# North Lake Shore Drive

Grand Avenue to Hollywood Avenue

Phase I Study

# Alternatives to be Carried Forward
## Technical Memorandum

July 30, 2020
Updated: Fall 2020

*Prepared for:*
Illinois Department of Transportation
Chicago Department of Transportation

## Forward

This Technical Memorandum summarizes the development and evaluation of the North Lake Shore Drive Alternatives during Level 1 and Level 2 Screening and documents the selection of the Alternatives to be Carried Forward (ATBCF).

The July 30, 2020 ATBCF Technical Memorandum was used to support Regulatory Agency Coordination during Level 2 screening. During the fall of 2020 , minor edits were made to add clarity, address format, and correct typos.

Table of Contents

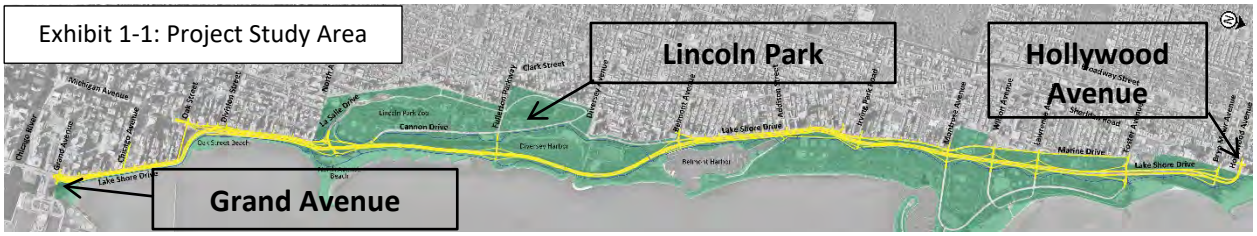
## Appendices

# 1. Introduction and Background

The purpose of this Technical Memorandum is to summarize the analysis and stakeholder coordination that supports the recommended alternatives to be carried forward for the North Lake Shore Drive (NLSD) project. The alternatives to be carried forward will be further evaluated in the Draft Environmental Impact Statement (DEIS).

The Illinois Department of Transportation and the City of Chicago initiated the NLSD Phase I study in 2013. The project limits extend approximately 7 miles, from Grand Avenue on the south to Hollywood Avenue on the north, as shown on Exhibit 1-1.

Exhibit 1-1: Project Study Area




NLSD is located primarily within Lincoln Park, which is a historic park that is over 1,200 acres in size and is listed on the *National Register of Historic Places*. Lincoln Park began as a 60 acre parcel of unused cemetery land in 1860 and was expanded in 9 major stages. The last stage was completed in 1957. Approximately 25% of Lincoln Park was established through property acquisition and the remainder was established through a series of lake fill projects. This long period of park expansion and design included the work of prominent landscape designers, architects, and artists. Exhibit 1-2 depicts an early plan for Lincoln Park.

Exhibit 1-2 Early Lincoln Park Plan


The project corridor consists of an 8 lane "Outer" Drive and a 2 to 4 lane "Inner" Drive. The Outer Drive, as it exists today, was constructed in sections, between the 1930s and 1950s. Although NLSD includes features similar to an expressway, such as grade-separated junctions (i.e., interchanges), the roadway also has non-expressway features such as curb and gutter and a 40 mph posted speed limit. NLSD is classified by the Illinois Department of Transportation (IDOT) as an arterial route rather than an expressway. Therefore, the project was not defined as a major capital project in the transportation component of the Chicago Metropolitan Agency for Planning (CMAP) GO TO 2040 Comprehensive Regional Plan. However, for the ON TO 2050 Plan, which was adopted in the fall of 2018, the definition of a major capital project has been updated to include arterials in addition to expressways. NLSD is included in the On To 2050 Plan as a fiscally constrained major capital project.

## 2. Purpose and Need Summary

The Purpose and Need received concurrence from the resource agencies in December of 2014, and was developed through a combination of technical analyses, agency coordination and stakeholder input. The Project Study Group (PSG), which consists of the Illinois Department of Transportation (IDOT), the Chicago Department of Transportation (CDOT), the Chicago Transit Authority (CTA), and the Chicago Park District (CPD), was utilized for initial discussion and review of project materials. Resource Agency input was gathered through formal scoping, individual meetings, and NEPA/404 Merger meetings. General stakeholder input was received through Task Force meetings/workshops, public meetings, community meetings, and other small group meetings. Based upon this information, the purpose of the project is to improve the NLSD multi-modal transportation facility. The specific needs to be addressed include:

**Improve Safety for All Users.** Over a 5-year period (2007 to 2011)*, the Outer Drive experienced over 5,800 crashes, resulting in 1,005 injuries and 17 fatalities. In addition, portions of the Outer Drive have been designated by IDOT as "5% locations", which are locations that are among the top 5% priorities for safety improvements statewide. The Outer Drive currently has substantial deficiencies that contribute to safety concerns, such as the sharp roadway alignment at the Oak Street S Curve, and the lack of clear zones at the outside edges of the roadway. Crashes involving cyclists or pedestrians are also a concern, with 146 crashes, 137 injuries and 1 fatality occurring over the same period. Crashes involving cyclists and pedestrians are predominantly along the Lakefront Trail, which includes multiple conflict points between vehicles and cyclists/pedestrians where the trail crosses roadways adjacent to the Outer Drive. Conflict points between pedestrians and cyclists are primarily located along the Lakefront Trail. Exhibit 2-1 shows a crash involving a cyclist on the Lakefront Trail.

Exhibit 2-1: Cyclist crash

**Improve Mobility for All Users.** The Outer Drive carries up to 161,000 vehicles and 42,000 transit riders per day. The Lakefront Trail accommodates as many as 31,000 trail users per day. This has led to poor levels of service and long stacks of vehicles at each junction and along the Outer Drive. This congestion effects bus service, with bus travel speeds being substantially reduced during the A.M. and P.M. peak periods. In addition, portions of the Lakefront Trail are far over capacity. Exhibit 2-2 illustrates Outer Drive congestion during a typical peak period.

*Note: the crash analysis will be updated as part of Level 3 Screening.

Exhibit 2-2: Typical Outer Drive Congestion

**Improve Infrastructure Deficiencies.** Much of the NLSD infrastructure was constructed in the 1930s. The bridges, tunnels and the base pavement have exceeded their typical service life by decades and the overall facility has numerous features that do not comply with ADA standards. Maintenance cycles have become more frequent and do not address underlying issues. Another key deficiency is drainage. The relatively close proximity of the Outer Drive and the Lakefront Trail to Lake Michigan, south of LaSalle Drive, results in periodic flooding during high wave conditions. This results in the closure of lanes on the Outer Drive, the complete closure of the Lakefront Trail, and damage to the Lakefront Trail. Exhibit 2-3 illustrates the temporary measures being taken to support an aging bridge.

Exhibit 2-3: Temporary Bridge Supports

Exhibit 2-4: Existing Pedestrian Underpass

**Improve Access and Circulation.** NLSD and Lincoln Park attracts tens of thousands of users to the study area each day. This level of demand overburdens the access and circulation systems of the park and the roadway. Access between Lake Michigan and the urban edge is provided at junctions and at multiple bicycle/pedestrian tunnels. At the junctions, non-motorized (bike/ped) access is hindered by conflicts with vehicles. The existing bicycle/pedestrian tunnels are undersized, non ADA compliant, and uninviting as shown on Exhibit 2-4. Transit access to the park is also limited by congestion, a lack of turnaround facilities, and a lack of bus staging and layover areas.

## 3. Alternatives Identification and Development

The NLSD Build Alternatives were developed to ensure consideration of a full range of potential alternatives. The below section includes features and concepts that are common to all Build Alternatives and descriptions of each alternative under consideration.

### 3.1 Features common to all Build Alternatives

#### 3.1.1 Study Area Constraints

The Outer Drive is within historic Lincoln Park, which includes 80 National Register of Historic Places contributing features within or adjacent to the Outer Drive. Some of the contributing features include the existing bridges at LaSalle Drive, Fullerton Parkway, Belmont Avenue, Wilson Avenue and Lawrence Avenue. There appears to be no platted right-of-way limits for the Outer Drive.

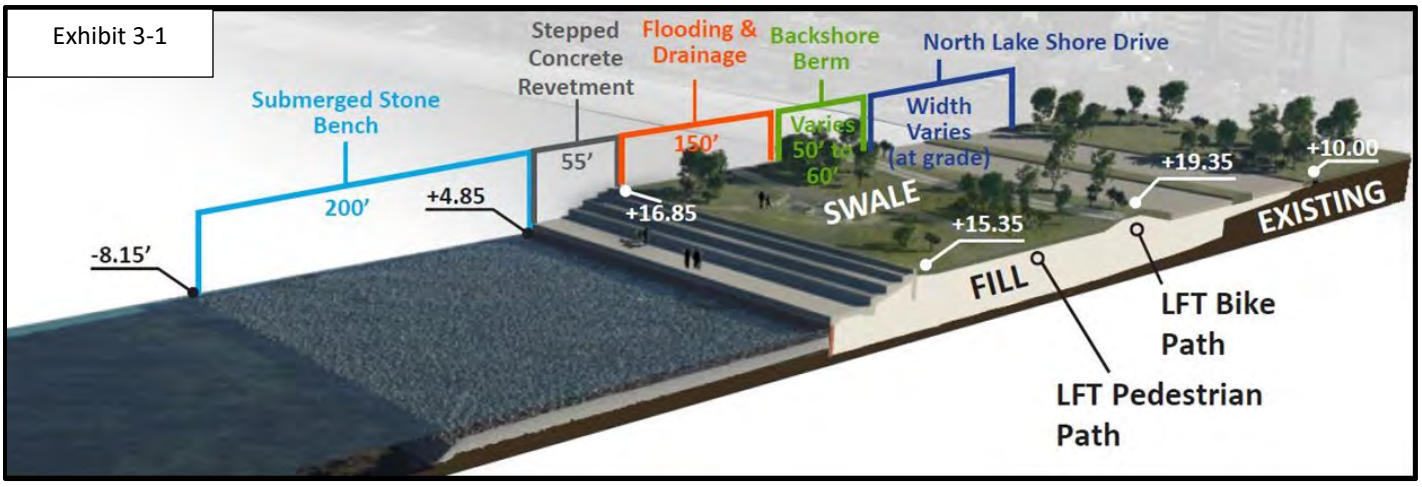
Therefore, for the purposes of this study, the right-of-way for the Outer Drive is assumed to be the existing backs of curbs. In addition, the median and junction infields are assumed to be part of the transportation footprint. The property beyond this right-of-way is Chicago Park District Property and is protected by Section 4(f) of the Department of Transportation Act of 1966 and Section 106 of the National Historic Preservation Act of 1966. This unique project setting requires early consideration of environmental factors, in addition to the Purpose and Need evaluation, which utilizes transportation performance factors. The environmental review discussed in Section 4 is high level, which is consistent with the conceptual level of detail of the Build Alternatives.

Another key consideration is the City of Chicago's 1972 Lakefront Plan of Chicago, and the companion Lake Michigan and Lakefront Protection Ordinance, which contain provisions related to NLSD. These provisions include strengthening the parkway characteristics of the Outer Drive, (i.e., converting the Outer Drive to a lower speed, landscaped thoroughfare with truck prohibitions) prohibiting expressway characteristics, and maintaining the current traffic speed and capacity. Alternatives that are not consistent with these provisions would require consideration of a new ordinance, or modifications to the existing ordinance.

### 3.1.2 Shoreline Protection Measures

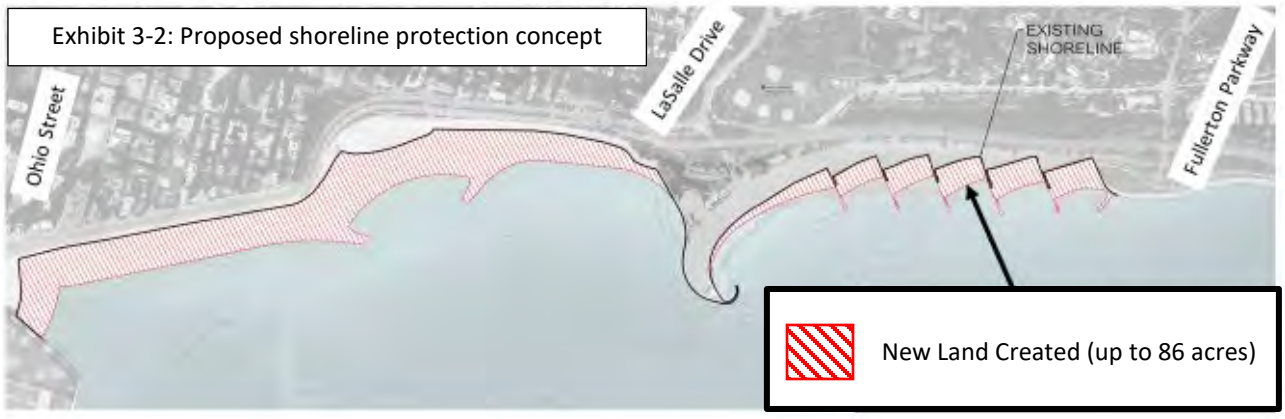
Shoreline protection measures, which would be designed to prevent wave overtopping from reaching the Outer Drive and portions of the Lakefront Trail, would be common to all Build Alternatives, and would create additional park space. Fill would be placed in Lake Michigan to extend the existing shoreline further east between Ohio Street and Fullerton Parkway in concert with stepped concrete revetment walls or expanded beaches, as shown on Exhibit 3-1. In addition, a swale and a backshore berm would be constructed within the new shoreline area to contain overtopping waves and return flood flows to the lake. The shoreline protection measures require state and federal agency coordination as well as the appropriate permits.

Exhibit 3-1




**Proposed Shoreline Protection Concept**

As shown on Exhibit 3-2, the new shoreline would extend up to 400 feet into Lake Michigan and create up to 86 acres of new land between Ohio Street and Fullerton Parkway.

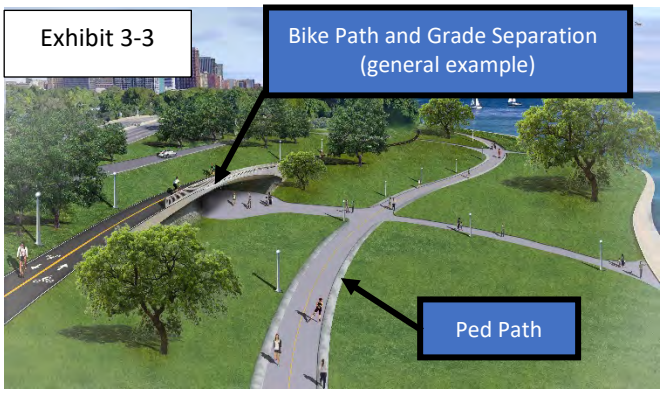


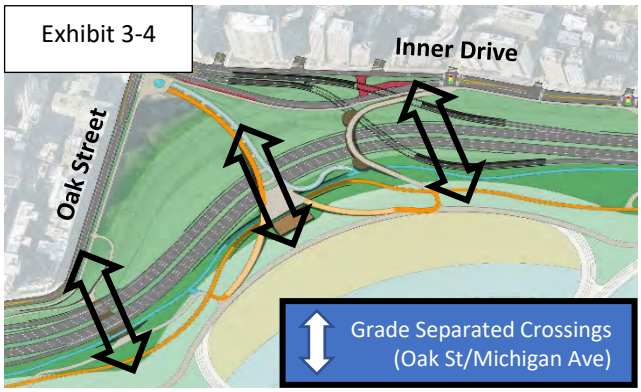

### 3.1.3 Lakefront Trail Improvements

Improvements to the existing Lakefront Trail will be common to all Build Alternatives, with some exceptions at spot locations where an alternative-specific design is required. The general scope of the Lakefront Trail improvements includes:

- Separate trails for cyclists and pedestrians.
- Grade separate the Lakefront Trail bike path from pedestrians at junctions to eliminate conflicts with vehicles and lakefront users.
- Protect the Lakefront Trail bike path from wave overtopping.
- Provide additional grade-separated crossings so there is a crossing approximately every one-quarter mile throughout the project.
- Expand sidewalks/paths at junctions.
- Reconstruct the existing trail underpasses to provide inviting, safe, and ADA compliant crossings.

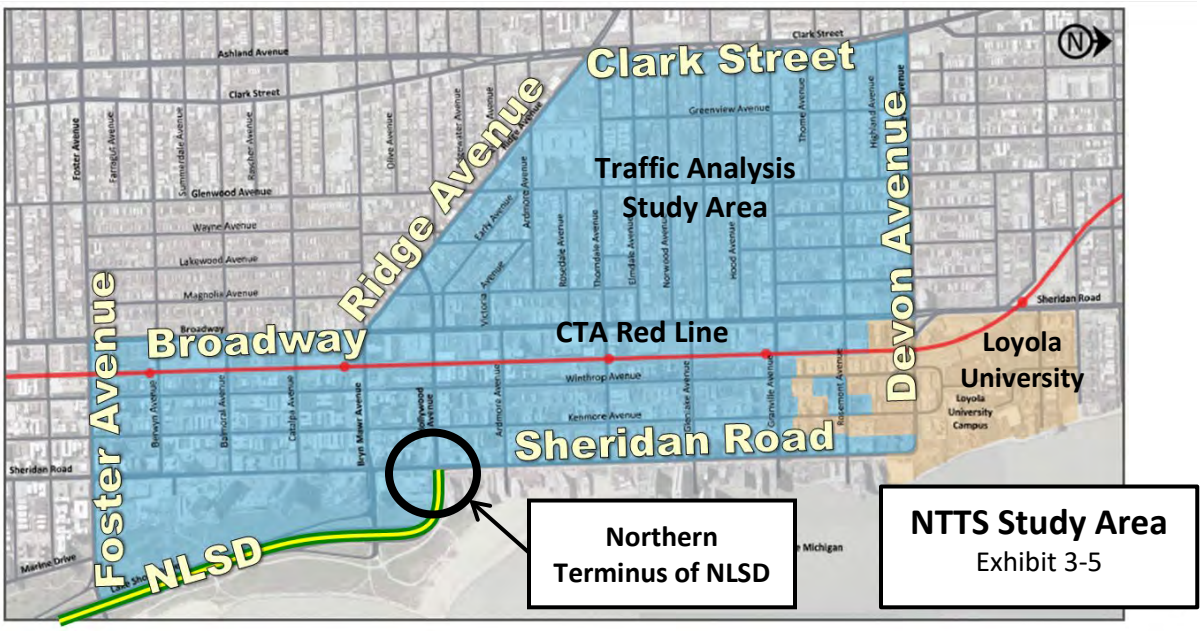
Exhibits 3-3 and 3-4 depict the separation of bicycle and pedestrian paths (Exhibit 3-3) and potential grade separated crossings at Michigan Avenue/Oak Street (Exhibit 3-4).



### 3.1.4 Northern Terminus Improvements

As shown on Exhibit 3-5, NLSD terminates within the Edgewater neighborhood and the 48th Ward, where more than 70,000 vehicles per day traverse through the neighborhood in order to travel to and from the northern terminus of NLSD. This heavy travel demand contributes to mobility, safety, and accessibility concerns within the community. An analysis of alternatives is ongoing (Northern Terminus Traffic Study, NTTS). The recommended NTTS improvements will be common to all the Draft EIS Alternatives. However, depending upon the scope of the NTTS improvements, they may or may not become part of the NLSD alternatives that are under study.




### 3.1.5 Outer Drive lane reduction

Another feature common to all Build Alternatives (with the exception of the Managed Lane Alternatives) is the reduction in the number of lanes on the Outer Drive north of Irving Park Road from the current 8 lanes (4 lanes in each direction) to 6 lanes (3 lanes in each direction). The following is a summary of the lane reduction analysis.

Under existing and year 2040 conditions, a substantial volume of southbound traffic enters the Outer Drive at Irving Park Road and at Belmont Avenue. The on-ramps were originally designed as one-lane ramps; however, due to the magnitude of entering volumes, they operate today as two-lane on-ramps. The heavy entering volume combined with inadequate merging areas cause congested conditions along the Outer Drive, which spill back as far north as Foster Avenue during the A.M. peak period. The congested conditions result in poor Levels of Service during peak times of day.

Exhibit 3-6 depicts a screenshot of a VISSIM (traffic model) simulation for the 2040 No Action Alternative (see section 4.1.2 for further information about the tools used for the NLSD alternatives analysis). The screen shot shows the spill back congestion and estimated speeds for the A.M. peak hour as a result of the heavy southbound volume entering at Irving Park Road that is forced to merge into the through lanes in a very short distance. North of Irving Park Road, traffic volumes on the Outer Drive decrease dramatically compared to traffic volumes south of Irving Park Road. North of Irving Park Road, traffic is less concentrated on the Outer Drive and disperses to the adjacent street network in the northern section of the project. The lower traffic volume presents an opportunity to "right size" the northern portion of the Outer Drive (reduce the existing cross section from 8 lanes to 6 lanes). An 8 lane cross section (4 lanes in each direction) would be maintained south of the Irving Park Road junction. However, the outer lanes would be exclusively for southbound vehicles entering and northbound vehicles exiting at Irving Park Road. This reduces the number of conflicts between vehicles entering and exiting the Outer Drive and through traffic, including weaving and/or lane changing maneuvers.

Exhibit 3-6: VISSIM Analysis screen shot (2040 No Action)

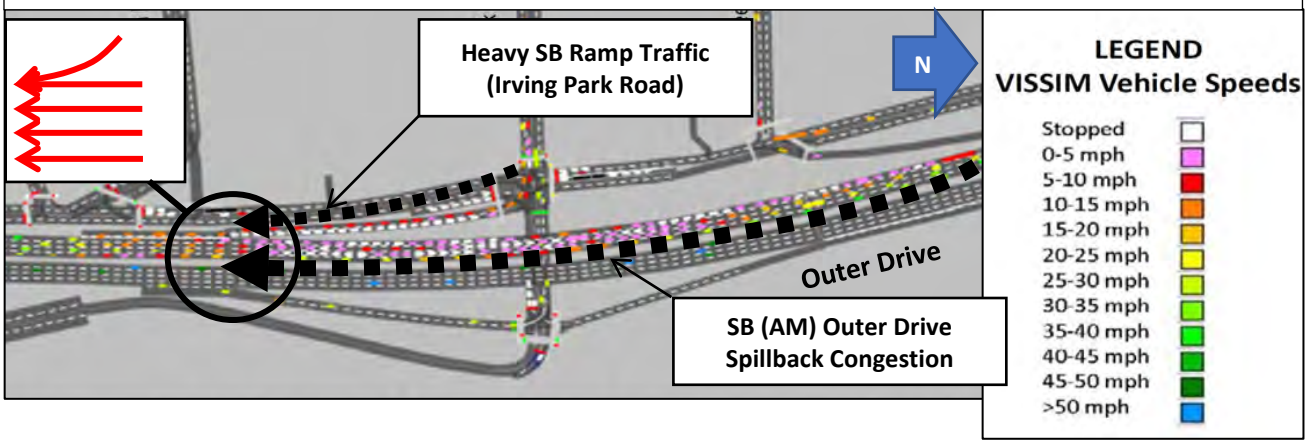
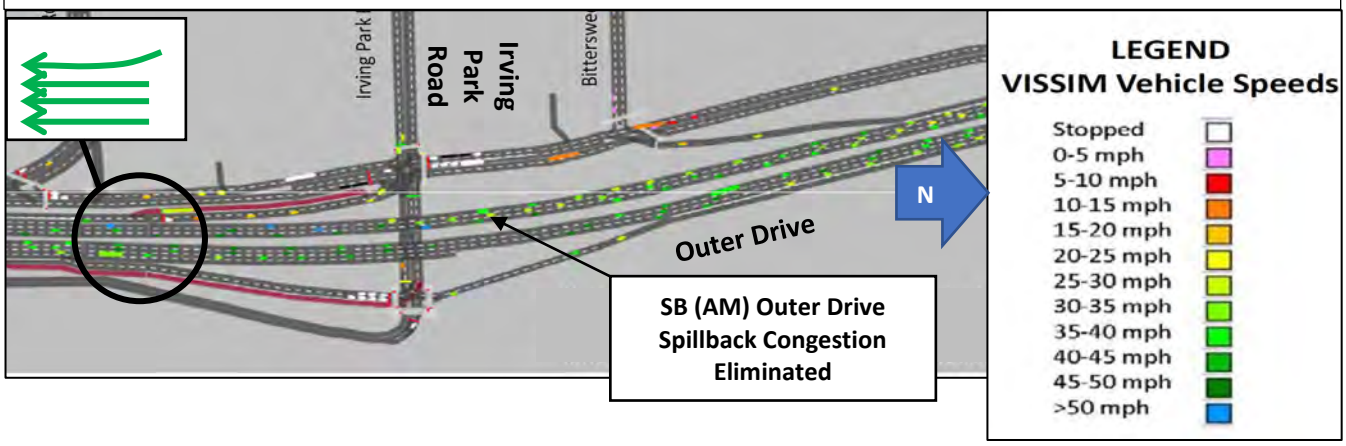



Exhibit 3-7 depicts a screenshot of the VISSIM (traffic model) simulation for the 2040 Build condition (southbound A.M. peak) discussed above. Converting the fourth (outside) southbound lane to an exclusive entrance lane would substantially improve travel flow along the Outer Drive, as shown.

Exhibit 3-7: VISSIM Analysis screen shot (2040 Build condition - with lane reduction)



## 3.2 Congestion Management Process

Federal transportation planning regulations require that for projects within designated Transportation Management Areas (TMAs) congestion management strategies must be fully considered as an alternative to increasing capacity for single occupant vehicles (SOVs), whether part of a project specific NEPA alternatives analysis, or as part of a regional planning Congestion Management Process (CMP). TMAs are urbanized areas with populations greater than 200,000. The greater urbanized area of northeast Illinois is a TMA and includes the NLSD study area. Congestion management can be defined as a series of low cost and/or modal strategies that have the potential to reduce travel demand or better accommodate existing traffic volumes without building additional SOV capacity into the roadway network. The NLSD build alternatives do not include adding general purpose lanes, in recognition of the environmental constraints discussed in section 3.1 and in the Purpose and Need. In addition, the build alternatives include extensive non-motorized travel and transit improvements, and/or tolling as a management strategy. It is also important to note that a major purpose of the project is to address infrastructure deficiencies, which CMP related strategies would not address. In summary, CMP elements are already considered as part of the build alternatives. Therefore, an additional CMP alternatives analysis is not necessary.

## 3.3 Description of Alternatives

### 3.3.1 No Action Alternative

The No Action Alternative assumes no improvements beyond periodic maintenance would be made to the Inner and Outer Drives in the study area. The existing design deficiencies, periodic flooding, capacity bottlenecks, and safety concerns would remain in place. Outside the study area, the fiscally constrained major capital projects in the CMAP GO TO 2040 comprehensive regional plan are assumed to be in place. The 2040 forecast was also used for the Level 2 screening, with CMAP incorporating the various roadway and transit improvements for each alternative and providing the corresponding Travel Demand Model output to the project team. Refined No Action and Build forecasts will be developed for the next round of alternatives evaluation (“Level 3”). For additional information regarding the Level 2 and Level 3 screening processes, see Section 4.1.

The Level 2 NLSD alternatives evaluation (Purpose and Need evaluation) began in 2017 using year 2040 forecasts and was mostly completed prior to the availability of the 2050 forecasts in the fall of 2018. Therefore, year 2040 forecasts were used for consistency to complete the remainder of the Level 2 alternatives evaluation. The Draft Environmental Impact Statement (DEIS) Alternatives will be evaluated (“Level 3”) using year 2050 forecasts.

### 3.3.2 Build Alternatives

Based upon a combination of technical studies and stakeholder input, four major categories of Build Alternatives were identified:

- Tunnels and Causeways
- Context Tailored Treatments (CTT)
- Transitways (TW)
- Managed Lane (ML)

The Tunnels and Causeways alternatives focus on addressing transportation needs while avoiding or minimizing impacts to historic Lincoln Park by relocating the Outer Drive into a tunnel beneath Lincoln Park or onto a causeway in Lake Michigan.

