

REPLINGER & ASSOCIATES LLC
TRANSPORTATION ENGINEERING

December 13, 2010

Ms. Nancy Kraushaar, PE
City of Oregon City
PO Box 3040
Oregon City, OR 97045

**SUBJECT: REVIEW OF PEDESTRIAN CROSSINGS AND TRAFFIC CONTROL AT THE
 INTERSECTIONS OF JOHN ADAMS STREET WITH 6TH AND 7TH STREETS**

Dear Nancy:

In response to your request, I have reviewed the existing pedestrian crossings and traffic control at the intersections of John Adams Street with 6th and 7th Streets.

BACKGROUND INFORMATION ON MARKED AND UNMARKED CROSSWALKS

Since one intersection currently has both unmarked and marked crosswalks and the installation of a marked crosswalk has been suggested at the other, it is worth reviewing information about marked and unmarked crosswalks including results of safety information.

First, it is important to recognize that under Oregon law, crosswalks exist on each approach at intersections whether they are marked or not. A crosswalk does not exist only when action has been taken to formally close the crosswalk and it is posted with "CROSSWALK CLOSED."

The most definitive study on the pedestrian safety issue is probably the report commissioned by the Federal Highway Administration and undertaken by the University of North Carolina's Highway Safety Research Center. *Safety Effects of Marked versus Unmarked Crosswalks at Uncontrolled Locations: Final Report and Recommended Guidelines* was published in August 2005. The study, conducted by Charles V. Zegeer and others, involved five years of pedestrian crashes at 1000 marked and 1000 unmarked crosswalks. The study included various road types, speeds, and volumes. The study concluded "that on two-lane roads, the presence of a marked crosswalk alone at an uncontrolled location was associated with no difference in pedestrian crash rate, compared to an unmarked crosswalk."

The report also explains that for two-lane roads, "The results for unmarked crosswalks show the only statistically significant effect to be for pedestrian volume." This means that increases in pedestrian volumes are likely to result in more crashes involving pedestrians, but the rate of crashes involving pedestrians would be the same.

The study also assessed the crash severity and concluded "Crash severity did not differ significantly between marked and unmarked crosswalks on two-lane roads."

The study differentiated between two-lane roads and wider roads with varying speeds. The results summarized above are only those associated with two-lane roads, which are relevant to this analysis.

JOHN ADAMS AND 6TH STREET

Existing Conditions

The existing intersection is governed by two-way stop control. John Adams Street is the through street; 6th Street is the minor street. The statutory speed on both streets is 25 miles per hour.

Marked crosswalks are provided on the north John Adams Street approach and on the west 6th Street approach. Neither of the other approaches features a marked crosswalk, but under Oregon law, both are still considered to be crosswalks. The crossing distances were measured to be approximately 30 feet across each approach. Sight distance was restricted only by vehicles parked using on-street spaces.

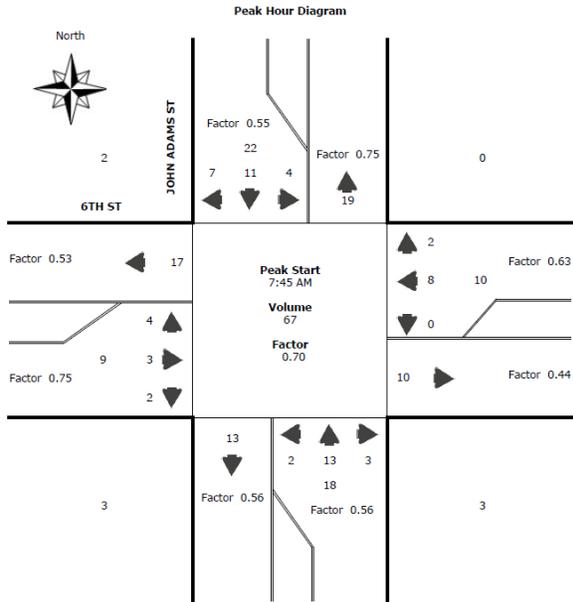


Marked Crosswalks

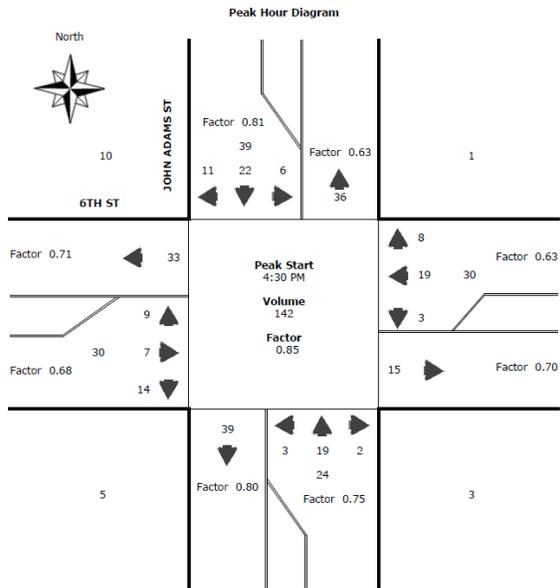
Unmarked Crosswalks

Observations were conducted at the intersections during different times on different days. In addition, traffic volume counts were conducted at the intersection during the two-hour AM peak period and the two-hour PM peak period. The volumes are shown in the figures below.

