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MEMORANDUM

Date: December 22, 2020

To: Todd Wietzema
Public Works Director

From: Jennifer McCoy, P.E., PTOE
Casey Kaucher, P.E.

Subject: Lake Street Pedestrian Crossings Review
Worthington, MN

Introduction

At request of the City of Worthington, a high-level traffic review was conducted for eight pedestrian crossing locations on Lake Street/Lake Avenue between 3rd Avenue and 9th Avenue (Figure 1). This review looked at the existing conditions including traffic control, geometrics, and pedestrian origin-destination demand to determine the appropriate crosswalk locations and treatments.

Lake Street/Lake Avenue is classified as a local roadway between the two major collector roadways, South Shore Drive/Second Avenue and 10th Avenue. The 30 mph two-lane roadway measures 30-foot-wide with curb, on-street parking and streetlights. Lake Okabena is located on the south side of the road along with a multiuse trail. Residential housing with driveway accesses and a sidewalk are located on the north side of the road. There are gaps in both the trail and sidewalk system. Review of the collision history over the past 5 years from the MnDOT database indicates an increased number of vehicular collisions between 7th and 8th Street. This is most likely due to the skewed geometry of the intersection and its proximity to the curve.

Review

Traffic counts and field inspections were not part of this review. Data was collected using Google Street View and the latest available information from MnDOT. The Data Collection Worksheets used to evaluate each proposed crossing location are attached. Sight distances were calculated per the AASHTO, *A Policy of Geometric Design of Highways and Streets* manual with an assumed pedestrian speed of 3.5 ft/sec.

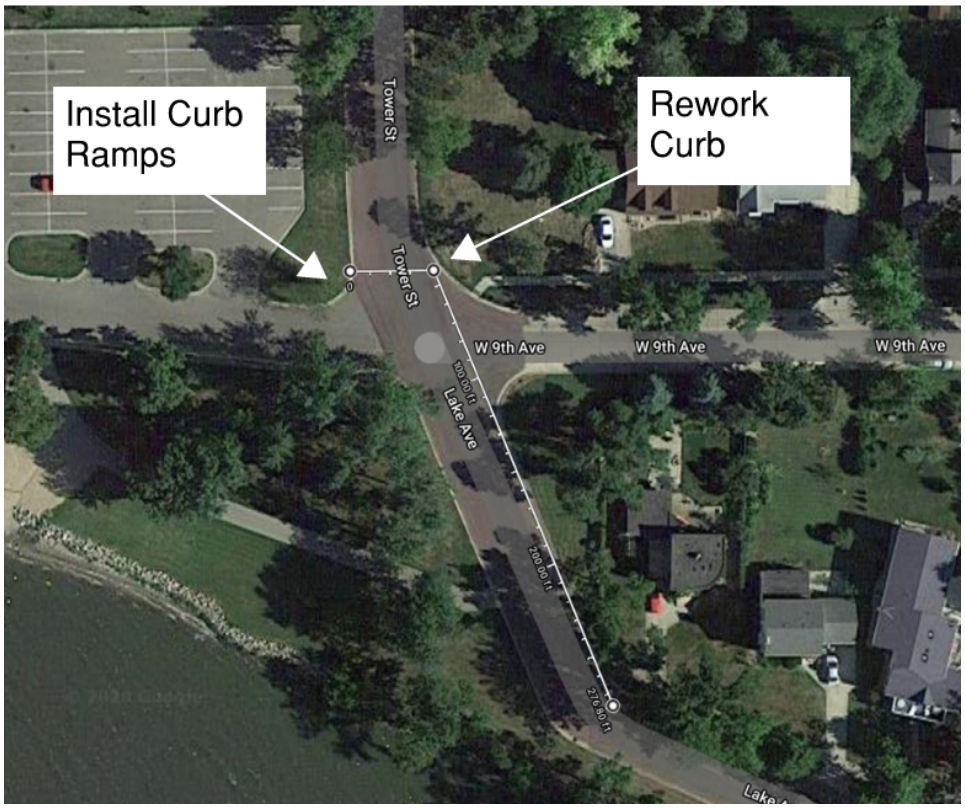
Each proposed pedestrian crossing location has its own unique configurations. Following is a review of each crossing location.

Figure 1: Proposed Crossing Locations

Crossing 1

This proposed Lake Avenue crosswalk location is on the north side of the Lake Avenue and 9th Avenue intersection. This location provides connection to Centennial Park. The vehicular stopping sight distance is sufficient for this crossing location, but the pedestrian sight distance is not adequate. If the city wants to have a crossing here, it is recommended to reconfigure the curb line to decrease the pedestrian crossing distance. This will increase the pedestrian sight lines and limit exposure time while crossing the street. There is a fire hydrant located on the northeast corner of the intersection that will need to be considered when extending sidewalk to the new curb location. Longitudinal crosswalk markings and pedestrian crossing warning signs with downward arrow plaque (MUTCD W11-2 and W16-7P) should be installed on each approach to the crosswalk. Additional curb ramps will need to be constructed on the northwest corner of the intersection, see **Figure 2**.

Figure 2: Crossing 1



Crossing 2

This proposed Lake Avenue crosswalk location is 140’ south of the Lake Avenue and 9th Avenue intersection. The multi-use trail becomes a signed bike route along Lake Avenue at this location. The proximity to the curve limits sight distance. Neither the pedestrian sight distance nor stopping sight distance is met. If the city wants a crossing here, it is recommended to extend the trail approximately 70’ south and install the pedestrian crossing at that location. Longitudinal crosswalk markings and pedestrian crossing warning signs with downward arrow plaque (MUTCD W11-2 and W16-7P) should be installed on each approach to the crosswalk. Sidewalk and curb ramp construction will be needed at the corner of 101 Lake Avenue.

Figure 3: Crossing 2 (Shifted 70' South)

Crossing 3

This proposed Lake Avenue crosswalk location is on the west side of the Lake Avenue and Winifred Street intersection and connects to Chautauqua Park. Both pedestrian sight distance and stopping sight distance requirements are met at this location. Pedestrian crosswalk installation is recommended at this location. Longitudinal crosswalk markings and pedestrian crossing warning signs with downward arrow plaque (MUTCD W11-2 and W16-7P) should be installed on each approach to the crosswalk.