The CTT alternatives represent a base level of improvements common to all Build Alternatives (excluding the Tunnels and Causeways Alternatives), and address key purpose and need factors, including safety, mobility, access, and facility condition and design. Spot transit improvements ("Transit Advantages") such as queue jump lanes and bus priority signals are included with each CTT Alternative, although the configuration of these spot improvements varies amongst the CTT Alternatives. The Top Performing CTT Alternative also serves as the foundation for the Transitway and Managed Lane Alternatives.

- The Transitway (TW) Alternatives build upon the base CTT by ***adding*** dedicated space for transit.
- The Managed Lane (ML) Alternatives utilize the base CTT but ***convert*** one or more general purpose lanes to a Managed Lane.

In addition to addressing basic transportation needs such as mobility, safety, access and facility condition/design, the CTT, TW and ML Alternatives also provide differing strategies for improving transit mobility on the Outer Drive:

- CTT Alternatives – spot transit improvements
- TW Alternatives – dedicated space for transit
- ML Alternatives – converted space for transit (and some autos)

Exhibit 3-8 illustrates the general relationship between the CTT, TW and ML Alternatives.

Exhibit 3-8: General relationships between CTT, TW and ML Alternatives

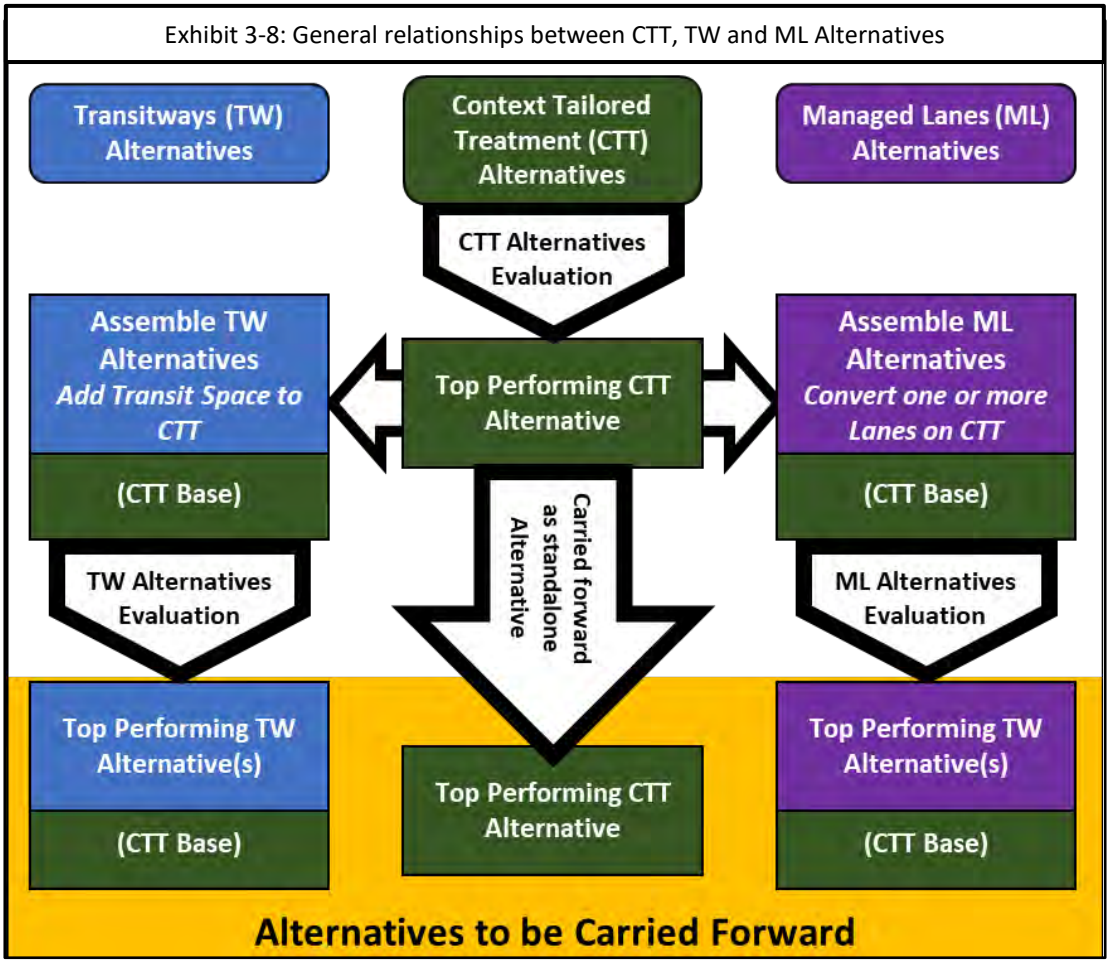
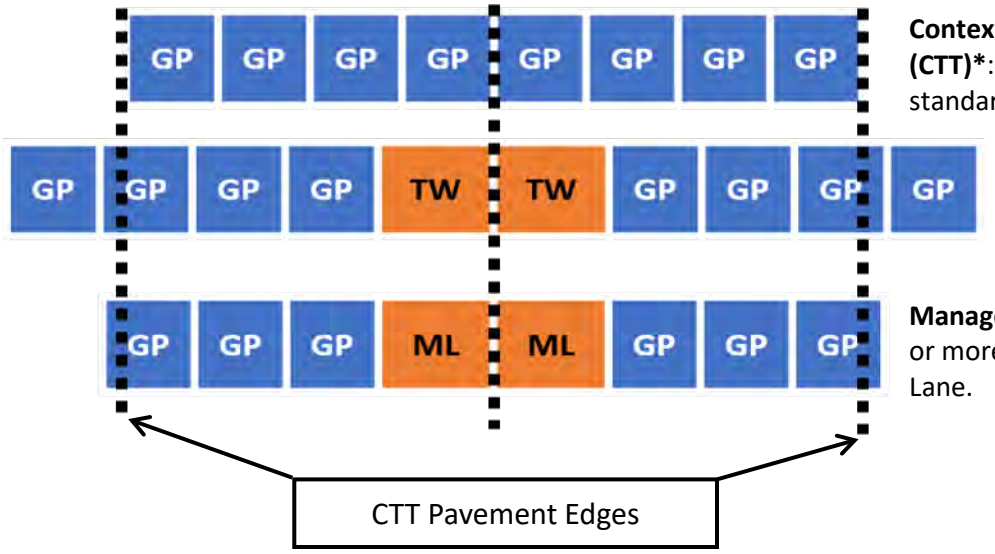


Exhibit 3-9 illustrates the footprint relationship between the CTT, TW and ML Alternatives

Exhibit 3-9: General *footprint* relationship of CTT, TW and ML cross sections (south of Irving Park Road)




**Context Tailored Treatments (CTT)***: bring NLSD up to modern standards.

**Transitways (TW)*:** add dedicated space for transit.

**Managed Lane (ML):** convert one or more GP lanes to a Managed Lane.

**4 General Purpose Lanes maintained in both directions south of Irving Park Road for the CTT and TW Alternatives*

**Legend**

GP = General Purpose Lane

TW = Transitway (Bus Only Lane) with 4 ft buffer

ML = Managed Lane, with 4 ft buffer

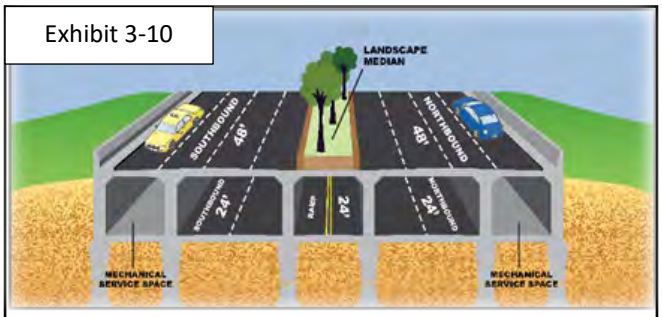
The following is a more detailed description of the Build Alternatives.

3.3.2.1 Tunnels and Causeways

The Tunnels and Causeways Alternatives are intended to serve longer end-to-end travel in the corridor, with limited access to the local street network. There are three Tunnels and Causeways Alternatives that were considered.

**Land Based Express Tunnel**. Similar to the illustration in Exhibit 3-10, this alternative would include the construction of a tunnel below the Outer Drive, from Grand Avenue to Hollywood Avenue, to serve longer distance travel. The existing Outer Drive would be converted to a surface boulevard with at grade intersections for local access.

Exhibit 3-10

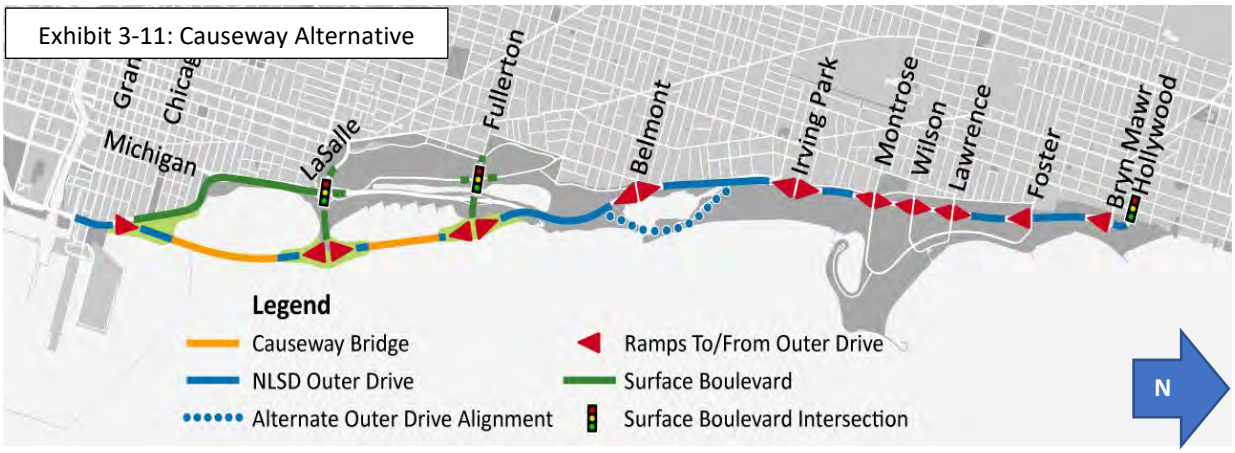



**Land Based Tunnel Alternative**

A majority of the traffic would be expected to utilize the tunnel. As such, the surface boulevard would be lower speed and have a lower traffic volume as compared to the existing Outer Drive.

**Causeway on Lake Michigan**. As shown on Exhibit 3-11, this alternative would include relocating the Outer Drive onto offshore bridges from Chicago Avenue to Fullerton Parkway. Access to the Causeway would be provided at Chicago Avenue, LaSalle Drive, and Fullerton Parkway. North of Fullerton Parkway, the Outer Drive would follow its current alignment.

Exhibit 3-11: Causeway Alternative




**Submerged Express Tunnel**. As shown on Exhibit 3-12, this alternative would include the construction of a tunnel on the bed of Lake Michigan from Grand Avenue to Hollywood Avenue, with access at Grand Avenue, Belmont Avenue, and Hollywood Avenue. A surface boulevard, with signalized intersections, would be constructed along the alignment of the existing Outer Drive.

Exhibit 3-12: Submerged Express Tunnel Alternative


As discussed in Section 4.2.1, the Tunnels and Causeways Alternatives were dismissed at the first stage (Level 1) of the alternatives evaluation due to major flaws, including relatively higher impacts and/or costs. As such, the remaining descriptions and alternatives evaluation is focused on the Context Tailored Treatments, Transitways and Managed Lane Alternatives.

3.3.2.2 Context Tailored Treatment Alternatives

The CTT alternatives include the following common features:

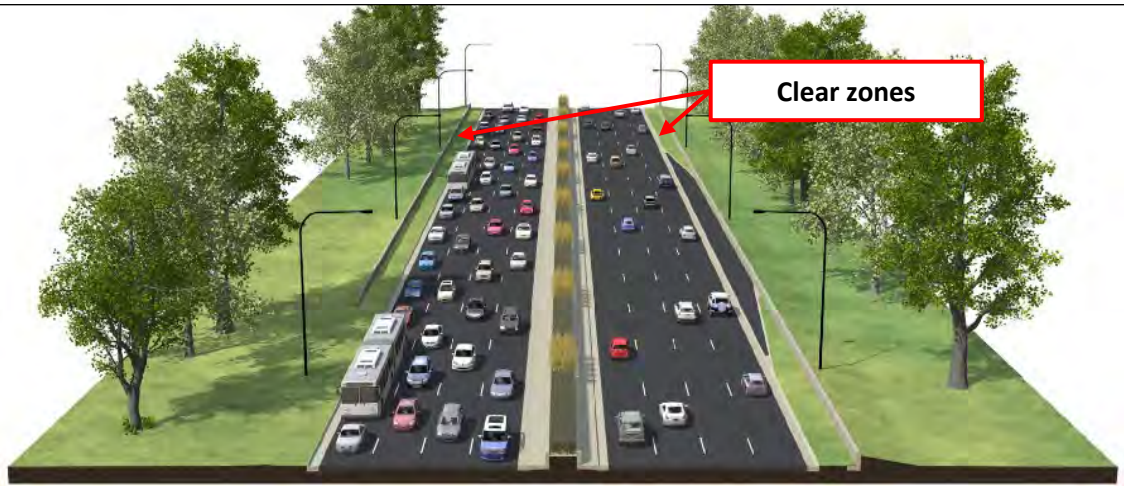
- Complete reconstruction of the Outer Drive and portions of the Inner Drive; improved alignments, weaving zones, and junctions.
- An eight-lane Outer Drive cross section from Grand Avenue to Irving Park Road. North of Irving Park Road, the Outer Drive cross section is reduced from eight lanes to six lanes.
- Improvements at each junction, including a new grade separated junction at Chicago Avenue.
- A flattened S-curve alignment at Oak Street, and an improved alignment near the Irving Park Road junction.
- Ten-foot clear zones beyond the edge of pavement.
- Transit Advantage improvements at junctions (queue jump lanes, bus priority signals) and other transit related improvements (bus turnarounds, bus layovers).
- Lakefront Trail improvements.

Three Initial Context Tailored Treatment (CTT) alternatives were developed, and can generally be described as follows:

- **CTT Alternative 1 (Corridor Modernization Concept)**. Includes reconstructing the Outer Drive to address transportation needs and bring it up to modern standards.
- **CTT Alternative 2 (Compressed Roadway Concept)**. Includes reconstructing the Outer Drive to address transportation needs and bring it up to modern standards, while compressing the footprint of the roadway through the extensive use of retaining walls and a short section of tunnel.
- **CTT Alternative 3 (Frontage Drive Concept)**. Includes reconstructing the Outer Drive to address transportation needs and bring it up to modern standards. One-way frontage drives are utilized at Chicago Avenue, between Belmont Avenue and Irving Park Road, and between Montrose Avenue and Wilson Avenue to accommodate access to the Outer Drive.

Exhibit 3-13 represents the typical roadway cross section for CTT Alternatives 1, 2 and 3 between junctions south of Belmont Avenue.

Exhibit 3-13: CTT Alternatives 1, 2 and 3 (between junctions, south section of the project)



The following is a description of the key features of each CTT Alternative.

Context Tailored Treatment Alternative 1 - Corridor Modernization Concept

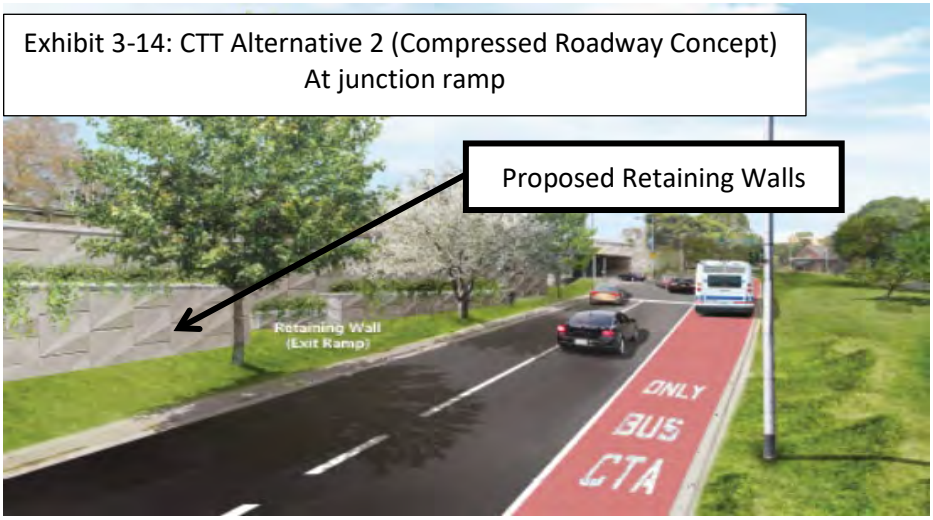
- A new grade separated junction at Chicago Avenue, with approximately 1,800 feet of the Outer Drive lowered below existing grade.
- Improvements that retain the current layout at each junction (e.g., diamond layout) between Michigan Avenue and Irving Park Road, with a compressed design at Fullerton Parkway.
- A new partial junction at Addison Street (to/from the south).
- Consolidation of southbound access at the Montrose Avenue and Wilson Avenue junctions.
- Improvements that retain the current layout at each junction between Lawrence Avenue and Bryn Mawr Avenue, with a compressed design at Bryn Mawr Avenue.
- Transit Advantage components, including queue jump lanes and bus priority signals. Other transit components include improved bus layover/turnaround facilities.

Context Tailored Treatment Alternative 2 - Compressed Roadway Concept

- Extensive use of retaining walls, a short section of tunnel, and compressed designs at junctions to minimize the roadway footprint.
- A new grade separated junction at Chicago Avenue, with approximately 1,800 feet of the Outer Drive lowered below existing grade.
- Improvements that retain the current layout at each junction between Michigan Avenue and Irving Park Road, with compressed designs at every junction.
- The northbound lanes of the Outer Drive would be placed in a 4,200-foot tunnel in the vicinity of Belmont Avenue.
- No access at Addison Street.
- The Outer Drive is shifted east at Montrose Avenue, and Montrose Avenue is converted to a compressed diamond design.
- Access is eliminated at the Wilson Avenue junction.
- Improvements that retain the current layout at each junction between Lawrence Avenue and Bryn Mawr Avenue, with compressed designs at every junction.
- Transit Advantage components, including queue jump lanes and bus priority signals. Other transit components include improved bus layover/turnaround facilities.

Exhibit 3-14 depicts a typical view of CTT Alternative 2 (Compressed Roadway Concept) at a junction. The ramp alignment is moved closer to the Outer Drive, and retaining walls are used in place of earth embankment slopes to create a more compact footprint.

Exhibit 3-14: CTT Alternative 2 (Compressed Roadway Concept)
At junction ramp

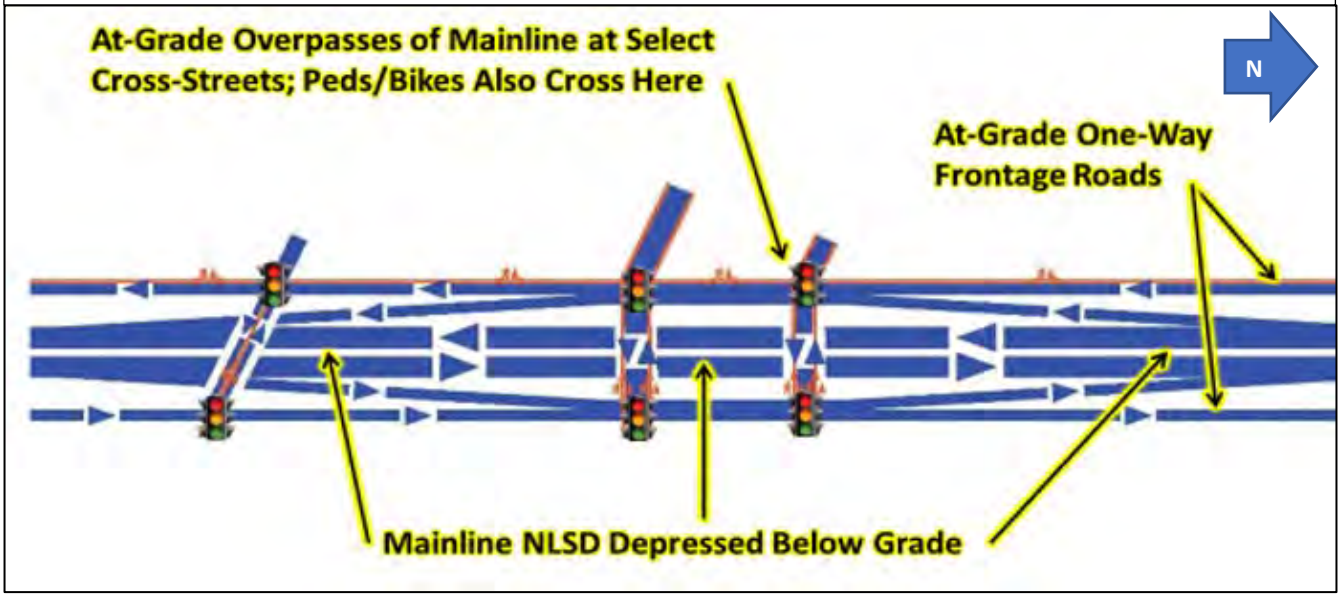


Context Tailored Treatment Alternative 3 - Frontage Drive Concept

- A new grade separated junction at Chicago Avenue, with approximately 3,800 feet of the Outer Drive lowered below existing grade, and one-way frontage drives created between Ohio Street and Walton Street.
- Improvements that retain the current layout at the Michigan Avenue junction.
- A hybrid design at LaSalle Drive that align the ramps to and from the north with the LaSalle Drive/Inner Drive intersection west of NLSD.
- A split junction design (e.g., northbound and southbound ramps are offset) is utilized at Fullerton Parkway and at Diversey Parkway.
- A new partial junction at Addison Street (to/from the south).
- Lowering the Outer Drive and creating one-way frontage drives for approximately 1.5 miles, from south of Belmont Avenue to north of Irving Park Road.
- Consolidation of access (to and from the south) at the Montrose Avenue and Wilson Avenue junctions, using one-way frontage drives.
- Compressed junction designs at Lawrence Avenue and Foster Avenue.
- The Bryn Mawr Avenue junction is converted to an at-grade intersection.
- Transit Advantage components, including queue jump lanes and bus priority signals. Other transit components include improved bus layover/turnaround facilities.

Exhibit 3-15 depicts a typical Frontage Drive concept at a junction.

Exhibit 3-15: CTT Alternative 3 (Frontage Drive Concept)



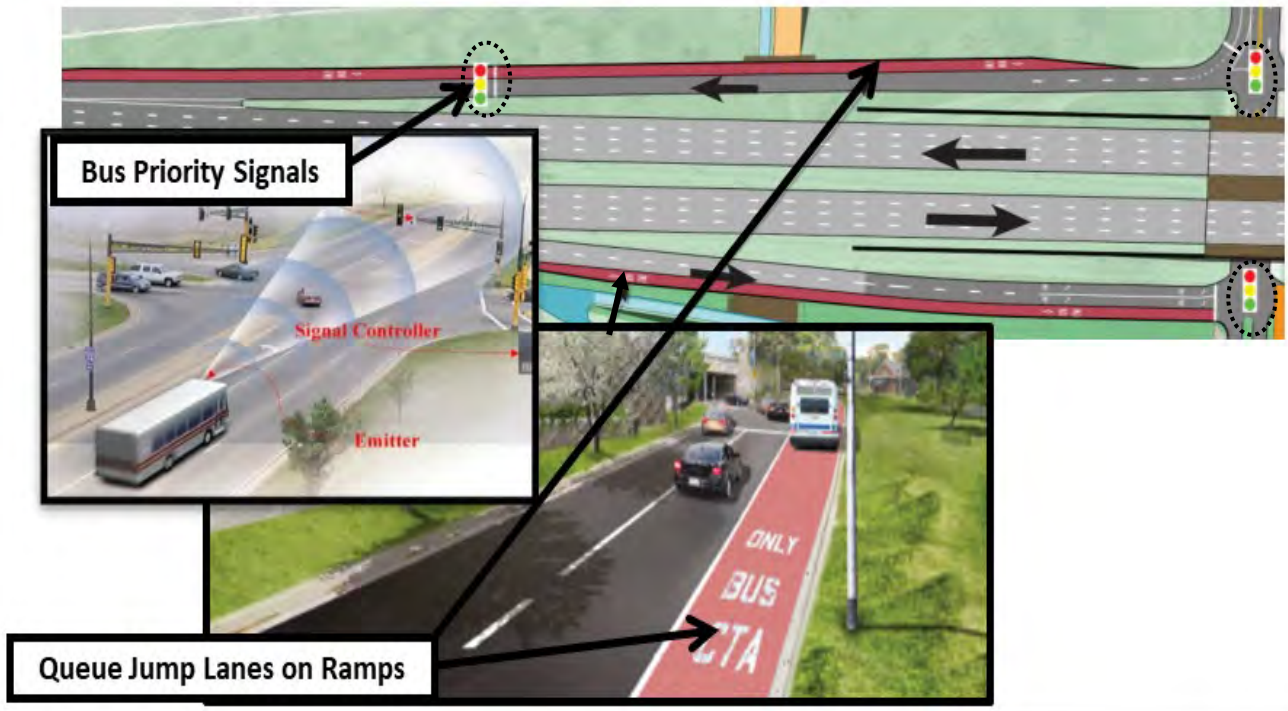
Context Tailored Treatment Alternatives - Transit Advantage Components

As noted previously, CTT Alternatives 1, 2 and 3 include Transit Advantage components, which are illustrated generally on Exhibit 3-16. These components coincide with access points for existing CTA express bus service along the Outer Drive.

The Transit Advantage components include **queue jump lanes**, shown in red on Exhibit 3-16 below, which allow buses to bypass queued traffic either entering or exiting the Outer Drive. Queue jump lanes work in concert with **bus priority signals**, which are activated by buses in the queue jump lanes. The bus priority signals allow buses to pass through these intersections more efficiently. In addition, bus priority signals would be placed at the end of entrance ramps to stop auto traffic and allow buses to merge onto the Outer Drive in advance of vehicular traffic.

Exhibit 3-17 provides a tabulation of the Transit Advantage components, as well as other notable transit components, for CTT Alternatives 1, 2 and 3.

Exhibit 3-16: Transit Advantages Components



| Exhibit 3-17: Transit Advantage components and other transit components (CTT Alternatives)* | | | |
|---|---|---|---|
| **Junction Location** | **CTT Alternative 1 (Corridor Modernization)** | **CTT Alternative 2 (Compressed Footprint)** | **CTT Alternative 3 (Frontage Drives)** |
| **Chicago Avenue** | Southbound queue jump lane and bus priority signal at Grand Avenue | | |
| **Oak Avenue/ Michigan Avenue** | Bus turnaround and layover facilities near Division Street | | |
| **LaSalle Drive** | Bus turnaround facility at east end of LaSalle Drive, improved passenger drop off area at North Avenue beach parking lot | | Bus turnaround and layover facility beneath Outer Drive; improved passenger drop off area at North Avenue beach parking lot |
| **Fullerton Parkway** | Queue jump lanes and bus priority signals for ramps to/from the south | | |
| **Belmont Avenue** | Queue jump lanes and bus priority signals for ramps to/from the south; bus stop, turnaround and layover facility on new alignment parallel to the Inner Drive, north of Belmont Avenue. | Queue jump lanes and bus priority signals for ramps to/from the south | Queue jump lanes and bus priority signals for ramps to/from the south; reconfiguration of a portion of Inner Drive to a bus stop, turnaround and layover facility, north of Belmont Avenue. |
| **Addison Street/ Irving Park Road** | **Addison Street**: queue jump lanes and bus priority signals for ramps to/from the south<br>**Irving Park Road**: queue jump lanes and bus priority signals for ramps to/from the south | **Addison Street** (no ramps at this location)<br>**Irving Park Road**: queue jump lanes and bus priority signals for ramps to/from the south | **Addison Street**: queue jump lane for southbound entrance ramp; bus priority signals for buses traveling to and from the south<br>**Irving Park Road**: queue jump lane for southbound entrance ramp; bus priority signals for buses traveling to and from the south |
| **Montrose/ Wilson/ Lawrence Avenue** | Bus stop, layover and turnaround facilities at Wilson Avenue/Simonds Drive, and Lawrence Avenue/Simonds Drive intersections | | |
| **Foster Avenue** | Queue jump lanes and bus priority signals for ramps to/from the south | | |
| **Bryn Mawr Avenue** | Eastbound to westbound U-turn facility | | |

*Transit Advantage components include queue jump lanes and bus priority signals. Other transit components include bus turnaround/layover facilities.

