North Lake Shore Drive

Grand Avenue to Hollywood Avenue

Phase I Study

Alternatives to be Carried Forward

Appendix A

Context Tailored Treatment Alternatives Evaluation

Technical Memorandum

July 30, 2020

Updated: Fall 2020

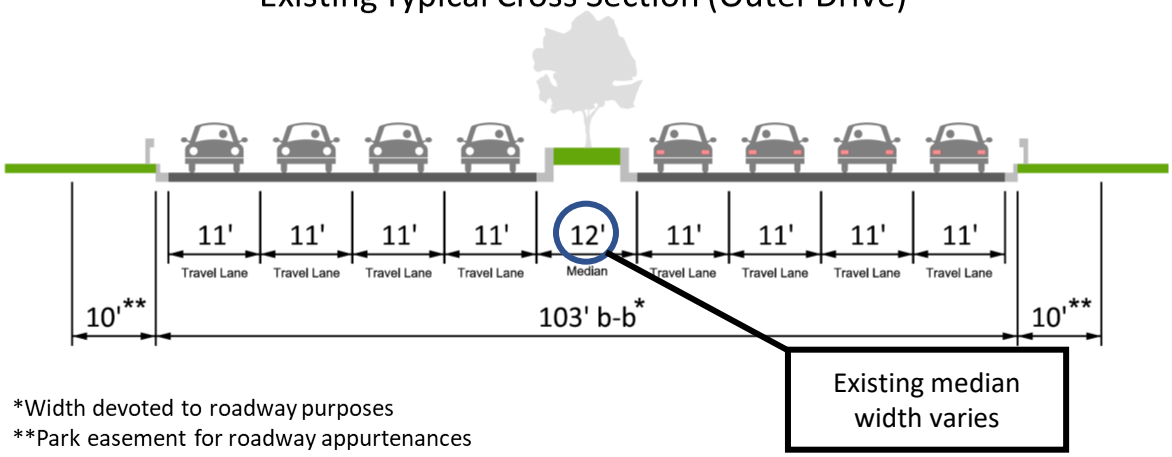
Table of Contents

1.0 Summary

The purpose of this Technical Memorandum is to document the evaluation and selection of the Top Performing Context Tailored Treatment (CTT) Alternative at individual junctions and for the overall project corridor. The Top Performing CTT Corridor Alternative will be carried forward for further development, refinement and evaluation in the Draft Environmental Impact Statement.

The existing Outer Drive typical cross section, as shown on Exhibit 1-1, includes 4 lanes in each direction, bounded by curb and gutter. Beyond the edge of pavement, there is a 10-foot easement for roadway appurtenances.

Existing Typical Cross Section (Outer Drive) Exhibit 1-1



*Width devoted to roadway purposes
**Park easement for roadway appurtenances

1.1 Description of Context Tailored Treatment Alternatives

The CTT alternatives include the following common features:

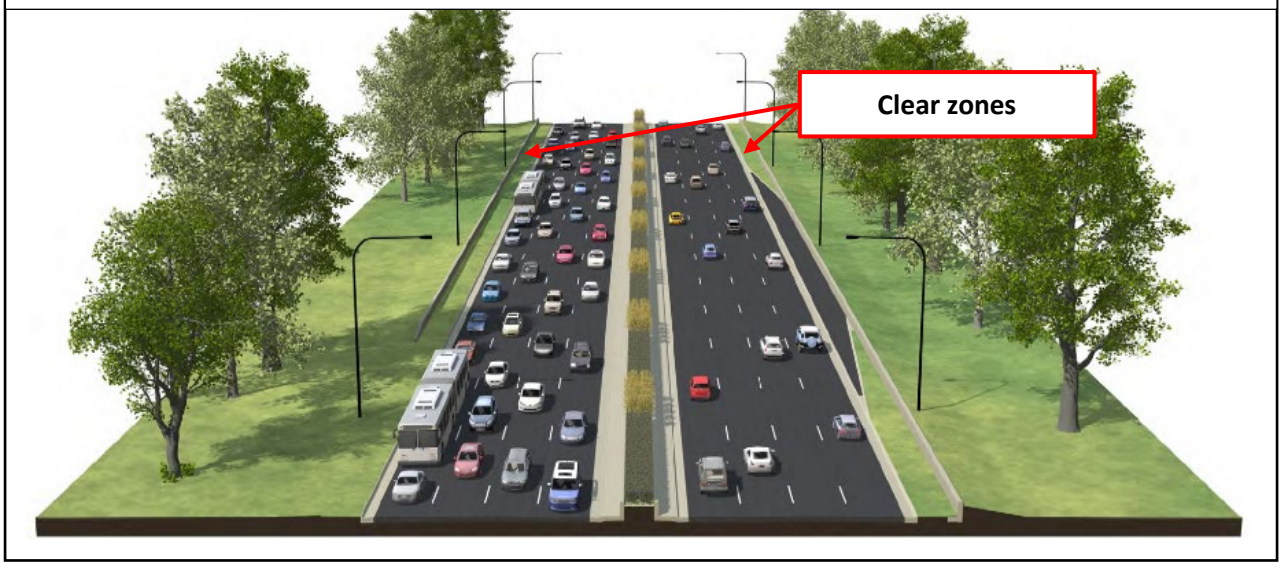
- Complete reconstruction of the Outer Drive and portions of the Inner Drive; improved alignments, weaving zones, and junctions.
- An eight-lane Outer Drive cross section from Grand Avenue to Irving Park Road. North of Irving Park Road, the Outer Drive cross section is reduced from eight lanes to six 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 1-2 represents the proposed typical roadway cross section for CTT Alternatives 1, 2 and 3 between junctions south of Belmont Avenue.

Exhibit 1-2: 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.

<u>Context Tailored Treatment Alternative 1 - Corridor Modernization Concept</u>

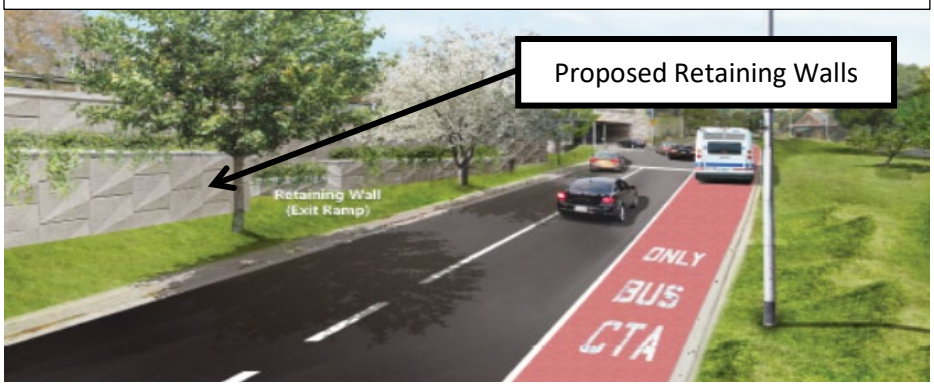
- A new grade separated junction at Chicago Avenue, with approximately 1,800 feet of the Outer Drive lowered below existing grade.
- Improvements that retain the current layout at each junction (e.g., diamond layout) between Michigan Avenue and Irving Park Road, with a compressed design at Fullerton 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 that are tailored to Alternative 1 (see Exhibit 1-6), 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

- A new grade separated junction at Chicago Avenue, with approximately 1,800 feet of the Outer Drive lowered below existing grade.
- Compressed designs at each junction between Michigan Avenue and Irving Park Road.
- 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 that are tailored to Alternative 2, including queue jump lanes and bus priority signals. Other transit components include improved bus layover/turnaround facilities.

Exhibit 1-3 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 1-3: CTT Alternative 2 (Compressed Roadway Concept) at junction ramp

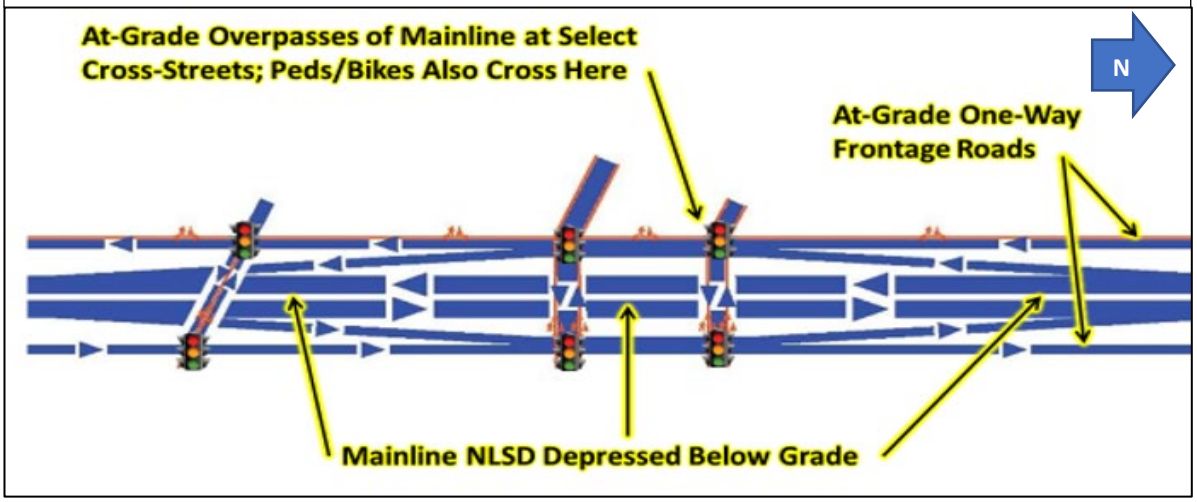


Context Tailored Treatment Alternative 3 - Frontage Drive Concept

- 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.
- An offset ramp design at LaSalle Drive (see Exhibit 3.3.3).
- Partial access at Fullerton Parkway (to/from the south) and at Diversey Parkway (to/from the north).
- 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 that are tailored to Alternative 3, including queue jump lanes and bus priority signals. Other transit components include improved bus layover/turnaround facilities.

Exhibit 1-4 depicts a typical Frontage Drive concept at a junction.

Exhibit 1-4: 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 1-5. 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 1-5 below, which allow buses to bypass queued traffic either entering or exiting the Outer Drive. The 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 1-5: Transit Advantage Components

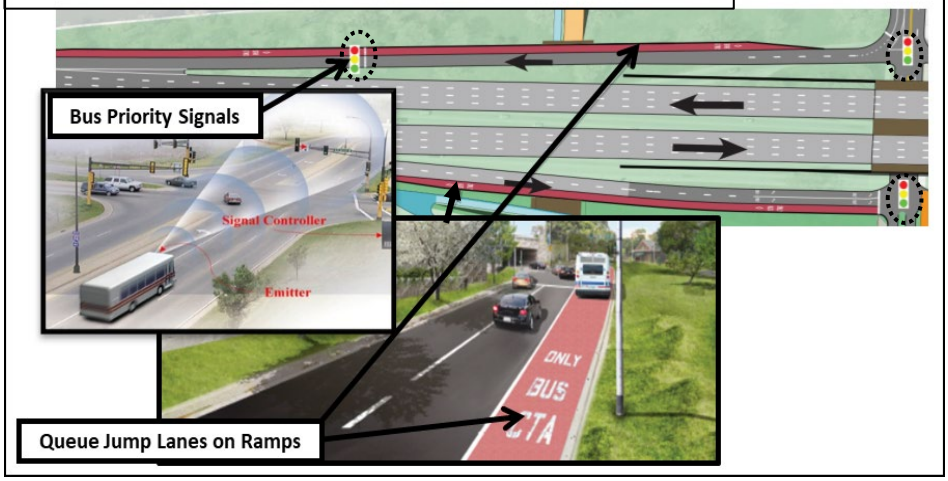


Exhibit 1-6 provides a tabulation of the Transit Advantage components, as well as other notable transit components, for CTT Alternatives 1, 2 and 3.

Exhibit 1-6: 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 **Irving Park Road**: queue jump lanes and bus priority signals for ramps to/from the south.	**Addison Street** (no ramps at this location) **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 **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.

1.2 Alternatives Evaluation Methodology

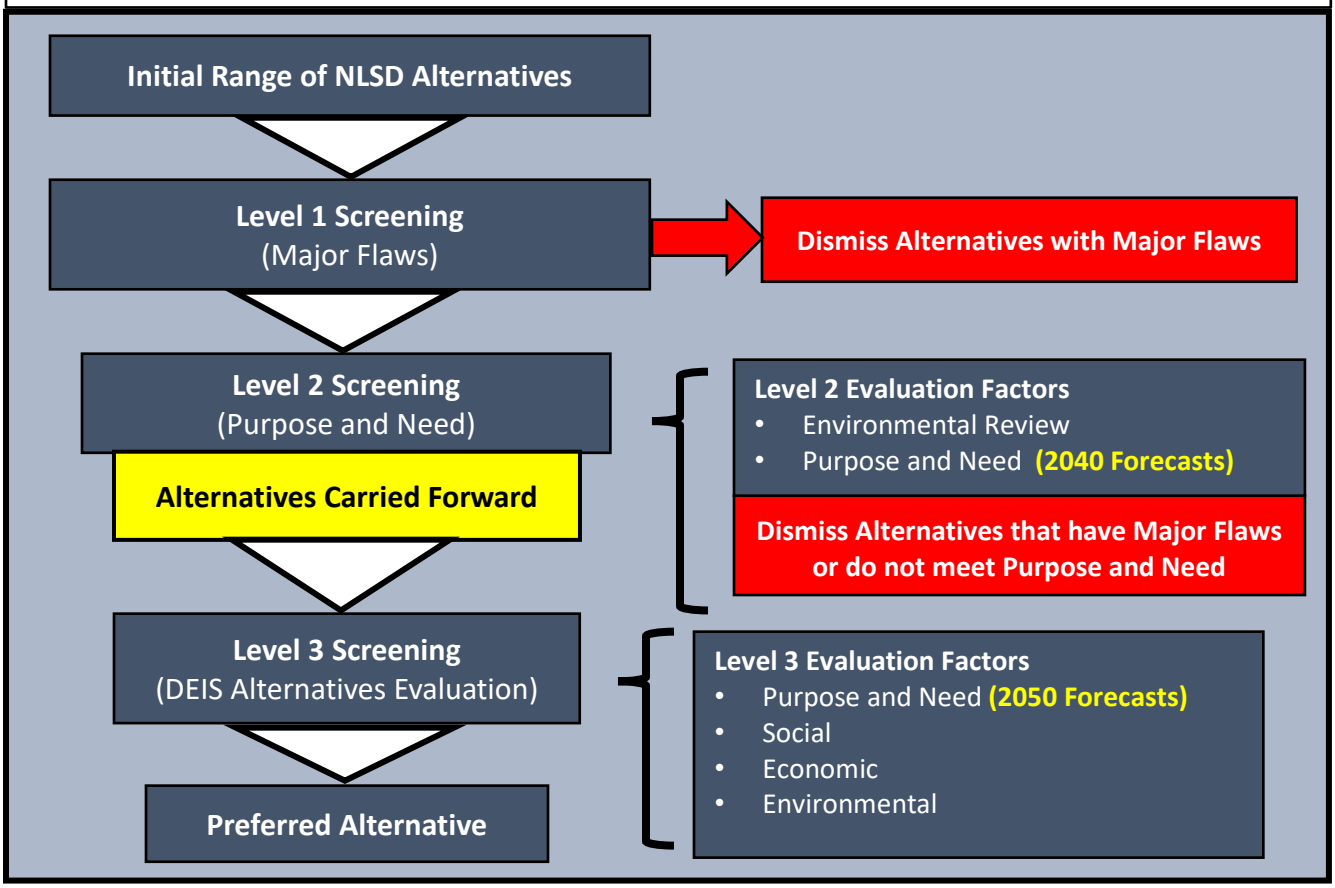
1.2.1 Overall NLSD Alternatives Evaluation Methodology

The overall NLSD Alternatives Evaluation methodology involves three major steps or "Levels", as shown on Exhibit 1-7.

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 distinguishing or relatively higher level of impacts and/or 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 Context Tailored Treatement (CTT), Transitway (TW) and Managed Lane (ML) Alternatives. This document (Appendix A) describes the Level 2 screening results for the CTT 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. The Section 4(f) and Section 106 evaluations would occur in parallel.

Exhibit 1-7: Overall NLSD alternatives evaluation process



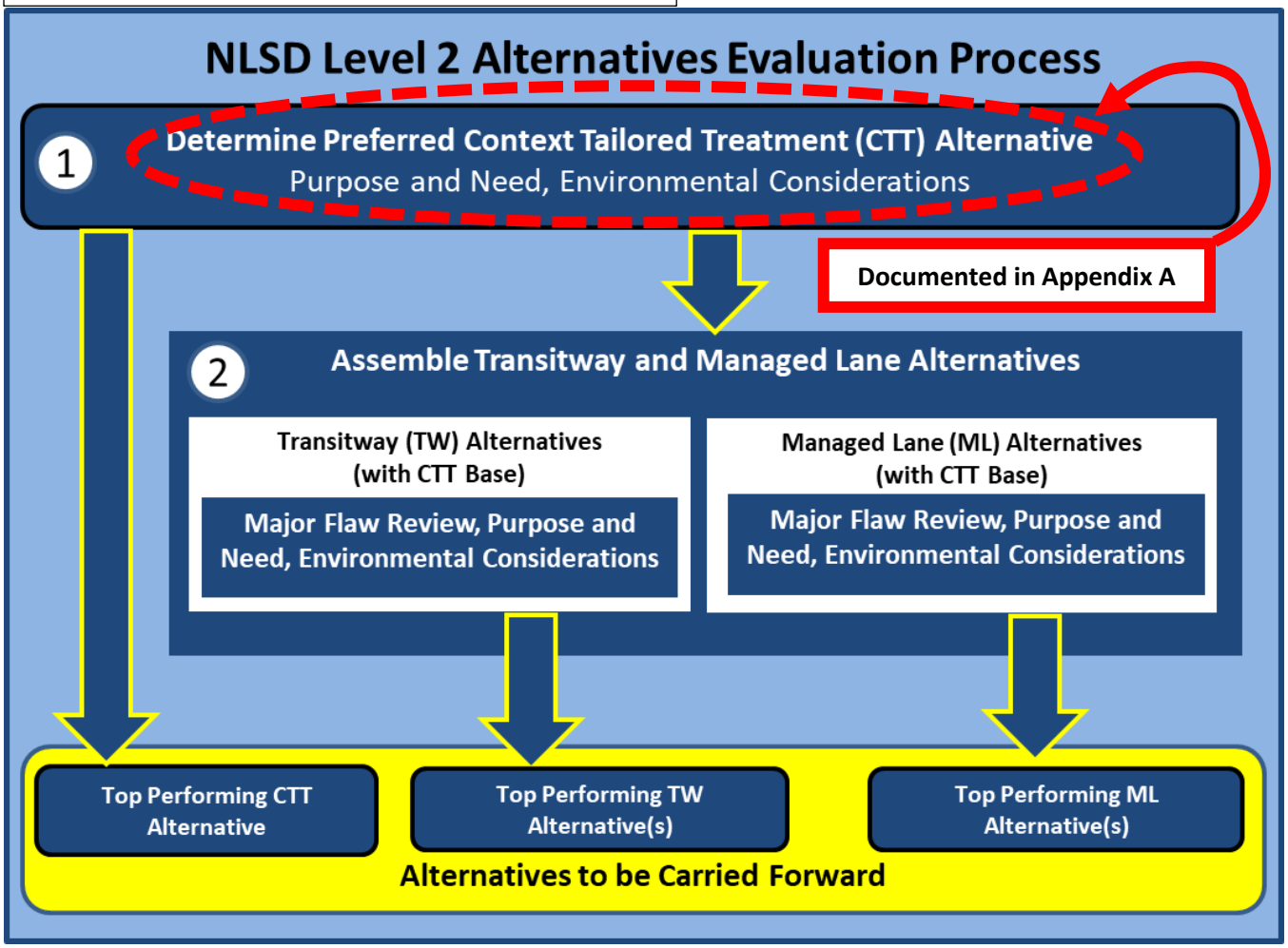
The Level 2 evaluation, which is shown in more detail on Exhibit 1-8, includes two major steps:

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. 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 1-8: Level 2 alternatives evaluation process



1.2.2 Context Tailored Treatment (CTT) Alternatives Evaluation Methodology

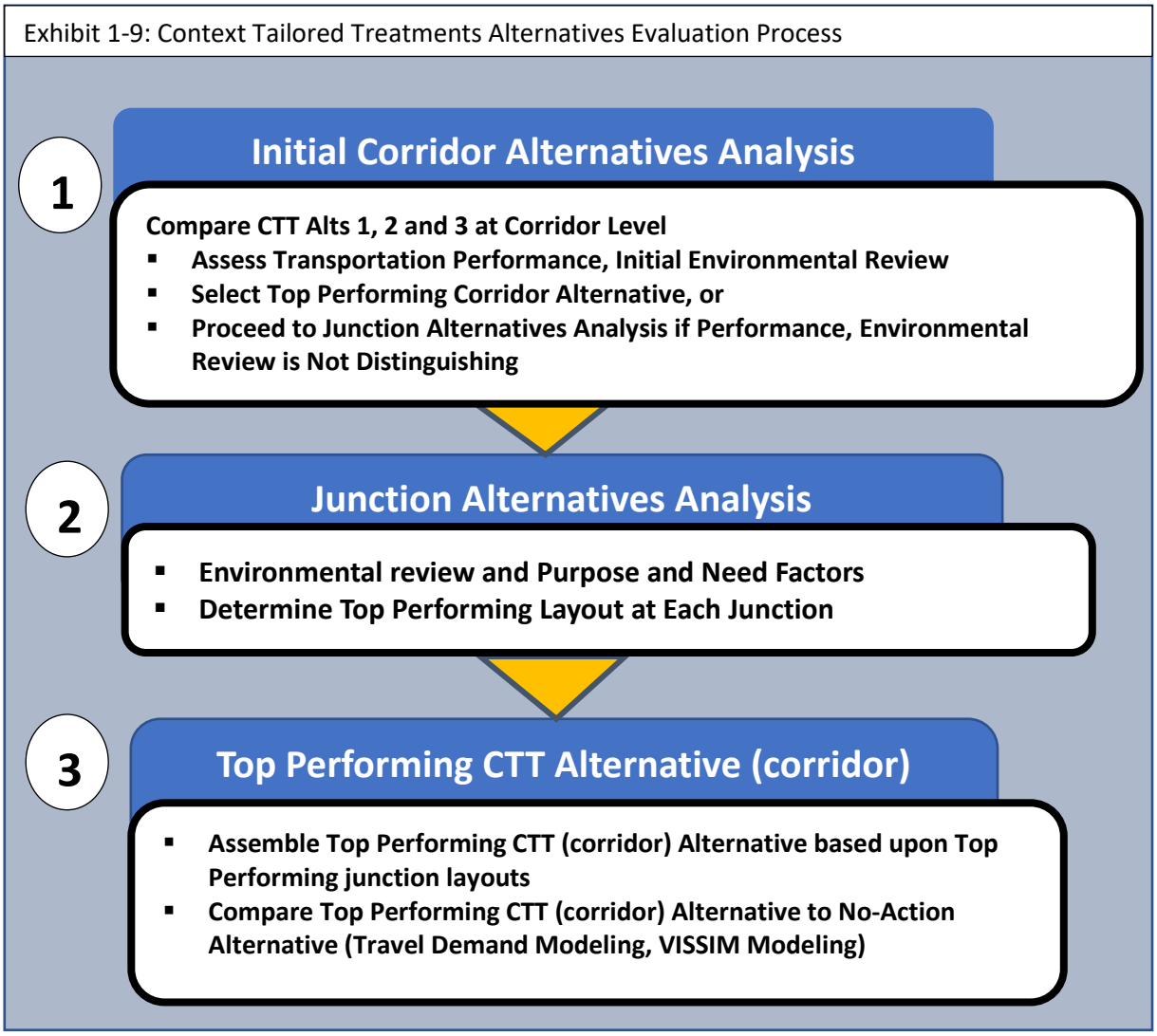
The evaluation of the CTT Alternatives was accomplished in 3 steps, as shown below in Exhibit 1-9. The following is a general description of each step:

1. **Initial CTT Corridor Alternatives Analysis**. Compare CTT Alternatives 1, 2 and 3 to each other at a corridor level using Traffic Modeling and an initial environmental review. Select the Top Performing Alternative or proceed to junction level analysis if the results of the initial corridor modeling and environmental review are 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 1-9: Context Tailored Treatments Alternatives Evaluation Process



1.2.2.1 Initial CTT Corridor Alternatives (Evaluation Step 1)

Initial Corridor Environmental Review

As noted in Section 4.1.1 of the Alternatives to be Carried Forward document, a general environmental review was undertaken for the initial CTT Corridor, Transitway and Managed Lane alternatives. The environmental review included displacements, historic structures, land use devoted to transportation, net change in green space, Lakefront Trail effects, Belmont Harbor effects and Fill in Lake Michigan (Waters of the US) effects. The following is a summary of the environmental review for the initial CTT Corridor Alternatives 1, 2 and 3, which is also tabulated in Exhibit 1-11:

- There are no displacements.
- All CTT Alternatives impact the same Historic structures.
- The land use devoted to transportation (footprint) ranges from a slight decrease over the No Action to a 1% increase as compared to the No Action Alternative.
- Lakefront Trail effects are the same (all CTT Alternatives include reconstructing the Lakefront Trail).
- Belmont Harbor effects are the same.
- South Lagoon effects vary from 0.0 acres to 0.1 acres of fill.
- Fill in Lake Michigan varies from 77 to 84 acres.

There were no environmental factors that were determined to be distinguishing at an initial corridor level. This finding supports the need for a junction alternatives analysis, which is also necessary to appropriately address context at each individual junction.

Exhibit 1-11: Environmental Review Summary (Context Tailored Treatment Corridor Alternatives)

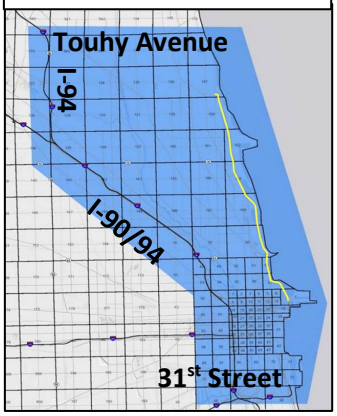
Criterion	Unit of Measure	No Action Alternative	Context Tailored Treatment Alternatives 1, 2 and 3
Displacements	Each	0	0
Historic Structure Impacts	Each	0	15 (same)
Land Devoted to Transportation Use	Acres	172	169 to 191
Additional Green Space	Acres	0	+82 to +90
Lakefront Trail Impacts	Linear Feet	0	Complete Replacement (same)
Belmont Harbor impacts	Number of Slips and Star Docks	0	13 Slips, 3 Star Docks (same)
Impacts to South Lagoon	Acres	0	0.0 – 0.1
Fill in Lake Michigan	Acres	0	78 – 84

Initial Corridor Travel Demand Modeling (Evaluation Step 1, continued)

The Initial Corridor Environmental Review supports the need for a junction level alternatives analysis. However, the initial CTT Corridor Alternatives were also modeled to quantitatively determine if there were any substantive differences in performance.

The travel demand modeling study area is shown on Exhibit 1-12, and the results of the travel demand modeling is shown on Exhibit 1-17.

Exhibit 1-12
Travel Demand Modeling Study Area



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.

1.2.2.2 CTT Junction Alternatives (evaluation Step 2)

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.

No single strategy (e.g., Corridor Modernization, 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 1-13, the analysis area for each junction includes portions of the Outer Drive to the north and south, and therefore encompasses the entire Outer Drive footprint from Grand Avenue to Hollywood Avenue.

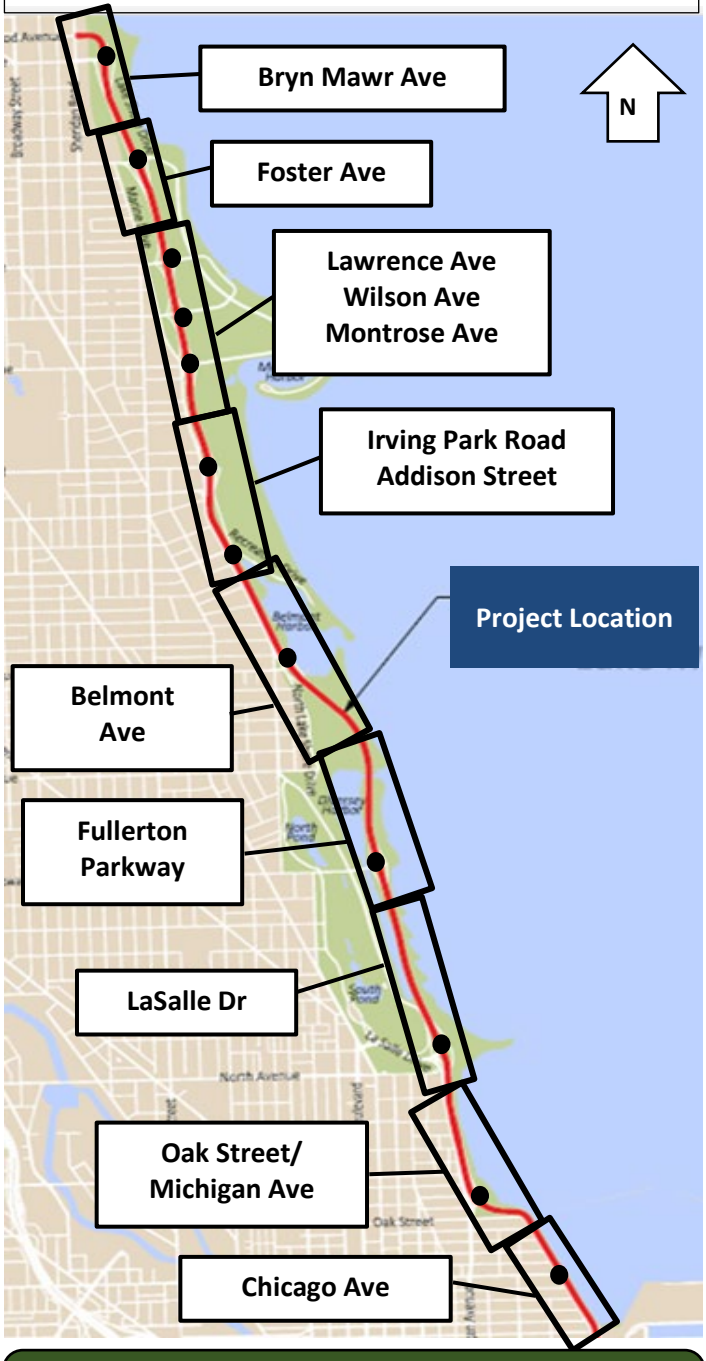
<u>CTT Junction Alternatives Evaluation Criteria</u>

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 1-13: CTT Junction Analysis Areas



Three CTT Alternatives were evaluated at each junction

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 highest and LOS F being lowest. 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 (see Section 1.3.3).
- **Network Performance.** The overall network, including the Outer Drive and the signalized intersections within each junction area (see Exhibit 1-13) was evaluated using Synchro. The total network delay (in hours) and total network travel time (in hours) for each alternative were measured.
- **Green Space**. Net change in green space for each alternative.
- **Cost.** Relative comparison of construction cost in 2017 $.

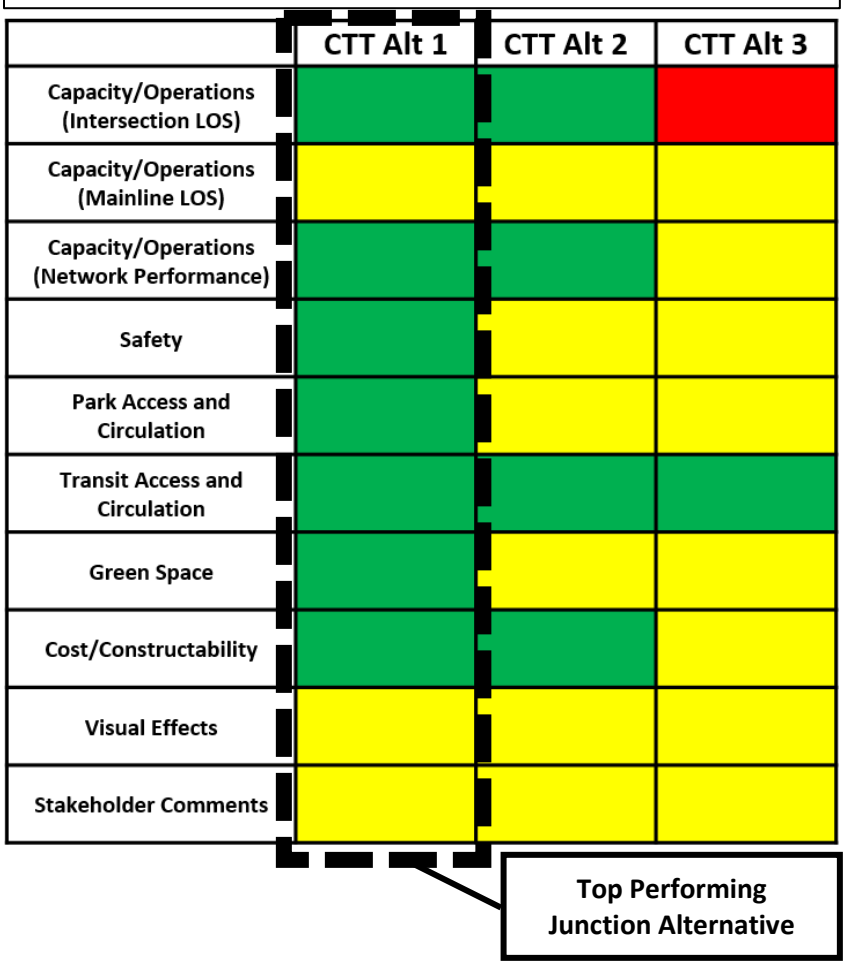
Qualitative Evaluation Criteria

- **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/pedestrian 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.

*The Highway Capacity Manual includes evaluation techniques for evaluating a variety of roadway types, including arterials.

As noted earlier, and as shown on Exhibit 1-14, 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).

Exhibit 1-14: Junction Alternatives Analysis Example



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.

1.2.2.3 Top Performing CTT (Corridor) Alternative (Evaluation Step 3)

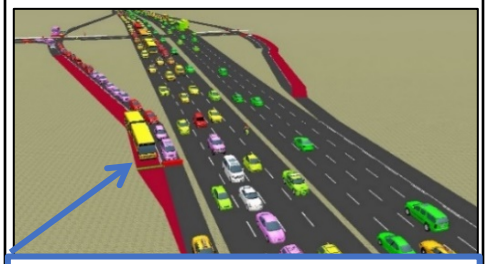
After assembling the Top Performing CTT Corridor Alternative, the CMAP Regional Travel Demand Model (TDM) was used to develop performance results at a "macro" scale.

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 1-15 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.

Exhibit 1-15

VISSIM Model Screen Capture



Queue Jump Lane
Bus Priority Signal

The VISSIM model output was used for the comparison between the top Performing CTT and the No Action Alternative, which is summarized in section 1.3.3 of this Appendix.

1.3 CTT Alternatives Evaluation Results

As noted in Section 4.1, the Context Tailored Treatment (CTT) Alternatives were evaluated both as initial 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.

1.3.1 Context Tailored Treatment Alternatives- Initial Corridor Evaluation (CTT Evaluation Step 1)

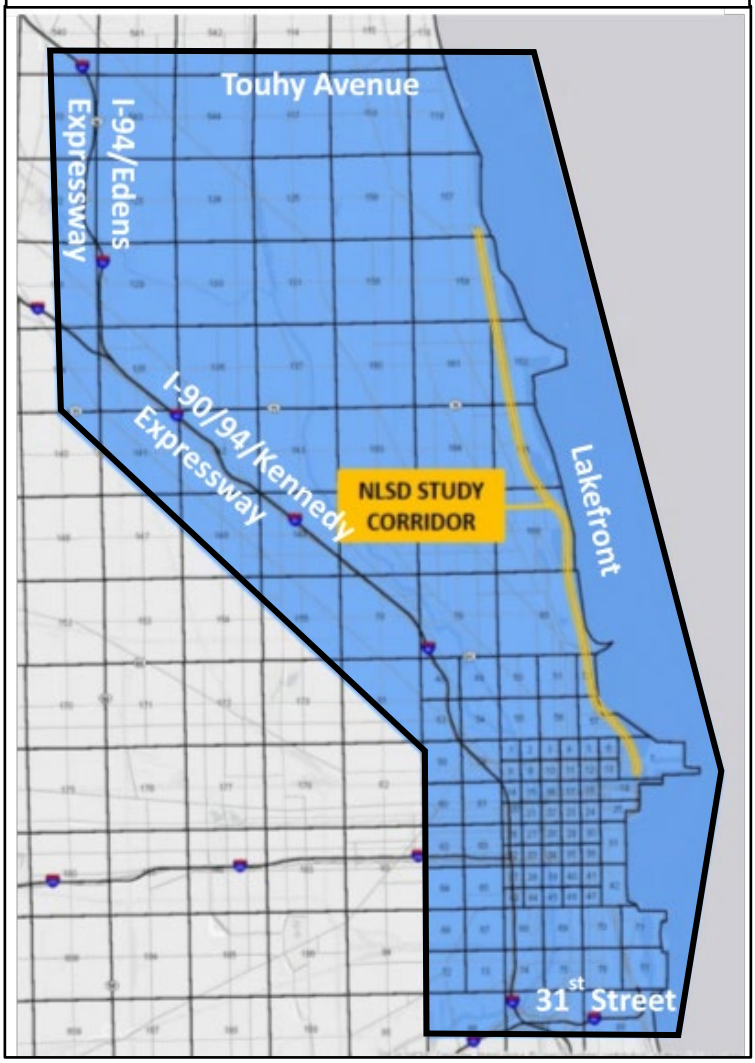
The CTT Alternatives were initially evaluated as corridors using the CMAP Regional Travel Demand Model (TDM).

As shown on Exhibit 1-16, 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 1.2.2.1, 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.

Exhibit 1-16: Initial Corridor Modeling Study Area



As shown in Exhibit 1-17, 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 more detailed review of environmental factors.

Exhibit 1-17
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	Less than 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.

1.3.2 Context Tailored Treatments - Junction Alternatives Evaluation (CTT Evaluation Step 2)

CTT Alternatives 1, 2 and 3 were compared at each junction using the criteria listed in section 1.2.2.2 of this Appendix. The detailed junction alternatives evaluation is located in Section 3.0 of this document. The following is a summary of the junction alternatives evaluation results:

- 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 at Chicago Avenue and at Wilson Avenue.

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 1-18.

Exhibit 1-18: 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**
****Northbound Frontage Drive added to CTT Alternative 1 between Montrose and Wilson**

1.3.3 Top Performing CTT Alternative comparison to the No Action Alternative (CTT Evaluation Step 3)

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 Corridor Alternative 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 1-19, the Top Performing CTT Corridor Alternative provides substantial mobility benefits (23% to 35% reduction in vehicular travel times, 15% to 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 in Section 3.3.2.3 of the Alternatives to be Carried Forward document, the CTT+TA Alternative will also be evaluated as a Transitway Alternative. An overall exhibit for the Top Performing CTT Corridor 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 1-19: 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.

2.0 Stakeholder Involvement

The following is summary of Stakeholder Involvement activities related to the development and evaluation of the Context Tailored Treatment (CTT) Alternatives.

Project Study Group (PSG)

The PSG, which includes representatives from the Illinois Department of Transportation, the Chicago Department of Transportation, the Chicago Park District, and the Chicago Transit Authority, was the initial forum for vetting every aspect of the CTT Alternatives. The PSG reviewed and discussed the following items:

- Analysis tools
- Evaluation methodologies
- Conceptual and refined alternatives
- Evaluation Results
- Recommended Top Performing Alternatives

In addition to regular coordination meetings, the PSG participated in several field trips in the project area to discuss existing conditions and potential alternatives. It is also important to note that the Top Performing Alternatives at each junction were the consensus choice of the PSG.

Task Force Meetings

After initial discussions with the PSG, additional stakeholder input was sought at Task Force Meetings #3 through #8. The following is a summary of Task Force coordination:

- Task Force Meeting #3. Review of the alternatives evaluation process, evaluation criteria, and a workshop to sketch the initial alternatives.
- Task Force Meeting #4. A junction "toolbox" was presented, and included a range of basic junction types, as well as their advantages and disadvantages. Environmental constraints were also identified.
- Task Force Meeting #5. The Level 2 screening methodology and the initial range of CTT Alternatives was reviewed.
- Task Force Meeting #6. A workshop was conducted to seek stakeholder feedback related to CTT Corridor Alternatives 1, 2 and 3.
- Task Force Meeting #7 (Exhibit 2-1). Discussed refined evaluation criteria and conducted a workshop to gather feedback regarding the layout of the NLSD Alternatives.
- Task Force Meeting #8 (Exhibit 2-2). Recommended Top Performing Junctions were presented and discussed.

Exhibit 2–1: Task Force Meeting #7

Exhibit 2–2: Task Force Meeting #8

Public Meetings

Public Meetings provided an additional layer of stakeholder input, which served to build on the PSG and Task Force coordination. Input relative to the CTT Alternatives was sought at Public Meetings #2 and #3. The following is a summary of each meeting:

- Public Meeting #2 (Exhibit 2-3). This meeting focused on alternatives development, with stakeholders sketching their improvement ideas on worksheets, similar to Task Force Meeting #3.
- Public Meeting #3 (Exhibit 2-4). This meeting included full displays of initial CTT Corridor Alternatives 1, 2 and 3. Stakeholders favored various individual CTT junction layouts, which supports the need for an initial evaluation of CTT Alternatives at a junction level, rather than a corridor level.

Exhibit 2–3: Public Meeting #2

Exhibit 2–4: Public Meeting #3

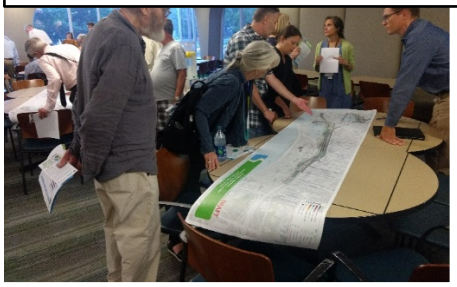
Community Meetings

Community meetings were held throughout the project limits, with a recent focus on three areas (Lakeview, Uptown and Edgewater neighborhoods). These meetings have resulted in additional refinements that are common to all Build Alternatives. The following is a summary of these recent stakeholder engagement efforts.

Lakeview Community Meetings

The Lakeview neighborhood includes the section of the project from Diversey Parkway to Irving Park Road. Community feedback is being sought regarding access to the South Harbor, potential new access at Addison Street, and other design issues within this section of the project. Two meetings were held within the community to seek input regarding junction layouts and other features. For further details, see Section 3.5.5 of this Appendix.

Exhibit 2–5: Lakeview Meetings



Uptown Community

The Uptown Community includes the section of the project between Montrose Avenue and Lawrence Avenue. A total of 3 community meetings (see Exhibit 2-6) were held to address design, safety and community access issues. Stakeholder input was sought regarding transportation needs, alternatives evaluation criteria, and the evaluation of 12 initial alternatives and 4 finalist alternatives, and a recommended Top Performing Alternative. For further details, see Section 3.7.5 of this Appendix.

Exhibit 2–6: Uptown Community Meeting #2

Northern Terminus Traffic Study

North of the Bryn Mawr Avenue junction, a separate evaluation of alternatives is being undertaken as part of the Northern Terminus Traffic Study (NTTS).

Exhibit 2–7: Northern Terminus Community Meeting #1

The Outer Drive terminates within the Edgewater community and the 48th Ward, where more than 70,000 vehicles per day traverse the neighborhood in order to travel to and from the northern terminus of the Outer Drive. This heavy travel demand contributes to mobility, safety, and accessibility concerns within the community. The recommended NTTS improvements will be common to all the Build 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.

Exhibit 2–8: Northern Terminus Community Meeting #2

Section 3.0
Junction Alternatives Evaluation

Section 3.0 documents the alternatives analysis and identifies the Top Performing Alternative at each junction. The Top Performing Junction Alternatives will be assembled to form the Top Performing CTT *Corridor* Alternative.

A comparison of the Top Performing CTT *Corridor* Alternative to the No Action Alternative is included in Section 4.0.

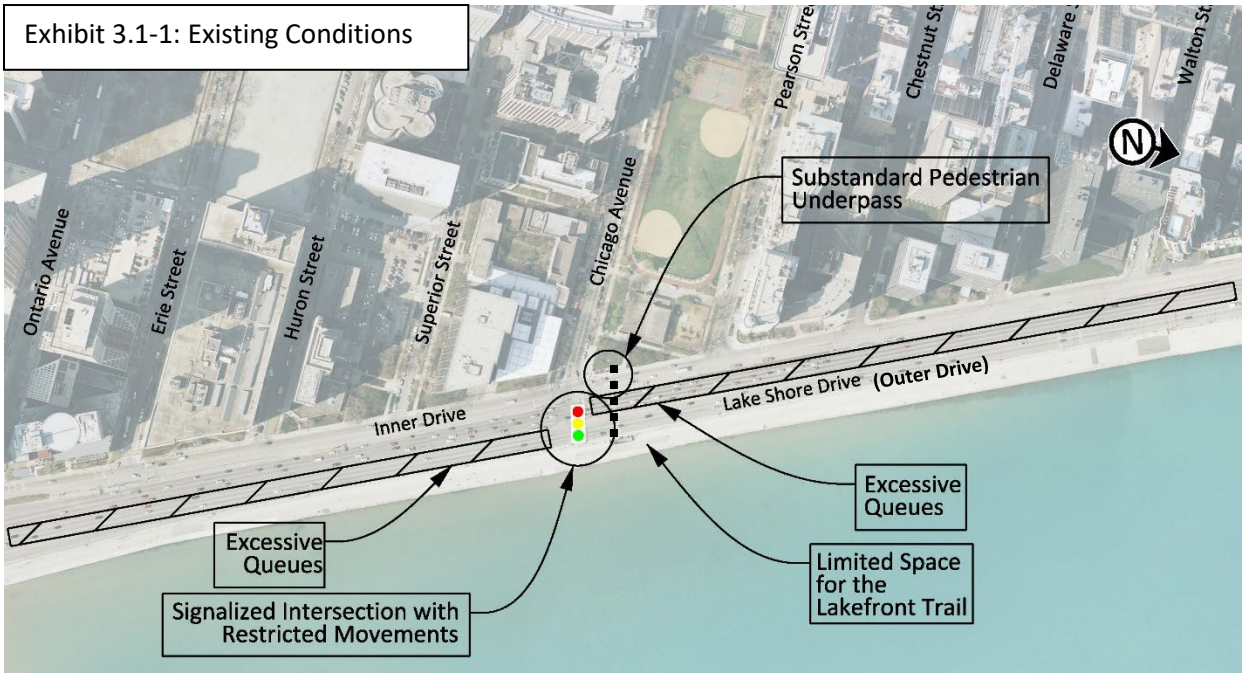
3.1 Chicago Avenue Junction

3.1.1 Current and 2040 No Action Conditions

General

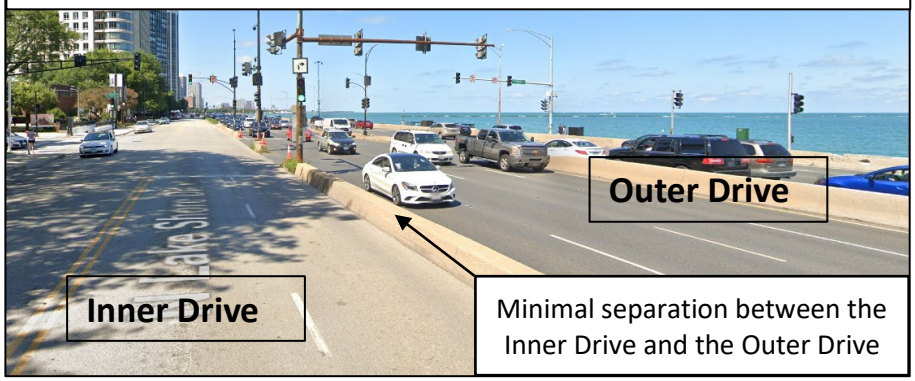
Chicago Avenue is an east-west minor arterial where it meets North Lake Shore Drive (Outer Drive) and is under the jurisdiction of the Chicago Department of Transportation (CDOT). The 2015 ADT of Chicago Avenue is approximately 9,900 vpd. The typical section consists 12-foot travel lanes (two eastbound and one westbound) with a 7' on-street parking lane in each direction, bound by B-6.12 curb and gutter. The intersection of Chicago Avenue and the Outer Drive is signalized/at-grade, and the travel lane widths on the Outer Drive are relatively narrow at 10' wide. Bicycle and pedestrian travel along Chicago Avenue is substantial, with up to 3,420 bikes/pedestrians using the Chicago Avenue bike/pedestrian tunnel each day to access the lakefront and the trail system (see Exhibit 3.1-1).

