Lincoln Way Multimodal Crossing Data Collection and Analysis

Phase 2 – Recommendations Summary

Prepared For:

Iowa State University

City of Ames

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Lincoln Highway

Lincoln Way Recommended Actions

Summary of Discovery Findings

Through technical assessment of the range of physical and operations improvement strategies and coordination with the Working Group that was involved throughout Phase 1 (Discovery) and Phase 2, recommended enhancements were developed for the two primary intersections of:

- Lincoln Way/Welch Avenue.
- Lincoln Way/Stanton Avenue.

The listed intersections were the primary focus of this phase as they currently experience safety and/or uncontrolled pedestrian activity warranting action. Reasons for concluding action is warranted are:

- Lincoln Way/Welch Avenue:
    - **Crash Severity:** Over the most recent five-year period crashes occurring at the intersection reflected more crashes that resulted in injuries than over intersections in the corridor and more than similar intersections across the state.
    - **Crashes Involving Pedestrians:** Drilling into conditions that exist relative to the elevated severity reveals more pedestrian-vehicle involved crashes than occur at other intersections in the corridor and at similar intersections across the state.
- Lincoln Way/Stanton Avenue:
    - **Uncontrolled Pedestrian Crossing Levels:** Stanton Avenue is one of two intersections (Gray Street is the other) between Sheldon Avenue and University Boulevard without a signalized pedestrian crossing. While there is not a marked and controlled pedestrian crossing, more than 230 pedestrians were observed crossing Lincoln Way at Stanton in the pedestrian peak hour during the data collection period.
    - **Elevated Crash Rate:** The crash rate observed at the intersection over the last five years (2007-2016) is higher than the critical crash rate. The observed crash rate over the period is 0.73 crashers per million entering vehicles and the critical crash rate is 0.33 crashes per million entering vehicles.
    - **Minor Sight Distance Issues:** On-street parking spaces on the south side of Lincoln Way and directly west of Stanton Avenue create the potential for

obstructed sight distance for vehicles on the south approach. While automobiles parked in the first stall or two do not create an issue, should a larger commercial vehicle be parked, there is the potential for obstructed views for drivers and pedestrians.

Recommended Physical Corridor Changes

To address safety and pedestrian crossing concerns identified in Phase 1-Discovery, three levels of improvement strategies have been identified. The levels reflect:

- **Low Cost Investment**: Improvements reflect lower cost concepts that actively address safety concerns. Lower cost investments represent construction costs of less than $20,000.
- **Moderate Cost Investment:** Improvements to address safety concerns in the construction cost range of $20,000 to $100,000.
- **Higher Cost Investment:** Improvements with construction costs in excess of $100,000.

