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MEMORANDUM

Date: May 31, 2011 Project #: 11539.0

To: Nikki Messenger
City of Roseburg
900 SE Douglas Avenue
Roseburg, OR 97470

From: Hermanus Steyn, P.E. and Matthew Bell

Project: Roseburg Pedestrian Crossing Study

Subject: SE Pine Street between SE Rice Avenue and SE Mosher Avenue

Introduction

This memorandum summarizes the existing physical, geometric and operational characteristics of SE Pine Street (OR99 Southbound) within the vicinity of the Mill Pine area in Roseburg, Oregon. This memorandum evaluates the need for a pedestrian crossing or crossings along SE Pine Street between SE Rice Avenue and SE Mosher Avenue based on field observations and input from the City. Ultimately, this memorandum proposes the installation of enhanced pedestrian crossings at two locations along SE Pine Street, including the intersections of SE Burke Avenue and SE Spring Avenue.

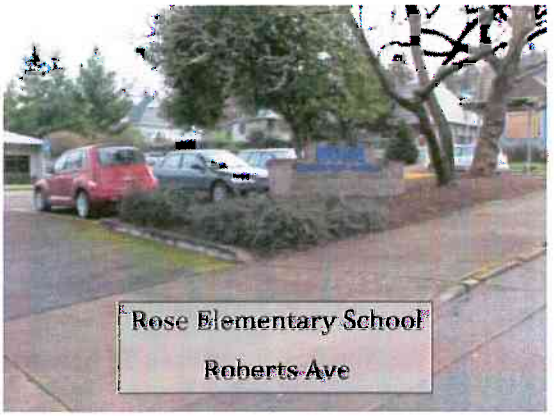
Issue

Residents of the Mill Pine area have been voicing concerns with potential safety issues related to crossing SE Pine Street. In particular, residents believe it is dangerous for their children to cross SE Pine Street to access Rose Elementary School and Thompson Park (both of which are located east of the SE Pine Street-Stephens Street couplet along SE Jackson Street). While the City has made progress in its efforts to improve the safety of crossing SE Stephens Street (OR99 Northbound), with the installation of enhanced pedestrian crossings at several intersections and mid-block locations, no improvements have been made along SE Pine Street.

Study Area

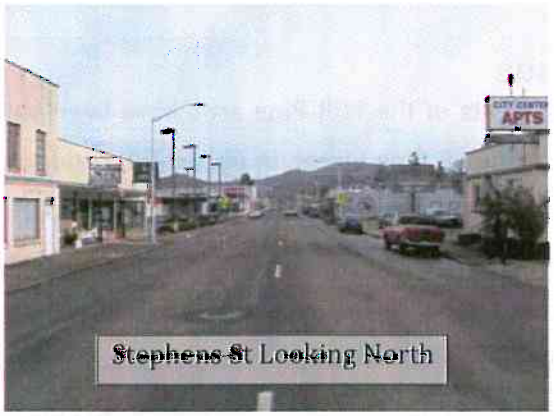
The study area consists of the segment of SE Pine Street located within the vicinity of the Mill Pine residential area, which is generally located between SE Rice Avenue and SE Mosher Avenue. Several

additional roadway facilities were also included in the study that both intersect and run parallel to SE Pine Street, including SE Stephens Street, SE Burke Avenue, SE Sykes Avenue, SE Spring Avenue, and SE Floed Avenue. Figure 1 illustrates the general study area as well as the location of Rose Elementary School and Thompson Park.



LAND USES

Land uses along SE Pine Street (OR99 Southbound) include a mix of general commercial, retail and residential with a majority of the residential properties located to the west of SE Pine Street and a majority of the commercial and retail businesses located to the east. Land uses along SE Stephens Street (OR99 Northbound) form an established mix of general commercial and retail developments. Rose Elementary School and Thompson Park are located two blocks east of the SE Pine-Stephens Street couplet along SE Jackson Street.



STUDY AREA
ROSEBURG, OREGON

FIGURE 1

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Transportation Facilities

ROADWAY FACILITIES

There are two major roadway facilities located within the study area, including SE Pine Street and SE Stephens Street, which together form a north-south couplet through the Mill Pine area. As shown in Figure 1, SE Pine Street runs one-way southbound and SE Stephens Street runs one-way northbound. Also shown in Figure 1, several of the east-west roadways located to the west of SE Stephens Street are off-set from the roadways located to the east. SE Burke Avenue, for example, is located approximately 90-feet north of SE Roberts Avenue and SE Spring Avenue is located approximately 120-feet north of SE Haynes Road. One of the challenges with these off-set intersections is that vehicles from the east must make one right and two lefts to travel south on SE Pine Street when approaching from the east. The multiple turning movements required by each vehicle present challenges to the placement of potential pedestrian crossings.

Jurisdiction

The City of Roseburg has Jurisdiction over a majority of the roadways in the study area, including SE Pine Street and SE Stephens Street, while Douglas County and the Oregon Department of Transportation (ODOT) do not have Jurisdiction over any of the Roadways in the study area.

Functional Classification

The roadway facilities within the study area include a mix of local streets and arterials. SE Pine Street and SE Stephens Street are classified as arterials by both the Oregon Department of Transportation (ODOT) and the City of Roseburg. The remaining streets in the study area are classified as local streets by both agencies. As arterials, SE Pine Street and Stephens Street are intended to carry a majority of the traffic in the area facilitating movement on a regional level, while the remaining roadways are intended to provide direct access to adjacent land uses.

Cross Section

SE Pine Streets currently has a 2-lane cross section with a one-way southbound bicycle lane on the right shoulder as well as landscape strips and sidewalks on both sides of the roadway; on-street parking is prohibited along the segment of SE Pine Street within the study area. The overall width of the paved surface is approximately 31-feet; consisting of two 13-foot

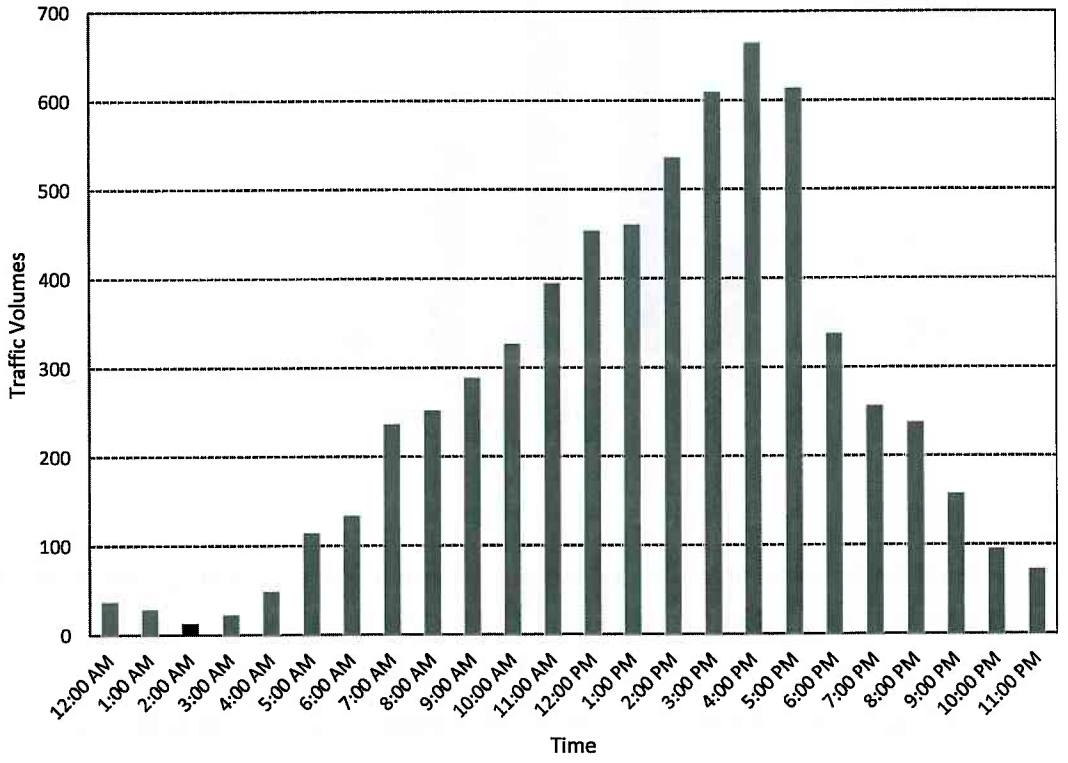
Pine St: Typical Cross Section

travel lanes and one 5-foot bicycle lane. The lack of on-street parking facilities makes the installation of curb extensions similar to those along SE Stephens Street challenging.

