoning, land use intensity, and context are not changing in these areas, the traffic distribution captured in an old count may reasonably be assumed constant, and a nominal growth rate method is adequate to capture minor variations in land use intensities (a business hires more workers, etc.).

Peak hour factors, truck percentages, pedestrian, bicycle, and time of the peak hour can reasonably be based on this count data.

Moderate Growth Area – Big Data Supplemented Furness Method

Big data average daily volume estimates should be collected for each approach of the study intersection for 3-6 months around the date of the historical count. Big data average daily volume estimates should then be collected for the 3-6 months prior to existing conditions. Given the effects of COVID-19, this is recommended to include October 2019, January 2020, and February 2020. Because of the nature of big data, it is important to capture a large enough sample while still controlling for "typical" weekdays. For this reason, data should be limited to Tuesdays, Wednesdays, and Thursdays.

Using the count data, the historic big data volume, and the present big data volume, the NCHRP 765 iterative directional method, commonly referred to as the Furness Method, should be applied to the old count to iteratively grow traffic volumes to existing conditions. This process provides corrective factoring to the directional distribution of traffic at the intersection that may not have been captured otherwise in the application of an average annual growth rate.

It may be appropriate to provide minor manual adjustments to peak hour factors, truck percentages, pedestrian, bicycle, and time of the peak hour based on changes in travel patterns that result from the application of the Furness Method. In general, however, it is not anticipated that this would be necessary.

High Growth Area – Big Data Supplemented Difference Method

Big data average ***peak hour*** turning movement volume estimates should be collected for each movement of the study intersection for 3-6 months around the date of the historical count. Big data average ***peak hour*** volume estimates should then be collected for the 3-6 months prior to existing conditions. Given the effects of COVID-19, this is recommended to include October 2019, January 2020, and February 2020. Because of the nature of big data, it is important to capture a large enough sample while still controlling for "typical" weekdays. For this reason, data should be limited to Tuesdays, Wednesdays, and Thursdays.

Using the count data, the historic big data hourly turning movement volumes and the present hourly big data turning movement volumes, the difference method should be applied as follows:

- The difference between existing big data turning movement volumes and historic big data turning movement volumes should be calculated for each movement
- The difference in big data volumes should be added directly to the historic count

Peak hour factors, truck percentages, pedestrian, bicycle, and time of the peak hour should be reviewed for appropriateness and manually updated based on reasonable manual adjustments that are supported by the changes made to count data based on the method described above. It may also be appropriate to supplement this data with alternative sources depending on the magnitude of change.

Care needs to be used when applying this methodology to determine when the initial count data is of such poor quality, or the changes so significant, that a full synthesis of the traffic count data might be preferable.

Synthesized Traffic Count Data with Nearby Traffic Data Method

When no turning movement count data is available at the study intersection, or this data is more than five years old, but you have recent daily traffic volumes, then a calibrated big data model may be used to synthesize traffic count data.

Peak hour factors, truck percentages, pedestrian, bicycle, and time of the peak hour should be taken from the nearby calibration data when possible. As appropriate, other datasets or methodologies may be used to supplement this information.

Synthesized Traffic Count Data without Nearby Traffic Data Method

When traffic data is not available at or nearby the study area intersection, then the final recourse is to synthesize intersection turning movement volumes using big data without additional calibration data. The big data should be used to determine average hourly volume on a Tuesday, Wednesday, or Thursday for the most recent 3-6 months (pre-COVID-19). At a minimum this should include October 2019, January 2019, and February 2019.

Truck percentage, pedestrian, or bicycle data may need to be derived from local published rates or other collected data. State and Federal transportation agencies and other professional organizations may provide helpful resources on how to estimate this data when it is not available based on facility type, location, and other factors.