NORTH DUSABLE LAKE SHORE DRIVE STUDY SPOTLIGHT

TRANSIT PRIORITY AT EXPRESS BUS JUNCTIONS

REDEFINE THE DRIVE
NORTH DuSABLE LAKE SHORE DRIVE

General Project Information

June 2022

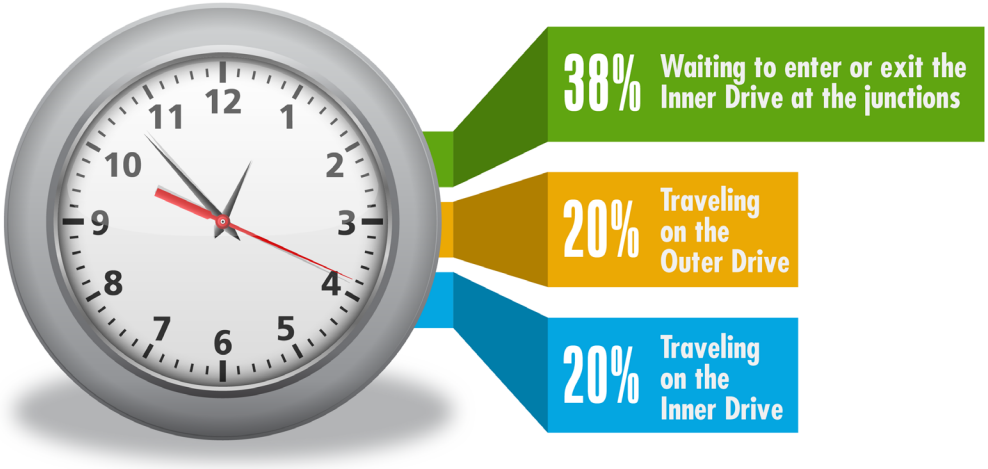
The North DuSable Lake Shore Drive (NDLSD) Phase I Study seeks to improve transit mobility and reliability in the NDLSD corridor. These efforts are not only focused on bus travel on the Outer Drive, but they also aim to reduce substantial delays affecting express buses at junction intersections and ramps. Based on survey results from the Fall 2020 Public Input Opportunity, more bus riders noted that delays are experienced when waiting at the junctions (38%), relative to on the Outer Drive (20%) or Inner Drive (20%). For additional details regarding the overall Phase I Study, please visit the project website at northdusablelakeshoredrive.org.

What is a junction?
A junction is a grade-separated intersection (one road passes over another) that allows crossing roadways to connect with NDLSD without interrupting through traffic on the Outer Drive.

Where are the express bus junctions on NDLSD?
Certain junctions along NDLSD accommodate existing CTA express bus routes. These include:

- Grand Ave/Chicago Ave
- Michigan Ave
- Fullerton Pkwy
- Belmont Ave
- Irving Park Rd
- Foster Ave

When on the bus, where do you generally experience the longest delays in travel times?

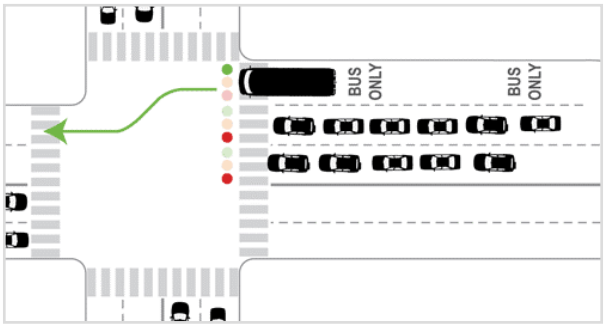


TOTAL RESPONSES: 2,565

Source: Survey responses for Question #5 from NLSD Phase I Study Public Information Opportunity Sept-Nov, 2020

