

## 8.0 CONCLUSIONS AND NEXT STEPS

The City of Lincoln has identified multiple corridors to convert from one-way to two-way operations within the downtown area. This study evaluated the feasibility of such a conversion by evaluating the impact on traffic operations, on-street parking, pedestrian and bicycle facilities, wayfinding signage, transit operations, curbside management, delivery vehicle access and parking garage operations. The purpose of this study was to complete a quantitative and qualitative evaluation of the benefits and disadvantages associated with a conversion to two-way streets.

This study completed an in-depth evaluation of the six Scenario 2 corridors by generating concept designs to accompany the traffic operations analysis. Two different alternatives for the two-way conversion concepts were developed as Concept 2A (3-lanes) and Concept 2B (2-lanes). This study does not provide a final recommended build option or phasing plan but rather multiple options for consideration and the pros and cons of each. As these projects move closer to construction, the final decision on cross-sections will likely be driven by a combination of community discussion, user groups, traffic engineering principles, and vision for the downtown area. In some cases, physical limitations and/or capacity concerns will dictate what options can be constructed in specific areas.

To benefit these discussions, the following criterion were identified and quickly summarized to highlight the difference in concept:

### 8.1 Pedestrian Safety

***Definition:*** The general level of ease a pedestrian perceives when using the facility and the statistical evidence of risks associated.

***Questions to ask yourself:*** How comfortable will you feel crossing the intersection? Do you know where all potential vehicles are coming from and whether they see you?

Concept 2A provides uniform intersection layouts throughout the study area as pedestrians will encounter two-way traffic flow at each intersection. As a result, pedestrians understand that vehicles can be in conflict from either direction. This is how interactions between pedestrians and vehicles occur at most intersections.

Concept 2B provides similar uniformity to Concept 2A. In addition to expectations, some all-way stop-controlled intersections implemented along certain corridors will increase the priority given to pedestrians. All-way stop control will also decrease the vehicular travel speed across the crosswalks.

## 8.2 Bicycle Safety

**Definition:** The general level of ease a bicyclist perceives when using the facility and the statistical evidence of risks associated.

**Questions to ask yourself:** How safe would you feel cycling within the study area? Would safety concerns prevent you from utilizing this mode of transportation?

Concept 2A provides traditional two-way operations and allows bicycle facilities to be implemented in both directions. This provides easier connections to destinations and avoids movements along one corridor for one direction and using another corridor for the return. Lower vehicle speeds on two-way streets would also improve bicyclist perceived safety.

Concept 2B provides the simplicity of Concept 2A, but with less street width dedicated for vehicle travel, an increased buffer space between vehicles and cyclists can be provided. Increased buffer space provides more separation of between modes and more margin of safety for driving errors when they occur.

## 8.3 Vehicle Safety

**Definition:** The general level of ease a motorist perceives when using the facility and the statistical evidence of risks associated.

**Questions to ask yourself:** How likely are you to be involved in a crash when driving the study area? Are there more or less risk factors to safety based on the layout and operations of the intersection?

Concept 2A provides uniform operations for vehicles which meets driver expectations. The lower speeds along street corridors are expected to reduce crash severity. Additionally, with only one through travel lane in each direction, weaving and merging between intersections is reduced. The inclusion of two-way left-turn lanes improves safety at intersections by reducing rear-end and angle crashes.

Concept 2B provides uniform operations similar to Concept 2A but is not expected to have as many safety benefits at intersections. Weaving and merging between intersections is further reduced with this concept. Without dedicated turn lanes, some higher volume intersections may see increased sideswipe, rear-end, and angle crashes when compared to Concept 2A.

## 8.4 Vehicle Mobility

**Definition:** The general level of ease a motorist can progress between intersections given potential interruptions in flow.

Questions to ask yourself: How quickly can you traverse the study area whether you are beginning or ending in downtown? Can more users be handled without significant impacts to reliable travel times at the same time of day?

Concept 2A reduces the number of thru lanes provided on some streets in the study area which is expected to reduce the ability for vehicles to consistently travel near the speed limit. Dedicated two-way left-turn lanes provide additional capacity at the intersection to limit the overall impact that may be had on mobility.

Concept 2B also reduces the number of thru lanes within the study area like Concept 2A. Without dedicated two-way left-turn lanes, reduced capacity at intersections will further limit the mobility of vehicles. Each interaction between users will likely have a more significant impact on vehicle speeds.

## 8.5 Multimodal Accommodations

Definition: The overall network's ability to accommodate users in an efficient manner that reduces conflict and increases serviceability among pedestrians, bicyclists, and transit/bus users.

Questions to ask yourself: How easily can different modes interact and navigate the study area? When you are not in a vehicle, is your ability to use the network easy, safe, and suitable?

Concept 2A creates a uniform network that simplifies bus routes. Reduced speeds of vehicles increase the safety of buses making maneuvers in and out of stops. Two-way left-turn lanes increases capacity at intersections providing more reliable service and user decision making during mixing is simplified.

Concept 2B creates a uniform network as well. Without two-way left-turn lanes, decreased capacity at intersections is expected to increase delay and could mean more unreliable service as compared to Concept 2A.

## 8.6 Delivery Accommodations

Definition: The overall capacity of delivery trucks to utilize the network and the level of impact the delivery truck staging has on surrounding vehicular operations.

