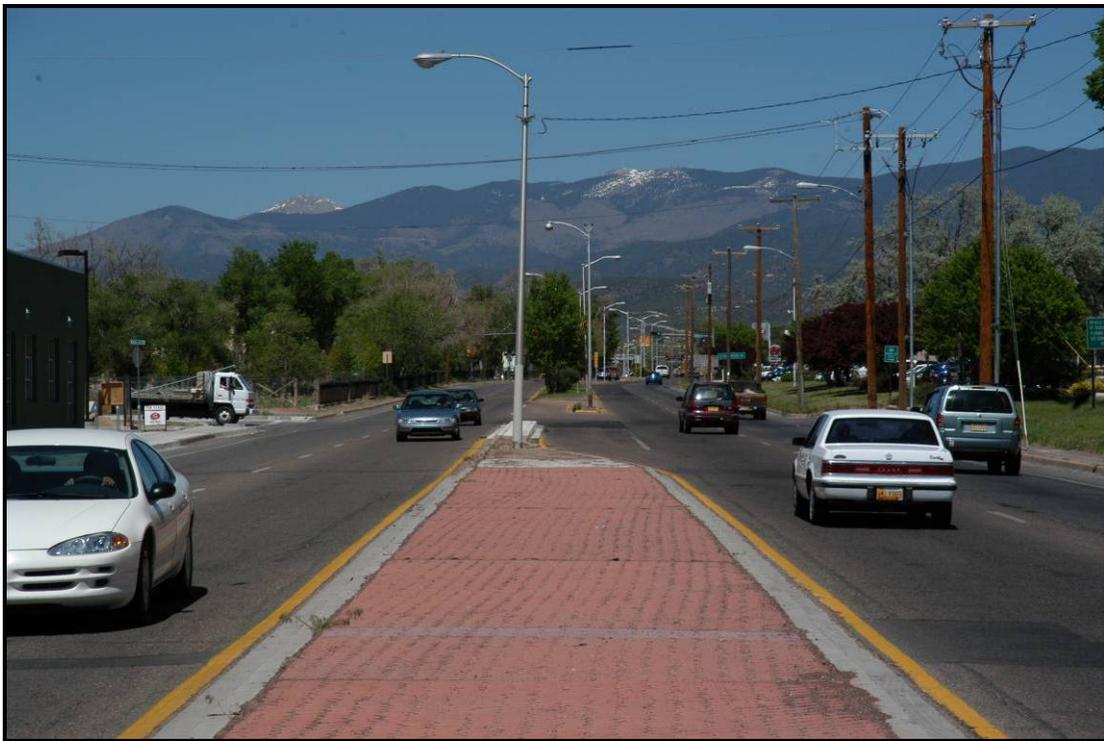


# **Cerrillos Road/Alta Vista Street/Luisa Street/Cordova Road**

**Pedestrian Road Safety Assessment**

**Santa Fe, New Mexico**

**May 11 – 12, 2009**



**Dan Nabors and Frank Gross  
Vanasse Hangen Brustlin (VHB), Inc**

# 1. Introduction

---

## 1.1. Objectives of Study

The objective of this study was to complete a pedestrian road safety assessment (RSA) in Santa Fe, New Mexico. The study area was a circuit including Cerrillos Road, Alta Vista Street, Luisa Street, and Cordova Road (see Figure 1).



Figure 1. Study Area

## 1.2. Background

Cerrillos Road is a multi-lane, north-south urban arterial in a mixed land use area in Santa Fe, New Mexico. This road serves as a commuter route and also provides access to several New Mexico State government buildings, residential neighborhoods, and commercial developments. Cordova Road is a multi-lane east-west urban arterial, and Alta Vista Street and Luisa Street are urban local roads. Pedestrian and bicycle activity in this area is generated by schools, a commuter train station (serving Albuquerque to Santa Fe), bus stops, commercial developments, residential areas, office buildings, and multi-purpose trails.

New Mexico is a pedestrian focus State and the City of Santa Fe was selected to host a course on pedestrian RSAs. The New Mexico DOT (NMDOT) provided the RSA team with information of the study area, including aerial maps and bicycle routes. The New Mexico Department of Transportation provided crash data for the study area. The RSA team reviewed six pedestrian crashes and four bicycle crashes that were reported in the study area over the five year period from

2004-2008. The purpose of this RSA was to identify safety issues that may be contributing to the reported pedestrian and bicycle crashes in the study area and to identify potential measures to mitigate these issues.

The RSA team consisted of members from the Federal Highway Administration (FHWA), NMDOT, Nevada DOT, Illinois DOT, Santa Fe Police Department, and VHB, Inc. The RSA was performed on May 11 – 12, 2009, during daytime and nighttime hours.

## 2. Existing Conditions

### 2.1. Site Characteristics and Pedestrian Accommodations

Cerrillos Road is a four-lane, divided, urban arterial with a posted speed limit of 35 mph through the study area. There is a raised center median; on the east and west side of the roadway are shoulders (approximately 5 ft wide) and curb-and-gutter through the study area. There is a sidewalk along the east side, but not along the west side of Cerrillos Road (see Figure 2).

Cordova Road is a four-lane, divided, urban arterial with a posted speed limit of 30 mph. There is a two-way left-turn lane with curb-and-gutter along the north and south side of the road through the study area. There is a sidewalk along both sides of the road (see Figure 2). Alta Vista Street and Luisa Street are two-lane urban local roads with a posted speed limit of 25 mph. Both roads have sidewalk along both sides (see Figure 2).