### 3.3.2.3 Transitway Alternatives

The Transitway (TW) Alternatives represent a range of strategies for improving bus mobility and reliability. In general, these strategies add transit space to the existing general-purpose lanes and range from spot improvements to more robust strategies that include dedicated space for transit along the entire project limits. Five Transitway Alternatives were developed and include:

- Transit Advantage at Junctions (CTT+TA) – spot transit improvements.
- Bus on Right Shoulder (BOS-R) – shared space for transit.
- Dedicated Transitway on Left (DTW-L) – dedicated lanes for transit.
- Dedicated Transitway – Off Alignment (DTW – OA) – dedicated bus corridor on new alignment.
- Light Rail Transit – dedicated rail corridor on new alignment.

The following is a more detailed description of each Transitway Alternative:

**Transit Advantage at Junctions (CTT+TA)**. The Transit Advantages (CTT+ TA) Alternative is the same as the Top Performing Context Tailored Treatment Alternative (CTT+TA) and is depicted on Exhibit 3-18.

The CTT+TA Alternative is also being evaluated as a Transitway Alternative since it includes Transit Advantage components and therefore can also be considered a relatively low impact Transitway Alternative. This is an important consideration for the NLSD project, which is located within historic Lincoln Park (see section 4 for an overall review of environmental considerations).

This second evaluation of the CTT+TA alternative, within the Transitways category, will allow for a comparison of spot transit improvements to more robust corridor transit improvements.

**Transit Advantages at Junctions Alternative**

- **Same as Top performing CTT Alternative (CTT + TA).**
- **CTT+TA includes Transit Advantages features and can also be considered a low impact Transitway Alternative.**
- **CTT + TA will also be evaluated as a Transitway Alternative.**

For reference, the Transit Advantage components are located at the ramps to and from the south at the following junctions:

- Grand Avenue (southbound only)
- Fullerton Parkway
- Belmont Avenue
- Addison Street
- Irving Park Road
- Foster Avenue

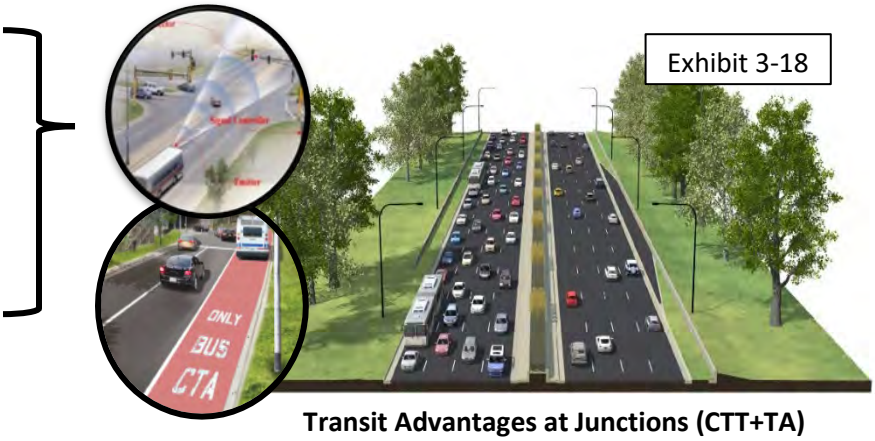



Exhibit 3-18

**Transit Advantages at Junctions (CTT+TA)**

**Bus on Right Shoulder (BOS-R).** As shown on Exhibit 3-19, this alternative includes a continuous paved right shoulder that would be used by buses during peak periods when Outer Drive speeds are below 35 mph. Buses would be able to bypass Outer Drive traffic at speeds no greater than 15 mph over Outer Drive traffic speeds. The right shoulder could also be used by disabled vehicles, emergency responders and police vehicles for speed enforcement.

Exhibit 3-19

**Bus on Right Shoulder (BOS R)**

**Dedicated Transitway on Left (DTW-L).** As shown on Exhibit 3-20, this alternative would include the addition of a bus only lane along the median, with exclusive express bus access to/from the median lanes, which coincides with existing CTA express bus routes at Grand Avenue, Michigan Avenue, Fullerton Parkway, Belmont Avenue, Irving Park Road, and Foster Avenue.

Exhibit 3-20


**Dedicated Transitway on Left (DTW-L)**

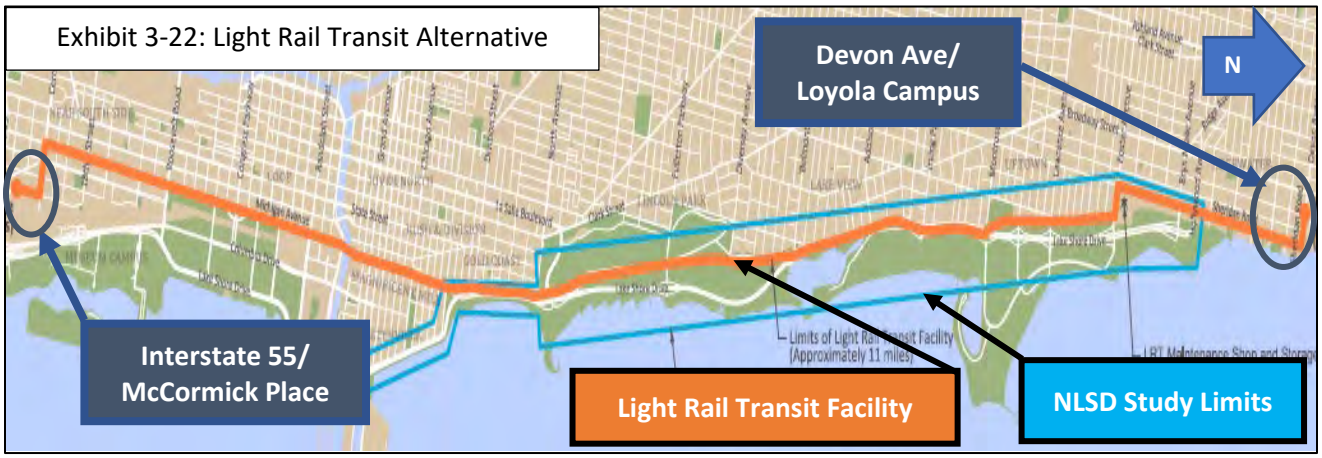
**Dedicated Transitway – Off Alignment (DTW – OA).** As shown on Exhibit 3-21, this alternative would include a separate roadway alignment between the Inner Drive and Outer Drive that is exclusively for buses. The buses would travel at free flow speeds and would have some signalized intersections to provide access to and from the adjoining roadway network.

Exhibit 3-21

**Dedicated Transitway – Off Alignment (DTW-OA)**

**Light Rail Transit**. As shown on Exhibit 3-22, this alternative would include constructing an at grade rail facility along the urban edge (areas west of the Inner Drive), with stations that are complimentary to existing bus transit service within the study area. In order to capture sufficient market share (ridership), the Light Rail Transit Facility would extend beyond the NLSD study limits, to major travel markets to the south (McCormick Place) and to the north (Loyola University).

Exhibit 3-22: Light Rail Transit Alternative




3.3.2.2 Managed Lane Alternatives

The Managed Lane (ML) Alternatives convert one or more existing general purpose lanes to a managed lane to provide high mobility for buses and some autos. Managed Lane mobility would be maintained through two differing strategies, depending upon the alternative.

- Tolling would be used for alternatives that allow both autos and buses in the managed lane. The toll rate would be set to reduce the volume of autos using the lane, and thereby maintain free flow speeds for buses and autos.
- Restricting the use of the managed lane to buses only.

There are five basic Managed Lane Alternatives:

- 3+1 Bus Only Lane (3+1 BOL)
- 3+1 Managed Lane (3+1 ML)
- 2+2 Managed Lane (2+2 ML)
- 3+2 Reversible Managed Lane (3+2 RML)
- 4+1 Contraflow Bus Only Lane (4+1 CBOL)

Each of the Managed Lane Alternatives include space reserved at Wilson Avenue for future transit access and/or special event traffic access. The following is a more detailed description of the Managed Lane Alternatives.

**3+1 Bus Only Lane (3+1 BOL).** As shown on Exhibit 3-23, this alternative would include converting the existing inside lanes of the Outer Drive to bus only lanes (3 general purpose lanes and 1 bus only lane in each direction). Dedicated bus only access ramps to and from the median would be provided at Grand Avenue, Michigan Avenue, Fullerton Parkway, Belmont Avenue, Irving Park Road, and Foster Avenue. The managed lane would be separated from the general purpose lanes by a 4 foot painted buffer.

For reference, the 3+1 BOL Alternative differs from the DTW-L Alternative. The 3+1 BOL converts one general purpose lane in each direction to a managed lane, and therefore reduces the number of general purpose lanes to 3 lanes in each direction. The DTW-L Alternative retains the existing 4 general purpose lanes south of Irving Park Road and adds a dedicated lane for transit.

Exhibit 3-23


**3+1 Bus Only Lane Alternative (3+1 BOL)**

**3+1 Managed Lane (3+1 ML).** As shown on Exhibit 3-24, this alternative would include converting the existing inside lanes of the Outer Drive to a Managed Lane (3 general purpose lanes and a managed lane in each direction). Buses and autos would be allowed to use the managed lane, and free flow speeds would be maintained in the managed lane through variable priced tolling. Dedicated bus only access ramps within the median would be provided as noted previously for the 3+1 BOL Alternative. Access (median ramps) for autos would be provided at Grand Avenue, Michigan Avenue, Addison Street, Bryn Mawr Avenue, and Hollywood Avenue. The managed lane would be separated from the general purpose lanes by a 4 foot painted buffer.

Exhibit 3-24

**3+1 Managed Lane Alternative (3+1 ML)**

**2+2 Managed Lane (2+2 ML).** As shown on Exhibit 3-25, this alternative would include converting the existing two inside lanes of the Outer drive to managed lanes (2 general purpose lanes and 2 managed lanes in each direction). Dedicated ramps to the managed lanes for buses and autos would be provided within the median as noted above for the 3+1 alternatives. Buses and autos would use the managed lanes and a free flow speed would be maintained through variable priced tolling. The managed lane would be separated from the general purpose lanes by a 4 foot painted buffer.

Exhibit 3-25

**2+2 Managed Lane Alternative (2+2 ML)**

**3+2 Reversible Managed Lane (3+2 RML)**. As shown on Exhibit 3-26, this alternative would include converting the existing inside lanes of the Outer drive to a cross section that provides 3 general purpose lanes in each direction, with 2 reversible lanes in the median. The reversible lane concept would provide a 5th lane in the southbound A.M. peak and in the northbound P.M. peak. Managed Lane access for autos and buses would be provided as noted above for the 3+1 Managed Alternative. Buses and autos would be allowed to use the managed lanes, with free flow speeds maintained through tolling. The barrier medians are required to separate opposing traffic flows, since traffic in the reversible lanes will be flowing in the opposite direction as general purpose lane traffic at all times (either NB or SB).

Barrier medians

Exhibit 3-26

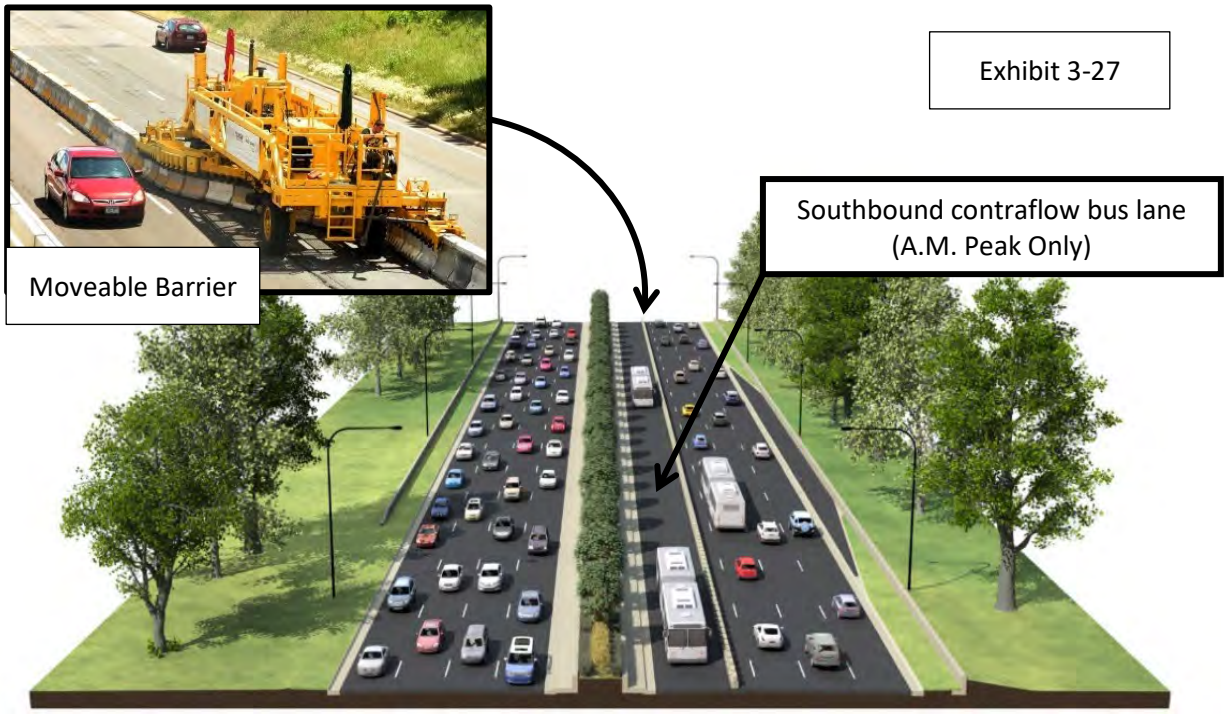
Reversible Lanes
(A.M. Configuration)

**3+2 Reversible Managed Lane Alternative (3+2 RML)**

**4+1 Contraflow Bus Only Lane (4+1 CBOL).** As shown on Exhibit 3-27, this alternative would include a bus only lane that is added in the off peak direction through the use of a moveable median barrier. For example, during the morning peak, there would be 4 general purpose lanes in the southbound direction. In the northbound direction, there would be 3 general purpose lanes, with the inner lane converted to a southbound bus only lane. Access to the contraflow bus only lane would be provided at Grand Avenue, Michigan Avenue, Fullerton Parkway, Belmont Avenue, Addison Street, Irving Park Road, and Foster Avenue.

The contraflow lane will be wide enough to allow buses to pass stalled vehicles.

A northbound contraflow lane is not included with this alternative but could be considered in future rounds of evaluation (thus far, modeling indicates that a northbound contraflow lane is not needed, high mobility is achieved in the general purpose lanes during the P.M. peak).




**4+1 Contraflow Bus Only Lane Alternative (4+1 CBOL)**

## 3.4 Stakeholder Input – Alternatives Development

The following is a summary of stakeholder input with respect to Alternatives Development. Stakeholder input related to the Alternatives Evaluation is discussed in Section 4.

Stakeholder involvement has been the foundation of the NLSD study process. Exhibit 3-28 depicts one of over 60 meetings held thus far. The extensive stakeholder outreach program follows IDOT's Context Sensitive Solutions (CSS) Policy. CSS is a strategy for developing a transportation solution that improves safety and mobility and that reflects the project's surroundings or "context". Stakeholder involvement has complimented the technical work throughout the study process. For further details see the *Stakeholder Involvement Plan* on the project website (www.northlakeshoredrive.org). The stakeholder outreach program included the following major elements:

Exhibit 3-28: Public Meeting

Project Study Group (PSG)

The PSG, which includes representatives from IDOT, CDOT the Chicago Park District and the CTA, has met on a regular basis since the inception of the project and has served as the initial forum for reviewing and discussing every aspect of the project. The multi-agency membership of the PSG allowed for direct discussions and collaboration amongst key agencies regarding the development of the Purpose and Need, Alternatives Development, Alternatives Evaluation methodologies, and Alternatives Evaluation criteria. Over a 6 year period, the PSG has held over 70 meetings. Discussions often led to refinements as well as new concepts for consideration.

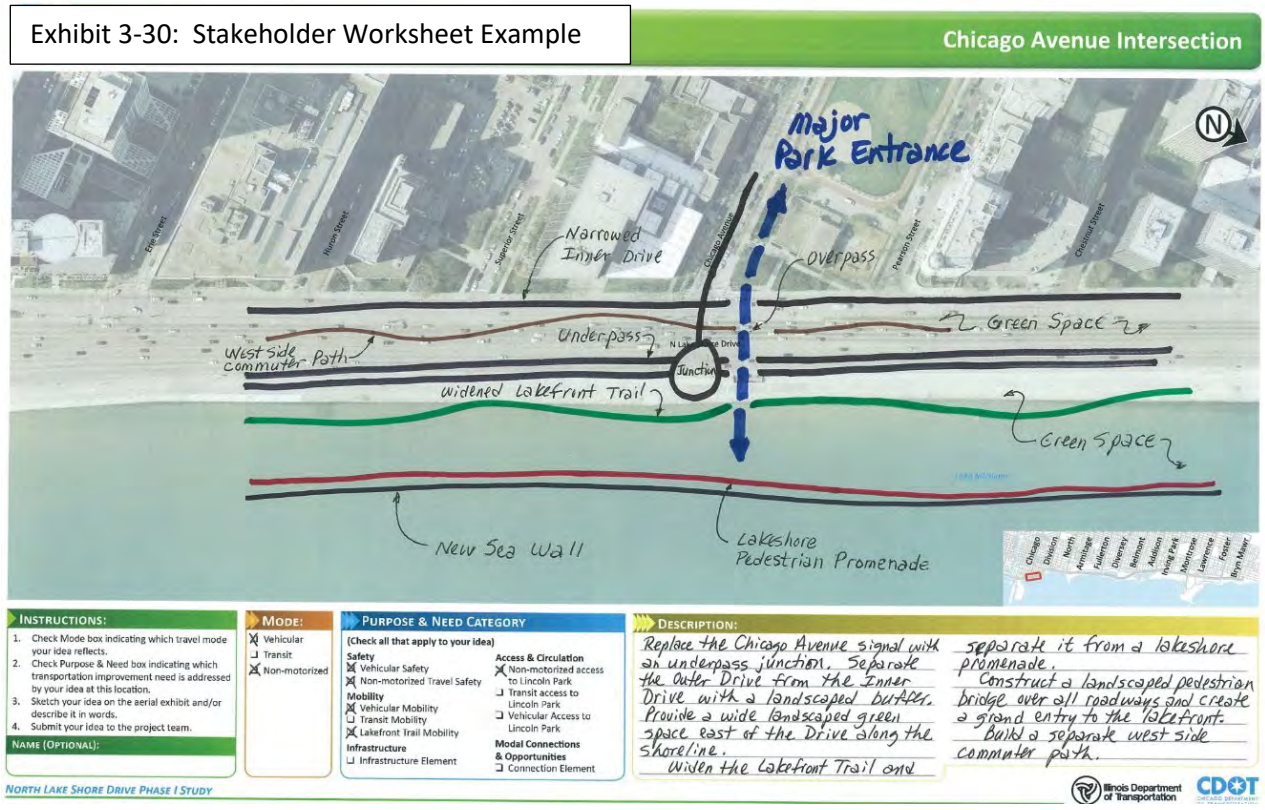
Task Force Meetings

Initially, a total of six separate Task Forces (Environment and Park Users, Transportation, Business and Institutions, as well as South, Central, and North residential areas) and a Corridor Planning Council were created. At the beginning of the study process in 2013 these groups met separately. In 2014, the Task Forces were combined so that the project team could gather input simultaneously. This also allowed members of the various Task Forces to share and discuss varying points of view. The combined Task Force meetings included morning and afternoon sessions, which presented the same materials, to maximize stakeholder participation. At Task Force Meetings #1 and #2, the overall NEPA process, the Draft Problem Statement and the Purpose and Need outline, as well as technical information regarding existing conditions, were presented and discussed. Stakeholders provided insights regarding the transportation needs by marking up aerial photos of the study area. Exhibit 3-29 depicts a Task Force meeting.

Exhibit 3-29: Task Force Meeting

Stakeholder insights from Task Force Meetings #1 and #2 aligned with the technical data and set the stage for discussions regarding the development of alternatives, which began at Task Force Meeting #3. Task Force Meeting #3 included a presentation of the proposed alternatives evaluation process and potential evaluation metrics. Another key component of Task Force Meeting #3 was a mapping exercise, in which stakeholders were asked to sketch their improvement ideas on a worksheet. Exhibit 3-30 depicts an example worksheet.

Exhibit 3-30: Stakeholder Worksheet Example



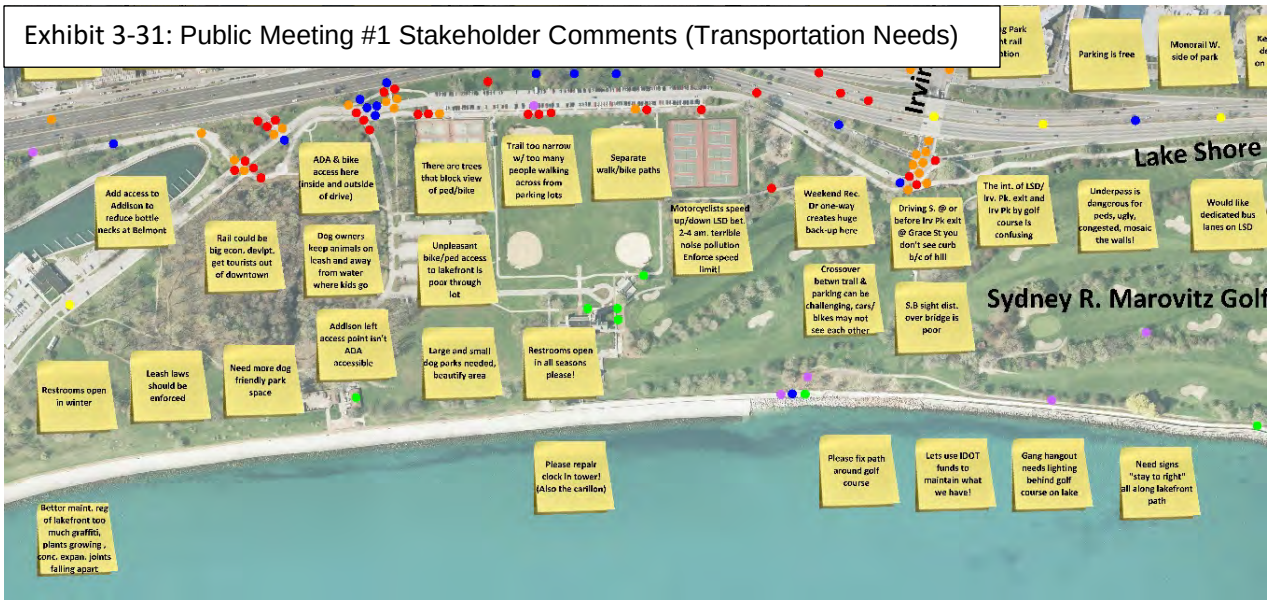

At Task Force Meeting #4, a "toolbox" of various modal improvements was discussed with stakeholders, as well as environmental constraints in the study area. The Level 1 screening results, as well as details about the Level 2 screening process, were discussed with stakeholders at Task Force Meeting #5, along with an introduction to the Context Tailored Treatments, Transitways, Managed Lane Alternatives, as well as Tunnels, Causeways and Light Rail. For more information regarding the Level 1 and Level 2 Screening processes, see Section 4.1.

Task Force Meetings #6 and #7 provided further details regarding the Level 2 evaluation process, criteria, and alternatives being considered. Task Force #6 also included a workshop to gather stakeholder feedback regarding the Context Tailored Treatment Alternatives and Task Force #7 included a workshop that gathered feedback regarding the Managed Lane and Transitway concepts. Task Force Meeting #8 included a workshop that gathered input regarding the Lakefront Trail improvements. Overall, feedback from the Task Force members led to refinements in the evaluation process as well as refinements to the alternatives.

Public Meetings

Three Public Meetings have been held to solicit stakeholder input regarding the development of the Purpose and Need as well as Alternatives. Public Meeting #1 was held in August of 2013 and introduced the NLSD Phase I Study to Stakeholders and solicited feedback regarding transportation issues and concerns. Stakeholders used aerial maps at Public Meeting #1 to record their comments relative to community context and transportation needs in the study area. Exhibit 3-31 depicts an example of stakeholder input from Public Meeting #1.

Exhibit 3-31: Public Meeting #1 Stakeholder Comments (Transportation Needs)




At Public Meeting #2, which was held in July of 2014, stakeholders were asked to complete a mapping exercise similar to Task Force Meeting #3. Over 400 maps were submitted to the project team and provided many ideas for improving NLSD. At Public Meeting #3, which was held in July of 2017, the initial range of alternatives was introduced. Stakeholders were also asked to complete a survey that posed questions regarding their typical mode of travel, travel patterns, and travel problems that they encounter in the study area. The survey also asked stakeholders about their design preferences at key locations within the project area. Over 2,400 surveys were submitted to the project team at the Public Meeting or online. Some of the most frequent comments gathered from the survey include:

- A mix of lake, park and city views is important for travelers along Lake Shore Drive.
- More park spaces should be created between the Inner and Outer Drive.
- East-west access to the park should be improved.
- New access at Addison Street would be beneficial.
- The number of lanes on the Outer Drive should not be reduced in the north section of the project.
- Consistent bus travel times would encourage greater bus usage.

Public Meeting #4, which will be hosted in the fall of 2020, will review the overall level 2 evaluation process with stakeholders. Information about Public Meeting #4 is located on the project website (northlakeshoredrive.org).

NEPA/404 Merger Meetings

Resource Agency input was sought through the NEPA/404 Merger process. Nine meetings have been held with the Resource Agencies, with Meetings #1 through #5 addressing existing conditions, scoping and the Purpose and Need. The agencies concurred with the Purpose and Need in December 2014. Meetings #6 through #9 introduced the proposed evaluation process, the initial range of alternatives, and the proposed evaluation criteria. Field Trips have also been conducted with the Resource Agencies.

Community Meetings and Small Group Meetings

Over 30 other meetings were held with various stakeholders, either as one-on-one meetings or as small group meetings. These meetings have typically occurred prior to a Task Force Meeting in order to discuss a particular topic with a specific stakeholder group. These meetings have occurred with Aldermen, City Departments, environmental organizations, local neighborhoods, and other stakeholders. Information gathered at these meetings was incorporated into subsequent project materials.

Project Website

A project website (www.northlakeshoredrive.org) was established to provide study information, summaries of meetings, exhibits, and a forum for stakeholder comments.

Newsletters

Newsletters were distributed to a list of over 1,500 stakeholders during the development of the project Purpose and Need, as well as the development of alternatives.

Media Coverage

The NLSD project is of great interest to stakeholders adjacent to the project as well as within the larger region. Articles have appeared in a variety of media platforms and have served to extend the reach of the stakeholder involvement process.

