UNIVERSITY OF CALIFORNIA, BERKELEY ● INSTITUTE OF TRANSPORTATION STUDIES ● TECHNOLOGY TRANSFER PROGRAM

ITSBerkeley TECH TRANSFER 20020

TOWN OF WINDSOR

PEDESTRIAN SAFETY ASSESSMENT

Issues, Opportunities, and Enhancement Strategies



Evaluation Team:

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August 2012

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FINAL REPORT

AUGUST 2012

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EXECUTIVE SUMMARY

The Public Works Department of Town of Windsor requested that the Technology Transfer Program of the Institute of Transportation Studies at University of California, Berkeley conduct a Pedestrian Safety Assessment (PSA) study. A team of two pedestrian safety experts conducted the PSA field visit of Windsor in April 2012 and prepared this report. The objectives of the PSA are to improve pedestrian safety and to enhance walkability and accessibility for all pedestrians in Windsor.

The Town of Windsor has been striving to accommodate both existing and future pedestrian demand with efforts such as:

- Development of the *Complete Street Design Guidelines for the Town of Windsor*
- Successful grant funding effort through the Town's Safe Routes to School Committee
- Methodical collision reporting and review procedures
- Commitment to improving bicycle and pedestrian infrastructure over the last few years such as gap closure projects

The PSA focused on identifying opportunities that could build on these existing efforts and offering ideas for potential enhancements.

The Town of Windsor has an estimated population of 26,847 residents. Based on the 2010 California Office of Traffic Safety (OTS) safety rankings of California counties, Windsor ranked 91st out of 93 California cities with a population of 25,001-50,000 for the number of pedestrians collisions by average population in the "number of collisions involving pedestrians" category, with 1st being the worst and 93th the best. This ranking is based on rate of collisions per "1000 daily-vehicle-miles-of-travel". Reviewing five years of collision data (January 1, 2006 to December 31, 2010), there were 20 reported pedestrian-involved collisions in the Town of Windsor in which 14 pedestrians were injured and one pedestrian was killed.

Chapter 2 provides an overview of collision data for Windsor, focusing particularly on pedestrian-involved collisions.

The remainder of this report presents the findings and suggestions derived from:

- Benchmarking analysis of the Town's existing pedestrian programs, policies, and practices (*Chapter 3*)
- Field walking audit of Windsor (*Chapter 4*)

BENCHMARKING ANALYSIS OF POLICIES, PROGRAMS, AND PRACTICES

A pedestrian safety interview was conducted with Town staff and other community stakeholders in advance of the PSA field visit to gain an understanding of the existing pedestrian policies, programs, and practices in Windsor. This interview formed the basis for a benchmarking process that categorized the Town's programs, practices, and policies into three groups:

- Key Strengths (areas where the Town is exceeding national best practices)
- Enhancement Areas (areas where the Town is meeting best practices)
- Opportunity Areas (areas where the Town may not meet best practices)

The benchmarking analysis aims to provide the Town with information on current best practices and how Windsor compares. Cities and towns have differing physical, demographic, and institutional characteristics that may make certain goals or policies more appropriate in some jurisdictions than others. Ultimately, Town staff may determine where resources and efforts are best placed for meeting local development and infrastructure goals for pedestrians.

A discussion of Windsor's pedestrian safety policies, programs, and practices, and ideas for enhancement is presented in *Chapter 3*.

Key Strengths

- Americans with Disabilities Act (ADA) Transition Plan for Streets and Sidewalks
- Collision History and Collision Reporting Practices
- Pedestrian-Oriented Traffic Signal and/or Stop Sign Warrants
- Specific Plans, Redevelopment Areas, and Overlay Zones
- Design Policies and Development Standards
- Pedestrian Master Plan
- Adoption of Routine Accommodations for New Development
- Enforcement
- Safe-Routes-to-School Program and Grant Funding
- Adoption of Open Space Requirements

Enhancement Areas

The enhancement areas for consideration include the following:

<u>Implementation of Americans with Disabilities Act (ADA) Improvements</u>

- Develop ADA design guidelines, which highlight state-of-the-practice. Specific examples include:
  - Require that all new traffic signals installed feature audible pedestrian signals, and identify existing traffic signals at major intersections where audible pedestrian signals may be installed.
  - Construct all intersections to include directional curb ramps with truncated domes where practical.
  - Set a standard for the minimum required number of disabled parking spaces as part of on-street parking projects.

  - Require the installation of high-contrast bands at the intersection of public sidewalks with commercial driveways and intersections

- Identify a more substantial funding source for the Town's ADA improvement program to implement improvements

- Consider developing a formal ADA improvement program for items such as curb ramps and sidewalk maintenance. The program may provide an inventory, prioritization plan and funding source for such improvements

Collection of Pedestrian Volumes

- Solidify recent practice of routinely collecting pedestrian and bicycle volumes by requiring them to be conducted in conjunction with all manual intersection turning movement counts as a matter of course

- Coordinate with Safe Route to School committee to ensure continual collection of annual or biannual counts of pedestrian volumes in the vicinities of schools during peak morning arrivals and afternoon departures

- Geo-code pedestrian volume data collected by various sources with GIS software along with other data such as pedestrian control devices and collisions to analyze data for trends or hotspots related to pedestrian safety

Pedestrian Traffic Control Audit (Signs, Markings, and Signals)

- Complete the inventory of all traffic control devices (including pedestrian-related equipment such as push button actuation and countdown indicators), signage, and markings and include maintenance records, preferably within a GIS database

- Develop a crosswalk inventory by conducting audits of the adequacy of current crosswalks. Seattle's inventory of its marked crosswalks may serve as a model. (see *http://www.seattle.gov/transportation/cwp_back.htm)*

- Ensure that locations with pedestrian desire lines have crosswalks. The crosswalk policy mentioned below in Section 3.3 (e) - Crosswalk Installation, Removal, and Enhancement Policy - can help determine the appropriate crossing treatment at uncontrolled locations without marked crosswalks

- Identify the highest priority signal locations for replacement with countdown signals and a funding source

- Develop a proactive monitoring program for traffic control devices

- Require that all new traffic signals be installed according to current MUTCD standards to include not only pedestrian signal head and navigator accessible pedestrian signal push buttons but also countdown pedestrian signals and LED bulbs.

Pedestrian-Oriented Speed Limits and Speed Surveys

- Consider pedestrian volumes when setting speed limits and employ traffic calming strategies in locations where speed surveys suggest traffic speeds are too high for pedestrian areas.
- Consider establishing 15 MPH school zones.
- Continue to ensure design standards and design speeds in pedestrian areas do not contribute to a routine need for traffic calming.

Inventory of Sidewalks, Informal Pathways, and Key Pedestrian Opportunity Areas

- Create an inventory of existing and missing sidewalks, informal pathways, and key pedestrian opportunity areas in GIS format and continue to maintain the inventory
- Consider additional sidewalk funding mechanisms, such as a requirement to provide or repair sidewalks with each property sale.

Proactive Approach to Institutional Coordination

- Proactively seek opportunities to collaborate with Caltrans and railroad companies to identify and improve pedestrian safety and access at Highway 101 ramps and around railroad crossings.
- Use the current Safe-Routes-to-School grant funding implementation process as an opportunity to build stronger relationship and improve communication with the School District
- Enhance outreach opportunities with other jurisdictions by enhancing the public feedback process, as detailed below in Section 3.2 (v) – Public Involvement and Feedback Process.
- Actively pursue not only transportation-related grant opportunities but also health-related grants particularly for non-capital improvement projects such as education programs

General Plan: Densities and Mixed-Use Zones

- Include the pedestrian priority districts identified in the Winsor Bicycle and Pedestrian Plan, where varied densities and mixed-uses could accommodate or attract pedestrian activities, in the next update of the Town's General Plan
- Incorporate the visions and policies of the Station Area Specific Plan into the next General Plan update and consider expanding and customizing the visions and policies to other appropriate areas
- Enhance pedestrian-friendly goals, policies, and actions in the next General Plan update and establish transit and auto vehicle policies that support a balanced multi-modal transportation network
- Consider policies that set parking maximums, require unbundled parking and other parking options

- Consider incorporating form-based zoning and policies for Transit Oriented Development (TOD) into the next General Plan update.

General Plan: Provision of Pedestrian Nodes

- Identify all existing and future pedestrian nodes in updates to General Plan using MTC's *Pedestrian District Study* as a resource (*http://www.mtc.ca.gov/planning/bicyclespedestrians/Ped_Districts/index.htm)*
- Consider an overlay district for pedestrian nodes with special pedestrian-oriented guidelines, such as suspending automobile Level of Service standards. Prioritize sidewalk improvement and completion projects in these nodes
- Identify pedestrian-oriented typologies for the circulation map. A resource for this is the City of Oakland's Pedestrian Master Plan, found here: *http://www.oaklandnet.com/government/pedestrian/index.html*
- Codify pedestrian orientation policies stated in the General Plan into zoning ordinances, particularly in identified pedestrian nodes.

Policies for Neighborhood-Sized and Accessible Schools

- Through Safe-Routes-to-School committee, work with the School District towards offering increased grade level range in each school in order to reduce the schools' proximity to targeted students; thereby increasing opportunities for walking and bicycling to schools and reducing school-related vehicular traffic
- Identify locations of abandoned public school buildings in existing neighborhoods, if any, and work with school districts to renovate
- Work with school districts to ensure that new and renovated schools have multiple access points through its grounds so that they themselves do not create barriers to pedestrians and bicyclists

Adoption of Street Tree Requirements

- Consider modifying the Street Tree Ordinance to address pedestrian access issues
- Where sidewalk widths do not support the addition of street trees, consider placing trees in tree wells within on-street parking
- Develop a GIS inventory of existing trees
- Incorporate trees into broader thermal comfort considerations by placing them in high pedestrian volumes areas

Transportation Demand Management (TDM) Program

- Consider codifying the TDM policies contained in the Windsor Station Area/Downtown Specific Plan in order to facilitate implementation
- Consider developing additional TDM policies appropriate for Town-wide applications and for sub-area applications

- Disseminate TDM information for residents, employees and visitors through link from the Town's official website

- Identify a part-time TDM Coordinator among Town staff

Public Involvement and Feedback Process

- Establish a website portal through which residents and others can submit concerns specifically related to pedestrian safety in the Town by creating a link on the home page and/or the Public Works page. Provide options that include sidewalk, curb ramps, enforcement, lighting, and other issues related to safety.

- Consider a tracking number process for citizen input, so that community members can track their requests

- Consider establishing a Town-wide citizen's advisory committee to exclusively address pedestrian needs

- Consider holding public meetings with established forums in the community such as churches, senior centers, or schools to solicit public inputs

Economic Vitality

- Consider developing Business Improvement Districts in the Town's commercial areas

- Consider adding overlay zones, such as transit-oriented zones, to the Zoning Code

Pedestrian Safety Education Program

- Develop a Town-wide educational campaign for all ages:

  - Campaigns may include advertisements on buses and bus shelters, an in-school curriculum, community school courses, public service announcements, and/or brochures, among many other strategies. The Street Smarts program in San José, California, provides a model pedestrian safety education program (see *www.getstreetsmarts.org* for more information).

  - In addition to current school-focused activities and programs, the Town may work with the Safe-Routes-to-School committee and the School District to incorporate pedestrian safety curriculum in the elementary school. The Bicycle Transportation Alliance has developed a pedestrian safety curriculum for 2nd-3rd graders, which incorporates physical education, health, and social responsibility

Coordination with Health Agencies

- Seek more active involvement of EMS personnel in the planning and design of pedestrian facilities

- Develop opportunities for technical collaboration and funding with the County's Department of Health Services and other health care professionals and organizations

- Consider coordinating with local hospitals as another source of collision data

Coordination with Emergency Response

- Institute a dialogue with emergency responders to discuss roadway safety goals, effects on their response times, and vehicle sizes.
- Before completing the design and installing traffic calming and pedestrian infrastructure, set-up temporary elements that replicate the design on the proposed on the streets. Coordinate with emergency responders to do before and after test runs to assess the delay on their response times and make adjustments to the design, as needed.

Historic Sites

- Develop a map to showcase natural or local sites of interest, and link key features in the Town, including a possible walking and/or biking routes between the sites. Maps of the tour route and historic documentation materials could be made available online and at information kiosks.
- Install wayfinding signs and plaques for historic sites throughout the Town

Opportunities Areas

Traffic Calming Programs

- Develop and adopt a traffic calming program
- Suggest design guidelines for new development that includes traffic calming treatments such as traffic circles and bulb-outs
- Establish a funding source for implementing traffic calming

Pedestrian Safety Program and Walking Audits

- Create a pedestrian safety program using the FHWA's *How to Develop a Pedestrian Safety Action Plan* found at:
  http://katana.hsrc.unc.edu/cms/downloads/howtoguide2006.pdf
- Conduct regular area-wide walking audits. This effort could complement other programs within the Town to improve health and safety or to enhance sustainability.

Attention to Pedestrian Crossing Barriers

- Include design standards for the accommodation of pedestrian and bicyclists at highway interchanges, and railroad tracks, in an updated Bicycle and Pedestrian Plan, a Streetscape Master Plan, or in an updated ADA Transition Plan
- Formally identify and create an inventory of pedestrian barriers
- Develop policies for reducing the barriers and maintaining the pedestrian infrastructure through prioritizing projects

- Identify funding sources for reducing the barriers

Crosswalk Installation, Removal, and Enhancement Policy

- Develop crosswalk policies that reflect best practices and recent research with respect to the installation, removal, and enhancement of crosswalks. These include removing crosswalks only as an option of last resort and providing midblock crossings where they serve pedestrian desire lines. These policies may consider adopting the "triple four" crosswalk striping treatment at mid-block or other uncontrolled locations used in Sacramento and other California jurisdictions.

- Include criteria for installing crosswalk enhancements at uncontrolled crossings, such as high-visibility crosswalks, flashing beacons, rapid-flash pedestrian actuated signage, in-roadway warning lights, or in-crosswalk pedestrian paddles.

Pedestrian/Bicycle Coordinator

- With a population of approximately 26,000, the Town may consider designating a current staff member as the role of Pedestrian/Bicycle Coordinator to include interdepartmental coordination, grant writing and staff liaison to local non-profits, advocacy groups and schools. This staff member would spend approximately 30 percent of his/her time on pedestrian and bicycle related issues.

Adoption of Newspaper Rack Ordinance

- Consider adopting a Newspaper Rack Ordinance that addresses pedestrian access issues if the use of newspaper rack is still prevalent in Windsor

Use of Street or Sidewalk Furniture Requirements

- Consider adopting a Street and Sidewalk Furniture Ordinance

- Develop a GIS inventory and conduct regular assessments of street and sidewalk furniture

Adoption of Bicycle Parking Requirements

- Consider adopting a Bicycle Parking Ordinance that requires bicycle parking. The ordinance may distinguish between and includes provisions for both long-term and short-term bike parking.

- Ensure that the bicycle parking requirements include the consideration of pedestrian circulation in its design, particularly on sidewalks.

Formal Advisory Committee

- Consider establishing a Pedestrian and Bicycle Advisory Committee that is comprised of citizens from different areas of the Town who are focused on addressing walkability issues, including at least one person focused on disabled access.

Sports Field Location Requirements

- Adopt a requirement that sports fields are located within existing neighborhoods or in close proximity to schools, frequent transit, or community centers.

Use of Leading Pedestrian Intervals

- Consider installing LPIs in areas of high pedestrian activity such as the downtown area.

WALKING AUDIT SUGGESTIONS FOR IMPROVEMENTS

The Team conducted observations and walking field audits at six locations in Windsor:

(1) Old Redwood Highway at US 101 Northbound Ramps/Lakewood Drive

(2) Conde Lane/Johnson Street/Old Oak Road

(3) Windsor High School

(4) Central Windsor: Windsor Road/Windsor River Road

(5) Starr Road at Cali Calmecac Language Academy

(6) Starr Road and Old Redwood Highway

These focus areas were visited and the walking audit identified positive practices as well as pedestrian safety and accessibility opportunities.

The observations made during the walking audit were used to suggest policies and physical improvements that could enhance pedestrian safety and accessibility, and in some instances, economic vitality. Key suggestions from the Windsor walking audit include:

- Install sidewalks, crosswalks and pedestrian signs
- Install signal and stop bar
- Square up intersections to improve safety and reduce crossing distances
- Extension of bike lanes
- Consider path connections and trail bridges

A narrative description of walking audit observations and suggestions for enhancements (with graphics) are summarized in *Chapter 4*.

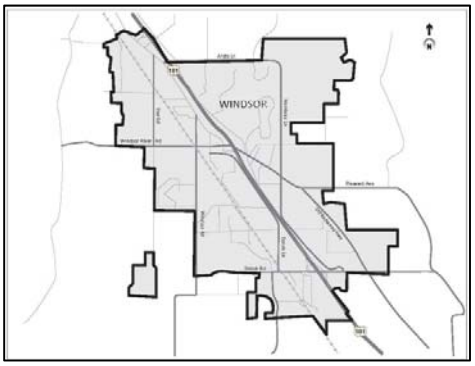
Many of the strategies suggested in this report are appropriate for grant applications, including Office of Traffic Safety (OTS) or Safe-Routes-to-School funding. The strategies may also be incorporated into a bicycle or pedestrian master plan, documents that could set forth bicycle, pedestrian and streetscape policies for the Town and identify and prioritize capital improvement projects.

The suggestions presented in this report are based on limited field observations and time spent in Windsor by the PSA evaluators. These suggestions, which are based on general knowledge

of best practices in pedestrian design and safety, are intended to guide Town staff in making decisions for future safety improvement projects in Windsor, and they may not incorporate all factors which may be relevant to the pedestrian safety issues in the Town.

As this report is conceptual in nature, conditions may exist in the focus areas that were not observed and may not be compatible with suggestions in this report. Before finalizing and implementing any physical changes, Town staff may choose to conduct more detailed studies or further analysis to refine or discard the suggestions in this report, if they are found to be contextually inappropriate or appear not to improve pedestrian safety or accessibility due to conditions including, but not limited to, high vehicular traffic volume or speeds, physical limitations on space or sight distance, or other potential safety concerns.

1. INTRODUCTION



1.1 OBJECTIVE

The Public Works Department of the Town of Windsor requested that the Technology Transfer Program of the Institute of Transportation Studies at University of California, Berkeley conduct a Pedestrian Safety Assessment (PSA) study for various locations in the town. The objectives of the PSA are to improve pedestrian safety and to enhance walkability and accessibility for all pedestrians in Windsor.

1.2 EVALUATION APPROACH

Prior to visiting Windsor, the PSA Team (Team) conducted a pre-visit telephone interview on December 20, 2011 with Town staff. The results from this interview provided input into the benchmarking analysis. The Team visited Windsor on April 18, 2012. A meeting was held with participants in the December telephone interview as well as representatives from the Windsor Unified School District and Safe-Route-to-School program and members of the public to discuss initial results from the benchmarking analysis and logistics for the field visit.

The Team conducted observations and walking field audits at six locations in Windsor:

(1) Old Redwood Highway at US 101 NB on and off-Ramps/Lakewood Drive,

(2) Conde Lane/Johnson Street/ Old Oak RD,

(3) Windsor High School,

(4) Central Windsor: Windsor Road/Windsor River Rd,

(5) Starr Road at Cali Calmecac Language Academy; and

(6) Starr Road and Old Redwood Highway.

Walking audit participants included Town staff, community stakeholders, and representatives from Sonoma County Bicycle Coalition and Windsor Unified School District. The walking audits began with field observations in the morning, followed by a review of the benchmarking analysis and an introduction to pedestrian safety. The presentation on pedestrian safety included a series of photograph examples that illustrate typical areas of concern for walkability as well as best practices for pedestrian safety and accommodation. Field observations continued into the late morning and afternoon. This meeting included a presentation of the draft concepts for site-specific improvements based on the results of the walking audits.

1.3 ORGANIZATION OF THIS REPORT

Chapter 2 presents background information on pedestrian safety in the Town of Windsor, including the safety rankings for the Town, the locations of the highest pedestrian-involved collisions, and locations where pedestrian fatalities occurred for a five-year period from July 1, 2006 to June 30, 2010. *Chapter 3* presents the findings and suggestions from the benchmarking analysis. *Chapter 4* presents the findings and suggestions from the walking audit.

There are two appendices at the end of the report: Appendix A presents a glossary of pedestrian improvement measures, and Appendix B is a resource list.

1.4 ACKNOWLEDGEMENTS

Several participants contributed to the wide range of topics addressed in this report. In particular, Allan Tilton of W-Trans organized a successful phone interview and field visit, which included several expert and stakeholder participants, including but not limited to:

- Allan Tilton, Senior Associate, Whitlock & Weinberger Transportation, Inc (W-Trans)
- Loren Barker, Windsor Unified School District
- Richard Burtt, Public Works Director/Town Engineer, Town of Windsor
- Pauletta Cangson, Associate Planner, Town of Windsor
- Mike Charles, Town Resident
- Sarah Hadler, Safe Routes to School Program Coordinator, Sonoma County Bicycle Coalition
- Stuart Hayre, Principal Civil Engineer, Town of Windsor
- Donna Legge, Parks and Recreation Director, Town of Windsor
- Christina Panza, Safe Routes to School Director, Sonoma County Bicycle Coalition
- Alejandro Perez, Town of Windsor
- AnnaLisa Wiley, Town Resident

1.5 DISCLOSURES

The benchmarking analysis aims to provide the Town with information on current best practices and how the Town compares. Cities have differing physical, demographic, and institutional characteristics that may make certain goals or policies more appropriate in some jurisdictions than others. Ultimately, Town staff may determine where resources and efforts are best placed for meeting local development and infrastructure goals for pedestrians.

The suggestions presented in this report are based on limited field observations and time spent in Windsor by the PSA evaluators. These suggestions, which are based on general knowledge of best practices in pedestrian design and safety, are intended to guide Town staff in making decisions for future safety improvement projects in Windsor, and they may not incorporate all factors which may be relevant to the pedestrian safety issues in the Town.

As this report is conceptual in nature, conditions may exist in the focus areas that were not observed and may not be compatible with suggestions in this report. Before finalizing and implementing any physical changes, Town staff may choose to conduct more detailed studies or further analysis to refine or discard the suggestions in this report, if they are found to be contextually inappropriate or appear not to improve pedestrian safety or accessibility due to conditions including, but not limited to, high vehicular traffic volume or speeds, physical limitations on space or sight distance, or other potential safety concerns.

2. BACKGROUND

The Town of Windsor, located in the Russian River valley, is one of nine municipalities in Sonoma County. Originally settled in 1851, the Town was not incorporated until 1992. The town has a total area of about 7.3 square miles. According to the 2010 United State Census, the town has a population of 26,801, which represents a growth of nearly 18 percent over the last decade.[1]

The Town of Windsor has been striving to accommodate both existing and future pedestrian demand with efforts such as:

- Development of the *Complete Street Design Guidelines for the Town of Windsor*
- Successful grant funding effort through the Town's Safe Routes to School Committee
- Methodical collision reporting and review procedures
- Commitment to improving bicycle and pedestrian infrastructure over the last few years such as gap closure projects

2.1 PEDESTRIAN SAFETY OVERVIEW FOR THE TOWN OF WINDSOR

Based on the 2010 California Office of Traffic Safety (OTS) safety rankings of California cities, Windsor ranked 91st out of 93 cities with population of 25,001-50,000 for the number of pedestrians collisions by average population in the "number of collisions involving pedestrians" category, with 1st being the worst and 93th the best. This ranking is based on rate of collisions per "1000 daily-vehicle-miles-of-travel".

