

MEMORANDUM

Date: April 4, 2018 Project #: 22064.0

To: Manuel Abarca, PE, City of Longview

From: Matt Bell and Nick Gross, Kittelson & Associates, Inc.

Project: 30th Avenue Pedestrian Crossing

Subject: Pedestrian Crossing Assessment

EXECUTIVE SUMMARY

This memorandum summarizes the results of a pedestrian crossing assessment prepared on behalf of the City of Longview and Columbia Valley Gardens (CVG) elementary school. The purpose of the assessment is to determine if 1) an enhanced mid-block crossing across from the main entrance to CVG is supported by the study methodology and 2) if the crossing would help address existing pedestrian and vehicle access and circulation issues within the CVG drive aisle during the morning and afternoon peak time periods. The assessment is based on field observations as well as conversations with City of Longview and CVG staff. Key findings are summarized below.

- Enhanced pedestrian crossings are currently provided along 30th Avenue at Pine Street and Pennsylvania Street – additional infrastructure that supports the crossings is provided along 30th Avenue, Pine Street, Pennsylvania Street, and Pershing Way in advance of the crossings.
- A significant number of pedestrians were observed crossing 30th Avenue at Pine Street and Pennsylvania Street during the morning and afternoon peak time periods – relatively few pedestrian were observed crossing mid-block between Pine Street and Pennsylvania Street.
- The morning and afternoon peak hours for pedestrian activity are consistent with the morning and afternoon peak hours for vehicle activity.
- Travel speeds along 30th Avenue are at or near the posted speed limit of 30 miles per hour (mph) throughout the day and at or near the school zone speed limit of 20 mph during the morning and afternoon peak time periods.

The results of the assessment indicate that an enhanced mid-block crossing along 30th Avenue across from the main entrance to CVG is supported by the study methodology assuming a shift in pedestrian activity from one or more of the existing crossings. However, the mid-block crossing is not expected to address the existing pedestrian and vehicle access and circulation issues within the CVG drive aisle during the morning and afternoon peak time periods and therefore, is not recommended.

To improve pedestrian and vehicle access and circulation, we recommend that the school continue to work with the crossing guards to improve the operations of the existing crossings at Pine Street and

Pennsylvania Street; educate students and parents about alternative pick-up and drop-off locations, such as the Valley Christian Church; educate students and parents about where and how to cross 30th Avenue; install stop bars at the eastbound approaches to the Pine Street and Pennsylvania Street intersections with “stop here for pedestrian” signs, and consider installing flashing beacons in advance of the Pine Street and Pennsylvania Street crossings. Other potential modifications include staggering release times for students, reconfiguring the drive aisle to separate buses from vehicles, and removing on-street parking between Pine Street and Pennsylvania Street on the northwest side of 30th Avenue

BACKGROUND

The City of Longview conducted a school zone study in February 2014. The study includes an assessment of 15 school zones throughout Longview, including CVG. The study includes recommendations for consideration by the City and Longview School District consistent with state and national guidance and policies. Other applicable treatments are also shown for each school; these treatments are not intended to address a specific deficiency, but are instead offered as additional treatments that could be considered if the City elects to provide further enhancements within the school zone. The study provides recommendations for consideration including the installation of a marked mid-block crossing with longitudinal (high-visibility) markings, School Crossing Assemblies, and a rectangular rapid flashing beacon (RRFB) on 30th Avenue between Pine Street and Pennsylvania Street, and removal of the marked crossings and associated School Crossing Assemblies at Pine Street and Pennsylvania Street to encourage use of the mid-block crossing.

ISSUE

There are currently two enhanced pedestrian crossings located in the vicinity of CVG, including one at Pine Street and one at Pennsylvania Street. During the morning and afternoon peak time periods, pedestrian crossing activity at the Pennsylvania Street crossing limit the ability of vehicles, including buses to exit the driveway. Given the location of the Pennsylvania Street crossing and the configuration of CVG’s drive aisle, right-turning vehicles exiting CVG, including buses, are frequently delayed as a result of the high volumes of pedestrian crossings and conflicting movement. Furthermore, left-turning vehicles exiting CVG are also frequently delayed as a result of northbound vehicles yielding the right-of-way to pedestrians crossing Pennsylvania Street, resulting in a blockage of left-turn movements existing CVG. These conflicts frequently cause extended vehicular queues throughout the CVG site.

STUDY AREA

The study area consists of the segment of 30th Avenue between Pine Street and Pennsylvania Street adjacent to CVG elementary school. The proposed mid-block crossing is located along 30th Avenue across from the main entrance to CVG. An existing marked crosswalk and concrete pathway from the schools main entrance leads northwest to the proposed crossing creating a natural path across 30th Avenue at the mid-block location.



Land-Uses

Land uses along 30th Avenue primarily consist of residential and institutional on both sides of the roadway. The residential uses include single-family residential to the north and south while the institutional uses include CVG and two churches (Valley Christian Fellowship and Longview United Methodist Church) to the north.

TRANSPORTATION FACILITIES

Roadway Facilities

30th Avenue is a two-lane neighborhood collector that travels northeast-southwest through the Columbia Valley Garden neighborhood. It provides a connection between State Route 4 (Ocean Beach Highway), a principle arterial to the south, and Pacific Way, a minor arterial to the northeast. The current traffic volumes and travel speeds along 30th Avenue are generally consistent with its neighborhood collector classification.

Jurisdiction

The City of Longview has jurisdiction over 30th Avenue and the adjacent roadways, including Pine Street and Pennsylvania Street.

Functional Classification

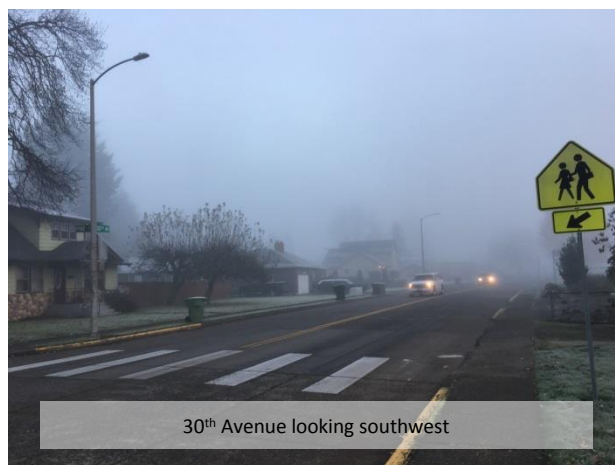
30th Avenue is classified as a neighborhood connector in the City of Longview's Comprehensive Plan (Reference 1). As a neighborhood connector, 30th Avenue is intended to distribute neighborhood traffic from arterials and connectors and provide direct access for abutting properties. Typically, connector streets are not continuous for any great length, nor do they form a connected network by themselves.

Cross Section

30th Avenue currently has a two-lane cross section within the study area, including two 11-foot travel lanes and two 7-foot parking lanes. The overall paved width is approximately 36 feet.



30th Avenue looking northeast



30th Avenue looking southwest

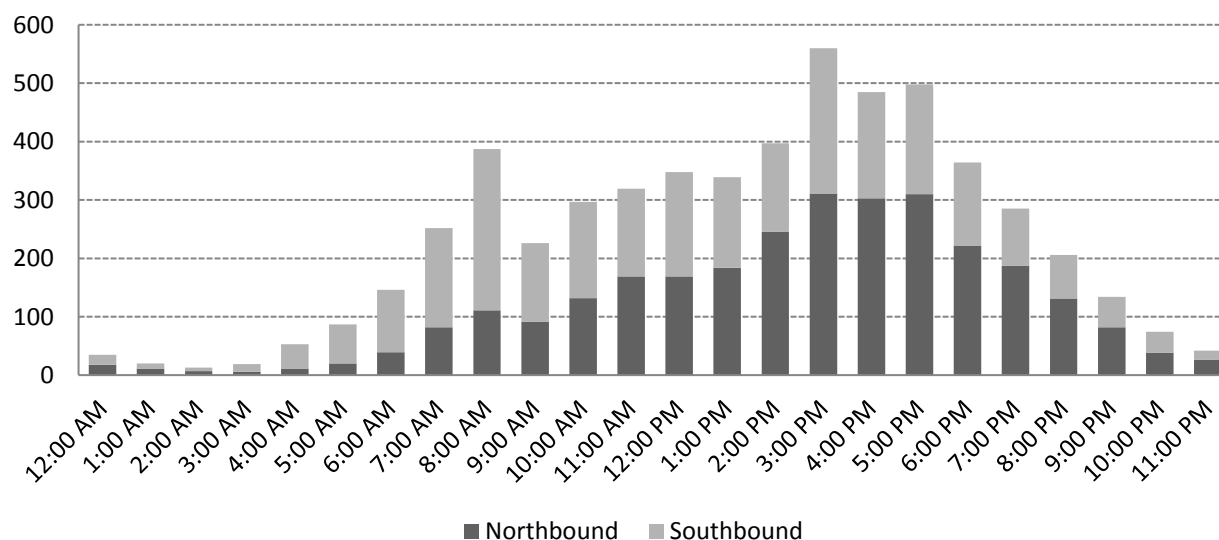
Traffic Control and Signage

The enhanced pedestrian crossings at Pine Street and Pennsylvania Street include high visibility pavement markings and school crosswalk signs facing both directions along 30th Avenue. The pavement markings and signs appear to be in good condition. The crossings are supplemented by school crossing ahead warning signs and school speed zone signs with flashing beacons and speed feedback signs along 30th Avenue in advance of the crossings. There are also school crossing ahead warning signs along Pine Street, Pennsylvania Street, and Pershing Way. The closest signalized intersections are located at the 30th Avenue/Pacific Way intersection approximately 1,050 feet to the north and the 30th Avenue/Ocean Beach Highway approximately 2,950 feet to the south. Crossing at either location would require significant out-of-direction travel for most people traveling to/from CVG.

