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WARM SPRINGS COMMERCIAL CORRIDOR SAFETY PLAN

Prepared for:

**Oregon Department of
Transportation & The
Confederated Tribes of
Warm Springs**

Prepared by:

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Final Report

Warm Springs Commercial Corridor Safety Plan

Warm Springs, Oregon

Prepared For:

Oregon Department of Transportation Region 4

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Section 1 Introduction

INTRODUCTION

This section provides an overview of the project purpose, Plan organization, study area, process used to develop the Plan, and foundational elements to inform the Plan (e.g., reviewing previous analysis and public engagement).

PROJECT DESCRIPTION

The Warm Springs Commercial Corridor Safety Plan identifies and documents recommended programs, policies, and projects to improve safety performance on and around the Warm Springs Commercial Corridor across multiple modes of transportation. To develop these recommendations, Kittelson & Associates, Inc. (KAI) worked with the Oregon Department of Transportation (ODOT) and the Confederated Tribes of Warm Springs (CTWS). The recommended projects were identified and informed by the existing transportation system conditions, future analysis, and input received from the public and project stakeholders.

This Plan documents the approach, analysis, and recommended projects. There is also a standalone Executive Summary available at www.ctwssafetyplan.com that summarizes the core elements of the Plan.

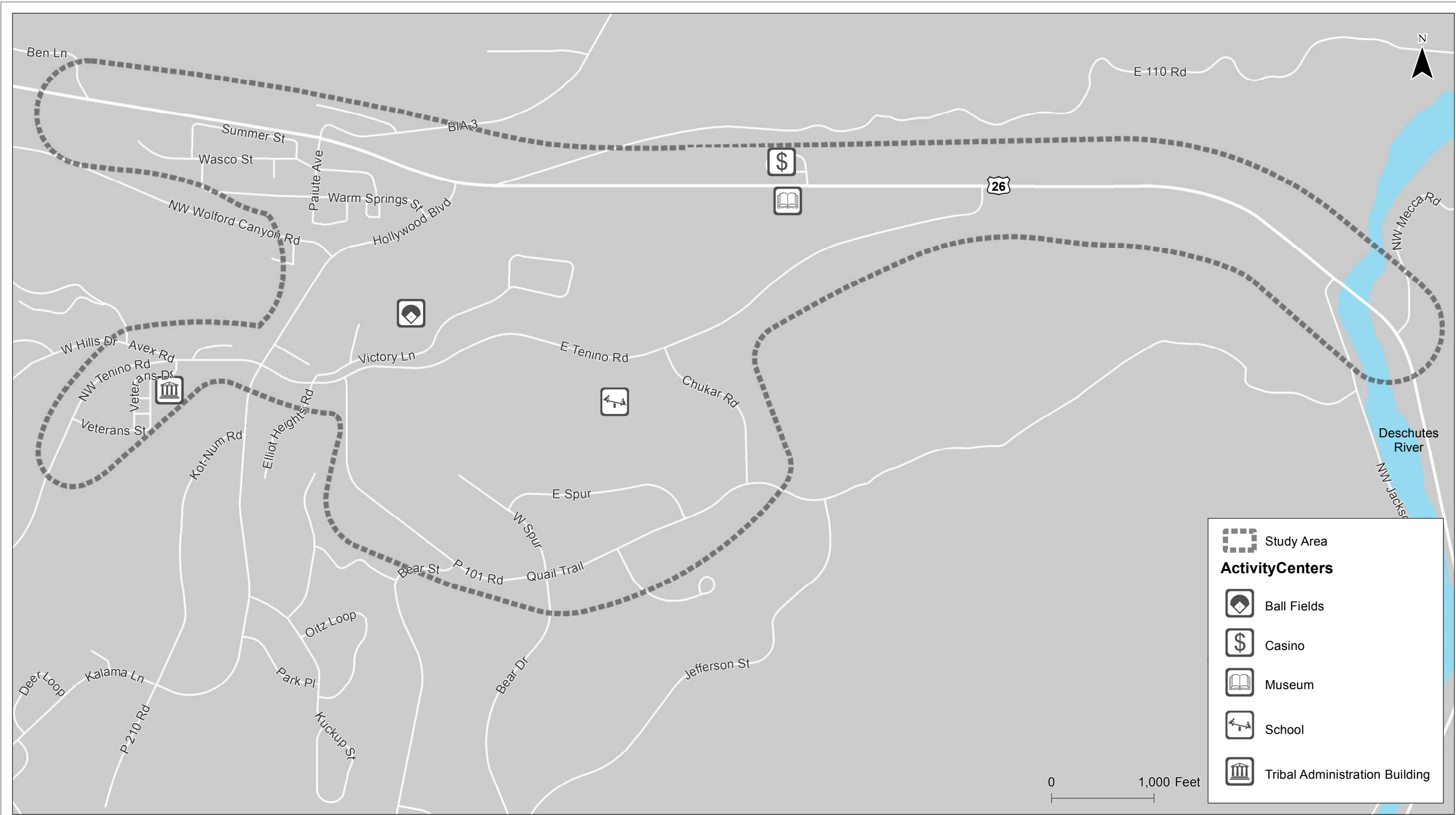
Information in this Plan is organized into the following sections:

- **Section 1 Introduction** – Discusses the project description, study area, previous plans and analysis that informed this work; public involvement during the Plan’s development; goals of this Plan; and the analysis methodologies used to inform the Plan content.
- **Section 2 Existing and Future Opportunities** - This section summarizes the existing and future conditions and documents the opportunities to improve safety within the study area.
- **Section 3 Potential Treatments** - This section identifies a set of potential treatments, summarized in a Project Toolbox. The Project Toolbox is a collection of possible treatments that could be used to improve safety performance and reduce risk.
- **Section 4 Recommendations** – This section identifies the prioritized project recommendations for each location within the study area as well as the programmatic and policy recommendations.

STUDY AREA

The Plan includes an approximately three mile section of US 26 from the intersection at Paiute Avenue (BIA 3) to the southeastern boundary of the reservation at the Deschutes River crossing and nearby streets, as illustrated in Figure 1. The Plan also includes portions of the Warm Springs community located south of the highway, including the downtown area and the area surrounding the school as defined by the project study area boundary.

US 26 is the primary east-west connection for the local Warm Springs community and serves as a major connection between Central Oregon and the Portland area. The Plan focuses on identifying opportunities to improve safety within the study area, evaluating potential improvements, and prioritizing recommendations for implementation. Many of the treatments recommended are potential systemic safety treatments that may be applied throughout the Reservation where similar safety issues are identified.



Study Area
Warm Springs, Oregon

Figure
1

PROCESS TO DEVELOP PLAN

The Commercial Corridor Safety Plan was completed through a data-informed and public-input driven process. Technical analysis informed the information and discussions at the Public Advisory Committee (PAC) meetings and Safety Charrette. The technical analysis provided an overview of traffic patterns, reported crash history, and geometric conditions that may affect crash risk. The input from the public helped focus the technical analyses scope and refinement of initial findings to arrive at the final recommendations.

The Plan was developed through the following general steps:

1. KAI obtained traffic volumes from the 2014 Transportation Plan and 2016 Casino Traffic Monitoring Study for the priority intersections and study segments, as available. These priority intersections and road segments included:
 - US 26 / Paiute Avenue (BIA 3)
 - US 26 / Hollywood Boulevard
 - US 26 / Indian Head Casino (Museum at Warm Springs) Driveway
 - US 26 / Tenino Road
 - US 26 throughout the study area
 - Hollywood Boulevard throughout the study area
 - Tenino Road between US 26 and the Tribal Administration Building
 - Quail Trail Road between Chukar Road and Tenino Road
 - Chukar Road between Tenino Road and Quail Trail Road
 - Paiute Avenue between Warm Springs Street and US 26
 - Warm Springs Street between Paiute Avenue and Hollywood Boulevard
2. KAI summarized planned projects from the 2014 Transportation Plan.
3. KAI obtained reported crashes from ODOT's crash database for the most current complete five year period.
4. KAI completed a crash analysis to identify trends in severity, crash types, or other crash characteristics that may identify potential safety issues in the study area.
5. KAI applied the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual (HSM), First Edition, Part C predictive methods to the priority roads and intersections within the study area to estimate expected crash frequency based on traffic and roadway characteristics.
6. KAI identified a list of potential safety issues for the study area based on the crash analysis, HSM analysis, and public input.
7. KAI evaluated potential countermeasures based on their documented effectiveness through crash modification factors and relative cost.
8. KAI prioritized recommendations based on their ability to meet the Plan's goals, input from the PAC, and relative ease of implementation.
9. KAI compiled the final recommendations into the Warm Springs Commercial Corridor Safety Plan.

PROJECT GOALS

Project goals were identified with input from the PAC. These goals were used to guide the development of The Plan and prioritize projects, policies, and programs.

The Project goals consist of the following:

- Provide a transportation system that promotes the safety performance of current and future travel modes for each user.
- Promote a transportation system that facilitates the use of US 26, Hollywood Boulevard, Tenino Road, Paiute Avenue, and Warm Springs Street for safe and efficient travel while providing safe multimodal corridors and connections to key destinations in the community.
- Reduce the frequency and severity of crashes for each user.
- Evaluate potential roadway geometry modifications to improve roadway safety.
- Identify educational and enforcement strategies to address crash trends and risks.

The CTWS in collaboration with ODOT will be working towards implementing this Plan's recommendations to achieve the goals above.

FOUNDATIONAL ELEMENTS TO INFORM THE PLAN

Previous Plans and Analysis

The CTWS have completed a number of recent planning efforts that are relevant to the study area. This Commercial Corridor Safety Plan builds upon these previous efforts, considering the identified needs and recommendations from each document. KAI reviewed the following documents:

1. Highway 26 Warm Springs Transportation Plan (1997)
2. The People's Plan – Comprehensive Plan for Year 2020 (1999)
3. Oregon Downtown Development Association – Resource Team Report for Warm Springs, Oregon (2002)
4. Warm Springs Local Street Network & Campus Area Plan (June 2005)
5. Warm Springs Downtown Development Plan (2005)
6. Integrated Resources Management Plan (2012)
7. Warm Springs Town Center – Property Summary (2012)
8. Warm Springs Reservation Transportation Plan (2014)
9. Traffic Monitoring Analysis for Indian Head Casino (2016)

Technical Memorandum #1 (Appendix 1) provides a summary of each of these documents. Key findings from the work above that directly informed this Plan included:

- The 1997 Highway 26 Warm Springs Transportation Plan identified the need for bicycle/pedestrian connections to Highway 26.

- The Warm Springs Local Street Network and Campus Area Plan (2005) provided guidance for the development of the local street system and trail system in the Campus Area, including several recommendations within the study area. The 2005 Plan recommended improvements to the intersection of US 26/Paiute Avenue and Hollywood Boulevard/Tenino Road. In addition, the 2005 Plan recommended adding and upgrading sidewalks on Warm Springs Street and Wasco Street and improving the separated pathways in the area.
- The 2014 Warm Springs Reservation Transportation Plan identified several trail connections needed in the vicinity of the new school and areas of residential growth located south of Quail Trail.
- The Traffic Monitoring study completed for the Indian Head Casino in 2016 found that the intersection of the Indian Head Casino/US 26 did not meet warrants for a traffic signal during weekday traffic conditions.

Public Involvement

The public involvement process included a public meeting (safety charrette) as well as guidance from a Public Advisory Committee (PAC). The following sections further describe the public involvement process. PAC meeting summaries and attendance lists are provided in Appendix 2.

Public Advisory Committee

The PAC guided the project through a series of three meetings to review and discuss technical analyses. The PAC was comprised of stakeholders representing a wide range of parties with interests in the study area, including public works members, public safety representatives from the CTWS, residents, and business owners.

The first meeting was held on August 18, 2016. During the first meeting, KAI presented an overview of the project goals and objectives and the proposed study approach. The PAC provided input about perceived safety issues within the study area using aerial maps, as shown in the photo in Figure 2.

The second meeting was held on September 13, 2016. During this meeting, KAI provided an overview of the existing conditions analysis results and the opportunities to improve safety based on technical analysis.

The third meeting was held on November 17, 2016. During this meeting, KAI presented and gathered input from the PAC on draft recommendations and priorities. KAI incorporated the discussions and input received from the November 17th PAC meeting in the revised recommendations presented in this Plan.



Figure 2: Public Advisory Committee Meeting

Public Meeting – The Safety Charrette

A Safety Charrette with the general public was held on September 13th, 2016, following the second PAC meeting. The Safety Charrette provided an opportunity for the general public to learn about the project and share their thoughts on potential recommendations and outcomes of the Plan. It was conducted in an interactive format, intended to allow participants to share thoughts about where they believed specific treatments were needed. Participants were provided a toolbox of treatments and encouraged to indicate locations where they recommended implementation of the treatments.

Section 2 Existing and Future Opportunities

EXISTING AND FUTURE OPPORTUNITIES

This section summarizes the existing and future conditions analyses and documents opportunities to improve safety within the study area. Topics discussed below include demographics and land use for the area, traffic volumes and roadway characteristics, descriptive crash statistics, and documented safety performance within the study area.

DEMOGRAPHICS

The Warm Springs community population consists of the Confederated Tribes of Warm Springs.

Demographic information provided in the 2014 Transportation Plan indicated the total Tribal Enrollment was 4,760 in 2010. Of these, 29.5 percent (1,402 people) were under the age of 16, and 2.4 percent (113 people) were age 65 and over. The majority of the population (68.1 percent) was between the ages of 16 and 64.

In 2010, the total workforce for the reservation included 2,999 employees, with an 8 percent unemployment rate. The major employers in the reservation included the Kah-Nee-Ta Resort and the Indian Head Casino. Twenty-one percent of the population was reported to have earnings below the poverty level.

The 2014 Transportation Plan provided housing data from 2003. As of 2003, there were a total of 1,037 occupied homes in Warm Springs, primarily located in the Warm Springs community area. Approximately 300 homes were planned for construction by 2014.

LAND USE

The study area includes important corridors used by community members traveling between residential areas and employment/service locations. Casino and former mill site workers frequently walk along US 26 to access their jobs. US 26 provides the only connection between these employment locations and Hollywood Boulevard/Tenino Road intersection, which provides access to the majority of the residential areas. The separation between the residential areas and employment centers of the community can be seen in the existing zoning map shown in Figure 3.

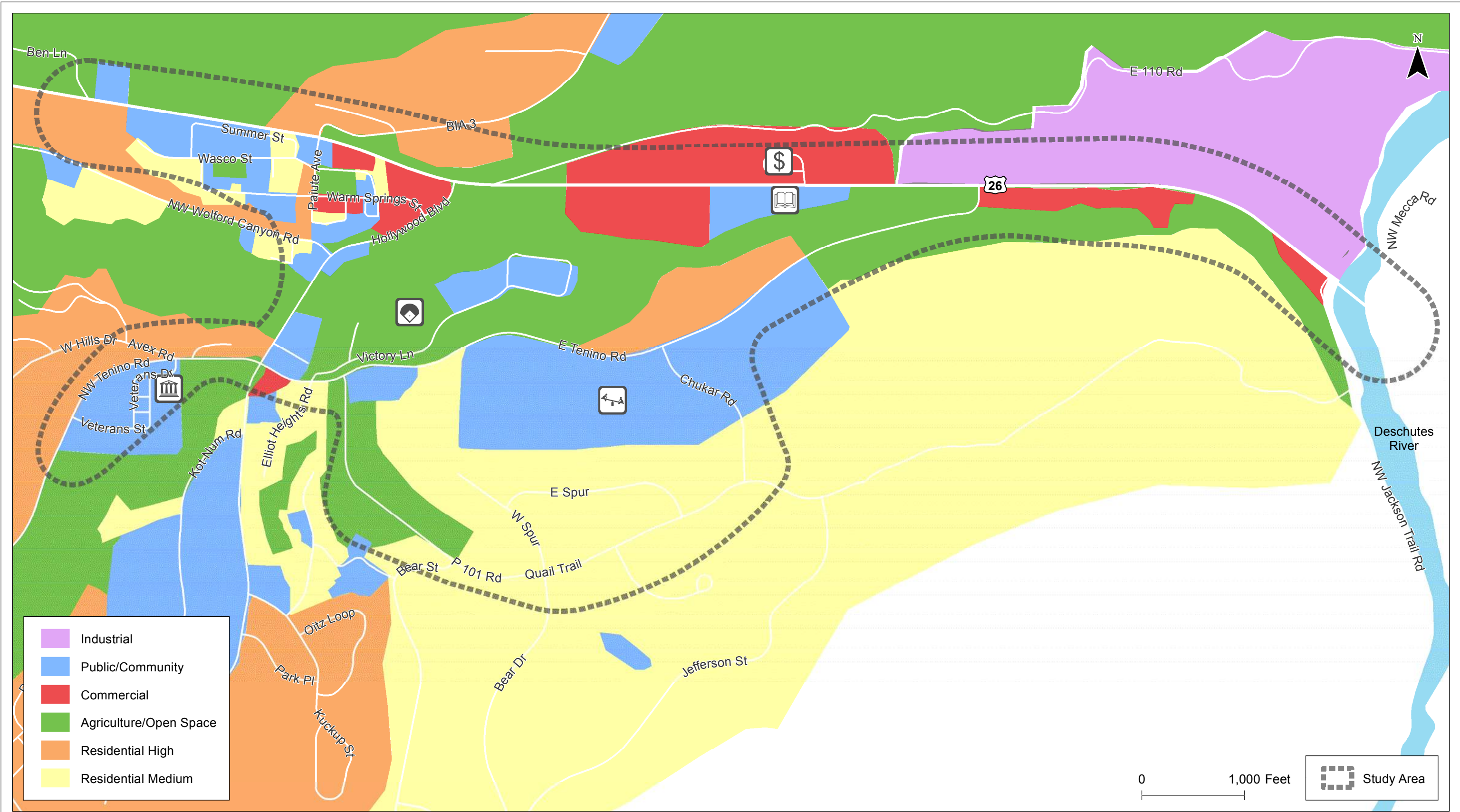
The residential areas (shown by orange and yellow in Figure 3) are heavily concentrated south of the core areas. There has been recent residential growth south of the Quail Trail area, and future residential development is identified for areas near Chukar Road and Tenino Road.

The commercial zones (in red) are scattered throughout the study area, primarily along US 26. The commercial zones on the western end of the map are located within the “Campus Area.” This area has been the subject of multiple planning efforts and is intended for redevelopment in the future. The center of the map contains the Indian Head Casino, one of the major employment centers for the community. The commercial area on the east end of the map includes a restaurant adjacent to the Deschutes River as well as vacant land available for development east of Tenino Road.

Within the study area, industrial zoning (purple) is primarily the former mill site which closed in 2016. The future use of this site is unknown at this time.

The public/community areas, shown by blue in the figure, include the local school, Museum at Warm Springs, Community Center, Tribal Administration building, and other supporting services.

The land use map highlights the need for an improved pedestrian/bicycle system to connect residential and employment locations on the north and south sides of US 26. In addition, the existing Indian Head Casino, which is a key employment center, and the potential for future redevelopment on the eastern end of the study corridor highlight the need for improved east-west connections for multimodal transportation.



Existing Zoning Map
Warm Springs, Oregon

Figure
3

ROADWAY AND TRAFFIC CONDITIONS

This section provides an overview of roadway conditions and traffic conditions within the study area.

US 26 Corridor Characteristics

US 26 is a statewide highway that provides a major connection between Central Oregon and the Portland area. It is a two-lane Rural Principal Arterial within the study area with turn lanes provided at the major intersections. There are no sidewalks or bicycle lanes provided within the study corridor. The posted speed limit throughout the study corridor is 45 miles per hour (mph). However, the speed limit increases to 55 mph immediately beyond the study area boundaries at approximately mileposts 102.8 and 106.5.

ODOT traffic volumes indicate a total (eastbound and westbound) annual average daily traffic (AADT) volume of 4,500 vehicles per day (veh/day) on US 26 west of Paiute Avenue and an AADT of 7,200 veh/day east of Paiute Avenue in 2015.¹ The truck percentages vary from 25.9% west of Paiute Avenue to 18.7% east of Paiute Avenue. ODOT's projected volumes for the corridor show the segment between Paiute Avenue and Hollywood Boulevard with higher general ADT projections in 2025 than other sections of the corridor, likely due to local traffic traveling north-south through Warm Springs and connecting to BIA 3.¹

Traffic counts were collected as part of the Indian Head Casino Traffic Monitoring Report. These volumes were collected between a Thursday and Sunday in August 2015 and therefore reflect peak season traffic volumes.² These counts revealed traffic volumes substantially higher than the AADT for the corridor. The ADT on Sunday was 12,712 vehicles/day on US 26, and the ADT recorded on Friday was 13,145 vehicles/day for US 26.

Traffic volumes were also obtained from the 2014 Warm Springs Transportation Plan for the major intersection approaches when possible. This data is summarized below.

- BIA 3: 2008 AADT: 5,900 veh/day
- Hollywood Boulevard: 2010 AADT: 6,637 veh/day
- Jackson Trail Road: 2008 AADT: 317 veh/day
- Tenino Road: 2008 AADT: 4,018 veh/day
- Paiute Avenue: 2008 AADT: 998 veh/day
- Warm Springs Street: 2008 AADT: 2,849 veh/day
- Quail Trail: 2010 AADT: 2,877 veh/day
- Casino/Museum Driveway: 1,400 veh/day (obtained from the Casino Traffic Monitoring Study)

¹ Source: ODOT's TransGIS

² ADT data from the Automated Traffic Recorder (ATR) 16-006, located at MP 113.17 on US 26, approximately 8 miles east of the study area, shows the peak traffic volumes occur between the months of June and August.

Pedestrian counts were conducted at the intersection of US 26/Casino/Museum driveway during the Casino Traffic Monitoring study. The number of pedestrians recorded at the intersection is summarized in Table 1. Seasonal patterns for pedestrians are unknown. The pedestrian counts do not indicate whether the pedestrians reflect commuter or recreational pedestrian traffic.

Table 1. Observed Pedestrian Crossing Volumes at US 26/Casino/Museum Driveway

Count Day (8/7/15 to 8/9/15)	Pedestrian Crossings of US 26	Total Pedestrian Volume (All Approaches)
Thursday	7	10
Friday	4	11
Saturday	6	18
Sunday	5	9

Off Highway Roadway Characteristics

Table 2 provides a summary of the major roads within the study area that are located off of the US 26 route. The roads are generally lower speed roads that serve as access to local destinations or residences. Some of the roads, for example, Hollywood Boulevard, serve as key connecting roadways for the community with higher traffic volumes.

Table 2. Roadway Characteristics of Non-Highway Roads

Road Name	Limits	Number of Lanes	Posted Speed Limit	Bike Lanes	Sidewalks	Traffic Volumes*
Paiute Avenue	US 26 to Warm Springs Street	2	15 mph	No	Curb tight on both sides of the road (except east side from US 26 to Wasco Street)	998 veh/day
Warm Springs Street	Hollywood Boulevard to Paiute Avenue	2	15 mph	No	Curb tight on both sides of the road	2,839 veh/day
Hollywood Boulevard	Tenino Road to US 26	2	30 mph	No	Shared-use path on east side (Tenino Road to Warm Springs Street)	6,637 veh/day
Tenino Road	US 26 to Hollywood Boulevard	2	25 mph (20 mph in school zone)	No	Curb tight sidewalk on south side (School to Hollywood Boulevard)	4,018 veh/day
Quail Trail	Chukar Road to Tenino Road	2	25 mph	No	None	2,877 veh/day
Chukar Road	Tenino Road to Quail Trail	2	Not posted	No	Shared-use path on west side	--

*Traffic volumes reflect AADT volumes obtained from the 2014 Warm Springs Transportation Plan, as documented on the previous page.

Pedestrian and Bicycle Facilities

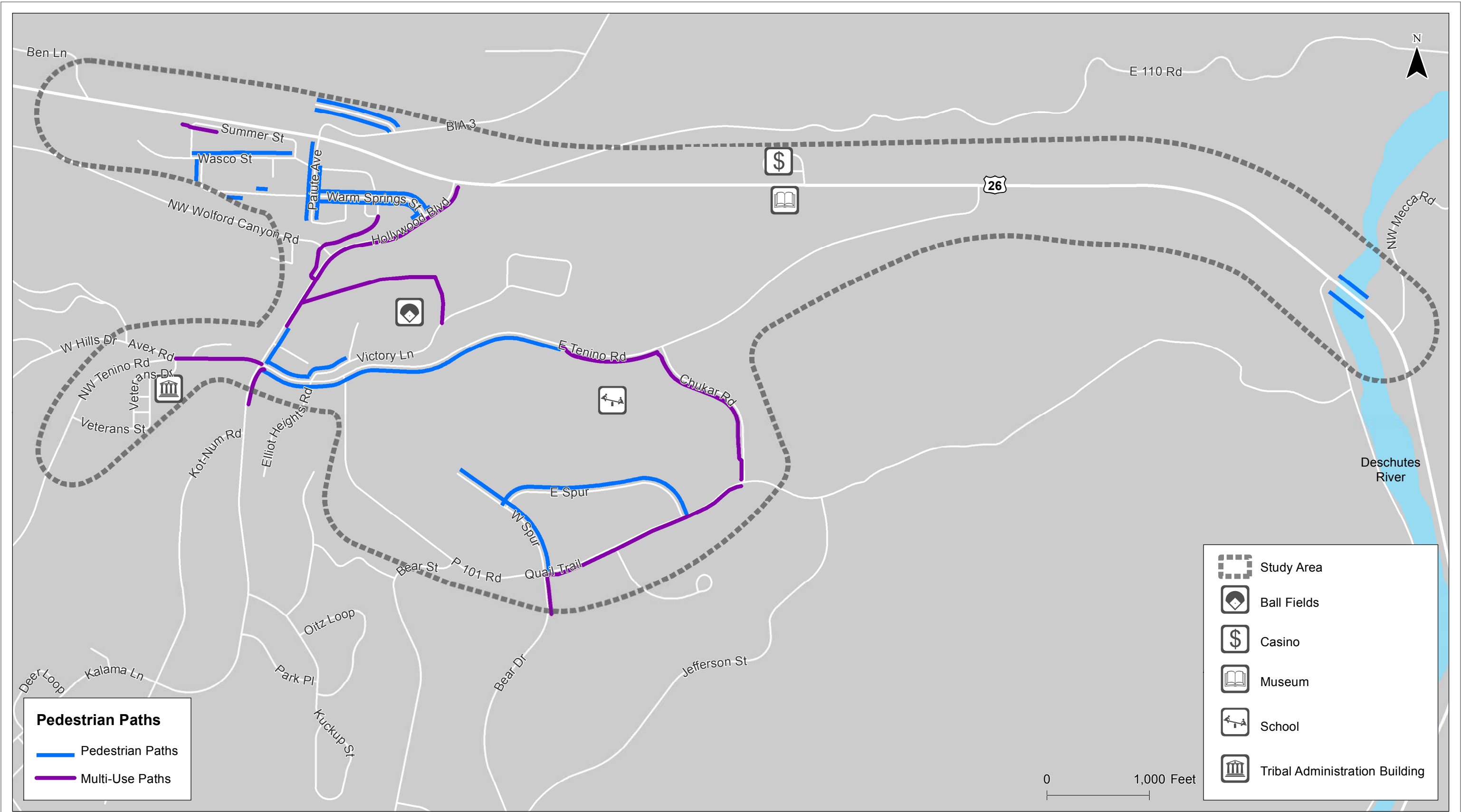
The US 26 corridor does not contain continuous pedestrian or bicycle facilities within the study area. A short section of sidewalk exists on both sides of the highway on the bridge crossing the Deschutes

River. Several of the off-highway roadways do provide sidewalks or shared-use paths, as shown in the example along Tenino Road in Figure 4.



Figure 4: Example of Multi-Use Path Along E Tenino

Figure 5 on the following page shows the location of existing sidewalks and shared-use paths within the study area. The key gaps exist within the network include east-west connections along the US 26 corridor and connections between the new school and nearby residential areas.

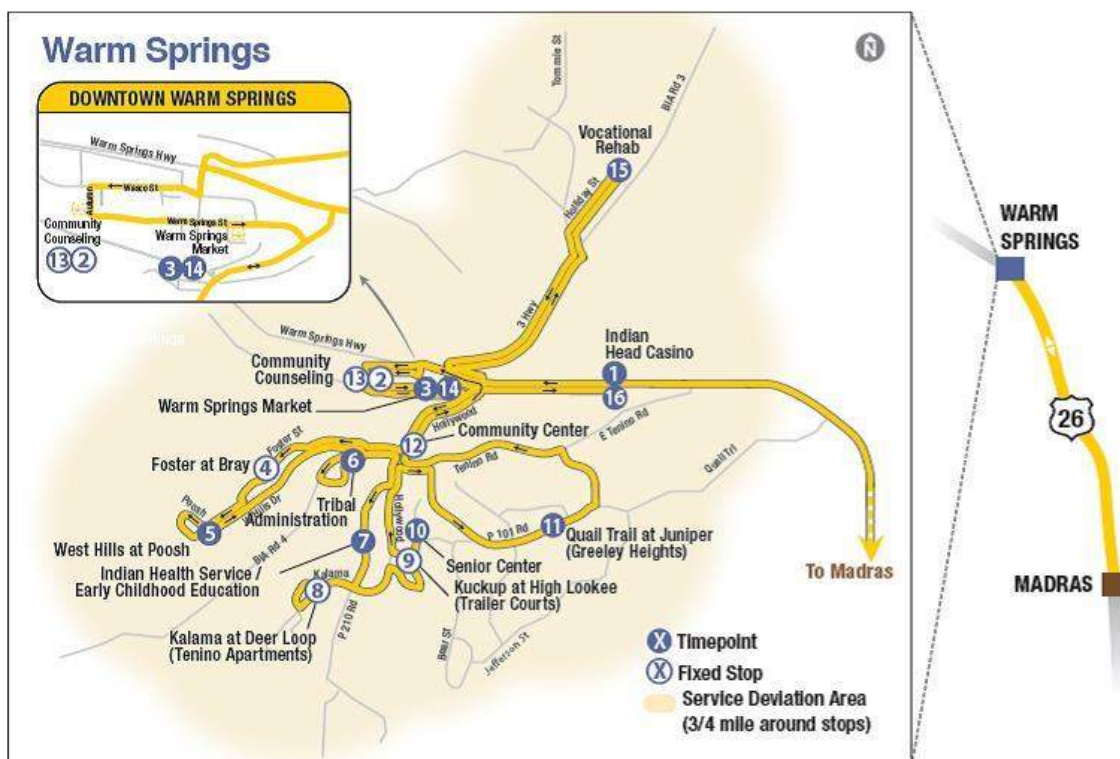


Existing Pedestrian and Multi-Use Paths
Warm Springs, Oregon

Figure
5

Transit Routes

The Warm Springs community is served by Cascades East Transit (CET), which provides connections to Madras, Redmond, Bend, Prineville, and La Pine. Route 20 connects Warm Springs with Madras, where riders have the option to continue on other routes. Route 20 currently runs six times per day during the week. As shown below, there are several fixed stops within the community, and the service will also deviate up to $\frac{3}{4}$ of a mile from the stops.



Source: Cascades East Transit

DESCRIPTIVE CRASH STATISTICS AND SAFETY PERFORMANCE

KAI obtained the most recent complete five years of reported crash data (2010 through 2014)³ from ODOT's crash database for the study area. Reported crashes in ODOT's database include those that

³ Data from the year 2015 was incomplete at the time of analysis (October 2016). Therefore, the crashes from 2015 were excluded from the analysis to provide a consistent analysis across different years. The data that was available for 2015 indicated two additional crashes within the study area that are described here for information purposes. One crash was reported at 3:00 pm on a Thursday in April. This crash occurred near the gas station access on US 26. The crash was a rear-end crash involving vehicles traveling northbound. The crash did not result in any injuries. Another crash was reported at 7:00 pm (during dusk) on a Saturday in May. This crash also occurred near the gas station access on US 26 and was reported as a turning movement crash. It involved one vehicle traveling westbound and one vehicle traveling eastbound. "Did not yield right-of-way" was reported as a contributing cause to the crash. The crash resulted in a minor injury.

resulted in an injury and/or over \$1,500 of property damage. The reported crash data from ODOT's crash database was used to complete the crash analysis summarized in this section.

The CTWS compiled crash records based on local police data. However, the data did not contain enough information to verify locations or crash information to be used in analysis. Therefore, it was excluded from this analysis. The summary statistics for the CTWS data are provided in Appendix 3.

Throughout this section, crashes are discussed based on the injury severity of the crash. This is based on the most severe injury associated with the crash and may be coded according to the following categories.

- Fatal
- Injury A (Severe Injury)
- Injury B (Moderate Injury)
- Injury C (Minor Injury)
- PDO (Property Damage Only)

There were 24 reported crashes within the study area boundaries between 2010 and 2014. Four of these crashes occurred in the Warm Springs area, off of US 26. The remaining 20 crashes occurred along US 26. This section organizes the crash statistics description into three sub-sections due to the different geometric and traffic characteristics of locations within the study area:

- US 26 Corridor Wide Trends
- Off-Highway Location Trends
- Location Specific Trends and Patterns

US 26 Corridor Wide Trends

Crash frequency and severity for the US 26 corridor, including crashes that occurred at intersections or driveways as well as along segments, are shown in the following exhibits. Of the 20 reported crashes in the corridor, 13 were property damage only (PDO) and 7 involved at least one injury. No fatal crashes occurred within the study corridor. As shown in Figure 6, an average of three crashes per year was reported within the study area, excluding those that occurred in 2013. Two crashes in 2011 resulted in severe injuries. One was a rear-end crash on US 26 near Mecca Road, and one was an angle crash at the intersection of US 26/Paiute Avenue. In 2013, seven crashes were reported; the six of these were PDO crashes.

Figure 7 shows the number of reported crashes by month for the five study years. The number of crashes exhibits a spike during July and August, which are peak summer travel months when US 26 traffic is higher than other months of the year. Figure 8 illustrates the number of crashes by day of the week. The highest number of crashes was reported on Thursday and Friday. The number of reported crashes on Sunday is lower than other days, although the Indian Head Casino Traffic Monitoring Report found that Friday and Sunday experienced the highest traffic volumes.

Crash reports indicated that alcohol and drugs were not a factor in the reported crashes on US 26 within the study timeframe.

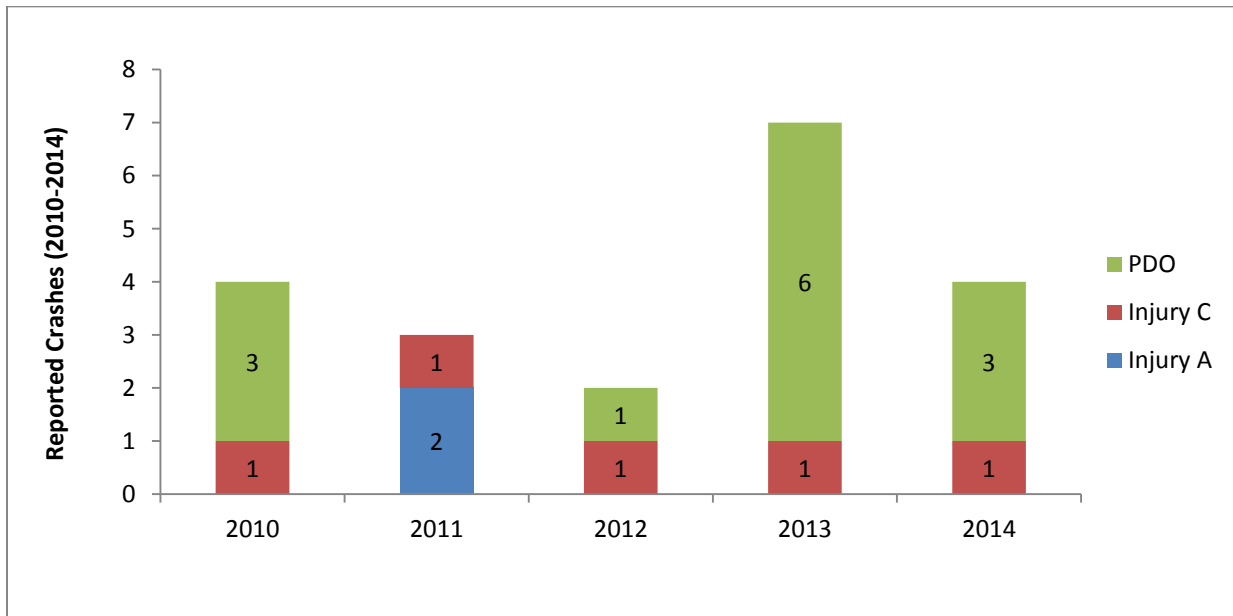


Figure 6: Number of Reported Crashes in US 26 Study Corridor (2010-2014)

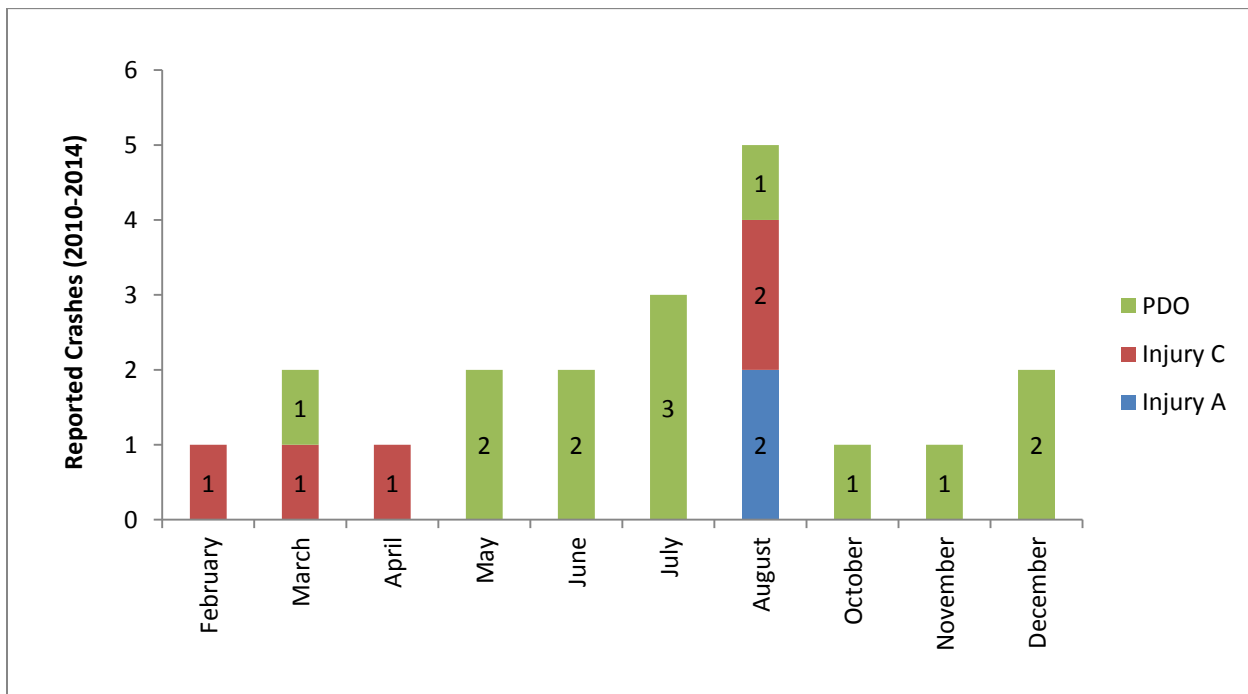


Figure 7: Number of Reported Crashes in US 26 Study Corridor by Month (2010-2014)

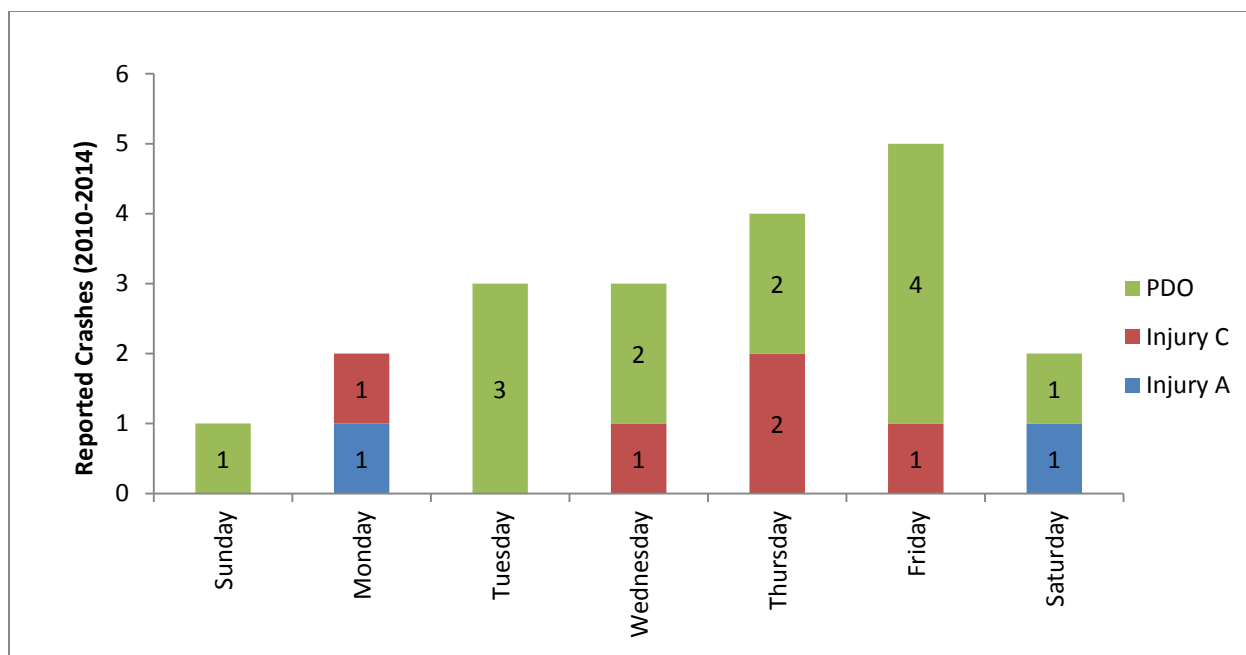


Figure 8: Number of Reported Crashes in US 26 Study Corridor by Day of Week (2010-2014)

Figure 9 illustrates the number of reported crashes and injury severity by crash type. The majority of crashes that occurred within the study corridor on US 26 were rear-end crashes. Several turning movement and angle crashes were also reported. Six of out seven injury crashes in the corridor were rear-end crashes.

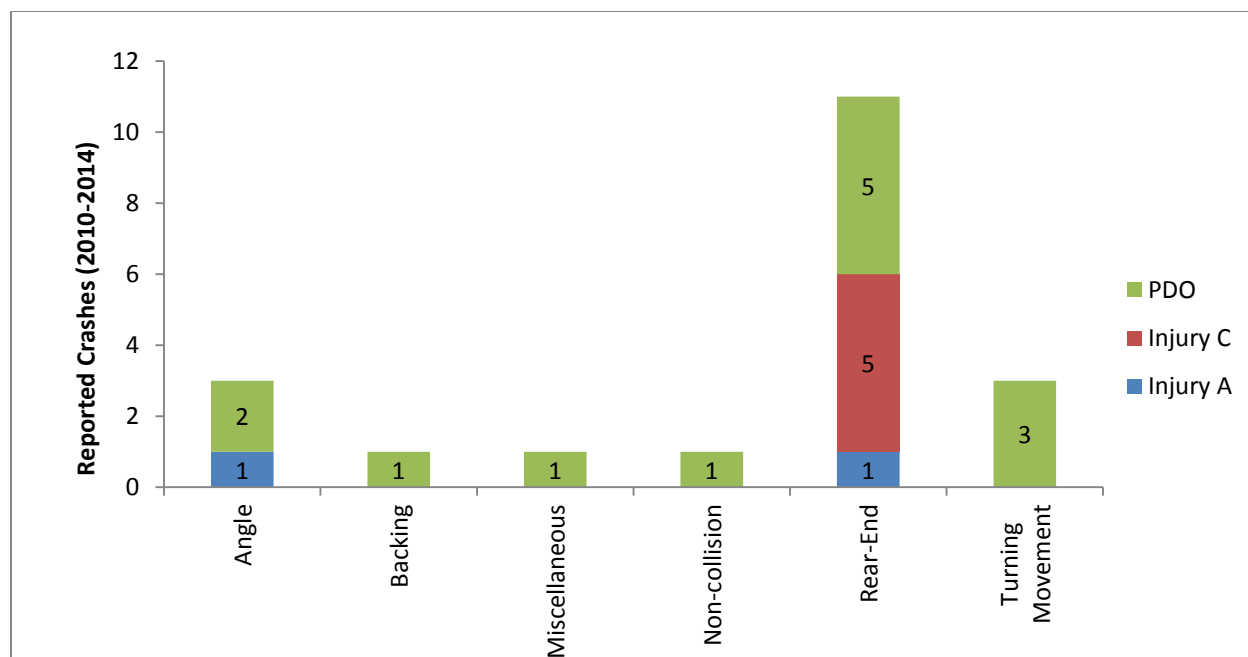


Figure 9: Number of Reported Crashes in US 26 Corridor by Collision Type (2010-2014)

Figure 10 illustrates the road condition at the time of reported crashes. The majority of crashes occurred during dry road conditions. Four crashes occurred on snow or ice. Six out of the seven reported injury crashes occurred during dry conditions.