Figure 2. Pedestrian Facilities within the Study Area

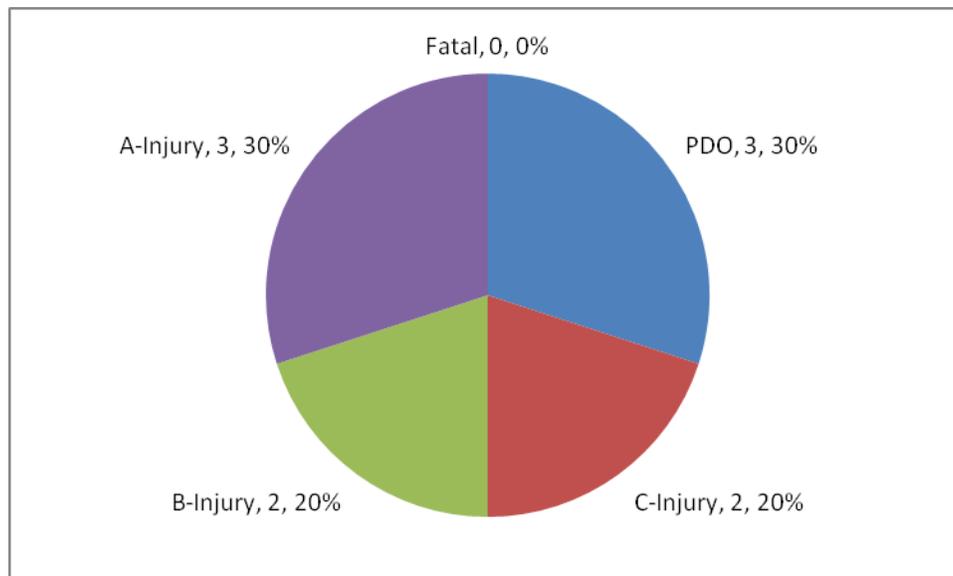
## 2.2. Traffic Data

The New Mexico DOT provided average annual daily traffic (AADT) volumes for Cordova Road, Alta Vista Street, and Cerrillos Road. The 2008 AADT on Cerrillos Road was approximately 31,000 vehicles per day. The 2006 AADT for Cordova Road and Alta Vista Street were approximately 11,000 and 2,900 vehicles per day, respectively. Traffic counts were not available for Luisa Street. Pedestrians and bicyclists were observed throughout the study area during both day and night.

## 2.3. Crash Analysis

The New Mexico Department of Transportation provided five years of crash data, including vehicle, bicycle, and pedestrian crashes. During that period there were 440 reported crashes in the study area, including six pedestrian-vehicle crashes and four bicycle-vehicle crashes. This section presents the results of the 10 pedestrian- and bicycle-related crashes by year, location, severity, time of day (day/night), and day of week, and weather. Of the 10 crashes, four occurred in 2004, two occurred in 2005, one occurred in 2006, one occurred in 2007, and two occurred in 2008. There were small clusters of crashes in three locations as shown in Appendix A.

The majority of the pedestrian/bicycle crashes (70 percent) were injury-related, including all six of the pedestrian-vehicle crashes. The remaining three crashes (30 percent) were property damage only (PDO), all involving a bicycle, as shown in Figure 3. There were no fatalities reported within the study area from 2004 to 2008.



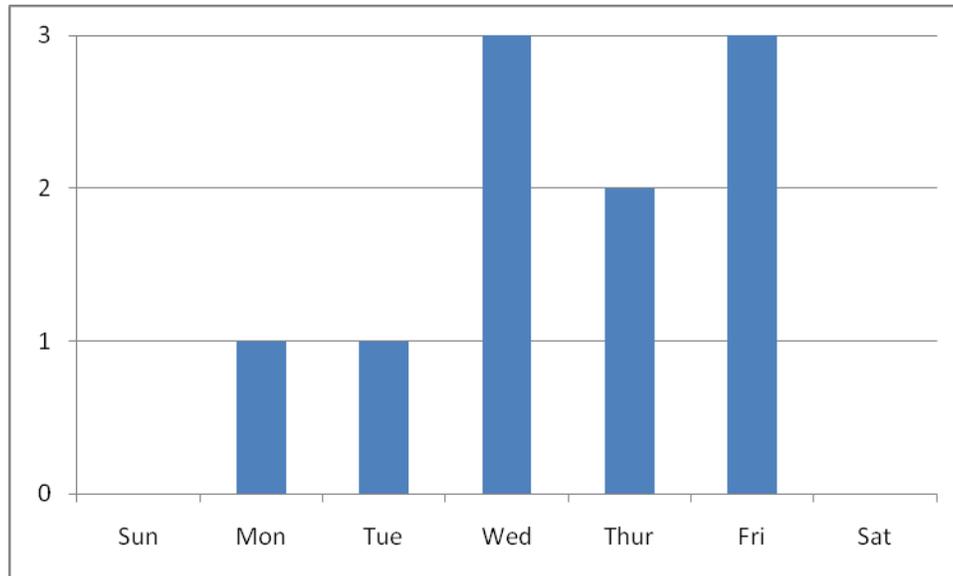
Note: A-injury = incapacitating injury, B-injury = moderate injury, C-injury = minor injury, and PDO = property damage only.

**Figure 3. Pedestrian/Bicycle Crashes by Severity**

Of the 10 pedestrian/bicycle crashes in the study area, six (60 percent) occurred during the day. There are generally more crashes during the day due to the greater exposure (i.e., traffic volumes and number of daylight hours). In fact, the ratio of night to day crashes is typically 30 percent night and

70 percent day (NHTSA, 2008). Based on the crash data, it appears that nighttime crashes are slightly over-represented within the study area.

All of the crashes from 2004 to 2008 occurred during the week and there were no crashes on the weekend as shown in Figure 4. During the weekdays, the majority of crashes are occurring between Wednesday and Friday.



**Figure 4. Crashes by Day of Week**

The weather was clear and dry for seven of the 10 crashes. Three crashes occurred in wet-weather conditions.

### **3. Assessment Findings**

---

#### **3.1. Safety Benefits of Existing Roadway Features**

Based on a review of existing site conditions, there are several notable roadway features that enhance pedestrian and bicycle safety in the study area, namely:

- **Pedestrian Countdown Signals** – Pedestrian countdown signals were provided for all crossings at signalized intersections within the study area. The use of pedestrian countdown signals has been shown to reduce risky behaviors; while more people may begin crossing during the clearance interval, there are less people in the crosswalk at the end of the clearance interval.
- **Positive Separation and Buffer** – There is a buffer strip along segments of sidewalk within the study area. Specific locations with a buffer strip, as shown in Figure 2, include the west side of St Francis Drive, from Alta Vista Street to Cordova Road, the south side of Cordova Road from Pen Road to Cerrillos Road, and along the east side of Cerrillos Road from Cordova Road to approximately 500 feet north of Alta Vista Street. The buffer strip provides positive separation

between vehicles and pedestrians, reducing the opportunity for conflict and providing a more comfortable walking environment for pedestrians.



