Traffic Technical Report

November 2016

Prepared for:

Federal Transit Administration and Northern Indiana Commuter Transportation District

Prepared by:

AECOM

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Acronyms

AWSC	All-Way Stop Controlled
CMAP	Chicago Metropolitan Agency for Planning
CRP	Comprehensive Regional Plan
DEIS	Draft Environmental Impact Statement
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HCM	Highway Capacity Manual
IDOT	Illinois Department of Transportation
IHB	Indiana Harbor Belt Railroad
INDOT	Indiana Department of Transportation
KNR	Kiss-and-Ride
LOS	Level of Service
MED	Metra Electric District
MUTCD	Manual on Uniform Traffic Control Devices
NEPA	National Environmental Policy Act
NICTD	Northern Indiana Commuter Transportation District
NIRPC	Northwest Indiana Regional Planning Commission
NS	Norfolk Southern Railway
ROW	Right-of-Way
sec/veh	Seconds per Vehicle
SSL	South Shore Line
STOPS	FTA's Simplified Trips-on-Project Software travel demand model
TIP	Transportation Improvement Program
TRB	Transportation Research Board
TWSC	Two-Way Stop Controlled
US	United States

1. INTRODUCTION

The Federal Transit Administration (FTA) and Northern Indiana Commuter Transportation District (NICTD) are conducting the environmental review process for the West Lake Corridor Project (Project) in Lake County, Indiana, and Cook County, Illinois, in accordance with the National Environmental Policy Act (NEPA) and other regulatory requirements. A Draft Environmental Impact Statement (DEIS) is being prepared as part of this process, with the FTA as the Federal Lead Agency and NICTD as the Local Project Sponsor responsible for implementing the Project under NEPA.

1.1 Purpose of Report

This Traffic Technical Report supports the DEIS and analyzes the multi-modal transportation system and potential benefits and impacts associated with the Project on:

- Intersection operational performance associated with traffic generated from the Project's parking facilities
- Traffic operations at existing and proposed highway/rail at-grade crossings
- Existing street network connectivity

1.2 Project Overview

The environmental review process builds upon NICTD's prior West Lake Corridor studies that examined a broad range of alignments, technologies, and transit modes. The studies concluded that a rail-based service between the Munster/Dyer area and Metra's Millennium Station in downtown Chicago, shown on **Figure 1-1**, would best meet the transportation needs of the Northwest Indiana area. Thus, NICTD advanced a "Commuter Rail" Alternative for more detailed analysis in the DEIS. NEPA also requires consideration of a "No Build" Alternative to provide a basis for comparison to the Commuter Rail Alternative. In addition, a number of design variations are being considered related to alignment, stations, parking, and maintenance and storage facilities (see **Figure 1-2**).

1.2.1 No Build Alternative

The No Build Alternative is defined as the existing transportation system, plus any committed transportation improvements included in the Northwestern Indiana Regional Planning Commission's (NIRPC) *2040 Comprehensive Regional Plan* (CRP) (NIRPC 2011) and Chicago Metropolitan Agency for Planning's (CMAP) *GO TO 2040 Comprehensive Regional Plan* (CMAP 2014) through the planning horizon year 2040. It also includes capacity improvements to the existing Metra Electric District's (MED) line and Millennium Station, documented in NICTD's *20-Year Strategic Business Plan* (NICTD 2014).