Traffic Volumes

Traffic volumes were collected along SE Pine Street over a 24-hour period in March of 2011. As shown in Chart 1 below, traffic volumes increased steadily between 3:00 a.m. and 5:00 p.m., decreased slightly between 5:00 and 6:00 p.m., the dropped off toward the evening. A total of approximately 6,400 vehicles were observed over the 24-hour period; approximately 250 were observed between 8:00 and 9:00 a.m. during the typical morning peak period and approximately 665 were observed between 4:00 and 5:00 p.m. during the typical evening peak period. The morning and evening peak hour traffic volumes will be compared to the morning and evening peak hour pedestrian volumes later in this report. Chart 1 displays the traffic volumes observed over the 24-hour period. *The traffic volumes are provided in Attachment "A".*

CHART 1: DAILY TRAFFIC VOLUMES ALONG SE PINE STREET (OR99 SOUTHBOUND ONLY)

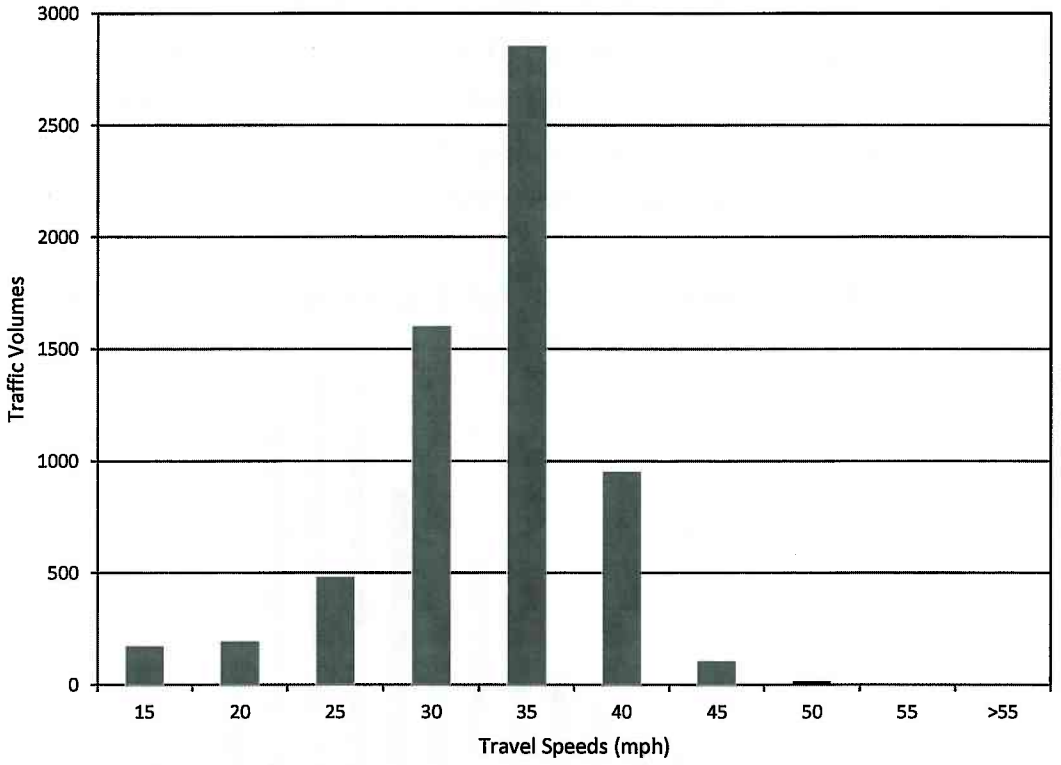


Traffic Speeds

Traffic speeds were also collected along SE Pine Street over a 24-hour period in March of 2011. Again, 6,400 vehicles were observed throughout the day of which approximately 38 percent (2,460 vehicles)

were traveling at or below the posted speed limit of 30 miles per hour (mph) while the remaining 62 percent (3,940) were traveling above the posted speed limit. The median speed was found to be 31 mph while the 85th percentile speed (the speed used to evaluate the need for various types of pedestrian crossing treatments) was found to be 35 mph. Only two percent of vehicles were observed traveling at speeds greater than 40 mph. Chart 2 displays the traffic speeds observed over the 24-hour period. *The speed data is provided in Attachment "B".*

CHART 2: DAILY TRAFFIC SPEEDS ALONG SE PINE STREET (OR 99 SOUTHBOUND ONLY)



Heavy Vehicles

Heavy vehicle percentages were not collected along with traffic volumes and speeds. However, SE Pine Street and SE Stephens Street are designated as freight routes in the City's Transportation System Plan (TSP); therefore, heavy vehicles should be expected along both roadways. A review of the 2005 analysis included within the City's TSP indicates truck percentages of approximately 7% in the southbound direction during the weekday p.m. peak period near the SE Washington Avenue intersection with SE Pine Street. That equates to approximately 45-50 heavy vehicles traveling southbound on SE Pine Street during the weekday p.m. peak hour based on existing traffic volumes.

Other Roadway Considerations

Illumination

Overhead illumination is currently provided at all major intersections and several mid-block locations along SE Pine Street and SE Stephens Street.

Lighting along Pine St

Lighting along Stephens St

Topography

The segments of SE Pine Street and SE Stephens Street included in the study are relatively flat. The local roadways included in the study are also relatively flat with a slight increase in the grade east of SE Stephens Street.

Vegetation

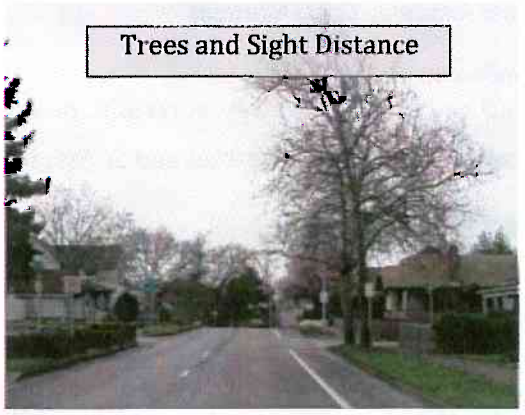
The only vegetation along SE Pine Street is located adjacent to residential properties and in the landscape strips. There is virtually no vegetation along SE Stephens Street within the study area. The vegetation on SE Pine Street as well as along several of the local streets included in the study area does not impact sight distance along any of the roadways or at any of the major intersections.

Landscape Strips along Pine St

Landscape Strips along Pine St

Sight Distance

As indicated previously, the 85th percentile speed along SE Pine Street is 35 mph. Based on the standard reference manual, *A Policy on Geometric Design of Highway and Streets* (Reference 2) the required stopping sight distance is approximately 250 feet. Figure 2 illustrates the required stopping sight distance in advance of the SE Burke Avenue intersection with SE Pine Street. As shown, there is currently sufficient stopping sight distance along SE Pine Street to safely stop a moving vehicle in advance of a potential pedestrian crossing. Sufficient stopping sight distance is also available at the SE Spring Avenue intersection with SE Pine Street. There may be a need to trim and even remove trees to ensure that pedestrians waiting to cross are visible at both locations.



Access Spacing

Access spacing was identified as a challenge along SE Pine Street due primarily to the frequency of residential driveways along the west side of the roadway. As indicated previously, arterials typically do not provide direct access to residential properties; access is typically provided along local streets. However, the presence of driveways should not significantly impact the operations of potential pedestrian crossings, assuming they are located at intersections or far enough away from the driveways to avoid potential conflicts.

Of the potential crossing locations evaluated in this study, only the SE Floed Avenue intersection with SE Pine Street has a potential conflict. There are two residential driveways located in the northwest corner of the intersection that are within close proximity to the intersection.

TRAFFIC SAFETY

Crash data was obtained from ODOT for the segment of SE Pine Street between SE Rive Avenue and SE Mosher Avenue in order to identify potential safety issues along the roadway. ODOT provided crash records for the most recent five-year period, from January 1, 2005, through December 31, 2009. A total of 14 crashes were identified along the corridor over the five year period, none of which involve either pedestrians or bicyclists.

SIGHT DISTANCE REQUIREMENTS
ROSEBURG, OREGON

FIGURE 2

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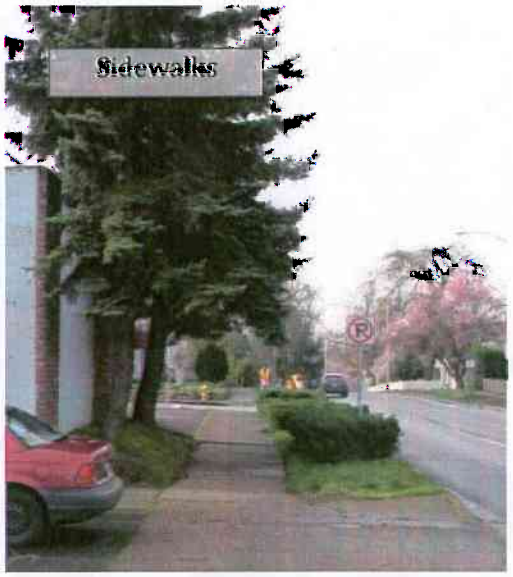
PEDESTRIAN FACILITIES

The pedestrian facilities along SE Pine Street primarily consist of sidewalks and curb ramps. As indicated previously, there are currently no enhanced pedestrian crossings along SE Pine Street similar to those along SE Stephens Street. Figure 3 illustrates the pedestrian facilities within the study area and also shows the potential pedestrian paths from the Mill Pine area to Rose Elementary and Thompson Park.

Sidewalks

Continuous 5-foot sidewalks are currently provided along both sides of SE Pine Street between SE Rice and Mosher Avenue. The sidewalks appear to be in good condition and are separated from the roadway by 5-foot landscape strips, street trees and other vegetation. No impediments, such as low hanging branches, oversized bushes, light poles, or street signs appear to block or restrict access to any of the sidewalks along SE Pine Street. Additional 5-foot sidewalks are also currently provided along all of the local streets located east and west of SE Pine Street and SE Stephens Street. Further evaluation indicates that there is a consistent sidewalk network throughout most of the Mill Pine area as well as many of the built-out areas of the city.