AM Peak Hour Counts



PM Peak Hour Counts



The Issues

The issues of pedestrian accessibility and safety have been raised by area residents. One suggestion for change is the installation of STOP signs on all four approaches.

Analysis

Traffic volumes are low with the combined vehicle volumes on all four approaches totaling 59 during the AM peak hour and 123 during the PM peak hour. Total pedestrian volumes at the intersection were 8 during the AM peak hour and 19 during the PM peak hour. During the AM peak period, traffic volumes on John Adams Street are approximately twice those on 6th Street. During the PM peak hour, the volumes on the two streets are approximately equal. A two-way stop is appropriate for these volumes and the orientation with 6th Street approaches having the STOP signs is the better choice.

Using an average walking speed of 4 feet per second, the pedestrian crossing time is less than 8 seconds. Using a slow walking speed of 3 feet per second, the time needed for a pedestrian to cross the intersection on any of the approaches is 10 seconds. The average interval of arrival of motor vehicles, based on the total volume entering the intersection, is far greater than the time it takes for a pedestrian to cross.

The rate of arriving vehicles does not cause pedestrians to be delayed significantly. The arrival rate of vehicle traffic is so low that pedestrians will seldom need to wait before crossing. Travel speeds are generally low.

Conclusions and Recommendations

Four-way stop control is not warranted by conditions at the intersection. The volumes are low and no other physical conditions are apparent that would make a four-way stop appropriate. Installing STOP signs on John Adams Street would do little if anything to improve pedestrian accessibility or safety. Four-way stop-control would increase delay for vehicles without any significant benefit for other users.

Both vehicle volumes and pedestrian volumes are low enough that marked crosswalks are probably not needed and, as described above, result in no significant safety benefit. There is no reason to remove the existing markings or to mark the crosswalks on approaches that currently have unmarked crosswalks.

Improving sight distance is one action where pedestrian safety and comfort might be enhanced. During multiple site visits, on-street parking was observed to occur within a few feet of the crosswalks. Parking of vehicles near the crosswalks can significantly reduce the sight triangles, causing pedestrians to enter the roadway to see around parked vehicles to observe on-coming traffic. Posting the curb for a distance of approximately 30 feet from each crosswalk on each approach would significantly improve sight distance for pedestrians and motorists.

I recommend establishing No Parking zones for a distance of approximately 30 feet from the crosswalk on all four approaches to the intersection to improve sight distance for motorists and pedestrians.