Reviewing five years of collision data (January 1, 2006 to December, 2010), there were 20 reported pedestrian-involved collisions in Windsor in which 14 persons were injured and one person were killed. The pedestrian fatality occurred on December 1, 2006 at Old Redwood Highway and Bluebird Drive.

The Office of Traffic Safety (OTS) collision rankings facilitate funding decisions and identify emerging traffic safety problem areas. The rankings allow cities to compare themselves to other cities with similar-sized populations and help them identify their potential disproportionate traffic safety problem(s). Please note that OTS rankings are only indicators of potential problems; there are many factors that may either understate or overstate a city ranking.

Victim and collision data for the rankings is taken from the latest published California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS) report. OTS provides two types of rankings: victim and collision rankings and DUI arrest rankings.

Victim and collision rankings are based on rates of victims killed and injured or fatal and injury collisions per "1,000 daily-vehicle-miles-of-travel" (2010 CALTRANS) and per "1,000 average population" (2010 Department of Finance) figures. Pedestrian, bicyclist and motorcycle victim rankings do not take into account the size or demographics of a city or the city's pedestrian/bicyclist/motorcyclist population.

[1] Wikipedia accessed on-line on June 5, 2012 at *http://en.wikipedia.org/wiki/Windsor,_California*.

Population groups using 2010 SWITRS data[2] are as follows:

Population Group	Collisions and Victims Rankings
A = over 250,000	13 cities ranked
B = 100,001 to 250,000	53 cities ranked
C = 50,000 to 100,000	103 cities ranked
D = 25,001 to 50,000	93 cities ranked

For victim and collision rankings, a Population Group Ranking of "1/93" would be assigned to the city with the highest number of victims/collisions per 1,000 residents in population group D, while a ranking of "93/93" would be assigned to the city with the lowest number of victims/collisions per 1,000 residents in population group D.

The 2010 OTS safety rankings for Contra Costa Town are shown in **TABLE 2-1** and **Table 2-2.**

TABLE 2-1: TOWN OF WINDSOR SUMMARY STATISTICS

Year	City	Population	Population Group	Daily Vehicle Miles Traveled (VMT)
2010	Windsor	26,847	D	130,890

Source: California Office of Traffic Safety, *http://www.ots.ca.gov/Media_and_Research/Rankings/default.asp*

[2] Reference: California Office of Traffic safety.
http://www.ots.ca.gov/Media_and_Research/Rankings/default.asp

TABLE 2-2: TOWN OF WINDSOR TRAFFIC COLLISIONS AND RANKINGS, 2010

Type of Collision	Victims Killed and Injured	Daily Vehicle Miles Traveled (of 93 cities)		Average Population (of 93 cities)	
		Rank	Percentile	Rank	Percentile
Total Fatal and Injury	34	61/93	66th	89/93	96th
Alcohol Involved	4	42/93	45th	81/93	87th
HBD (Had Been Drinking) Driver < 21	1	52/93	56th	33/93	35th
HBD Driver 21 - 34	3	31/93	23rd	36/93	39th
Motorcycle	0	7/93	8th	85/93	91th
Pedestrians	1	21/93	23th	91/93	98th
Pedestrians < 15	0	24/93	26th	70/93	75th
Pedestrians 65+	0	13/93	14th	61/93	66th
Bicyclists	3	20/93	22nd	74/93	80th
Bicyclists < 15	1	22/93	24th	47/93	51st
Type of Collision	**Number of Collisions**	**Daily Vehicle Miles Traveled (of 93 cities)**		**Average Population (of 93 cities)**	
		Rank	**Percentile**	**Rank**	**Percentile**
Speed Related	7	50/93	54th	78/93	84th
Nighttime (9:00pm - 2:59am)	3	52/93	56th	80/93	86th
Hit and Run	1	76/93	82nd	88/93	80th

Source: California Office of Traffic Safety, *www.ots.ca.gov/Media_and_Research/Rankings/default.asp*

Based on these rankings, the areas of highest concern for traffic safety in Windsor in 2010 were:

- Motorcycle-involved collisions
- Collisions involving pedestrians over age 64
- Bicyclist-involved collisions (all age groups)
- Pedestrian-involved collisions (all age groups)
- Drivers between age 21 and 34 who have been driving
- Collisions involving bicyclists under age 15

This assessment and report emphasize safety issues associated with pedestrians, including a focus on older and younger pedestrians through suggested treatments such as roadway crossing aids (i.e., median refuge islands, bulb-outs, crosswalk striping), and walkways. Many of the suggestions in this report may also improve safety for bicyclists in Windsor.

2.2 HIGH PEDESTRIAN COLLISION LOCATIONS

Pedestrian-involved collision data for the five-year period from January 1, 2006 through December 31, 2010 was taken from the Statewide Integrated Traffic Records System (SWITRS). There were 26 reported pedestrian-involved incidents in Windsor during this period. While most of these incidents occurred at isolated locations as illustrated in Figure 2-1, two incidents occurred at or near each of the three locations shown in Table 2-3 including one fatal pedestrian collision at Old Redwood Highway and Bluebird Drive.

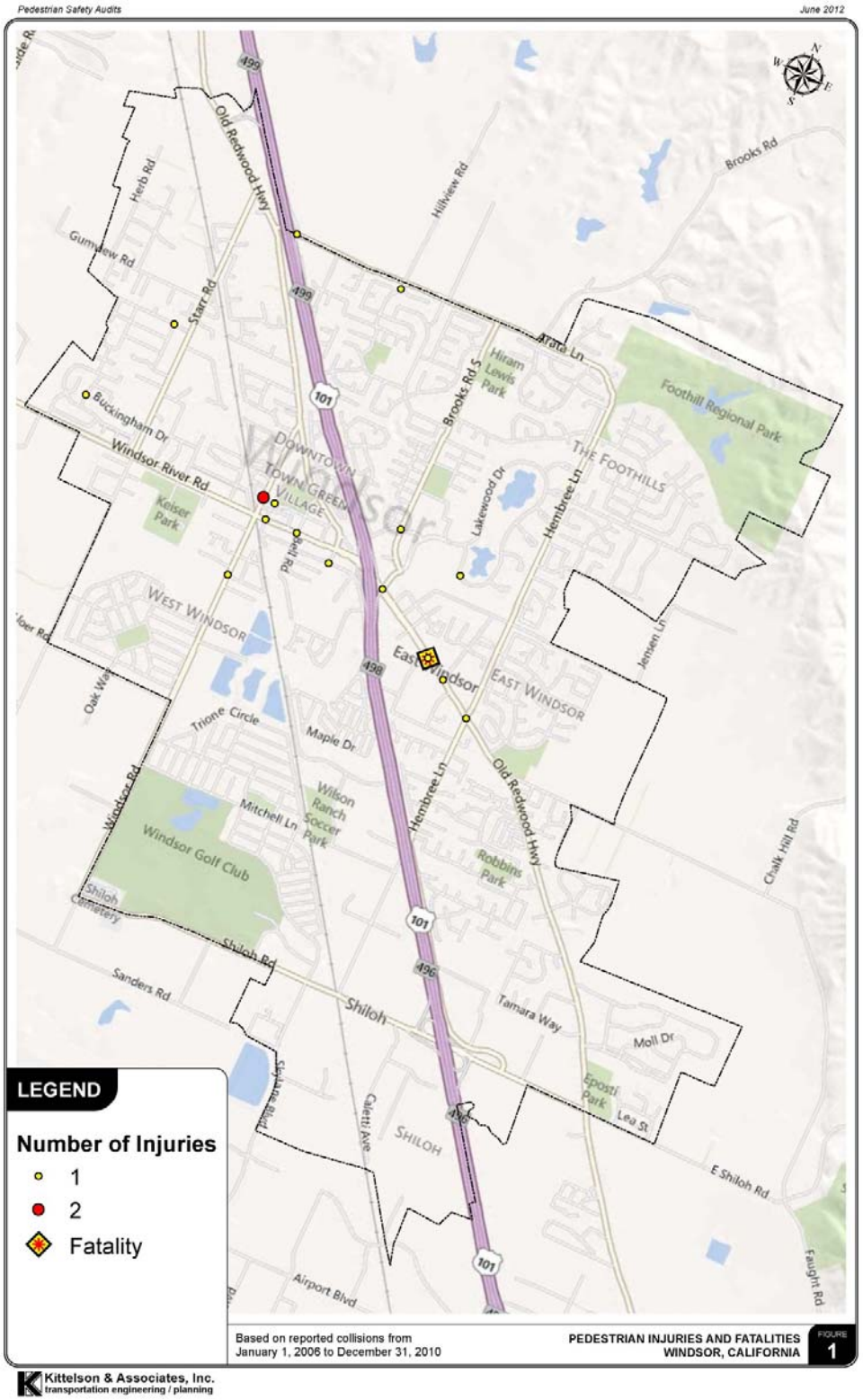
TABLE 2-3: PEDESTRIAN COLLISION LOCATIONS, 2006-2010

Locations	Number of Pedestrian Injury Collisions
Old Redwood Highway/Bluebird Drive	1 injury and 1 fatality
Windsor Rd/McClelland Rd	2 injuries and 0 fatality
Windsor River Rd/Bill Beedie Wy	1 injury and 0 fatality

Source: California Highway Patrol

Notes: This list is based on number of collisions and does not adjust for vehicle or pedestrian volumes (exposure)
Notes: Midblock collisions were assigned to the nearest intersection.

Figure 2-1: Town of Windsor Collisions - Pedestrian Injuries and Fatalities, 2006-2010



3. BENCHMARKING ANALYSIS RESULTS AND SUGGESTIONS

Prior to the field visit to the Town of Windsor, the PSA team conducted an in-depth telephone interview on December 20, 2011 with Town's staff and community stakeholders regarding the Town's pedestrian safety policies, programs, and practices. The Town's responses were analyzed with a benchmarking matrix, as shown in Table 3-1 (the highlighted cell represents the closest match). The Town's policies, programs, and practices were compared with national best practices. The benchmarking analysis categorized the Town's programs, practices, and policies into three groups:

- Key Strengths (areas where the Town is exceeding national best practices)
- Enhancement Areas (areas where the Town is meeting best practices)
- Opportunity Areas (areas where the Town may not meet best practices)

The items in **TABLE 3-1** are further elaborated in the following sections. The Town may select strategies for implementation based on local priorities. The PSA Team presented the results of this benchmarking analysis to Town staff during the field visit.

TABLE 3-1: SUMMARY OF PROGRAMS, POLICIES, AND PRACTICES BENCHMARKING ANALYSIS FOR CONTRA COSTA TOWN

Benchmark Topic	Key Strength	Enhancement	Opportunity
Americans with Disabilities Act (ADA) Transition Plan for Streets and Sidewalks	**Has ADA Transition Plan in place**	Partial ADA Transition Plan	No transition plan
Collision History and Collision Reporting Practices	**Creates annual reports or employs other comprehensive monitoring practice**	Reviews data only following fatalities or other high-profile incident	Does not have set practices for data review
Pedestrian-Oriented Traffic Signal and Stop Sign Warrants	**Uses relaxed warrants for traffic signals and/or all-way stops**	Uses MUTCD Warrants	N/A
Specific Plans, Redevelopment Areas, and Overlay Zones	**Pedestrian-oriented design, "walkability", or place-making is stressed in the Plans**	Plans require pedestrian accommodations and placemaking	Plans do not address pedestrian needs
Design Policies and Development Standards	**Has a Streetscape Master Plan**	Has minimal design policies	Does not have a Streetscape Master Plan or design policies for pedestrian treatments

TABLE 3-1: SUMMARY OF PROGRAMS, POLICIES, AND PRACTICES BENCHMARKING ANALYSIS FOR CONTRA COSTA TOWN			
Benchmark Topic	**Key Strength**	**Enhancement**	**Opportunity**
Pedestrian Master Plan	**Has a recently-updated Plan and pedestrian projects have been completed recently**	Has a Pedestrian Master Plan but it may be outdated and/or no recent projects from the Plan have been completed	Does not have a Pedestrian Master Plan
Adoption of Routine Accommodations for New Development	**Has Routine Accommodations Policy that applies to the development review process and assesses impact fees**	Has Routine Accommodations Policy for public works projects only	Does not have a Routine Accommodations Policy
Enforcement	**Police Department conducts sustained pedestrian safety-related enforcement efforts, which may include resource sharing with neighboring cities**	Police Department conducts some pedestrian safety- related enforcement activities	Police Department does not have Traffic Safety Officer(s)
Safe-Routes-to-School Program and Grant Funding	**Has a Safe Routes to Schools program and funding for recent projects**	Has obtained funding for recent projects but no city-wide Safe Routes to Schools program	Does not have a Safe Routes to Schools program
Adoption of Open Space Requirement	**Has an open space requirement that addresses pedestrian safety and access**	Has an open space requirement but does not address pedestrian safety or access	Does not have an open space requirement
Implementation of Americans with Disabilities Act (ADA) Improvements	Uses state-of-the-practice ADA improvements with consistent installation practices	**Has clear design guidelines but no regular practices for ADA compliance**	Has minimal design guidelines and practices related to ADA requirements
Collection of Pedestrian Volumes	Collects pedestrian volumes routinely with intersection counts	**Collects some pedestrian volumes, but not routinely**	Does not collect pedestrian volumes
Pedestrian Traffic Control Audit (Signs, Markings, and Signals)	Maintains an up-to-date inventory of pedestrian signs, markings, and signals	**Has a limited inventory of signs, markings, and signals**	Does not have an inventory of signs, markings, and signals

TABLE 3-1: SUMMARY OF PROGRAMS, POLICIES, AND PRACTICES BENCHMARKING ANALYSIS FOR CONTRA COSTA TOWN			
Benchmark Topic	**Key Strength**	**Enhancement**	**Opportunity**
Pedestrian-Oriented Speed Limits and Speed Surveys	Employs comprehensive practice to proactively review speed limits such as USLIMITS	**Reviews data only in response to reported concerns or frequent collisions**	Does not have set practices for speed limit reviews
Inventory of Sidewalks, Informal Pathways, and Key Pedestrian Opportunity Areas	Maintains and inventory of missing and existing sidewalks and includes sidewalk projects in the CIP	**Maintains an inventory of missing sidewalks, informal pathways, and/or pedestrian opportunity areas**	Does not have an inventory of missing sidewalks. Informal pathways, or pedestrian opportunity areas
Proactive Approach to Institutional Coordination	Has identified obstacles and has implemented efforts to overcome barriers	**Has identified obstacles**	Does not have any identified obstacles
General Plan: Densities and Mixed Use Zones	Has moderate to high densities in the CBD and mixed use zones	**Has moderate densities with separate uses**	Has low densities with separate uses
General Plan: Provision for Pedestrian Nodes	Pedestrian nodes are identified and pedestrian-oriented policies are in place for these nodes	**Pedestrian nodes are identified but pedestrian accommodations are not**	Pedestrian nodes are not identified
Policies for Neighborhood-sized Schools	Has a policy to encourage neighborhood-sized and accessible schools	**Does not have a policy to encourage neighborhood-sized/ accessible schools**	Does not have a policy to encourage neighborhood sized/ accessible schools and recent schools have been “mega schools” on the periphery
Adoption of Street Tree Requirements	Has a street tree ordinance that improves pedestrian safety	**Has a street tree ordinance, but it does not address pedestrian safety**	Does not have a street tree ordinance
Transportation Demand Management Program	Has extensive TDM programs and enforces parking cash out, etc.	**Has basic TDM programs (Commuter Checks, Guaranteed Ride Home)**	Does not have a Travel Demand Management program or policy

TABLE 3-1: SUMMARY OF PROGRAMS, POLICIES, AND PRACTICES BENCHMARKING ANALYSIS FOR CONTRA COSTA TOWN			
Benchmark Topic	**Key Strength**	**Enhancement**	**Opportunity**
Public Involvement and Feedback Process	Has a formal, active public feedback process (web-enabled)	**Has a limited public feedback process**	Does not have a public feedback process
Economic Vitality	Has several business improvement districts, an established façade improvement program, and/or aggressive downtown parking policies	**Has a business improvement district, façade improvement program, or downtown parking policies**	Does not have business improvement districts, façade improvement program, or downtown parking policies
Pedestrian Safety Education Program	In addition to pedestrian safety curriculum in schools, provides brochures and/or conducts education campaigns	**Has some traffic safety programs that include pedestrians**	Does not have pedestrian safety education programs
Coordination with Health Agencies	Health agencies are involved in the planning of pedestrian facilities and/or programs and collection of collision data	**Health agencies have programs to promote healthy lifestyles through active transportation**	Health agencies are not involved in pedestrian safety or active transportation
Coordination with Emergency Response	Emergency response is involved in all aspects of pedestrian facility planning, design, operation, and construction	**Emergency response is involved in some aspects of pedestrian facility planning, design, operation, or construction**	Emergency response is not involved in pedestrian facility planning, design, operation, or construction
Historic Sites	Cultural and Historic Preservation Plans include a wayfinding and walkability focus	**Cultural and Historic Preservation Plans require pedestrian accommodations**	No Cultural or Historic Preservation Plan in place
Traffic Calming Programs	Has a significant traffic calming program with a dedicated funding source	Has a traffic calming program but no dedicated funding source	**Does not have a traffic calming program**

TABLE 3-1: SUMMARY OF PROGRAMS, POLICIES, AND PRACTICES BENCHMARKING ANALYSIS FOR CONTRA COSTA TOWN			
Benchmark Topic	**Key Strength**	**Enhancement**	**Opportunity**
Pedestrian Safety Program and Walking Audits	Has significant and ongoing programs which include Walking Audits	Has no safety programs but has conducted some walking audits	**Has no pedestrian safety programs and has not conducted any walking audits**
Attention to Pedestrian Crossing Barriers	Has a recently updated policy and comprehensive inventory of barriers	Has an outdated policy	**Does not have a policy for pedestrian crossings at railroads, freeways, etc.**
Crosswalk Installation, Removal, and Enhancement Policy	Has a crosswalk policy that reflects best practices for signalized and uncontrolled crosswalk treatments	Has a crosswalk policy but it is not comprehensive or up to date with best practices	**Does not have a crosswalk policy**
Pedestrian/Bicycle Coordinator	Has a Coordinator on staff who manages the Town Pedestrian Program	Occasionally uses a contract Coordinator (part-time)	**Does not have a Pedestrian Coordinator**
Adoption of Newspaper Rack Ordinance	Has a newspaper rack ordinance that addresses pedestrian safety and access	Has a newspaper rack ordinance, but it does not address pedestrian safety or access	**Does not have a newspaper rack ordinance**
Use of Street or Sidewalk Furniture Requirements	Has street or sidewalk furniture requirements that addresses pedestrian safety and access	Has street or sidewalk furniture requirements, but they do not address pedestrian safety or access	**Does not have street or sidewalk furniture requirements**
Adoption of Bicycle Parking Requirements	Has adopted bicycle parking requirements that address pedestrian safety	Has bicycle parking requirements, but it may not address pedestrian safety	**Does not require bicycle parking**
Formal Advisory Committee	Has a formal, active Pedestrian Committee	Has an ad-hoc Pedestrian Committee	**Does not have a Pedestrian Committee**

TABLE 3-1: SUMMARY OF PROGRAMS, POLICIES, AND PRACTICES BENCHMARKING ANALYSIS FOR CONTRA COSTA TOWN			
Benchmark Topic	**Key Strength**	**Enhancement**	**Opportunity**
Sports Field Policy	Requires sports fields to be located near existing schools and neighborhoods	Requires sports fields to be located near existing or future schools and neighborhoods	**Does not have a requirement for sports field locations**
Use of Leading Pedestrian Intervals	Strategically installs LPIs at appropriate location	Has installed LPIs at some locations	**Has not installed LPIs**

3.1 KEY STRENGTHS

(a) Americans with Disabilities Act (ADA) Transition Plan for Streets and Sidewalks

Compliance with the Americans with Disability Act (ADA) guidelines is important not only to enhance community accessibility, but also to improve walking conditions for all pedestrians. An ADA Transition Plan sets forth the process for bringing public facilities into compliance with ADA regulations. An ADA Transition Plan could address public buildings, sidewalks, ramps, and other pedestrian facilities. An ADA Coordinator is typically responsible for administering the ADA Transition Plan.

Windsor has an ADA Transition Plan, which was last updated in 2007. It identifies and catalogs existing and potential barriers to accessibility in public facilities as well as in the public right-of-way, and suggests remedies to bring the barriers into compliance with the ADA guidelines. Surveys of the public facilities included parking space, path of travel to facility, entry to facilities and all areas available to the public; and surveys of the public right-of-way included 80-miles of public sidewalks, 1,165 curb ramps and 24 bus stops and shelters. The ADA Compliance Coordinator, who is also the Town's Building Official, has determined the following implementation priorities, which are to be reviewed on an annual basis:

1. Removal of architectural barriers of the Civic Center path of travel from the parking lot into each building with emphasis on buildings that provide the largest percentage of public assemblage (completed)

2. Removal of barriers along path of travel at remaining Town owned buildings

3. Removal of barriers along sidewalks and curb ramps that are located in high traffic and pedestrian areas. Priority is given to repairs that would also remedy safety hazards

4. Removal of barriers in areas that have low impact or pedestrian use

Suggestions for Potential Improvement

- In the next update of the ADA Transition Plan, consider including the following:
  - Sidewalk gap inventory
  - Public input mechanisms
  - Design guidelines, as detailed below

- Develop ADA design guidelines for the Town of Windsor highlight state-of-the-practice, as detailed below in Section *3.2 (a) – Implementation of Americans with Disabilities Act (ADA) Improvements*.

(b) Collision History and Collision Reporting Practices

Identifying and responding to collision patterns on a regular basis is an important reactive approach to pedestrian safety (which may be combined with proactive measures). Collision records are compiled on a monthly basis and are published annually. The collisions are mapped to help identify hot spots and changes in collision patterns. Steps are then taken to remedy the problems if applicable. Through this process, the Town has identified a number of sustained issues; but generally, there are not many new problems.

Suggestions for Potential Improvement

- Coordinate with hospitals to collect data on pedestrian and bicycle-related injuries that are not reported by the California Highway Patrol
- A field inventory of collision locations and pedestrian volume counts could enhance comprehensive monitoring. With sufficient pedestrian volume data, the Town could prioritize collision locations based on collision rates (i.e., collisions/daily pedestrian volume), a practice that results in a more complete safety needs assessment. Treatments could then be identified for each location and programmatic funding allocated in the Town's Capital Improvements Program (CIP). Volunteers can collect pedestrian volumes and other data at collision locations.
- Conduct periodic focus groups or surveys to identify key focus sites for safety.

(c) Pedestrian-Oriented Traffic Signal and/or Stop Sign Warrants

Providing all-way stop or signal control at an intersection may improve pedestrian safety by reducing speeds and controlling pedestrian-vehicle conflicts. The MUTCD defines warrants for installing signals and stop signs. However, jurisdictions may choose to define relaxed pedestrian criteria to encourage pedestrian safety. Best practices for stop-sign warrant application include:

- Requiring a collision history of three instead of five collisions, based on routine underreporting
- Reducing traffic and/or pedestrian volume thresholds based on latent pedestrian demand
- Providing consideration for school children, pedestrians, and traffic speeds

Windsor follows California MUTCD traffic signal warrants, but has developed Town-specific warrants for stop signs based on *All Way STOP Installation Criteria*[3] that defines a set of warrant criteria for multi-way STOP sign installation on neighborhood streets. It takes into account various elements such as pedestrian volumes, roadway speed and road classifications and includes adjustment criteria for narrow street. The Town does not generally install stop signs to rectify speeding issues since such issues are proactively corrected by other means.