View of southwest quadrant of the intersection of St Francis Drive and Cordova Road. Photo shows where trees and bushes have been planted to provide a buffer strip between the sidewalk and roadway.

- **Traffic Calming** – There is neck-down installed along Alta Vista Street near the senior center. The neck-down reduces the crossing distance for pedestrians and also helps to reduce vehicle speeds by narrowing the roadway width.



View of Alta Vista Road looking eastbound between St Francis Drive and Luisa Street. Photo shows a neck-down strategy where the pedestrian crossing distance has been reduced by providing raised islands near the edge of the travel lanes.

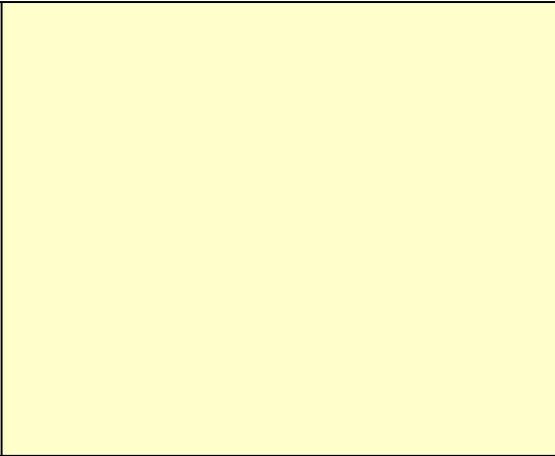
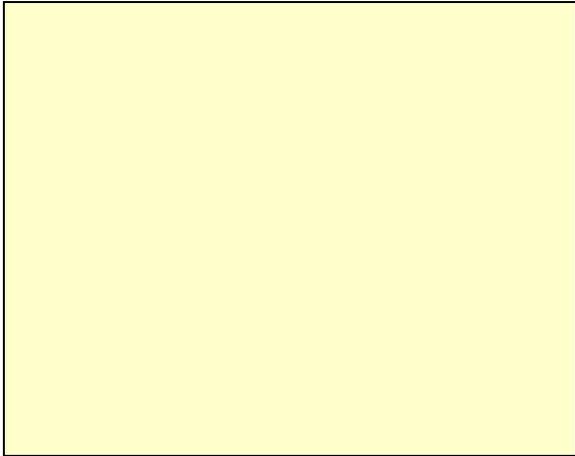
- **Provision of Sidewalk** – A sidewalk is provided through most of the study area, as shown in Figure 2. This provides a designated path for pedestrians and helps to provide separation between pedestrians and vehicles.
- **Train and Bus Station** – The newly constructed train station provides several amenities for pedestrians and bicyclists, which may help to attract riders. Figure 2 shows the central location of the train station within the study area.
- **Signing for Deaf School** – There is a sign at the corner of Cerrillos Road and Cordova Road, alerting drivers to the presence of deaf pedestrians.

### **3.2. Identified Safety Issues and Suggestions for Improvement**

Despite the measures to improve pedestrian safety throughout the RSA corridor, 10 general safety issues were identified. The RSA team prioritized the issues based upon their perceived importance in the study area and developed suggestions to correct or mitigate the safety concerns. The issues and suggestions are summarized in Table 1. While specific examples are provided for each safety issue identified, this report is not considered as an exhaustive list of locations where each issue is present. It was beyond the scope of this RSA to identify each specific location for every issue (e.g., ADA compliance issues). Instead, this report provides a list of specific safety issues, as identified by the RSA team, along with suggestions to mitigate the issues. The findings apply, in general, to the study area, but the City should look for opportunities to identify similar issues elsewhere and implement improvements as appropriate.

**TABLE 1. Summary of Safety Issues and Suggestions for Existing Facilities**

1. Lack of Continuity and Connectivity for Bicyclists		
SAFETY ISSUE	SUGGESTED IMPROVEMENTS	EXAMPLES OF ISSUES
<p><b>Gaps in network</b>—there are gaps in the bicycle network including a lack of crossings and gaps in paths and routes. Gaps in the network may cause bicyclists to take unintended paths, potentially increasing the risk of a conflict with a vehicle. There were three bicycle crashes along Cordova Road, one at each of the intersections of Cerrillos Road, St Francis Drive, and Camino de los Marquez. There are no designated bike facilities along Cordova Road in this area.</p> <p>Bicycling is a popular mode of transportation in Santa Fe and there are designated routes coming into the city from the north, west, southeast, and southwest. The designated routes continue through the city, however, there are gaps in the network to destinations within the city. There is also a lack of signing and markings along current bike routes and at designated crossings from trails into the city.</p> <p>There are bicycle crossing signs to warn drivers where the shared-use trail crosses Alta Vista Street (west of the railroad tracks). However, the warning sign in the westbound direction is obstructed by the railroad crossing warning devices.</p>	<p><i>Short-term</i> – Relocate bicycle crossing sign on Alta Vista Road to be more visible. Consider marking crossings based on ADT, following the guidance in <i>Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations</i> (Zegeer et al, 2005).</p> <p><i>Intermediate</i> – Consider locations for bicycle connections from the train station to north and for bicyclists along Cordova Road. Install bicycle crossing signs as necessary.</p> <p>Develop a city-wide bicycle plan, incorporating the current Santa Fe Bikeways Map, to improve connectivity to other paths and routes in Santa Fe. This includes identifying origins and destinations to define the needs for new paths or designated bicycle routes and crossing locations. Publish maps of future and existing routes and post bike route maps on key bike facilities.</p> <p>Where right-of-way does not allow for a designated bike lane, install “sharrows” to inform drivers of the presence of bicyclists and remind drivers and bicyclists to share the road.</p> <p><i>Long-term</i> – Provide designated bike lanes based on the city-wide bicycle plan.</p>	 <p>Photos above show where the bicycle trail crosses Alta Vista Street to the west of the train station. There are no pavement markings to designate the crossing and a warning sign is obstructed by railroad crossing devices.</p>



View of Cordova Road. Photo shows a bicyclist riding in road with traffic because there is no designated bike lane. This is an appropriate location for “sharrows”.

**Hazards along roadway**—there are bicycle hazards along the roadway, including longitudinal joints, drainage grates, diagonal track crossings (outside study area), and speed humps.

When hazards are present along the edge of the road, bicyclists may choose to ride further out in the travel lane, increasing the risk of conflict with vehicles.