Figure 1-1 Regional Setting for West Lake Corridor Project

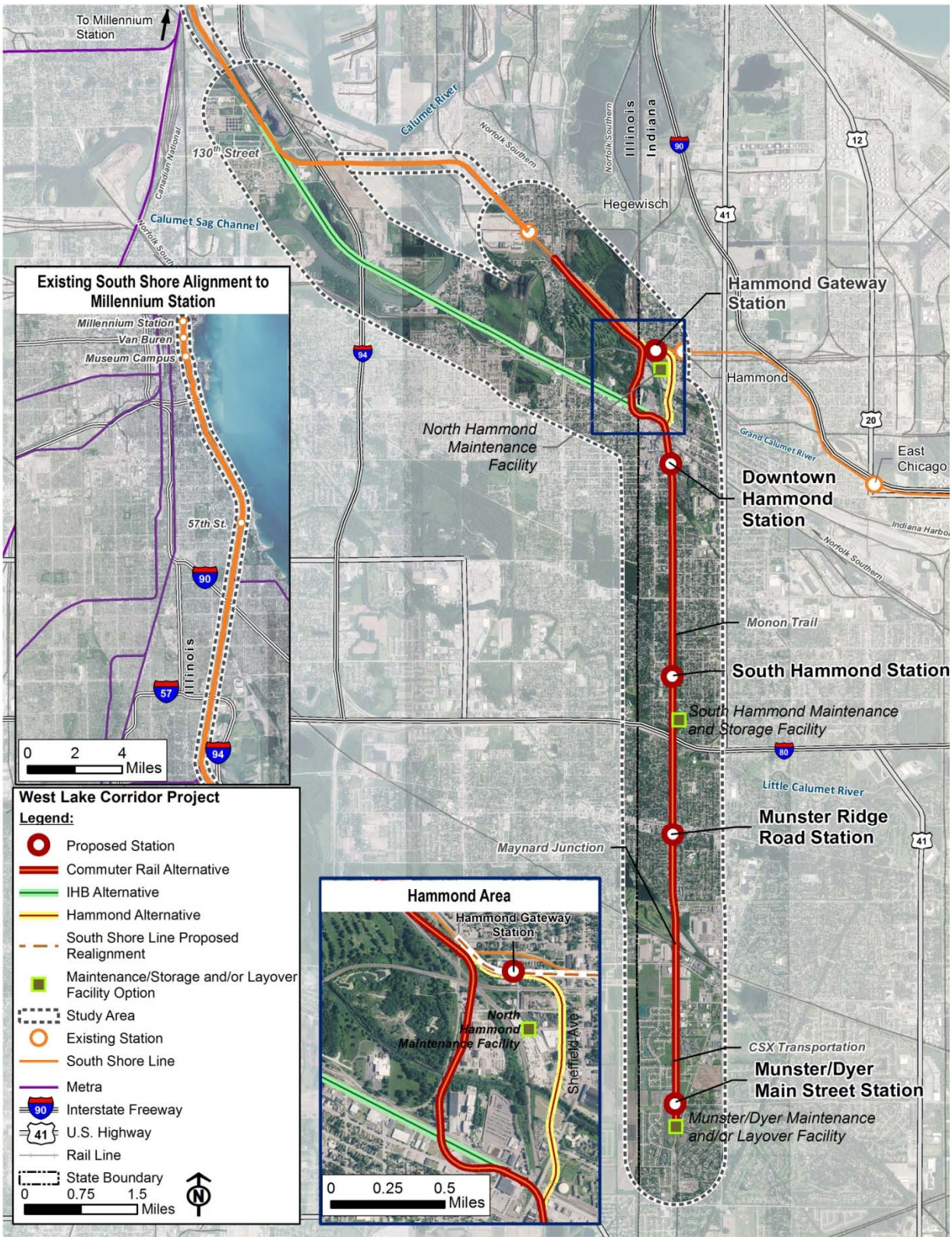


Figure 1-2 West Lake Corridor Project Study Area

1.2.2 Commuter Rail Alternative

The Commuter Rail Alternative would involve commuter rail service using electric-powered trains on an approximate 9-mile southern extension of NICTD's existing South Shore Line (SSL) between Dyer and Hammond, Indiana (see **Figures 1-2** and **1-3**). Heading north from the southern terminus near Main Street at the Munster/Dyer municipal boundary, the Project would include new track on a separate right-of-way (ROW) adjacent to, and east of, the CSX freight line in Munster. North of the proposed elevated crossing over another CSX freight line at the Maynard Junction, the proposed Commuter Rail Alternative alignment would use the publically-owned former Monon Railroad corridor in Munster and Hammond. North of downtown Hammond the track alignment would turn west under Hohman Avenue, and then continue north on new elevated track generally along the Indiana-Illinois state line to connect to the existing SSL southeast of the Hegewisch Station in Chicago. Project trains would operate on the existing MED line for their final 14 miles, terminating at Millennium Station in downtown Chicago. Station locations for the Commuter Rail Alternative would include Munster/Dyer Main Street, Munster Ridge Road, South Hammond, and Downtown Hammond.

Four design options to the Commuter Rail Alternative near the southern Project terminus include:

- **Commuter Rail Alternative Option 1**: Under this design variation, parking for the Munster/Dyer Main Street Station would be located on the east side of the station, and a vehicle maintenance and storage facility would be located south of 173rd Street in Hammond near the South Hammond Station. See **Figure 1-3**.
- **Commuter Rail Alternative Option 2**: Under this design variation, parking for the Munster/Dyer Main Street Station would be located on the west side of the existing CSX freight line. Main Street would be extended west from Sheffield Avenue using an underpass to cross the CSX railroad and Project ROW. The vehicle maintenance and storage facility would be located south of 173rd Street in Hammond near the South Hammond Station. See **Figure 1-3**.
- **Commuter Rail Alternative Option 3**: Under this design variation, the vehicle maintenance and storage facility would be located south of the Munster/Dyer Main Street Station, on the east side of the existing CSX freight line, at Munster/Dyer Main Street Station, instead of south of the South Hammond Station. Parking for the Munster/Dyer Main Street Station would be located on the east side of the station. See **Figure 1-3**.
- **Commuter Rail Alternative Option 4**: Under this design variation, the rail alignment would be routed above the existing CSX freight line at Maynard Junction, to land on the west side of the CSX freight line, and then continue south to the Munster/Dyer Main Street Station area. The Munster/Dyer Main Street Station and parking would be located west of the existing CSX freight line. A Main Street extension west under the CSX freight line and the Project ROW would be required. The vehicle maintenance and storage facility would be located south of 173rd Street in Hammond near the South Hammond Station. See **Figure 1-3**.

There are two design variations to the Commuter Rail Alternative related to the proposed alignment (i.e., the Indiana Harbor Belt [IHB] Alternative and the Hammond Alternative) as follows. See **Figures 1-4**, **1-5**, and **1-6**.