Traffic Volumes

Traffic volume data was collected along 30th Avenue between Pine Street and Pennsylvania Street in January, 2018 while school was in session. The data includes the total number of vehicles that traveled along 30th Avenue over a 24-hour period. Chart 1 displays the hourly traffic volume data.

Chart 1: Daily Traffic Volumes along 30th Avenue



As shown in Chart 1, traffic volumes along 30th Avenue tend to increase steadily throughout the day with distinct morning and afternoon peak hours occurring at 8:00 a.m. and 3:00 p.m., respectfully. Based on the data, a total of 5,586 vehicles were counted over the 24-hour period, including 387 during the morning and 560 during the afternoon peak hours. *The traffic volume data is provided in Attachment "A".*

Travel Speeds

Travel speed data was also collected along 30th Avenue between Pine Street and Pennsylvania Street over a 24-hour period in January, 2018. Based on the data, the 85th percentile speeds (the speeds typically used to determine the appropriate level of crosswalk protection) are 30 miles per hour (mph) in the eastbound direction and 29 mph in the westbound direction. However, further evaluation of the data indicates that the 85th percentile while the school speed zone is in effect are 21 mph in the eastbound and westbound directions during the morning peak hour (8:00 AM) and 20 mph in the eastbound direction and 22 mph in the westbound direction during the afternoon peak hour (3:00 PM). *The travel speed data is provided in Attachment "B".*

Other Roadway Considerations

Illumination

Illumination is currently provided by street lights installed at approximate 170-foot intervals along the west side of 30th Avenue including adjacent to the proposed mid-block crossing location. No illumination is provided along the east side of 30th Avenue.

Topography

30th Avenue is relatively flat throughout the study area and there are no vertical or horizontal curvature issues that limit sight distance along the roadway.

Vegetation

At the time of the field investigation, vegetation along both sides of 30th Avenue was maintained and did not limit sight distance along the roadway.

Sight Distance

The posted speed limit of 30 mph was used to calculate stopping sight distance requirements along 30th Avenue in accordance with the methodology identified in the standard reference manual, *A Policy on Geometric Design of Highway and Streets*, published by the American Association of State Highway and Transportation Officials (AASHTO – Reference 2). Accordingly, the stopping sight distance requirement at the proposed mid-block crossing is 197-feet. Given this requirement, there is currently sufficient stopping sight distance along 30th Avenue to safely stop a moving vehicle in advance of the proposed mid-block crossing.

Pedestrian Facilities

Sidewalks

Continuous sidewalks are currently provided along both sides of 30th Avenue. The sidewalks on the northwest side of 30th Avenue appear to be in poor to fair condition whereas the sidewalks on the southeast side appear to be in good condition. A 3 foot landscape strip is provided between the sidewalks and parking lane on the northwest side of the roadway whereas the sidewalks on the southeast side are curb tight. All sidewalks are free from any impediments such as utility poles, light poles, fire hydrants, etc. A concrete pathway is also provided along the southeast side of the CVG drive aisle. The pathway provides a connection from the main entrance of CVG to the sidewalks east and west of the school drive aisle. An additional pathway is provided between the drive aisle and the sidewalks along the southeast side of 30th Avenue adjacent to the location of the proposed mid-block crossing.

Crosswalks

There are currently two marked crosswalks located along 30th Avenue, including one at Pine Street and one at Pennsylvania Street. An additional marked crosswalk is located along the CVG drive aisle between the main entrance to CVG and the pedestrian pathways described above.



Crossing Guards and Signage

Through a coordinated effort with CVG, volunteer crossing guards are present during the morning and afternoon peak hours to help facilitate students safely across 30th Avenue. Crossing guards are located at the Pine Street and Pennsylvania Street intersections as well as the crosswalk located along the CVG drive aisle. Once pedestrian queues reach a reasonable volume, crossing guards with high visibility vest and flags walk into 30th Avenue to temporarily stop north and southbound vehicles to help safely facilitate pedestrian movement across 30th Avenue. Temporary signage is also placed along the centerline of 30th Avenue directing students to cross at the existing marked crosswalks locations e.g. Pine Street and Pennsylvania Street.



Temporary signage directing students to cross at the existing marked crossings along 30th Avenue.



Volunteer crossing guards help facilitate students to safely cross the 30th Avenue at Pennsylvania Street during the afternoon school release period.

Pedestrian Activity

Pedestrian activity data was collected along 30th Avenue in January, 2018. The data includes the total number of pedestrians that crossed 30th Avenue at Pine Street, Pennsylvania Street, and mid-block between Pine Street and Pennsylvania Street during the morning (7:30 to 9:30 a.m.) and afternoon (2:00 to 4:00 p.m.) peak hours. The following provides a summary of the pedestrian data at each location.

- The morning and afternoon peak hours for pedestrian activity were found to occur from 8:00 to 9:00 a.m. and from 3:00 to 4:00 p.m., respectively. These peak hours are consistent with the morning and afternoon peak hours for vehicle activity along 30th Avenue.
- Pine Street: A total of four pedestrians (0 adults, 4 children) were observed crossing 30th Avenue during the morning peak hour and 37 pedestrians (16 adults, 21 children) were observed crossing during the afternoon peak hour.
- Pennsylvania Street: A total of 25 pedestrians (4 adults, 21 children) were observed crossing 30th Avenue during the morning peak hour and 119 pedestrians (61 adults, 58 children) were observed crossing during the afternoon peak hour.
- Mid-block: 0 pedestrians were observed crossing 30th Avenue during the morning peak hour and 1 pedestrian (0 adults, 1 child) was observed crossing during the afternoon peak hour.

Through discussions with CVG staff, it was noted that Pine Street and Pennsylvania Street are both designated walk-to-school routes for CVG students. *The pedestrian crossing data is provided in Attachment "E".*

Transit Facilities and Services

Transit for Longview residents is provided by River Cities Transit (RCT). Information regarding local transit service within the study area was obtained from the current RCT system map and bus schedule. RCT Line 33 provides hourly service along 30th Avenue on approximately 60 minute headways. Service is provided Monday through Friday from 6:30 a.m. to 7:00 p.m. and on Saturday's from 8:00 a.m. to 6:00 p.m. The closest transit stop is located at the 30th Avenue/Olympia Way intersection and is served by RCT Line 33.

PLANNED AND PENDING TRANSPORTATION FACILITIES

The Longview Comprehensive Plan identifies a list of potential projects that will improve traffic safety, increase traffic flow, increase traffic circulation, improve freight mobility, or enhance the beautification of roadways. No projects have been identified in the Comprehensive Plan as having the potential to impact conditions along 30th Avenue.

CROSSWALK ASSESSMENT

A crosswalk assessment was conducted to determine if the proposed mid-block crossing would be supported by the study methodology under existing traffic conditions with and without the existing Pine Street and Pennsylvania Street crossings. The results of the assessment indicate that the crosswalk is not supported by the methodology due to a lack of pedestrian activity; however, with and a shift in pedestrian activity from either the Pine Street or Pennsylvania Street crossings to the mid-block crossing, the mid-block crossing would be supported.

Gap Analysis

The National Cooperative Highway Research Program (NCHRP) Report 562 *Improving Pedestrian Safety at Unsignalized Crossings* (Reference 3) provides a methodology for evaluating appropriate levels of crosswalk protection that considers traffic volumes, travel speeds, and pedestrian crossing volumes as well as a number of other factors. The NCHRP Report 562 method was applied to the proposed mid-block crossing as well as the existing crossings at Pine Street and Pennsylvania Street under existing traffic conditions. A sensitivity analysis was then conducted to determine the impact of shifting pedestrian activity from one or more of the existing crossings to the proposed mid-block crossing.

Existing Conditions

Table 1 summarizes the existing traffic volumes, travel speeds, and pedestrian crossing volumes at the proposed mid-block crossing and at the existing crossings during the morning and afternoon peak hours.

