

Appendix D: Crosswalk Assessment





MEMORANDUM

Date: February 10, 2016
To: Brent Pearse, VTA
From: Carrie Modi and Matt Haynes, Fehr & Peers
Subject: Story-Keys Complete Streets Study: Crosswalk Assessment Memo

OK16-0122

This memorandum summarizes existing crosswalk conditions on the corridor for the Story-Keys Corridor Complete Streets Study. Pedestrian crossing conditions vary throughout the corridor based on roadway characteristics and adjacent land uses. Land uses on the corridor influence levels of pedestrian demand, and roadway characteristics help determine the appropriate crosswalk design and level of enhancement. Because of the diversity of conditions, the memorandum is organized into characteristics of each segment of the corridor. Ultimately, the crosswalk information will be integrated into a larger discussion of the pedestrian environment, which will include information on sidewalk, urban design, and streetscape issues.

CORRIDOR SEGMENTATION

Opportunities to cross vary substantially along the corridor. Marked crosswalks appear with varying frequency but generally occur on average every 750 feet. However, the typical block lengths vary from a fine-grain street grid on Willow Street, Graham Avenue, Goodyear Street, and Keyes Street with frequent crossing opportunities to a corridor with long block lengths and limited crossing opportunities on Story Road. **Table 1** presents the seven segments with distinct roadway, land use, and streetscape characteristics used to organize the crosswalk assessment.



TABLE 1: CORRIDOR SEGMENTATION

Segment Number	Location
1	Willow Street between SR 87 and Graham Avenue
2	Graham Avenue and Goodyear Street between Willow Street and S 1 st Street
3	Keyes Street between S 1 st Street and 12 th Street
4	Story Road between 12 th Street and Roberts Avenue
5	Story Road between Roberts Avenue and Via Ferrari/Olinder Ct
6	Story Road and US 101 Interchange
7	Story Road between Knox Avenue and Capitol Expressway

EXISTING PEDESTRIAN CROSSING CONDITIONS

To assess existing pedestrian conditions, a marked crosswalk inventory was completed and general conditions related to the safety and ease of crossing the corridor were assessed. **Figures 1 and 2** present the inventory of existing marked crosswalk on the corridor and identify locations for new and enhanced crosswalks per the City's Vision Zero implementation efforts, as described later in this memorandum. **Appendix A** presents the inventory in tabular form.

The following sections detail, first, the potential pedestrian demand for crossings using land use considerations to understand potential for generating pedestrian trips and, second, roadway characteristics to understand safety considerations, crosswalk design, and potential for additional crosswalk enhancements.

Segment 1 –Willow Street between from SR 87 and Graham Avenue

Segment 1 has short block lengths (approximately 250 feet) and the fewest number of travel lanes on the corridor – only one lane in each direction. With the many retail and commercial uses of Willow Street, marked crosswalks are available frequently. Many existing crosswalk also have a safe routes to school function and are marked in yellow paint. West of the commercial area of Willow Street, there are few marked crossing opportunities despite the connections to Tamien Station to the south. **Table 2** summarizes the existing conditions for this segment.



TABLE 2: EXISTING CONDITIONS: SEGMENT 1 - WILLOW STREET BETWEEN SR 87 AND GRAHAM AVENUE

Key Characteristics	Description
Cross Section	2 Travel Lanes
Parking	Both sides through commercial areas
Posted Speed Limit	25 MPH
Bicycle Facility	Bicycle Route with Sharrows
Typical Distance Between Controlled Crosswalks	Approximately 550 Feet
Land Uses	Compact commercial and retail, neighborhood residential

The following needs and opportunities were identified for this segment:

- Intense retail, commercial, and school uses along and near the corridor likely indicate a high pedestrian demand through most of this segment
- Opportunity to mark uncontrolled crosswalks throughout based on lower speeds and narrow cross-section without additional enhancements
- Opportunity to adjust complex intersection geometries with slip lane and mark crosswalks at Lick Avenue
- No marked crossing is present at the Guadalupe River trail crossing of Willow Street
- Many of the existing crosswalks provide safe routes to school access for students walking and biking

Segment 2 – Graham Avenue and Goodyear Street between Willow Street and S 1st Street

Segment 2 has residential uses fronting both sides. Complex intersections with slip lanes and few marked crosswalks are located on both ends of the Graham Avenue block. **Table 3** summarizes the existing conditions for this segment.