Questions to ask yourself: How well can the network accommodate delivery activities? Are you likely to be impacted by delivery activities?

Concept 2A provides two-way operations that limits the ability of users to maneuver around delivery vehicles staged in the street. A two-way left-turn lane provides some refuge for delivery

activities without interrupting the thru lane. Trucks stopped in the center lane could affect intersection operations and queueing.

Concept 2B has two-way operations but does not have an extra lane for truck deliveries. Any stopped truck on a two lane facility would significantly impact traffic operations. An alternate option under this concept would be the use of alleys or dynamic parking areas for delivery vehicle loading/unloading.

## 8.7 Parking Inventory

Definition: The net change in total on-street parking inventory.

Question to ask yourself: What is the total availability of on-street parking within the study area?

Concept 2A provides three traveling lanes which means less pavement between curbs is available for parking. As a result, there may be entire block faces without parking or parking areas must be designed for parallel parking layouts which limits inventory and increases parking friction.

Concept 2B provides one lane in each direction without the additional lane for storage of left-turning vehicles. This increases the potential for parking on all block faces and more opportunities for angle parking stalls. Angle parking stalls allow for more overall inventory per block face compared to Concept 2A.

## 8.8 Parking Friction

Definition: The level of effect on-street parking maneuvers has on the safety of all users.

Questions to ask yourself: How difficult is it to get into and out of on-street parking stalls? What is the expected severity and rate of crashes involving parking maneuvers?

Concept 2A provides two-way operations that will decrease the average speed of vehicular traffic. The decrease in speeds along each street will make parking maneuvers easier to react to. The two-way left-turn lane also provides additional space for evasive maneuvers to be made with reduced likeliness to conflict with another vehicle.

Concept 2B provides two-way operations that will decrease average speeds of vehicular traffic and create easier reactions to parking maneuvers. Without a two-way left-turn lane, some dedicated space to turning-movements that could provide extra refuge is lost. However, in many cases a greater buffer width may exist between parking and thru traffic conflict zones depending on parking layout and design.

## 8.9 Parking Garage Ingress/Egress

**Definition:** The ease of which vehicular traffic can enter or exit parking facilities during peak operations.

**Questions to ask yourself:** How easy can you access parking garages? Can you easily exit garage facilities?

Concept 2A provides two-way operations which increases the available routes for entering and leaving parking facilities. Two-way left-turn lanes provide separation for queueing vehicles to wait to enter garages while allowing thru traffic to bypass. During peak periods, gaps to make left-turns may be less available and may be hindered by conflicting vehicles and queues.

Concept 2B provides two-way operations but does not have a two-way left-turn lane for additional capacity. During times of peak operations, both entering and exiting garage facilities can be inhibited due to the loss in capacity of the adjacent street and longer queues.

## 8.10 Ease of Circulation

**Definition:** The general accessibility of each user to reach their destination.

**Questions to ask yourself:** How quickly can you reach your intended destination when entering the study area? If interruptions in service exist at a location, how can alternatives be utilized to quickly reroute your path to your destination?

Concept 2A provides two-way operations that simplifies the path to and from destinations. Two-way left-turn lanes provide additional capacity at intersections to reduce delay. During interruptions in routes due to emergencies, accidents, or construction, multiple alternate routes are available within the study area.

Concept 2B provides two-way operations for increased routing options like Concept 2A. Without two-way left-turn lanes, capacity at intersections is reduced and the ability for users to navigate the study area is reduced compared to Concept 2A.

## 8.11 Cost of Implementation

**Definition:** The cumulative cost to the City to fund the construction of a transition to two-way operations.

**Question to ask yourself:** What will engineering, construction, and construction management of the alternative cost?

Concept 2A provides two-way operations and three lanes for vehicular traffic. This option avoids implementing stop-controlled intersections to avoid potential safety risks. Signalized intersections require more infrastructure and increase the cost of the alternative.

Concept 2B provides two-way operations and two lanes for vehicular traffic. This option can implement stop-controlled intersections throughout the network which require less infrastructure investment compared to signalized intersections. This option is expected to be less expensive than Concept 2A.

## 8.12 Event Operations

**Definition:** The network capacity and ease of planning to accommodate large demand in short intervals.

**Question to ask yourself:** How easily can you arrive/leave a special event in around the study area? How much delay is incurred during pre- and post-event traffic?

Concept 2A provides two-way operations with a two-way left-turn lane. This left turn lane provides additional intersection capacity to service event traffic flow. Additionally, with traffic signals at intersections, traffic flow can be prioritized through traffic signal timings and pedestrian movements better controlled. This concept also allows for reversible lane center turn lane treatments on key entry and exit corridors from large events.

Concept 2B provides two-way operations with a single lane in each direction. Further reduction in capacity will cause more delay when compared to Concept 2A.

## 8.13 Ease of Understanding

**Definition:** The overall ability for a new user to understand the network and utilize it accordingly.

**Questions to ask yourself:** How likely are you to understand how to navigate the study area? Are out of town visitors more or less likely to disrupt operations?

Concept 2A provides two-way operations throughout the network. This makes unfamiliar users more likely to understand how to navigate the study area and more easily identify intended routes. This also reduces confusion while operating a vehicle that may lead to errant behavior, mistakes, and crashes.

Concept 2B also provides two-way operations throughout the network. The ability to understand the network is expected to be very similar to that of Concept 2A.