Table 1: Existing Conditions – 30th Avenue

Potential Crossing Location	Morning Peak Hour			Afternoon Peak Hour		
	Traffic Volume	Travel Speed	Ped Crossings	Traffic Volume	Travel Speed	Ped Crossings
30 th Avenue/Pine Street	387	21	4	560	21	37
30 th Avenue/Pennsylvania Street	387	21	25	560	21	119
30 th Avenue/Mid-block	387	21	0	560	21	1

Assessment of the traffic volumes shown in Table 1 led to the conclusion that the enhanced pedestrian crossings at Pine Street and Pennsylvania Street are supported by the study methodology and the level of crosswalk protection currently provided at the crossings is appropriate given the level of pedestrian activity. However, an enhanced mid-block crossing is NOT supported by the study methodology due to a lack of pedestrian activity. The NCHRP methodology requires a minimum of 20 pedestrian crossings over the course of an hour to support minimal crossing treatments. As pedestrian crossing volumes increase, the level of crosswalk protection needed also increases. *The worksheets used in the existing conditions evaluation are included in Attachment “F”.*

Sensitivity Analysis

This analysis is intended to determine the impact of closing one or more of the existing crosswalks on the proposed mid-block crossing. This analysis assumes installation of an enhanced crossing at the midblock crossing along with:

- Scenario 1: Closure of the Pine Street crossing – this is expected to result in a shift in pedestrian activity to the mid-block crossing; however, some pedestrian are expected to continue to cross at Pine street.
- Scenario 2: Closure of the Pennsylvania Street crossing – this is expected to result in a shift in pedestrian activity to the mid-block crossing; however, some pedestrians are expected to continue to cross at Pennsylvania street.
- Scenario 3: Closure of the Pine Street and Pennsylvania Street crossings – this is expected to result in a shift in pedestrian activity to the mid-block crossing; however, some pedestrians are expected to continue to cross at Pine Street and Pennsylvania Street.
- Scenario 4: Closure of the Pine Street and/or Pennsylvania Street crossing with the minimum amount of pedestrian activity needed to support an enhanced mid-block crossing (20 pedestrians)

The results of the sensitivity analysis indicate that an enhanced mid-block crossing is supported by the study methodology under all scenarios; however, under Scenario 3, the level of pedestrian activity at the proposed mid-block crossing would support “Active or Enhanced” crossing treatments, such as flashing beacons. The results of the analysis also indicate that all three crossings are supported by the study methodology assuming the minimum amount of pedestrian activity needed to support an enhanced crossing (20 pedestrian) shifts to the proposed mid-block crossing location.

FINDINGS AND RECOMMENDATIONS

The results of the assessment indicate that an enhanced mid-block crossing along 30th Avenue across from the main entrance to CVG is supported by the study methodology assuming a shift in pedestrian activity from one or more of the existing crossings to the mid-block crossing. However, the mid-block crossing is not expected to address the existing pedestrian and vehicle access and circulation issues within the CVG drive aisle during the morning and afternoon peak time periods and therefore, is not recommended. The following summarizes the recommended crossing treatments needed to improve pedestrian and vehicle access and circulation.

Recommended Crossing Treatments

Recognizing that the implementation of any additional enhanced crossing treatments will likely depend on policies, priorities and available funding, the following recommendations are presented according to their simplicity and anticipated time and cost constraints.

Near-Term Treatments

- CVG should continue to work with the crossing guards to improve the operation of the existing Pine Street and Pennsylvania Street crossings.
- CVG should educate students and parents about alternative pick-up and drop-off locations, such as the Valley Christian Church, as well as where and how to cross 30th Avenue.
- The city should install stop bars at the eastbound approaches to the Pine Street and Pennsylvania Street intersections with “stop here for pedestrian” signs.
- The City should evaluate light levels at the Pine Street and Pennsylvania Street crossing to ensure they meet City standards for the roadway.

Long-Term Recommendations

The near-term recommendations should provide incremental improvements to existing operations such as focusing crossings at the Pine Street and Pennsylvania Street crossings, minimizing mid-block crossings, and improving the operations of the driveways. In addition, the character of 30th Avenue with the additional signs and pavement markings could potentially alter the motorists’ driving behavior. The following activities should be considered as a follow-up to the proposed near-term enhancements.

- CVG should consider staggering release times for students.
- CVG should consider reconfiguring the drive aisle to separate buses from vehicles.
- The City should consider installing flashing beacons in advance of the Pine Street and Pennsylvania Street crossings, similar to treatment at Olympic Elementary School.
- The City should consider removal of on-street parking spaces between Pine Street and Pennsylvania Street on the northwest side of 30th Avenue to discourage mid-block crossings.

REFERENCES:

1. City of Longview. *Comprehensive Plan. Adopted 2006*
2. American Association of State Highway and Transportation Officials. *A Policy on Geometric Design of Highway and Streets*. 2012.
3. The National Cooperative Highway Research Program (NCHRP). *Report 562 Improving Pedestrian Safety at Unsignalized Crossings*. 2006.

ATTACHMENTS

- A. Traffic Volumes
- B. Traffic Speed Data
- C. Pedestrian Volumes
- D. NCHRP 562 Worksheets: Existing Conditions
- E. NCHRP 562 Worksheets: Sensitivity Analysis

Attachment A Traffic Volumes

LOCATION: 30th Ave btwn Pine & Pennsylvania						QC JOB #: 14583901				
SPECIFIC LOCATION: 30th Ave btwn Pine & Pennsylvania						DIRECTION: EB/WB				
CITY/STATE: Longview, WA						DATE: Jan 09 2018 - Jan 09 2018				
Start Time	Mon 09-Jan-18	Tue	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		35				35			35	
1:00 AM		20				20			20	
2:00 AM		13				13			13	
3:00 AM		19				19			19	
4:00 AM		53				53			53	
5:00 AM		87				87			87	
6:00 AM		146				146			146	
7:00 AM		252				252			252	
8:00 AM		387				387			387	
9:00 AM		226				226			226	
10:00 AM		297				297			297	
11:00 AM		319				319			319	
12:00 PM		348				348			348	
1:00 PM		339				339			339	
2:00 PM		397				397			397	
3:00 PM		560				560			560	
4:00 PM		485				485			485	
5:00 PM		498				498			498	
6:00 PM		364				364			364	
7:00 PM		285				285			285	
8:00 PM		206				206			206	
9:00 PM		134				134			134	
10:00 PM		74				74			74	
11:00 PM		42				42			42	
Day Total		5586				5586			5586	
% Weekday Average		100.0%								
% Week Average		100.0%				100.0%				
AM Peak Volume		8:00 AM 387				8:00 AM 387			8:00 AM 387	
PM Peak Volume		3:00 PM 560				3:00 PM 560			3:00 PM 560	
Comments:										

LOCATION: 30th Ave btwn Pine & Pennsylvania						QC JOB #: 14583901				
SPECIFIC LOCATION: 30th Ave btwn Pine & Pennsylvania						DIRECTION: EB				
CITY/STATE: Longview, WA						DATE: Jan 09 2018 - Jan 09 2018				
Start Time	Mon 09-Jan-18	Tue	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		18				18			18	
1:00 AM		11				11			11	
2:00 AM		7				7			7	
3:00 AM		6				6			6	
4:00 AM		11				11			11	
5:00 AM		20				20			20	
6:00 AM		39				39			39	
7:00 AM		82				82			82	
8:00 AM		111				111			111	
9:00 AM		91				91			91	
10:00 AM		132				132			132	
11:00 AM		169				169			169	
12:00 PM		169				169			169	
1:00 PM		184				184			184	
2:00 PM		245				245			245	
3:00 PM		311				311			311	
4:00 PM		303				303			303	
5:00 PM		310				310			310	
6:00 PM		221				221			221	
7:00 PM		187				187			187	
8:00 PM		131				131			131	
9:00 PM		82				82			82	
10:00 PM		38				38			38	
11:00 PM		26				26			26	
Day Total		2904				2904			2904	
% Weekday Average		100.0%								
% Week Average		100.0%				100.0%				
AM Peak		11:00 AM				11:00 AM			11:00 AM	
Volume		169				169			169	
PM Peak		3:00 PM				3:00 PM			3:00 PM	
Volume		311				311			311	
Comments:										

LOCATION: 30th Ave btwn Pine & Pennsylvania						QC JOB #: 14583901				
SPECIFIC LOCATION: 30th Ave btwn Pine & Pennsylvania						DIRECTION: WB				
CITY/STATE: Longview, WA						DATE: Jan 09 2018 - Jan 09 2018				
Start Time	Mon 09-Jan-18	Tue	Wed	Thu	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM		17				17			17	
1:00 AM		9				9			9	
2:00 AM		6				6			6	
3:00 AM		13				13			13	
4:00 AM		42				42			42	
5:00 AM		67				67			67	
6:00 AM		107				107			107	
7:00 AM		170				170			170	
8:00 AM		276				276			276	
9:00 AM		135				135			135	
10:00 AM		165				165			165	
11:00 AM		150				150			150	
12:00 PM		179				179			179	
1:00 PM		155				155			155	
2:00 PM		152				152			152	
3:00 PM		249				249			249	
4:00 PM		182				182			182	
5:00 PM		188				188			188	
6:00 PM		143				143			143	
7:00 PM		98				98			98	
8:00 PM		75				75			75	
9:00 PM		52				52			52	
10:00 PM		36				36			36	
11:00 PM		16				16			16	
Day Total		2682				2682			2682	
% Weekday Average		100.0%								
% Week Average		100.0%				100.0%				
AM Peak		8:00 AM				8:00 AM			8:00 AM	
Volume		276				276			276	
PM Peak		3:00 PM				3:00 PM			3:00 PM	
Volume		249				249			249	
Comments:										