TABLE 3: EXISTING CONDITIONS: SEGMENT 2 - GRAHAM AVENUE AND GOODYEAR STREET BETWEEN WILLOW STREET AND S 1ST STREET

Key Characteristics	Description
Cross Section	2-3 Travel Lanes on Graham Avenue; 5 Travel Lanes on Goodyear
Parking	Both sides
Posted Speed Limit	25 mph
Bicycle Facility	Class II Bicycle Lanes on Graham Avenue; Class III Bicycle Route with Sharrows on Goodyear Street
Typical Distance Between Controlled Crosswalks	Approximately 600 Feet
Land Uses	Primarily Residential on Graham Avenue, Commercial node near 1 st Street

The following needs and opportunities were identified for this segment:

- In its existing configuration, uncontrolled crosswalks in this segment would likely require flashing beacons; if a road diet is implemented, flashing beacons would not be required and crosswalks can be marked more frequently
- This segment has two complex intersections: one at Graham Avenue/Goodyear Street and one at Graham Avenue/Willow Street/Almaden Avenue, both of which are difficult for pedestrians to cross and increase auto speeds in residential areas; these could be reconfigured to create clearer expectations between drivers and pedestrians
- Many of the crosswalks at the two complex intersections are not marked. While not prohibited, no curb ramps are provided at many potential crossing locations, and some pork chop islands have landscaping or no improvements to discourage pedestrian travel
- Crossings of Goodyear are prohibited at Sherman Street

Segment 3 –Keyes Street between South 1st Street and 12th Street

In **Segment 3**, block lengths increase slightly as does crosswalk spacing, with marked crosswalks occurring approximately every quarter mile. Pedestrian demand in this area remains high due to locally-serving retail and commercial and industrial activity on the corridor. The multi-lane cross-section of Keyes makes crossing distances long for pedestrians. **Table 4** summarizes the existing conditions for this segment.



TABLE 4: EXISTING CONDITIONS: SEGMENT 3 – KEYES STREET BETWEEN SOUTH 1ST STREET AND 12TH STREET

Key Characteristics	Description
Cross Section	4-5 Travel Lanes
Parking	Both sides
Posted Speed Limit	35 mph
Bicycle Facility	Class II Bicycle Lanes with buffers in some locations
Typical Distance Between Controlled Crosswalks	Approximately 800 Feet
Land Uses	Compact Urban with industrial/commercial area between 2 nd and 6 th ; residential between 6 th and 12 th

The following needs and opportunities were identified for this segment:

- Short block lengths and fronting commercial uses create high potential demand for crossings.
- Multiple sports stadia are located to the south of this segment, which create high potential crossing demand near game times
- In its existing configuration, uncontrolled crosswalks in this segment would likely require flashing beacons
- With a lane reduction, marked crosswalk could be marked throughout the corridor without further enhancements based on low speeds and narrower cross-section
- There is a missing crosswalk on the east leg of the Keyes Street/10th Street intersection, where crossings are currently prohibited due to the double left-turns from southbound S 10th Street

Segment 4 – Story Road and 12th Street to Story Road and Roberts Avenue

Keyes Street becomes Story Road and widens for the remainder of the study corridor. **Segment 4** has almost no uses fronting the corridor, and, as a result, pedestrian demand is generally low except at the signalized intersections at each end of the segment. A large park complex, including Happy Hollow Zoo, and other parks and museums are located to the south of this area. The Coyote Creek Trail, which is currently unimproved in this section, intersects the corridor at Senter Road. The multi-



lane cross-section of Story Road makes crossing distances long for pedestrians. The City recently prepare concepts design to look at adding a trail crossing at the existing signal at Senter Road associated with Coyote Creek Trail improvements. The project is not funded at this time. **Table 5** summarizes the existing conditions for this segment.

