Staff Report

ISU RESEARCH PARK TRAFFIC AND PEDESTRIAN EVALUATION

July 23, 2013

On January 22, 2013, City Council referred to staff a letter from Steve Carter, President of the Iowa State University (ISU) Research Park. This letter asks the City to study three areas of concern related to traffic and pedestrian safety and operations along affected sections of University Avenue and Airport Road. The concerns generally are related to impacts seen by the significant growth of WebFilings both in the number of employees and location of their facilities within the ISU Research Park.

Since the referral, staff has met on several occasions with Mr. Carter and other ISU Research Park staff jointly with WebFilings management whom has knowledge of their staffing and transition to their new facility that is currently under construction at the southeast corner of University Boulevard and Airport Road. During those meetings, staff discussed the short-term needs as well as the long-term vision not only for Webfilings, but for the ISU Research Park as a whole. **The three areas of concern are as follows; 1) pedestrian crossing safety at the intersection of North Loop Drive and Airport Road, 2) traffic operations at the University Boulevard and Airport Road intersection, and 3) traffic operations at the westbound off-ramp of U.S. Highway 30 and University Boulevard.**

During the past several months, City staff has devoted 90 hours to collect and analyze turning movement counts at intersections along University Boulevard, as well as volume and speed counts along Airport Road in the area of the north-south pedestrian crossing at the N. Loop Drive intersection. The findings from that data are included below.

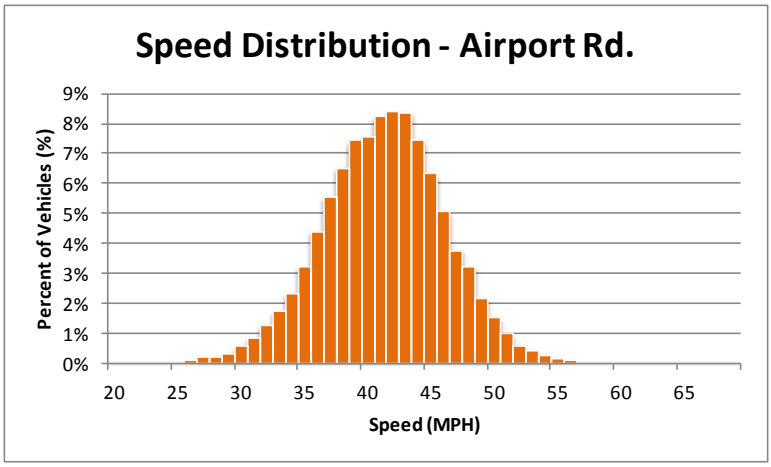
Pedestrian Crossing - N. Loop Drive and Airport Road:

To evaluate the pedestrian crossing at Airport Road and North Loop Drive, several data sets were collected such as 1) Speed, 2) Sight Distance, and 3) Gap (time between vehicles). The method used estimates the average wait time for a pedestrian to safely cross Airport Road and whether approaching vehicles from the east or west are able to see the crossing in time to stop or yield as necessary.

Speed

Speed data was assessed based upon the posted Speed Limit versus the Prevailing Speed. Prevailing Speed is defined as a combined speed value of the 85th Percentile Speed and the Pace, which is defined as a 10 MPH range that contains the highest number of vehicles. Currently, Airport Road is posted at 45 MPH due to the fact it is an arterial road located in an industrial/suburban area of town. The Prevailing Speed was found to be 46 MPH**. Considering that speed is within +/- 3 MPH of the posted limit, it could be considered "ideal" as far as driver compliance to the legal limit.**

It should also be noted that the Pace (37-46 MPH) constituted 70% of the vehicles seen on Airport Road. A value of 70% is noticeably higher than typical values seen ranging from 45% to 65%. A graph of the speed distribution has been provided, below.



Sight Distance

Based upon these findings, a vehicle would need approximately 375 feet of sight distance in order to safely evaluate whether a pedestrian was in the crosswalk and have time to yield or come to a stop. Currently, there is approximately 1,000 feet of sight distance for westbound traffic measured from the southbound stop bar, and from the center median there is approximately 500 feet for eastbound traffic**. In general, when measured from the first point of conflict with an oncoming vehicular lane there is more than adequate sight distance available.**

Gap

The third criterion evaluated was how long a pedestrian would potentially have to wait until a gap of adequate size was available to safely cross Airport Road. It should be noted that this calculation was evaluated in two stages due to the fact that the median acts as a refuge area that breaks up and potentially simplifies the crossing movement. An average wait time range for typical delays seen along an arterial street crossing is from 30 to 55 seconds, whereas above 55 seconds would be considered a "high" amount of delay. The data showed the following average values by hour of the day in the table provided to the right.