Attachment B Traffic Speed Data

LOCATION: 30th Ave btwn Pine & Pennsylvania SPECIFIC LOCATION: 30th Ave btwn Pine & Pennsylvania CITY/STATE: Longview, WA															QC JOB #: 14583901 DIRECTION: EB/WB DATE: Jan 09 2018		
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	0	1	15	17	2	0	0	0	0	0	0	0	0	35	26-35	31
1:00 AM	0	0	1	7	9	2	1	0	0	0	0	0	0	0	20	26-35	16
2:00 AM	0	0	0	6	6	1	0	0	0	0	0	0	0	0	13	26-35	11
3:00 AM	0	1	3	5	9	1	0	0	0	0	0	0	0	0	19	26-35	14
4:00 AM	0	1	5	16	22	8	1	0	0	0	0	0	0	0	53	26-35	38
5:00 AM	0	1	2	32	38	10	4	0	0	0	0	0	0	0	87	26-35	69
6:00 AM	1	3	11	55	63	13	0	0	0	0	0	0	0	0	146	26-35	117
7:00 AM	8	77	90	52	19	5	1	0	0	0	0	0	0	0	252	16-25	167
8:00 AM	90	214	80	3	0	0	0	0	0	0	0	0	0	0	387	16-25	294
9:00 AM	11	136	77	2	0	0	0	0	0	0	0	0	0	0	226	16-25	212
10:00 AM	12	194	81	9	1	0	0	0	0	0	0	0	0	0	297	16-25	275
11:00 AM	19	189	106	5	0	0	0	0	0	0	0	0	0	0	319	16-25	295
12:00 PM	29	195	117	7	0	0	0	0	0	0	0	0	0	0	348	16-25	311
1:00 PM	18	213	98	10	0	0	0	0	0	0	0	0	0	0	339	16-25	311
2:00 PM	60	243	90	4	0	0	0	0	0	0	0	0	0	0	397	16-25	333
3:00 PM	187	253	109	10	1	0	0	0	0	0	0	0	0	0	560	16-25	361
4:00 PM	23	125	154	139	40	4	0	0	0	0	0	0	0	0	485	21-30	293
5:00 PM	22	4	53	288	121	9	0	1	0	0	0	0	0	0	498	26-35	409
6:00 PM	11	2	33	195	118	5	0	0	0	0	0	0	0	0	364	26-35	313
7:00 PM	8	1	20	147	98	11	0	0	0	0	0	0	0	0	285	26-35	245
8:00 PM	4	1	15	97	82	5	2	0	0	0	0	0	0	0	206	26-35	178
9:00 PM	2	0	8	69	49	5	1	0	0	0	0	0	0	0	134	26-35	118
10:00 PM	0	0	8	35	28	3	0	0	0	0	0	0	0	0	74	26-35	62
11:00 PM	0	1	2	19	18	2	0	0	0	0	0	0	0	0	42	26-35	37
Day Total	505	1854	1164	1227	739	86	10	1	0	0	0	0	0	0	5586	16-25	3018
Percent	9.0%	33.2%	20.8%	22.0%	13.2%	1.5%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
ADT 5586																	
AM Peak Volume	8:00 AM 90	8:00 AM 214	11:00 AM 106	6:00 AM 55	6:00 AM 63	6:00 AM 13	5:00 AM 4								8:00 AM 387		
PM Peak Volume	3:00 PM 187	3:00 PM 253	4:00 PM 154	5:00 PM 288	5:00 PM 121	7:00 PM 11	8:00 PM 2	5:00 PM 1							3:00 PM 560		
Comments:																	

LOCATION: 30th Ave btwn Pine & Pennsylvania SPECIFIC LOCATION: 30th Ave btwn Pine & Pennsylvania CITY/STATE: Longview, WA															QC JOB #: 14583901 DIRECTION: EB/WB DATE: Jan 09 2018 - Jan 09 2018		
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	505	1854	1164	1227	739	86	10	1	0	0	0	0	0	0	5586	16-25	3018
Percent	9.0%	33.2%	20.8%	22.0%	13.2%	1.5%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
Cumulative Percent	9.0%	42.2%	63.1%	85.0%	98.3%	99.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			
ADT 5586															85th Percentile 29 MPH Mean Speed(Average) 22 MPH		
Comments:															Median 21 MPH Mode: 18 MPH		



LOCATION: 30th Ave btwn Pine & Pennsylvania															QC JOB #: 14583901		
SPECIFIC LOCATION: 30th Ave btwn Pine & Pennsylvania															DIRECTION: EB		
CITY/STATE: Longview, WA															DATE: Jan 09 2018		
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	0	1	11	6	0	0	0	0	0	0	0	0	0	18	26-35	17
1:00 AM	0	0	0	6	2	2	1	0	0	0	0	0	0	0	11	26-35	8
2:00 AM	0	0	0	4	2	1	0	0	0	0	0	0	0	0	7	26-35	6
3:00 AM	0	0	2	1	3	0	0	0	0	0	0	0	0	0	6	26-35	4
4:00 AM	0	0	2	5	2	2	0	0	0	0	0	0	0	0	11	26-35	7
5:00 AM	0	1	1	5	8	3	2	0	0	0	0	0	0	0	20	26-35	13
6:00 AM	0	2	3	15	15	4	0	0	0	0	0	0	0	0	39	26-35	30
7:00 AM	4	27	28	18	2	3	0	0	0	0	0	0	0	0	82	16-25	54
8:00 AM	30	59	21	1	0	0	0	0	0	0	0	0	0	0	111	16-25	79
9:00 AM	8	65	18	0	0	0	0	0	0	0	0	0	0	0	91	16-25	82
10:00 AM	7	105	16	3	1	0	0	0	0	0	0	0	0	0	132	16-25	120
11:00 AM	11	120	36	2	0	0	0	0	0	0	0	0	0	0	169	16-25	155
12:00 PM	21	114	34	0	0	0	0	0	0	0	0	0	0	0	169	16-25	148
1:00 PM	14	122	46	2	0	0	0	0	0	0	0	0	0	0	184	16-25	167
2:00 PM	42	167	33	3	0	0	0	0	0	0	0	0	0	0	245	16-25	200
3:00 PM	109	152	41	8	1	0	0	0	0	0	0	0	0	0	311	16-25	192
4:00 PM	15	98	83	87	17	3	0	0	0	0	0	0	0	0	303	16-25	181
5:00 PM	13	3	35	185	67	6	0	1	0	0	0	0	0	0	310	26-35	251
6:00 PM	4	2	19	126	67	3	0	0	0	0	0	0	0	0	221	26-35	192
7:00 PM	4	1	10	103	61	8	0	0	0	0	0	0	0	0	187	26-35	163
8:00 PM	1	1	12	61	52	3	1	0	0	0	0	0	0	0	131	26-35	113
9:00 PM	1	0	5	43	29	3	1	0	0	0	0	0	0	0	82	26-35	72
10:00 PM	0	0	3	20	14	1	0	0	0	0	0	0	0	0	38	26-35	33
11:00 PM	0	1	1	12	12	0	0	0	0	0	0	0	0	0	26	26-35	23
Day Total	284	1040	450	721	361	42	5	1	0	0	0	0	0	0	2904	16-25	1490
Percent	9.8%	35.8%	15.5%	24.8%	12.4%	1.4%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
ADT 2904																	
AM Peak Volume	8:00 AM 30	11:00 AM 120	11:00 AM 36	7:00 AM 18	6:00 AM 15	6:00 AM 4	5:00 AM 2								11:00 AM 169		
PM Peak Volume	3:00 PM 109	2:00 PM 167	4:00 PM 83	5:00 PM 185	5:00 PM 67	7:00 PM 8	8:00 PM 1	5:00 PM 1							3:00 PM 311		
Comments:																	

LOCATION: 30th Ave btwn Pine & Pennsylvania SPECIFIC LOCATION: 30th Ave btwn Pine & Pennsylvania CITY/STATE: Longview, WA															QC JOB #: 14583901 DIRECTION: EB DATE: Jan 09 2018 - Jan 09 2018		
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	284	1040	450	721	361	42	5	1	0	0	0	0	0	0	2904	16-25	1490
Percent	9.8%	35.8%	15.5%	24.8%	12.4%	1.4%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
Cumulative Percent	9.8%	45.6%	61.1%	85.9%	98.3%	99.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			
ADT 2904															85th Percentile 29 MPH Mean Speed(Average) 21 MPH Median 21 MPH Mode: 18 MPH		
Comments:																	