Crossing 4

This proposed Lake Avenue crosswalk location is 125' east of the Lake Avenue and May Street intersection. The pedestrian sight distance is not met at this location due to the curvature of the road and the on-street parking. Parking is currently restricted on the south side of the street. If the city wants a crossing in this area, it is recommended to change the parking restriction to the north side of the street to increase pedestrian sight distance, see **Figure 4**. Longitudinal crosswalk markings and pedestrian crossing warning signs with downward arrow plaque (MUTCD W11-2 and W16-7P) should also be installed on each approach to the crosswalk.

An alternative option would be to relocate the pedestrian crossing to the east side of the Lake Avenue and May Street intersection. The same signs and markings would need to be installed and curb ramps would need to be constructed on both sides of Lake Avenue. If the alternative location is chosen, the existing curb ramps at the location 125' east of May Street would need to be removed.

Figure 4: Crossing 4

Crossing 5

This proposed Lake Street crosswalk location is on the south side of the Lake Street and 6th Avenue intersection. The stopping sight distance is met at this location therefore the crosswalk is recommended. Crosswalk markings are not required at this location. The existing curb ramps should remain in place and pedestrian crossing warning signs with an ahead plaque (MUTCD W11-2 and W16-9P) should be installed, refer to **Figure 6**.

Crossing 6

This proposed Lake Street crosswalk location is on the north side of the Lake Street and 5th Avenue intersection. The stopping sight distance is met at this location therefore the crosswalk is recommended. Crosswalk markings are not required at this location. The existing curb ramps should remain in place and pedestrian crossing warning signs with an ahead plaque (MUTCD W11-2 and W16-9P) should be installed, refer to **Figure 6**.

Crossing 7

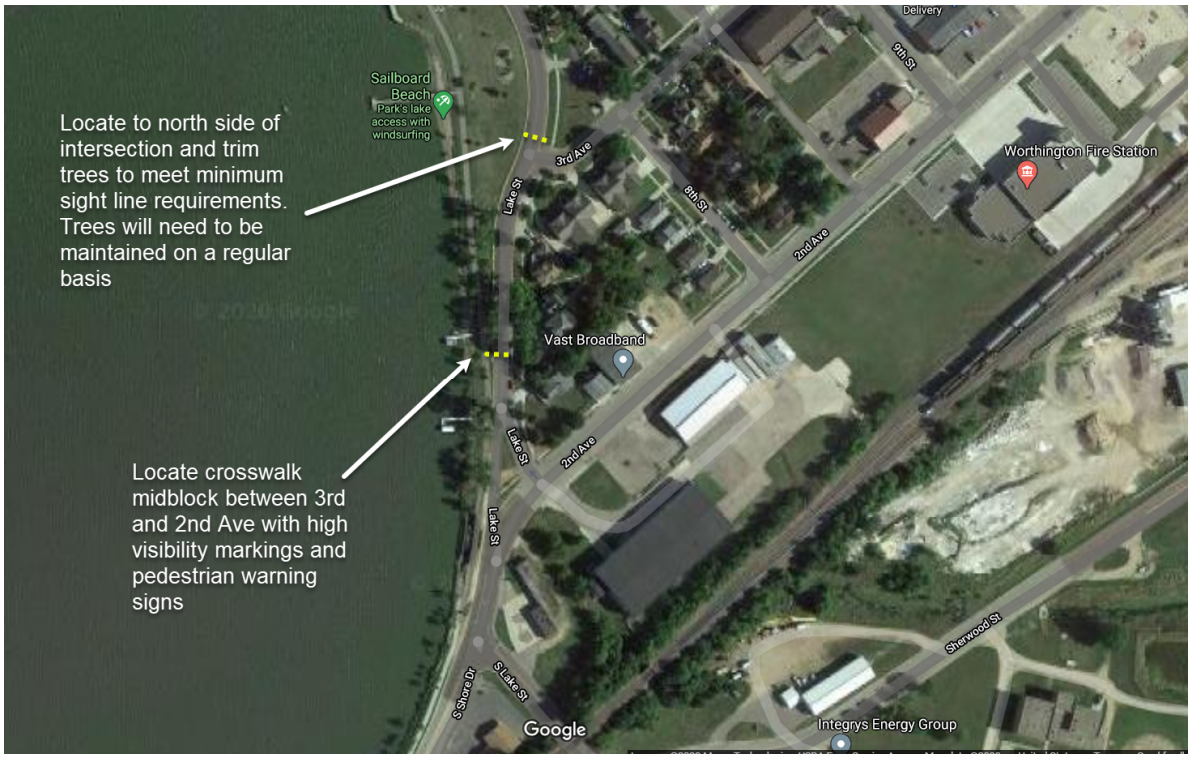
This proposed Lake Street crosswalk location is on the south side of the Lake Street and 4th Avenue intersection. This location connects to Lake Front Park and Sailboard Beach. The stopping sight distance is met at this location therefore the crosswalk is recommended. Longitudinal crosswalk markings and pedestrian crossing warning signs with downward arrow plaque (MUTCD W11-2 and W16-7P) on each approach to the crosswalk should be installed. Curb ramps are already in place.

Crossing 8

This proposed Lake Street crosswalk location is on the south side of the Lake Street and 3rd Avenue intersection. This location connects to Lake Front Park and Sailboard Beach. Pedestrian sight distance is not met at this location due to the existing trees and roadway curve. If the City desires a crossing in this area, it is recommend to relocate the proposed crosswalk approximately 300' south between 2nd and 3rd Avenue. Longitudinal crosswalk markings and pedestrian crossing warning signs with downward arrow plaque (MUTCD W11-2 and W16-7P) should be installed on each approach of this midblock location.

An alternative option would be to shift the crosswalk to the north side of the Lake Street and 3rd Avenue intersection. The same pedestrian signs and markings would need to be installed. Trees located in the utility strip along the east side of the road would need to be trimmed to minimum 7' and maintained regularly to ensure minimum sight distances maintained. The existing curb ramps on the lake side of Lake Street and 3rd Avenue intersection would need to be removed in both options, see **Figure 8**.

Figure 5: Crossing 8



Conclusion

Figure 6 below depicts the recommended crossing locations and pedestrian ahead signage locations. All sight line measurements need to be field verified prior to the above crosswalk recommendations being installed. All pedestrian signage (W11-2 with W16-7P or W16-9P) should be the fluorescent yellow-green sheeting material and crosswalk markings should be the high visibility longitudinal lines per the MnMUTCD manual, see **Figure 7** below. Recommend implementing parking restrictions on the approaches for each pedestrian crossing to ensure adequate sight distance for motorists and pedestrians. The minimum parking setback should be 30 feet based on the 30-mph speed limit. All crossings must meet ADA requirements.