Exhibit 3.1-1: Existing Conditions



As shown on Exhibit 3.1-2, there is minimal separation between the Inner Drive and the Outer Drive. This limits the ability to make turning movements to and from the Outer Drive at the Chicago Avenue intersection, and contributes to safety and congestion concerns.

Exhibit 3.1-2: Chicago Avenue Intersection, looking north



The following movements are restricted at this location under existing conditions:

- Turning movements from SB Outer Drive to Chicago Avenue or the Inner Drive are prohibited.
- Turning movements from the Inner Drive to the Outer Drive are prohibited.
- Left turns from NB Outer Drive to Chicago Avenue/Inner Drive during the 5-hour A.M. peak period are prohibited (5:00 A.M. to 10:00 A.M.).
- Turns from Chicago Avenue to the Outer Drive during the 5-hour A.M. peak period are prohibited.

Cyclists and pedestrians are not allowed to cross the Inner Drive or the Outer Drive at grade, and instead must use an underpass at Chicago Avenue. However, the size of this structure does not adequately accommodate the current level of bike/pedestrian demand, and it is not ADA accessible.

Capacity/Operations (2040 No Action)

The existing signalized intersection at Chicago Avenue and the Outer Drive is the source of substantial congestion, with over 120,000 vehicles per day passing through the intersection. Vehicle queues extend approximately one mile north and south of the Chicago Avenue intersection.

Safety

The Chicago Avenue Intersection (Inner and Outer Drive intersections) experienced a total of 255 (37 injury, 0 fatal) crashes between 2007 and 2011 predominantly during dry, daytime conditions. Along the Outer Drive, the predominant crash types were rear end and sideswipe. These crashes were likely caused by congested conditions, substantial queueing, uneven travel flow, and vehicles changing lanes to bypass queues in the vicinity of the existing traffic signal at Chicago Avenue. A total of 4 bike/pedestrian crashes were recorded during the study period. Although the number of crashes was relatively small, all crashes resulted in an injury, which indicates that bike/pedestrian safety is a concern, regardless of the number of crashes. In addition, given the level of bike/pedestrian usage, further enhancing bike/pedestrian safety is a priority.

Exhibit 3.1-3: Crash Summary (2007-2011)*
Chicago Avenue Junction

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	0	1	0	0	3	4
Left Turn	0	0	1	1	8	10
Rear End	0	1	5	15	98	120
Sideswipe	0	0	4	3	85	92
Pedestrian/Bike	0	1	1	2	0	4
Off Rd. Fixed Obj.	0	0	1	0	17	18
Other	0	0	0	0	7	7
Total	0	3	12	21	218	255

Year	
2007	60
2008	61
2009	44
2010	43
2011	47

Pavement Condition	
Dry	174
Wet	74
Icy	7

Time of Day	
Day	180
Night	75

*The crash analysis will be updated for the Level 3/DEIS Alternatives evaluation

3.1.2 Build Alternatives

In order to address the existing deficiencies, all Build Alternatives include a grade separation at Chicago Avenue. In addition, all Build Alternatives include shoreline protection features to prevent wave overtopping.

The Build Alternatives as well as the analysis area for each junction (e.g., green space, cost) are shown on Exhibit 3.1-4.

CTT Alternative 1 – Corridor Modernization Alternative

The Corridor Modernization Alternative includes a grade separation of Chicago Avenue and the Outer Drive via a diamond junction configuration. Full access is provided between Inner Drive, Outer Drive and Chicago Avenue. The Outer Drive alignment is shifted east to provide additional space for improvements to the Outer Drive as well as improved bike/pedestrian facilities. The Outer Drive is depressed under Chicago Avenue for approximately 1,800 feet.

Bike/pedestrian access to/from the Lakefront is provided along the Chicago Avenue bridge and a bike/pedestrian overpass that would span both the Inner and Outer Drives at Pearson Street.

CTT Alternative 2 – Compressed Roadway Alternative

The Compressed Roadway Alternative includes a grade separation of Chicago Avenue and the Outer Drive via a diamond junction configuration. Full access is provided between the Inner Drive, Outer Drive and Chicago Avenue. The proposed cross section is compressed to minimize the transportation footprint, which results in relatively less separation between the Inner and Outer Drive, as well as narrower sidewalks along the Inner Drive. The Outer Drive is depressed under Chicago Avenue for approximately 1,800 feet.

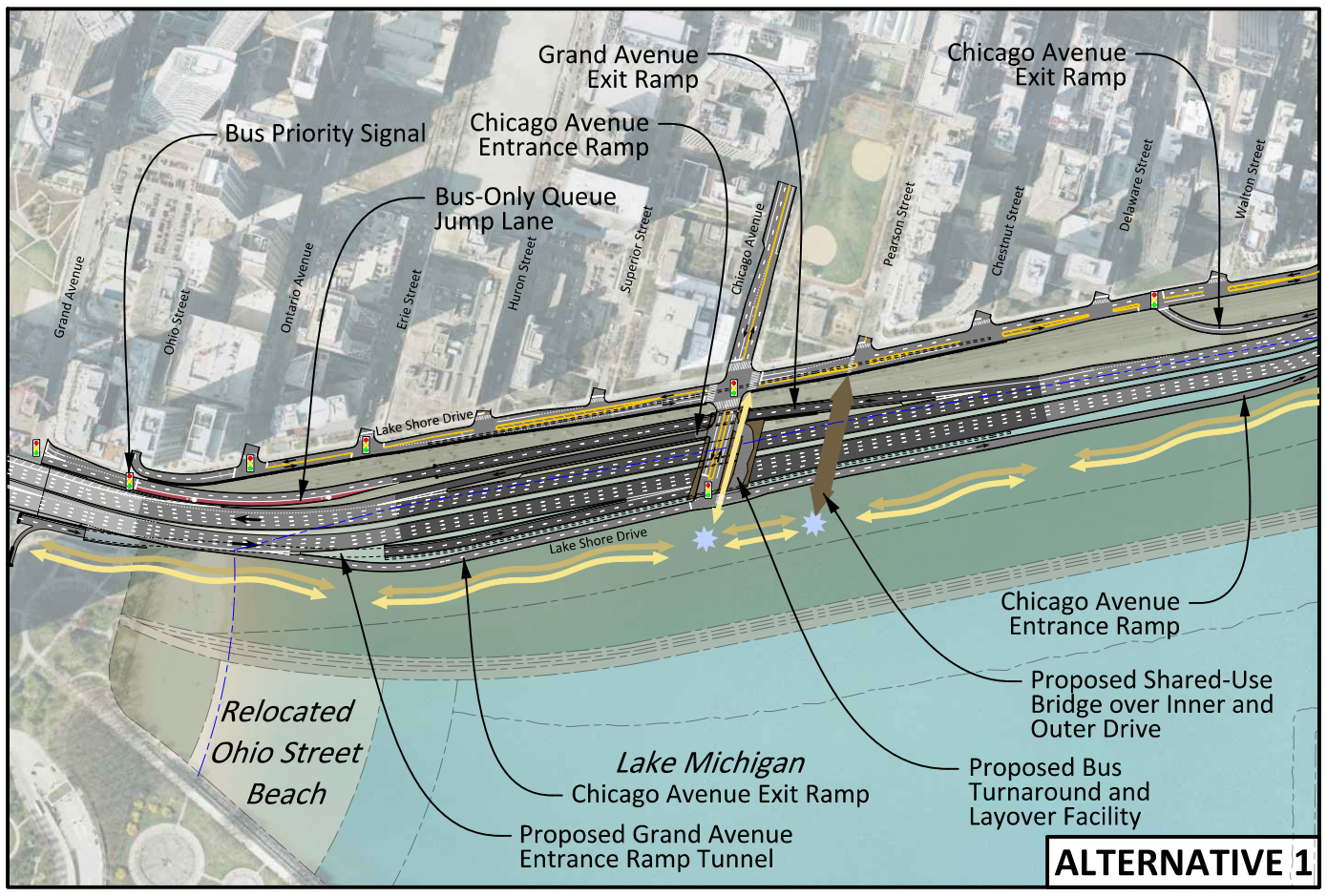
Bike/pedestrian access to/from the Lakefront is provided along the Chicago Avenue bridge.

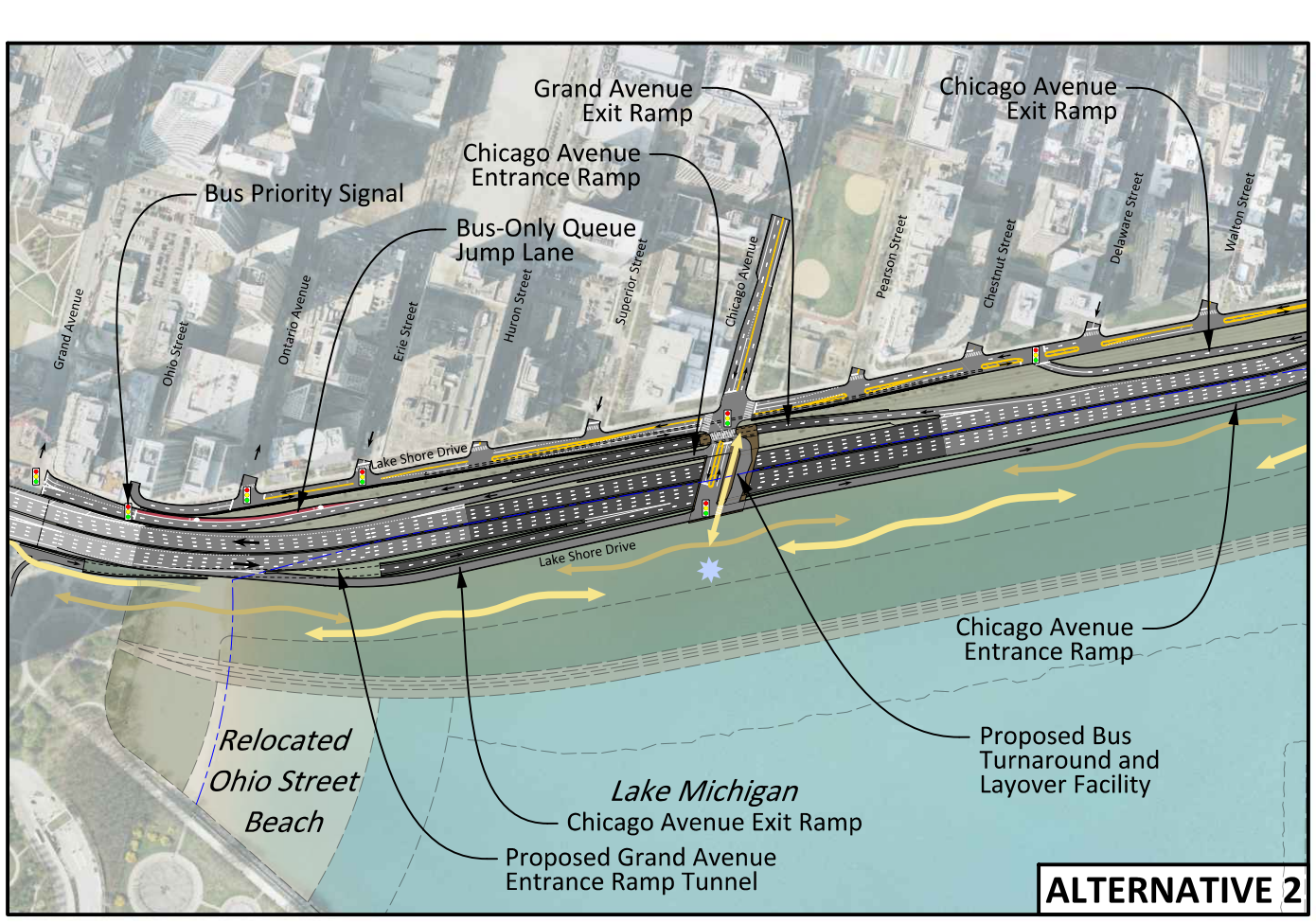
CTT Alternative 3 - Frontage Drive Alternative

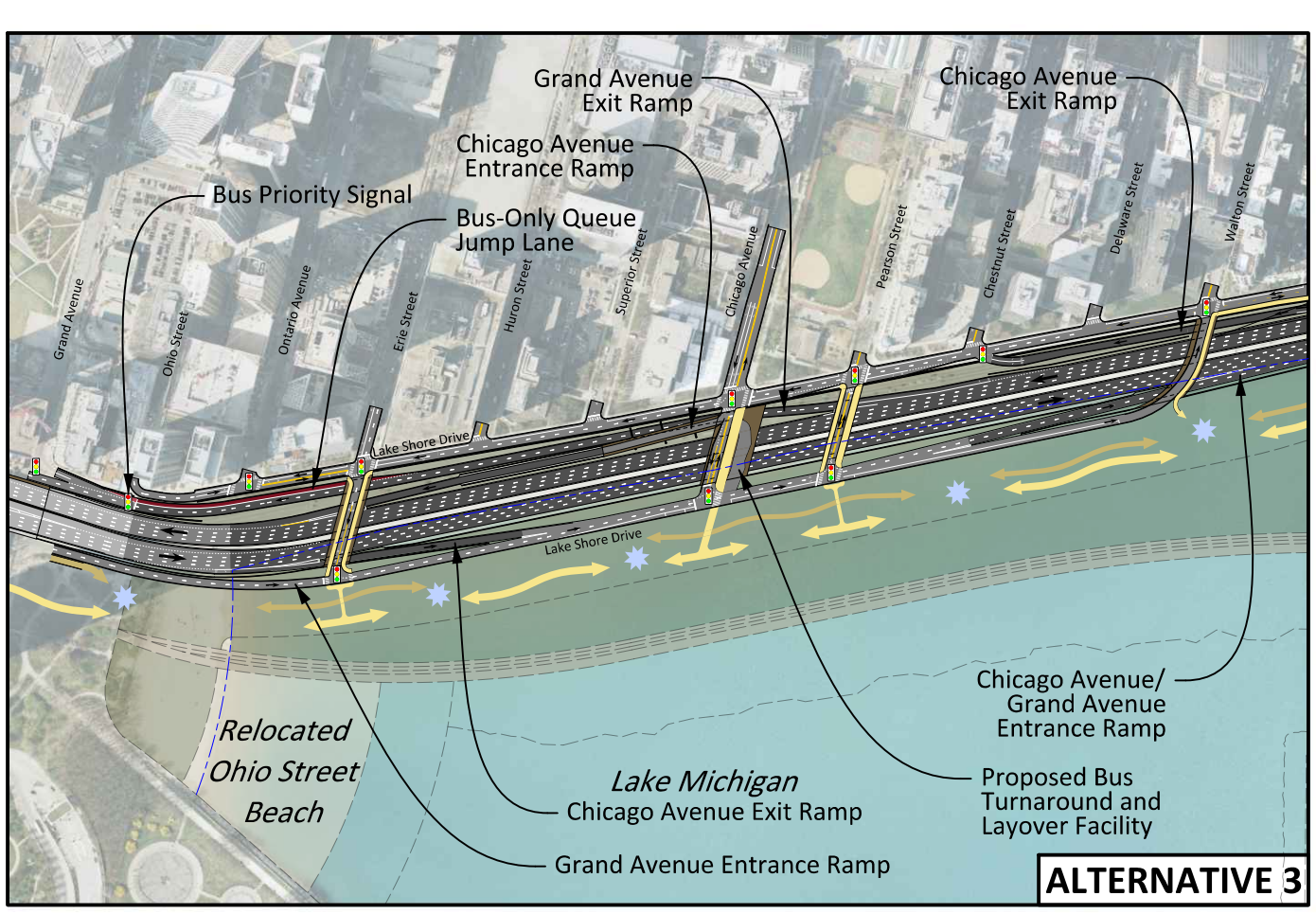
The Frontage Drive Alternative includes a grade separation of Chicago Avenue and the Outer Drive via a diamond junction configuration with one-way frontage drives between Erie Street and Walton Street. Full access is provided between the Inner Drive, Outer Drive and Chicago Avenue. The Outer Drive is compressed along the Inner Drive, and therefore does not include any additional green space. The Outer Drive is also depressed under Chicago Avenue for approximately 3,700 feet.

Bike/pedestrian access to/from the Lakefront is provided along roadway bridges at Chicago Avenue, Erie Street, Pearson Street, and Walton Avenue.

Exhibit 3.1-4: Chicago Avenue Junction Alternatives







0' 250' 500'

REDEFINE THE DRIVE
NORTH LAKE SHORE DRIVE

LEGEND

	Below Grade	At Grade	Above Grade
Roadway Facility			
Bus-Only Facility			
Bridges and Tunnels			

- Potential Green Space
- Potential Relocated/New Beach
- One-Way Street
- Two-Way Street
- Traffic Signal
- Existing Shoreline
- Proposed Shoreline
- Lower Speed Trail
- Higher Speed Trail
- Higher Speed/Lower Speed Trail Junction
- Pedestrian/Bike Bridges and Underpasses

3.1.3 Alternatives Evaluation

The alternatives were evaluated utilizing a variety of factors including travel performance, safety, park access and circulation, green space, transit access and circulation, visual effects, cost/constructability, and stakeholder input.

Traffic Operations

Intersection Level of Service (LOS)

- As shown in Exhibit 3.1-5, Alternatives 1 and 2 provide an acceptable overall LOS and improve capacity over the No Action alternative.
- Alternative 3 has several intersections operating at LOS E in the PM peak condition.

Exhibit 3.1-5: 2040 Intersection Level of Service

Intersection	2040 No Action		CTT Alt 1		CTT Alt 2		CTT Alt 3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Chicago Avenue at Inner Drive	A	F	C	C	C	C	B[2]	B[2]
Inner Drive at SB Exit Ramp	E	C	B	B	B	A	C[2]	B[2]
Chicago Avenue at NB Ramps	E[1]	F[1]	C	B	C	B	B	E
SB Frontage Drive at Erie Street							B	B
NB Frontage Drive at Erie Street							B	C
SB Frontage Drive at Pearson Street							B	B
NB Frontage Drive at Pearson Street							A	E
NB/SB Frontage Drive at Walton Street							B	E

[1]For the No Action Alternative, the LOS reported is at the Outer Drive/Chicago Avenue Intersection (instead of at the NB ramps).
[2]The "Inner Drive" is the proposed one way (southbound) frontage drive.

Mainline Level of Service

The Build Alternatives provide similar mainline performance as shown in Exhibit 3.1-6.

Exhibit 3.1-6: 2040 NLSD Level of Service								
Outer Drive Section	No Action*		CTT Alt 1		CTT Alt 2		CTT Alt 3	
			A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Northbound Diverge (Chicago Ave Exit)			B	B	B	B	B	B
Northbound Mainline Segment			C	C	C	C	C	C
Northbound Merge (Grand Ave Entrance)			B	C	B	C	B	C
Northbound Mainline Segment			C	C	C	C	C	D
Northbound Merge (Chicago Ave Entrance)			B	C	B	C	B	C
Southbound Mainline Segment			D	C	D	C	D	C
Southbound Diverge (Chicago Ave Exit)			C	B	C	B	C	B
Southbound Diverge (Grand Ave Exit)			D	B	C	B	C	B
Southbound Mainline Segment			C	B	B	B	B	B
Southbound Merge (Chicago Ave Entrance)			C	B	B	B	B	B

*The HCM software does not fully capture existing and 2040 No Action conditions. The No Action comparison will be made at the corridor level, after assembling the Top Performing CTT Alternative.

Overall Network Performance

- As shown on Exhibit 3.1-7, all Build alternatives improve overall network performance as compared to the No Action by grade separating Chicago Avenue and the Outer Drive.
- Alternatives 1 and 2 have better overall network performance as compared to Alternative 3.

Exhibit 3.1-7: 2040 Network Performance								
	2040 No Action		CTT Alt 1		CTT Alt 2		CTT Alt 3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Total Delay (hours)	758	569	34	42	34	40	35	140
Total Travel Time (hours)	941	752	257	244	250	237	341	406

Safety

- All Build Alternatives add a 10-foot clear zone along the Outer Drive.
- All Build Alternatives include a grade separation between Chicago Avenue and Outer Drive, and extend the Grand Avenue ramps to the north, which improve merging and weaving operations. The grade separation at Chicago Avenue also eliminates vehicle conflicts on the Outer Drive.

- Alternative 1 provides relatively better bike/pedestrian safety performance by providing an exclusive bike/pedestrian structure at Pearson Street.

Park Access and Circulation

- All Build Alternatives will improve park access by providing ADA accessible crossings along proposed roadway bridges. The Lakefront Trail improvements, which are common to all Build Alternatives, enhance park circulation.
- Alternative 1 provides the relative best bike/pedestrian access, since it includes a bike/pedestrian only overpass, which would span both the Inner Drive and the Outer Drive at Pearson Street.
- Alternative 2 provides an at-grade bike/pedestrian crossing along the Chicago Avenue roadway bridge, which increases the potential for bike/pedestrian/vehicular conflicts, as compared to Alternative 1.
- Alternative 3 provides slightly better bike/pedestrian access as compared to Alternative 2 by providing additional at-grade crossings (Erie Street, Chicago Avenue, Pearson Street and Walton Street).

Green Space

- As shown on Exhibit 3.1-8, all alternatives create additional green space as part of the Shoreline Protection concept for the Outer Drive, with Alternative 1 providing the relative most additional green space.
- Alternative 2 has a relatively smaller footprint at Chicago Avenue as the roadway cross section is compressed.
- The additional frontage drives included with Alternative 3 create the relative least amount of green space.

Exhibit 3.1-8: Net Green Space (rounded to nearest acre)				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Green Space (ac)	N/A	+27	+25	+22

Transit Access and Circulation

- All Build Alternatives improve transit access by adding a turnaround/layover facility on the Chicago Avenue bridge over the Outer Drive.

Visual Effects

- All Build Alternatives diminish views from the Outer Drive by depressing portions of the Outer Drive. This view is most diminished for Alternative 3 as the Outer Drive is lowered for the longest distance.
- All Build Alternatives improve the view from the park and the urban edge (properties west of the Inner Drive) by depressing portions of the Outer Drive and creating additional park space along the shoreline.
- Alternative 1 improves the view from the urban edge the relative most by creating the most additional green space along Inner Drive. However, this is somewhat offset by the pedestrian overpass at Pearson Street, which spans both the Inner and Outer Drive.

Cost/Constructability

- As shown on Exhibit 3.1-9, Alternatives 1 and 2 are similar in design configuration and therefore have costs that are relatively similar. Alternative 1 is slightly more costly due to the bike/pedestrian only bridge over the Inner and Outer Drive at Pearson Street.
- Alternative 3 is the relatively most expensive due to the longer portions of depressed roadway.
- Alternatives 1 and 2 are similar in design and therefore would be similar from a constructability perspective.
- Alternative 3 is the relatively least constructible as it has the longest portions of depressed roadway.

Exhibit 3.1-9: Construction Cost				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Total Cost (2017 $)	N/A	$508M	$494M	$586M

Stakeholder Input

- Many stakeholders preferred the at-grade pedestrian crossing options at Chicago Avenue, rather than a bike/pedestrian only structure that would pass over both the Inner and Outer Drive. Some stakeholders expressed concerns about the visual impact of the bike/pedestrian only structure as well as the potential impacts to the properties west of the Inner Drive.
- Stakeholders expressed support for addressing congestion at Chicago Avenue.
- Stakeholders expressed concerns about the visual impacts associated with the pump station needed to drain the lowered section of the Outer Drive.
- There was mixed support for depressing the Outer Drive. Some stakeholders thought the view from the Outer Drive was important to the overall experience of driving along the Outer Drive. Other stakeholders thought depressing the drive improved views from the urban edge.
- Alternative 1 was the consensus choice of the Project Study Group.

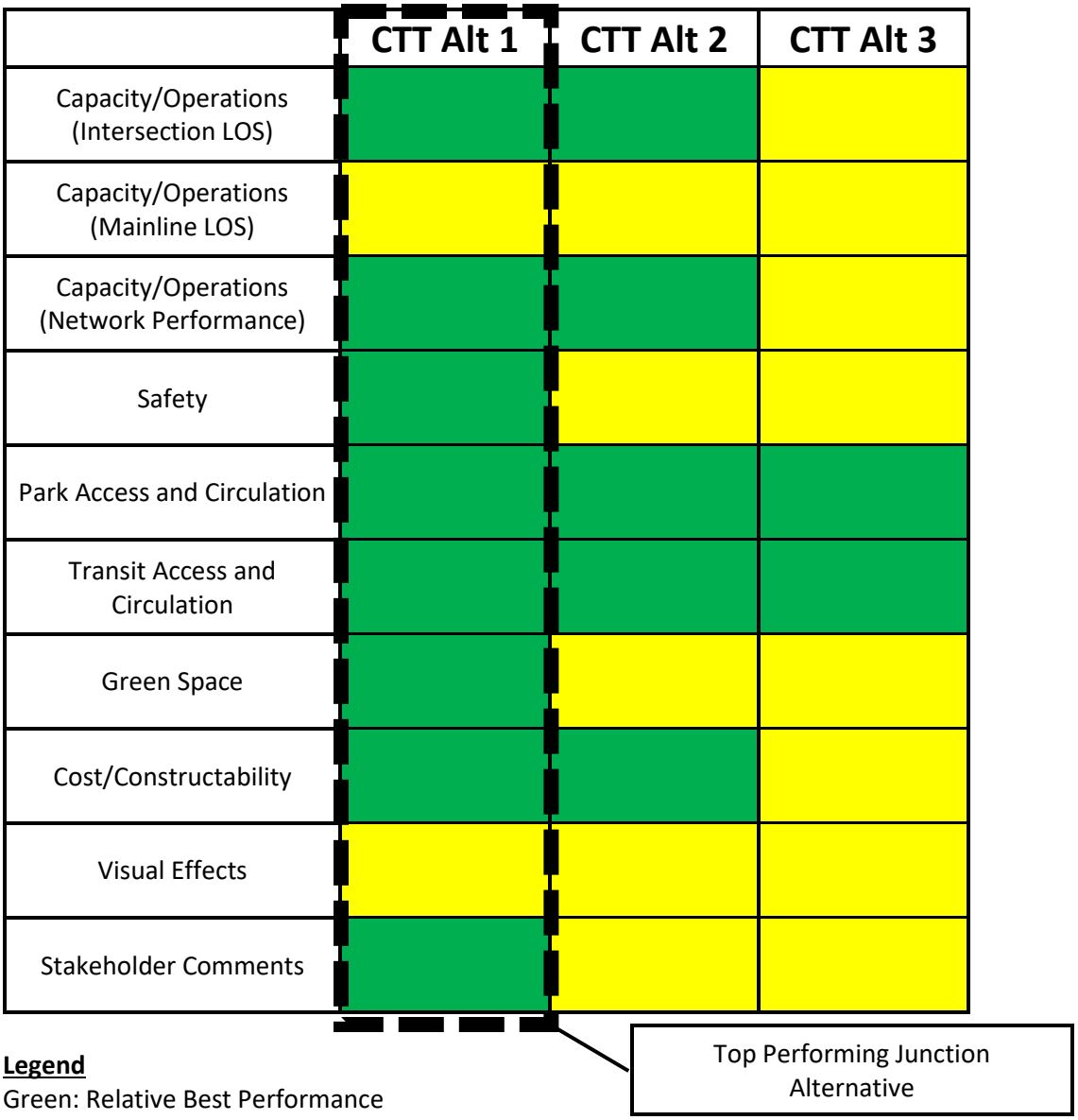
3.1.4 Conclusions

The following is an overall summary of the evaluation results:

- All Build Alternatives provide similar Outer Drive performance; Alternatives 1 and 2 provide the relative best intersection LOS and network performance.
- Alternative 1 provides the relative best safety performance for all modes.
- All Build Alternatives provide similar levels of improved park and transit access/circulation.
- Alternative 1 provides the net greatest increase in green space.
- Alternatives 1 and 2 have the relative lowest cost and relative best constructability.
- All Build Alternatives had similar visual effects.
- Stakeholders provided a mixture of views regarding CTT Alternatives 1, 2 and 3. Alternative 1 was the consensus choice of the Project Study Group.

Exhibit 3.1-10 summarizes the ratings for CTT Junction Alternatives 1, 2 and 3, and is a relative comparison of Build Alternatives. Once the overall Top Performing CTT Corridor Alternative is assembled, a comparison to the No Action Alternative, based upon travel performance, will be made, as summarized in section 1.3.3 of this Appendix.

Exhibit 3.1-10: Context Tailored Treatment Alternative Evaluation
Chicago Ave Junction



Legend
Green: Relative Best Performance
Yellow: Non-Distinguishing or Neutral Performance
Red: Relative Worst Performance

Alternative 1 is recommended because it has the best combination of improved mobility, safety, and additional green space. Alternative 1 was also amongst the top performers for cost and constructability. Based on stakeholder feedback, the bike/pedestrian only bridge over the Inner and Outer Drive at Pearson Street will be replaced with a multi-modal bridge (vehicles, bikes, pedestrians) over the Outer Drive in the same location. This alternative is subject to further refinement as the evaluation and coordination process advances.

3.2 Oak Street Curve and Michigan Avenue Junction

3.2.1 Current and 2040 No Action Conditions

General

Michigan Avenue is classified as an "other principal arterial" where it meets North Lake Shore Drive (Outer Drive) and is under the jurisdiction of IDOT. The 2015 ADT of Michigan Avenue is approximately 35,500 vpd. The typical section (at Oak Street) consists of four northbound and three southbound 11.5 foot travel lanes, bound by B-6.12 curb and gutter. The Michigan Avenue junction with the Outer Drive is grade separated, with ramps to and from the north. From the Michigan/Oak Street intersection, two northbound lanes continue north and become Inner Drive, while the other two northbound lanes enter a tunnel under the Outer Drive and become the northbound entrance ramp to the Outer Drive. In the southbound direction, two lanes from the Inner Drive merge with the southbound exit ramp from Outer Drive at the Michigan/Oak Street intersection. Pedestrian volumes along Michigan Avenue are substantial, with up to 44,410 bikes/pedestrians crossing the Michigan Avenue/Oak Street intersection each day (see Exhibit 3.2-1).

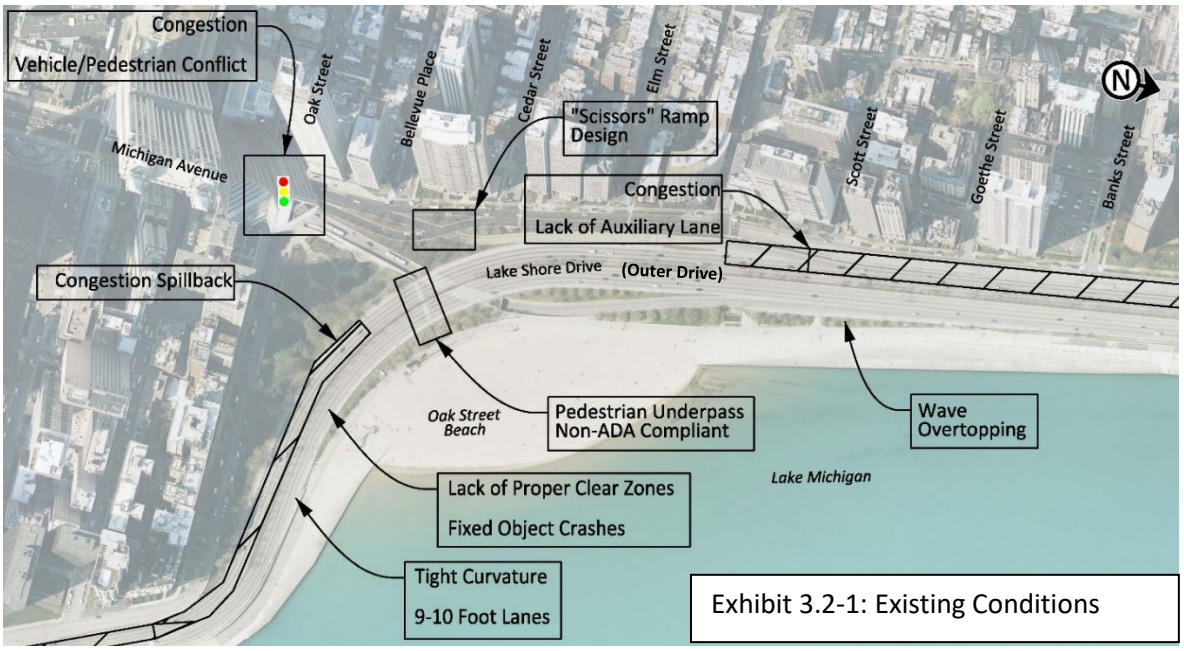


Exhibit 3.2-1: Existing Conditions

This section of the Outer Drive has reverse curves at Oak Street. The southern curve meets a design speed of 30 mph and the northern curve meets a design speed of 45 mph. Most of the Outer Drive has a design speed of 45 mph and a posted speed of 40 mph.

Overhead flashing speed reduction warning signals (25 mph) are present in both directions for vehicles approaching the southern curve. Posted speed limit signs (35 mph) are present in both directions for vehicles approaching the northern curve. The reverse curve geometrics require traffic to slow dramatically in a short amount of time. The travel lane widths on the Outer Drive within the Oak Street Curve are relatively narrow and vary from 9' to 10' wide.

This section of the Outer Drive (north of Michigan Avenue) has minimal separation from Lake Michigan and experiences wave overtopping during storm events, which results in periodic closures of the Outer Drive and the Lakefront Trail, as well as damage to the Lakefront Trail.

This section of the Outer Drive includes a dedicated east-west bicycle/pedestrian underpass at Michigan Avenue with up to 21,650 bikes/pedestrians using the underpass each day to access the lakefront and the trail system; the size of the structure does not adequately accommodate the current demand, and it is not ADA accessible.

Capacity/Operations (2040 No Action)

This portion of the Outer Drive between Michigan and LaSalle is the second most heavily traveled section with an ADT of 149,700. Peak hour volumes approach 9,000 vehicles per hour during the A.M. in the southbound direction, which exceeds the capacity of the existing 4 lane cross section. In the northbound direction, there is an existing auxiliary lane connecting the Michigan Avenue entrance ramp to the LaSalle Drive exit ramp. However, in the southbound direction, there is no auxiliary lane between LaSalle Drive and Michigan Avenue. The Outer Drive and southbound exit ramp to Michigan Avenue operates at LOS E.

Due to the need for vehicles to slow down to navigate the reverse curves (the southern curve has a design speed of 30 mph and the northern curve has a design speed of 45 mph), abrupt stops or braking occurs when drivers enter the curves. This has a “shockwave” effect, resulting in congestion north of the Michigan Avenue junction, sometimes as far north as Fullerton Avenue. Southbound congestion related to the existing signal at Chicago Avenue also spills into the Oak Street Curve and extends through the Michigan Avenue junction and further north.

The intersection of Michigan Avenue and Oak Street is highly complex. The high pedestrian volumes severely limit the ability of vehicles to turn right on red or make permitted left turns on the Oak Street and the Inner Drive approaches, which contributes to congestion. The Michigan Avenue/Oak Street intersection can cause substantial queuing in the northbound and southbound directions. This congestion occasionally spills back onto the southbound Outer Drive.

Safety

The portion of the Outer Drive along the Oak Street Curve was designated as a “5% location”, which means that it is amongst the top 5% of priority locations for safety improvements. Overall, the Oak Street Curve experienced a total of 753 crashes between 2007 and 2011, which occurred predominantly in daytime, wet conditions (see Exhibit 3.2-2). Of those crashes, 127 crashes had injuries, and there were 2 fatal injury crashes. The predominant crash type was fixed object with either the inner or outer barrier wall. These crashes were likely caused by the relatively sharp roadway curvature and the necessary reduction in speed to navigate the reverse curves, compared to the rest of the Outer Drive which is generally designed at higher speeds. The sharp roadway curvature creates conditions that make this section of the Outer Drive particularly susceptible to crashes during wet conditions.

Rear and sideswipe collisions were the next most predominant crash type. The existing narrow lanes, roadway curvature and spill back effects of congestion to the north and south are likely contributors to these crash types.

The Outer Drive at the Michigan Avenue junction experienced a total of 271 crashes (47 injury, 2 fatal) between 2007 and 2011, which occurred predominantly in daytime, dry conditions (see Exhibit 3.2-3). The predominant crash types were rear end and sideswipe. These crashes were likely caused by congested conditions and uneven traffic flow, which is also caused by the spill back effects of congestion to the north and south. A total of 43 crashes were recorded at the Michigan Avenue and Oak Street signalized intersection. Complex geometry and congestion may contribute to the crashes at this intersection.

A total of 7 bike/pedestrian crashes were recorded during the study period. Although the number of crashes was relatively small, all the crashes resulted in an injury, and one resulted in a fatality. This indicates that bike/pedestrian safety is a concern, regardless of the number of crashes. In addition, given the level of bike/pedestrian usage, further enhancing bike/pedestrian safety is a priority.

Exhibit 3.2-2: Crash Summary (2007-2011)*
Oak Street Curve

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	0	0	0	0	0	0
Left Turn	0	0	0	0	0	0
Rear End	0	0	7	10	122	139
Sideswipe	0	0	11	10	148	169
Pedestrian/Bike	0	1	0	0	0	1
Off Rd. Fixed Obj.	2	8	53	26	334	423
Other	0	1	0	0	20	21
Total	2	10	71	46	624	753

Year	
2007	154
2008	191
2009	135
2010	153
2011	120

Pavement Condition	
Dry	182
Wet	532
Icy	39

Time of Day	
Day	478
Night	275

Exhibit 3.2-3: Crash Summary (2007-2011)*
Michigan Avenue Junction

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	0	0	0	1	9	10
Left Turn	0	0	2	0	13	15
Rear End	0	2	9	9	82	102
Sideswipe	0	0	1	2	68	71
Pedestrian/Bike	1	3	2	0	0	6
Off Rd. Fixed Obj.	1	4	7	1	39	52
Other	0	2	2	0	11	15
Total	2	11	23	13	222	271

Year	
2007	71
2008	66
2009	43
2010	44
2011	47

Pavement Condition	
Dry	172
Wet	79
Icy	20

Time of Day	
Day	192
Night	79

*Crash analysis will be updated for the Level 3/DEIS Alternatives evaluation

3.2.2 Build Alternatives

As shown on Exhibit 3.2-4, all Build Alternatives retain the existing half diamond configuration at the Michigan Avenue junction, while flattening the Oak Street curves along the Outer Drive and increasing the design speed to a consistent 45 mph*. In addition, all Build Alternatives include shoreline protection features to prevent wave overtopping and Lakefront Trail improvements.

The analysis area for each junction alternative (e.g., green space, cost) is also shown on Exhibit 3.2-4. The following is a summary of each alternative considered:

CTT Alternative 1 – Corridor Modernization Alternative

Alternative 1 includes the flattening of the Oak Street Curve and a shift of the Outer Drive east, creating additional green space between Inner and Outer Drive. The Outer Drive would be depressed through the Oak Street Curve to accommodate an at-grade shared-use bridge to the Oak Street Beach. Both the northbound entrance ramp and southbound exit ramp would be placed into tunnels to cross the Inner and Outer Drive. A bike/pedestrian overpass is proposed at the Oak Street curve and a bike/pedestrian underpass would be located at Banks Street.

CTT Alternative 2 – Compressed Roadway Alternative

Alternative 2 includes the flattening of the Oak Street Curve, and the reconstruction of the Outer Drive. The north leg of the Michigan/Oak intersection would be reconfigured to include only movements to and from the Outer Drive. The Inner Drive would continue east and create a new signalized intersection with an extended Oak Street. The Outer Drive is at-grade and a pedestrian underpass is proposed to cross both the Inner and Outer Drives. Both the northbound entrance ramp and southbound exit ramp would be placed into tunnels to cross the Outer and Inner Drive. A bike/pedestrian underpass is proposed at the Oak Street curve, and a bike/pedestrian underpass would be located at Banks Street. The Banks Street underpass ramps would require closing a one block section of Banks Street to vehicular traffic.

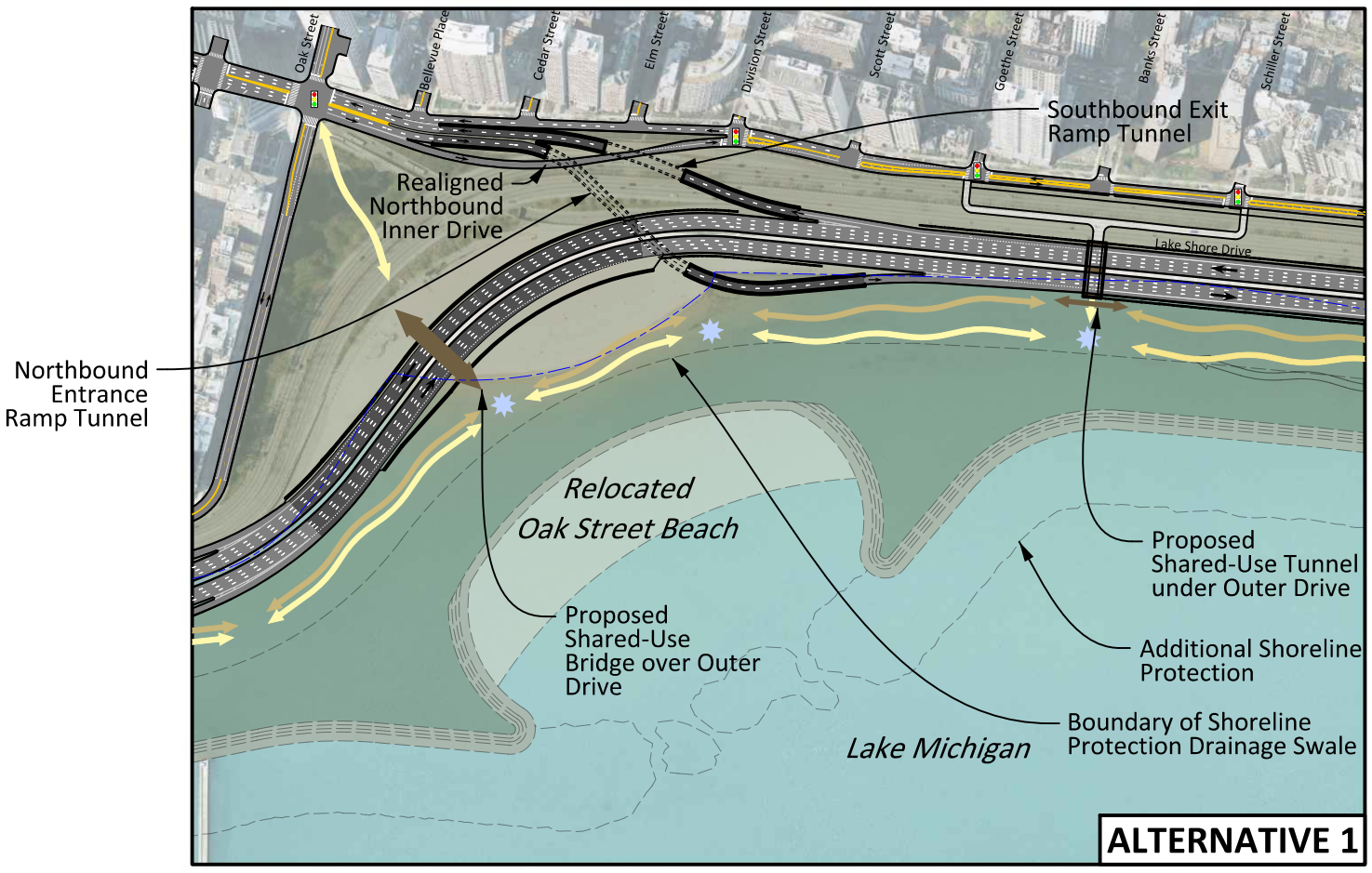
CTT Alternative 3 - Frontage Drive Alternative (Frontage Drives not provided at this location)

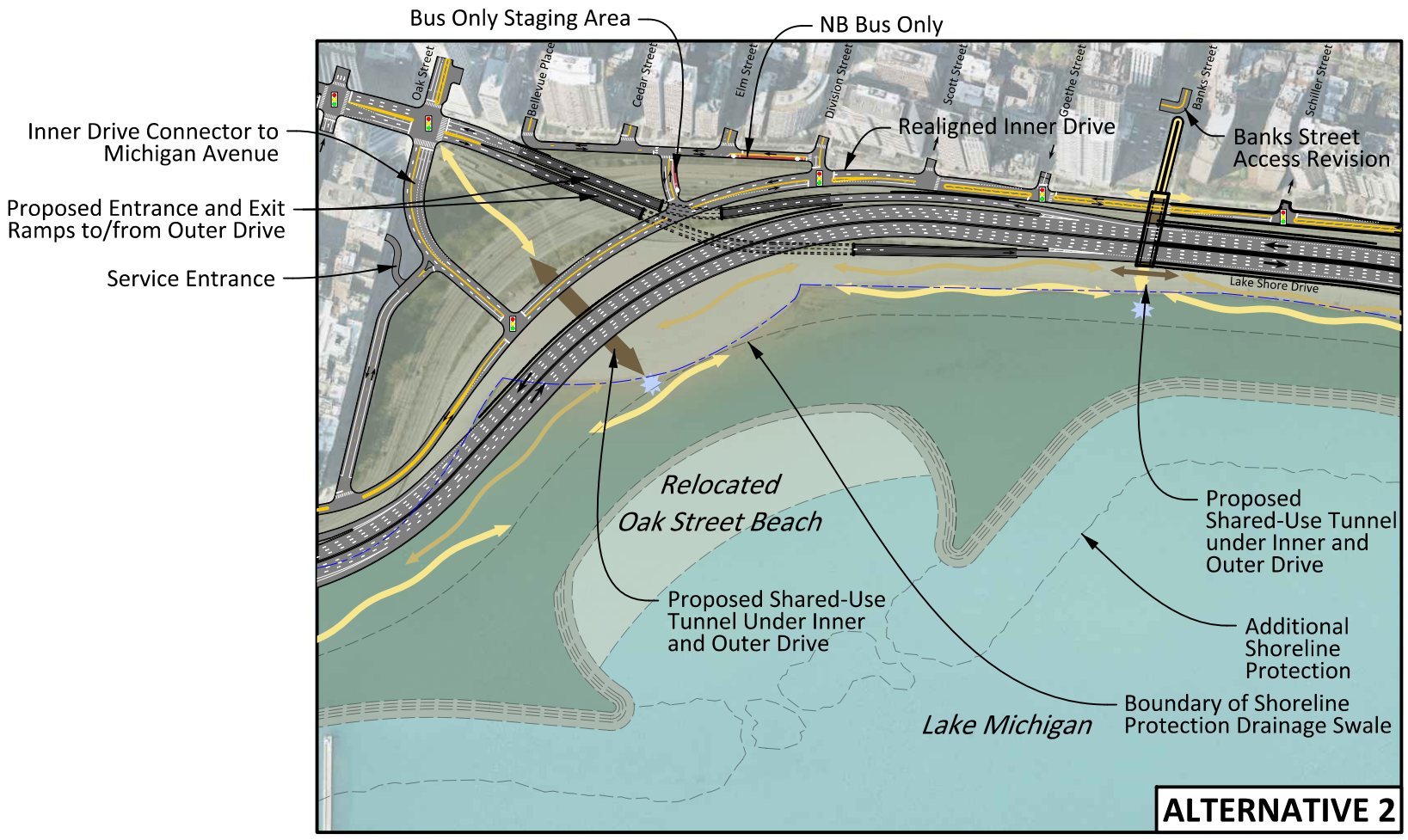
Alternative 3 includes the flattening of the Oak Street Curve, and a shift of the Outer Drive east to provide additional space for geometric improvements, which will also create additional green space between the Inner and Outer Drive. The Inner Drive would be widened to include a center turn lane. The Outer Drive is depressed through the first/southern curve at Oak Street, and transitions to the existing grade to the north. Both the northbound entrance ramp and southbound exit ramp would be placed into tunnels to cross Outer and Inner Drive. Bike/Pedestrian overpasses are proposed at the Oak Street curve, Division Street, and Schiller Street.