LOCATION: 30th Ave btwn Pine & Pennsylvania SPECIFIC LOCATION: 30th Ave btwn Pine & Pennsylvania CITY/STATE: Longview, WA															QC JOB #: 14583901 DIRECTION: WB DATE: Jan 09 2018		
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	0	0	4	11	2	0	0	0	0	0	0	0	0	17	28-37	14
1:00 AM	0	0	1	1	7	0	0	0	0	0	0	0	0	0	9	26-35	8
2:00 AM	0	0	0	2	4	0	0	0	0	0	0	0	0	0	6	26-35	6
3:00 AM	0	1	1	4	6	1	0	0	0	0	0	0	0	0	13	27-36	9
4:00 AM	0	1	3	11	20	6	1	0	0	0	0	0	0	0	42	26-35	31
5:00 AM	0	0	1	27	30	7	2	0	0	0	0	0	0	0	67	26-35	57
6:00 AM	1	1	8	40	48	9	0	0	0	0	0	0	0	0	107	26-35	87
7:00 AM	4	50	62	34	17	2	1	0	0	0	0	0	0	0	170	16-25	112
8:00 AM	60	155	59	2	0	0	0	0	0	0	0	0	0	0	276	16-25	214
9:00 AM	3	71	59	2	0	0	0	0	0	0	0	0	0	0	135	16-25	130
10:00 AM	5	89	65	6	0	0	0	0	0	0	0	0	0	0	165	16-25	154
11:00 AM	8	69	70	3	0	0	0	0	0	0	0	0	0	0	150	16-25	139
12:00 PM	8	81	83	7	0	0	0	0	0	0	0	0	0	0	179	16-25	164
1:00 PM	4	91	52	8	0	0	0	0	0	0	0	0	0	0	155	16-25	143
2:00 PM	18	76	57	1	0	0	0	0	0	0	0	0	0	0	152	16-25	133
3:00 PM	78	101	68	2	0	0	0	0	0	0	0	0	0	0	249	16-25	169
4:00 PM	8	27	71	52	23	1	0	0	0	0	0	0	0	0	182	21-30	123
5:00 PM	9	1	18	103	54	3	0	0	0	0	0	0	0	0	188	26-35	157
6:00 PM	7	0	14	69	51	2	0	0	0	0	0	0	0	0	143	26-35	119
7:00 PM	4	0	10	44	37	3	0	0	0	0	0	0	0	0	98	26-35	81
8:00 PM	3	0	3	36	30	2	1	0	0	0	0	0	0	0	75	26-35	66
9:00 PM	1	0	3	26	20	2	0	0	0	0	0	0	0	0	52	26-35	46
10:00 PM	0	0	5	15	14	2	0	0	0	0	0	0	0	0	36	26-35	28
11:00 PM	0	0	1	7	6	2	0	0	0	0	0	0	0	0	16	26-35	12
Day Total	221	814	714	506	378	44	5	0	0	0	0	0	0	0	2682	16-25	1528
Percent	8.2%	30.4%	26.6%	18.9%	14.1%	1.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
ADT 2682																	
AM Peak Volume	8:00 AM 60	8:00 AM 155	11:00 AM 70	6:00 AM 40	6:00 AM 48	6:00 AM 9	5:00 AM 2								8:00 AM 276		
PM Peak Volume	3:00 PM 78	3:00 PM 101	12:00 PM 83	5:00 PM 103	5:00 PM 54	5:00 PM 3	8:00 PM 1								3:00 PM 249		
Comments:																	

LOCATION: 30th Ave btwn Pine & Pennsylvania SPECIFIC LOCATION: 30th Ave btwn Pine & Pennsylvania CITY/STATE: Longview, WA															QC JOB #: 14583901 DIRECTION: WB DATE: Jan 09 2018 - Jan 09 2018		
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	221	814	714	506	378	44	5	0	0	0	0	0	0	0	2682	16-25	1528
Percent	8.2%	30.4%	26.6%	18.9%	14.1%	1.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
Cumulative Percent	8.2%	38.6%	65.2%	84.1%	98.2%	99.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			
ADT 2682															85th Percentile 30 MPH Mean Speed(Average) 22 MPH		
	Comments:																
																Median 22 MPH Mode: 18 MPH	



Attachment C Pedestrian Volumes



Location: 30th Ave - Pine St

Date: 1/9/2018

Time: 2:00 PM - 4:00 PM

Site Code: 14583903

	Westbound	Westbound
Start Time	Adults	Children
2:00 PM	0	0
2:05 PM	0	0
2:10 PM	0	0
2:15 PM	0	0
2:20 PM	0	0
2:25 PM	0	0
2:30 PM	0	0
2:35 PM	0	0
2:40 PM	0	0
2:45 PM	0	0
2:50 PM	0	0
2:55 PM	0	0
3:00 PM	2	0
3:05 PM	1	0
3:10 PM	3	0
3:15 PM	2	5
3:20 PM	8	16
3:25 PM	0	0
3:30 PM	0	0
3:35 PM	0	0
3:40 PM	0	0
3:45 PM	0	0
3:50 PM	0	0
3:55 PM	0	0
Total	16	21



Location: Pennsylvania St - 30th Ave

Date: 1/9/2018

Time: 7:30 AM - 9:30 AM

Site Code: 14592404

	Westbound	Westbound
Start Time	Adults	Children
7:30 AM	0	0
7:35 AM	0	0
7:40 AM	0	0
7:45 AM	0	0
7:50 AM	0	0
7:55 AM	0	0
8:00 AM	1	2
8:05 AM	0	2
8:10 AM	0	1
8:15 AM	0	2
8:20 AM	1	5
8:25 AM	1	6
8:30 AM	1	3
8:35 AM	0	0
8:40 AM	0	0
8:45 AM	0	0
8:50 AM	0	0
8:55 AM	0	0
9:00 AM	0	0
9:05 AM	0	0
9:10 AM	0	0
9:15 AM	0	0
9:20 AM	0	0
9:25 AM	0	0
Total	4	21

Attachment D NCHRP 562 Worksheets:
Existing Conditions

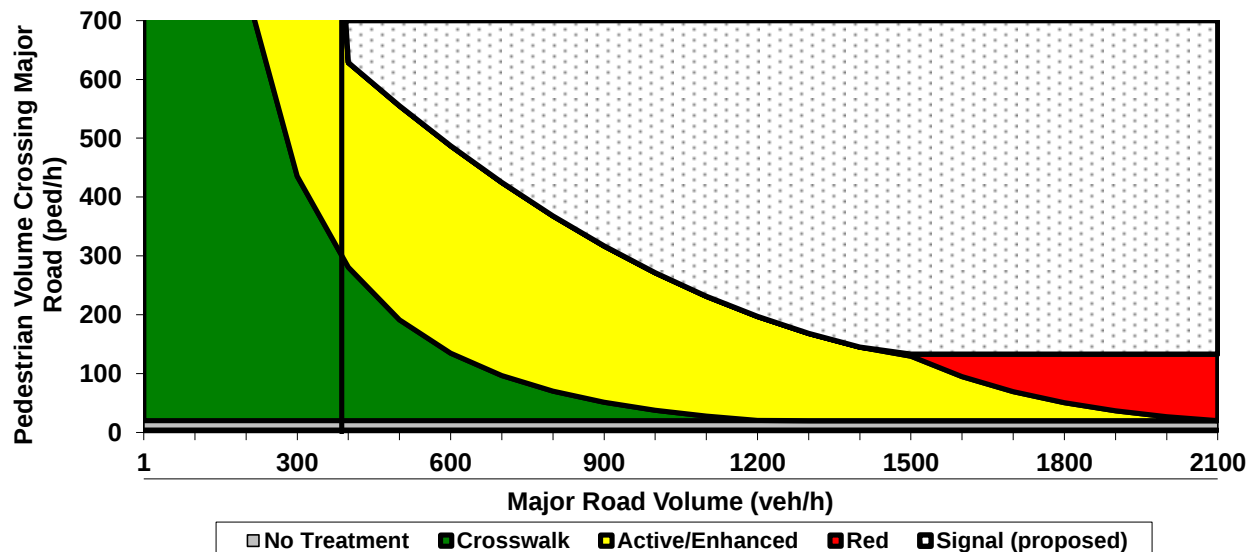
GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

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.