JOHN ADAMS AND 7TH STREET

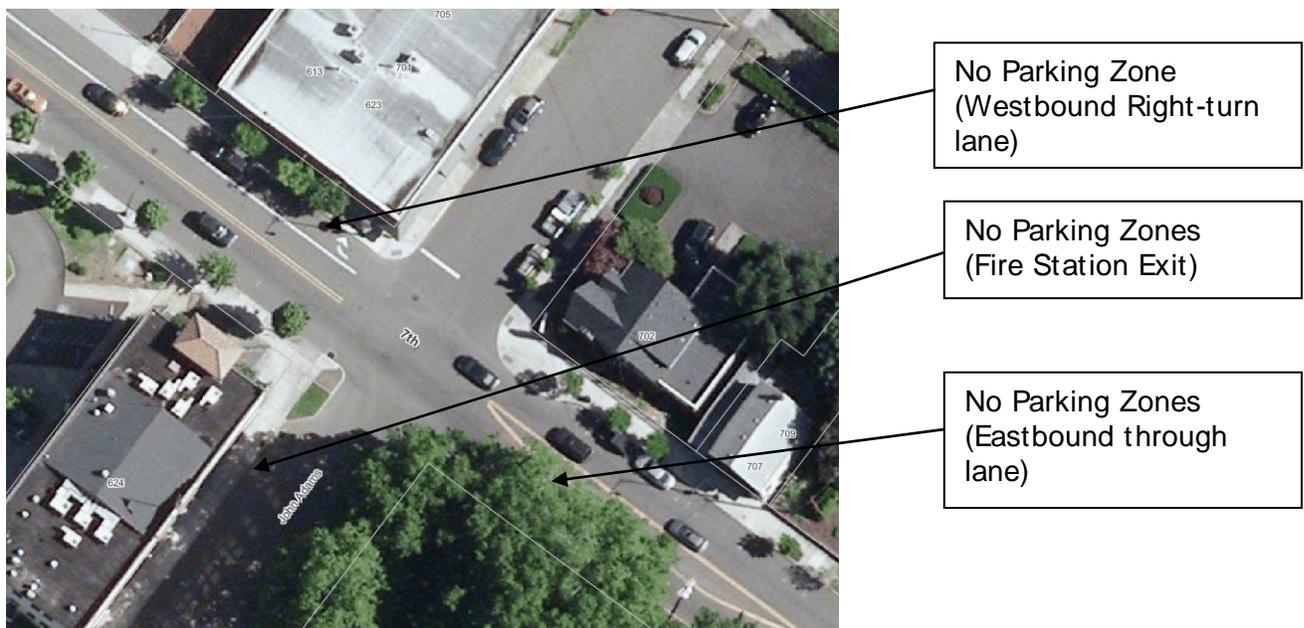
Existing Conditions

The existing intersection is governed by two-way stop control. 7th Street is the through street; John Adams Street is the minor street. The statutory speed on both streets is 25 miles per hour.

Marked crosswalks are not provided on any approach. Pedestrian crossing distances were also measured to be approximately 30 feet for each approach.

Parking is provided on the north side of 7th Street to the east of John Adams Street and on the south side of 7th Street to the west of John Adams Street. Parking is provided on both sides of John Adams Street north of 7th Street and on the east side of John Adams Street to the south of 7th Street. Sight distance was restricted only by vehicles parked using on-street parking spaces.

Traffic volumes were not obtained for this evaluation, but it is evident that volumes are far higher on 7th Street than they are John Adams Street. Observations were conducted at various times on different days to assess the level of pedestrian activity and the frequency of parking near the intersection.



The Issues

The issues of pedestrian accessibility and safety have been raised by area residents. Suggestions for changes have included installation of a marked crosswalk.

Analysis

Traffic volumes are high enough that pedestrians can encounter significant delays during the peak hours while waiting safe opportunities to cross 7th Street or for motorists to yield. The presence of a traffic signal one block to the west at 7th Street and Washington Street does provide some breaks in eastbound traffic, but not as many as might be expected because of high turn volumes. Left turns from southbound Washington Street to eastbound 7th Street combine with eastbound through volumes on 7th Street at Washington Street and result in a fairly consistent stream of traffic on 7th Street at John Adams Street during peak hours.

The suggestion for a marked crosswalk at this location has been raised by area residents. As explained in the introductory portion of this letter, studies do not suggest there would be a safety benefit from the installation of a marked crosswalk across 7th Street.

At the intersection of 7th Street and John Adams Street, perhaps the most difficult aspect of pedestrians' crossings is the lack of good sight distance. Sight distance is particularly poor for eastbound motorists and pedestrians seeking to cross from the southwest corner to the northwest corner of the intersection (from the fire station to the Singer Hill Café). This limitation on sight distance occurs when cars are parked on the south side of 7th Street to the west of John Adams Street. The photo below illustrates the sight distance issue.