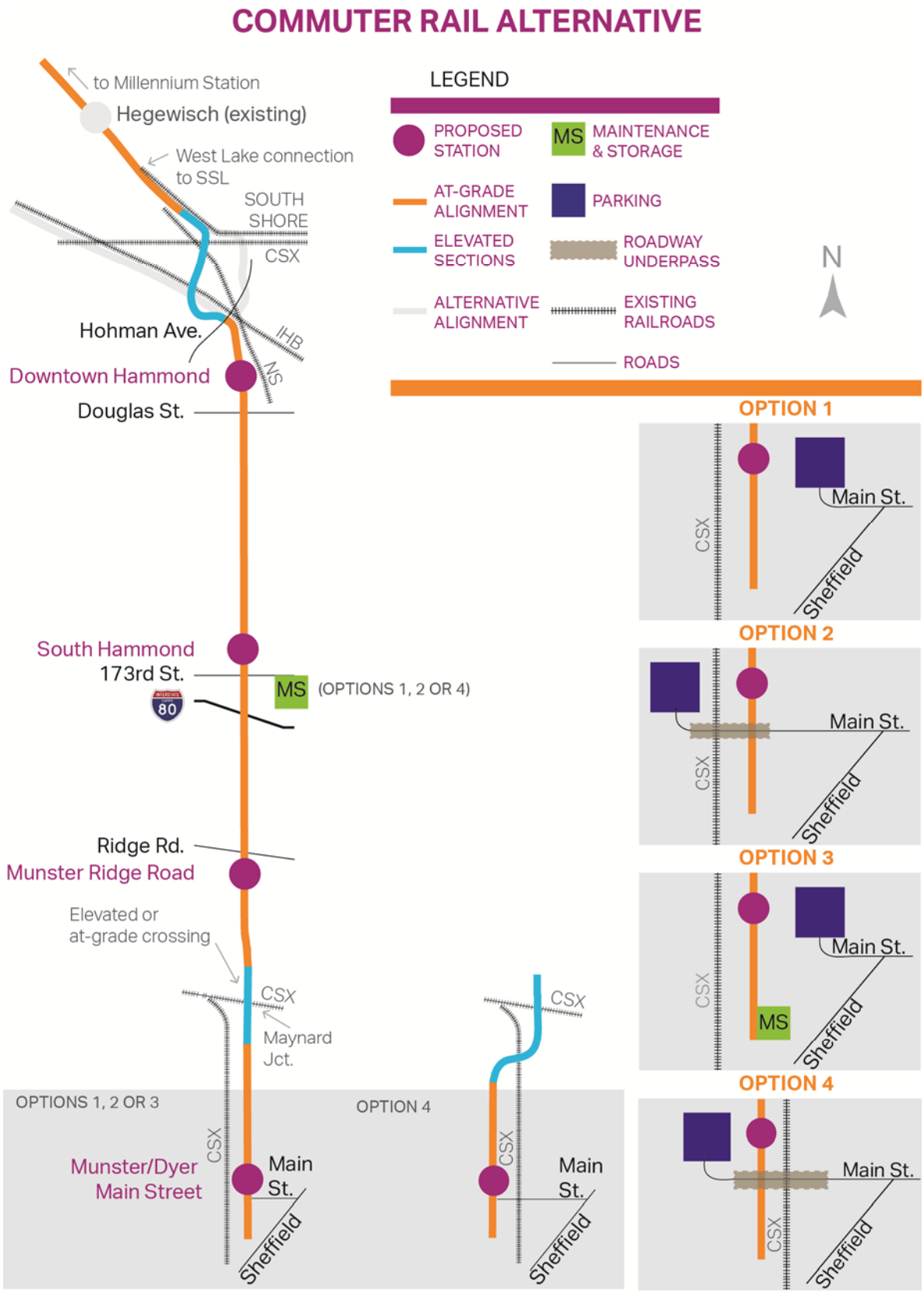


Figure 1-3 Commuter Rail Alternative Options

1.2.3 Indiana Harbor Belt (IHB) Alternative

South of Douglas Street, the IHB Alternative duplicates the Commuter Rail Alternative Options described above. From downtown Hammond north of Douglas Street, the alignment of the IHB Alternative would turn west under Hohman Avenue in Hammond and would be constructed in the IHB freight line ROW west through Calumet City, Burnham, and Chicago, Illinois. West of Burnham Avenue, the IHB Alternative would bridge over the IHB and CSX freight lines, landing in the IHB Kensington Branch freight line ROW, and would include relocating and reconstructing the IHB freight line on a new adjacent track within the existing railroad ROW. The Project would then continue northwest to the proposed connection with the existing SSL near I-94 and 130th Street in Chicago. See **Figure 1-4**.

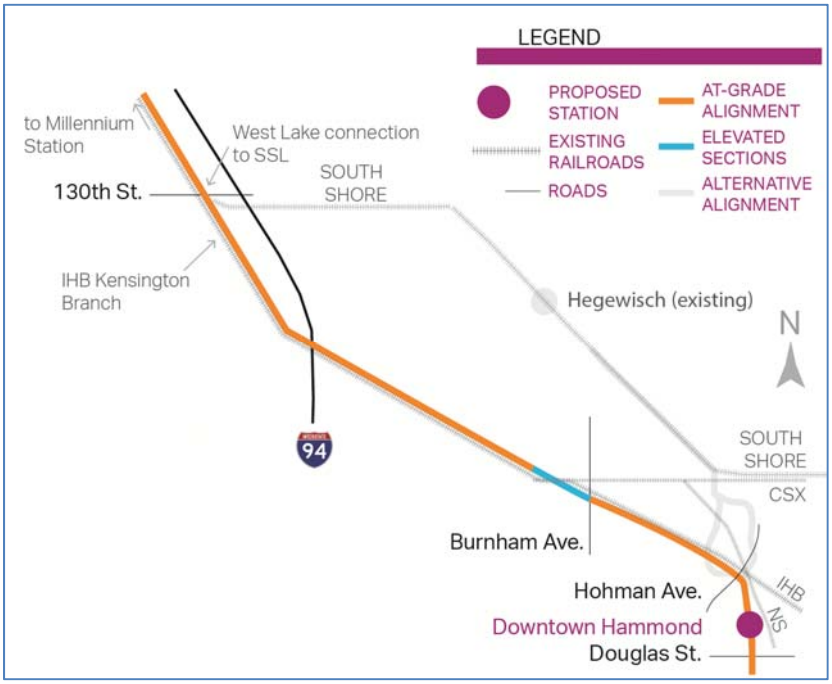


Figure 1-4 Indiana Harbor Belt Alternative

1.2.4 Hammond Alternative

South of Douglas Street, the Hammond Alternative is similar to the Commuter Rail Alternative described above. From downtown Hammond north of Douglas Street, the Hammond Alternative would extend north on embankment and bridges crossing over the IHB and Norfolk Southern freight lines immediately east of the Hohman Avenue overpass. The alignment would then extend northward and cross over Hohman Avenue just south of Michigan Street. The alignment would then continue north and west, crossing over the existing CSX freight line, and connecting with the existing SSL. See **Figure 1-5**.

Under the Hammond Alternative, the Hammond Gateway Station would be constructed in North Hammond and would replace the existing SSL Hammond Station (see **Figure 1-5**). The Hammond Alternative assumes the existing SSL track would be relocated between the existing SSL Hammond Station and the Indiana-Illinois state line to facilitate a passenger connection between the Project and the SSL at the Hammond Gateway Station on the Hammond Alternative. The alignments of both routes would be adjacent to one another at this location, allowing passengers to transfer at the combined station. During non-peak times, West Lake Corridor Project trains would operate as shuttles between Munster/Dyer Main Street Station and

Hammond Gateway Station, making connections with SSL service. **Figure 1-6** illustrates the SSL track relocation.