Gap: Ped Wait Times			
Time of Day	Average Time (s)	Time of Day	Average Time (s)
12:00 AM	1.0	12:00 PM	53.4
1:00 AM	0.2	1:00 PM	49.4
2:00 AM	0.1	2:00 PM	41.5
3:00 AM	0.0	3:00 PM	48.4
4:00 AM	0.0	**4:00 PM**	**55.3**
5:00 AM	0.6	**5:00 PM**	**68.3**
6:00 AM	4.2	6:00 PM	33.4
7:00 AM	27.7	7:00 PM	17.9
8:00 AM	35.0	8:00 PM	12.2
9:00 AM	26.2	9:00 PM	6.4
10:00 AM	31.3	10:00 PM	2.2
11:00 AM	42.2	11:00 PM	1.0

As expected, a pedestrian experiences increasing delay when crossing Airport Road as traffic volumes increase during the peak hours of the day. Only two

hours for a typical work day were found to have "high" levels of average delay. These were during the PM Peak Hour, 4:00 PM to 5:00 PM. The remaining work hours saw low to moderately-high amounts of delay, which are within the expected range for an arterial street.

From meetings with ISU Research Park and WebFilings staff, it appears that most of the pedestrian crossing issues that were cited happen throughout the work day. Both the speed and volume of traffic would indicate safety benefits from adding flashing lights to the existing signs and pavement markings to increase driver's awareness of pedestrians using the crosswalk. A recent example that is comparable would be the 12th Street pedestrian crossing on north Duff Avenue by the Hospital, where there are a higher number of pedestrians crossing a four-lane arterial roadway.

Traffic Operations - Airport Road and University Boulevard:

For this study, Public Works staff collected peak-hour turning movement counts (AM, Noon, and PM peak-hours) at major intersections along University Boulevard from Airport Road north through the interchange with U.S. Highway 30. **ISU Research Park staff expressed concerns related to increased delays as Research Park businesses, such as WebFilings, continue to grow at a rapid pace and feel that a traffic signal should be placed at the intersection.**

In order to meet Federal guidelines for a traffic signal, as outlined in the Manual on Uniform Traffic Control Devices (MUTCD) – Part 4: Highway Traffic Signals, a proposed traffic signal installation must **meet at least one of nine possible warrants**. Because of time and data constraints only Warrant 3, Peak Hour, was evaluated. Warrant 3 states that a traffic control signal shall be considered if either criteria A or B is met as follows:

Criteria A: (all three must be met)

1. Total stopped time delay >= five vehicle-hours
2. Traffic volumes on one of the minor street approaches >= 150 vehicles/hour
3. Total entering traffic volume >= 800 vehicles

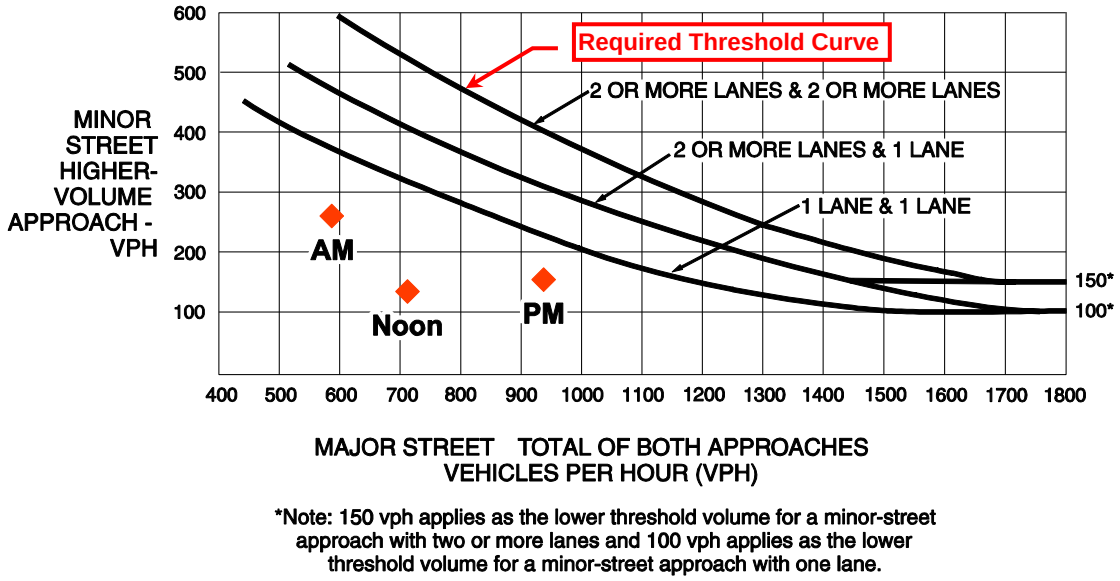
Criteria B: Plotted traffic volumes (must be above the appropriate curve on the graph)