TABLE 5: EXISTING CONDITIONS: SEGMENT 4 – STORY ROAD BETWEEN 12TH STREET AND ROBERTS AVENUE

Key Characteristics	Description
Cross Section	6-7 Travel Lanes
Parking	Prohibited
Posted Speed Limit	40 mph
Bicycle Facility	Class II Bicycle Lanes
Typical Distance Between Controlled Crosswalks	Approximately 800 Feet
Land Uses	Parks and Open Space

The following needs and opportunities were identified for this segment:

- No fronting uses exist in this segment and pedestrian demand is therefore expected to be low except at either end of the corridor
- Opportunity to improve the Coyote Creek Trail (alignment currently follows Coyote Creek) and a spur to the trail connecting to Senter Road
- Opportunity to provide trail crossings at the Story Road/Remillard Court and Story Road/Senter Road intersections

Segment 5 – Story Road between Roberts Avenue and Via Ferrari/Olinder Court

Segment 5 has many large shopping centers and includes the Little Saigon area, which is a regionally- and locally-serving destination. This portion of the story has relatively long distances between signalized crosswalks, typically 750 feet. The multi-lane cross-section of Story Road makes crossing distances long for pedestrians, typically 110 feet and up to 140 feet where there are slip lanes. **Table 6** summarizes the existing conditions for this segment.



TABLE 6: EXISTING CONDITIONS: SEGMENT 5 – STORY ROAD BETWEEN ROBERTS AVENUE AND VIA FERRARI/OLINDER COURT

Key Characteristics	Description
Cross Section	6-7 Travel Lanes
Parking	Prohibited
Posted Speed Limit	40 mph
Bicycle Facility	Class II Bicycle Lanes west of McLaughlin Avenue
Typical Distance Between Controlled Crosswalks	Approximately 750 Feet
Land Uses	General Commercial and Mixed Use

The following needs and opportunities were identified for this segment:

- Pedestrian demand is expected to be high in this area, due to important retail and commercial destinations as well as high ridership bus stops
- Large block sizes and auto-oriented land uses create infrequent crossing opportunities, with long distances between controlled crosswalks
- In order to provide more frequent crossing opportunities, pedestrian hybrid beacons (PHBs) or traffic signals would likely be required due to the speed and nature of the corridor in this segment.
- The east crosswalk at the Story Road/Roberts Avenue intersection can be straightened to reduce crossing distances and improve accessibility for those with mobility and visual impairments
- Opportunity to remove the existing pork chop islands at the Story Road/McLaughlin Avenue intersection in order to reduce crossing distances

Segment 6 – Story Road and US 101 Interchange

Segment 6 is the interchange with US 101. This segment has no marked crossings across Story Road, consistent with the inactivated land uses through the interchange. However, clover-leaf ramp



geometries present a significant barrier to pedestrians, particularly for those with mobility and visual impairments. **Table 7** summarizes the existing conditions for this segment.

TABLE 7: EXISTING CONDITIONS: SEGMENT 6 – STORY ROAD AND US 101 INTERCHANGE

Key Characteristics	Description
Cross Section	6 Travel Lanes
Parking	Prohibited
Posted Speed Limit	40 mph
Bicycle Facility	None
Typical Distance Between Controlled Crosswalks	0.4 Miles
Land Uses	High Speed Highway Interchange
Driveways	Highway Entrances

The following needs and opportunities were identified for this segment:

- Existing ramp geometries and cross slopes allow high speeds at the existing marked crosswalks.
- All crosswalks are currently marked with standard crosswalk and markings are faded
- In the long term, opportunity to reconfigure ramps to reduce vehicle speeds entering and exiting ramps
- In the interim, opportunity to enhance crosswalks through improved striping and signage to alert drivers to the presence of pedestrians and to improve disabled access

Segment 7 – Story Road between Knox Avenue and Capitol Expressway

Similar to Segment 5, the crossing distances in **Segment 7** are long, and there are long distances between marked crossings – typically 750 to 1,000 feet - due to the road being high-speed and multi-lane as well as the disconnected street network. The multi-lane cross-section of Story Road makes crossing distances long for pedestrians, typically 100 to 120 feet. **Table 8** summarizes the existing conditions for this segment.