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).
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Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	30th Avenue
Analysis Date	February 1, 2018	Minor Street or Location	Pine Street
Data Collection Date	January 9, 2018	Peak Hour	8:00 AM
Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		1a	21
Is the population of the surrounding area <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	4
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	387
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		3b	639
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		3c	639
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter YES or NO)		3d	Yes
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
		Reduced value or 3c	3f
Result:			
Step 4: Estimate pedestrian delay.			
Pedestrian crossing distance, curb to curb (ft), L		4a	36
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	13
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	387
Major road flow rate (veh/s), v		4f	0.11
Average pedestrian delay (s/person), d_p		4g	17
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

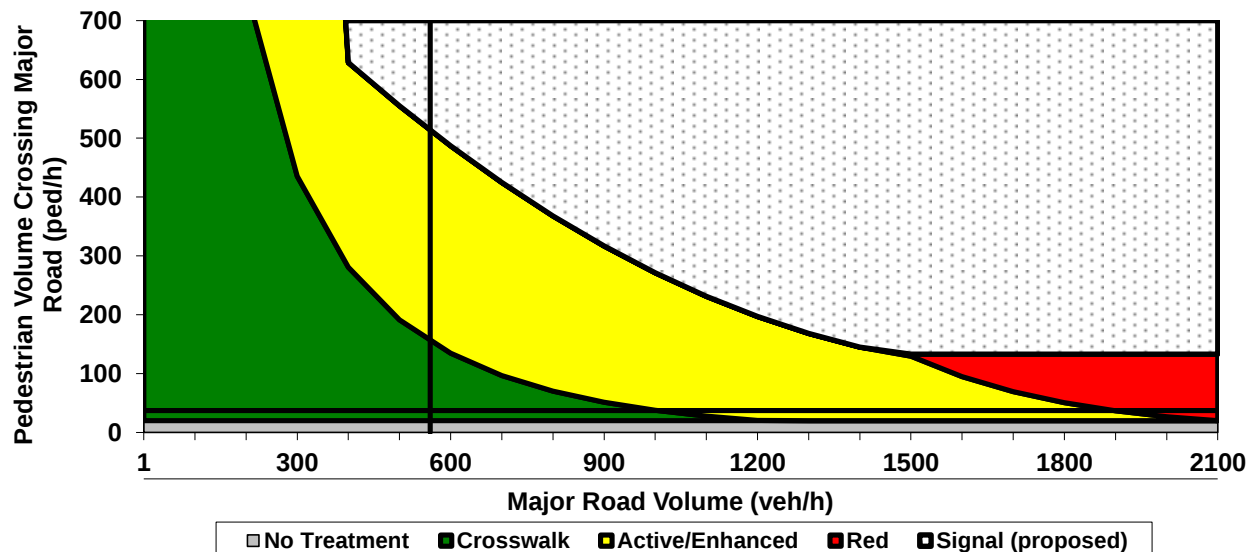
This spreadsheet combines Worksheet 1 and Worksheet 2 (Appendix A, pages 69-70) of TCRP Report 112/NCHRP Report 562 (*Improving Pedestrian Safety at Unsignalized Intersections*) into an electronic format. This spreadsheet should be used in conjunction with, and not independent of, Appendix A documentation.

Key

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

Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	30th Avenue
Analysis Date	February 1, 2018	Minor Street or Location	Pine Street
Data Collection Date	January 9, 2018	Peak Hour	3:00 PM
Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		1a	22
Is the population of the surrounding area <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	37
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	560
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		3b	514
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		3c	514
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter YES or NO)		3d	Yes
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 514
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	36
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	13
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	560
Major road flow rate (veh/s), v		4f	0.16
Average pedestrian delay (s/person), d_p		4g	33
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	0.3
		4i	
Step 5: Select treatment based 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	



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

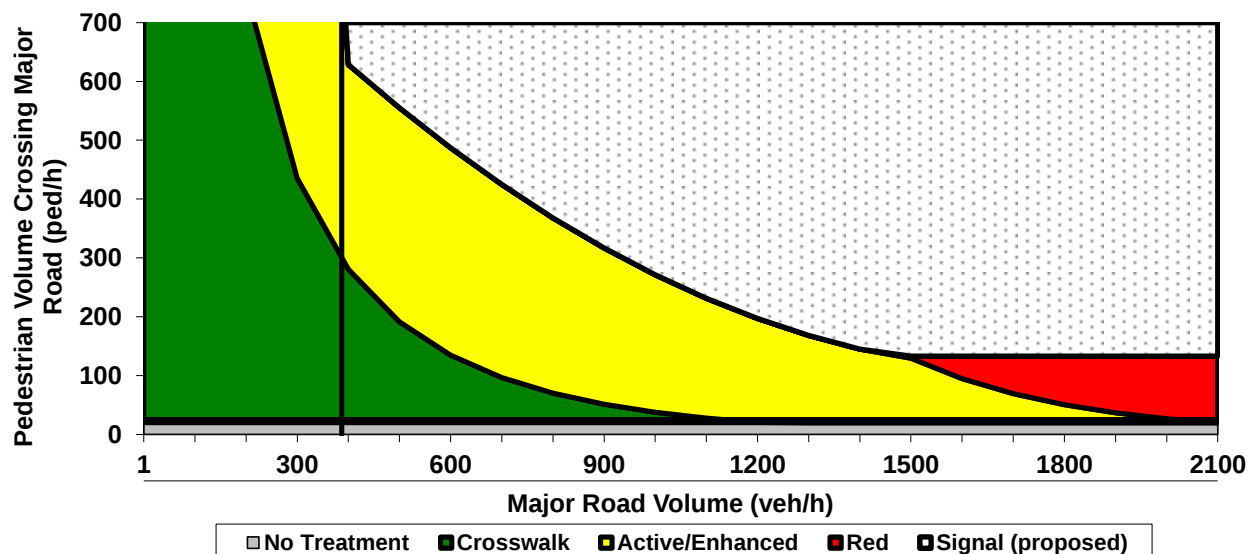
This spreadsheet combines Worksheet 1 and Worksheet 2 (Appendix A, pages 69-70) of TCRP Report 112/NCHRP Report 562 (*Improving Pedestrian Safety at Unsignalized Intersections*) into an electronic format. This spreadsheet should be used in conjunction with, and not independent of, Appendix A documentation.

Key

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

Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	30th Avenue
Analysis Date	February 1, 2018	Minor Street or Location	Pennsylvania Street
Data Collection Date	January 9, 2018	Peak Hour	8:00 AM
Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		1a	21
Is the population of the surrounding area <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	25
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	387
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		3b	639
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		3c	639
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter YES or NO)		3d	Yes
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
		Reduced value or 3c	3f
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	36
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	13
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	387
Major road flow rate (veh/s), v		4f	0.11
Average pedestrian delay (s/person), d_p		4g	17
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:		CROSSWALK	



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

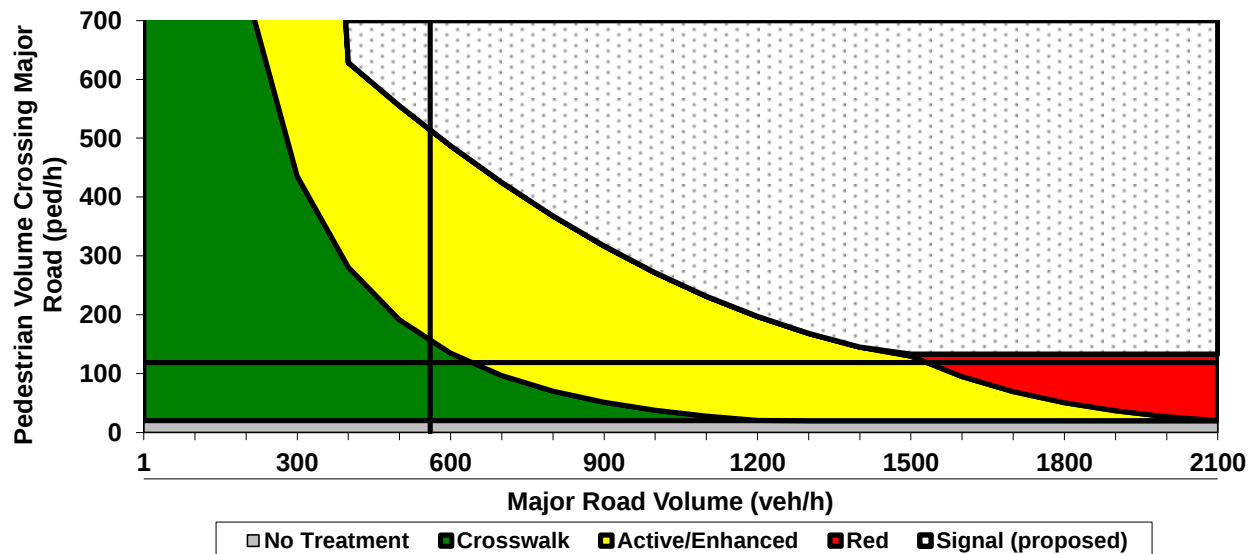
This spreadsheet combines Worksheet 1 and Worksheet 2 (Appendix A, pages 69-70) of TCRP Report 112/NCHRP Report 562 (*Improving Pedestrian Safety at Unsignalized Intersections*) into an electronic format. This spreadsheet should be used in conjunction with, and not independent of, Appendix A documentation.

Key

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	Gray fields are automatically calculated and should not be edited.