Stakeholder Input Summary – Alternatives Development

In general, stakeholder involvement has complemented and influenced the development of alternatives by providing fresh ideas and comments on proposals developed by the project team. The top ideas provided by stakeholders at these various forums include:

- Improve safety.
- Improve bike/pedestrian facilities, access and wayfinding signage.
- Improve transit service.
- Add green space, trees and landscaping.
- Straighten the Oak Street curve.
- Construct a Chicago Avenue Junction.
- Expand the shoreline to improve flood protection.

# 4. Alternatives Evaluation

## 4.1 Methodology

The overall NLSD Alternatives Evaluation methodology involves three major steps or "Levels", as shown on Exhibit 4-1.

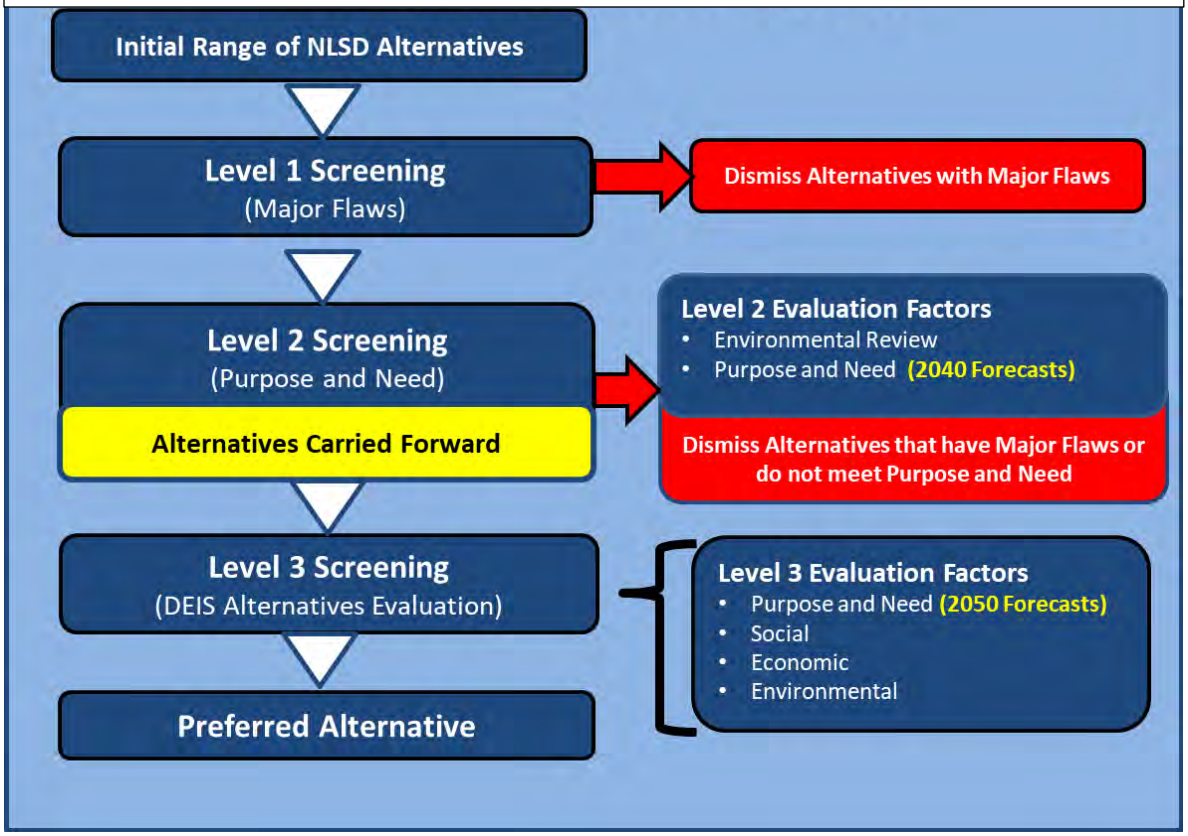
The initial step, known as Level 1, is a "Major Flaw" screening. Alternatives would be dismissed during Level 1 screening based upon a high level assessment of relative costs and impacts. Alternatives with a substantially higher level of impacts and cost would be dismissed from further consideration.

During the Level 1 screening, the Tunnels and Causeways and Light Rail Alternatives were dismissed from further consideration due to relative impacts and costs. Therefore, the Level 2 screening is focused upon the CTT, TW and ML Alternatives.

Level 2 screening includes an additional round of major flaw reviews, a more in depth environmental review and a detailed Purpose and Need Evaluation. The Top Peforming Alternatives from Level 2 will become the Alternatives to be Carried Forward. The Level 3 evaluation, which is the Draft EIS Alternatives evaluation, will include Purpose and Need factors as well as a detailed evaluation of social, economic and environmental factors, as well as a Section 4(f) and Section 106 evaluation, which would occur in parallel.

The results of the Level 1 and Level 2 alternatives evaluation are discussed in more detail in section 4.2.

Exhibit 4-1: NLSD alternatives evaluation process



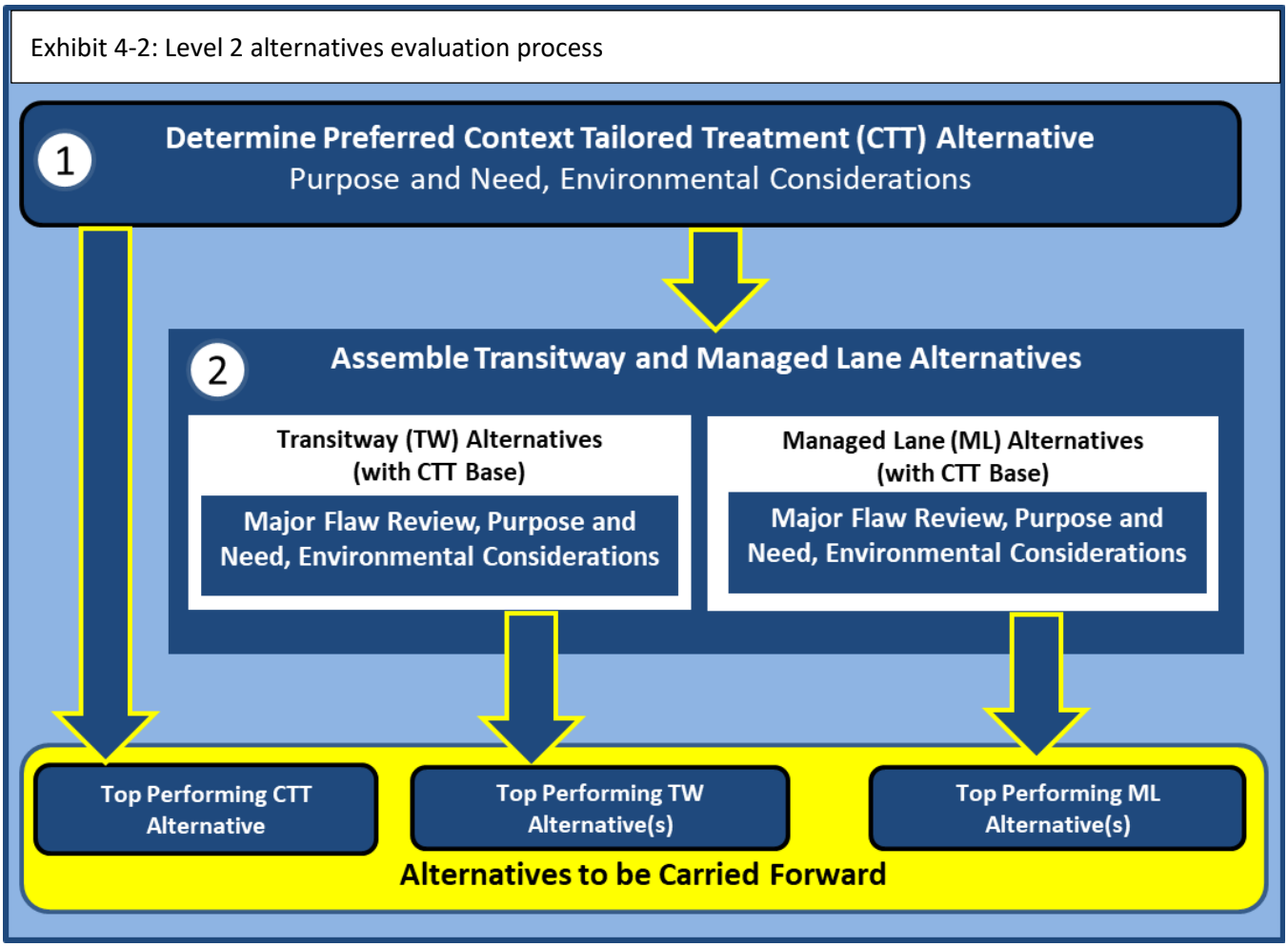
The Level 2 evaluation, which is shown in more detail on Exhibit 4-2, includes two major steps:

1. The identification of the Top Performing CTT alternative, which will be a standalone alternative, as well as the base for the TW and ML Alternatives. The CTT Alternatives also include Transit Advantage components.

2. The layering of TW and ML features onto the Top Performing CTT Alternative to form complete TW and ML Alternatives. The Top Performing alternatives within the TW and ML categories are then determined.

The alternatives that remain after Level 2 screening is completed will be the Alternatives to be Carried Forward. The 2040 No Action forecast (CMAP C16Q1 2040), which does not include any roadway capacity improvements to the Outer Drive, was used for Level 2 Screening. As noted in Section 3.3, the Level 2 Alternatives Evaluation process was initiated and advanced prior to the availability of year 2050 forecasts. Therefore, the Level 2 screening was completed using 2040 forecasts. Year 2050 forecasts will be used for the Level 3 screening (Draft EIS Alternatives Evaluation).

Exhibit 4-2: Level 2 alternatives evaluation process



### 4.1.1 Environmental Considerations

The location of the NLSD project, which is wholly within historic Lincoln Park, requires consideration of environmental factors at a relatively early stage. The Level 1 and Level 2 Alternatives evaluation each included environmental considerations, but at differing levels of detail. The Level 1 environmental review did not consider specific environmental factors. Instead, the level 1 review was a high-level assessment of major flaws from a general perspective and is summarized in section 4.2.

The Level 2 environmental review considers specific environmental factors in a manner that is consistent with the conceptual level of engineering detail of the Level 2 Alternatives. Environmental factors have been considered within the context of corridor-wide alternatives, as well as at the junction level. Another important component of Level 2 screening has been frequent coordination with the Chicago Park District, whom is the owner with jurisdiction (OWJ) of Lincoln Park. Over the course of 70 Project Study Group Meetings and additional one-on-one meetings, the Chicago Park District has provided input regarding constraints, impacts, evaluation methodology and design alternatives and has generally supported the evaluation process.

The Level 2 environmental review considered the following factors:

- Displacements
- Historic Structures
- Land Use Devoted to Transportation
- Net Change in Green Space
- Lakefront Trail (LFT) Effects
- Belmont Harbor Effects
- Fill in Lake Michigan

Other environmental factors, such as Air Quality, Noise, Environmental Justice, Threatened and Endangered Species, and Wetlands were not considered as part of the Level 2 Alternatives Evaluation. These factors require a greater level of engineering detail, refined traffic information, and additional coordination in order to provide meaningful evaluation results. The Level 3 evaluation (DEIS Alternatives) will include the necessary level of detail to conduct a comprehensive analysis of Social, Economic and Environmental factors.

The following is a summary of the environmental review. The results are tabulated in Exhibit 4-8.

<u>Displacements</u>
The Build Alternatives do not impact any commercial or residential structures so therefore displacements is not a distinguishing evaluation factor.

<u>Historic Structures</u>
As noted in Section 1, the Outer Drive infrastructure is over 80 years old, is in poor condition, does not comply with ADA standards, and requires replacement. The Outer Drive infrastructure includes pedestrian tunnels and roadway bridges that are contributing features in Lincoln Park's National Register of Historic Places (NRHP) nomination or State Listed structures that would be impacted by all Build Alternatives. These structures are as follows:

1. Chicago Avenue Pedestrian Underpass
2. Oak Street Pedestrian Underpass

3. Division Street Pedestrian Underpass
4. North Avenue Pedestrian Underpass
5. LaSalle Drive Roadway Bridge
6. Passerelle Pedestrian Overpass
7. Fullerton Parkway Roadway Bridge
8. Diversey Parkway Roadway Bridge
9. Barry Avenue Pedestrian Underpass
10. Belmont Avenue Roadway Bridge
11. Roscoe Street/Aldine Avenue Pedestrian Underpass
12. Waveland Avenue/Addison Street Pedestrian Underpass
13. Wilson Avenue Roadway Bridge
14. Lawrence Avenue Roadway Bridge
15. Argyle Street Pedestrian Underpass

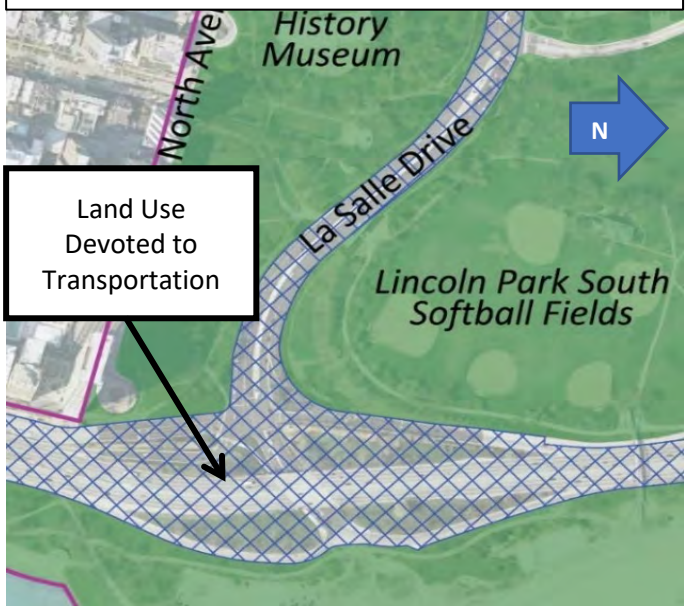
Exhibit 4-3: Historic structure impact (example)


Impacts to these Historic structures cannot be avoided. Exhibit 4-3 shows the Lawrence Avenue Bridge, which is an integral part of the existing Outer Drive. Given the reconstruction scope of the NLSD Build Alternatives, impacts to this bridge cannot be avoided. This type of impact is similar across all alternatives for all 15 historic structures.

Land Use Devoted to Transportation

This criterion is defined as the spaces adjacent to the Outer Drive which would traditionally be considered the roadway "right-of-way", as shown on Exhibit 4-4 (as noted in Section 1, there is no known platted right-of-way for the Outer Drive). The Initial CTT Alternatives provide the relative smallest increases to the right-of-way (less than 2% of the total park acreage), with CTT Alternative 2 (Compressed Roadway) providing a transportation footprint that is slightly smaller than the No-Action Alternative. The difference in footprint size amongst the Initial CTT Alternatives is 2%. The TW and ML Alternatives, which add transportation features to the CTT base alternative, have relatively larger transportation footprints, and impact 2% to 5% of the total park acreage. The difference in footprint size amongst the Transitway Alternatives is 3%. For the Managed Lane Alternatives the difference is 1%.

Exhibit 4-4: Land Use Devoted to Transportation (Example)




Within the context of the overall 1,200 acre park, the differences in impacts were not considered substantive. In order to determine meaningful differences and define the severity of an impact, a detailed Section 4(f)/Section 106 evaluation will be needed and undertaken during Level 3.

A major flaw review, which is also a part of the Level 2 evaluation, will provide more meaningful results at this stage of the evaluation. Therefore, transportation footprint, at a broader corridor level, was not considered a distinguishing factor. In addition, the change in transportation footprint could essentially be offset by any net change in green space, which is another environmental related criterion that was considered.

Net Change in Green Space.

All Build Alternatives provide a net increase in green space, which implies a net benefit to Lincoln Park for all Alternatives. This increase in green space is primarily a result of the proposed shoreline protection measures in the south section of the project, the lane reduction at the north end of the project, and compressed designs at individual junctions. The CTT Alternatives have the relative largest increase in green space. The TW and ML alternatives, which expand the base CTT footprint to incorporate transit or managed lane features, have slightly smaller increases in green space. Within the context of the overall 1,200 acre park, the differences in additional green space is not considered substantive. In order to determine the quality of the Green Space added, and therefore meaningful differences between alternatives, a detailed Section 4(f)/Section 106 evaluation will be needed and undertaken during Level 3. A major flaw review, which is also a part of the Level 2 evaluation, will provide more meaningful results at this stage of the evaluation. Therefore, net change in green space was not considered a distinguishing factor.

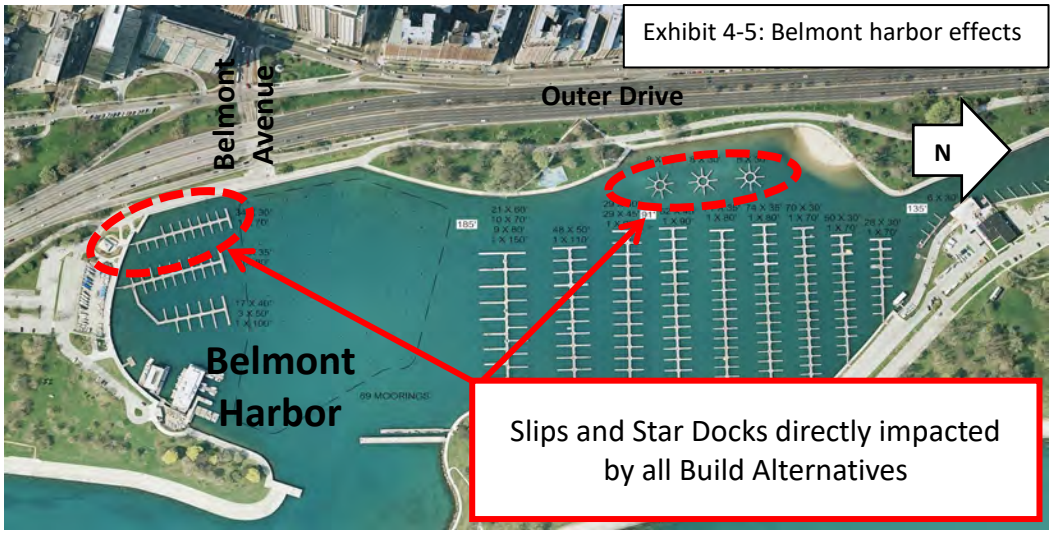
Lakefront Trail (LFT) effects

All Build Alternatives would impact the LFT, and all Build Alternatives include reconstruction of the LFT. The proposed LFT design will be based upon input from the Chicago Park District. LFT effects are not considered a distinguishing factor.

Belmont Harbor Effects

The section of the Outer Drive along Belmont Harbor (particularly at the Belmont Avenue Junction) is within the most constrained portion of the project. Improvements to the Outer Drive, the Belmont Avenue Junction, and the Lakefront Trail will encroach into Belmont Harbor. As shown on Exhibit 4-5, the Boat Slips and Star Docks adjacent to the Outer Drive would be impacted. This impact is common to all alternatives, and therefore is not a considered a distinguishing factor. The NLSD project team has been discussing potential mitigation strategies with the Chicago Park District and harbor management personnel, which will be refined in Level 3.

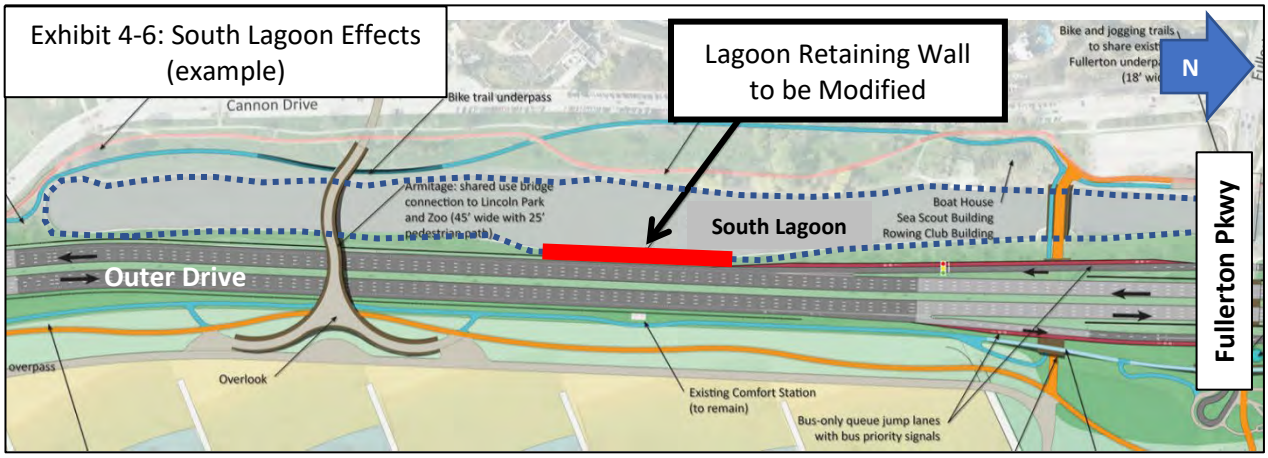
Exhibit 4-5: Belmont harbor effects



South Lagoon Effects

Along the South Lagoon, the existing transportation footprint is constrained. As such, each of the Build Alternatives would encroach into the South Lagoon to varying degrees, as shown on Exhibit 4-6. All Build Alternatives would have less than an acre of encroachment and would require varying lengths of new retaining wall along the east bank. In addition, the function of the Lagoon would be unchanged for all Build Alternatives so South Lagoon effects are not considered a distinguishing criterion.

Exhibit 4-6: South Lagoon Effects (example)

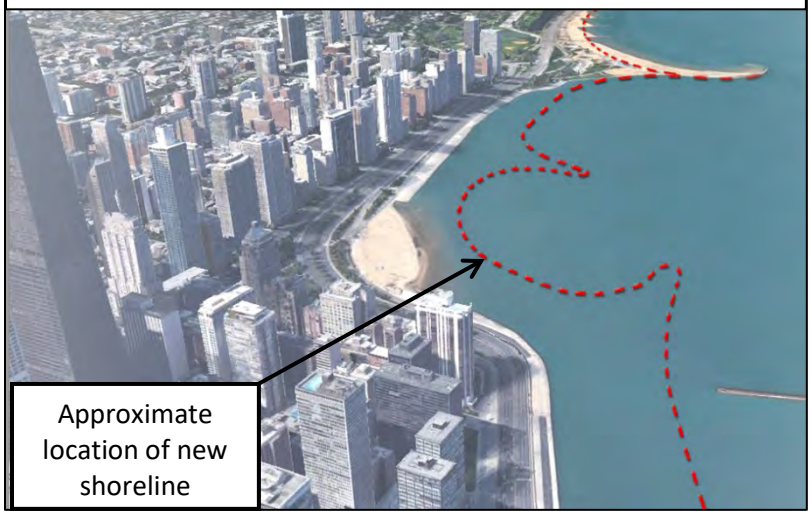



Fill in Lake Michigan

As noted in section 3.1.2, the Build Alternatives will include filling in a portion of Lake Michigan in order to prevent wave overtopping from reaching the Outer Drive and portions of the Lakefront Trail. This fill would create additional green space and would be placed into Lake Michigan from approximately Ohio Street to Fullerton Parkway. The lake fill would be considered an impact to Waters of the US (WOUS). The fill associated with the initial CTT Alternatives ranges from approximately 78 to 84 acres; for the TW Alternatives, the range is approximately 77 to 84 acres and for the ML Alternatives, the range is approximately 82 to 86 acres.

Within the context of Lake Michigan, the differences in acreage within each Build Alternative category (CTT, TW, ML) is relatively minor, and therefore this criterion was not considered a distinguishing factor. Additional analysis, which would be undertaken in Level 3, is needed to determine any meaningful differences. Exhibit 4-7 illustrates a lake fill concept at Michigan Avenue.

Exhibit 4-7: Lake fill concept at Michigan Avenue, looking north



Summary

The Level 2 environmental review is tabulated in Exhibit 4-8. In summary, there were no environmental factors that were determined to be distinguishing during the Level 2 alternatives evaluation. As part of the Level 3 evaluation, additional detail will be added to the remaining alternatives, which will allow for a more detailed environmental evaluation and more meaningful comparisons.

Exhibit 4-8: Level 2 Screening/Environmental Considerations

| Criterion | Unit of Measure | No Action Alternative | CTT Alternatives | TW Alternatives | ML Alternatives |
|---|---|---|---|---|---|
| Displacements | Each | 0 | 0 | 0 | 0 |
| NRHP Contributing Features or State Listed Structures Impacted | Each | 0 | 15 | 15 | 15 |
| Land Devoted to Transportation Use | Acres | 172 | 169 to 191 | 191 to 221 | 209 to 223 |
| Additional Green Space | Acres | 0 | +82 to +90 | +52 to +82 | +61 to +72 |
| Lakefront Trail Impacts | Linear Feet | 0 | (same) Complete Replacement | (same) Complete Replacement | (same) Complete Replacement |
| Belmont Harbor impacts | Number of Slips and Star Docks | 0 | 13 Slips 3 Star Docks | 13 Slips 3 Star Docks | 13 Slips 3 Star Docks |
| Impacts to South Lagoon | Acres | 0 | 0.0 – 0.1 | 0.0 – 0.9 | 0.0 – 0.2 |
| Fill in Lake Michigan | Acres | 0 | 78 - 84 | 77 - 84 | 82 - 86 |

### 4.1.2 Context Tailored Treatments (CTT) Evaluation Methodology

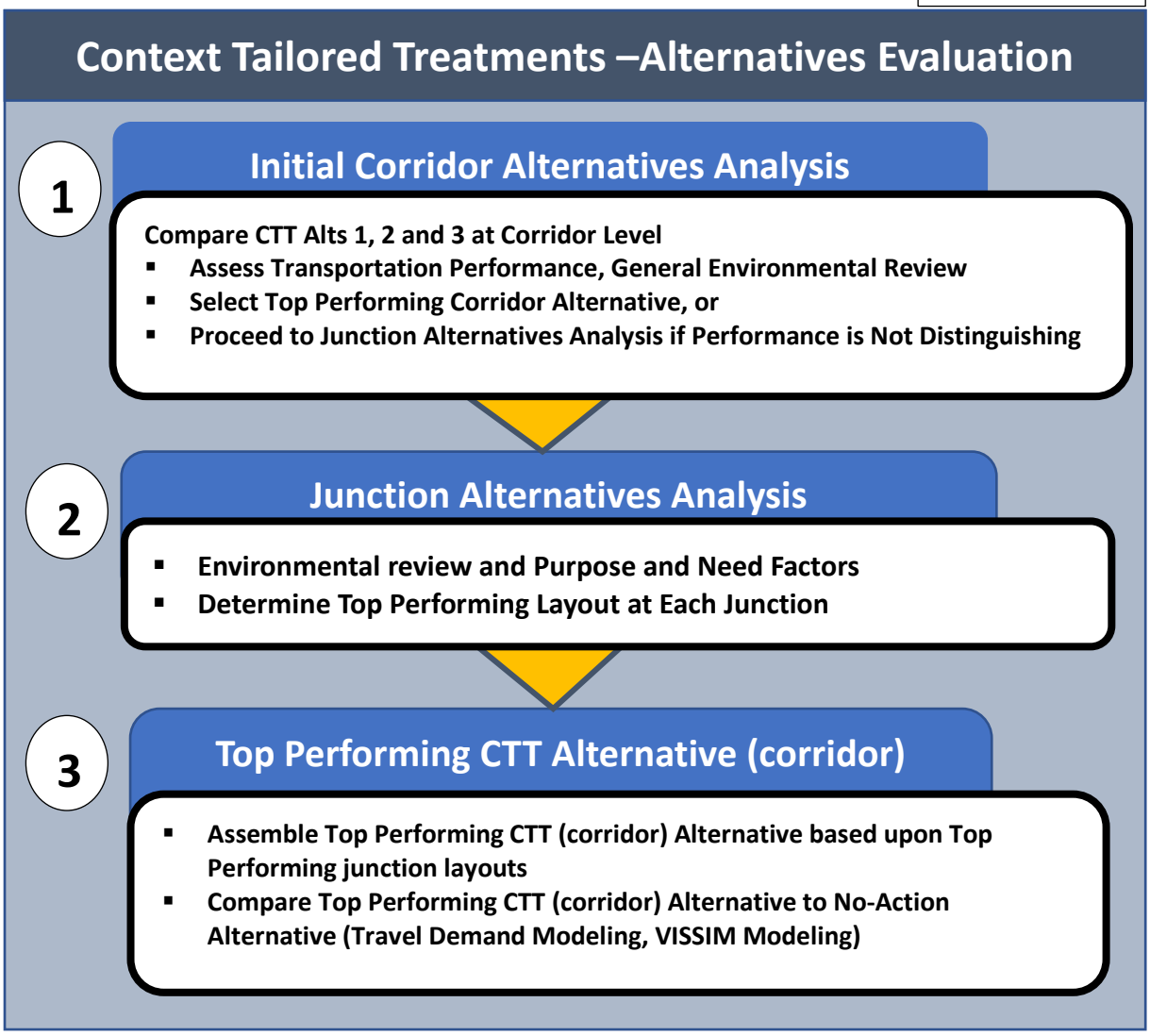
The evaluation of the CTT Alternatives were accomplished in 3 steps, as shown below in Exhibit 4-9. The following is a general description of each evaluation step:

1. **Initial CTT Corridor Alternatives Analysis**. Compare CTT Alternatives 1, 2 and 3 to each other at a corridor level using Traffic Modeling and a general environmental review. Select the Top Performing Alternative or proceed to junction level analysis if corridor performance is not distinguishing.