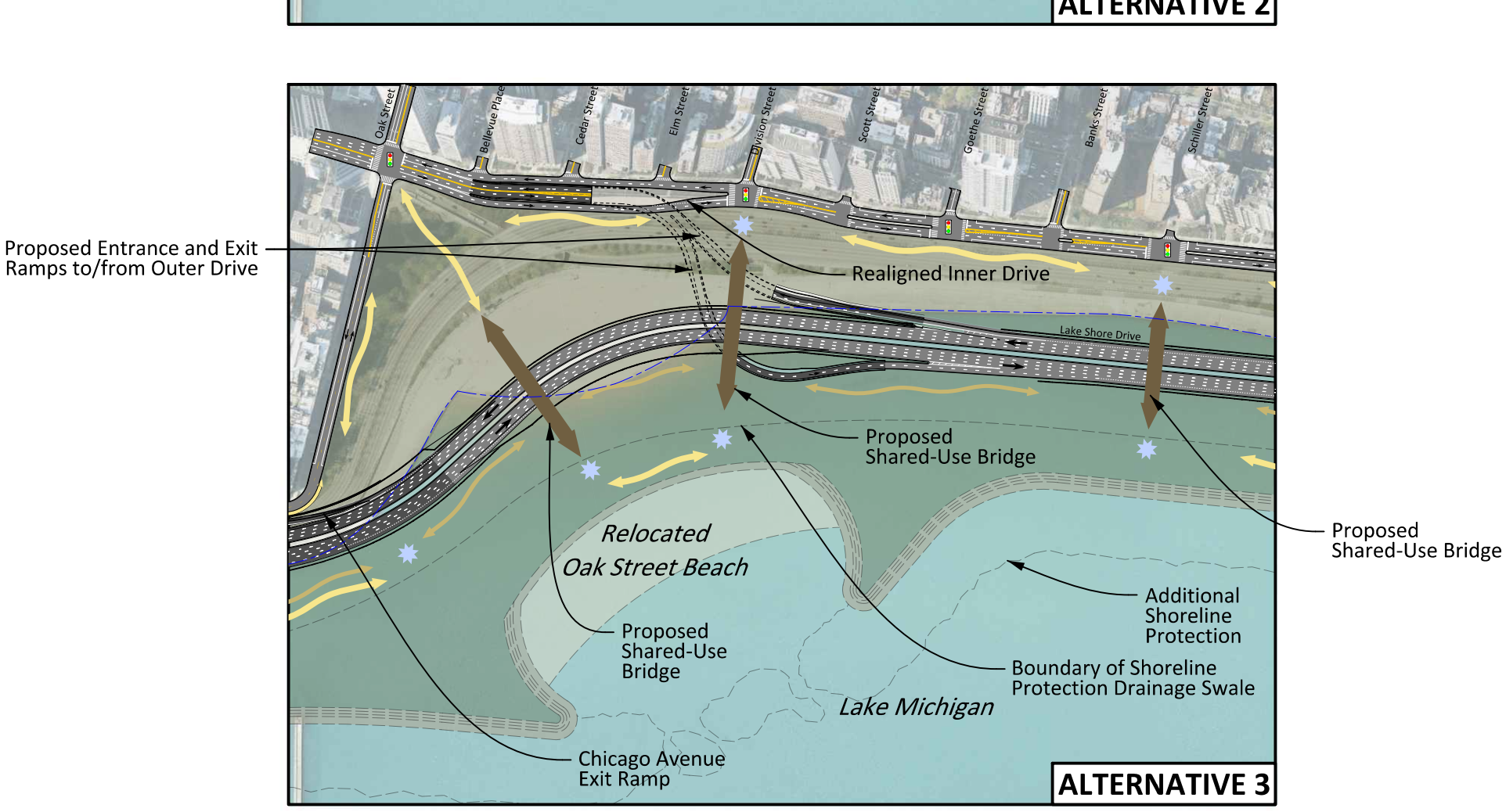
The Inner Drive is widened to provide two lanes in each direction with a painted median.

**Standard engineering practice includes designing a roadway for 5 mph over the current posted speed. Therefore, although the design speed is 45 mph, the 40 mph speed on the Outer Drive would not be changed.*

Exhibit 3.2-4: Michigan Avenue Junction Alternatives







LEGEND

Below Grade / At Grade / Above Grade
- Roadway Facility
- Bus-Only Facility
- Bridges and Tunnels
- Potential Green Space
- Potential Relocated/New Beach
- One-Way Street
- Two-Way Street
- Traffic Signal
- Existing Shoreline
- Proposed Shoreline
- Lower Speed Trail
- Higher Speed Trail
- Higher Speed/Lower Speed Trail Junction
- Pedestrian/Bike Bridges and Underpasses

3.2.3 Alternatives Evaluation

The alternatives were evaluated utilizing a variety of factors, including travel performance, safety, park access and circulation, green space, transit access and circulation, visual effects, cost/constructability, and stakeholder input.

Traffic Operations

Intersection Level of Service (LOS)

As shown in Exhibit 3.2-5, Alternatives 1 and 3 provide an acceptable overall LOS and improve capacity over the No Action alternative. Alternative 2 has a poor LOS at the Michigan/Oak Street intersection.

At the Michigan Avenue at Oak Street intersection, there are two separate signal operations for the No Action Alternative:

- A signal for the Michigan Avenue/Inner Drive/Oak Street movements.
- A signal for the Michigan Avenue/northbound Inner Drive ramps/Oak Street movements.

Exhibit 3.2-5: 2040 Intersection Level of Service								
Intersection	**2040 No Action**		**CTT Alt 1**		**CTT Alt 2**		**CTT Alt 3**	
	A.M.	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**
Michigan Avenue at Oak Street	B[1]/C[2]	B[1]/F[2]	C	C	D	E	C	C
Inner Drive at Division Street	A	B	B	A	A	B	B	A
Inner Drive at Oak Street	NA	NA	NA	NA	A	B	NA	NA

[1]Michigan Avenue/Inner Drive/Oak Street
[2]Michigan Avenue/northbound Outer Drive ramps/Oak Street

Overall Network Performance

- As shown in Exhibit 3.2-6, all Build Alternatives improve conditions over the No-Action Alternative.
- Alternatives 1 and 3 perform relatively better than Alternative 2.

Exhibit 3.2-6: 2040 Network Performance								
	2040 No Action		**CTT Alt 1**		**CTT Alt 2**		**CTT Alt 3**	
	A.M.	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**
Total Delay (hrs)	45	112	31	53	44	90	26	44
Total Travel Time (hrs)	241	332	186	226	200	279	181	217

Mainline Level of Service

- As shown in Exhibit 3.2-7, all Build Alternatives provide similar mainline LOS performance.
- It should be noted that due to constraints (Historic Lincoln Park), substantial additional capacity improvements are not being considered on the Outer Drive. However, design refinements will be explored to optimize performance using updated traffic information in future rounds of evaluation.

Exhibit 3.2-7: 2040 NLSD Level of Service								
Outer Drive Section	No Action*		CTT Alt 1		CTT Alt 2		CTT Alt 3	
			A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Northbound Mainline Segment			C	D	C	D	C	D
Northbound Weave (Michigan to LaSalle)			C	F	C	F	C	F
Southbound Weave (LaSalle to Michigan)			F	C	E	C	E	C
Southbound Mainline Segment			D	C	D	C	D	C

*The HCM software does not fully capture existing and 2040 No Action conditions. The No Action comparison will be made at the corridor level, after assembling the Top Performing CTT Alternative.

Safety

- All Build Alternatives add a clear zone along the Outer Drive.
- All Build Alternatives flatten the Oak Street curves on the Outer Drive and provide consistent lane widths (11 feet), which will reduce or eliminate the variability in speeds and improve safety along Outer Drive. This improvement would enhance safety performance by meeting driver expectations and reduce the potential for fixed object crashes.
- All Build Alternatives will improve bicycle and pedestrian safety by providing upgraded facilities.

Park Access and Circulation

- All Build Alternatives will improve park access and circulation by providing separate bike and pedestrian paths along the lakefront, and by providing ADA accessible bike/pedestrian underpasses and/or overpasses.
- Park access and circulation will be improved by providing wider bike/pedestrian structures that will accommodate the current and future levels of daily bike/pedestrian volumes.
- Alternatives 1 and 2 provide two bike/pedestrian crossings for Lakefront access; Alternative 3 includes three crossings.

Green Space

- As shown in Exhibit 3.2-8, all alternatives create additional green space.
- Alternative 3 has the largest increase in green space as it has the largest separation between the Inner and Outer Drive.
- Alternative 2 creates the relative least amount of green space. The additional green space between the Inner and Outer Drive is also fragmented by the extension of the Inner Drive.

Exhibit 3.2-8: Net Green Space (rounded to nearest acre)				
	2040 No Action	CTT Alt 1	CTT Alt 2	CTT Alt 3
Green Space (ac)	N/A	+30	+27	+32

Transit Access and Circulation

- All Build Alternatives will improve circulation by adding a bus turnaround/layover facility on the Inner Drive just north of the Michigan/Oak intersection.
- All Build Alternatives will relocate the existing northbound bus stop at the Michigan/Oak intersection from the median to the curb side, improving access and boarding.

Visual Effects

- All alternatives improve the views from the urban edge and the park by creating additional park space along the shoreline and along the Oak Street Curve.
- Alternative 1 improves the views the most from the urban edge and the park by depressing portions of the Outer Drive along the Oak Street Curve and keeping the bike/pedestrian crossings at or below grade. The view for Outer Drive users is diminished by lowering a portion of the Outer Drive.
- Alternative 2 views are similar to existing conditions based upon the improved views from the new park space being offset by the fragmenting of that park space with the extension of Inner Drive to the east. Alternative 2 also does not create green space between Inner and Outer Drive north of the Oak Street curve.
- Alternative 3 provides improved views from the urban edge and the park as a result of the extensive green space added along the Inner and Outer Drives; these same views are somewhat diminished by the three bike/pedestrian overpasses in this section of the project. The view for Outer Drive users is somewhat diminished by the lowering of the Outer Drive at the south portion of the Oak/Michigan junction area.

Cost/Constructability

- As shown in Exhibit 3.2-9, Alternative 1 has the relative lowest cost.
- Alternatives 2 and 3 have relatively higher costs, which are associated with the more extensive level of Inner Drive improvements for both alternatives, and additional Shoreline protection/lake fill associated with Alternative 3.
- Alternative 2 is relatively less constructible due to the proximity of the existing and proposed Outer Drive alignments, which hinders staged construction, specifically the ability to maintain traffic on the existing lanes during construction.
- Alternatives 1 and 3 are relatively more constructible due to the extent of the proposed Outer Drive that is on new alignment, which can more readily allow for staged construction.

Exhibit 3.2-9: Construction Cost				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Total Cost (2017 $)	N/A	$462M	$516M	$524M

Stakeholder Input

- Stakeholders expressed concern with the large pump station needed to drain the depressed portion of the Outer Drive. Noise and visual impacts associated with the pump station were noted.
- There was mixed support for depressing Outer Drive. Some stakeholders thought the view from the Outer Drive was important to the overall experience of driving along the Outer Drive. Other stakeholders thought depressing the Outer Drive improved views from the urban edge.
- Stakeholders expressed support for additional green space created by the separation of the Inner and Outer Drive.
- Stakeholders expressed concern with widening the Inner Drive and potentially increasing traffic volumes along the local network.
- Alternative 1 was the consensus choice of the Project Study Group.

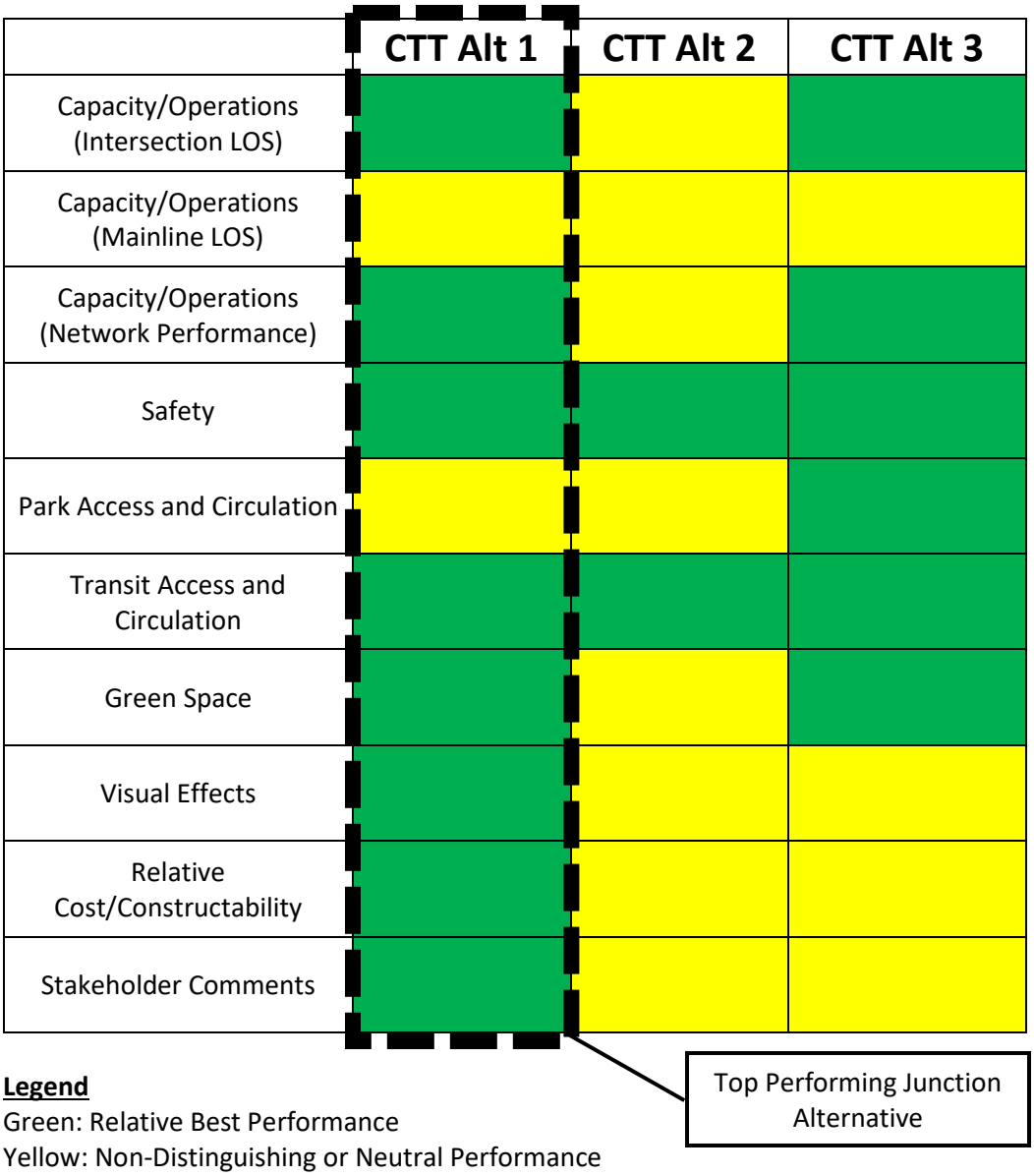
3.2.4 Conclusions

The following is an overall summary of the evaluation results:

- Alternatives 1 and 3 provide the relative best intersection LOS and network performance.
- All Build Alternatives provide similar mainline LOS performance.
- All Build Alternatives provide similar safety performance.
- All Build Alternatives improve park access and circulation by providing ADA accessible crossings of the Outer Drive; Alternative 3 provides the relative most crossings.
- All Build Alternatives provide similar transit access and circulation performance.
- Alternatives 1 and 3 provide the relative most additional green space.
- Alternative 1 has slightly better performance in terms of visual effects.
- Alternative 1 has the relative lowest cost.
- Alternatives 1 and 3 are relatively more constructible since portions of the Outer Drive are on new alignment, which could better facilitate staged construction.
- Alternative 1, with refinements, best reflects stakeholder comments.
- Alternative 1 was the consensus choice of the PSG.

Exhibit 3.2-10 summarizes the ratings for CTT Junction Alternatives 1, 2 and 3, and is a relative comparison of Build Alternatives. Once the overall Top Performing CTT Corridor Alternative is assembled, a comparison to the No Action Alternative, based upon travel performance, will be made, as summarized in section 1.3.3 of this Appendix.

Exhibit 3.2-10: Context Tailored Treatment Evaluation
Oak Avenue/Michigan Ave Junction



Legend
Green: Relative Best Performance
Yellow: Non-Distinguishing or Neutral Performance
Red: Relative Worst Performance

Alternative 1 is recommended because it improves mobility, safety, and park access/circulation, creates additional green space along the Inner and Outer Drive, and best balances the visual impacts from the urban edge, Outer Drive and the park. Based on stakeholder feedback, maintaining the Outer Drive at existing grade (or only slightly depressed) through the Oak Street curve will be incorporated into the Alternative 1 design. This alternative is subject to further refinement as the evaluation and coordination process advances.

3.3 LaSalle Drive Junction

3.3.1 Current and 2040 No Action Conditions

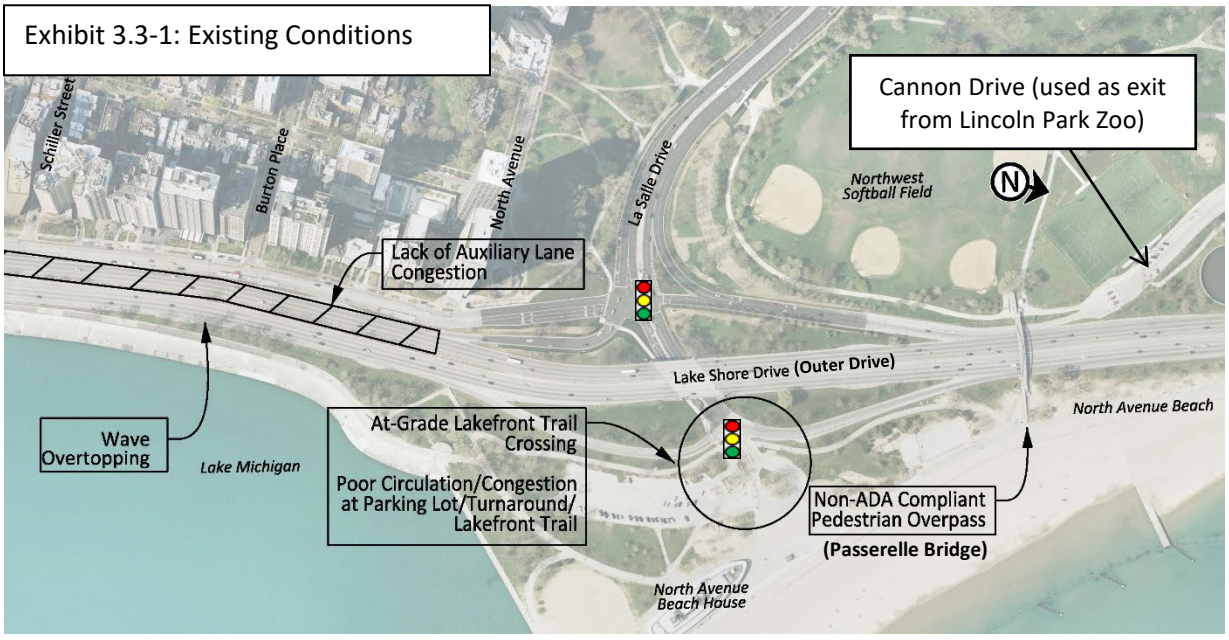
General

LaSalle Drive is an east-west other principal arterial where it meets North Lake Shore Drive (Outer Drive) and is under the jurisdiction of IDOT. The 2015 ADT of LaSalle Drive is approximately 30,400 vpd. The typical section of LaSalle Drive (near the junction) consists of two 11' lanes in each direction with an 11' westbound left turn lane, bound by B-6.12 curb and gutter. The LaSalle Drive/Outer Drive junction is grade separated in a diamond configuration. Beyond the immediate junction area, LaSalle Drive widens to 3 lanes in each direction with multiple auxiliary lanes.

The ramp intersections are signalized; the southbound exit ramp includes traffic from Cannon Drive, which is the exit for Lincoln Park Zoo. The northbound exit/entrance ramp signal includes access to the North Avenue Beach parking lot at the east leg.

Bicycle and pedestrian travel along LaSalle Drive is substantial, with a daily volume of up to 920 bikes/pedestrians using LaSalle Drive to access the lakefront and the trail system. The majority of bikes/pedestrians utilize an underpass just south of LaSalle Drive (3,460) and the Passerelle bridge to the north (5,390). Exhibit 3.3-1 depicts existing conditions at the LaSalle Drive junction.

Exhibit 3.3-1: Existing Conditions



LaSalle Drive crosses underneath the Outer Drive at approximately a 55 degree skew, which requires relatively more time (compared to the desired 90 degree intersection angle) for pedestrians and vehicles to navigate, due to the additional pavement area. The skewed design also creates sight distance concerns for vehicles. The section of the Outer Drive south of LaSalle Drive has minimal separation from Lake Michigan and experiences wave overtopping during storm events.

The section of the Outer Drive north of LaSalle Drive includes the Passerelle Bridge, which is a dedicated east-west bicycle/pedestrian overpass. The size of this structure, however, does not adequately accommodate the current demand, and it is not ADA accessible.

Capacity/Operations (2040 No Action)

This section of the Outer Drive is within the most heavily traveled section with a volume of 155,000 vehicles per day. The A.M. peak hour volumes approach 9,000 vehicles per hour in the southbound direction. There is no southbound auxiliary lane between LaSalle Drive and Michigan Avenue. The Outer Drive and southbound entrance ramp operate at LOS E and F in the morning and evening peak hours respectively. The eastern ramp intersection at LaSalle Drive also operates at LOS F in the P.M. peak hour.

Safety

The LaSalle Drive junction experienced a total of 540 crashes (129 injury, 1 fatal) between 2007 and 2011, predominantly under dry, daytime conditions (see Exhibit 3.3-2). Along the Outer Drive, the predominant crash types were rear end, sideswipe and fixed object. The rear end and sideswipe crashes were likely caused by congested conditions, especially related to northbound vehicles queued at the ramp signal, southbound vehicles unable to safely merge into the southbound mainline traffic flow, and southbound spill back congestion from Chicago Avenue and the Oak Street curve. The majority of the fixed object crashes occurred in the southbound direction on the Outer Drive, which could be attributed to the combined horizontal and vertical curvature, which reduces sight distance along the Outer Drive just south of LaSalle Drive.

A total of 8 bike/pedestrian crashes were recorded during the study period. Although the number of crashes was relatively small, a majority of the crashes resulted in an injury, which indicates that bike/pedestrian safety is a concern, regardless of the number of crashes. In addition, given the level of bike/pedestrian usage, further enhancing bike/pedestrian safety is a priority.

Exhibit 3.3-2
Crash Summary (2006-2011)*
LaSalle Drive Junction

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	0	0	1	3	21	25
Left Turn	0	0	1	0	7	8
Rear End	0	3	18	19	201	241
Sideswipe	0	3	5	7	107	122
Pedestrian/Bike	0	1	3	3	1	8
Off Rd. Fixed Obj.	0	3	20	12	79	114
Other	1	1	4	1	15	22
Total	1	11	52	45	431	540

Year	
2007	124
2008	129
2009	100
2010	93
2011	94

Pavement Condition	
Dry	352
Wet	149
Icy	39

Time of Day	
Day	361
Night	179

*Crash analysis will be updated for the Level 3/DEIS Alternatives evaluation

3.3.2 Build Alternatives

The Build Alternatives at LaSalle Drive as well as the analysis area (e.g., green space, cost) for each junction alternative is shown on Exhibit 3.3-3.

The following is a summary of the features common to all LaSalle Drive junction alternatives:

- LaSalle Drive is realigned at the Outer Drive to create a perpendicular crossing.
- Auxiliary lanes between LaSalle Drive and Michigan Avenue, and between LaSalle Drive and Fullerton Avenue.
- Shoreline protection features are included to prevent wave overtopping.
- Lakefront Trail improvements are included as well as east-west bike/pedestrian crossings at 3 locations.
- The North Avenue Beach parking is relocated, which will reduce congestion at the east leg of the junction, improving bus access to North Avenue Beach.
- A bus turnaround/layover facility is provided beneath the Outer Drive, adjacent to LaSalle Drive.

The following is a summary of each alternative considered:

CTT Alternative 1 – Corridor Modernization Alternative

The Corridor Modernization Alternative includes retaining the existing diamond junction layout and shifting the Outer Drive east. The eastward shift creates additional space for geometric improvements as well as additional green space between the Inner and Outer Drive south of LaSalle Drive.

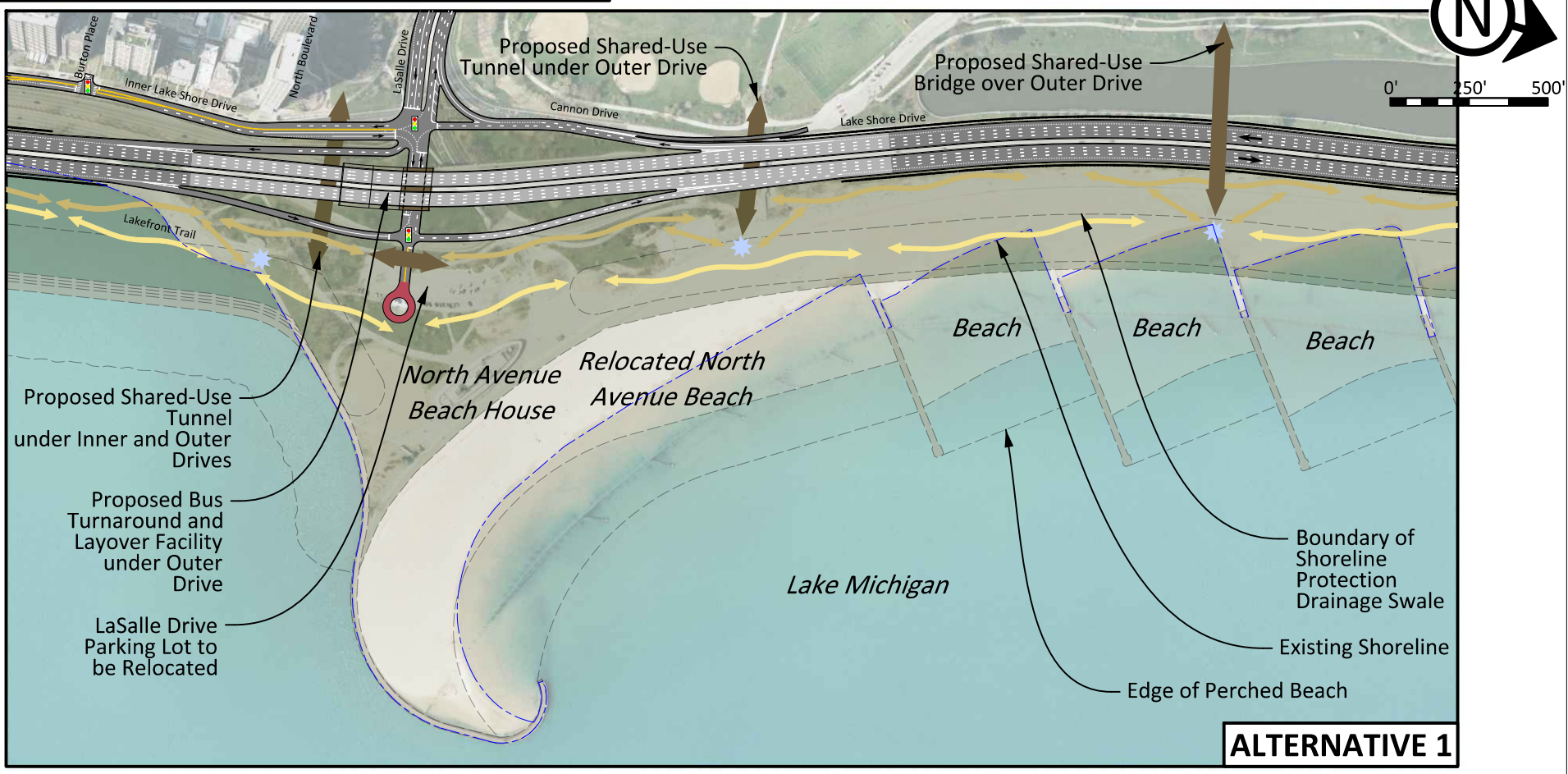
CTT Alternative 2 – Compressed Roadway Alternative

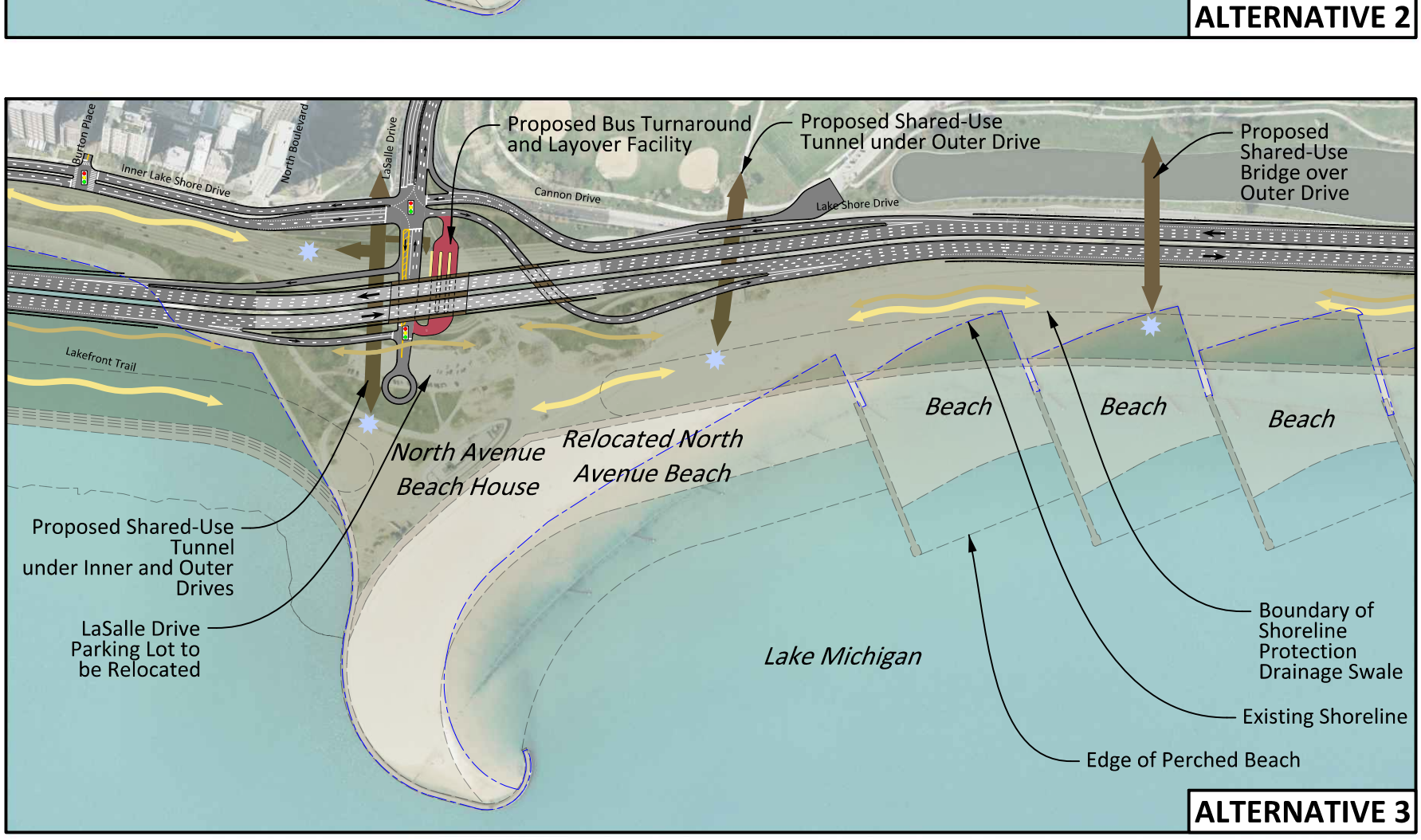
The Compressed Roadway Alternative retains the existing diamond junction layout. However, the footprint is compressed by using retaining walls and moving the ramps closer to the Outer Drive. Alternative 2 includes a relatively smaller shift of the Outer Drive to the east.

CTT Alternative 3 - Frontage Drive Alternative (Frontage Drives are not provided at this location)

The Frontage Drive Alternative retains the existing full access junction, but offsets the northbound and southbound ramps, which requires a relatively larger shift of the Outer Drive to the east. This larger shift to the east also creates relatively more green space between the Inner and Outer Drive, south of LaSalle Drive.

Exhibit 3.3-3: LaSalle Drive Junction Alternatives





REDEFINE THE DRIVE
NORTH LAKE SHORE DRIVE

LEGEND

Below Grade / At Grade / Above Grade
- Roadway Facility
- Bus-Only Facility
- Bridges and Tunnels
- Potential Green Space
- Potential Relocated/New Beach
- One-Way Street
- Two-Way Street
- Traffic Signal
- Existing Shoreline
- Proposed Shoreline
- Lower Speed Trail
- Higher Speed Trail
- Higher Speed/Lower Speed Trail Junction
- Pedestrian/Bike Bridges and Underpasses

3.3.3 Alternatives Evaluation

The alternatives were evaluated utilizing a variety of factors including travel performance, safety, park access and circulation, green space, transit access and circulation, visual effects, cost/constructability, and stakeholder input.

Traffic Operations

Intersection Level of Service (LOS)

- As shown in Exhibit 3.3-4, all Build Alternatives provide an acceptable overall LOS.
- Alternative 3 provides relatively better operations at the LaSalle/NB Exit Ramp intersection as a result of the offset ramp configuration, which distributes ramp traffic to separate intersections.

Exhibit 3.3-4: 2040 Intersection Level of Service

Intersection	2040 No Action		CTT Alt 1		CTT Alt 2		CTT Alt 3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
LaSalle Drive at Inner Drive/SB Ramps	C	C	C	C	C	C	C	C
Outer Drive at NB Ramps	C	F	C	C	C	D	A	B

Mainline Level of Service

- As shown in Exhibit 3.3-5, the Build Alternatives provide similar mainline LOS performance.
- It should be noted that due to constraints (Historic Lincoln Park), substantial additional capacity improvements are not being considered on the Outer Drive. However, design refinements will be explored to optimize performance using updated traffic information in future rounds of evaluation.

Exhibit 3.3-5: 2040 NLSD Level of Service

Outer Drive Section	No Action*		CTT Alt 1		CTT Alt 2		CTT Alt 3	
			A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Northbound Weave (Michigan to LaSalle)			C	F	C	F	C	F
Northbound Mainline Segment			C	D	C	D	C	D
Northbound Merge (LaSalle Entrance)			B	D	B	D	C	F
Southbound Diverge (LaSalle Exit)			E	C	F	D	F	D
Southbound Mainline Segment			E	C	D	C	D	C
Southbound Weave (LaSalle to Michigan			F	C	E	C	E	C

*The HCM software does not fully capture existing and 2040 No Action conditions. The No Action comparison will be made at the corridor level, after assembling the Top Performing CTT Alternative.

Overall Network Performance

As shown in Exhibit 3.3-6, all Build Alternatives improve performance over the No Action, with Alternative 3 performing slightly better.

Exhibit 3.3-6: 2040 Network Performance								
	2040 No Action		**CTT Alt 1**		**CTT Alt 2**		**CTT Alt 3**	
	A.M.	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**
Total Delay (hrs)	36	72	23	45	23	48	21	35
Total Travel Time (hrs)	218	267	212	225	212	227	209	211

Safety

- All Build Alternatives add a clear zone along the Outer Drive, which will provide similar safety benefits for all alternatives.
- All Build Alternatives include northbound and southbound auxiliary lanes between LaSalle Drive and Michigan Avenue which will improve merging and weaving operations.
- All Build Alternatives provide similar bicycle and pedestrian safety. The same Lakefront Trail improvements and proposed bike/pedestrian crossings are included with each alternative.

Park Access and Circulation

- All Build Alternatives will improve park access and circulation by providing improved crossings and Lakefront Trail improvements.
- All Build Alternatives improve safety for vehicles exiting the Lincoln Park Zoo at Cannon Drive by eliminating the short weave section along the Outer Drive.

Transit Access and Circulation

- All build Alternatives will improve transit access and circulation by providing an expanded bus turnaround/layover facility beneath the Outer Drive.

Green Space

- As shown in Exhibit 3.3-7, all alternatives create additional green space along the Inner and Outer Drive.
- Alternative 3 has the largest gain in green space as it has the largest separation between the Inner and Outer Drive south of LaSalle Drive.
- The compressed footprint included with Alternative 2 creates the least amount of green space.

Exhibit 3.3-7: Net Green Space (rounded to nearest acre)				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Green Space (ac)	NA	+19	+18	+24

Visual Effects

- All Build Alternatives improve the view from the park by creating additional green space along the shoreline.
- Alternative 1 has views similar to existing conditions north of LaSalle Drive, and improved views from the park, Outer Drive and the urban edge south of LaSalle Drive due to the additional green space created along both the Inner and the Outer Drive.
- Alternative 2 has views from the urban edge that are similar to existing conditions. Additional green space along the Lakefront somewhat improves views from the Outer Drive and the park.
- Alternative 3 improves the views from the urban edge and park by creating additional green space south of LaSalle Drive; this is offset by the wider footprint of the proposed junction north of LaSalle Drive.

Cost/Constructability

- As shown in Exhibit 3.3-8, Alternative 1 has the relative lowest cost, and alternative 3 has the relative highest cost.
- Alternative 2 has higher costs associated with the retaining walls needed to compress the footprint, as compared to Alternative 1.
- Alternative 1 would be the relative most constructible due to its less complex design; Alternative 3 would be the relative least constructible due to its more complex design.

Exhibit 3.3-8: Construction Cost				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Total Cost (2017 $)	NA	$444M	$497M	$580M

Stakeholder Input

- Stakeholders expressed support for additional green space created by the separation of Inner and Outer drive and providing a landscaped median south of LaSalle Drive.
- Stakeholders expressed support for the expanded bus turnaround and did not want to see the amount of parking increased at North Avenue Beach.
- Alternative 1 was the consensus choice of the Project Study Group.

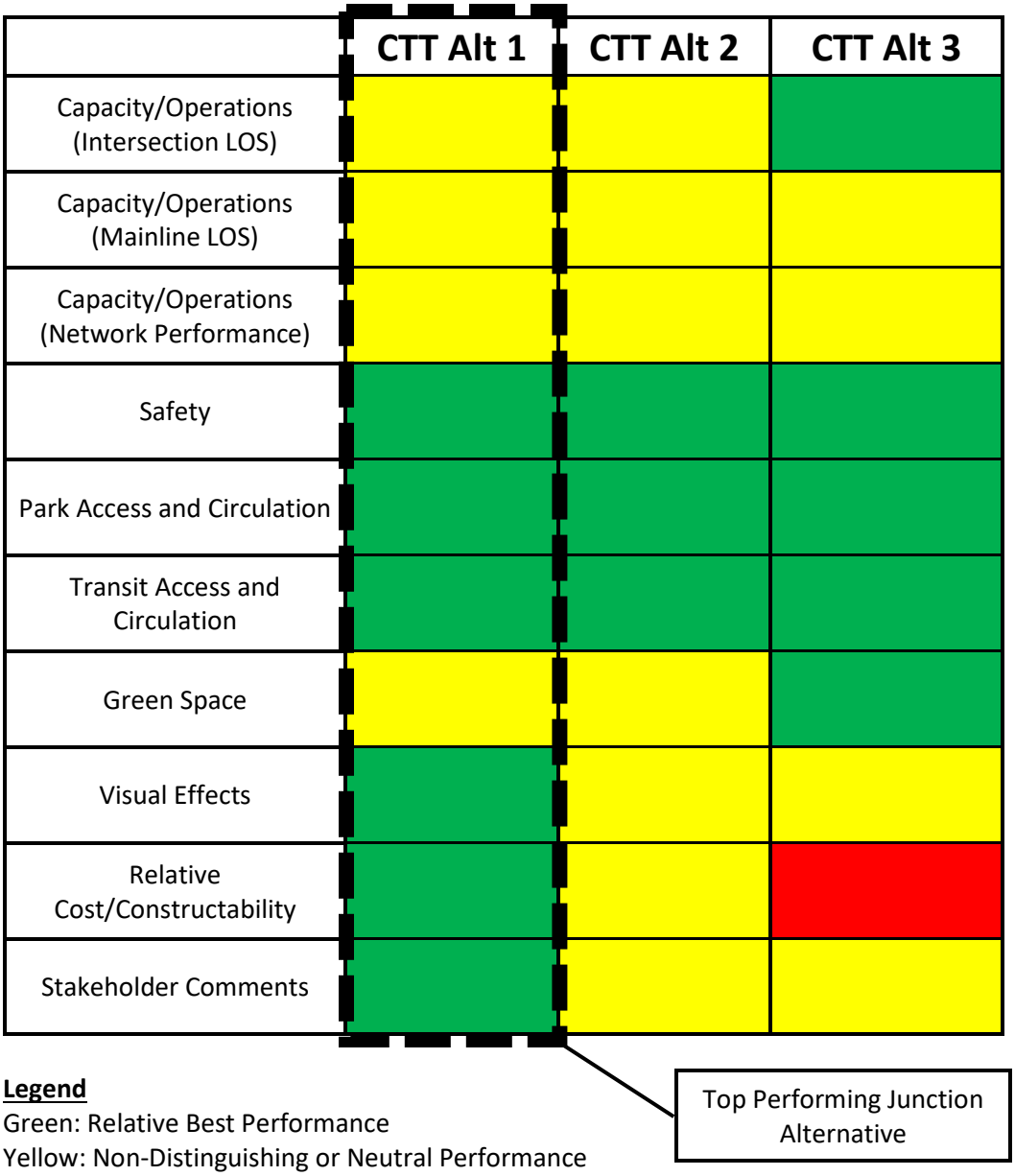
3.3.4 Conclusions

The following is an overall summary of the evaluation results:

- All Build Alternatives provide similar mainline Outer Drive and network performance.
- Alternative 3 provides the relative best intersection LOS performance.
- All Build alternatives provide a similar level of safety performance.
- All Build Alternatives provide a similar level of improved park and transit access/circulation.
- Alternative 3 provides the largest amount of additional green space.
- Alternative 1 had the relative best performance for visual effects, had the relative lowest cost, and was the relative most constructible. Alternative 3 was the relative most costly and relative least constructible.
- Alternative 1 best reflects stakeholder comments and was also the consensus choice of the PSG.

Exhibit 3.3-9 summarizes the ratings for CTT Junction Alternatives 1, 2 and 3, and is a relative comparison of Build Alternatives. Once the overall Top Performing CTT Corridor Alternative is assembled, a comparison to the No Action Alternative, based upon travel performance, will be made, as summarized in section 1.3.3 of this Appendix.

Exhibit 3.3-9: Context Tailored Treatment Evaluation
LaSalle Drive Junction



Legend
Green: Relative Best Performance
Yellow: Non-Distinguishing or Neutral Performance
Red: Relative Worst Performance

Alternative 1 is recommended because it improves safety, park and transit access/circulation, has relatively less visual impacts, has the relative best cost/constructability performance, and best reflects stakeholder comments. This alternative is subject to further refinement as the evaluation and coordination process advances.

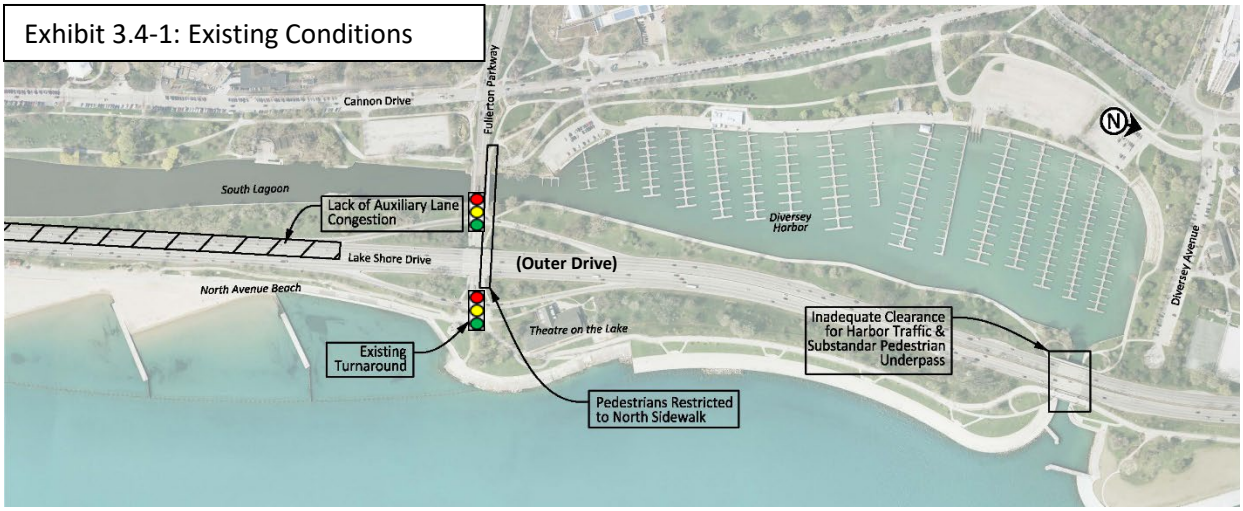
3.4 Fullerton Parkway Junction

3.4.1 Current and 2040 No Action Conditions

General

Fullerton Parkway is an east-west minor arterial where it meets North Lake Shore Drive (Outer Drive) and is under the jurisdiction of IDOT. The 2015 ADT of Fullerton Parkway is approximately 20,500 vpd. The typical section of Fullerton Parkway consists of two 11' lanes in each direction, bound by B-6.12 curb and gutter. The Fullerton Parkway junction with the Outer Drive is grade separated, in a diamond configuration. The ramp intersections are signalized; the northbound ramp signal includes access to a park district turnaround on the east leg. Bicycle and pedestrian travel along Fullerton Parkway is substantial, with up to 5,310 bikes/pedestrians using Fullerton Parkway each day to access the lakefront and the trail system. Bike/pedestrian accommodations are only provided along the north side of Fullerton Parkway (see Exhibit 3.4-1).

Exhibit 3.4-1: Existing Conditions



Capacity/Operations (2040 No Action)

The portion of the Outer Drive between Fullerton Parkway and LaSalle Drive is within the most heavily traveled section of the Outer Drive with a volume of 155,000 vehicles per day. The Fullerton Parkway southbound entrance ramp has the highest A.M. peak hour ramp volume in the study area. There is no southbound auxiliary lane between Fullerton Parkway and LaSalle Drive. The southbound ramp merge operates at LOS F due to the very high entering volume in the morning and the lack of an auxiliary lane.

During the AM peak hour, southbound congestion spills back away from the Chicago Avenue intersection, the Oak Street Curve area, and LaSalle Drive. In the P.M. peak hour, there is substantial congestion in the northbound direction as a result of congestion at the northbound Belmont Avenue exit ramp that spills back through the Fullerton Parkway junction.

Two CTA bus routes enter and leave this highly congested section of the Outer Drive (to and from the south) at this junction and must compete with other vehicles while entering the Outer Drive, increasing bus travel times and reducing transit reliability.

Safety

The portion of the Outer Drive from Fullerton Parkway to Belmont Avenue was designated a "5% location" which means that it is amongst the top 5% of priority locations for safety improvements. Overall, the Fullerton Parkway junction experienced a total of 455 crashes (80 injury, 0 fatal) between 2007 and 2011 predominantly under dry, daytime conditions (see Exhibit 3.4-2). Along the Outer Drive, the predominant crash types were rear end and sideswipe. The rear end and sideswipe crashes were likely caused by congested conditions, especially related to northbound vehicles queued from Belmont Avenue and southbound vehicles unable to safely merge into the southbound mainline traffic flow due to congestion spilling back from sections of the Outer Drive to the south.

The east leg of the Fullerton Parkway junction is a congested area for cyclists and pedestrians due to the relative lack of space between the Outer Drive and the lakefront. The Theater on the Lake is a prominent feature in this area, and although near term improvements have been made by the Chicago Park District to separate cyclists and pedestrians, additional improvements, such as grade separating the bike path, would further enhance safety.

A total of 4 bike/pedestrian crashes were recorded during the study period. Although the number of crashes was relatively small, all crashes resulted in an injury, which indicates that bike/pedestrian safety is a concern, regardless of the number of crashes. In addition, given the level of bike/pedestrian usage, further enhancing bike/pedestrian safety is a priority.

Exhibit 3.4-2: Crash Summary (2006-2011)*
Fullerton Parkway Junction

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	0	0	0	1	8	9
Left Turn	0	0	0	0	1	1
Rear End	0	7	21	26	214	268
Sideswipe	0	1	5	2	89	97
Pedestrian/Bike	0	1	3	0	0	4
Off Rd. Fixed Obj.	0	0	8	4	37	49
Other	0	1	0	0	26	27
Total	0	10	37	33	375	455

Year	
2007	101
2008	109
2009	71
2010	93
2011	81

Pavement Condition	
Dry	340
Wet	84
Icy	31

Time of Day	
Day	359
Night	96

*Crash analysis will be updated for the Level 3/DEIS Alternatives evaluation

3.4.2 Build Alternatives

CTT Alternatives 1, 2 and 3 as well as the analysis area (e.g. green space, cost, network performance) for each junction is shown on Exhibit 3.4-3. The following are features common to each alternative:

- Bus-only queue jump lanes and transit priority signals, as well as a bus turnaround facility on the east leg.
- Lakefront Trail improvements, which include an improved east-west access at Diversey Parkway.
- Northbound and southbound auxiliary lanes along the Outer Drive between LaSalle Drive and Fullerton Parkway.