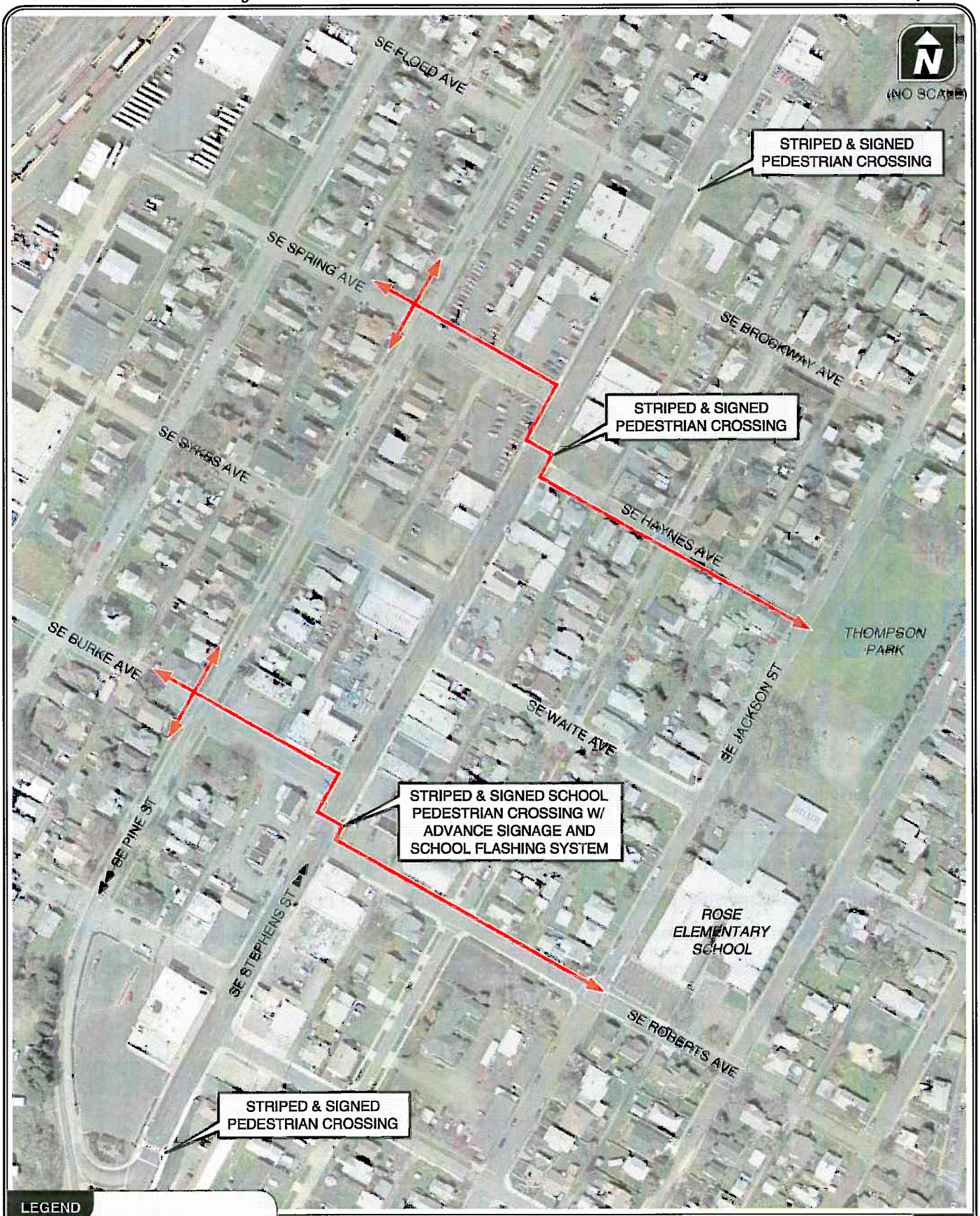


Curb Ramps

Curb ramps are currently provided on all four corners of every major intersection along SE Pine Street and SE Stephens Street. Curb ramps are also provided on both sides of every mid-block crossing along SE Stephens Street.

Crosswalks

There are currently no marked crosswalks provided along SE Pine Street. As shown in Figure 3, the only marked pedestrian crossings within the study area are located on SE Stephens Street near the southern entrance to the couplet and adjacent to SE Roberts, SE Haynes Avenue and SE Floed Avenue. All four crossings are signed, striped and include curb extensions and overhead illumination. The crosswalk adjacent to SE Roberts Avenue is signed as a school crossing with an advance warning system that lights up during school hours; directing motorists to reduce their travel speed to 20 mph.



EXISTING PEDESTRIAN CROSSINGS
ROSEBURG, OREGON

FIGURE 3

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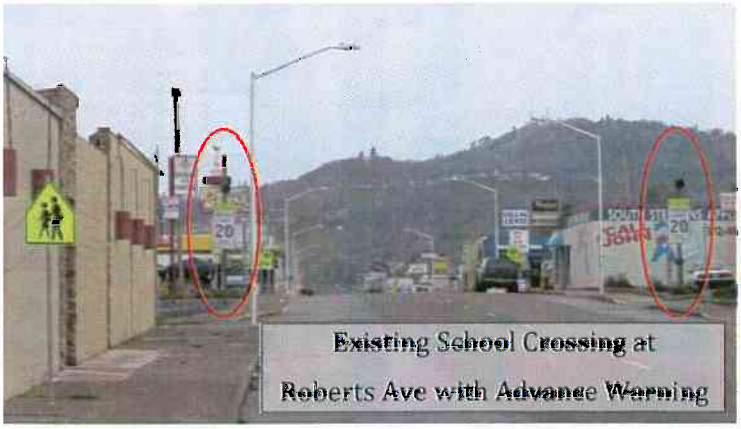
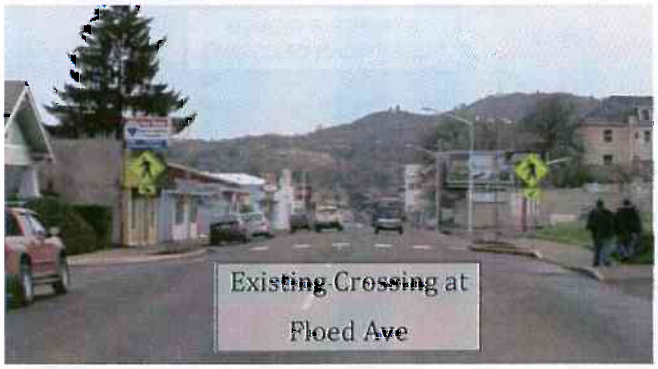
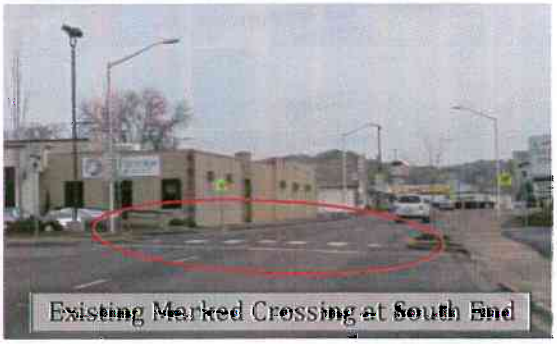


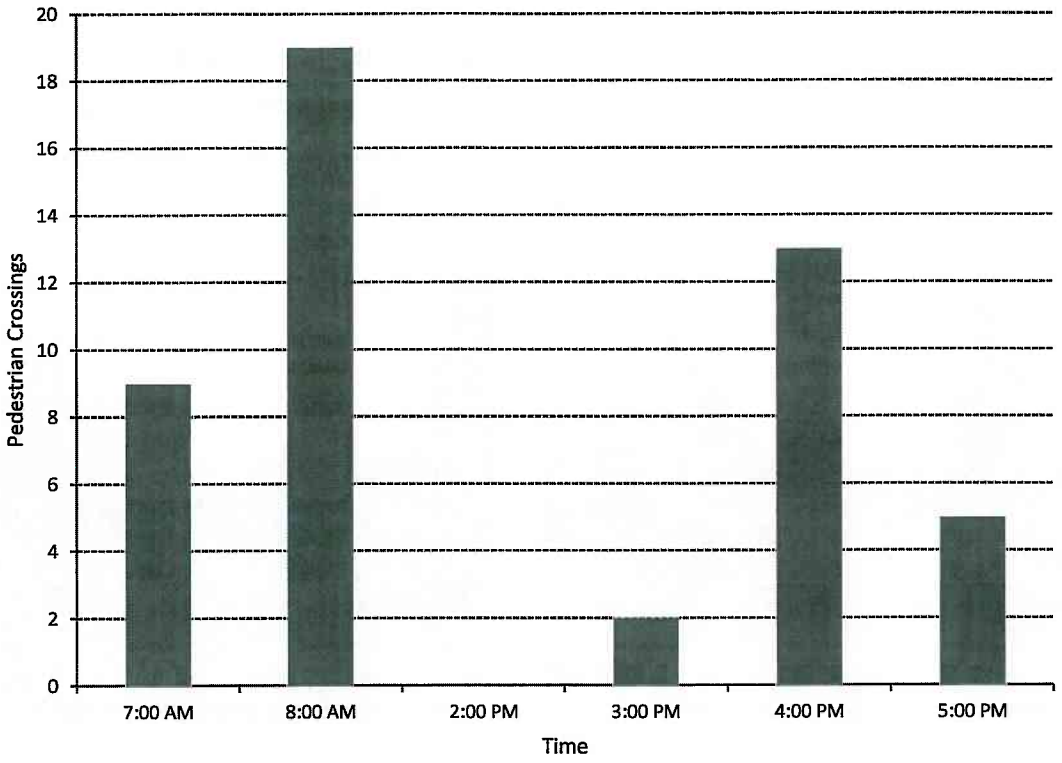




Pedestrian Activity

The number of pedestrians who crossed SE Pine Street between SE Burke and SE Spring Avenue were collected in March 2011 during the morning (7:00 to 9:00 a.m.) and evening (2:00 to 6:00 p.m.) peak time periods (the evening peak time period was started at 2:00 to capture school peak hour operations). Chart 3 displays the pedestrian crossings that occurred during the morning and evening peak periods. As shown, there were 19 pedestrian crossings during the morning peak period that corresponds to the morning peak period for vehicular traffic and 13 pedestrian crossings during the evening peak period that corresponds to the evening peak period for vehicular traffic. These volumes were used to evaluate the types of potential pedestrian crossings treatments later in this report. *The pedestrian count information is provided in Attachment "C".*

CHART 3: PEDESTRIAN CROSSINGS



TRANSIT FACILITIES

Transit Service

Transit service is provided within the study are along SE Pine Street and SE Stephens Street by U-Trans Public Transportation Service. Service is provided by the U-Trans Roseburg Redline between 6:50 a.m. and 6:40 p.m. on 1-hour headways.