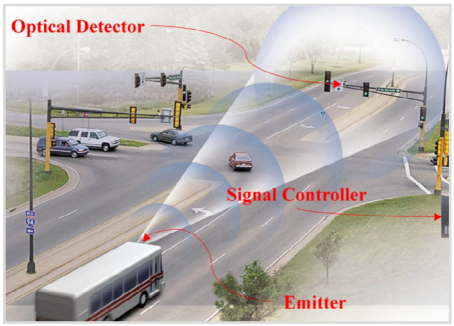
IMPROVEMENT GOAL

Allow buses to bypass traffic congestion at express bus junction entrance and exit ramps and intersections. This can be achieved by providing traffic signal priority phases for buses, bus-only queue-jump lanes, bus-activated ramp signals and/or exclusive bus-only entrance and exit ramps and signals.



Bus Queue Jump Lane

Transit Signal Priority



Transit Signal Priority Operations

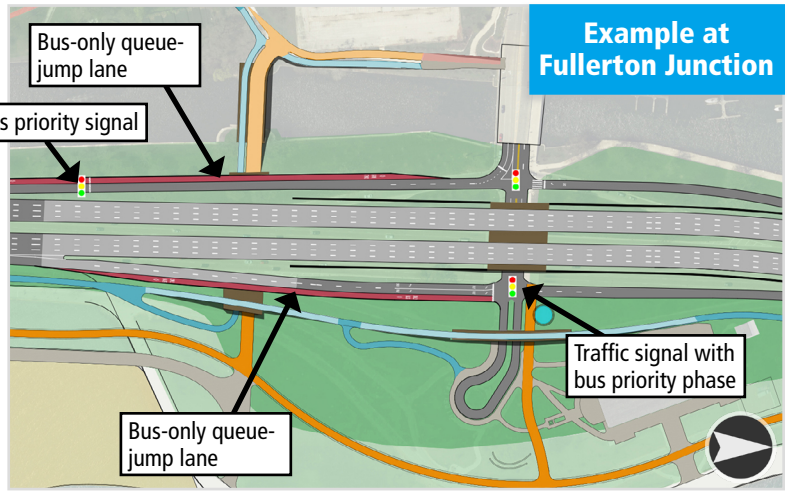
Illinois Department of Transportation
CDOT Chicago Department of Transportation

IMPROVEMENT ALTERNATIVES

The NDLSD alternatives feature two different methods for providing transit priority at express bus junctions: bus-only queue jump lanes on general purpose entrance and exit ramps, or special purpose entrance and exit ramps serving restricted access median lanes.

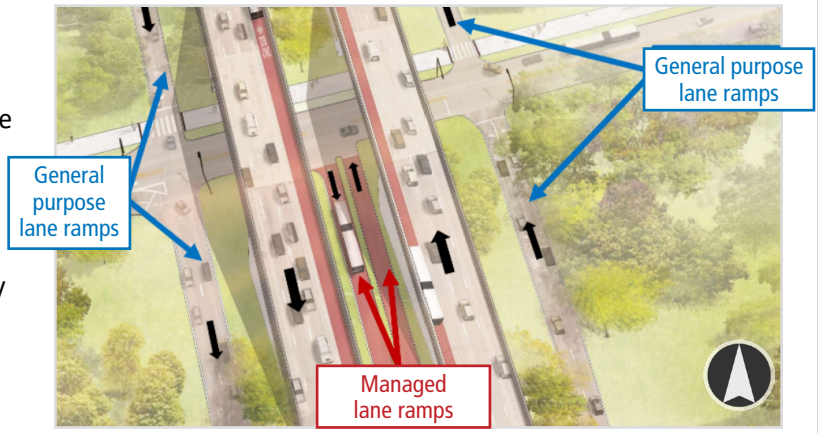
1. **The Essential Alternative** features bus-only queue-jump lanes on general purpose entrance and exit ramps as shown at right:

- Southbound entering buses would use a bus-only queue jump lane to activate a ramp signal that stops general traffic flow on the ramp, allows the bus to "jump" the queue, and creates a gap in the entering traffic flow to help the bus merge into the Outer Drive.
- Northbound exiting buses would use a bus-only queue-jump lane to "jump" the exit ramp traffic queue approaching a ramp intersection and then activate a special bus-only signal phase to advance buses through junction intersections ahead of general purpose traffic.
- Express buses would enter and exit the Outer Drive from the right-most general purpose travel lane.