The following table summarizes the evaluation of the three peak-hours seen at the intersection of Airport Road and University Boulevard:

	Criteria A				Criteria B
Peak-Hour	A1	A2	A3	Y/N?	Y/N?
AM	3.7	265	935	N	N
Noon	0.9	140	885	N	N
PM	1.9	160	1135	N	N
>=	5	150	800		

Criteria B

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Airport Rd. and University Blvd.

As shown by the data, the intersection does not meet Criteria A or Criteria B in any of the three peak hour periods, and therefore does not meet warrants to install a traffic signal at this time. However, as seen in the table above, the intersection is close to meeting all three thresholds under Criteria A, which does support the experiences of those who work at the ISU Research Park whom are seeing heavy delays during the AM and PM peak hours.

The intersection is expected to meet warrants if there is any further growth seen at the ISU Research Park. Knowing that ISU is looking to significantly expand the Research Park, as shown in a recent conceptual plan referred to as the "Phase 3" expansion, the most appropriate approach would be to improve the intersection of Airport Road and University Boulevard after a traffic impact study has been completed for Phase 3. This study would account for all existing and future transportation needs of the area.

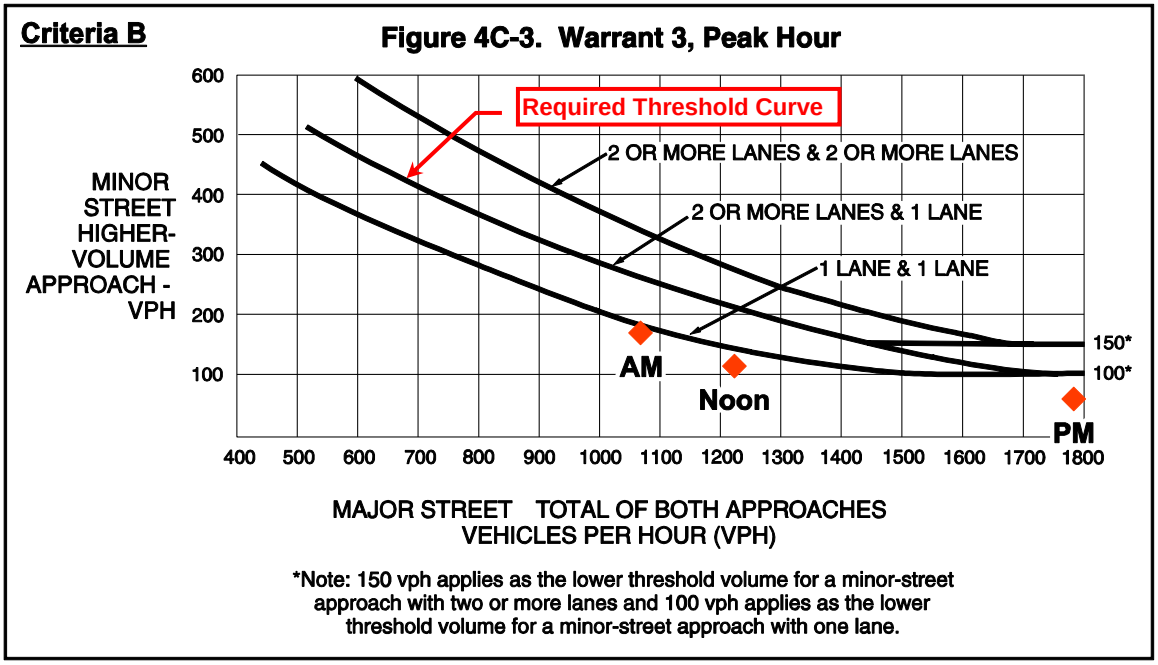
It should be noted that staff also reviewed the intersection's crash history from the last ten years (2003-2012) using the most current database provided by the Iowa Department of Transportation (Iowa DOT). **The data did not indicate any significant safety issues related to congestion, nor were there any accidents that occurred that can be best mitigated by installation of a traffic signal.** There were only 10