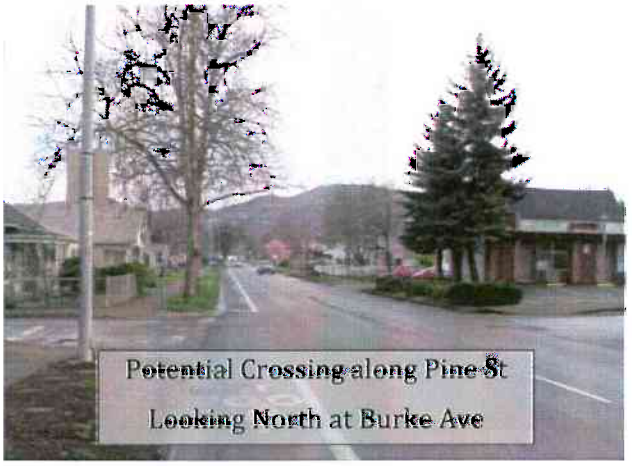
Transit Stops

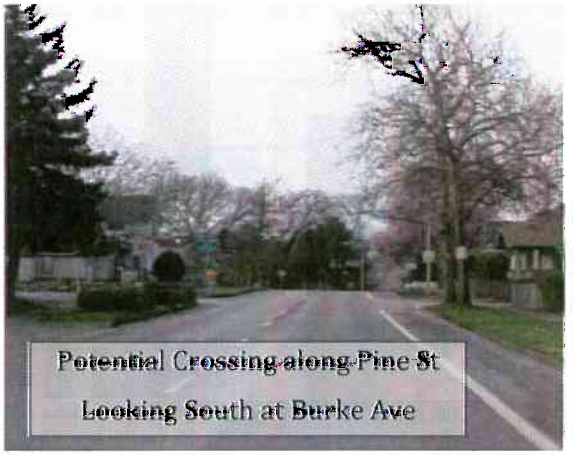
There are currently no transit stops located along SE Pine Street within the study area. The U-Trans Roseburg Redline travels south along SE Pine Street to the couplet terminus, then north on SE Stephens Street and stops near the City Center Apartments between SE Sykes Avenue and SE Haynes Avenue. Transit riders from the Mill Pine area attempting to travel north must cross SE Pine Street and SE Stephens Street to access the stop.

Crosswalk Assessment

POTENTIAL CROSSING LOCATIONS

The SE Burke Avenue, SE Sykes Avenue, SE Spring Avenue, and SE Floed Avenue intersections along SE Pine Street were evaluated as potential locations for enhanced pedestrian crossing treatments based on their relative importance to the overall transportation network and their ability to provide direct connections to SE Stephens Street, Rose Elementary School and Thompson Park.





SE Burke Avenue

The SE Burke Avenue intersection is located along a direct pedestrian pathway from Rose Elementary School and would therefore require pedestrian crossing treatments similar to those at the SE Roberts Avenue intersection along SE Stephens Street; including a school crossing sign located approximately 500-feet in advance of the crossing and a reduced speed limit sign located approximately 250-feet in advance of the crossing. The location of the advance signs would conflict with a potential crossing at the SE Sykes Avenue intersection.

SE Sykes Avenue

In addition to the potential conflict described above, the lack of an enhanced pedestrian crossing near the SE Sykes Avenue intersection with SE Stephens Street makes the provision of a signed crossing at this less of a priority as the other locations.

SE Spring Avenue

The SE Spring Avenue intersection is located along a direct pedestrian pathway from Thompson Park and would therefore be a good candidate for a potential secondary crossing along SE Pine Street.

SE Floed Avenue

As described previously in this report, two residential driveways located in the northwest corner of the SE Floed Avenue intersection with SE Pine Street would conflict with a potential crosswalk across the north leg of the intersection. The City would need to consider closing of the southernmost driveway, consolidating the two driveways further to the north, or locating the crosswalk across the south leg of the intersection, placing it in direct conflict with east and westbound motorists turning south.

Ultimately the SE Burke Avenue and SE Spring Avenue intersections were identified as potential location for enhanced pedestrian crossing treatments. The types of pedestrian crossing treatments considered at each location are described in the tables below.

PEDESTRIAN CROSSING ANALYSIS

The National Cooperative Highway Research Program (NCHRP) Report 562 *Improving Pedestrian Safety at Unsignalized Crossings* recommends an engineering study method for evaluating the appropriate levels of crosswalk protection that takes into account traffic volumes, travel speeds and pedestrian crossing volumes. The NCHRP Report 562 method was applied to the potential crosswalk locations along SE Pine Street and led to the conclusion that an "active or enhanced" treatment would be appropriate at all suggested locations. *The worksheets used in the evaluations are included in Attachment "D".*

It is challenging to predict the anticipated volume of pedestrians that would cross at these proposed locations in the future. However, a sensitivity analysis was conducted for the following scenarios:

- The proposed treatment (pavement markings and signs) at the proposed locations would be able to accommodate up to 50 pedestrians with an increase of traffic up to 1,000 during a peak hour.
- If "Active or Enhance" treatments (e.g., flashing beacon when actuated, or rectangular rapid-flash beacon [RRFB]) are considered at the proposed locations would be able to accommodate 100-150 pedestrians with an increase of traffic up to 1,300 (doubling existing traffic volume during a peak hour.

The worksheets used in the sensitivity evaluations are included in Attachment "E".

POTENTIAL PEDESTRIAN CROSSING TREATMENTS

There are a variety of potential pedestrian crossing treatments that can be installed along SE Pine Street that can improve the safety of the potential pedestrian crossings by enhancing driver's awareness. Tables 1-8 below provide a brief summary of the pedestrian crossing treatments considered for the crossings and the feasibility for implementation.

Table 1 Minor Geometric Enhancements

Enhancement Feature	Feasible Option?
Install raised median (refuge) islands	No: SE Pine Street is a one-way two-lane facility.
Install staggered refuge islands	No: SE Pine Street is a one-way two-lane facility.
Install curb extensions	No: curb extensions would encroach into the travel lanes and/or bike lane.
Install raised crossing platforms	No: SE Pine Street is classified as an arterial and the speeds are too high for this application.

Table 2 Striping Enhancements

Enhancement Feature	Feasible Option?
Install advance stop/yield lines	**Yes**: this application should be used in conjunction with marked crosswalks on multilane approaches.
Install high-visibility crosswalk markings	**Yes**: the new crosswalk markings will be thermoplastic.
Install advance pavement legends	**Possible**: pavement legends could be a maintenance challenge.
Install non-reflective coloring in crosswalk	**Possible**: colored markings in crosswalk could be a maintenance challenge.

Table 3 Signing Enhancements

Enhancement Feature	Feasible Option?
Install in-street flexible signs	No: in-street flexible signs would be inappropriate for an arterial facility.
Install high-visibility roadway signs	**Yes**: the pedestrian crossing signs (at the crosswalk) will be installed as part of this project and meet current retroreflectivity standards.
Install high-visibility post covers	**Yes**: although the post covers do not actively indicate the presence of pedestrians they increase visibility especially during the winter months in peak periods
Install oversized signs	No: the speeds and topography in the area do not justify installing signs to expressway standards
Install signs on both sides of approaching roadway	**Yes**: per the MUTCD, crosswalk signs should be installed on both sides of a one-way street.

Table 4 Other Lower Cost Enhancements

Enhancement Feature	Feasible Option?
Install transverse rumble strips in advance of the crossing	**Possible**: although rumble strips could be a maintenance challenge and typically neighboring property owners raise noise concerns.
Install flag kiosks at each end of the crosswalk	No: flag kiosks require frequent restocking of the flags and are not a crossing option accessible to all pedestrians.

Table 5 Basic Warning Beacon Systems

Enhancement Feature	Feasible Option?
Install a continuously-flashing circular beacon, at or in advance of the crossing (overhead or side-mounted)	**Possible:** although studies show a higher compliance rate for motorists when beacons are not flashing continuously.
Install a pedestrian-activated flashing circular beacon at the crossing (overhead or side-mounted)	**Possible:** options exist for how pedestrians trigger the warning beacons (push button, passive detection [e.g. radar], pressure pad at the ramp, etc.).

Table 6 Advanced Warning Beacon Systems

Enhancement Feature	Feasible Option?
In-Pavement Warning Lights	No: these systems have maintenance challenges, and are not as visible during bright sunny days.
In-Sign Warning Lights (e.g. LEDs around the perimeter of the signs)	**Possible:** although these signs require additional up-front costs and long-term maintenance to maintain their effectiveness.
Speed Feedback Signs	**Possible:** speed feedback signs could be added to the crosswalk signs in advance of the SE Floed Avenue crosswalk.
Rectangular Rapid Flashing Beacon (RRFB)	**Possible:** RRFBs have the highest yield rate of any device that does not feature a red display.
Pedestrian Hybrid Beacon (e.g. HAWK)	No: the current pedestrian volumes do not warrant this device. The installation cost for a Pedestrian Hybrid Beacon is roughly 50% of a new traffic signal and requires meeting minimum warrants per the 2009 MUTCD.