The following is a summary of each alternative considered:

CTT Alternative 1 – Corridor Modernization Alternative

The Corridor Modernization Alternative retains the existing diamond junction configuration and further compresses the footprint with retaining walls to the north and the south of Fullerton Parkway.

A bike/pedestrian underpass is proposed south of Fullerton Parkway and at Diversey Parkway.

CTT Alternative 2 – Compressed Roadway Alternative

The Compressed Roadway Alternative is similar to Alternative 1, with retaining walls utilized to compress the footprint. Alternative 2 also eliminates the proposed landscaped median to further reduce the size of the roadway footprint.

A bike/pedestrian underpass is proposed south of Fullerton Parkway and at Diversey Parkway.

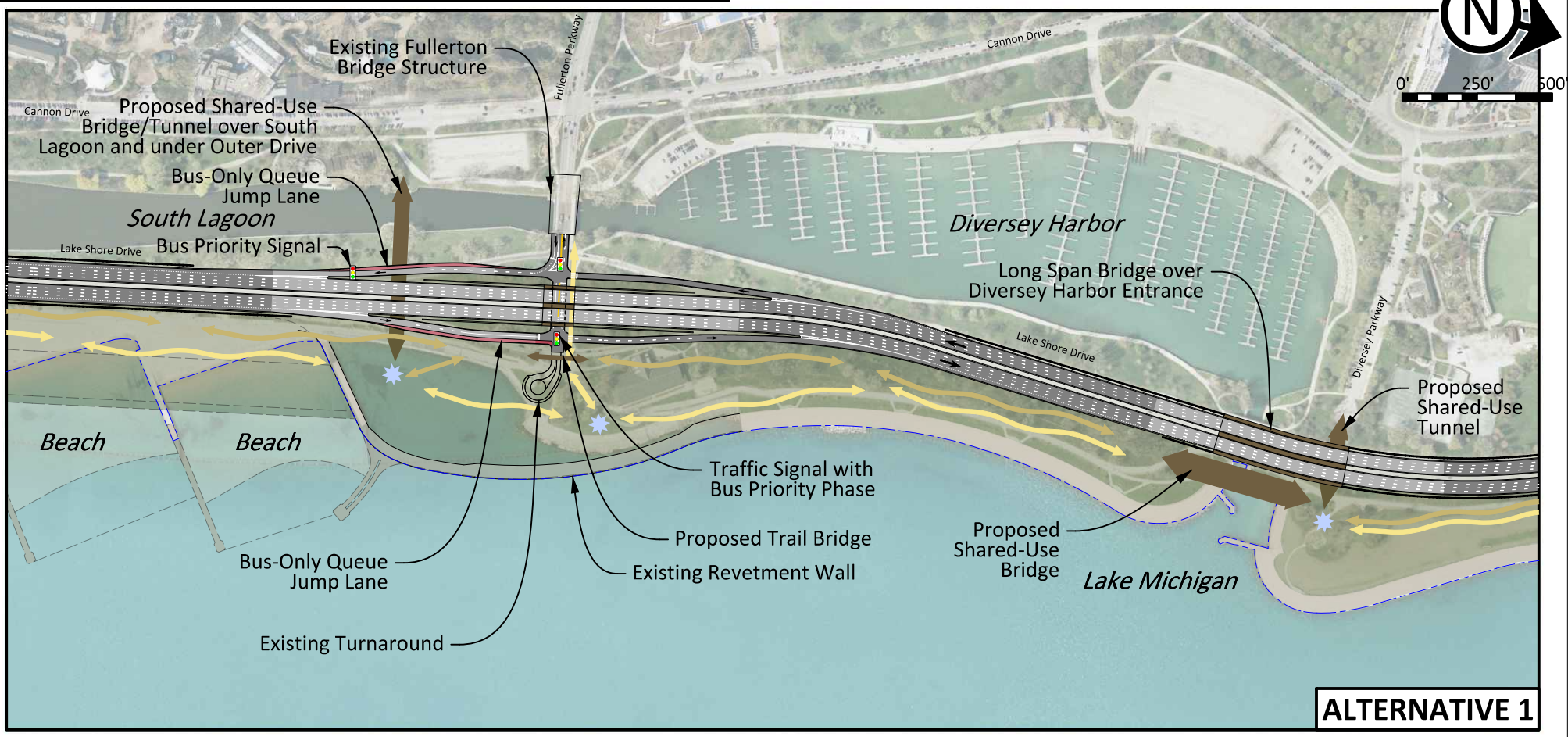
CTT Alternative 3 - Frontage Drive Alternative (Frontage Drives not provided at this location)

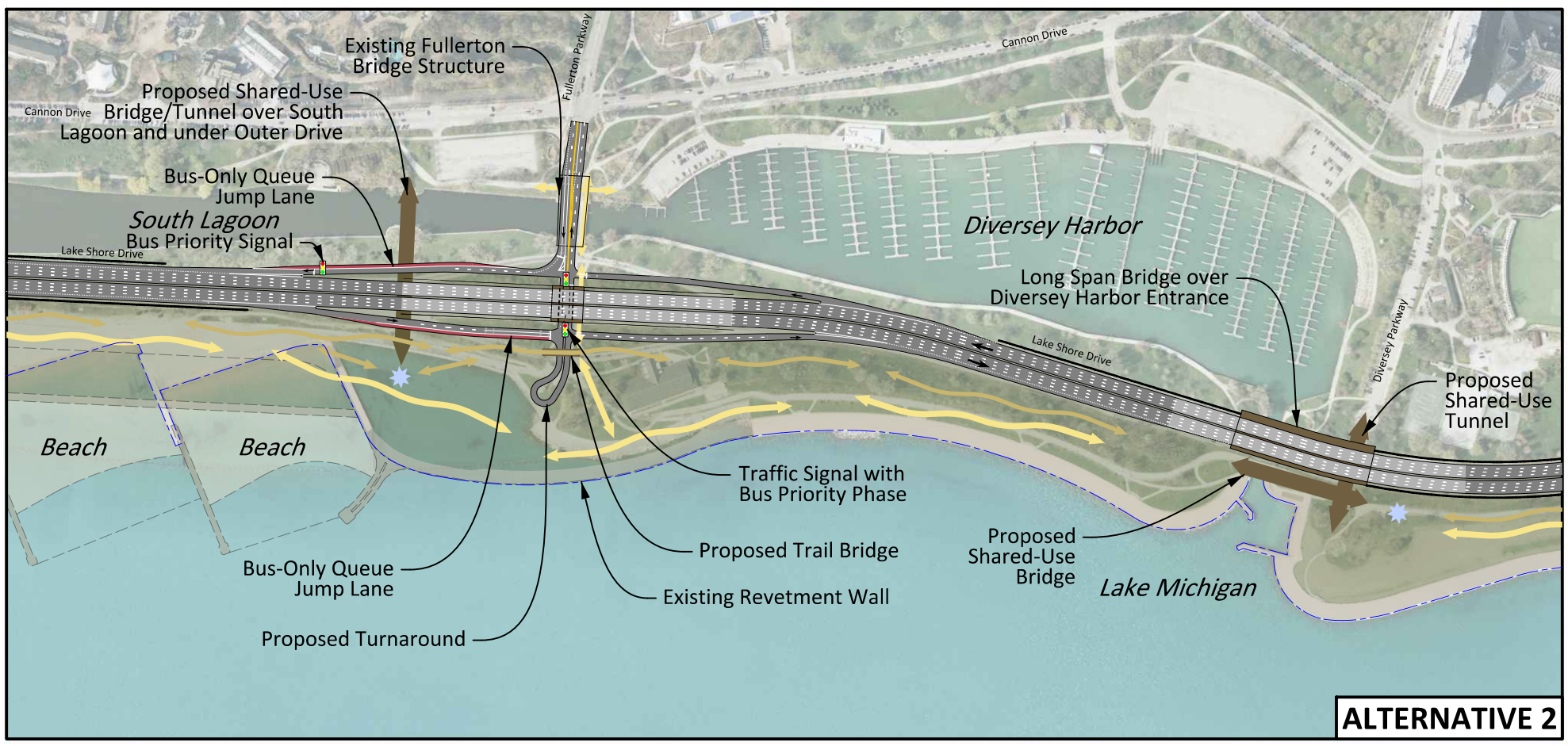
The Frontage Drive Alternative includes a split junction configuration that would create half-diamond junctions at Fullerton Parkway and at Diversey Parkway, which would serve to distribute traffic to/from the Outer Drive over a larger portion of the local arterial system.

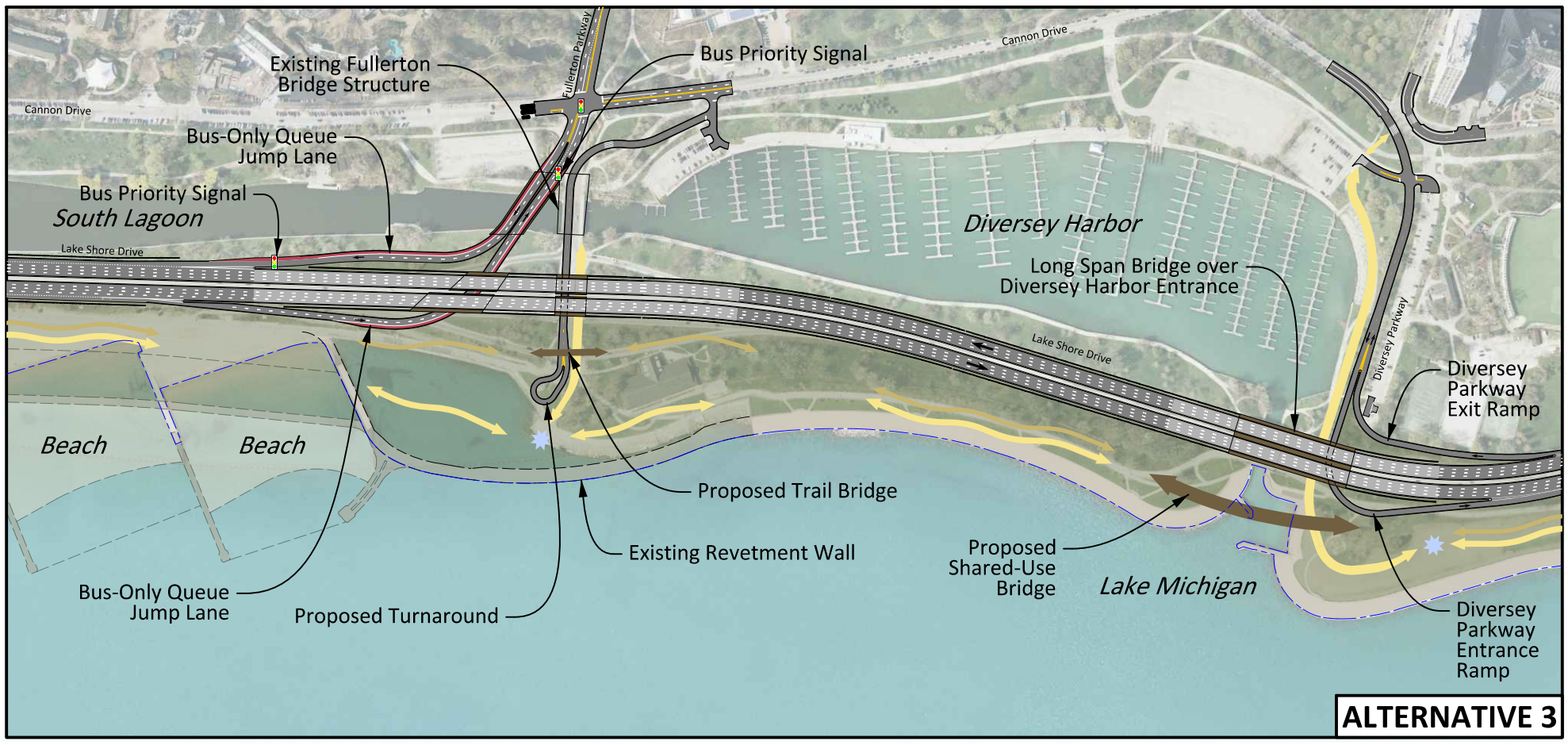
The ramps to and from the south at Fullerton Parkway would be realigned to provide more efficient access to Canon Drive and a separate access roadway would be provided for access between Cannon Drive and the Theater on the Lake (using the existing Fullerton Parkway Alignment).

Ramps to/from the north would be added at Diversey Parkway, with access reconfigured at the North Lakeshore Drive West intersection. Traffic to/from the new ramps would be directed to Cannon Drive, and access to North Lake Shore Drive West would be severed.

Exhibit 3.4-3: Fullerton Parkway Junction Alternatives







REDEFINE THE DRIVE
NORTH LAKE SHORE DRIVE

LEGEND

Below Grade / At Grade / Above Grade
- Roadway Facility
- Bus-Only Facility
- Bridges and Tunnels
- Potential Green Space
- Potential Relocated/New Beach
- One-Way Street
- Two-Way Street
- Traffic Signal
- Existing Shoreline
- Proposed Shoreline
- Lower Speed Trail
- Higher Speed Trail
- Higher Speed/Lower Speed Trail Junction
- Pedestrian/Bike Bridges and Underpasses

3.4.3 Alternatives Evaluation

The alternatives were evaluated utilizing a variety of factors including travel performance, safety, park access and circulation, green space, transit access and circulation, visual effects, cost/constructability, and stakeholder input.

Traffic Operations

Intersection Level of Service (LOS)

- As shown in Exhibit 3.4-4, Alternatives 1 and 2 provide a LOS similar to the No Action Alternative.
- Alternative 3 has the relative worst operations at the Fullerton Parkway/Cannon Drive intersection.

Exhibit 3.4-4: 2040 Intersection Level of Service

Intersection	2040 No Action		CTT Alt 1		CTT Alt 2		CTT Alt 3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Cannon Drive at Fullerton Parkway	C	B	C	B	C	B	D	C
Fullerton at SB Ramps	A	A	A	A	A	A		
Fullerton at NB Ramps	B	B	B	B	B	B		

Overall Network Performance

- As shown in Exhibit 3.4-5, Alternatives 1 and 2 perform the same.
- Alternative 3 has relatively more intersections and performs the relative worst.
- Alternative 3, which includes new access to the Outer Drive, would likely increase traffic along Canon Drive and Diversey Parkway and substantially change traffic patterns at the Fullerton Parkway/Canon Drive intersection.

Exhibit 3.4-5: 2040 Network Performance

	2040 No Action		CTT Alt 1		CTT Alt 2		CTT Alt 3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Total Delay (hrs)	21	21	23	23	23	23	34	22
Total Travel Time (hrs)	249	219	240	212	240	212	280	266

Mainline Level of Service

- As shown in Exhibit 3.4-6, Alternatives 1 and 2 provide similar performance.
- Alternative 3 had relative worst performance and creates a new, relatively short weave section between Diversey Parkway and Belmont Avenue, where congestion is already substantial.
- It should be noted that due to constraints (Historic Lincoln Park), substantial additional capacity improvements are not being considered on the Outer Drive. However, design refinements will be explored to optimize performance using updated traffic information in future rounds of evaluation.

Exhibit 3.4-6: 2040 NLSD Level of Service								
Outer Drive Section	No Action*		CTT Alt 1		CTT Alt 2		CTT Alt 3	
			A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Northbound Diverge (Fullerton Exit)			C	D	C	D		
Northbound Mainline Segment			C	D	C	D	C	D
Northbound Merge (Fullerton Entrance)			B	D	B	D	C	E
Northbound Mainline Segment			C	D	C	D		
Southbound Mainline Segment			E	C	E	C		
Southbound Diverge (Fullerton Exit)			D	C	F	C	F	C
Southbound Mainline Segment			D	C	F	C	F	C
Southbound Merge (Fullerton Entrance)			E	C	F	D	F	D

*The HCM software does not fully capture existing and 2040 No Action conditions. The No Action comparison will be made at the corridor level, after assembling the Top Performing CTT Alternative.

Safety

- All Build Alternatives include a grade separation of the Lakefront Trail at Fullerton Parkway and the Diversey Harbor entrance, which will improve bike/pedestrian safety.
- Alternatives 1 and 2 would provide a new, separate bike/pedestrian access over the Lagoon south of Fullerton Parkway.
- All Build Alternatives add a clear zone along the Outer Drive.
- All Build Alternatives include a southbound auxiliary lane between Fullerton Parkway and LaSalle Drive, which will improve merging/weaving operations.
- Alternatives 1 and 2 are viewed as relatively safer designs due to their longer ramp spacing, as compared to Alternative 3, which introduces a new, relatively short weave section within a highly congested section of the Outer Drive.

Park Access and Circulation

- All Build Alternatives will improve existing bike/pedestrian facilities, which will improve access to the park.
- Alternatives 1 and 2 will improve bicycle and pedestrian access to the park south of Fullerton Parkway by providing an additional proposed bridge/underpass.

Green Space

- As shown in Exhibit 3.4-7, Alternative 2 has the largest gain in green space as it does not include landscaped medians along Outer Drive and compresses the ramps.

Exhibit 3.4-7: Net Green Space (rounded to nearest acre)				
	2040 No Action	CTT Alt 1	CTT Alt 2	CTT Alt 3
Green Space (ac)	NA	+2.0	+5	+1

Transit Access and Circulation

- All Build Alternatives improve transit access and circulation by providing bus priority signals at the ramp intersections and bus only queue jump lanes along the ramps.

Visual Effects

- All Build Alternatives improve the view from the Outer Drive and the Park by creating additional green space along the shoreline south of Fullerton Parkway.
- Alternatives 1 and 2 provide views from the urban edge that are similar to existing conditions.
- Alternative 3 somewhat diminishes views from the urban edge. These views are diminished by a relatively longer elevated section of the Outer Drive, as well as additional ramps at the south Lagoon.

Cost/Constructability

- As shown in Exhibit 3.4-8, Alternative 1 had the relative lowest cost, and Alternative 3 had the relative highest cost.
- Alternatives 1 and 2 would be similar with respect to constructability due to their similar design.
- Alternative 3 would be the relative least constructible due to the relatively more complex design and extent of improvements on the arterial system.

Exhibit 3.4-8: Construction Cost				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Total Cost (2017 $)	NA	$324M	$356M	$409M

Stakeholder Input

- Stakeholders expressed strong support for a landscaped median.
- Stakeholders generally did not support new access from the Outer Drive to Diversey Parkway.
- Alternative 1 best reflects stakeholder comments and was also the consensus choice of the Project Study Group.

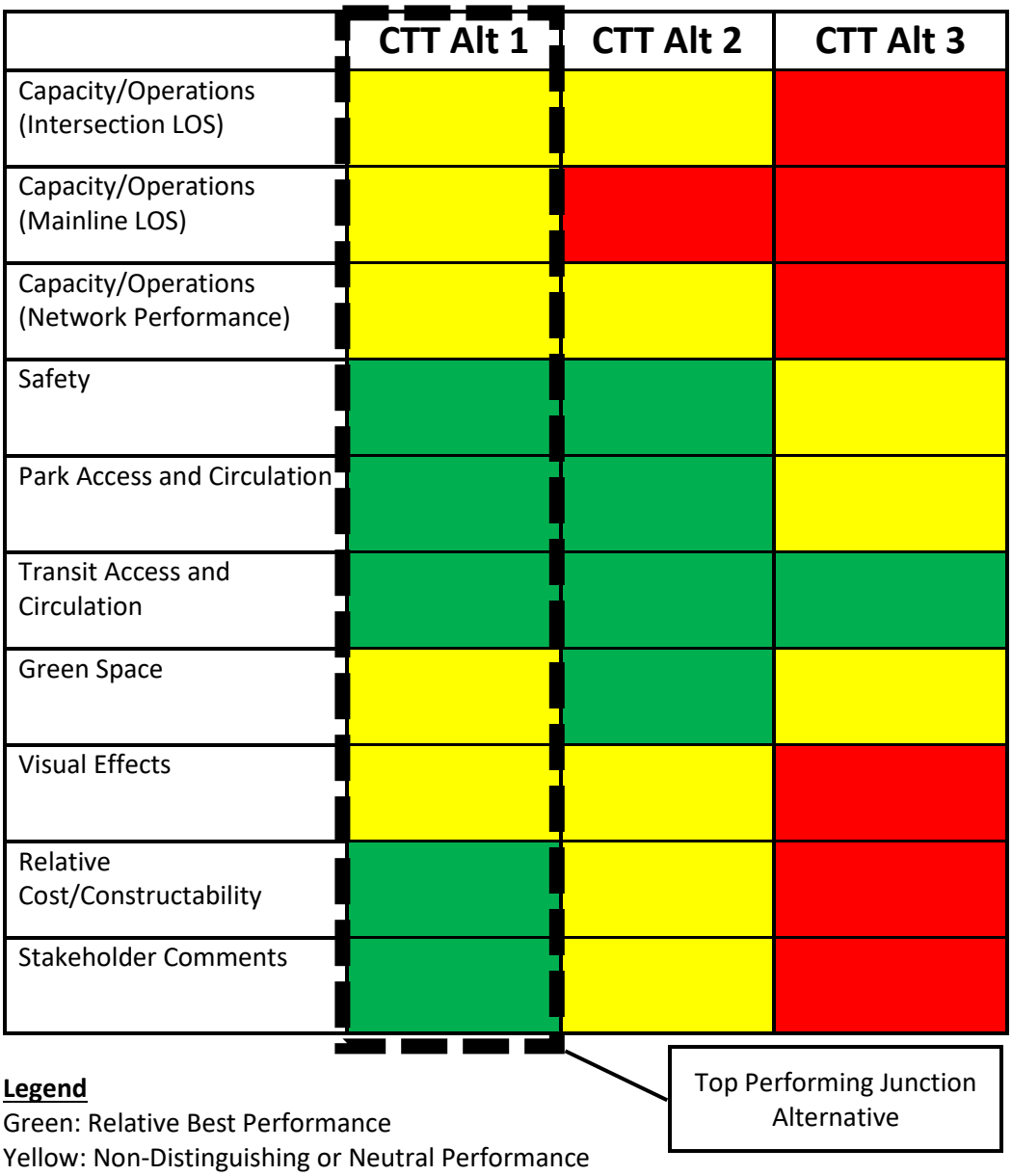
3.4.4 Conclusions

The following is an overall summary of the evaluation results:

- Alternatives 1 and 2 provide relatively better intersection LOS and network performance.
- Alternative 1 provides the relative best Outer Drive performance.
- Alternatives 1 and 2 provide an additional bike/pedestrian only tunnel, and provide better ramp spacing along the Outer Drive and therefore provide the relative best safety performance.
- Alternatives 1 and 2 include an additional bike/pedestrian only tunnel and therefore provide relatively better park access and circulation.
- All Build Alternatives improve transit access and circulation.
- Alternative 2 provides the relative greatest amount of green space.
- Alternative 1 has the relative lowest cost; Alternative 3 would be the relative most costly and least constructible.
- Alternative 1 best reflects stakeholder comments and was the consensus choice of the PSG.

Exhibit 3.4-9 summarizes the ratings for CTT Junction Alternatives 1, 2 and 3 and is a relative comparison of Build Alternatives. Once the overall Top Performing CTT Corridor Alternative is assembled, a comparison to the No Action Alternative, based upon travel performance, will be made, as summarized in section 1.3.3 of this Appendix.

Exhibit 3.4-9: Context Tailored Treatment Evaluation
Fullerton Parkway Junction



Legend
Green: Relative Best Performance
Yellow: Non-Distinguishing or Neutral Performance
Red: Relative Worst Performance

Alternative 1 is recommended because it has the overall relative best combination of improved mobility, safety, transit and park access/circulation, the relative lowest cost, and best reflects stakeholder comments. This alternative is subject to further refinement as the evaluation and coordination process advances.

3.5 Belmont Avenue Junction

3.5.1 Current and 2040 No Action Conditions

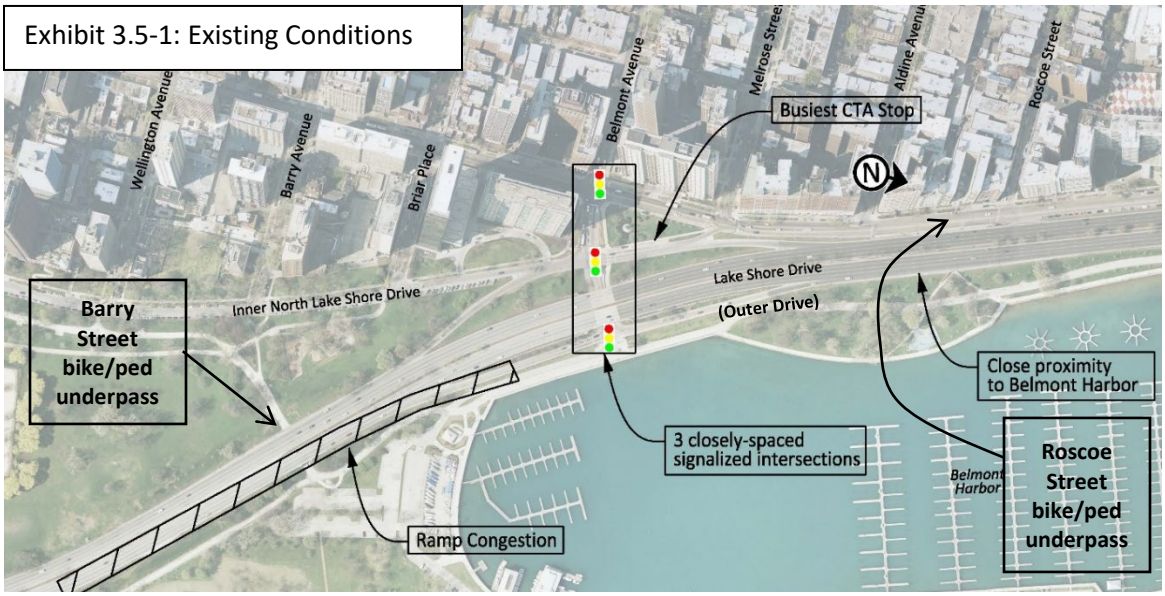
General

Belmont Avenue is an east-west minor arterial where it meets North Lake Shore Drive (Outer Drive) and is under the jurisdiction of CDOT. The 2015 ADT of Belmont Avenue is approximately 19,300 vpd. The typical section of Belmont Avenue consists of two 10.5' lanes in each direction and a 10.5' westbound left turn lane, bound by B-6.12 curb and gutter. The Belmont Avenue junction is grade separated, in a diamond configuration. The ramp intersections are signalized and are part of a series of three closely spaced intersections. The northbound ramp intersection includes access to South Belmont Harbor, and the southbound exit ramp merges into a CTA Bus stop, which is the highest volume location on the CTA system. The existing design creates conflicts between autos, pedestrians and transit vehicles and is a source of substantial safety and congestion concerns.

Bicycle and pedestrian travel along Belmont Avenue is substantial, with up to 3,530 bikes/pedestrians using Belmont Avenue each day to access the lakefront and the trail system.

Exhibit 3.5-1 illustrates existing conditions at the Belmont Avenue junction.

Exhibit 3.5-1: Existing Conditions



The portion of the Outer Drive between Belmont Avenue and Irving Park Road is within a highly constrained area, with the urban edge to the west (residential and commercial land use west of Inner Drive) and Belmont Harbor to the east.

There are dedicated east-west bicycle/pedestrian underpasses at Barry Avenue and Roscoe Street. These structures need replacement due to their age as well as the need to comply with ADA standards (the Roscoe Street underpass is not ADA compliant).

Capacity/Operations (2040 No Action)

The three closely spaced intersections cannot efficiently process the volume of traffic passing through the Belmont junction. These capacity/operational issues are compounded by southbound congestion along the Outer Drive, which extends from Chicago Avenue to Montrose Avenue in the A.M. peak.

- During the A.M. peak hour, congestion spills back from the southbound exit ramp, which blocks the outside (southbound) lane of the Outer Drive. In addition, the congested junction causes eastbound queues along Belmont Avenue that can extend up 1,500 feet.
- As a result of congestion along the Outer Drive, southbound vehicles are unable to merge onto the Outer Drive, which causes ramp traffic to back up into the ramp intersection at Belmont Avenue.
- During the P.M. peak hour, the heavy northbound exiting traffic volumes at Belmont Avenue backs traffic onto the Outer Drive and blocks the outside (northbound) lane.
- The congested conditions in the outside lanes (A.M. or P.M.) have a ripple effect on the other lanes on the Outer Drive, which become congested as vehicles are forced into fewer lanes and attempt to change lanes.

The CTA bus stop on the Inner Drive north of Sheridan Road is the highest volume stop on the CTA system and is located along the southbound exit ramp. This design is the source of conflicts between vehicles, buses and pedestrians, and affects bus travel times and reliability. The need to accommodate pedestrians limits the ability to re-time existing traffic signal systems, as pedestrian phases must be full duration to manage the pedestrian traffic.

Safety

The portion of the Outer Drive at the Belmont Avenue junction area was designated as a “5% location” which means that it is amongst the top 5% of priority locations for safety improvements. Overall, the Belmont Avenue junction experienced a total of 819 crashes (120 injury, 2 fatal) between 2007 and 2011 predominantly under dry, daytime conditions (see Exhibit 3.5-2).

Along the Outer Drive, the predominant crash types were rear end and sideswipe. The rear end crashes were likely caused by congested conditions, especially related to northbound vehicles queued from Belmont Avenue, and southbound vehicles unable to safely merge into the southbound mainline traffic flow. The intersections along Belmont Avenue at Sheridan Road and at the Inner Drive experienced the most sideswipe collisions in the junction area. Complex lane configurations and the close proximity of these intersections likely contributed to those crashes.

A total of 14 bike/pedestrian crashes were recorded during the study period, with 13 of the crashes resulting in an injury. The east leg of the Belmont junction includes a mix of vehicular, bike and pedestrian access within a relatively tight space, and creates conflicts between vehicles, bikes and pedestrians, which is a safety concern.

Exhibit 3.5-2: Crash Summary (2007-2011)*
Belmont Avenue Junction

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	1	1	7	7	39	55
Left Turn	0	2	0	2	13	17
Rear End	1	6	15	35	332	389
Sideswipe	0	2	4	10	218	234
Pedestrian/Bike	0	2	7	4	1	14
Off Rd. Fixed Obj.	0	4	9	2	48	63
Other	0	0	1	0	46	47
Total	2	17	43	60	697	819

Year	
2007	198
2008	206
2009	135
2010	153
2011	127

Pavement Condition	
Dry	610
Wet	171
Icy	38

Time of Day	
Day	609
Night	210

*Crash analysis will be updated for the Level 3/DEIS Alternatives evaluation

3.5.2 Build Alternatives

CTT Alternatives 1, 2 and 3 as well as the analysis area (e.g. green space, cost, network performance) for each junction is shown on Exhibit 3.5-3. All alternatives include relocating the South Harbor access to align with Barry Avenue or Briar Place. The following is a summary of each Build Alternative:

CTT Alternative 1 – Corridor Modernization Alternative

The Corridor Modernization Alternative maintains the current diamond configuration.

- Queue jump lanes and bus priority signals are provided on the ramps to/from the south.
- A bus only facility is added and would allow buses to load and unload passengers without conflicts with vehicles. The bus only facility also creates a layover/turnaround area.
- Bike/pedestrian underpasses would be provided at Barry Avenue and at Hawthorne Place.

CTT Alternative 2 – Compressed Roadway Alternative

The Compressed Roadway Alternative includes a compressed footprint without landscaped medians.

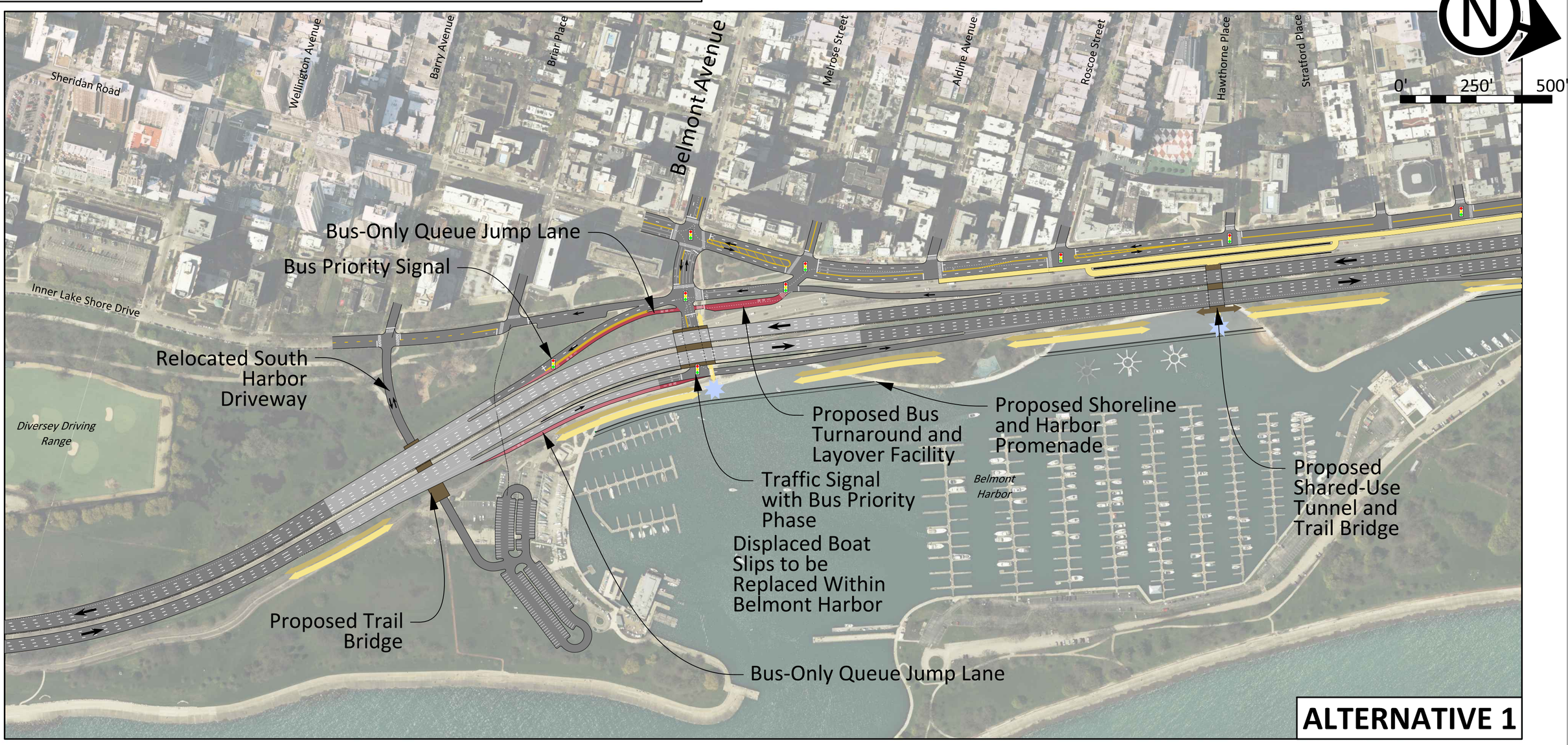
- The northbound Outer Drive lanes would be placed into a tunnel beneath the southbound Outer Drive lanes.
- Left side ramps would be utilized for southbound exiting and entering traffic.
- Queue jump lanes and bus priority signals are provided on the ramps to/from the south.
- The CTA bus stop would continue to operate along the Inner Drive, similar to existing conditions.
- Bike/pedestrian underpasses would be provided at Briar Place and at Aldine Avenue.

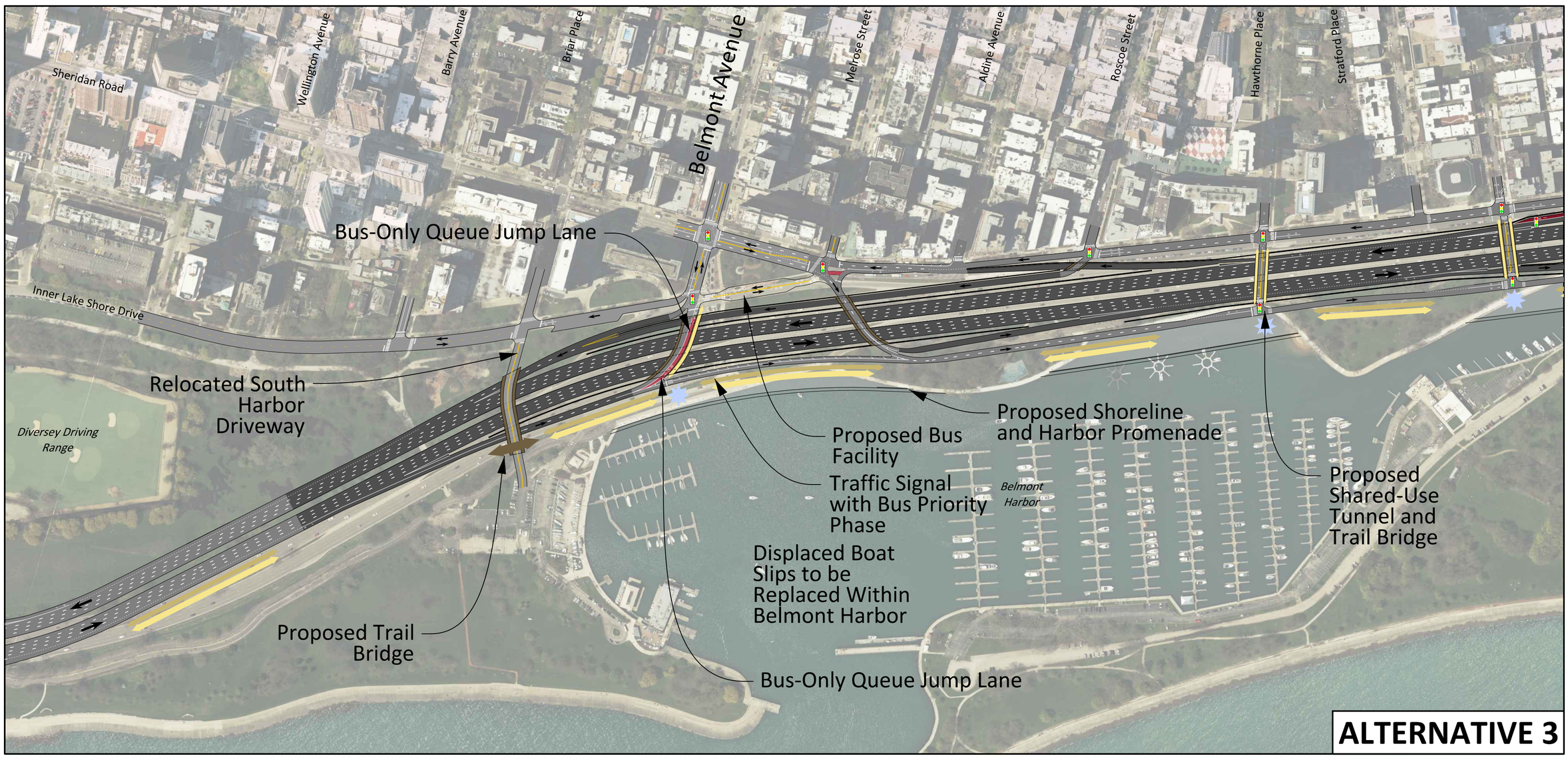
CTT Alternative 3 - Frontage Drive Alternative

The Frontage Drive Alternative depresses the Outer Drive and provides one way Frontage Drives between Belmont Avenue and Irving Park Road.

- A section of North Lake Shore Drive West/Inner Drive would be converted to a bus only facility, which will allow buses to stop, layover or turn around.
- Bike/pedestrian access is provided by a series of bridges that would pass over the Outer Drive at Barry Avenue, Hawthorne Place and Cornelia Avenue.

Exhibit 3.5-3: Belmont Avenue Junction Alternatives





REDEFINE THE DRIVE
NORTH LAKE SHORE DRIVE

LEGEND

Below Grade / At Grade / Above Grade
- Roadway Facility
- Bus-Only Facility
- Bridges and Tunnels
- Potential Green Space
- Potential Relocated/New Beach
- One-Way Street
- Two-Way Street

Exhibit 5
- Traffic Signal
- Existing Shoreline
- Proposed Shoreline
- Lower Speed Trail
- Higher Speed Trail
- Higher Speed/Lower Speed Trail Junction
- Pedestrian/Bike Bridges and Underpasses

3.5.3 Alternatives Evaluation

The alternatives were evaluated utilizing a variety of factors including travel performance, safety, park access and circulation, green space, transit access and circulation, visual effects, cost/constructability, and stakeholder input.

Traffic Operations

Mainline Level of Service.

- As shown in Exhibit 3.5-4, Alternatives 1 and 2 provide similar performance.
- Alternative 3 has the relative worst mainline performance. The new weave section created between Diversey Parkway and Belmont Avenue causes additional congestion.
- It should be noted that due to constraints (Historic Lincoln Park), substantial additional capacity improvements are not being considered on the Outer Drive. However, design refinements will be explored to optimize performance using updated traffic information in future rounds of evaluation.

Exhibit 3.5-4: 2040 NLSD Level of Service

Outer Drive Section	No Action*		CTT Alt 1		CTT Alt 2		CTT Alt 3	
			A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Northbound Mainline Segment			C	D	C	D		
Northbound Diverge (Belmont Exit)			B	D	B	D	C	E
Northbound Mainline Segment			C	D	C	D	C	D
Northbound Weave (Belmont to Addison)			B	D	B	D	B	D
Southbound Weave (Addison to Belmont)			D	C	C	C	D	C
Southbound Mainline Segment			D	C	D	C	D	C
Southbound Merge (Belmont Entrance)			D	B	D	B	F	C
Southbound Mainline Segment			E	C	E	C	F	C

*The HCM software does not fully capture existing and 2040 No Action conditions. The No Action comparison will be made at the corridor level, after assembling the Top Performing CTT Alternative.

Intersection Level of Service (LOS)

- As shown in Exhibit 3.5-5, Alternatives 2 and 3 provide the relative best overall intersection LOS performance.

Exhibit 3.5-5: 2040 Intersection Level of Service								
Intersection	**2040 No Action**		**CTT Alt 1**		**CTT Alt 2**		**CTT Alt 3**	
	A.M.	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**
Sheridan Road at Belmont Avenue	E	C	C	C	C	B	D	E
Melrose Street at Inner Drive	D	E	B	C	B	C	A	A
Inner Drive/SB Ramps at Melrose Street			A	B				
Inner Drive at Belmont Avenue	C	B	C	C	B	A	A	A
Belmont at NB Ramps	B	C	C	D	A	B		

Overall Network Performance

The Belmont Avenue, Addison Street and Irving Park Road junctions are in relatively close proximity. Therefore, the network performance analysis includes these junctions. As shown in Exhibit 3.5-6, all Build Alternatives improve performance over the No Action Alternative.

Exhibit 3.5-6: 2040 Network Performance								
	2040 No Action		**CTT Alt 1**		**CTT Alt 2**		**CTT Alt 3**	
	A.M.	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**
Total Delay (hrs)	807	179	88	115	145	117	82	82
Total Travel Time (hrs)	1264	653	524	585	601	611	533	557

Safety

- All build Alternatives add a clear zone along the Outer Drive and include Lakefront Trail improvements (separation of bikes/pedestrians, grade separation of bike path).
- Alternatives 1 and 3 relocate/separate the CTA bus stop from the Inner Drive to improve safety, operations and capacity, and improve the quality/safety of pedestrian access.
- Alternative 2 includes left side ramps, which are generally undesirable from a safety perspective.

Park Access and Circulation

- Alternative 1 provides the relative best park access and circulation, since access is provided at Barry Avenue, Belmont Avenue and Hawthorne Place.
- Alternative 2 has relatively less park access and circulation benefits as compared to Alternative 1. Two bike/pedestrian tunnels are provided, but at Belmont Avenue, the free flow/left side ramps would create conflicts with cyclists and pedestrians.
- Alternative 3 relies mostly on vehicular bridges for bike/pedestrian access, which have a relatively greater number of potential conflict points, as compared to bike/pedestrian only underpasses/overpasses.

Transit Access and Circulation

- All Build Alternatives will improve transit access and circulation by adding bus priority signals at the ramp intersections and bus only queue jump lanes along the ramps to and from the south.
- Alternatives 1 and 3 provide a bus only facility that will greatly reduce conflicts with vehicles and improve the efficiency and reliability of bus routes using this stop.
- Alternative 2 does not include a bus only facility and therefore is the lowest performing alternative.

Green Space

- As shown in Exhibit 3.5-7, Alternative 2 is the only build alternative with a net gain in green space due to its compressed footprint, which does not include landscaped medians along Outer Drive and stacks northbound Outer Drive under southbound Outer Drive.
- Alternatives 1 and 3, which widen the existing footprint within a constrained area, have a net loss in green space.

Exhibit 3.5-7: Net Green Space (rounded to nearest acre)				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Green Space (ac)	N/A	-3	+2	-4

Visual Effects

- Alternative 1 improves the view for all users by adding some green space between the Inner and Outer Drives and along Belmont Harbor.
- Alternative 2 diminishes views from the urban edge, the Outer Drive and the park. Views from the urban edge and the park are diminished by the relatively longer elevated section of the Outer Drive; views from the Outer Drive are diminished by placing the northbound lanes in a tunnel.
- Alternative 3 slightly improves the views from the urban edge and the park by depressing the Outer Drive. However, this improved view is somewhat offset by the additional overpasses that are required to provide vehicular access to the Frontage Drive system.
- The view from the Outer Drive is diminished for Alternative 3 since the Outer Drive is lowered throughout this section of the project.

Cost/Constructability

- As shown in Exhibit 3.5-8, Alternative 1 has the relative lowest cost.
- Alternative 3 has a relatively higher cost due to the depressed section of the Outer Drive.
- Alternative 2 has the highest cost due to the northbound tunnel, which extends north and south of Belmont Avenue.
- Alternatives 2 and 3 are the relatively least constructible due to their use of depressed roadway or tunnel sections.

Exhibit 3.5-8: Construction Cost				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Total Cost (2017 $)	N/A	$190M	$578M	$275M

Stakeholder Input

- Stakeholders supported the addition of green space and improved bike/pedestrian access along Belmont Harbor.
- Stakeholders expressed concerns regarding combined bike/pedestrian/South Harbor access at Barry Avenue or Briar Place.
- Stakeholders expressed concerns about the additional pump stations that may be required with Alternative 3.
- Alternative 1 was the consensus choice of the Project Study Group.