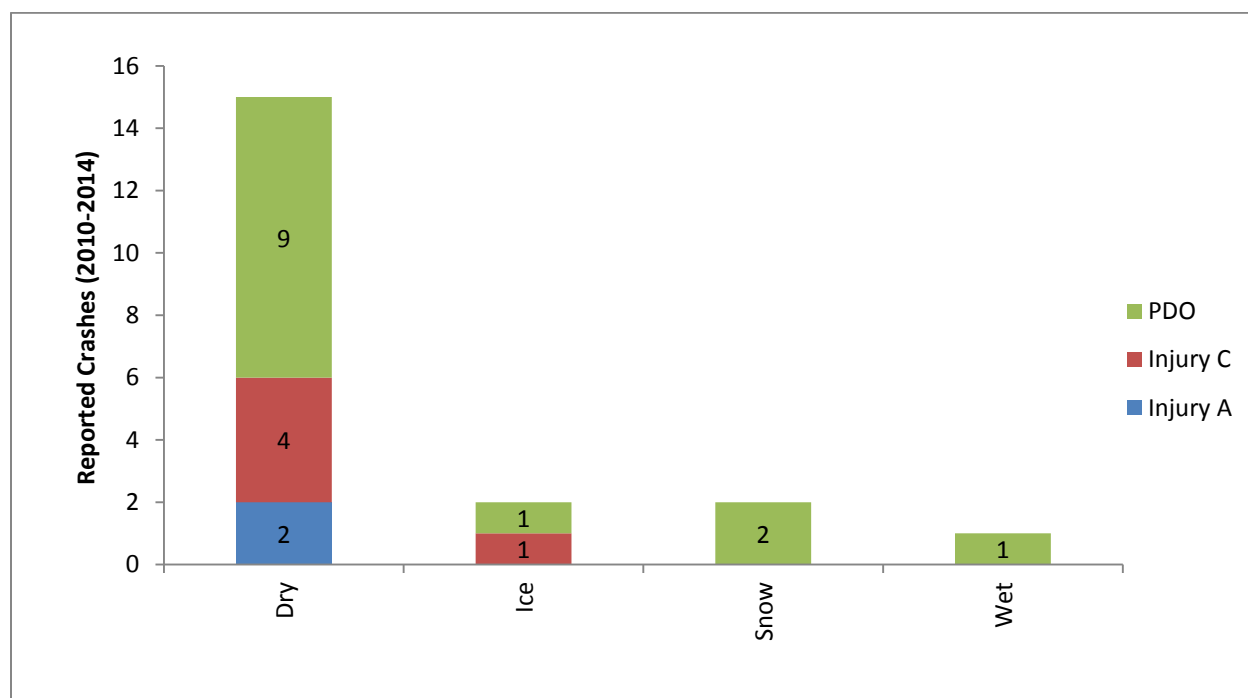


Figure 10: Number of Reported Crashes in US 26 Corridor by Road Condition (2010-2014)

Figure 11 illustrates that the majority of crashes occurred during daylight conditions. Four reported crashes occurred during “dark” light conditions, and one crash occurred at dusk. The majority of injury crashes also occurred during daylight conditions.

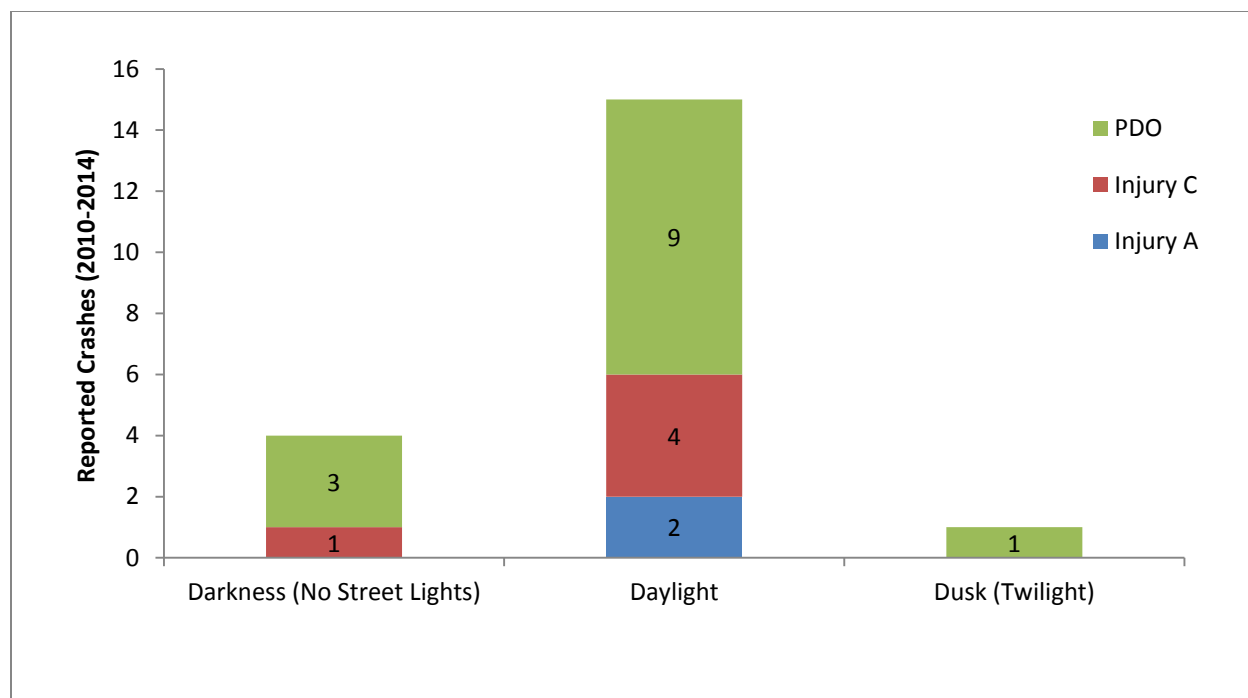


Figure 11: Number of Reported Crashes in US 26 Corridor by Light Condition (2010-2014)

Crash Location and Frequency

Consistent with guidance from the Highway Safety Manual (HSM), KAI organized the US 26 corridor into 11 sites based on roadway characteristics such as horizontal alignment, roadside conditions, shoulder widths, and frequency of intersections. The sites included 6 segments and 5 intersections. Crashes were associated with each intersection and roadway segment based on their physical location, crash type, and contributing factors.

KAI calculated the crash rate for the US 26 highway corridor. The resulting crash rate was 0.65 crashes per million vehicle miles traveled based on the five years of data analyzed. This is slightly lower than the statewide 90th percentile crash rate, which is 0.76 for Rural Principal Arterials.

Using Part C – Chapter 10 of the HSM as well as roadway, crash, and volume data, KAI calculated the expected annual number of crashes for each intersection and roadway segment using the HiSafe software. The expected annual number of crashes is the long-term yearly average number of crashes anticipated to occur on the segment or at the intersection based on each location’s physical

characteristics, previous crash frequency, and current traffic volumes. Oregon specific calibration factors were used in the analysis to reflect crash experiences in the state of Oregon.⁴

The expected annual number of crashes per site was calculated and is summarized below to provide a relative sense of which sites along the study corridor are anticipated to have higher long-term average crash frequency based on their current geometry, operational characteristics and traffic volumes. Table 3 summarizes the sites, the total number of reported crashes, and expected annual number of crashes. Appendix 4 provides the HiSafe reports for the HSM analysis.

Table 3. US 26 Corridor Sections and Crash Frequency

Location	Description	Length (miles)	Reported Crash Frequency per Year	Predicted Crash Frequency per Year	Expected Crash Frequency per Year
US 26 - 1	Ben Lane to Paiute Avenue	0.43	0.2	4.2	1.4
US26/Paiute	4-leg, minor street stop-controlled intersection	--	1.6	0.1	0.1
US 26 - 2	Paiute Avenue to Hollywood Boulevard	0.27	0.4	0.6	0.5
US26/Hollywood	3-leg, minor street stop-controlled intersection	--	0.4	0.3	0.3
US 26 - 3	Hollywood Boulevard to Casino/Museum	0.64	1.2	1.9	1.6
US26/Museum	4-leg, minor street stop-controlled intersection	--	0	0.3	0.3
US 26 - 4	Casino/Museum to Tenino Road	0.32	0.2	3.5	1.1
US26/Tenino	3-leg, minor street stop-controlled intersection	--	0	0.2	0.2
US 26 - 5	Tenino Road to Jackson Trail	0.70	0.6	2.3	1.6
US26/Jackson Trail	3-leg, minor street stop-controlled intersection	--	0	0.3	0.2
US 26 - 6	Jackson Trail to East Boundary	0.42	0.8	1.2	1.0

Crash Location and Severity

Figure 12 maps the reported crashes by location and severity. As shown in the figure, the PDO and Injury C (minor injury) crashes are located throughout the study area. The more severe injury crashes (Injury B and Injury A) occurred near the intersection of US 26/Hollywood Boulevard.

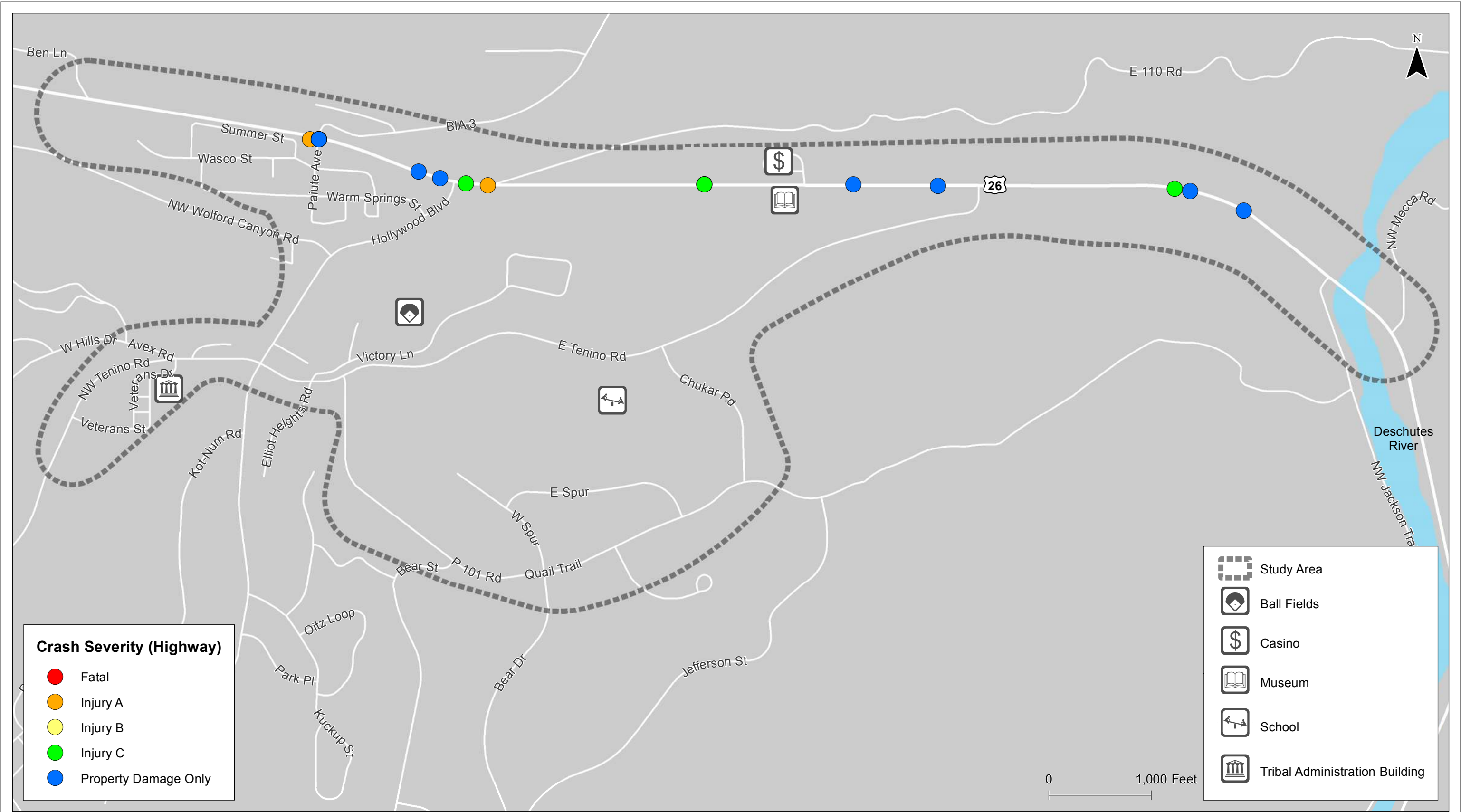
⁴ Calibrating the Highway Safety Manual Predictive Methods for Oregon Highways. Final Report. SPR 684. OTREC-RR-12-02.

Crash Location and Collision Type

Figure 13 maps the reported crashes by location and collision type. The turning movement crashes occurred most frequently at the intersections of US 26 with Paiute Avenue and Hollywood Boulevard. However, the rear-end crashes occurred throughout the entire US 26 corridor.

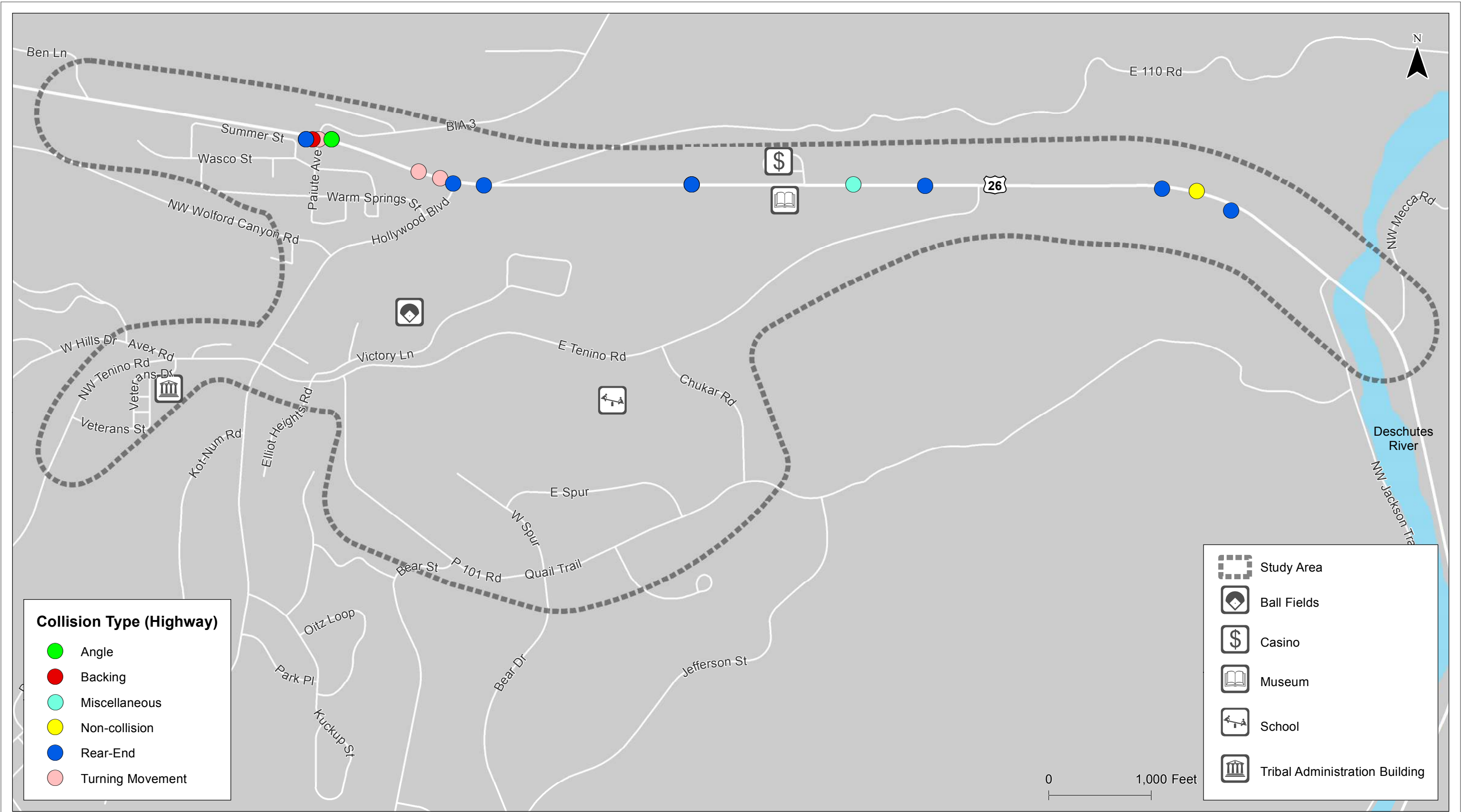
Crash Location and Contributing Cause

As shown in Figure 14, the most commonly cited, by the responding officer, primary contributing factor was following too closely. This was cited for crashes throughout the corridor. Failure to yield right-of-way was also a common factor for some of the intersection crashes.



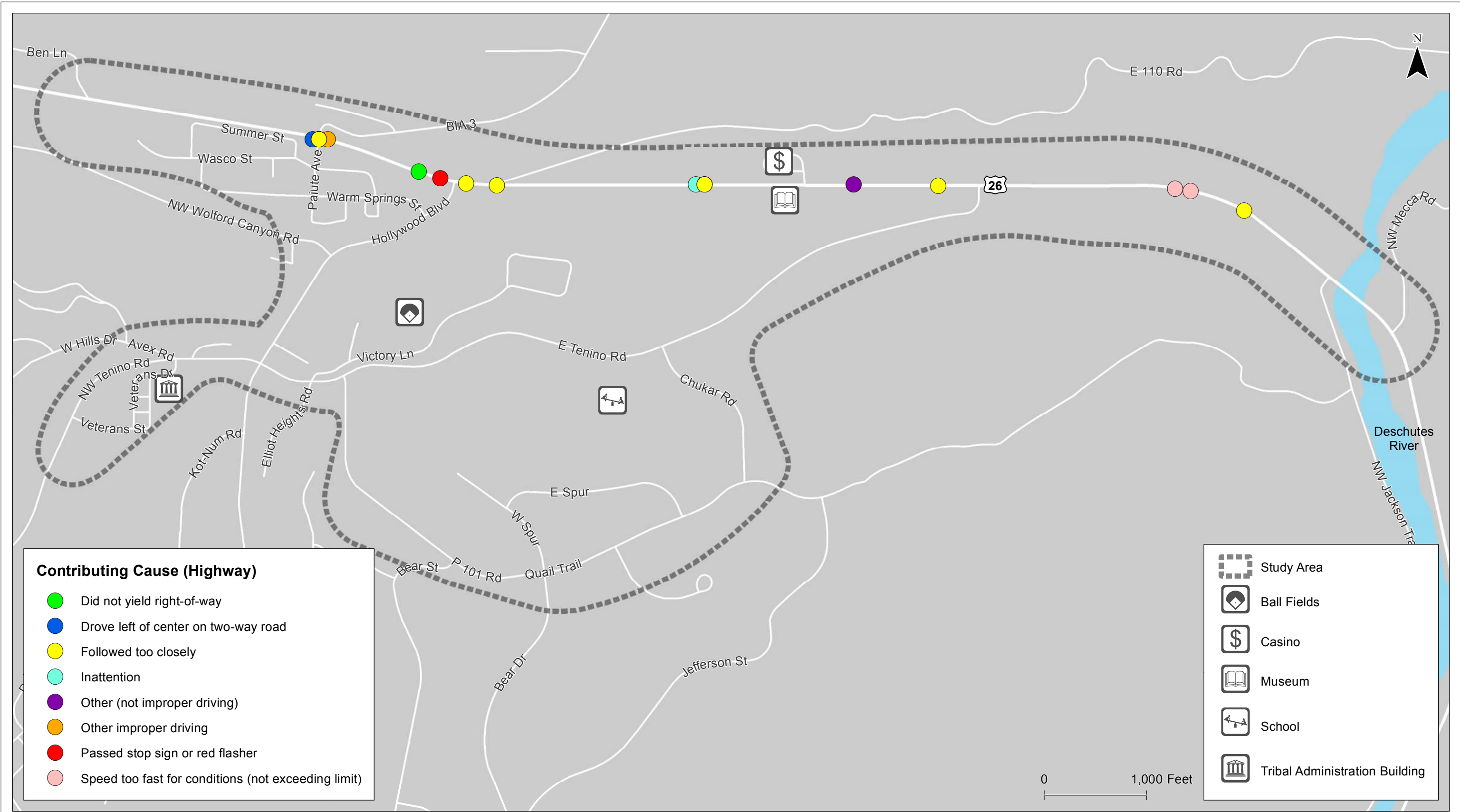
Reported Crashes by Severity on US 26 Corridor (2010 - 2014)
Warm Springs, Oregon

Figure
12



Reported Crashes by Collision Type on US 26 Corridor (2010 - 2014)
Warm Springs, Oregon

Figure
13



Reported Crashes by Contributing Cause on US 26 Corridor (2010 - 2014)
Warm Springs, Oregon

Figure
14

Off Highway Location Trends

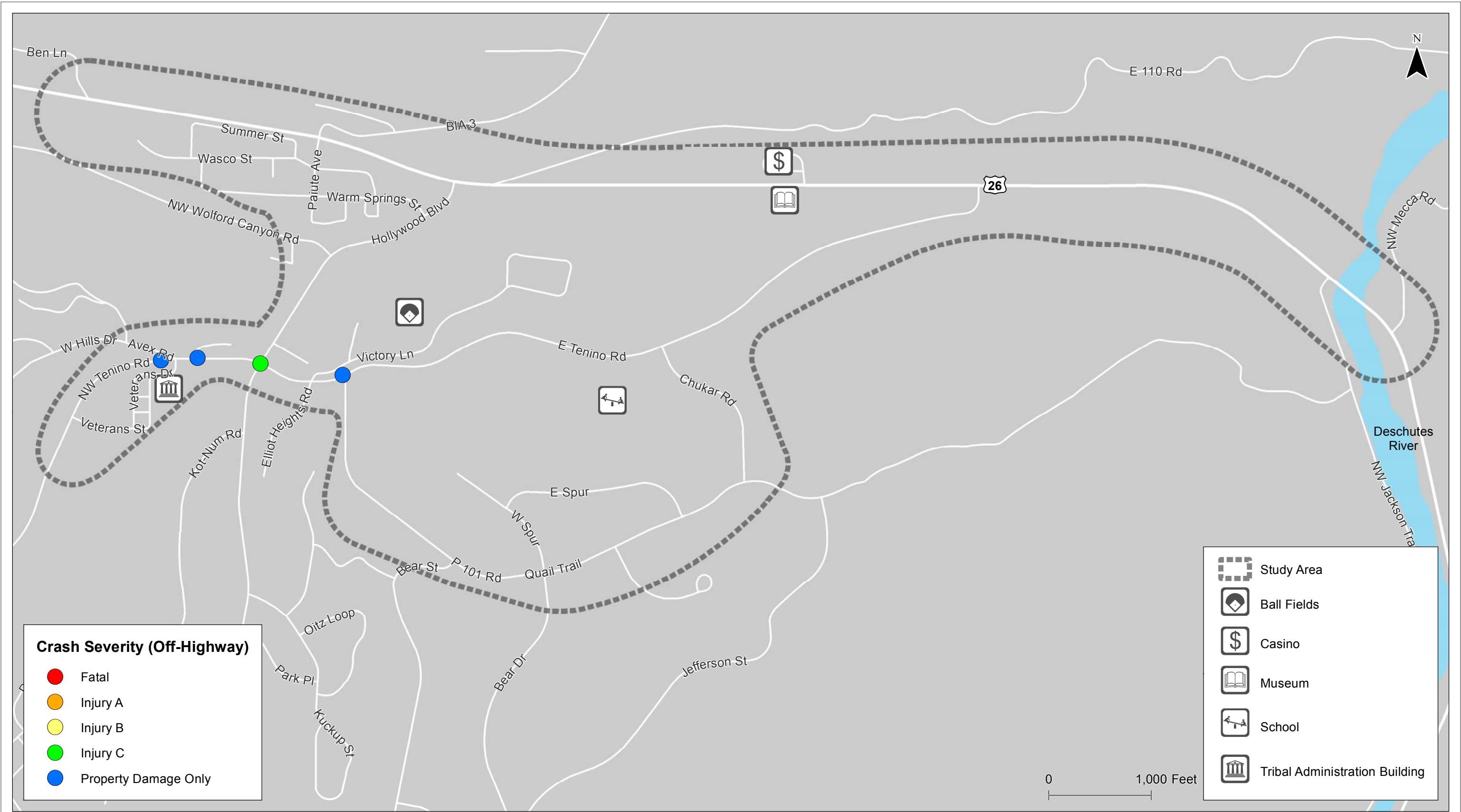
Reported crashes that occurred off of US 26 but within the study area are referred to as “Off Highway” crashes and described in this section. Reported crashes for the off highway area were obtained from ODOT’s database.

Four crashes were reported during the 2010 – 2014 time period. One crash resulted in a minor injury; the remainder were PDO crashes. Figure 15 shows the location of the off-highway crashes.

Two crashes occurred on Tenino Road, west of Hollywood Boulevard. One of these was a turning movement crash, and the other was a sideswipe-meeting crash. Both of these crashes were PDO crashes. One occurred during snow conditions. Both occurred during daylight conditions.

One crash was reported at the intersection of Tenino Road/Hollywood Boulevard. This crash resulted in a minor injury. The crash was reported as an angle crash and occurred during dry, dark conditions. According to the crash report, alcohol was involved in this crash.

One crash was reported at the intersection of Tenino Road/Quail Trail. No injuries occurred as a result of this crash. The crash was reported as a turning movement crash, and “speed too fast” for conditions was identified as a contributing factor. The crash occurred during daylight hours in snowy road conditions.



Reported Crashes by Severity (2010 - 2014)
Warm Springs, Oregon

Figure
15

Crash Location and Frequency

Consistent with the approach used for the US 26 Corridor area, HSM Part C predictive methods were applied to the Off Highway Locations. Due to the relatively low numbers of reported crashes in these areas, the expected crash frequency provides information about locations that may have higher crash risk relative to other locations in the area. For example, although no crashes occurred at some locations, geometric characteristics may indicate a risk for potential crashes in the future. This risk is captured in the expected crash frequency result. A total of six intersections and nine segments were identified for evaluation based on changes in geometric and traffic characteristics. Table 4 summarizes the observed and expected crashes at each location.

Table 4. Off-Highway Segments/Intersections and Crash Frequency

Location	Description	Length (miles)	Reported Crash Frequency per Year	Predicted Crash Frequency per Year	Expected Crash Frequency per Year
Intersections					
Paiute Avenue/Warm Springs Street	4-leg, all-way stop-controlled intersection	--	0	0.1	0.1
Hollywood Boulevard/Warm Springs Street	3-leg, minor street stop-controlled intersection	--	0	0.0	0.0
Tenino Road/Hollywood Boulevard	4-leg all-way stop-controlled intersection	--	0.2	0.1	0.1
Tenino Road/Quail Trail	3-leg, minor street stop-controlled intersection	--	0	0.0	0.0
Tenino Road/Chukar Road	3-leg, minor street stop-controlled intersection	--	0	0.0	0.0
Quail Trail/Chukar Road	3-leg, minor street stop-controlled intersection	--	0	0.0	0.0
Segments					
Paiute Avenue	US 26 to Warm Springs Street	0.10	0	0.0	0.0
Warm Springs Street	Paiute Avenue to Hollywood Boulevard	0.22	0	0.1	0.1
Hollywood Boulevard - 1	Tenino Road to Warm Springs Street	0.09	0	0.0	0.0
Hollywood Boulevard - 2	Warm Springs Street to US 26	0.43	0	0.1	0.1
Tenino Road - 1	Hollywood Boulevard to Quail Trail	0.16	0.2	0.0	0.0
Tenino Road - 2	Quail Trail to Chukar Road	0.61	0	0.1	0.1
Tenino Road - 3	Chukar Road to US 26	0.69	0	0.1	0.1
Chukar Road	Tenino Road to Quail Trail	0.33	0	0.1	0.1
Quail Trail - 1	Tenino Road to Chukar Road	1.02	0	0.2	0.2

Location Specific Trends

KAI selected two individual intersections for closer analysis based on crash frequency, crash severity, and trends noted in the corridor assessment. The specific locations discussed in more detail include the US 26/Paiute Avenue and US 26/Hollywood Boulevard intersections.

US 26/Paiute Avenue Intersection

The US 26/Paiute Avenue intersection is a minor street stop-controlled, four-legged intersection. This is the first intersection eastbound drivers encounter on US 26 as they approach the Warm Springs community. BIA 3 extends north from US 26 at this location, providing connections to employment locations including the Kah-Nee-Ta Resort and carries approximately 5,900 veh/day (AADT From 2009). Figure 16 shows the existing intersection configuration.

Eight crashes were reported at this intersection during the study period, including one severe injury crash. The remaining seven crashes did not result in an injury. Rear-end crashes and angle crashes were the most common reported crash types, with three crashes each. The severe crash was an angle crash. There was also one turning movement and one backing crash reported. Two reported crashes occurred during snow conditions; the remainder occurred during dry conditions. One crash occurred during dark lighting conditions.

Among the three reported angle crashes, one crash involved southbound and eastbound vehicles, one crash involved northbound and westbound vehicles, and one crash involved southbound and westbound vehicles. Among the rear-end crashes, two crashes involved southbound vehicles and one crash involved westbound vehicles. The turning movement crash involved westbound and eastbound vehicles. The backing crash involved a southbound and northbound vehicle.



Figure 16: Existing Intersection Configuration of US 26/Paiute Avenue (Source: Google Maps)

US 26/Hollywood Boulevard/Gas Station Intersection Area

The US 26/Hollywood Boulevard is located approximately 250 feet from a gas station, as shown in Figure 17. The gas station driveway access was considered as part of the intersection due to the close proximity. Four crashes were reported at this location between 2010 and 2014. In addition, the partial 2015 crash data indicates an additional two crashes that occurred near the gas station driveway.

One of the four reported crashes resulted in a severe injury, and one crash resulted in a minor injury. The remaining two crashes did not result in an injury. The four reported crashes occurred during dry, daylight conditions. Two crashes were reported as turning movement crashes, and two were rear-end crashes. The two turning movement crashes involved vehicles traveling eastbound in conflict with northbound turning vehicles. The two rear-end crashes occurred in the westbound direction on the approach to the intersection.



Figure 17: Existing Configuration of the US 26/Hollywood Boulevard Intersection

(Source: Google Maps)

SUMMARY OF OPPORTUNITIES

Figure 18 summarizes the opportunities identified within the study area. The eastern and western ends of the US 26 study area act as transition areas between the community and the rural highway; speed management is a key issue in these areas and continues throughout the US 26 corridor. The US 26 segment between Hollywood Boulevard and the casino is an important pedestrian and bicycle connection; the lack of facilities in this segment is a key issue. Opportunities in the off-highway area include speed management, particularly along Tenino Road, and bicycle and pedestrian connectivity. Key gaps in the pedestrian and bicycle system include connections between residential areas and the school as well as pedestrian crossings.

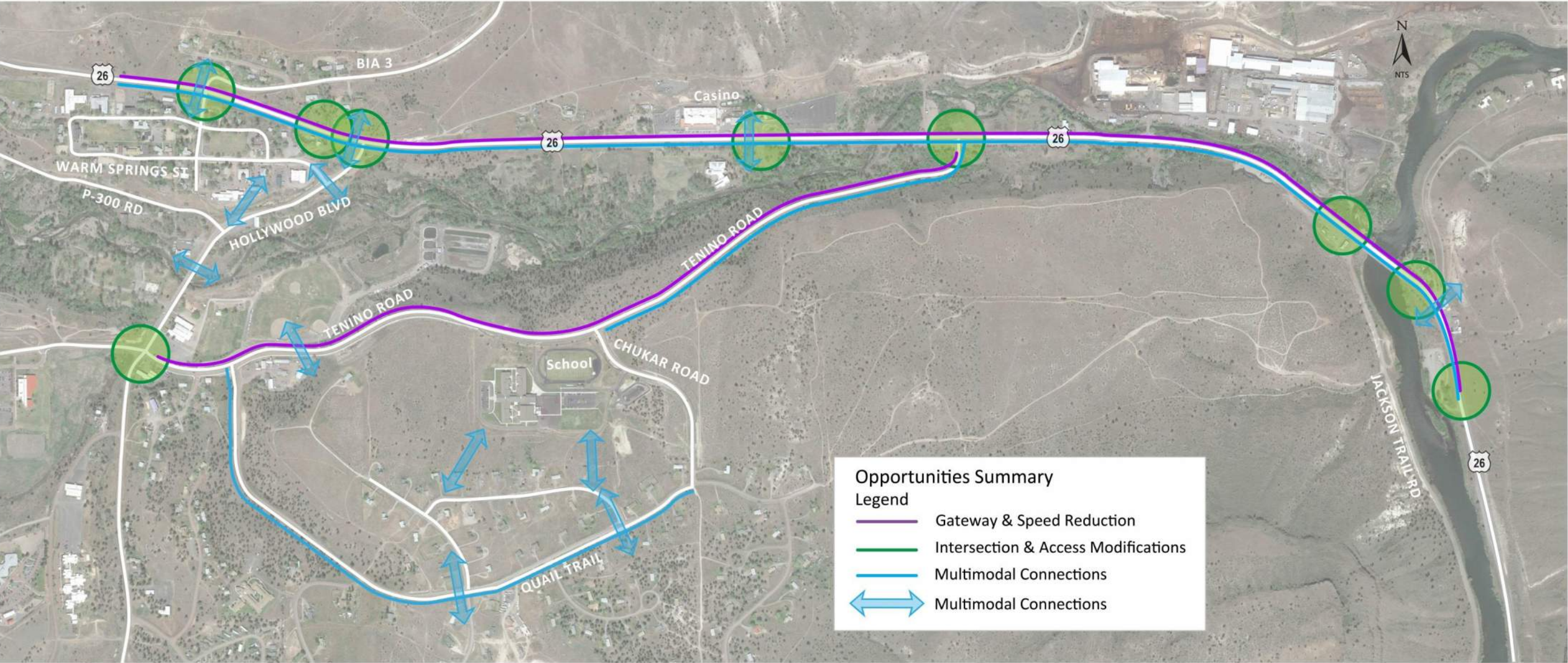


Figure 18: Summary of Identified Opportunities

Section 3 Potential Treatments

POTENTIAL TREATMENTS

This section identifies a set of potential treatments, summarized in a Project Toolbox, that were identified to address the safety issues within the study area. The Project Toolbox is a collection of possible treatments that could be used to improve safety performance and reduce risk. Treatments from the toolbox can be applied at specific locations and used to address future safety concerns in the community.

Potential Systemic Safety Treatments

Many of the safety issues identified for the study area are commonly exhibited on rural highways and within rural communities. The potential treatments identified in this toolbox may be applied at other locations throughout the Warm Springs Reservation where similar issues such as speed, multimodal connections, and intersection crashes are identified. Rural developments that are located within the reservation are likely to exhibit similar needs for multimodal connections that provide a dedicated facility for pedestrians and bicyclists. Treatments in the toolbox that are identified as potential systemic safety treatments are examples of low-cost, proven treatments that may easily be applied at other locations when appropriate.

PROJECT TOOLBOX

The Project Toolbox includes a diverse set of potential treatments ranging from low-cost to high-cost treatments.

To establish a focused group of potential projects, KAI identified three treatment categories for the study area, including gateway and speed reduction treatments, intersection and driveway treatments, and pedestrian and bicycle treatments.

Participants at the Safety Charrette used this toolbox to indicate their thoughts about types of treatments at various locations within the study area. These treatments may also be used to address future safety concerns related to these three categories.

The following sections provide an overview of these treatment categories; the full toolbox is provided in Appendix 5.

Gateway / Speed Reduction Treatments (Table 5-1 in Appendix 5)

The gateway treatments, summarized in Table 5-1 in Appendix 5, may include elements such as raised median, curb, narrower lanes, illumination, and signage, and are intended to inform drivers that they are entering a different context of a roadway corridor. Most commonly this is alerting drivers they are transitioning from a rural setting to an urbanized area where posted speeds are typically lower and conflicts are more common because of increased driveways and pedestrian and bicycle facilities. Gateways and speed reduction treatments are intended to modify driver behavior for the changed contextual environment. Figure 19 illustrates an example of curb and sidewalk used to modify a rural

highway to feel like a more urban highway traveling through a community. Other treatments that may be used to modify the cross-section include land narrowing, illumination, and pedestrian and bicycle facilities.

Speed reduction treatments are intended to encourage drivers to maintain these slower speeds and increase awareness of vulnerable users, such as cyclists or pedestrians that might be using or accessing the roadway. Speed reduction may be accomplished through cross-section elements, pedestrian and bicycle facilities, and signage. Figure 20 illustrates an example of speed feedback signs, used to alert drivers of their travel speed relative to the posted speed limit. Slower vehicular speeds reduce the severity of crashes for all users but especially for non-motorized users.



Figure 19: Example of Context Sensitive Cross-Section
(Source: Google Maps)

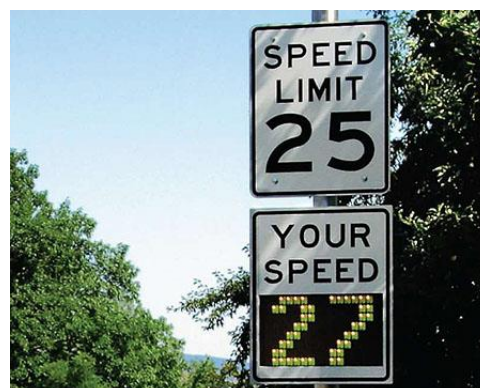


Figure 20: Example of Speed Feedback Sign
(Source: safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa12004/)

Intersection/Driveway Treatments (Table 5-2 in Appendix 5)

Intersection and driveway treatments, summarized in Table 5-2 of Appendix 5, are intended to reduce crash frequency and severity while raising driver awareness at access points. This may include turn lanes, intersection control changes, intersection geometry changes, illumination, access management, and sight distance improvements.

One potential treatment that can be used at intersections is tightening the turning radius, as illustrated by the concept in Figure 21. Larger turning radii facilitate faster vehicle turning movements and increase crossing distance for pedestrians compared to smaller radii. Reducing the curb radii aids in slowing vehicles and improving pedestrian crossings by reducing crossing distance and making the pedestrian more visible to motorists.

Another treatment that is often applied to properties with large areas of undefined access points or multiple access points is creating defined access to a property, as illustrated in Figure 22. Creating defined access points reduces the number of potential conflict points on the roadway and minimizes confusion of drivers. It also reduces pedestrians' exposure to potential conflicts with vehicles.

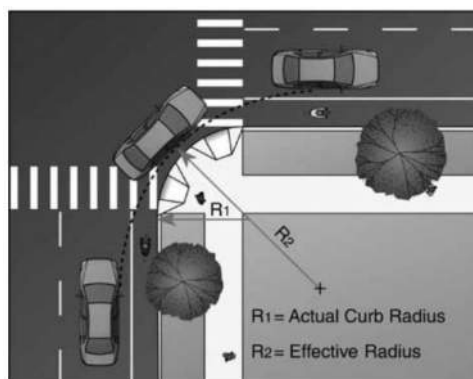


Figure 21: Example of Tightening Turning Radii
(Source: ITE Walkable Urban Thoroughfares)



Figure 22: Example of Defined Access
(Source: Shutterstock.com)

Pedestrian and Bicycle Treatments (Table 5-3 in Appendix 5)

The pedestrian and bicycle treatments, summarized in Table 5-3 of Appendix 5, are intended to create defined and visible facilities and connections for non-motorized users. This could include enhancing existing facilities or creating new facilities along and crossing roadways. The majority of recommended treatments provide pedestrian and bicycle connections where none exist today. Without appropriate facilities, pedestrians and bicyclists walk or bike along the roadways, which increases potential conflicts with vehicles and diminishes the quality of service for non-motorized users.

Pedestrian and bicycle specific facilities along roadways provide users with a separated facility, reducing the potential for conflicts between different modes. Shared-use paths, illustrated in Figure 23, physically separate pedestrians, bicyclists, and other non-motorized users from vehicular traffic by either a barrier or an open space. The path width is established to serve the range of users who will share the path. Shared paths typically range from 8 to 14 feet wide.

Crossing treatments on roadways define crossing locations, alert users to conflict areas, and support pedestrian and bicycle mobility in Warm Springs. There are a variety of options available for increasing the visibility of a pedestrian crossing and aiding in driver yield rates:

- High visibility markings,
- Pedestrian refuge islands,
- Pedestrian activated signs,
- Raised crosswalks,
- Flashing beacons.

The appropriate crossing treatment depends on a variety of factors include pedestrian crossing volume, vehicle volume, vehicle travel speeds, and typical user characteristics. Active crossings, such as the rectangular rapid flashing beacon (RRFB), illustrated in Figure 24, are typically reserved for roadways with higher volumes and speeds, where pedestrian volumes are above a certain threshold.



Figure 23: Example of Shared-use Path
(Source: englewoodindependent.com)



Figure 24: Example of RRFB
(Source: carmanah.com/traffic/products/r920-solar-rectangular-rapid-flashing-beacon-rrfb)

Section 4 Recommendations

RECOMMENDATIONS

This section summarizes the Plan's recommendations with respect to opportunities to improve safety. The recommendations are provided two general sections. The first section summarizes the recommended projects, which include location-specific recommendations that implement potential treatments to address identified issues. The second section provides recommended policies and programs aimed at addressing the key themes identified.

The recommendations were identified and refined through collaboration between KAI, ODOT, and the CTWS and vetted by the project stakeholders, PAC members, and the public that attended the Safety Charrette.

RECOMMENDED PROJECTS

This section summarizes the recommendations at specific locations. Each page in this section provides the following information for each segment or intersection within the study area:

- Location description;
- Overarching opportunities and challenges for the specific location;
- Table with a summary of projects at that location;
- Project map; and
- Additional information as needed for additional context, such as cross-sections.

The intersection concept graphics shown at some locations are intended to illustrate treatment concepts, not the specific final recommended design for the location. Additional collaboration with project stakeholders, combined with more design level detail about engineering needs at each location, will be needed to define specific project recommendations in activities beyond this safety plan effort.

PRIORITIZATION PROCESS

The projects are identified as near-term projects, medium-term projects, and long-term projects. The priorities and timelines are based on the crash trends, identified risk factors, community input, effectiveness of the treatment, and relative cost and ease of implementation.

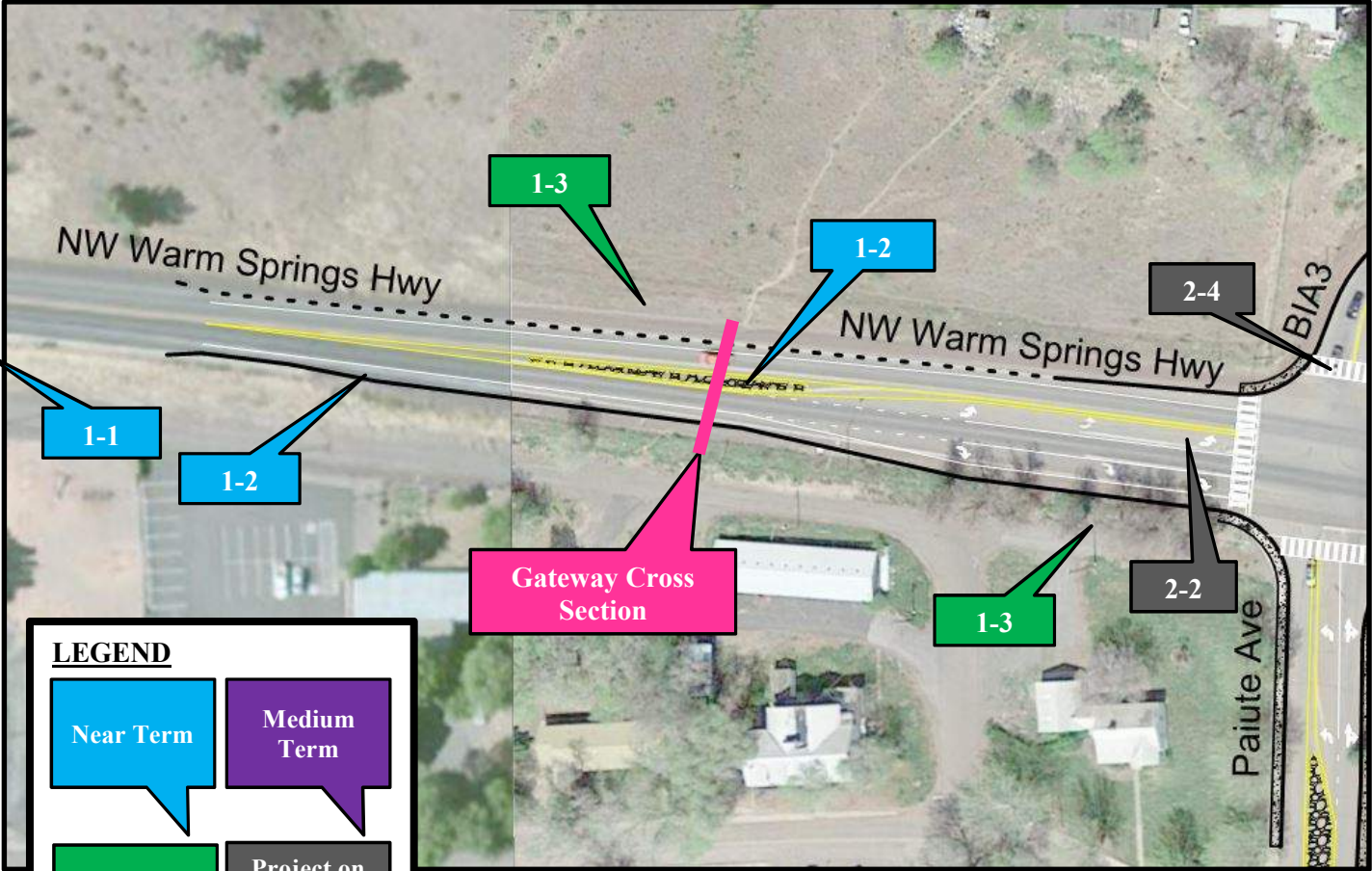
- The near-term projects are the highest priority and lowest cost and have the potential to be implemented within the next 1-to-2 years. These projects are those that can be completed with limited engineering and/or project programming and permitting.
- The medium-term projects include those that are also high priority but may take longer to implement since they may require more design details and stakeholder outreach to support project programming. They may be dependent upon the completion of prior projects. The medium-term projects have the potential to be implemented within approximately 2-to-5 years.

- The long-term projects are those identified by KAI and the community for their potential safety benefits but may be lower priority than other projects and/or take longer to construct due to challenges such as obtaining funding and purchasing right-of-way.

Some projects are identified on the long-term plan and should also be considered as part of development-driven projects. These projects are recognized for their benefits but are lower priority under existing conditions. However, a change in land use or development nearby may trigger the need for or opportunity to include these elements in response to a specific project catalyst.

The recommendations in this plan are meant to be flexible and adaptive over time. The priorities and timelines could shift over time as the conditions and context within the community change. However, the foundational nature of the implementation approach does not diminish as the CTWS adapts to varying community needs. The priorities are intended to serve as guidelines for Warm Springs without binding the CTWS to complete all near-term projects before beginning long-term projects. The CTWS is encouraged to use these project groupings to determine the most efficient use of future funding.

LOCATION 1: US 26—WEST OF PAIUTE AVENUE/BIA 3



LEGEND

Near Term

Medium Term

Long Term

Project on Different Page

LOCATION DESCRIPTION

This segment forms the approach (gateway) to the Warm Springs community for vehicles traveling eastbound. Crashes: There were no reported crashes along this segment between the years of 2010 and 2014.