Table 7 Pedestrian/Roadway Lighting

Enhancement Feature	Feasible Option?
Install pedestrian lighting (e.g., bollard lighting) along sidewalks	No: the detached sidewalks are located relatively close to the existing roadway and no lighting in addition to the roadway lighting would be required.
Install roadway lighting at crosswalk	**Possible:** roadway lighting exists along SE Pine Street. However, lighting at the proposed crossing locations may be considered depending on the roadway light pole locations.

Table 8 Higher Cost Crossing Enhancements

Enhancement Feature	Feasible Option?
Signalize the crossing	No: as the crossing does not have the pedestrian volumes (per field observations) necessary to meet MUTCD warrants. Further, the cost of this installation is likely beyond the scope of this project.
Install two-stage signalized crossing	No: SE Pine Street is a one-way facility and the crossing does not have the pedestrian volumes (per field observations) necessary to meet MUTCD warrants. Further, the cost of this installation is likely beyond the scope of this project.
Grade-separate the crossing	No: as this is not a cost-effective measure for these crossings and not commonly used across two-lane roadways.

PROPOSED ENHANCEMENTS

As indicated above, there are several potential pedestrian crossing treatments that could be used to both enhance driver's awareness of pedestrians as well as provide safe and convenient locations for pedestrians to cross. Recognizing that the implementation of any of the potential enhancement will likely depend on policies, priorities and available funding, the proposed enhancements are presented according to their simplicity and anticipated time and cost constraints.

Near-Term Pedestrian Crossing Enhancements

The City should consider the following pedestrian enhancements along SE Pine Street:

- Install high visibility crosswalk pavement markings per the MUTCD across the north legs of the SE Burke Avenue and SE Spring Avenue intersections along SE Pine Street.
    - Crosswalks across the north legs will prevent conflicts with east and westbound motorists turning south.
- Install American Disability Act (ADA) compliant curb ramps at both ends of the crosswalks per City standards.
- Install advance stop bars with "Stop Here" signs on both sides of the roadway.
- Install crosswalk signs per the MUTCD on both sides of the SE Spring Avenue crossing
- Install school crosswalk signs per the MUTCD on both sides of the SE Burke Avenue crossing along with supplemental advance warning signs and signs that direct motorists to reduce travel speeds to 20 mph through the school zone "When Children are Present".

Figure 4 illustrates the location and layout of the proposed pedestrian crossings. The City should also consider the following treatments along SE Stephens Street:

- Install pedestrian warning signs at the existing marked crosswalk at the south end of the couplet.

Long-Term Pedestrian Enhancements

The near-term proposed installations would encourage certain pedestrian behavior such as focusing crossings at key locations; consider walking versus driving, etc. In addition, the character along SE Pine Street with these signed and marked pedestrian crossings could potentially alter the motorists' driving behavior. The City should consider the following activities as a follow-up to the proposed near-term enhancements.

- Monitor motorist behavior and yielding rates after installation of near-term enhancements. To improve yielding behavior the following may be consider:
    - Convert the near-term school zone signage on SE Pine Street by removing the "When Children are Present" signage and replacing with an actuated flashing beacon to direct motorists to reduce to 20 mph through the school zone to be consistent with the application along Pine Street.
    - Install Rectangular Rapid Flashing Beacon (RRFB) at the SE Spring Avenue crosswalk.
- Educate neighborhood residents about the purpose of the crosswalk treatments and how pedestrians, cyclists and automobiles are supposed to behave based on Oregon laws.
- Consider the consolidation of driveways along SE Pine Street and SE Stephens Street and where it is permitted; provide access along local side streets.
- Consider the installation of advance stop bars at each of the marked crosswalks along SE Stephens Street to reduce the potential for multiple threat crashes.
- If speeds along SE Pine Street and/or SE Stephens Drive continue to be a concern, consideration should be given to install permanent "Speed Feedback" signs in appropriate locations.

PROPOSED NEAR-TERM IMPROVEMENTS
ROSEBURG, OREGON

FIGURE 4

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References:

1. Oregon Department of Transportation. *Oregon Highway Plan*. 1999
2. American Association of State Highway and Transportation Officials. *A Policy on Geometric Design of Highway and Streets*. 2004.

Attachments

A. Traffic Volumes Data

B. Traffic Speed Data

C. Pedestrian Count Data

D. NCHRP 562 Worksheets

E. NCHRP 562 Worksheets for Sensitivity Analysis

Attachment A:
Traffic Volume Data

LOCATION: SE Pine Street North of Burke
SPECIFIC LOCATION: 50 ft from
CITY/STATE: Roseburg, OR

QC JOB #: 10592503
DIRECTION: SB
DATE: Mar 15 2011 - Mar 16 2011

Start Time	Mon	Tue 15-Mar-11	Wed 16-Mar-11	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			37			37			37	
1:00 AM			29			29			29	
2:00 AM			13			13			13	
3:00 AM			23			23			23	
4:00 AM			49			49			49	
5:00 AM			115			115			115	
6:00 AM			134			134			134	
7:00 AM			237			237			237	
8:00 AM			252			252			252	
9:00 AM			289			289			289	
10:00 AM			327			327			327	
11:00 AM			**395**			**395**			**395**	
12:00 PM			454			454			454	
1:00 PM			461			461			461	
2:00 PM			536			536			536	
3:00 PM			**610**			610			610	
4:00 PM		**665**				**665**			**665**	
5:00 PM		614				614			614	
6:00 PM		338				338			338	
7:00 PM		257				257			257	
8:00 PM		238				238			238	
9:00 PM		158				158			158	
10:00 PM		96				96			96	
11:00 PM		73				73			73	
Day Total		2439	3961			6400			6400	
% Weekday Average		38.1%	61.9%							
% Week Average		38.1%	61.9%			100.0%				
AM Peak Volume			11:00 AM 395			11:00 AM 395			11:00 AM 395	
PM Peak Volume		4:00 PM 665	3:00 PM 610			4:00 PM 665			4:00 PM 665	

Comments:

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Attachment B:
Traffic Speed Data

LOCATION: SE Pine Street North of Burke
SPECIFIC LOCATION: 50 ft from
CITY/STATE: Roseburg, OR

QC JOB #: 10592503
DIRECTION: SB
DATE: Mar 15 2011

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM																	
1:00 AM																	
2:00 AM																	
3:00 AM																	
4:00 AM																	
5:00 AM																	
6:00 AM																	
7:00 AM																	
8:00 AM																	
9:00 AM																	
10:00 AM																	
11:00 AM																	
12:00 PM																	
1:00 PM																	
2:00 PM																	
3:00 PM																	
4:00 PM	**15**	**13**	**58**	**180**	**301**	89	7	**2**	0	0	0	0	0	0	**665**	26-35	481
5:00 PM	14	9	52	176	248	**92**	**22**	0	0	0	0	**1**	0	0	614	26-35	423
6:00 PM	6	4	19	83	153	67	4	2	0	0	0	0	0	0	338	26-35	236
7:00 PM	3	9	12	49	139	41	2	2	0	0	0	0	0	0	257	26-35	187
8:00 PM	3	10	20	58	110	33	3	1	0	0	0	0	0	0	238	26-35	168
9:00 PM	3	7	12	36	80	19	0	1	0	0	0	0	0	0	158	26-35	115
10:00 PM	1	1	11	26	46	8	3	0	0	0	0	0	0	0	96	26-35	71
11:00 PM	1	4	7	18	32	11	0	0	0	0	0	0	0	0	73	26-35	50
Day Total	46	57	191	626	1109	360	41	8	0	0	0	1	0	0	2439	26-35	1735
Percent	1.9%	2.3%	7.8%	25.7%	45.5%	14.8%	1.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

AM Peak Volume																	
PM Peak Volume	4:00 PM 15	4:00 PM 13	4:00 PM 58	4:00 PM 180	4:00 PM 301	5:00 PM 92	5:00 PM 22	4:00 PM 2				5:00 PM 1			4:00 PM 665		

Comments:

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

LOCATION: SE Pine Street North of Burke
SPECIFIC LOCATION: 50 ft from
CITY/STATE: Roseburg, OR

QC JOB #: 10592503
DIRECTION: SB
DATE: Mar 16 2011

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
12:00 AM	0	1	0	18	13	5	0	0	0	0	0	0	0	0	37	26-35	30
1:00 AM	0	2	1	8	13	2	2	1	0	0	0	0	0	0	29	26-35	20
2:00 AM	1	3	2	3	4	0	0	0	0	0	0	0	0	0	13	26-35	7
3:00 AM	0	0	3	6	9	5	0	0	0	0	0	0	0	0	23	26-35	15
4:00 AM	1	2	5	13	21	6	1	0	0	0	0	0	0	0	49	26-35	33
5:00 AM	1	2	3	20	63	23	3	0	0	0	0	0	0	0	115	31-40	86
6:00 AM	3	2	6	24	63	31	4	1	0	0	0	0	0	0	134	31-40	94
7:00 AM	3	9	18	56	106	35	**9**	1	0	0	0	0	0	0	237	26-35	162
8:00 AM	6	13	14	70	111	35	2	0	0	**1**	0	0	0	0	252	26-35	181
9:00 AM	4	10	26	70	125	48	6	0	0	0	0	0	0	0	289	26-35	195
10:00 AM	8	7	20	76	**162**	47	7	0	0	0	0	0	0	0	327	26-35	238
11:00 AM	**21**	**20**	**30**	**100**	156	**63**	4	1	0	0	0	0	0	0	**395**	26-35	256
12:00 PM	13	14	45	123	188	61	**9**	1	0	0	0	0	0	0	454	26-35	310
1:00 PM	24	**21**	29	128	184	67	8	0	0	0	0	0	0	0	461	26-35	311
2:00 PM	16	16	20	120	247	**108**	8	1	0	0	0	0	0	0	536	26-35	367
3:00 PM	**29**	18	**71**	**143**	**282**	58	6	**3**	0	0	0	0	0	0	**610**	26-35	425
4:00 PM																	
5:00 PM																	
6:00 PM																	
7:00 PM																	
8:00 PM																	
9:00 PM																	
10:00 PM																	
11:00 PM																	
Day Total	130	140	293	978	1747	594	69	9	0	1	0	0	0	0	3961	26-35	2725
Percent	3.3%	3.5%	7.4%	24.7%	44.1%	15.0%	1.7%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