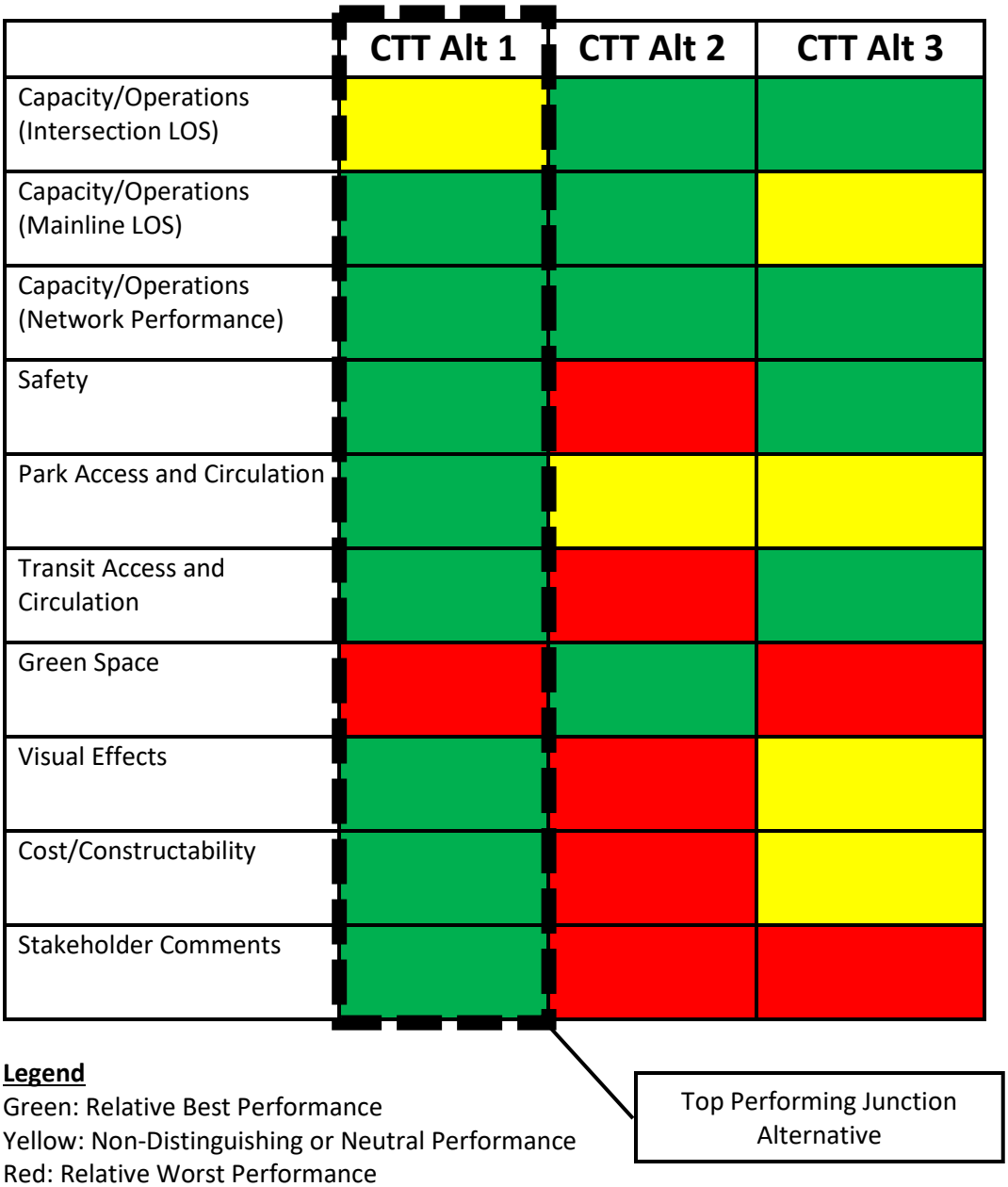
3.5.4 Conclusions

The following is an overall summary of the evaluation results:

- Alternatives 1 and 2 provided the relative best mainline/Outer Drive performance.
- Alternatives 2 and 3 provided the relative best intersection LOS performance.
- All Build Alternatives improve network performance.
- Alternatives 1 and 3 provide the relative fewest bike/pedestrian conflict points and therefore the relative best safety performance; Alternative 2 has the relative worst safety performance as a result of the left side ramps and additional bike/pedestrian conflict points.
- Alternative 1 provides the relative best combination of bike/pedestrian and vehicular access, and therefore provides the relative best park access and circulation.
- Alternatives 1 and 3 provide the relative best transit access and circulation; both alternatives convert a section of North Lake Shore Drive West (part of the Inner Drive arterial system) into a bus stop/layover/staging facility.
- Alternative 2 provides a net increase in green space; Alternatives 1 and 3 have a net decrease in green space.
- Alternative 1 provides the relative best visual effects performance, followed by Alternative 2.
- Alternative 2 had the relative worst visual effects performance.
- Alternative 1 is the relative least costly and most constructible; Alternative 2 has the relatively highest cost and is the relatively least constructible.
- Alternative 1 best reflects stakeholder comments, which advocate for maintaining a design similar to existing conditions (no tunnels, fewer or no pump stations) and was the consensus choice of the PSG.

Exhibit 3.5-9 summarizes the ratings for CTT Junction Alternatives 1, 2 and 3, and is a relative comparison of Build Alternatives. Once the overall Top Performing CTT Corridor Alternative is assembled, a comparison to the No Action Alternative, based upon travel performance, will be made, as summarized in section 1.3.3 of this Appendix.

Exhibit 3.5-9: Context Tailored Treatment Evaluation
Belmont Avenue Junction



Legend
Green: Relative Best Performance
Yellow: Non-Distinguishing or Neutral Performance
Red: Relative Worst Performance

Alternative 1 is recommended because it improves mobility, and is the relative best for safety, as well as park and transit access/circulation. Alternative 1 also has the relative least visual effects, is the relative least costly/most constructible, and best reflects stakeholder comments. This alternative is subject to further refinement as the evaluation and coordination process advances.

3.5.5 South Belmont Harbor Access Refinement

The following is a summary of additional stakeholder coordination at the Belmont Junction area and refinements to the Top Performing CTT Alternative.

As discussed in Section 3.5-4, the Top Performing Belmont Junction Alternative included relocating the South Harbor parking lot access to a new roadway that is aligned with Barry Avenue. However, subsequent stakeholder input resulted in further refinements and development of an additional alternative.

The following is a more detailed review of South Harbor access concerns and the new alternatives that were considered.

As shown on Exhibit 5.5-10, there is minimal separation between the Lakefront Trail and the South Harbor access driveway at Belmont Avenue. The conflicts between vehicles, cyclists and pedestrians is a source of safety concerns.

As shown on Exhibit 3.5-11, a second conflict point is located near the South Harbor parking lot. The Lakefront Trail and the South Harbor access driveway cross at this location. Vehicles have been observed inadvertently turning onto the Lakefront Trail at this location.

Exhibit 5.5-10 Existing Conditions at South Belmont Harbor

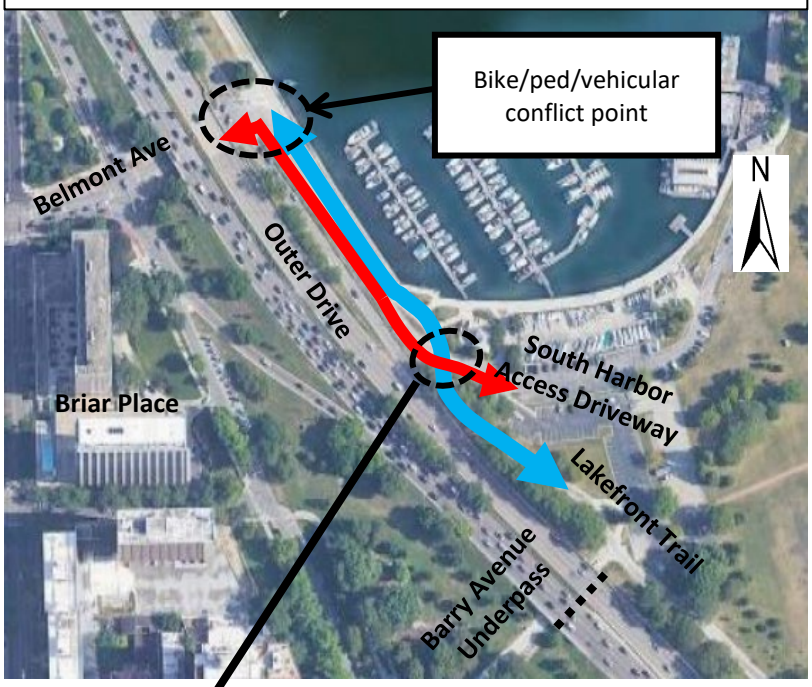
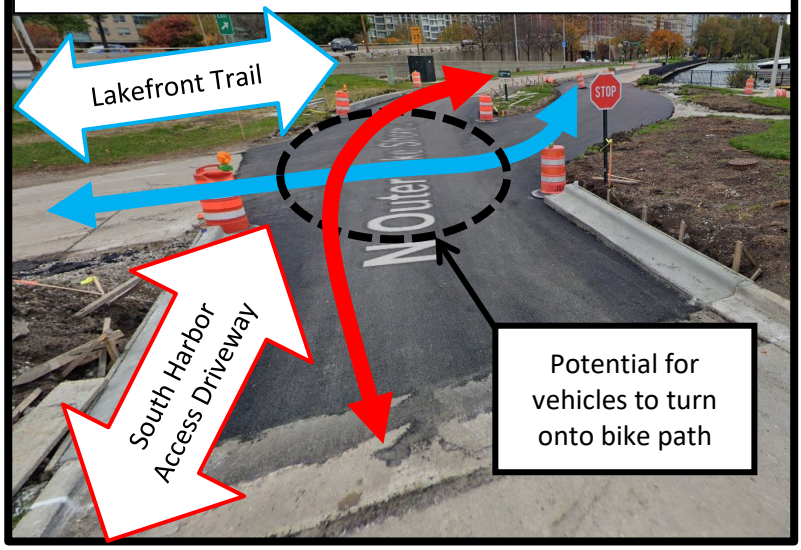


Exhibit 3.5-11: South Harbor Entrance, looking north



As shown on Exhibits 3.5-12 and 3.5-13, two access alternatives were initially developed, and are described as follows:

- Alternative A: relocates the south harbor access driveway to align with Barry Avenue to form an east leg to the Barry Avenue intersection with Inner Lake Shore Drive. The new access driveway would pass under the Outer Drive. Lakefront bike/pedestrian access would continue to be accommodated at this location.
- Alternative B: relocates the south harbor access to align with Briar Place. The existing Lakefront bike/pedestrian access at Barry Avenue would be closed and relocated to Briar Place. The relocated driveway would form an east leg to the Inner Drive intersection with Briar Place.

Exhibit 3.5-12: Access alternative A

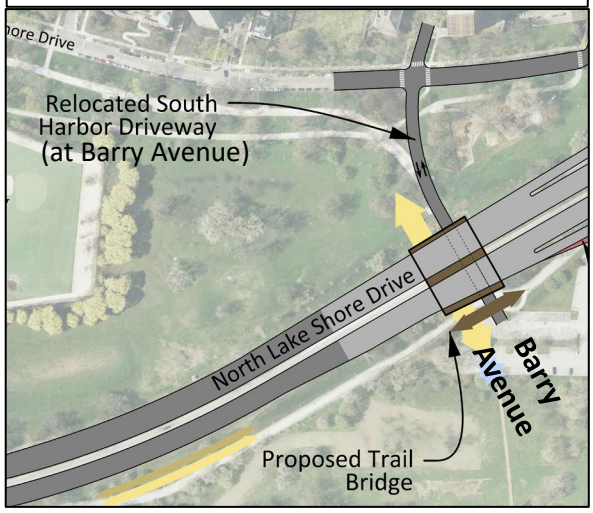
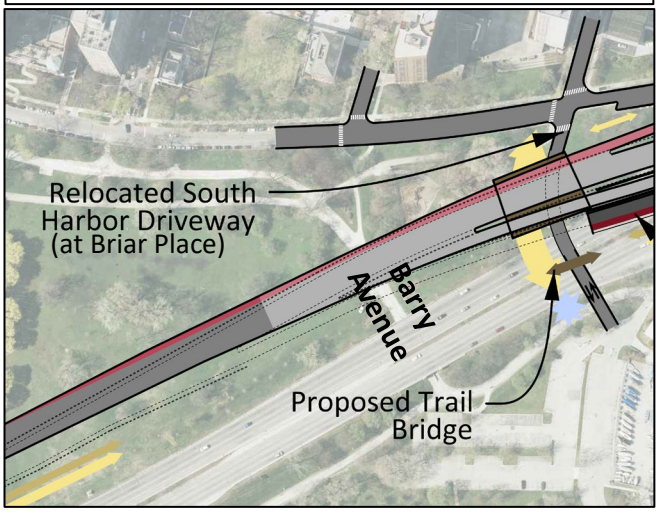


Exhibit 3.5-13: Access alternative B



Based upon initial stakeholder coordination, Alternative A was dropped, Alternative B was further refined, and a new alternative (Alternative C) was developed that utilizes the existing South Harbor access point location at Belmont Avenue.

The following is a description of refined Alternative B and Alternative C.

Refined Alternative B, shown on Exhibit 3.5-14, includes relocating the South Harbor access to a new entrance that is aligned with Briar Place. This access location would also serve as pedestrian and bicycle access to the lakefront, replacing the existing underpass at Barry Avenue. The bike and pedestrian paths along the Outer Drive would be separated, with the bike path grade separated from the new harbor entrance at Briar Street and the bike/ped lakefront access paths at Belmont Avenue. The parking lot would be reconfigured to align with the new access driveway.

The following are the advantages and disadvantages of refined Alternative B:

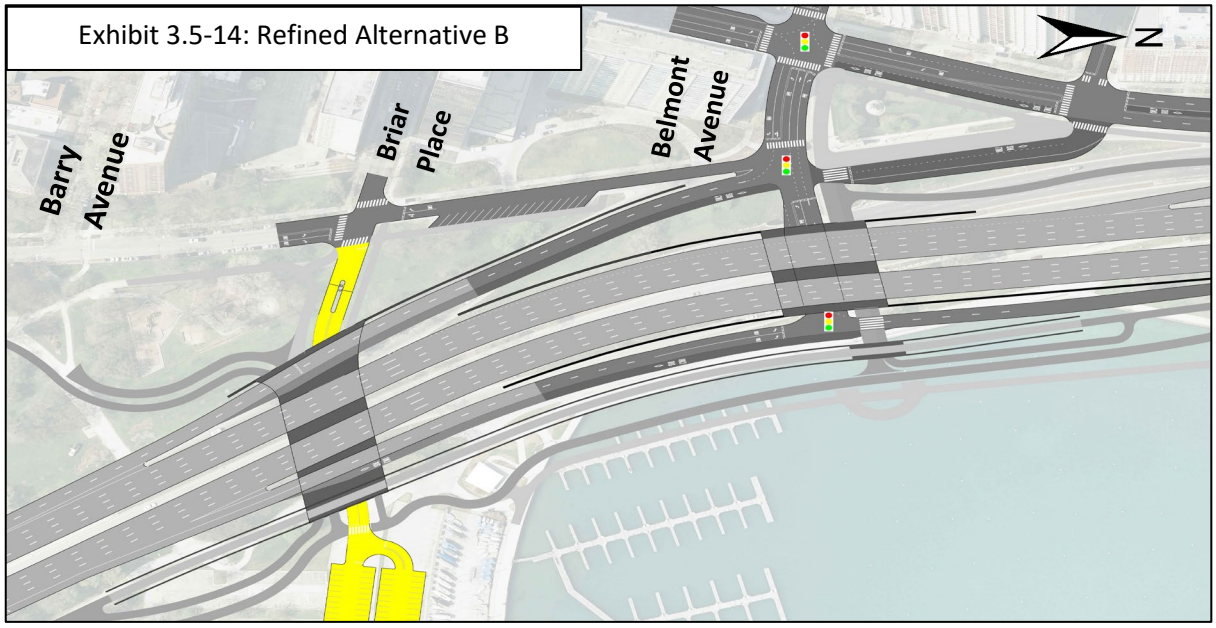
Advantages

- Minimizes conflicts with the Lakefront Trail. The LFT bike path is grade separated and the harbor access driveway crosses the LFT ped path at a right angle, reducing the potential for wrong-way travel.
- Minimizes impacts to park facilities, Belmont Harbor and harbor boating operations.
- Minimizes the pavement footprint along Belmont Harbor (eliminates nearly one-half acre of pavement along the harbor.
- Improves traffic safety and operations at the Belmont junction by eliminating the driveway signal phase at the northbound ramp intersection.

Disadvantages

- Directs traffic entering the harbor onto the Inner Drive between Belmont Avenue and Briar Place (roughly 200 vpd or one car every 8 to 12 minutes during peak hours).
- Directs traffic exiting the harbor onto Briar Place or onto the southbound Inner Drive (roughly 200 vpd or one car every 8 to 12 minutes during peak hours split between the two roadways).

Exhibit 3.5-14: Refined Alternative B



Alternative C, shown on Exhibit 3.5-15, would maintain the existing termini of the harbor access driveway and create a 90-degree intersection at the Lakefront Trail pedestrian path crossing. The bike and pedestrian paths along the Outer Drive would be separated, with the bike path grade separated from the new lakefront access underpass, the harbor access driveway, and the lakefront access paths at Belmont Avenue. The existing pedestrian underpass at Barry Avenue would be relocated to Briar Place.

The following are the advantages and disadvantages of Alternative C:

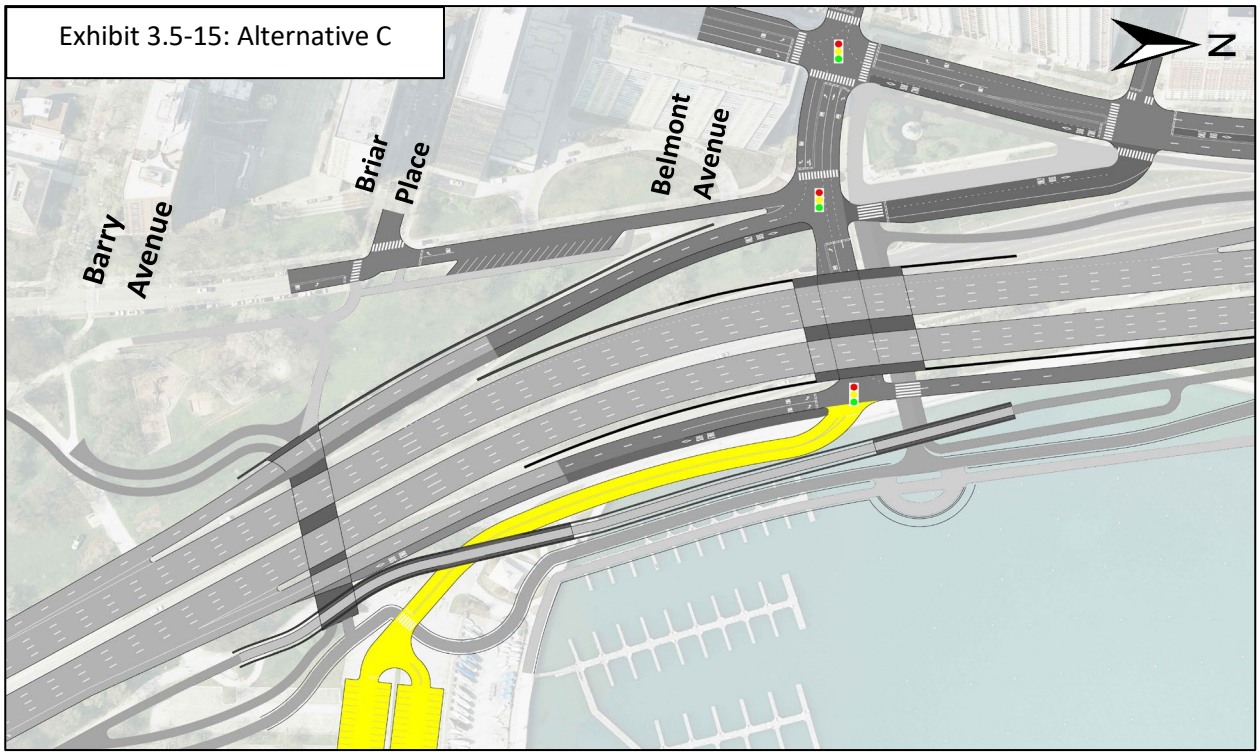
Advantages

- Retains existing driveway access location, avoiding any traffic impacts to the Inner Drive, Barry Avenue or Briar Place.
- Crosses the Lakefront Trail ped path at a right angle, reducing the potential for wrong-way travel.

Disadvantages

- Encroaches further into Belmont Harbor, and impacts existing boat slips.
- The Lakefront Trail ped path encroaches into the boat storage yard, resulting in loss of storage capacity.
- Results in paving much of the park area east of the Outer Drive between Briar Avenue and Belmont Avenue.
- A longer bike path bridge span is required to cross the new driveway road and the relocated Lakefront access at Briar Place.

Exhibit 3.5-15: Alternative C



After developing refinements to Alternative B and Alternative C, community meetings were held on August 12 and 13, 2019 in the Lakeview neighborhood. The purpose of the meetings was to gather additional stakeholder feedback regarding the Belmont harbor south access driveway options as well as general feedback for the section of the project between Diversey Parkway and Irving Park Road.

The presentation featured a project overview, a review of existing conditions within the Diversey to Irving Park area, and descriptions of the improvements proposed for the area as a part of the CTT+TA alternative. The discussion of the CTT+TA alternative included an examination of the improvements proposed for the following junctions: Diversey Parkway, Belmont Avenue (including access to the south Belmont Harbor parking lot), Addison Street, and Irving Park Road.

Though attendees provided feedback on every area of the Diversey Parkway to Irving Park Road corridor, attendees offered the greatest number of comments on the two alternative designs for access to the Belmont Harbor south parking lot. Stakeholders were very concerned about impacts to the park and potential traffic impacts to Briar Place and the Inner Drive, which they considered to be already congested.

Both Alternatives improve safety by grade separating the bike path and creating a 90-degree intersection at the Lakefront Trail ped path/harbor access crossing point. Based upon stakeholder comments, Alternative C was chosen.

Other refinements may be undertaken based upon future stakeholder coordination and analysis.

3.2 Addison Street and Irving Park Road Junction

The Addison Street and Irving Park Road junctions are being analyzed in combination due to their close proximity.

3.2.1 Current and 2040 No Action Conditions

General

Addison Street is an east-west major collector where it meets the Outer Drive (see Exhibit 3.6-1) and is under the jurisdiction of IDOT. The 2015 ADT of Addison Street is approximately 7,800 vehicles per day. The typical section of Addison Street consists of two 11' eastbound lanes and one 11' westbound lane with on-street parking along both sides, bound by B-6.12 curb and gutter. Addison Street terminates at the Inner Drive, but has gated access to the Outer Drive that is used for special events. When the gate is open, eastbound Addison Street traffic is allowed to turn right onto southbound Outer Drive.

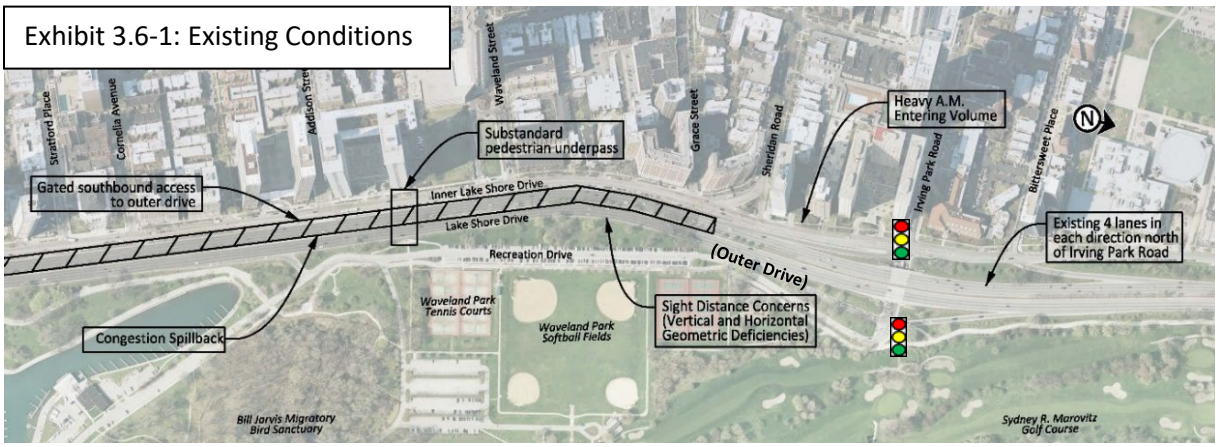
Bicycle and pedestrian travel along Addison Street is substantial, with up to 3,400 bikes/pedestrians using the Addison Street underpass each day to access the lakefront and the trail system.

Irving Park Road is an east-west other principal arterial where it meets North Lake Shore Drive (Outer Drive) and is under the jurisdiction of IDOT. The 2015 ADT of Irving Park Road is approximately 20,800 vehicles per day. The typical section of Irving Park Road consists of one 11' lane with on-street parking in each direction, bound by B-6.12 curb and gutter. The Irving Park Road junction is grade separated, in a diamond configuration. The northbound ramp intersection is signalized; the southbound exit ramp ties into the Inner Drive north of Irving Park and is stop-controlled, and the southbound entrance ramp is combined with the Inner Drive/Irving Park Road signalized intersection.

Bicycle and pedestrian travel along Irving Park Road is substantial, with up to 2,850 bikes/pedestrians using Irving Park Road each day to access the lakefront and the trail system.

The alignment of the Outer Drive in the vicinity of Irving Park Road includes horizontal and vertical curves that restricts sight distance, which likely contributes to safety concerns.

Exhibit 3.6-1: Existing Conditions



The portion of the Outer Drive between Belmont Avenue and Irving Park Road is within a highly constrained area, with the urban edge running adjacent to the Inner Drive and multiple Lincoln Park facilities adjacent to the Outer Drive, including Belmont Harbor, the Bill Jarvis Migratory Bird Sanctuary, the Waveland Park tennis courts and softball fields, and the Sydney R. Marovitz Memorial Golf Course.

Dedicated east-west bicycle/pedestrian underpasses are located just north of Addison Street and at Buena Avenue; however, these structures are undersized and do not adequately accommodate the current level of bike/pedestrian usage. In addition, the underpasses are not ADA accessible.

Capacity/Operations (2040 No Action)

During the A.M. peak hour, southbound congestion from the southern portion of the project spills back through the Irving Park Road junction. The Irving Park Road junction, with its high volume of entering traffic, further contributes to mainline congestion that can back up as far as Foster Avenue. The southbound mainline congestion has a spillover effect, and creates congestion within the local street network, especially along Irving Park Road, where queues can extend as far west as Broadway Avenue (~1,200 feet to the west).

Southbound express bus service enters the Outer Drive at Irving Park Road during the A.M. peak. Buses must compete with other vehicles while merging onto the Outer Drive and then encounter additional congestion along the Outer Drive, which reduces bus reliability. During the P.M. peak, northbound buses are slowed by queued traffic that backs onto the Outer Drive from the Irving Park Road junction.

A large portion of the traffic that is accessing the Outer Drive must utilize substantial portions of the Inner Drive to access the ramps at Belmont Avenue and at Irving Park Road. As shown on Exhibit 3.6-2, which depicts southbound AM conditions, a portion of the traffic entering the Outer Drive at Irving Park Road is from the neighborhoods to the south; these motorists travel north along the Inner Drive to Irving Park Road (gold bands). As shown in the light blue and green bands, there is a substantial portion of traffic from areas north of Belmont Avenue that are using the Inner Drive to access the Outer Drive at Belmont Avenue. Providing a new junction at Addison Street would more evenly distribute traffic, and provide relief for the Belmont Avenue junction, as well as the Irving Park Road junction.

Exhibit 3.6-2: A.M. Traffic Flow

Safety

The section of the Outer Drive between Addison Street and Irving Park Road was designated as a "5% location" which means that it is amongst the top 5% of priority locations for safety improvements.

Overall, the Irving Park Road junction experienced a total of 429 crashes (53 injury, 5 fatal) between 2007 and 2011 predominantly during dry, daytime conditions (see Exhibit 3.6-3). Along the Outer Drive, the predominant crash types were rear end, sideswipe and fixed object.

The Irving Park Road junction experienced the greatest number of fatalities among all studied locations. The rear end crashes and sideswipe crashes were likely caused by congested, uneven traffic flow and vehicles changing lanes to enter/exit the Outer Drive. The fixed object crashes could be attributed to the combined horizontal and vertical curvature on the mainline, which restricts sight distance in this area.

A total of 6 bike/pedestrian crashes were recorded during the study period. Although the number of crashes was relatively small, 5 of the 6 crashes resulted in an injury, which indicates that bike/pedestrian safety is a concern, regardless of the number of crashes. In addition, given the level of bike/pedestrian usage, further enhancing bike/pedestrian safety is a priority.

Exhibit 3.6-3: Crash Summary (2007-2011)*
Irving Park Road Junction

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	0	0	0	0	6	6
Left Turn	0	0	3	0	10	13
Rear End	2	1	13	11	132	159
Sideswipe	0	0	4	1	111	116
Pedestrian/Bike	0	2	2	1	1	6
Off Rd. Fixed Obj.	3	3	7	4	87	104
Other	0	0	1	0	24	25
Total	5	6	30	17	371	429

Year	
2007	118
2008	127
2009	64
2010	58
2011	62

Pavement Condition	
Dry	274
Wet	123
Icy	32

Time of Day	
Day	311
Night	118

*Crash analysis will be updated for the Level 3/DEIS Alternatives evaluation

3.2.2 Build Alternatives

Each of the alternatives includes a mainline lane reduction from eight lanes south of Irving Park Road to six lanes north of Irving Park Road, as discussed in section 3.1.5 of the Alternatives to be Carried Forward document. CTT Alternatives 1, 2 and 3 as well as the analysis area (e.g. green space, cost, network performance) for each junction is shown on Exhibit 3.6-4.

The following is a summary of each Build Alternative:

CTT Alternative 1 – Corridor Modernization Alternative

The Corridor Modernization Alternative includes new ramps to and from the south at Addison Street; the ramp intersection at the Inner Drive would be signalized. The Outer Drive is depressed (below the elevation of the existing Outer Drive) to accommodate an at grade eastward extension of Addison Street. The existing diamond configuration is maintained at the Irving Park Road junction, and bus priority signals and queue jump lanes are included for the ramps to/from the south at both junctions.

Recreation Drive, between Addison Street and Irving Park Road, is removed. Access to the park facilities and the north Belmont Harbor facilities is provided by an eastward extension of Addison Street. An expansion of the existing parking lots is being considered to offset parking losses along Recreation Drive. Bike/Pedestrian access to the lakefront is provided at Addison Street, Irving Park Road, and a shared use bike/pedestrian tunnel at Buena Avenue.

CTT Alternative 2 – Compressed Roadway Alternative

The Compressed Roadway Alternative includes a compressed footprint without landscaped medians. The ramps are compressed along the Outer Drive, utilizing retaining walls. The existing diamond configuration at the Irving Park Road junction is retained; access to the Outer Drive is not provided at Addison Street. Bus priority signals and queue jump lanes are included for the ramps to/from the south at Irving Park Road.

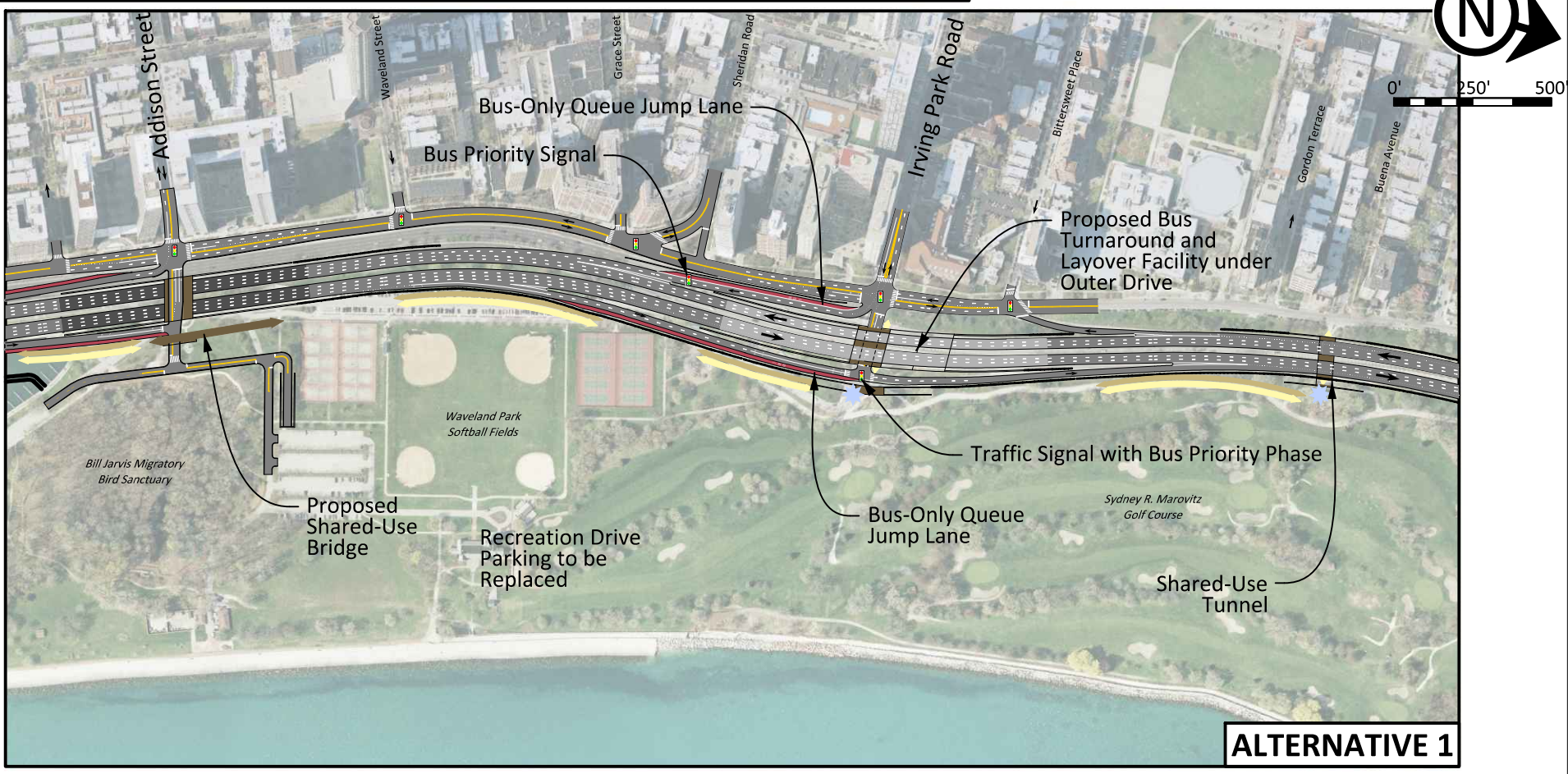
Recreation Drive is retained, and bike/pedestrian access to the lakefront is provided at Irving Park Road, and bike/pedestrian tunnels at Addison Street and Buena Avenue.

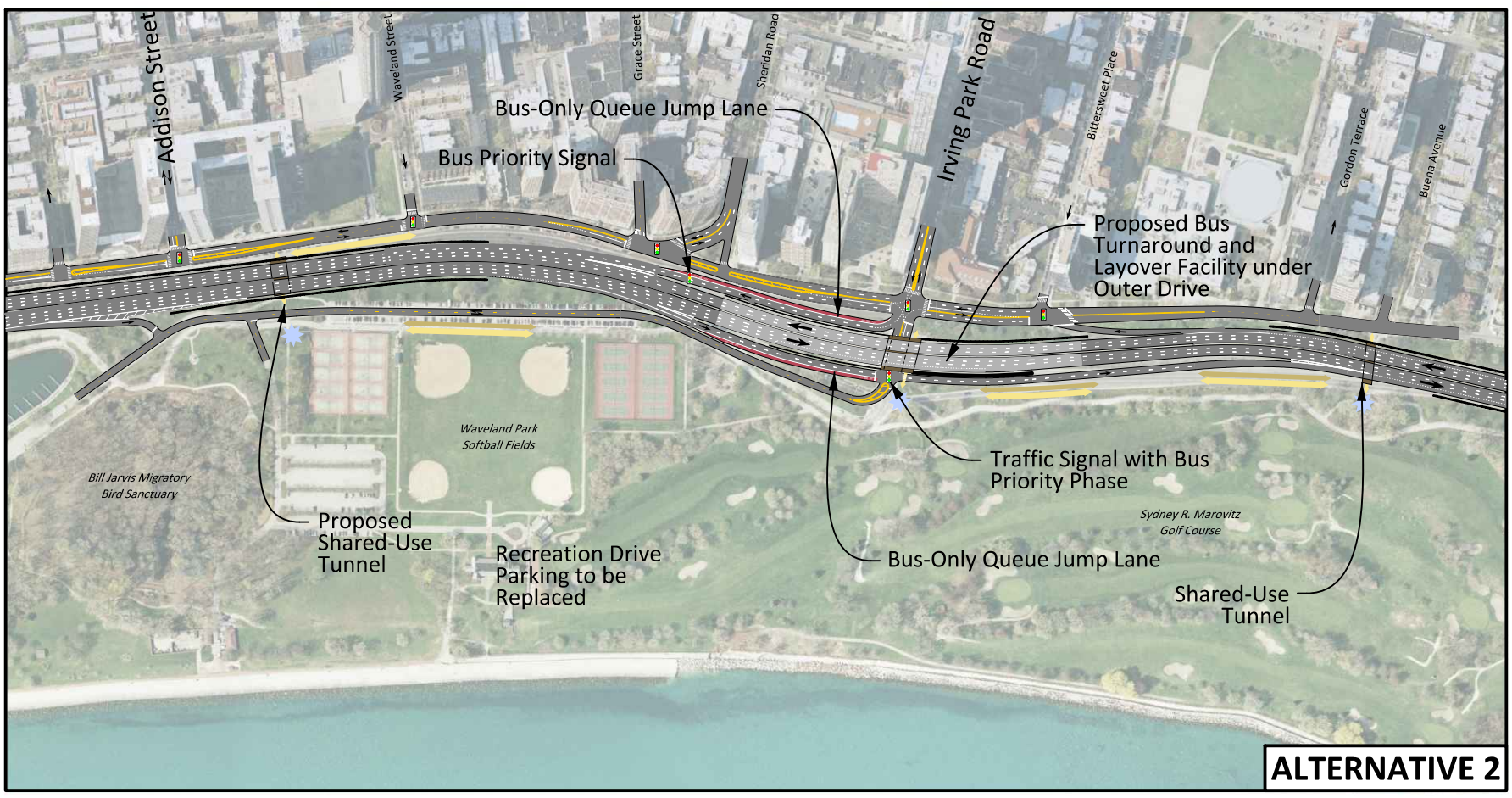
CTT Alternative 3 - Frontage Drive Alternative

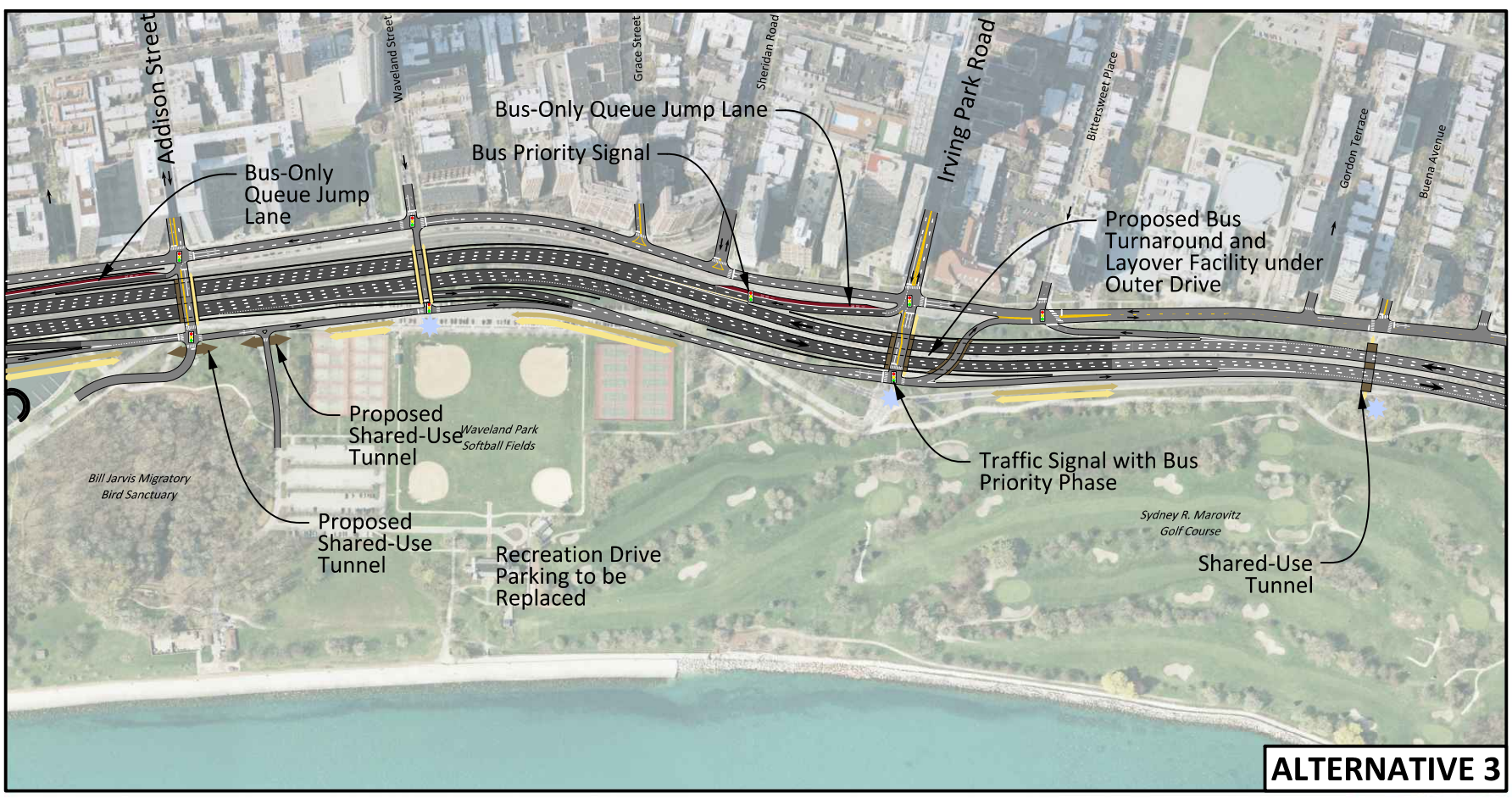
The Frontage Drive Alternative converts the existing Inner Drive to a southbound only frontage drive and provides a new northbound frontage drive east of the Outer Drive. The Outer Drive is depressed from Wellington Avenue to Bittersweet Place. Full access is provided at Irving Park Road, as well as access to and from the south at Addison Street. Bus priority signals and queue jump lanes are only provided on the southbound entrance ramps at Addison Street and Irving Park Road (the northbound exits are part of a frontage drive system).

The one-way northbound frontage drive also replaces Recreation Drive. Bike/pedestrian access to the lakefront is provided along vehicular bridges at Addison Street, Waveland Avenue, and Irving Park Road. A bike/pedestrian underpass is also provided at Buena Avenue.

Exhibit 3.6-4: Addison Aveune and Irving Park Road Junction Alternatives







REDEFINE THE DRIVE
NORTH LAKE SHORE DRIVE

LEGEND

Below Grade	At Grade	Above Grade	
			Roadway Facility
			Bus-Only Facility
			Bridges and Tunnels

- Potential Green Space
- Potential Relocated/New Beach
- One-Way Street
- Two-Way Street
- Traffic Signal
- Existing Shoreline
- Proposed Shoreline
- Lower Speed Trail
- Higher Speed Trail
- Higher Speed/Lower Speed Trail Junction
- Pedestrian/Bike Bridges and Underpasses

3.2.3 Alternatives Evaluation

The alternatives were evaluated utilizing a variety of factors including travel performance, safety, park access and circulation, green space, transit access and circulation, visual effects, cost/constructability, and stakeholder input.

Traffic Operations

Intersection Level of Service (LOS)

- As shown in Exhibit 3.6-5, all Build Alternatives provide an acceptable overall LOS and improve intersection capacity over the No Action alternative.
- Alternatives 1 and 3, which include new ramps at Addison Street, adequately handle the additional traffic drawn to the intersections adjacent to the new ramps (LOS C or better).

Exhibit 3.6-5: 2040 Intersection Level of Service

Intersection	2040 No Action		CTT Alt 1		CTT Alt 2		CTT Alt 3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Inner Drive at Addison Street	C	D	C	C	C	B	B	B
Addison at NB Exit Ramp			B	B			A	A
Inner/Marine Drive at Irving Park Road	D	D	B	B	B	B	C	B
Irving Park at NB Ramps	D	F	B	B	B	C	B	B
Marine Drive at Bittersweet/SB Exit			B	B	B	B	B	C

Overall Network Performance

- As noted in section 3.5.3, the Network Performance analysis includes the junctions at Belmont Avenue, Addison Street and Irving Park Road. Therefore Exhibit 3.6-6 displays the same results. All Build Alternatives improve network performance.

Exhibit 3.6-6: 2040 Network Performance

	2040 No Action		CTT Alt 1		CTT Alt 2		CTT Alt 3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Total Delay (hrs)	807	179	88	115	145	117	82	82
Total Travel Time (hrs)	1264	653	524	585	601	611	533	557

Mainline Level of Service

- As shown in Exhibit 3.6-7, each of the alternatives provide a similar Level of Service along the Outer Drive.
- It should be noted that due to constraints (Historic Lincoln Park), substantial additional capacity improvements are not being considered on the Outer Drive. However, design refinements will be explored to optimize performance using updated traffic information in future rounds of evaluation.

Exhibit 3.6-7: 2040 NLSD Level of Service								
Outer Drive Section	No Action*		CTT Alt 1		CTT Alt 2		CTT Alt 3	
			A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Northbound Weave (Belmont to Addison)			B	D	B	D	B	D
Northbound Mainline Segment			C	D	C	D		
Northbound Diverge (Irving Park Exit)			B	C	B	C	B	C
Northbound Mainline Segment			C	D	B	C	C	D
Northbound Weave (Irving Park to Montrose)			C	E	C	E	C	E
Southbound Weave (Montrose to Irving Park)			D	C	D	C	D	C
Southbound Mainline Segment			D	C	D	C	D	C
Southbound Merge (Irving Park Entrance)			D	C	D	C	D	C
Southbound Mainline Segment			D	C	D	C	D	C
Southbound Weave (Addison to Belmont)			D	C	C	C	D	C

*The HCM software does not fully capture existing and 2040 No Action conditions. The No Action comparison will be made at the corridor level, after assembling the Top Performing CTT Alternative.

Safety

- All Build Alternatives include separating bikes and pedestrians on the Lakefront Trail.
- All Build Alternatives provide grade separations for the bike path at each crossroad.
- All Build Alternatives add a clear zone along the Outer Drive.
- All Build Alternatives contribute to improved safety performance by addressing the horizontal and vertical alignment concerns along the Outer Drive south of Irving Park Road.

Park Access and Circulation

- All Build Alternatives include improvements to the Lakefront Trail (trail separation, grade separations).
- Alternative 1 eliminates Recreation Drive between Addison Street and Irving Park Road, which will reduce park access for vehicles; however, this is somewhat offset by providing new park access at Addison Street.
- Alternative 2 provides access and circulation similar to existing conditions. Recreation Drive is maintained, and east-west lakefront access for bikes/pedestrians is provided at the Addison Street and Buena Avenue underpasses, as well as along Irving Park Road.
- Alternative 3 effects park access and circulation to a similar degree as Alternative 1. Recreation Drive would be converted to a one-way northbound frontage drive, which would create some

circuitous travel for park users from the north. East-west lakefront access for bikes/pedestrians would be provided along roadway bridges at Addison Street, Waveland Avenue, and Irving Park Road. A bike/pedestrian tunnel would be provided at Buena Avenue.

Green Space

- As shown in Exhibit 3.6-8, Alternative 2 is the only Build Alternative with a net gain in green space, as it does not include landscaped medians along Outer Drive, does not include ramps at Addison Street, and has a smaller footprint with the compressed ramp configuration at Irving Park Road.
- Alternatives 1 and 3 provide additional green space along the Inner Drive.

Exhibit 3.6-8: Net Green Space (rounded to nearest acre)				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Green Space (ac)	N/A	-3	+0	-2

Transit Access and Circulation

- Alternatives 1 and 3 include an extension of Addison Street over the Outer Drive, which provides transit access into the park in the vicinity of Addison Street. Alternative 2 maintains Recreation Drive and provides access similar to existing conditions.
- Alternative 1 improves transit access and circulation by adding bus priority signals at the ramp intersections and bus only queue jump lanes along the ramps to/from the south at Irving Park Road. Alternative 1 also includes bus only queue jump lanes and bus priority signals along the ramps at Addison Street.
- Alternative 2 improves transit access and circulation to a lesser degree than Alternative 1; queue jump lanes and bus priority signals are only provided at the ramps to/from the south at Irving Park Road.
- Alternative 3 only provides bus only queue jump lanes and bus priority signals on the southbound entrance ramps at Addison Street and at Irving Park Road. The conversion of the Inner Drive to a one-way southbound frontage drive will affect existing bus routes that utilize the Inner Drive.

Visual Effects

- Alternative 1 has views from the Outer Drive that are similar to existing conditions, with the exception of the Addison Street area, which has diminished views due to the lowering of the Outer Drive. Views from the park are somewhat improved due to the elimination of Recreation Drive but offset by the additional ramps and a bridge at Addison Street. Views from the Outer Drive are improved by the addition of green space along the Inner Drive and the elimination of Recreation Drive but offset by the lowered Outer Drive profile at Addison Street.
- Alternative 2 has views similar to existing conditions from the Outer Drive, park, and urban edge.
- Alternative 3 has improved views in some locations that are offset by diminished views in other locations. The view from the urban edge and the park is improved by depressing the Outer Drive and providing additional green space along the Inner Drive. However, the view from the Outer Drive is diminished for Alternative 3 as the Outer Drive is lowered from Addison Street to Irving Park Road.