Suggestions for Potential Improvement

- Consider developing Town-specific traffic signal warrants for adoption by the Town Council and subsequent application
- Consider individual circumstances when evaluating signal and stop sign warrants

(d) Specific Plans, Redevelopment Areas, and Overlay Zones

Specific plans, redevelopment areas, and overlay zones create special districts that identify particular goals for an area and provide more guidance than the General Plan. For example, an overlay zone could be created to require more pedestrian amenities in a downtown area.

[3] Rees, Robert, "*All-Way Stop Sign Installation Criteria",* Westernite, Jan-Feb 1999

Redevelopment areas and specific plans might include mixed-use development or Transit-Oriented Development (TOD) centered on transit stations and/or along transit corridors. Depending on the goals, these policy documents have the potential to encourage pedestrian access and transit ridership, to create more livable communities, and to reduce automobile dependency and usage, resulting in reduced vehicle-miles traveled.

The Windsor Redevelopment Plan covers a large area in downtown, areas adjacent to Old Redwood Highway, and a smaller area surrounding Shiloh Road. Developments in these areas focused on a mix of uses including office, residential and commercial and were financed by the Town's Redevelopment Agency. A historic district (HD) overlay has been added to the existing zoning for some of the properties on the Town's historic register in order to protect such historic resources.

Some of the Town's planned unit developments (PUDs) predate the establishment of the Town. These gated communities often have limited external pedestrian connections. The municipal codes require pedestrian connections and other pedestrian amenities as new developments are implemented.

The Town has developed a number of specific plans such as the Shiloh Vision Plan and the recently adopted Windsor Station Area/Downtown Specific Plan. The recent plans have placed an emphasis of pedestrian accommodations as well as transportation options.

The municipal codes include a frontage improvement ordinance, which requires any developments fronting onto creeks to develop pedestrian/bicycle trail.

Suggestions for Potential Improvement

- Strengthen the Town's current pedestrian-friendly practices by incorporating them into policies throughout the Town's planning process
- Create a pedestrian-orientation project checklist for the development review process
- Consider developing a pedestrian overlay district in downtown Windsor that does not have a vehicular level of service policy or uses a multi-modal level of service significance threshold
- Identify priority pedestrian areas in the Town, and ensure that they are focused areas in future specific plans



Example Sidewalk Corridor

(e) Design Policies and Development Standards

Design policies and development standards can provide guidance for improving the pedestrian walking experience, encouraging walking, enhancing economic vitality, and offering funding opportunities for pedestrian improvements.

A draft *Complete Street Design Guidelines for the Town of Windsor* have been prepared and would be submitted for town council approval in mid 2012. It consolidates the Town's design policies into one uniform document. Complete streets concepts are presented throughout the document. Design

policies and standards for pedestrian treatments by roadway types are also included. This document as well as the Town's zoning codes encourage street-fronting buildings.

Suggestions for Potential Improvement

- Consider form-based zoning to influence the "look and feel" of neighborhoods throughout the Town
- Reduce design speeds for arterial and collector roadways in the standard

(f) Pedestrian Master Plan

This type of plan includes a large menu of policy, program, and practice suggestions, as well as site-specific (and prototypical) engineering treatment suggestions. A Pedestrian (or Pedestrian/Bicycle) Master Plan documents a jurisdiction's vision for improving walkability and pedestrian safety; establish policies, programs, and practices; and outline the prioritization and budgeting process for project implementation. Combining this with the Town's Complete Streets Policy would address other suggestions in this report.

The Windsor Bicycle and Pedestrian Plan was developed as a component of the Sonoma County Transportation Authority's (SCTA) 2008 Countywide Bicycle & Pedestrian Master Plan The plan outlined pedestrian/bicycle programs and policies in order to ensure logical links on regional facilities as well as to guide implementation of local projects and programs. The Plan also includes provision for multimodal integration such as safe routes to transit and bicycle parking facilities at transit stops. While the Plan has a policy of assigning a bicycle and pedestrian coordinator to oversee implementation of the Plan, no such coordinator has been designated.

The Town has been successful at getting a number grants to implement bicycle and pedestrian projects. For example, one-half mile of Class II bike lanes was installed using funds from Caltrans' Bicycle Transportation Account (BTA). Funds from two Transportation for Livable Communities (TLC) grants allowed the Town to make improvements in the downtown area such as providing better connection to a mobile home park, installing bulb out, street lighting and colored pavements at critical locations.

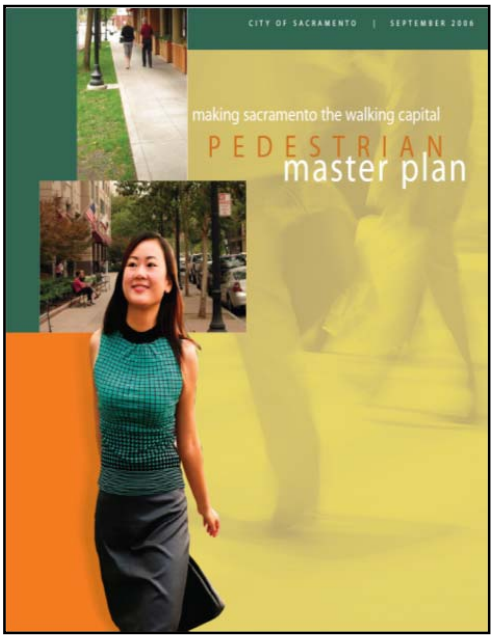
The Town has spent approximately $200,000 on bicycle improvements and $100,000 on pedestrian improvements annually or about $1.5 million over the last four years. Most of the funding comes from grants but also uses funds from the Town's traffic impact fee program (TIF). The allocation of TIF funds is based on Census' journey to work data. For instance, if the data indicate that five percent of Windsor residents walk to work, then five percent of the TIF funds are allocated to pedestrian improvements. Recently, the Town has made strong efforts to carryout sidewalk gap closure projects in order to enhance the pedestrian environment rather than relying on developments to build sidewalks as they had done previously.

The current General Plan dated from the incorporation of the town in 1996. Future updates would likely integrate the needs of pedestrians based on guidance from the town council. The town's Parks and Recreation Master Plan - 2015 (1996) encourages pleasant walking environments with goals of establishing a network of trails throughout the town wherever feasible.

Suggestions for Potential Improvement

- In the next update of the Bicycle and Pedestrian Plan, consider including policies and suggestions to prioritize and implement capital and maintenance projects, which could address the following:
  - Town-wide crosswalk policy and toolbox
  - Pedestrian connectivity
  - Prioritization of sidewalks and other pedestrian facility improvements
  - Opportunities and barriers to pedestrian travel
  - Public safety and "eyes on the street" design guidelines
  - Consistency of treatments
  - Interdepartmental coordination

  Model Pedestrian Master Plans are available at: *http://www.walkinginfo.org/develop/sample-plans.cfm*



Example Pedestrian Master Plan from the City of Sacramento

(g) Adoption of Routine Accommodations for New Development

Routine Accommodations or Complete Streets Policies accommodate all modes of travel and travelers of all ages and abilities.

The Town of Windsor assesses impact fees (TIF) to new development to pay for transportation impact mitigations. While the amount generated by the TIF assessment is limited, these fees are often used as required local matching funds to leverage federal and/or state grants. All improvements funded by TIF include pedestrian and/or bicycle components.

Routine accommodations (complete streets) policies are expected to be formally incorporated as Town policies, through the adoption of the *Complete Street Design Guidelines for the Town of Windsor* in mid-2012. However, complete street principals have been applied for a number of years by Town staff and are considered throughout the development review process. For example, a 400-unit residential project located adjacent to the downtown undertook a street design plan prior to moving forward with the project. The plan considered various aspects such as reversed angle parking, narrow travel lanes, and sidewalks. Generally, the Town follows a set of basic criteria and reviews each development project on a case by case basis. However, specific requirements, such as the 1,600 feet maximum perimeter block length in the Windsor Downtown/Station Area Specific Plan, do exist.

Commercial developments are encouraged to provide safe and convenient access to buildings by orienting the structures along pedestrian ways and locating parking area to the back side of the development. The design standards also require consideration of ADA compliance for commercial developments.

Suggestions for Potential Improvement

- Review your policies in comparison to MTC's Routine Accommodation Checklist, found at *http://www.mtc.ca.gov/planning/bicyclespedestrians/routine_accommodations.htm.* The checklist documents how the needs of bicyclists and pedestrians are considered in the process of planning and designing for projects considered for regional transportation funds
- Consider adopting a Multi-Modal Level of Service methodology for transportation analysis. A resource is the Complete Street Level of Service Multimodal LOS Toolkit: *www.completestreetslos.com*

The following jurisdictions have established practices for Complete Streets and Routine Accommodations, including implementation of these policies through multi-modal level of service thresholds, and may serve as models for Windsor as complete streets policies are incorporated into the street design guidelines:

- Fort Collins, Colorado's Multi-Modal Level of Service Manual: *http://www.larimer.org/engineering/GMARdStds/ApdxH_04_01_2007.pdf*
- Charlotte, North Carolina's Urban Street Design Guidelines: *www.charmeck.org/Departments/Transportation/Urban+Street+Design+Guidelines.htm*
- Sacramento Transportation and Air Quality Collaborative Best Practices for Complete Streets*:* *http://www.sacta.org/pdf/STAQC/FinalReportII_BPCompleteStreets.pdf*
- San Francisco, California, Department of Public Health's Pedestrian Quality Index: *http://www.sfphes.org/elements/24-elements/tools/106-pedestrian-environmental-quality-index*
- San Francisco County Transportation Authority's Multi-modal Impact Criteria: *www.sfcta.org/images/stories/Planning/CongestionManagementPlan/2007%20-%20appendix%2005%20-%20tia.pdf*

(h) Enforcement

Enforcement of pedestrian right-of-way laws and speed limits is an important complement to engineering treatments and education programs.

The 3-E's of Pedestrian Safety:

Engineering

Education

Enforcement

Windsor has one officer dedicated to traffic safety. On average, he spends 15 percent of his time on pedestrian safety related responsibility such as handling complaints related to motorists not yielding to pedestrians. He also visits schools on a daily basis to conduct enforcement activities. The office has not attended any pedestrian safety and law enforcement course and is not aware any such course exists.

The police department shares its resources with Sonoma County sheriff department to enforce traffic safety. It also participates in design review process of any pedestrian

facilities.

Suggestions for Potential Improvement

- Seek funding to involve local law enforcement in the design, construction and operation of pedestrian facilities
- Use enforcement as an opportunity for education by distributing pedestrian safety pamphlets in-lieu of, or in addition to, citations
- Consider pedestrian stings at unmarked crosswalk locations with pedestrian activity where motorists frequently fail to yield to pedestrians
- Implement sustained pedestrian safety enforcement efforts and involve the media. Use enforcement as an opportunity for education by distributing pedestrian safety pamphlets in-lieu of, or in addition to, citations. The Miami-Dade Pedestrian Safety Demonstration Project provides a model for the role of media in the sustained effectiveness of enforcement. Information is available at: *http://www.miamidade.gov/MPO/docs/MPO_ped_safety_demo_eval_report_200806.pdf.*
- Train officers in pedestrian safety enforcement principles. The Madison, Wisconsin Department of Transportation has developed a DVD in collaboration with the Madison Police Department to train traffic officers in pedestrian and bicycle issues (for more information see *http://www.walkinginfo.org/library/details.cfm?id=2865*). The Bicycle Transportation Alliance in Portland, Oregon offers Pedestrian Safety Enforcement Training (for more information on this five-hour course see: *http://btaoregon.org/get-involved/pedestrian-safety-enforcement-mini-grants/).*

(i) Safe-Routes-to-School Program and Grant Funding

Safe-Routes-to-School programs encourage children to safely walk or bicycle to school. The Marin Town Bicycle Coalition was an early champion of the concept, which has spread nationally (refer to best practices at *www.saferoutestoschools.org*). Safe-Routes-to-School programs are important both for increasing physical activity (and reducing childhood obesity) and for reducing morning traffic associated with school drop-off (as much as 30% of morning peak hour traffic). Best practices include:

- Developing a comprehensive town- or county-wide Safe-Routes-to-School program that encourages walking to school and highlights preferred walking routes. Such a program may involve schools, advocates, parents, City staff, community health representatives, and other stakeholders. A coalition may be developed for the program, with committees for mapping/data collection, outreach, education and encouragement, enforcement and engineering, and traffic safety. School-specific committees may



Example Safe Routes to School Activity

also be considered.

- Forming a steering committee for the program (or each school) comprised of Town staff, school district staff, PTA leaders, and other stakeholders.
- Scheduling regular, ongoing meetings to maintain stakeholder involvement.
- Applying for grant funding for non-infrastructure as well as infrastructure projects.

Funding for Safe-Routes-to-School programs and/or projects is available at the state (see: *http://www.dot.ca.gov/hq/LocalPrograms/saferoutes/sr2s.htm*) and federal levels (see: *http://www.dot.ca.gov/hq/LocalPrograms/saferoutes/srts.htm*).

The Town has a Safe Routes to School (SR2S) committee and was successful with obtaining a grant in 2011 to install in-pavement lighting at a critical location near the high school. They have recently received a multi-year, $300,000 non-infrastructure SR2S grant. The committee is a joint partnership between the school district and various departments of the Town, such as Engineering and Police Departments.

Suggestions for Potential Improvement

- Continue applying for grant funding, including non-infrastructure as well as infrastructure projects. Some of the suggestions in this report may be eligible

(j) Adoption of Open Space Requirements

Residents typically rate open space as among a jurisdiction's key assets and needs. Open space may encourage walking, especially for recreational trips. Model open space requirements consider (1) the existing context – population patterns, connections to current open spaces, natural resources, and wildlife needs and (2) anticipated needs - public parks, gardens, play spaces, sports areas, recreational and commute access, natural or semi-natural green space.

Section 16.3 of the Municipal Codes requires development projects to dedicate land, pay in-lieu fees or a combination of both for neighborhood/community parks or recreational purposes as consistent with the State's Quimby Act.

Suggestion for Potential Improvement

- Define and categorize open space typologies
- Consider a Town-wide goal of having open space access within ½ mile of every home

  Open Space Requirements resources include:

  - American Planning Association – Planning Advisory Service Information Report No. 46 – *Public Open Space in Subdivisions*
    http://www.planning.org/pas/at60/report46.htm
  - U.S. Environmental Protection Agency – *Model Ordinances to Protect Local Resources – Open Space Development*
    http://www.epa.gov/owow/NPS/ordinance/openspace.htm

3.2 ENHANCEMENT AREAS

(a) Implementation of Americans with Disabilities Act (ADA) Improvements



Example of Two ADA-accessible Curb Ramps per Corner
Image source: Armor-Tile

According to current practice, roadways are built in accordance with ADA standards when they are being constructed or retrofitted with pedestrian facilities. However, the Town does not have design guidelines for implementing accessible facilities in Windsor. Thus, there is a lack of official guidance for installing audible pedestrian signals, directional curb ramps, on-street handicap parking spaces on existing or commercial roadways, and contrasting edge bands at commercial driveways or intersections. The Town relies on grants for bringing existing facilities in line with ADA requirement. Recent grant funding enables installation of audible pedestrian signals. It is projected that about 60 percent of the traffic signals would be equipped with audible signals by the end of 2012. Presently, most curb ramps have perpendicular configuration and have truncated domes.

Suggestions for Potential Improvement

- Develop ADA design guidelines, which highlight state-of-the-practice. Specific examples include:
  - Require that all new traffic signals installed feature audible pedestrian signals, and identify existing traffic signals at major intersections where audible pedestrian signals may be installed.
  - Construct all intersections to include directional curb ramps with truncated domes where practical.
  - Set a standard for the minimum required number of disabled parking spaces as part of on-street parking projects.
  - Require the installation of high-contrast bands at the intersection of public sidewalks with commercial driveways and intersections
- Identify a more substantial funding source for the Town's ADA improvement program to implement improvements
- Consider developing a formal ADA improvement program for items such as curb ramps and sidewalk maintenance. The program may provide an inventory, prioritization plan and funding source for such improvements

(b) Collection of Pedestrian Volumes

Pedestrian volume data is important for prioritizing projects, developing collision rates, and determining appropriate pedestrian infrastructure. The Town does not regularly collect bicycle and pedestrian volume data. However, they have recently started to require that bicycle or pedestrian counts be collected with manual intersection counts. The Safe Route to School committee has also collected pedestrian volume data at key school locations during school activities. This effort will be expanded at K-8 schools through funding from a recent Safe-Routes-to-School grant. The Sonoma County Transportation Authority also collects pedestrians at three key locations.

Suggestions for Potential Improvement

- Solidify recent practice of routinely collecting pedestrian and bicycle volumes by requiring them to be conducted in conjunction with all manual intersection turning movement counts as a matter of course
- Coordinate with Safe-Route-to-School committee to ensure continual collection of annual or biannual counts of pedestrian volumes in the vicinities of schools during peak morning arrivals and afternoon departures
- Geo-code pedestrian volume data collected by various sources with GIS software along with other data such as pedestrian control devices and collisions to analyze data for trends or hotspots related to pedestrian safety

(c) Pedestrian Traffic Control Audit (Signs, Markings, and Signals)

The 2009 federal *Manual of Uniform Traffic Control Devices* (MUTCD) requires the installation of countdown pedestrian signals for all new signals. Replacing traffic signal bulbs with LED bulbs is also suggested to increase visibility and improve efficiency.

The Town maintains an inventory of traffic signals, stop signs, crosswalks, stop limit lines, and stop legend. No systematic assessment of traffic control devices is conducted. Work order is issued if Town staff observes or becomes aware of any issues. The public could report street maintenance issues, including broken/missing signage through the Town's website.

Suggestions for Potential Improvement

- Complete the inventory of all traffic control devices (including pedestrian-related equipment such as push button actuation and countdown indicators), signage, and markings and include maintenance records, preferably within a GIS database
- Develop a crosswalk inventory by conducting audits of the adequacy of current crosswalks. Seattle's inventory of its marked crosswalks may serve as a model. (see *http://www.seattle.gov/transportation/cwp_back.htm)*
- Ensure that locations with pedestrian desire lines have crosswalks. The crosswalk policy mentioned below in Section 3.3 (d) - Crosswalk Installation, Removal, and Enhancement Policy - can help determine the appropriate crossing treatment at uncontrolled locations without marked crosswalks

- Identify the highest priority signal locations for replacement with countdown signals and a funding source
- Develop a proactive monitoring program for traffic control devices
- Require that all new traffic signals be installed according to current MUTCD standards to include not only pedestrian signal head and navigator accessible pedestrian signal push buttons but also countdown pedestrian signals and LED bulbs.

(d) Pedestrian-Oriented Speed Limits and Speed Surveys

As shown in Figure 3-1, pedestrian fatality rates increase exponentially with vehicle speed. Thus, reducing vehicle speeds in pedestrian zones may be one of the most important strategies for enhancing pedestrian safety.

A 2009 policy directive from the California Department of Transportation, pursuant to the California Vehicle Codes (CVC) and resulting in changes to the California Manual on Uniform Traffic Control Devices (MUTCD), provides state and local municipalities with the authority to reduce the posted speed limit if an engineering and traffic study demonstrates that a different (lower) speed limit may be a better fit based on local conditions. The allowable reduction is five miles per hour from what the posted speed limit need to be based on the 85th percentile speed of free-flowing traffic. However, school zone speed limits are a de facto 25 miles per hour or under. Also, the Vehicle Code was recently amended to allow local municipalities to reduce the school zone speed to 15 miles per hour without a traffic study if the road approaching the school is in a residential district, has a maximum of two lanes, and a regular speed limit of 30 miles per hour or less. Under these conditions, municipalities also have the option of extending a 25 mile per hour school zone to 1,000 feet from the school instead of only 500.

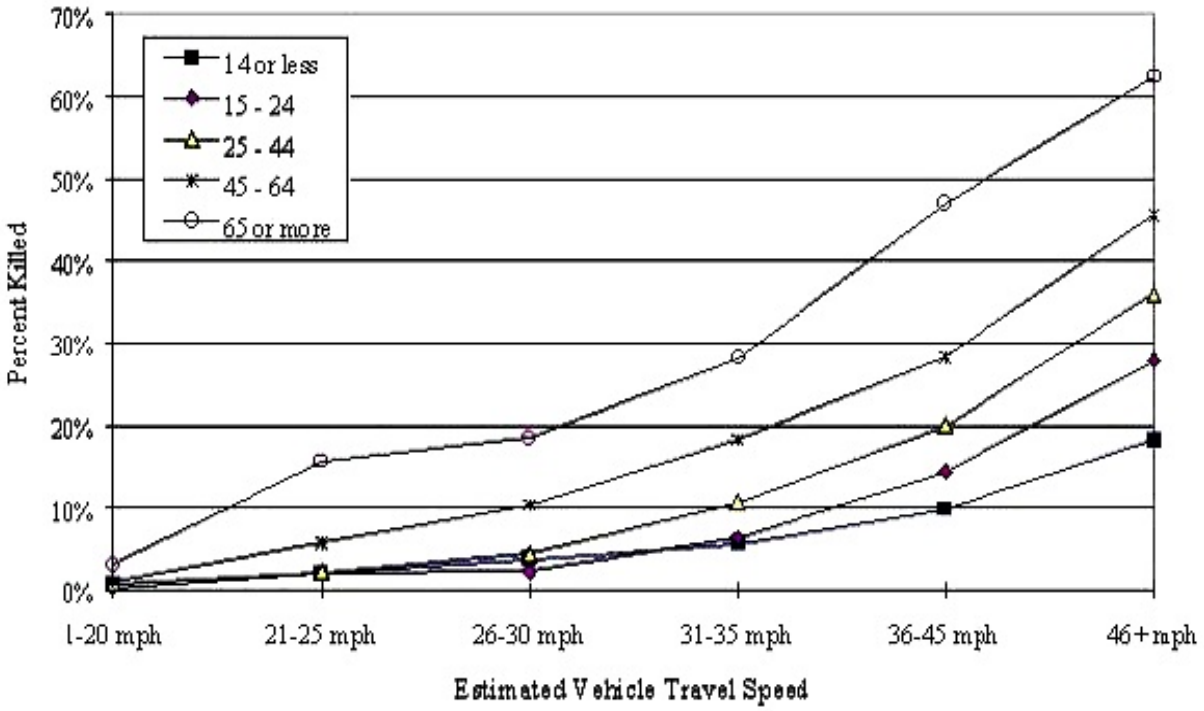
In Windsor, speed limits of all major streets on the federal street system are routinely reviewed on a rotating basis every seven to ten years in compliance of CVC Section 40802. The speed limit on local streets is 25 mph; while speed limits on collectors and arterials are generally set at the nearest five mph increment of the 85th percentile speed levels. The Town also considers surrounding land use and locations with high pedestrian volumes when setting speed limits. The Town has had to increase the speed limits at certain locations in order to comply with the "nearest" five mph increment guidance of the 2009 Caltrans directive. While the Police Department is in support of the speed limit changes, the Town has encountered some resistance politically. Speed limits signs are typically posted on arterials and collectors as well as residential streets.