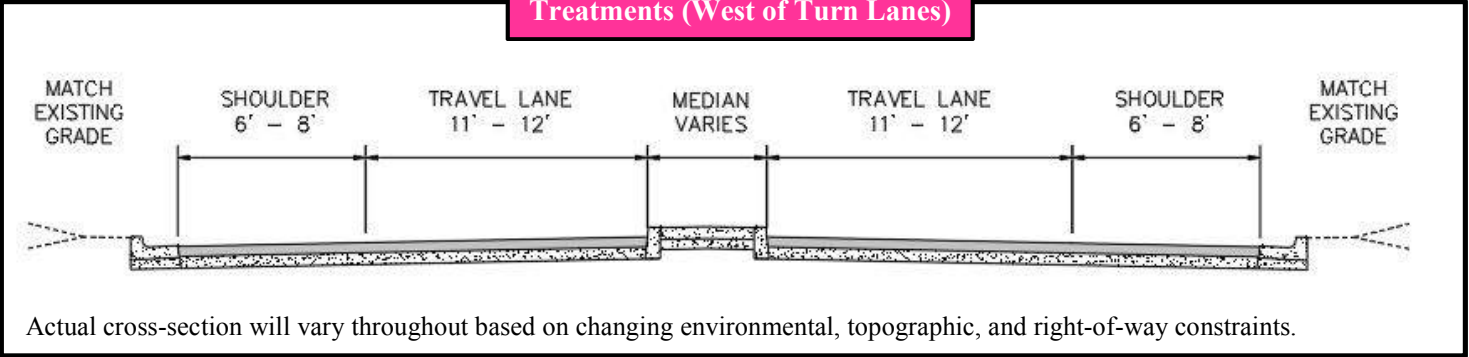
OVERARCHING OPPORTUNITIES

- Increase driver awareness to the change in environment (gateway treatments)
- Reduce speed of vehicles entering the community
- Creating a safer environment for pedestrians/bicycles

OVERARCHING CHALLENGES

- Accommodating freight trucks on US 26

Cross Section for Gateway Treatments (West of Turn Lanes)

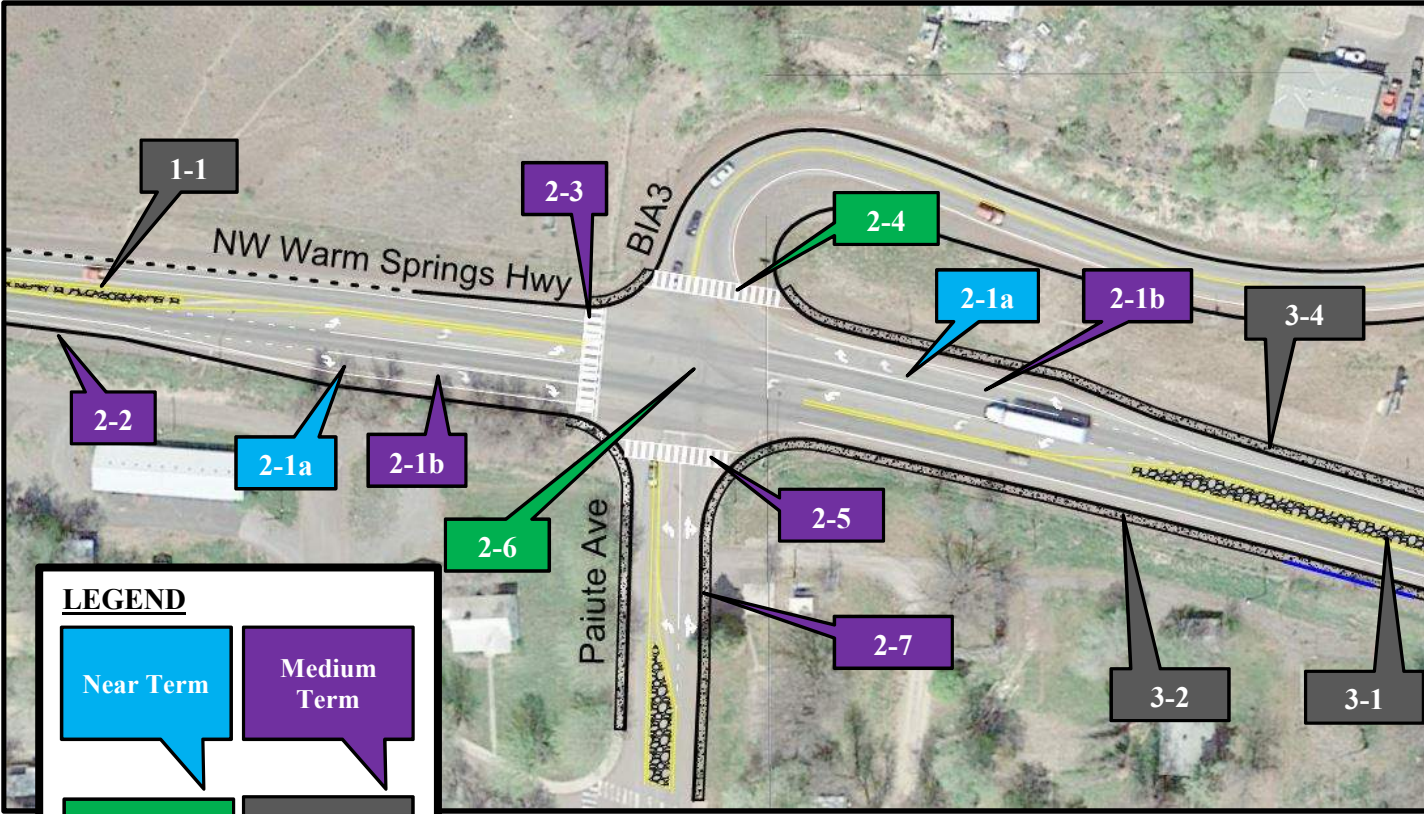


SUMMARY OF PROJECTS – LOCATION 1							
	ID	PROJECT	PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Near Term	1-1	Retain Existing Speed Feedback Sign	Retain existing speed feedback sign for eastbound traffic. To the extent possible, the feedback sign could be integrated with downstream intersection warning devices.	Speed reduction upon entry to Warm Springs. CRF: 41% all crash types	Exists under current conditions	Speed reduction reinforcement	There may be an opportunity to interconnect the speed feedback sign with the intersection warning device at the US 26 and Paiute Avenue/BIA 3 intersection.
	1-2	Install Gateway Treatments	Install curb and median, and consider restriping and narrowing travel lanes to provide visual cues that alert eastbound drivers to a new environment, encourage slower speeds, and increase driver awareness of the change in land use.	Speed reduction; increased awareness of approaching community and intersection. CRF: 15% injury crashes (based on 10% reduction in speed)	\$80,000 B/C: 1.4	Project could be constructed at the same time as project 1-3 for maximum benefits. However, project may be phased (i.e., curb along the south as a near-term project and curb along the north as a medium-term project. Curb on the north side should extend a minimum of 100' west from the intersection in initial phase.	Project assumes no roadway widening. Lane widths could be reduced to 11' and 6' shoulders. Coordinate with the freight industry during the project design to establish cross section dimensions. The gateway treatments begin approximately 500' west of the intersection. The raised median should include end treatment channelization and shy distance per the Highway Design Manual and will remain within existing striped median width.
Long Term	1-3	Install Additional Roadway Illumination	Install up to three additional light poles to increase illumination.	Visual cues for speed reduction, increased driver awareness. CRF: 28% nighttime crashes	\$40,000 B/C: 1.3	Project could be constructed at the same time as project 1-2 for maximum benefits.	--

¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.

² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

LOCATION 2: US 26/PAIUTE AVENUE/BIA 3 INTERSECTION



LOCATION DESCRIPTION

US 26/Paiute Avenue/BIA 3 is the first intersection vehicles encounter when approaching Warm Springs from the west.

Crashes: 8 reported crashes between the years of 2010 and 2014.

- 1 Severe crash
- Collision types included 3 angle crashes, 1 rear end crash, and 1 turning movement crash

OVERARCHING OPPORTUNITIES

- Reduce speed of vehicles entering the community
- Add or improve pedestrian/bicycle facilities

OVERARCHING CHALLENGES

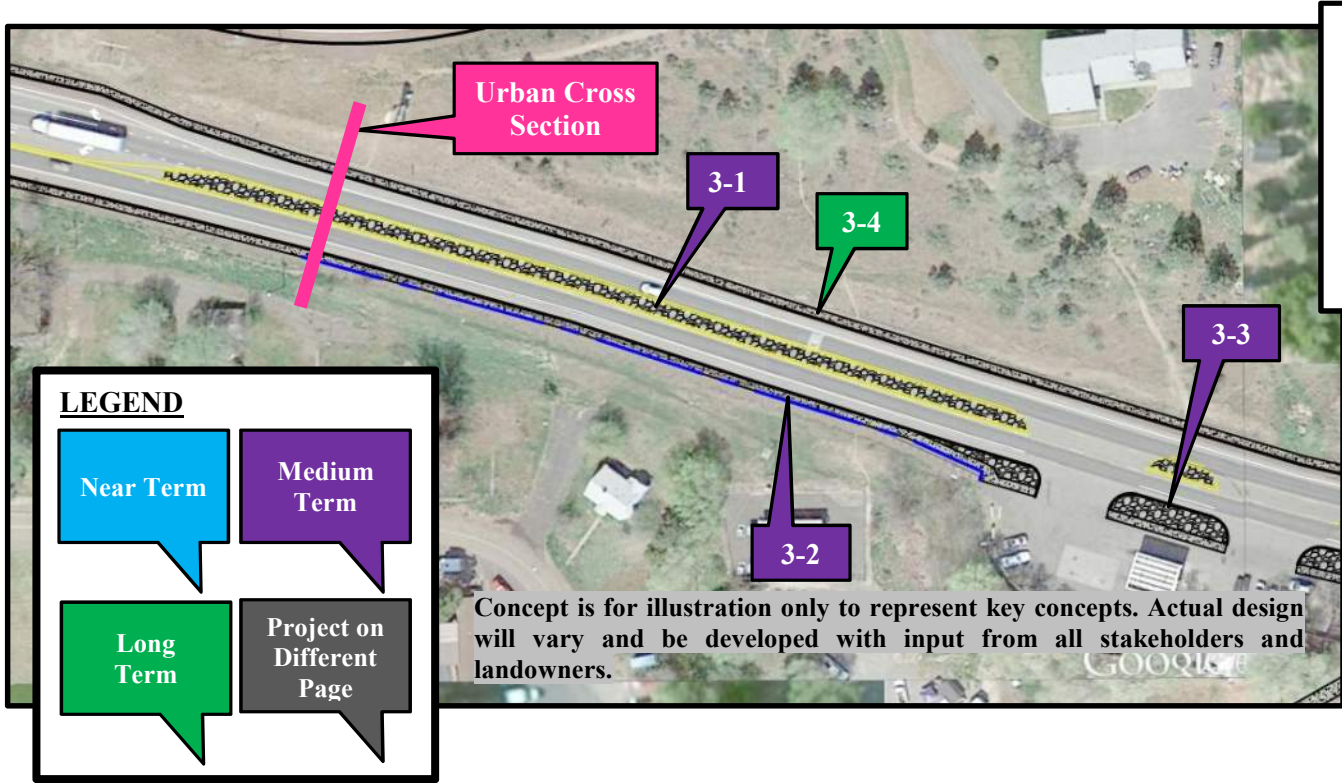
- Accommodate freight trucks on US 26
- Impacts to current right-of-way limits

SUMMARY OF PROJECTS – LOCATION 2							
	ID	PROJECT	PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Near Term	2-1a	Restripe Right Turn Lanes	Restripe east and westbound right turn lanes to better define merge areas to encourage drivers to complete the merge from the travel lane to the turn lane.	Speed reduction; Increased sight distance at side streets.	\$5,000 B/C: 13.2	Reduce turning vehicle speeds at crosswalks	Interim treatment for project 2-1b. Design evaluations should consider widening for future ped refuge island.
	2-1b	Restripe and Widen Right Turn Lanes	Restripe and widen east and westbound right turn lanes to an urbanized format with shorter tapers and longer storage lengths.	CRF: 15% injury crashes	\$375,000 B/C: 0.7	Combine with project 2-3 (ped refuge island) for maximum benefit	Not needed if roundabout (project 2-6) occurs first. Should consider widening for pedestrian refuge island and existing topography constraints.
Medium Term	2-2	Install Intersection Warning System	Install eastbound intelligent transportation system (ITS) intersection warning system to alert drivers approaching from the west of potential conflicts ahead.	Speed reduction; Alerts vehicles of potential conflicts.	\$70,000 CRF: --	Could potentially be integrated with existing feedback sign	Not needed if roundabout (2-6) occurs first
	2-3	Install Pedestrian Crossing on West Leg of Intersection	Install enhanced pedestrian crossing across US 26. This could take the form of advanced signage, pavement markings, illumination, an RRFB or a hybrid pedestrian beacon. A ped refuge island should be installed prior to activation.	Speed reduction; Vehicular and pedestrian visibility and awareness.	\$90,000 CRF: 56% RRFB CRF: 46% island CRF: 15% Marked crosswalk	Combine with projects 1-2 and/or 2-1b for maximum efficiencies. Should be completed when Project 3-4 is installed.	An engineering study including considerations of traffic speeds should inform the preferred design. Recommendations are based on speeds of 45 mph and crossing volumes <13 people/hour.
	2-7	Install Pedestrian Connection on Paiute Avenue	Install 8-10' hard surface, accessible, shared use path on the east side of Paiute Avenue between US 26 and Wasco Street.	Conflict reduction.	\$25,000 CRF: --	Should be completed with 3-2	Should include curbs and consider right-of-way impacts and which agency is responsible for maintenance. May also include center median island on Paiute Avenue.
	2-5	Install Pedestrian Crossing on South Leg of Intersection	Install marked pedestrian crosswalk and commensurate signage on the Paiute Avenue (northbound) leg to the intersection.	Speed reduction; Vehicular and pedestrian visibility and awareness.	\$3,000	Combine with project 3-4	--
	2-4	Install Pedestrian Crossing on North Leg of Intersection	Install marked pedestrian crosswalk and commensurate signage on the BIA 3 (southbound) leg to the intersection.	CRF: 15% marked crosswalk	\$3,000	Combine with project 3-4	--
Long Term	2-6	Conduct Roundabout Evaluation	Evaluate the feasibility of constructing a roundabout. A roundabout would reinforce speed reduction/gateway treatments and be expected to have lower crash frequency/severity than a potential signal.	Gateway; Speed reduction; Access for pedestrians.	Study: \$20,000 \$3,500,000 (roundabout estimate) B/C: 0.4 CRF: 82% injury crashes	Roundabout would decrease speeds and act as gateway to community.	Evaluation should be completed if volumes or crashes increase. Should consider freight accommodation, pedestrian crossings, topographic constraints, right-of-way impacts, cultural impacts, and operational analysis at a minimum.

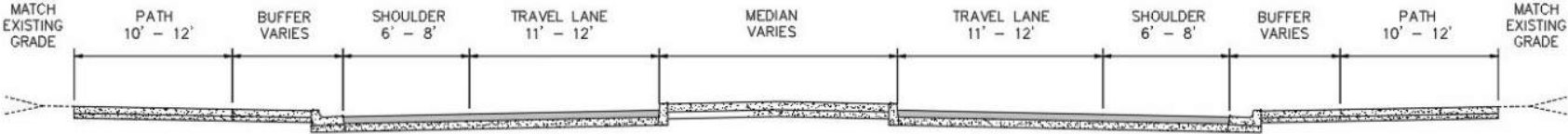
¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.

² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

LOCATION 3: US 26—BETWEEN PAIUTE AVENUE AND HOLLYWOOD BOULEVARD



Cross Section for Urban Street Treatments
at Location 3



Actual cross-section will vary throughout based on changing environmental, topographic, and right-of-way constraints.

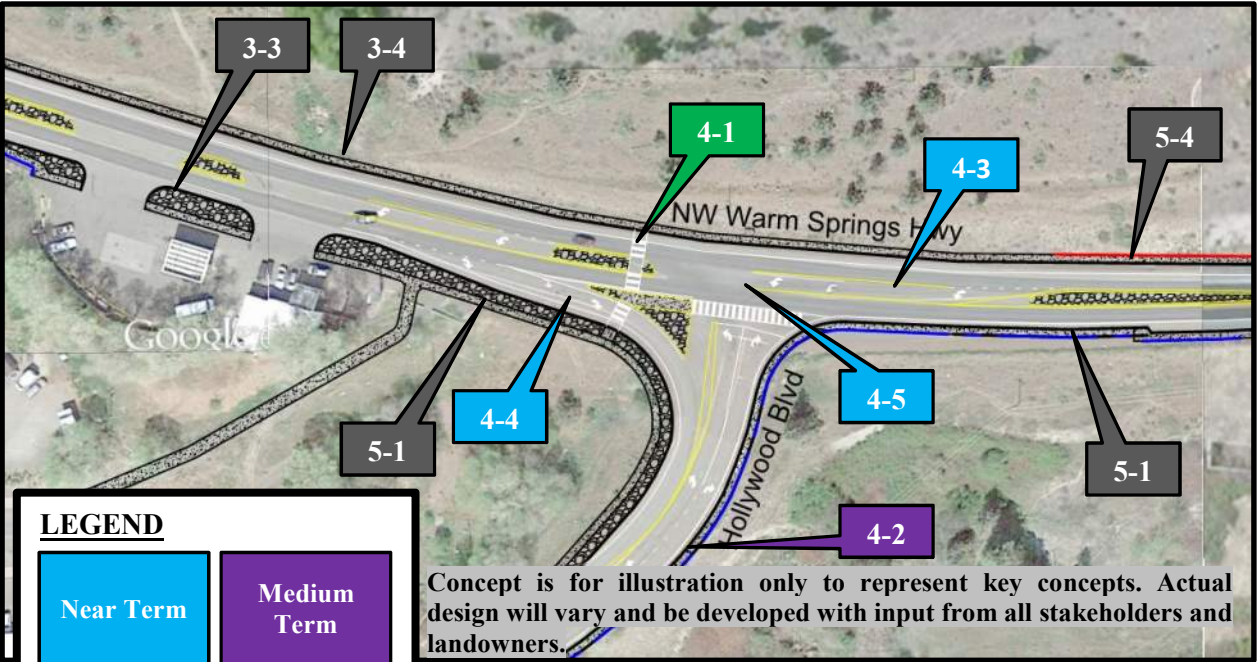
SUMMARY OF PROJECTS – LOCATION 3

	ID	PROJECT	BRIEF PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Medium Term	3-1	Install Urban Cross Section	Install urban cross section along segment of road between Paiute Avenue & Hollywood Boulevard to help manage speed reduction.	Speed reduction; increased driver awareness. CRF: 15% injury crashes (based on 10% speed reduction)	\$310,000 B/C: 0.1	Should be coordinated with project 3-3 for maximum benefits and construction efficiencies.	Coordination between ODOT and property owners is required for this project. The median island will provide clear delineation for left-turning vehicles at the gas station.
	3-2	Install Shared-Use Path (South Side)	Install a hard surface, accessible (10' – 12' wide) path with pedestrian scale illumination along south side of US 26 between Paiute Avenue & Hollywood Boulevard.	Conflict reduction; quality of service. CRF: --	\$200,000	Minimizing buffer width while providing adequate space for utilities and snow (8' minimum when possible) will increase the speed reduction effects of the urban cross section. Should be coordinated with project 3-3 for maximum benefits.	Considerations should include topography, right-of-way impacts, and how the path would cross the gas station. Maintenance and funding responsibility for illumination should be agreed upon by ODOT and the CTWS.
	3-3	Access Management at Gas Station	Redefine access into and out of the gas station to reduce conflict points and increase driver awareness.	Conflict reduction. CRF: 25% injury crashes (based on reduction in driveway density)	\$20,000 B/C: 3.8	Should be coordinated with projects 3-1 and 3-2 for maximum benefits.	Coordination between all parties is required for this project. Operational analysis should consider queuing and turn lanes.
Long Term	3-4	Install Shared-Use Path (North Side)	Install a hard surface, accessible path (8'-10' wide) along north side of US 26 between Paiute Avenue & Hollywood Boulevard to provide a separated facility for pedestrians and bicyclists. Include pedestrian scale illumination.	Conflict reduction; quality of service. CRF: --	\$200,000	Minimizing buffer width while providing adequate space for utilities and snow (8' minimum when possible) will increase the speed reduction effects of the urban cross section.	Topography and right-of-way impacts will need to be assessed when considering configurations. Maintenance and funding responsibility for illumination should be agreed upon by ODOT and the CTWS.

¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.

² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

LOCATION 4: US 26/HOLLYWOOD BOULEVARD INTERSECTION



LOCATION DESCRIPTION

The intersection of Hollywood Boulevard/US 26 connects much of the Warm Springs community to US 26. The intersection sits on a horizontal and vertical curve in close proximity to the gas station.

- Crashes: 2 reported crashes between the years of 2010 and 2014
- Both were rear end crashes

OVERARCHING OPPORTUNITIES

- Enhance intersection to improve sight distance from the side street approach
- Increase pedestrian and bicycle awareness and visibility

OVERARCHING CHALLENGES

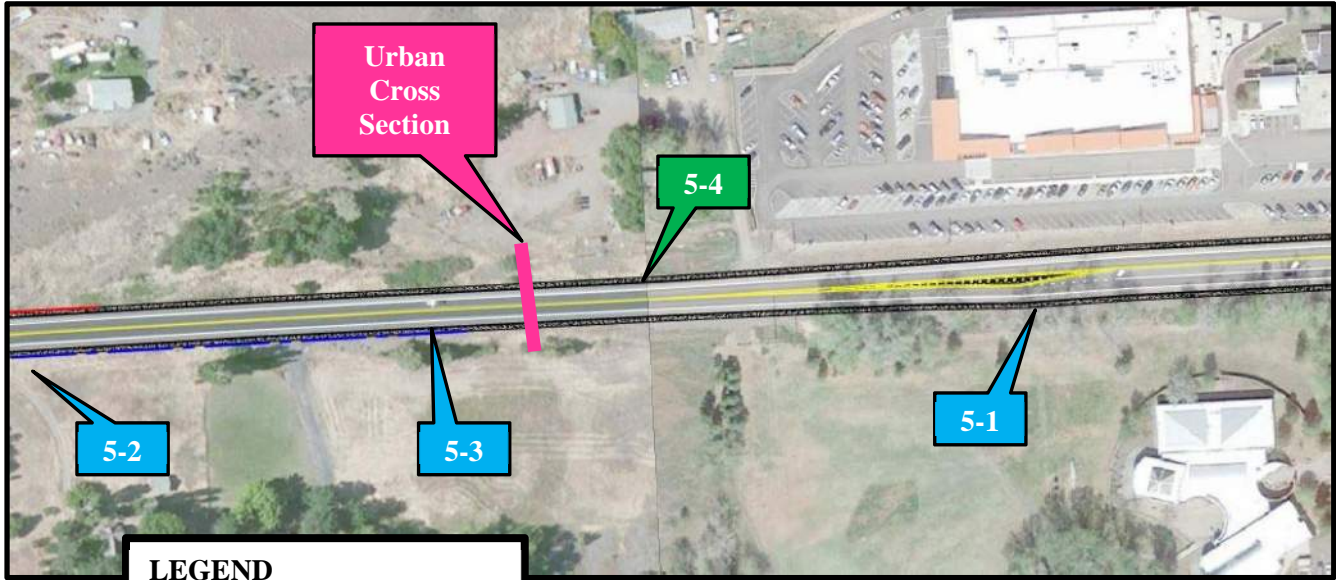
- Impacts to current right-of-way
- Grade changes within intersection
- Accommodate freight trucks (serves as a connection to the alternate route through town)

SUMMARY OF PROJECTS – LOCATION 4							
	ID	PROJECT	BRIEF PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Near Term	4-3	Update Left Turn Lane on US 26	Reconfigure westbound left turn lane to convert from rural design into an urbanized format with shorter tapers and longer storage lengths.	Speed reduction; conflict reduction; sight distance improvement. CRF: --	\$40,000	Combine with project 4-5 if possible for construction efficiencies.	No widening is assumed (construct within existing median space). Project includes median construction on approach to westbound left-turn lane.
	4-4	Update Right Turn Lane on US 26	Reconfigure eastbound right turn lane to convert from rural design into an urbanized format with shorter tapers and longer storage lengths. The channelized right-turn will allow a pedestrian refuge island and encourage reduced turning vehicle speeds.	Speed reduction; sight distance improvement; reduced pedestrian crossing distance. CRF: --	\$45,000	Combine with project 4-5 if possible for construction efficiencies with the pedestrian refuge island.	Truck access should be considered in the design. ⁴ Project should include defining the westbound right-turn merge area and tightening the turn radius with the addition of a median island.
	4-5	Enhance Intersection Sight Distance	Reduce superelevation of US 26 at the intersection to improve sight distance for the Hollywood Boulevard approach	Sight distance improvement. CRF: 15% injury crashes	\$825,000 B/C: 0.2	Combine with projects 4-3, 4-4, and 5-1 if possible for construction efficiencies.	Truck access should be considered in the design. ⁴ This is near-term since the design evaluations are extensive. The effort would reduce superelevation to near 2%.
Medium Term	4-2	Install Path on Hollywood Boulevard	Install shared-use path on the east side of Hollywood Boulevard to connect the path along the south side of US 26 to the crossing at Warm Springs Street.	Conflict reduction. CRF: --	\$50,000	Should be constructed at the same time as or after completing project 5-1. Lane narrowing/median width reduction may help maximize path/buffer width.	Project should include consideration of right-of-way impacts, cultural site southeast of intersection, amount of fill needed, and pedestrian scale illumination along the path and at motor vehicle conflict points.
Long Term	4-1	Install Pedestrian Crossing	Install pedestrian crossing with raised pedestrian refuge island across US 26 at Hollywood Boulevard.	Conflict reduction. CRF: --	\$20,000	Should build upon or coordinate with projects 3-1 and 4-4	Projects 3-1, 3-4, 4-4, and 5-4 should be completed prior to or in conjunction with installing a crossing at this location. Crossing design should consider traffic speeds and pedestrian volume.

¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.

² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

LOCATION 5: US 26—BETWEEN HOLLYWOOD BOULEVARD AND CASINO/MUSEUM INTERSECTION



LEGEND

Near Term

Medium Term

Long Term

Project on Different Page

LOCATION DESCRIPTION

This segment of US 26 is a relatively long segment between key employment centers and Hollywood Boulevard. Pedestrians frequently walk beside the highway along this corridor. Crashes: 3 reported crashes between the years of 2010 and 2014

- All were rear end crashes

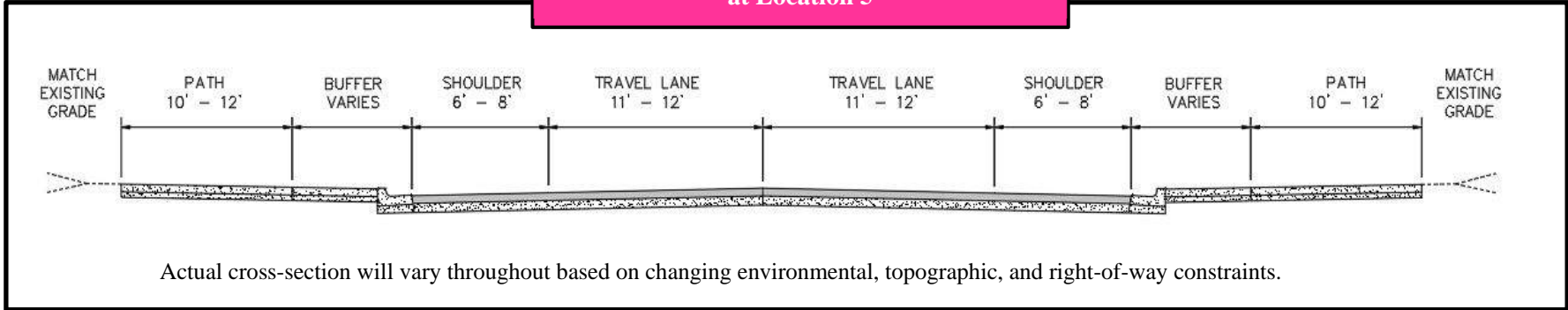
OVERARCHING OPPORTUNITIES

- Increase pedestrian and bicycle awareness and separation from vehicles
- Maintain decreased speeds established at gateways
- Create a safer environment for pedestrians and bicycles

OVERARCHING CHALLENGES

- Existing pedestrian and bicycle use without dedicated facilities

Cross Section for Urban Street Treatments at Location 5

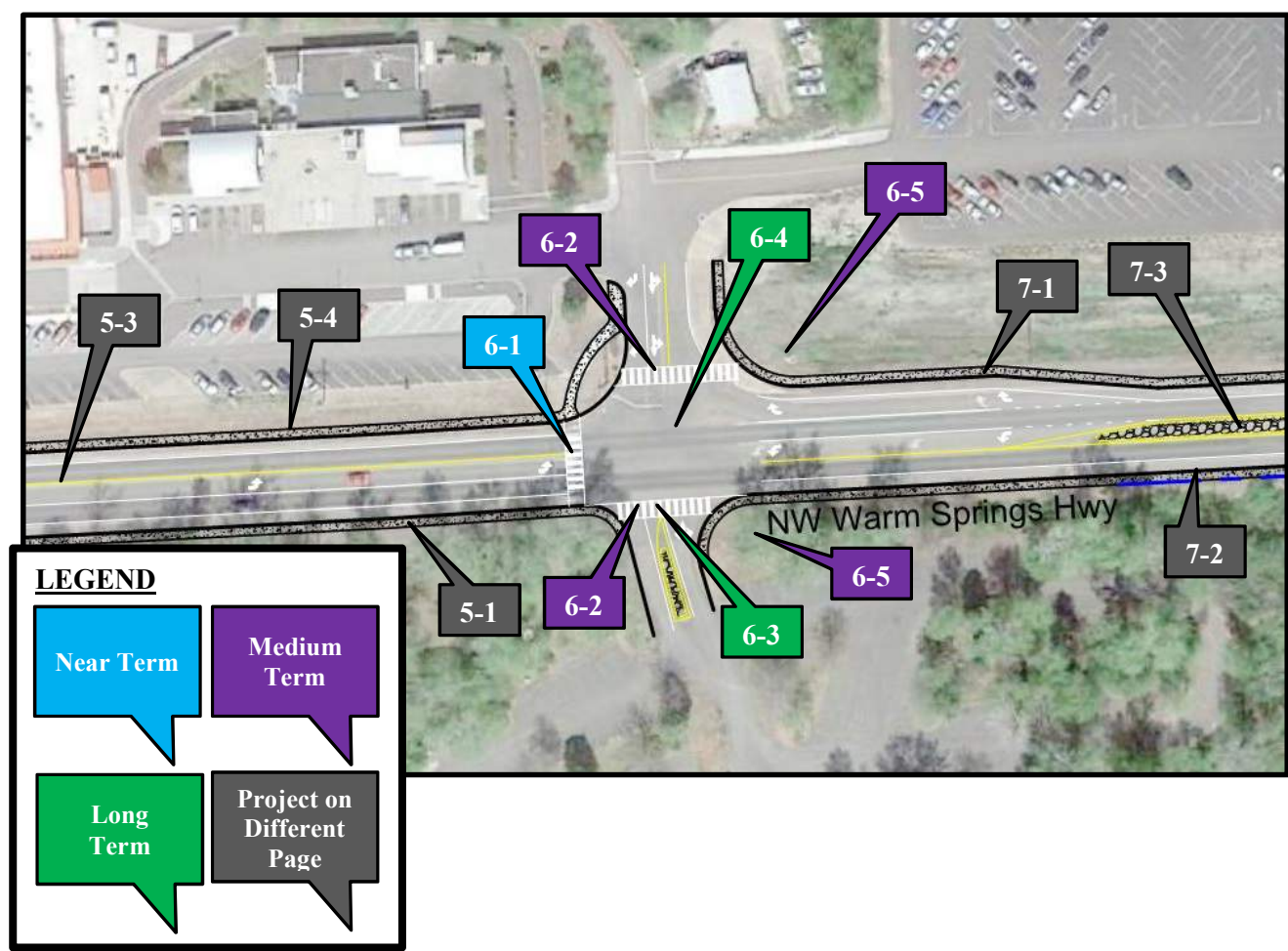


SUMMARY OF PROJECTS – LOCATION 5							
	ID	PROJECT	BRIEF PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Near Term	5-1	Shared Use Path (South Side)	Install a hard surface, accessible path (10’ – 12’ wide) along south side of US 26 between Hollywood Boulevard and the Casino/Museum to provide a separated facility for pedestrians and bicyclists. Include pedestrian scale illumination along the path and at path/vehicle conflict points.	Conflict reduction. CRF: --	\$390,000	Combine with projects 4-5 and 5-3) if possible for construction efficiencies. Minimizing buffer width while providing adequate space for utilities and snow (8’ minimum when possible) will increase the speed reduction effects of the urban cross section.	The design of this project should tie-in to existing path behind the gas station on the west side of Hollywood Boulevard and should consider topography and right-of-way impacts. Extensive earthwork is expected. Design should consider the widening needed for project 6-1. Illumination maintenance should be agreed upon by ODOT and the CTWS.
	5-2	Install Eastbound Feedback Sign	Install feedback sign for eastbound drivers to help maintain reduced speeds along the corridor.	Speed reduction. CRF: 41% all crashes	\$15,000 B/C: 34.9	Combine with projects 5-3 and 6-1 if possible for maximum benefit.	--
	5-3	Install Urban Cross Section	Install urban cross section between Hollywood Boulevard and the Casino/Museum to encourage speed reduction. This should include lane narrowing and adding curbs on both sides of the roadway where they do not exist.	Speed reduction. CRF: 15% injury crashes (based on 10% speed reduction)	\$215,000 B/C: 0.6	Install with projects 5-1 and 5-2 for maximum benefit and construction efficiencies.	Coordination between all property owners and the freight industry is required for this project. Lane widths may be reduced to 11’ and shoulder widths to 6’. Wide shoulders are not recommended to discourage trucks from parking on the shoulder.
Long Term	5-4	Install Shared-Use Path (North Side)	Install a hard surface, accessible path (10’-12’ wide) along north side of US 26 between Hollywood Boulevard and the Casino/Museum to provide a separated facility for pedestrians and bicyclists. Include pedestrian scale illumination.	Conflict reduction. CRF: --	\$360,000	Minimizing buffer width while providing adequate space for utilities and snow (8’ minimum when possible) will increase the speed reduction effects of the urban cross section.	Topography and right-of-way impacts should be assessed through the design of this project. Retaining walls may be needed. Illumination maintenance should be agreed upon by ODOT and the CTWS. The design should deter crossings at the western emergency access to the casino.

¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.

² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is

LOCATION 6: US 26/CASINO/MUSEUM INTERSECTION



LOCATION DESCRIPTION

This location serves as the access to the casino and the museum. Both locations are key employment centers and tourist attractions.
Crashes: There were no reported crashes at this intersection between the years of 2010 and 2014.

OVERARCHING OPPORTUNITIES

- Enhance sight distance on the side street approaches to the intersection
- Increase pedestrian and bicycle awareness, visibility, and comfort crossing

OVERARCHING CHALLENGES

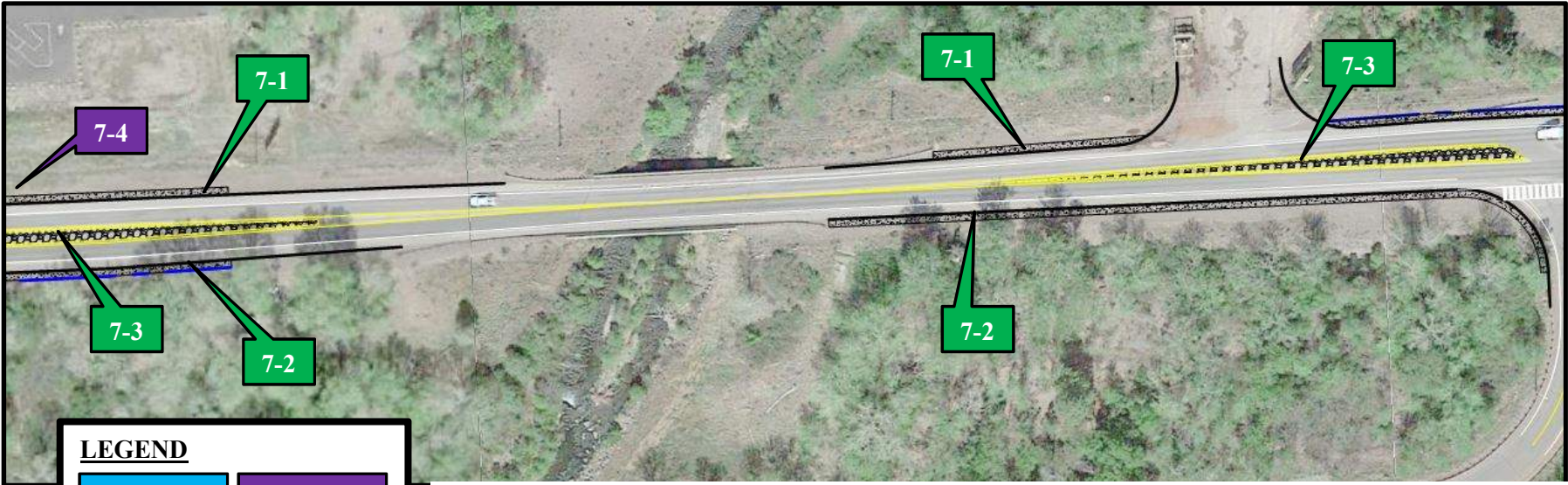
- Restricted sight distance from the side streets

SUMMARY OF PROJECTS – LOCATION 6							
	ID	PROJECT	BRIEF PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Near Term	6-1	Enhance Existing Pedestrian Crosswalk	Install enhanced crossing across US 26 with a pedestrian refuge island. Include supplemental illumination on the SW intersection corner. Consider an active crossing if volumes increase.	Pedestrian and intersection awareness; speed reduction. CRF (pedestrian crashes): 46%: island CRF: 15% marked crosswalk	\$60,000	Should consider widening roadway for a pedestrian refuge island. Some space may be obtained through lane narrowing.	Combine with projects 5-2, 5-3, 6-2, and 6-3 for maximum benefits in speed reduction. Pedestrian crossing volumes from the 2016 Casino Traffic Monitoring Study do not warrant an active crossing and should be reevaluated after completion of the path.
	6-2	Install Pedestrian Crosswalks	Install marked pedestrian crosswalks and commensurate signage on both minor street approaches to the intersection.	Pedestrian and intersection awareness. CRF: 15% marked crosswalk	\$6,000	--	Projects 6-3, 6-5, 7-1, and 7-2 should be completed prior to this project.
Medium Term	6-5	Install Intersection Illumination	Install intersection illumination in the northeast and southeast corners of the intersection.	Pedestrian and intersection awareness. CRF: 38% injury crashes at night	\$25,000 B/C: 0.5	--	Project should be completed prior to 6-2.
	6-3	Enhance Intersection Sight Distance	Adjust grades at south leg of intersection to bring the approach up to the highway and enhance sight distance for drivers entering US 26	Improved sight distance. CRF: 15% injury crashes (sight distance improvements)	\$215,000 B/C: 0.3	Project should include the review of sight distance and the relocation/removal of trees or objects that restrict sight distance.	Project should include coordination with the museum property owner for right-of-way and access considerations.
Long Term	6-4	Conduct Evaluation for Signal or Roundabout	Evaluate the feasibility of a signal or roundabout if traffic volumes, number of crashes, or crash severity increases.	CRF: 67-77% angle crashes (signal); 58-143% increase in rear-end crashes CRF: 82% injury crashes (roundabout)	Study: \$20,000 Varies (\$400,000 - \$3,500,000)	A roundabout would reinforce of speed reduction treatments and the opportunity for vehicles to turn around in the event of a highway closure.	Project (intersection control evaluation) should be initiated by the Casino per the IGA developed between the casino and ODOT. Evaluation should consider right-of-way impacts, safety, operations, freight, and environmental impacts. Traffic data collected in 2015 as part of the Casino’s traffic monitoring report did not meet warrants for a traffic signal, with the exception of Sunday.

¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.

² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

LOCATION 7: US 26—BETWEEN MUSEUM/CASINO INTERSECTION AND TENINO ROAD



LOCATION DESCRIPTION

This segment forms part of the connection between the casino/museum and the western portion of the community. With the closure of the lumber mill, this segment is not as heavily used by pedestrians as it once may have been. Crashes: 2 reported crashes between the years of 2010 and 2014

- 1 rear end
- 1 miscellaneous

OVERARCHING OPPORTUNITIES

- Speed management
- Pedestrian and bicycle connectivity

OVERARCHING CHALLENGES

- Existing bridge constraints on US 26

SUMMARY OF PROJECTS – LOCATION 7							
	ID	PROJECT	BRIEF PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Medium Term	7-4	Maintain Westbound Speed Feedback Sign	Maintain existing westbound speed feedback sign to help maintain reduced speeds along the corridor.	Speed reduction. CRF: 41% all crashes	Exists under current conditions	Combine with project 7-3 if possible for maximum benefits to reinforce speed reduction efforts	--
Long Term	7-1	Install Shared-use Path on North Side of US 26	Install a hard surface, accessible path (10’ – 12’ wide) on the north side of US 26 between the casino and the Deschutes River to provide a separated facility for pedestrians and bicyclists. Include pedestrian scale illumination.	Conflict reduction. CRF: --	\$580,000	Minimizing buffer width while providing adequate space for utilities and snow (8’ minimum when possible) will increase the speed reduction effects of the urban cross section. Should be coordinated with project 7-3 for maximum benefits.	The design of this project should consider topography, right-of-way impacts, proximity to the creek and steelhead sensitivity buffer, and bridge dimensions. The existing US 26 bridge over Shitike Creek is not wide enough to accommodate the path. Project design should tie into existing sidewalks on the US 26 bridge over the Deschutes River. Buffer width may require design variations from the Highway Design Manual due to these constraints. Illumination maintenance should be agreed upon by ODOT and the CTWS.
	7-2	Install Path on South Side of US 26	Install path a hard surface, accessible path (10’ – 12’ wide) on the south side of US 26 between the casino and the Deschutes River to provide a separated facility for pedestrians and bicyclists. Include pedestrian scale illumination.	Conflict reduction. CRF: --	\$580,000	This project may increase in priority if redevelopment of land south of US 26 occurs. Minimizing buffer width while providing adequate space for utilities and snow (8’ minimum when possible) will increase the speed reduction effects of the urban cross section. Project design should be coordinated with projects 7-3 and 9-2	The design of this project should consider topography, right-of-way impacts and bridge constraints. Project should tie into existing US 26 bridge over the Deschutes River. Buffer width may require design variations from the Highway Design Manual due to these constraints. Further study is needed to evaluate the existing US 26 bridge crossing over Shitike Creek. Illumination maintenance should be agreed upon by ODOT and the CTWS.
	7-3	Install Urban Cross Section	Install urban cross section to encourage speed reduction. This should include lane narrowing and adding curbs on both sides of the roadway where they do not exist.	Speed reduction. CRF: 15% injury crashes (based on 10% reduction in speed)	\$250,000 B/C: 0.36	Should be constructed with projects 7-1 and 7-2 construction efficiencies and to reduce vehicle travel speeds.	Coordination with freight industry should be completed during the design of the project. Lane widths may be reduced to 11’ and shoulder widths to 6’. Wide shoulders are not recommended to discourage trucks from parking on the shoulder.

¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.

² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

LOCATION 8: US 26/TENINO ROAD INTERSECTION



LEGEND

Near Term

Medium Term

Long Term

Project on Different Page

LOCATION DESCRIPTION

The intersection of US 26/Tenino Road forms an eastern connection to the Warm Springs community. Tenino Road connects to the local school and provides an alternate route to US 26 in the event of emergency highway closures.
Crashes: There were no reported crashes at this intersection between the years of 2010 and 2014.

OVERARCHING OPPORTUNITIES

- Enhance intersection to facilitate movements between Tenino Road/US 26
- Increase pedestrian and bicycle awareness
- Maintain speed reduction

OVERARCHING CHALLENGES

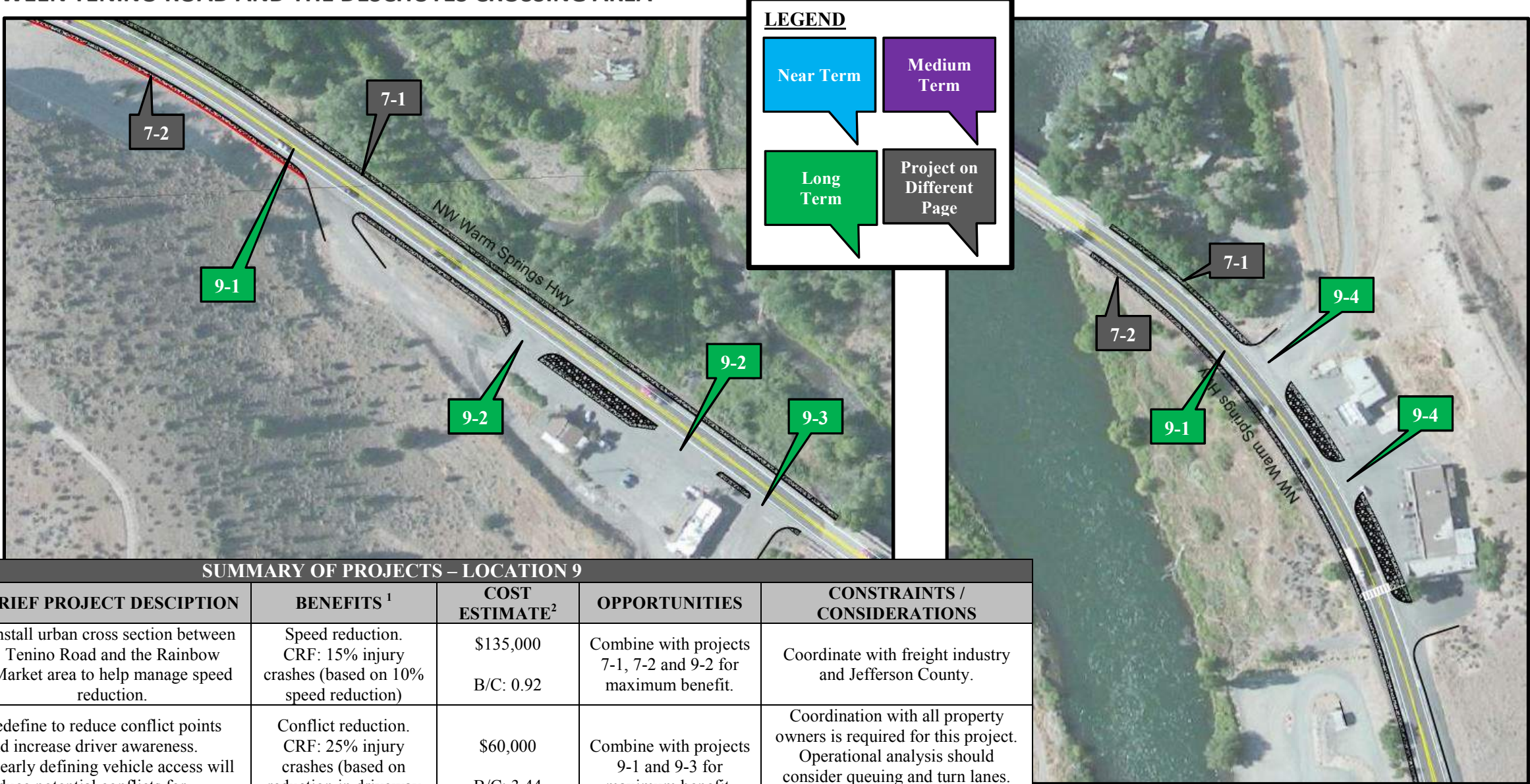
- Accommodate freight trucks (alternate route through town)

SUMMARY OF PROJECTS – LOCATION 8							
	ID	PROJECT	BRIEF PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Long Term	8-1	Conduct Evaluation for Signal or Roundabout	Evaluate the feasibility of a signal or roundabout if traffic volumes, number of crashes, or crash severity increases.	CRF: 67-77% angle crashes (signal); 58-143% increase in rear-end crashes CRF: 82% injury crashes (roundabout)	Study: \$20,000 Varies (\$400,000 - \$3,500,000)	A roundabout would reinforce the speed reduction treatments and the opportunity for vehicles to turn around in the event of a highway closure.	The evaluation should consider right-of-way impacts, safety impacts, operational impacts, freight, and environmental impacts at minimum.
	8-2	Install Pedestrian Crosswalk	Install marked pedestrian crosswalk and commensurate signage on the Tenino (southbound) leg to the intersection.	Pedestrian & intersection awareness; speed reduction. CRF (pedestrian crashes): 15% marked crosswalk	\$3,000	The crosswalk should be installed at the same time as the path on the south side of US 26 (project 7-2).	--

¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.

² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

LOCATION 9: US 26—BETWEEN TENINO ROAD AND THE DESCHUTES CROSSING AREA



SUMMARY OF PROJECTS – LOCATION 9

	ID	PROJECT	BRIEF PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Long Term	9-1	Install Urban Cross Section	Install urban cross section between Tenino Road and the Rainbow Market area to help manage speed reduction.	Speed reduction. CRF: 15% injury crashes (based on 10% speed reduction)	\$135,000 B/C: 0.92	Combine with projects 7-1, 7-2 and 9-2 for maximum benefit.	Coordinate with freight industry and Jefferson County.
	9-2	Access Management at Eagle Crossing Restaurant Area	Redefine to reduce conflict points and increase driver awareness. Clearly defining vehicle access will reduce potential conflicts for vehicles, pedestrians, and bicyclists.	Conflict reduction. CRF: 25% injury crashes (based on reduction in driveway density)	\$60,000 B/C: 3.44	Combine with projects 9-1 and 9-3 for maximum benefit.	Coordination with all property owners is required for this project. Operational analysis should consider queuing and turn lanes. Consider tree removal to improve sight distance.
	9-3	Conduct Feasibility Study to Realign Jackson Trail	Conduct a feasibility study to realign the Jackson Trail approach to US 26 to the west of the Eagle Crossing development area.	Improve sight distance CRF: --	\$30,000	Combine construction of realignment with project 9-2 for maximum benefit & efficiencies.	The study should consider right-of-way impacts, topography and coordination with land owners.
	9-4	Access Management at Rainbow Market	Redefine access points to reduce conflict points and increase driver awareness. Clearly defining vehicle access will reduce potential conflicts for vehicles, pedestrians, and bicyclists.	Conflict reduction. CRF: 25% injury crashes (based on reduction in driveway density)	\$60,000 B/C: 2.24	Combine with project 10-1 for maximum benefit & efficiencies.	Coordination with Jefferson County and all owners is required for this project. Operational analysis should consider queuing and the need for eastbound left-turn lanes.

¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.

² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

LOCATION DESCRIPTION

This segment of US 26 contains several destinations with undefined access along US 26.

Crashes: There were 4 reported crashes between the years of 2010 and 2014

- 2 rear ends
- 1 non-collision
- 1 sideswipe

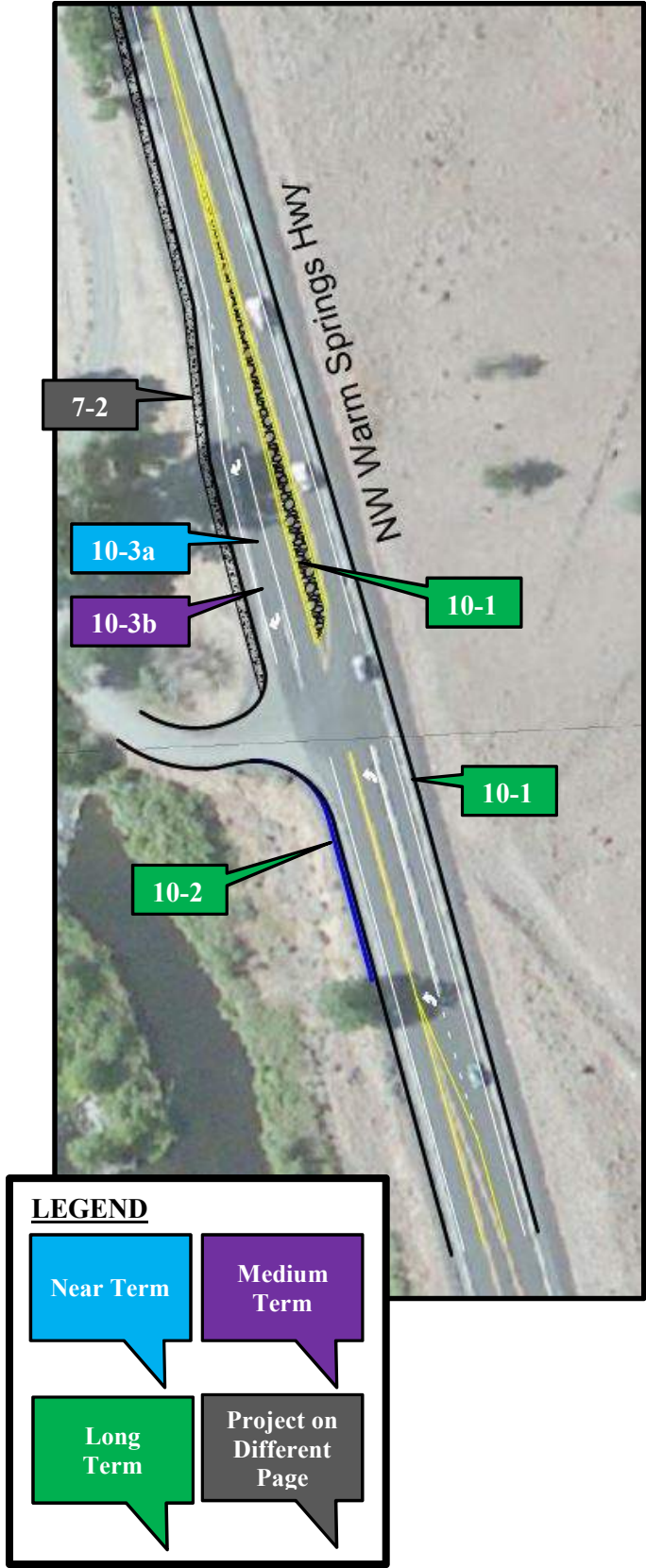
OVERARCHING OPPORTUNITIES

- Continue speed reduction from eastern gateway

OVERARCHING CHALLENGES

- Uncertain timing and impacts of future development
- Access management at current establishments

LOCATION 10: US 26 FROM RAINBOW MARKET AREA TO EAST END OF THE CORRIDOR



SUMMARY OF PROJECTS – LOCATION 10							
	ID	PROJECT	BRIEF PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Near Term	10-3a	Restripe Turn Lane	Restripe turn lanes to better define merge areas to encourage drivers to complete the merge from the travel lane to the turn lane, better indicating lane choices and increasing driveway sight distance.	Speed reduction; sight distance improvements. CRF: 48% injury crashes (sight distance improvements)	\$1,500	This will assist in reducing vehicle turning speeds where pedestrians may be crossing the driveway.	This project is an interim project for 10-3b. Coordinate with Jefferson County.
	10-3b	Restripe and Widen Turn Lane	Restripe and widen turn lanes to an urbanized format with shorter tapers and longer storage lengths. This encourages drivers to access their turn-lane farther upstream compared to the existing rural striping configuration. This will indicate lane choices earlier and increase driveway sight distance.		\$170,000		Cost estimates do not include significant earthwork, and adapting to existing topography may increase construction costs. Coordinate with Jefferson County.
Long Term	10-1	Install Gateway Treatments	Install curb, median, speed feedback sign, and potentially restripe and narrow travel lanes to provide visual cues that alert westbound drivers to a new environment, encourage slower speeds, and increase driver awareness of the changed land uses.	Speed reduction. CRF: 15% injury crashes (based on 10% speed reduction)	\$50,000	Combine with project 10-2 for maximum benefit.	Project assumes no roadway widening (raised median will remain within existing striped median width). The median should include end treatment channelization and shy distance per the Highway Design Manual. Coordination with the freight industry is needed regarding lane widths (11’ recommended) and shoulder widths (6’ minimum). Coordinate with Jefferson County.
	10-2	Install Roadway Illumination	Install light poles to increase illumination.	Speed reduction. CRF: 28% nighttime injury crashes	\$140,000	Combine with project 10-1 for maximum benefit.	Coordinate with Jefferson County.

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² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

LOCATION DESCRIPTION

This segment forms the approach (gateway) to the Warm Springs community for vehicles traveling westbound.

Crashes: There were no reported crashes along this segment between the years of 2010 & 2014.

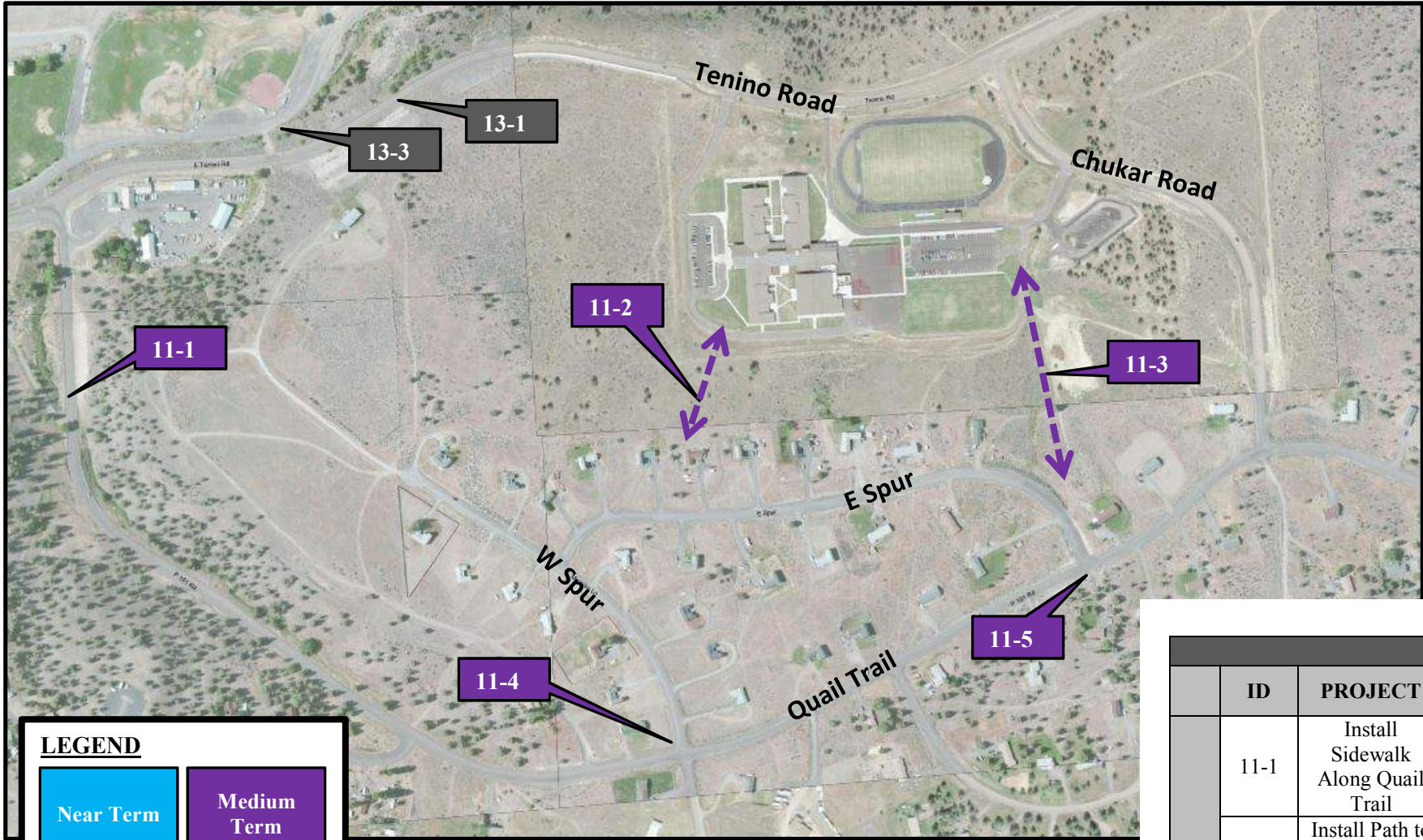
OVERARCHING OPPORTUNITIES

- Increase driver awareness to the change in environment (gateway treatments)
- Reduce speed of vehicles entering the community
- Creating a safer environment for pedestrians/bicycles

OVERARCHING CHALLENGES

- Accommodating freight trucks on US 26

LOCATION 11: OFF HIGHWAY - SCHOOL AREA



LEGEND

Near Term

Medium Term

Long Term

Project on Different Page

LOCATION DESCRIPTION
This section of Warm Springs contains the school and residential housing areas.
Crashes: There were no reported crashes within this area between the years of 2010 and 2014.

OVERARCHING OPPORTUNITIES

- More complete pedestrian connectivity throughout area and to the school

OVERARCHING CHALLENGES

- Coordination with private property owners

SUMMARY OF PROJECTS – LOCATION 11							
	ID	PROJECT	BRIEF PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES ³	CONSTRAINTS / CONSIDERATIONS ³
Medium Term	11-1	Install Sidewalk Along Quail Trail	Install sidewalk to provide a separated facility for pedestrians. Illumination should be installed at motor vehicle crossing points.	Conflict reduction. CRF: --	\$350,000	Combine with projects 11-4 and 11-5 for maximum benefit.	The design of this project should consider topography and right-of-way impacts.
	11-2	Install Path to Connect Community to School	Install a hard surface, accessible path (10-12’ wide) with illumination to provide a separated facility for pedestrians and bicyclists.	Conflict reduction; quality of service. CRF: --	\$100,000	--	The design of this project should consider topography and right-of-way impacts. Coordination with property owners will be needed.
	11-3	Install Path to Connect Community to School	Install a hard surface, accessible path (10-12’ wide) with illumination to provide a separated facility for pedestrians and bicyclists.		\$120,000	--	
	11-4	Install Pedestrian Crossings to Connect Community to School	Install a marked pedestrian crossing and commensurate signage across the four legs of the intersection at Quail Trail/ W Spur Road.	Pedestrian visibility & awareness; intersection awareness. CRF (pedestrian crashes): 15% marked crosswalk	\$5,000	Combine with projects 11-1 and 11-5 for maximum benefit.	The design of this project should consider topography and right-of-way impacts.
	11-5	Install Pedestrian Crossings to Connect Community to School	Install a marked pedestrian crossing and commensurate signage across the four legs of the intersection at Quail Trail/ E Spur Road.		\$5,000	Combine with projects 11-1 and 11-4 for maximum benefit.	

¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.
² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

LOCATION 12: OFF HIGHWAY - HOLLYWOOD BOULEVARD

LOCATION DESCRIPTION

Hollywood Boulevard forms the primary connection between the community of Warm Springs and US 26.

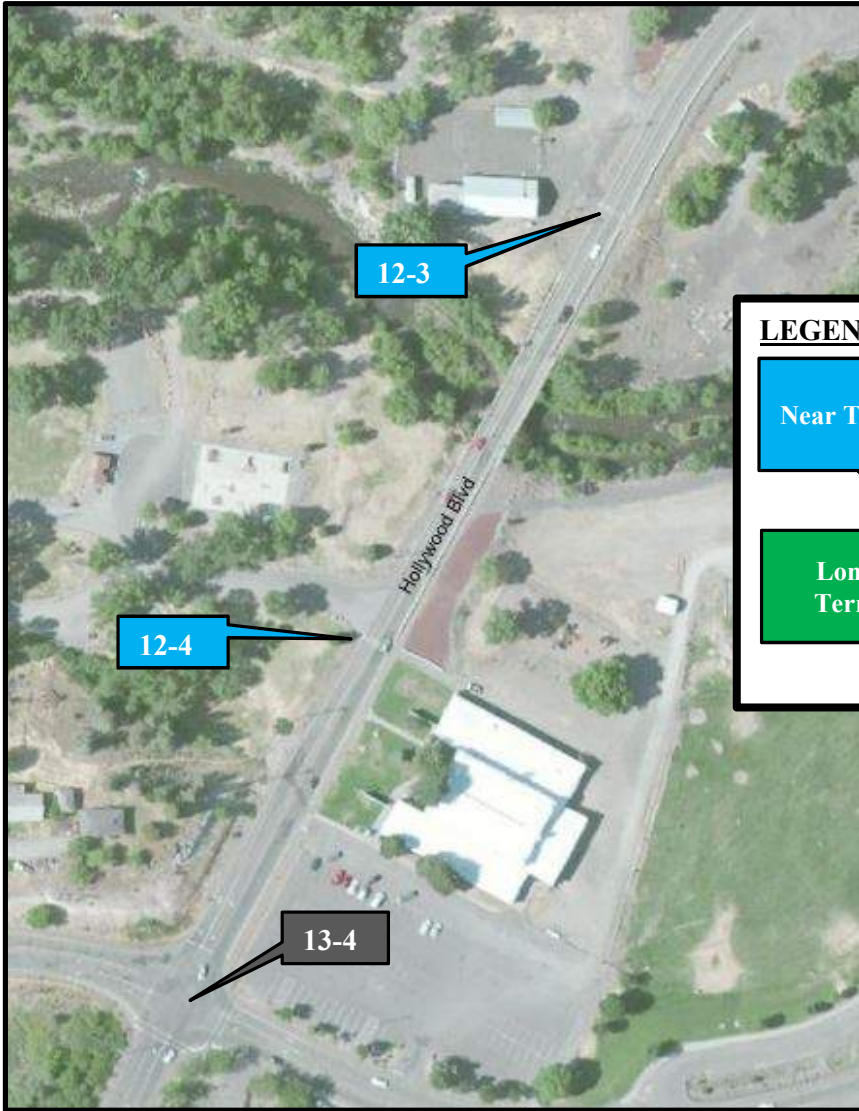
Crashes: There were no reported crashes along this segment between the years of 2010 and 2014.

OVERARCHING OPPORTUNITIES

- More complete pedestrian connectivity
- Creating a safer environment for pedestrians/bicycles

OVERARCHING CHALLENGES

- Accommodating freight trucks as an alternate route to US 26



LEGEND

Near Term

Medium Term

Long Term

Project on Different Page

SUMMARY OF PROJECTS – LOCATION 12							
	ID	PROJECT	BRIEF PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Near Term	12-2	Enhance Existing Pedestrian Crosswalk	Install enhanced crossing with illumination across Hollywood Blvd.	Pedestrian visibility & awareness. CRF (pedestrian crashes): 56% RRFB CRF: 15% marked crosswalk	\$30,000	Combine with project 4-2 for maximum benefit.	The design of this project should consider topography and right-of-way impacts. An active crossing should be considered if volumes increase.
	12-3	Enhance Existing Pedestrian Crosswalk	Install enhanced crossing with illumination across Hollywood Blvd.		\$30,000	--	
	12-4	Enhance Existing Pedestrian Crosswalk	Install enhanced crossing with illumination across Hollywood Blvd.		\$30,000	--	
Long Term	12-1	Enhance Shared-Use Path	Install lighting along existing path to provide a greater visibility and driver awareness.	Pedestrian visibility & awareness. CRF: --	\$40,000	Combine with project 12-3 for maximum benefit.	The design of this project should consider topography and right-of-way impacts.

¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.

² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

LOCATION 13: OFF HIGHWAY – TENINO ROAD



LOCATION DESCRIPTION

Tenino Road serves as a key alternate route to US 26. It also provides access to the Warm Springs school and residential areas. Crashes: There were 2 reported crashes between the years of 2010 and 2014

- 1 angle
- 1 turning movement

OVERARCHING OPPORTUNITIES

- More complete pedestrian connectivity
- Speed reduction

OVERARCHING CHALLENGES

- Accommodating freight trucks as an alternate route to US 26
- Topography constraints on the north side of Tenino Road

LEGEND

Near Term

Medium Term

Long Term

Project on Different Page

SUMMARY OF PROJECTS – LOCATION 13							
	ID	PROJECT	BRIEF PROJECT DESCRIPTION	BENEFITS ¹	COST ESTIMATE ²	OPPORTUNITIES	CONSTRAINTS / CONSIDERATIONS
Near Term	13-1	Install Eastbound Feedback Sign	Install feedback sign for eastbound drivers to help maintain reduced speeds along the corridor.	Speed reduction. CRF: 41% all crashes	\$15,000 B/C: 2.18	This will reinforce school zone speed limits.	--
	13-2	Install Westbound Feedback Sign	Install feedback sign for westbound drivers to help maintain reduced speeds along the corridor.	Speed reduction. CRF: 41% all crashes	\$15,000 B/C: 2.40	This will reinforce school zone speed limits.	--
Long Term	13-3	Feasibility Study for Ballfield Connections	Conduct a feasibility study to determine the preferred alternative and alignment for a more direct connection such as a shared-use path or stair case to connect the ballfields with Tenino Road.	Conflict reduction; improved quality of service. CRF: --	\$30,000	--	The design should account for a pedestrian crossing of Tenino Road where the preferred alternative ties in with Tenino Road. Topography will be a challenge.
	13-4	Conduct Evaluation for Signal or Roundabout	Evaluate the feasibility of a signal or roundabout at Hollywood Boulevard/Tenino Road if traffic volumes, number of crashes, or crash severity increases.	CRF: 67-77% angle crashes (signal); 58-143% increase in rear-end crashes CRF: 82% injury crashes (roundabout)	\$20,000	A roundabout would reinforce the speed reduction treatments along Tenino Road and Hollywood Boulevard.	The evaluation should consider right-of-way impacts, safety impacts, operational impacts, freight, and environmental impacts. This is an important intersection as part of the US 26 by-pass route for trucks in the event of a highway closure.
	13-5	Install Sidewalks	Install sidewalk on one side of Tenino Road between Chukar Road and US 26 to connect existing paths along Tenino Road with paths along US 26.	Conflict reduction; improved quality of service. CRF: --	\$200,000	Combine with project 13-2 for maximum benefit.	--

¹ CRF = Crash Reduction Factor. CRFs are not available to quantify all safety benefits associated with the recommendations. Therefore, B/C ratios (B/C) are provided in the cost estimate column, when available, to inform prioritization recommendations, but engineering judgement and risk factors supplement these numbers.

² All cost estimates are planning level and do not include right-of-way or significant earthworks costs. A 50% contingency is applied to cost estimates.

SUMMARY OF RECOMMENDED PROJECTS

Table 5 presents a summary of total cost by priority for the study area. As shown in the table, the total cost to implement the recommendations in the Safety Plan is nearly \$7 million. Near-term recommendations account for approximately \$1.8 million. The majority of the near-term recommendations on US 26 are identified for the western section of the study area. The recommendations in this area are higher priority than others due to the potential for the highest cost effectiveness. The recommendations in this area are intended to address the issues documented by reported crash data in this area of the corridor.

Table 5. Summary of Project Costs

Location ID	Location	Near-Term	Medium-Term	Long-Term	Total
1	US 26 (West of Paiute Ave/BIA 3)	\$80,000	\$0	\$40,000	\$120,000
2	US 26/Paiute Ave/BIA 3 Intersection	\$5,000	\$543,000	\$3,000	\$551,000
3	US 26 (Paiute Ave to Hollywood Blvd)	\$0	\$530,000	\$200,000	\$730,000
4	US 26/Hollywood Boulevard Intersection	\$910,000	\$50,000	\$20,000	\$980,000
5	US 26 (Hollywood Boulevard to Casino/Museum Intersection)	\$620,000	\$0	\$360,000	\$980,000
6	US 26/Casino/Museum Intersection	\$60,000	\$31,000	\$235,000	\$326,000
7	US 26 (Casino/Museum to Tenino Road)	\$0	\$0	\$1,410,000	\$1,410,000
8	US 26/Tenino Road Intersection	\$0	\$0	\$23,000	\$23,000
9	US 26 (Tenino Road to Deschutes River)	\$0	\$0	\$285,000	\$285,000
10	US 26 (Deschutes River to East End of Study Area)	\$1,500	\$170,000	\$190,000	\$361,500
11	Off Highway - School Area	\$0	\$580,000	\$0	\$580,000
12	Off Highway - Hollywood Boulevard	\$90,000	\$0	\$40,000	\$130,000
13	Off Highway - Tenino Road	\$30,000	\$0	\$250,000	\$280,000
	Total	\$1,796,500	\$1,904,000	\$3,056,000	\$6,756,500

In addition to the recommendations on US 26, several low-cost recommendations along Hollywood Boulevard and Tenino Road are recommended for near-term implementation. These are projects that are focused on improving pedestrian visibility at key crossing locations and reducing speed in the school vicinity.

ODOT is moving forward with plans to complete a section of the shared-use path along the south side of US 26 between Hollywood Boulevard and the Indian Head Casino. Appendix 6 provides meeting materials from the Tribal Council meeting held in December 2016. During this meeting, the path project was discussed. These materials illustrate the scope of the near-term ODOT project that is currently under design.

PROGRAMMATIC AND POLICY RECOMMENDATIONS

The projects recommended are primarily engineering based solutions. However, there are a variety of other strategies that are needed to form a comprehensive safety plan. The following additional recommendations are intended to complement the engineering solutions and support the continual evaluation of the plan. These policy and programmatic recommendations go beyond engineering and include education, enforcement, and reevaluation of the progress the plan is making. The following recommendations are intended to complement the engineering-focused projects.

- **Education:** Education content for students at the school should address safe crossing practices, appropriate side of the road for traveling as a pedestrian when sidewalks are not present, and best practices for skateboarding. Although Tenino Road has new sidewalks on one side of the road, a common concern dealt with skateboards on the sidewalk. On downhill sections, the skateboarders should walk on the sidewalk to avoid injuring another pedestrian.
- **Enforcement:** Many of the recommended projects recommended will not be successful without effective enforcement. For example, truck parking along the highway was noted as an issue. Even with “No Parking” signs installed, the issue may continue if it is not enforced. Similarly, speed is a concern in the corridor. Enforcement should focus on maintaining speeds through the 45 mph zone.

Engineering, education, and enforcement can be augmented with a robust evaluation component. This first begins with having baseline data from which to measure the progress of the safety plan execution and to identify future refinements. An additional recommendation is to improve the collection and assembly of crash data:

- **Data Collection:** Crash data records were limited within the study area, particularly off the state highway. The PAC believed reported crash data did not fully represent the crashes that had occurred within the reservation. The CTWS should develop a consistent method of gathering data for crashes and reporting the data to the state. ODOT stores reported crash data and relies heavily on the reported crash data to identify safety issues and award grant funding for projects. This comprehensive data would assist the CTWS in being competitive for future project grants in addition to monitoring for progress towards the goals of the Safety Plan.

Finally, the safety plan considered opportunities to improve safety performance and manage risk for non-motorized travel in the community in general and, specifically, near school. CTWS could explore specific programs to support student safety and integrate pedestrian and bicycle facilities as part of future development. This could include activities associated with:

- **Safe Routes to School:** Several projects are identified are focused on improving pedestrian connections to the local school. KAI recommends the CTWS develop a Safe Routes to School Plan for the school to identify additional improvements and supporting programs that may be needed.
- **Development Standards:** KAI recommends the CTWS adopt development standards that require new developments to include frontage improvements along their roadway, consistent

with the cross-section for the specific location. This will help the CTWS build towards the community's vision.

- **Prioritize Pedestrian Connections to Transit:** KAI recommends the CTWS prioritize pedestrian facilities and lighting enhancements at transit stops and along transit routes. These enhancements work towards creating a complete multimodal system for all users.

APPENDICES

APPENDIX 1: TECHNICAL MEMORANDUM #1 (METHODOLOGY)

APPENDIX 2: PUBLIC INVOLVEMENT MEETING SUMMARIES

APPENDIX 3: CTWS CRASH DATA SUMMARY STATISTICS

APPENDIX 4: HISAFE ANALYSIS REPORTS FOR HSM CALCULATIONS

APPENDIX 5: PROJECT TOOLBOX

APPENDIX 6: MEETING MATERIALS FROM DECEMBER 2016 MEETING ABOUT
SHARED-USE PATH PROJECT

APPENDIX 1: TECHNICAL MEMORANDUM #1 (METHODOLOGY)



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TRANSPORTATION ENGINEERING / PLANNING

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TECHNICAL MEMORANDUM

Warm Springs Commercial Corridor Safety Plan

Technical Memorandum #1: Project Overview and Methodology

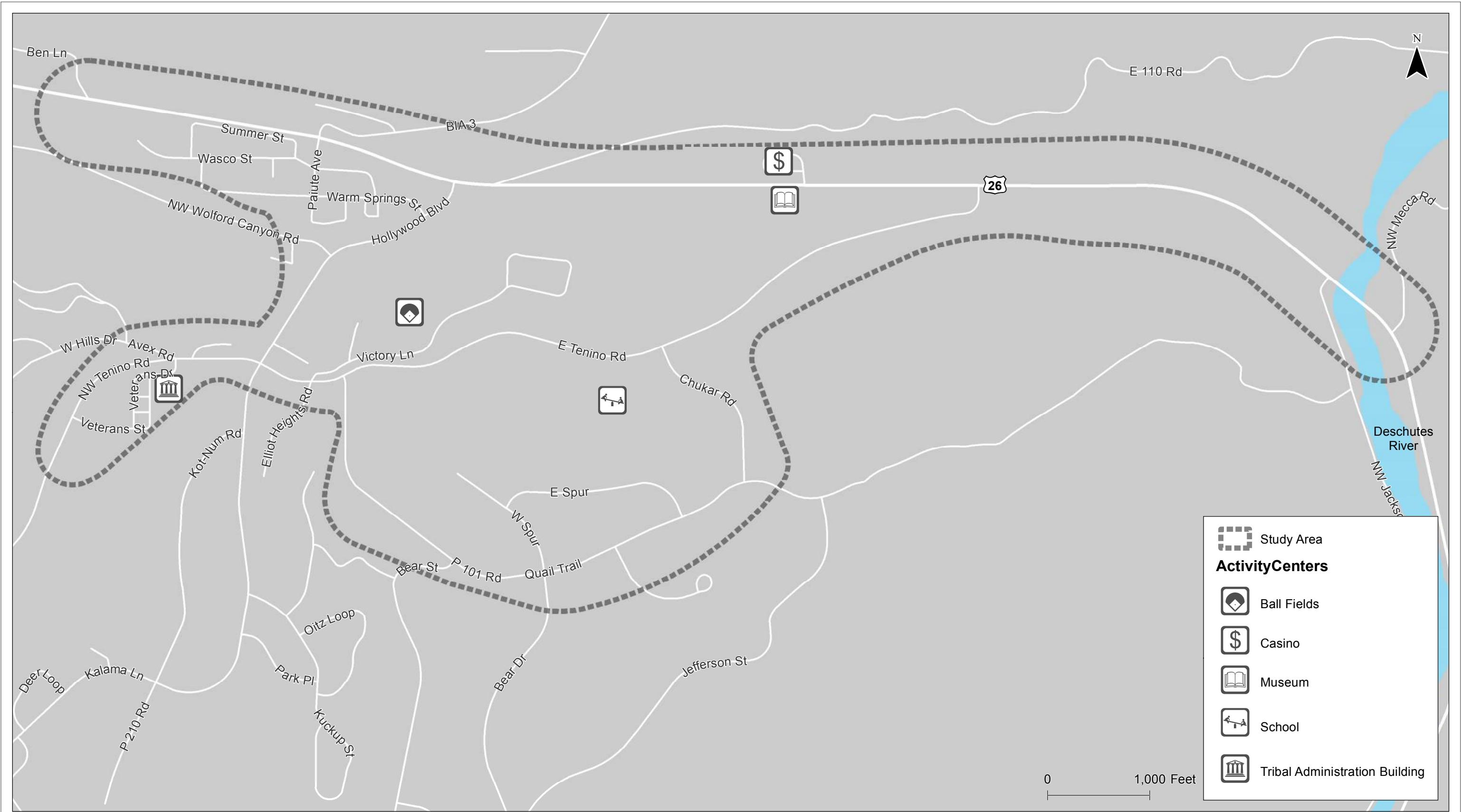
Date:	March 17, 2017	Project #: 19780
To:	Michael Duncan, ODOT	
From:	Ashleigh Ludwig, AICP, Jessica Spivey, and Brian Ray, PE	
cc:	Lonny Macy, Confederated Tribes of Warm Springs	

This memorandum provides an overview of the Warm Springs Commercial Corridor Safety Plan. It describes the methodology that will be used to evaluate the study area and develop recommendations as part of the Plan.

STUDY PURPOSE

The Warm Springs Commercial Corridor Safety Plan is intended to develop a set of goals, objectives, and strategies that improve the safety performance on and around the Warm Springs Commercial Corridor. The Plan is intended to supplement and build upon the goals of the 2014 Warm Springs Transportation Plan. This Plan will also identify and prioritize safe and efficient infrastructure for all modes of transportation.

The Plan focuses on an approximately three mile section of US 26 from the intersection at Paiute Avenue (BIA 3) to the southeastern boundary of the reservation at the Deschutes River Crossing and nearby streets including Hollywood Boulevard, Tenino Road, and Quail Trail, as illustrated in Figure 1.



Study Area
Warm Springs, Oregon

Figure
1

PLAN GOALS

Project goals were identified with input from the Project Management Team (PMT) and Project Advisory Committee (PAC). These goals will be used to guide the development of The Plan and prioritize projects, policies, and programs.

The goals identified for this Plan include:

- Provide a transportation system that promotes the safety performance of current and future travel modes for each user.
- Promote a transportation system that facilitates the use of US 26, Hollywood Boulevard, Tenino Road, Paiute Avenue, and Warm Springs Street for safe and efficient travel while providing safe multimodal corridors and connections to key destinations in the community.
- Reduce the frequency and severity of crashes for each user.
- Evaluate potential roadway geometry modifications to improve roadway safety.
- Identify educational and enforcement strategies to address crash trends and risks.

PROJECT METHODOLOGY

The Commercial Corridor Safety Plan will be completed through a data-informed and public-driven process. Technical analysis will be completed to inform the PAC at a series of stakeholder meetings throughout the project. The technical analysis will provide an overview of traffic patterns, reported crash history, and geometric conditions that may affect crash risk.

The Plan will be developed through the following general steps:

1. Obtain traffic volumes from the 2014 Transportation Plan and 2016 Casino Traffic Monitoring Study for the priority intersections and study segments, as available. These priority intersections and road segments include:
 - US 26 / Paiute Avenue (BIA 3)
 - US 26 / Hollywood Boulevard
 - US 26 / Indian Head Casino (Museum at Warm Springs) Driveway
 - US 26 / Tenino Road
 - US 26 throughout the study area
 - Hollywood Boulevard throughout the study area
 - Tenino Road between US 26 and the Tribal Administration Building
 - Quail Trail Road between Chukar Road and Tenino Road
 - Chukar Road between Tenino Road and Quail Trail Road
 - Paiute Avenue between Warm Springs Street and US 26
 - Warm Springs Street between Paiute Avenue and Hollywood Boulevard
2. Summarize planned projects from the 2014 Transportation Plan.

3. Obtain reported crashes from ODOT's crash database for the most current complete five year period. These crashes will be supplemented with any additional data provided by the Confederated Tribes of Warm Springs (CTWS).
4. Complete a crash analysis to identify trends in severity, crash types, or other crash characteristics that may identify potential safety issues in the study area.
5. Apply the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual (HSM), First Edition, Part C predictive methods to the priority roads and intersections within the study area to estimate expected crash frequency based on traffic and roadway characteristics.
6. Identify a list of potential safety issues for the study area based on the crash analysis, HSM analysis, and public input.
7. Determine and evaluate potential countermeasures based on their documented effectiveness through crash modification factors and relative cost.
8. Prioritize projects based on their ability to meet the Plan's goals, as summarized in the previous section, and relative ease of implementation.
9. Compile the final recommendations into the Draft Commercial Corridor Safety Plan.

BACKGROUND DOCUMENTS

The Confederated Tribes of Warm Springs (CTWS) have completed a number of recent planning efforts that are relevant to the study area. This Commercial Corridor Safety Plan will build upon the previous efforts. In order to ensure consistency with previous plans, a review of the following documents was completed:

1. Highway 26 Warm Springs Transportation Plan (1997)
2. The People's Plan – Comprehensive Plan for Year 2020 (1999)
3. Oregon Downtown Development Association – Resource Team Report for Warm Springs, Oregon (2002)
4. Warm Springs Local Street Network & Campus Area Plan (June 2005)
5. Warm Springs Downtown Development Plan (2005)
6. Integrated Resources Management Plan (2012)
7. Warm Springs Town Center – Property Summary (2012)
8. Warm Springs Reservation Transportation Plan (2014)
9. Traffic Monitoring Analysis for Indian Head Casino (2016)

The following sections provide a brief summary of the relevant items from the plans above.

1. Highway 26 Warm Springs Transportation Plan (1997)

The Highway 26 Warm Springs Transportation Plan is a corridor plan that focuses on Highway 26 within the Warm Springs Reservation. The Plan was adopted in 1997. The Plan identifies 28 recommended projects along the Highway 26 corridor within the Warm Springs Reservation and

groups these into short-term, mid-term, and long-term projects. The following projects are identified within the Commercial Corridor Safety Plan study area:

- MP 104, Tenino/Highway 26: Provide a westbound left-turn lane on Highway 26 (Short-term);
- MP 103.3, Kahneeta/Paiute/Highway 26: Signalize the intersection and complete grading improvements to the west (Short-term);
- MP 71-105: Remove noxious weeds (Short-term);
- MP 71-105: Install open range signs along the corridor (Short-term);
- Areas prone to ice: Install weather stations and variable message signs in areas prone to ice (Short-term);
- MP 99 to Warm Springs Community: Resurface the highway, restructure the culvert at MP 103, extend school jersey barriers (Short-term);
- MP 103-105: Complete Warm Springs Community Detailed Study (Short-term);
- MP 104, Museum/Retail/Highway 26: Install a pedestrian button to activate the flashing beacon at the crosswalk (Short-term);
- MP 104, Museum/Retail/Highway 26: Monitor and install a signal if necessary (Mid-term);
- MP 103.5, Hollywood/Highway 26: Monitor and install a signal if necessary (Mid-term);
- MP 71-105: Increase patrol on Highway 26 (Mid-term);
- MP 103-105, Warm Springs Community: Implement Warm Springs Community Plan (Long-term);
- MP 103-105, Warm Spring Community: Provide bicycle/pedestrian connections to Highway 26 (Long-term);
- MP 104, Tenino/Highway 26: Monitor and install a signal if necessary (Long-term);
- MP 105.2, Deschutes River/Highway 26: Repave the pedestrian underpass (Long-term).

2. The People's Plan

The People's Plan was adopted in 1999 as the Confederated Tribes of Warm Springs' Comprehensive Plan. It served as an update to the 1983 Plan. The Plan represents the CTWS's vision for its future and provides benchmarks for achieving its goals. The Plan identifies the Tribal Council priorities, which include Public Safety and Community Development and Housing, among other items.

The Public Safety Section and the Land Use, Transportation, and Community chapters both reference the increase in traffic volumes experienced on US 26 and on the local roads. The Land Use, Transportation, and Community chapter also documents an increasing demand for road maintenance.

The Other Priorities section of The People's Plan includes an overview of the Highway 26 recommended improvements in the 1996 Highway 26 Corridor Plan. Several of these are located within the Commercial Corridor Safety Plan study area. These include:

- Tenino Road/Highway 26 Westbound left-turn lane (*completed*)

- Traffic signal at Kah-Nee-Ta/Paiute/Highway 26 intersection
- Increase personnel and equipment at Bear Springs maintenance office
- “Open Range” signs along corridor
- Weather stations/message signs in ice prone areas

3. Oregon Downtown Development Association – Resource Team Report for Warm Springs, Oregon (2002)

The Oregon Downtown Development Association – Resource Team Report for Warm Springs was completed in 2002 with the intent to “bring the community together to discuss a shared vision of the downtown’s future.”

Several recommendations from the report include transportation projects. The Plan recommends a “figure-8 loop” of connected sidewalks, streetscape improvements, and crosswalks around the greenspaces. It also identifies gateways, circulations and linkages, streetscape improvements, overlooks, and gathering areas as general opportunities for the downtown area. In particular, it recommends the approach to downtown on Paiute Avenue from US 26 as a potential location for gateway treatments consisting of attractive signage on both sides of Paiute Avenue, pedestrian-scale lighting, and wide sidewalks.

4. Warm Springs Local Street Network and Campus Area Plan (June 2005)

The Warm Springs Local Street Network and Campus Area Plan is intended to provide the CTWS with guidance for the development of the local street and trail system around the Campus Area (downtown). It forms the transportation component of the Warm Springs Downtown Development Plan (2005). It provides guidance on the development of the downtown street system, sidewalks, shared-use paths, and other traffic issues.

The Plan recommended the following potential projects:

- US 26 Intersection Improvements (Priority: Within 10 years)
- Hollywood Boulevard/Tenino Road Roundabout (Low Priority)
- Extend Warm Springs Street to West (Low Priority)
- Reconstruct Wasco Street (High Priority)
- Add/Upgrade Sidewalks on Warm Springs Street and Wasco Street east of Paiute Avenue (High Priority)
- Upgrade ADA Compliance at existing corners (Low Priority)
- Improve separated pathways (Low-Moderate Priority)

5. Warm Springs Downtown Development Plan (2005)

The Warm Springs Downtown Development Plan was completed in 2005 for the East Campus area of downtown Warm Springs. The Development Plan provides a guide for redevelopment of this area with the goal providing an economic benefit to the Warm Springs community. Section 5 of this Plan provides infrastructure recommendations to support the Plan. The Street System subsection of the Plan indicates that Warm Springs Street, Paiute Avenue, and Hollywood Boulevard are generally in good conditions and provide adequate capacity for traffic. However, the Plan indicates that Wasco Street needs to be reconstructed to support development of the Plan.

6. Integrated Resources Management (2012)

The Integrated Resources Management Plan for the Forested Area and Rangelands (IRMP) “provides guidelines for the stewardship of all forest and rangeland resources, and serves as a basis for making management decisions on the Warm Springs Reservation.” The IRMP goals are intended to encourage resource management planning that will:

1. “Preserve, protect and enhance environmental and cultural values.
2. Sustain traditional, subsistence and other cultural needs of current and future tribal members.
3. Provide for sustainable economic and employment opportunities.
4. Provide for public health and safety.
5. Manage for diversity, long-term productivity and sustainability of all natural resources.”

Several of the Plan’s goals are related to transportation and are applicable to the Commercial Corridor Safety Plan. These include the following goals and objectives:

Goals:

- 1) “Develop a transportation system that accommodates the growing population while providing for the safety and influx of people coming onto and passing through the reservation.
- 2) Develop a plan to create a safe and efficient network of roads and paths that meet current needs and projected demand.
- 3) Develop and maintain a system that will provide economical transportation for residents, and for commercial and resource management activities.
- 4) Develop and maintain a reservation-wide transportation system that will minimize adverse impacts on natural resources.
- 5) Minimize the impact of vehicular traffic on residential streets through design.
- 6) Encourage community involvement in all phases of neighborhood traffic management.”

7. Warm Springs Town Center – Property Summary (2012)

The Warm Springs Town Center Plan is a “conceptual level plan” that prepares the Campus Area for redevelopment based on the studies and Plans done prior to 2012. The Plan acknowledges the desire

to attract visitors and business from traffic on US 26. These visitors would access the Campus Area from the intersection of US 26/Paiute Avenue. The Plan indicates that traffic volumes on US 26 peak on Fridays and Sundays.

The Plan states that the streets surrounding the Campus Area (Paiute Avenue and Warm Springs Street) are generally in good condition. However, it indicates that Wasco Street has poor roadway conditions and needs to be reconstructed. Because Wasco Street forms the internal circulation within the Campus, it recommends the road be redesigned to accommodate all modes when it is rebuilt.

8. Warm Springs Reservation Transportation Plan (2014)

The Warm Springs Reservation Transportation Plan was completed in 2014. The Plan focuses on the entire Warm Springs Reservation (690,000 acres), identifying unmet needs and projects to address those needs. The 2014 Transportation Plan provided several recommended projects that are located within the Commercial Corridor study area. These are summarized in Table 1 below.

Table 1. Relevant Projects from the 2014 Transportation Plan

Project Number	Project	Total Estimated Cost	Priority
11	Jackson Trail Road Chip Seal	\$904,000	Short-Term
26	New Housing Streets off of Chukar Street	\$711,000	Mid-Term
2	New School Access	\$427,000	Short-Term (Completed)
8	Trail: Campus Area to Museum	\$388,000	Short-Term
9	Trail: School to Community Center	\$496,000	Short-Term
6	Trail: West Tenino Road	\$460,000	Short-Term

9. Traffic Monitoring for the Indian Head Casino (2016)

The Indian Head Casino, located on US 26 in Warm Springs within the Commercial Corridor Safety Plan study area, completed a traffic monitoring analysis in February 2016. The traffic monitoring analysis was required as part of the condition for approval of the casino in 2011. The following traffic data was collected as part of the Indian Head Casino Traffic Monitoring study:

- Manual turning movement traffic counts at US 26/Wasley Lane (Casino driveway) from August 6, 2015 (Thursday) at noon to August 9, 2015 (Sunday) at midnight. The weekday p.m. peak hour was found to occur at 12:00 pm on Thursday, 2:00 pm on Friday, and 1:00 pm on Sunday. The study found that the traffic volumes to/from the casino are roughly split among those traveling east and west along US 26.