accidents in those 10 years of which more than half were snow and ice related. The remaining accidents involved distracted or intoxicated (1 accident was alcohol related) drivers.

U.S. Highway 30 Westbound Off Ramp Operation:

Similarly to the intersection of Airport Road and University Boulevard, the westbound off ramp of U.S. Highway 30 was treated as a T-intersection and evaluated operationally using Warrant 3 of the MUTCD. Since there is only one lane on the off ramp, the thresholds of Criteria A are reduced to the values shown at the bottom of the table. The results of the warrant analysis are shown, below:

	Criteria A				Criteria B
Peak-Hour	A1	A2	A3	Y/N?	Y/N?
AM	5.4	120	1340	Y	N
Noon	2.4	175	1240	N	N
PM	18.1	65	1845	N	N
>=	4	100	650		



University Blvd. and US HW 30 Off Ramp

The peak-hour warrant analysis for the westbound U.S. Highway 30 off ramp resulted in meeting Criteria A in only the AM peak-hour. Although this does meet the minimum threshold specified within Warrant 3, engineering judgment would not indicate a need for a traffic signal to be installed at this time due to the high volume of north-south traffic on University Boulevard. Traffic signals have the potential, if placed improperly, to actually increase overall delay seen along a corridor,

like University Boulevard, as well as a potential decrease in safety as traffic signals tend to see an increase in rear-end accidents (typically property damage only accidents).

The City Council should note, since the interchange is part of U.S. Highway 30 right-of-way, the Iowa DOT will have final say as to whether or not a traffic signal control is installed, regardless of the outcome of these findings.

Historically, the Iowa DOT has required a more robust study that would involve analysis of Warrants 1, 2, 3, and 7, which are the Eight-Hour, Four-Hour, Peak-Hour, and Crash Experience warrants respectively. This type of study would entail a significant amount of additional data collection and cost.

STAFF COMMENTS:

City staff gained valuable insight after meeting with members of the ISU Research Park to hear their concerns, in the context of the existing conditions as well as future plans for growth of the Research Park. **The data collected during the course of this study does indicate that the sections of Airport Road and University Boulevard affected by the Research Park are beginning to experience transportation issues related to congestion, which is typical of areas of larger employment, such as the case of a research or industrial park.**

Pedestrian Crossing

Because of above findings, City staff has already installed advanced warning signs and high visibility crosswalk markings at the intersection of North Loop Drive and Airport Road. One possible initial action would be to direct staff to enhance the existing warnings signs by installing pedestrian push-button activated flashers. This additional warning system will cost approximately $9,000 for the materials only, which can be installed by City crews. Given this magnitude of expenditures, funding could come from the available balance in the Road Use Tax Fund.

Nationally, this treatment has been shown to greatly increase compliance on the part of drivers to yield or stop if needed for pedestrians using crosswalks on multi-lane arterial streets as in the case of Airport Road. It should be noted that if growth plans for the Research Park significantly change the current condition seen along Airport Road, these flashers can be removed and reused at another location with little or no cost to the City (labor only).

Traffic Control

In regards to the intersection control at either Airport Road/University Boulevard, or University Boulevard/U.S. Highway 30 westbound off ramp, the data does not support traffic signal improvements at this time. However, if the City Council would like a more robust analysis of these two locations in question, staff could be directed to proceed with a more comprehensive analysis for the remaining warrants.

Because there are plans to substantially expand the Research Park in the near future, staff would suggest that the best course of action at this time is to wait until a Traffic Impact Study is performed in relation to the proposed Phase 3 expansion of the ISU Research Park. This approach will not only yield the best long-term investment (not having to remove an expensive improvement installed today when the expansion of the Research Park calls for a different solution) in transportation for the area, but will also ensure whatever improvements are needed will be consistent with the Long Range Transportation Plan, thereby maintaining traffic operations now and into the future.