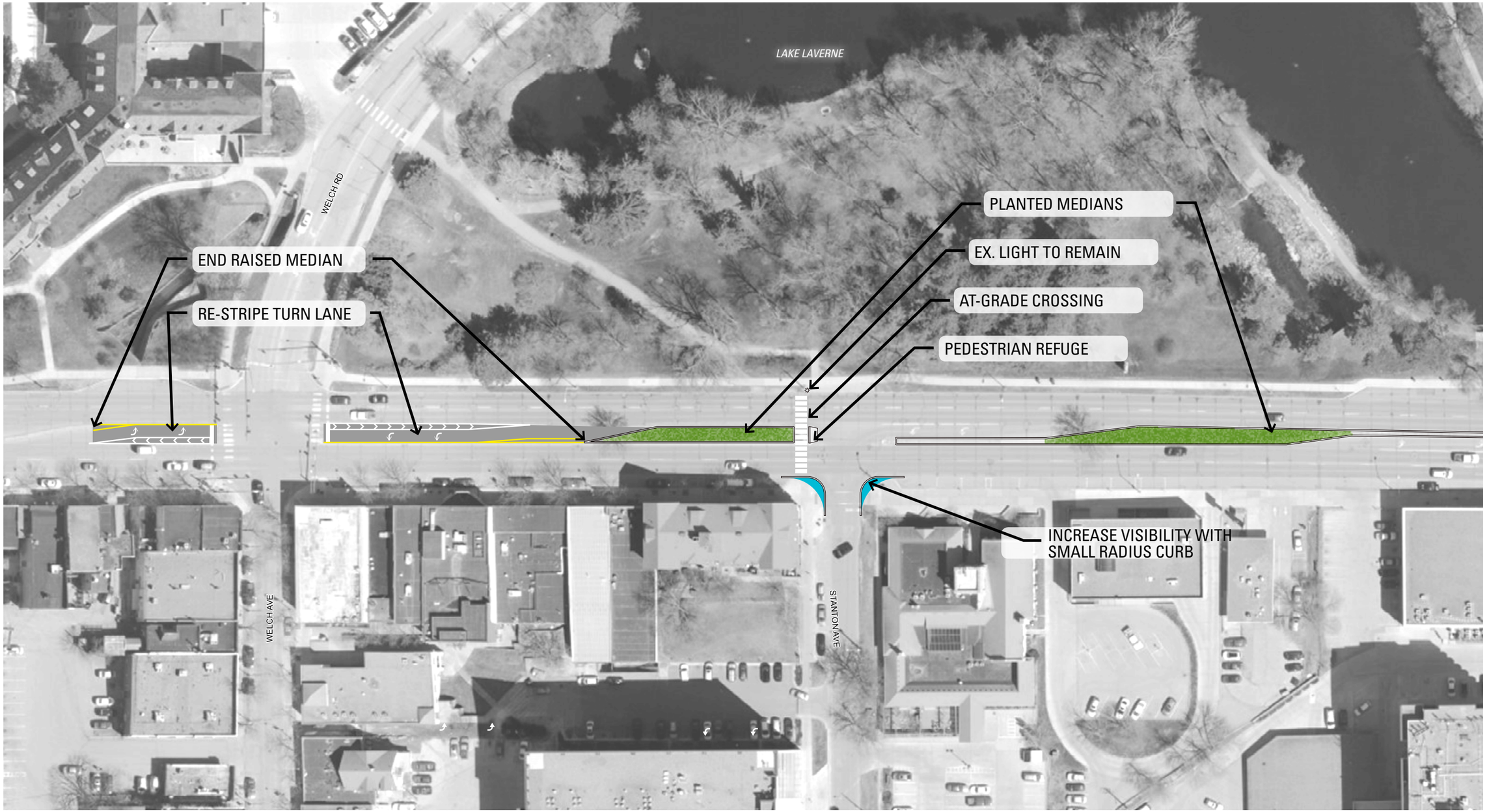
Recommended physical changes at the Lincoln Way/Welch Avenue intersection are intended to increase the level of pedestrian compliance with walk indications by removing the two-stage crossing promoted by the raised median currently present. Recommendations for the intersection fall into the moderate cost category.

While study of the pedestrian compliance with signal indications associated with the presence of a median is relatively limited, those identified suggest an 18 percent reduction in compliance when a median is present[1]. By removing the current four-foot wide raised median (which is not intended to be a pedestrian refuge) through the left turn lane and replacing it with a painted separation between the left turn and inside through lane the ad hoc refuge created by pedestrians is eliminated. Thus, the ability to make a two-stage crossing against the WALK indication is substantially reduced. Figure 1 displays the recommended concept for reconfiguring left turn lanes on Lincoln Way at Welch Avenue.

Recommendations from the study for the Stanton Avenue intersection reflect physical changes focused on one of two alternate philosophies of addressing observed conditions:

- **Discourage pedestrian crossing at the intersection:** To significantly reduce pedestrian crossing of Lincoln Way at Stanton Avenue the Working Group supported a physical barrier (fence) be added to the median and the median break

[1] Pedestrian Compliance with Concurrent and Exclusive Phasing at Traffic Signals, Kevin R. McKernan University of Connecticut, 2015



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Recommended Improvements - Lincoln Way at Welch Avenue and Stanton Avenue

Lincoln Way Corridor Safety Study
Ames, IA

Figure 1

along Lincoln Way be eliminated. By removing the median break, a continuous barrier between controlled intersections at Welch Avenue and Lynn Avenue is possible and was proposed as the most effective option to discourage pedestrian crossing.