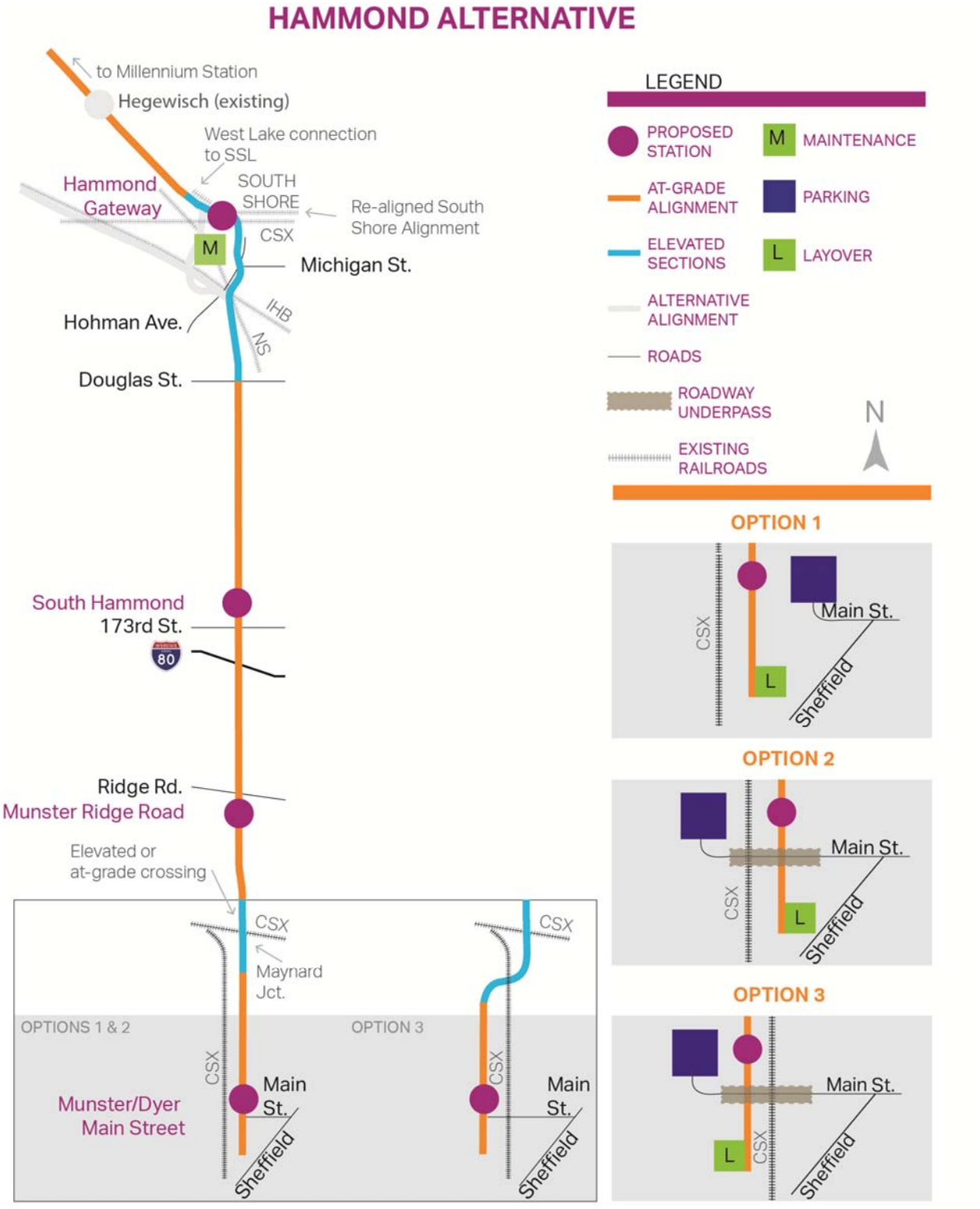


Figure 1-5 Hammond Alternative Options

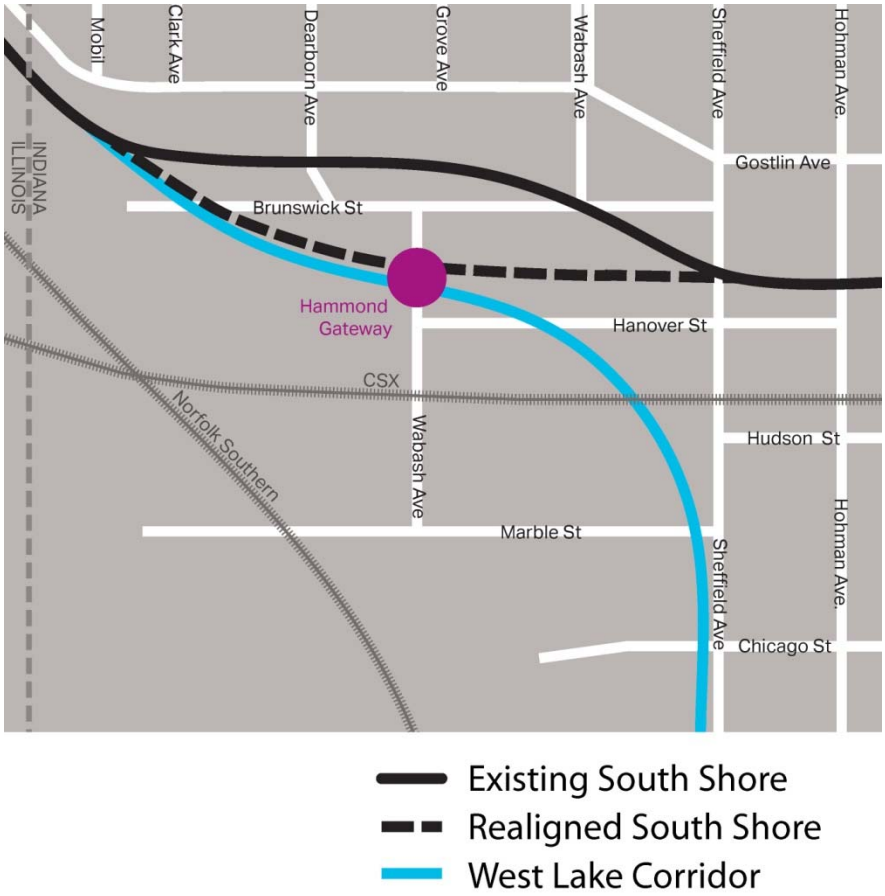


Figure 1-6 South Shore Line Proposed Realignment

A maintenance facility would be located immediately south of the Hammond Gateway Station. A separate layover facility at the southern end of the Project corridor, near the Munster/Dyer Main Street Station, would also be constructed, as shown on **Figure 1-5**. There are three design variations on how the layover facility, Munster/Dyer Main Street Station, and parking would be configured under the Hammond Alternative, as follows:

- **Hammond Alternative Option 1:** The Munster/Dyer Main Street Station, layover facility, and parking would be on the east side of the existing CSX freight line. See **Figure 1-5**.
- **Hammond Alternative Option 2:** The Munster/Dyer Main Street Station and layover facility would be on the east side of the existing CSX freight line, and the parking would be west of the CSX freight line. A Main Street extension west under the CSX freight line and Project ROW would be required. See **Figure 1-5**.
- **Hammond Alternative Option 3:** This option would require routing the Project above the existing CSX freight line at Maynard Junction, landing on the west side of the CSX freight line ROW, and continuing south to the Munster/Dyer Main Street area. The Munster/Dyer Main Street Station, layover facility, and parking would be located west of the existing CSX freight line. A Main Street extension west under the CSX freight line and the Project ROW would be required. See **Figure 1-5**.

1.2.5 Maynard Junction Rail Profile Option

One design variation is being considered for each Build Alternative—the Maynard Junction Rail Profile Option. Under this design variation, at Maynard Junction in Munster, the alignment would cross the existing CSX freight line in an at-grade profile instead of an elevated profile. The proposed alignment would remain east of the CSX freight line ROW for the Commuter Rail Alternative Options 1, 2, and 3 (see **Figure 1-3**), IHB Alternative Options 1, 2, and 3, and Hammond Alternative Options 1 and 2 (see **Figure 1-5**).