2. **The Addition, Exchange, Flex,** and **Double Flex Alternatives** would feature special purpose entrance and exit ramps directly to and from bus-only or shared managed lanes as shown at right:

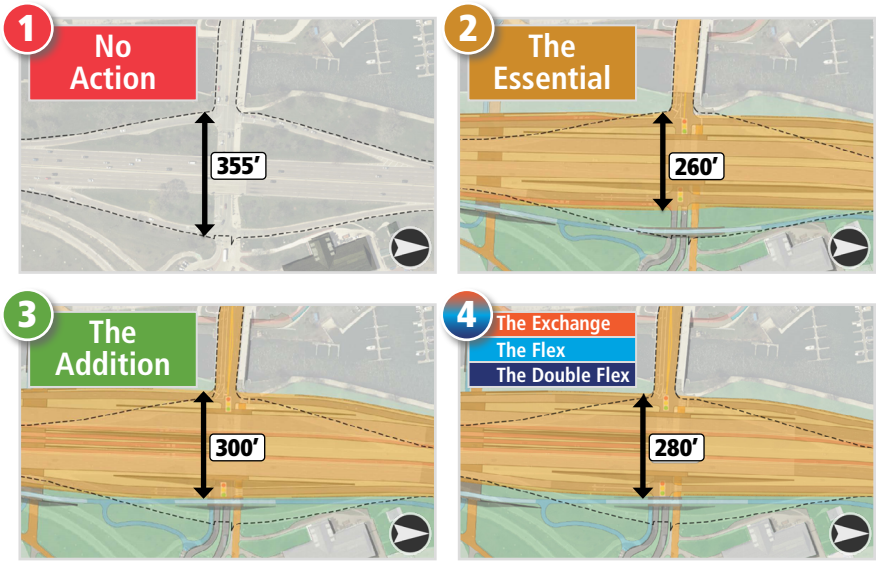
- Southbound entering buses would bypass the general purpose entrance ramp and enter the Drive using a special purpose entrance ramp located in the NDLSD median that directly accesses bus-only or managed lanes on the left side of the Outer Drive.
- Northbound exiting buses would exit to the left from bus-only or managed lanes directly onto a special purpose exit ramp located in the NDLSD median. Buses would then activate a bus priority traffic signal to advance through the junction intersections ahead of general purpose traffic.



TRANSPORTATION FOOTPRINTS AT EXPRESS BUS JUNCTIONS

All alternatives aim to reduce transportation footprints at junctions to the maximum extent possible. One method to achieve this is by narrowing the widths of the junction infield areas (inaccessible spaces between the junction ramps and the Outer Drive). At both Fullerton Parkway and Foster Avenue junctions, the proposed transportation footprint for all alternatives is reduced compared to existing conditions. At all express bus junctions, the alternatives with center median access ramps for transit are marginally wider compared to the Essential alternative with bus queue jump ramps along general purpose ramps. The images below compare the widths of transportation footprints for existing conditions various alternatives at the Fullerton Parkway junction:

1. **No Action** (existing conditions)
2. **The Essential**
3. **The Addition**
4. **The Exchange, the Flex, and the Double Flex**



TRANSIT MOBILITY AND RELIABILITY

The right side queue-jump lanes at junctions in the Essential alternative and the special purpose center median queue-jump ramps and lanes in the Addition, Exchange, Flex, and Double Flex alternatives would all enhance transit service on NDLSD. The Essential alternative would provide transit priority at junctions while the other alternatives would provide transit priority both at and between junctions. From a corridor-wide perspective, these differences in transit priority treatments affect the level of estimated mobility and reliability benefits each alternative is expected to achieve.