TABLE 8: EXISTING CONDITIONS: SEGMENT 7 – STORY ROAD BETWEEN KNOX AVENUE AND CAPITOL EXPRESSWAY

Key Characteristics	Description
Cross Section	6-7 Travel Lanes
Parking	Allowed with Fronting Residential
Posted Speed Limit	35 mph
Bicycle Facility	None
Typical Distance Between Controlled Crosswalks	Approximately 700 Feet
Land Uses	Mixed Commercial on Western portion and Residential
Driveways	N/A

The following needs and opportunities were identified for this segment:

- Potential for pedestrian demand with school, residential, and shopping centers on the corridor
- Long block lengths and long distances between controlled intersections result in infrequent crossing opportunities
- In order to provide more frequent crossing opportunities, PHBs or traffic signals would likely be required due to the speed and nature of the corridor
- Many schools are located near the corridor, which makes safe routes to school crossing important for students walking and biking to school
- Missing west crosswalk and bent east crosswalk at the Story Road/Knox Avenue Intersection
- Opportunity to straighten east crosswalk at Hopkins Drive/Story Road
- Opportunity for crossing improvements as well as two-way cycle track/bicycle boulevard connection at Hopkins Drive/Sunset Drive intersection in conjunction with the Sunset I 680 project. Sunset 680 is a community collaboration project to revitalize the South Sunset Avenue Pedestrian Bridge area into a community space.



- Opportunity to enhance connection to existing path just west of Galahad Avenue with wayfinding and trail crossing improvements at the existing Story Road/Galahad Avenue intersection.

POTENTIAL PEDESTRIAN CROSSING ENCHANCEMENT OPPORTUNITIES

There are a variety of opportunities to enhance existing crossings on the corridor and to install new enhanced crosswalks. **Table 10** presents a list of issues and potential opportunities to address each issue. This potential toolkit of enhancements can be considered as alternatives and project concepts are developed through the Study.

TABLE 10: SUMMARY OF EXISTING CROSSING ISSUES AND POTENTIAL OPPORTUNITIES

Existing Issues	Potential Opportunities
Slip Lanes (“Pork Chop” Islands)	-Remove slip lanes entirely where out of context with the neighborhood and/or pedestrian safety goals -Where they remain, enhance existing slip lanes with yield, stop or signal control -Enhance existing slip lanes with more comfortable waiting areas and address accessibility issues, such as wide cut throughs and truncated domes
Bent Crosswalks	-Straighten crosswalk through restriping and adjusting curb ramps and median tips, as needed
Missing Crosswalks at Controlled Intersections	-Mark crosswalks with appropriate traffic control -Review traffic operations to make sure this does not create additional driver-pedestrian conflicts -Consider marking all crosswalks as routine practice in high priority pedestrian areas
Infrequent Crossing Opportunities	-Mark frequent uncontrolled crosswalks where pedestrian activity is expected to be high and where possible based on few travel lanes and lower speeds -Mark additional uncontrolled crosswalks at key locations where multi-lane cross-section and wider cross-section requires higher level of enhancement, such as flashing beacons, PHBs, or traffic signals
ADA Access	-Provide directional curb ramps -Consider accessible push buttons and audible warning devices



Multi-lane Roadways	<ul style="list-style-type: none">-Consider lane reduction where feasible based on traffic volumes-Provide higher level of crosswalk enhancement across multi-lane roadways to avoid multiple-threat collisions-Consider strategies to reduce target travel speeds-Existing median provides an opportunity for median refuges at both controlled and uncontrolled crosswalks
Missing Trail Crossings	Add marked trail crossings with appropriate level of enhancement where trails terminate or cross the corridor, such as the Tamien Station Path or Coyote Creek Trail

Source: Fehr & Peers, 2016.