Suggestions for Potential Improvement

- Consider pedestrian volumes when setting speed limits and employ traffic calming strategies in locations where speed surveys suggest traffic speeds are too high for pedestrian areas.
- Consider establishing 15 MPH school zones.
- Continue to ensure design standards and design speeds in pedestrian areas do not contribute to a routine need for traffic calming.

Figure 3-1: Fatal Injury Rates by Vehicle speed, by Pedestrian Ages

(Florida, 1993-1996, pedestrians in single-vehicle collisions)



(e) Inventory of Sidewalks, Informal Pathways, and Key Pedestrian Opportunity Areas

A GIS-based sidewalk inventory enables project identification and prioritization, as well as project coordination with new development, roadway resurfacing, etc. Best practices for sidewalk inventories include the delineation between development-driven and Town-funded gap filling projects and policies that make it possible for the Town to be reimbursed for filling a development-driven sidewalk gap.

The Town conducted a sidewalk inventory as part of its 2007 ADA Transition Plan, which identified sidewalk locations with rough transitions and sidewalks that were less than 36 inches in width. While the Town does not maintain an inventory of existing or missing sidewalks, such locations are identified on a previously prepared map. An inventory of informal pathways is maintained.

Sidewalk projects are included in the Capital Improvements Program (CIP) in order to identify the needs when grant opportunities or grant funding become available. Because of its reliance on grant funding, there is no specific annual allocation for sidewalk replacement and gap closure projects. The Town has been successful in obtaining grants in the last few years and has spent an average of $100,000 on pedestrian improvement projects annually. Much of these funds are used for gap closures.

Property owners are generally required to maintain sidewalks that front their properties. Request for assistance from homeowners are rare. Missing sidewalks are often found along lots that have not been developed and the landowners have no interest in providing sidewalks.

Suggestions for Potential Improvement

- Create an inventory of existing and missing sidewalks, informal pathways, and key pedestrian opportunity areas in GIS format and continue to maintain the inventory
- Consider additional sidewalk funding mechanisms, such as a requirement to provide or repair sidewalks with each property sale.

(f) Proactive Approach to Institutional Coordination

Besides the Town, other agencies have jurisdiction over components of Windsor's transportation network, including Caltrans, transit agencies, and railroad companies (particularly, North Coast Railroad Authority and Sonoma-Marin Area Rail Transit). For example, Caltrans policies have historically discouraged proposals for bulb-outs, wider sidewalks, and other pedestrian-oriented improvements. Recent Context Sensitive Solutions and Routine Accommodations policies within Caltrans (refer to the revised Deputy Directive 64: *http://www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets_files/dd_64_r1_signed.pdf*) now require the agency to consider multimodal needs and engage in collaborative community planning. These new policies may reduce institutional challenges, and the Town may work with Caltrans and other agencies to identify new opportunities for joint planning of transportation facilities.

The Town has identified obstacles of funding constraints and general opposition by railroad companies to improve railroad right-of-way and crossings for pedestrian access. The bureaucratic requirements to obtain federal and state grant funding are also burdensome and costly especially for smaller projects. The Town also sees opportunities to build better relationship with the school district in order to improve pedestrian access. Currently, the Town is invited to participate in school planning only at a very late stage of the process.

Suggestions for Potential Improvement

- Proactively seek opportunities to collaborate with Caltrans and railroad companies to identify and improve pedestrian safety and access at Highway 101 ramps and around railroad crossings.
- Use the current Safe-Routes-to-School grant funding implementation process as an opportunity to build stronger relationship and improve communication with the School District
- Enhance outreach opportunities with other jurisdictions by enhancing the public feedback process, as detailed below in Section 3.2 (l) – Public Involvement and Feedback Process.
- Actively pursue not only transportation-related grant opportunities but also health-related grants particularly for non-capital improvement projects such as education programs

(g) General Plan: Densities and Mixed-Use Zones

Planning principles contained in a jurisdiction's General Plan can provide an important policy context for developing pedestrian-oriented, walkable areas. Transit-oriented development, form-based zoning, higher densities, and mixed uses are important planning tools for pedestrian-oriented areas.

Windsor is a relatively new town. Much of the development patterns were established prior to incorporation. The Town's General Plan 2015 identifies a range of residential densities from very low (Rural Residential: 0-0.2 dwelling unit per acre) to high (Compact Residential: up to 32 dwelling units per acre). The Surrounding Residential designation, which allows between three and six dwelling units per acre, is the most common residential land use category in the Town. Areas of the highest residential density are found in the southeast portion of the town near Shiloh Road. The General Plan encourages development of a range of housing types and permits secondary dwelling units on single-family residential lots.

Mixed use developments are allowed in three areas: downtown, areas near Shiloh Road, and along Old Redwood Highway corridor. In particular, the recently adopted Windsor Station Area/Downtown Specific Plan envisions a mixed-use, pedestrian scaled, transit-oriented community with sustainable density within one-half mile of the intermodal transit station. A bicycle and pedestrian trail will be developed along the railroad right-of-way that would connect neighborhoods in Windsor and provide direct access to the downtown core. Many of the visions and policies from the Specific Plan might be incorporated in the next General Plan update.

The Town tends to use conventional methods for calculating off-street parking requirements based on land uses. Provision of parking spaces in excess of the requirements requires approval by the Town. Reduction of standard parking requirement may be approved with minor use permit. It may also be approved by the Director of Planning when such reduction is justified due to shared parking opportunities between two or more non-residential land uses. The Zoning Ordinance also establishes shared-use parking standards for three commercial zoning districts. No provision for unbundled parking is included; however, the Town plans to conduct a parking study in the future to review unbundled parking and other parking options.

Suggestions for Potential Improvements

- Include the pedestrian priority districts identified in the Windsor Bicycle and Pedestrian Plan, where varied densities and mixed-uses could accommodate or attract pedestrian activities, in the next update of the Town's General Plan
- Incorporate the visions and policies of the Station Area Specific Plan into the next General Plan update and consider expanding and customizing the visions and policies to other appropriate areas
- Enhance pedestrian-friendly goals, policies, and actions in the next General Plan update and establish transit and auto vehicle policies that support a balanced multi-modal transportation network
- Consider policies that set parking maximums, require unbundled parking and other parking options
- Consider incorporating form-based zoning and policies for Transit Oriented Development (TOD) into the next General Plan update.

(h) General Plan: Provision of Pedestrian Nodes

A jurisdiction's General Plan is a key opportunity to establish the framework for pedestrian orientation. The Circulation Element of the Plan typically assigns roadway typologies, which

can include a layered network approach with prioritized corridors for transit, pedestrian, bicycle, and auto travel.

Windsor's General Plan contains no reference to specific pedestrian nodes; although one of the goals is to provide opportunities for residents, visitors and employees to circulate about town without total reliance on the automobile. To this end, a trail system, including streets, off-street pathways and greenways, is to be developed for non-motorized modes. The Trail Plan Map includes parks, schools and destination nodes. The General Plan also encourages higher density mixed land uses within walking distances of transit stops.

Suggestions for Potential Improvement

- Identify all existing and future pedestrian nodes in updates to General Plan using MTC's *Pedestrian District Study* as a resource (*http://www.mtc.ca.gov/planning/bicyclespedestrians/Ped_Districts/index.htm)*

- Consider an overlay district for pedestrian nodes with special pedestrian-oriented guidelines, such as suspending automobile Level of Service standards. Prioritize sidewalk improvement and completion projects in these nodes

- Identify pedestrian-oriented typologies for the circulation map. A resource for this is the City of Oakland's Pedestrian Master Plan, found here: *http://www.oaklandnet.com/government/pedestrian/index.html*

- Codify pedestrian orientation policies stated in the General Plan into zoning ordinances, particularly in identified pedestrian nodes.

(i) Policies for Neighborhood-Sized and Accessible Schools

Neighborhood-sized schools that are designed to be accessible, as opposed to mega schools on the periphery, are a key ingredient for encouraging walking and bicycling to school. When they are located in the heart of a neighborhood, more students in their catchment area have the option to walk or bike to school, as opposed to being driven. In addition, pedestrian and ADA improvements could be prioritized near schools. Consequences of mega schools on the periphery include an increase in the number of cars on the road, which creates more hostile conditions for pedestrian access.

The Town does not have a formal policy to encourage neighborhood-sized or accessible schools. Elementary schools in the Windsor Unified School District serve only two grade levels per school. For some parents, this necessitates traveling to different schools for pickup and drop-off even if children are relatively close in age; thereby discourages walking to schools. Currently, not many students walk to school. The Safe-Routes-to-School committee is reviewing the two grade level practice as well as developing a walking school bus program.

Suggestions for Potential Improvement

- Through Safe-Routes-to-School committee, work with the School District towards offering increased grade level range in each school in order to reduce the schools' proximity to targeted students; thereby increasing opportunities for walking and bicycling to schools and reducing school-related vehicular traffic

- Identify locations of abandoned public school buildings in existing neighborhoods, if any, and work with school districts to renovate
- Work with school districts to ensure that new and renovated schools have multiple access points through its grounds so that they themselves do not create barriers to pedestrians and bicyclists

A resource for the use of neighborhood-sized schools is the 2009 publication *Helping Johnny Walk to School: Policy Recommendations for Removing Barriers to Community-Centered Schools* by the National Trust for Historic Preservation. The report encourages the retention and development of community-centered schools and is available here: *http://www.preservationnation.org/issues/historic-schools/helping-johnny-walk-to-school/*

(j) Adoption of Street Tree Requirements

Street trees enhance the pedestrian environment by providing shade and a buffer from vehicles. Street trees may also enhance property values, especially in residential neighborhoods. However, street trees, when improperly selected, planted, or maintained, may cause damage to adjacent public utilities.

Example of Parking Lane Tree Well



Source: Kittelson & Associates, Inc.

Chapter 27.36 of the zoning code provides regulations for the protection, preservation and maintenance of trees of significance and mature trees. However, this ordinance does not specifically address street trees and related pedestrian access concerns.

Suggestions for Potential Improvement

- Consider modifying the Street Tree Ordinance to address pedestrian access issues
- Where sidewalk widths do not support the addition of street trees, consider placing trees in tree wells within on-street parking
- Develop a GIS inventory of existing trees
- Incorporate trees into broader thermal comfort considerations by placing them in high pedestrian volumes areas

(k) Transportation Demand Management Program

Transportation Demand Management (TDM) programs encourage multi-modal travel by incentivizing carpool and non-auto options. As new development occurs, TDM programs can be expanded, formalized, and strengthened.

The Town of Windsor does not currently have TDM programs. However, it plans to explore TDM opportunities for larger projects in the Downtown area. The recently adopted Windsor Station Area/Downtown Specific Plan includes goals and policies aimed to manage parking and transportation demand in order to reduce congestion and improve the quality of the pedestrian and bicycle environment. The stated goals include:

- Balance parking need and provision with the desire to promote transit, walking and bicycling
- Reduce transportation demand by promoting alternative modes of transportation and ridesharing

While there is no policy regarding transit shelters and pedestrian connections to transit stops and stations, the Town works with Sonoma County Transit in reviewing development plans in order to identify transit needs for pending projects.

Suggestions for Potential Improvement

- Consider codifying the TDM policies contained in the Windsor Station Area/Downtown Specific Plan in order to facilitate implementation
- Consider developing additional TDM policies appropriate for Town-wide applications and for sub-area applications
- Disseminate TDM information for residents, employees and visitors through link from the Town's official website
- Identify a part-time TDM Coordinator among Town staff

(l) Public Involvement and Feedback Process

Responding to public concerns through public feedback mechanisms represents a more proactive and inclusive approach to pedestrian safety compared to a conventional approach of reacting to pedestrian collisions.

The Town's Planning Commission and Parks and Recreation Commission play active roles in advocating for pedestrians and bicyclists. The commissions are responsible for researching and suggesting policy alternatives and for assisting in implementing the Town's policies and programs. The commissions are made up of Town residents appointed by Town Council. The Town also established a Safe-Routes-to-School task force that work closely with bicycle coalitions, schools, staff and the public to address pedestrian and other relevant issues.

The public may report concerns or file complaints through the Town's website. Public workshops also provide forums for the public to discuss their concerns for particular large scale projects. The public may also voice their concerns related to pedestrian issues during Town-council, planning commission, park and recreation committee meetings.

Suggestions for Potential Improvement

- Establish a website portal through which residents and others can submit concerns specifically related to pedestrian safety in the Town by creating a link on the home page and/or the Public Works page. Provide options that include sidewalk, curb ramps, enforcement, lighting, and other issues related to safety.
- Consider a tracking number process for citizen input, so that community members can track their requests
- Consider establishing a Town-wide citizen's advisory committee to exclusively address pedestrian needs, as indicated below in Section 3.3 (i) – Formal Advisory Committee

- Consider holding public meetings with established forums in the community such as churches, senior centers, or schools to solicit public inputs

(m) Economic Vitality

Improving pedestrian safety and walkability can enhance economic vitality. Similarly, enhancing economic vitality through innovative funding options such as Business Improvement Districts (BIDs), parking management and facade improvement programs can lead to more active pedestrian areas and encourage walking.

The Town has not established Business Improvement Districts but does have informal business improvement groups. The goals of such groups are generally for business development purpose. The Town also does not have a façade improvement program. In the downtown area, there are pedestrian oriented wayfinder signs.

The zoning ordinance allows for shared parking and reduced parking for certain land uses. In some special circumstances, on-street parking may also be counted towards the parking requirement. Park-once practice is encouraged in the downtown and Shiloh Road areas where mixed use and commercial developments are located.

Suggestions for Potential Improvement

- Consider developing Business Improvement Districts in the Town's commercial areas
- Consider adding overlay zones, such as transit-oriented zones, to the Zoning Code. An example is the City of Palo Alto's *Pedestrian and Transit Oriented Development Combining District Regulations* in §18.34 of the Municipal Code (see: *http://www.cityofpaloalto.org/knowzone/city_projects/land_use/zoning_ordinance.asp)*

(n) Pedestrian Safety Education Program

Education is a critical element for a complete and balanced approach to improving pedestrian safety. Education campaigns may target pedestrians of all ages, especially emphasizing education of school children where safe walking habits may be instilled as lifelong lessons.

The Town does not have a town-wide pedestrian safety education program. It relies on the Safe Routes to School committee to provide pedestrian safety education at schools. Individual schools participate in activities and events such as *Street Smarts* and *Walk & Roll* organized by agencies and organizations like Sonoma County Safe-Routes-to-School Program and Bicycle Coalition. Part of the $300,000 non-infrastructure SR2S grant may be used for developing pedestrian/walking safety brochures and other safety education campaigns. The Town is in the process of developing a bilingual bike and trail map that would show all area bikeways. The map would also include educational information with focus on bike safety.

Suggestions for Potential Improvement

- Develop a Town-wide educational campaign for all ages:
  - Campaigns may include advertisements on buses and bus shelters, an in-school curriculum, community school courses, public service announcements, and/or brochures, among many other strategies. The Street Smarts program in San José,

California, provides a model pedestrian safety education program (see *www.getstreetsmarts.org* for more information).

- In addition to current school-focused activities and programs, the Town may work with the Safe-Routes-to-School committee and the School District to incorporate pedestrian safety curriculum in the elementary school. The Bicycle Transportation Alliance has developed a pedestrian safety curriculum for 2nd-3rd graders, which incorporates physical education, health, and social responsibility

  Other safety curriculum resources are available at*: http://walknbike.org/pedestrian-safety/* and at *www.saferoutespartnership.org/resourcecenter/publications.*

Resources for sample pedestrian safety brochures are available from FHWA and AAA at *http://safety.fhwa.dot.gov/ped_bike/ped_bike_order/* and at *www.aaafoundation.org/products/index.cfm.*

(o) Coordination with Health Agencies

Involving non-traditional partners such as Emergency Medical Service (EMS) personnel, public health agencies, pediatricians, etc., in the planning or design of pedestrian facilities may create opportunities to be more proactive with pedestrian safety, identify pedestrian safety challenges and education venues, and secure funding. Additionally, under-reporting of pedestrian-vehicle collisions could be a problem that may be partially mitigated by involving the medical community in pedestrian safety planning.[4]

The Town is a member of a health action council (Health Action), which was convened by the Sonoma County Health Department to work on improving health and health care for all Sonoma County residents. One of Health Action's initiative is iWALK, which has stated goals of inspiring people to begin walking regularly to improve their health, increasing the number of walking groups and making Sonoma County communities more walkable. Safe-Routes-to-School (SR2S) is another Health Action initiative, which promotes walking and biking to school through education and encouragement activities. Meetings are held once a month involving all schools and jurisdictions in Sonoma County.

Suggestions for Potential Improvement

- Seek more active involvement of EMS personnel in the planning and design of pedestrian facilities
- Develop opportunities for technical collaboration and funding with the County's Department of Health Services and other health care professionals and organizations
- Consider coordinating with local hospitals as another source of collision data

(p) Coordination with Emergency Response

Emergency responders, particularly staff from the fire department, are sometimes concerned that infrastructure to improve the pedestrian environment and calm traffic will significantly delay

[4] Sciortino, S., Vassar, M., Radetsky, M. and M. Knudson, "San Francisco Pedestrian Injury Surveillance: Mapping, Underreporting, and Injury Severity in Police and Hospital Records," *Accident Analysis and Prevention*, Volume 37, Issue 6, November 2005, Pages 1102-1113

their response time. As a result, they can derail projects that are aimed at improving roadway safety. Therefore, it's crucial that emergency responders participate in a two-way dialogue regarding pedestrian infrastructure. This dialogue can include factual information about response time delay due to roadway infrastructure changes, consideration of emergency vehicle sizes and specifications, and roadway testing by emergency responders in advance of installations using temporary elements.

The Windsor Fire Protection District is a part of the design review committee and provides input in the planning or design of pedestrian facilities even as early as the preliminary review process.

Suggestions for Potential Improvement

- Institute a dialogue with emergency responders to discuss roadway safety goals, effects on their response times, and vehicle sizes.
- Before completing the design and installing traffic calming and pedestrian infrastructure, set-up temporary elements that replicate the design on the proposed on the streets. Coordinate with emergency responders to do before and after test runs to assess the delay on their response times and make adjustments to the design, as needed.

A resource for the discussion with emergency responders is the Institute of Transportation Engineers Informational Report, *Traffic Calming State of the Practice* by Reid Ewing, published in 1999. In particular, Chapter 7, Emergency Response and Other Agency Concerns, is most pertinent to informing these discussions and can be found here: http://www.ite.org/traffic/tcsop/Chapter7.pdf

(g) Historic Sites

Historic walking routes, such as the famous Freedom Trail in Boston, encourage walking and enhance economic vitality.

The Town of Windsor has gone through an extensive historic inventory in recent years. Its Historic Register consists of nine properties located on Windsor River Road, Windsor Road, Foxwood Drive and Foothill Drive in the Old Town area. Seventeen palm trees along the west side of Old Redwood Highway have also been designated as landmark trees. Some of the properties have historic overlay zoning designations which aim to preserve such historic resources. The Town's General Plan contains goals, policies, and implementation measures that address historic preservation. It calls for, among other things, conservation of structures with architectural or historic significance and uses them to reinforce Windsor's unique sense of place.

Suggestions for Potential Improvement

- Develop a map to showcase natural or local sites of interest, and link key features in the Town, including a possible walking and/or biking routes between the sites. Maps of the tour route and historic documentation materials could be made available online and at information kiosks.
- Install wayfinding signs and plaques for historic sites throughout the Town

3.3 OPPORTUNITY AREAS

(a) Traffic Calming Programs

Traffic Calming Programs, also known as Neighborhood Traffic Management Programs (NTMP), set forth a consensus threshold on neighborhood requests and approvals for infrastructure, as well as standard treatments and criteria. Elements may include speed humps, curb extensions, and roadway narrowing on residential streets. Installation is restricted in some locations in order to maintain emergency response times.

The Town does not currently have a traffic calming program. While guidelines and policies were developed in recent years, they have not been formally adopted by the town council. However, these guidelines and policies are generally followed by staff whenever there is a request for traffic calming in neighborhoods. Public Works staff would meet with the complainers (usually residents) to understand their concerns. They would identify the problem and coordinate with traffic officers to find a resolution. In general, there is no request for costly devices. A new traffic calming program is being developed.

Previous traffic calming efforts have included bulb outs, in-roadway warning lights, dynamic feedback display, and tighter street alignment. Traffic calming elements, such as traffic circles and roundabouts, are incorporated into new development projects.



Suggestions for Potential Improvement

- Develop and adopt a traffic calming program
- Model traffic calming guidelines are available at:
  - *Traffic Calming Guidelines from the City of Danville (http://www.ci.danville.ca.us/Residents/Traffic_and_Transportation/Traffic_Calming/)*
  - Traffic Calming Guidelines from the City of Anaheim (*http://www.anaheim.net/article.asp?Id=1703*)
  - Traffic Calming Guidelines from the City of La Habra (*http://www.ci.la-habra.ca.us/article.cfm?id=191*).
- Other traffic calming information can be found at *www.trafficcalming.org.*
- Suggest design guidelines for new development that includes traffic calming treatments such as traffic circles and bulb-outs
- Establish a funding source for implementing traffic calming

(b) Pedestrian Safety Program and Walking Audits

A pedestrian safety program often has the overall goals to reduce pedestrian collisions while encouraging walking for transportation and recreation. Program tools include components of education, enforcement, public information, engineering and design. Walking audits provide an interactive opportunity to experience transportation from a pedestrian's perspective, receive feedback from key stakeholders about the study area, as well as discuss potential solutions and their feasibility. They can be led by City staff, advocacy groups, neighborhood groups, or consultants.

Windsor does not have a pedestrian safety program, nor has staff conducted walking audits.

Suggestions for Potential Improvement

- Create a pedestrian safety program using the FHWA's *How to Develop a Pedestrian Safety Action Plan* found at:
  http://katana.hsrc.unc.edu/cms/downloads/howtoguide2006.pdf

- Conduct regular area-wide walking audits. This effort could complement other programs within the Town to improve health and safety or to enhance sustainability.

(c) Attention to Pedestrian Crossing Barriers

Crossing barriers such as railroads, freeways, and major arterials, may discourage or even prohibit pedestrian access. Additionally, crossing barriers are often associated with vehicle-pedestrian collisions (including severe injuries and fatalities). Identifying and removing barriers, as well as preventing new barriers, is essential for improving walkability and pedestrian safety.

Windsor does not have a formal policy for identifying and addressing barriers to walking. However, pedestrian crossing barrier presents one of the greatest challenges the Town faces. The town is diagonally bisected by US Highway 101 and railroad tracks that following the US 101 alignment. Currently, there are three crossing of US 101 and four crossing of the tracks. Additional pedestrian crossings of the tracks are needed to provide added convenience and to enhance connectivity.

Currently, there are no formalized plans to address these barriers to pedestrian circulation but the staff recognized that regional effort is required to develop a pedestrian crossing program.