*Intermediate* – For all designated bike routes, extend pavement to the edge of the curb during resurfacing projects to eliminate longitudinal edges. Where there is sufficient width, provide a designated bike lane. Where width is insufficient for a designated bike lane, consider installing “sharrows” as described in the previous issue.

Install bicycle-friendly grates and ensure the grates are level with the pavement surface.

Consider installing surface corrections to fill-in gaps in the railroad tracks where the tracks cross Cerrillos Road outside the study area.

Modify existing speed humps along the access to the train station so that humps do not cross the bicycle lane.



Photo shows where pavement deterioration presents a hazard to bicyclists due to the uneven surface.



View along access road to train station. Photo shows where a speed hump extends into the bicycle lane. This presents a hazard to bicyclists.

2. Geometric Issues		
Safety Issue	Suggested Improvements	Examples of Issues
<p><b>Trap lane</b>—the RSA team identified one location along Cordova where there is a “trap lane”. There are two eastbound through lanes along the segment to the west of St. Francis, but the right-most lane turns into a right-turn lane at the intersection and the left-most thru lane becomes the right thru lane at the intersection. Unfamiliar drivers may expect to continue straight from the right-most lane, but become trapped at the intersection as the lane changes to a right-turn only lane.</p>	<p><i>Short-term</i> – Install “Right lane must turn right” signage for eastbound traffic on Cordova Road at St. Francis Drive to warn motorists of the “trap lane”.</p>	 <p>View of Cordova Road looking eastbound toward the intersection of St. Francis. Photo shows where the eastbound thru lane becomes a right-turn lane near the intersection.</p>
<p><b>Wide turning radius</b>—the team identified relatively wide turning radii at many intersections within the study area. The safety concern is two-fold because wide radii allow vehicles to make higher-speed turning movements and also increase the crossing distance for pedestrians.</p>	<p><i>Intermediate</i> – Consider reducing turning radii at following intersections:</p> <ul style="list-style-type: none"> <li>• Cordova and St. Francis (there was one pedestrian crash and one bicycle crash at this location during the study period)</li> <li>• Cerrillos and Cordova (there was one pedestrian crash and one bicycle crash at this location during the study period)</li> <li>• Cordova and Luisa</li> <li>• Alta Vista and St. Francis (there were three pedestrian crashes and one bicycle crash at this location during the study period)</li> </ul>	 <p>View of intersection at St Francis and Cordova. Photo shows the relatively wide turning radius on the southwest corner.</p>

**Skewed offset intersection**—the intersection of Cordova Road and Marquez is skewed and offset from access points on the south side of Cordova Road. The intersection skew creates sight distance issues. This also creates additional conflict points because drivers can access Cordova Road at two locations in close proximity along Marquez. The current configuration of the west access point provides direct access from Marquez to the westbound left-turn lane on Cordova Road. It is also relatively close to the intersection at St. Francis Drive, which creates issues with weaving maneuvers to access the through and left-turn lanes.

There was one bicycle crash at this location during the study period.

*Short-term* – Consider conducting a formal traffic study to reduce conflicts at this location. The following intermediate/long-term options can be considered as part of the study.

*Intermediate/Long-term* – Consider closing one of the access points to Marquez.

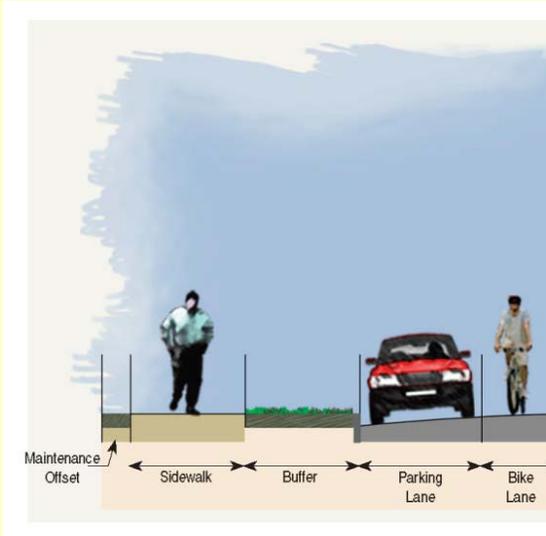
- Option 1: Close west access point to create a cul-de-sac near Maria’s and channel traffic to the east access point. The cul-de-sac could be designed to provide on-street parking for Maria’s while allowing westbound bicyclists to travel through the end of the cul-de-sac onto Cordova Road.
- Option 2: Close east access point across from the shopping entrance and redesign west access point to provide better access to through and left-turn movements at St. Francis Drive. The west access point could be moved further east (within the existing channelizing island) to provide direct access to the right-most through lane on Cordova Road. This will improve access to the through and left-turn movements at St. Francis Drive for drivers coming from Marquez. Also consider eliminating left-turns from Marquez onto Cordova Road. These vehicles can access Cordova Road via Don Diego Ave (further to the east).

There is also an opportunity to enhance pedestrian facilities (e.g., widening the sidewalk and creating public space) along the north side of Marquez as part of either option.



Aerial from Google Maps shows the skewed intersection of Cordova Road and Marquez where multiple access points create several conflicting movements.

### 3. Lack of Continuity and Connectivity for Pedestrians

Safety Issue	Suggested Improvements	Examples of Issues
<p><b>Gaps in sidewalk network</b>—there are gaps in the existing sidewalk network within the study area, including locations along Cerrillos Road, Cordova Road, Luisa Street, and Alta Vista Street. Specific gaps are shown in Figure 2. The gaps create safety issues for pedestrians, particularly those with mobility restrictions, because it may cause people to walk along the roadway where the surface is more traversable, putting them in conflict with vehicles.</p>	<p><i>Intermediate</i> – Fill-in gaps in the sidewalk network within the study area. Coordinate improvements with future developments where possible. Consider establishing a sidewalk zone system based on traffic speeds and volume detailing buffer widths, sidewalk clear zone widths, and frontage/maintenance zone widths.</p>  <p>Sketch shows the zones of a sidewalk network. A buffer zone may be a landscaped area or paved; parking lanes and bike lanes may also serve as buffers as they can provide separation between pedestrian and vehicular traffic.</p>	 <p>Photo shows a gap in the sidewalk, creating a discontinuity for those with mobility restrictions.</p>  <p>Photo shows an example of a gap in the sidewalk network where curb ramps were installed, but the sidewalk was not continued along Alta Vista Street. It is apparent that there is pedestrian activity in this area, evidenced by the “goat path”.</p>