2. **CTT Junction Alternatives Analysis**. Evaluate individual junctions based upon Purpose and Need, environmental, and other factors. Determine top performing layout at each junction.

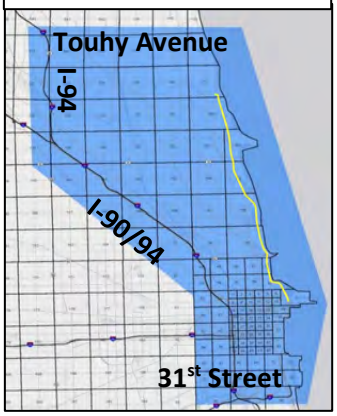
3. **Top Performing CTT Corridor Alternative**. Assemble Top Performing CTT Corridor Alternative based upon Top Performing junction layouts. Compare to No Action Alternative using Traffic modeling.

Exhibit 4-9



Initial CTT Corridor Alternatives Analysis

Exhibit 4-10
**Travel Demand Modeling Study Area**




CTT Alternatives 1 (Corridor Modernization), 2 (Compressed Roadway), and 3 (Frontage Drives) have many common features (e.g., number of mainline through lanes) and are therefore likely to have similar performance characteristics. Travel Demand modeling was initially undertaken to quantitatively determine whether there were meaningful differences in transportation performance. The Travel Demand Modeling study area is shown on Exhibit 4-10. As noted in section 4.1.1, an environmental review of the Initial CTT Corridor Alternatives was also undertaken.

The evaluation criteria for the initial corridor analysis includes:

- **Vehicle Hours of Travel (VHT).** Total hours of travel on all roadways in the study area. VHT measures the efficiency of the transportation system.
- **Congested Vehicle Hours of Travel (CVHT)**. Total hours of congested travel on all roadways in the study area. Congested travel is defined as travel at speeds less than 90% of free flow speed.
- **Arterial Vehicle Hours of Travel.** Total hours of travel on **arterial** roadways in the study area.
- **Arterial Congested Vehicle Hours of Travel**. Total hours of congested travel on **arterial** roadways in the study area. Congested travel is defined as travel at speeds less than 90% of free flow speed.
- **Average Auto Commute Time.** Average auto commute time within the study area for home to work trips, in minutes.
- **Average Transit Trip Time.** Average transit trip time for home to work trips in the study area, in minutes.
- **Total Transit Share.** Percentage of trips in study area that are transit trips.

The results for each criterion was compared to the No Action Alternative, which is summarized in Exhibit 4-19.

CTT Junction Alternatives Analysis

The Initial CTT Corridor Alternatives analysis confirmed that Junction Alternatives analysis was necessary and was used as the method for developing and assembling a Top Performing CTT Alternative. From a corridor wide perspective, no single strategy (i.e., Compressed Roadway, Frontage Drive) could be considered the best alternative at every junction. Each junction would need a unique treatment. This was confirmed by stakeholders, who offered support or non-support for a mixture of junction features from CTT Alternatives 1, 2 and 3.

**The Junction Alternatives analysis is primarily a relative comparison of CTT Junction Alternatives 1, 2 and 3.**

**The full comparison to the No Action Alternative will be made at the corridor level, after assembling the Top Performing CTT (corridor) alternative**

The Junction Alternatives analysis is primarily focused on a relative comparison of CTT Junction Alternatives 1, 2 and 3, and includes the following locations:

- Chicago Avenue
- Michigan/Oak Avenue
- LaSalle Drive
- Fullerton Avenue
- Belmont Avenue
- Addison Street/Irving Park Road
- Montrose/Wilson/Lawrence Avenue
- Foster Avenue
- Bryn Mawr Avenue

As shown on Exhibit 4-11, the analysis area for each junction includes portions of the Outer Drive to the north and south, and therefore encompasses the entire NLSD footprint from Grand Avenue to Hollywood Avenue.

<u>CTT Junction alternatives evaluation criteria</u>

The basic scope of work for the CTT Alternatives was developed to address major elements of the Purpose and Need. This includes **infrastructure deficiencies** (e.g., complete reconstruction), **Transit Access and Circulation** (e.g., queue jump lanes, priority signals, staging/layover facilities), as well as **Park Access and Circulation** (e.g., improved junctions, improved east-west bicycle/pedestrian crossings, Lakefront Trail improvements).

**Safety** is addressed by the CTT Alternatives through design improvements such as straightening the Oak Street S curve, establishing clear zones, and addressing Lakefront Trail deficiencies.

Exhibit 4-11: CTT Junction Analysis Areas

Since these Purpose and Need related improvements are common to all CTT Alternatives, they are not anticipated to be distinguishing factors. In addition, given the many similarities between junction alternatives, the **mobility** component of the Purpose and Need is also not anticipated to be a single factor that yields substantial differences in performance. The unique project setting also requires an early assessment of environmental factors. Therefore, the evaluation criteria for the junction alternatives also included environmental factors such as green space, park access/circulation, and visual effects as well as other factors such as cost and stakeholder input.
The evaluation includes a combination of qualitative and quantitative criteria, which is described as follows:

Quantitative Evaluation Criteria

- **Intersection Level of Service (LOS)**. A measure of the quality of traffic flow at individual signalized intersections, similar to a report card, with LOS A being best, and LOS F being worst.
- **Mainline LOS.** This criterion measures the quality of traffic flow on the Outer Drive, using the Highway Capacity Manual (HCM)*, with LOS A being best and LOS F being worst. The mainline LOS analysis consists of a relative comparison of Build Alternatives, rather than a comparison between the Build and No-Action Alternatives. The HCM software does not fully capture current and 2040 No Action conditions on the Outer Drive, which is characterized by vehicle queues that may extend for several miles from the signalized intersection at Chicago Avenue or other bottlenecks during peak period conditions. Instead, a comparison between the No-Action Alternative and the Top Performing CTT Alternative was made at a corridor level using traffic modeling (e.g., VISSIM).
- **Network Performance.** A measure of the overall network performance (delay and travel time) at each junction area.
- **Green Space**. Net change in green space for each alternative.
- **Cost.** Relative comparison of construction cost in 2017 $.

Qualitative Evaluation Criteria

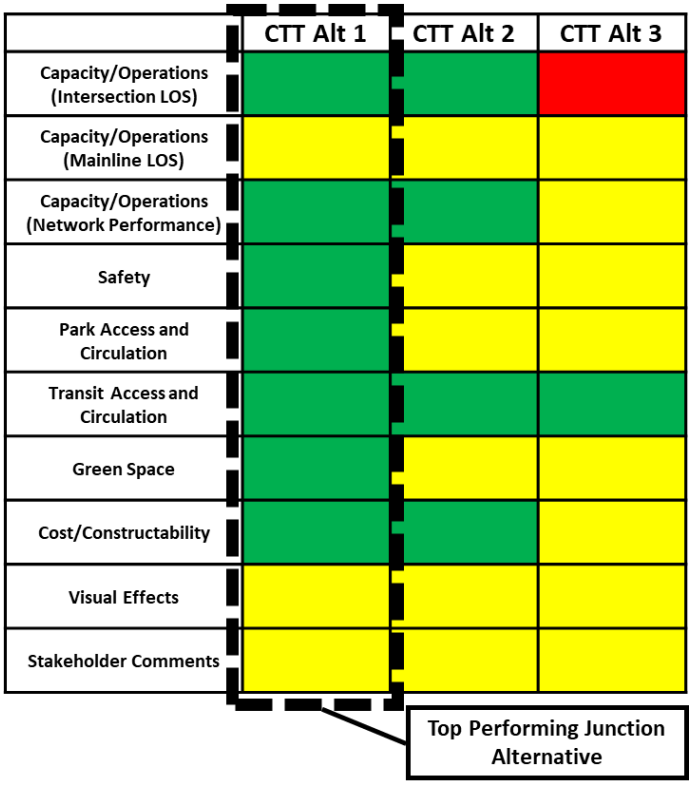
- **Safety.** Assessment and relative comparison of safety features, which vary to some degree between the CTT Alternatives. A quantitative safety evaluation will be prepared for the Level 3/DEIS Alternatives.
- **Park Access.** Assessment of how each alternative improves or hinders bike/ped access to the park.
- **Transit Access.** Assessment of how each alternative improves or hinders transit access to the park and the Outer Drive.
- **Visual Effects.** Assessment of visual effects from the urban edge, the Outer Drive, and the park. The proposed backshore berm concepts are currently under development so an assessment of potential berm related impacts is not included. The visual effects of the backshore berm would also be common to all alternatives.
- **Stakeholder Input.** Summary of stakeholder comments from Task Force Meetings and Public Meetings. *Note: each Top Performing Junction was the consensus choice of the Project Study Group.*
- **Constructability.** A high-level, relative comparison of constructability.

As noted earlier, and as shown on Exhibit 4-12, the junction analysis consists of a relative comparison of CTT Alternatives 1, 2 and 3 (a No Action comparison is conducted at the corridor level).
*The Highway Capacity Manual includes evaluation techniques for evaluating a variety of roadway types, including arterials such as North Lake Shore Drive.

Alternatives were rated as "green" if they had the relative best performance, "yellow" if performance was neutral or non-distinguishing, and "red" if performance was the relative worst.

Appendix A includes the detailed evaluation of CTT Junction Alternatives.

Exhibit 4-12:Junction Alternatives Analysis Example




Top Performing CTT (Corridor) Alternative

After assembling the Top Performing CTT Corridor Alternative, the CMAP Regional Travel Demand Model (TDM) was used to develop performance results at a "macro" scale. Exhibit 4-13 depicts the CMAP Travel Demand Modeling study area (see section 4.2 for further details). The CMAP TDM output was then used for VISSIM modeling, which assesses multimodal performance at a "micro" level of detail.

Considerable effort was undertaken to calibrate the VISSIM model to properly simulate existing CTA express bus service and proposed conditions.

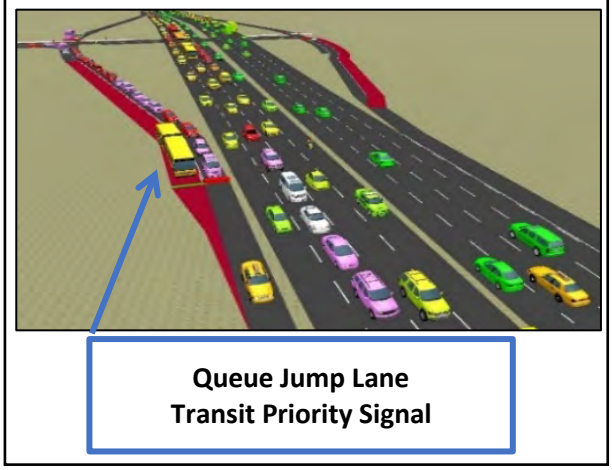
Exhibit 4-14 is a screen capture from the VISSIM model, which Illustrates Transit Advantage components such as queue jump lanes and transit priority signals that are analyzed in detail with the VISSIM Model. The VISSIM model output was used for the comparison between the top Performing CTT and the No Action Alternative, which is summarized in section 4.2.

Exhibit 4-13

**Travel Demand Modeling Study Area**

Exhibit 4-14

**VISSIM Model Screen Capture**



### 4.1.3 Transitways Evaluation Methodology

The Transitway Alternatives were evaluated by initially performing a major flaw review. The remaining alternatives were evaluated based upon a relative comparison of travel performance, using the CMAP and VISSIM models. As noted earlier, the VISSIM model was calibrated to simulate existing travel conditions. The Federal Transit Administration's STOPS ("Simplified Trips on Project Software") model was also used to develop a relative comparison of estimated 2040 ridership for the Transitway Alternatives. The Transitway Alternatives add space for transit and each have the same number of General Purpose Lanes (GPL), and as such, GPL operations are the same for all Transitway Alternatives. Therefore, the Transitway Alternatives evaluation criteria does not include GPL related factors and is instead focused upon transit factors related to the Purpose and Need. The Transitway Alternatives evaluation criteria, which is related to the Purpose and Need, are listed below:

**Total Person Throughput - Transit Riders in Peak Hour**

- A.M. and P.M. conditions (average of all CTA bus routes)
- Higher (transit) person throughput favored

**Daily Transit Ridership**

- Percent increase in daily transit ridership
- Greater increases favored

**Transit Mobility**

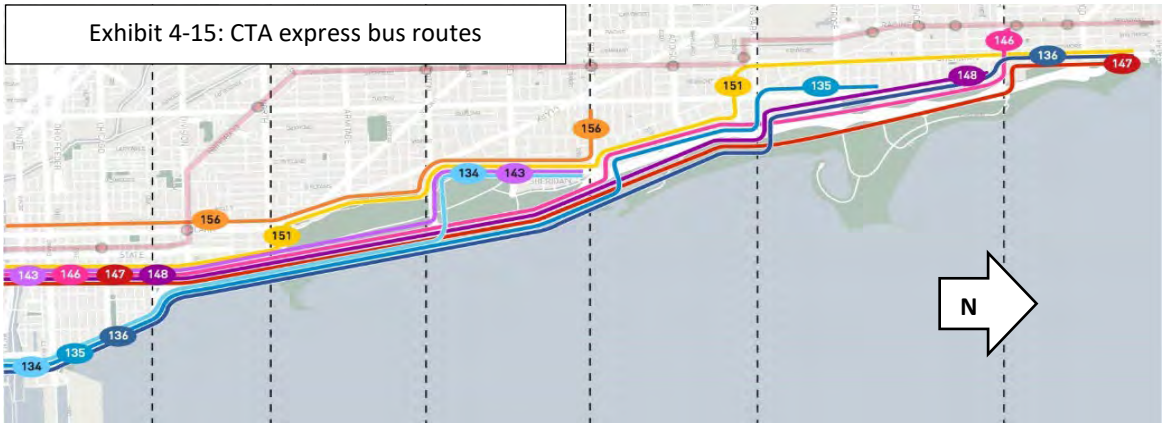
- A.M., P.M., average, and poor conditions (average of all CTA routes)
- Greater travel time savings favored

**Transit Reliability**

- Travel time range between poor and average conditions, A.M. and P.M.
- Smaller travel time ranges favored

The transit travel time savings were reported as an average of all 7 express bus routes that currently utilize the Outer Drive and portions of the Inner Drive. The express bus routes are shown on Exhibit 4-15. The assessment of travel time reliability is also a critical transit performance measure. If a bus route experiences significant travel time variability, this travel option becomes less attractive for users and would impact ridership. Based upon a review of historical weather conditions and NLSD traffic data, poor travel conditions occur during approximately 30% of the peak travel periods and reduce speeds for all vehicles by an average of 40%. This reduction in speed negatively affects bus travel times. Average conditions occur during peak periods approximately 70% of the time. The environmental review for the Transitways alternatives, which indicated that there were no distinguishing environmental effects, is discussed in section 4.1.1.

Exhibit 4-15: CTA express bus routes



After the output from the Transitways evaluation was tabulated, a composite result was developed through scoring. A ratio scoring method was used, because it is more sensitive to differences in performance, as compared to a 1-2-3 (ordinal) scoring system. Exhibit 4-16 is an example of ratio scoring. The scoring involved the following steps:

- Score individual criteria for each alternative; the worst performing alternative is scored as a "1", and the best performing alternative is scored as a "10".
- Alternatives that fall between the best/worst are scored proportionally.
- The individual scores are added to create an overall result.
- For the Transitways evaluation, the maximum score is 60.

Exhibit 4-16
Ratio Scoring Example

| New Green Space | Score |
|---|---|
| 1 acre | 1 |
| 11 acres | 5.3 |
| 20 acres | 10 |

### 4.1.4 Managed Lane Evaluation Methodology

The Managed Lane Alternatives evaluation includes an initial major flaw review. The travel performance analysis used both the CMAP Regional Travel Demand Model and the VISSIM Model. The primary purpose of the Managed Lane Alternatives is to provide high mobility and reliability for transit (and some autos). Since the Managed Lane Alternatives convert one or more GP lanes to a managed lane, GP Lane performance will be affected. Therefore, the Managed Lane Alternatives evaluation criteria includes both transit and auto factors related to the Purpose and Need, as shown below:

**Transit Mobility**
- A.M. and P.M. bus travel times (average and poor conditions)
- Greater travel time savings favored

**Transit Reliability**
- Travel time range between poor and average conditions (A.M. and P.M.)
- Smaller travel time ranges favored

**Transit Mode Share**
- Percentage change from No Action
- Highest increase in transit model share favored.

**Vehicular Mobility**
- GPL and ML travel times in the A.M. and P.M. (average and poor conditions)
- Lower travel times favored

**Traffic Volume Change**
- Daily volume change (Outer Drive)
- Peak hour volume change (arterial system)
- Relative least amount of traffic diversion *or* traffic attraction favored

**Total Person Throughput (bus and auto)**
- Daily total auto and transit riders
- Higher person throughput favored

Ratio scoring was also used for the Managed Lane Alternatives Evaluation.

## 4.2 Alternatives Evaluation Results

### 4.2.1 Level 1 Screening

During Level 1 Screening the Tunnels, Causeways and Light Rail Alternatives were dropped from further consideration. At a conceptual level, the **Tunnels and Causeways Alternatives** would have substantially higher costs (approximately 3X) and impacts as compared to the other Build Alternatives that are under consideration. In addition, the Tunnels and Causeways alternatives would *reduce* access to transit and the park due to their limited access configurations.

The **Light Rail Transit Alternative** was dropped as a standalone alternative for the following reasons:

- The rail facility would not fully replace the existing express bus routes, given that those bus routes include portions of the arterial system/neighborhoods as well as the Outer Drive.
- The rail facility would not directly connect to the arterial system/neighborhoods.
- The at grade design of the facility would limit access and circulation in Lincoln Park, and result in a relatively higher level of impacts and cost.
- The Dedicated Transitway Off Alignment Alternative would serve a similar function with relatively less impacts and lower cost.

As shown in Exhibit 4-17, the Light Rail Transit Alternative as well as the Tunnels and Causeways Alternatives were dismissed and the remaining TW, ML and CTT Alternatives were advanced into Level 2 Screening.

**Exhibit 4-17: Level 1 Alternatives Screening Summary**

| Tunnels and Causeways Alternatives | Context Tailored Treatments |
|---|---|
| Causeway on Lake Michigan | Corridor Modernization Alternative |
| Submerged Express Tunnel | Compressed Roadway Alternative |
| Land Based Express Tunnel | Frontage Drive Alternative |

| Transitways Alternatives | Managed Lane Alternatives |
|---|---|
| Transit Advantages | 3+1 Bus Only Lane |
| Bus on Shoulder – Right | 3+1 Managed Lane |
| Dedicated Transitway – Left | 2+2 Managed Lane |
| Dedicated Transitway – Off Alignment | 3+2 Reversible Managed Lane |
| Light Rail Transit | 4+1 Contraflow Bus Only Lane |

Dismissed During Level 1 Screening

Carried into Level 2 Screening

### 4.2.2 Level 2 Screening Results

#### 4.2.2.1 Context Tailored Treatment Alternatives Evaluation

As noted in Section 4.1, the Context Tailored Treatment (CTT) Alternatives were evaluated both as corridor alternatives and as individual junction alternatives. The CTT evaluation considered factors that relate to the Purpose and Need, including infrastructure deficiencies, mobility, and access and circulation. Environmental factors, as well as cost and stakeholder input, were also considered. This section includes a summary of the CTT evaluation findings. The detailed evaluation of the CTT Alternatives is included in Appendix A.

Context Tailored Treatment Alternatives- Initial Corridor Evaluation

The CTT Alternatives were initially evaluated as corridors using the CMAP Regional Travel Demand Model (TDM). As shown on Exhibit 4-18, the study area for the traffic modeling analysis is bounded by the Edens Expressway and the Kennedy Expressway to the west, Touhy Avenue to the north, 31st Street to the south, and the Lakefront to the east.

Travel performance along the Outer Drive was measured, and other factors, such as arterial performance were measured within the modeling study area. The overall purpose of the corridor evaluation was to assess the performance of the CTT Alternatives and determine whether there were any substantive differences in corridor performance that warranted further detailed modeling and evaluation.

As noted in section 4.1.1, the environmental review of the Initial CTT Corridor Alternatives indicated that there were no distinguishing environmental effects amongst CTT Corridor Alternatives 1, 2 and 3.

Travel Demand Modeling Study Area
Exhibit 4-18

As shown in Exhibit 4-19, Context Tailored Treatment Alternatives 1, 2 and 3 provide comparable performance, with differences in performance generally 1% or less.

The results of the initial CTT corridor alternatives analysis confirm that CTT Alternatives 1, 2 and 3 provide similar performance and support the need for a junction analysis to develop a Top Performing CTT Corridor Alternative.

As noted earlier, a junction analysis is also needed to appropriately consider context at each individual junction. The junction analysis will also allow a relatively more detailed review of environmental factors.

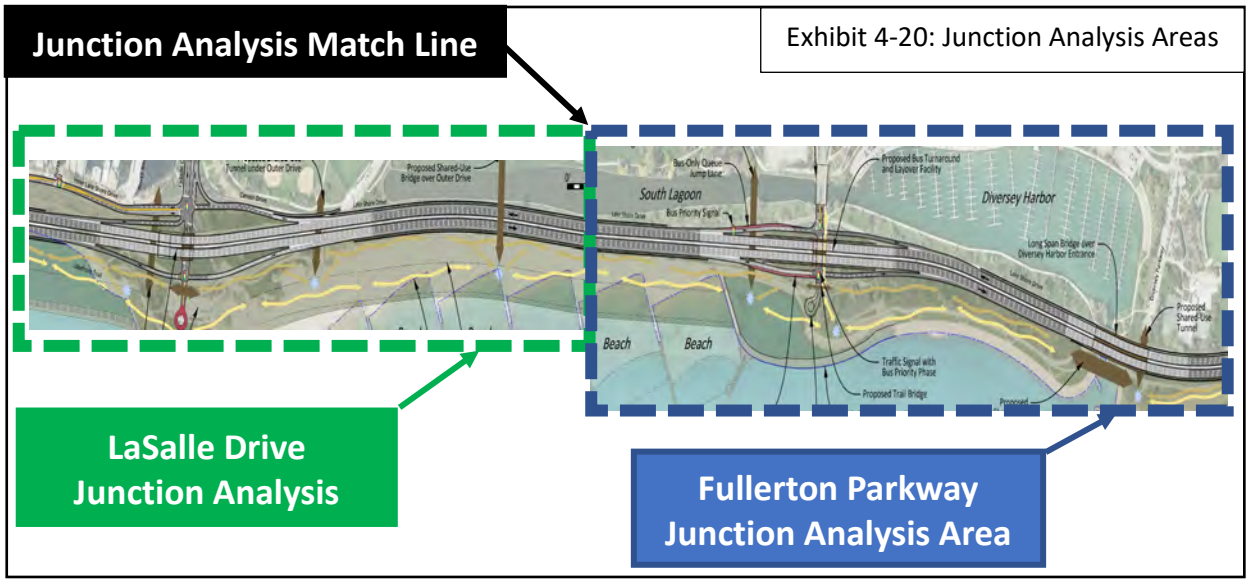
**Exhibit 4-19**
**Travel Demand Modeling Summary (initial CTT Corridor Alternatives Evaluation)***

| Performance Metric | No Action | CTT Alt 1 Corridor Modernization | CTT Alt 2 Compressed Roadway | CTT Alt 3 Frontage Drives | % Difference between Build Alts** |
|---|---|---|---|---|---|
| **Vehicle Hours of Travel (VHT) (hours X 1,000)** | 734 | 726 | 727 | 727 | >1% |
| **Congested VHT (CVHT) (hours X 1000)** | 288 | 278 | 282 | 278 | 1% |
| **Arterial VHT (hours X 1,000)** | 423 | 417 | 420 | 418 | 1% |
| **Arterial CVHT (hours X 1,000)** | 161 | 155 | 158 | 155 | 2% |
| **Average Auto Commute Time (minutes)** | 29 | 29 | 29 | 28 | 3% |
| **Average Transit Trip Time (minutes)** | 25 | 25 | 25 | 25 | 0% |
| **Transit Mode Share (percentage of total trips by transit in study area)** | 54% | 54% | 54% | 54% | 0% |

*CMAP Model Output is rounded to nearest whole number.
**% difference in performance between CTT Alts 1, 2 and 3.

Context Tailored Treatments - Junction Alternatives Evaluation

As shown in Exhibit 4-20 (and Exhibit 4-11), the evaluation for each junction includes sections of the Outer Drive to the north and south of each junction. The study areas for each junction match up so that the evaluation captures the entire length of the NLSD project. The junction evaluation used criteria related to the Purpose and Need and considered environmental factors, stakeholder input and cost.




Context Tailored Treatment Alternatives – Junction Evaluation Summary

- CTT Alternative 1 (Corridor Modernization) was selected for a majority of the junctions, since this alternative provided the relative best balance of improved mobility, modest changes in footprint, and relatively lower cost.

- CTT Alternative 2 (Compressed Roadway) was selected for junctions in the northern portion of the project due to its relatively smaller footprint at those junctions.

- CTT Alternative 3 (Frontage Drives) was not selected at any junction based upon a combination of factors, including performance, cost and impacts. However, individual components of CTT Alternative 3 were incorporated into the Top Performing Alternative at the Chicago Avenue and Montrose/Wilson Avenue junctions.

The overall Top Performing CTT Alternative includes Alternative 1 (Corridor Modernization) from Grand Avenue to Wilson Avenue, and Alternative 2 (Compressed Roadway) from Lawrence Avenue to Hollywood Avenue, with elements of Alternative 3 in two locations, as shown on Exhibit 4-21.

| Exhibit 4-21: Top Performing Junctions | | | |
|---|---|---|---|
| Junction Location | CTT Alternative 1 (Corridor Modernization) | CTT Alternative 2 (Compressed Roadway) | CTT Alternative 3 (Frontage Drives) |
| Chicago Avenue | X | | * |
| Oak Street /Michigan Avenue | X | | |
| LaSalle Drive | X | | |
| Fullerton Parkway | X | | |
| Belmont Avenue | X | | |
| Addison Street | X | | |
| Irving Park Road | X | | |
| Montrose Avenue | X | | |
| Wilson Avenue | X | | ** |
| Lawrence Avenue | | X | |
| Foster Avenue | | X | |
| Bryn Mawr Avenue | | X | |
| *Pearson Street Bridge added to CTT Alternative 1<br>**Northbound Frontage Drive added to CTT Alternative 1 between Montrose and Wilson | | | |

Comparison of Top Performing CTT Alternative to the No Action Alternative

After identifying the Top Performing junction layouts, the Top Performing CTT Alternative was assembled and refined based upon further stakeholder review. The Top Performing CTT was then compared to the No Action Alternative using the Travel Demand and VISSIM models to assess its overall mobility benefits. The A.M. peak period was evaluated in the southbound direction and the P.M. peak period was evaluated in the northbound direction, which generally corresponds to the highest demand during each peak.