Suggestions for Potential Improvement

- Include design standards for the accommodation of pedestrian and bicyclists at highway interchanges, and railroad tracks, in an updated Bicycle and Pedestrian Plan, a Streetscape Master Plan, or in an updated ADA Transition Plan

- Formally identify and create an inventory of pedestrian barriers

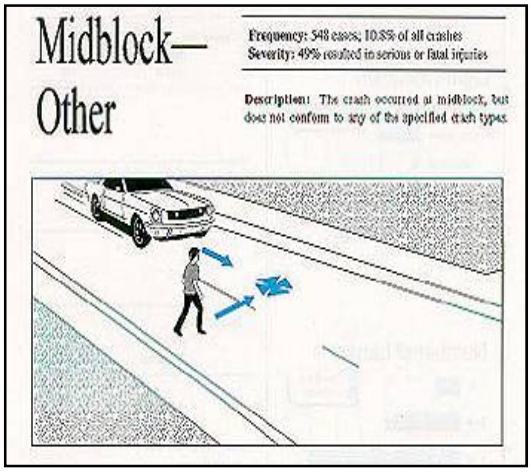
- Develop policies for reducing the barriers and maintaining the pedestrian infrastructure through prioritizing projects

- Identify funding sources for reducing the barriers

(d) Crosswalk Installation, Removal, and Enhancement Policy

A formal policy for crosswalk installation, removal, and enhancement provides transparency in decision-making and adopts best practices in pedestrian safety and accommodation.

The Town of Windsor currently does not have a crosswalk policy in place. Crosswalks at uncontrolled locations are being upgraded to ladder markings, which provide higher visibility. Advanced stop bars are not commonly used in the town. There is no formal process for the installation, removal, or enhancement of mid-block crosswalks and uncontrolled crosswalks. Where critical locations are identified, treatments are installed on a case-by-case basis. For example, in-pavement warning lights have been installed at three locations in town.



Example of Triple-Four Marked Crosswalk



Source: *Kittelson & Associates, 2011*

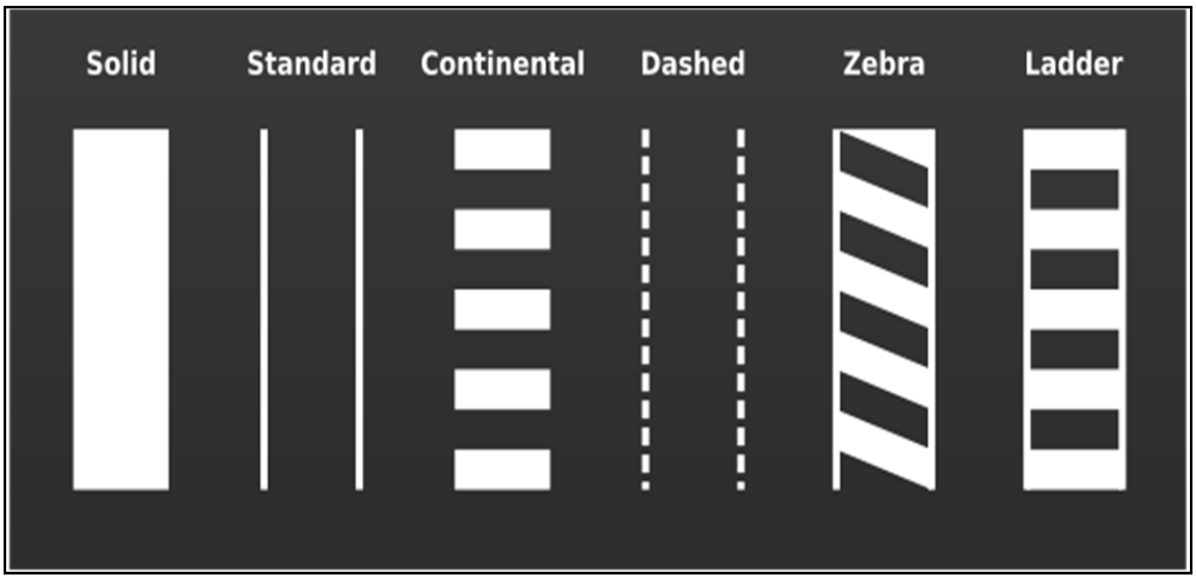
<u>Suggestions for Potential Improvement</u>

- Develop crosswalk policies that reflect best practices and recent research with respect to the installation, removal, and enhancement of crosswalks. These include removing crosswalks only as an option of last resort and providing midblock crossings where they serve pedestrian desire lines. These policies may consider adopting the "triple four" crosswalk striping treatment at mid-block or other uncontrolled locations used in Sacramento and other California jurisdictions.
- Include criteria for installing crosswalk enhancements at uncontrolled crossings, such as high-visibility crosswalks, flashing beacons, rapid-flash pedestrian actuated signage, in-roadway warning lights, or in-crosswalk pedestrian paddles.

Crosswalk policy resources include:

- Sacramento, CA Crosswalk Policy: *www.cityofsacramento.org/transportation/dot_media/engineer_media/pdf/PedSafety.pdf*
- Stockton, CA Crosswalk Policy: *http://www.stocktongov.com/government/departments/publicWorks/tOpPed.html*
- Federal Highway Administration Study on Marked versus Unmarked Crosswalks: *http://safety.fhwa.dot.gov/ped_bike/docs/cros.pdf*

- National Cooperative Highway Research Program Report on Crosswalks at Uncontrolled Locations: *http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_562.pdf*.
- Caltrans/UC Berkeley Study on Pedestrian/Driver Behavior at Marked versus Unmarked Crosswalks: *http://repositories.cdlib.org/its/tsc/UCB-TSC-RR-2007-4*



Standard Crosswalk Marking Patterns
Image source: FHWA, Planning and Designing for Pedestrian Safety Course, 2008

(e) Pedestrian/Bicycle Coordinator

In a sampling of pedestrian-oriented California cities, a full-time pedestrian/bicycle coordinator is typically provided at a ratio of one per 100,000 population. The Town of Windsor does not have a designated bicycle/ pedestrian coordinator, although planning and engineering staff members are cognizant of pedestrian needs and issues and take them into consideration in their everyday work.

Suggestions for Potential Improvement

- With a population of approximately 26,000, the Town may consider designating a current staff member as the role of Pedestrian/Bicycle Coordinator to include interdepartmental coordination, grant writing and staff liaison to local non-profits, advocacy groups and schools. This staff member would spend approximately 30 percent of his/her time on pedestrian and bicycle related issues.



(f) Adoption of Newspaper Rack Ordinance

Newspaper racks may obstruct walkways and reduce accessibility and pedestrian conspicuity when ordinances are not in place. A Newspaper Rack Ordinance improves the pedestrian realm by reducing

clutter and organizing sidewalk zones. It details size, location, and maintenance requirements.

The Town does not have a Newspaper Rack Ordinance.

Suggestion for Potential Improvement

- Consider adopting a Newspaper Rack Ordinance that addresses pedestrian access issues if the use of newspaper rack is still prevalent in Windsor

  Newspaper Rack Ordinance resources include:

  - City of Boston ordinance:
    - *http://www.legaline.com/Boston%20Newsracks%20Ordinance%207%2030%2008.pdf*
  - City of Richmond, California ordinance:
    - *http://search.municode.com/html/16579/level2/ARTVIIBU_CH7.32NERA.html*

(g) Use of Street or Sidewalk Furniture Requirements

Uniform street and sidewalk furniture requirements enhance the design of the pedestrian realm and may improve economic vitality.

Street furniture are often supplied by a jurisdiction for general public use and may include benches, transit shelters, trash/ recycling/ compost bins, information kiosks and wayfinding structures, water fountains, mailboxes, and newspaper corrals. Street furniture encourages walking by (1) accommodating pedestrians with benches to rest along the route or wait for transit, (2) providing receptacles for refuse and recycling to maintain a clean environment, and (3) providing opportunities for residents and visitors to gather information at kiosks and newspaper racks.

Sidewalk furniture is often provided by businesses on the public right of way for their clientele and may include seating, tables, railing, umbrellas, heat lamps, planters, flower boxes, lighting, trash cans, and other amenities. Sidewalk furniture may enhance the pedestrian environment by creating a more vibrant street atmosphere and by increasing the perception of safety by having more eyes on the street.

The Town does not have street or sidewalk furniture requirements.

Suggestions for Potential Improvement

- Consider adopting a Street and Sidewalk Furniture Ordinance
- Develop a GIS inventory and conduct regular assessments of street and sidewalk furniture

Street and Sidewalk Furniture Ordinance resources include:

- City of The Dalles, Oregon sidewalk furniture ordinance: *http://www.ci.the-dalles.or.us/newsite/sites/default/files/imported/public_docs/ordinances/ PDFs/8.26_sidewalk_furniture_ordinance.pdf*
- City of Gilroy, California zoning ordinance for street furniture objects:

http://www.ci.gilroy.ca.us/cityofgilroy_files/city_hall/community_development/planning/zoning_ordinance/Sec44.pdf

- City of Denver, Colorado miscellaneous street furniture ordinance: *http://denvergov.org/Portals/730/documents/ROWPermits/Street%20Furniture%20and%20Table%20and%20Chairs%20122808.pdf*

(h) Adoption of Bicycle Parking Requirements

Bicyclists become pedestrians after parking their bicycles. Safe and convenient bicycle parking is essential for encouraging bicycle travel (especially in-lieu of vehicle travel). Bicycle parking design guidelines could include a discussion on placement of parking so that it does not impede pedestrian circulation.

With the exception of Neighborhood Markets land use, the Town has no bicycle parking requirements, neither as a percent of vehicle parking provided nor based on land uses. However, the provision of bicycle parking is often discussed as a part of the new development approval process and is addressed on a case by case basis in other areas. For Neighborhood Markets, Chapter 27.34.130 of the zoning codes requires that three bicycle racks be provided.

Suggestions for Potential Improvement

- Consider adopting a Bicycle Parking Ordinance that requires bicycle parking. The ordinance may distinguish between and includes provisions for both long-term and short-term bike parking as shown below. The City of Oakland's bicycle parking ordinance *(http://www2.oaklandnet.com/Government/o/PWA/o/EC/s/BicycleandPedestrianProgram/OAK024596#ordinance)* is a resource for ordinances. *The Bicycle Parking Guidelines*, published by the Association of Pedestrian and Bicycle Professionals (APBP), is a resource for best practices in bicycle parking design (see *http://www.sfbike.org/download/Bike_Parking/APBPbikeparking.pdf*

- Ensure that the bicycle parking requirements include the consideration of pedestrian circulation in its design, particularly on sidewalks

Bicycle Parking Options



Image sources: Staple Rack in Los Angeles, (*http://ladotbikeblog.wordpress.com/)*; Covered parking design, Sussing Sustainability at Stanford (*http://suss.stanford.edu/*); Bike lockers in Tarzana, L.A. Curbed (*http://la.curbed.com/*); Bike station in Long Beach, Forward and Backward Blogspot (*http://forward-and-backward.blogspot.com/*)

(i) Formal Advisory Committee

Advisory committees serve as important sounding boards for new policies, programs, and practices. A citizens' pedestrian advisory committee is also a key component of proactive public involvement for identifying pedestrian safety issues and opportunities.

While pedestrian issues are championed by the Town's Safe-Routes-to-School Committee, Planning Commission and Park and Recreation Commission as well as the staff review committee during project review process, Windsor does not have a Pedestrian and/or Bicycle Committee that focuses on pedestrian and/or bicycle issues.

Suggestions for Potential Improvement

- Consider establishing a Pedestrian and Bicycle Advisory Committee that is comprised of citizens from different areas of the Town who are focused on addressing walkability issues, including at least one person focused on disabled access

(j) Sports Field Location Requirements

Locating sports fields in close proximity to schools, frequent transit service, community centers, or residential neighborhoods promotes access by walking or biking. In contrast, locating sports fields on the periphery of a city or in remote areas tends to encourage automobile access.

Windsor has no requirements that sports fields be located within walking or biking distance from schools or existing neighborhoods.

Suggestions for Potential Improvement

- Adopt a requirement that sports fields are located within existing neighborhoods or in close proximity to schools, frequent transit, or community centers.

(k) Use of Leading Pedestrian Intervals

Leading Pedestrian Intervals (LPIs) provide pedestrians with a "head start" signal timing before vehicles on the parallel street are allowed to proceed through an intersection. A 2000 study by the Insurance Institute for Highway Safety found that the LPI reduces conflicts between turning vehicles and pedestrians by enhancing the visibility of the pedestrian in the crosswalk.[5]

The Town has not installed any LPIs.

Suggestions for Potential Improvement

- Consider installing LPIs in areas of high pedestrian activity such as the downtown area

[5] Van Houten, R.; Retting, R.A.; Farmer, C.M.; and Van Houten, J. 2000. Field evaluation of a leading pedestrian interval signal phase at three urban intersections. *Transportation Research Record* 1734:86-92.

4. WALKING AUDIT RESULTS AND SUGGESTIONS

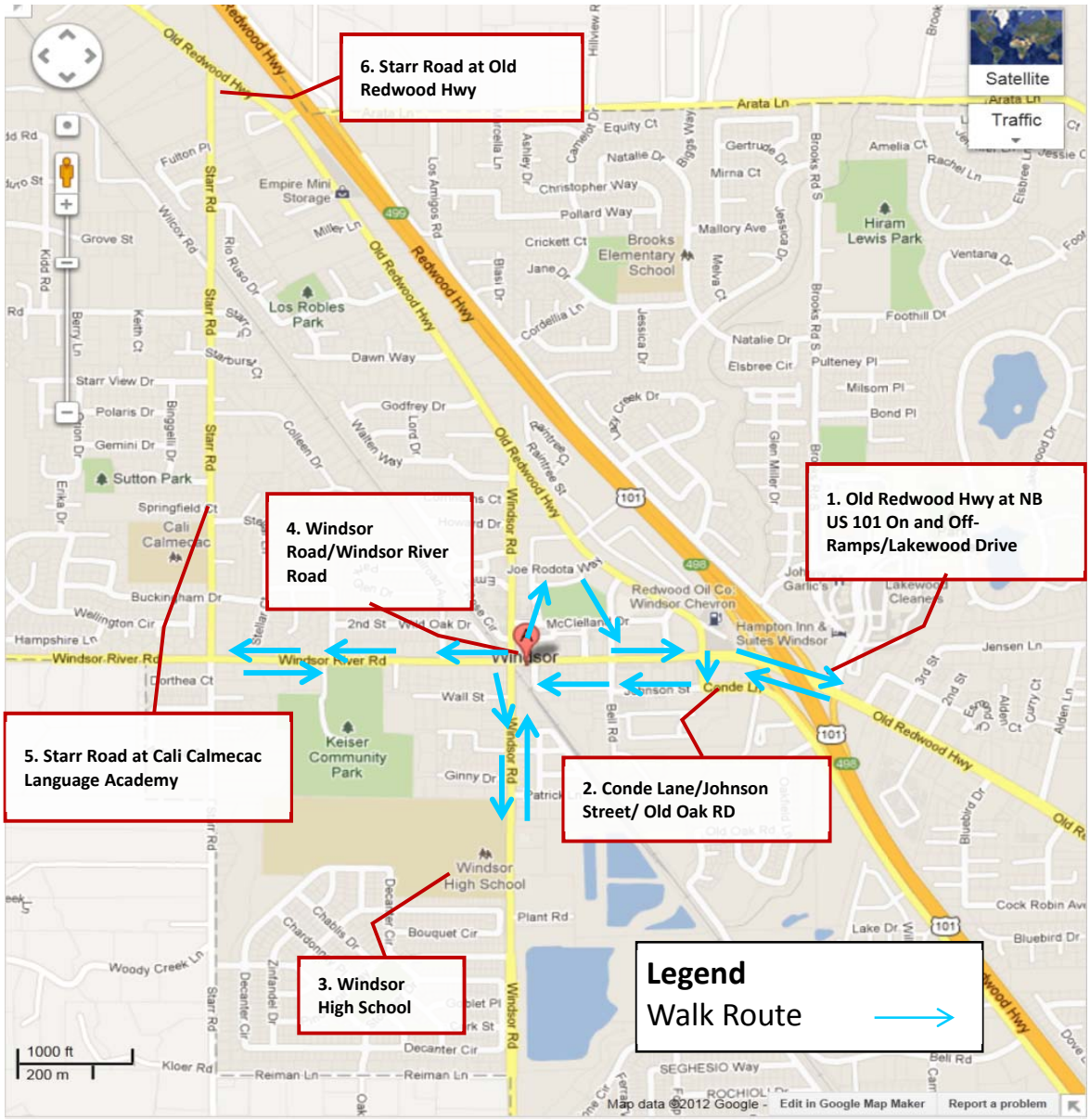
Walking audits are typically conducted as an initial step to improve the pedestrian environment within the selected area. Many individuals can participate: residents, stakeholders, and affiliated individuals. During a walking audit, positive practices are observed and issues and opportunity areas are noted. Observations are based on how motorists behave around pedestrians and how pedestrians behave, especially at intersections (for example, if pedestrians are crossing at unmarked locations to avoid certain intersections). For each opportunity area, the group discusses possible suggestions to address pedestrian safety concerns. Walking audits are highly interactive, with many observations explored during the walk. They are a means to observing and learning how to "see through the eyes of the pedestrian."

This chapter presents the observations and suggestions made during the walking audits conducted in Windsor on April 18, 2012. The suggestions are based on best practices and discussions with the participant group regarding local needs and feasibility. A glossary of pedestrian improvement measures is presented in Appendix A.

4.1 WALKING AUDIT OVERVIEW

The participants in the Windsor area walking audit visited and observed the six locations shown in Figure 4-1. The weather on the day of the visit was clear and mild.

Figure 4-1: Walking Audit Sites



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Focus Area 1. Old Redwood Highway at US 101 NB on and off-Ramps/Lakewood Drive

Issues – Lack of a pedestrian crossing of the north leg of the intersection. For a mile or more in both directions there are sidewalks on the north and northeasterly side of the street. The lack of a crossing is the only gap in the pedestrian facilities which poses a significant barrier to pedestrian travel.

Current Plans – The Town is seeking Transportation Enhancement funds to provide a pedestrian crossing. Concept plans have been prepared and are included as well as an aerial image.

Challenges – These improvements will require additional signal phasing and may have a slight reduction in intersection capacity.

Focus Area 2. Conde Lane/Johnson Street/ Old Oak RD

Issues - This intersection is stop controlled and adjacent to a major signalized intersection and a minor signalized intersection. The intersection is near an elementary school and congestion occurs during peak hours.

Current Plans – The Town is considering installing an In-Roadway Warning Light system (IRWL). It is suggested that they also consider Rectangular Rapid Flashing Beacons (RRFBs). (RRFBs are user-actuated amber LEDs that supplement warning signs at unsignalized intersections or mid-block crosswalks.)

Focus Area 3. Windsor High School

3A - Windsor Road at Jaguar Way

Issues- The easterly side of this intersection is unimproved. There are no sidewalks and students walk in the street to cross Windsor Road to get to the high school.

Current Plans – The Town will be applying for State Safe Route to School funds to install curb, gutter and sidewalks as well as an In-Roadway Warning Light system (IRWLs). It is suggested that they also consider Rectangular Rapid Flashing Beacons (RRFBs).

3B - Windsor Road Sidewalk Gap Closure

Issues- The sidewalks on the easterly side of this street are unimproved. This is a single Town owned property. Recently the Town widened the street to install a Class II Bike Lane however had insufficient funds to construct a sidewalk.

Current Plans – The Town will be applying for State Safe Route to School funds to install sidewalk and street lighting.

Focus Area 4. Central Windsor: Windsor Road/Windsor River Rd

Issues - Intersection improvement were completed over 10 years ago when trains were not using this track. The tracks run through the intersection on a diagonal and the pedestrian crossings are located within the drop gate and not outside. The CPUC has requested that this be corrected.

Current Plans – The Town is evaluating two alternative intersection configurations to address this concern. One is a standard signalized intersection while the other is a roundabout. The

Town is in the process of selecting one of the two alternatives as a preferred alternative to seek funding.

Focus Area 5. Starr Road at Cali Calmecac Language Academy

Issues - The sidewalks on the eastern side of this street opposite the school are unimproved. This is a single property that has not been developed and there are no sidewalks and students walk in the street.

Current Plans – The Town will be applying for State Safe Route to School funds to install curb, gutter and sidewalks.

Focus Area 6. Starr Road and Old Redwood Highway

Issues-Large signalized intersection at the northern border of town without a proper crosswalk.

4.2 FOCUS AREA 1: OLD REDWOOD HIGHWAY AT US 101 NB ON & OFF-RAMPS/LAKEWOOD DRIVE

Site Description

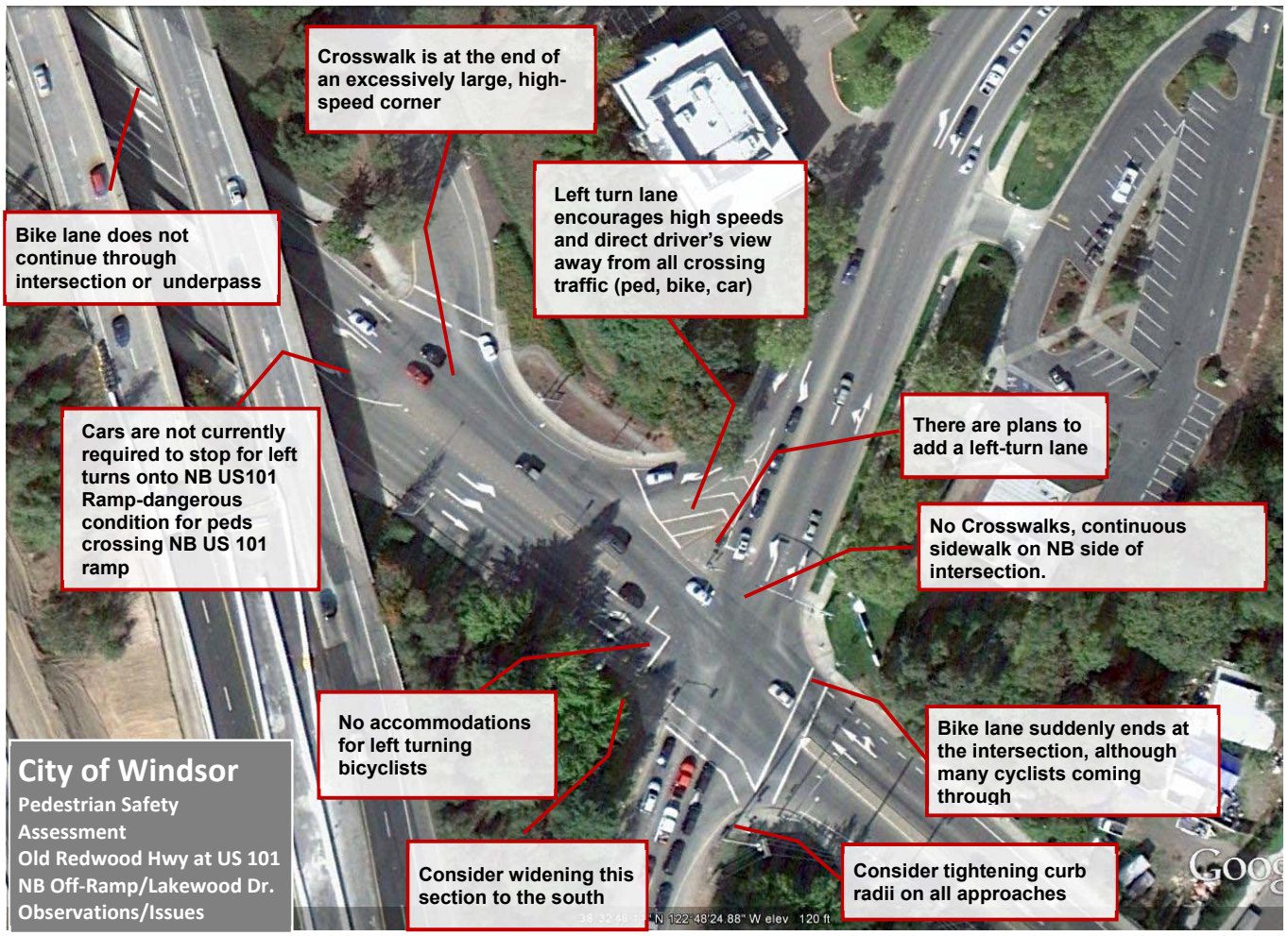
Focus Area 1. Old Redwood Highway at US 101 NB Off-Ramp/Lakewood Drive

US 101 road splits the Town of Windsor in two. This area serves as only one of three east-west crossings of US 101 connecting the town of Windsor. It is also the most central of the three and there are many pedestrians and bicyclist who rely on this east-west connection for mandatory travel to work, school and shopping. The current design of this area does not safely or comfortably serve any of this pedestrians and bicyclist travel. Therefore, it is very important to redesign this area.