Cost/Constructability

- As shown in Exhibit 3.6-9, Alternative 1 is the least costly.
- Alternative 2, which is the Compressed Roadway Concept, has slightly higher costs due to additional retaining walls, which are used to compress the Outer Drive footprint.
- Alternative 3 has the highest cost, which is associated with the retaining walls and pump station needed to drain the depressed portions of the Outer Drive.
- Alternatives 1 and 2 are relatively more constructible than Alternative 3.
- Alternative 3 is the relatively least constructible due to the extensive section of depressed roadway.

Exhibit 3.6-9: Construction Cost				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Total Cost (2017 $)	N/A	$134M	$189M	$275M

Stakeholder Input

- Stakeholders supported the transit and Lakefront Trail related improvements as well as adding green space along the Inner Drive.
- Stakeholders expressed some concerns about the Outer Drive lane reduction north of Irving Park Road and had varied opinions regarding new access at Addison Street.
- Stakeholders did not think that all impacted parking along Recreation Drive should be replaced.
- Alternative 1 was the consensus choice of the Project Study Group.

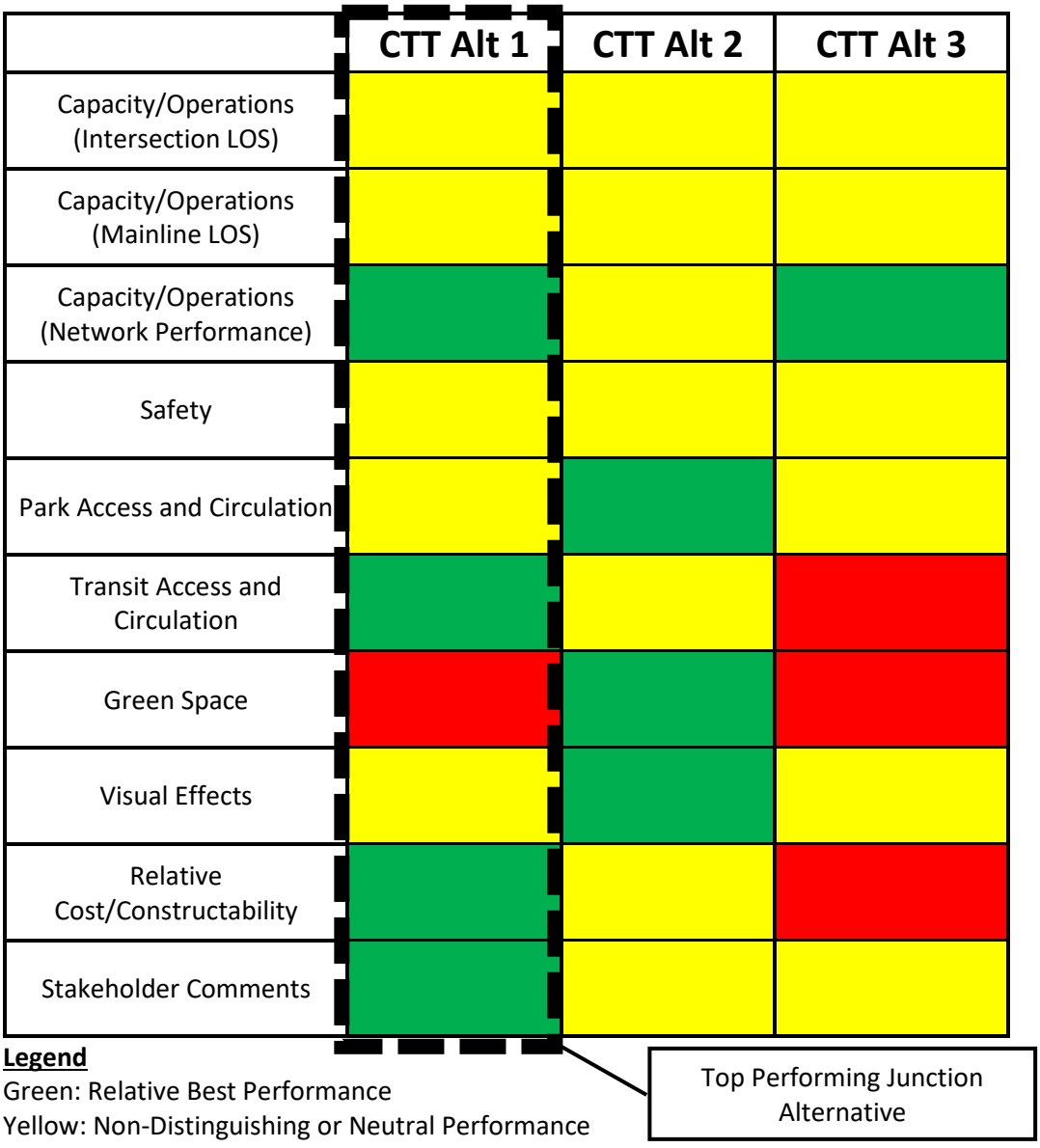
3.2.4 Conclusions

The following is an overall summary of the evaluation results:

- All Build Alternatives provide similar Outer Drive and intersection LOS performance.
- Alternatives 1 and 3 provide the relative best network performance.
- All Build Alternatives provide similar safety benefits.
- Alternative 2 maintains existing conditions, and therefore provides the relative best park access and circulation. Alternatives 1 and 3 provide a slightly lower level of park access and circulation.
- Alternative 1 had the relative best transit access and circulation, since bus only queue jump lanes and priority signals are provided at the relative greatest number of locations. Alternative 3 had the relative worst transit access and circulation, since the Inner Drive is converted to one-way operations, which will impact existing bus routes and circulation patterns.
- Alternatives 1 and 3 provide a net decrease in green space primarily due to the proposed ramps at Addison Street. Alternative 2 does not include ramps at Addison Street, and provides no (zero) net change in green space.
- Alternative 2 provided the relative best performance for visual effects, since existing views are essentially unchanged. Alternatives 1 and 3 include lowering the Outer Drive at Addison Street, which diminishes views from the Outer Drive.
- Alternative 1 was the relative least costly and most constructible. Alternative 3 was the relative most costly and least constructible due to the extensive lowering of the Outer Drive.
- Stakeholders had a mixture of viewpoints regarding the Build Alternatives.
- Alternative 1 was the consensus choice of the Project Study Group.

Exhibit 3.6-10 summarizes the ratings for CTT Junction Alternatives 1, 2 and 3, and is a relative comparison of Build Alternatives. Once the overall Top Performing CTT Corridor Alternative is assembled, a comparison to the No Action Alternative, based upon travel performance, will be made, as summarized in section 1.3.3 of this Appendix.

Exhibit 3.6-10: Context Tailored Treatment Evaluation
Addison Street and Irving Park Road Junction

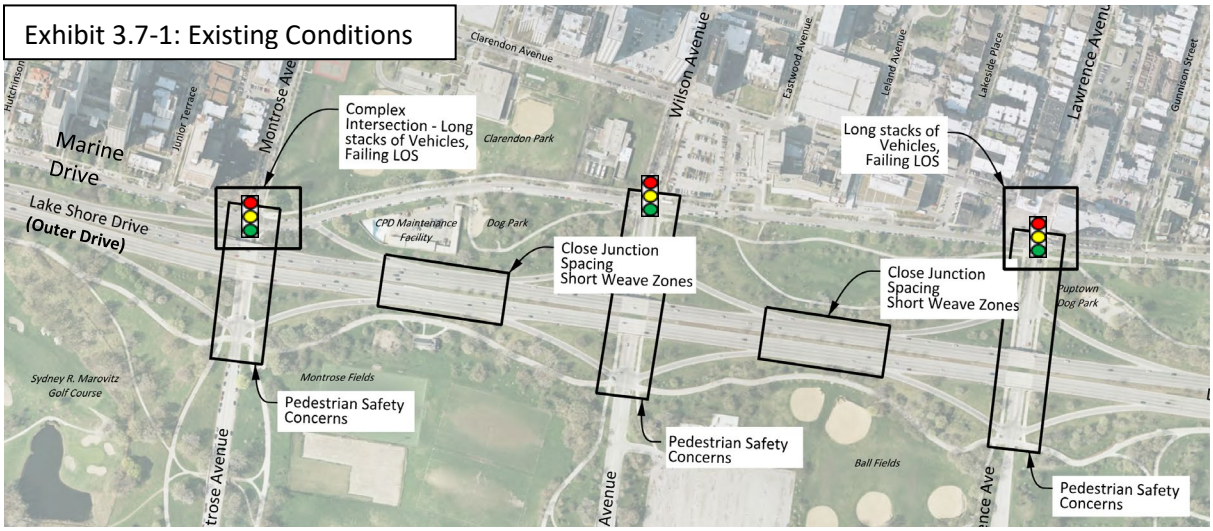


Legend
Green: Relative Best Performance
Yellow: Non-Distinguishing or Neutral Performance
Red: Relative Worst Performance

Alternative 1 is recommended because it has the relative best combination of mobility, safety, and park and transit access/circulation improvements. Alternative 1 is also the relative least costly and most constructible. This recommendation is subject to further refinement as the NLSD alternatives evaluation process advances.

3.3 Montrose/Wilson/Lawrence Avenue Junctions

The Montrose Avenue, Wilson Avenue and Lawrence Avenue (MWL) junctions are being evaluated in combination due to their proximity. Existing conditions are shown on Exhibit 3.7-1.



3.3.1 Current and 2040 No Action Conditions

General

This section of the Outer Drive includes ¼ mile junction spacing, which is the tightest spacing within the project limits and provides relatively short distances between ramps (approximately 300 to 400 ft) for entering and exiting the Outer Drive between these junctions. The design standard is 1000 ft (per IDOT BDE Manual 37-2D and AASHTO Exhibit 10-68), which is more consistent with the ramp spacing to the north and south of this section. At the Montrose Avenue/Marine Drive intersection, there are poor levels of service and long queues of vehicles due to the complexity of the intersection, which includes ramps to/from the Outer Drive. This section of the Outer Drive lacks dedicated east-west bicycle/pedestrian crossings; the sidewalks along the arterials must be used to access the Lakefront Trail. The Lakefront Trail crosses Montrose, Wilson and Lawrence Avenues immediately east of the northbound exit ramps. Weiss Hospital is located at the Marine Drive/Wilson Avenue intersection.

Montrose Avenue

Montrose Avenue is an east-west major collector where it meets North Lake Shore Drive (Outer Drive). Montrose Avenue is under the jurisdiction of CDOT and has continuity to the western edge of the City. The 2015 ADT of Montrose Avenue is approximately 12,100 vpd. The typical section of Montrose Avenue consists of one 12' travel lane with a 7' on-street parking lane in each direction, bound by B-6.12 curb and gutter.

The Montrose Avenue junction is a diamond configuration, with the Outer Drive passing over Montrose Avenue. The southbound entrance ramp to the Outer Drive forms a fifth leg at the Marine Drive/Montrose Avenue signalized intersection. The southbound exit ramp from the Outer Drive ties into Marine Drive north of the Montrose/Marine intersection.

The northbound exit/entrance ramp intersection and the southbound exit ramp are stop-controlled. Bicycle and pedestrian travel along Montrose Avenue is substantial, with up to 2,700 bikes/pedestrians using Montrose Avenue each day to access the lakefront and the trail system.

Wilson Avenue

Wilson Avenue is an east-west major collector where it meets North Lake Shore Drive (Outer Drive), is under the jurisdiction of CDOT, and has relatively less continuity to the west (compared to Montrose Avenue and Lawrence Avenue). The 2015 ADT of Wilson Avenue is approximately 9,400 vpd. The typical section of Wilson Avenue consists of one 12' travel lane with a 7' on-street parking lane in each direction, bound by B-6.12 curb and gutter. The intersection of Wilson Avenue and the Outer Drive is grade separated, with the Outer Drive crossing over Wilson Avenue.

The Wilson junction is a diamond configuration. The northbound exit/entrance ramp intersection and the southbound exit ramp are stop-controlled. Bicycle and pedestrian travel along Wilson Avenue is substantial, with up to 1,800 bikes/pedestrians using Wilson Avenue each day to access the lakefront and the trail system.

Lawrence Avenue

Lawrence Avenue is an east-west minor arterial where it meets North Lake Shore Drive (Outer Drive), is under the jurisdiction of IDOT, and has continuity to the western edge of the City. The 2015 ADT of Lawrence Avenue is approximately 12,600 vpd. The typical section of Lawrence Avenue consists of one 13' shared use travel lane with a 7' on-street parking lane in each direction, bound by B-6.12 curb and gutter. The intersection of Lawrence Avenue and the Outer Drive is grade separated, with the Outer Drive crossing over Lawrence Avenue.

The Lawrence Avenue junction is a diamond configuration. The exit ramps are stop sign-controlled, and the east ramp intersection is stop sign-controlled. Bicycle and pedestrian travel along Lawrence Avenue is substantial, with up to 1,700 bikes/pedestrians using Lawrence Avenue each day to access the lakefront and the trail system.

Capacity/Operations (2040 No Action)

The existing stop sign control contributes to congestion during peak periods (typically on summer weekends), which creates long queues. The northbound exit ramp at Montrose Avenue is periodically closed if the nearby section of the park is full. The proximity of the exit ramps and the Lakefront Trail, as well as the mix of vehicles, pedestrians and cyclists contribute to congested conditions. The intersections of Montrose Avenue at Marine Drive, and Lawrence Avenue at Clarendon Avenue experience the relatively longest queues and poor levels of service. Along the mainline, the heavy entering volumes at Irving Park Road and other junctions to the south create southbound congestion in the AM peak. This southbound congestion often spills back into the MWL section of the project.

Safety

The Montrose/Wilson/Lawrence junctions experienced a total of 536 crashes (137 injury, 2 fatal) between 2007 and 2011, predominantly during dry, daytime conditions, as summarized in Exhibit 3-7.2. Along the Outer Drive, the predominant crash types were rear end and sideswipe.

These crashes were likely caused by congested conditions, speed differential between lanes, and vehicles maneuvering to enter and exit the Outer Drive within relatively short weave zones. The section of the Outer Drive from Montrose to Lawrence was designated as a "5% location" which means that it is amongst the top 5% of priority locations for safety improvements. National research (Highway Safety Manual*) has documented that increased ramp spacing can increase safety performance. A total of 75 bike/pedestrian crashes with 71 injuries also occurred in the MWL area. As noted previously, there are no dedicated east-west bike/pedestrian underpasses between Montrose and Lawrence, which is likely a contributing factor to crashes. The MWL junction area currently has at-grade crossings, which create conflict points between vehicles, bicycles and pedestrians.

Exhibit 3.7-2: Crash Summary (2007-2011)**
Montrose/Wilson/Lawrence Junctions

Montrose Avenue

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	0	0	2	0	5	7
Left Turn	0	0	0	0	4	4
Rear End	0	3	3	5	60	71
Sideswipe	0	0	3	2	51	56
Pedestrian/Bike	0	5	16	12	2	35
Off Rd. Fixed Obj.	0	2	3	2	22	29
Other	0	0	1	1	40	42
Total	0	10	28	22	184	244

Year	
2007	67
2008	85
2009	29
2010	33
2011	30

Pavement Condition	
Dry	182
Wet	45
Icy	17

Time of Day	
Day	191
Night	53

Wilson Avenue

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	0	0	2	0	8	10
Left Turn	0	0	0	0	2	2
Rear End	0	0	6	4	32	42
Sideswipe	0	0	0	1	26	27
Pedestrian/Bike	0	3	8	15	1	27
Off Rd. Fixed Obj.	1	2	4	2	5	14
Other	0	2	0	0	24	26
Total	1	7	20	22	98	148

Year	
2007	30
2008	50
2009	30
2010	24
2011	14

Pavement Condition	
Dry	110
Wet	32
Icy	6

Time of Day	
Day	115
Night	33

**The Highway Safety Manual includes quantitative safety evaluation techniques for many different roadway types, including rural and urban arterials, as well as higher type facilities.*
***Crash analysis will be updated for the Level 3/DEIS Alternatives evaluation*

Lawrence Avenue*

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	0	0	1	1	6	8
Left Turn	0	0	0	0	5	5
Rear End	0	2	1	3	43	49
Sideswipe	0	0	1	0	36	37
Pedestrian/Bike	0	3	6	3	1	13
Off Rd. Fixed Obj.	1	1	4	0	12	18
Other	0	0	0	2	12	14
Total	1	6	13	9	115	144

Year	
2007	32
2008	39
2009	31
2010	26
2011	16

Pavement Condition	
Dry	104
Wet	32
Icy	8

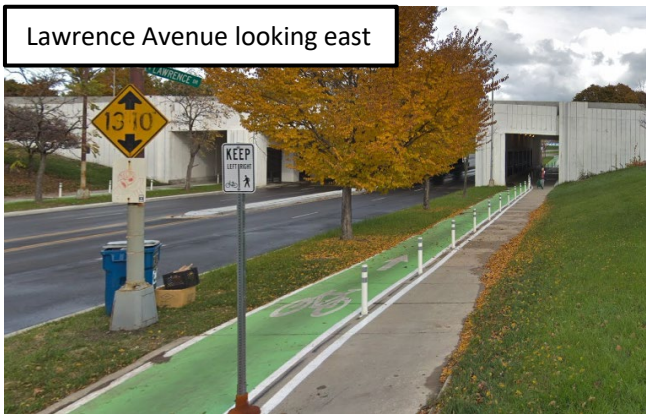
Time of Day	
Day	105
Night	39

*Crash analysis will be updated for the Level 3/DEIS Alternatives evaluation

It should be noted that improvements were implemented at the Lawrence Avenue and Wilson Avenue junction areas in 2018. Space was reallocated within the existing sidewalks on both sides of Lawrence and Wilson Avenues to create separate bike and pedestrian paths, as shown on Exhibit 3.7-3. As noted earlier, the crash analysis will be updated for the Level 3 screening, and the updated crash analysis will include these 2018 improvements.

Exhibit 3.7-3: 2018 bike/ped improvements at Lawrence Avenue and Wilson Avenue

Lawrence Avenue looking east



Wilson Avenue looking east

3.3.2 Build Alternatives

Alternatives were developed to improve ramp spacing, address safety deficiencies, and provide efficient community and park access. The ramps at Wilson Avenue were selected for consolidation due to their relatively lower traffic volumes and the lack of regional continuity for Wilson Avenue to the west. The ramp consolidation at Wilson Avenue was also considered in conjunction with partial ramp consolidation at Montrose Avenue.

The Build Alternatives include the following common features:

- A reduction in the number of General Purpose lanes on the Outer Drive from 4 lanes in each direction to 3 lanes in each direction.
- Separate bike and pedestrian Lakefront Trails and grade separating the trails at each crossroad.
- Bus layover/turnaround facilities at the Wilson/Simonds and Lawrence/Simonds intersections.
- At Lawrence Avenue, 13-foot sidewalks are proposed on both sides, as well as a combination of bike lanes/shared lanes.
- The Wilson Avenue roadway cross section is reduced from 4 lanes to 2 lanes, with 10-foot sidewalks and on road bike lanes provided on both sides.
- At Montrose Avenue, a 15-foot multi-use trail is provided on both sides.

The Build Alternatives and the analysis area for each alternative (e.g., green space, cost) is shown on Exhibit 3.7-4.

CTT Alternative 1 – Corridor Modernization Alternative

The Corridor Modernization Alternative includes increased junction spacing along the Outer Drive that is accomplished by consolidating the southbound access for Montrose Avenue and Wilson Avenue at a single midblock intersection along Marine Drive. Direct access to/from the south is eliminated at Wilson Avenue. Lawrence Avenue remains full access within its existing footprint. On street parking along Marine Drive would be removed and replaced by proposed parking lots east of Marine Drive.

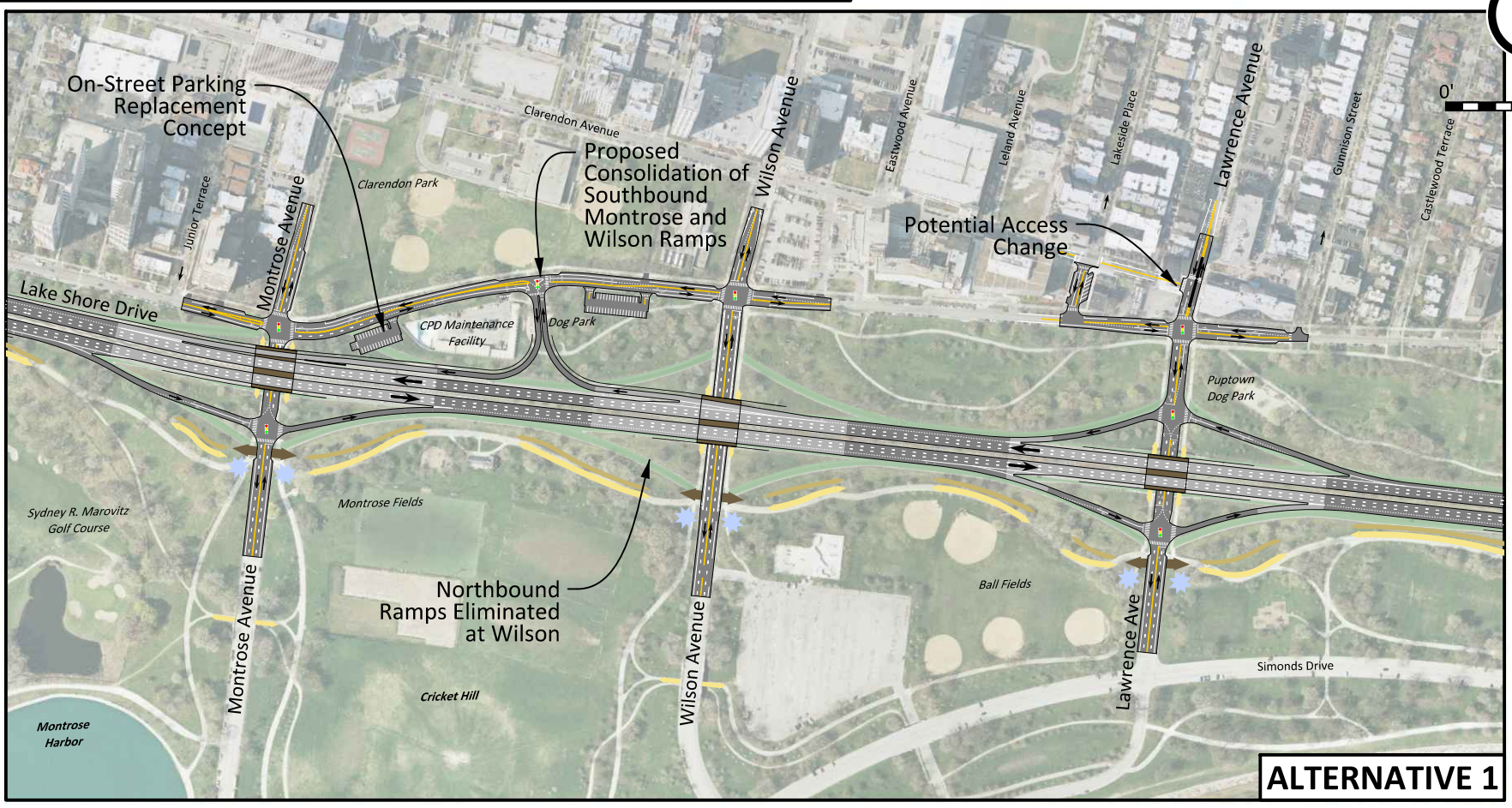
CTT Alternative 2 – Compressed Roadway Alternative

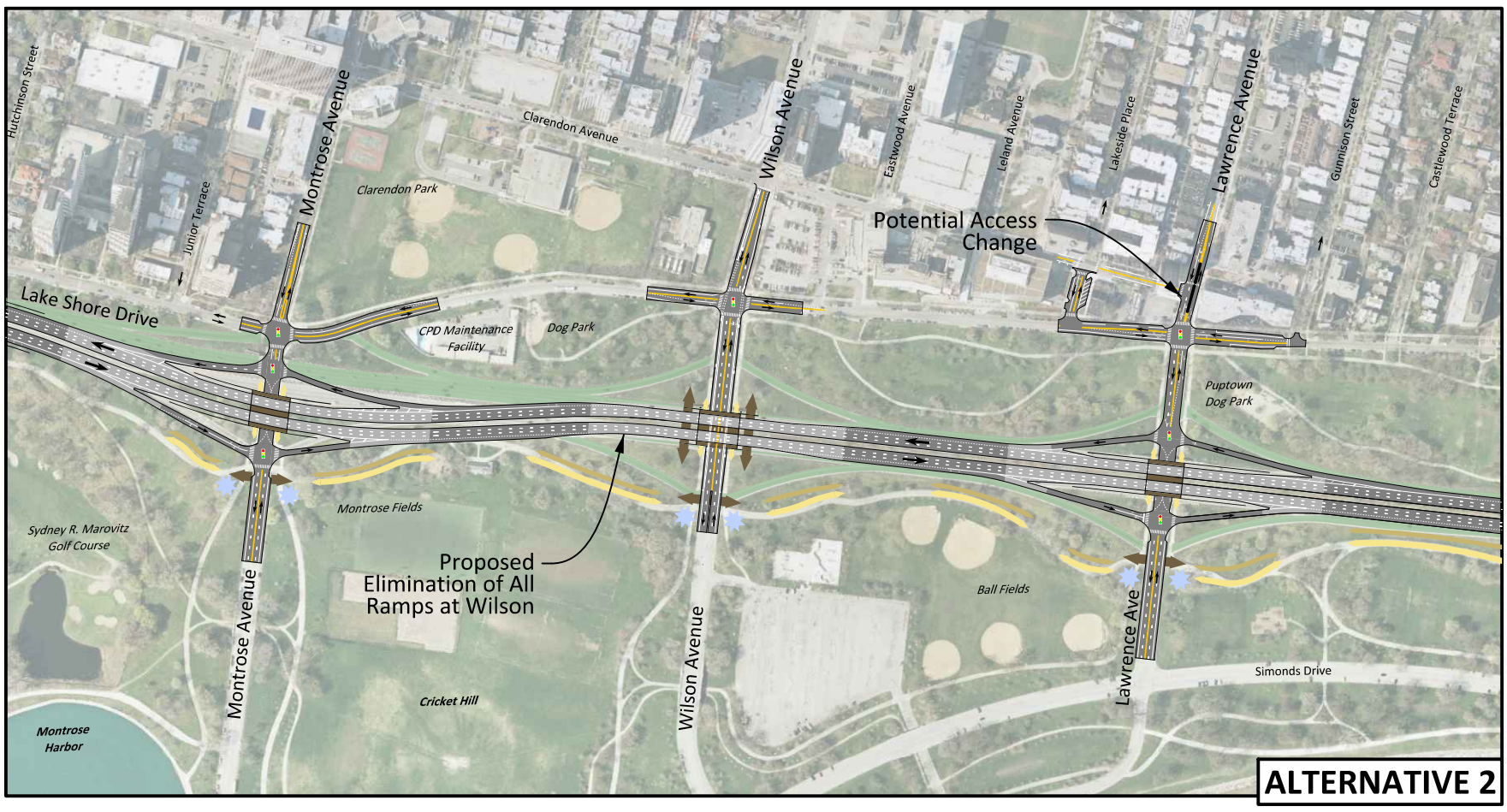
The Compressed Roadway Alternative increases ramp spacing along the Outer Drive by eliminating all direct access at Wilson Avenue. The Outer Drive is shifted east to create a compressed diamond junction at Montrose Avenue, which removes the southbound ramps from the Marine Drive/Montrose Avenue intersection and creates three closely spaced intersections along Montrose Avenue. The Lawrence Avenue ramps are also compressed to minimize the transportation footprint.

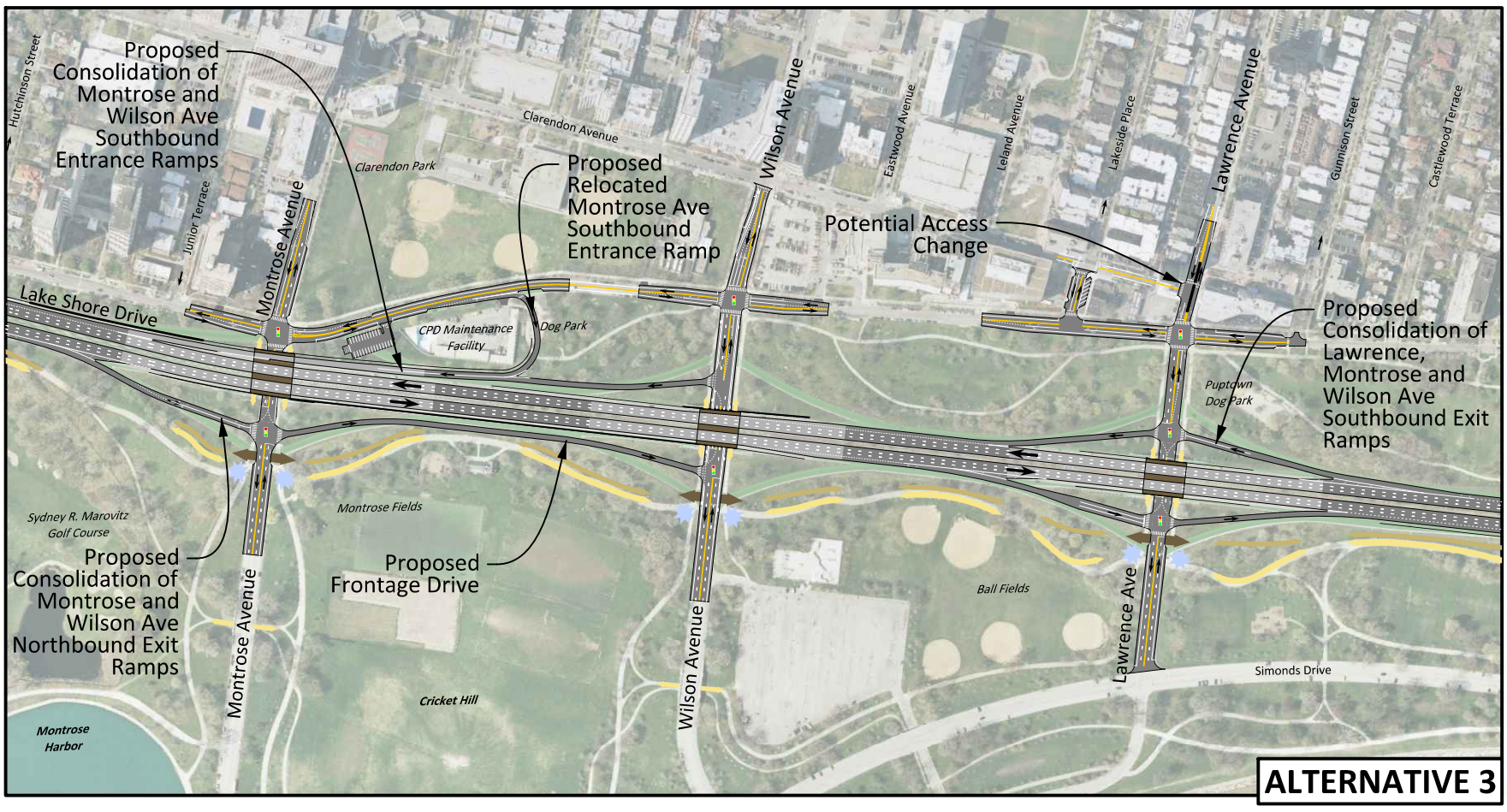
CTT Alternative 3 - Frontage Drive Alternative

The Frontage Drive Alternative increases ramp spacing along the Outer Drive by consolidating southbound access between Montrose Avenue and Wilson Avenue; Access to and from the south is provided at Wilson Avenue. The diamond junction configuration is retained at Lawrence Avenue and would provide all access to and from the north in this section of the project. A parking lot east of Marine Drive is proposed to replace on street parking along Marine Drive.

Exhibit 3.7-4: Montrose-Wilson-Lawrence Junction Alternatives







REDEFINE THE DRIVE
NORTH LAKE SHORE DRIVE

LEGEND

Below Grade / At Grade / Above Grade
- Roadway Facility
- Bus-Only Facility
- Bridges and Tunnels
- Potential Green Space
- Potential Relocated/New Beach
- One-Way Street
- Two-Way Street
- Traffic Signal
- Existing Shoreline
- Proposed Shoreline
- Lower Speed Trail
- Higher Speed Trail
- Higher Speed/Lower Speed Trail Junction
- Pedestrian/Bike Bridges and Underpasses

3.3.3 Alternatives Evaluation

The alternatives were evaluated utilizing a variety of factors including travel performance, safety, park access and circulation, green space, transit access and circulation, visual effects, cost/constructability, and stakeholder input.

Traffic Operations

Intersection Level of Service (LOS)

As shown on Exhibit 3.7-5, each of the build alternatives provides an acceptable overall LOS and/or improves capacity over the No Action alternative; Alternative 2 requires three closely spaced intersections, which would be relatively more prone to congestion during peak periods.

Exhibit 3.7-5: 2040 Intersection Level of Service

Intersection	2040 No Action		CTT Alt 1		CTT Alt 2		CTT Alt 3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Montrose Avenue at NB NLSD Exit Ramp	A	B	B	B	B	B	B	B
Montrose Avenue at Marine Drive	F	C	C	B	C	B	C	B
Marine Drive at SB Exit Ramp	A	A	B	B				
Wilson Avenue at NB NLSD Exit Ramp							A*	B*
Wilson Avenue at Marine Drive	B	B	B	B	B	B	C	C
Lawrence Avenue at NB NLSD Exit Ramp	A	B	A	B	B	B	B	B
Lawrence Avenue at Marine Drive	E	B	C	C	C	C	C	C

*Frontage Drive at Wilson

Overall Network Performance

As shown on Exhibit 3.7-6, the Build Alternatives provide similar performance, and show an improvement over the No Action Alternative.

Exhibit 3.7-6: 2040 Network Performance

	2040 No Action		CTT Alt 1		CTT Alt 2		CTT Alt 3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Total Delay (hours)	111	61	50	41	51	47	60	56
Total Travel Time (hours)	322	301	299	294	262	328	296	305

Mainline Level of Service

- As shown on Exhibit 3.7-7, the Build Alternatives provide similar LOS performance.
- It should be noted that due to constraints (Historic Lincoln Park), substantial additional capacity improvements are not being considered on the Outer Drive. However, design refinements will be explored to optimize performance using updated traffic information in future rounds of evaluation.

Exhibit 3.7-7: 2040 NLSD Level of Service

Outer Drive Section	No Action*		CTT Alt 1		CTT Alt 2		CTT Alt 3	
			A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Northbound Weave (Irving Park to Montrose Avenue)			C	E	C	E	C	E
Northbound Mainline Segment			C	D	C	D	C	D
Northbound Weave (Montrose Avenue to Wilson Avenue)			C	D	B	C	B	C
Northbound Weave (Wilson Avenue to Lawrence Avenue)					B	C		
Northbound Mainline Segment			C	C	C	D	B	C
Southbound Mainline Segment			C	C	C	C	C	C
Southbound Weave (Lawrence Avenue to Wilson Avenue)					C	C		
Southbound Weave (Wilson Avenue to Montrose Avenue)			C	C	C	C	C	B
Southbound Mainline Segment			D	C	D	C	C	C
Southbound Weave (Montrose Avenue to Irving Park Road)			D	C	D	C	D	C

*The HCM software does not fully capture existing and 2040 No Action conditions. The No Action comparison will be made at the corridor level, after assembling the Top Performing CTT Alternative.

Safety

- All Build Alternatives include clear zones, improved ramp spacing and auxiliary lanes between Montrose Avenue and Lawrence Avenue, which will improve merging and weaving operations.
- All Build Alternatives will improve bicycle and pedestrian safety by improving intersections, providing improved bike/pedestrian accommodations along Montrose, Wilson and Lawrence Avenues, and grade separating the Lakefront Trail from Montrose, Wilson and Lawrence Avenues.
- Alternatives 1 and 2 eliminate the relative most vehicle/pedestrian conflict points along Wilson Avenue by consolidating or removing ramps.

Park Access and Circulation

- All Build Alternatives improve park access and circulation for vehicles by signalizing intersections, improving existing intersections, and providing a grade separation of the Lakefront Trail at Montrose, Wilson and Lawrence Avenues.
- All build alternatives improve park access and circulation for bikes/pedestrians by providing wider sidewalks, multi-use trails and bike lanes/shared use lanes, as well as Lakefront Trail improvements.
- Alternatives 1 and 2 eliminate the relative most vehicle/pedestrian conflict points by consolidating or removing the ramps along Wilson Avenue.

Green Space

- As shown on Exhibit 3.7-8, all build alternatives provide additional green space by compressing the footprint of the Outer Drive and consolidating ramp access.
- Alternative 2 provides the relative most additional green space but requires a shift of the Outer Drive to the east, impacting additional park space along the east side of the Outer Drive.
- Alternative 3 creates the least amount of green space due to the addition of the frontage drives.

Exhibit 3.7-8: Net Green Space (rounded to nearest acre)				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Green Space (Ac)	N/A	+7	+10	+7

Transit Access and Circulation

- Alternatives 1, 2, and 3 will provide a similar level of improved transit access and circulation; all Build Alternatives include bus turnaround/layover facilities along Simonds Drive.

Visual Effects

- Alternative 1 has improved views from the urban edge and the Outer Drive north of Wilson Avenue (ramps eliminated) that are offset by diminished views south of Wilson Avenue (parking lot, additional new ramps). Views from the park are improved by the consolidation of ramps at Wilson Avenue.
- Alternative 2 most improves the view from the urban edge by shifting the Outer Drive east and eliminating ramps at Wilson Avenue, and compressing the footprint at Montrose and Lawrence. The eastward shift creates the relative most additional green space along the Inner Drive. Views from the park are somewhat diminished by the eastward shift of the Outer Drive, which reduces park space east of the Outer Drive. The view from the Outer Drive is similar to existing conditions, with improved views north of Wilson Avenue offset by diminished views south of Wilson Avenue.
- Alternative 3 has improved views from the urban edge and the Outer Drive north of Wilson Avenue (ramps removed) that are offset by diminished views south of Wilson Avenue (ramps, parking lot). Views from the park are similar to existing conditions, with additional green space north of Wilson Avenue offset by the proposed frontage drive south of Wilson Avenue.

Cost/Constructability

- As shown on Exhibit 3.7-9, Alternative 1 has the relative lowest cost.
- Alternative 3 has the relatively highest cost, which is associated with the retaining walls and additional pavement needed to provide frontage drives along the Outer Drive.
- Alternative 2 would be the relative most constructible, since the alignment shift would better facilitate construction staging at Montrose Avenue.

Exhibit 3.7-9: Construction Cost				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Total Cost (2017 $)	N/A	$181M	$203M	$214M

Stakeholder Input

- Stakeholder expressed support for transit and bike/pedestrian related improvements.
- Stakeholders expressed support for improving safety and congestion for all modes.
- Stakeholders expressed a mixture of support and non-support for access changes.
- A combination of alternatives 1 (at Montrose Avenue and Wilson Avenue) and Alternative 2 (Lawrence Avenue) was the consensus choice of the Project Study Group.

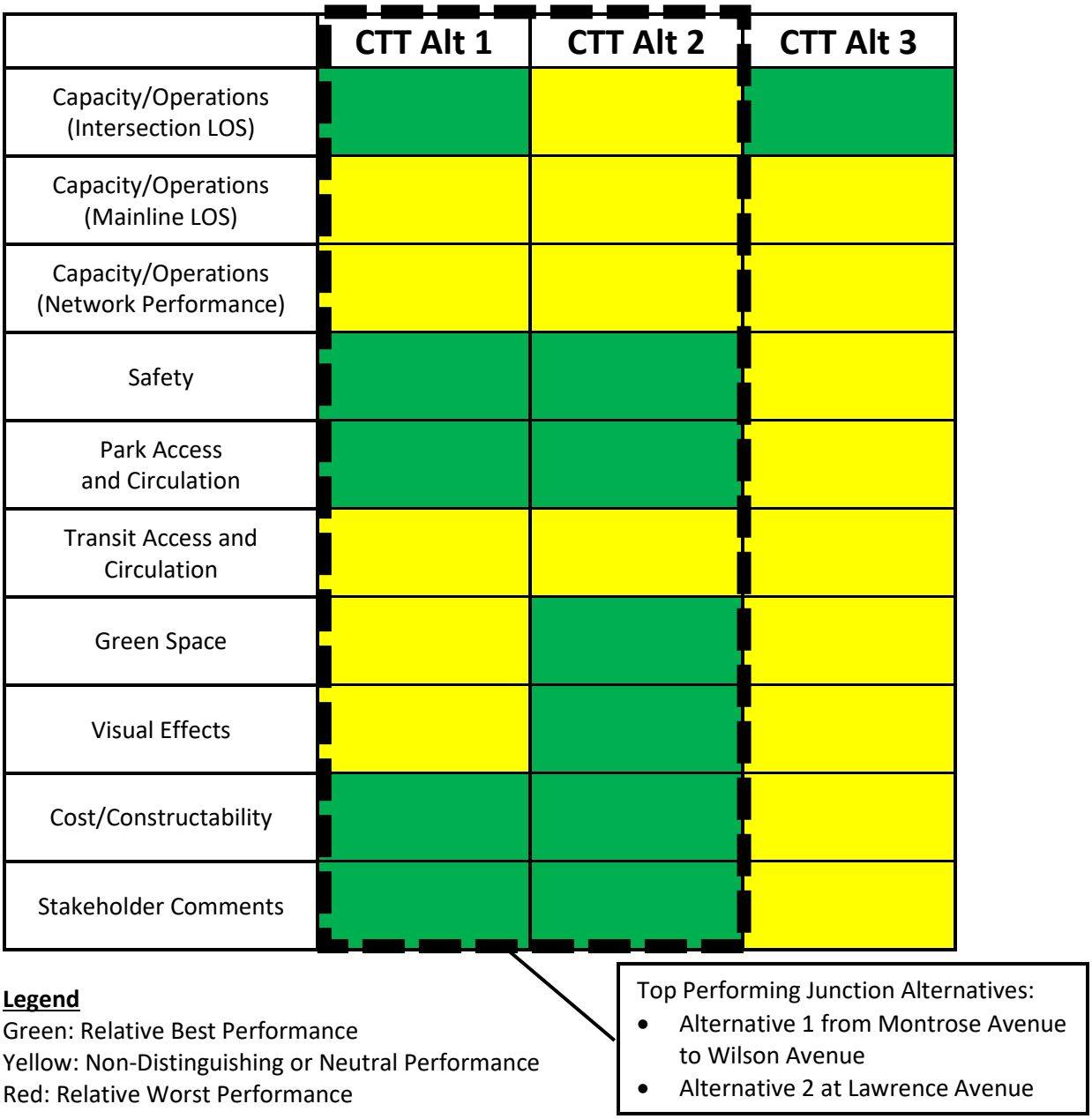
3.3.4 Conclusions

The following is an overview of the evaluation results, which is also summarized in Exhibit 3.7-7.

- All Build Alternatives provide similar Outer Drive and network performance.
- All Build Alternatives provide similar intersection LOS performance. However, it should be noted that Alternative 2, with three closely spaced intersections, would be relatively more prone to intersection capacity breakdowns and queueing.
- All Build Alternatives improve vehicular safety by adding clear zones, auxiliary lanes and increasing ramp spacing. Alternatives 1 and 2 provide the relative best overall safety performance by also eliminating all bike/pedestrian/vehicle conflict points at Wilson Avenue.
- Alternatives 1 and 2 provide the relative most improvement in park access and circulation by removing ramp connections at Wilson Avenue. Vehicles, pedestrians and cyclists accessing the park at Wilson Avenue would encounter fewer conflicts.
- All Build Alternatives provide a similar level of transit access and circulation.
- Alternative 2 creates the relative greatest amount of additional green space.
- Alternative 2 provided the best overall performance for visual effects. Alternatives 1 and 3 include off street parking lots and additional ramps along Marine Drive, which diminish views from the Outer Drive and the urban edge.
- Alternative 1 had the relative lowest cost; Alternative 2 would be relatively more constructible.
- Stakeholder comments included a mixture of support for various improvements.
- A combination of Alternatives 1 and 2 was the consensus choice of the Project Study Group.

Exhibit 3.7-10 summarizes the ratings for CTT Junction Alternatives 1, 2 and 3, and is a relative comparison of Build Alternatives. Once the overall Top Performing CTT Corridor Alternative is assembled, a comparison to the No Action Alternative, based upon travel performance, will be made, as summarized in section 1.3.3 of this Appendix.

Exhibit 3.7-10: Context Tailored Treatment Evaluation
Montrose-Wilson-Lawrence Junctions



Legend
Green: Relative Best Performance
Yellow: Non-Distinguishing or Neutral Performance
Red: Relative Worst Performance

Alternative 1 is recommended at Montrose Avenue and Wilson Avenue, as it provides the relative best mobility, safety and park access and circulation performance, while also avoiding the Outer Drive shift east associated with Alternative 2. Alternative 2 at Lawrence Avenue is recommended due to its compressed footprint. This alternative is subject to further refinement as the evaluation and coordination process advances.

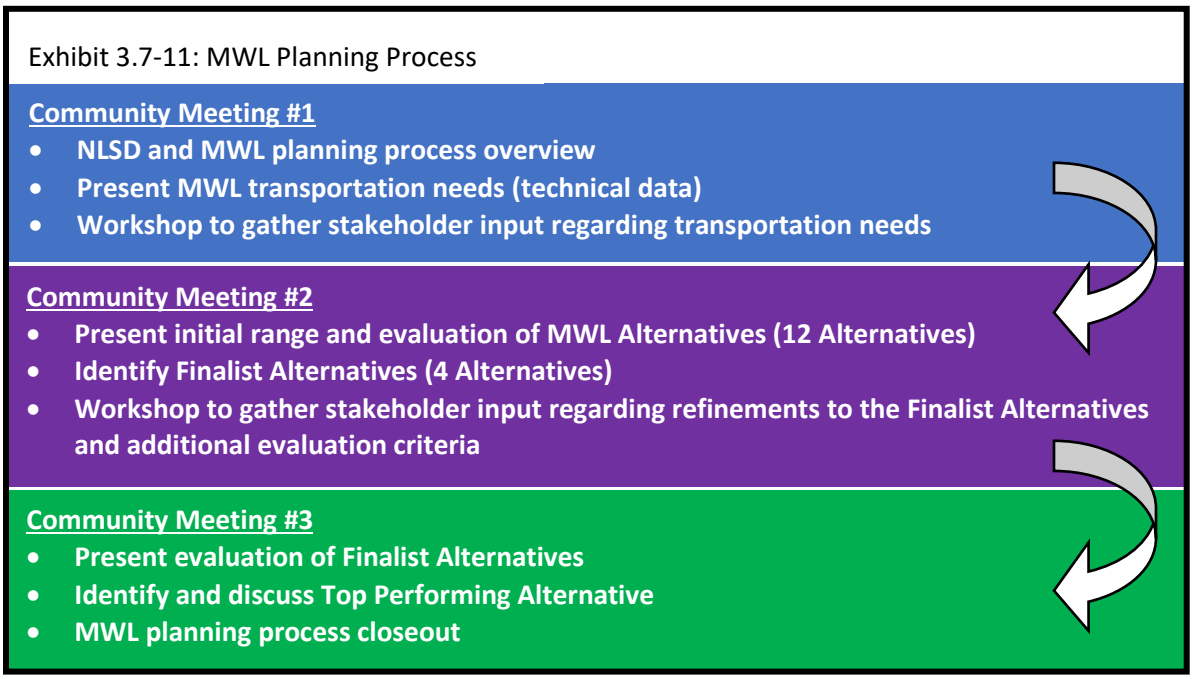
3.7-5 Montrose Avenue/Wilson Avenue/Lawrence Avenue Refinements

In response to additional comments received at Public Meeting #3 and subsequent Task Force Meetings, further stakeholder coordination and analysis was undertaken in the MWL section of the project. The following is a summary of the additional MWL coordination and analysis. Please see the project website (northlakeshoredrive.org) for additional information.

MWL Planning Process

As shown in Exhibit 3.7-11, the project team developed a planning process to further engage stakeholders in the Montrose/Wilson/Lawrence (MWL) section of the project. A total of 3 community meetings were hosted that coincided with each basic step in the NEPA process, including the identification of transportation needs, alternatives development and evaluation, and selecting a Top Performing Alternative.

Exhibit 3.7-11: MWL Planning Process



The following is a summary of each step in the MWL Planning process.

Transportation Needs Assessment (Community Meeting #1)

MWL **Community Meeting #1** was held on October 17, 2018 at Truman College, which is located along Wilson Avenue just west of the Outer Drive. The project team presented existing conditions, followed by a workshop to gather stakeholder comments relative to the transportation needs in the MWL area.