2. REGULATORY SETTING

No federal laws, regulations, or executive orders specifically regulate how impacts to roadways resulting from transit projects are evaluated; however, NEPA provides the general legal framework for considering potential impacts. In addition, CEQ regulations include requirements for describing the affected environment and environmental consequences for general resources, including roadways. *See* 40 CFR § 1502.15.

The Indiana Department of Transportation's (INDOT) *Design Manual* (INDOT 2013) and the Illinois Department of Transportation's (IDOT) *Bureau of Local Roads and Street Manual* (IDOT 2012) describe the acceptable level of service (LOS) for intersections depending on the type of roadway. The roadways are described as suburban arterials, collectors, and local roads. For the roadways in Indiana, LOS A to C is considered acceptable and LOS D, E, and F are unacceptable. LOS is an A-through-F rating system, with LOS A indicating free-flow conditions with little or no vehicle delay and LOS F indicating break-down conditions with substantial congestion and long delays (see **Figure 2–1**). The Illinois roadways classified as arterials have a minimum LOS C and any collectors have a minimum LOS D and preferable LOS C.

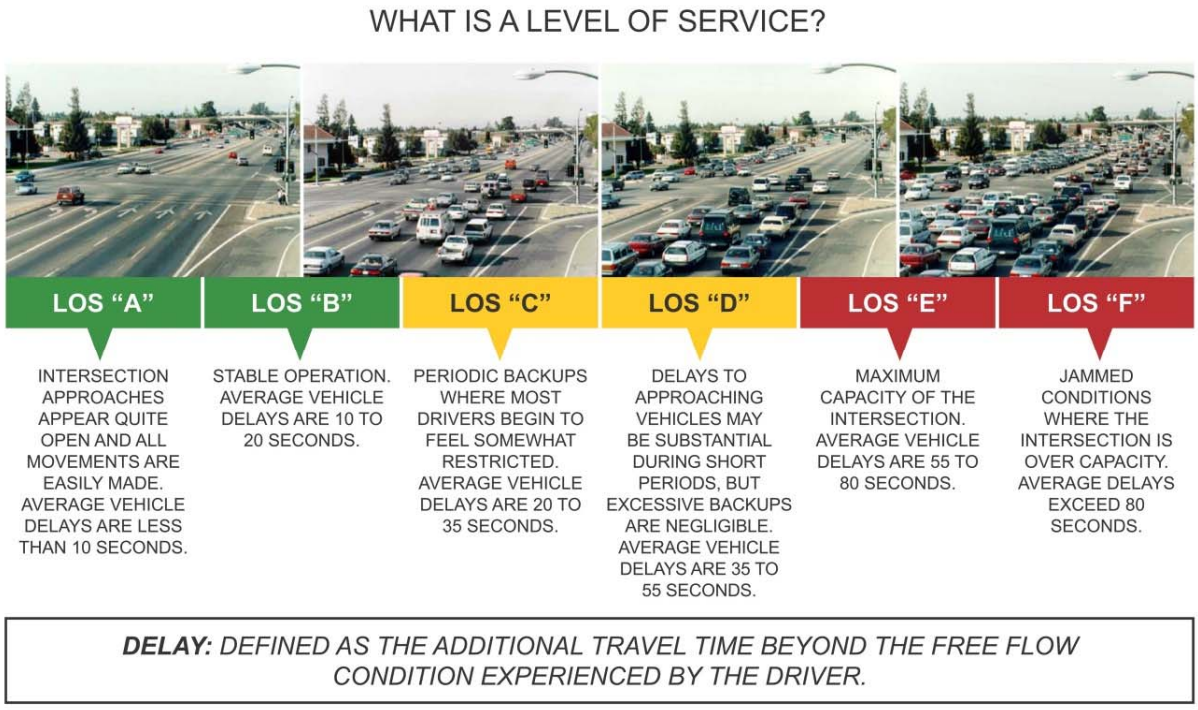


Figure 2-1 Level of Service (LOS) Diagram

At-grade highway/railroad crossings require warning devices be installed. Warning devices can either be passive (e.g., stop signs) or active (e.g., automatic gates). The Federal Highway Administration's (FHWA) *Manual on Uniform Traffic Control Devices* (MUTCD) specifies the timing of the downward motion of gate arms, conditions for how long the gate arm must be in a down position, and timing for the gate arms to return to an upright position (FHWA 2009).