Previously Identified Projects

In addition to the toolbox of crosswalk enhancement options described above, the City of San Jose has identified some specific crosswalk enhancements on the corridor. In April 2015, the City adopted the Vision Zero transportation safety initiative, which aims to eliminate fatalities and reduce severe injuries caused by traffic collisions. This assessment found that 50 percent of fatal traffic crashes occur on only 3 percent of city streets, which includes the portion of Story Road between Senter Road and Capitol Expressway. As a result, the City set those streets as safety priority streets and conducted further analysis, which included detailed collision analysis, walk audits, and preliminary recommendations. This analysis focused on site-specific safety improvements and generally included the following on Story Road:

- Repair damaged sidewalks
- Upgrade pedestrian ramps to meet current ADA practices
- Mark crosswalks that are currently unmarked at existing signals
- Straighten crosswalks that are currently skewed
- Consider removing pork chop islands

ATTACHMENT A: INVENTORY OF EXISTING MARKED CROSSWALK ON THE CORRIDOR

TABLE A-1: EXISTING CROSSWALK INVENTORY

Corridor Segment	Cross-Street	Marked Crosswalks ¹	School ²	Traffic Control	Existing Crosswalk Issues
Goodyear Street	S 1st Street	N, S, W	N	Signal	-
Goodyear Street	Sherman Street	N, S	N	Uncontrolled	Skewed crosswalk on north leg
Graham Avenue	Almaden Avenue	E	N	Uncontrolled	Crosswalk to pork chop island on east leg
Graham Avenue	Sherman Street	W	N	All-way Stop	Two stage crossing with pedestrian refuge
Keyes Street	S 10th Street	N, S, W	N	Signal	Crosswalk to pork chop island on south and west legs Prohibited pedestrian crossing on east leg
Keyes Street	S 11th Street	N, E, S, W	N	Signal	Crosswalk to pork chop island on east leg
Keyes Street	S 12th Street	S	N	Side Street Stop	-
Keyes Street	S 3rd Street	N, E, S, W	N	Signal	Skewed crosswalk on north leg
Keyes Street	S 6th Street	N, S	N	Side Street Stop	-
Keyes Street	S 7th Street	N, E, S, W	N	Signal	Skewed crosswalk on east and west legs



Corridor Segment	Cross-Street	Marked Crosswalks ¹	School ²	Traffic Control	Existing Crosswalk Issues
Keyes Street	S 8th Street	N, S	N	Side Street Stop	-
Keyes Street	S 9th Street	N, S	N	Side Street Stop	-
Keyes Street	S Second Street	N, S, W	N	Signal	Skewed crosswalk on north leg
Keyes Street	Senter Road	S, W	N	Signal	No marked west leg crossing (Not marked as prohibited, no gate) Skewed crosswalk to pork chop island on south leg
Story Road	Adrian Way	E, S, W	N	Signal	No marked west leg crossing (Not marked as prohibited, no gate)
Story Road	Capitol Expy	N, E, S, W	N	Signal	Skewed crosswalk on east and west legs Crosswalk to pork chop island on north, east, and south legs
Story Road	Clemence Avenue	S	N	Signal	-
Story Road	Felipe Avenue/Via Ferrari	N, E, S, W	N	Signal	-
Story Road	Galahad Avenue	N, E, S, W	N	Signal	Skewed crosswalk on east and west legs
Story Road	Grand Century Shopping Mall	E, W	N	Signal	-
Story Road	Hopkins Drive	E, W	N	Signal	Skewed crosswalk on east leg