- As part of the traffic counts at US 26/Wasley Lane, pedestrian counts were collected at the intersection. The highest number of recorded pedestrian crossings per day occurred on Thursday, when seven pedestrians crossed US 26. However, the total pedestrian volume at the intersection (for all approaches) peaked on Saturday, when 18 pedestrians were counted.

The findings from the Casino traffic monitoring study found that the traffic volumes at the Casino driveway met signal warrants on Sundays during the peak season of traffic (summer). However, the weekday volumes did not warrant a signal. Based on this, a signal was not recommended by the study. In addition, the study found that an enhanced pedestrian crossing (e.g., a Rectangular Rapid Flashing Beacon) is not warranted based on less than 14 peak-hour pedestrian crossings of US 26.

PUBLIC INVOLVEMENT

The Plan will be developed through a public involvement process guided by technical data. The public involvement process will include a public meeting as well as guidance from a Public Advisory Committee (PAC). The following sections further describe the public involvement process.

Public Advisory Committee (PAC)

A Public Advisory Committee (PAC) will guide the project through a series of meetings to review and discuss technical analyses. The PAC will be comprised of stakeholders representing a wide range of parties with interests in the study area, including public works members, public safety representatives, residents, and business owners. The first meeting will focus on the project goals and methodology and identifying key safety issues. The second meeting will focus on an overview of the data analysis and identified issues. The final meeting will focus on gathering input on the draft prioritized plan elements.

Public Meeting

A Safety Charrette will be held following the second PAC meeting. The Safety Charrette will provide an opportunity for the general public to learn about the project and share their thoughts on potential recommendations and outcomes of the Plan. The Safety Charrette will be conducted in an interactive format, intended to allow participants to share thoughts about where specific treatments are needed.

PROJECT SCHEDULE

The project began in June 2016 and will conclude in Spring 2017, as shown in Figure 2. Key meetings during the project occurred in August, September, and November, during the key development stages of the draft strategies. After the Draft Plan is developed, the Tribal Council will adopt the Final Safety Plan.



Figure 2. Project Schedule

PROJECT WEBSITE

Throughout the development of the Plan, the project website will provide the latest information about the project including upcoming meetings and documents available for review. Website subscribers will be notified when meetings are posted or updated documents are available.

Project Website: www.ctwssafetyplan.com

APPENDIX 2: PUBLIC INVOLVEMENT MEETING SUMMARIES

Draft Warm Springs Transportation Safety Plan Committee (6/7/16)

first	last	organization	role	phone	email
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PAC Meeting #1
Sign-In Sheet

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Sunmiel Mabin	Museum	541-553-3331	officemanager@museumatwarm Springs.org





NAME	AGENCY/COMPANY	PHONE	EMAIL
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Kahseuss Jackson CTWS Kahseuss.jackson@ws-tribes.org



- Safety Concerns
 - Better circulation
 - Public utilities
 - Uses the corridor to go running/walking
 - The school being near to the highway with nowhere to go
 - R/w issues with various people along the corridor
 - Speeds along the corridor
 - Pedestrians getting from one place to another
 - Tenino/Hollywood roads need to be improved
 - Ped access along the highway
 - Especially at night
 - Hollywood going west
 - Turns are tight
 - Crossing from museum to casino
 - Volumes on highway 26 and the lack of ped access
 - Area by the gas station is congested
 - Ped pathways to and from school
 - Tenino towards the community center is rough on peds
 - Pedestrian access to the school
 - Signage and lighting
 - Protection for pedestrians
 - Traffic speeds
 - Accessibility for cars along the corridor (Turn lanes)
 - Lighting along the corridor
 - Significant number of peds along the highway
 - Mix of traffic along the corridor
 - Better lighting
 - Better speed management
 - People going west are much more prone to speeding because of the hill
 - People going east do ok
 - Access the highway (cars) especially on Fridays and weekends
 - Crossing the highway (cars and peds)
- Project Purpose
- Study Area
- Project Goals
 - Slide 1
 - Slide 2
 - Wanting to change the identification of the highway from a freight route
 - From the mill to the river access there are environmental factors and safety concerns as well
 - Staffing levels are difficult to maintain
 - Kaneeta intersection has many close calls
 - Close calls happen almost every day; on the weekends don't even try to make a left turn
 - Speed differentials along the highway are of concerns
 - Increase in semi-truck traffic in the past few years
- PAC Members
- Role of PAC Members
 - Consolidating all the plans into one would help the tribes to know where and how to proceed
- Document Slide
- Website
- Schedule
- Methodology Overview

- Document Review
- Preview of Reported Crash History
- Reported Crash Severity by Year
- Crash Severity
- Crash Type
- Weather Conditions
- Discussion/Breakout Groups
 - Group 1 Discussion Comments
 - Highway has to be shutdown periodically because of crashes and there is no good detour for traffic during this time—especially for trucks since many are too large to use the only detour road
 - Longer lines and longer wait times since the feedback signs have been put in and that has caused some fidgety drivers
 - Another fatality caused by poor lighting near tenino
 - Sometimes trucks will park along the highway near the museum causing limited visibility
 - Casino parking lot doesn't have good spots for much of anything bigger than a large car
 - Part of the problem is R/w and environmental factors
 - Parts of Tenino road are sinking (?)
 - Kaneeta is sliding too (?) –so “they” say, not sure
 - Pedestrian paths should be outside of the bridges—bridges don't currently accommodate ped traffic
 - Get the school involved in educating kids about road safety
 - Lighting is a major concern for most of WS
 - Everyone Coming Back Together
 - Group 1
 - 1. Piaute intersection
 - Congestion—eod back to ____ heights
 - 2. Narrow shoulder along hwy 26 near gas station
 - 3. Museum intersection needs better vehicle and ped recognition
 - And better lighting
 - 4. Quail trail rd
 - Dangerous for peds
 - 5. Lighting for the community below the school
 - 6. Hollywood/tenino intersection & Tenino/26 intersection
 - Accident happens between the 2 so this new road becomes the bypass and freight can't handle it
 - Group 2
 - Lighting is an issue everywhere
 - Remo market has issues for peds during some parts of they eyar
 - Access issues at the rest stop/ restaurant (river access area)
 - Mill composite prodeucts still in use—trucks getting through is an issue
 - Trucks parking along the highway is a concern
 - Reducing speed along the hwy is a problem
 - Hollywood
 - Width of the intersection
 - Ped crossings
 - Slops of the road is significant
 - Noo medians to divide the road to allow better access
 - Shell access has had problems of multiple people trying to leave at once
 - Piaute/hwy 3
 - Access trying to access 26 from hwy 3 is tough sometimes
 - Overall corridor
 - Access for peds needs to be upgraded and/or developed

- Quail trail to e tenino
 - No pathways developed
 - Pathways from the new community north needs to be connected stil
 - Skateboarding is an issue—keeping people separate from vehicle access is a desire
- Hollywood intersection should be a roundabout
- Sidewalk should be near the clinic up to Hollywood
- Public awareness needs to be better enforced
- Group 3
 - Peds
 - Shell to campus needs something
 - Tie into ped bridge near casino
 - Casino to rainbow
 - Not as well traveled, but still an issue
 - Making a path along the creek to make a new pathway for peds
 - People use existing paths to access downtown (n of 26) and need better trails and access across 26
 - Quail trail has some sidewalks and a few gravel paths but things need to be connected better
 - Traffic
 - Piaute/hwy 3
 - Visibility is an issue from certain angles (from hwy 3 e and w)
 - Hollywood intersection + Shell
 - Combined issue where you have to really pay attention to navigate it
 - Roads get icy sometimes
 - Way to stagger cars to slow people down
 - Cars pull in and out with no consideration near Rainbow causing poor visibility and awkward turns
 - Sidewalk along Quail Trail
- Preview of Issue Summary
- Next Steps
-

CONFEDERATED TRIBES OF WARM SPRINGS

Project Advisory Committee Meeting #1

August 18, 2016




Meeting Agenda

- Introductions (20 minutes)
- Project Overview (5 minutes)
- Project Goals (10 minutes)
- Methodology Overview (5 minutes)
- Preview of Existing Conditions (10 minutes)
- Discussion (45 minutes)
- Preview of Preliminary Issues (10 minutes)
- Next Steps (5 minutes)

Introductions

- Name
- Organization
- What are your top 2 safety concerns or priorities for Warm Springs?

Project Purpose



Develop an adoption-ready document that contains a prioritized set of goals, objectives, strategies, and projects to improve safety performance on and around the Warm Springs Commercial Corridor.

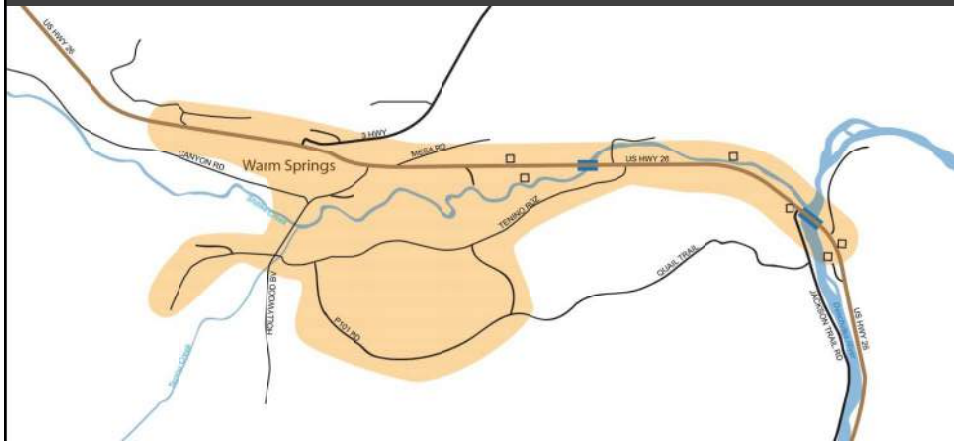
Project Goals

- Provide a transportation system that promotes the ***safety performance*** of current and future travel modes for ***each user***
- Promote a transportation system that facilitates the use of ***state highways for safe and efficient travel*** while providing safe ***multimodal corridors and connections*** to key destinations in the community

Project Goals

- Reduce ***frequency and severity of crashes*** for each user
- Identify roads with ***geometric conditions*** that could potentially be modified to reduce the risk of future crashes
- Identify ***educational and enforcement*** strategies to address crash trends and risks

Study Area




Project Advisory Committee (PAC) Members

- Bureau of Indian Affairs Representative
- Casino Management
- CTWS Administrator
- CTWS Councilor
- CTWS Planning
- CTWS Planning Commissioner
- CTWS Police Chief
- CTWS Public Safety Representative
- CTWS Public Works Director
- CTWS Public Works & Parks Commissioner
- Department of Land Conservation & Development Regional Representative
- Local Business Community
- ODOT APM
- ODOT Planner
- Transportation Disadvantaged Representative
- Tribal Council Representatives

Role of PAC Members

- Attend and actively contribute to PAC meetings
- Attendance at the Safety Charrette (next month) is highly recommended
- Represent community interest
- Review memoranda distributed after each meeting



www.ctwssafetyplan.com

HOME	LATEST NEWS	MEETINGS	PROJECT TEAM MEMBERS	DOCUMENTS	PUBLIC INVOLVEMENT		SUBSCRIBE	CONTACT
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Warm Springs Commercial Corridor Safety Plan

Purpose: The Confederated Tribes of Warm Springs and Oregon Department of Transportation seek to improve the safety of those using the Warm Springs Commercial Corridor.

Strategy: Determine what safety needs there are on and around the corridor and then develop a document that contain the improvements required to meet those needs.

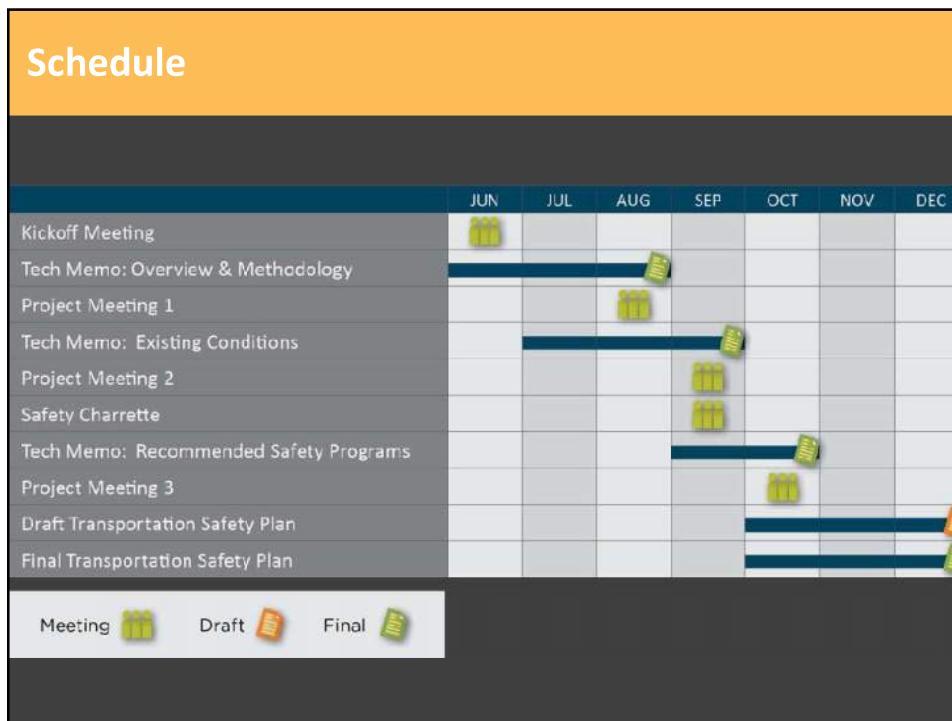
Upcoming Meetings

PAC Meeting #1
Thursday, August 18th, 2016 from 1:00 at Museum at Warm Springs

Warm Springs Commercial Corridor Safety Plan © 2016. All rights reserved.

» Log in?

This website was crafted by the folks at Kittelson & Associates, Inc., an international transportation engineering and planning organization based in Portland, Oregon.



Methodology Overview

- Review crash data to identify trends
- Inventory existing conditions (road characteristics, sidewalks, speed, traffic volumes)
- Implement crash prediction methods to quantify the predicted safety performance
- Identify potential safety issues
- Develop safety countermeasures
- Prioritize both long-term and short-term countermeasures
- Develop comprehensive safety strategies and policy recommendations
- Summarize findings and recommendations

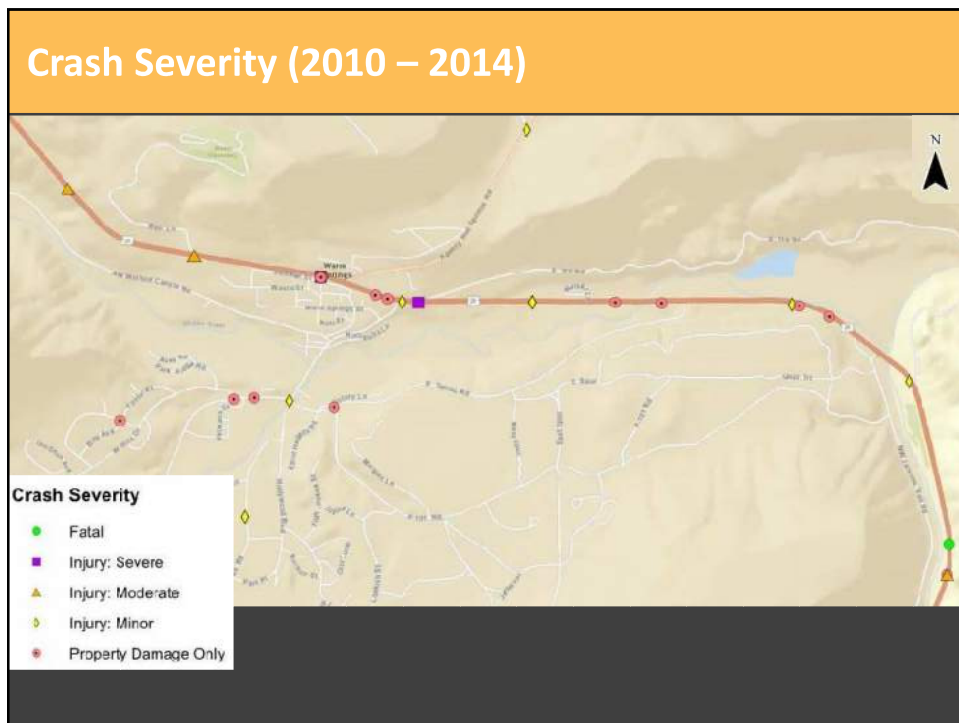
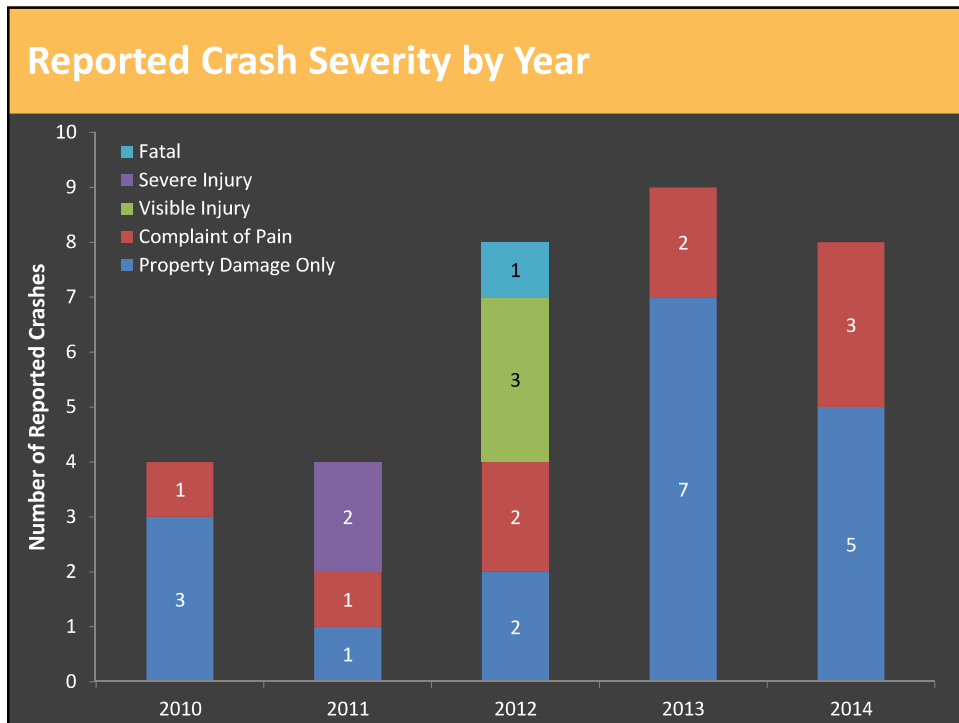
Document Review

- Warm Springs Reservation Transportation Plan (2014)
- Warm Springs Town Center Property Summary (2012)
- Warm Springs Downtown Development Plan (2005)
- Warm Springs Local Street Network & Campus Area Plan (2005)
- Oregon Downtown Development Association's Resource Team Report for Warm Springs (2002)
- Integrated Resources Management Plan for the Forested Area and Rangelands
- Comprehensive Plan for the Year 2020: The People's Plan (1999)
- Highway 26 Warm Springs Transportation Plan (1997)

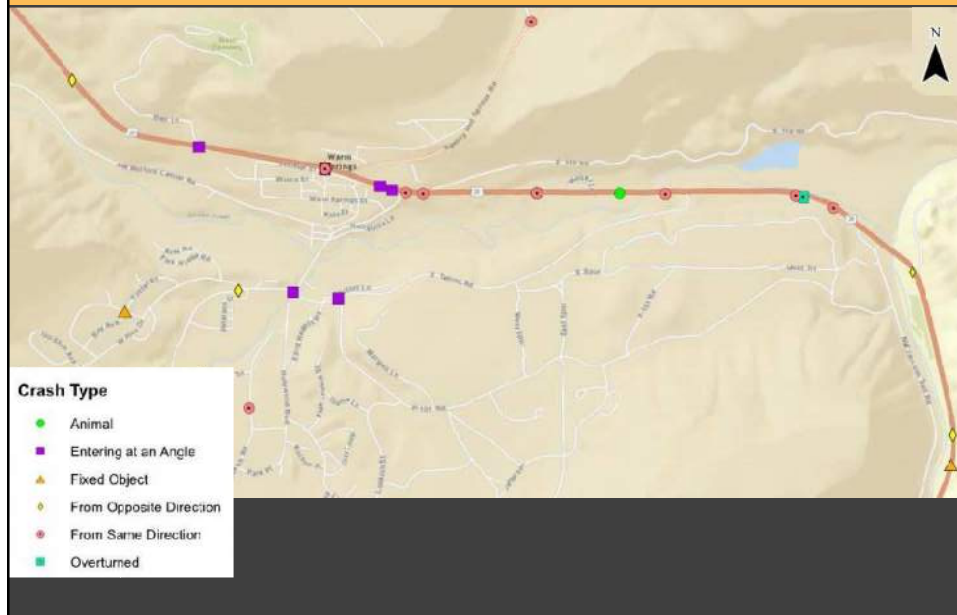


Preview of Reported Crash History

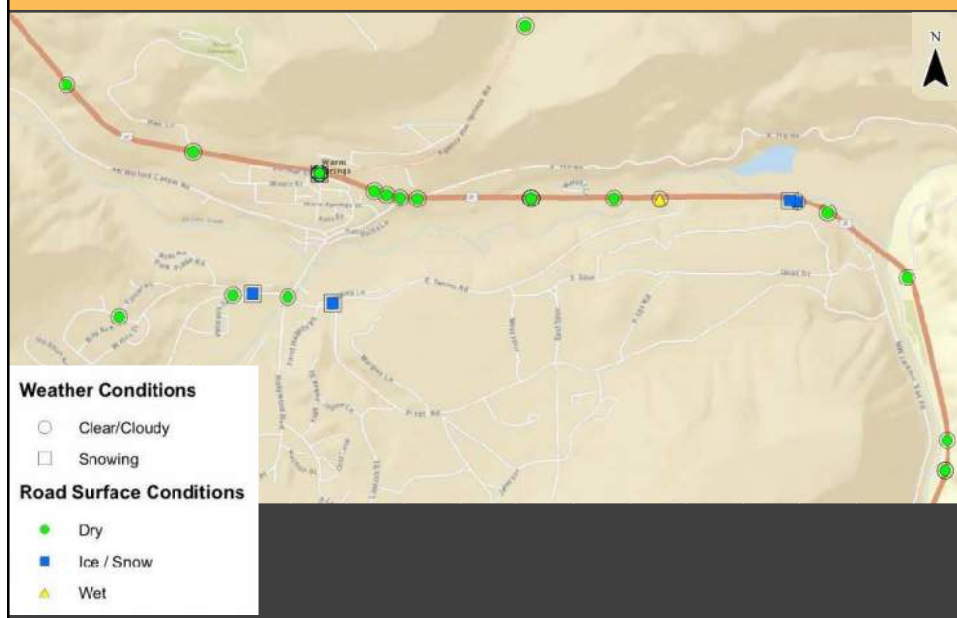
- Evaluated reported crash history for the latest five years available (2010 – 2014)
- Reviewed crash characteristics to identify trends:
 - Time of day
 - Light conditions
 - Weather
 - Crash type
 - Contributing factors
 - Severity
 - Impaired Driving



Crash Type (2010 – 2014)

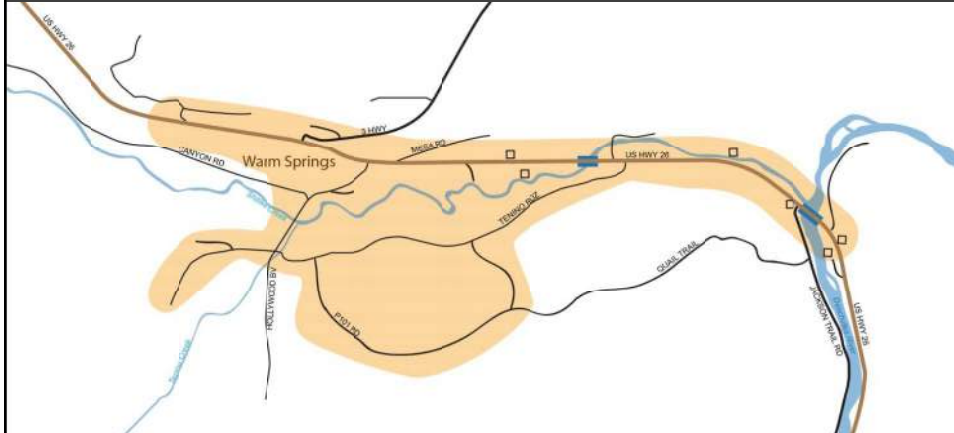


Weather Conditions (2010 – 2014)

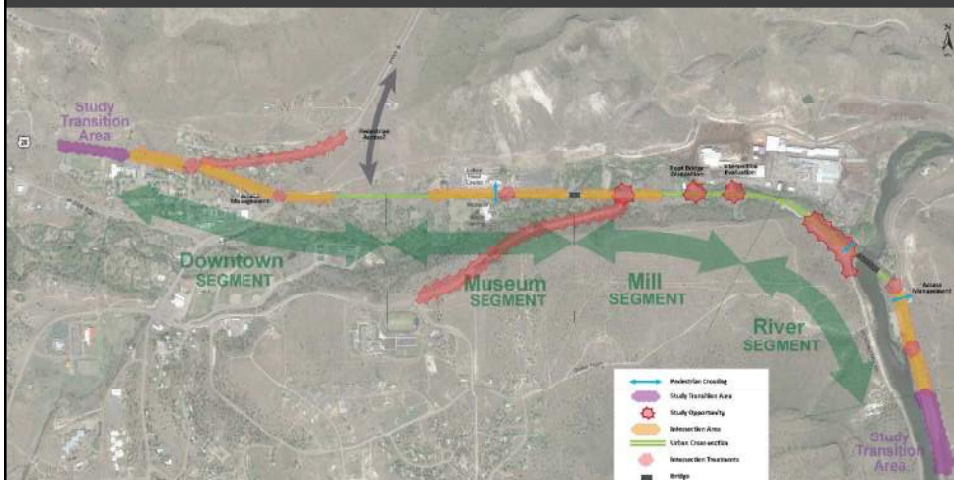


Discussion/Breakout Groups

- What are your top 3 safety concerns
 - Within the Highway 26 study area?
 - Within the study area, off the highway?
- How should projects be prioritized?



Preview of Issue Summary – Highway Corridor



Next Steps

- Next PAC Meeting: September 13, 2016
 - Complete overview of existing conditions
- Safety Charrette: September 13, 2016
 - Identify potential countermeasures

Please let us know if you have any questions:

Ashleigh Griffin, agriffin@kittelson.com (541.639.8615)

Lonny Macy, lonny.macy@wstribes.org (541.553.3509)

**PAC Meeting #2
Sign-In Sheet**

NAME	AGENCY/COMPANY	PHONE	EMAIL
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Nancy Collins	CTWS	541-553-4943	nancy.collins@ihs.gov
DAN MARTINEZ	CTWS	(541) 419-8094	danny.martinez@wstribes.org
Lorena Medina	CTWS	956-346-2377	loreana.medina@wstribes.org
TRAVIS WELLS	CTWS	541-460-1262	travis.wells@wstribes.org
Lanny May	CTWS	541-553-3509	Lanny.May@wstribes.org
Don Courtney	CTWS	541-460-1668	don.courtney@wstribes.org
Ned Morningstar	CTWS	541-877-2804	
Darryl Smith	Safferson County School dist	541-475-6192	darryl.smith@SOS9.net
Lyle Katchia	CTWS	541-325-1562	Lyle.Katchia@CTWS.B.NR.or
William Bagley	W.S. FIRE & SAFETY	541-460-8989	william.bagley@wstribes.org
Clay Penhollow	CTWS Nat. Res	541-553-2014	clay.penhollow@ctwsbar.org
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DAN SERPICO	ODOT	- 6170	DANIEL.S.SERPICO@ODOT.STATE.OR.US
Michael Duncan	ODOT	541-388-6046	Michael.W.Duncan@odot.state.or.us
Kangni Jiang	ODOT	541-388-6334	Kangni.Jiang@odot.state.or.us
David Amilton	ODOT	541-388-6111	david.amilton@odot.state.or.us
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Brian Ray	KAC	503-535-7437	bray@Kittelson.com
Ashleigh Ludwig	"		Ashleigh@Kittelson.com
Jessica Spivey	"		JSpivey@Kittelson.com
Randall O. Nathan	Eagle Crossing Restaurant	541-460-0046	eaglecrossing09@ixkhoa.com
Jonathan W. Smith	JUPC/RESS	541-553-3257	jwsmith@wstribes.org
Yvonne Iverson	IHS	541-553-2488	yvonne.iverson@ihs.gov
Kahseuss Jackson	CTWS		Kahseuss.jackson@wstribes.org



- Project Purpose
- Study Area
- Schedule
- Summary from PAC Meeting #1: Issue Summary
 - Crossings along Quail Trail need to be added
 - There are sidewalks along part of the community between quail trail and the school
 - Lighting is needed both for cars and peds along Quail Trail
- Existing Conditions
- Warm Springs Zoning
- Traffic Volumes – Average Daily Traffic
 - 6637 has higher traffic volumes
 - Tenino and quail trail should be higher since the school has been built
 - 3 hwy probably has higher traffic volumes during the summer because of seasonal workers
 - There are traffic counts at the casino intersection that might reflect some of the seasonal changes—at least along the highway
- Posted Speed Limit
- Existing Sidewalks
 - Sidewalks also around the administration building
 - Campus area has a sidewalk that goes through the west campus green area
 - Path that goes around the ball fields down by the community center
 - Path comes off e spur connects e spur community with the school
 - Sidewalks along the bridge on the e side of the project boundary
 - Sidewalks along cotton
 - Show sidewalks outside of the project boundary to better show where connections could be
 - Sidewalk down bear drive
 - Sidewalks with curb separation all along Hollywood outside of the project area
 - People cant cross the creek so they generally go up to Hollywood and cross the highway over to the casino
- Crash data
- Reported Crash Severity by Year
- Crash Severity
 - 2 fatalities near the first one
 - One closer to Rainbow (2016)
 - Head on collision – driver fell asleep
 - Other one further up the year (2016)
- Crash Type
- Weather Conditions
- Paiute Intersection
 - Trees are blocking visibility (sw corner)
 - Crosswalk is hard to see during certain times of the day
 - Highway 3 backs up—no matter which direction you are trying to get to
 - Crossing the highway is the hardest
 - Visibility on highway 3 heading onto the 26 or crossing
 - Close calls happen a lot because of visibility issues and high speeds
 - People slide off the road during the winter trying to make the turn
- Hollywood Intersection

- Trucks park anywhere they can—the center lane, along the highway, wherever
- Invisible crosswalk from highway 3 to gas station
 - Another one across Hollywood
- Not everyone will get back on the highway but instead use the extra pavement along the turn lane
- Museum Intersection
 - Time of day can really affect potential of crash
 - Crashes on the left side of the slide might be because of seeing pedestrians walking along the highway (the road narrows up around this location)
- Non-highway
 - 3 crashes near the crosswalk at the top of the slide (peds involved)
- Issue Summary: Reported Crash History
- Crash Prediction
- Crash Prediction: Intersections
- Crash Prediction: Segments
- Issue Summary: Core Area
- Issue Summary: Highway Corridor
- Crash Rate Comparison
- Preview of Safety Charrette
 - Truck parking forces pedestrians (potentially) to walk either directly on the highway, or be much closer than they would otherwise have to be
 - Heading towards mt hood, trucks need a place to chain up before they start making their way up the hill
 -
-

CONFEDERATED TRIBES OF WARM SPRINGS

Project Advisory Committee Meeting #2

September 13, 2016



Meeting Agenda

- Meeting Goals
- Project Overview
- Summary of Feedback from PAC Meeting #1
- Existing Conditions: Inventory
- Crash Analysis
- Summary of Issues
 - Issues Based on Reported Crash History
 - Issues Based on Risk
- Crash Rate Comparison
- Preview of Safety Charrette

Meeting Agenda

- Meeting Goals
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Meeting Goals

- PAC Meeting Goals (1:00 – 3:00 PM)
 - Review Issues Identified at PAC Meeting #1
 - Review Data Analysis
 - Summarize Safety Issues
- Safety Charrette Meeting (6:00 – 8:00 PM)
 - Identify Potential Treatments
 - Determine Potential Locations for Treatments

Meeting Agenda

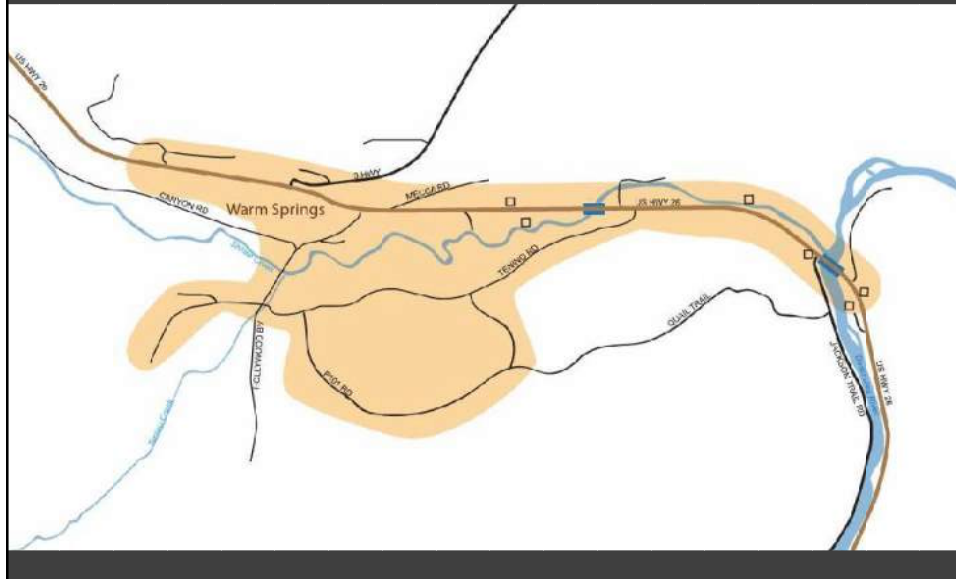
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Project Purpose



Develop an adoption-ready document that contains a prioritized set of goals, objectives, strategies, and projects to improve safety performance on and around the Warm Springs Commercial Corridor.

Study Area



Schedule



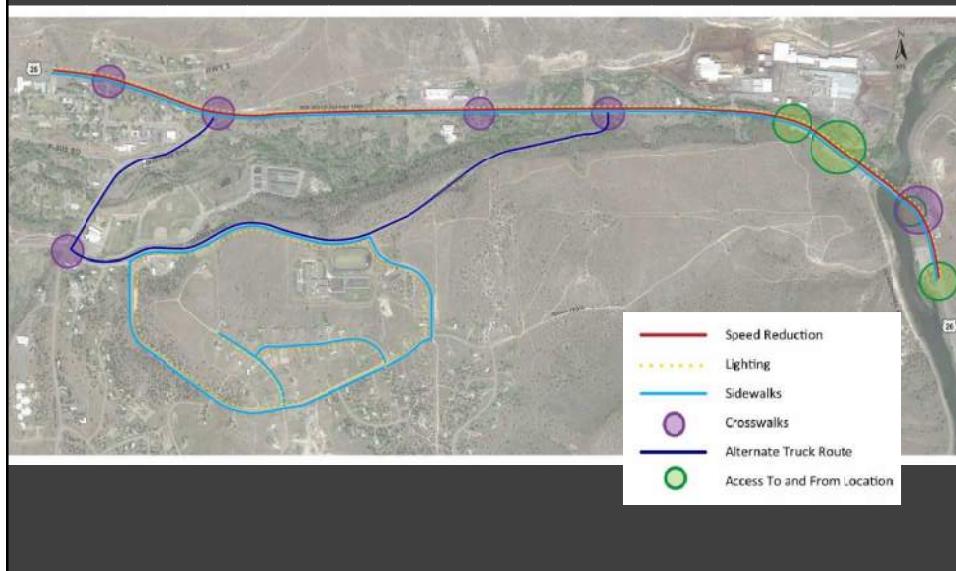
Meeting Agenda

- Meeting Goals
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Summary From PAC Meeting #1 Issue Summary



Summary From PAC Meeting #1 Issue Summary



Meeting Agenda

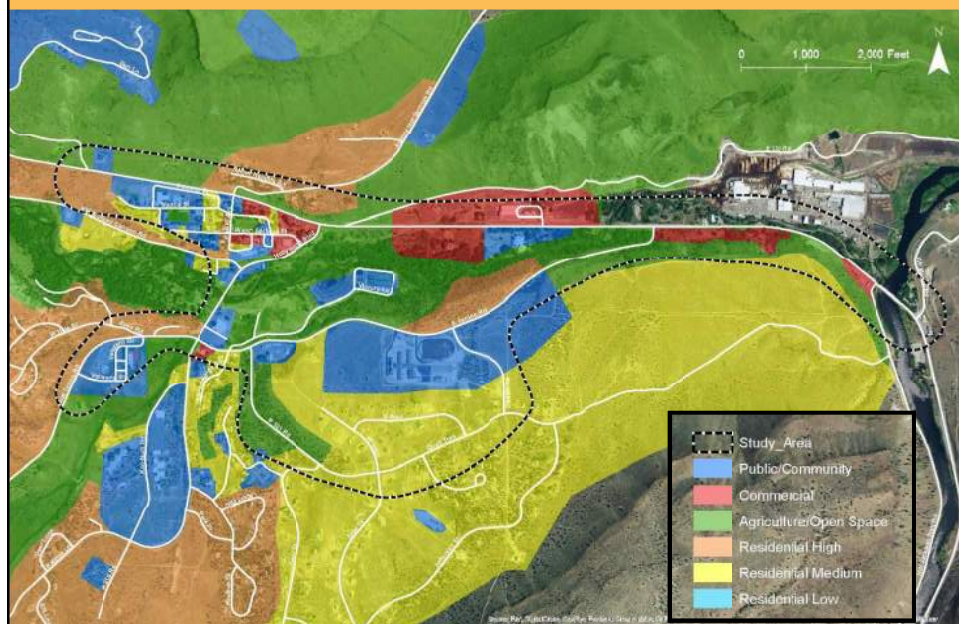
- Meeting Goals
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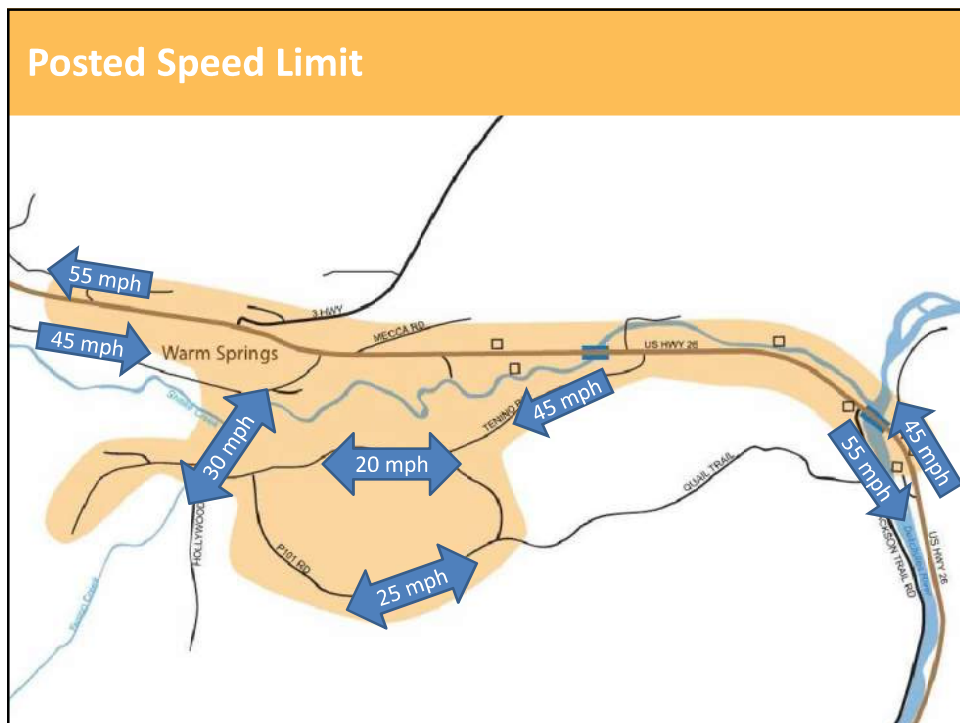
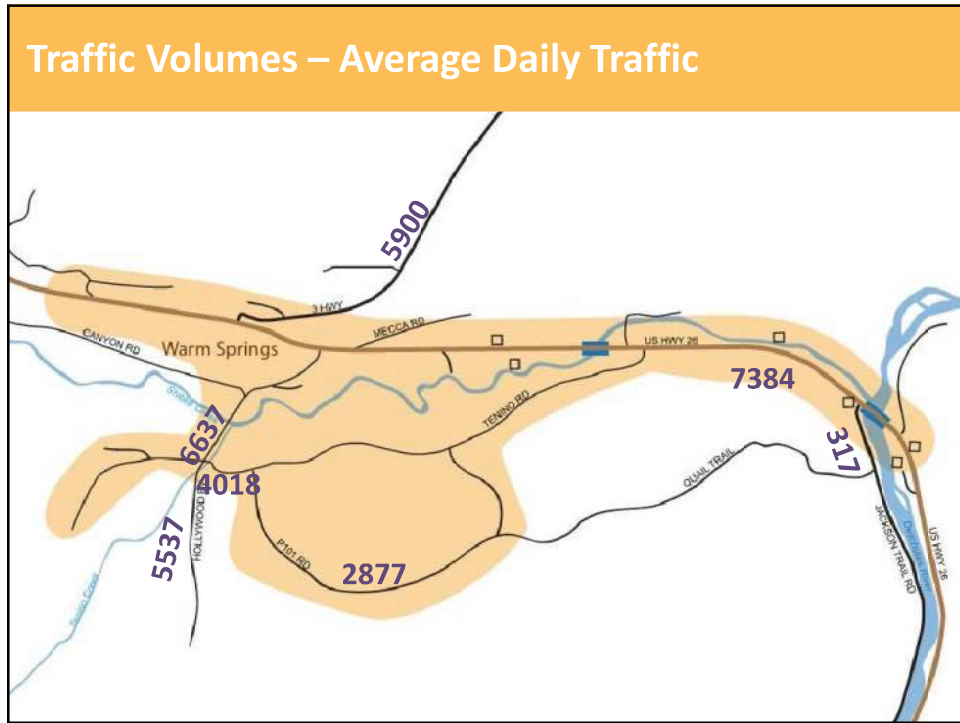
Existing Conditions: Inventory

- Zoning and Activity Centers
- Traffic Volumes
- Posted Speed Limits
- Location of Sidewalks

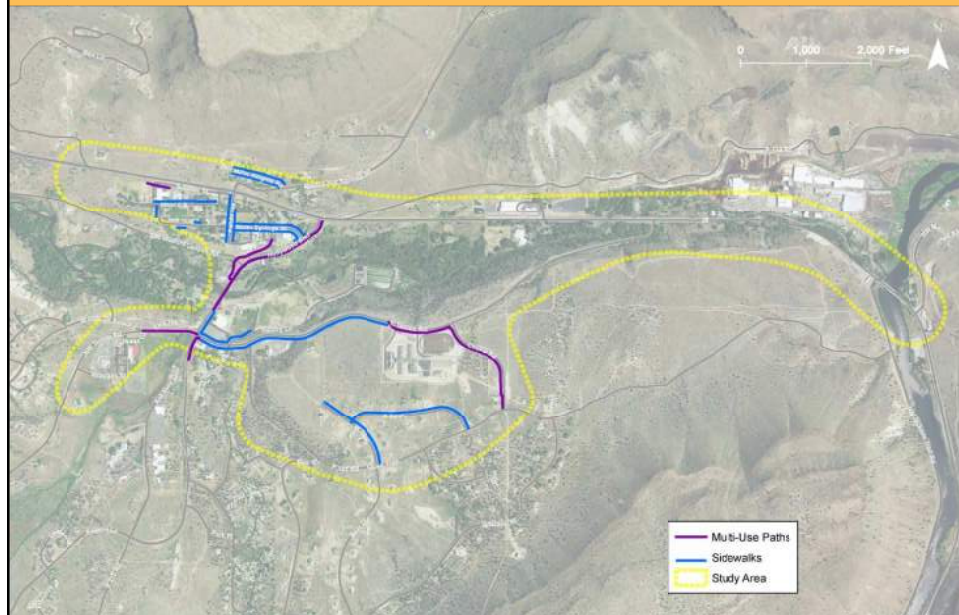


Warm Springs Zoning





Existing Sidewalks



Meeting Agenda

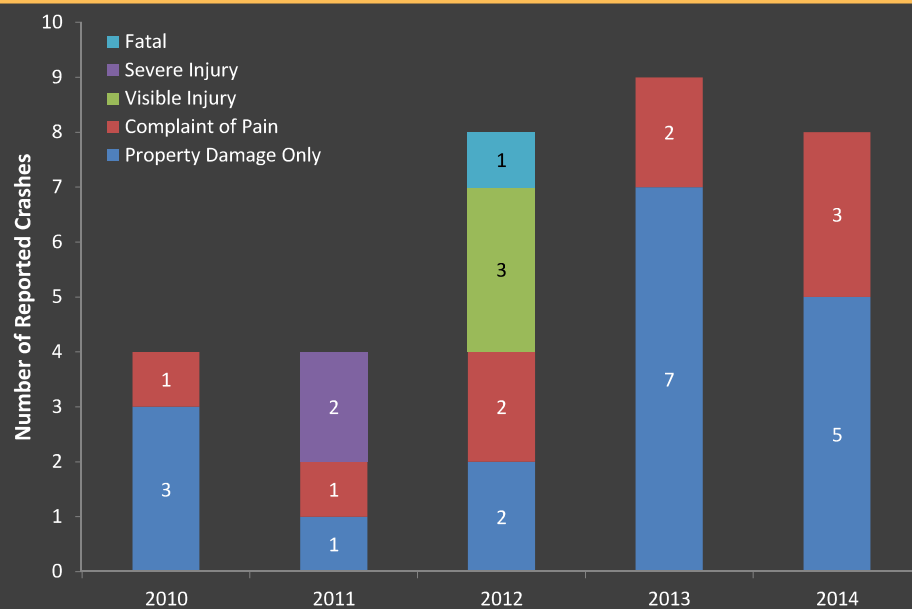
- Meeting Goals
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Existing Conditions: Reported Crash Analysis