AM Peak Volume	11:00 AM 21	11:00 AM 20	11:00 AM 30	11:00 AM 100	10:00 AM 162	11:00 AM 63	7:00 AM 9	1:00 AM 1		8:00 AM 1					11:00 AM 395		
PM Peak Volume	3:00 PM 29	1:00 PM 21	3:00 PM 71	3:00 PM 143	3:00 PM 282	2:00 PM 108	12:00 PM 9	3:00 PM 3							3:00 PM 610		

Comments:

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

SUMMARY - Tube Count - Speed Data

LOCATION: SE Pine Street North of Burke
SPECIFIC LOCATION: 50 ft from
CITY/STATE: Roseburg, OR

QC JOB #: 10592503
DIRECTION: SB
DATE: Mar 15 2011 - Mar 16 2011

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
Grand Total	176	197	484	1604	2856	954	110	17	0	1	0	1	0	0	6400	26-35	4460
Percent	2.8%	3.1%	7.6%	25.1%	44.6%	14.9%	1.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
Cumulative Percent	2.8%	5.8%	13.4%	38.5%	83.1%	98.0%	99.7%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			

85th Percentile: 35 MPH

Mean Speed(Average): 30 MPH
Median 31 MPH
Mode: 33 MPH

Comments:

Report generated on 3/22/2011 12:33 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Quality Counts

Attachment C:
Pedestrian Count Data

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Pedestrians Crossing Pine St

3/15/2011	Burke Ave S Leg	Burke Ave N Leg	Between Burke & Sykes	Sykes S Leg	Sykes N Leg	Between Sykes & Spring
4:00 PM	0	0	0	0	0	0
4:05 PM	0	0	0	0	0	0
4:10 PM	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0
4:20 PM	0	0	0	0	1	0
4:25 PM	0	0	1	0	0	0
4:30 PM	0	0	0	0	0	0
4:35 PM	0	1	0	1	0	0
4:40 PM	2	0	0	0	0	0
4:45 PM	0	2	0	0	0	0
4:50 PM	0	0	0	0	0	0
4:55 PM	0	0	1	0	0	0
5:00 PM	0	0	0	0	0	0
5:05 PM	0	0	1	0	1	0
5:10 PM	0	1	0	0	0	0
5:15 PM	0	0	0	0	0	0
5:20 PM	0	0	0	0	2	0
5:25 PM	0	0	2	0	0	0
5:30 PM	1	0	1	0	0	0
5:35 PM	1	0	0	0	0	0
5:40 PM	0	0	0	0	0	0
5:45 PM	1	0	0	3	0	0
5:50 PM	0	2	0	0	1	0
5:55 PM	2	0	0	0	0	0

3/16/2011	Burke Ave S Leg	Burke Ave N Leg	Between Burke & Sykes	Sykes S Leg	Sykes N Leg	Between Sykes & Spring
7:00 AM	0	0	0	0	0	0
7:05 AM	0	0	0	0	0	0
7:10 AM	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0
7:20 AM	0	0	0	0	0	0
7:25 AM	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0
7:35 AM	0	0	0	0	0	0
7:40 AM	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0
7:50 AM	0	0	0	0	0	0
7:55 AM	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0
8:05 AM	0	0	0	0	0	0
8:10 AM	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0
8:20 AM	0	0	0	0	0	0
8:25 AM	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0
8:35 AM	0	0	0	0	0	0
8:40 AM	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0
8:50 AM	0	0	0	0	0	0
8:55 AM	0	1	1	0	0	0

3/16/2011	Burke Ave S Leg	Burke Ave N Leg	Between Burke & Sykes	Sykes S Leg	Sykes N Leg	Between Sykes & Spring
2:00 PM	0	0	0	0	0	0
2:05 PM	0	2	1	0	0	0
2:10 PM	0	0	0	0	3	0
2:15 PM	0	0	0	0	2	0
2:20 PM	0	0	0	1	0	0
2:25 PM	0	1	1	0	0	1
2:30 PM	0	1	0	0	0	0
2:35 PM	0	0	0	0	0	0
2:40 PM	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0
2:50 PM	0	0	0	0	0	0
2:55 PM	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	1
3:05 PM	1	0	0	0	0	0
3:10 PM	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0
3:20 PM	0	0	0	0	0	0
3:25 PM	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0
3:35 PM	0	0	0	0	0	1
3:40 PM	0	1	0	0	0	0
3:45 PM	0	0	0	0	0	1
3:50 PM	0	0	0	0	0	0
3:55 PM	0	0	0	0	0	0

Attachment D:
NCHRP 562 Worksheets

GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

This spreadsheet combines Worksheet 1 and Worksheet 2 (Appendix A, pages 69-70) of TCRP Report 112/NCHRP Report 562 (*Improving Pedestrian Safety at Unsignalized Intersections*) into an electronic format. This spreadsheet should be used in conjunction with, and not independent of, Appendix A documentation.

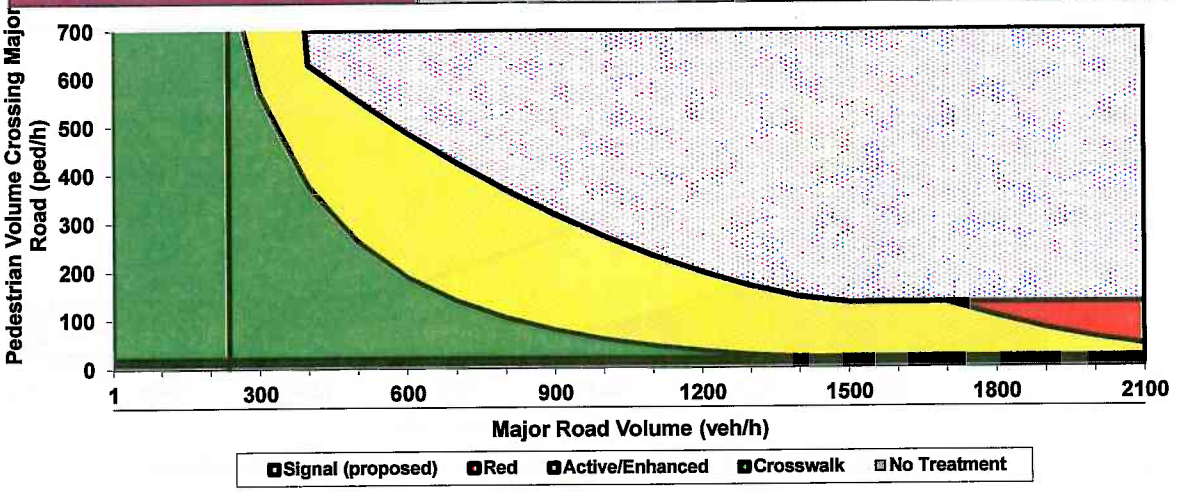
This spreadsheet is still under development, please inform TTI if errors are identified.

Key

- Blue fields contain descriptive information.
- Green fields are required and must be completed.
- Tan fields are adjustments that are filled out only under certain conditions (follow instructions to the left of the cell).
- Gray fields are automatically calculated and should not be edited.

Analyst and Site Information			
Analyst	MJB	Major Street	SE Pine Street
Analysis Date	April 6, 2011	Minor Street or Location	Burke, Sykes, Spring, Floed
Data Collection Date	March 15, 2011	Peak Hour	7:00 to 8:00 AM

Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		*1a*	35
Is the population of the surrounding area **LESS THAN** 10,000? (enter ***YES*** or ***NO***)		*1b*	NO
Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?			
Peak-hour pedestrian volume (ped/h), V_p		*2a*	9
Result: Consider raised median islands, curb extensions, traffic calming, etc. as feasible.			
Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?			
Major road volume, total of both approaches during peak hour (veh/h), V_{maj-s}		*3a*	237
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		*3b*	236
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		*3c*	750
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)		*3d*	No
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%.	% rate of reduction for *3c* (up to 50%)	*3e*	0%
	Reduced value or *3c*	*3f*	750
Result:			
Step 4: Estimate pedestrian delay.			
Pedestrian crossing distance, curb to curb (ft), L		*4a*	31
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)		*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)		*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c		*4d*	12
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), V_{maj-d}		*4e*	237
Major road flow rate (veh/s), v		*4f*	0.07
Average pedestrian delay (s/person), d_p		*4g*	7
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance). If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.		*4h*	0.0
		4i	
Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.			
Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance***		*5a*	High
Treatment Category:	**Consider raised median islands, curb extensions, traffic calming, etc. as feasible.**		



This worksheet provides general recommendations on pedestrian crossing treatments to consider at unsignalized intersections; in all cases, engineering judgment should be used in selecting a specific treatment for installation. This worksheet does not apply to school crossings. In addition to the results provided by this worksheet, users should consider whether a pedestrian treatment could present an increased safety risk to pedestrians, such as where there is poor sight distance, complex geometrics, or nearby traffic signals.

GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

This spreadsheet combines Worksheet 1 and Worksheet 2 (Appendix A, pages 69-70) of TCRP Report 112/NCHRP Report 562 (*Improving Pedestrian Safety at Unsignalized Intersections*) into an electronic format. This spreadsheet should be used in conjunction with, and not independent of, Appendix A documentation.