	<p><i>Long-term</i> – Consider evaluating sidewalk connectivity and continuity outside of study area and fill-in identified gaps.</p>	 <p>Photo shows the west side of Cerrillos Road. There is obvious pedestrian activity and existing pedestrian crossings to access the west side of Cerrillos Road. However, there is not a sidewalk provided, creating a gap in the network.</p>
<p><b>Lack of buffer</b>—there is limited or no buffer provided between the sidewalk and travel way at locations within the study area.</p>	<p><i>Intermediate</i> – Determine opportunities for sidewalk setback (buffer) based on traffic volumes, existing development, and existing right-of-way. Several government buildings are located within the study area, which may present low-cost opportunities for sidewalk relocation due to availability of right-of-way.</p>	 <p>Photo shows a sidewalk along Cordova Road, which is adjacent to the travel lanes with no buffer.</p>

**4. Potentially Harmful Road User Behaviors**

Safety Issue	Suggested Improvements	Examples of Issues
<p><b>Unsafe pedestrian behavior</b>—some pedestrians are not obeying/observing the intersection pedestrian countdown signals. Other pedestrians are crossing at unmarked midblock locations throughout the study area, but particularly along Cordova Road. The location of the westbound bus stop along Cordova Road (east of Marquez) does not coincide with the existing midblock crossing, which is leading to pedestrians crossing outside of the marked midblock crossing.</p>	<p><i>Short-term and Intermediate</i> – Consider improving existing crossings to attract pedestrians (see Geometric Issues). Treatments are described in other areas throughout the report, including high-visibility continental pavement markings, reduced crossing distances, and reducing conflicting traffic flows.</p> <p><i>Intermediate</i> – Consider relocating bus stop along Cordova Road to coincide with existing midblock crossing.</p> <p>Identify pedestrian desire lines and consider providing additional midblock crossings along Cordova Road between St Francis and the railroad crossing.</p> <p>Consider installing a median island along Cordova Road (converting the existing two-way left-turn lane) to reduce left-turning movements at access points. This will also help to provide refuge for those pedestrians that choose to cross midblock.</p> <p>Consider education program to explain proper crossing behaviors and promote safe pedestrian crossings. This could be coordinated with other safety education, including safe driver and bicycle behaviors.</p>	 <p>Photo shows where three pedestrians are crossing midblock in between traffic, increasing the potential for conflict with vehicles.</p>  <p>Photo shows a pedestrian crossing the first half of the road (against the signal) while adjacent vehicles are turning left.</p>

**Unsafe bicyclist behavior**—the team observed unsafe behaviors by bicyclists, including riding across several lanes of traffic, riding along the railroad tracks to cross the road, and pushing their bike across the road at midblock locations rather than merging with traffic or crossing on foot at an intersection crossing.

*Intermediate* – Establish designated bike routes and post signs to clearly mark the routes. Consider aggressive education program. This may include developing and publishing bike route brochures and tourist information about safe bicycle riding behaviors. Bicycle education programs could be coordinated with other educational campaigns for pedestrians and drivers. Educational messages could be posted at kiosks at the train station and even on the trains if/when advertisements are permitted.



Photo shows example of unsafe behavior where a bicyclist dismounted and crossed midblock rather than merging with traffic and performing a left-turn maneuver.

**Failure to yield to pedestrians**—the team observed drivers failing to yield the right-of-way to pedestrians when turning. For example, drivers turning left during the permissive phase did not always yield to pedestrians crossing the side street. Also, there were some drivers that waited in the crosswalk to turn left and did not make the left-turn phase, so they continued to obstruct the crosswalk during the following phase.

Failure to yield was cited as the primary contributing factor for 30 percent of the pedestrian and bicycle crashes during the study period.

*Short-term* – Consider enhancing conspicuity of pedestrian crossings through use of signs and high-visibility pavement markings at signalized intersections.

*Intermediate* – Install bulb outs or reduce the turning radius to reduce the crossing distance for pedestrians.

Consider increasing the presence of law enforcement.

Consider an aggressive education program to inform both motorists and pedestrians of the rules of the road.



Photo shows an example of a driver obstructing the crosswalk, causing the pedestrians to walk outside the crosswalk and between queuing traffic.

**Failure to yield to bicyclists**—the team observed drivers failing to yield the right-of-way to bicyclists when turning.

For example, the RSA team observed a driver turning right into a shopping plaza along Cordova Road. The driver passed two bicyclists and turned directly in front of them to enter the plaza. The front bicyclist had to stop short to avoid hitting the vehicle and the second bicyclist nearly rear-ended the front bike.

Failure to yield was cited as the primary contributing factor for 30 percent of the pedestrian and bicycle crashes during the study period.

*Short-term* – Consider an aggressive education program to inform both motorists and bicyclists of the rules of the road.

*Intermediate* – Enhance conspicuity of bike lanes and facilities through use of “sharrows” and bike route signs and pavement markings.



View of entrance to shopping plaza along Cordova Road. Photo shows an example of a driver not yielding to bicyclists. The driver of the white truck passed the bicyclists and turned in front of them to enter the plaza; both bicyclists had to stop to avoid a collision.

5. Accessibility Issues		
Safety Issue	Suggested Improvements	Examples of Issues
<p><b>General accessibility issues</b>—the team identified several accessibility issues throughout the study area, including:</p> <ul style="list-style-type: none"> <li>• Curb ramps and truncated domes: curb ramps and tactile warnings are not provided at several crossings.</li> <li>• Obstructions: there are several obstructions on the sidewalk within the study area, including utility poles and cabinets.</li> <li>• Slopes: cross slopes at some driveways are steep, which may direct pedestrians into the street.</li> </ul>	<p><i>Short-term</i> – Perform a system-wide accessibility study.</p> <p><i>Intermediate</i> - Upgrade facilities as necessary based on the study.</p>  <p>Photo shows a recent sidewalk upgrade on Alta Vista Street. Pedestrians are provided a level area around the sloped driveway apron. Such designs provide improved accessibility for pedestrians.</p>	 <p>Photo shows a sidewalk along Cerrillos Road where there is no curb ramp or tactile warnings provided and a utility pole is creating an obstruction.</p>  <p>View of sidewalk along Cordova Road. Photo shows where the cross-slope of the sidewalk at the driveway</p>