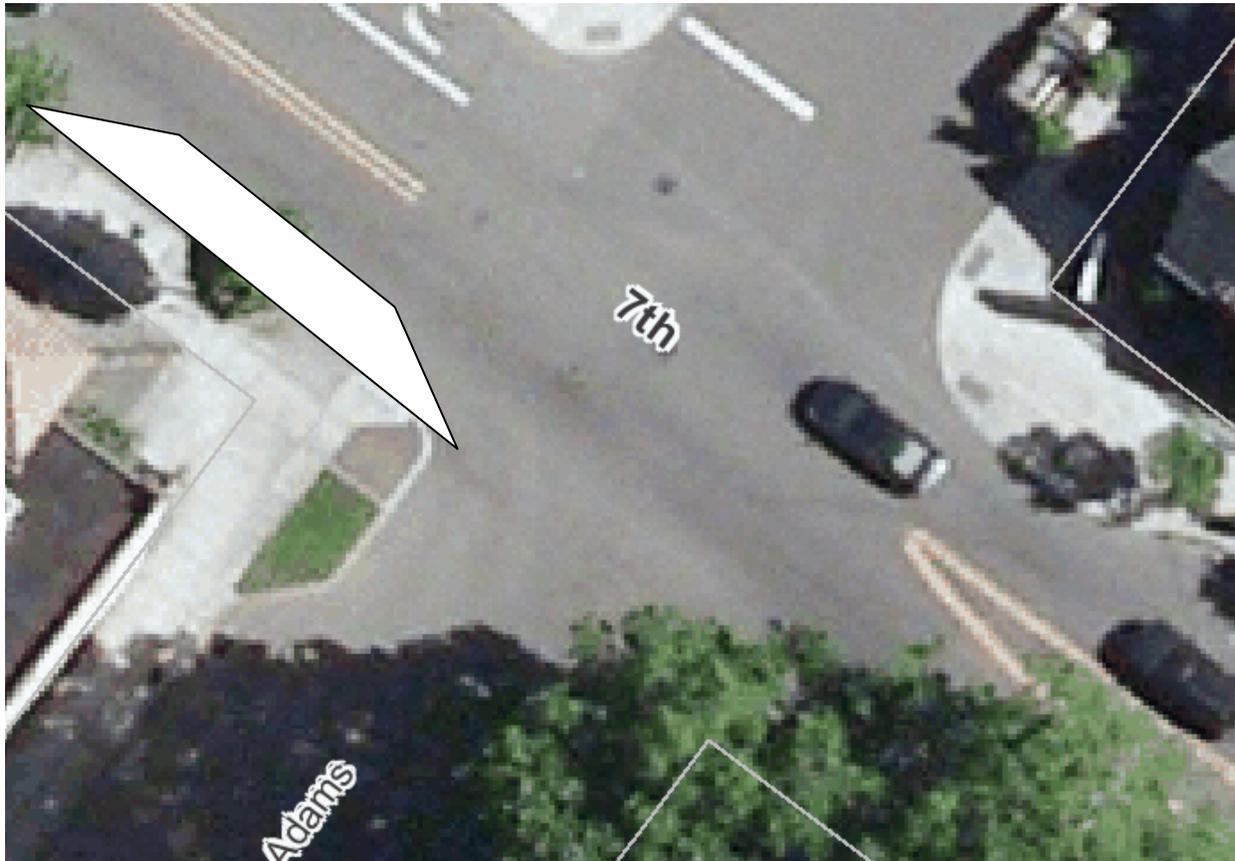


The east side of the intersection has better sight distance because parking is provided in inset bays and the existence of a "bulb-out" that slightly reduces crossing distance and provides a place on the curb for pedestrians that is more in line with motorists' sight lines. The photo below illustrates the inset parking and the bulb-out. Note that even if the parking space nearest the intersection were occupied, pedestrians would be more visible to motorists and pedestrians could better see on-coming cars.



Improving sight distance for the crosswalk on the west side of the intersection could be accomplished by removal of some of the existing on-street parking on the south side of 7th Street west of John Adams Street. As noted above, this parking appears to be fairly regularly occupied. With low volumes of pedestrians at this location, the loss of a convenient, well-used parking space could be controversial. The removal of one parking space would allow better sight distance allowing pedestrians to stay on the curb while watching for on-coming traffic from the west and allowing the motorists to more readily see pedestrians waiting to cross.

A better, but far more expensive, solution to signing and marking a section of curb as a no-parking zone would be installation of a bulb-out similar to that already in place on the northeast corner of the intersection. It would improve sight distance and shorten the crossing distance. A schematic of a bulb-out that requires removal of one on-street space and shortens the crossing distance is illustrated below. Another advantage of a solution involving a bulb-out is that it would allow installation of a pedestrian warning sign in an advantageous location. Because of the presence of on-street parking in this block, there is currently no good option for the installation of a pedestrian warning sign.



Conclusions and Recommendations

I do not recommend installation of a marked crosswalk for a number of reasons. As explained in the introductory part of this letter, the installation of a marked crosswalk has not been shown to significantly improve pedestrian safety. The pedestrian volumes are relatively low and, for those uncomfortable crossing at this intersection, a marked crosswalk is located one block away at the signalized intersection of 7th Street and Washington Street.

Removal of one parking space on the south side of 7th Street immediately west of John Adams Street would improve sight distance for pedestrians viewing on-coming, eastbound traffic on 7th Street and allow motorists to more readily see pedestrians on the corner. Installation of a bulb-out similar to that on the existing one on the northeast corner of the intersection would be a nice feature to improve the pedestrian environment. That would be an expensive installation, in part because of the presence of a storm drain. A bulb-out would be worth considering as part of a larger project, but it would be hard to justify as an independent project due to cost.

I recommend removal of one parking space on the south side of 7th Street immediately west of John Adams Street and the installation of an appropriate No Parking sign.

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Thanks for letting me be of service to you on this analysis. If you have any questions or need any further information, please contact me at replinger-associates@comcast.net.

Sincerely,

A handwritten signature in cursive script that reads "John Replinger". The signature is written in black ink and is positioned above the typed name and title.

John Replinger, PE
Principal

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