As summarized in Exhibit 4-22, the Top Performing CTT Corridor Alternative provides substantial mobility benefits (up to 35% reduction in vehicular travel times, up to a 42% reduction in transit travel times) in addition to addressing the safety, access circulation and infrastructure elements of the Purpose and Need.

The CTT with Transit Advantages (CTT+TA) alternative will be carried forward for evaluation in the DEIS, and as noted earlier, the CTT+TA Alternative will also be evaluated as a Transitway Alternative. An overall exhibit for the Top Performing CTT Alternative is included in Appendix B of this report.

***Further refinements will be made to the Top Performing CTT Alternative (CTT + TA) based upon ongoing and future stakeholder engagement as well as future technical studies, including year 2050 Travel Demand Modeling.***

**Exhibit 4-22: Top Performing CTT (Corridor) Alternative – Mobility Comparison to No Action**

| Performance Metric | | 2040 No Action | CTT + TA | Change from No Action |
|---|---|---|---|---|
| Vehicular Mobility* (average conditions) | SB (AM) | 11.8 min | 9.0 min | -24% |
| | NB (PM) | 13.2 min | 8.6 min | -35% |
| Vehicular Mobility* (poor conditions) | SB (AM) | 18.1 min | 14.0 min | -23% |
| | NB (PM) | 16.2 min | 11.6 min | -28% |
| Transit Mobility** (average conditions) | SB (AM) | 20.4 min | 14.9 min | -27% |
| | NB (PM) | 21.8 min | 12.6 min | -42% |
| Transit Mobility** (poor conditions) | SB (AM) | 33.3 min | 25.2 min | -24% |
| | NB (PM) | 25.1 min | 21.4 min | -15% |

*Vehicular travel times are average travel times on the Outer Drive measured between Grand Avenue and Foster Avenue.
**Transit travel times represent the average travel times for 7 express bus routes that travel on various portions of the Inner and Outer Drives measured between Grand Avenue and Foster Avenue.

4.2.2.2 Transitways Evaluation

Once layouts were developed for each Transitway Alternatives, a major flaw review was completed. No major flaws were evident.

The Transitway Alternatives were evaluated based upon their ability to increase transit ridership and reduce the duration and variability of transit travel times. Exhibit 4-23 includes the output from the Transitways evaluation, which includes average travel times for all seven express bus routes currently utilizing the Outer Drive. As noted earlier, the Transit Advantages (CTT+TA) alternative has the same configuration as the top performing CTT Alternative (CTT+TA) and is also being tested as a Transitway Alternative to compare the performance of spot transit improvements to more robust alternatives that add dedicated space for transit.

**Exhibit 4:23: Transitway Alternatives Evaluation**

| Evaluation Criterion | Evaluation Measure | | No Action | Transit Advantages (CTT+TA) | Bus on Shoulder – Right (BOS-R) | Dedicated Transitway – Left (DTW-L) | Dedicated Transitway - Off Alignment (DTW-OA) |
|---|---|---|---|---|---|---|---|
| **Total Person Throughput*** | **Persons/Peak Hour x 1,000 (Transit Riders Only)** | | 6.2 AM<br>4.5 PM | 8.6 AM<br>6.3 PM | 8.6 AM<br>6.3 PM | 9.5 AM<br>6.8 PM | 8.6 AM<br>6.3 PM |
| **Transit Ridership**** | **% Change in Ridership** | | 0% | 40% | 40% | 52% | 39% |
| **Transit Mobility***** | **2040 Travel Time (Avg Conditions)** | **AM** | 20.4 min. | 14.9 min | 14.9 min | 14.1 min | 15.3 min |
| | | **PM** | 21.8 min. | 12.6 min | 12.6 min | 12.0 min | 13.7 min |
| | **2040 Travel Time (Poor Conditions)** | **AM** | 33.3 min. | 25.2 min | 24.9 min | 20.6 min | 21.7 min |
| | | **PM** | 25.1 min. | 21.4 min | 20.0 min | 18.5 min | 21.6 min |
| **Transit Reliability***** | **2040 Travel Time Range (Avg Conditions)** | **AM** | 14-27 min. | 13-17 min | 13-17 min | 13-15 min | 13-17 min |
| | | **PM** | 16-27 min. | 11-14 min | 11-14 min | 11-13 min | 12-15 min |
| | **2040 Travel Time Range (Poor Conditions)** | **AM** | 28-39 min. | 22-28 min | 23-27 min | 19-22 min | 20-23 min |
| | | **PM** | 20-30 min. | 20-23 min | 18-22 min | 18-19 min | 20-23 in |

* Data developed from CMAP Travel Demand Modeling
** Data developed from STOPS analysis
***Data developed from VISSIM analysis

The following observations can be made from the Transitway evaluation:

- All Transitway Alternatives include base CTT improvements to eliminate bottlenecks that impede bus and auto mobility and result in substantial performance improvements over the No Action Alternative.
- The **Dedicated Transitway Left Alternative (DTW-L)** provided the relative best performance. The dedicated space for buses is configured to have the relative fewest conflicts with auto traffic.
- The **Dedicated Transitway Off Alignment Alternative (DTW-OA)** provided relatively lower performance. The separate roadway for buses (parallel to the Outer Drive) requires signalized intersections to provide access to and from the arterial network, which lowers performance.
- The **Bus on Shoulder Right Alternative (BOS-R)** performance was similar to the DTW-OA alternative.
  - The base CTT improvements increase speeds along the Outer Drive to the extent that the shoulder would not be used by buses during average conditions during the A.M. and P.M. peaks. The shoulder would only be used by buses during poor conditions.
  - The Transit Advantage components (queue jump lanes and bus priority signals) further improve bus travel times.
- The **Transit Advantages Alternative (CTT+TA)** performance was similar to the DTW-OA and BOS-R Alternatives.
  - The base CTT improvements and Transit Advantage components improve performance along the Outer Drive.
  - The CTT + TA Alternative does not include a shoulder riding feature, and therefore has slightly lower performance as compared to the BOS-R.

The individual results from the Transitways modeling were calculated using the ratio scoring method. Exhibit 4-24 provides the ratio scores for each Transitways Alternative.

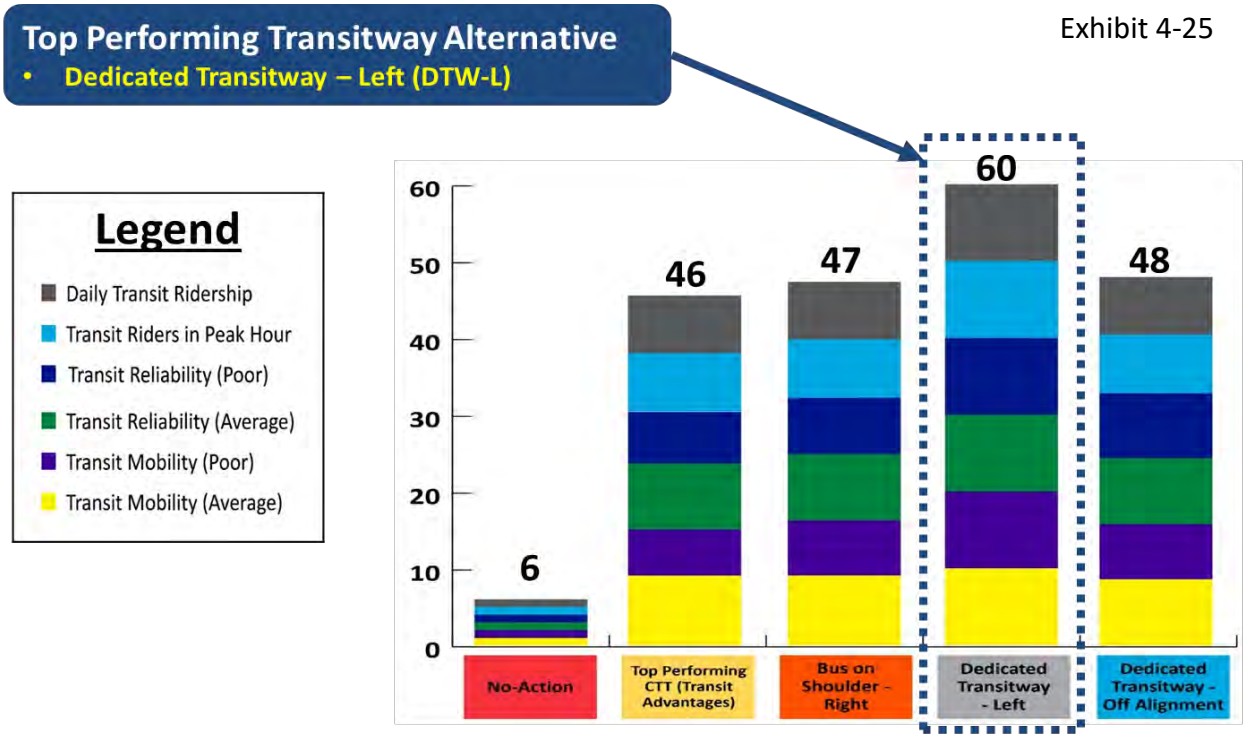
**Exhibit 4-24: Transitways Evaluation (Ratio Scoring)**

| Evaluation Criterion | No Action | CTT+TA | BOS – R | DTW – L | DTW -OA |
|---|---|---|---|---|---|
| Peak Hour Person Throughput | 1 | 7.6 | 7.6 | 10 | 7.6 |
| Daily Transit Ridership | 1 | 7.5 | 7.5 | 10 | 7.5 |
| Transit Mobility (poor) | 1 | 9.1 | 9.1 | 10 | 8.6 |
| Transit Mobility (avg) | 1 | 6.0 | 7.2 | 10 | 7.2 |
| Transit Reliability (poor) | 1 | 8.6 | 8.6 | 10 | 8.6 |
| Transit Reliability (avg) | 1 | 6.7 | 7.4 | 10 | 8.5 |
| **Total (Rounded)** | **6** | **46** | **47** | **60** | **48** |

**Top Performing Transitway Alternative**

As shown on Exhibit 4-25, the scoring results indicate that the **Dedicated Transitway Left Alternative (DTW-L)** was the relative best performing Transitway Alternative and is the relative best at satisfying the Purpose and Need. It is recommended to be carried forward for further evaluation in the DEIS.

Exhibit 4-25




The DTW-L alternative is shown on Exhibit 4-26.

Exhibit 4-26: Top Performing Transitway Alternative

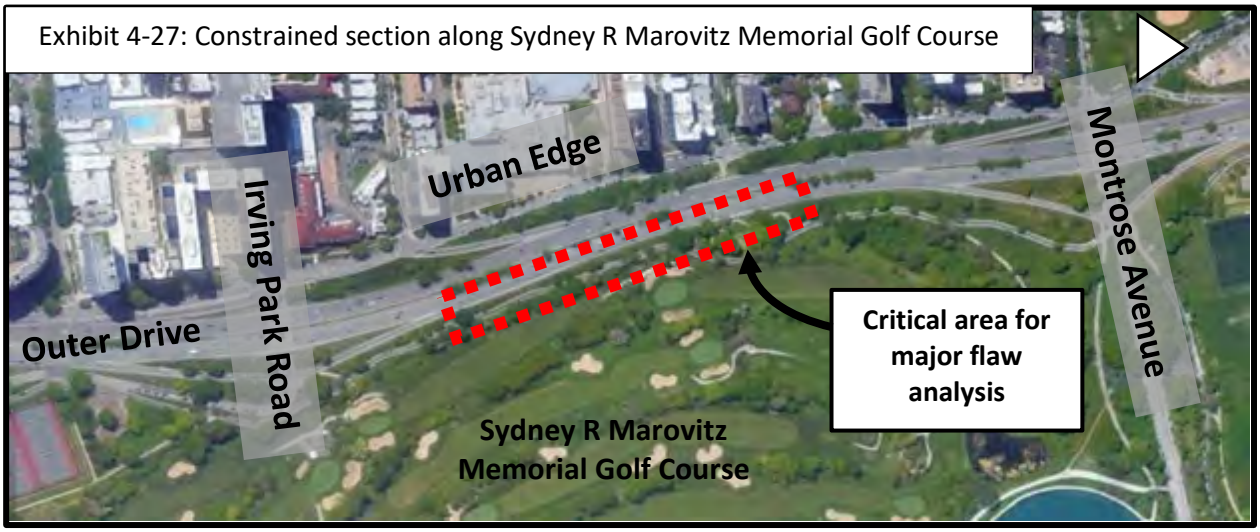

**Dedicated Transitway on Left (DTW-L)**

4.2.2.3 Managed Lane Alternatives Evaluation

Major Flaw Review

As noted in the Managed Lane Evaluation Methodology section (4.1.4), the Managed Lane Alternatives evaluation began with a preliminary review to determine if any major flaws were evident, including substantially larger impacts and/or costs. During the Major Flaw Review, two of the alternatives were dropped, including the 3+2 Reversible Managed Lane and the 4+1 Contraflow Bus Only Lane Alternatives, and the major flaws are described in more detail below.

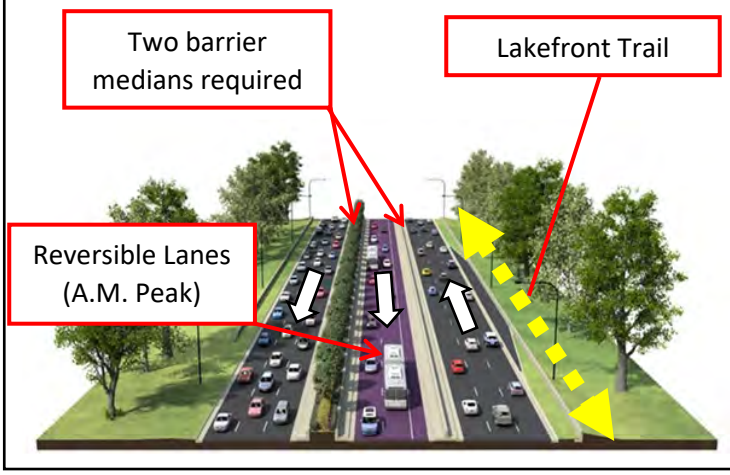
Exhibit 4-27: Constrained section along Sydney R Marovitz Memorial Golf Course




The key area of concern for the major flaw analysis is between Irving Park Road and Montrose Avenue, which is within the relatively most constrained section of the project, as shown on Exhibit 4-27. The constraints include the urban edge to the west and the Sydney R Marovitz Memorial golf course to the east, which both present challenges with respect to accommodating the proposed cross section.

The initial layout for the 3+1 BOL, 3+1 ML and 2+2 ML Alternatives have the same footprint within the constrained area and do not encroach into the Golf Course. The initial layout for the 3+2 Reversible Managed Lane (3+2 RML) Alternative, which has a relatively wider footprint, was reviewed to determine if other major flaws were present. The 4+1 CBOL Alternative, while not initially having any major flaws, was refined based on stakeholder input. A major flaw review was performed for the refined 4+1 CBOL Alternative.

Exhibit 4-28: Initial 3+2 RML Alternative
Typical Cross section (looking north)

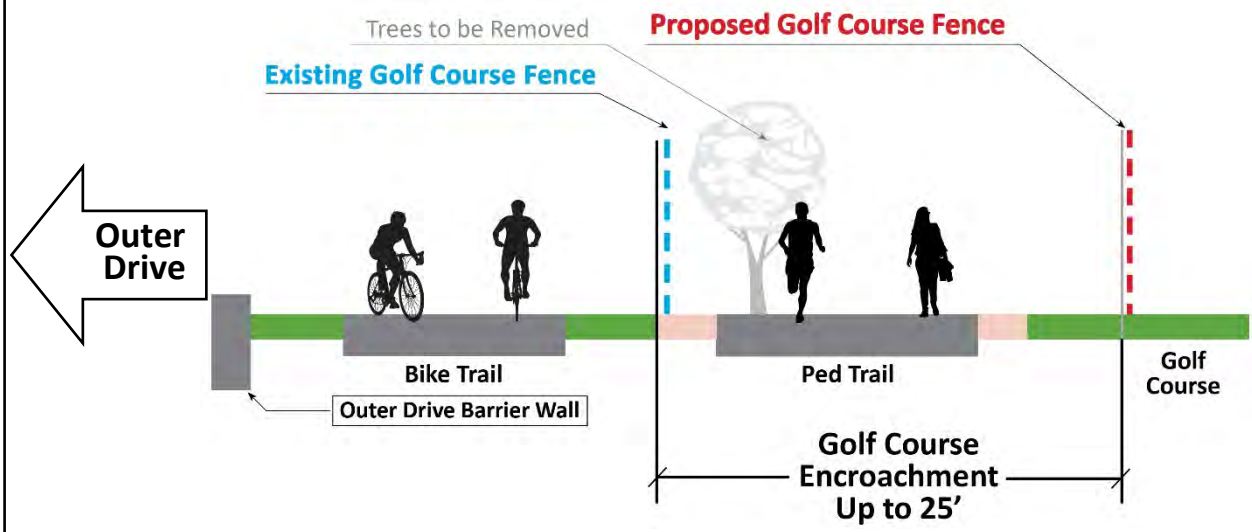


3+2 RML Alternative Review

*Initial Design*

Exhibit 4-28 illustrates the typical cross section for the 3+2 RML Alternative, which includes the Outer Drive as well as the Lakefront Trail. The 3+2 RML requires two barrier (raised) medians to separate the managed lane traffic from the general purpose lane traffic. The barrier medians are required for safety, due to traffic in the reversible managed lane flowing in the opposite direction as the general purpose lanes at all times (either northbound or southbound). The median along the southbound general purpose lanes was initially designed as a landscaped median to provide green space within a relatively wide typical cross section. Exhibit 4-29 depicts the eastern portion of the typical cross section for the 3+2 RML Alternative, along the Lakefront Trail and Golf Course. As shown, the footprint of the 3+2 RML Alternative would encroach up to 25 feet into the Sydney Marovitz Golf Course. Therefore, the 3+2 RML Alternative was further refined to potentially avoid this impact.

Exhibit 4-29: Eastern portion of 3+2 RML Typical cross section (Initial Design)
Golf Course Encroachment (looking north)




*Refined Design*

As shown on Exhibit 4-30, the 3+2 RML Alternative was refined to replace the proposed landscaped barrier median along the southbound general purpose lanes with a relatively narrower concrete barrier median. This refinement reduced but did not eliminate the encroachment into the Golf Course. The refined 3+2 RML Alternative would still encroach up to 13 feet into the Golf Course, as shown on exhibit 4-31.

Exhibit 4-30: Refined 3+2 RML Alternative
Minimal Cross section (looking north)

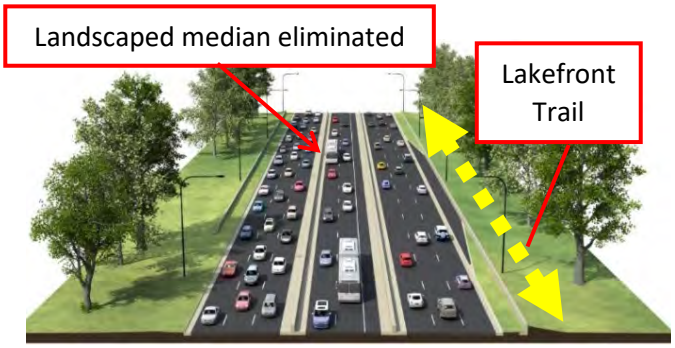
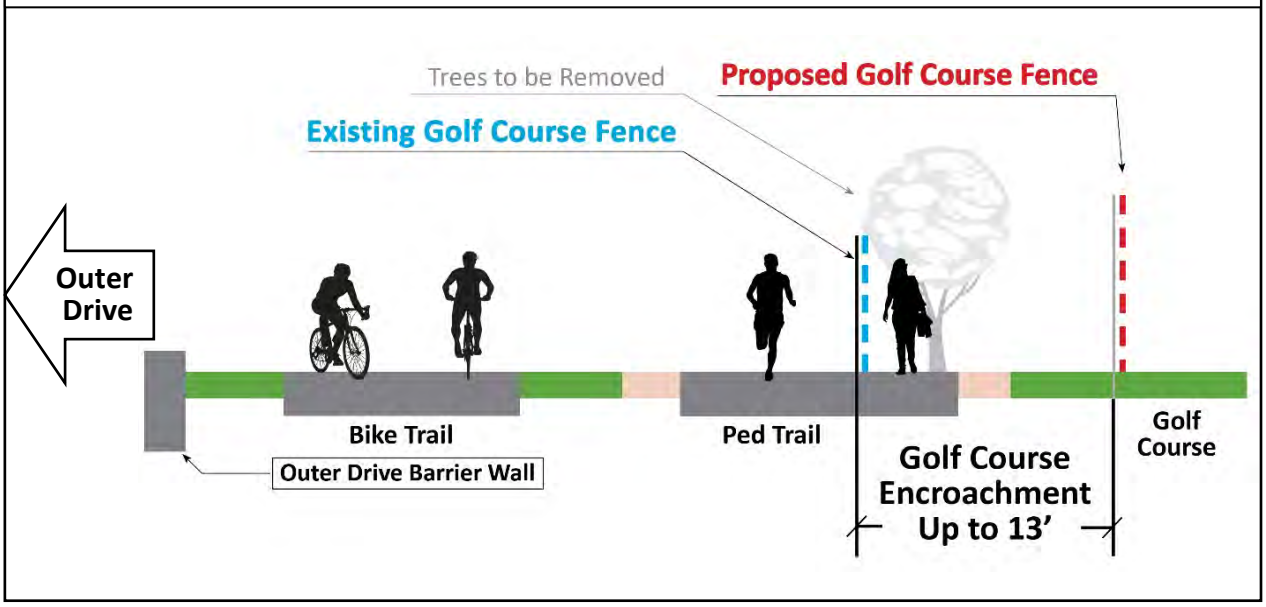


Exhibit 4-31: Eastern portion of 3+2 RML Minimal cross section (Refined Design)
Golf Course Encroachment (looking north)




*3+2 RML Alternative Conclusion*

This encroachment for the Minimal Cross Section (refined design) would still require tree removals within the golf course along the 8th fairway and potential modifications to the 8th fairway. This represents an additional impact to 4(f) property that is not included with the 3+1 BOL, 3+1 ML and 2+2 ML Alternatives (or the Transitways and CTT Alternatives). Additional impacts to 4(f) property should be avoided in favor of other alternatives that meet the Purpose and Need with fewer impacts. Therefore, the 3+2 RML includes impacts to the golf course that are considered a major flaw. ***The 3+2 RML Alternative is dismissed from further consideration.***

4+1 CBOL Alternative Review

*Initial Design*

As shown on Exhibit 4-32, the initial layout for the 4+1 CBOL Alternative included a southbound bus only lane during the A.M. peak period.

The bus only contraflow lane would be deployed by a movable barrier wall in the inside northbound lane.

Exhibit 4-32: Initial 4+1 CBOL Alternative
Typical Cross section (looking north)


(Southbound Contraflow lane only)

During discussions with the Project Study Group (PSG), the CTA noted that the 4+1 CBOL Alternative, as currently configured, does not provide the same level of operational flexibility as compared to the 3+1 BOL, 3+1 ML and 2+2 ML Alternatives. The peak hour/southbound only contraflow lane limits the ability to respond to changing conditions along the Outer Drive, as compared to the 3+1 BOL, 3+1 ML and 2+2 ML Alternatives, which provide both northbound and southbound managed lanes at all times.

The need for a managed lane in both directions was also expressed by stakeholders at Task Force Meeting #10. Task Force members, including First Responders, also noted that emergency access to the contraflow lane would be relatively more difficult as compared to the other Managed Lane Alternatives.

*Refined Design*

Therefore, in response to PSG and Task Force input, the 4+1 CBOL Alternative was refined to provide contraflow lanes in both directions.

- During the A.M. peak, the southbound contraflow lane would operate in the northbound General Purpose lanes.
- During the P.M. peak, the northbound contraflow lane would operate in the southbound General Purpose Lanes.

Exhibit 4-33 depicts the revised layout for the 4+1 CBOL Alternative.

Exhibit 4-33: Refined 4+1 Contraflow Bus Only Lane (CBOL) Alternative
Typical Cross section (looking north)

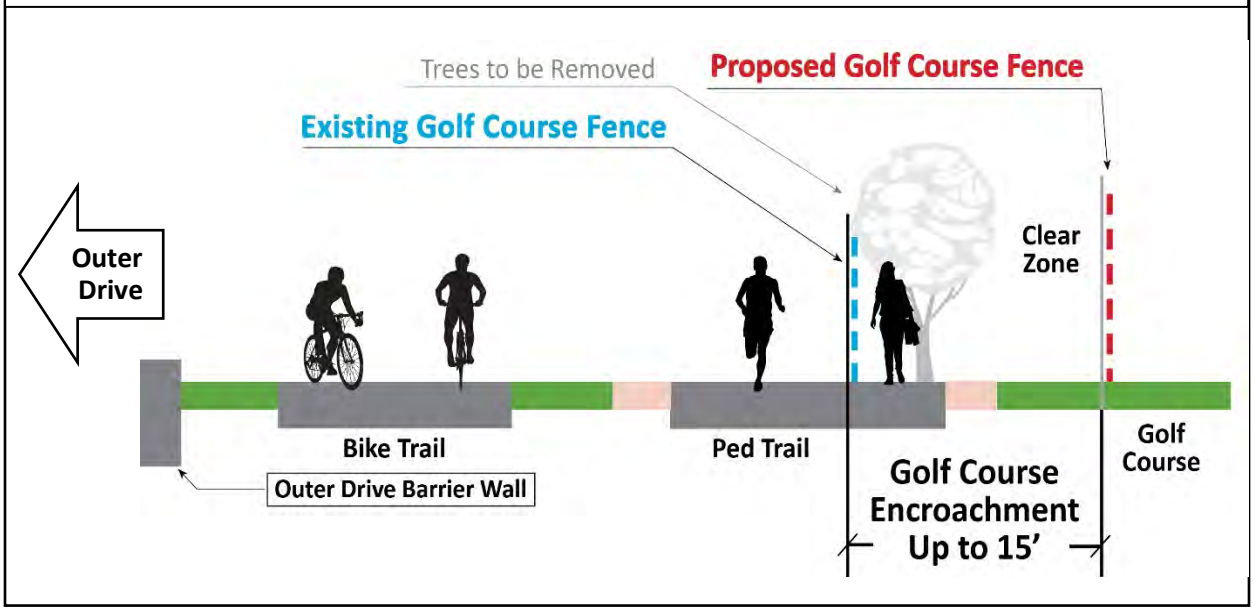
A.M. Configuration
Southbound Contraflow lane deployed

P.M. Configuration
Northbound Contraflow lane deployed

Although the contraflow bus only lanes reallocate space within existing travel lanes when deployed, the footprint is wider than existing conditions. The bus only contraflow lane must be 21 feet wide to allow for passing a stalled bus.

Exhibit 4-34 depicts the eastern portion of the revised 4+1 CBOL typical cross section. As shown, the refined 4+1 CBOL Alternative would encroach into the Golf Course by up to 15 feet.

Exhibit 4-34: Eastern portion of 4+1 CBOL Alternative
Refined typical cross section (looking north)




*4+1 CBOL Alternative Conclusion*

Similar to the 3+2 RML Alternative, this encroachment represents an additional impact to 4(f) property that is not included with the 3+1 BOL, 3+1 ML and 2+2 ML Alternatives (or the Transitways and CTT Alternatives). Additional impacts to 4(f) property should be avoided in favor of other alternatives that meet the Purpose and Need with fewer impacts.