- **Permit pedestrian crossings and improve safety:** Features that result in discouraging pedestrian crossing at Stanton Avenue are relatively costly, increase maintenance costs, and restrict access at Stanton Avenue to right-in-right-out. If these impacts are too intrusive at the intersection and surroundings areas to be accepted by pedestrians and/or travelers, the recommended alternative is to provide a marked, but uncontrolled pedestrian crossing.

Consensus of the Working Group was eliminating the uncontrolled pedestrian activity at Stanton Avenue was preferred, however, it was also the majority opinion that creating the continuous barrier required to eliminate crossings was very intrusive and had substantial negative vehicle impacts. Thus, the initial recommendation for the intersection was to establish a marked, but uncontrolled pedestrian crossing. Figure 1 highlights the concept that includes:

- Painting a crosswalk across the west side of the intersection.
- Reconstructing the west side median to provide an ADA compliant crossing and pedestrian refuge in the median. Providing an adequate crossing will require reconstructing a portion of the eastern portion of the west side median.

Corridor Signal Timing Update

In addition to location specific improvement strategies, an update of the signal timing and offsets between intersections was recommended to address the following:

- **Reduce pedestrian and vehicular delay currently observed:** While the current signal timing supports acceptable operations in the peak and off-peak periods (level-of-service C or better), updating the timing from the circa-2008 plan, can have the following benefits:
    - Reduce average pedestrian delay by approximately 10 to 23 percent depending on the intersection, which can improve compliance with signal indication as the wait time is less.
    - Reduce average vehicular delay by approximately 20 percent.
- **Reduce the number of stops vehicles traveling through the corridor experience per trip:** By updating the signal timing to better reflect current traffic, average stops can be reduced by approximately 18 percent.

- Reduce corridor vehicle travel time: As much of the time spent traveling through the corridor is delay associated with stopping at a signal, reducing the stops will reduce the overall travel time. The proposed update to signal timing is anticipated to reduce corridor travel time by approximately 15 percent.

  Associated with the signal retiming, the Working Group supported incorporating a leading pedestrian interval (LPI) at Welch Avenue, which will give pedestrians the WALK indicator for approximately four to 10 seconds (depending on approach) to at least cross one lane of traffic before vehicles on Welch Avenue are given the green light to proceed. The primary benefit of the early release is pedestrians are more visible to drivers, which results in a reduction in vehicle-pedestrian crashes and severe crashes. Based on pedestrian and vehicle traffic travel patterns, implementing a LPI with the timing update, the following improvements can result:

- **Severe Crashes:** Reduced by 64 percent.
- **Vehicle-Pedestrian Crashes:** Reduced by 59 percent. It should be noted, five of the seven crashes observed over the most recent 10-year period (2008-2017) are correctable by including the leading pedestrian interval application.

Planning Level Cost Estimates of Recommended Changes

Basic unit cost based construction cost estimates were prepared for the physical change alternatives included in the recommended plan for Lincoln Way at Welch Avenue and Stanton Avenue. Estimates are based on the following general elements:

- Demolition of current curbs/medians.
- Reconstruction of the median as needed to relocate the curbline.
- Repaving the existing roadway in construction areas.
- Painting affected crosswalks (new and rehabilitated).
- Limited landscaping rehabilitation.

Table 1 documents the estimated costs associated with each of the recommended physical changes to the intersections. The table also includes planning level cost estimates of creating a pedestrian crossing barrier at Lincoln Way/Stanton Avenue by closing the median opening and constructing a median fence from east of Welch Avenue to west of Lynn Avenue.

Table 1. Physical Change Planning Level Cost Estimates

Location	Description		Low Cost	High Cost
Welch Avenue	Remove concrete median Reconstruct concrete median nose Repave	Repaint crosswalk Restripe turn lane	$8,500	$10,000
Stanton Avenue – Cross Walk	Remove concrete median Repave Patch median curb	Repaint crosswalk Curb ramps Curbline modifications	$12,000	$15,000
Stanton Avenue– Median Closure/ Barrier	Remove concrete median Remove base material Add soil	Patch median curb landscaping Black picket-style fence in median	$100,000	$125,000
Corridor Retiming	Implement signal cycle length, phasing plan and offset recommendations from study.		Minimal – Staff time only. Plans from study readily implementable	