		<p>is greater than 2 percent, which is a safety issue for those with mobility restrictions. The issue is compounded by the fact that there is no separation between the sidewalk and travel lane.</p>
<p><b>Location of push buttons</b>—push buttons are located on the opposite side of the signal pole at some locations. Pedestrians may not see the push buttons when they are located on the far side of the pole.</p> <p>The push button on the southwest corner of St Francis and Cordova is located behind signal post and difficult to access.</p>	<p><i>Short-term</i> – Relocate push-buttons toward pedestrian traffic and the sidewalk.</p> <p><i>Intermediate</i> – Review all signalized intersections within the City and ensure proper placement of push-buttons.</p>	 <p>Photo shows the location of the push-buttons on the southwest corner of St Francis and Cordova. The push-button on the back side of the signal pole is difficult to access, particularly for those with mobility restrictions.</p>

**Orientation of ramps and truncated domes**

—the team identified several curb ramps and domes that were not oriented in the direction of the pedestrian crossing. Instead, the ramps were oriented diagonally across the street, potentially leading pedestrians out of the crosswalk.

*Short-term* – Review standards for the orientation of curb ramps and truncated domes and modify as necessary to better align the ramps and tactile warnings with the crosswalks.



Photo shows curb ramps and truncated domes that are not aligned with the crossing. The ramps and tactile warnings are actually leading people into the adjacent travel lane.

**Maintenance of truncated domes**—there is a general lack of maintenance of truncated domes. The team identified several locations where the truncated domes were separating from the sidewalk surface. This creates a tripping hazard and eventually the truncated domes will be completely removed from the surface.

*Short-term* – Replace or repair damaged truncated domes.  
*Intermediate* – Review installation practices to identify opportunities to provide a better seal between the truncated domes and the sidewalk surface.



Photo shows a truncated dome that is separating from the surface of the sidewalk.

**Sidewalk maintenance**—the team identified several locations where the surface of the sidewalk made it impassable to some pedestrians. An example is the sections of sidewalk on the south side of Cordova Road, just east of Luisa Street (see photos, right).

*Short-term* – Perform a system-wide maintenance inventory of all pedestrian facilities. Develop a priority list of locations with existing deficiencies based on hazard potential.

*Intermediate* – Repave sidewalks and upgrade pedestrian facilities as necessary based on the inventory.



Photo shows a sidewalk along Cordova Road where the surface has deteriorated. The RSA team observed a person pushing another person in a wheelchair along this section; however, they had to push the wheelchair in the roadway due to the condition of the sidewalk surface.

6. Traffic Control Devices		
Safety Issue	Suggested Improvements	Examples of Issues
<p><b>Faded crosswalks-</b> the pavement markings are faded at many of the crossing locations. This reduces the conspicuity of the crossings, particularly at night.</p>	<p><i>Short-term</i> – Restripe faded crosswalk markings.</p>	 <p>Photo shows an example of a crossing at the intersection of Alta Vista and St. Francis that is faded and indirect.</p>
<p><b>Indirect crosswalks</b>—the team identified one location where the crosswalk did not follow a direct path across the intersection (see photo, right). This not only increases crosswalk length, increasing exposure of pedestrians, but it also is difficult for pedestrians with visual impairments to follow the intended crosswalk path.</p>	<p><i>Intermediate</i> – Reconfigure indirect crosswalks repainting the crosswalk straight across the intersection or placing a refuge island in the median with tactile warnings (truncated domes) to direct pedestrians with limited vision along the correct path.</p>	 <p>Photo shows a pedestrian/bicycle crossing along the railroad tracks. There is a sign telling pedestrians and bicyclists to look both ways before crossing, but no gates to prevent pedestrians with limited vision from crossing at the tracks.</p>
<p><b>Traffic control devices at railroad crossings</b>—the design of these crossings is critical, as pedestrian/train collisions typically result in severe or fatal injuries. At-grade crossings with multiple tracks can present additional dangers to pedestrians who may assume that a warning has been deployed for a train that is currently stopped on one of the tracks when in reality, a second train is also coming on another track. Currently, there are signs installed near the train station and along the railroad tracks to alert pedestrians and bicyclists to the presence of trains.</p>	<p><i>Intermediate-</i> Consider including a gate assembly that can be added to the existing signal that crosses the pedestrian path from both directions. For more information on pedestrian crossings of rail facilities see Federal Highway Administration’s <i>Railroad-Highway Grade Crossing Handbook</i> and Federal Railroad Administration’s <i>Compilation of Pedestrian Safety Devices In Use at Grade Crossings</i>.</p>	

**Pedestrian intervals**—the pedestrian intervals are relatively short at the intersection of St Francis and Cordova. The team observed several instances where pedestrians began walking at the start of the walk interval and barely made it to the other side by the end of the clearance interval.

*Intermediate* – Review pedestrian clearance intervals, particularly at St Francis and Cordova, to ensure that pedestrians have sufficient time to cross. At locations where pedestrian volumes are greater, consider providing more than the minimum to allow larger groups of pedestrians to cross per phase.



Photo shows pedestrians crossing St Francis along Cordova with just 1 second left on the countdown signal.