Since the 4+1 CBOL Alternative includes impacts to the golf course that are considered a major flaw***, the 4+1 CBOL Alternative is dismissed from further consideration.***

Managed Lane Alternatives Evaluation

The remaining three Managed Lane Alternatives are shown on Exhibit 4-35 and evaluated in this section.

Exhibit 4-35: Remaining Managed Lane Alternatives for evaluation

3+1 BOL Alternative | 3+1 ML Alternative | 2+2 ML Alternative

The final three Managed Lane Alternatives were evaluated based upon Purpose and Need factors, which include their ability to improve vehicular mobility, transit mobility and transit reliability as well as minimize traffic impacts (changes in volumes on the Outer Drive and arterial system) and maximize person throughput.

Based on stakeholder input, a transit mode share criterion was also included in the Managed Lanes Alternatives Evaluation. For the alternatives that allow autos in their respective managed lanes (3+1 ML, 2+2 ML), tolling is used to maintain free flow speeds. An initial rate of $1.00 per mile was selected for the Managed Lane Alternatives Evaluation based upon preliminary travel demand modeling and is subject to change in future rounds of evaluation and overall project development.

**Transit Mobility and Reliability Evaluation**

Exhibit 4-36 summarizes the Transit Mobility and Reliability portion of the evaluation. The *Transit Mobility* criterion represents bus travel times for the A.M and P.M. peak periods, under poor and average conditions. The *Transit Reliability* criterion represents the range of bus travel times between poor and average conditions. Reducing the range in travel times would be an increase in reliability.

Exhibit 4-36: Managed Lane Alternatives Evaluation (Transit Mobility and Reliability)

| Transit Mobility and Reliability* | | | No Action | Manage Lane Alternatives | | |
|---|---|---|---|---|---|---|
| | | | | 3+1 BOL | 3+1 ML | 2+2 ML |
| Transit Mobility | 2040 Travel Times and % change from No Action (Average Traffic Conditions) | AM | 20.4 min | 16.1 min -21% | 16.0 min -22% | 17.6 min -14% |
| | | PM | 21.8 min | 13.3 min -39% | 13.7 min -37% | 13.6 min -38% |
| | 2040 Travel Times and % change from No Action (Poor Traffic Conditions) | AM | 33.3 min | 18.6 min -44% | 19.2 min -42% | 20.5 min -38% |
| | | PM | 25.1 min | 14.6 min -42% | 16.3 min -35% | 15.8 min -37% |
| Transit Reliability | 2040 Travel Time Range and % change from No Action (All Traffic Conditions) | AM | 24.5 min | 5.5 min -78% | 6.4 min -74% | 7.2 min -71% |
| | | PM | 14.5 min | 4.1 min -72% | 5.1 min -65% | 5.1 min -65% |

*Data developed from the CMAP TDM and VISSIM analysis

The following observations can be made regarding the Transit Mobility and Transit Reliability evaluation:

- All Managed Lane Alternatives provide high mobility and reliability for transit.
- The 3+1 BOL Alternative includes bus only lanes and as such, provides the *relative highest transit mobility under poor conditions*, as buses are not impeded by autos.

**Transit Mode Share Evaluation**

Based upon stakeholder input, a Transit Mode Share criterion was added to the Managed Lanes evaluation. Transit Mode Share is defined as the percentage of trips being made by transit. The output from the CMAP Travel Demand Model (TDM) for each Managed Lane Alternative contains a variety of performance metrics that were used for Level 2 Screening, including Transit Mode Share. Therefore, the Transit Mode Share values were extracted from the modeling results and added to the Managed Lanes Alternatives evaluation. The key Transit Mode Share related assumptions that are included in the CMAP TDM and the modeling results are described in this section.

*Existing Travel Patterns*

Prior to describing the Transit Mode Share analysis assumptions and results, it is important to review the predominant origins, destinations and travel patterns for Outer Drive users. Exhibit 4-37 depicts the origin, destination and predominant travel patterns for southbound A.M. peak traffic that is entering the Outer Drive between Hollywood Avenue and LaSalle Drive. The trip origins are from a large area that extends north of the City of Chicago border, west to Pulaski Avenue, and south to North Avenue. A majority of these trips are destined for downtown (Central Business District). Exhibit 4-38 overlays the transit catchment areas (areas within ½ mile of a station or bus stop) for the CTA and Metra rail lines as well as the transit catchment area for the NLSD Express Bus service.

Exhibit 4-37: Travel Patterns (SB, AM)

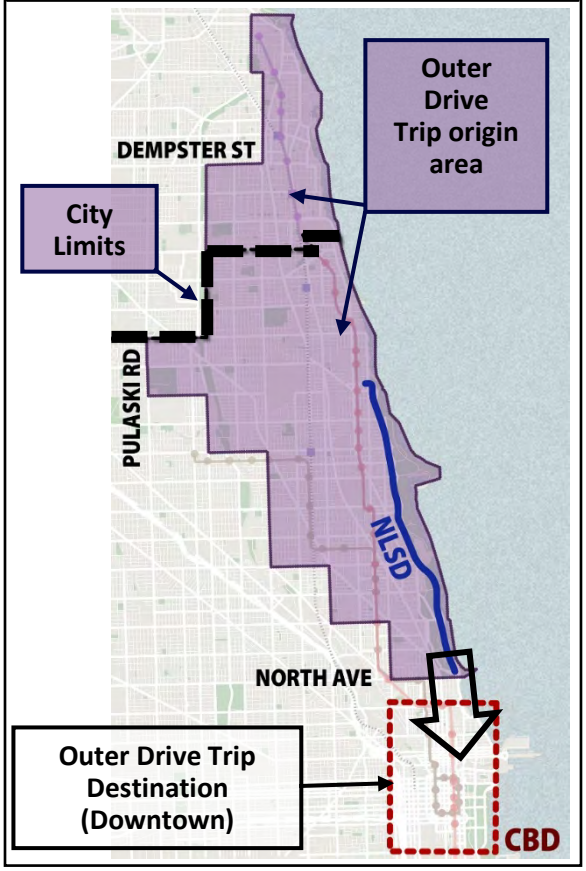
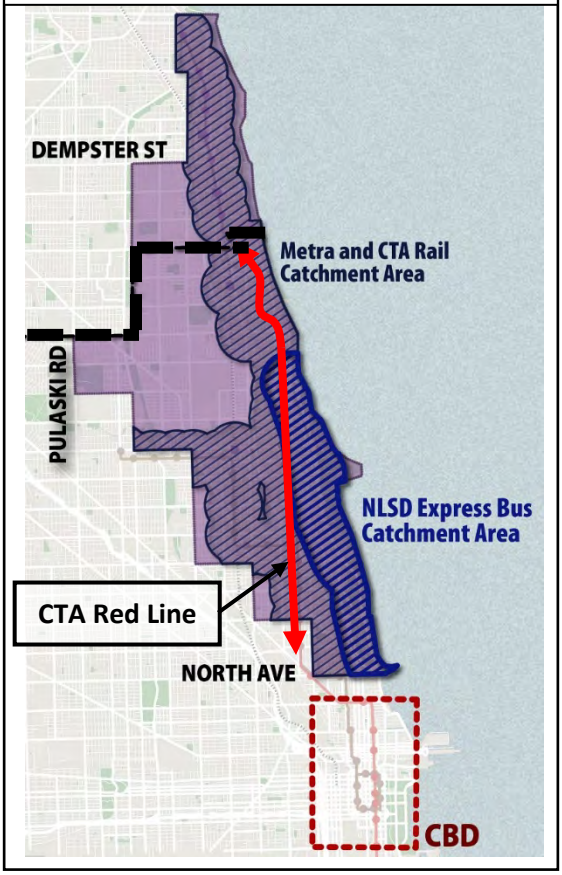



Exhibit 4-38: Catchment Areas



As shown, the majority of travelers have access to transit service under existing conditions, and the CTA Red Line catchment area partially overlaps the NLSD Express bus catchment area. The availability of existing transit service and the overlapping catchment areas may limit the capture of new transit ridership from expanded express bus service along the Outer Drive.

*Travel Demand Modeling Assumptions*

The basic factors that influence transit mode share include travel demand, service frequency, and mobility and reliability. The following is a description of the key Transit Mode Share related assumptions that were incorporated into the CMAP Travel Demand Model.

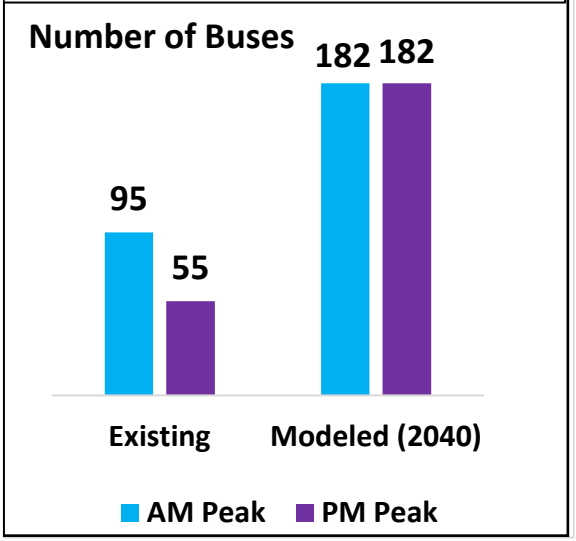
*Travel Demand:* The CMAP Travel Demand Model assumes that transit growth is unconstrained (there will always be room for passengers) and auto growth is constrained (the arterial network will not be expanded). More specifically, the model assumes a 20% growth in transit trips, and an 8% growth in auto trips (year 2040 No Action forecast).

*Service Frequency*: As shown on Exhibit 4-39, the number of buses in the A.M. peak hour is being increased from 95 buses arriving every 4 to 7 minutes to a modeled scenario of 182 buses arriving every two minutes.

In the P.M. peak, the modeling assumes an increase from 55 buses arriving every 4 to 7 minutes to 182 buses arriving every 2 minutes.

*Transit Mobility and Reliability*. As discussed earlier and noted on Exhibit 4-36, the Managed Lane Alternatives reduce bus travel times by up to 44% and improve reliability by up to 78%.

Exhibit 4-39: Service Frequency




*Transit Mode Share – Managed Lane Alternatives*

Exhibit 4-40 displays the Transit Mode Share for the No Action and Managed Lane Alternatives.

Exhibit 4-40: Transit Mode Share*

| | No Action | 3+1 BOL | 3+1 ML | 2+2 ML |
|---|---|---|---|---|
| **Transit Mode Share (% of total trips made by transit)** | 45.7% | 46.6% | 46.4% | 47.2% |
| **% change from No Action** | -- | 0.9% | 0.7% | 1.5% |

*Results from CMAP Travel Demand Model

The following observations can be made regarding Transit Mode Share:

- The Transit Mode Share increase over the No Action Alternative is relatively small. The study area is already well served by transit, with the CTA Red line and the NLSD Express bus catchment areas overlapping, which serves to limit the capture of new ridership.

- There are minor differences between the Build Alternatives (less than 1%), although the alternatives with the relative least GP Lane capacity (2+2 ML Alternative) had a higher transit mode share.

- The percent change in transit mode *share* over the No Action Alternative is between 0.7% and 1.5%, which implies a mode *shift* (to transit) of 0.7% to 1.5%.

**Vehicular Mobility Evaluation**

Exhibit 4-41 summarizes the vehicular mobility portion of the evaluation. General Purpose Lane (GPL) and Managed Lane (ML) travel times are provided for the A.M. and P.M. peak periods, for both average and poor conditions (poor conditions represent rain/snow events, which occur 30% of the time, and reduce speeds by 40%).

Exhibit 4-41: Managed Lane Alternatives Evaluation (Vehicular Mobility)*

| | | No Action | 3+1 BOL | 3+1 ML | 2+2 ML |
|---|---|---|---|---|---|
| GP Lane Travel Times Average Traffic Conditions, % change over No Action | AM | 11.8 min | 12.3 min<br>+4% (worse) | 8.8 min<br>-25% | 18.5 min<br>+57% (worse) |
| | PM | 13.2 min | 8.6 min<br>-35% | 8.7 min<br>-34% | 8.5 min<br>-36% |
| GP Lane Travel Times Poor Traffic Conditions % change over No Action | AM | 18.1 min | 18.1 min<br>0% | 12.2 min<br>-33% | 26.6 min<br>+47% (worse) |
| | PM | 16.2 min | 11.5 min<br>-29% | 11.4 min<br>-30% | 11.0 min<br>-32% |
| ML Travel Times Average Traffic Conditions % change over No Action | AM | 11.8 min | 9.4 min<br>-20% | 9.0 min<br>-24% | 8.5 min<br>-28% |
| | PM | 13.2 min | 9.4 min<br>-14% | 8.8 min<br>-33% | 8.1 min<br>-39% |
| ML Travel Times Poor Traffic Conditions % change over No Action | AM | 18.1 min | 9.4 min<br>-48% | 11.7 min<br>-35% | 11.3 min<br>-38% |
| | PM | 16.2 min | 9.4 min<br>-42% | 11.1 min<br>-31% | 10.7 min<br>-34% |

*Data developed from the CMAP TDM and VISSIM analysis

The following observations can be made regarding the Vehicular Mobility evaluation:

*General Purpose Lane Mobility*

- The 3+1 Managed Lane Alternative provides the relative best GP lane mobility. The loss of GP lane capacity is offset by the configuration of the managed lane, which allows both autos and buses to use the managed lane.
- The 3+1 BOL and 2+2 ML Alternatives include relatively greater reductions in GP lane capacity. GP Lane performance is worsened over the No Action Alternative during the A.M. Peak.

*Managed Lane Mobility*

- The 2+2 ML Alternative provides the *relative best managed lane performance* under *average* conditions. Two managed lanes are provided, which doubles its vehicular capacity as compared to other alternatives. In addition, autos can pass buses in the managed lanes, which increases average managed lane speeds.
- The 3+1 BOL Alternative provides the *relative best managed lane performance* under *poor* conditions. A bus only lane is provided in both the northbound and southbound directions and is unencumbered by autos (in general, autos reduce managed lane performance under poor conditions).

*Overall Vehicular Mobility*

- The 3+1 ML Alternative provides the relative best overall Vehicular Mobility performance.
- The 3+1 ML Alternative provides *the relative highest GP lane performance*.
- The 3+1 ML Alternative achieves *relatively high managed lane performance* (average conditions) through tolling, which maintains free flow speeds by reducing the number of autos in the managed lane.

**Traffic Volume Change**

*Outer Drive*

The Managed Lane Alternatives affect GP Lane capacity to varied degrees, which causes traffic to be diverted or attracted to the Outer Drive.

For the purposes of this evaluation criterion, changes in traffic volumes were treated equally, whether attracting traffic to the Outer Drive or diverting traffic away from the Outer Drive. This neutral approach was taken because both diversions (increased arterial congestion) and attractions (increased Outer Drive congestion) can have negative results. As such, the No Action Alternative is the best performing alternative for this criterion.

Any mode shift from auto to transit is reflected in the daily volumes shown in Exhibit 4-42, which displays the volumes and volume change for each Managed Lane Alternative.

| Exhibit 4-42: Outer Drive Daily Volume Change | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Roadway Section | 3+1 BOL | | 3+1 ML | | | | 2+2 ML | | | |
| | Volume (vpd**) (GPL) | Change from No-Action | Volume (vpd) | | | Change from No-Action | Volume (vpd) | | | Change from No-Action |
| | | | GPL | ML | Total | | GPL | ML | Total | |
| Chicago to Michigan | 118,700 | (6,300) | 114,600 | 15,300 | 129,900 | 4,900 | 93,100 | 30,000 | 123,100 | (1,900) |
| Michigan to LaSalle | 148,700 | (8,300) | 143,400 | 21,900 | 165,300 | 8,300 | 120,100 | 39,000 | 159,100 | 2,100 |
| LaSalle to Fullerton | 152,700 | (7,300) | 147,200 | 21,300 | 168,500 | 8,500 | 124,300 | 38,100 | 162,400 | 2,400 |
| Fullerton to Belmont | 136,100 | (10,900) | 130,600 | 20,200 | 150,800 | 3,800 | 105,700 | 37,300 | 143,000 | (4,000) |
| Belmont to Addison | 119,100 | (9,400) | 120,400 | 18,500 | 138,900 | 10,400 | 101,100 | 35,500 | 136,600 | 8,100 |
| Addison to Irving Park | 119,100 | (9,400) | 120,400 | 5,200 | 125,600 | (2,900) | 101,100 | 17,000 | 118,100 | (10,400) |
| Irving Park to Montrose | 108,900 | (7,600) | 110,800 | 3,400 | 109,800 | (2,300) | 91,300 | 15,900 | 107,200 | (9,300) |
| Lawrence to Foster | 83,800 | (4,700) | 84,900 | 3,400 | 88,300 | (200) | 70,400 | 15,900 | 86,300 | (2,200) |
| Foster to Bryn Mawr | 66,900 | (3,600) | 67,800 | 3,000 | 70,800 | 300 | 54,900 | 14,000 | 68,900 | (1,600) |
| Bryn Mawr to Hollywood | 55,300 | (2,700) | 57,900 | - | 57,900 | (100) | 56,400 | - | 56,400 | (1,600) |

*Data developed from the CMAP Travel Demand model
**VPD = Vehicles per day

The Average Daily Traffic for the 10 sections of the Outer Drive listed in Exhibit 4-42 was converted to a horizontal bar chart.

Exhibit 4-43 depicts an example bar chart, with Grand Avenue at the bottom and Hollywood Avenue at the top. The example shows a maximum of 6,700 vehicles diverted from the Outer Drive in the section between Montrose Avenue and Lawrence Avenue.

A maximum of 10,400 vehicles are attracted to the Outer Drive in the section between Belmont Avenue and Addison Street.

Exhibit 4-43: Daily traffic volume change criterion example

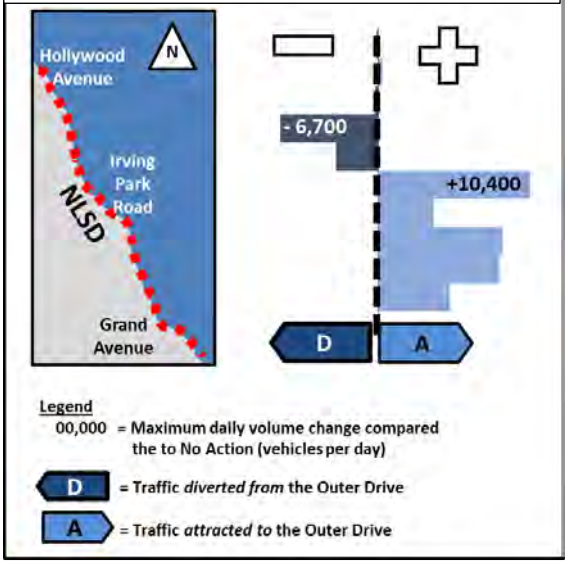
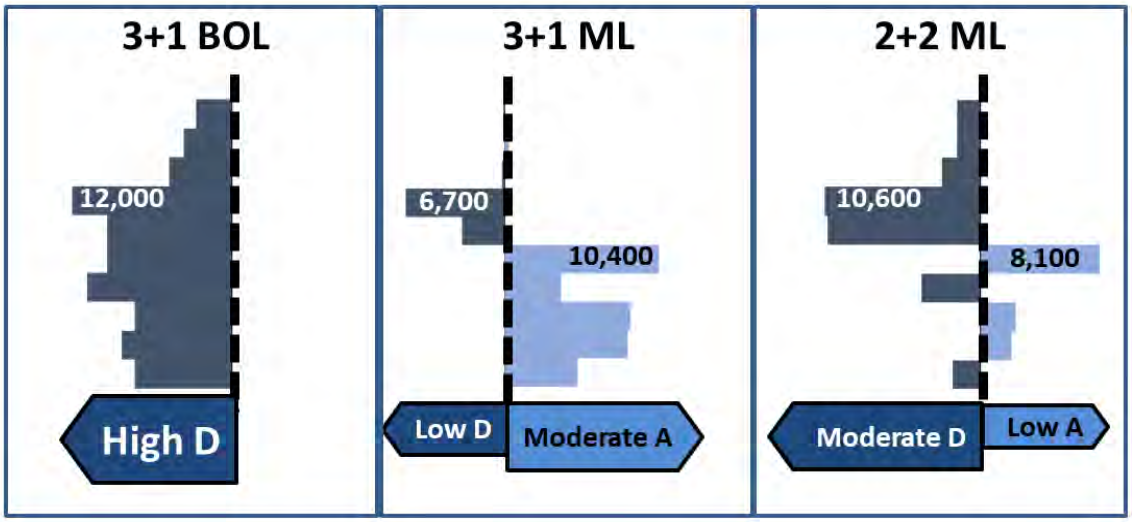


Exhibit 4-44 depicts the volume change for the 3+1 Bus Only Lane, 3+1 Managed Lane and 2+2 Managed Lane Alternatives.

Exhibit 4-44: Daily traffic volume change criterion – Managed Lane Alternatives




The following observations can be made:

- The 3+1 BOL Alternative has a relatively high level of traffic diversion throughout the project limits. The reduction in GP Lane capacity from 8 lanes to 6 lanes causes substantial diversion.

- The 3+1 ML Alternative has a relatively low traffic diversion. GP lane capacity is somewhat reduced by converting one lane in each direction to a tolled managed lane. The introduction of tolling does not cause any substantive diversion. The moderate level of attraction at the south end of the project can be attributed to design and operational improvements, such as the Chicago Avenue junction and flattening the Oak Street curve.

- The 2+2 ML Alternative has a relatively moderate level of traffic diversion. GP lane capacity is reduced to 2 lanes in each direction, with 2 tolled managed lanes in each direction. The combination of reduced GP lane capacity and tolled managed lanes causes some traffic to divert from the northern section of the project onto the arterial system, where congestion is relatively lower. The 2+2 Alternative has a low amount of traffic attraction.

*Arterial Volume Change*

Based upon stakeholder feedback, an additional volume change analysis was performed to identify the effects on the adjacent arterial system. Outputs from the CMAP Travel Demand Model were used to develop the findings. Exhibit 4-46 displays the volume change on the north-south arterials for the A.M. peak, and Exhibit 4-47 displays the north-south arterial volume change for the P.M. peak.

A 10% threshold was selected to highlight the relatively larger changes to the arterial network. North-south arterials were chosen for the analysis because diversions from the Outer Drive would be predominantly north-south trips. Similar to the daily volume change criterion, the higher performing alternatives have the relative least change from the No Action Alternative.

Exhibit 4-45: Arterial Volume Change (AM Peak)

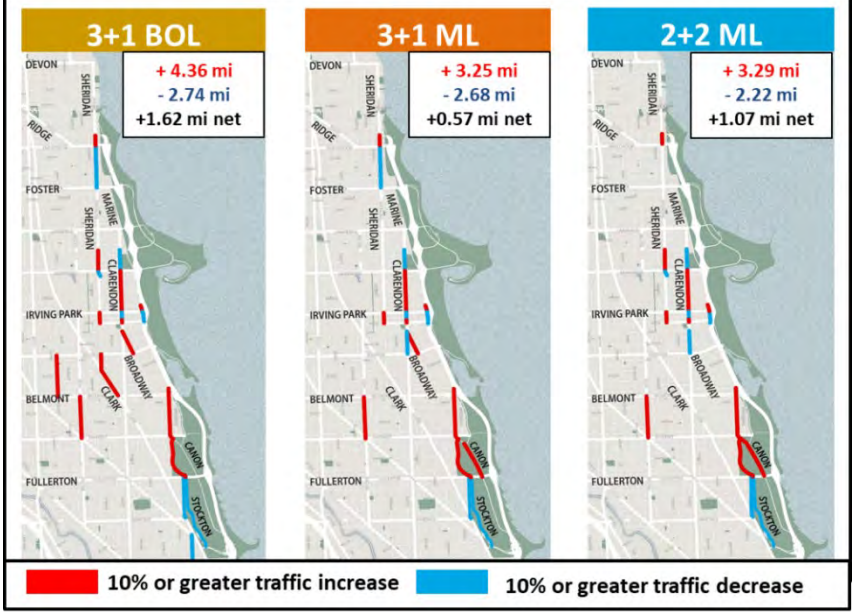



Exhibit 4-46: Arterial Volume Change (PM Peak)

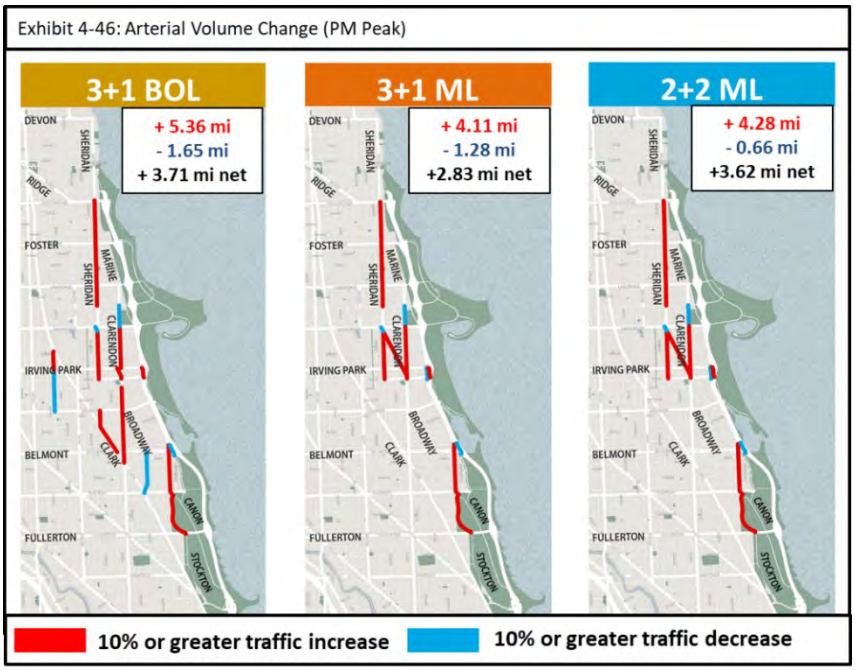



Exhibit 4-47 summarizes the overall combined length of the arterial system with either a 10% increase or 10% decrease in volume as compared to the No Action Alternative. The 3+1 ML Alternative has the best overall performance.

| Exhibit 4-47: Managed Lane Alternatives Evaluation (Volume Change) | | | | |
|---|---|---|---|---|
| **Arterial Traffic Volume Change (mi)** | **No Action** | **Managed Lane Alternatives** | | |
| | | **3+1 BOL** | **3+1 ML** | **2+2 ML** |
| **Length with volume increase over No Action** | **AM** | **+4.36** | **+3.25** | **+3.29** |
| **Length with volume decrease over No Action** | | **-2.74** | **-2.68** | **-2.12** |
| **AM Net Change** | | **+1.62 mi** | **+0.57 mi** | **+1.07 mi** |
| **Length with volume increase over No Action** | **PM** | **+5.36** | **+4.11** | **+4.28** |
| **Length with volume decrease over No Action** | | **-1.65** | **-1.28** | **-0.66** |
| **PM Net Change** | | **+3.71 mi** | **+2.83 mi** | **+3.62mi** |
| **Total Net Change** | | **+5.33 mi** | **+3.4 mi** | **+4.69 mi** |

The following observations can be made from the peak hour volume change analysis:

- The arterial network is most congested during the A.M. peak, and therefore has a relatively lower net change in volume, as compared to the P.M. peak.
- The 3+1 BOL Alternative has the relative largest diversion to parallel arterials, which is consistent with the daily traffic volume change noted above. The 3+1 BOL Alternative results in an overall net increase in peak hour volume for 5.33 miles of arterials.
- The 3+1 ML Alternative has the relative least amount of diversion, with an overall net increase in peak hour volume for 3.4 miles of arterials.