3. METHODOLOGY

3.1 Regional Traffic

The FTA STOPS model was used to determine projected changes in VMT and VHT to assess the effect of the Build and No Build Alternatives on regional transportation activity.

3.2 Intersection Operations

Traffic analysis was conducted at 25 intersections within the Study Area (22 existing intersections and 3 park-and-ride access points). These intersections were selected for their proximity to proposed station and park-and-ride facility locations and their potential to be impacted by traffic generated from the Project. **Figure 3–1** shows the locations of these intersections. The operations of these intersections were evaluated for existing conditions, the No Build Alternative (year 2040), and the Build Alternatives (year 2040). The process for evaluating the intersection operations involved several steps:

1. **Traffic Data Collection**: Existing traffic volumes at the studied intersections were collected between October 22 and November 18, 2014, in the AM (7:00 a.m. to 9:00 a.m.) and PM (4:00 p.m. to 6:00 p.m.) peak periods. Existing traffic volumes during the AM and PM peak periods was collected on May 1, 2015, for an intersection near the Hegewisch Station. The peak traffic hours were determined to be 7:15 a.m. to 8:15 a.m. (AM peak hour) and 4:30 p.m. to 5:30 p.m. (PM peak hour). These intersection traffic volumes were used to evaluate existing conditions.
2. **Traffic Volume Escalation**: The existing traffic counts were used as the basis for the 2040 No Build Alternative. Existing volumes were escalated to the year 2040 using growth percentages from the NIRPC travel demand model. Assumptions were made based on growth percentages in the surrounding area where specific growth percentages were unavailable or the model data were inconsistent with the existing traffic counts.
3. **Site Generated Traffic Estimation**: The Build Alternatives traffic volumes are based on the volumes projected for the 2040 No Build Alternative combined with site generated traffic for the stations and station options. Using FTA's Simplified Trips-on-Project Software (STOPS) model, the approximate number of riders at each station along with their area of origin was determined. The Project-generated traffic was derived from the projected riders assumed to drive to/from the stations during the AM and PM peak traffic hours. This includes riders who are parking and riding or who are utilizing kiss-and-ride (KNR) at a potential station. For KNR customers, both inbound and outbound movements were added to the relevant intersections, signifying the round trip of the vehicle returning to the point of origin rather than terminating in the parking lot during the AM peak and originating from the parking lot during the PM peak. The estimated traffic generated by the Build Alternative was applied to the affected surrounding roadway network.
4. **Intersection Operations Analysis**: Overall intersection LOS was used to determine potential impacts. For each signalized or all-way stop controlled (AWSC) intersection, operating conditions were evaluated for the existing condition, No Build Alternative, and Build Alternative according to the methods described in the Transportation Research Board's (TRB) 2010 Highway Capacity Manual (HCM) using the traffic simulation software Synchro 8. Traffic signal timings were optimized because signal timing plans for each intersection were unavailable. For two-way stop controlled (TWSC) intersections, the total delay was calculated by taking the weighted delay of each movement that experiences

delay. In TWSC scenarios, the delayed movements included the minor street vehicles and vehicles turning left from the major street as the major street through volumes always have the right-of-way. The calculated delay was used to determine the LOS based on the criteria outlined in TRB's HCM (2010).

5. **Potential Impacts Assessment**: The potential Project impacts on traffic operations were identified by comparing the differences between the No Build Alternative and Build Alternatives during the planning horizon year 2040. This study sought to isolate traffic deficiencies caused by normal traffic growth over time from traffic impacts generated by the proposed Build Alternatives. Two general thresholds were established to define an impact from the Project:

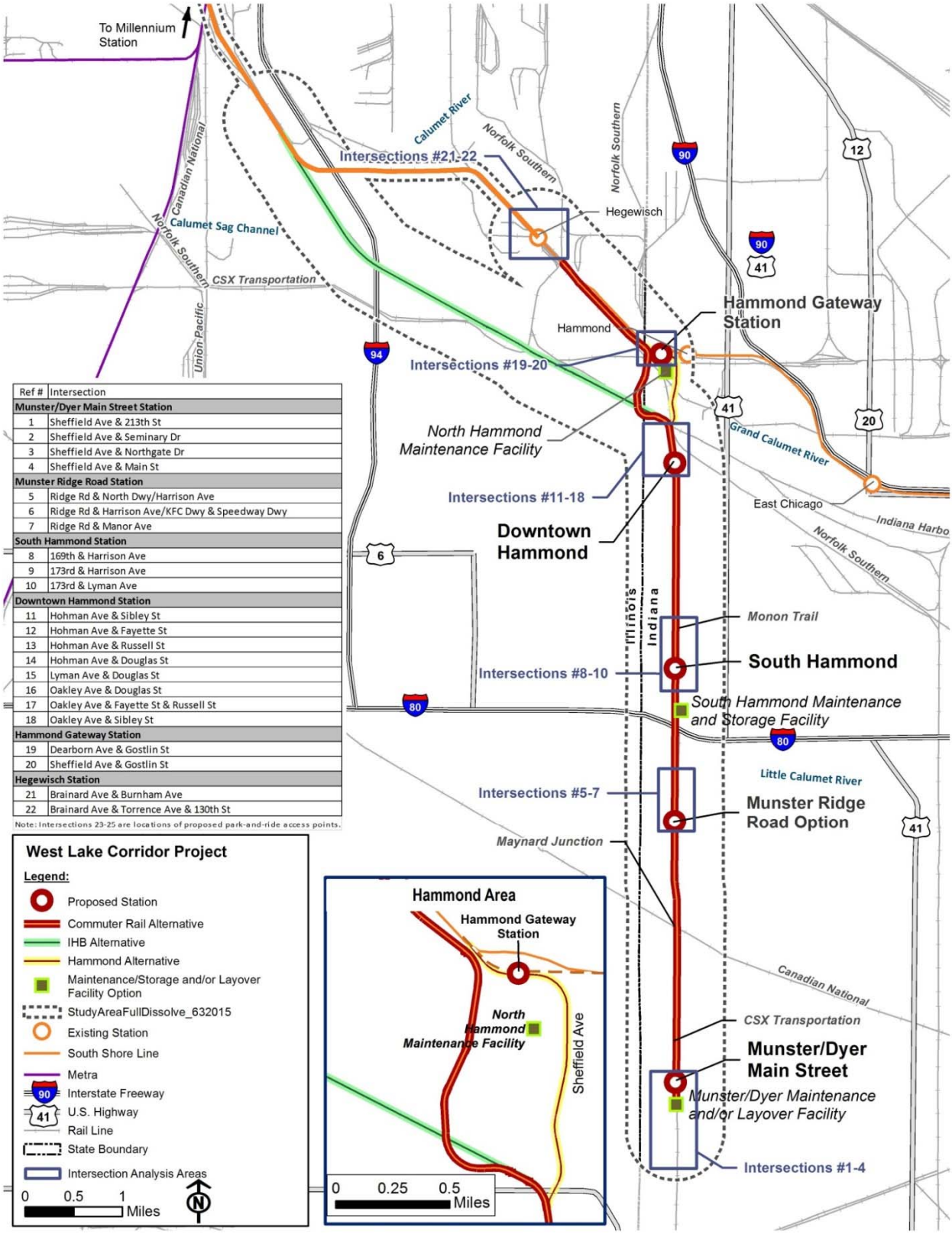
    - If an intersection in the Build Alternatives scenario operates at unacceptable conditions (LOS D, E, or F) but operates at acceptable conditions (LOS A, B, or C) in the No Build Alternative, the intersection was considered to be "impacted" and/or
    - If the projected intersection delay is at unacceptable conditions (LOS D, E, or F) in the No Build Alternative and the change in delay between the No Build Alternative and Build Alternative is greater than 20 percent, this study considered the intersection to be "impacted."

If the intersection was considered to be impacted by the Project, potential intersection modifications were considered in this study to minimize or mitigate the impact. The operations of the proposed park-and-ride entrances/exits for the proposed stations were also evaluated. As these access points are not present in existing condition and the No Build Alternative, impacts at access points were evaluated only for the Build Alternatives.

3.3 Highway/Rail At-Grade Crossings

The potential effects of highway/rail at-grade crossings on traffic operations were analyzed using a similar methodology to the intersections:

1. **Traffic Data Collection**: In addition to the traffic counts collected for intersections near proposed highway/rail at-grade crossings, existing train counts were collected along segments of currently used tracks that would be shared by the Project.
2. **Traffic Volume Escalation**: The process for escalating the existing traffic data to year 2040 was the same as described for the intersection analysis in **Section 3.1**.
3. **Determine Time the Train is in the Crossing**: The analysis included data for existing train arrivals, the Project train speeds, and the length of time traffic would be stopped by a train crossing the roadway. The time needed for the train to pass the crossing is dependent on its speed at that location and its length. Based on information from the MUTCD, it was assumed that the gates would descend in 12 seconds, include a 5 second buffer interval, and the time for the gates to return to an upright position would be 12 seconds.
4. **Assess Impacts**: For the Build Alternatives, the highway/rail at-grade crossings with the highest traffic volume per lane in the peak traffic hours were modeled as worst-case scenarios. SIM Traffic within Synchro 8 was used to perform the analysis. If the queue of vehicles from the gate closing would not fully clear prior to the next existing or Project train passing, then the Project was considered to have an impact.



Ref #	Intersection
Munster/Dyer Main Street Station	
1	Sheffield Ave & 213th St
2	Sheffield Ave & Seminary Dr
3	Sheffield Ave & Northgate Dr
4	Sheffield Ave & Main St
Munster Ridge Road Station	
5	Ridge Rd & North Dwy/Harrison Ave
6	Ridge Rd & Harrison Ave/KFC Dwy & Speedway Dwy
7	Ridge Rd & Manor Ave
South Hammond Station	
8	169th & Harrison Ave
9	173rd & Harrison Ave
10	173rd & Lyman Ave
Downtown Hammond Station	
11	Hohman Ave & Sibley St
12	Hohman Ave & Fayette St
13	Hohman Ave & Russell St
14	Hohman Ave & Douglas St
15	Lyman Ave & Douglas St
16	Oakley Ave & Douglas St
17	Oakley Ave & Fayette St & Russell St
18	Oakley Ave & Sibley St
Hammond Gateway Station	
19	Dearborn Ave & Gostlin St
20	Sheffield Ave & Gostlin St
Hegewisch Station	
21	Brainard Ave & Burnham Ave
22	Brainard Ave & Torrence Ave & 130th St

Note: Intersections 23-25 are locations of proposed park-and-ride access points.

Figure 3-1 Intersection Traffic Count Locations

3.4 Roadway Network Connectivity

The locations, nature, and effects of Project changes to the existing street network were evaluated. Potential Project changes include roadway closings at railroad crossings and changes in traffic routing.

4. AFFECTED ENVIRONMENT

Each proposed station would be served by specific roadways; these roads were considered the most likely to experience Project traffic impacts. A traffic analysis of existing conditions, based on the collected traffic counts, examined 22 intersections in the Study Area. All intersections within the Study Area operate at LOS C or better in the existing condition. More detail regarding the existing conditions analysis can be found in **Appendix A**.