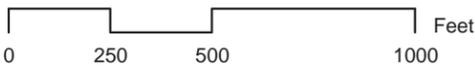
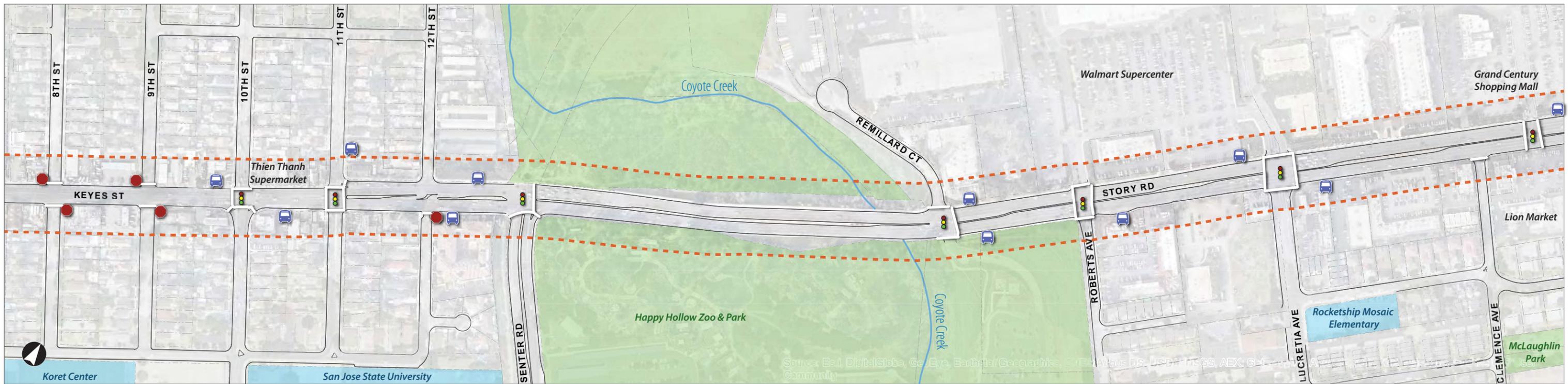
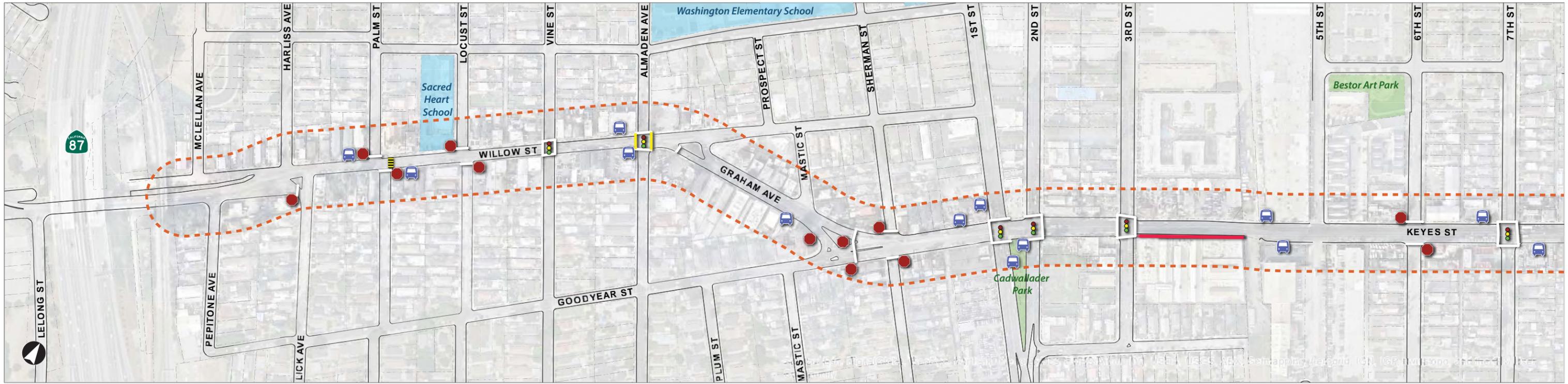
Corridor Segment	Cross-Street	Marked Crosswalks ¹	School ²	Traffic Control	Existing Crosswalk Issues
Story Road	Knox Avenue	N, E, S, W	N	Signal	Skewed crosswalk on east leg No marked west leg (not marked as prohibited, no gate)
Story Road	Leeward Drive	E, S, W	N	Signal	Skewed crosswalk on east leg No marked west leg crossing (not marked as prohibited, no gate)
Story Road	Lucretia Avenue	N, E, S, W	N	Signal	Skewed crosswalk on east leg
Story Road	McCreery Avenue/Bal Harbor Way	N, E, S, W	N	Signal	-
Story Road	Mi Pueblo Plaza	N	N	Signal	-
Story Road	McLaughlin Avenue	N, E, S, W	N	Signal	Crosswalk to pork chop island on north, east, and south legs
Story Road	Plaza de San Jose	S	N	Signal	-
Story Road	Plaza de San Jose/Mi Pueblo Plaza	W	N	Signal	-
Story Road	Remillard Court	N, E, S, W	N	Signal	Skewed crosswalk on east leg Prohibited pedestrian crossing on west leg
Story Road	Roberts Avenue	N, E, S, W	N	Signal	Bent crosswalk on east leg
Story Road	S Jackson Avenue	N, W	N	Signal	No marked east leg crossing (Not marked as prohibited, no gate)