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Analyst and Site Information

Analyst	MJB	Major Street	SE Pine Street
Analysis Date	April 6, 2011	Minor Street or Location	Burke, Sykes, Spring, Floed
Data Collection Date	March 15, 2011	Peak Hour	8:00 to 9:00 AM

Step 1: Select worksheet:

Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)	*1a*	35
Is the population of the surrounding area **LESS THAN** 10,000? (enter ***YES*** or ***NO***)	*1b*	NO

Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?

Peak-hour pedestrian volume (ped/h), V_p	*2a*	19

Result: Consider raised median islands, curb extensions, traffic calming, etc. as feasible.

Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?

Major road volume, total of both approaches during peak hour (veh/h), V_{maj-s}		*3a*	252
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		*3b*	748
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		*3c*	748
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)		*3d*	No
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%.	% rate of reduction for *3c* (up to 50%)	*3e*	0%
	Reduced value or *3c*	*3f*	748

Result: The signal warrant is not met. Go to step 4.

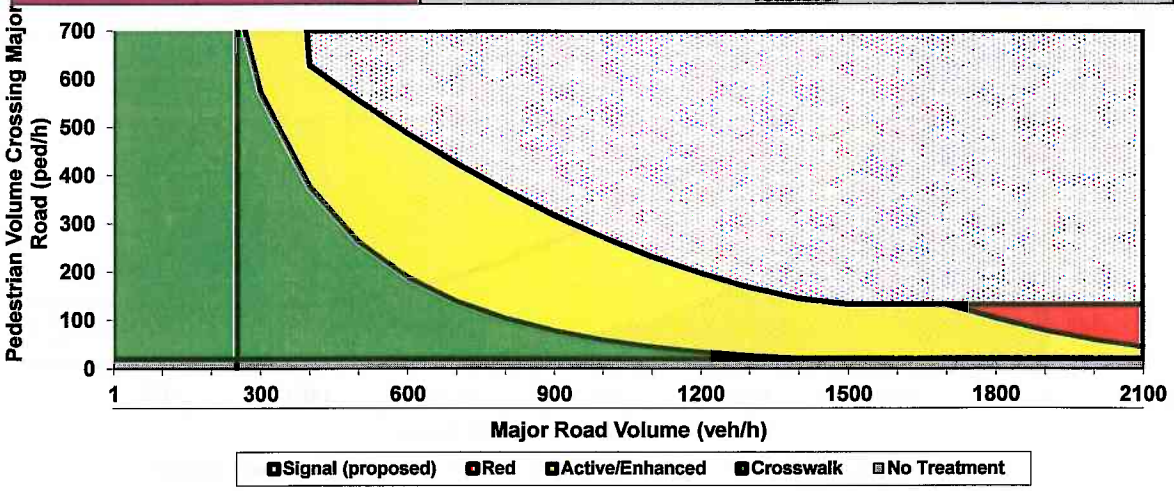
Step 4: Estimate pedestrian delay.

Pedestrian crossing distance, curb to curb (ft), L	*4a*	31
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)	*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)	*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c	*4d*	12
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), V_{maj-d}	*4e*	252
Major road flow rate (veh/s), v	*4f*	0.07
Average pedestrian delay (s/person), d_p	*4g*	7
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance). If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.	*4h*	0.0
	4i	

Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.

Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance*** .	*5a*	High

Treatment Category: **Consider raised median islands, curb extensions, traffic calming, etc. as feasible.**



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GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

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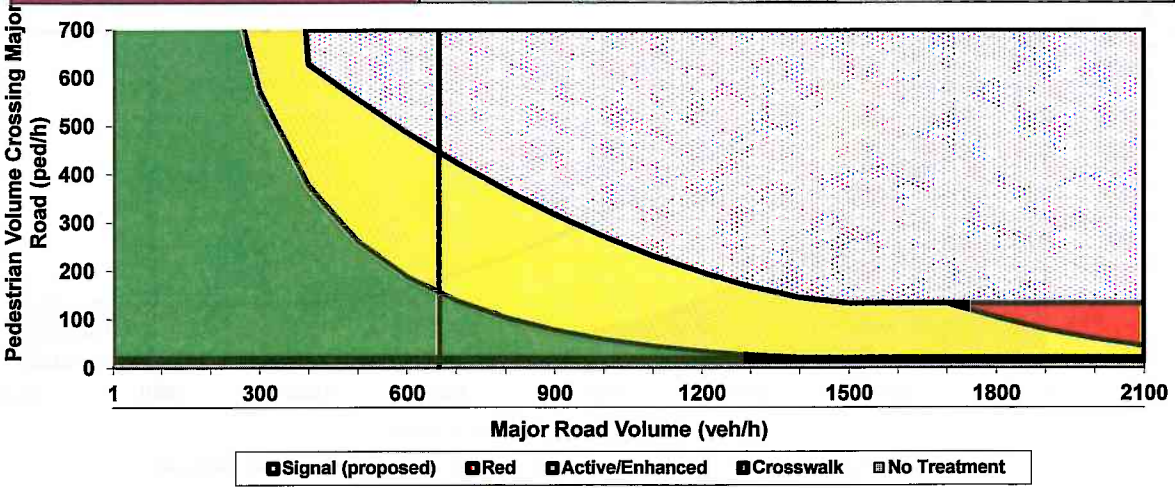
- Gray fields are automatically calculated and should not be edited.

Analyst and Site Information			
Analyst	MJB	Major Street	SE Pine Street
Analysis Date	April 6, 2011	Minor Street or Location	Burke, Sykes, Spring, Floed
Data Collection Date	March 15, 2011	Peak Hour	4:00 to 5:00 PM

Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		*1a*	35
Is the population of the surrounding area **LESS THAN** 10,000? (enter ***YES*** or ***NO***)		*1b*	NO
Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?			
Peak-hour pedestrian volume (ped/h), V_p		*2a*	13
Result: Consider raised median islands, curb extensions, traffic calming, etc. as feasible.			
Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?			
Major road volume, total of both approaches during peak hour (veh/h), V_{maj-s}		*3a*	665
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		*3b*	[illegible]
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		*3c*	[illegible]
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)		*3d*	No
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%.	% rate of reduction for *3c* (up to 50%)	*3e*	0%
	Reduced value or *3c*	*3f*	[illegible]
Result:			
Step 4: Estimate pedestrian delay.			
Pedestrian crossing distance, curb to curb (ft), L		*4a*	31
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)		*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)		*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c		*4d*	12
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), V_{maj-d}		*4e*	665
Major road flow rate (veh/s), v		*4f*	[illegible]
Average pedestrian delay (s/person), d_p		*4g*	[illegible]
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance). If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.		*4h*	0.1
		4i	
Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.			
Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance***		*5a*	High
Treatment Category:	**Consider raised median islands, curb extensions, traffic calming, etc. as feasible.**		



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GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

This spreadsheet combines Worksheet 1 and Worksheet 2 (Appendix A, pages 69-70) of TCRP Report 112/NCHRP Report 562 (*Improving Pedestrian Safety at Unsignalized Intersections*) into an electronic format. This spreadsheet should be used in conjunction with, and not independent of, Appendix A documentation.

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- Gray fields are automatically calculated and should not be edited.

Analyst and Site Information

Analyst	MJB	Major Street	SE Pine Street
Analysis Date	April 6, 2011	Minor Street or Location	Burke, Sykes, Spring, Flood
Data Collection Date	March 15, 2011	Peak Hour	5:00 to 6:00 PM

Step 1: Select worksheet:

Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)	*1a*	35
Is the population of the surrounding area **LESS THAN** 10,000? (enter ***YES*** or ***NO***)	*1b*	NO

Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?

Peak-hour pedestrian volume (ped/h), V_p	*2a*	5

Result: Consider raised median islands, curb extensions, traffic calming, etc. as feasible.

Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?

Major road volume, total of both approaches during peak hour (veh/h), V_{maj-s}	*3a*	614
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant	*3b*	178
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant	*3c*	178
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)	*3d*	No
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — % rate of reduction for *3c* (up to 50%)	*3e*	0%
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%. — Reduced value or *3c*	*3f*	178

Result:

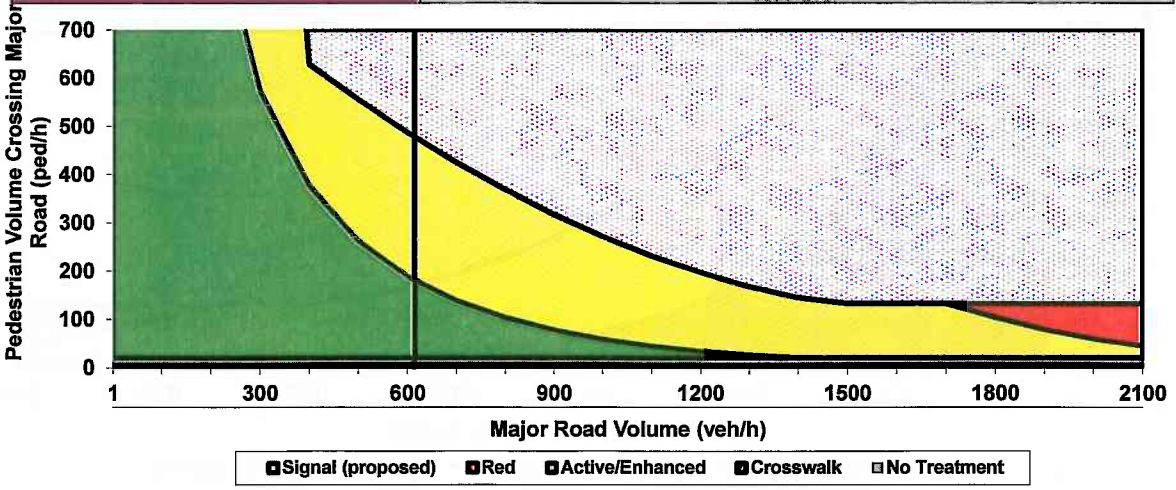
Step 4: Estimate pedestrian delay.