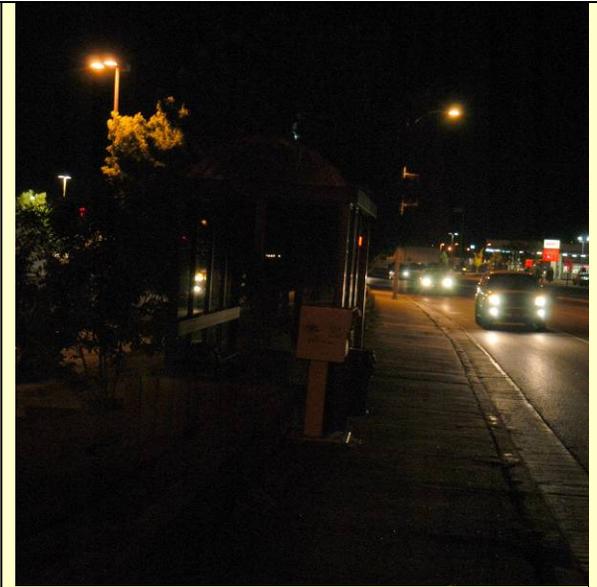
7. Sight Distance Obstructions		
Safety Issue	Suggested Improvements	Examples of Issues
<p><b>Trees, walls, and snow</b>—the team identified sight obstructions, including trees and walls near access points throughout the study area. The trees and walls limit sight distance for drivers, causing them to move forward into the pedestrian zone to get a better view of traffic. This also causes drivers to focus more carefully on oncoming vehicles and less on pedestrians.</p> <p>Snow removal from the roads during winter months creates sight distance issues for drivers and obstructions for pedestrians as the snow is piled on the sidewalk. The team did not observe this issue, but relied on input from local enforcement.</p>	<p><i>Short-term</i>- Trim trees to improve sight distance, especially along Cordova Road.</p> <p><i>Intermediate</i> – Identify opportunities to improve sight distance at access points by removing/relocating trees and modifying existing walls.</p> <p>Identify opportunities to provide a wider buffer between the roadway and sidewalk to allow for snow storage.</p>	 <p>View of access point along Cordova Road. Photo shows where trees and a wall are obstructing sight distance for drivers. The issue is compounded by the horizontal curve.</p>

8. Insufficient Lighting		
Safety Issue	Suggested Improvements	Examples of Issues
<p><b>Unlit bulbs</b>—the team identified unlit bulbs within the study area, which reduces the effectiveness of existing lighting.</p> <p>One unlit bulb was noted at the intersection of St Francis and Cordova.</p>	<p><i>Short-term</i> – Identify and replace unlit bulbs.</p>	<p>This cell is intentionally left blank.</p>
<p><b>Gaps in lighting</b>—there are gaps in the lighting along Alta Vista, St Francis, and Cordova. Specific gaps on Cordova occur near Maria’s restaurant, the midblock crossing, and the railroad crossing.</p> <p>The crash data analysis indicated that 40 percent of the pedestrian and bicycle crashes occurred at night.</p> <p>There is currently adequate lighting at the train station, but no lighting along the access road to the train station.</p> <p>There is also limited lighting at the midblock crossing along Cordova Road, reducing the visibility of pedestrians and the crossing.</p>	<p><i>Intermediate</i> – Consider enhancing lighting along access to train/bus station. Also consider enhancing lighting at existing midblock crossing on Cordova Road to increase the conspicuity of the crossing and pedestrians.</p> <p>Fill-in gaps in lighting along Alta Vista, St Francis, and Cordova.</p>	 <p>The midblock crossing on Cordova Road has no lighting illuminating the crossing.</p>

**Light along one side of street**—lighting is provided only along one side of the street within the study area on Cordova, St Francis, and Alta Vista. The lighting is not sufficient to illuminate both sides of the road. Furthermore, many bus stops are unlit.

The crash data analysis indicated that 40 percent of the pedestrian and bicycle crashes occurred at night.

*Intermediate* – Consider installing lighting along both sides of Cordova Road where pedestrian activity is prevalent at night. Increase light levels on all streets to enhance visibility of pedestrians and bicyclists.



Lighting at this bus stop on St. Francis Drive is poor.

9. Lack of Access Management		
Safety Issue	Suggested Improvements	Examples of Issues
<p><b>Frequency and width of access points</b>—the RSA team identified access management as an overall issue through the study area. Specifically, several properties have multiple access points and some access points are relatively wide. A wide driveway with no defined entry or exit points exposes pedestrians on the sidewalk to interference from drivers accessing the commercial premises over a large, undefined area. Drivers can enter or leave the driveway at a shallow angle, and consequently at a high speed, increasing the risk of collision with pedestrians on the sidewalk or in the parking area. Multiple access points increase exposure for pedestrians traveling along the sidewalk and increases the opportunity for conflict.</p>	<p><i>Short-term</i> – Consider developing an access management plan to support decisions to restrict access points.</p> <p><i>Long-term</i> – Consider reducing the width of excessively wide access points. This will help to reduce the speed of vehicles turning into and out of the access points and reduce exposure for pedestrians. Look for opportunities to consolidate access points, especially as redevelopment occurs.</p>	 <p>Photo shows a wide access point along Luisa Road, increasing exposure and opportunities for conflict between pedestrians and vehicles.</p>
<p><b>Unrestricted left-turns from businesses</b>—drivers are allowed to turn left into and out of access points along Cordova Road. There are several access points along this road in close proximity and the team observed pedestrians crossing at several unmarked midblock locations. The unrestricted left-turns create several potential conflict points and increase risk for pedestrians crossing midblock.</p> <p>There were two pedestrian crashes and three bicycle crashes along Cordova Road during the study period.</p>	<p><i>Intermediate</i> – Consider installing a median island along Cordova Road, restricting access to right-in-right-out only. There is currently a two-way left-turn lane along this section that could be converted to a median island. A median island will also provide refuge for pedestrians crossing at midblock locations. Median islands have been shown to reduce pedestrian crashes by 40% (<i>Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations</i> (Zegeer et al, 2005)).</p>	 <p>View of cross-section of Cordova Road. Photo shows the unrestricted access to properties along Cordova Road and the existing right-of-way within the turn lane, which provides an opportunity to install a median island.</p>

**Angle parking interferes with sidewalk**— angle parking that leads directly back to the sidewalk creates a significant safety issue for pedestrians. Not only is this a direct conflict point between vehicles and pedestrians, but it is difficult for drivers to see pedestrians as they back out of the space.

*Short-term* – identify and modify parking spaces that conflict with the sidewalk. One option to modify parking is to make the spaces parallel to the sidewalk and leave a buffer between the parking and the sidewalk.



View of parking lot along Luisa Road. Photo shows where angle parking leads directly onto the sidewalk as vehicles back out of the space.