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

Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	30th Avenue
Analysis Date	February 1, 2018	Minor Street or Location	Pennsylvania Street
Data Collection Date	January 9, 2018	Peak Hour	3:00 PM
Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		1a	22
Is the population of the surrounding area <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	119
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	560
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		3b	514
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		3c	514
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter YES or NO)		3d	Yes
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
		Reduced value or 3c	3f
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	36
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	13
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	560
Major road flow rate (veh/s), v		4f	0.16
Average pedestrian delay (s/person), d_p		4g	33
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	1.1
		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:		CROSSWALK	



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.

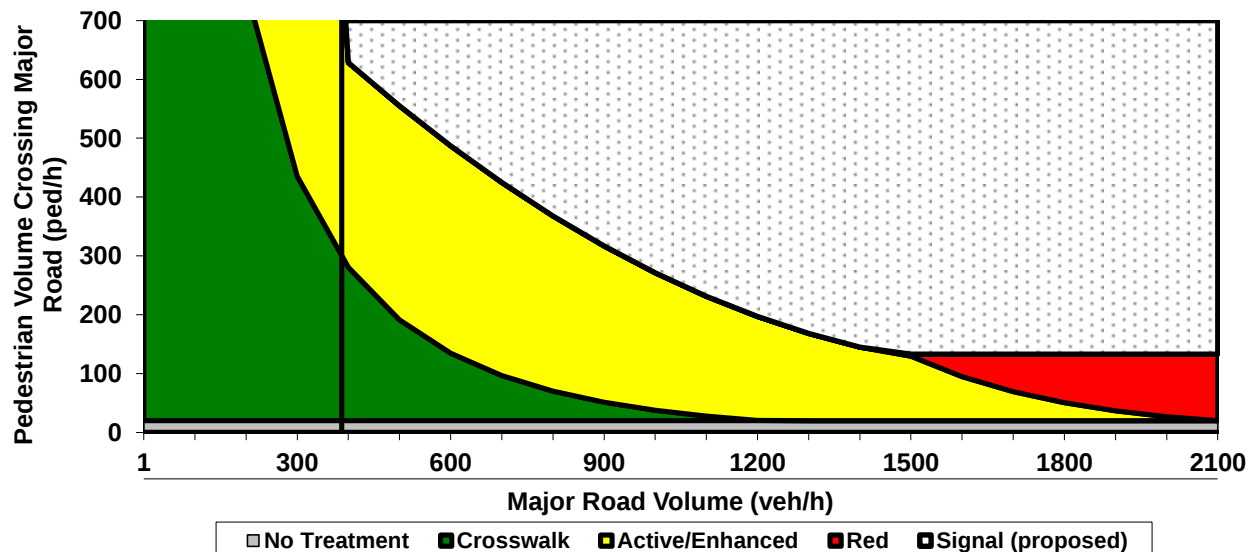
GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

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.

Key

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Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	30th Avenue
Analysis Date	February 1, 2018	Minor Street or Location	Mid-Block
Data Collection Date	January 9, 2018	Peak Hour	8:00 AM
Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		1a	21
Is the population of the surrounding area <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	0
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	387
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		3b	639
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		3c	639
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter YES or NO)		3d	Yes
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
		Reduced value or 3c	3f
			639
Result:			
Step 4: Estimate pedestrian delay.			
Pedestrian crossing distance, curb to curb (ft), L		4a	36
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	13
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	387
Major road flow rate (veh/s), v		4f	0.11
Average pedestrian delay (s/person), d_p		4g	17
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.

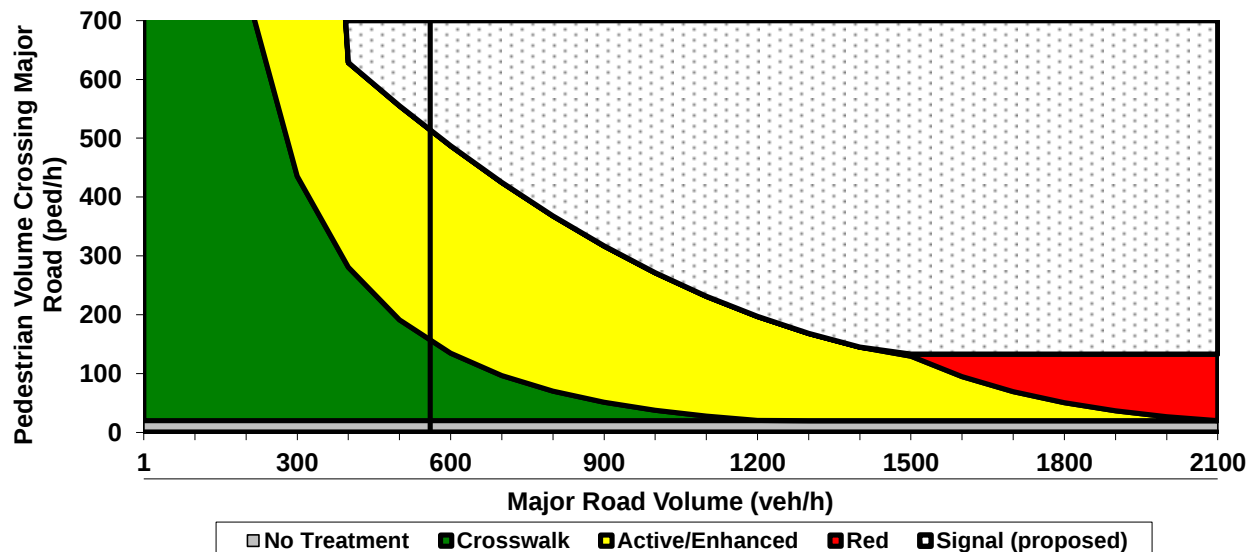
GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

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Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	30th Avenue
Analysis Date	February 1, 2018	Minor Street or Location	Mid-Block
Data Collection Date	January 9, 2018	Peak Hour	3:00 PM
Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		1a	22
Is the population of the surrounding area <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	1
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	560
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		3b	514
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		3c	514
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter YES or NO)		3d	Yes
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
		Reduced value or 3c	3f
Result:			
Step 4: Estimate pedestrian delay.			
Pedestrian crossing distance, curb to curb (ft), L		4a	36
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	13
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	560
Major road flow rate (veh/s), v		4f	0.16
Average pedestrian delay (s/person), d_p		4g	33
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 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:
Sensitivity Analysis

GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

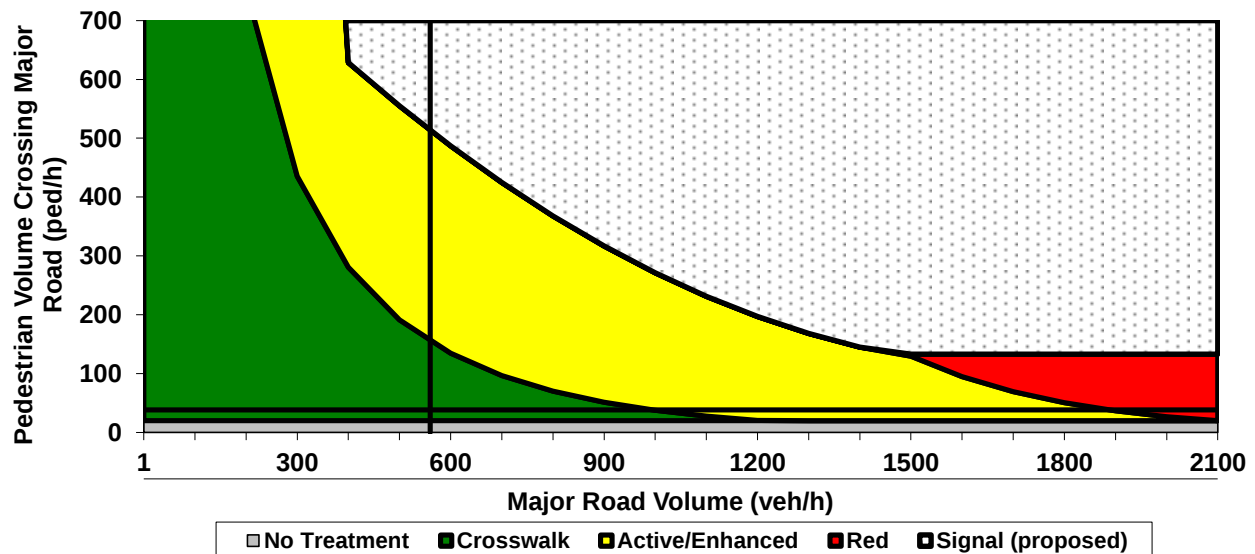
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Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	30th Avenue
Analysis Date	February 1, 2018	Minor Street or Location	Mid-Block
Data Collection Date	January 9, 2018	Peak Hour	3:00 PM
Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		1a	22
Is the population of the surrounding area <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	38
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	560
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		3b	514
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		3c	514
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter YES or NO)		3d	Yes
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
		Reduced value or 3c	3f
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	36
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	13
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	560
Major road flow rate (veh/s), v		4f	0.16
Average pedestrian delay (s/person), d_p		4g	33
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	0.3
		4i	
Step 5: Select treatment based 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	