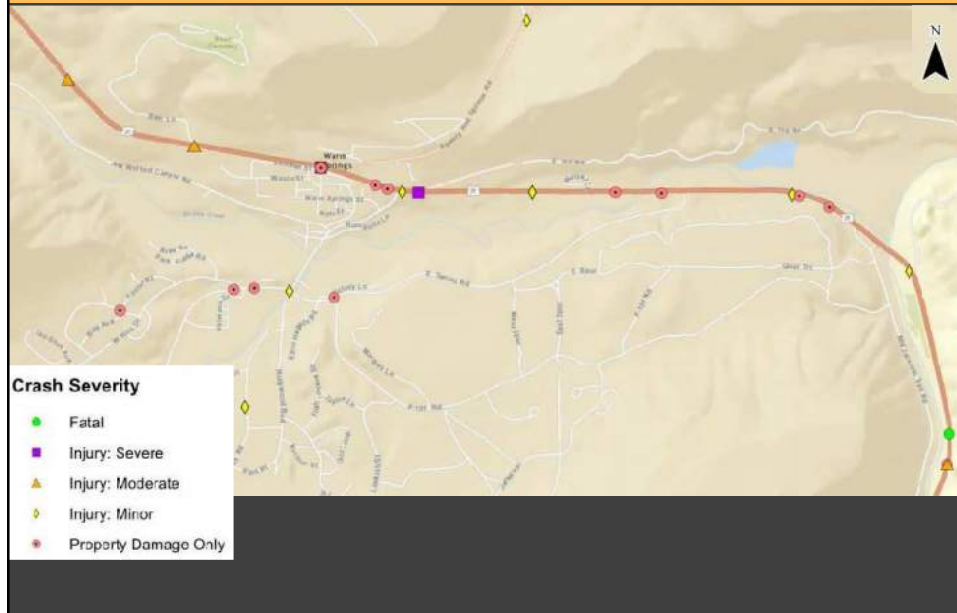
- Dates
- Severity
- Crash Type
- Weather
- Locations



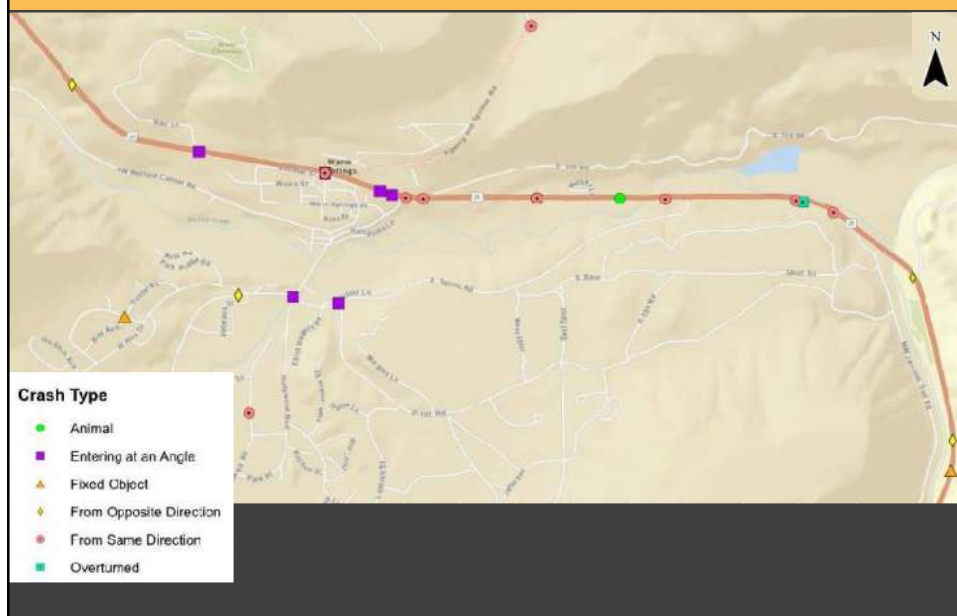
Reported Crash Severity by Year

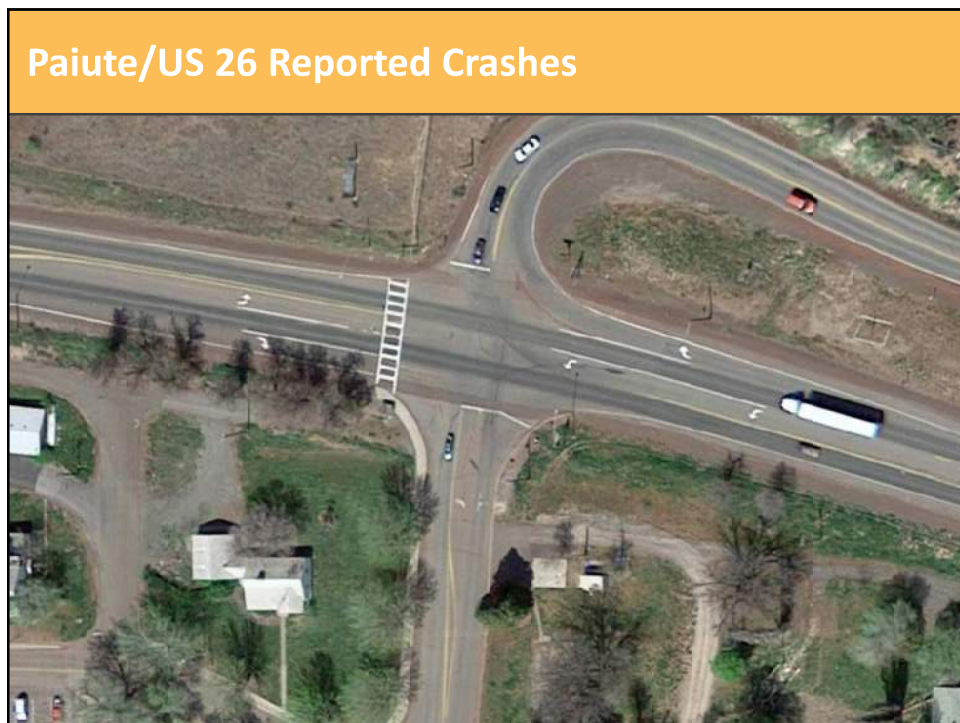
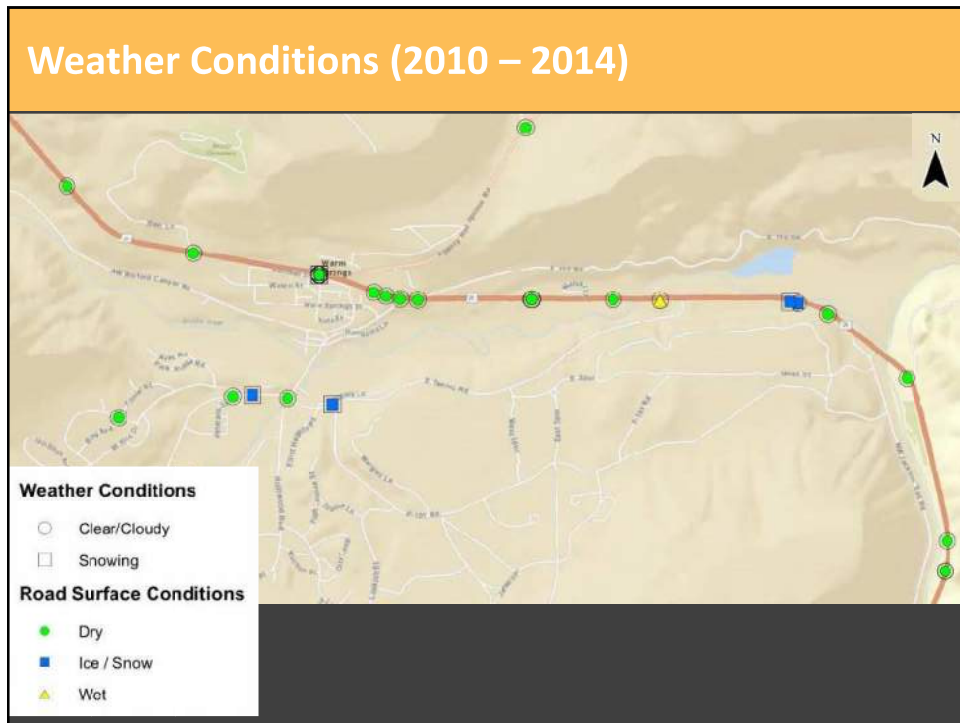


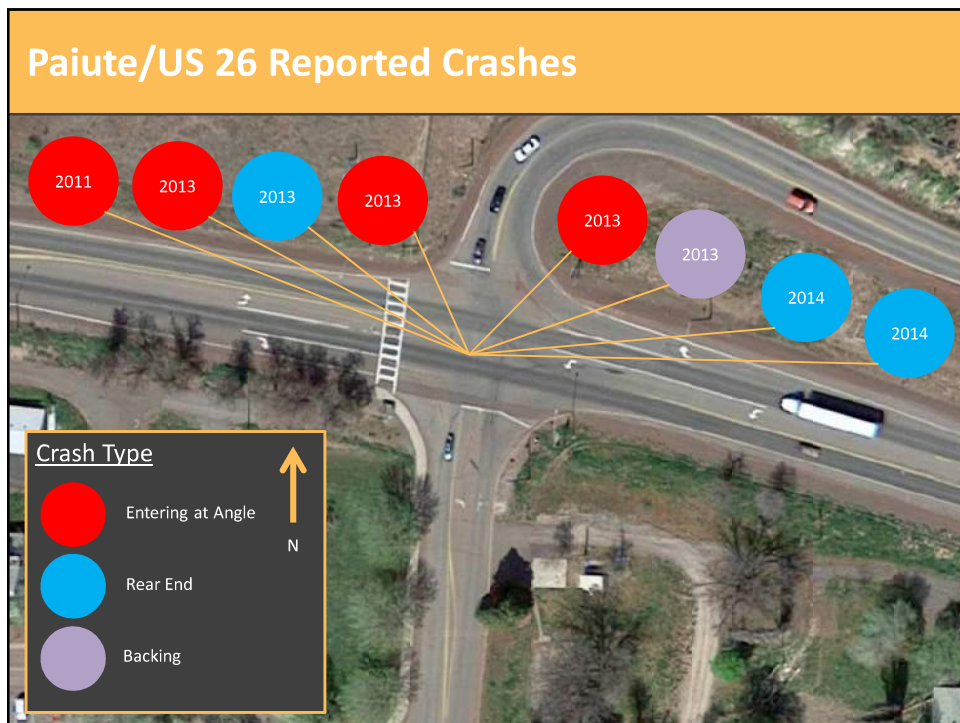
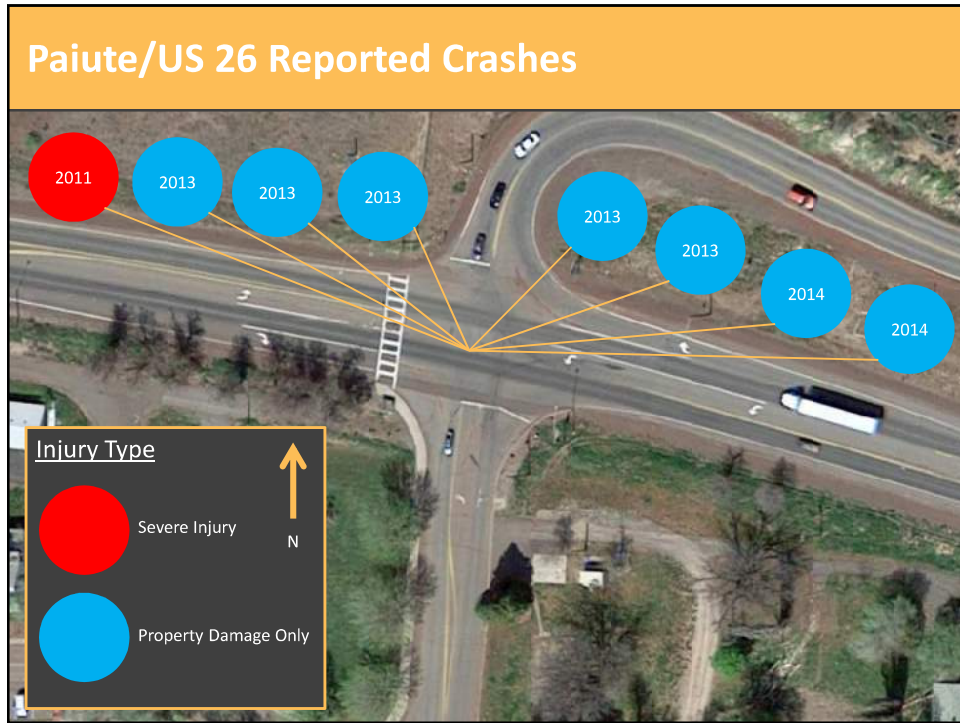
Crash Severity (2010 – 2014)

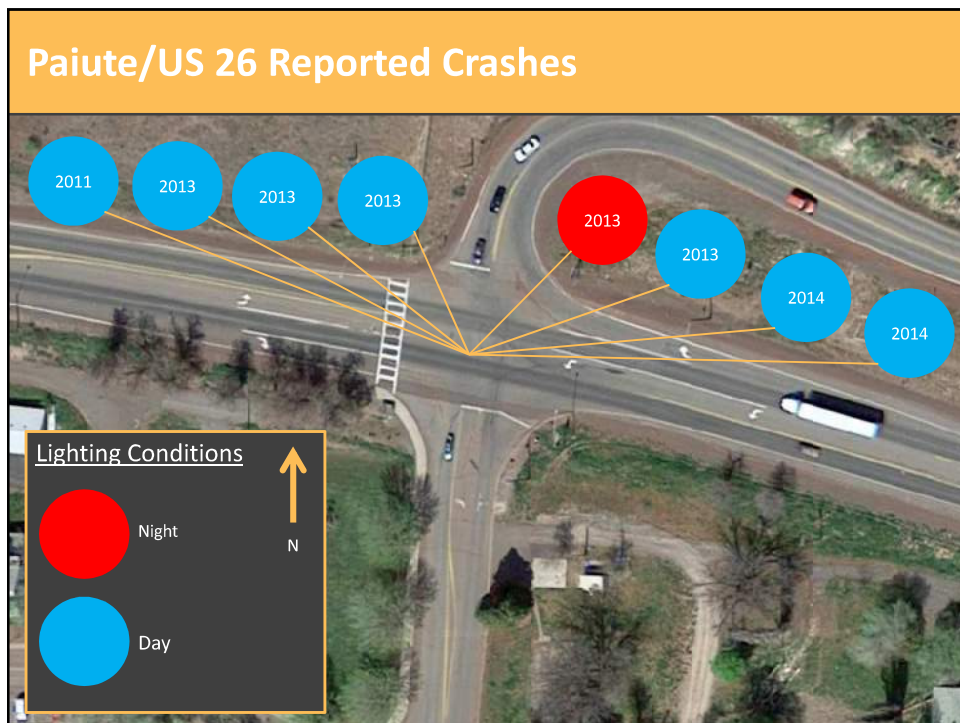
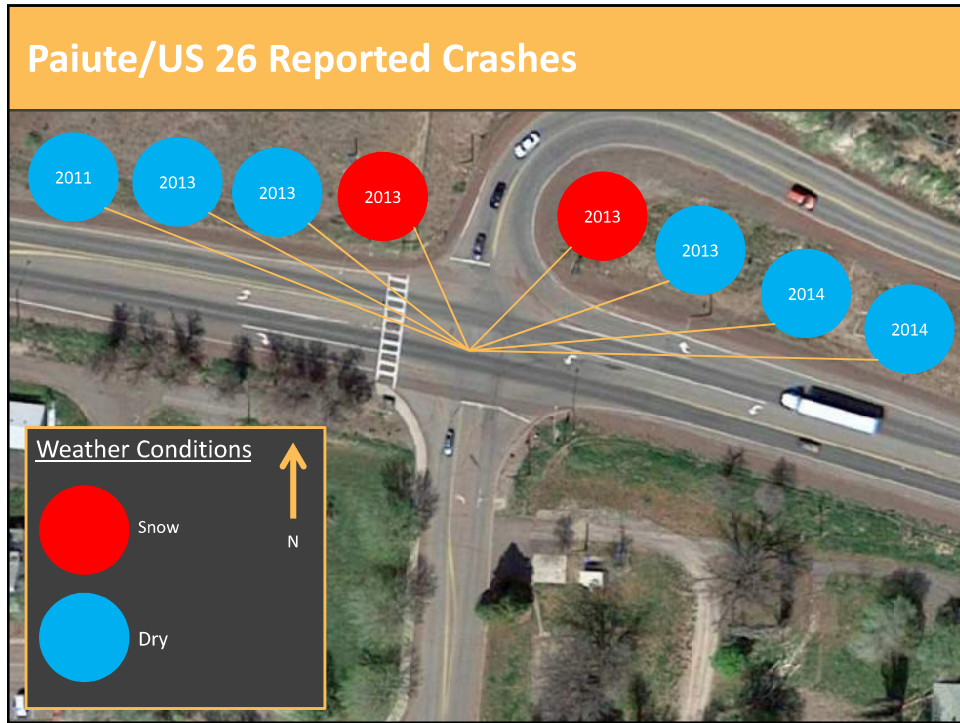


Crash Type (2010 – 2014)





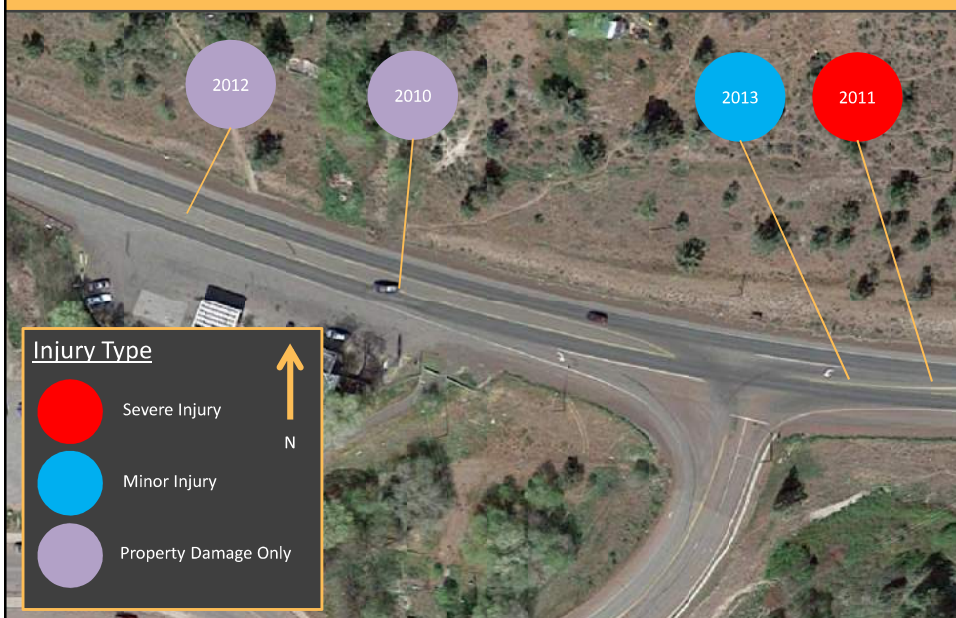


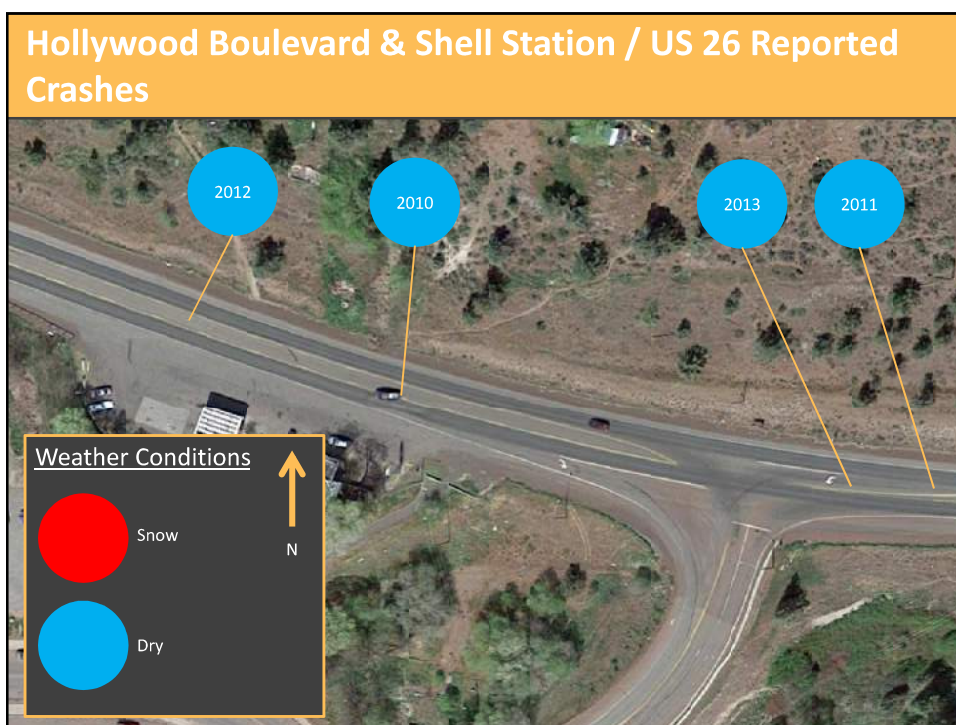
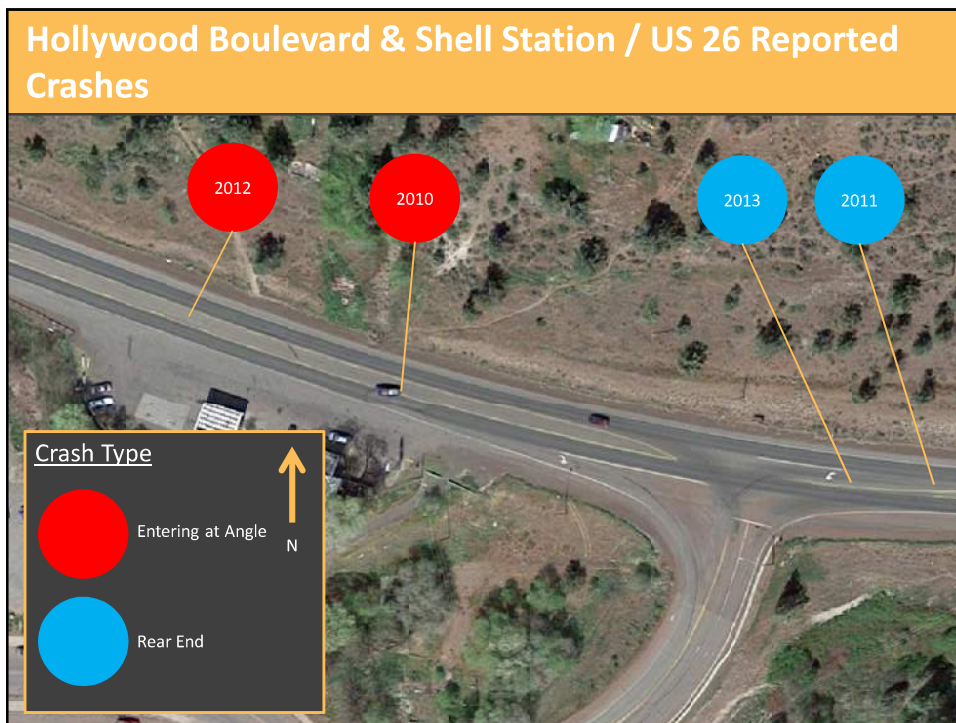


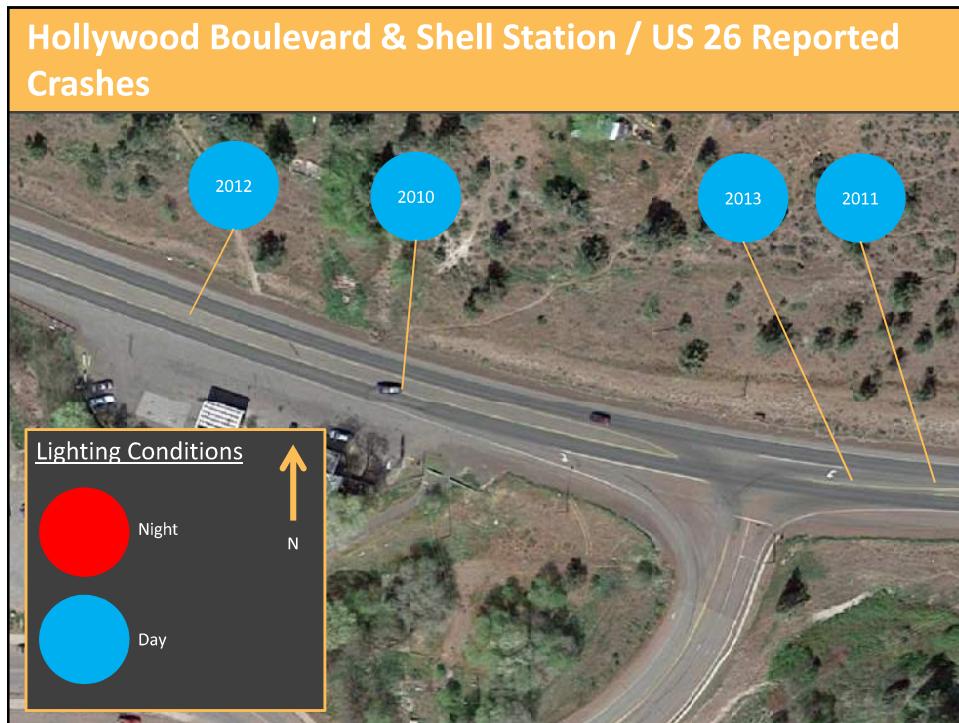
Hollywood Boulevard & Shell Station / US 26 Reported Crashes

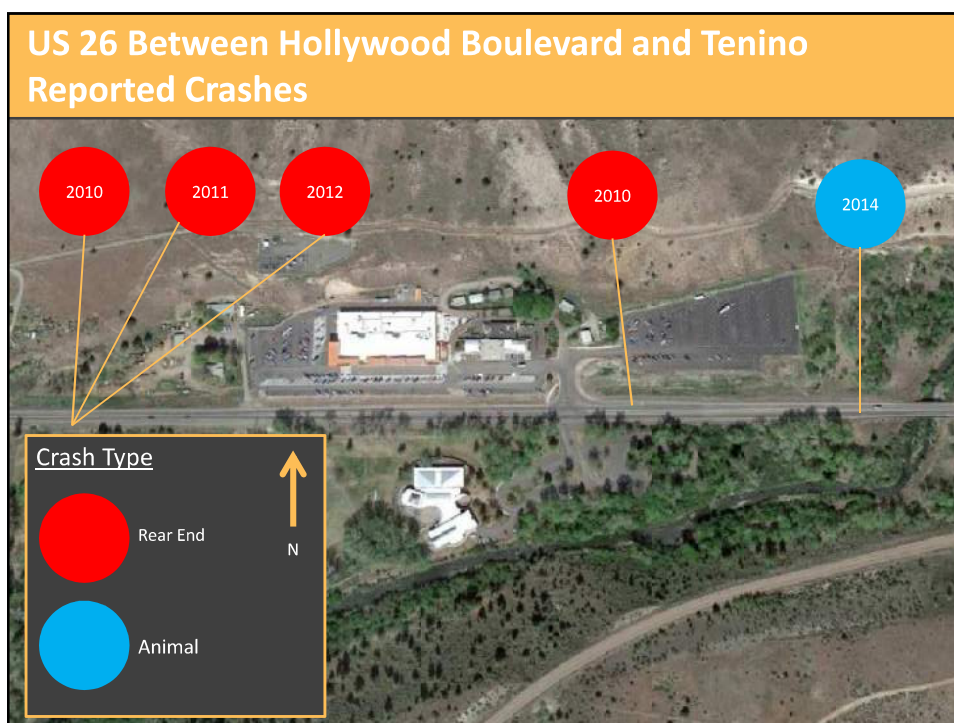
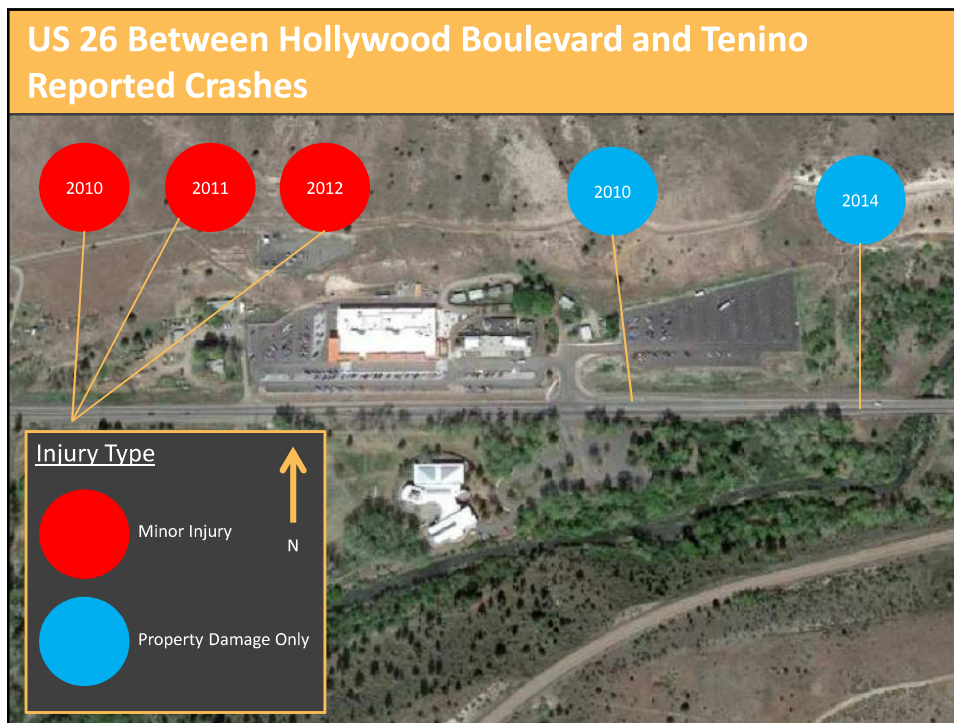


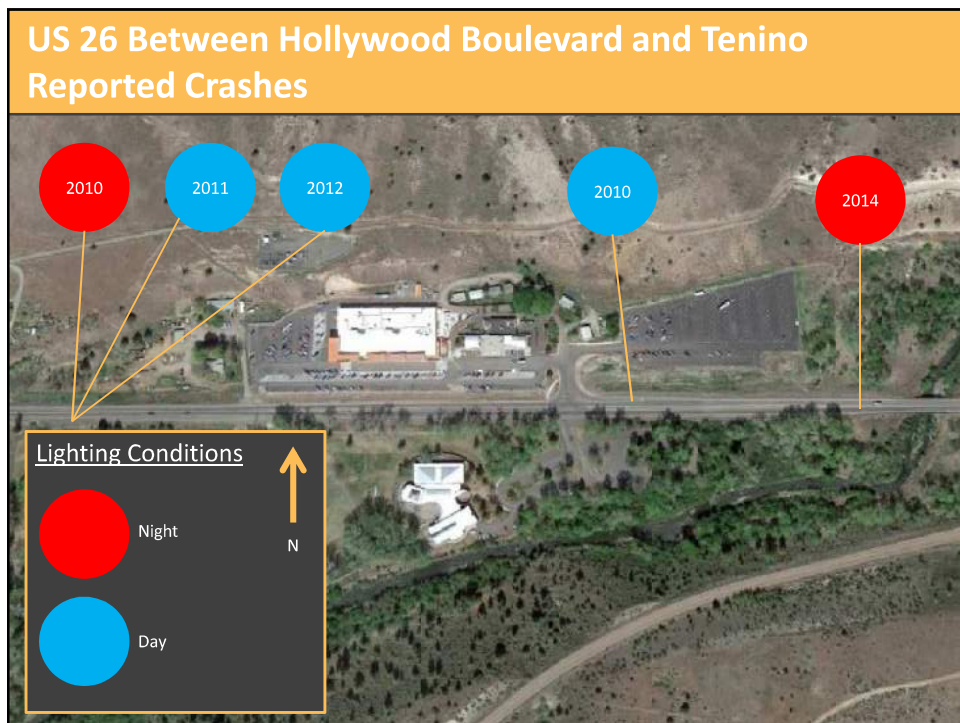
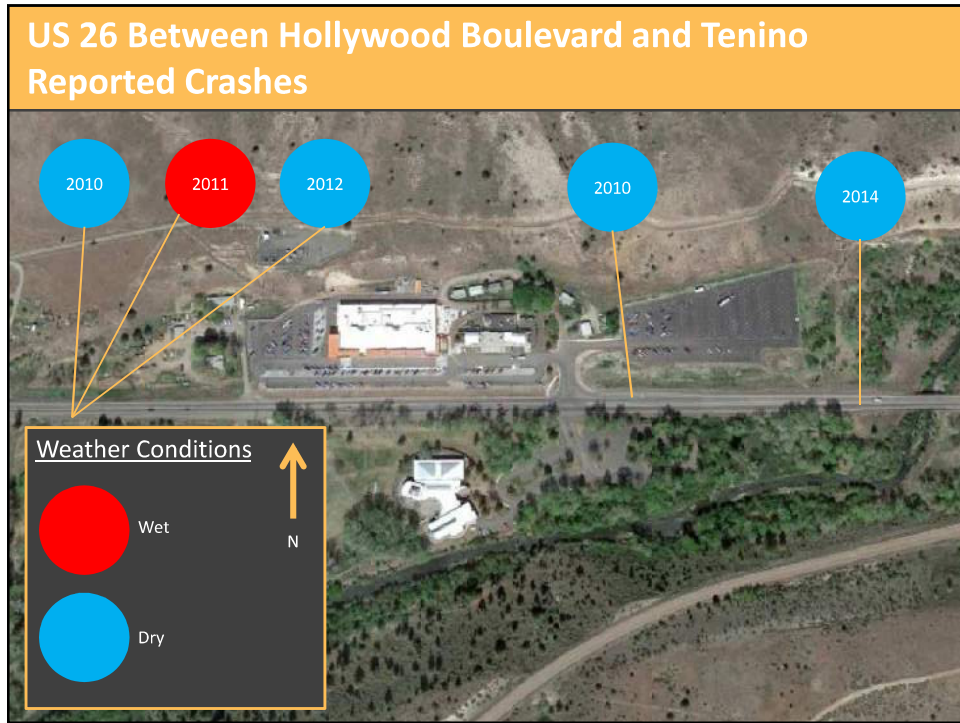
Hollywood Boulevard & Shell Station / US 26 Reported Crashes

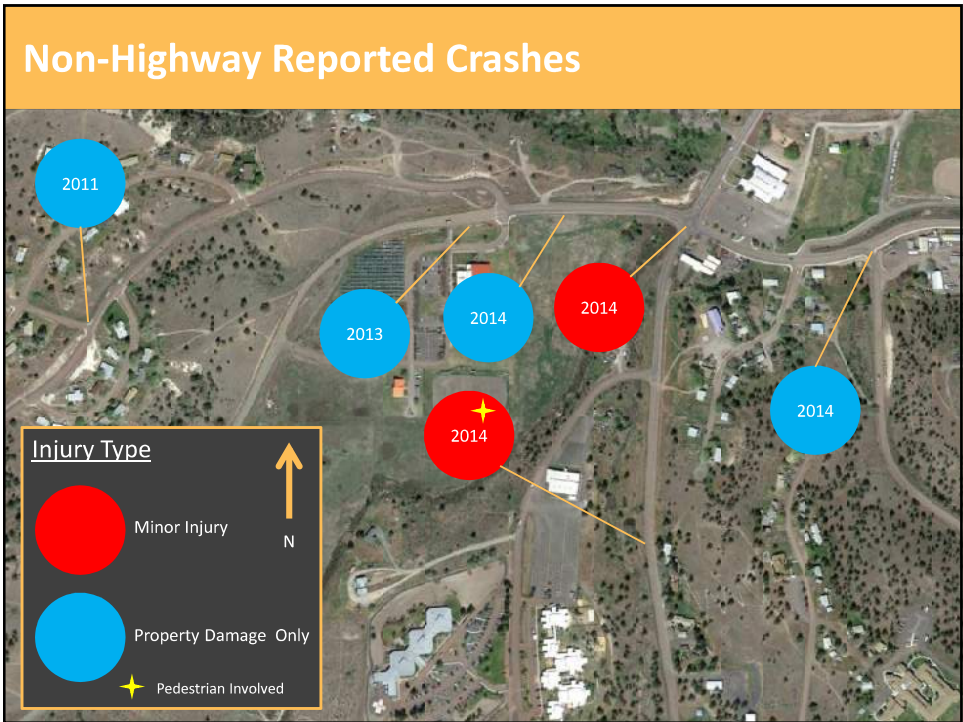
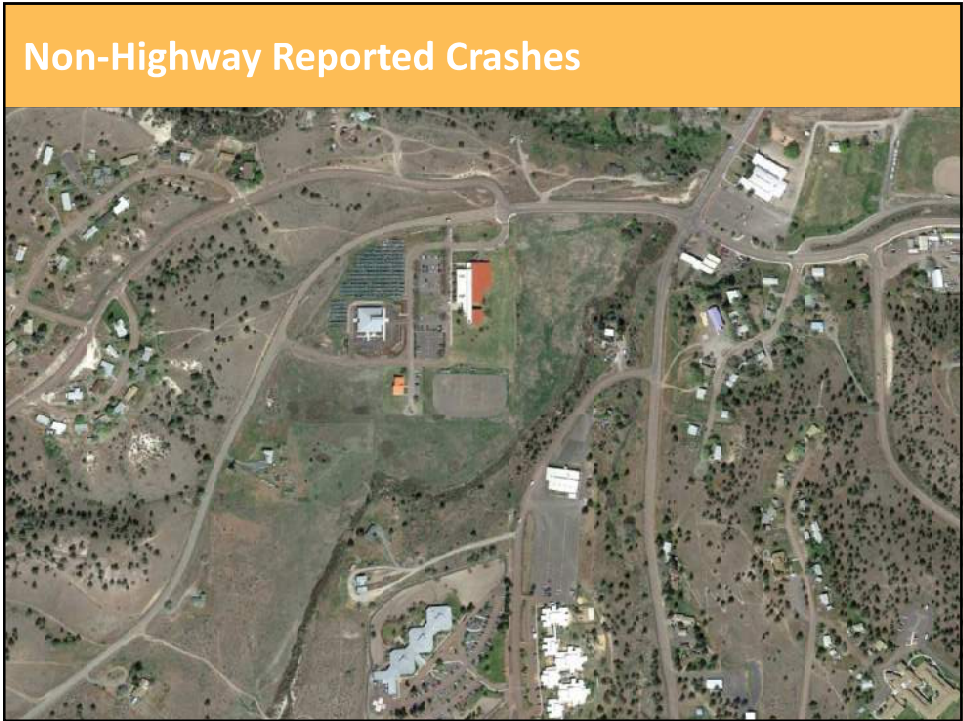


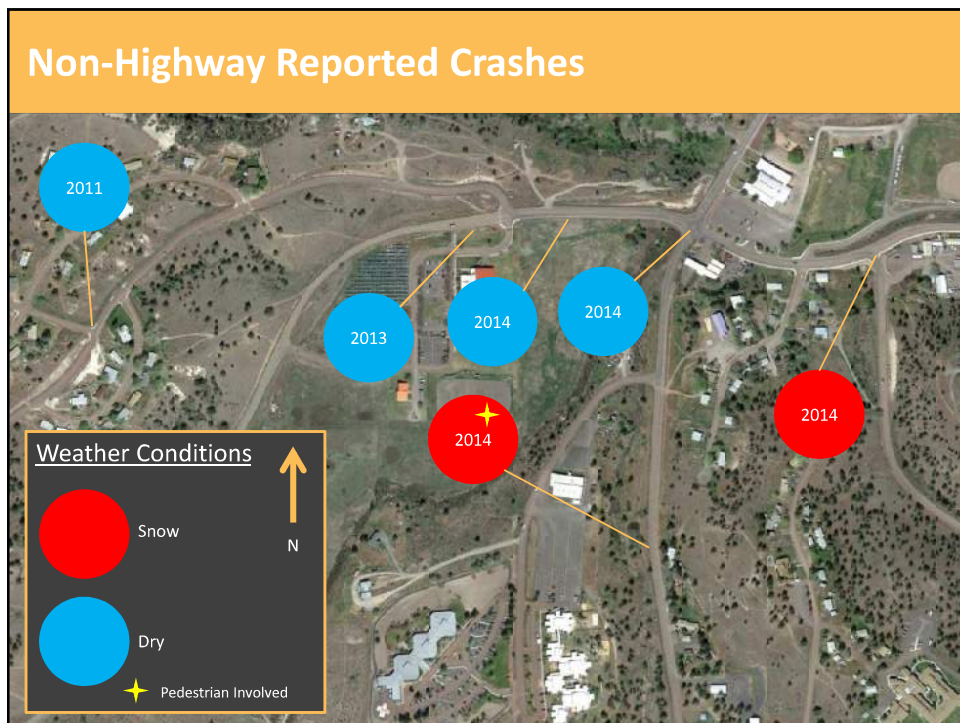
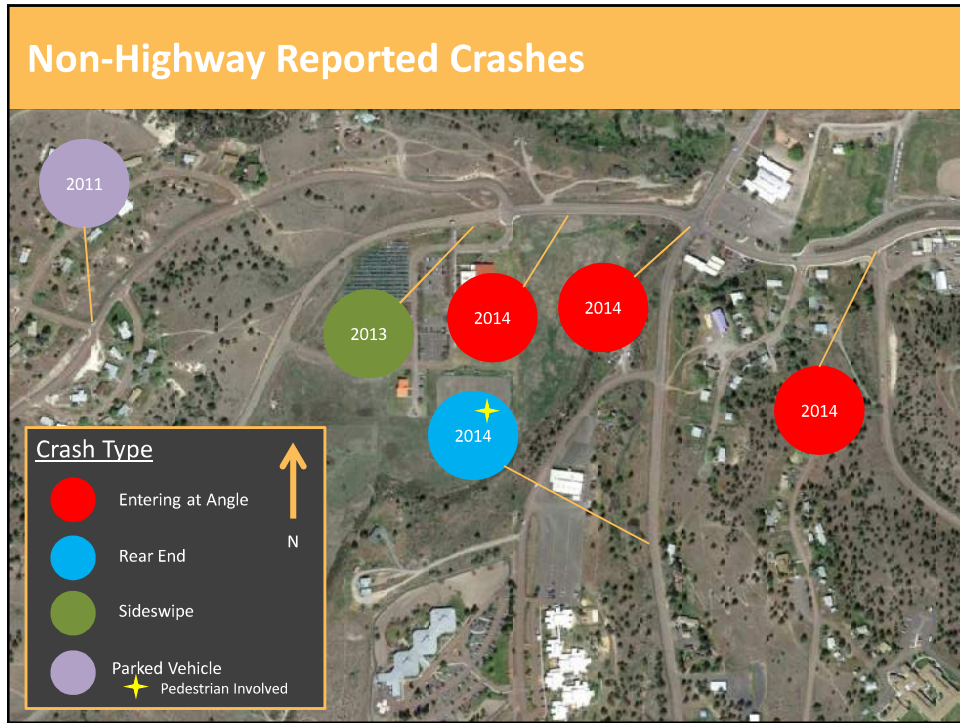




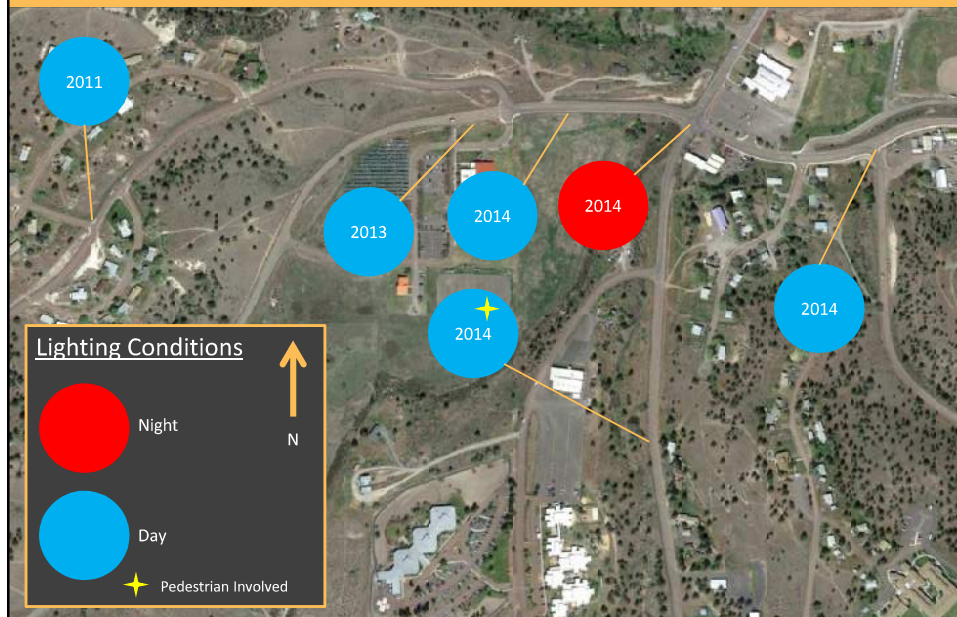








Non-Highway Reported Crashes



Meeting Agenda

- Meeting Goals
- Project Overview
- Summary of Feedback from PAC Meeting #1
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- Crash Analysis
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 - Issues Based on Reported Crash History
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Issue Summary: Reported Crash History

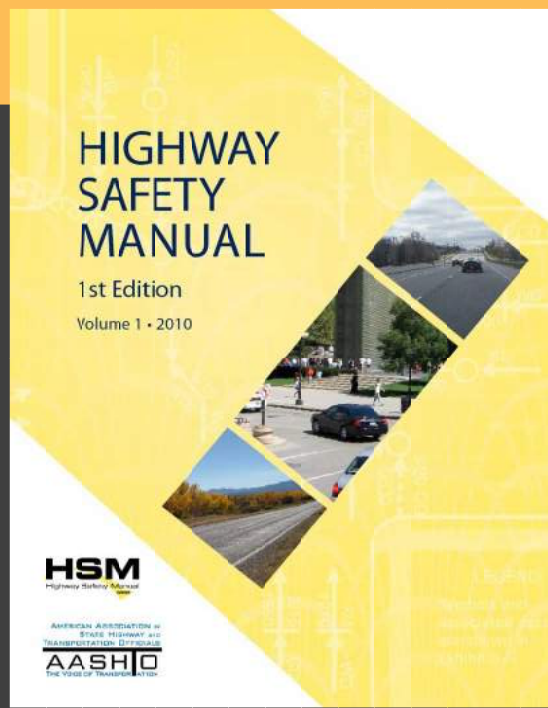


Meeting Agenda

- Meeting Goals
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Crash Prediction

- Highway Safety Manual (HSM) used to “predict” crash frequency
- Based on geometric and traffic characteristics



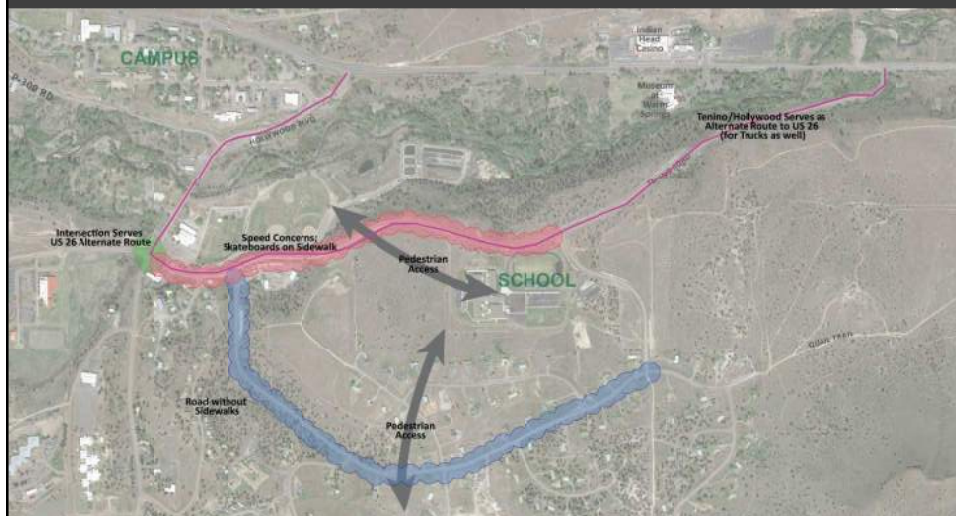
Crash Prediction: Intersections

	Intersections	Reported Crash Frequency per Year	Predicted Crash Frequency	Expected Crash Frequency
Core	Paiute/Warm Springs	0	0.1	0.1
	Hollywood/Warm Springs	0	0.02	0.02
	Tenino/Hollywood	0.2	0.05	0.05
	Tenino/Quail Trail	0	0.02	0.02
	Tenino/Chukar	0	0.02	0.02
	Quail Trail/Chukar	0	0.03	0.03
	Jackson Trail/Quail Trail	0	0.03	0.03
Highway	US26/Paiute	1.6	0.08	0.11
	US26/Hollywood	0.4	0.3	0.26
	US26/Museum	0	0.28	0.26
	US26/Tenino	0	0.19	0.18
	US26/Jackson Trail	0	0.25	0.22

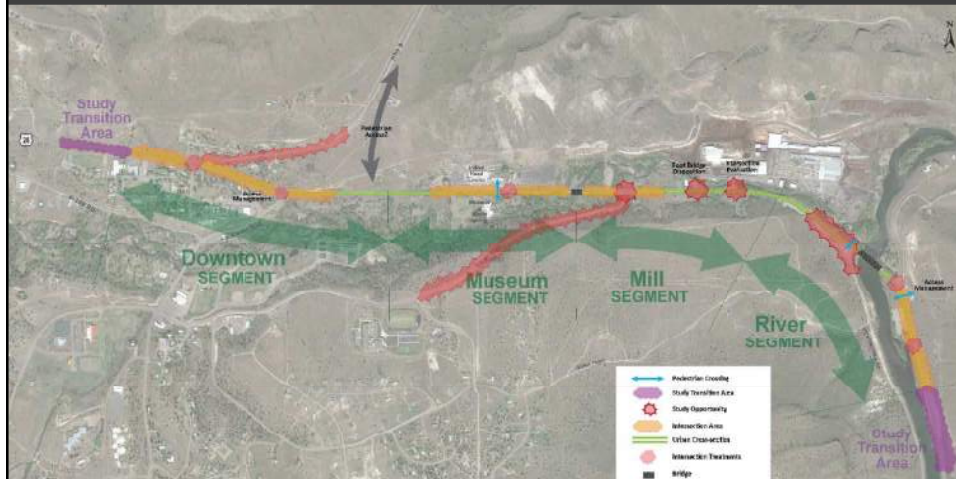
Crash Prediction: Segments

	Segments	Reported Crash Frequency per Year	Predicted Crash Frequency	Expected Crash Frequency
Core	Paiute	0	0.03	0.03
	Warm Springs	0	0.09	0.09
	Hollywood1	0	0.01	0.01
	Hollywood2	0	0.1	0.09
	Tenino1	0.2	0.03	0.03
	Tenino2	0	0.1	0.1
	Tenino3	0	0.12	0.11
	Chukar	0	0.06	0.06
	Quail Trail1	0	0.2	0.19
	Quail Trail2	0	0.2	0.19
	Jackson Trail	0	0.03	0.03
	US26-1	0.2	4.15	1.41
Highway	US26-2	0.4	0.59	0.52
	US26-3	1.2	1.87	1.6
	US26-4	0.2	3.49	1.12
	US26-5	0.6	2.28	1.55
	US26-6	0.8	1.15	1.01

Issue Summary: Core Area



Issue Summary: Highway Corridor



Meeting Agenda

- Meeting Goals
- Project Overview
- Summary of Feedback from PAC Meeting #1
- Existing Conditions: Inventory
- Crash Analysis
- Summary of Issues
 - Issues Based on Reported Crash History
 - Issues Based on Risk
- Crash Rate Comparison
- Preview of Safety Charrette

Crash Rate Comparison

Intersection	5-Year Average Crash Rate (Crashes per million vehicle miles traveled)	Statewide 90 th Percentile Crash Rate (Crashes per million vehicle miles traveled)
US 26 / Paiute Ave	0.33	1.08
US 26 / Hollywood Blvd	0.08	0.48

Meeting Agenda

- Meeting Goals
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- Crash Analysis
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 - Issues Based on Risk
- Crash Rate Comparison
- Preview of Safety Charrette

Safety Countermeasures Toolbox

Defined Pedestrian and Bicycle Facilities



Sidewalk
Sidewalks provide physical space for pedestrians separate from the vehicle travel lanes. They provide safety and security, while improving pedestrian comfort and accessibility on streets.