Pedestrian crossing distance, curb to curb (ft), L	*4a*	31
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)	*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)	*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c	*4d*	12
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), V_{maj-d}	*4e*	614
Major road flow rate (veh/s), v	*4f*	0.17
Average pedestrian delay (s/person), d_p	*4g*	26
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance). If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.	*4h*	0.9
	4i	

Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.

Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance***	*5a*	High

Treatment Category: Consider raised median islands, curb extensions, traffic calming, etc. as feasible.



This worksheet provides general recommendations on pedestrian crossing treatments to consider at unsignalized intersections; in all cases, engineering judgment should be used in selecting a specific treatment for installation. This worksheet does not apply to school crossings. In addition to the results provided by this worksheet, users should consider whether a pedestrian treatment could present an increased safety risk to pedestrians, such as where there is poor sight distance, complex geometrics, or nearby traffic signals.

Attachment E:
NCHRP 562 Worksheets
for Sensitivity Analysis

GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

This spreadsheet combines Worksheet 1 and Worksheet 2 (Appendix A, pages 69-70) of TCRP Report 112/NCHRP Report 562 (*Improving Pedestrian Safety at Unsignalized Intersections*) into an electronic format. This spreadsheet should be used in conjunction with, and not independent of, Appendix A documentation.

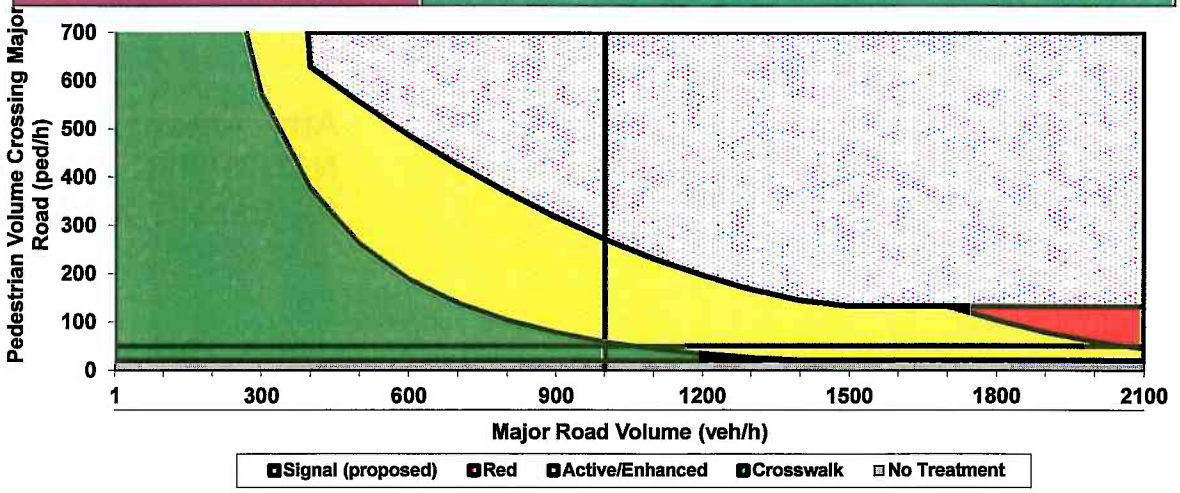
This spreadsheet is still under development, please inform TTI if errors are identified.

Key

- Blue fields contain descriptive information.
- Green fields are required and must be completed.
- Tan fields are adjustments that are filled out only under certain conditions (follow instructions to the left of the cell).
- Gray fields are automatically calculated and should not be edited.

Analyst and Site Information			
Analyst	MJB	Major Street	SE Pine Street
Analysis Date	April 6, 2011	Minor Street or Location	Burke, Sykes, Spring, Floed
Data Collection Date	March 15, 2011	Peak Hour	Sensitivity Analysis

Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		*1a*	35
Is the population of the surrounding area **LESS THAN** 10,000? (enter ***YES*** or ***NO***)		*1b*	NO
Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?			
Peak-hour pedestrian volume (ped/h), V_p		*2a*	50
Result: Go to step 3.			
Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?			
Major road volume, total of both approaches during peak hour (veh/h), V_{maj-s}		*3a*	1000
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		*3b*	271
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		*3c*	271
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)		*3d*	No
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%.	% rate of reduction for *3c* (up to 50%)	*3e*	0%
	Reduced value or *3c*	*3f*	271
Result: The signal warrant is not met. Go to step 4.			
Step 4: Estimate pedestrian delay.			
Pedestrian crossing distance, curb to curb (ft), L		*4a*	31
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)		*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)		*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c		*4d*	12
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), V_{maj-d}		*4e*	1000
Major road flow rate (veh/s), v		*4f*	0.28
Average pedestrian delay (s/person), d_p		*4g*	86
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance). If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.		*4h*	1.2
		4i	
Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.			
Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance***		*5a*	High
Treatment Category:			**CROSSWALK**



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GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

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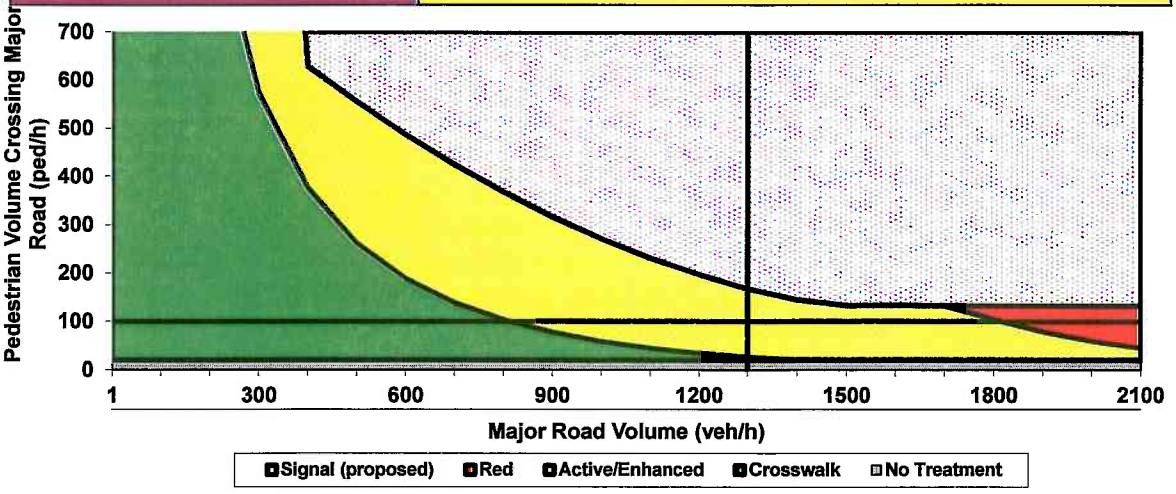
Analyst and Site Information			
Analyst	MJB	Major Street	SE Pine Street
Analysis Date	April 6, 2011	Minor Street or Location	Burke, Sykes, Spring, Floed
Data Collection Date	March 15, 2011	Peak Hour	Sensitivity Analysis

Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		*1a*	35
Is the population of the surrounding area **LESS THAN** 10,000? (enter ***YES*** or ***NO***)		*1b*	NO
Step 2: Does the crossing meet minimum pedestrian volumes to be considered for a traffic control device?			
Peak-hour pedestrian volume (ped/h), V_p		*2a*	100
Result: 100			
Step 3: Does the crossing meet the pedestrian warrant for a traffic signal?			
Major road volume, total of both approaches during peak hour (veh/h), V_{maj-s}		*3a*	1300
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		*3b*	[illegible]
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		*3c*	15[illegible]
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter ***YES*** or ***NO***)		*3d*	No
If 15th percentile crossing speed of pedestrians is less than 3.5 ft/s (1.1 m/s), then reduce *3c* by up to 50%.	% rate of reduction for *3c* (up to 50%)	*3e*	0%
	Reduced value or *3c*	*3f*	[illegible]
Result: The signal warrant is not met. Go to step 4.			
Step 4: Estimate pedestrian delay.			
Pedestrian crossing distance, curb to curb (ft), L		*4a*	31
Pedestrian walking speed (ft/s), S_p (suggested speed = 3.5 ft/s)		*4b*	3.5
Pedestrian start-up time and end clearance time (s), t_s (suggested start-up time = 3 sec)		*4c*	3
[Calculated automatically] Critical gap required for crossing pedestrian (s), t_c		*4d*	12
Major road volume, total both approaches OR approach being crossed if raised median island is present, during peak hour (veh/h), V_{maj-d}		*4e*	1300
Major road flow rate (veh/s), v		*4f*	0.36
Average pedestrian delay (s/person), d_p		*4g*	12.4
Total pedestrian delay (h), D_p The value in 4h is the calculated estimated delay for all pedestrians crossing the major roadway without a crossing treatment (assumes 0% compliance). If the actual total pedestrian delay has been measured at the site, that value can be entered in 4i to replace the calculated value in 4h.		*4h*	5.1
		4i	
Step 5: Select treatment based up on total pedestrian delay and expected motorist compliance.			
Expected motorist compliance at pedestrian crossings in region: enter ***HIGH for High Compliance*** or ***LOW for Low Compliance***		*5a*	High
Treatment Category:			**ACTIVE OR ENHANCED**



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