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

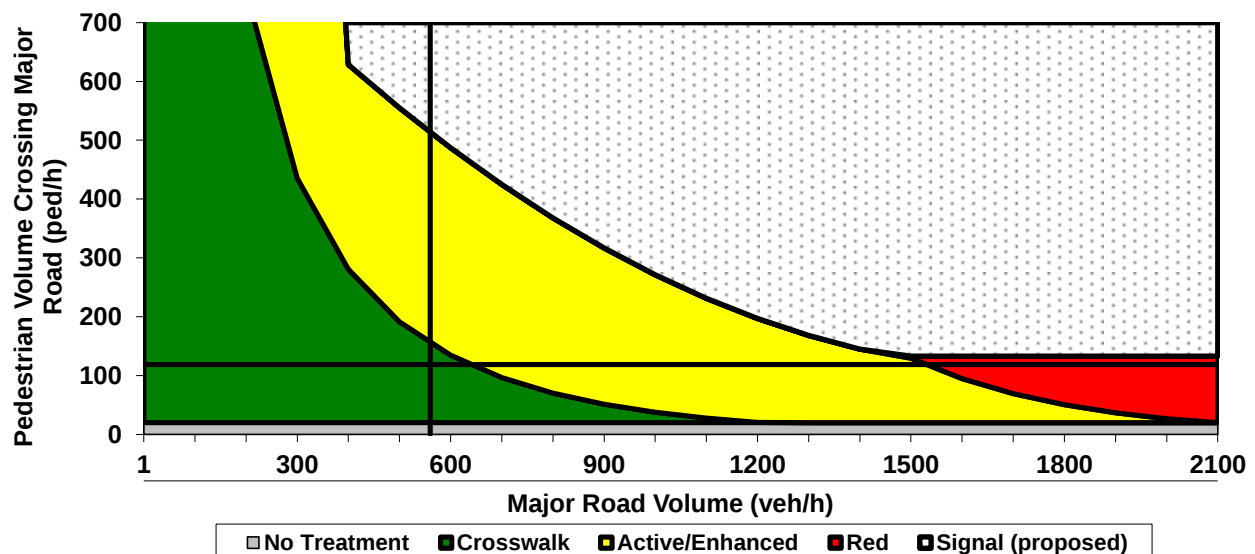
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Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	30th Avenue
Analysis Date	February 1, 2018	Minor Street or Location	Mid-Block
Data Collection Date	January 9, 2018	Peak Hour	3:00 PM
Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		1a	22
Is the population of the surrounding area <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	119
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	560
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		3b	514
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		3c	514
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter YES or NO)		3d	Yes
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
		Reduced value or 3c	3f
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	36
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	13
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	560
Major road flow rate (veh/s), v		4f	0.16
Average pedestrian delay (s/person), d_p		4g	33
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	1.1
		4i	
Step 5: Select treatment based 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	



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

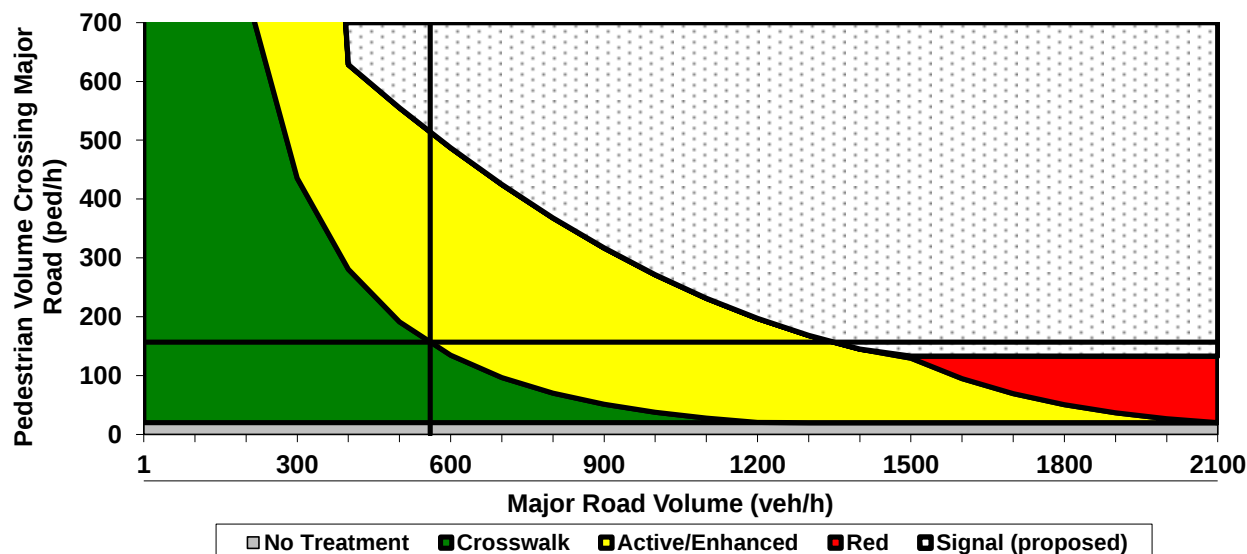
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Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	30th Avenue
Analysis Date	February 1, 2018	Minor Street or Location	Mid-Block
Data Collection Date	January 9, 2018	Peak Hour	3:00 PM
Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		1a	22
Is the population of the surrounding area <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	157
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	560
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		3b	514
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		3c	514
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter YES or NO)		3d	Yes
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
		Reduced value or 3c	3f
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	36
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	13
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	560
Major road flow rate (veh/s), v		4f	0.16
Average pedestrian delay (s/person), d_p		4g	33
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	1.4
		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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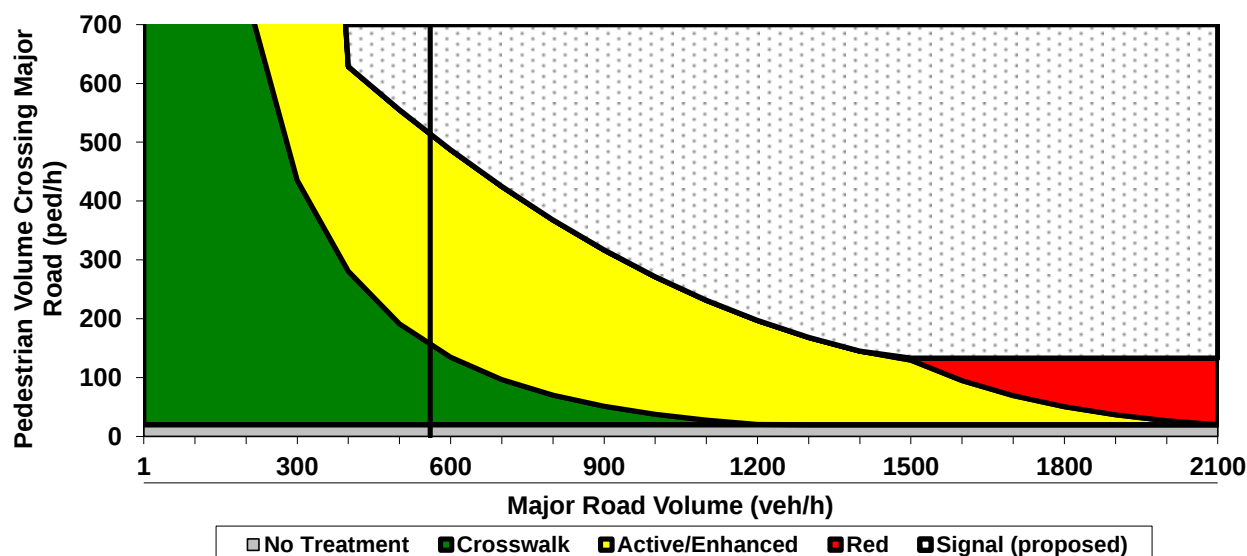
GUIDELINES FOR PEDESTRIAN CROSSING TREATMENTS

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Analyst and Site Information			
Analyst	Kittelson & Associates, Inc.	Major Street	30th Avenue
Analysis Date	February 1, 2018	Minor Street or Location	Mid-Block
Data Collection Date	January 9, 2018	Peak Hour	3:00 PM
Step 1: Select worksheet:			
Posted or statutory speed limit (or 85th percentile speed) on the major street (mph)		1a	22
Is the population of the surrounding area <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	20
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	560
[Calculated automatically] Preliminary (before min. threshold) peak hour pedestrian volume to meet warrant		3b	514
[Calculated automatically] Minimum required peak hour pedestrian volume to meet traffic signal warrant		3c	514
Is 15th percentile crossing speed of pedestrians less than 3.5 ft/s (1.1 m/s)? (enter YES or NO)		3d	Yes
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
		Reduced value or 3c	3f
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	36
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	13
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	560
Major road flow rate (veh/s), v		4f	0.16
Average pedestrian delay (s/person), d_p		4g	33
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	0.2
		4i	
Step 5: Select treatment based 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	



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.