Figure 6: Crossing Recommendations

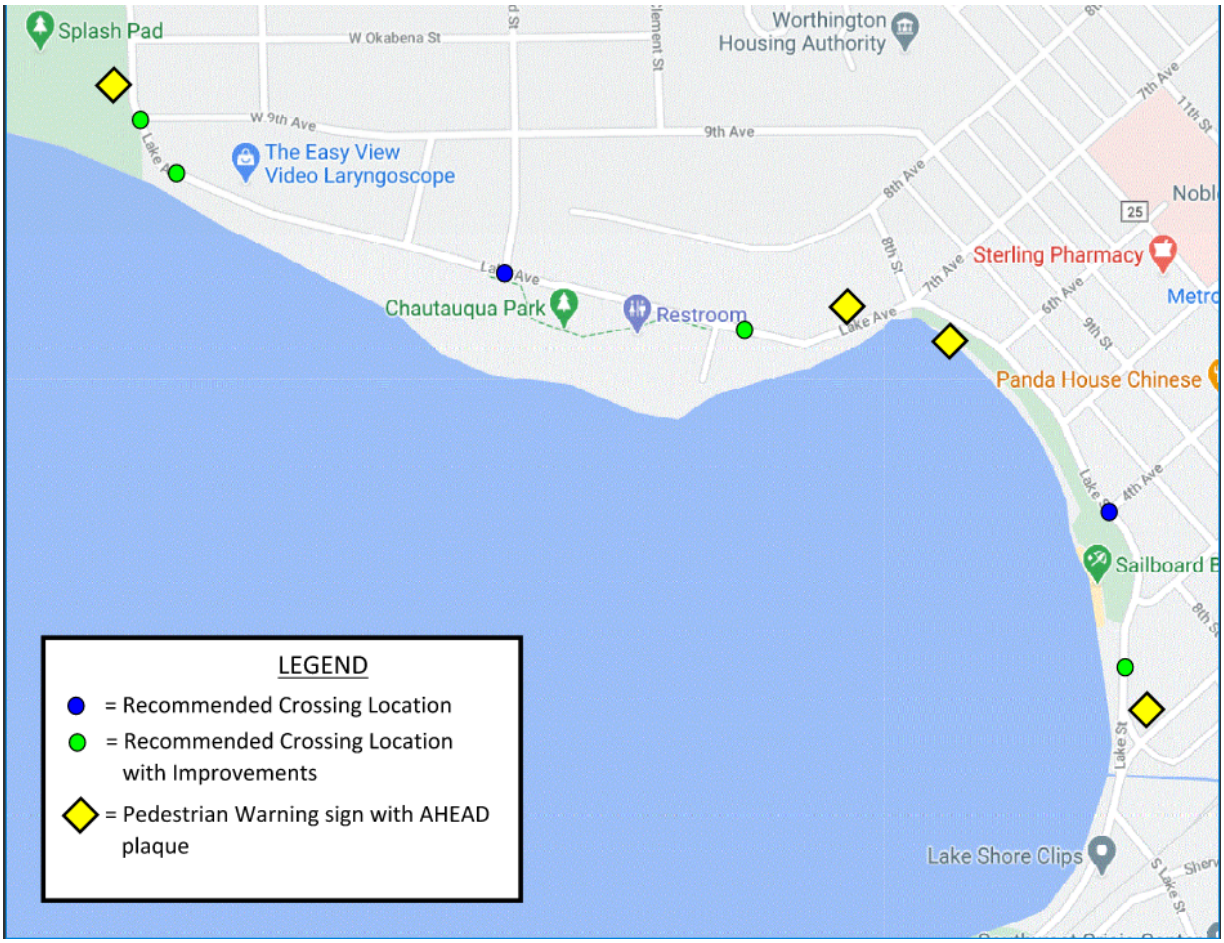
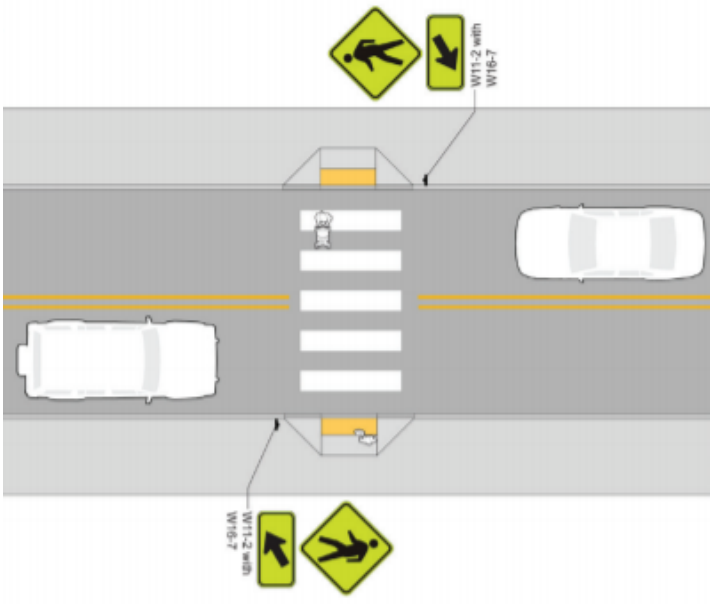


Figure 7: Crosswalk Signs and Markings



Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Location:	Crossing #1 - Tower Street at 9th Avenue	Date:	9-Oct-20
City, State:	Worthington, Minnesota	Scenario:	Pedestrian Crossing Analysis
Reviewer(s):	Jake Pilz	Agency:	BMI
Project #:	0F1122838	ID #:	

The first step in understanding the pedestrian needs at a potential crossing location is completing a review of the location and adjacent facilities.

Geometrics

Crossing Length: Measure the crossing distance from curb to curb. Crossing 1: 63 ft.
Fill in Crossing 1 distance if there is no median. If there is a median at the crossing location, fill in Crossing 1 and 2 distances. Crossing 2: ft.

Median: width of median at crossing location: 0 ft.

Crossing Width: effective crosswalk width: 8 ft.