10. Existing Midblock Crossings		
Safety Issue	Suggested Improvements	Examples of Issues
<p><b>Location and conspicuity of midblock crossing</b>—there is a midblock crosswalk on Cordova between Marquez and Luisa Street. The team identified several safety concerns with this crosswalk, including:</p> <ul style="list-style-type: none"> <li>• Location: the crosswalk is located just west of an access point to a shopping plaza. Vehicles turning right out of the plaza are looking left for a gap in traffic and are not looking for pedestrians in the crosswalk.</li> <li>• Design: The crosswalk is painted with traditional markings (2 parallel lines). There are other crosswalk marking designs that enhance the conspicuity for drivers.</li> <li>• Flashing beacons: there are flashing beacons to enhance the conspicuity of the crossing. The beacons are, however, located well in advance of the crossing and are operated on a continuous basis, reducing their effectiveness.</li> <li>• Location of bus stops: Bus stops are located along Cordova on both sides of the street. While the eastbound stop is located at the crossing, the westbound stop is located past the crosswalk, increasing the likelihood of midblock crossings outside of the designated crossing location.</li> </ul>	<p><i>Short-term</i> – Upgrade the midblock crosswalk marking from traditional style to continental or ladder type for better visibility.</p> <p>Upgrade pedestrian crossing signs with higher grade sheeting to improve visibility and conspicuity.</p> <p>Consider relocating bus stop closer to the crossing to “capture” pedestrian trips going to and from the bus stop.</p> <p><i>Intermediate</i> – Relocate the existing flashing beacons to the crossing location. Consider the use of pedestrian-activated beacons rather than continuous flash.</p> <p>Install a raised median at the crossing to provide a refuge for pedestrians.</p> <p><i>Long-term</i> – Consider installing a raised median through this section of Cordova, replacing the two-way left-turn lane as discussed previously.</p>	 <p>View along Cordova Road toward the midblock crossing. Photo shows a pedestrian crossing within the crosswalk, but the markings are not visible even from this close distance. There is also a vehicle turning right out of an access point and the driver is looking to the left for a gap in traffic and is unaware of the crossing pedestrian.</p>

## Opportunities Beyond Engineering

Public safety can be improved through education and enforcement measures as well as engineering. There are at least two opportunities to improve safety through these measures.

### Public Outreach:

*Education:* The Santa Fe Police Department has provided educational messages, including bicycle safety, to the community. These educational efforts should be continued and other opportunities should be identified to include youth and adults. Future education campaigns could include information on pedestrian safety in addition to the bicycle safety messages.

### Enforcement:

*Santa Fe Police Department:* The Santa Fe Police Department was represented on the RSA team and helped to identify opportunities for increased enforcement. Enforcement was not identified as a primary measure for any of the locations within the study area, but has been used to provide warnings and citations to pedestrians, bicyclists, and drivers for unsafe behaviors. There may be opportunities to provide spot enforcement to continue to discourage risky behaviors.

For more information related to education and enforcement, look at the education and enforcement measures included in the following publications:

How to Develop a Pedestrian Safety Action Plan (FHWA-SA-05-12) <http://drusilla.hsrb.unc.edu/cms/downloads/howtoguide2006.pdf>

A Resident's Guide for Creating Safe and Walkable Communities (FHWA-SA-07-016)

[http://safety.fhwa.dot.gov/PED\\_BIKE/ped/ped\\_walkguide/residentsguide.pdf](http://safety.fhwa.dot.gov/PED_BIKE/ped/ped_walkguide/residentsguide.pdf)

## 4. Conclusions

---

The objective of this study was to complete a pedestrian RSA for the City of Santa Fe, New Mexico. The study area included the circuit from Cerrillos Road along Alta Vista Street, Luisa Street, and Cordova Road. The RSA team investigated existing safety issues, but also noted several positive safety features throughout the study area. Based on field observations, 'Lack of Continuity and Connectivity for Bicyclists' was determined to be the most critical issue in the study area. The remaining nine safety issues are ranked below 'Lack of Continuity and Connectivity for Bicyclists' from most to least critical, although many were considered nearly equal in importance. Suggestions for mitigating issues have been identified and are described in this report.

Beyond engineering measures, road safety can be improved through education and enforcement. These measures are also discussed in the report.

The owners are invited to consider the suggested changes. To complete the RSA process, the owners may prepare a short written response to the issues and options outlined in this report. The response letter should identify the actions that will and will not be taken as well as the reason for those suggestions that are not implemented.

## **5. References**

---

- 1) National Highway Traffic Safety Administration (NHTSA), National Center for Statistics and Analysis. *Traffic Safety Facts*. National Highway Traffic Safety Administration. Washington, DC, 2008.
- 2) Zegeer, C.V., J.R. Stewart, H.H. Huang, PA. Lagerwey, J. Feaganes, and B.J. Campbell. “Safety Effects of Marked versus Unmarked Crosswalks at Uncontrolled Locations: Final Report and Recommended Guidelines”. Federal Highway Administration, FHWA–HRT–04–100, McLean, VA, 2005.

## Appendix A: Crash Details and Crash Diagram

SREET 1	STREET 2	SEVERITY	LOCATION	TYPE	LIGHT	WEATHER	PRIMARY FACTOR	DATE	DAY
CORDOVA RD	CAMINO	PDO	Non-Intersection	Bike	Dark (lit)	Rain	Failure to Yield	6/30/2004	Wed
CORDOVA RD	CERRILLOS RD	PDO	Non-Intersection	Bike	Day	Clear	Driver Inattention	6/13/2008	Fri
CORDOVA RD	CERRILLOS RD	B-Injury	Non-Intersection	Ped	Day	Clear	Failure to Yield	6/5/2006	Mon
CORDOVA RD	ST FRANCIS DR	PDO	Non-Intersection	Bike	Day	Clear	Failure to Yield	9/2/2004	Thur
ST FRANCIS DR	CORDOVA RD	A-Injury	Non-Intersection	Ped	Day	Clear	Alcohol	1/8/2008	Tue
ST FRANCIS DR	ALTA VISTA ST	C-Injury	Non-Intersection	Ped	Dark (lit)	Clear	Alcohol	9/7/2007	Fri
ST FRANCIS DR	ALTA VISTA ST	C-Injury	Intersection	Ped	Day	Clear	Traffic Control Out	8/18/2005	Thur
ST FRANCIS DR	ALTA VISTA ST	B-Injury	Intersection	Bike	Day	Clear	Improper Lane Change	6/9/2004	Wed
ST FRANCIS DR	ALTA VISTA ST	A-Injury	Non-Intersection	Ped	Dark (unlit)	Rain	Alcohol	2/11/2005	Fri
PACHECO ST	ST FRANCIS DR	A-Injury	Intersection	Ped	Dark (lit)	Rain	Ped Error	10/27/2004	Wed