The input gathered at Community Meeting #1 was consistent with past input and analysis, and can be summarized as follows:

- Community access is very important.
- Improve park and transit access.
- Lakefront Trail crossings are critical safety issues.
- A mix of support or non-support for access changes.
- Support for dedicated bus lanes, additional green space.
- Montrose Avenue had the highest concentration of safety, congestion and access concerns.

This information assisted in the development of the initial MWL Alternatives, as well as the initial evaluation criteria. Exhibit 3.7-11 illustrates the initial alternatives evaluation criteria, which relates to the Purpose and Need as well as stakeholder comments from Community Meeting #1.

Exhibit 3.7-12: Initial Alternatives Evaluation Criteria	
Safety*	• Predicted crash frequency and severity (Outer Drive) • Emergency vehicle travel times from the Outer Drive
Mobility*	• Intersection Level of Service (local system) • Delay (overall MWL system)
Park Access*	• Number of east-west conflict points (bike/pedestrian)
Green Space**	• Net change in green space

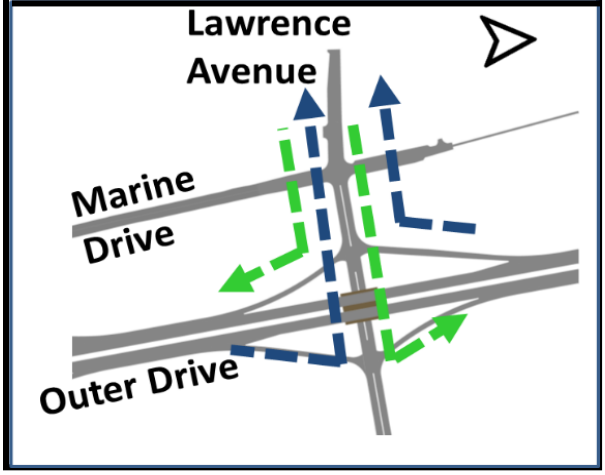
*Related to Purpose and Need as well as stakeholder input
**Related to stakeholder input

<u>Development of and Evaluation of Initial Alternatives (Community Meeting #2)</u>

The initial MWL Alternatives included a range of access/design strategies including minor design changes, ramp consolidation, ramp removal, or combinations of strategies. The strategies were then organized into groups according to the level of access or "movements" provided.

A movement is defined as an access path to/from the Outer Drive to Montrose Avenue, Wilson Avenue and Lawrence Avenue. Under existing conditions, there are a total of 12 movements to/from the Outer Drive (4 movements each at Montrose Avenue, Wilson Avenue and Lawrence Avenue). Exhibit 3.7-13 illustrates the 4 existing movements at the Lawrence Avenue junction.

Exhibit 3.7-13: Existing movements (4) at Lawrence Avenue



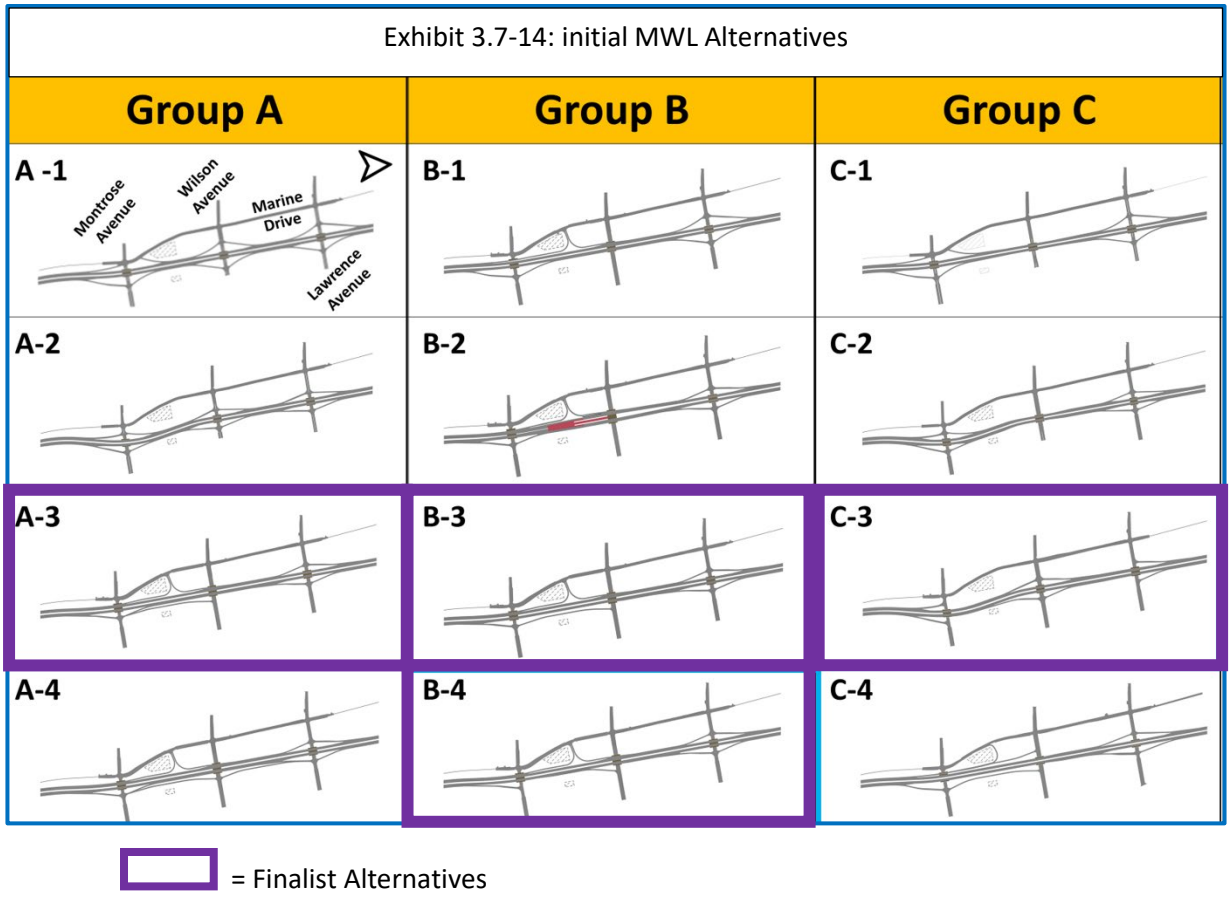
As shown on Exhibit 3.7-14, a total of 12 initial alternatives were developed and organized into the following groups:

- Group A provides 11 to 12 movements.
- Group B provides 10 movements.
- Group C provides 8 movements.

The initial alternatives were evaluated to determine the "best of" Groups A, B and C, using ratio scoring. Exhibit 3.7-14 also highlights the Top Performing Alternatives from each group.

- Alternative **A-3** was selected from Group A.
- Alternatives **B-3 and B-4** were selected from Group B.
- Alternative **C-3** was selected from Group C.

Exhibit 3.7-14: initial MWL Alternatives



= Finalist Alternatives

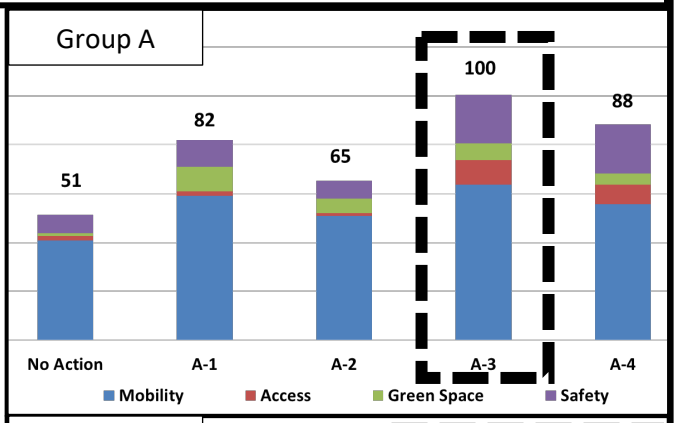
Exhibit 3.7-15 summarizes the initial alternatives evaluation results for Group A, B and C, as well as the ratio scoring within each group.

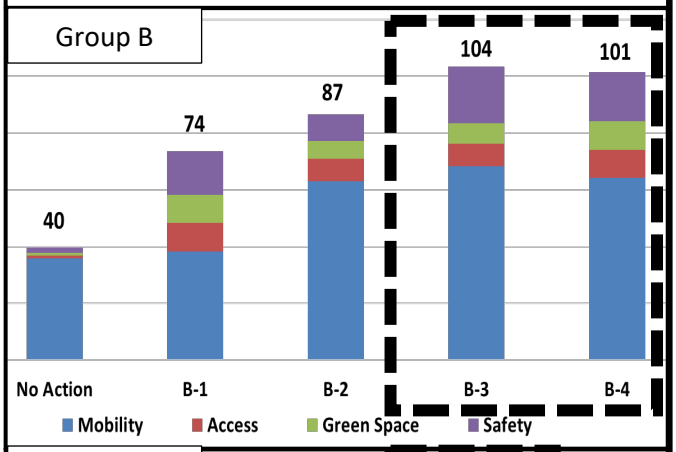
Exhibit 3.7-15: Group A, B and C Initial Evaluation Summary, Ratio Scoring

Alternative A-3 was the top performing alternative from Group A. Alternative A-3 provides the relative highest mobility performance, with a combination of relatively high Intersection LOS, Network and Travel Time performance. Alternative A-3 also has the fewest conflict points, the second largest increase in green space. Alternatives A-3 and A-4 provided the highest safety performance, which was driven by improved ramp spacing.

Alternatives B-3 and B-4 were the top performing Alternatives from Group B. Both alternatives provide relatively high Intersection LOS, Delay and Travel Time performance, had moderate to high performance for green space and access. Alternatives B-3 and B-4 provide the highest safety performance.

Alternative C-3 was the top performing alternative from Group C. Alternative C-3 provides the highest Intersection LOS performance and moderate Travel Time performance, while also providing moderate green space and access performance. Alternative C-3 had the second highest safety performance.





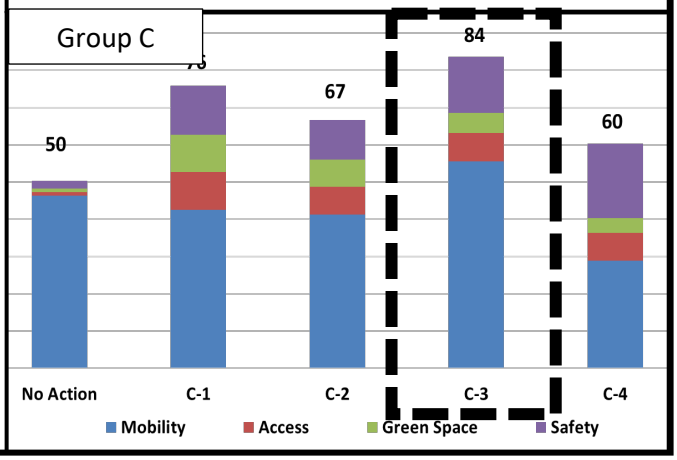
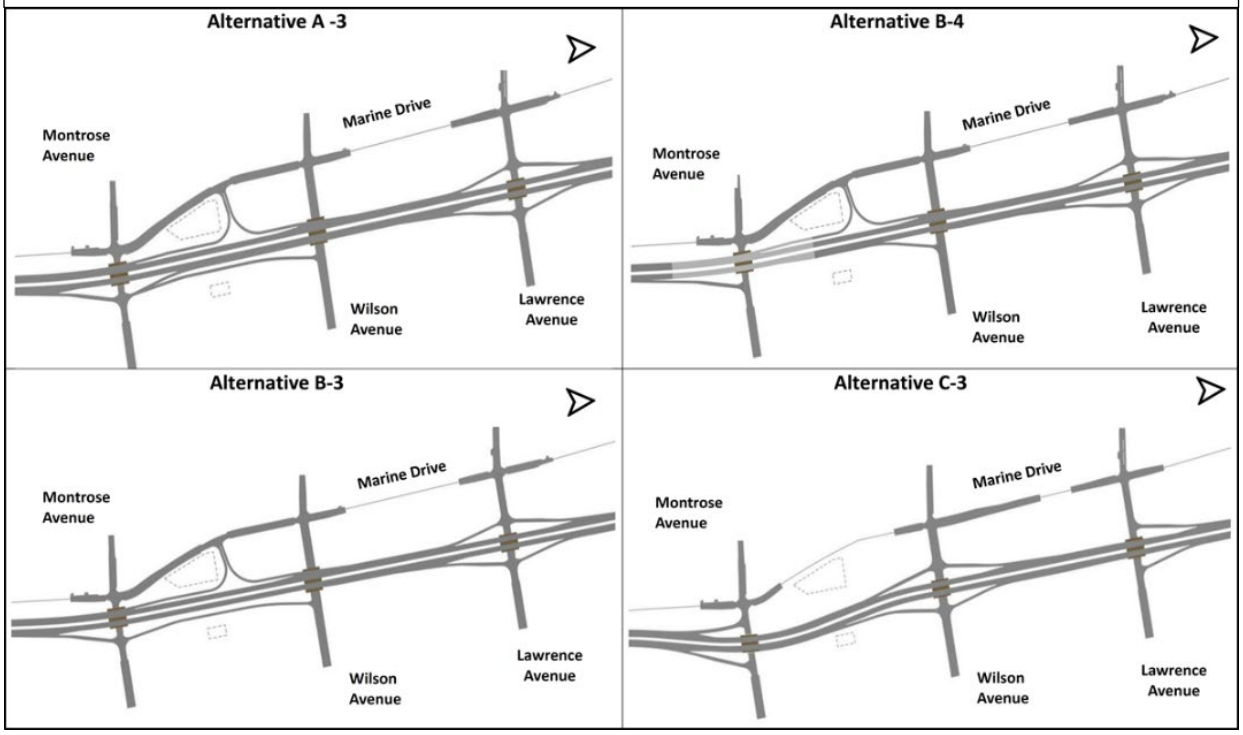


Exhibit 3.7-16: MWL Finalist Alternatives



MWL **Community Meeting #2** was held on January 24, 2019 at Truman College. The project team presented a summary of Community Meeting #1, described the initial alternatives development and evaluation, and identified the finalist alternatives. After the presentation, a workshop was conducted to gather feedback on the recommended Finalist Alternatives.

The MWL Community Meeting #2 stakeholder input can be summarized as follows:

- Commercial areas along Wilson Avenue are priority destinations.
- The traffic analysis should be extended further west.
- Bicycle and pedestrian facilities should be improved.
- Park impacts should be minimized, and park aesthetics should be improved.
- Provide additional information regarding the benefits of various design changes.
- Suggestions for expanded evaluation criteria related to safety, mobility, access and green space, and new a new criterion (cost/constructability).

Exhibit 3.7-17 illustrates the criteria used for the evaluation of the MWL Finalist Alternatives. The criteria added for the Finalist Alternatives evaluation, which was generated from MWL Community Meeting #2 input, is highlighted in yellow.

Exhibit 3.7-17: Finalist Alternatives Evaluation Criteria	
Safety	• Predicted crash frequency and severity (Outer Drive) • Emergency vehicle travel times from the Outer Drive
	• Emergency vehicle travel times to the Outer Drive
Mobility	• Intersection Level of Service (local system) • Delay (overall MWL system)
	• Transit travel times • Daily traffic redistribution
Park Access	• Number of east-west conflict points (bike/pedestrian)
	• Number of park exit points (auto) • Number of parking spaces
Green Space	• Net change in green space
	• Net change in green space east of the Outer Drive
Cost/Constructability	• Cost in 2017 $$/relative ease of construction

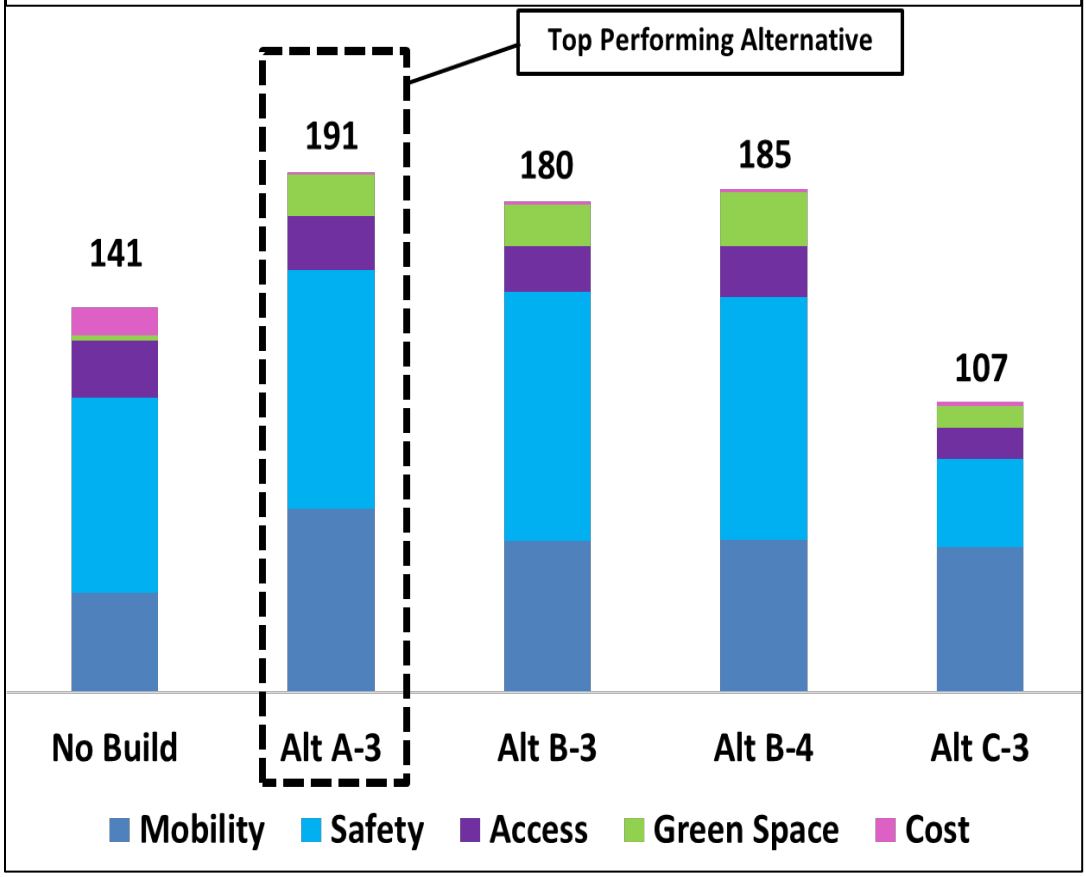
Finalist Alternatives Evaluation (Community Meeting #3)

The following is a summary of the MWL Finalist Alternatives evaluation.

- **Safety.** Alternative B-3 had the relative highest safety performance, while Alternatives A-3 and B-4 had relatively high safety performance. Alternative C-3 has the lowest safety performance, including the relative longest Emergency Vehicle travel times to/from the Outer Drive.
- **Mobility.** Alternative A-3 had the relative highest mobility performance, Alternatives B-3 and B-4 had relatively high mobility performance. Alternative C-3 had the relative lowest mobility performance; Alternative C-3 concentrates traffic at Wilson Avenue which causes the relative greatest impact upon the network of arterials to the west of the Outer Drive.
- **Access.** Alternatives A-3, B-3 and B-4 had the relative highest performance. Alternative C-3 had the relative lowest performance; Alternative C-3 impacted the greatest number parking spaces.
- **Green Space.** Alternative B-3 had the relative highest performance, followed by Alternatives A-3 and B-4, which provided relatively high performance. Alternative C-3 had the relative lowest performance; Alternative C-3 has an eastward shift of the Outer Drive, which causes additional impacts to the park space east of the Outer Drive.
- **Cost/Constructability.** There were no distinguishing differences between the Finalist Alternatives.

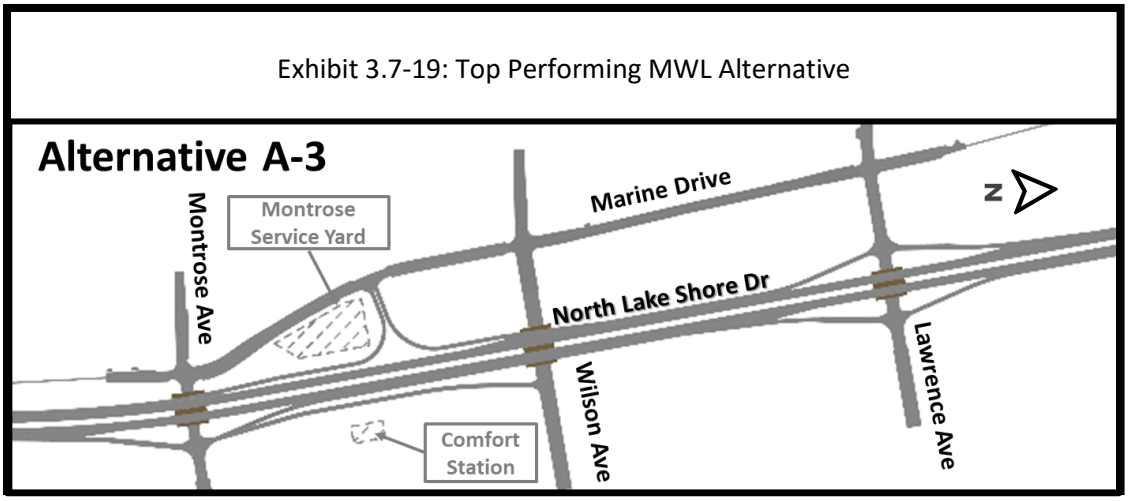
Exhibit 3.7-18 depicts the results of the ratio scoring for the Finalist Alternatives. The relatively high performance of Alternative A-3 in all evaluation categories resulted in the relative highest score.

Exhibit 3.7-18: Finalist Alternatives Evaluation Results



MWL **Community Meeting #3** was hosted at Truman College on September 26, 2019. The project team recapped Community Meetings #1 and #2, the results of the Initial Alternatives evaluation, and the results of the Finalist Alternatives evaluation. Stakeholders generally confirmed the selection of Alternative A-3, which is shown on Exhibit 3.7-19.

Exhibit 3.7-19: Top Performing MWL Alternative



3.4 Foster Avenue Junction

3.8.1 Current and 2040 No Action Conditions

General

Foster Avenue is an east-west minor arterial where it meets North Lake Shore Drive (Outer Drive) in a half diamond configuration, is under the jurisdiction of IDOT, and is marked as US 41 from the Outer Drive to Lincoln Avenue. The 2015 ADT of Foster Avenue is approximately 14,500 vpd. The typical cross section of Foster Avenue consists of two 12' lanes in each direction bound by B-6.12 curb and gutter. The Foster Avenue junction is grade separated, with the Outer Drive crossing over Foster Avenue. The northbound exit (east) ramp is stop-controlled and the southbound entrance (west) ramp is free-flow. Approximately 130' west of the free-flow southbound entrance ramp, Foster Avenue and Marine Drive intersect at a signalized intersection.

A bike/pedestrian underpass crosses the Outer Drive at Argyle Street to the south and at Berwyn Avenue to the north.

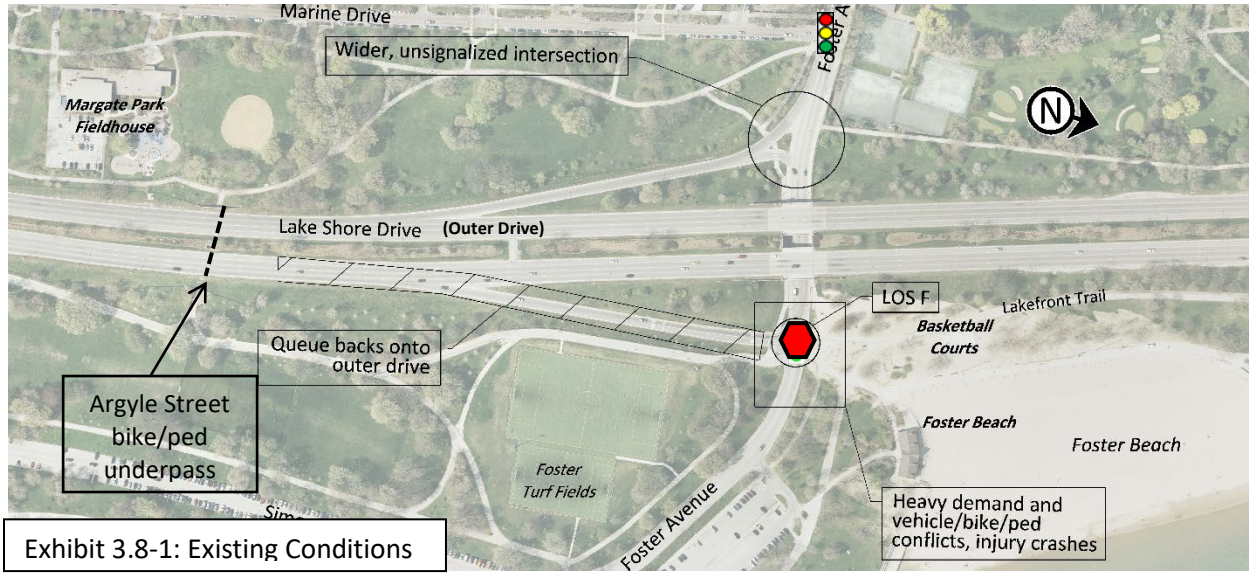


Exhibit 3.8-1: Existing Conditions

Less than a mile north of Foster Avenue, the Outer Drive terminates at the Hollywood Avenue/Sheridan Road intersection, and traffic is dispersed into the grid system to the west. Four northbound lanes and two southbound lanes are provided at this northern terminus. During the A.M. peak hours each weekday, CDOT performs a manual operation to reallocate the existing travel lanes on the Outer Drive. Orange traffic cones are used to provide four southbound and one northbound lane (with the remaining pavement closed off to vehicles). These manual operations occur north of Foster Avenue. However, northbound congestion, which is caused by the reduction to a single northbound lane, spills back from the north into the Foster Avenue junction during heavy traffic conditions. All Foster Avenue alternatives assume the Hollywood/Sheridan intersection will continue to operate via manual operations. The Northern Terminus Traffic Study (NTTS), which will examine capacity and operations within the grid system to the west, is ongoing and recommendations from the NTTS may or may not require refinements to the proposed Foster junction design.

This section of the Outer Drive carries the relative lowest commuter traffic volumes. However, travel demand on Foster Avenue is similar or higher during weekends. This area of Lincoln Park is home to many programmed activities throughout the year, and travel demand can peak during Park District special events.

Capacity/Operations (2040 No Action)

Under 2040 No Action conditions, the Marine Drive at Foster Avenue intersection operates at an acceptable level of service. However, the stop controlled Foster Avenue/northbound exit ramp intersection operates at LOS F in the A.M. and P.M. peak conditions. In addition, the 2040 No Action queue on the exit ramp causes back-ups onto the Outer Drive during the P.M. peak hour.

Bicycle and pedestrian travel along Foster Avenue is substantial, with up to 1,300 bikes/pedestrians using Foster Avenue each day to access the Lakefront and the Lakefront trail system. Cyclists/pedestrians on the south side of Foster Avenue must cross the southbound Outer Drive entrance ramp, which includes a wide radius, and is unsignalized, as well as the northbound Outer Drive exit ramp, which is stop controlled. The Lakefront Trail crosses Foster Avenue immediately east of the exit ramp. The proximity of the exit ramp and the Lakefront Trail, as well as the mix of vehicles, pedestrians and cyclists contribute to congested conditions.

Express bus service enters the Outer Drive at Foster Avenue and must compete with other vehicles while entering the Drive. There is local bus service (#92) along Foster Avenue, which circulates between Milwaukee Avenue and Sheridan Road; these buses currently stage along city streets and do not enter the park.

Safety

The Foster Avenue junction was designated as a 5% location which means that it was amongst the top 5% of priority locations in the State for safety improvements. Overall, a total of 159 crashes with 45 injuries and one fatality occurred at the Foster Avenue junction from 2007 to 2011, predominantly during dry, daytime conditions, as summarized in Exhibit 3.8-2.

The predominant crash types were rear end and sideswipe crashes, which could be generally attributed to merging and weaving operations that occur under congested conditions, and a lack of auxiliary lanes on the Outer Drive. The majority of the rear end and sideswipe crashes occurred in the northbound direction, which is likely related to the congestion spilling back from the manual operation lane reduction in the A.M. peak that occurs at the northern terminus of the project (the existing four northbound lanes are reduced to a single lane). The ongoing NTTS study may address some of the safety concerns at this location.

A total of 22 bike/pedestrian related crashes occurred at the Foster Avenue junction, with 21 of the 22 crashes resulting in an injury. The heavy bike/pedestrian volumes along Foster Avenue, combined with a lack of signalized or grade separated crossings are likely crash contributors.

Exhibit 3.8-2: Crash Summary (2007-2011)*
Foster Junction

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	0	0	0	0	3	3
Left Turn	0	0	0	0	0	0
Rear End	0	2	5	4	51	62
Sideswipe	0	0	1	1	28	30
Pedestrian/Bike	0	3	10	8	1	22
Off Rd. Fixed Obj.	1	1	6	2	12	22
Other	0	1	0	0	19	20
Total	1	7	22	15	114	159

Year	
2007	28
2008	52
2009	26
2010	28
2011	25

Pavement Condition	
Dry	121
Wet	27
Icy	11

Time of Day	
Day	120
Night	39

*Crash analysis will be updated for the Level 3/DEIS Alternatives evaluation

3.4.1 Build Alternatives

Each of the CTT Build alternatives retains the existing half diamond configuration and includes reconstruction of the bike/pedestrian tunnels at Argyle Street and Berwyn Avenue. A new pedestrian tunnel is proposed at the northbound ramp intersection, and the existing sidewalks along both sides of Foster Avenue will be replaced with multi-use trails. The Build Alternatives and the analysis area at each junction (e.g., green space, cost) is shown on Exhibit 3.8-3.

The following is a summary of each alternative considered:

<u>CTT Alternative 1 – Corridor Modernization Alternative</u>

The Corridor Modernization Alternative includes the replacement of the Foster Avenue ramps in their existing locations. The northbound exit ramp would be signalized. The southbound entrance ramp intersection would be more compact and include a more defined crossing, but pedestrians would continue to cross under free flow conditions.

<u>CTT Alternative 2 – Compressed Roadway Alternative</u>

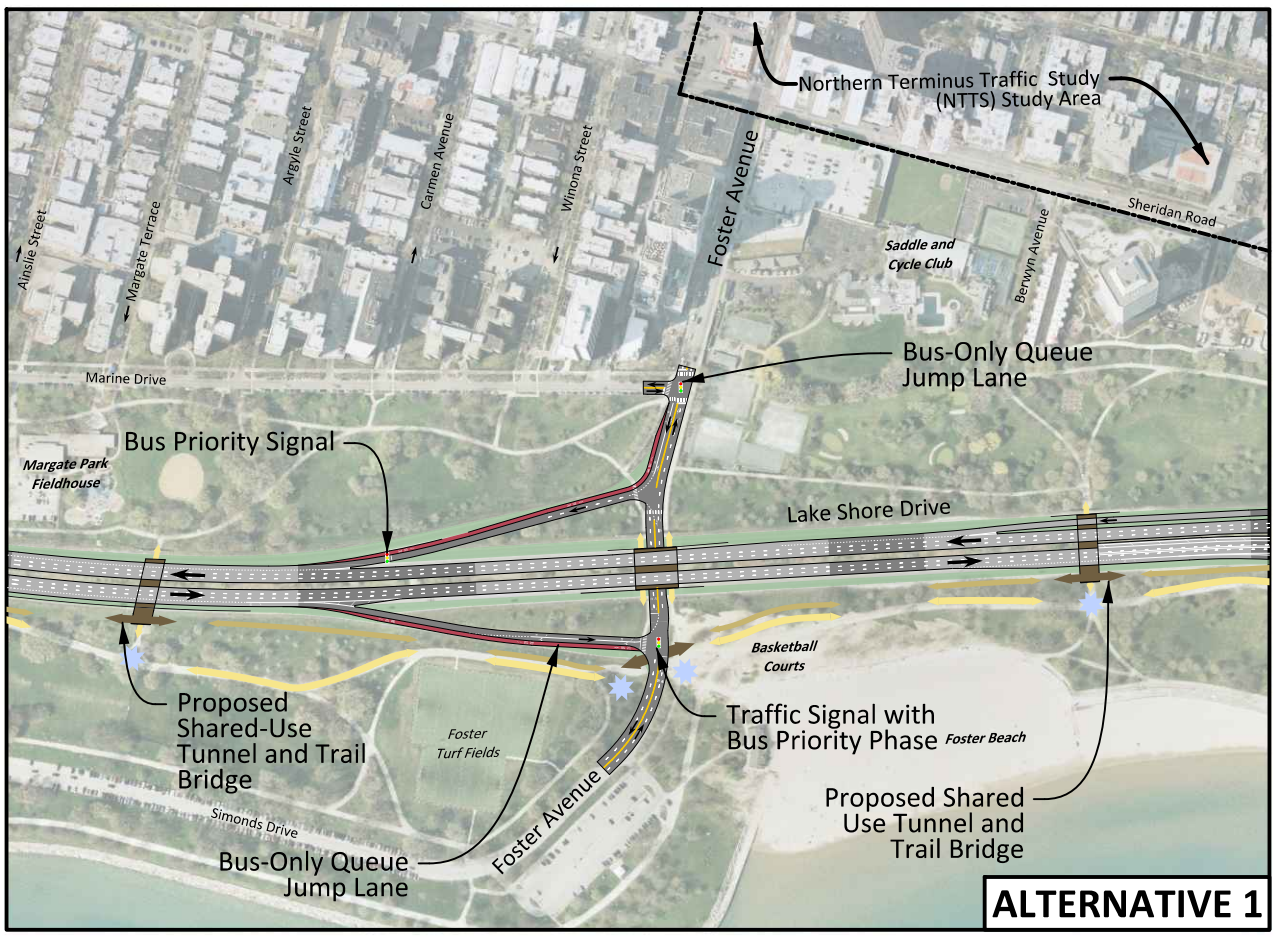
The Compressed Roadway Alternative compresses the Foster Avenue ramps to minimize the transportation footprint and includes the same free flow southbound entrance ramp intersection design as CTT Alt 1. The northbound exit ramp would be signalized.

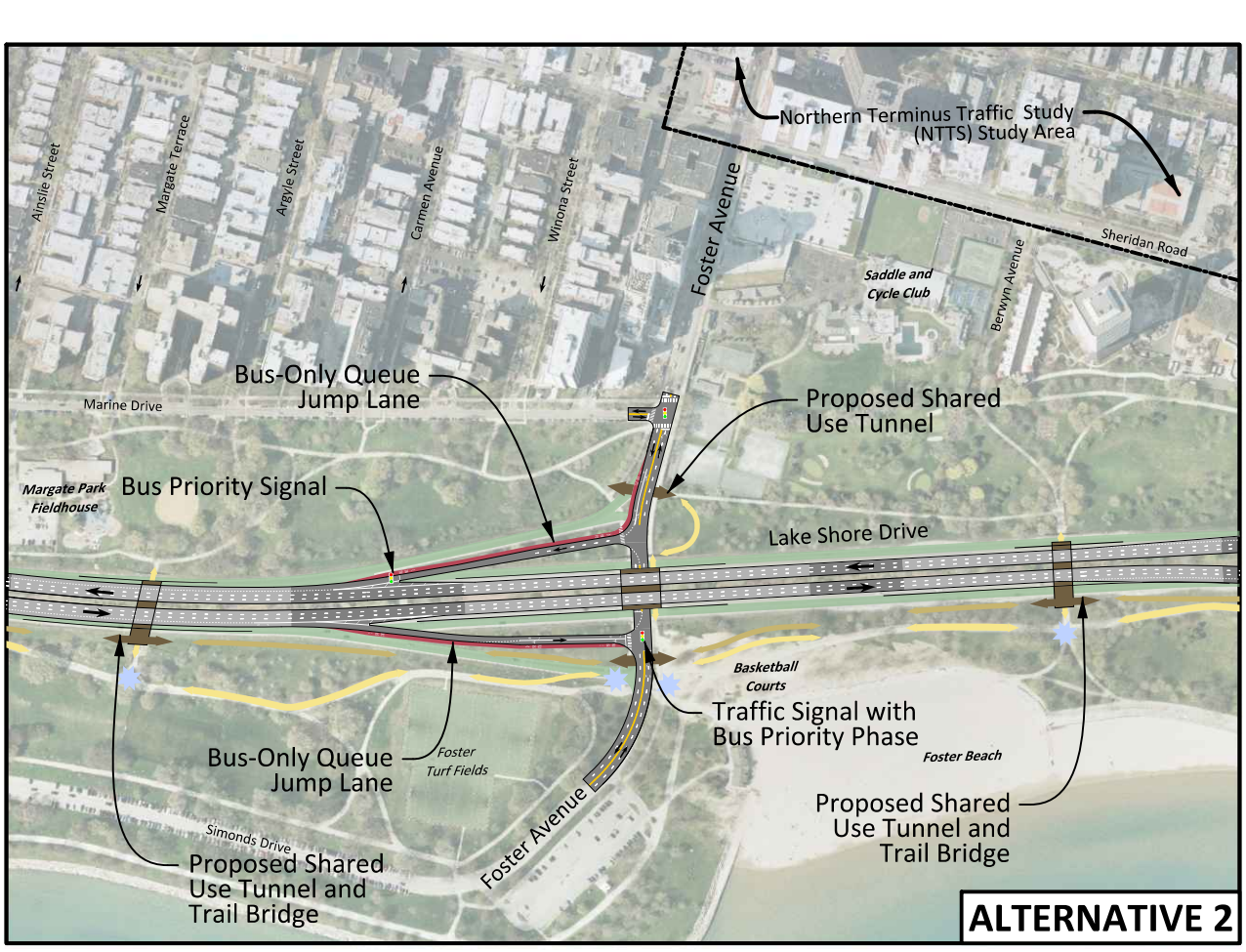
A pedestrian tunnel would be added on the west side of the junction to provide a grade separated crossing of Foster Avenue on both sides of the junction.

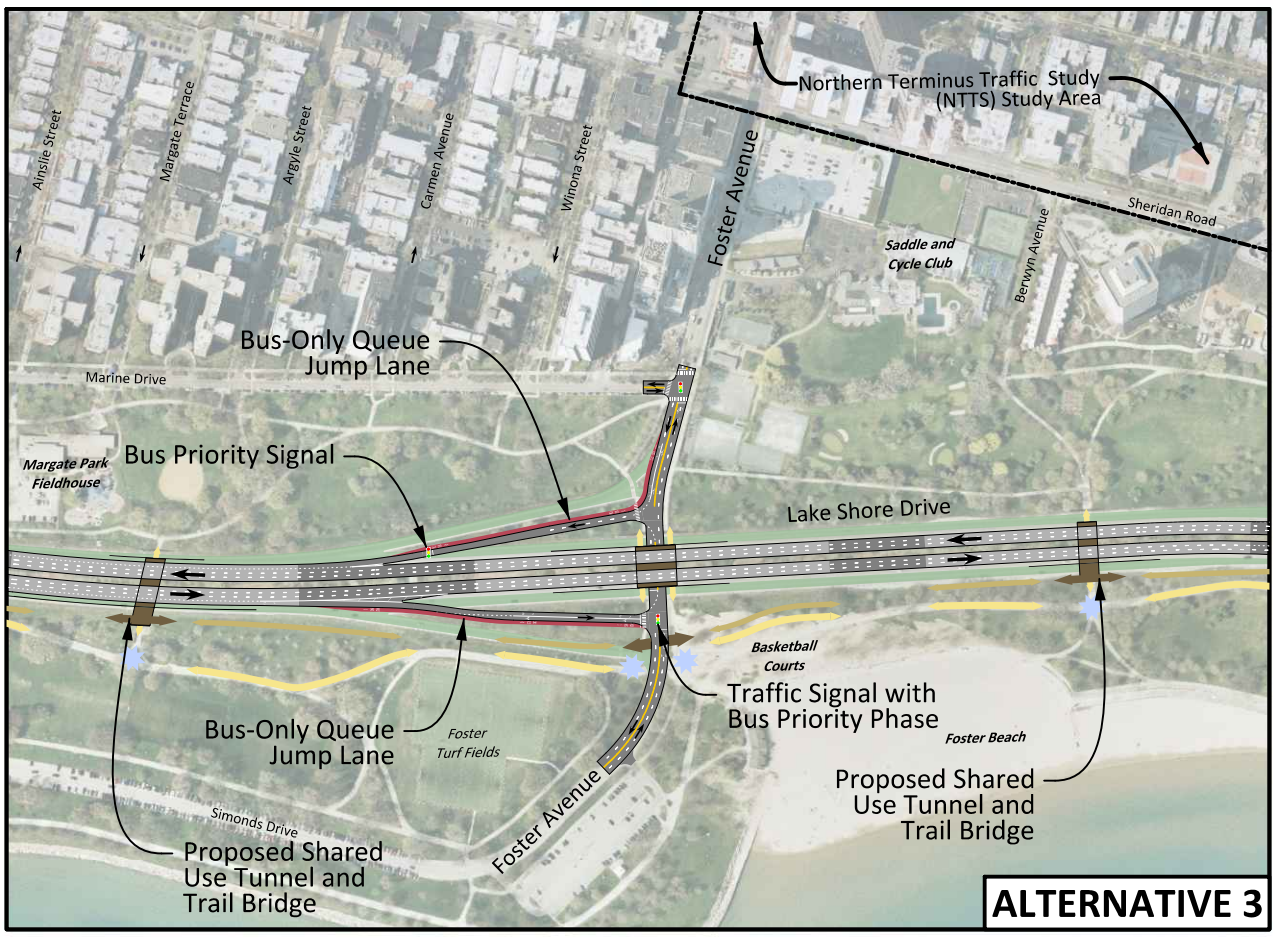
<u>CTT Alternative 3 - Frontage Drive Alternative (Frontage Drives not provided at this location)</u>

The Frontage Drive Alternative does not include a Frontage Drive in this area and is similar to CTT Alternative 2, with the exception of the bike/pedestrian tunnel west of the Outer Drive, which is not included with CTT Alternative 3.

Exhibit 3.8-3: Foster Avenue Junction Alternatives







0' 250' 500'

REDEFINE THE DRIVE
NORTH LAKE SHORE DRIVE

LEGEND

Below Grade / At Grade / Above Grade
- Roadway Facility
- Bus-Only Facility
- Bridges and Tunnels
- Potential Green Space
- Potential Relocated/New Beach
- One-Way Street
- Two-Way Street
- Traffic Signal
- Existing Shoreline
- Proposed Shoreline
- Lower Speed Trail
- Higher Speed Trail
- Higher Speed/Lower Speed Trail Junction
- Pedestrian/Bike Bridges and Underpasses

3.4.2 Alternatives Evaluation

The alternatives were evaluated utilizing a variety of factors including travel performance, safety, park access and circulation, green space, transit access and circulation, visual effects, cost/constructability, and stakeholder input.

Traffic Operations

Intersection Level of Service (LOS)

As shown in Exhibit 3.8-4, each of the Build Alternatives provides an acceptable overall LOS. Each of the Build Alternatives also substantially improves capacity (at the NB ramp) over the No Action alternative by converting the existing stop controlled intersection to a signalized intersection.

Exhibit 3.8-4: 2040 Intersection Level of Service

Intersection	2040 No Action		CTT Alt 1		CTT Alt 2/3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Foster Avenue at NB NLSD Exit Ramp	F	F	A	B	A	B
Foster Avenue at Marine Drive	B	B	B	B	B	B

Mainline Level of Service

As shown in Exhibit 3.8-5, each of the Build Alternatives provides similar performance.

Exhibit 3.8-5: 2040 NLSD Level of Service

Outer Drive Section	No Action*		CTT Alt 1		CTT Alt 2/3	
			A.M.	P.M.	A.M.	P.M.
Lawrence Avenue to Foster Avenue Northbound (weave)			B	C	B	C
Foster Avenue to Bryn Mawr Avenue Northbound			B	C	B	C
Bryn Mawr Avenue to Foster Avenue Southbound			C	B	C	B
Foster Avenue to Lawrence Avenue Southbound (weave)			C	B	C	B

*The HCM software does not fully capture existing and 2040 No Action conditions. The No Action comparison will be made at the corridor level, after assembling the Top Performing CTT Alternative.

Overall Network Performance

The overall network, including the Outer Drive and the signalized intersections within or within close proximity to the Foster Avenue junction were compared to the No Action Alternative. The total network delay (in hours) and total network travel time (in hours) for each alternative was measured.

As shown in Exhibit 3.8-6, All Build Alternatives improve performance over the No Action alternative and have comparable performance, with Alternatives 2 and 3 having the relative best performance.

Exhibit 3.8-6: 2040 Network Performance

	2040 No Action		CTT Alt 1		CTT Alt 2/3	
	A.M.	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**
Total Delay (hours)	21	34	7	8	7	8
Total Travel Time (hours)	162	144	152	139	151	114

Safety

- All Build Alternatives include auxiliary lanes between Foster Avenue and Lawrence Avenue, which will improve merging and weaving operations.
- All Build Alternatives will improve bicycle and pedestrian safety by converting the existing stop controlled intersection at the northbound exit ramp to signalized operations and grade separating the Lakefront Trail at Foster Avenue.
- Alternative 2 provides a relatively higher level of bicycle/pedestrian safety benefits due to the additional pedestrian crossings that are grade separated or signal controlled.

Park Access and Circulation

- All Build Alternatives improve park access and circulation by signalizing the northbound exit ramp intersection at Foster Avenue, providing a multi-use path along Foster Avenue, and by providing a grade separation of the Lakefront Trail and Foster Avenue, which will reduce conflicts between vehicles, cyclists, and pedestrians.
- Alternative 2 provides an additional underpass immediately west of the southbound entrance ramp, which provides relatively better access to the park.

Transit Access and Circulation

- The Build Alternatives provide similar levels of improved transit access and circulation. The proposed Bus Priority Signal at the northbound exit ramp, and the queue jump lanes on both ramps will improve bus access. This will enhance performance for the Express Bus 147 route, which enters/exits the outer Drive at Foster Avenue.
- The Build Alternatives will improve circulation by adding a bus turnaround/layover facility on Foster Avenue, near the parking lot for Foster Avenue beach.

Green Space

- As shown in Exhibit 3.8-7, all Build Alternatives provide additional green space.
- Alternatives 2 and 3 have similar (compressed) footprints and result in a larger net increase in green space.

Exhibit 3.8-7: Net Green Space (rounded to nearest acre)			
	2040 No Action	**CTT Alt 1**	**CTT Alt 2 and 3**
Green Space (Ac)	N/A	+1	+3

Visual Effects

- Alternative 1 views are similar to existing conditions.
- Alternatives 2 and 3 improve the views from the urban edge and the park by compressing the footprint to create the relative most additional park space.

Cost/Constructability

As shown on Exhibit 3.8-8, Alternatives 1 and 3 have the relative lowest costs. Alternative 2 includes longer retaining walls and an additional pedestrian underpass, and therefore has a relatively higher cost. The Build Alternatives would have similar constructability performance.

Exhibit 3.8-8: Construction Cost				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Total Cost (2017 $)	N/A	$109M	$215M	97M

Stakeholder Input

- Stakeholder comments at the Foster Junction indicated support for retaining the existing ramp configuration.
- Stakeholders expressed concerns that a pedestrian tunnel on the west side of the junction may not be used (Alternative 2).
- Alternative 2 was the consensus choice of the Project Study Group.