The table to the right displays average forecasted 2050 corridor travel times derived from a traffic simulation model for the seven existing CTA express bus routes for the proposed alternatives. Results are presented for peak hour, peak direction bus operations (Southbound A.M. and Northbound P.M.) under average and poor travel conditions. Poor travel conditions in this case refer to reduced travel speeds due to rain or snow that are experienced 30% of the peak hours during the year on average. During off-peak hours when there is limited congestion along NDLSD, the transit travel times would be comparable between alternatives.

Alternative	2050 Average Transit Corridor Travel Time (in minutes)*			
	Average Conditions		Poor Conditions	
	AM Southbound	PM Northbound	AM Southbound	PM Northbound
No Action	**23.5**	**20.2**	**33.8**	**25.8**
Essential	**20.1**	**15.0**	**30.8**	**22.8**
Addition	**16.1**	**13.4**	**19.6**	**14.8**
Exchange	**16.7**	**14.2**	**19.8**	**15.5**
Flex	**16.4**	**13.6**	**19.6**	**15.7**
Double Flex	**16.9**	**14.8**	**20.5**	**16.7**

*Transit Corridor includes NDLSD and junctions.

Some key findings from the travel time results shown in the table are as follows:

- Adding transit priority only at junctions for the Essential would result in a 9 to 26% reduction in average express bus travel times compared to No Action depending on peak hour and travel conditions.
- Providing center bus-only access ramps at junctions combined with exclusive free-flow bus-only or managed lanes would result in an even greater travel time savings (27 to 43%) compared to No Action.

In terms of transit travel reliability, the table to the right displays average 2050 corridor travel time ranges for the seven express bus routes for these alternatives as derived from a traffic simulation model. Notable results in terms of transit reliability are as follows:

Alternative	2050 Corridor Transit Reliability Travel Time Range (in minutes)*			
	Average Conditions		Poor Conditions	
	AM Southbound	PM Northbound	AM Southbound	PM Northbound
No Action	**8.0**	**9.1**	**12.3**	**7.0**
Essential	**4.8**	**1.9**	**5.6**	**2.1**
Addition	**2.0**	**1.0**	**5.1**	**1.2**
Exchange	**2.4**	**1.2**	**3.2**	**1.5**
Flex	**1.5**	**1.5**	**2.3**	**1.7**
Double Flex	**2.2**	**3.7**	**6.4**	**2.0**

*Larger ranges indicate less reliable transit service.

- The proposed transit priority improvements in the Essential would result in greatly improved travel time reliability during peak hours in the peak direction (40 to 55% better during the A.M. and 70 to 80% better during the P.M.) depending on travel conditions.
- Provision of center bus-only access ramps at junctions combined with exclusive free-flow bus-only (Addition and Exchange alternatives or a single managed lane (Flex alternative) improves reliability further (59 to 89% more reliable).
- Provision of center bus-only access ramps at junctions combined with dual managed lanes (Double Flex alternative) results in substantial improvements in reliability (48 to 72% more reliable), although not as much as the other three alternatives with center access ramps.

BUS ON RIGHT SHOULDER

During Level 2 Screening the study team evaluated adding a right shoulder to NDLSD that could be used as bus priority lane between junctions when the general traffic lanes are congested. This concept was dismissed due to poor performance and operational challenges. Although buses operating on the shoulder could travel somewhat faster than congested general traffic in adjacent lanes, top bus speeds adjacent to slow traffic would need to be limited to maintain safe operation. Analysis found that during more than 70% of peak period conditions, general traffic would not operate slowly enough to warrant bus on shoulder operation.

In addition, because of the magnitude of entering and/or exiting traffic in the peak direction at junctions, buses would either have to merge back into the adjacent congested general purpose travel lane or exit and reenter the Drive at each junction. This would limit and potentially eliminate any corridor-wide transit mobility and reliability benefits of bus on right shoulder operations.