Shared Use Path
A shared-use path physically separates pedestrians, bicyclists, and other non-motorized users from vehicular traffic by either a barrier or an open space.



Marked Crosswalks
Marked crosswalks indicate optimal or preferred locations for pedestrians to cross and help designate right-of-way for motorists to yield to pedestrians.



Enhanced Crosswalks (Rapid Rectangular Flashing Beacon)
There are a variety of options available for increasing the visibility of a pedestrian crossing:

- high visibility markings,
- pedestrian refuge islands,
- pedestrian actuated signs,
- raised crosswalks,
- flashing beacons.



Lighting/Illumination
Illumination at crossings provides better visibility of the pedestrian so that drivers have greater time to react and slow before reaching the crosswalk.



New Paths
Creating new pedestrian and bicycle paths could increase safety for both users. These paths could connect to other paths in the area and would allow for pedestrians and bicycles to have routes that avoid being directly on the road.

Strategic Network Connections



Gap Closures (footbridge, stairs, etc.)
Gap closures would connect existing route/parks together to create a more cohesive pedestrian/bicycle system throughout Warm Springs. These closures could be footbridges, stairs, etc.



Routes to School
Having maintained routes to school would allow for pedestrians to more safely commute to school.

Safety Countermeasures Toolbox

Speed Reduction Treatments/Roadway Segment Safety Improvements



Radar Speed Feedback Sign
Speed feedback signs inform drivers of their speed and encourage drivers to reduce their speed. Warm Springs currently has two signs on US 26.



Gateway Treatments
Improvements that provide a transition from a rural environment to an urban environment provide an indication to drivers that they need to reduce speed. Potential improvements to change this environment include:

- curbs
- raised medians
- narrow lanes
- speed reduction signage
- gateway signage



Context Sensitive Roadway Cross Section
Maintaining an urban cross section throughout Warm Springs will provide indication to drivers that they are in an urban environment until they exit the core area.



Lighting/Illumination
Roadway illumination enables road users to better see each other and the roadway conditions.













Rumble strips
Rumble strips are grooves placed in the roadway in such a manner that, as the tire of the vehicle contact them, they produce sound and vibration intended to alert the driver. They can be placed on the centerline or shoulder.



Turn Lanes
Enclosure lanes for turning movements direct vehicles that are turning into a separate lane. This removes stopped vehicles from through traffic.

Safety Countermeasures Toolbox

Intersection and Driveway Access Treatments

	 <p>Lighting/Illumination Roadway illumination enables road users to better see each other and the roadway surroundings.</p> <p><small>Source: FHWA, 2008</small></p>	<p>Roundabout A type of intersection characterized by its circular shape, channelized approaches and yield to entry.</p> <p><small>Source: FHWA, 2008</small></p>	
	 <p>Tightening Turning Radii Large turning radii facilitate faster vehicle turning movements and increase crossing distance for pedestrians. Reducing the curb radii aids in slowing vehicles and improving pedestrian safety.</p> <p><small>Source: FHWA, 2008</small></p>	<p>Alternate Truck Routing Alternate truck routes provide trucks with a travel option during the special situations when the highway may be closed. Signage is needed to direct trucks to these routes.</p> <p><small>Source: FHWA, 2008</small></p>	
	 <p>Turn Lanes Exclusive lanes for turning movements direct vehicles that are turning into a separate lane. This removes stopped vehicles from through traffic.</p> <p><small>Source: FHWA, 2008</small></p>	<p>Improve Sight Distance Providing adequate sight distance at intersections and driveways allows drivers to have adequate time to see and respond to potential conflicts.</p> <p><small>Source: FHWA, 2008</small></p>	
	 <p>Traffic Signal Traffic signals are traffic control devices that provide orderly movement of conflicting flows through an intersection. Traffic signals separate movements and conflicts with time separation.</p> <p><small>Source: FHWA, 2008</small></p>	<p>Define Access to Properties Creating defined access points reduces the number of potential conflict points in the roadway and minimizes confusion of drivers. It also reduces pedestrians' exposure to potential conflicts with vehicles.</p> <p><small>Source: FHWA, 2008</small></p>	
	 <p>Truck Parking Locations Having designated places for trucks to park would help alleviate the amount of trucks parking along the highway. This would increase visibility, both for those on the highway and those trying to access the highway, and would increase safety.</p> <p><small>Source: FHWA, 2008</small></p>		

Next Steps

- Evaluation and Prioritization of Countermeasures based on Feedback Received
- Reviewing Draft Countermeasures with the PAC
- Develop Draft Safety Plan

Please let us know if you have any questions:

Ashleigh Griffin, agriffin@kittelson.com (541.639.8615)

Lonny Macy, lonny.macy@wstribe.org (541.553.3509)

PAC Meeting #3
Sign-In Sheet

NAME	AGENCY/COMPANY	PHONE	EMAIL
TRANS WILKS	CTWS	(541) 460-1202	trans.wilks@tribes.org
JEFF CARROLL	IHC		
Michael Leno	BIA	541-325-1050	edwin.leno@bia.gov
DAN MARTINEZ	EMERGENCY MGM	541 419-8014	danny.martinez@tribes.org
Chelsie Beaver	BNR	541-325-1462	Chelsie.Beaaver@BNR.org
Carol Leone	Museum	541-553-3331	
Chelsie Beaver	F&S	541-553-1034	
Joel McCarroll	ODOT-R4	541 388 6189	joel.mccarroll@odot.state.or.us
DAN SERPICO	"	" " 6170	DANIEL.S.SERPICO@... .
David Amiton	"	541 388 6111	david.amiton@odot.state.or.us
Lorena Medina	emergency management	541-553-3345	
Neal Morningowl	emergency management	541-777-2804	neal.morningowl@wstribes.org
Pat Cammityotti	ODOT-R4	541-296-2215	Patrick.N.Cammityotti@odot.state.or.us
Michael Duncan	ODOT-R4	541-388-6046	Michael.M.DUNCAN@ODOT...
Joel Holliday	WSHA	541-553-3250	Joel.Holliday@wsa.us
Richard Craig	BNR-TEO	541 553 2018	richardcraig@tribes.org
Dan Courtney	CTWS-Public Utility	541 553 3452	dan.courtney@tribes.org
Urban Ross	BIA	541-553-2420	urban.ross@bia.gov
Bruce Irwin	WS	541-615-0178	bruce.irwin@wstribes.org





PAC Meeting #3 Sign-In Sheet

NAME	AGENCY/COMPANY	PHONE	EMAIL
Lanny Macy	CTWS	541-533-3509	Lanny.Macy@wstribes.org
Chris Watson	WSCAT	541-553-3148	Chris@wscat.org
Thomas Adams	WSCE	541-325-6894	thomas.adams@wstribes.org
Jimmy Toke Sr	CTWS	541-460-0582	jim2159@yahoo.com



- Meeting Agenda
- Meeting Goals
- Schedule
- Summary of Input from PAC Meeting #1
- Review of PAC Meeting #2
- Input Affecting Draft Recommendations
- Study Area
- Safety Countermeasures Toolbox 1
- Safety Countermeasures Toolbox 2
- Safety Countermeasures Toolbox 3
- Projects—Immediate Implementation
 - “Retain” instead of “Maintain” for the casino feedback sign
- Projects—Near-Term
- Projects—Long-Term
- Paiute/US26
- Hollywood
- Casino
- Tenino
 - Do we have sketch of roundabout at Tenino?
- River Access
 - Maintenance requirements – could you contract with CTWS and ODOT for this?
 - Must consider freight industry too
 - Reminder – this is just planning level not design
 - Water quality and fishery on the north side of the stream near the restaurant has suffered and sidewalks along the north end would make it worse
- December 7th – right of way meeting – federal regulations – they may have questions
- Timelines for projects should be specified in the report
 - Immediate: 0-2yrs
 - Near-term: 2-5yrs
 - Long-term: 5+
- Downtown Warm Springs
- Hollywood/Tenino Intersection
- School Area: Immediate Projects
 - Completed
- School Area: Near-Term
- School Area: Long-Term
- Work Session
 - Interest in having the speed limit reduced to 35mph on US 26 throughout Warm Springs
 - A lot of the current trails that people use traverse private property
 - Gateway treatment be moved to immediate
 - Lane narrowing to be added to gateway treatments
 - Hollywood Boulevard is too steep when trying to get from Hollywood to US26 to get up to 45pmh speed quickly
 - Changing this (reducing speed) would help with pedestrians as well

- Casino/museum intersection improvements
 - Agree with longer term
- Restaurants/market area
 - Crosswalks should come after speed reductions have become effective
- Pedestrians walking along US26
 - South side of US 26 from casino to the west
 - North side of US 26 from rainbow market to the casino
 - Whatever part is widest tends to be what people currently use because it feels safer
- Cultural site on the south side of US26 on the east side of Hollywood intersection
- School area
 - Policy portion to have a safe routes to school plan
 - Data collection can happen
 - Dedicated resources
 - Current projects addressing many aspects of these
 - School zone signs have been added along the road
 - Road to the ball fields needs to happen
- Downtown
 - Crossing across Hollywood should be moved from long-term to near-term
 - Some lighting is burning out on the other crossing further south on Hollywood and that crossing should be added to the list of projects
 - Community center crossing
 - Hollywood is very dark currently
 - Thinking about putting sidewalks on both sides
 - Lighting along the corridor would be appreciated
- A lot of benefits of getting the shared use path away from the road
 - If there was a buffer between the path and US26 that would be helpful
 - For snow storage and other materials
 - The buffer distance is undefined at this point
- There are talks—but nothing at all set in stone—to develop the area west of Paiute Avenue
- Update the community to let them know the draft plans

CONFEDERATED TRIBES OF WARM SPRINGS

Project Advisory Committee Meeting #3

November 17, 2016



Meeting Agenda

- Meeting Goals
- Project Schedule
- Review of Project to Date
- Preliminary Project Recommendations
 - Immediate/Near Term/Long Term Priorities
- Worksession (Handout)
- Next Steps

Meeting Goals

- Today's meeting goals:
 - Present DRAFT recommendations
 - Obtain input from the PAC about the
 - Recommendations
 - Priorities
- Overview of handout & tech memo

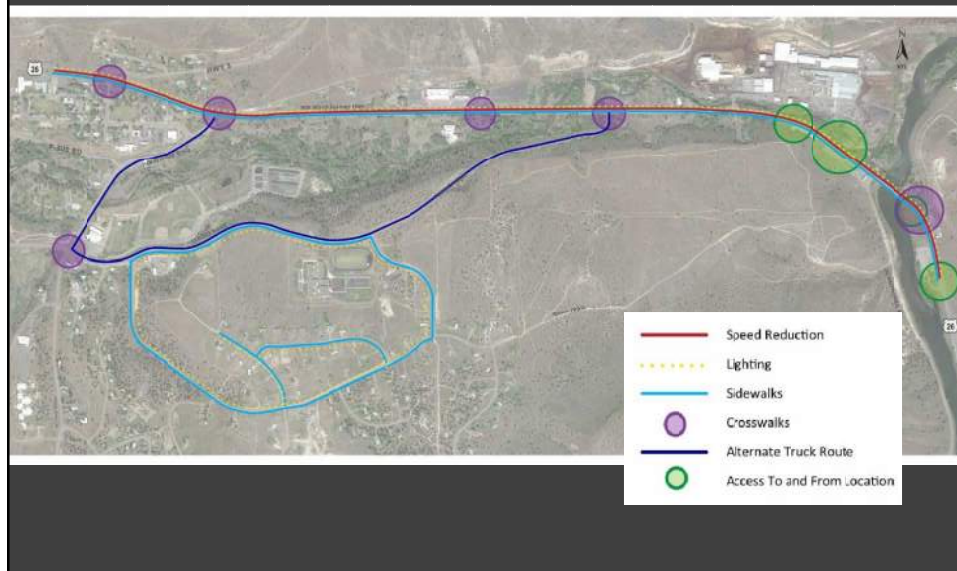


Schedule



DRAFT memos are available on the project website: www.ctwssafetyplan.com

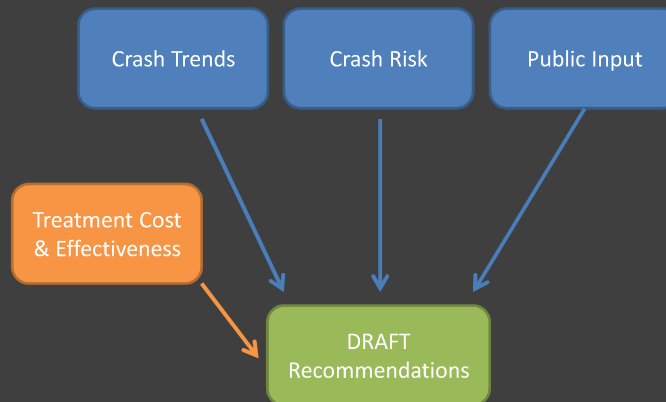
Summary of Input from PAC Meeting #1



Review of PAC Meeting #2

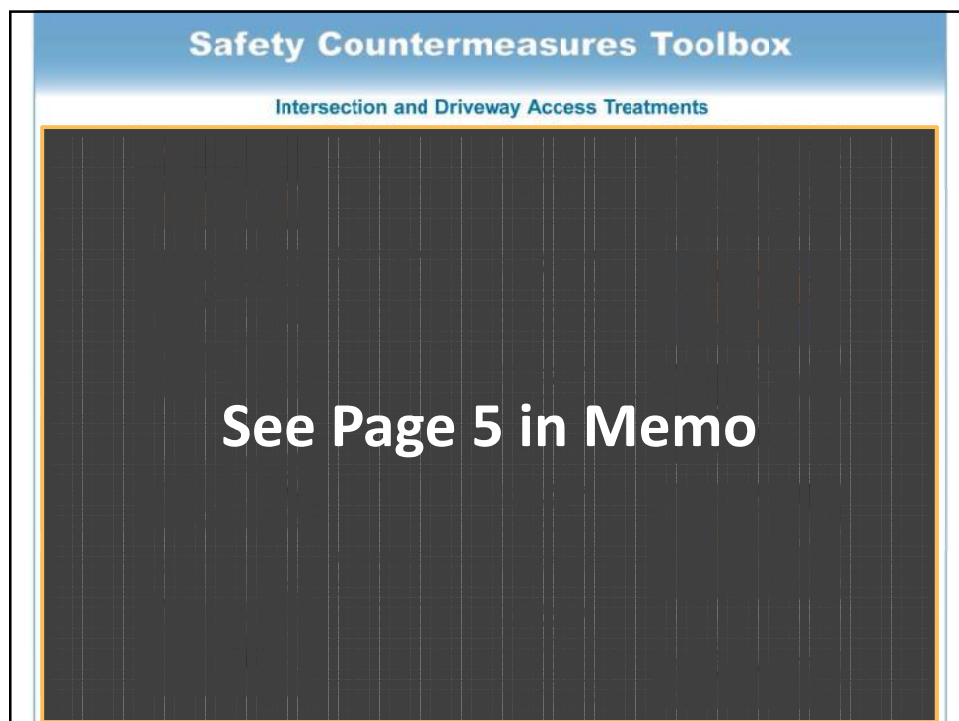
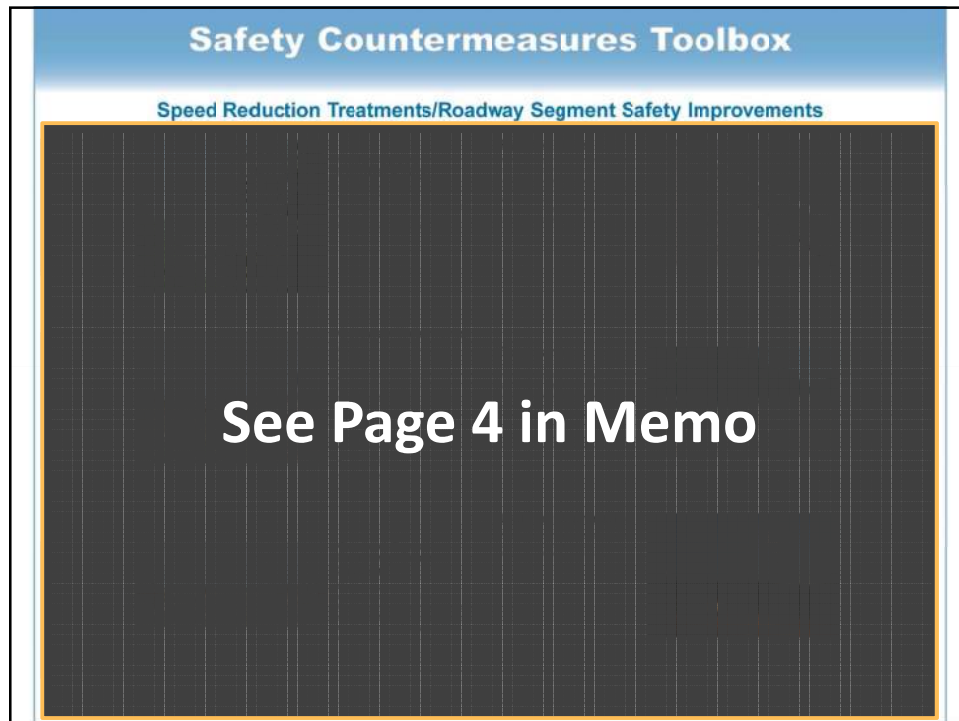


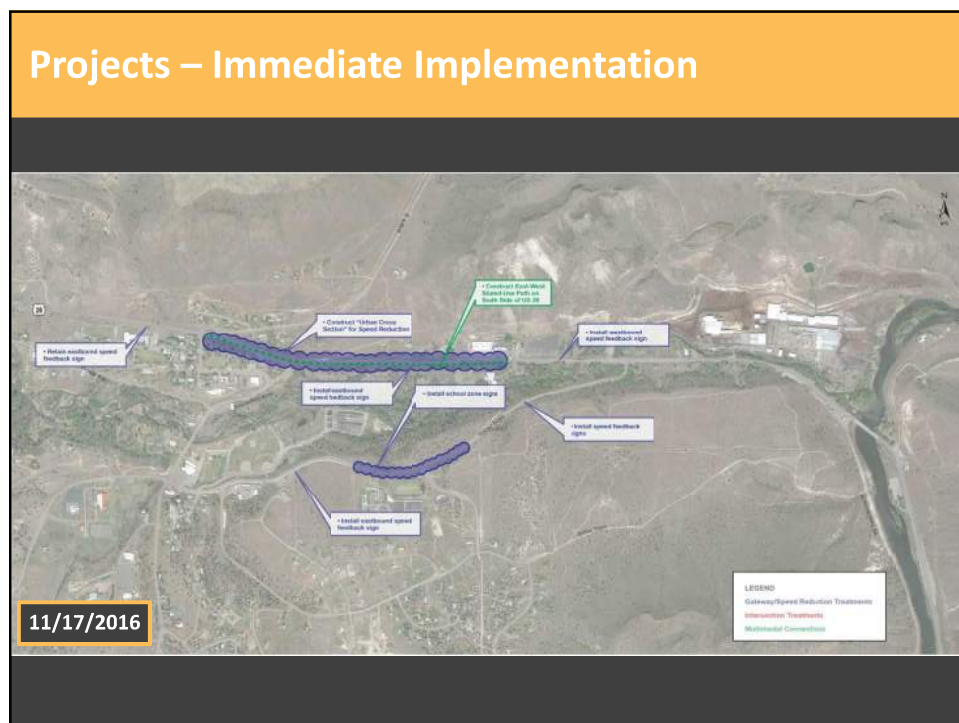
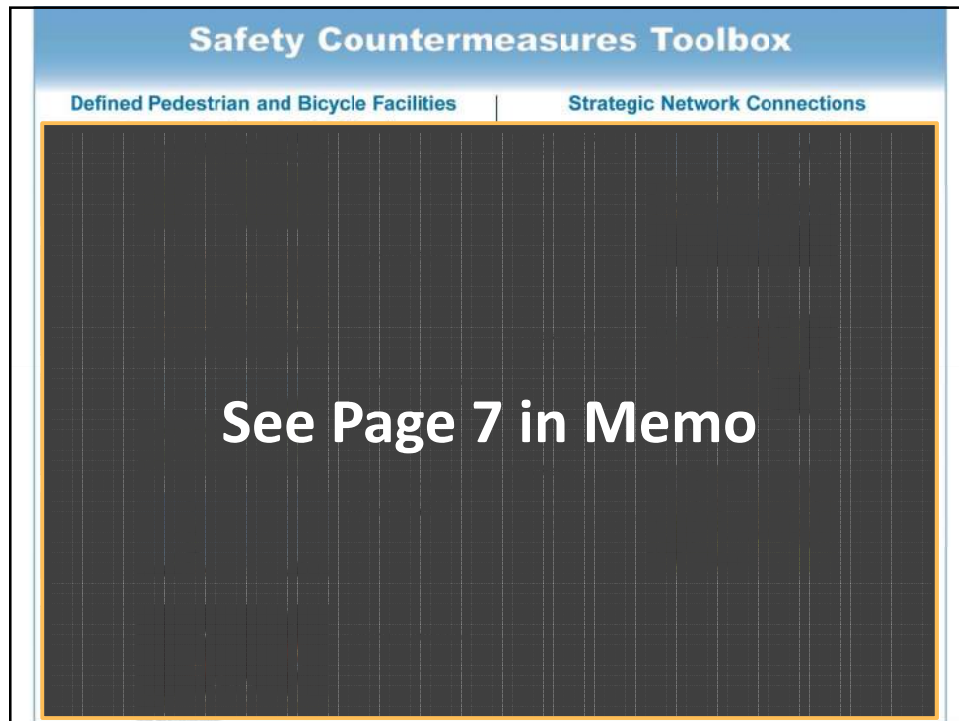
Input Affecting Draft Recommendations



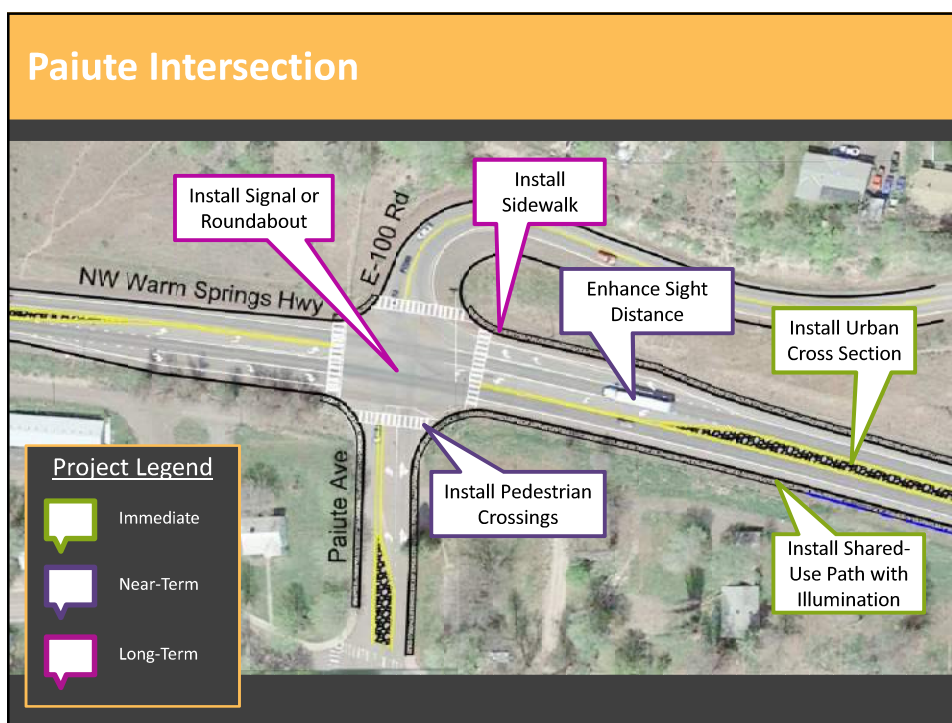
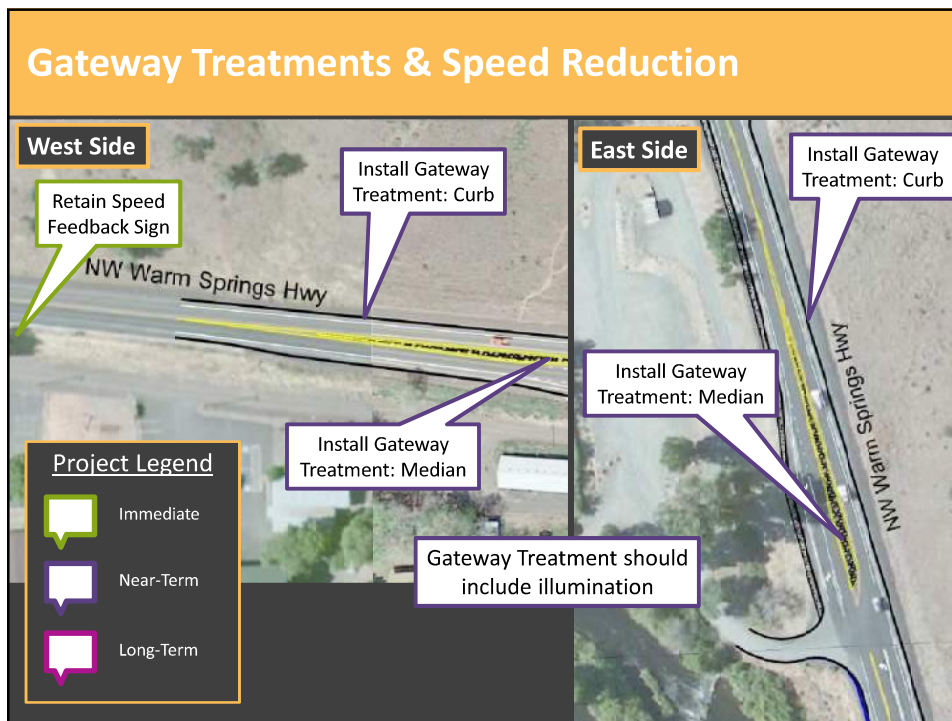
Study Area

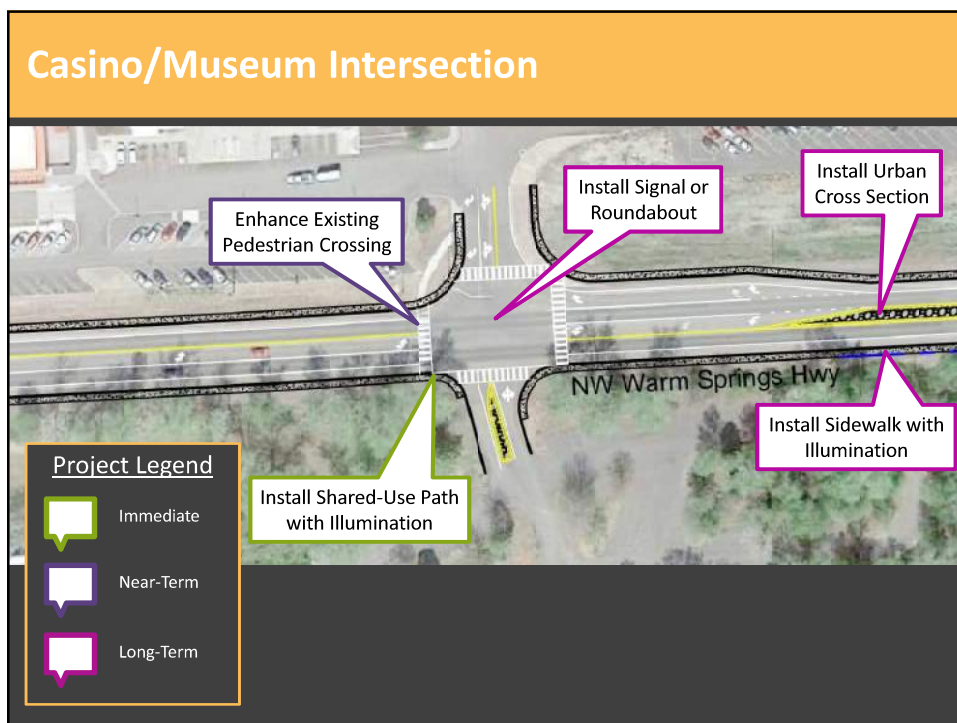
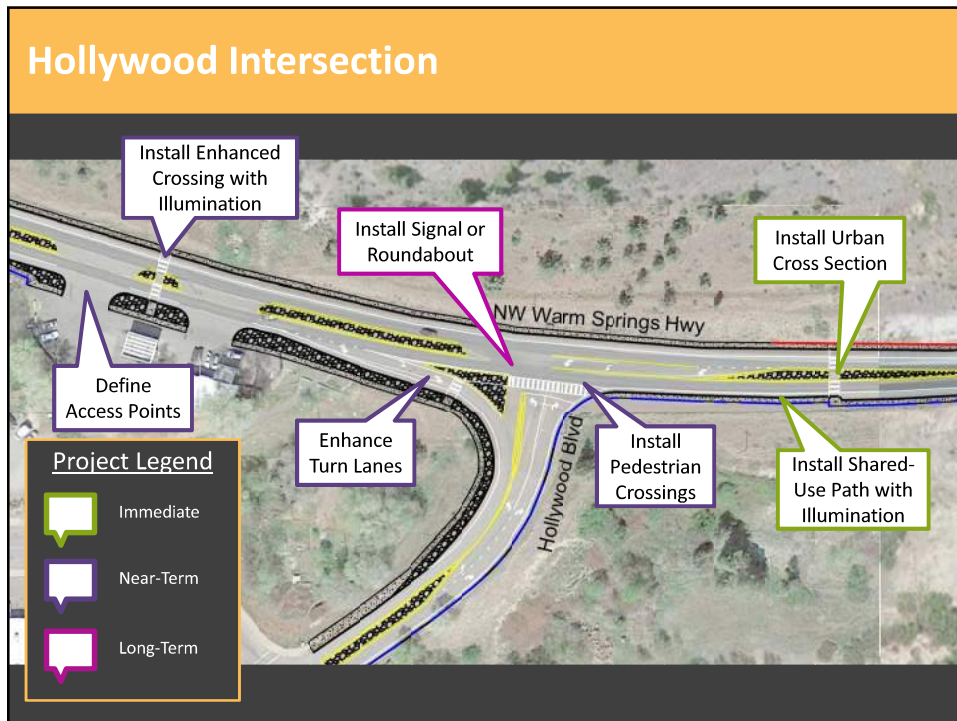


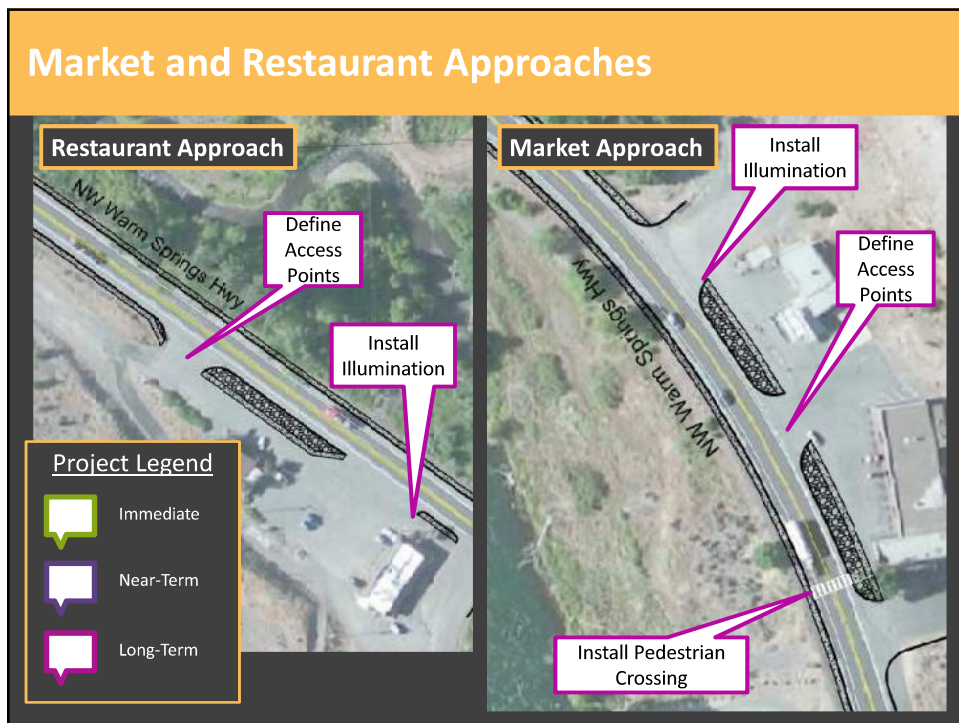
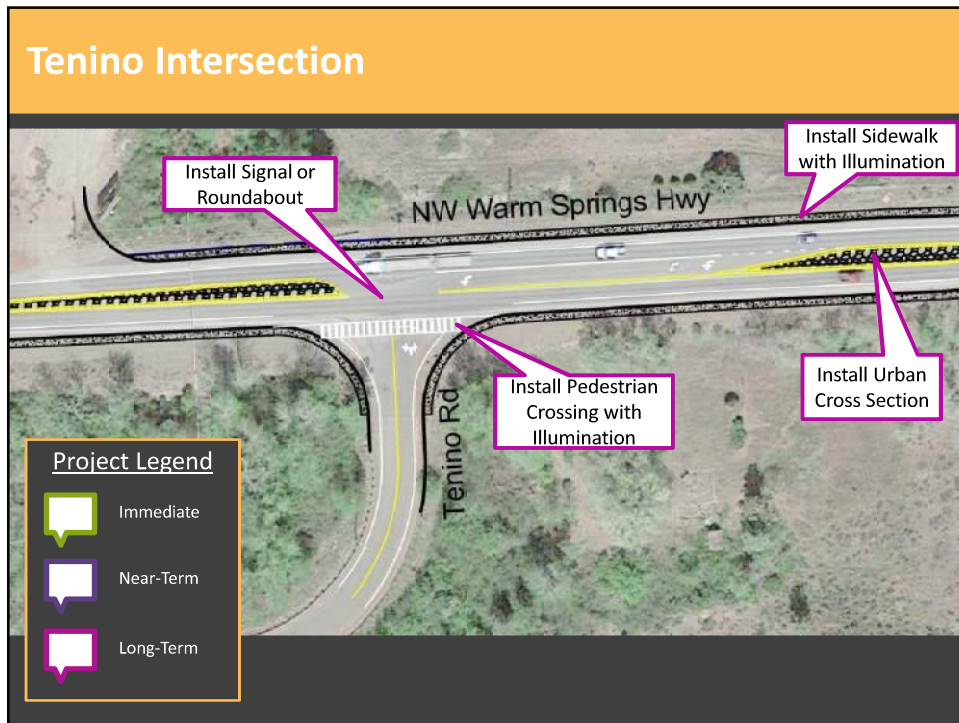


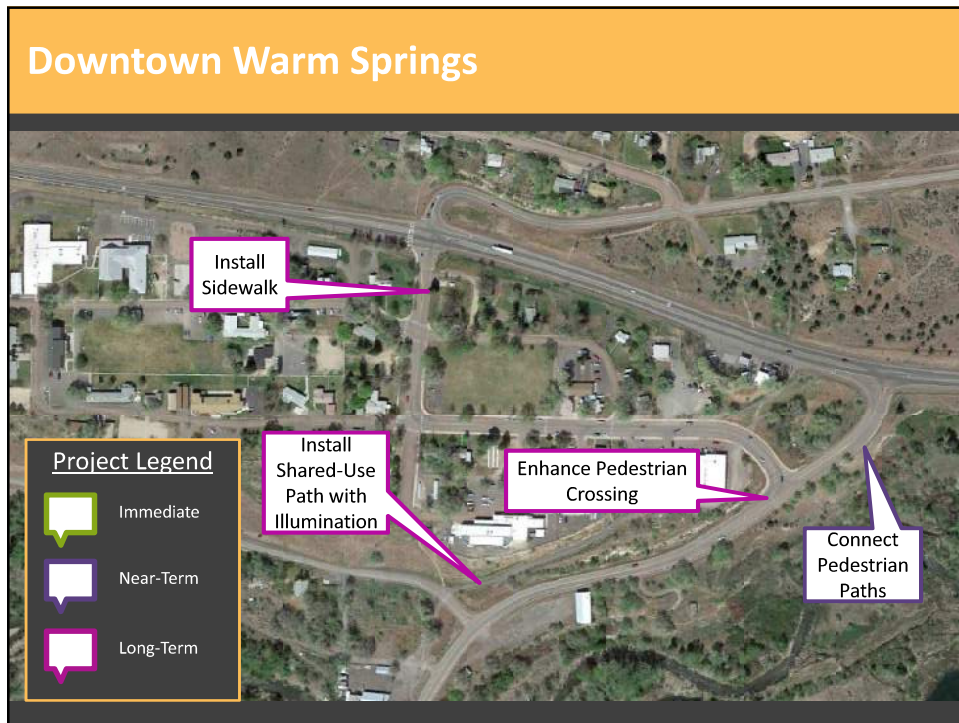




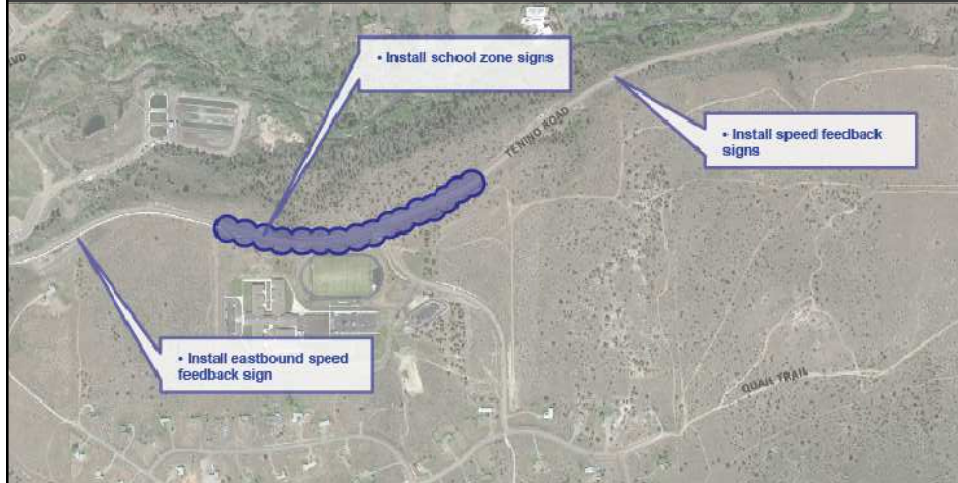




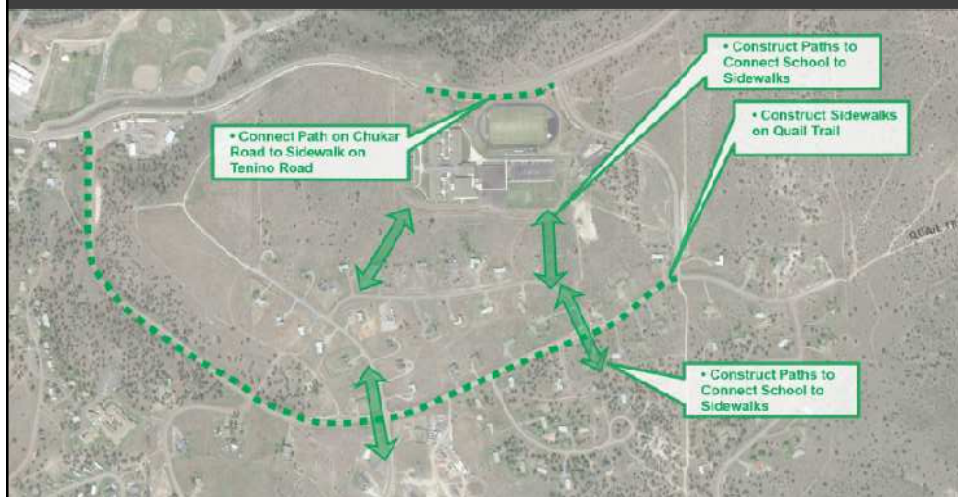




School Area: Immediate Projects



School Area: Near-Term Projects



School Area: Long-Term Projects



Worksession

Location	Recommendations	Do you AGREE with the recommended projects and policies at this location? Please indicate which policies/practices you agree with.	If you DISAGREE with the recommendations (project or policies), please explain more here: • What do you disagree with and why? • What do you recommend be changed or added at this location?	Other General Comments?
US 26 Corridor				
US 26 Corridor from Palate Avenue to Caskie/Museum	Immediate-Term: • Install speed feedback signs • Construct urban cross-section for speed reduction • Install shared-use pedestrian/bicycle path Near-Term: • Install eastbound gateway treatments Long-Term: • Install sidewalk on south side of US 26			
US 26 Corridor from Caskie/Museum to Freshwater River	Long-Term: • Construct urban cross-section for speed reduction • Install sidewalk or shared-use pedestrian/bicycle path			
	Near-Term:			

Next Steps

- Submit comments by November 23rd
 - The tech memo will be revised based on your input
- The Draft Safety Plan will be developed
- Tribal Council Worksession to review the Draft Plan
 - Date: TBD

Please let us know if you have any questions:

Ashleigh Ludwig, aludwig@kittelson.com (541.639.8615)

Lonny Macy, lonny.macy@wstribes.org (541.553.3509)

Michael Duncan, Michael.W.Duncan@odot.state.or.us (541.388.6046)

APPENDIX 3: CTWS CRASH DATA SUMMARY STATISTICS

SUMMARY STATISTICS FROM CTWS DATA

The CTWS provided additional data from local police records to supplement the ODOT crash records. The police records may include the reported crashes in the ODOT database; therefore the crashes summarized in the police reports should not be considered additive to the reported crashes obtained from ODOT's database.