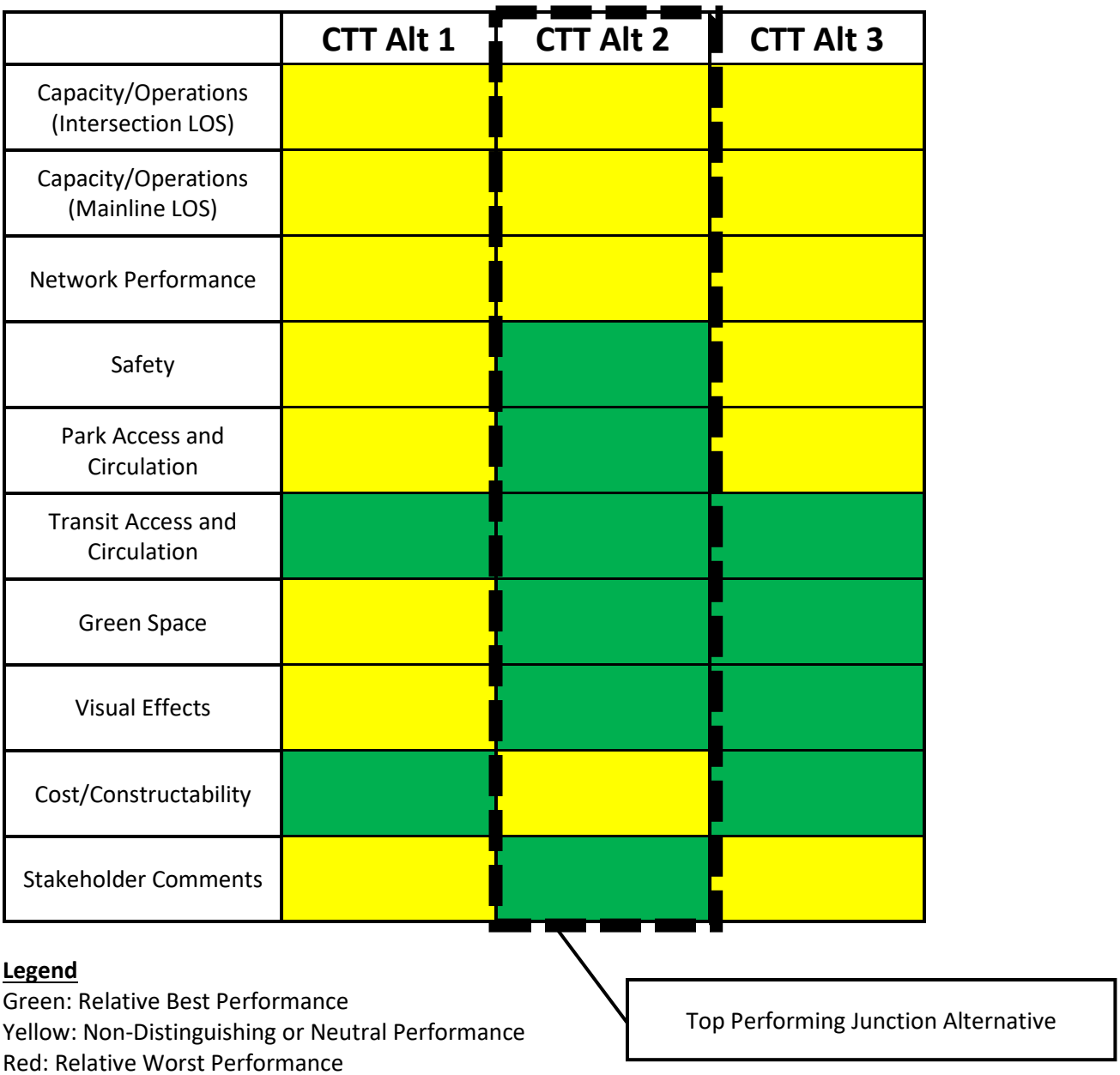
3.4.3 Conclusions

The following is an overall summary of the evaluation results, which is also reflected on Exhibit 3.8-9.

- The Build Alternatives provide similar Intersection LOS, Outer Drive and network performance.
- Alternative 2 provides relatively better safety and park access/circulation by providing improved bicycle/pedestrian crossings at both ramp intersections.
- The Build Alternatives provide similar transit access and circulation benefits.
- Alternatives 2 and 3 create relatively more green space by compressing the transportation footprint.
- Alternatives 2 and 3 have relatively better visual effects.
- Alternatives 1 and 3 had the relative lowest cost; there were no distinguishing differences in constructability.
- Stakeholder comments were not distinguishing; Alternative 2 was the consensus choice of the PSG.

Exhibit 3.8-9 summarizes the ratings for CTT Junction Alternatives 1, 2 and 3, and is a relative comparison of Build Alternatives. Once the overall Top Performing CTT Corridor Alternative is assembled, a comparison to the No Action Alternative, based upon travel performance, will be made, as summarized in section 1.3.3 of this Appendix.

Exhibit 3.8-9: Context Tailored Treatment Evaluation
Foster Avenue Junction



Legend
Green: Relative Best Performance
Yellow: Non-Distinguishing or Neutral Performance
Red: Relative Worst Performance

Alternative 2 improves mobility, provides the relative best performance for safety and park access/circulation, while also providing additional green space. This alternative is subject to further refinement as the evaluation and coordination process advances.

3.8.5 Foster Avenue Junction Refinement

Alternative 2, which was identified in section 3.8.4 as the Top Performing Alternative at Foster Avenue, is shown on Exhibit 3.8.10. As previously noted, the southbound entrance ramp is free-flow, which hinders bicycle and pedestrian crossings. Alternative 2 includes a pedestrian underpass west of the Outer Drive to address pedestrian safety.

However, stakeholders expressed concerns that the underpass would not be utilized, and that pedestrians would continue to cross the free flow southbound ramp.

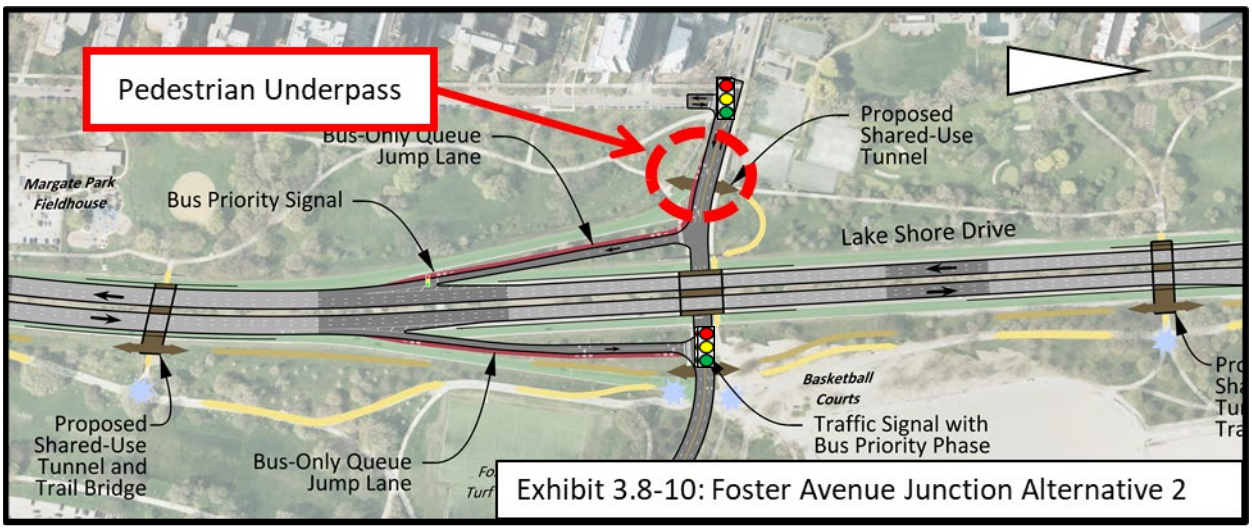


Exhibit 3.8-10: Foster Avenue Junction Alternative 2

Therefore, a design refinement at the Foster Avenue junction was developed to further address pedestrian safety, specifically near the southbound entrance ramp. As shown on Exhibit 3.8-11, Alternative 2A (a refinement to Alternative 2) was developed to eliminate the pedestrian underpass. The southbound ramp, Marine Drive, and portions of Foster Avenue are realigned to create a signalized intersection. Pedestrians would cross at-grade at this new signal.

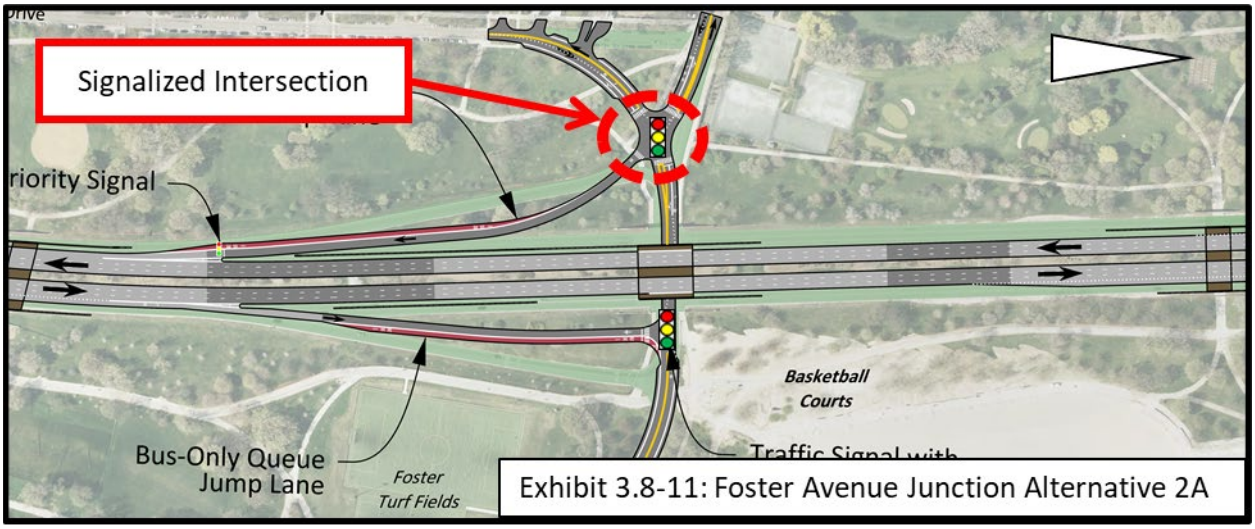


Exhibit 3.8-11: Foster Avenue Junction Alternative 2A

The following is a comparison of Alternatives 2 and 2A in the area of the southbound ramp.

Capacity/Operations

Alternatives 2 and 2A provide similar intersection LOS.

2040 Intersection Level of Service				
Intersection	**Alternative 2**		**Alternative 2A**	
	A.M.	**P.M.**	**A.M.**	**P.M.**
Foster Avenue at NB NLSD Exit Ramp	A	B	B	B
Foster Avenue at Marine Drive	B	B	B	B

Safety

Alternatives 2 (pedestrian tunnel) and 2A (signalized intersection) improve bike/pedestrian safety over the No-Action alternative by providing a grade separated or signal controlled crossing at the southbound entrance ramp.

Park Access and Circulation

Alternative 2A provides slightly better park access and circulation, since it allows bike/pedestrian access on both sides of Foster Avenue.

Transit Access and Circulation

Alternatives 2 and 2A provide the same improvements with respect to transit access and circulation.

Green Space

Alternatives 2 and 2A provide a net increase in green space (approximately 1 acre each).

Visual Effects

- Alternative 2 would have views that are similar to existing conditions.
- Alternative 2A would have diminished views from the urban edge as compared to existing conditions, which is somewhat offset by increased green space along Marine Drive.

Stakeholder Comments

Alternative 2A best reflects stakeholder comments related to the pedestrian crossing design at the southbound ramp, and was the consensus choice of the PSG.

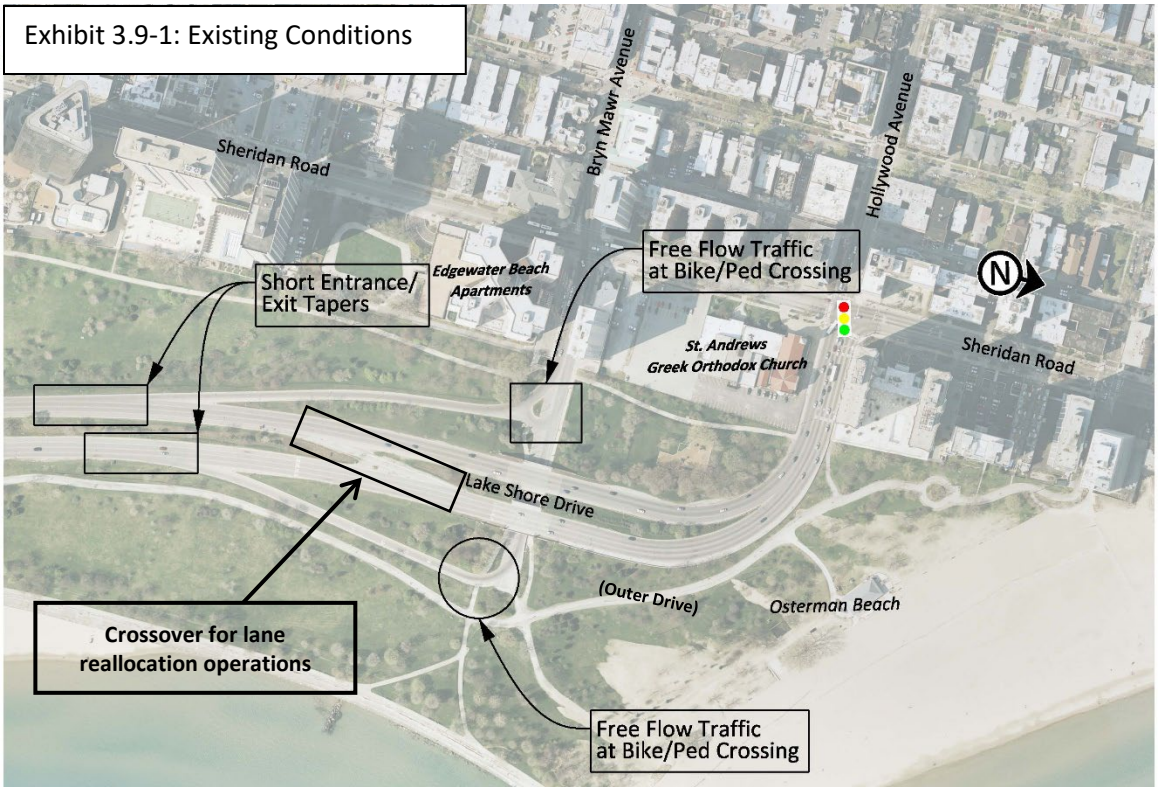
Conclusion: Alternatives 2 and 2A have similar overall performance. Alternative 2A will be carried forward at this time based upon stakeholder and Project Study Group input. This alternative is subject to further refinement as the evaluation and coordination process advances.

3.5 Bryn Mawr Avenue Junction

3.5.1 Current and 2040 No Action Conditions

General

Bryn Mawr Avenue is an east-west other principal arterial where it meets North Lake Shore Drive (Outer Drive) in a half diamond configuration and is under the jurisdiction of CDOT. The 2015 ADT of Bryn Mawr Avenue is approximately 13,200 vpd. The typical section of Bryn Mawr Avenue (in the vicinity of the Outer Drive) consists of two 12' lanes in the westbound direction and one 12' eastbound lane with on-street parking and dedicated bike lanes, bound by B-6.12 curb and gutter. The Bryn Mawr Avenue junction is grade separated, with the Outer Drive crossing over Bryn Mawr Avenue. It is a half diamond junction with ramps to and from the south. Both the northbound exit ramp and the southbound entrance ramp are free flow. Approximately 600' west of the Outer Drive, Bryn Mawr Avenue and Sheridan Road intersect at a signalized intersection.



Just north of Bryn Mawr Avenue, the Outer Drive terminates at the Hollywood Avenue/Sheridan Road signalized intersection, and traffic is dispersed into the grid system to the west. Four northbound lanes and two southbound lanes are provided at this northern terminus. During the A.M. peak hours each weekday, CDOT performs a manual operation to reallocate the existing travel lanes on the Outer Drive. Orange traffic cones are used to provide four southbound and one northbound lane (with the remaining pavement closed off to vehicles). These manual operations occur between Foster Avenue and Bryn Mawr Avenue, with a crossover just south of Bryn Mawr Avenue.

The reduction to a single northbound lane causes congestion to spill back from the north into the Bryn Mawr Avenue and Foster Avenue junctions during heavy traffic conditions. All Bryn Mawr Avenue alternatives assume the Hollywood/Sheridan intersection will continue to operate via manual operations. The Northern Terminus Traffic Study (NTTS), which will examine capacity and operations within the grid system to the west, is ongoing and recommendations from the NTTS may or may not require refinements to the proposed Bryn Mawr junction design.

Capacity/Operations (2040 No Action)

Under 2040 No Action conditions, the Bryn Mawr Avenue and Sheridan Road intersection operates at LOS C during the A.M and P.M. peak conditions.

Bicycle and pedestrian travel along Bryn Mawr Avenue is substantial, with up to 1,980 bikes/pedestrians using Bryn Mawr Avenue each day to access the lakefront and the trail system. Cyclists/pedestrians on the south side of Bryn Mawr Avenue must cross the southbound Outer Drive entrance ramp, which includes a relatively wide radius and the northbound Outer Drive exit ramp, which are both free flow.

The Lakefront Trail is immediately east of the northbound exit ramp. There is local bus service (#84) along Bryn Mawr Avenue, which circulates between Central Avenue and Sheridan Road; these buses currently utilize a turnaround at the southbound entrance ramp and stage along city streets.

Safety

From 2007 to 2011, a total of 100 crashes with 19 injuries occurred at the Bryn Mawr Avenue junction, predominantly during daytime, dry conditions, as shown on Exhibit 3.9-2. The predominant crash types were rear end and sideswipe crashes, which could be generally attributed to merging and weaving operations that occur under congested conditions. The majority of these crashes occurred in the northbound direction, which is likely related to congestion, lane changes and speed differential caused by the manual operations and lane reduction in the A.M. peak (northbound is reduced to one lane).

There were no recorded bike/pedestrian crashes at this junction. However, given the level of bike/pedestrian usage, further enhancing bike/pedestrian safety is a priority.

Exhibit 3.9-2: Crash Summary (2007-2011)*
Bryn Mawr Junction

Collision Type and Severity						
Type	K	A	B	C	PDO	Total
Right Turn	0	0	0	0	0	0
Left Turn	0	0	0	0	0	0
Rear End	0	3	3	6	41	53
Sideswipe	0	0	1	0	16	17
Pedestrian/Bike	0	0	0	0	0	0
Off Rd. Fixed Obj.	0	0	2	3	10	15
Other	0	0	1	0	14	15
Total	0	3	7	9	81	100

Year	
2007	20
2008	32
2009	22
2010	17
2011	9

Pavement Condition	
Dry	82
Wet	15
Icy	3

Time of Day	
Day	83
Night	17

*Crash analysis will be updated for the Level 3/DEIS Alternatives evaluation

3.5.2 Build Alternatives

CTT Alternatives 1 and 2 retain the existing half diamond configuration and CTT Alternative 3 converts the Bryn Mawr/Outer Drive junction to an at-grade signalized intersection. The following features are common to all Build Alternatives:

- Lakefront Trail improvements.
- A bus turnaround facility at the west ramp intersection.
- A bike/pedestrian tunnel west of the Bryn Mawr Avenue junction.
- A bike/pedestrian tunnel at the Outer Drive between Bryn Mawr Avenue and Hollywood Avenue.

The Build Alternatives and the analysis area for each junction (e.g., green space, cost) is shown on Exhibit 3.9-3.

The following is a summary of each alternative considered:

CTT Alternative 1 – Corridor Modernization Alternative

The Corridor Modernization Alternative includes the reconstruction of the Bryn Mawr Avenue ramps essentially in their existing locations, with each ramp lengthened to improve operations. Both ramp intersections would remain free flow.

A multi-use trail is provided along the north and south sides of Bryn Mawr Avenue. A pedestrian tunnel would be included at the northbound exit ramp.

CTT Alternative 2 – Compressed Roadway Alternative

The Compressed Roadway Alternative compresses both Bryn Mawr Avenue ramps to minimize the transportation footprint and includes the same free flow ramp intersection design. Both ramps would be lengthened by approximately 500 feet.

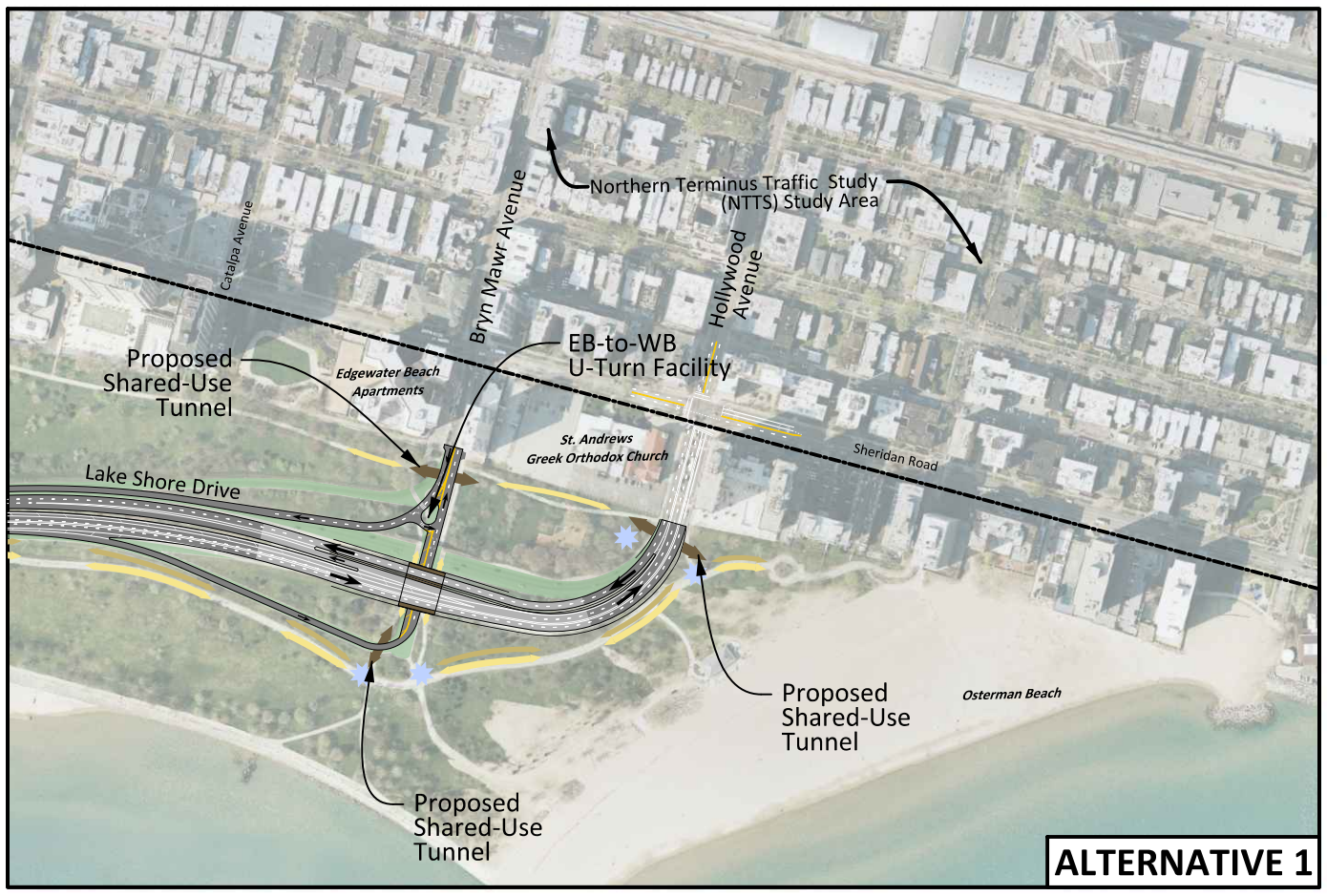
A multi-use trail is provided along the north side of Bryn Mawr Avenue.

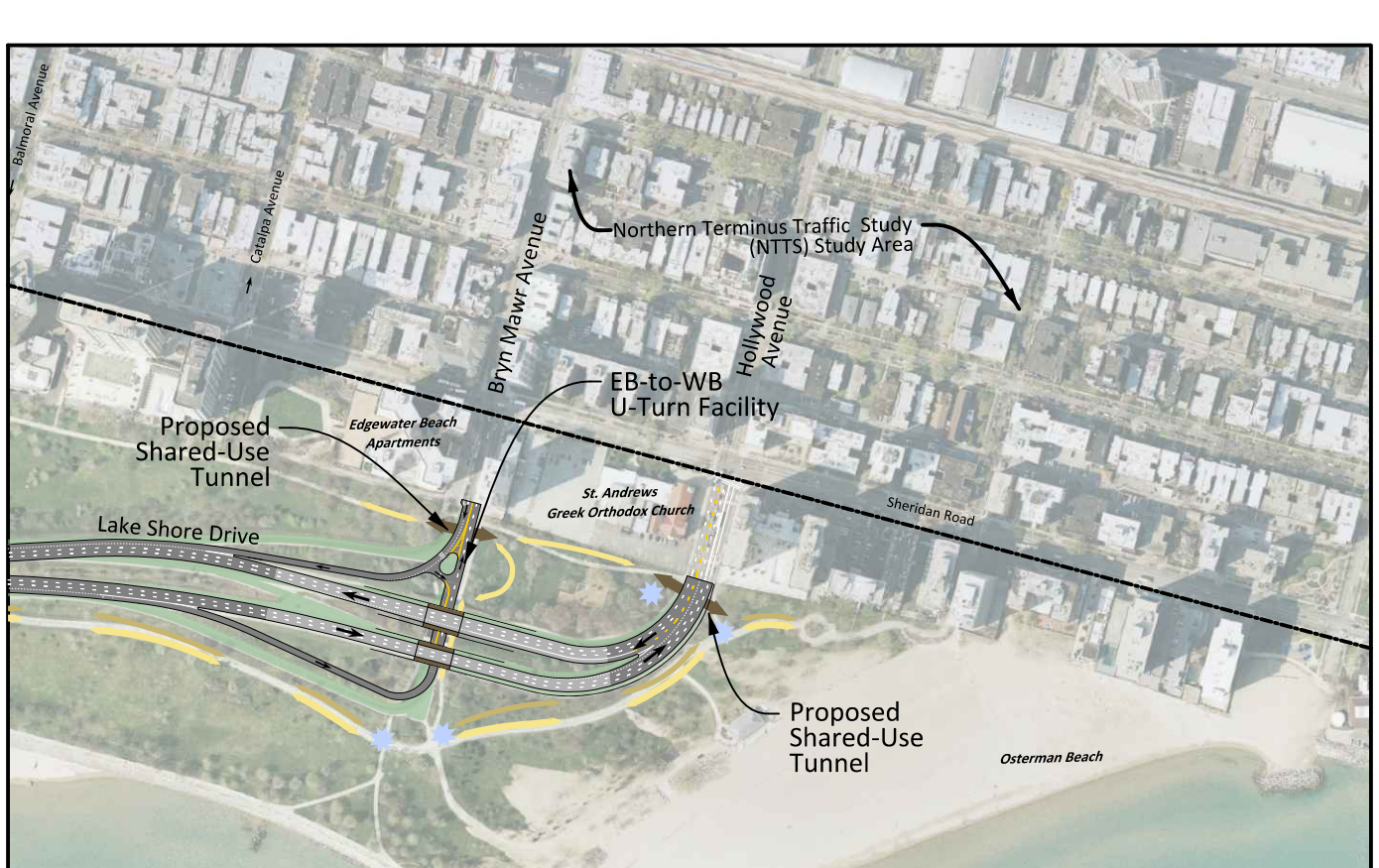
CTT Alternative 3 - Frontage Drive Alternative (Frontage Drives are not provided at this location)

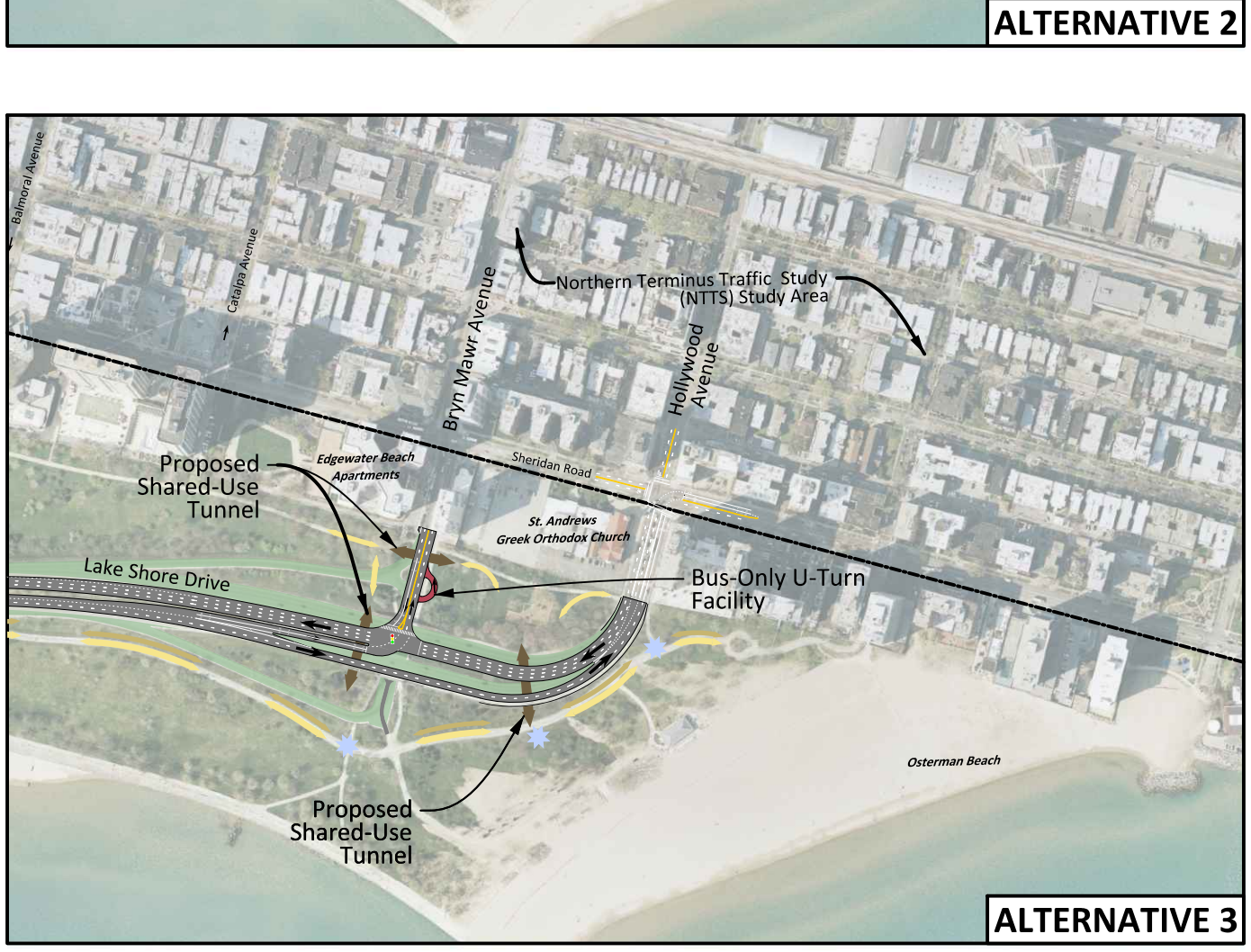
The existing grade separated junction would be removed and converted to an at-grade signalized intersection. The northbound Outer Drive lanes would be on a separate alignment to the east, which would allow northbound vehicles to bypass the proposed signal.

A bike/pedestrian tunnel would be included beneath the Outer Drive, south of Bryn Mawr Avenue.

Exhibit 3.9-3: Bryn Mawr Avenue and Hollywood Avenue Junction Alternatives







REDEFINE THE DRIVE
NORTH LAKE SHORE DRIVE

LEGEND

Below Grade / At Grade / Above Grade

- Roadway Facility
- Bus-Only Facility
- Bridges and Tunnels
- Potential Green Space
- Potential Relocated/New Beach
- One-Way Street
- Two-Way Street
- Traffic Signal
- Existing Shoreline
- Proposed Shoreline
- Lower Speed Trail
- Higher Speed Trail
- Higher Speed/Lower Speed Trail Junction
- Pedestrian/Bike Bridges and Underpasses

3.5.3 Alternatives Evaluation

The alternatives were evaluated utilizing a variety of factors including travel performance, safety, park access and circulation, green space, transit access and circulation, visual effects, cost/constructability, and stakeholder input.

Traffic Operations

Mainline Level of Service

As shown in Exhibit 3.9-4, each of the Alternatives provides an acceptable LOS along the Outer Drive.

Exhibit 3.9-4: 2040 NLSD Level of Service								
Outer Drive Section	**No Action***		**CTT Alt 1**		**CTT Alt 2**		**CTT Alt 3**	
			A.M.	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**
Foster Avenue to Bryn Mawr Avenue Northbound (weave)			B	C	B	C	B	C
Bryn Mawr Exit Northbound			B	B	B	B		
Bryn Mawr Entrance Southbound			B	A	B	A		
Bryn Mawr Avenue to Foster Avenue Southbound (weave)			C	B	C	B	C	B

*The HCM software does not fully capture existing and 2040 No Action conditions. The No Action comparison will be made at the corridor level, after assembling the Top Performing CTT Alternative.

Intersection Level of Service

Exhibit 3.9-5 summarizes the intersection level of service for CTT Alternative 3, which is the only Bryn Mawr alternative that includes a signalized intersection. The signalized intersection at the Outer Drive and Bryn Mawr Avenue operates at an acceptable Level of Service.

Exhibit 3.9-5: 2040 Intersection Level of Service								
Intersection	**2040 No Action**		**CTT Alt 1**		**CTT Alt 2**		**CTT Alt 3**	
	A.M.	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**	**A.M.**	**P.M.**
NLSD at Bryn Mawr Avenue							C	B

Overall Network Performance

As shown in Exhibit 3.9-6, Alternative 2 provides the relative best performance. Alternative 3 performs substantially worse.

Exhibit 3.9-6: 2040 Network Performance								
	2040 No Action		CTT Alt 1		CTT Alt 2		CTT Alt 3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Total Delay (hours)	21	34	7	8	7	8	41	38
Total Travel Time (hours)	162	144	152	139	151	114	187	152

Safety

- Alternative 3 could increase the potential for vehicle conflicts due to the at-grade design.
- All Build Alternatives will improve bicycle and pedestrian safety by providing multiple grade separations.

Park Access and Circulation

- All Build Alternatives improve park access by providing pedestrian tunnels, which will reduce conflicts between vehicles, cyclists, and pedestrians.

Transit Access and Circulation

- Alternatives 1, 2, and 3 will improve circulation by adding a bus turnaround/layover facility on Bryn Mawr Avenue, just west of the Outer Drive.
- Alternative 3 could potentially increase transit travel times if the proposed signal becomes congested and blocks or otherwise inhibits access to Bryn Mawr Avenue.

Green Space

- As shown in Exhibit 3.9-7, all Build Alternatives include a net increase in green space.
- Alternative 2 compresses both junction ramps, and therefore results in a larger net increase in green space, as compared Alternative 1.
- Alternative 3, which includes converting the existing junction to an at-grade intersection, results in the largest net increase in green space.

Exhibit 3.9-7: Net Green Space (rounded to nearest acre)				
	2040 No Action	CTT Alt 1	CTT Alt 2	CTT Alt 3
Green Space (Ac)	N/A	+1	+2	+4

Visual Effects

- Alternative 1 has views that are similar to existing conditions.
- Alternative 2 improves views from the urban edge and the park due to the compressed ramp design.
- Alternative 3 improves the views the relative most from the urban edge, the park and the Outer Drive by eliminating the existing grade separation and ramps.

Cost/Constructability

- As shown in Exhibit 3.9-8, Alternative 1 has the relative lowest cost; Alternative 2 has the relative highest cost due to the additional retaining walls needed to compress both ramps and provide an additional pedestrian tunnel.
- Alternative 3 would be the relative most constructible due to the at grade design.

Exhibit 3.9-8: Construction Cost				
	2040 No Action	**CTT Alt 1**	**CTT Alt 2**	**CTT Alt 3**
Total Cost (2017 $)	N/A	$69M	$111M	$97M

Stakeholder Input

- Stakeholders supported retaining the existing grade separation and ramp configuration (Alternatives 1 and 2).
- Stakeholders expressed concerns that an at-grade signalized intersection (Alternative 3) would not adequately address current congestion.
- Alternative 2 was the consensus choice of the Project Study Group.

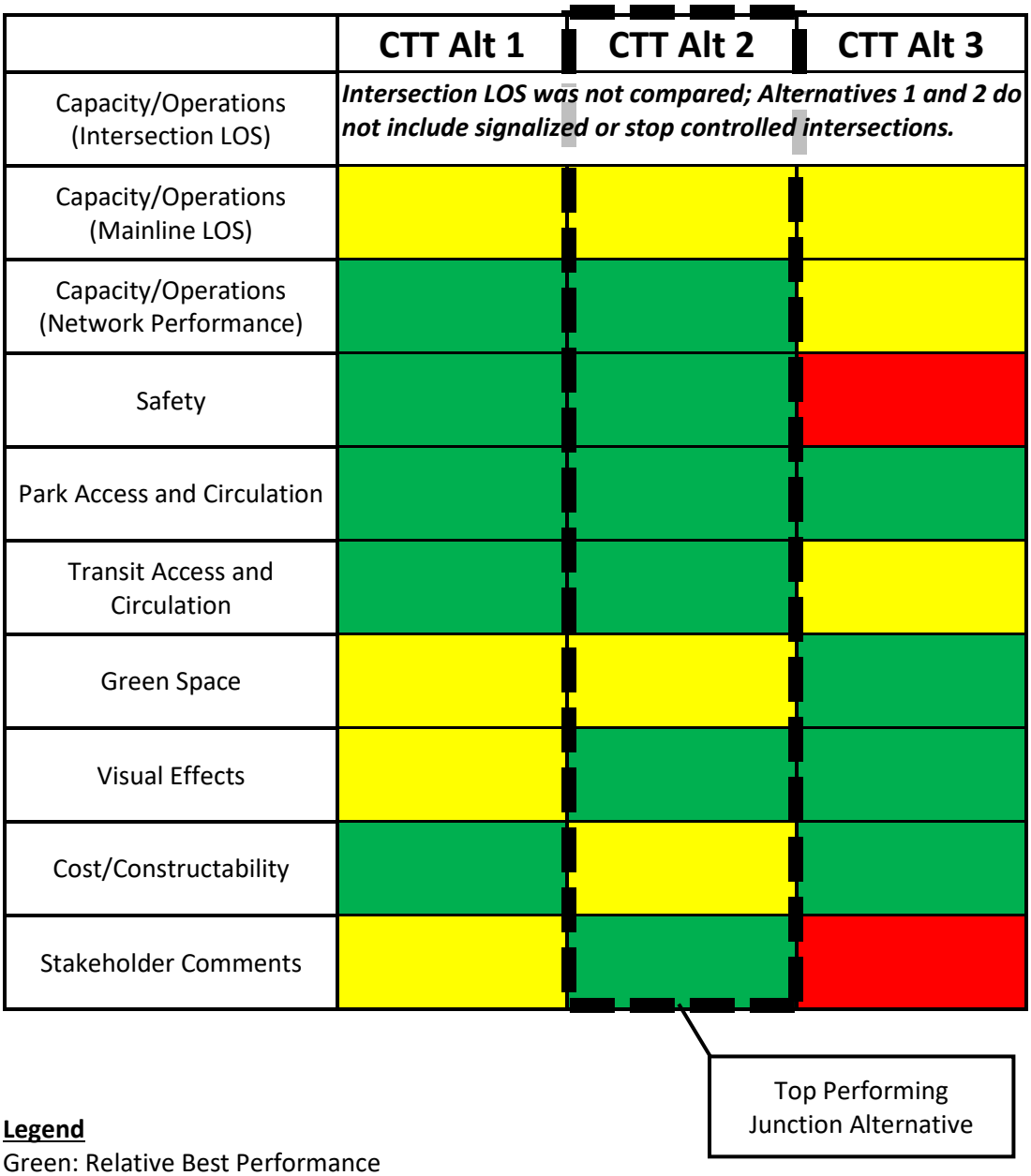
3.5.4 Conclusions

The following is an overall summary of the evaluation results, which is also reflected on the chart below:

- All Build Alternatives provide similar Outer Drive mainline performance.
- Intersection LOS was not compared; Alternatives 1 and 2 do not include signalized intersections.
- Alternatives 1 and 2 provide relatively better network performance.
- Alternatives 1 and 2 provide relatively better safety performance. The at-grade intersection associated with Alternative 3 would increase the potential for conflicts between vehicles.
- The Build Alternatives provide similar park access and circulation improvements. All Build Alternatives provide improved bicycle/pedestrian crossings.
- Alternatives 1 and 2 provide relatively better transit access and circulation, as compared to Alternative 3. The at grade intersection associated with Alternative 3 increases the potential for congested conditions, which would negatively impact bus service.
- Alternative 3 results in the largest net increase in green space.
- Alternatives 2 and 3 improve views from the urban edge and the park the relative most.
- Alternative 1 has the relative lowest cost; Alternative 2 has the relative highest cost; Alternative 3 is the relative most constructible.
- Stakeholders generally did not support Alternative 3 due to concerns that the signalized intersection would not adequately address current congestion.
- Stakeholders favored retaining the existing junction design (Alternatives 1 and 2); Alternative 2 was the consensus choice of the Project Study Group.

Exhibit 3.9-9 summarizes the ratings for CTT Junction Alternatives 1, 2 and 3, and is a relative comparison of Build Alternatives. Once the overall Top Performing CTT Corridor Alternative is assembled, a comparison to the No Action Alternative, based upon travel performance, will be made, as summarized in section 1.3.3 of this Appendix.

Exhibit 3.9-9: Context Tailored Treatment Evaluation
Bryn Mawr Avenue Junction



Legend
Green: Relative Best Performance
Yellow: Non-Distinguishing or Neutral Performance
Red: Relative Worst Performance

Alternative 2 is recommended because it improves mobility, safety, and park and transit access/circulation while also providing additional green space and consistency with stakeholder comments. The at-grade signalized intersection included with Alternative 3 increases safety concerns by introducing additional vehicle conflict points. Alternative 2 is subject to further refinement as the evaluation and coordination process advances.

4.0 CTT Alternatives Evaluation Summary

Initial CTT Corridor Evaluation (Step 1)

The initial Travel Demand Modeling indicated that the Corridor Modernization (CTT Alternative 1), Compressed Roadway (CTT Alternative 2) and Frontage Drive (CTT Alternative 3) Alternatives provided similar travel performance. In addition, an initial environmental review indicated that there were no major flaws or distinguishing differences between the initial CTT Corridor Alternatives. Therefore, a junction level analysis was necessary to identify the Top Performing junctions, which could then be assembled to form a Top Performing CTT Corridor Alternative.

Top Performing Junction Alternatives (Step 2)

Exhibit 4-1 summarizes the results of the junction analysis. CTT Alternative 1 was selected from Chicago Avenue to Wilson Avenue and CTT Alternative 2 was selected from Lawrence Avenue to Bryn Mawr Avenue due to a combination of relatively better performance, lower impacts and lower cost. Elements of CTT Alternative 3 will be incorporated at Chicago Avenue and at Wilson Avenue.

Exhibit 4-1: 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**
****Northbound Frontage Drive added to CTT Alternative 1 between Montrose and Wilson**

Top Performing Corridor CTT Alternative (Step 3)

After assembling the Top Performing CTT Corridor Alternative, modeling was undertaken to compare the Top Performing CTT and No Action Alternatives. As shown on Exhibit 4-2, the Top Performing CTT Corridor Alternative provides up to a 35% reduction in vehicular travel times, and up to a 42% reduction in bus travel times.

Exhibit 4-2: 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.

The Top Performing CTT Corridor Alternative will be carried forward for further evaluation.

Section 5.0
Junction Alternatives Cost Estimates

North Lake Shore Drive Phase I Study
Grand Avenue to Hollywood Avenue

DRAFT ORDER-OF-MAGNITUDE COST ESTIMATE

CTT Alternatives Cost Summary

	CTT Alt 1	CTT Alt 2	CTT Alt 3
Chicago Avenue Junction			
SHORELINE ITEMS	$256,856,000	$256,856,000	$225,909,000
ROADWAY ITEMS (OUTER DRIVE)	$181,229,000	$198,548,000	$267,168,000
ROADWAY ITEMS (INNER DRIVE AND SIDE STREETS)	$8,798,000	$12,317,000	$19,355,000
TRANSIT ITEMS	$0	$0	$0
PEDS/BIKES/PARK ITEMS	$61,583,000	$26,393,000	$73,899,000
JUNCTION ALTERNATIVE TOTAL	$508,000,000	$494,000,000	$586,000,000
Oak Street/ Michigan Avenue Junction			
SHORELINE ITEMS	$249,119,500	$249,119,500	$221,267,500
ROADWAY ITEMS (OUTER DRIVE)	$130,203,000	$156,320,000	$205,586,000
ROADWAY ITEMS (INNER DRIVE AND SIDE STREETS)	$15,836,000	$21,114,000	$15,836,000
TRANSIT ITEMS	$0	$0	$0
PEDS/BIKES/PARK ITEMS	$66,861,000	$89,735,000	$80,937,000
JUNCTION ALTERNATIVE TOTAL	$462,000,000	$516,000,000	$524,000,000
LaSalle Drive Junction			
SHORELINE ITEMS	$255,308,500	$255,308,500	$278,519,000
ROADWAY ITEMS (OUTER DRIVE)	$52,785,000	$91,897,000	$93,656,000
ROADWAY ITEMS (INNER DRIVE AND SIDE STREETS)	$7,038,000	$12,317,000	$17,595,000
TRANSIT ITEMS	$0	$0	$0
PEDS/BIKES/PARK ITEMS	$128,444,000	$137,241,000	$190,026,000
JUNCTION ALTERNATIVE TOTAL	$444,000,000	$497,000,000	$580,000,000
Fullerton Parkway Junction			
SHORELINE ITEMS	$64,988,000	$64,988,000	$89,745,000
ROADWAY ITEMS (OUTER DRIVE)	$149,558,000	$192,188,000	$234,416,000
ROADWAY ITEMS (INNER DRIVE AND SIDE STREETS)	$1,760,000	$1,760,000	$14,076,000
TRANSIT ITEMS	$0	$0	$0
PEDS/BIKES/PARK ITEMS	$107,330,000	$96,773,000	$70,380,000
JUNCTION ALTERNATIVE TOTAL	$324,000,000	$356,000,000	$409,000,000
Belmont Avenue Junction			
SHORELINE ITEMS	$0	$0	$10,831,500
ROADWAY ITEMS (OUTER DRIVE)	$139,001,000	$500,101,000	$200,986,000
ROADWAY ITEMS (INNER DRIVE AND SIDE STREETS)	$14,076,000	$14,076,000	$21,114,000
TRANSIT ITEMS	$0	$0	$0
PEDS/BIKES/PARK ITEMS	$36,950,000	$63,342,000	$42,228,000
JUNCTION ALTERNATIVE TOTAL	$190,000,000	$578,000,000	$275,000,000
Addison/Irving Park Road Junction			
SHORELINE ITEMS	$0	$0	$3,095,000
ROADWAY ITEMS (OUTER DRIVE)	$63,342,000	$76,061,000	$178,112,000
ROADWAY ITEMS (INNER DRIVE AND SIDE STREETS)	$12,317,000	$19,355,000	$15,836,000
TRANSIT ITEMS	$0	$0	$0
PEDS/BIKES/PARK ITEMS	$58,064,000	$93,254,000	$100,292,000
JUNCTION ALTERNATIVE TOTAL	$134,000,000	$189,000,000	$297,000,000

DRAFT ORDER-OF-MAGNITUDE COST ESTIMATE

CTT Alternatives Cost Summary

	CTT Alt 1	CTT Alt 2	CTT Alt 3
Montrose/Wilson/Lawrence Junctions			
SHORELINE ITEMS	$0	$0	$0
ROADWAY ITEMS (OUTER DRIVE)	$91,494,000	$109,492,000	$111,654,000
ROADWAY ITEMS (INNER DRIVE AND SIDE STREETS)	$12,317,000	$12,317,000	$17,595,000
TRANSIT ITEMS	$0	$0	$0
PEDS/BIKES/PARK ITEMS	$77,418,000	$80,937,000	$84,456,000
JUNCTION ALTERNATIVE TOTAL	$181,000,000	$203,000,000	$214,000,000
Foster Avenue Junction			
SHORELINE ITEMS	$0	$0	$0
ROADWAY ITEMS (OUTER DRIVE)	$36,950,000	$51,428,000	$28,152,000
ROADWAY ITEMS (INNER DRIVE AND SIDE STREETS)	$1,760,000	$1,760,000	$1,760,000
TRANSIT ITEMS	$0	$0	$0
PEDS/BIKES/PARK ITEMS	$70,380,000	$70,380,000	$66,861,000
JUNCTION ALTERNATIVE TOTAL	$109,000,000	$124,000,000	$97,000,000
Bryn Mawr Avenue Junction			
SHORELINE ITEMS	$0	$0	$0
ROADWAY ITEMS (OUTER DRIVE)	$33,431,000	$47,909,000	$21,517,000
ROADWAY ITEMS (INNER DRIVE AND SIDE STREETS)	$1,760,000	$1,760,000	$0
TRANSIT ITEMS	$0	$0	$0
PEDS/BIKES/PARK ITEMS	$33,431,000	$61,583,000	$75,659,000
JUNCTION ALTERNATIVE TOTAL	$69,000,000	$111,000,000	$97,000,000
COMPLETE ALTERNATIVE TOTALS	$2,526,000,000	$3,083,000,000	$3,094,000,000