Raised Median Available?	☐ Yes	☑ No
ADA Compliant Median Available (minimum 4' x 4' landing)?	☐ Yes	☑ No
Curb Ramps Available?	☑ Yes	☐ No
ADA Compliant Curb Ramp Available (width, grades, truncated domes)?	☐ Yes	☑ No

Speed: Posted or 85th percentile speed: 30 mph

Roadway Curvature and Sight Distances: Average walking speed: 3.5 ft/s

Is the crossing location within a horizontal or vertical curve? ☐ Yes ☑ No

Equations to calculate the following are located on the next page

Direction 1:	Stopping Sight Distance (SSD)	197 ft.	provided?	☐ Yes	☐ No
Direction 2:	Stopping Sight Distance (SSD)	ft.	provided?	☐ Yes	☐ No
Direction 1:	Pedestrian Sight Distance (PedSD)	926 ft.	provided?	☐ Yes	☐ No
Direction 2:	Pedestrian Sight Distance (PedSD)	ft.	provided?	☐ Yes	☐ No

Traffic and Pedestrian Data

Measure traffic and pedestrian volume in 15-minute increments on the roadway to be crossed.

Attach Counts	**vehicles:**		Daily		**pedestrians:**		Daily	
AM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	
PM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	

Additional Site Characteristics

Lighting:

Is street lighting present and does it light the crosswalk location? ☐ Yes ☑ No

Crosswalk Pavement Markings: Is the pedestrian crossing currently marked? ☐ Yes ☑ No

What is the condition of the markings? ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Are the markings easily defined? ☐ Yes ☐ No

Do they need replacement? ☐ Yes ☐ No

What is the crosswalk marking pattern? None

Signing: Currently signed at crosswalk? ☐ Yes ☑ No

Currently signed in advance of crosswalk? ☐ Yes ☑ No

Distances? direction 1: N/A ft. direction 2: N/A ft.

Enhancements: What enhancements are currently at the crossing location? None

Adjacent Facilities: Distance to nearest marked crosswalk? N/A ft.

What pedestrian control devices are present at the nearest adjacent marked crosswalk? None

Distance to nearest all-way stop, roundabout or signalized intersection: 300 ft.

Could another location serve the same pedestrian crossing movement? ☐ Yes ☑ No

Could another location serve the the movement more effectively? ☐ Yes ☑ No

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Mark the following: site distances and potential conflicts, pavement markings (crosswalk, edge lines, center lines, lane lines, stop lines, and any other markings), signing, location of lighting units, curb ramps, truncated domes, presence of any other crosswalks or crossing locations parallel to and nearby the location being studied, adjacent intersection traffic control, parking, intersection width, lane lengths, shoulder widths, sign placement, and nearby orgins and destinations .

draw or insert map of location being studied

Notes: It is unknown where the pedestrian will be crossing to. Existing Ped Ramp angles and directs pedestrian directly into the middle of intersection.

Sight Distance Calculations:

Stopping sight distance (SSD), ft = $1.47St + 1.075S^2/a$

Pedestrian sight distance (PedSD), ft = $1.47S(L / S_p + t_s)$

where: S = design speed, mph
L = length of crossing, ft

where:	defaults:
t = brake reaction time, s	2.5
a = deceleration rate, ft/s^2	11.2
S_p = average pedestrian walking speed, ft/s	3.5
t_s = pedestrian start-up and end clearance time, s	3.0

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Location:	Crossing #2 - Lake Street at Midblock (S. of 9th)	Date:	9-Oct-20
City, State:	Worthington, Minnesota	Scenario:	Pedestrian Crossing Analysis
Reviewer(s):	Jake Pilz	Agency:	BMI
Project #:	0F1122838	ID #:	

The first step in understanding the pedestrian needs at a potential crossing location is completing a review of the location and adjacent facilities.

Geometrics

Crossing Length: Measure the crossing distance from curb to curb. Crossing 1: 37 ft.
Fill in Crossing 1 distance if there is no median. If there is a median at the crossing location, fill in Crossing 1 and 2 distances. Crossing 2: ft.

Median: width of median at crossing location: 0 ft.

Crossing Width: effective crosswalk width: 8 ft.

Raised Median Available?	☐ Yes	☑ No
ADA Compliant Median Available (minimum 4' x 4' landing)?	☐ Yes	☑ No
Curb Ramps Available?	☑ Yes	☐ No
ADA Compliant Curb Ramp Available (width, grades, truncated domes)?	☐ Yes	☑ No

Speed: Posted or 85th percentile speed: 30 mph

Roadway Curvature and Sight Distances: Average walking speed: 3.5 ft/s

Is the crossing location within a horizontal or vertical curve? ☐ Yes ☑ No

Equations to calculate the following are located on the next page

Direction 1:	Stopping Sight Distance (SSD)	197 ft.	provided?	☐ Yes	☐ No
Direction 2:	Stopping Sight Distance (SSD)	ft.	provided?	☐ Yes	☐ No
Direction 1:	Pedestrian Sight Distance (PedSD)	599 ft.	provided?	☐ Yes	☐ No
Direction 2:	Pedestrian Sight Distance (PedSD)	ft.	provided?	☐ Yes	☐ No

Traffic and Pedestrian Data

Measure traffic and pedestrian volume in 15-minute increments on the roadway to be crossed.

Attach Counts	**vehicles:**		Daily		**pedestrians:**		Daily	
AM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	
PM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	

Additional Site Characteristics

Lighting:

Is street lighting present and does it light the crosswalk location? ☐ Yes ☑ No

Crosswalk Pavement Markings: Is the pedestrian crossing currently marked? ☐ Yes ☑ No

What is the condition of the markings? ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Are the markings easily defined? ☐ Yes ☐ No

Do they need replacement? ☐ Yes ☐ No

What is the crosswalk marking pattern? None

Signing: Currently signed at crosswalk? ☐ Yes ☑ No

Currently signed in advance of crosswalk? ☐ Yes ☑ No

Distances? direction 1: N/A ft. direction 2: N/A ft.

Enhancements: What enhancements are currently at the crossing location? None

Adjacent Facilities: Distance to nearest marked crosswalk? N/A ft.

What pedestrian control devices are present at the nearest adjacent marked crosswalk? None

Distance to nearest all-way stop, roundabout or signalized intersection: 140 ft.