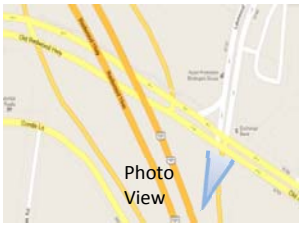
The Town is seeking Transportation Enhancement funds to modify this location to provide a pedestrian crossing. Concept plans have been prepared and are included as well as an aerial image.

The focal points of the walking audit were the entire intersection area, as shown in Figure 4-2.

Figure 4-2: Observations around Old Redwood Highway at US 101/Lakewood Drive



Figures 4-3: Old Redwood Highway at US 101 NB Off-Ramp/Lakewood Drive
(looking north from NB off-ramp of US 101)



a) Although bike lanes suddenly end at both approaches to US 101 along Old Redwood Highway, many bicyclist use this area as an important east-west connection for mandatory trips to work, school, errands, etc.

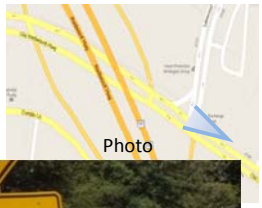




b) Pedestrian making a mandatory walking in the morning from east to west.



Figure 4-4: Old Redwood Highway at US 101 NB On-Ramp/Lakewood Drive (looking east toward US 101)



a) All corner radii in this area (along Old Redwood Highway, on both sides of US 101) are excessively large and designed for high-speed vehicle turns. The area needs to be redesigned with pedestrians and bicyclists in mind.



b) EB drivers are not currently required to stop for left turns onto NB US101 Ramp-dangerous condition for pedestrians and bicyclists crossing NB US 101 ramp.



c) The current design also directs driver's away from look at what is ahead them. Notice the difference between how the drivers have to crane their necks, as opposed to the pedestrian demonstrating how much easier it is to see the cross-traffic, if the intersecting lanes direct the drivers forward (as shown by arrows).



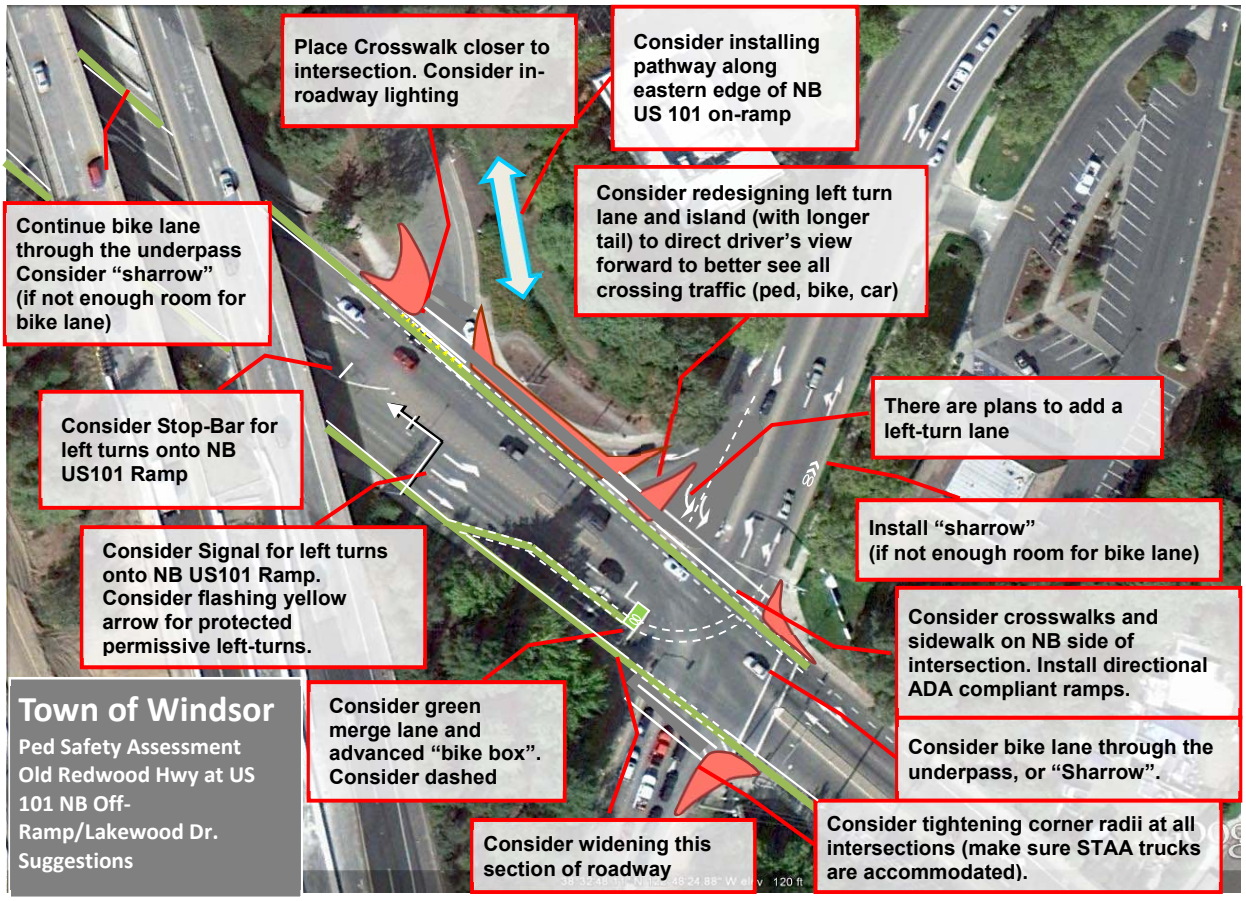
Analysis

This intersection is the central connection of three east-west crossings of US 101 providing a critical link between the east and west sections of the town of Windsor.

Many pedestrians and bicyclists rely on this east-west connection for mandatory travel to work, school and shopping. There also many recreational cyclists and tourist who use this critical connection. Discussions have occurred about the concept of a trail along the NB US 101 on-ramp serving as a complement to this east-west connection. This is discussed in more detail in a later section.

The current design of this area does not safely accommodate pedestrian and bicycle travel. Therefore, it is very important to work to redesign this area with pedestrians and bicyclists in mind. This can be done without inconveniencing auto-travel to any great extent, and the benefits to overall travel and safety in the area will likely outweigh the costs.

Figure 4-5: Old Redwood Highway at US 101 NB Off-Ramp/Lakewood Drive —Suggestions

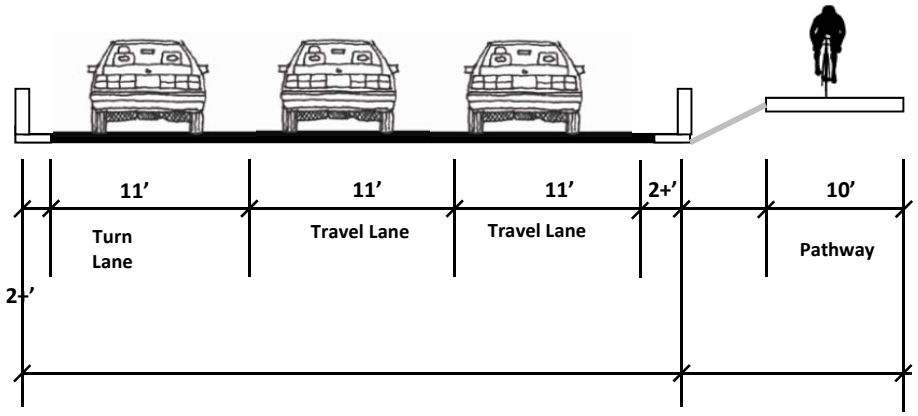


Considerations for Bicycle Lane or "Sharrow" Along Old Redwood Highway Passing Under US 101

Although there is an off-street bike path, bicyclists still use the Old Redwood Highway (ORH) roadway to traverse along this critical east-west link. Therefore we suggest considering a study to install either a Class 2 bike lanes or Shared Lane Markings (*sharrows)*. The figures below provide conceptual diagrams for consideration. All measures are approximate.

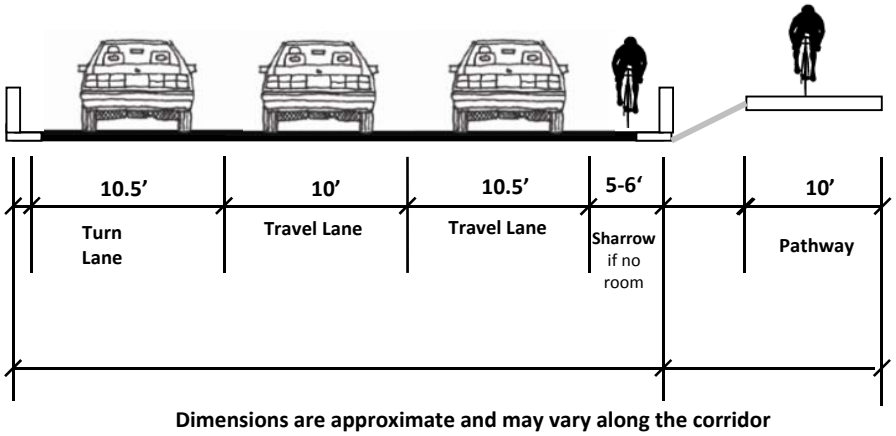
If space permits, a 6' lane is suggested to be considered to provide some clear area or shy-distance from the wall. Otherwise, a 5' lane is workable as there are no parked cars on the outside (eliminating the hazard of a bicyclist being "doored"). If a study deems that there is not enough room for a bike-lane, then we suggest considering a study to install sharrows. As the ORH in this location has a posted speed of 35 MPH, Shared Lane Markings (sharrows) would be allowed according to Section 9C.07 of the CA MUTCD, which says"02 Except as provided in Paragraph 02a, The Shared Lane Marking may not be placed on roadways that have a speed limit above 35 mph."

Figure 4-6 Old Redwood Hwy, WB under US 101 (Current Configuration)



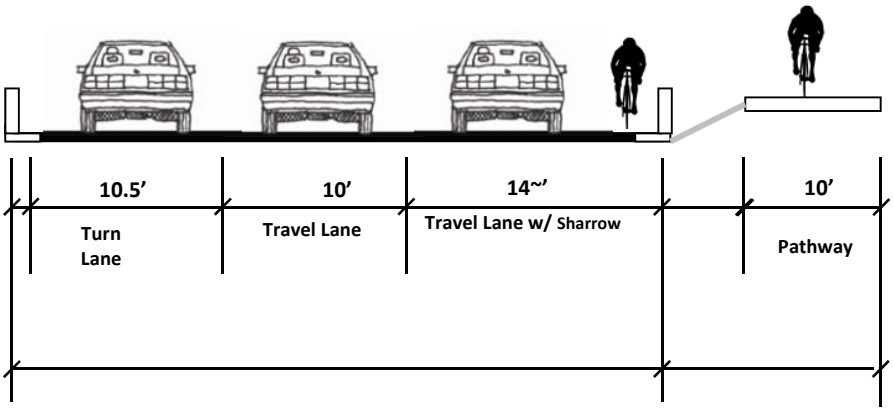
Dimensions are approximate and may vary along the corridor

Figure 4-7 Bike Lane Option
Old Redwood Hwy, WB (under US 101)



Dimensions are approximate and may vary along the corridor

Figure 4-8 Sharrow Option
Old Redwood Hwy, WB (Under US 101)



Dimensions are approximate and may vary along the corridor

Suggestions for Potential Improvements (as shown in Figure 4-5)

Old Redwood Highway at US 101 NB Off-Ramp/Lakewood Dr—Suggestions

Suggestion	Reasons/Caveats/Challenges
a) Install east-west crosswalks and sidewalks along the entire northern side of intersection. Include a pedestrian signal phase for this northern section. Install ADA compliant directional ramps at each crossing.	To provide a critical east-west connection for pedestrians, linking the east and west portions of the Town of Windsor.
b) Consider redesigning left-turn island and sharpen the northwest corner of Lakewood Drive & Old Redwood Highway intersection	
c) Consider extending green striped east-west bike lanes on both sides of Old Redwood Highway, including under US 101	To provide a critical east-west connections for the town of Windsor.

Old Redwood Highway at US 101 NB Off-Ramp/Lakewood Dr—Suggestions (Cont.)

Suggestion	Reasons/Caveats/Challenges
d) Install signal and stop-bar for EB left-turns onto NB US101 Ramp. Consider flashing yellow arrow for protected permissive left-turns. Coordinate with nearby signals to the east.	This improvement will help make crossing the NB US 101 on-ramp safer for the east-west traveling pedestrians and cyclists. If signal cannot be installed, consider installing a high visibility crosswalk on north leg (NB US101 on-ramp). Also, consider installing in-pavement lighting for pedestrians crossing the NB US101 on-ramp
e) Consider tightening corner radii on all approaches in this area (both sides of US 101). Make sure STAA trucks can be accommodated at all corners. For more information, see: http://www.dot.ca.gov/dist1/d1projects/staa.htm	All corners were designed for high-speed turns. By "squaring-up" the corners: • Pedestrians wishing to cross will be more visible: • Drivers will take the turns with more care and likely lower speeds.
f) Install green merge lane and advanced "bike box". Consider dashed lines for left turning bicyclists and a "sharrow" on Lakewood Dr. (if not room for bike lane).	The safest way for EB cyclists to make a left turn onto NB Lakewood Drive is to exit the roadway and use the crosswalks. Some cyclists will try to use the roadway. Therefore we suggest finding ways to safely accommodate them.
g) There were concerns raised related to the lack of adequate light at night for pedestrians and bicyclists. We suggest installing better lighting throughout this area.	This will make it easier for drivers to see pedestrians and cyclists travelling through this area.

Additional Suggestions for the Greater Area around the Intersection of Old Redwood Highway and US 101

Site Description

There is a pathway that ends abruptly at Los Amigos RD, as shown in the figure below:

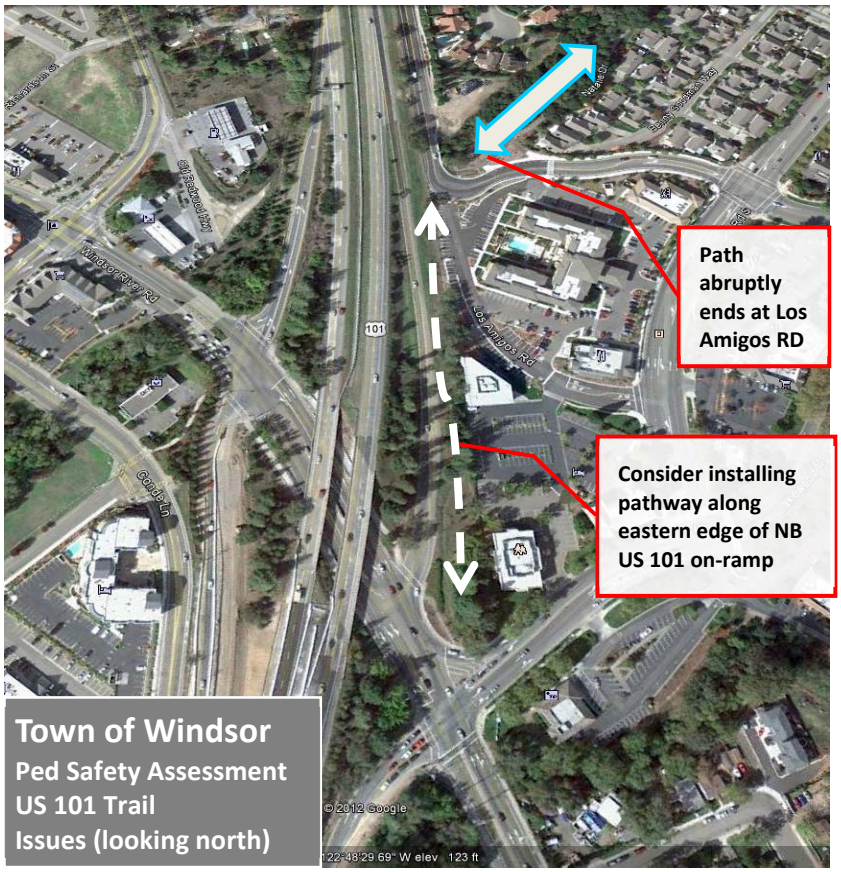


Figure 4-9: Trail between Los Amigos Rd and Old Redwood Highway



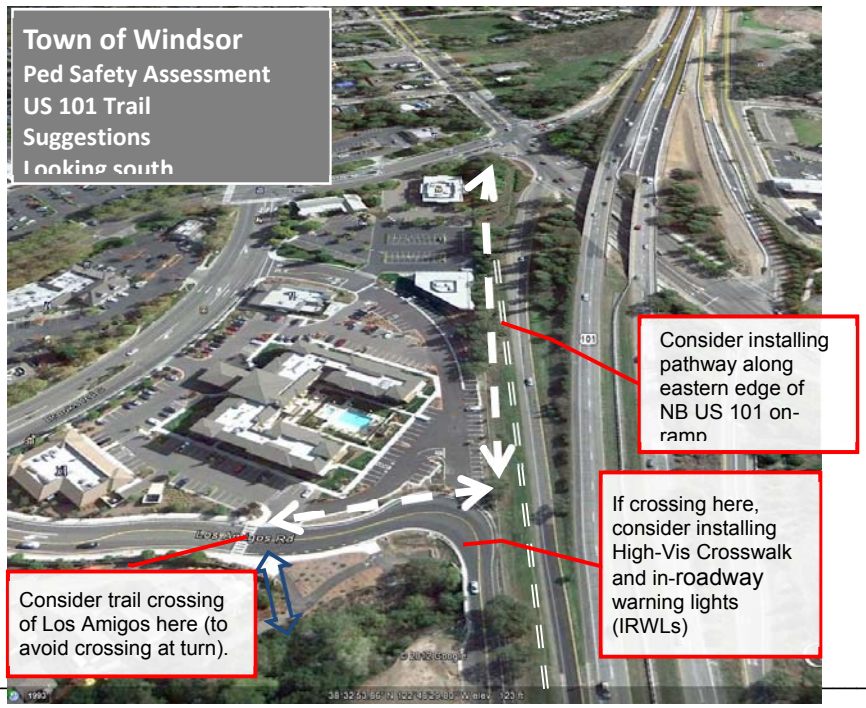
a) Facing south from Los Amigos Rd toward US 101 on-ramp and Old Redwood Highway



b) Facing south from down US 101 on-ramp toward Old Redwood Highway

Suggestions for Potential Improvements

Suggestions	Reasons
a) Consider path connections and trail bridges along old section of the Old Redwood Highway	• Connect users between Old Redwood Highway and the Windsor Town Green.
b) Provide a direct off-street trail connection for bicyclists and walkers from Los Amigos Road to the Old Redwood Highway Crossing under US 101.	• Provide a safe trail to an east-west crossing of US 101.
c) Consider tightening corner radii on all approaches in this area (both sides of US 101).	All corners were designed for high-speed turns. By "squaring-up" the corners: • Pedestrians wishing to cross will be more visible: • Drivers will take the turns with more care and likely lower speeds.
d) Consider trail crossing of Los Amigos at existing High visibility crosswalk (to avoid crossing at turn).	Enhance motorists' ability to identify the crossing location.
e) Another option is to cross Los Amigos Rd just northwest of the curve where the sidewalk ends, then extend trail along the southeast edge of Los Amigos Rd by narrowing the knuckle.	Two trucks would not be able to pass in that case, but a question to ask is if it is necessary to have such a wide knuckle?



4.3 FOCUS AREA 2: CONDE LANE BETWEEN JOHNSON AND OLD OAK ROAD (ENTRANCE TO WINDSOR CREEK ELEMENTARY SCHOOL)

Site Description

The intersection of Conde Lane and Johnson is stop controlled and adjacent to a major signalized intersection (to the north) and a minor signalized intersection (to the east at Old Oak Rd). The intersection is near an elementary school and congestion occurs during peak hours. The Town is considering installing in-roadway lights (IRWL) and restriping parts of the area around this intersection.

Observations

The team examined the area around this intersection twice during the day: At about 11:15 AM and at around 1:15 PM. Many of the key concerns are shown in Figure 4-10, and listed as follows:

- Many trucks (and cars) use this intersection to traveling between US 101 and Industrial area to south (especially in the AM). Often this traffic is traveling relatively fast through these turns, as well as rolling through the stops.
- There is heavy school related traffic at pick-up and drop-off periods.
- This intersection is bordered on the northeast by a store. The current crosswalks provide access between the store and the school site.