The police records do not provide enough information to determine the nature of the police call. Crashes that should be reported to ODOT's crash records include those that result in an injury or more than \$1,500 of property damage. Therefore, some of the CTWS police records may be associated with crashes that did not meet these criteria. Without additional information about the crashes in the CTWS police records, it is difficult to draw conclusions from this data.

Additionally, the data provided did not contain location information or crash characteristics. Therefore, the data could not be used to complete crash analysis for this study.

Year	Data from CTWS Police Records				Data from ODOT's Crash Records*			
	US 26 Study Corridor	School Area	Hollywood Boulevard Corridor	Total per Year	US 26 Study Corridor	School Area	Hollywood Boulevard Corridor	Total per Year
2010	61	7	11	79	4	0	0	4
2011	43	3	5	51	3	0	0	3
2012	40	2	15	57	2	0	0	2
2013	49	2	7	58	7	0	0	7
2014	42	1	6	49	4	1	1	4
2015	30	0	4	34	N/A	N/A	N/A	N/A
2016	31	3	1	35	N/A	N/A	N/A	N/A

*ODOT enters crash reports into a system, and there is a lag between the crash data and when the records are entered. As of October 2016, the 2015 data was partially complete. Therefore, the numbers for 2015 and 2016 cannot be used as a direct comparison to the CTWS data.

APPENDIX 4: HISAFE ANALYSIS REPORTS FOR HSM CALCULATIONS

General Information

Analyst	JDS	Analysis Name	Analysis 2	Date of Analysis	8/31/2016
Agency/Company	Kittelson	Project Number/PIN #	19780	Comments	
State	Oregon	Site(s)	Highway		
Region/Area/City/County	Warm Springs	Jurisdiction	ODOT		

Analysis Summary Results

Crash Severity Distribution	Crash Frequency		
	Fatal and Injury (FI)	Property Damage Only (PDO)	Total
Total Predicted Crashes (entire study period)	4.81	9.83	14.64
Total Predicted Crashes (crashes/year)	4.81	9.83	14.64
Total Expected Crashes (entire study period)	3.78	5.80	8.24
Total Expected Crashes (crashes/year)	3.78	5.80	8.24
US26-1	1.33	2.82	4.15
Total Predicted Crashes (crashes/year)	1.33	2.82	4.15
Total Expected Crashes (crashes/year)	0.85	1.11	1.41
US26-2	0.19	0.40	0.59
Total Predicted Crashes (crashes/year)	0.19	0.40	0.59
Total Expected Crashes (crashes/year)	0.16	0.40	0.52
US26-3	0.60	1.27	1.87
Total Predicted Crashes (crashes/year)	0.60	1.27	1.87
Total Expected Crashes (crashes/year)	0.67	0.93	1.60
US26-4	1.12	2.37	3.49
Total Predicted Crashes (crashes/year)	1.12	2.37	3.49
Total Expected Crashes (crashes/year)	0.61	0.99	1.12

Analysis Summary Results

Crash Severity Distribution	Crash Frequency		
	Fatal and Injury (FI)	Property Damage Only (PDO)	Total
US26-5	0.73	1.55	2.28
Total Predicted Crashes (crashes/year)	0.73	1.55	2.28
Total Expected Crashes (crashes/year)	0.63	1.16	1.55
US26-6	0.37	0.78	1.15
Total Predicted Crashes (crashes/year)	0.37	0.78	1.15
Total Expected Crashes (crashes/year)	0.41	0.61	1.01
US26/Paiute	0.03	0.05	0.08
Total Predicted Crashes (crashes/year)	0.03	0.05	0.08
Total Expected Crashes (crashes/year)	0.04	0.06	0.11
US26/Hollywood	0.12	0.17	0.30
Total Predicted Crashes (crashes/year)	0.12	0.17	0.30
Total Expected Crashes (crashes/year)	0.12	0.16	0.26
US26/Museum	0.12	0.16	0.28
Total Predicted Crashes (crashes/year)	0.12	0.16	0.28
Total Expected Crashes (crashes/year)	0.12	0.15	0.26
US26/Tenino	0.08	0.11	0.19
Total Predicted Crashes (crashes/year)	0.08	0.11	0.19
Total Expected Crashes (crashes/year)	0.08	0.11	0.18
US26/Jackson Trail	0.10	0.15	0.25
Total Predicted Crashes (crashes/year)	0.10	0.15	0.25
Total Expected Crashes (crashes/year)	0.10	0.13	0.22

Analysis Summary Results

Crash Severity Distribution

Crash Frequency

Fatal and Injury (FI)

Property Damage Only (PDO)

Total

General Information

Analyst	JDS	Analysis Name	Analysis 1	Date of Analysis	8/31/2016
Agency/Company	Kittelson	Project Number/PIN #	19780	Comments	
State	Oregon	Site(s)	Core		
Region/Area/City/County	Warm Springs	Jurisdiction	ODOT		

Analysis Summary Results

Crash Severity Distribution	Crash Frequency		
	Fatal and Injury (FI)	Property Damage Only (PDO)	Total
Total Predicted Crashes (entire study period)	0.50	0.77	1.27
Total Predicted Crashes (crashes/year)	0.50	0.77	1.27
Total Expected Crashes (entire study period)	0.58	0.65	1.20
Total Expected Crashes (crashes/year)	0.58	0.65	1.20
Paiute Rd	0.01	0.02	0.03
Total Predicted Crashes (crashes/year)	0.01	0.02	0.03
Total Expected Crashes (crashes/year)	0.01	0.02	0.03
Warm Springs Rd	0.04	0.06	0.09
Total Predicted Crashes (crashes/year)	0.04	0.06	0.09
Total Expected Crashes (crashes/year)	0.04	0.06	0.09
Hollywood_1	0.01	0.01	0.01
Total Predicted Crashes (crashes/year)	0.01	0.01	0.01
Total Expected Crashes (crashes/year)	0.01	0.01	0.01
Hollywood_2	0.04	0.06	0.10
Total Predicted Crashes (crashes/year)	0.04	0.06	0.10
Total Expected Crashes (crashes/year)	0.04	0.05	0.09

Analysis Summary Results

Crash Severity Distribution	Crash Frequency		
	Fatal and Injury (FI)	Property Damage Only (PDO)	Total
Tenino_1	0.01	0.02	0.03
Total Predicted Crashes (crashes/year)	0.01	0.02	0.03
Total Expected Crashes (crashes/year)	0.01	0.02	0.03
Tenino_2	0.04	0.06	0.10
Total Predicted Crashes (crashes/year)	0.04	0.06	0.10
Total Expected Crashes (crashes/year)	0.04	0.06	0.10
Tenino_3	0.05	0.07	0.12
Total Predicted Crashes (crashes/year)	0.05	0.07	0.12
Total Expected Crashes (crashes/year)	0.05	0.07	0.11
Chukar	0.02	0.03	0.06
Total Predicted Crashes (crashes/year)	0.02	0.03	0.06
Total Expected Crashes (crashes/year)	0.02	0.03	0.06
Quail Trail_1	0.08	0.12	0.20
Total Predicted Crashes (crashes/year)	0.08	0.12	0.20
Total Expected Crashes (crashes/year)	0.08	0.11	0.19
Quail Trail_2	0.09	0.12	0.20
Total Predicted Crashes (crashes/year)	0.09	0.12	0.20
Total Expected Crashes (crashes/year)	0.08	0.11	0.19
Jackson Trail	0.01	0.02	0.03
Total Predicted Crashes (crashes/year)	0.01	0.02	0.03
Total Expected Crashes (crashes/year)	0.01	0.02	0.03

Analysis Summary Results

Crash Severity Distribution	Crash Frequency		
	Fatal and Injury (FI)	Property Damage Only (PDO)	Total
Paiute/Warm Springs	0.03	0.07	0.10
Total Predicted Crashes (crashes/year)	0.03	0.07	0.10
Total Expected Crashes (crashes/year)		0.03	0.09
Hollywood/Warm Springs	0.01	0.01	0.02
Total Predicted Crashes (crashes/year)	0.01	0.01	0.02
Total Expected Crashes (crashes/year)		0.01	0.02
Tenino/Hollywood	0.01	0.04	0.05
Total Predicted Crashes (crashes/year)	0.01	0.04	0.05
Total Expected Crashes (crashes/year)	0.20	0.01	0.05
Tenino/Quail Trail	0.01	0.01	0.02
Total Predicted Crashes (crashes/year)	0.01	0.01	0.02
Total Expected Crashes (crashes/year)		0.01	0.02
Tenino/Chukar	0.01	0.01	0.02
Total Predicted Crashes (crashes/year)	0.01	0.01	0.02
Total Expected Crashes (crashes/year)		0.01	0.02
Quail Trail/Chukar	0.01	0.02	0.03
Total Predicted Crashes (crashes/year)	0.01	0.02	0.03
Total Expected Crashes (crashes/year)		0.02	0.03
Jackson Trail/Quail Trail	0.01	0.02	0.03
Total Predicted Crashes (crashes/year)	0.01	0.02	0.03

Analysis Summary Results

Crash Severity Distribution	Crash Frequency		
	Fatal and Injury (FI)	Property Damage Only (PDO)	Total
Total Expected Crashes (crashes/year)		0.02	0.03

APPENDIX 5: PROJECT TOOLBOX

PROJECT TOOLBOX

Prior to identifying projects for specific locations within the study area, KAI defined the general scope of potential safety projects by identifying a Project Toolbox: a collection of possible treatments that could be used to improve various locations and needs. In identifying this broad range of potential treatments, KAI considered the crash types and contributing factors at each reported location. KAI also incorporated previous potential mitigations defined in the 2014 Warm Springs Transportation Plan. Once this list was established, KAI identified a broad range of potential treatments that could be adapted to specific locations in the study area. A primary focus was identifying specific treatments that would best address documented safety performance, risks, and anecdotal input from project stakeholders. Treatment strategies were then adapted to each location's unique context.

The Project Toolbox includes a diverse set of potential treatments ranging from low-cost to high-cost treatments.

To establish a focused group of potential projects, KAI identified three treatment categories for the study area:

- **Gateway / Speed Reduction Treatments (Table 5-1):** The gateway treatments, which may include elements such as raised median, curb, narrower lanes, illumination, and signage, are intended to inform drivers that they are entering a different context of a roadway corridor. Most commonly this is alerting drivers they are transitioning from a rural setting to an urbanized area where posted speeds are typically lower and conflicts are more common because of increased driveways and pedestrian and bicycle facilities. Gateways and speed reduction treatments are intended to modify driver behavior for the changed contextual environment. Speed reduction treatments are intended to encourage drivers to maintain these slower speeds and increase awareness of vulnerable users, such as cyclists or pedestrians that might be using or accessing the roadway. Speed reduction may be accomplished through cross-section elements, pedestrian and bicycle facilities, and signage. Slower vehicular speeds reduce the severity of crashes for all users; but especially for non-motorized users.
- **Intersection / Driveway Treatments (Table 5-2):** These treatments are intended to reduce crash frequency and severity while raising driver awareness at access points. This may include turn lanes, intersection control changes, intersection geometry changes, illumination, access management, and sight distance improvements.
- **Pedestrian and Bicycle Treatments (Table 5-3):** The pedestrian and bicycle treatments are intended to create defined and visible facilities and connections for non-motorized users. This could include enhancing existing facilities or creating new facilities along and crossing roadways. The majority of recommended treatments provide pedestrian and bicycle connections where none exist today. Without appropriate facilities, pedestrians and bicyclists walk or bike along the roadways, which increases potential conflicts with vehicles and diminishes the quality of service for non-motorized users. Pedestrian and bicycle specific







facilities along roadways provide users with a separated facility, reducing the potential for conflicts between different modes. Crossing treatments on roadways define crossing locations, alert users to conflict areas, and support pedestrian and bicycle mobility in Warm Springs.

The projects toolbox tables are provided on the following pages.

POTENTIAL SYSTEMIC SAFETY TREATMENTS

Many of the safety issues identified for the study area are commonly exhibited on rural highways and within rural communities. The potential treatments identified in this toolbox may be applied at other locations throughout the Warm Springs Reservation where similar issues such as speed, multimodal connections, and intersection crashes are identified. Rural developments that are located within the reservation are likely to exhibit similar needs for multimodal connections that provide a dedicated facility for pedestrians and bicyclists. Treatments in the toolbox that are identified as potential systemic safety treatments are examples of low-cost, proven treatments that may easily be applied at other locations when appropriate.


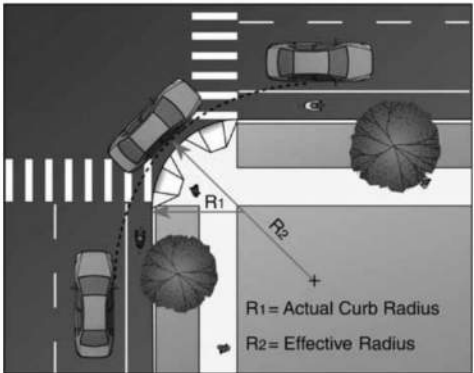




Table 5-6. Gateway and Speed Reduction Treatments




Gateway and Speed Reduction Treatments			
Treatment	Description	CRF*	Unit Cost Estimate^
<div><div>Radar Speed Feedback Sign</div><div></div><div>Source: safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa12004/</div></div>	<p>Speed feedback signs inform drivers of their speed and encourage drivers traveling over the posted speed to reduce their speed. Warm Springs currently has two signs on US 26.</p> <p>Potential systemic safety treatment.</p>	41% (all crashes)	\$10,000 per sign
<div><div>Gateway Treatments</div><div></div><div>Source: google.maps.com</div></div>	<p>Features that provide a noted transition from a rural environment to an urban environment provide an indication to drivers that they need to reduce speed and/or be prepared for a changing land use and roadway environment. Potential improvements to change the environment include:</p> <ul style="list-style-type: none">• Curbs• Raised medians• Narrow lanes• Speed reduction signage• Gateway signage <p>Potential systemic safety treatment.</p>	15% (all injury crashes) for a 10% reduction in speed	\$8 per square feet of raised median \$15 per foot for curb
<div><div>Context Sensitive Roadway Cross-Section</div><div></div><div>Source: google.maps.com</div></div>	<p>Providing an urban cross section through Warm Springs will indicate to drivers they are in an urban environment until they exit the core area. The urban environment typically includes more active pedestrian and bicyclist activity. The environment typically includes more access points and associated turning crossing activity.</p> <p>Potential systemic safety treatment.</p>	15% (all injury crashes) for a 10% reduction in speed	\$8 per square feet of raised median \$15 per foot for curb \$33 per linear foot for 6-ft sidewalk
<div><div>Rumble Strips</div><div></div><div>Source: a1seakubinc.com</div></div>	<p>Rumble strips are grooves or raised elements (“rumble stripe”) placed at the roadway edge or centerline in such a matter that, as the tires of the vehicle contact them, they produce sound and vibration intended to alert a driver to stay in their lane.</p> <p>Potential systemic safety treatment.</p>	Centerline rumble strips: 12% (all injury crashes in rural areas) Shoulder rumble strips: 22% (run-off the road crashes)	\$3,000 per mile for centerline rumble strips \$850/mile for shoulder
<div><div>Turn Lanes</div><div></div><div>Source: ux.stackexchange.com</div></div>	<p>Exclusive lanes for turning movements direct turning vehicles into a lane separate from a through traffic lane. This removes stopped vehicles in through traffic lanes. If raised channelization is used to shadow a left turn lane, the taper and raised median can be included as part of a gateway treatment.</p> <p>Potential systemic safety treatment.</p>	14 to 48% (depending on characteristics of location)	Varies (\$55/square feet of asphalt widening)
<div><div>Lighting/Illumination</div><div></div><div>Source: sciencedaily.com/releases/2013/02/130205094512</div></div>	<p>Roadway illumination enables road users to better see each other and the roadway conditions. Illumination can be continuous or at conflict points such as driveways, roadways, crossings, or at the introduction of channelization.</p> <p>Potential systemic safety treatment.</p>	28% (all injury, night-time crashes)	\$8,500 per pole

^Unit cost estimates are intended to be planning-level order of magnitude and do not include engineering, contingency, right-of-way, or significant earth work.

*CRF = Crash Reduction Factor. CRFs are obtained from the ODOT list of approved crash reduction factors when available.

Table 5-7. Intersection and Driveway Treatments

Intersection and Driveway Treatments			
Treatment	Description	CRF**	Unit Cost Estimate^
<div>Lighting/Illumination</div> <div></div> <div>Source:dangerousintersection.org/2009/02/02/di-is-still-under-onstruction-but-now-theres-artwork-in-our-header</div>	<p>Roadway illumination enables road users to better see each other and the roadway conditions. Illumination increases visibility in conflict areas.</p> <p>Potential systemic safety treatment.</p>	38% (all injury, night time crashes)	\$8,500 per pole
<div>Tightening Turning Radii</div> <div></div> <div>Source: ITE Walkable Urban Thoroughfares</div>	<p>Larger turning radii facilitate faster vehicle turning movements and increase crossing distance for pedestrians compared to smaller radii. Reducing the curb radii aids in slowing vehicles and improving pedestrian crossings by reducing crossing distance and making the pedestrian more visible to motorists.</p> <p>Potential systemic safety treatment.</p>	N/A	Varies
<div>Turn Lanes</div> <div></div> <div>Source:safety.transportation.org/htmlguides/UnsigInter</div>	<p>Exclusive lanes for turning movements direct turning vehicles into a lane separate from a through traffic lane. This removes stopped vehicles in through traffic lanes.</p> <p>Potential systemic safety treatment.</p>	14 to 48% (depending on characteristics of location)	Varies (\$55/square feet of asphalt widening)
<div>Traffic Signal</div> <div></div> <div>Source: fhwa.dot.gov</div>	<p>Traffic signals are traffic control devices that provide an orderly movement of conflicting flows through an intersection. Traffic signals separate movements and conflicts with time separation.</p>	<p>67 to 77% for angle crashes</p> <p>-58 to -143% for rear-end crashes (<i>increase</i> in rear-end crashes)</p>	\$250,000 - \$400,000 per signal
<div>Roundabout</div> <div></div> <div>Source: google.maps.com</div>	<p>A type of intersection characterized by its circular shape, channelized approaches and yield to entry. Roundabouts have lower speeds than conventional intersections and have reduced crossing conflicts for all users compared to conventional intersection forms. They have a documented safety performance record of reducing crash frequency and severity.</p>	82% (all injury)	\$300,000 - \$3.5 million
<div>Alternate Truck Routing</div> <div></div> <div>Source: robertsterlingmusic.com/home/taking-an-alternate-route</div>	<p>Alternate truck routes provide a route that can accommodate trucks and large vehicles in special situations when the highway may be closed. Signage is needed to direct drivers to these routes.</p>	N/A	<p>\$500 per sign</p> <p>Roadway and intersection design elements and modifications may also be needed to accommodate larger vehicles.</p>







Intersection and Driveway Treatments			
Treatment	Description	CRF**	Unit Cost Estimate^
<div><div>Improve Sight Distance</div><div></div><div>Source: www.fabb-bikes.org/guide/commonissues2</div></div>	<p>Providing adequate sight distance at intersections and driveways allows drivers to have adequate time to see and react to potential conflicts.</p> <p>Potential systemic safety treatment.</p>	48% (all injury crashes)	Varies*
<div><div>Define Access to Properties</div><div></div><div>Source: shutterstock.com</div></div>	<p>Creating defined access points reduces the number of potential conflict points on the roadway and minimizes confusion of drivers. It also reduces pedestrians’ exposure to potential conflicts with vehicles.</p> <p>Potential systemic safety treatment.</p>	25% (all injury crashes) based on reduction in driveway density	\$15 per foot for curb, in addition to new pavement and landscaping
<div><div>Truck Parking Locations</div><div></div><div>Source: nedapidentification.com/solutions/cases/nedap-deploys-smart-truck-parking-system-in-denmark</div></div>	<p>Having designated locations for trucks to park would help alleviate the amount of trucks parking along the highway. This would increase visibility for those on the highway and those trying to access the highway.</p>	<p>N/A</p> <p>At some locations, this treatment would reduce the number of trucks parking on-street, thus improving sight distance. This also reduces potentially undesirable roadway crossings by truck drivers.</p>	<p>\$500 per sign for directional signs;</p> <p>Cost of new parking locations would vary</p>



^Unit cost estimates are intended to be planning-level cost estimates and do not include engineering, contingency, right-of-way, or significant earth work.

*In some situations, sight distance can be improved with low-cost treatments such as landscaping modifications. In other situations, intersection realignment may be required, which is more expensive to complete.

**CRF = Crash Reduction Factor. CRFs are obtained from the ODOT list of approved crash reduction factors when available.

Table 5-8. Pedestrian and Bicycle Treatments

Pedestrian and Bicycle Treatments			
Treatment	Description	Crash Reduction Factor (CRF)*	Unit Cost Estimate^
<div>Sidewalk</div> <div></div> <div>Source: type.dvrlists.com/sidewalk/</div>	<p>Sidewalks provide physical space for pedestrians separate from the vehicle travel lanes. They provide designated walking/riding area and specifically address mobility for these users. The separation increases pedestrian comfort by serving as a buffer to roadway traffic.</p> <p>Potential systemic safety treatment.</p>	N/A	\$33 per linear foot for 6-ft sidewalk
<div>Shared Use Path</div> <div></div> <div>Source: englewoodindependent.com</div>	<p>A shared-use path physically separates pedestrians, bicyclists, and other non-motorized users from vehicular traffic by either a barrier or an open space. The path width is established to serve the range of users who will share the path. Shared paths typically range from 8 to 14 feet wide.</p> <p>Potential systemic safety treatment.</p>	N/A	\$6 per square feet of asphalt path
<div>Marked Crosswalks</div> <div></div> <div>Source: safety.fhwa.dot.gov</div>	<p>Marked crosswalks indicate optimal or preferred locations for pedestrians to cross and help designate right-of-way for motorists to yield to pedestrians. The marked locations define crossing locations for motorists to increase driver awareness of pedestrian conflicts.</p> <p>Potential systemic safety treatment.</p>	15% for pedestrian crashes	\$2,000 per crossing
<div>Enhanced Crosswalks (Rectangular Rapid Flashing Beacon - RRFB, Pedestrian Refuge Island, etc.)</div> <div></div> <div>Source: carmanah.com/traffic/products/r920-solar-rectangular-rapid-flashing-beacon-rrfb</div>	<p>There are a variety of options available for increasing the visibility of a pedestrian crossing and aiding in driver yield rates:</p> <ul style="list-style-type: none">• High visibility markings,• Pedestrian refuge islands,• Pedestrian activated signs,• Raised crosswalks,• Flashing beacons. <p>Potential systemic safety treatment.</p>	56% for pedestrian crashes for RRFB with median on a 3-lane or more roadway	\$50,000
<div>Lighting/Illumination</div> <div></div> <div>Source: type.dvrlists.com/sidewalk/</div>	<p>Pedestrian scale illumination at crossings provides better visibility of the pedestrian so that drivers have greater time to react and slow before reaching the crosswalk.</p> <p>Potential systemic safety treatment.</p>	42% for intersection illumination for bike & ped crashes at night (injury)	\$2,200 per pole (pedestrian scale)
<div>Gap Closures (footbridge, stairs, etc.)</div> <div></div> <div>Source:caithness.org/bridges/gallery.php?gallery=0&image=4</div>	<p>Gap closures would connect existing routes/paths together to create a cohesive pedestrian/bicycle system throughout Warm Springs. These closures could include footbridges, stairs, and other connections that support a non-motorized travel network.</p>	N/A	Varies depending on surface type, slope, etc.

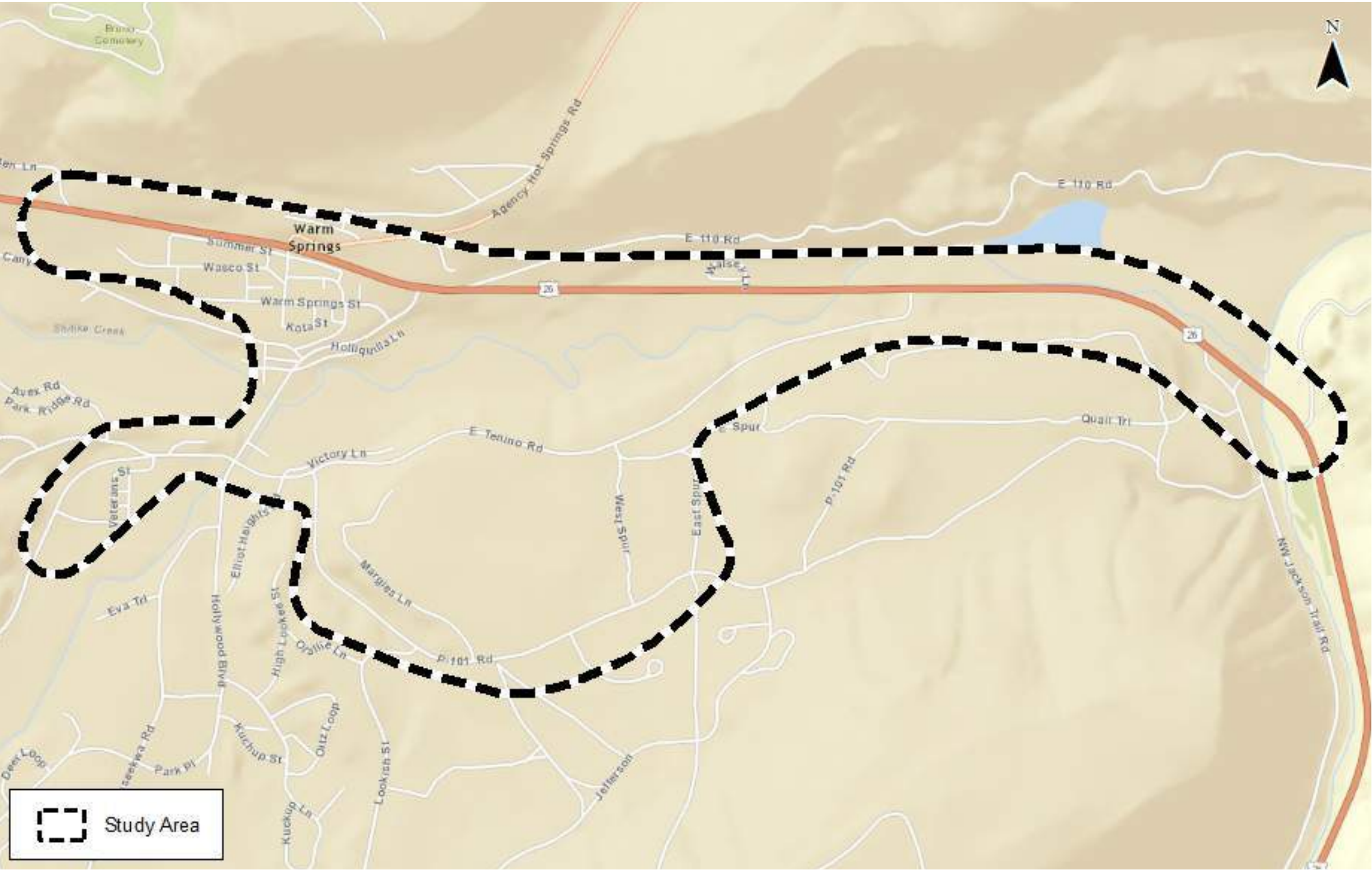
Pedestrian and Bicycle Treatments			
Treatment	Description	Crash Reduction Factor (CRF)*	Unit Cost Estimate^
<div>Routes to School</div> <div></div> <div>Source:thecalifornian.com/story/news/2016/08/19/school-crosswalks-unfinished-business/89025232</div>	<p>Having maintained routes to school would allow for pedestrians to more comfortably commute to school on routes defined to maximize safety performance and security for users.</p>	N/A	Varies depending on surface type, slope, etc.
<div>New Paths</div> <div></div> <div>Source:http://appvoices.org/2016/08/12/trailbuilding-forging-new-paths/</div>	<p>Creating new pedestrian and bicycle paths could increase mobility for both users. These paths could connect to other paths in the area and would allow for pedestrians and bicycles to have routes that do not conflict with vehicles.</p> <p>Potential systemic safety treatment.</p>	N/A	Varies depending on surface type, slope, etc.

^Unit cost estimates are intended to be planning-level cost estimates and do not include engineering, contingency, right-of-way, or significant earth work.

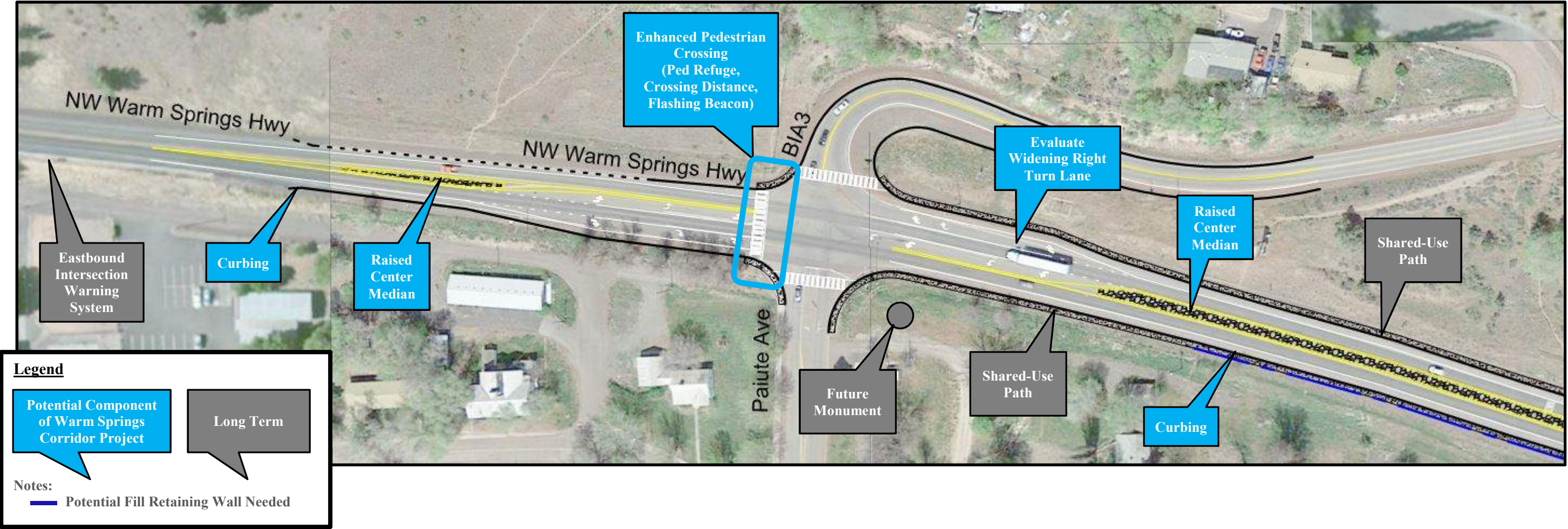
*CRF = Crash Reduction Factor. CRFs are obtained from the ODOT list of approved crash reduction factors when available.

APPENDIX 6: MEETING MATERIALS FROM DECEMBER 2016 MEETING ABOUT SHARED-USE PATH PROJECT

WARM SPRINGS COMMERCIAL CORRIDOR SAFETY PLAN: STUDY Area



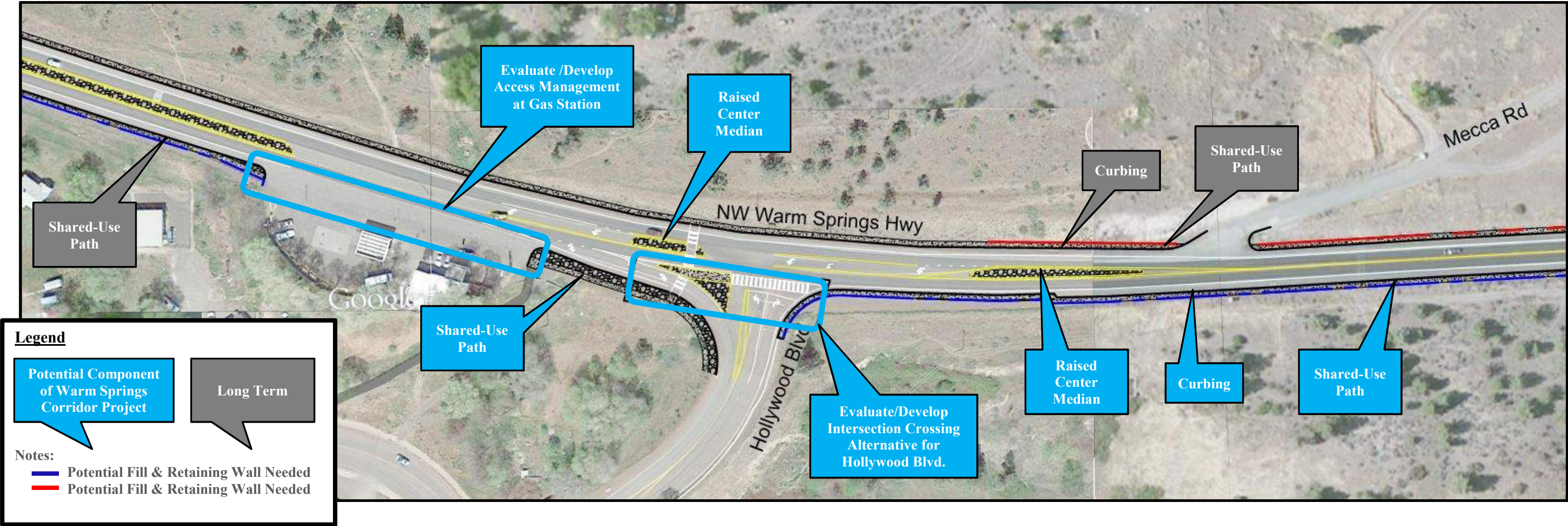
SECTION 1



- Opportunities for Warm Springs Corridor Project**
- Enhance pedestrian and bicycle safety with shared-use path and safer crossings
 - Encourage vehicle speed reduction upon gateway to Warm Springs
 - Reduce intersection related crashes and severity

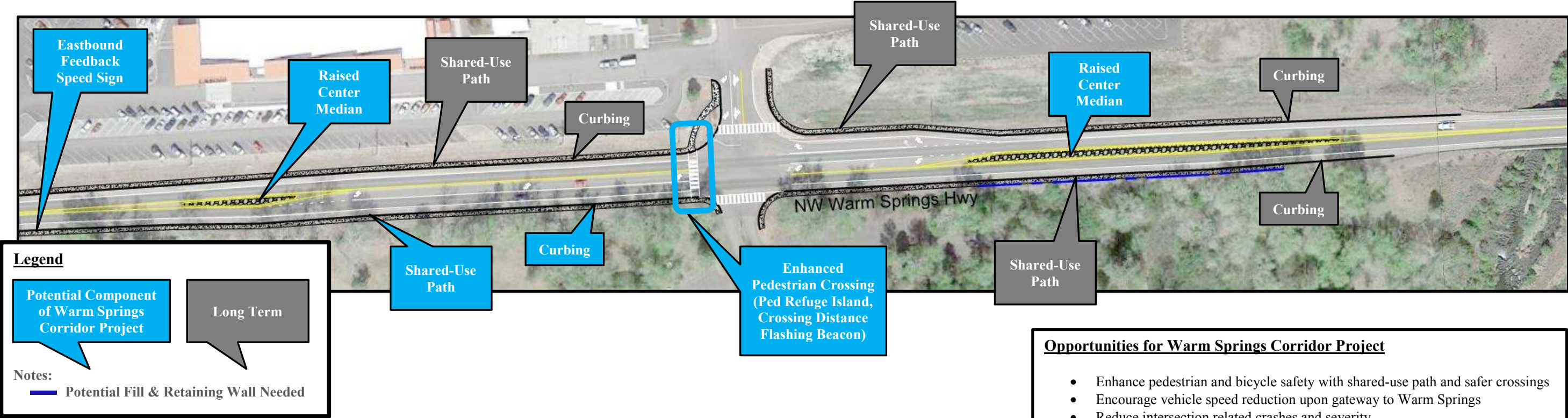
- Other Long-Term Safety Plan Recommendations**
- Evaluate additional roadway illumination on the eastbound approach to Paiute Avenue/BIA 3
 - Install curb on the north side of US 26
 - Evaluate pedestrian crossings across BIA 3 and Paiute Avenue
 - Conduct intersection evaluation

SECTION 2



- Opportunities for Warm Springs Corridor Project**
- Enhance pedestrian and bicycle safety with shared-use path and safer crossings
 - Encourage vehicle speed reduction upon gateway to Warm Springs
 - Reduce intersection related crashes and severity

SECTION 3

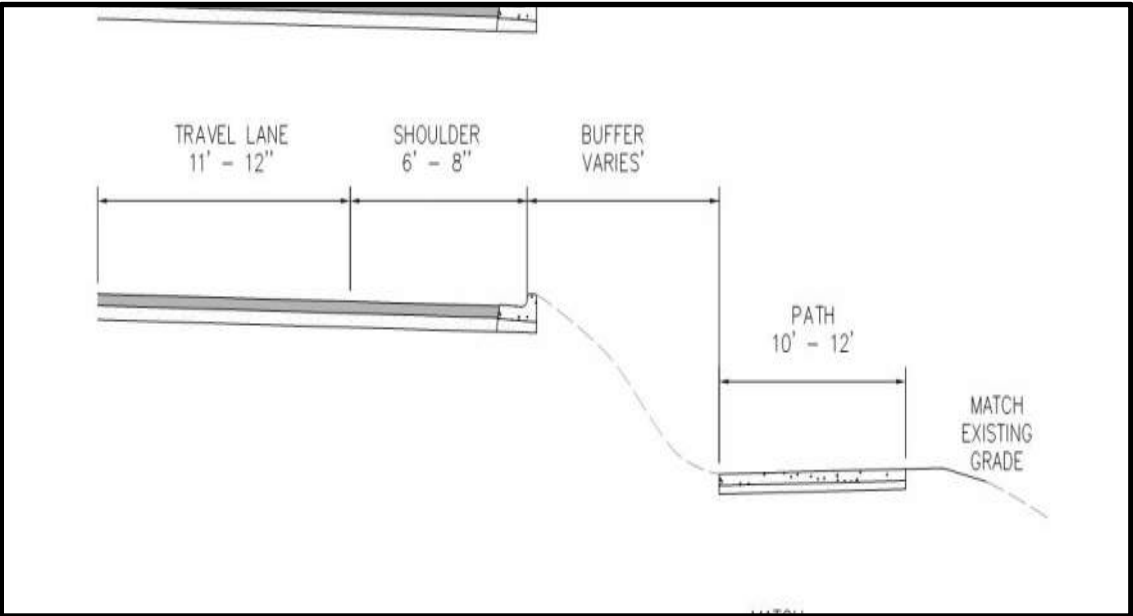
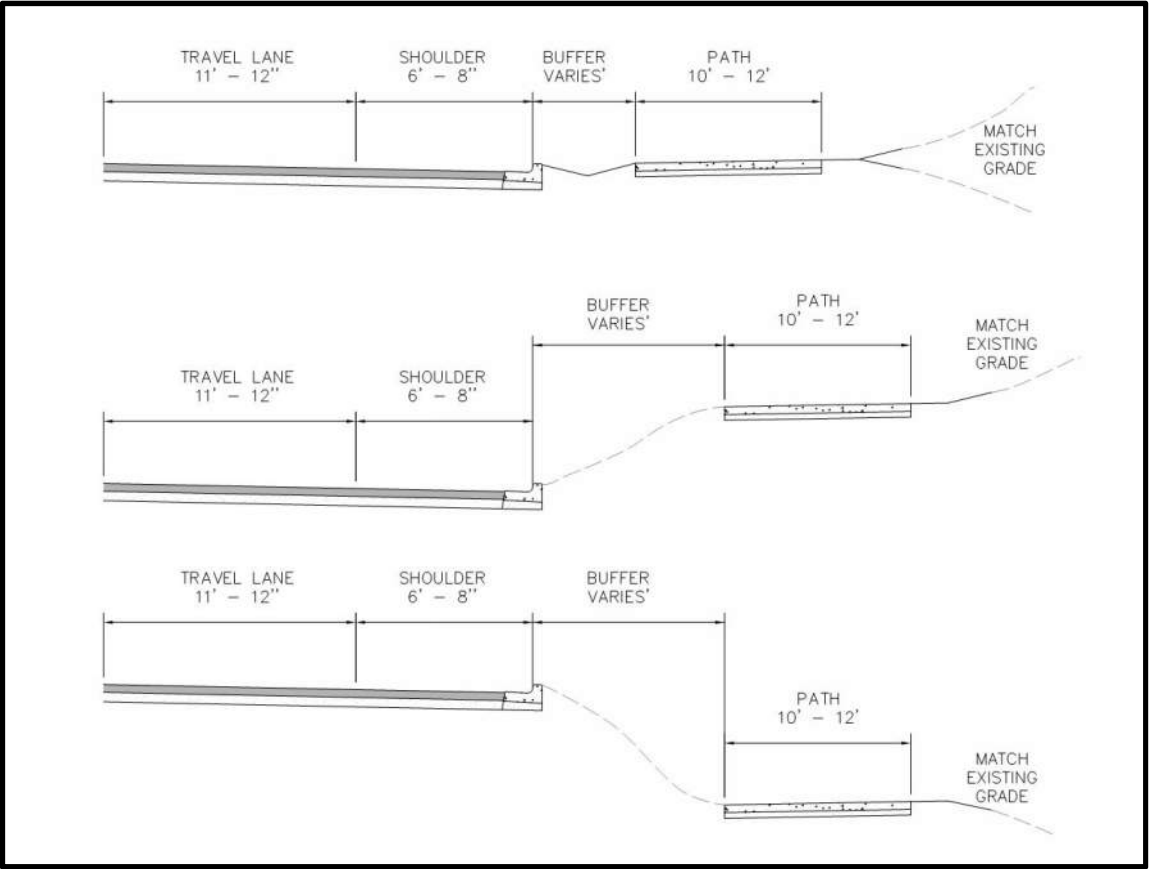


Shared-Use Path Scenarios

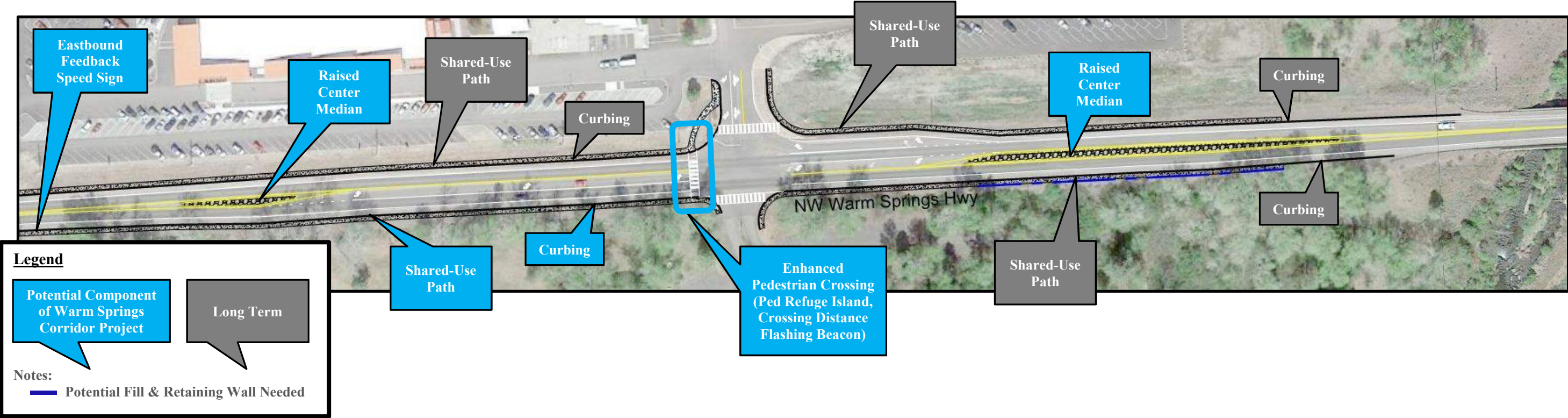
- Path, Walk & Buffer Varies Depending on Terrain and Design Priorities
- Consider Pathway Lighting

Other Safety Plan Recommendations

- Evaluate pedestrian crossings of the casino and museum driveways
- Evaluate intersection illumination in the northeast and southeast intersection corners
- Conduct intersection evaluation



SECTION 3



Opportunities for Warm Springs Corridor Project

- Enhance pedestrian and bicycle safety with shared-use path and safer crossings
- Encourage vehicle speed reduction upon gateway to Warm Springs
- Reduce intersection related crashes and severity

Other Safety Plan Recommendations

- Evaluate pedestrian crossings of the casino and museum driveways
- Evaluate intersection illumination in the northeast and southeast intersection corners
- Conduct intersection evaluation

Shared-Use Path Scenarios

- PATH, WALK & BUFFER VARIES' DEPENDING ON TERRAIN AND DESIGN PRIORITIES
- CONSIDER PATHWAY LIGHTING