Could another location serve the same pedestrian crossing movement? ☐ Yes ☑ No

Could another location serve the the movement more effectively? ☐ Yes ☑ No

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Mark the following: site distances and potential conflicts, pavement markings (crosswalk, edge lines, center lines, lane lines, stop lines, and any other markings), signing, location of lighting units, curb ramps, truncated domes, presence of any other crosswalks or crossing locations parallel to and nearby the location being studied, adjacent intersection traffic control, parking, intersection width, lane lengths, shoulder widths, sign placement, and nearby orgins and destinations .

draw or insert map of location being studied

Notes: It is unknown where the pedestrian will be crossing to. Existing Ped Ramp angles and directs pedestrian directly into the middle of intersection.

Sight Distance Calculations:

Stopping sight distance (SSD), ft = $1.47St + 1.075S^2/a$

Pedestrian sight distance (PedSD), ft = $1.47S(L / S_p + t_s)$

where: S = design speed, mph
L = length of crossing, ft

where:	defaults:
t = brake reaction time, s	2.5
a = deceleration rate, ft/s^2	11.2
S_p = average pedestrian walking speed, ft/s	3.5
t_s = pedestrian start-up and end clearance time, s	3.0

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Location:	Crossing #3 - Lake Street at Winifred Street	Date:	9-Oct-20
City, State:	Worthington, Minnesota	Scenario:	Pedestrian Crossing Analysis
Reviewer(s):	Jake Pilz	Agency:	BMI
Project #:	0F1122838	ID #:	

The first step in understanding the pedestrian needs at a potential crossing location is completing a review of the location and adjacent facilities.

Geometrics

Crossing Length: Measure the crossing distance from curb to curb. Crossing 1: 36 ft.
Fill in Crossing 1 distance if there is no median. If there is a median at the crossing location, fill in Crossing 1 and 2 distances. Crossing 2: ft.

Median: width of median at crossing location: 0 ft.

Crossing Width: effective crosswalk width: 8 ft.

Raised Median Available?	☐ Yes	☑ No
ADA Compliant Median Available (minimum 4' x 4' landing)?	☐ Yes	☑ No
Curb Ramps Available?	☑ Yes	☐ No
ADA Compliant Curb Ramp Available (width, grades, truncated domes)?	☐ Yes	☑ No

Speed: Posted or 85th percentile speed: 30 mph

Roadway Curvature and Sight Distances: Average walking speed: 3.5 ft/s

Is the crossing location within a horizontal or vertical curve? ☐ Yes ☑ No

Equations to calculate the following are located on the next page

Direction 1:	Stopping Sight Distance (SSD)	197 ft.	provided?	☐ Yes	☐ No
Direction 2:	Stopping Sight Distance (SSD)	ft.	provided?	☐ Yes	☐ No
Direction 1:	Pedestrian Sight Distance (PedSD)	586 ft.	provided?	☐ Yes	☐ No
Direction 2:	Pedestrian Sight Distance (PedSD)	ft.	provided?	☐ Yes	☐ No

Traffic and Pedestrian Data

Measure traffic and pedestrian volume in 15-minute increments on the roadway to be crossed.

Attach Counts	**vehicles:**		Daily		**pedestrians:**		Daily	
AM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	
PM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	

Additional Site Characteristics

Lighting:

Is street lighting present and does it light the crosswalk location? ☐ Yes ☑ No

Crosswalk Pavement Markings: Is the pedestrian crossing currently marked? ☐ Yes ☑ No

What is the condition of the markings? ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Are the markings easily defined? ☐ Yes ☐ No

Do they need replacement? ☐ Yes ☐ No

What is the crosswalk marking pattern? None

Signing: Currently signed at crosswalk? ☐ Yes ☑ No

Currently signed in advance of crosswalk? ☐ Yes ☑ No

Distances? direction 1: N/A ft. direction 2: N/A ft.

Enhancements: What enhancements are currently at the crossing location? None

Adjacent Facilities: Distance to nearest marked crosswalk? N/A ft.

What pedestrian control devices are present at the nearest adjacent marked crosswalk? None

Distance to nearest all-way stop, roundabout or signalized intersection: 400 ft.

Could another location serve the same pedestrian crossing movement? ☐ Yes ☑ No

Could another location serve the the movement more effectively? ☐ Yes ☑ No

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Mark the following: site distances and potential conflicts, pavement markings (crosswalk, edge lines, center lines, lane lines, stop lines, and any other markings), signing, location of lighting units, curb ramps, truncated domes, presence of any other crosswalks or crossing locations parallel to and nearby the location being studied, adjacent intersection traffic control, parking, intersection width, lane lengths, shoulder widths, sign placement, and nearby orgins and destinations .

draw or insert map of location being studied

Notes: Vehicles Parked on the side of the street may obstruct sight of pedestrians. Consider using bump outs Or having no parking in area of crossing.

Sight Distance Calculations:

Stopping sight distance (SSD), ft = $1.47St + 1.075S^2/a$

Pedestrian sight distance (PedSD), ft = $1.47S(L / S_p + t_s)$

where: S = design speed, mph
L = length of crossing, ft

where:	defaults:
t = brake reaction time, s	2.5
a = deceleration rate, ft/s^2	11.2
S_p = average pedestrian walking speed, ft/s	3.5
t_s = pedestrian start-up and end clearance time, s	3.0

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Location:	Crossing #4 - Lake Street at Midblock (E. of Mary)	Date:	9-Oct-20
City, State:	Worthington, Minnesota	Scenario:	Pedestrian Crossing Analysis
Reviewer(s):	Jake Pilz	Agency:	BMI
Project #:	0F1122838	ID #:	

The first step in understanding the pedestrian needs at a potential crossing location is completing a review of the location and adjacent facilities.

Geometrics

Crossing Length: Measure the crossing distance from curb to curb. Crossing 1: 35 ft.
Fill in Crossing 1 distance if there is no median. If there is a median at the crossing location, fill in Crossing 1 and 2 distances. Crossing 2: ft.

Median: width of median at crossing location: 0 ft.

Crossing Width: effective crosswalk width: 8 ft.

Raised Median Available?	☐ Yes	☑ No
ADA Compliant Median Available (minimum 4' x 4' landing)?	☐ Yes	☑ No
Curb Ramps Available?	☑ Yes	☐ No
ADA Compliant Curb Ramp Available (width, grades, truncated domes)?	☐ Yes	☑ No

Speed: Posted or 85th percentile speed: 30 mph

Roadway Curvature and Sight Distances: Average walking speed: 3.5 ft/s

Is the crossing location within a horizontal or vertical curve? ☐ Yes ☑ No

Equations to calculate the following are located on the next page

Direction 1:	Stopping Sight Distance (SSD)	197 ft.	provided?	☐ Yes	☐ No
Direction 2:	Stopping Sight Distance (SSD)	ft.	provided?	☐ Yes	☐ No
Direction 1:	Pedestrian Sight Distance (PedSD)	573 ft.	provided?	☐ Yes	☐ No
Direction 2:	Pedestrian Sight Distance (PedSD)	ft.	provided?	☐ Yes	☐ No

Traffic and Pedestrian Data

Measure traffic and pedestrian volume in 15-minute increments on the roadway to be crossed.