Corridor Segment	Cross-Street	Marked Crosswalks ¹	School ²	Traffic Control	Existing Crosswalk Issues
Story Road	S King Road	N, E, S, W	N	Signal	-
Story Road	S Sunset Avenue	N	N	Signal	-
Story Road	Senter Road	E	N	Signal	No marked west leg crossing (Not marked as prohibited, no gate)
Willow Street	Almaden Avenue	N, E, S, W	Y	Signal	Skewed crosswalk on south leg
Willow Street	Lick Avenue	W	N	Side Street Stop	Five-legged intersection Marked crosswalk at EB slip lane only
Willow Street	Locust Street	N, S	N	Side Street Stop	-
Willow Street	Palm Street	N, E, S	Y	Side Street Stop	-
Willow Street	Vine Street	N, E, S, W	N	Signal	-

1. Indicates which crosswalks are marked: N = north, S= south, W = west, and E = east

2. Denotes whether the crosswalk is striped yellow as a result of being in a school zone. Y = yes (yellow), and N – no (white).

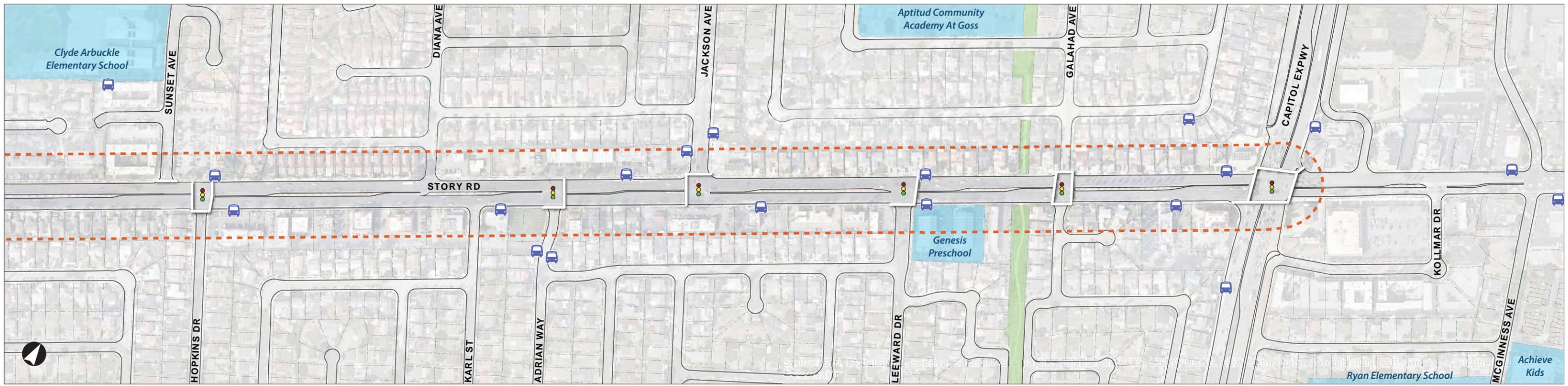


November 2016
 Source: VTA, City of San Jose, Fehr and Peers

Crosswalks and Bus Stops on the Story-Keys Corridor

 Existing Bus Stops	 Existing Standard Crosswalk
 Stop Sign	 Existing Ladder Crosswalk
 Traffic Signal	 Missing Sidewalk
	 Park
	 School





November 2016

Source: VTA, City of San Jose, Fehr and Peers

Crosswalks and Bus Stops on the Story-Keys Corridor

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