Figure 4-10: Intersection of Conde Lane between Johnson and Old Oak Road – Existing

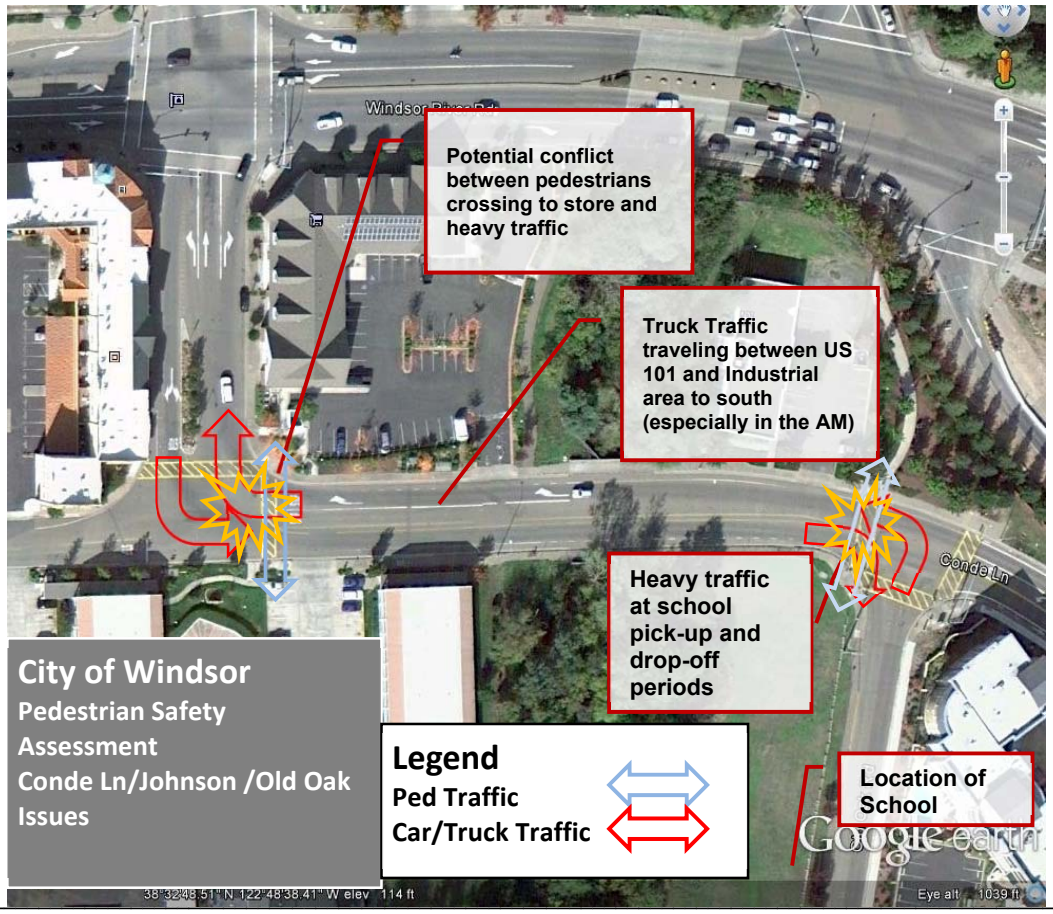


Figure 4-11: Intersection of Conde Lane and Old Oak Road

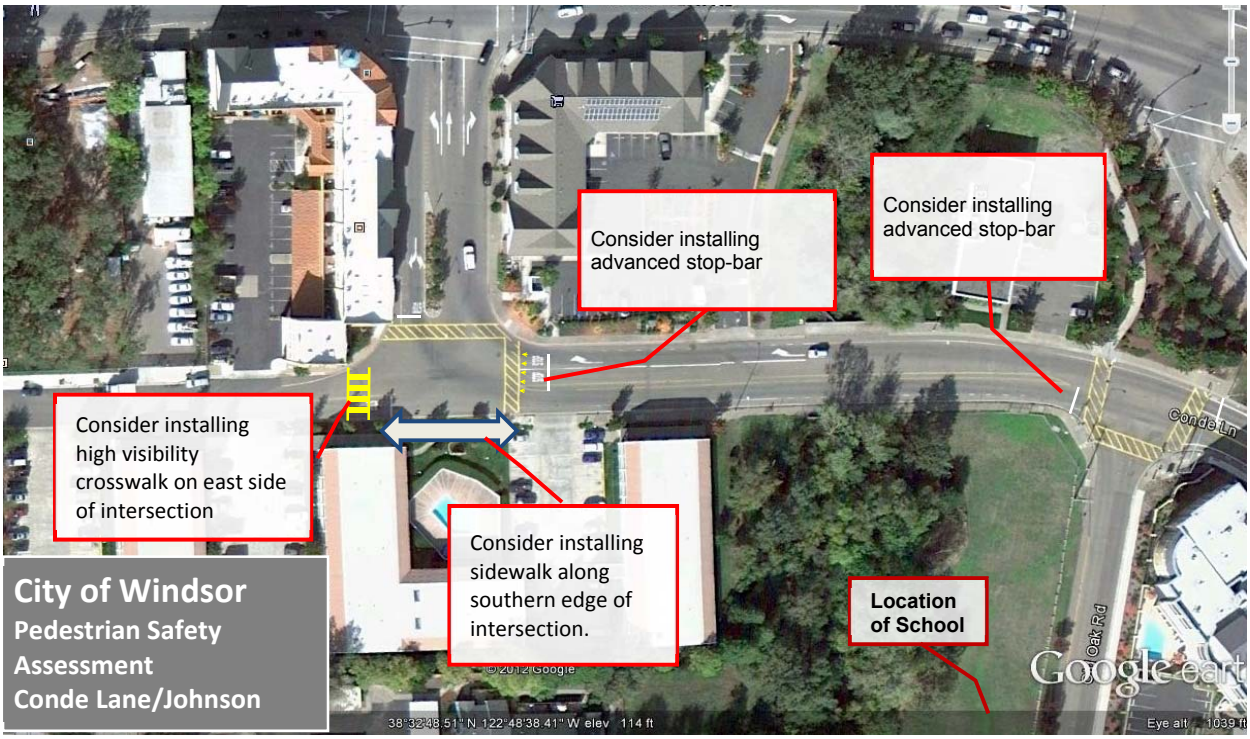


The visibility of a schoolchild at the west crosswalk of Old Oak Rd heading north is blocked by heavy traffic back-ups during school pick-up and drop-off periods.





Figure 4-12: Intersection of Conde Lane between Johnson and Old Oak Road – Suggestions



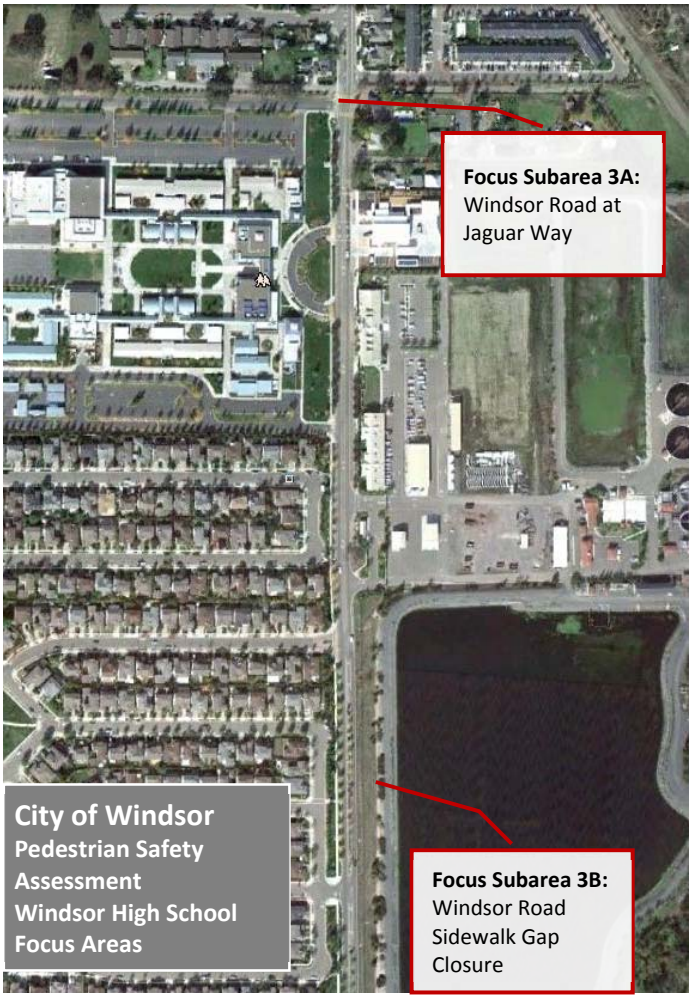
Suggestions for Potential Improvement

Suggestion	Reasons
Intersection of Conde Lane and Johnson Road	
a) Install advanced stop bars at all crossings.	• Discourages "rolling stops" and high-speed turns.
b) Consider installing sidewalk along southern edge of intersection. In addition, consider adding high visibility crosswalk on east side of intersection	• Allows pedestrians & bicyclists to bypass conflict areas on the north and eastern crosswalks.
At Conde Lane and Old Oak Road (entrance to school)	
a) Consider installing advanced stop-bars	• The visibility of a schoolchild at the west crosswalk heading north is blocked by the Heavy traffic back-ups at school pick-up and drop-off periods. A stop-bar would better ensure a child wishing to cross is visible.

4.4 FOCUS AREA 3: WINDSOR HIGH SCHOOL

Site Description

Figure 4-13: Windsor High School Focus Areas



Windsor High School's campus is bounded by Windsor Rd on the West, and driveways on the north and south sides. There are two specific subareas focused on for this PSA as follows:

1. Focus Subarea 3A: Windsor Road at Jaguar Way
2. Focus Subarea 3B: Sidewalk Gap Closure on Windsor Road, South of Windsor High School

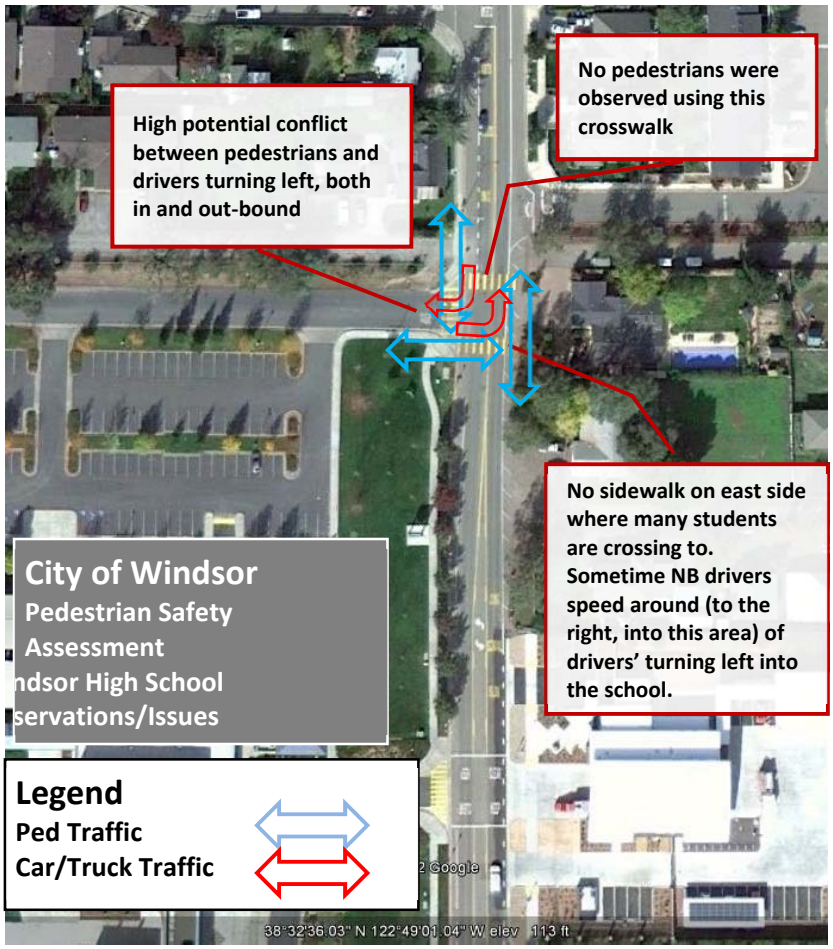
The team visited the area around the 2:15 PM dismissal period (there was another dismissal period later in the day).

Focus Subarea 3A: Windsor Road at Jaguar Way

Observations/Issues:

The school serves 9th to 12th grades. The team observed the first of two dismissal periods of Wednesday, April 18th, around 2:15pm. As shown in Figure 4-3, the following observations were made:

Figure 4-14: Windsor Road at Jaguar Way



- At Jaguar Way and Windsor Rd (the access driveway at the northern edge of the school) there is a high potential conflict between pedestrians and drivers (turning left into the school (both travel south and inbound, as well as out and northbound). The majority of both auto and pedestrian traffic at drop-off and dismissal times is traveling to and from the north.
- Currently, there is no sidewalk on the eastern side of Windsor Rd, where many students are crossing to and from school. Sometime NB drivers speed around vehicles to the right and into the area where there is no sidewalk.
- Current Plans – The Town of Windsor will be applying for State Safe Route to School funds to install curb, gutter and sidewalks as well as an In-Roadway Warning Light system.

Figure 4-15: Windsor High School, Windsor Road at Jaguar Way (looking north across from school)

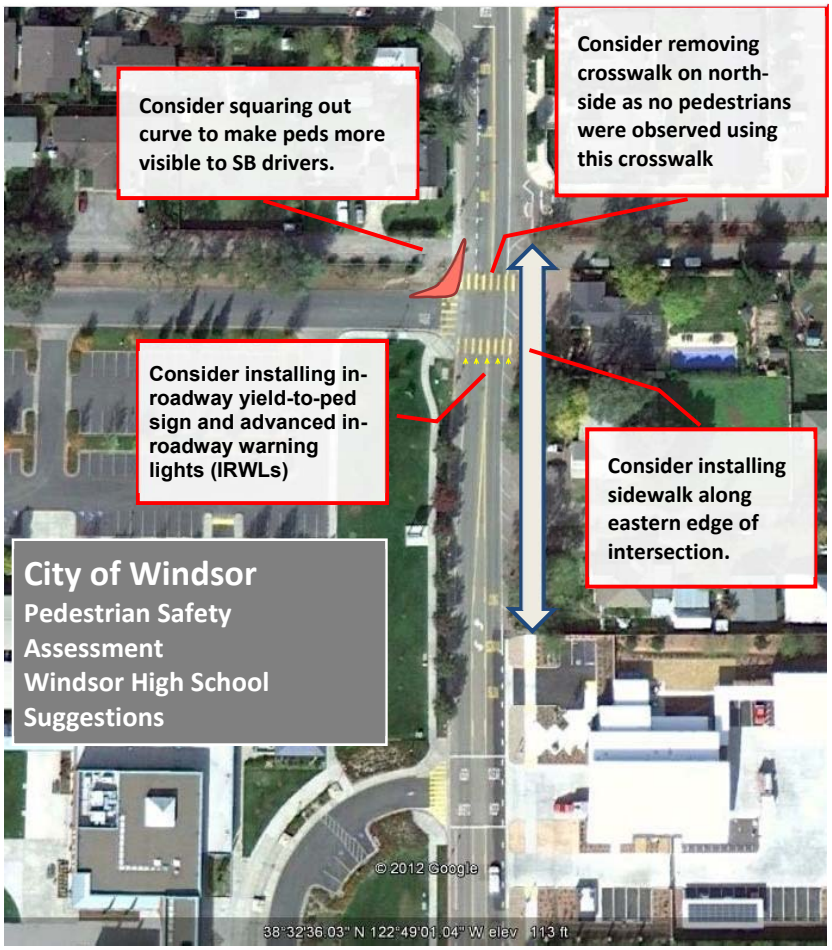
Many students were observed to use the east side of Windsor Road, where there is currently no sidewalk. No students were observed using the crosswalk on the north edge of the intersection.





Suggestions for Potential Improvement

Figure 4-16 FocusSubarea 3A: Windsor Road at Jaguar Way-Suggestions



Suggestions	Reasons
a) Consider installing sidewalk along eastern edge of intersection.	• Eliminate the need for students returning to the Trail to cross Delta Road between Marsh Creek Trail and Sellers Avenue in order to reach Delta Road's westbound bike lane.
b) Consider installing in-roadway yield-to-pedestrian sign and advanced in-roadway warning lights (IRWLs)	• Eliminate the need for students arriving on the Trail south of Delta Road to proceed all the way to Delta Road before accessing the school.
c) Consider leaving in crosswalk on north side of intersection	• Although no pedestrians were observed using this crosswalk, it likely adds emphasis to drivers about students crossing the intersection.

Focus Subarea 3B: Windsor Road Sidewalk Gap Closure

Observations and Issues

The sidewalk on the easterly side of this street is unimproved. This is a single Town owned property. Recently the Town widened the street to install a Class II Bike Lane however had insufficient funds to construct a sidewalk.

Current Plans

The Town will be applying for State Safe Route to School funds to install sidewalk and street lighting.

Figure 4-17:
Sidewalk Gap Closure on Windsor Road, South of Windsor High School—Suggestions



Suggestions for Potential Improvement

Focus Subarea 3B: Sidewalk Gap Closure on Windsor Road, South of Windsor High School

Suggestions	Reasons
• Close gap in sidewalk, on east side of Windsor Rd, immediately south of Windsor High School	• Creates a continuous and safe connection for students on way to school

4.5 FOCUS AREA 4: INTERSECTION OF WINDSOR ROAD AND WINDSOR RIVER ROAD

Site Description

Intersection improvements were completed over 10 years ago when trains were not using this track. The tracks run through the intersection on a diagonal and the pedestrian crossings are located within the drop gate (not outside as would be preferred). The California Public Utilities Commission (CPUC) has requested that this be corrected.

The Town is evaluating two alternative intersection configurations to address this concern:

- A standard signalized intersection option;
- A single lane roundabout option.

The Town is in the process of selecting one of the two alternatives as a preferred alternative to seek funding.

Figure 4-18: Intersection of Windsor Road and Windsor River Road—Existing



Figure 4-19: Intersection of Windsor Road and Windsor River Road—Signal Option

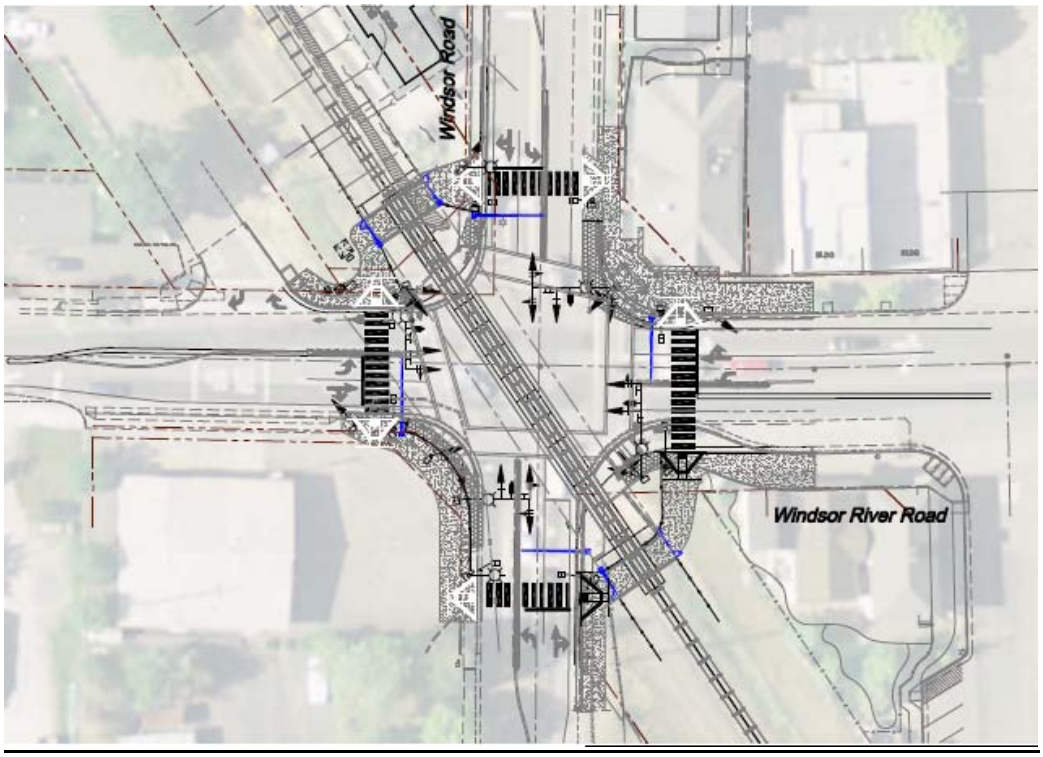
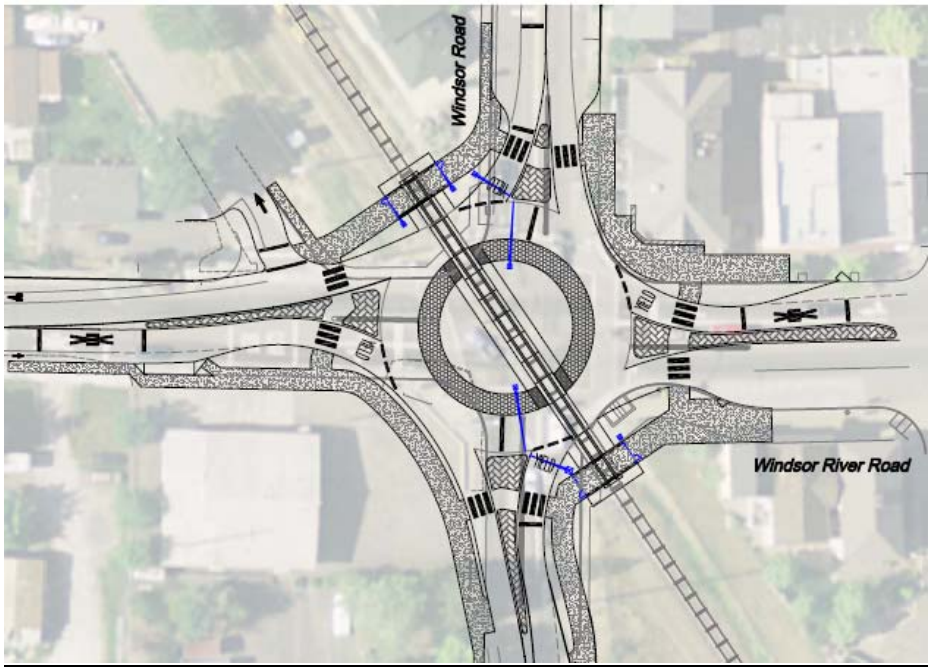


Figure 4-20: Intersection of Windsor Road and Windsor River Road—Roundabout Option



Analysis

The Railroad tracks run through the intersection of Windsor Road/Windsor River Road on a diagonal, and the pedestrian crossings are located within the drop gates (not outside as would be preferred). The California Public Utilities Commission (CPUC) has requested that this be corrected.

From a pedestrian standpoint, there are several considerations to make when choosing between a roundabout and a signalized intersection. According to the "Walkinfo" website, "Roundabouts have a mixed record regarding pedestrian and bicyclist safety." (http://www.walkinginfo.org/pedsafe/pedsafe_curb1.cfm?CM_NUM=16). Furthermore, roundabouts can be a significant challenge for the visually impaired and there are typically more bike crashes for roundabouts.

From the standpoint of safety for pedestrians, bicyclists, and the visually impaired, a signalized configuration provides advantages, primarily by controlling all traffic movements. A very real safety concern is presented where cars are encouraged to freely exit the roundabout at the crosswalks. Furthermore, the capacity of a roundabout may not be able to accommodate future growth in traffic volumes. At the very least, further study needs to be done.

While a roundabout might not be ultimately safer, this case presents some unique aspects when compared to a signal option, as follows:

1. Roundabouts often require pedestrians to travel further distances around the intersections. As the crosswalks need to be placed outside the RR crossing gates in both cases, there is not much difference between these distances.

2. Roundabouts usually require more space, and therefore do not work in tight, urban areas. In this case, it appears that nothing will be displaced.

3. Roundabouts can be much more expensive than a signal. According to a representative from the Town of Windsor, the cost would not be prohibitively greater.

Aesthetically, the roundabout has the advantage of providing an appealing gateway to the town center of Windsor.

One area of concern may be the capacity of a single lane roundabout. Currently, the intersection handles about 13000 on Windsor River Road, 16000 ADT on Windsor Road, for a total of 29000 ADT. According to the FHWA,[6] a detailed capacity analysis may be considered for a 4-leg single-lane roundabout over 25,000 vehicle entries per day – the capacity of a medium-size traffic signal—but with several major advantages compared to a signalized option:

- Much less traffic delay (less motorist frustration, greatly reduced air pollution). Because all entries operate simultaneously, a single lane modern roundabout intersection can handle the traffic volume of a medium-sized traffic signal.