Attach Counts	**vehicles:**		Daily		**pedestrians:**		Daily	
AM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	
PM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	

Additional Site Characteristics

Lighting:

Is street lighting present and does it light the crosswalk location? ☐ Yes ☑ No

Crosswalk Pavement Markings: Is the pedestrian crossing currently marked? ☐ Yes ☑ No

What is the condition of the markings? ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Are the markings easily defined? ☐ Yes ☐ No

Do they need replacement? ☐ Yes ☐ No

What is the crosswalk marking pattern? None

Signing: Currently signed at crosswalk? ☐ Yes ☑ No

Currently signed in advance of crosswalk? ☐ Yes ☑ No

Distances? direction 1: N/A ft. direction 2: N/A ft.

Enhancements: What enhancements are currently at the crossing location? None

Adjacent Facilities: Distance to nearest marked crosswalk? N/A ft.

What pedestrian control devices are present at the nearest adjacent marked crosswalk? None

Distance to nearest all-way stop, roundabout or signalized intersection: 140 ft.

Could another location serve the same pedestrian crossing movement? ☑ Yes ☐ No

Could another location serve the the movement more effectively? ☑ Yes ☐ No

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Mark the following: site distances and potential conflicts, pavement markings (crosswalk, edge lines, center lines, lane lines, stop lines, and any other markings), signing, location of lighting units, curb ramps, truncated domes, presence of any other crosswalks or crossing locations parallel to and nearby the location being studied, adjacent intersection traffic control, parking, intersection width, lane lengths, shoulder widths, sign placement, and nearby orgins and destinations .

draw or insert map of location being studied

Notes: Vehicles Parked on the side of the street may obstruct sight of pedestrians. Consider using bump outs Or having no parking in area of crossing.

Sight Distance Calculations:

Stopping sight distance (SSD), ft = $1.47St + 1.075S^2/a$

Pedestrian sight distance (PedSD), ft = $1.47S(L / S_p + t_s)$

where: S = design speed, mph
L = length of crossing, ft

where:	defaults:
t = brake reaction time, s	2.5
a = deceleration rate, ft/s^2	11.2
S_p = average pedestrian walking speed, ft/s	3.5
t_s = pedestrian start-up and end clearance time, s	3.0

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Location:	Crossing #5 - Lake Street at 6th Avenue	Date:	9-Oct-20
City, State:	Worthington, Minnesota	Scenario:	Pedestrian Crossing Analysis
Reviewer(s):	Jake Pilz	Agency:	BMI
Project #:	0F1122838	ID #:	

The first step in understanding the pedestrian needs at a potential crossing location is completing a review of the location and adjacent facilities.

Geometrics

Crossing Length: Measure the crossing distance from curb to curb. Crossing 1: 32 ft.
Fill in Crossing 1 distance if there is no median. If there is a median at the crossing location, fill in Crossing 1 and 2 distances. Crossing 2: ft.

Median: width of median at crossing location: 0 ft.

Crossing Width: effective crosswalk width: 8 ft.

Raised Median Available?	☐ Yes	☑ No
ADA Compliant Median Available (minimum 4' x 4' landing)?	☐ Yes	☑ No
Curb Ramps Available?	☑ Yes	☐ No
ADA Compliant Curb Ramp Available (width, grades, truncated domes)?	☐ Yes	☑ No

Speed: Posted or 85th percentile speed: 30 mph

Roadway Curvature and Sight Distances: Average walking speed: 3.5 ft/s

Is the crossing location within a horizontal or vertical curve? ☐ Yes ☑ No

Equations to calculate the following are located on the next page

Direction 1:	Stopping Sight Distance (SSD)	197 ft.	provided?	☐ Yes	☐ No
Direction 2:	Stopping Sight Distance (SSD)	ft.	provided?	☐ Yes	☐ No
Direction 1:	Pedestrian Sight Distance (PedSD)	536 ft.	provided?	☐ Yes	☐ No
Direction 2:	Pedestrian Sight Distance (PedSD)	ft.	provided?	☐ Yes	☐ No

Traffic and Pedestrian Data

Measure traffic and pedestrian volume in 15-minute increments on the roadway to be crossed.

Attach Counts	**vehicles:**	Daily		**pedestrians:**	Daily	
AM Peak	Hourly		Pk 15-min	Hourly		Pk 15-min
PM Peak	Hourly		Pk 15-min	Hourly		Pk 15-min

Additional Site Characteristics

Lighting:

Is street lighting present and does it light the crosswalk location? ☐ Yes ☑ No

Crosswalk Pavement Markings: Is the pedestrian crossing currently marked? ☐ Yes ☑ No

What is the condition of the markings? ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Are the markings easily defined? ☐ Yes ☐ No

Do they need replacement? ☐ Yes ☐ No

What is the crosswalk marking pattern? None

Signing: Currently signed at crosswalk? ☐ Yes ☑ No

Currently signed in advance of crosswalk? ☐ Yes ☑ No

Distances? direction 1: N/A ft. direction 2: N/A ft.

Enhancements: What enhancements are currently at the crossing location? None

Adjacent Facilities: Distance to nearest marked crosswalk? N/A ft.

What pedestrian control devices are present at the nearest adjacent marked crosswalk? None

Distance to nearest all-way stop, roundabout or signalized intersection: 370 ft.