**Total Person Throughput Evaluation**

Exhibit 4-48 summarizes the Total Person Throughput portion of the Managed Lane Alternatives evaluation. The Total Person Throughput criterion was developed based upon output from the CMAP Travel Demand model.

| Exhibit 4-48: Daily Total Person Throughput | | | | |
|---|---|---|---|---|
| **Daily Person Throughput Persons X 1,000** | **No Action** | **Managed Lane Alternatives** | | |
| | | **3+1 BOL** | **3+1 ML** | **2+2 ML** |
| **Auto** | 148.4** | 146.4 | 148.6 | 144.8 |
| **Transit** | 173.5 | 179.2 | 177.7 | 181.1 |
| **Total** | 321.9 | 325.6 | 326.3 | 325.9 |

*Data developed from the CMAP Travel Demand model
**Example: “148.4” = 148,400 daily person trips

The following observations can be made regarding the Total Person Throughput evaluation:

- All Build Alternatives increase daily **transit** person trips over the No Action.
- **Auto** person trips are similar to or lower than the No Action Alternative.
- All Build Alternatives increase **total** daily person trips over the No Action Alternative.
- The **2+2 ML Alternative** reduces GP lane capacity the relative most, which reduces auto person throughput and increases transit person throughput. The 2+2 ML Alternative had the relative highest transit person throughput.
- The **3+1 ML Alternative** reduces GP lane capacity, which also *reduces person throughput in the GP lanes*. However, this is somewhat offset by higher managed lane person throughput (autos and buses allowed to use the managed lane). The 3+1 ML Alternative had the relative highest auto person throughput, which was slightly higher than the No Action Alternative.
- The **3+1 BOL Alternative** provided the relative lowest person throughput. GP lane capacity is reduced from 4 lanes to 3 lanes, with no auto traffic in the managed (bus only) lane. This combination of factors resulted in the *relative lowest person throughput*.

**Ratio Scoring Results**

The Managed Lane Alternative scores were calculated using the ratio method (see section 4.1.3 for details regarding the ratio scoring method). Exhibit 4-49 displays the ratio scoring results, which can be summarized as follows:

- The overall performance of the Managed Lane Alternatives is reasonably comparable.
- The 3+1 ML Alternative has the relative highest performance.

Exhibit 4-49: Managed Lane Alternatives ratio scoring results

| | No Action | 3+1 BOL | 3+1 ML | 2+2 ML |
|---|---|---|---|---|
| GPL Mobility (Average) | 4.1 | 8.3 | 9.8 | 5.5 |
| ML Mobility (Average) | 1.0 | 7.6 | 8.7 | 10.0 |
| GPL Mobility (Poor) | 3.7 | 7.7 | 9.7 | 5.5 |
| ML Mobility (Poor) | 1.0 | 10.0 | 7.7 | 8.2 |
| Volume Change/Outer Drive | 10.0 | 1.5 | 5.7 | 5.1 |
| Transit Mode Share | 1.0 | 6.4 | 5.2 | 10.0 |
| Transit Mobility (Average) | 1.0 | 9.9 | 9.8 | 8.2 |
| Transit Mobility (Poor) | 1.0 | 10.0 | 9.1 | 8.9 |
| Transit Reliability (All) | 1.0 | 10.0 | 9.4 | 9.2 |
| Person Throughput | 1.0 | 8.6 | 10.0 | 9.2 |
| Volume Change/North-South Arterials | 10.0 | 1.0 | 4.3 | 2.1 |
| Total Score | 34.8 | 81.0 | 89.2 | 81.8 |

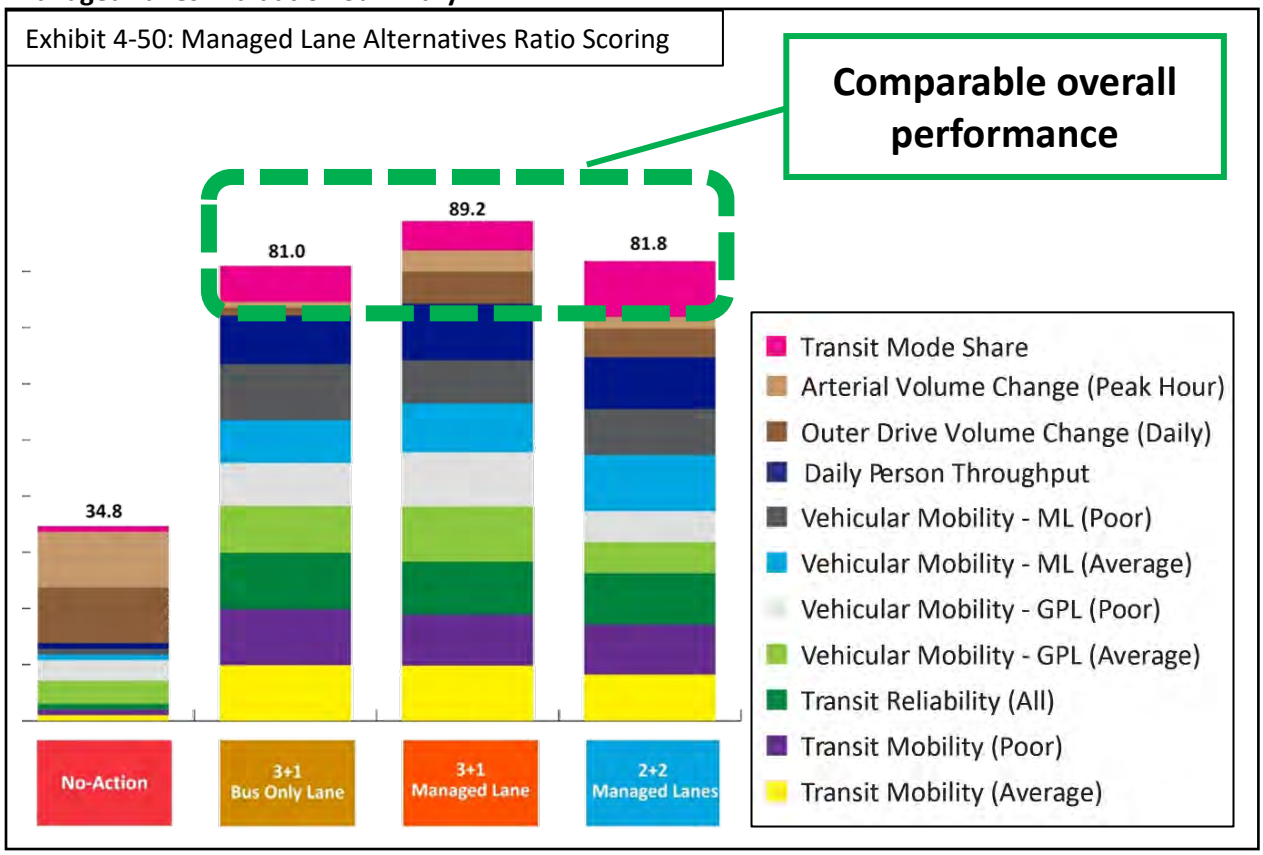
**Overall performance is reasonably comparable**

**Relative highest performance**

Exhibit 4-50 depicts the Managed Lane Evaluation ratio scoring results as a bar chart.

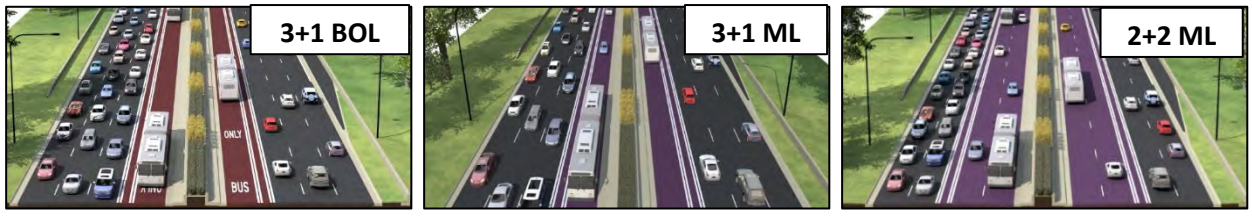
**Managed Lanes Evaluation Summary**

Exhibit 4-50: Managed Lane Alternatives Ratio Scoring




All Managed Lane Alternatives improve transit mobility and reliability, increase transit mode share, and total person throughput but differ with respect to vehicular mobility performance. Although the 3+1 ML Alternative has the relative highest performance, the scores for the 3+1 BOL, 3+1 ML and 2+2 ML Alternatives are reasonably comparable. In addition, as noted in Section 4.3, stakeholders have expressed a strong desire for further evaluating and discussing the Managed Lane Alternatives. Therefore, as shown on Exhibit 4-51, the 3+1 BOL, 3+1 ML and 2+2 ML Alternatives will be carried forward from the ML Alternatives category.

Exhibit 4-51: Managed Lane Alternatives to be carried forward



## 4.3 Stakeholder Involvement (Alternatives Evaluation)

Stakeholder input related to the NLSD Alternatives Evaluation (Level 2 screening) was gathered from multiple forums, including Project Study Group (PSG), Task Force, NEPA/404 Merger and Community meetings. Input was also sought at Public Meeting #4. The following is a summary of that outreach.

Project Study Group (PSG)

The PSG discussed the evaluation methodologies and results of the Context Tailored Treatment, Transitway and Managed Lane Alternatives evaluation over the course of multiple meetings between 2017 and 2020. The following is a summary of the coordination related to each category of NLSD Alternatives.

**Context Tailored Treatment (CTT) Alternatives.** The most intensive efforts were related to the Junction Alternatives analysis. After considering multiple layouts, refinements and technical data, the Top Performing Junction Alternatives were identified and presented to the PSG. The PSG confirmed and supported the project team's recommendations at each junction. The Top Performing CTT *Corridor* Alternative was then assembled using the Top Performing *Junction* Alternatives. The Top Performing CTT *Corridor* Alternative was supported by the PSG as an alternative to be carried forward.

**Transitway (TW) Alternatives.** The evaluation criteria for the TW Alternatives was discussed over multiple PSG meetings, as well as the use of ratio scoring to evaluate the TW Alternatives. Based upon the scoring of the Transitway Alternatives, the Dedicated Transitway Left (DTW-L) Alternative was identified as the Top performing Transitway Alternative. The PSG confirmed and supported the selection of the DTW-L Alternative to be carried forward.

**Managed Lane (ML) Alternatives.** The project team worked with the PSG over multiple meetings to develop and refine the ML Alternatives evaluation criteria. Ratio scoring was also applied to the ML Alternatives, and the results of the scoring were discussed with the PSG over the course of several meetings. As a starting point, the PSG concurred with dropping the 3+2 RML Alternative and later the 4+1 CBOL Alternative based upon footprint impacts to additional 4(f) properties which constituted a Major Flaw. The PSG also concurred with the technical evaluation for the remaining ML Alternatives. However, CTA expressed a desire to continue to carry the 3+1 BOL Alternative forward for further evaluation and discussion. CTA feels that a bus only lane alternative best meets their policy goals of improving bus speeds and reliability and noted that although the DTW-L Alternative includes a bus only lane, its footprint is relatively larger, and therefore is less desirable from an impact perspective. The project team agreed to present the scoring results at Task Force meeting #10 and gather additional stakeholder comments prior to selecting a Top Performing ML Alternative.

Based upon feedback from Task #10, additional and refined evaluation criteria were utilized. The updated scoring indicated that the 3+1 ML Alternative was the Top Performing ML Alternative, while also illustrating that the overall scores for the ML Alternatives were reasonably comparable. After presenting updated ML evaluation results at Task Force Meeting #11, the project team received a number of stakeholder comments requesting that the 3+1 BOL be carried forward for additional evaluation. In order to address stakeholder comments, and given that the performance of the ML Alternatives is reasonably comparable, all ML Alternatives (3+1 ML, 3+1 BOL and 2+2 ML Alternatives) will be carried forward for evaluation in Level 3.

Task Force Meetings

The Level 2 alternatives evaluation results were discussed with the Task Force during TF Meetings #8, #9, #10 and #11. The following is a summary of each Task Force Meeting:

**Task Force Meeting #8.** The Lakefront Trail (LFT) concepts as well as the Top Performing CTT Junction Alternatives were presented. Task Force members also participated in a workshop to provide feedback on the LFT concepts and individual junction layouts. These comments were considered in subsequent refinements to the junction layouts.

Task Force Meeting #8

**Task Force Meeting #9.** At TF Meeting #9, refinements to the Top Performing CTT Corridor Alternative were presented, as well as the results of the Transitway Alternatives evaluation. The Dedicated Transitway Left (DTW-L) Alternative was identified as the Top Performing Transitway Alternative. Following the presentation, a workshop was hosted to review the layouts and seek further input regarding the CTT and DTW-L Alternatives. Overall, the Task Force members supported the project team's recommendations.

**Task Force Meeting #10.** The project team presented the evaluation criteria, methodology and preliminary results of the Managed Lanes (ML) Alternatives evaluation. At the beginning of the presentation, the major flaw analysis was presented for the 3+2 RML Alternative, and the TF agreed with dropping the 3+2 RML Alternative based upon major flaws. For the remaining ML Alternatives, Task Force members discussed several of the evaluation criteria, and as a result, the project team agreed to refine the person throughput and traffic volume change criteria and add a transit mode share criteria. In addition, the TF members expressed concern that the 4+1 CBOL Alternative would not provide the operational flexibility as compared to the other ML Alternatives. As such, the project team refined the 4+1 CBOL Alternative to add a northbound contraflow lane for the P.M. peak. The refined and added evaluation criteria, as well as the modifications to the 4+1 CBOL Alternative, were presented at TF #11.

**Task Force Meeting #11.** The project team presented information related to each main stakeholder comment from Task Force #10, beginning with a review of baseline improvements that are common to all NLSD Alternatives, followed by a review of the refined 4+1 CBOL Alternative. The addition of the northbound contraflow lane expanded the footprint of this alternative and the resultant impacts were considered a major flaw. Based on this information, the Task Force concurred with the dismissal of the 4+1 CBOL Alternative. The project team then reviewed the updated evaluation criteria and results for the remaining ML Alternatives, the recommended Top Performing ML Alternative (3+1 ML Alternative) and the overall ATBCF (CTT+TA, DTWL, 3+1 ML Alternatives). A preview of Public Meeting #4 as well as preliminary Level 3 evaluation criteria was also presented. During the comment period following Task Force Meeting #11, the project team mostly received stakeholder comments requesting that the 3+1 BOL be carried into the next round of evaluation. Given the comparable scores between Managed Lane Alternatives, the project team decided to carry the 3+1 BOL, 3+1 ML and 2+2 ML Alternatives into the next round of evaluation.

NEPA/404 Merger Meetings

The project team presented evaluation criteria, methodologies and results at several NEPA/404 Merger Meetings. Additionally, Resource Agency personnel have regularly participated in Task Force meetings. In order to refresh the Resource Agencies and position the project for achieving Concurrence Point #2 at the September 2020 meeting, the project team provided briefings at the February 2020 and June 2020 Merger Meetings.

**February 2020 NEPA/404 Merger Meeting.** The project team presented the overall Level 2 screening process, which involves testing the CTT, TW and ML alternatives against the project Purpose and Need, and determining the best performing alternatives within each of the 3 categories. The evaluation criteria, evaluation methodology and results for the CTT and TW Alternatives evaluation were presented.

**June 2020 NEPA/404 Merger Meeting**. The project team presented the results of the Managed Lanes Alternatives Evaluation and overall recommended ATBCF, as well as the anticipated schedule for submitting the ATBCF documents for agency review. The September 2020 timeframe for Concurrence Point #2 was also noted. Although the agencies were in general agreement with the Managed Lane analysis, based upon the comments received after Task Force Meeting #11, the project team will carry 3 Managed Lane Alternatives forward.

Community Meetings

Individual meetings with a variety of stakeholders have been held during the Level 2 Alternatives evaluation process. The following describes the project team's largest community coordination efforts, which includes the following stakeholder groups:

**Uptown Community (Montrose Avenue, Wilson Avenue, Lawrence Avenue)**. A series of three community meetings were held in the Uptown community to discuss safety, access and congestion concerns along the section of the Outer Drive between Montrose Avenue and Lawrence Avenue (MWL section).

The initial meeting focused on presenting findings from an existing conditions analysis and included a workshop to gather further input from stakeholders regarding existing conditions and deficiencies. The stakeholder input was consistent with the technical data that was presented by the project team. The second meeting introduced an initial range of 12 alternatives, which were based upon modifications to the Top Performing CTT Alternative (the MWL Alternatives would also be compatible with the Transitway and Managed Lane Alternatives).

Uptown Community Meeting

The preliminary evaluation results were also presented, and four finalist alternatives were identified. A workshop was hosted to seek further input regarding the finalist alternatives. The third meeting presented the evaluation results for the four finalist alternatives and the recommended Top Performing Alternative. The group generally agreed with the project team's recommendations.

**Lakeview Community (Diversey Parkway to Irving Park Road)**. This community includes the section of the Outer Drive between Diversey Parkway and Irving Park Road.

Two community meetings were hosted to review the layout for the CTT Alternative and Lakefront Trail improvements. Stakeholders commented on access along the Outer Drive between Belmont Avenue and Addison Street and the potential redistribution of traffic into the neighborhood to the west. They also provided suggestions for refining the layout of the LFT and access to the Lakefront. Lakeview stakeholders provided the relative most feedback regarding the options for improving access to south Belmont Harbor. Based upon that feedback, option 2, which maintains access at Belmont Avenue, was selected and incorporated into the overall CTT design. Additional meetings are planned to follow up on other comments regarding access.

Lakeview Community Meeting

**Edgewater Community (Northern Terminus Traffic Study, NTTS)**. Two rounds of meetings have been hosted in the Edgewater community. The overall goal of these coordination efforts is to identify a preferred alternative for the northern terminus of the project.

The study area extends into the arterial street system to the west, as noted in section 3.1.4. The initial NTTS meeting included an overview of the planning process and a workshop to identify existing transportation problems. That information was used to develop and further refine an initial group of alternatives. The second round of NTTS meetings included a walking tour to refresh the list of identified transportation needs as well as a presentation of the alternatives developed and evaluated to date. Four finalist alternatives were identified for further evaluation. The third round of NTTS meetings will include the selection of a preferred alternative. The NTTS recommendations that are within the project limits will be incorporated into the NLSD Phase I Study.

Edgewater Community Meeting

<u>Public Meeting #4</u>

*Public Meeting #4 will be hosted in the fall of 2020. See the Project Website (northlakeshoredrive.org) for further information about this meeting.*

## 5.0 Alternatives to be Carried Forward

Exhibit 4-52 illustrates the alternatives to be dismissed and the alternatives to be carried forward as a result of the Level 1 and Level 2 screening process.

**Legend**

- Dismissed During Level 1 and Level 2 Screening
- Alternatives to be carried forward

**Exhibit 4-52: Level 1 and Level 2 Alternatives Screening Summary**

| Tunnels and Causeways Alternatives |
|---|
| Causeway on Lake Michigan |
| Submerged Express Tunnel |
| Land Based Express Tunnel |

| Context Tailored Treatments |
|---|
| **Corridor Modernization/Compressed Roadway Alternative, w*ith Transit Advantage components*** ** |
| Frontage Drive Alternative |

| Transitways Alternatives |
|---|
| Transit Advantages* |
| Bus on Shoulder – Right |
| **Dedicated Transitway – Left** |
| Dedicated Transitway – Off Alignment |
| Light Rail Transit |

| Managed Lane Alternatives |
|---|
| **3+1 Bus Only Lane** |
| **3+1 Managed Lane** |
| **2+2 Managed Lane** |
| 3+2 Reversible Managed Lane |
| 4+1 Contraflow Bus Only Lane |

***Combined with Top Performing CTT Alternative.***

****Top performing CTT Alternative is a combination of the Corridor Modernization and Compressed Roadway Alternatives, with elements of the Frontage Drive Alternative at Chicago Avenue and Wilson Avenue.***

The following summarizes the results of the Level 1 and Level 2 Screening process:

Level 1 Screening

- Stakeholder input was sought through Project Study Group, Task Force, and Community Meetings, as well as Public Informational Meetings.
- The Tunnels and Causeways Alternatives and the Light Rail Alternative were dismissed during Level 1 screening due to Major Flaws.

Level 2 Screening

- Stakeholder input was also sought through the Project Study Group and Task Force, Community and Public Informational Meetings.
- The Level 2 screening process used evaluation criteria related to the project Purpose and Need and a scoring system that provided a rigorous and objective comparison of performance measures.
- The objective of the Level 2 Screening process was to determine the Top Performing Alternative within the Context Tailored Treatments (CTT), Transitways (TW) and Managed Lanes (ML) Alternatives.
- The Top Performing Alternative(s) within each category (CTT, TW and ML) best satisfied the project purpose and need.

*Context Tailored Treatments*

- The Top Performing Context Tailored Treatment (CTT) Alternative was developed by first determining the Top Performing Alternative at each junction.
- The Top Performing Junction Alternatives were a combination of the Corridor Modernization Alternative (Grand Avenue to Wilson Avenue) and the Compressed Roadway Alternative (Wilson Avenue to Hollywood Avenue), with elements of the Frontage Drive Alternative at Chicago Avenue and Wilson Avenue. The Top Performing Junction Layouts were then used to assemble the Top Performing CTT Corridor Alternative.

*Transitways*

- The Transitway Alternatives evaluation used transit related evaluation criteria since GP Lane Performance was unchanged between the Transitway Alternatives.
- The results of the evaluation clearly supported the selection of the Dedicated Transitway-Left (DTWL) Alternative.

*Managed Lanes*

- The Managed Lane Alternatives evaluation utilized both vehicular and transit related criteria since GP lane and managed lane performance varied by alternative.
- The 3+2 RML and 4+1 CBOL Alternatives were dismissed due to Major Flaws.
- The evaluation of the remaining ML Alternatives indicated that the 3+1 Managed Lane Alternative had the relative highest performance, but the overall performance of the Managed Lane Alternatives was reasonably comparable. Therefore, the 3+1 ML, 3+1 BOL and 2+2 ML Alternatives will be carried forward for further evaluation in Level 3.

Exhibits 4-53 and 4-54 Illustrate the NLSD Alternatives to be Carried Forward.

**Exhibit 4-53: Alternatives to be Carried Forward**

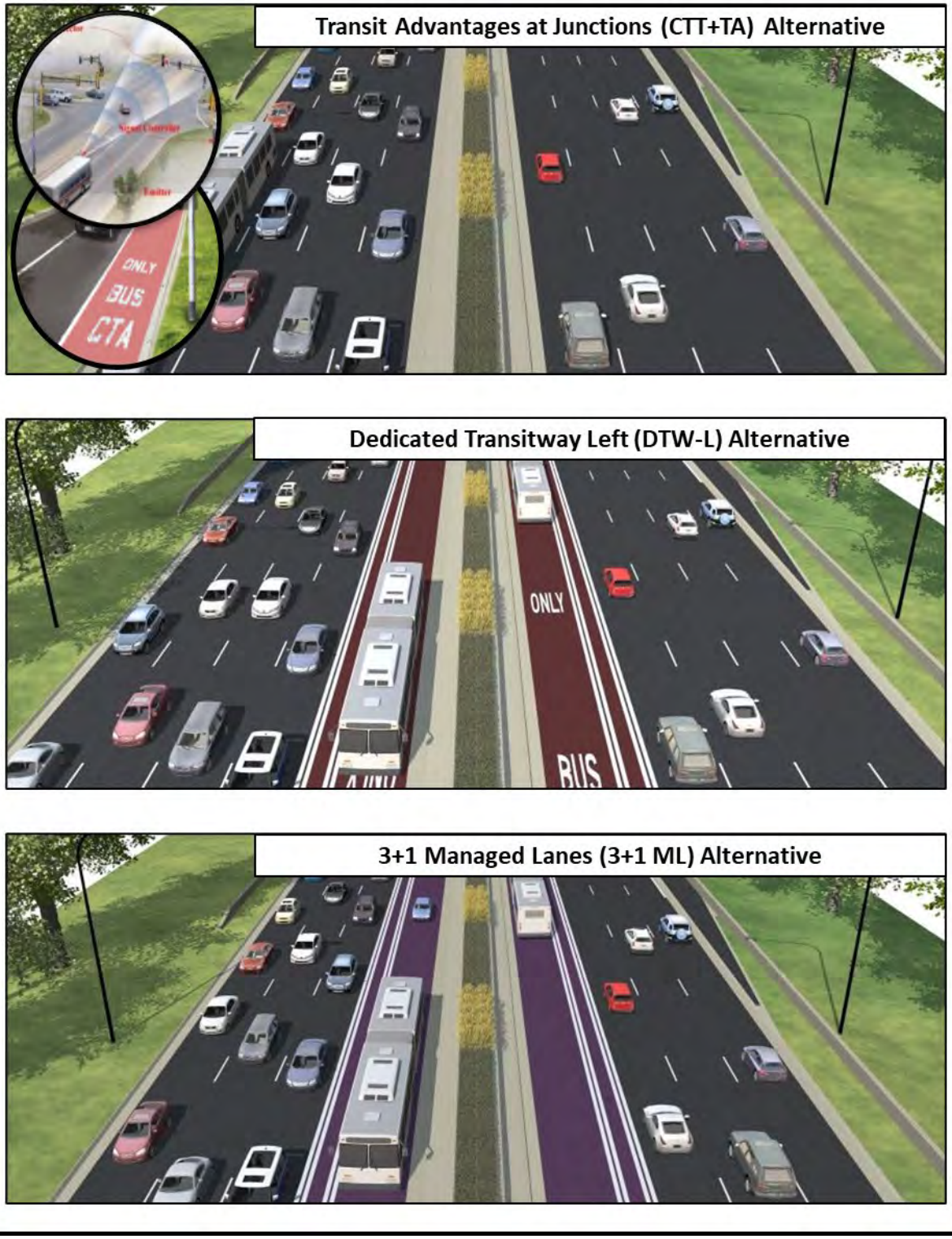
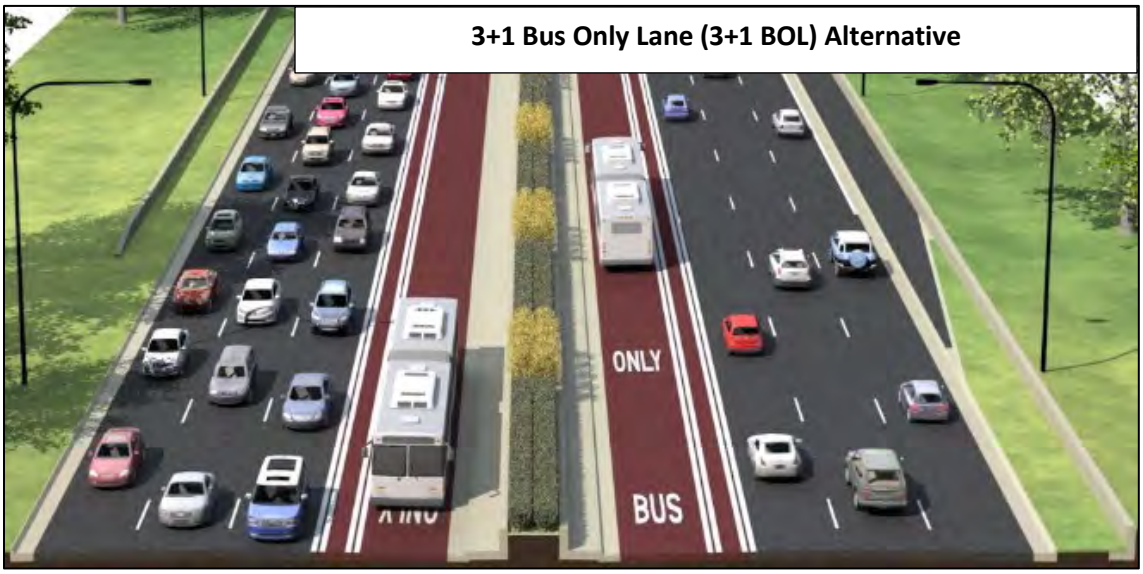


**Exhibit 4-54: Alternatives to be Carried Forward, continued**

**3+1 Bus Only Lane (3+1 BOL) Alternative**




**2+2 Managed Lanes (2+2 ML) Alternative**