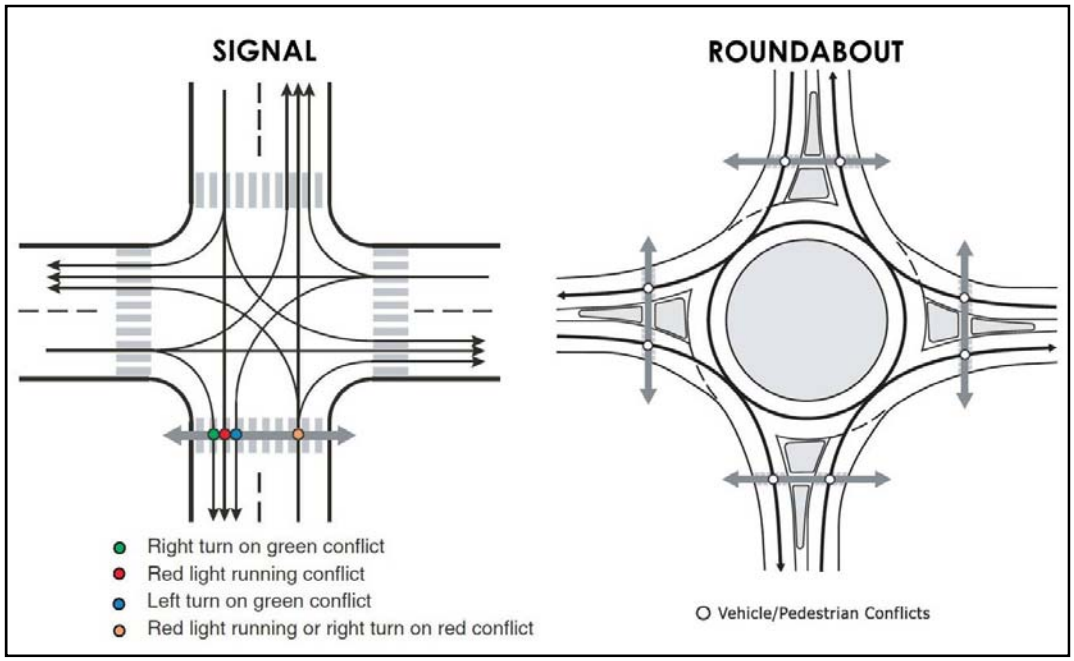
[6] The information presented here reflects the principles described in the FHWA document Roundabouts: An Informational Guide [1] and the forthcoming 2nd Edition [2] of that document (hereafter referred to as the Roundabout Guide), which is in progress at the time of this writing and due to be published in 2010.

- Little or no need to widen approaching roadways because a roundabout needs no turn lanes or multi-lane storage
  - Less need to acquire right of way outside of the current intersection area
  - Streets away from the intersection can remain single-lane -- easier and safer to cross on foot or bicycle
- Fewer vehicle-vehicle and vehicle-pedestrian collisions, and greatly reduced severity of vehicle-vehicle collisions (Figure 4-21 a & b)

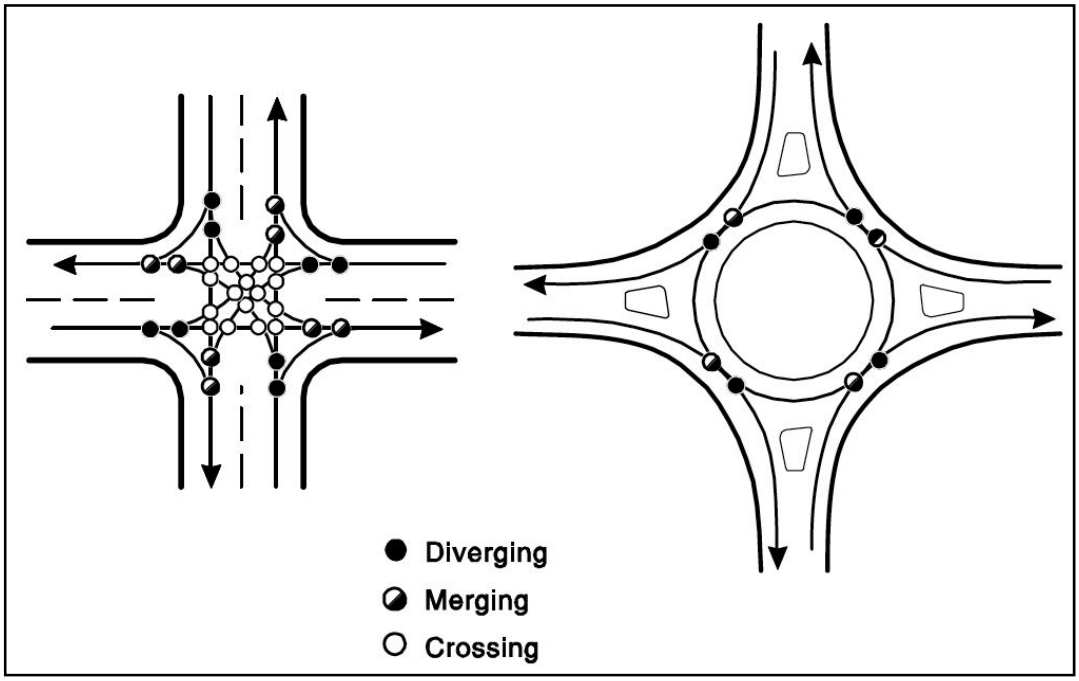
Suggestions for Potential Improvement

Suggestion	**Reasons/Caveats/Challenges**
a) A roundabout might be considered for the reasons listed	• As a strategy to move the crosswalks behind the RR crossing gates • The distance travelled by pedestrians in this RB option is not much greater than signal option (see above). • Provide aesthetic gateway into central Windsor • Consider conducting detailed capacity analysis. • For more information, see FHWA's publication Roundabouts: An Informational Guide
b) Considerations for bicyclists in roundabouts	• For bicyclists, install ramps before the channelized neck downs at all approaches, so cyclists choosing not to use the roundabout can have "escape routes" onto the sidewalk. The sidewalks should be providing at least 10 foot travel ways to accommodate both pedestrians and bicyclists near the roundabout.

Figure 4-21: How Roundabouts Reduce the Number and Severity of Conflicts



a) Vehicle/Pedestrian conflicts



b) Vehicle/vehicle conflicts

4.6 FOCUS AREA 5: STARR ROAD AT CALI CALMECAC LANGUAGE ACADEMY

Site Description

The sidewalks on the east side of this street opposite the school is unimproved. This is a single property that has not been developed and there are no sidewalks and students must walk in the street.

Figure 4-22: STARR ROAD AT CALI CALMECAC LANGUAGE ACADEMY—SUGGESTIONS



Suggestions for Potential Improvement:

Install curb, gutter and sidewalks on the eastern side of Starr Road.

4.7 FOCUS AREA 6: STARR ROAD AND OLD REDWOOD HIGHWAY

Site Description

At the north end of the Town of Windsor, Starr Road runs roughly north-south and intersects the Old Redwood Highway at approximately a 45-degree angle. Pedestrians walking along old redwood Highway do not have a formal crossing, and have long crossing distances. This intersection is also very near the Windsor Christian Academy.

If this area of the Old Redwood Highway "strip" continues to grow to the north, it might be worth considering "squaring up" this intersection by realigning Starr Rd to intersect the Old Redwood Highway at more of a 90-degree angle. This could create a wider and more usable sidewalk plaza on both sides of Starr Rd, shorten pedestrian crossing distance, and slow vehicle turns into and out of the Old Redwood Highway.

Figure 4-23: Old Redwood Highway at Starr Rd



a) Aerial view



b) View across Old Redwood Highway toward Starr Rd

Suggestions for Potential Improvement

Figure 4-24: Concept for Realigning Old Redwood Hwy at Starr Rd



Old Redwood Highway at Starr Rd

Suggestion	Reasons
a) If desired for future development along this stretch of Old Redwood Highway at Starr Road, consider realigning Starr Rd east to meet The Old Redwood Highway at more of a right angle. b) An effective, less costly option is to consider a curb extension on the southwest corner of the intersection to create a more right-angle intersection of Starr Road with Old Redwood Highway. Extending the curb on the southeast corner would likely create a problem for truck turning movements. c) Consider installing, first on the south and west sides of intersection. (on the north side when development occurs).	• Create a wider sidewalk plaza along Old Redwood Highway at Starr Rd • Shorten pedestrian crossing distances • Calm vehicle movements into and out of Starr Rd

APPENDIX A: GLOSSARY OF PEDESTRIAN IMPROVEMENT MEASURES

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Traffic Control Countermeasures			
Traffic Signal or All-Way Stop	Conventional traffic control devices with warrants for use based on the Manual on Uniform Control Devices (MUTCD).	Reduces pedestrian-vehicle conflicts and slows traffic speeds.	Must meet warrant based on traffic and pedestrian volumes; however, exceptions are possible based on demonstrated pedestrian safety concerns (collision history).
HAWK Beacon Signal	HAWK (High Intensity Activated Crosswalks) are pedestrian-actuated signals that are a combination of a beacon flasher and a traffic control signal. When actuated, HAWK displays a yellow (warning) indication followed by a solid red light. During pedestrian clearance, the driver sees a flashing red “wig-wag” pattern until the clearance interval has ended and the signal goes dark.	Reduces pedestrian-vehicle conflicts and slows traffic speeds.	Useful in areas where it is difficult for pedestrians to find gaps in automobile traffic to cross safely, but where normal signal warrants are not satisfied. Appropriate for multi-lane roadways.
Overhead Flashing Beacons	Flashing amber lights are installed on overhead signs, in advance of the crosswalk or at the entrance to the crosswalk.	The blinking lights during pedestrian crossing times increase the number of drivers yielding for pedestrians and reduce pedestrian-vehicle conflicts. This measure can also improve conditions on multi-lane roadways.	Best used in places where motorists cannot see a traditional sign due to topography or other barriers.
Stutter Flash	The Overhead Flashing Beacon is enhanced by replacing the traditional slow flashing incandescent lamps with rapid flashing LED lamps. The beacons may be push-button activated or activated with pedestrian detection.	Initial studies suggest the stutter flash is very effective as measured by increased driver yielding behavior. Solar panels reduce energy costs associated with the device.	Appropriate for multi-lane roadways.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
In-Roadway Warning Lights	Both sides of a crosswalk are lined with pavement markers, often containing an amber LED strobe light. The lights may be push-button activated or activated with pedestrian detection.	This measure provides a dynamic visual cue, and is increasingly effective in bad weather.	Best in locations with low bicycle ridership, as the raised markers present a hazard to bicyclists. May not be appropriate in areas with heavy winter weather due to high maintenance costs. May not be appropriate for locations with bright sunlight. The lights may cause confusion when pedestrians fail to activate them and/or when they falsely activate.
High-Visibility Signs and Markings	High-visibility markings include a family of crosswalk striping styles including the “ladder” and the “triple four.” One style, the zebra-style crosswalk pavement markings, were once popular in Europe, but have been phased out because the signal-controlled puffin is more effective (see notes). High-visibility fluorescent yellow green signs are made of the approved fluorescent yellow-green color and posted at crossings to increase the visibility of a pedestrian crossing ahead.	FHWA recently ended its approval process for the experimental use of fluorescent yellow crosswalk markings and found that they had no discernable benefit over white markings.	Beneficial in areas with high pedestrian activity, as near schools, and in areas where travel speeds are high and/or motorist visibility is low.
In-Street Pedestrian Crossing Signs	This measure involves posting regulatory pedestrian signage on lane edge lines and road centerlines. The In-Street Pedestrian Crossing sign may be used to remind road users of laws regarding right of way at an unsignalized pedestrian crossing. The legend STATE LAW may be shown at the top of the sign if applicable. The legends STOP FOR or YIELD TO may be used in conjunction with the appropriate symbol.	This measure is highly visible to motorists and has a positive impact on pedestrian safety at crosswalks.	Mid-block crosswalks, unsignalized intersections, low-speed areas, and two-lane roadways are ideal for this pedestrian treatment. The STOP FOR legend shall only be used in states where the state law specifically requires that a driver must stop for a pedestrian in a crosswalk.
Pedestrian Crossing Flags	Square flags of various colors, which are mounted on a stick and stored in sign-mounted holders on both side of the street at crossing locations; they are carried by pedestrians while crossing a roadway.	This measure makes pedestrians more visible to motorists.	Appropriate for mid-block and uncontrolled crosswalks with low visibility or poor sight distance.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Advanced Yield Lines	Standard white stop or yield limit lines are placed in advance of marked, uncontrolled crosswalks.	This measure increases the pedestrian's visibility to motorists, reduces the number of vehicles encroaching on the crosswalk, and improves general pedestrian conditions on multi-lane roadways. It is also an affordable option.	Useful in areas where pedestrian visibility is low and in areas with aggressive drivers, as advance limit lines will help prevent drivers from encroaching on the crosswalk. Addresses the multiple-threat collision on multi-lane roads.
Geometric Treatments			
Pedestrian Overpass/ Underpass	This measure consists of a pedestrian-only overpass or underpass over a roadway. It provides complete separation of pedestrians from motor vehicle traffic, normally where no other pedestrian facility is available, and connects off-road trails and paths across major barriers.	Pedestrian overpasses and underpasses allow for the uninterrupted flow of pedestrian movement separate from the vehicle traffic.	Grade separation via this measure is most feasible and appropriate in extreme cases where pedestrians must cross roadways such as freeways and high-speed, high-volume arterials. This measure should be considered a last resort, as it is expensive and visually intrusive.
Road Diet (aka Lane Reduction)	The number of lanes of travel is reduced by widening sidewalks, adding bicycle and parking lanes, and converting parallel parking to angled or perpendicular parking.	This is a good traffic calming and pedestrian safety tool, particularly in areas that would benefit from curb extensions but have infrastructure in the way. This measure also improves pedestrian conditions on multi-lane roadways.	Roadways with surplus roadway capacity (typically multi-lane roadways with less than 15,000 to 17,000 ADT) and high bicycle volumes, and roadways that would benefit from traffic calming measures.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Median Refuge Island	Raised islands are placed in the center of a roadway, separating opposing lanes of traffic with cutouts for accessibility along the pedestrian path.	This measure allows pedestrians to focus on each direction of traffic separately, and the refuge provides pedestrians with a better view of oncoming traffic as well as allowing drivers to see pedestrians more easily. It can also split up a multi-lane road and act as a supplement to additional pedestrian tools.	Recommended for multi-lane roads wide enough to accommodate an ADA-accessible median.
Staggered Median Refuge Island	This measure is similar to traditional median refuge islands; the only difference is that the crosswalks in the roadway are staggered such that a pedestrian crosses half the street and then must walk towards traffic to reach the second half of the crosswalk. This measure must be designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel.	Benefits of this tool include an increase in the concentration of pedestrians at a crossing and the provision of better traffic views for pedestrians. Additionally, motorists are better able to see pedestrians as they walk through the staggered refuge.	Best used on multi-lane roads with obstructed pedestrian visibility or with off-set intersections.
Curb Extension	Also known as a pedestrian bulb-out, this traffic-calming measure is meant to slow traffic and increase driver awareness. It consists of an extension of the curb into the street, making the pedestrian space (sidewalk) wider.	Curb extensions narrow the distance that a pedestrian has to cross and increases the sidewalk space on the corners. They also improve emergency vehicle access and make it difficult for drivers to turn illegally.	Due to the high cost of installation, this tool would only be suitable on streets with high pedestrian activity, on-street parking, and infrequent (or no) curb-edge transit service. It is often used in combination with crosswalks or other markings.
Reduced Curb Radii	The radius of a curb can be reduced to require motorists to make a tighter turn.	Shorter radii narrow the distance that pedestrians have to cross; they also reduce traffic speeds and increase driver awareness (like curb extensions), but are less difficult and expensive to implement.	This measure would be beneficial on streets with high pedestrian activity, on-street parking, and no curb-edge transit service. It is more suitable for wider roadways and roadways with low volumes of heavy truck traffic.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Curb Ramps	Curb ramps are sloped ramps that are constructed at the edge of a curb (normally at intersections) as a transition between the sidewalk and a crosswalk.	Curb ramps provide easy access between the sidewalk and roadway for people using wheelchairs, strollers, walkers, crutches, handcarts, bicycles, and also for pedestrians with mobility impairments who have trouble stepping up and down high curbs.	Curb ramps must be installed at all intersections and mid-block locations where pedestrian crossings exist, as mandated by federal legislation (1973 Rehabilitation Act and 1990 Americans with Disabilities Act). Where feasible, separate curb ramps for each crosswalk at an intersection should be provided rather than having a single ramp at a corner for both crosswalks.
Raised Crosswalk	A crosswalk whose surface is elevated above the travel lanes.	Attracts drivers' attention; encourages lower travel speeds by providing visual and tactile feedback when approaching the crosswalk.	Appropriate for multi-lane roadways, roadways with lower speed limits that are not emergency routes, and roadways with high levels of pedestrian activity, such as near schools, shopping malls, etc.
Improved Right-Turn Slip-Lane Design	Right-turn slip lanes (aka channelized right-turn lanes) are separated from the rest of the travel lanes by a pork chop-shaped striped area. This measure separates right-turning traffic and streamlines right-turning movements. Improved right-turn slip lanes would provide pedestrian crossing islands within the intersection and be designed to optimize the right-turning motorist's view of the pedestrian and of vehicles to his or her left.	This measure reduces the pedestrian's crossing distance and turning vehicle speeds.	Appropriate for intersections with high volumes of right-turning vehicles.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Chicanes	A chicane is a sequence of tight serpentine curves (usually an S-shape curve) in a roadway, used on city streets to slow cars.	This is a traffic-calming measure that can improve the pedestrian environment and pedestrian safety.	Chicanes can be created on streets with higher volumes, given that the number of through lanes is maintained; they can also be created on higher-volume residential streets to slow traffic. Chicanes may be constructed by alternating parallel or angled parking in combination with curb extensions.
Pedestrian Access and Amenities			
Marked Crosswalk	Marked crosswalks should be installed to provide designated pedestrian crossings at major pedestrian generators, crossings with significant pedestrian volumes (at least 15 per hour), crossings with high vehicle-pedestrian collisions, and other areas based on engineering judgment.	Marked crosswalks provide a designated crossing, which may improve walkability and reduce jaywalking.	Marked crosswalks alone should not be installed on multi-lane roads with more than about 10,000 vehicles/ day. Enhanced crosswalk treatments (as presented in this table) should supplement the marked crosswalk.
Textured Pavers	Textured pavers come in a variety of materials (for example, concrete, brick, and stone) and can be constructed to create a textured pedestrian surface such as a crosswalk or sidewalk. Crosswalks are constructed with the pavers, or can be made of stamped concrete or asphalt.	Highly visible to motorists, this measure provides a visual and tactile cue to motorists and delineates a separate space for pedestrians, as it provides a different texture to the street for pedestrians and motorists. It also aesthetically enhances the streetscape.	Appropriate for areas with high volumes of pedestrian traffic and roadways with low visibility and/or narrow travel ways, as in the downtown area of towns and small cities.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Anti-Skid Surfacing	Surface treatment is applied to streets to improve skid resistance during wet weather. This is a supplementary tool that can be used to reduce skidding in wet conditions.	Improves driver and pedestrian safety.	Appropriate for multi-lane roadways and roadways with higher posted speed limit and/or high vehicle volumes or collision rates.
Accessibility Upgrades	Treatments such as audible pedestrian signals, accessible push buttons, and truncated domes should be installed at crossings to accommodate disabled pedestrians.	Improves accessibility of pedestrian facilities for all users.	Accessibility upgrades should be provided for all pedestrian facilities following a citywide ADA Transition Plan.
Pedestrian Countdown Signal	Displays a “countdown” of the number of seconds remaining for the pedestrian crossing interval. In some jurisdictions the countdown includes the walk phase. In other jurisdictions, the countdown is only displayed during the flashing don’t walk phase.	Increases pedestrian awareness and allows them the flexibility to know when to speed up if the pedestrian phase is about to expire.	The forthcoming 2009 MUTCD is expected to require all pedestrian signals to incorporated countdown signals within ten years. The signals should be prioritized for areas with pedestrian activity, roadways with high volumes of vehicular traffic, multi-lane roadways, and areas with elderly or disabled persons (who may walk slower than others may).
Transit			
High-Visibility Bus Stop Locations	This measure should include siting bus stops on the far side of intersections, with paved connections to sidewalks where landscape buffers exist.	Provides safe, convenient, and inviting access for transit users; can improve roadway efficiency and driver sight distance.	Appropriate for all bus stops subject to sight distance and right-of-way constraints.
Transit Bulb	Transit bulbs or bus bulbs, also known as nubs, curb extensions, or bus bulges are a section of sidewalk that extends from the curb of a parking lane to the edge of the through lane.	Creates additional space at a bus stop for shelters, benches, and other passenger amenities.	Appropriate at sites with high patron volumes, crowded city sidewalks, and curbside parking.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Enhanced Bus Stop Amenities	Adequate bus stop signing, lighting, a bus shelter with seating, trash receptacles, and bicycle parking are desirable features at bus stops.	Increase pedestrian visibility at bus stops and encourage transit ridership.	Appropriate at sites with high patron volumes.

APPENDIX B: RESOURCE LIST

RESOURCE LIST
A Guide for Reducing Collisions Involving Pedestrians (NCHRP Report 500) *http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v10.pdf*
Pedestrian and Bicycle Information Center *http://www.walkinginfo.org/*
National Center for Safe Routes to School *http://www.saferoutesinfo.org/*
Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations (HRT-04-100) *http://www.thrc.gov/safety/pubs/04100/index.htm*
How to Develop a Pedestrian Safety Action Plan (FHWA-SA-05-12) *http://www.walkinginfo.org/pp/howtoguide2006.pdf*
Improving Pedestrian Safety at Unsignalized Crossings (NCHRP Report 562) *http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_562.pdf*
Road Safety Audits: Case Studies (FHWA-SA-06-17) *http://safety.fhwa.dot.gov/rsa/rsa_cstudies.htm*
Pedestrian Road Safety Audit Guidelines and Prompt Lists *http://drusilla.hsrc.unc.edu/cms/downloads/PedRSA.reduced.pdf*
PEDSAFE: The Pedestrian Safety Guide and Countermeasure Selection System (FHWA-SA-04-003) *http://www.walkinginfo.org/pedsafe/*
Pedestrian and Bicycle Crash Analysis Tool (PBCAT) *http://www.bicyclinginfo.org/bc/pbcat.cfm*
FHWA, A Resident's Guide for Creating Safe and Walkable Communities *http://safety.fhwa.dot.gov/ped_bicycle/ped/ped_walkguide/index.htm*
FHWA, Pedestrian Safety Guide for Transit Agencies (FHWA-SA-07-017) *http://safety.fhwa.dot.gov/ped_bicycle/ped/ped_transguide/*
FHWA Pedestrian Safety Training Courses:
Developing a pedestrian safety action plan (two-day course) *next California course:* *http://www.google.com/calendar/embed?src=lssandt@email.unc.edu*
Designing for pedestrian safety (two-day course) *next California course:* *http://www.google.com/calendar/embed?src=lssandt@email.unc.edu*
Planning and designing for pedestrian safety (three-day course) *next California course:* *http://www.google.com/calendar/embed?src=lssandt@email.unc.edu*
Adapted from FHWA *Pedestrian Road Safety Audit Guidelines and Prompt Lists*

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