Could another location serve the same pedestrian crossing movement? ☑ Yes ☐ No

Could another location serve the the movement more effectively? ☑ Yes ☐ No

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Mark the following: site distances and potential conflicts, pavement markings (crosswalk, edge lines, center lines, lane lines, stop lines, and any other markings), signing, location of lighting units, curb ramps, truncated domes, presence of any other crosswalks or crossing locations parallel to and nearby the location being studied, adjacent intersection traffic control, parking, intersection width, lane lengths, shoulder widths, sign placement, and nearby orgins and destinations .

draw or insert map of location being studied

Notes:

Sight Distance Calculations:

Stopping sight distance (SSD), ft = $1.47St + 1.075S^2/a$

Pedestrian sight distance (PedSD), ft = $1.47S(L / S_p + t_s)$

where: S = design speed, mph
L = length of crossing, ft

where:	defaults:
t = brake reaction time, s	2.5
a = deceleration rate, ft/s^2	11.2
S_p = average pedestrian walking speed, ft/s	3.5
t_s = pedestrian start-up and end clearance time, s	3.0

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Location:	Crossing #6 - Lake Street at 5th Avenue	Date:	9-Oct-20
City, State:	Worthington, Minnesota	Scenario:	Pedestrian Crossing Analysis
Reviewer(s):	Jake Pilz	Agency:	BMI
Project #:	0F1122838	ID #:	

The first step in understanding the pedestrian needs at a potential crossing location is completing a review of the location and adjacent facilities.

Geometrics

Crossing Length: Measure the crossing distance from curb to curb. Crossing 1: 34 ft.
Fill in Crossing 1 distance if there is no median. If there is a median at the crossing location, fill in Crossing 1 and 2 distances. Crossing 2: ft.

Median: width of median at crossing location: 0 ft.

Crossing Width: effective crosswalk width: 8 ft.

Raised Median Available?	☐ Yes	☑ No
ADA Compliant Median Available (minimum 4' x 4' landing)?	☐ Yes	☑ No
Curb Ramps Available?	☑ Yes	☐ No
ADA Compliant Curb Ramp Available (width, grades, truncated domes)?	☐ Yes	☑ No

Speed: Posted or 85th percentile speed: 30 mph

Roadway Curvature and Sight Distances: Average walking speed: 3.5 ft/s

Is the crossing location within a horizontal or vertical curve? ☐ Yes ☑ No

Equations to calculate the following are located on the next page

Direction 1:	Stopping Sight Distance (SSD)	197 ft.	provided?	☐ Yes	☐ No
Direction 2:	Stopping Sight Distance (SSD)	ft.	provided?	☐ Yes	☐ No
Direction 1:	Pedestrian Sight Distance (PedSD)	561 ft.	provided?	☐ Yes	☐ No
Direction 2:	Pedestrian Sight Distance (PedSD)	ft.	provided?	☐ Yes	☐ No

Traffic and Pedestrian Data

Measure traffic and pedestrian volume in 15-minute increments on the roadway to be crossed.

Attach Counts	**vehicles:**		Daily		**pedestrians:**		Daily	
AM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	
PM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	

Additional Site Characteristics

Lighting:

Is street lighting present and does it light the crosswalk location? ☐ Yes ☑ No

Crosswalk Pavement Markings: Is the pedestrian crossing currently marked? ☐ Yes ☑ No

What is the condition of the markings? ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Are the markings easily defined? ☐ Yes ☐ No

Do they need replacement? ☐ Yes ☐ No

What is the crosswalk marking pattern? None

Signing: Currently signed at crosswalk? ☐ Yes ☑ No

Currently signed in advance of crosswalk? ☐ Yes ☑ No

Distances? direction 1: N/A ft. direction 2: N/A ft.

Enhancements: What enhancements are currently at the crossing location? None

Adjacent Facilities: Distance to nearest marked crosswalk? N/A ft.

What pedestrian control devices are present at the nearest adjacent marked crosswalk? None

Distance to nearest all-way stop, roundabout or signalized intersection: 370 ft.

Could another location serve the same pedestrian crossing movement? ☑ Yes ☐ No

Could another location serve the the movement more effectively? ☑ Yes ☐ No

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Mark the following: site distances and potential conflicts, pavement markings (crosswalk, edge lines, center lines, lane lines, stop lines, and any other markings), signing, location of lighting units, curb ramps, truncated domes, presence of any other crosswalks or crossing locations parallel to and nearby the location being studied, adjacent intersection traffic control, parking, intersection width, lane lengths, shoulder widths, sign placement, and nearby orgins and destinations .

draw or insert map of location being studied

Notes:

Sight Distance Calculations:

Stopping sight distance (SSD), ft = $1.47St + 1.075S^2/a$

Pedestrian sight distance (PedSD), ft = $1.47S(L / S_p + t_s)$

where: S = design speed, mph
L = length of crossing, ft

where:	defaults:
t = brake reaction time, s	2.5
a = deceleration rate, ft/s^2	11.2
S_p = average pedestrian walking speed, ft/s	3.5
t_s = pedestrian start-up and end clearance time, s	3.0

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Location:	Crossing #7 - Lake Street at 4th Avenue	Date:	9-Oct-20
City, State:	Worthington, Minnesota	Scenario:	Pedestrian Crossing Analysis
Reviewer(s):	Jake Pilz	Agency:	BMI
Project #:	0F1122838	ID #:	

The first step in understanding the pedestrian needs at a potential crossing location is completing a review of the location and adjacent facilities.

Geometrics

Crossing Length: Measure the crossing distance from curb to curb. Crossing 1: 34 ft.
Fill in Crossing 1 distance if there is no median. If there is a median at the crossing location, fill in Crossing 1 and 2 distances. Crossing 2: ft.

Median: width of median at crossing location: 0 ft.

Crossing Width: effective crosswalk width: 8 ft.

Raised Median Available?	☐ Yes	☑ No
ADA Compliant Median Available (minimum 4' x 4' landing)?	☐ Yes	☑ No
Curb Ramps Available?	☑ Yes	☐ No
ADA Compliant Curb Ramp Available (width, grades, truncated domes)?	☐ Yes	☑ No

Speed: Posted or 85th percentile speed: 30 mph

Roadway Curvature and Sight Distances: Average walking speed: 3.5 ft/s

Is the crossing location within a horizontal or vertical curve? ☐ Yes ☑ No

Equations to calculate the following are located on the next page

Direction 1:	Stopping Sight Distance (SSD)	197 ft.	provided?	☐ Yes	☐ No
Direction 2:	Stopping Sight Distance (SSD)	ft.	provided?	☐ Yes	☐ No
Direction 1:	Pedestrian Sight Distance (PedSD)	561 ft.	provided?	☐ Yes	☐ No
Direction 2:	Pedestrian Sight Distance (PedSD)	ft.	provided?	☐ Yes	☐ No

Traffic and Pedestrian Data

Measure traffic and pedestrian volume in 15-minute increments on the roadway to be crossed.

Attach Counts	**vehicles:**		Daily		**pedestrians:**		Daily	
AM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	
PM Peak	Hourly		Pk 15-min		Hourly		Pk 15-min	

Additional Site Characteristics

Lighting:

Is street lighting present and does it light the crosswalk location? ☐ Yes ☑ No

Crosswalk Pavement Markings: Is the pedestrian crossing currently marked? ☐ Yes ☑ No

What is the condition of the markings? ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Are the markings easily defined? ☐ Yes ☐ No

Do they need replacement? ☐ Yes ☐ No

What is the crosswalk marking pattern? None

Signing: Currently signed at crosswalk? ☐ Yes ☑ No

Currently signed in advance of crosswalk? ☐ Yes ☑ No

Distances? direction 1: N/A ft. direction 2: N/A ft.

Enhancements: What enhancements are currently at the crossing location? None

Adjacent Facilities: Distance to nearest marked crosswalk? N/A ft.

What pedestrian control devices are present at the nearest adjacent marked crosswalk? None

Distance to nearest all-way stop, roundabout or signalized intersection: 370 ft.

Could another location serve the same pedestrian crossing movement? ☑ Yes ☐ No

Could another location serve the the movement more effectively? ☑ Yes ☐ No

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Mark the following: site distances and potential conflicts, pavement markings (crosswalk, edge lines, center lines, lane lines, stop lines, and any other markings), signing, location of lighting units, curb ramps, truncated domes, presence of any other crosswalks or crossing locations parallel to and nearby the location being studied, adjacent intersection traffic control, parking, intersection width, lane lengths, shoulder widths, sign placement, and nearby orgins and destinations .

draw or insert map of location being studied

Notes:

Sight Distance Calculations:

Stopping sight distance (SSD), ft = $1.47St + 1.075S^2/a$

Pedestrian sight distance (PedSD), ft = $1.47S(L / S_p + t_s)$

where: S = design speed, mph
L = length of crossing, ft

where:	defaults:
t = brake reaction time, s	2.5
a = deceleration rate, ft/s^2	11.2
S_p = average pedestrian walking speed, ft/s	3.5
t_s = pedestrian start-up and end clearance time, s	3.0

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Location:	Crossing #8 - Lake Street at 3rd Avenue	Date:	9-Oct-20
City, State:	Worthington, Minnesota	Scenario:	Pedestrian Crossing Analysis
Reviewer(s):	Jake Pilz	Agency:	BMI
Project #:	0F1122838	ID #:	

The first step in understanding the pedestrian needs at a potential crossing location is completing a review of the location and adjacent facilities.

Geometrics

Crossing Length: Measure the crossing distance from curb to curb. Crossing 1: 35 ft.
Fill in Crossing 1 distance if there is no median. If there is a median at the crossing location, fill in Crossing 1 and 2 distances. Crossing 2: ft.

Median: width of median at crossing location: 0 ft.

Crossing Width: effective crosswalk width: 8 ft.

Raised Median Available?	☐ Yes	☑ No
ADA Compliant Median Available (minimum 4' x 4' landing)?	☐ Yes	☑ No
Curb Ramps Available?	☑ Yes	☐ No
ADA Compliant Curb Ramp Available (width, grades, truncated domes)?	☐ Yes	☑ No

Speed: Posted or 85th percentile speed: 30 mph

Roadway Curvature and Sight Distances: Average walking speed: 3.5 ft/s

Is the crossing location within a horizontal or vertical curve? ☐ Yes ☑ No

Equations to calculate the following are located on the next page

Direction 1:	Stopping Sight Distance (SSD)	197 ft.	provided?	☐ Yes	☐ No
Direction 2:	Stopping Sight Distance (SSD)	ft.	provided?	☐ Yes	☐ No
Direction 1:	Pedestrian Sight Distance (PedSD)	573 ft.	provided?	☐ Yes	☐ No
Direction 2:	Pedestrian Sight Distance (PedSD)	ft.	provided?	☐ Yes	☐ No

Traffic and Pedestrian Data

Measure traffic and pedestrian volume in 15-minute increments on the roadway to be crossed.

Attach Counts	**vehicles:**			**pedestrians:**	
	Daily			Daily	
AM Peak	Hourly		Pk 15-min	Hourly	Pk 15-min
PM Peak	Hourly		Pk 15-min	Hourly	Pk 15-min

Additional Site Characteristics

Lighting:

Is street lighting present and does it light the crosswalk location? ☐ Yes ☑ No

Crosswalk Pavement Markings: Is the pedestrian crossing currently marked? ☐ Yes ☑ No

What is the condition of the markings? ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Are the markings easily defined? ☐ Yes ☐ No

Do they need replacement? ☐ Yes ☐ No

What is the crosswalk marking pattern? None

Signing: Currently signed at crosswalk? ☐ Yes ☑ No

Currently signed in advance of crosswalk? ☐ Yes ☑ No

Distances? direction 1: N/A ft. direction 2: N/A ft.

Enhancements: What enhancements are currently at the crossing location? None

Adjacent Facilities: Distance to nearest marked crosswalk? N/A ft.

What pedestrian control devices are present at the nearest adjacent marked crosswalk? None

Distance to nearest all-way stop, roundabout or signalized intersection: 380 ft.

Could another location serve the same pedestrian crossing movement? ☑ Yes ☐ No

Could another location serve the the movement more effectively? ☑ Yes ☐ No

Uncontrolled Pedestrian Crossing
Data Collection Worksheet

Mark the following: site distances and potential conflicts, pavement markings (crosswalk, edge lines, center lines, lane lines, stop lines, and any other markings), signing, location of lighting units, curb ramps, truncated domes, presence of any other crosswalks or crossing locations parallel to and nearby the location being studied, adjacent intersection traffic control, parking, intersection width, lane lengths, shoulder widths, sign placement, and nearby orgins and destinations .

draw or insert map of location being studied

Notes: Tree may hider sight of pedestrian

Sight Distance Calculations:

Stopping sight distance (SSD), ft = $1.47St + 1.075S^2/a$

Pedestrian sight distance (PedSD), ft = $1.47S(L / S_p + t_s)$

where: S = design speed, mph
L = length of crossing, ft

where:

	defaults:
t = brake reaction time, s	2.5
a = deceleration rate, ft/s^2	11.2
S_p = average pedestrian walking speed, ft/s	3.5
t_s = pedestrian start-up and end clearance time, s	3.0