Northwest Indiana is served by a comprehensive, hierarchical network of streets and roadways, ranging from local streets to interstate highways. The interconnectivity of routes provides for the efficient collection/distribution of vehicle travel to the higher order arterial and freeway network. Major routes are illustrated on **Figure 4–1** and described below.

The proximity of Northwest Indiana at the southern end of Lake Michigan causes three of the nation's principal east-west interstates to traverse the Study Area (i.e., I-80, I-90, and I-94). The primary highway routes used to travel to downtown Chicago include the following:

- **Frank Borman Expressway** is the stretch of I-80 and I-94 from I-65 west to the Indiana-Illinois border. This is a major truck thoroughfare and is the most heavily traveled route in Northwest Indiana.
- **Indiana Toll Road** is the section of I-90 that travels east-west through LaPorte, Porter, and Lake Counties to the Indiana-Illinois border, connecting with the Chicago Skyway.
- **Chicago Skyway** is a tolled section of I-90 running east-west from the Indiana-Illinois border to the Dan Ryan Expressway.
- **Bishop Ford Expressway** is the section of I-94 from the southern end of the Dan Ryan Expressway at 95th Street in Chicago southeast to I-80.
- **Dan Ryan Expressway** is a primary link used to connect Northwest Indiana to downtown Chicago. It is designated as both I-94 and I-90 from the merge with the Chicago Skyway (I-90) to the Circle Interchange (now designated the Jane Byrne Interchange). The route's remaining distance of 4 miles extends from the I-90 merge to 95th Street in Chicago. Dan Ryan Expressway has 14 lanes of traffic; 7 in each direction, with 4 of those as express lanes and the other 3 local lanes providing access for exit and on-ramps. On an average day, the roadway carries over 300,000 vehicles.

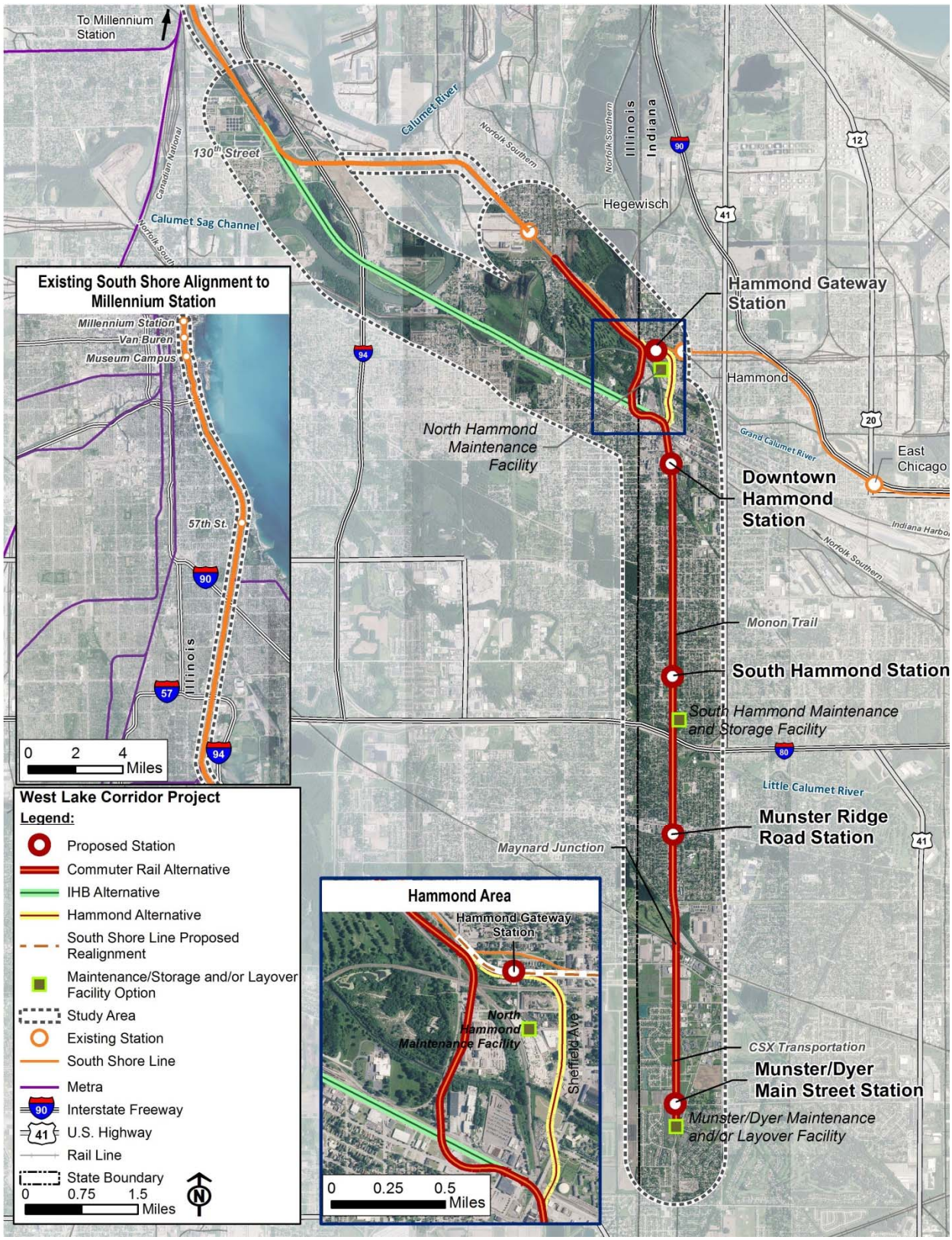


Figure 4-1 Major Roadways in the West Lake Corridor Project Study Area

An extensive network of United States (US) and state routes serve Northwest Indiana. Primarily built before the interstate system, use of this connected system of roads involves lower speeds than expressways. Key routes include the following:

- **US 41** has a north-south orientation through Lake County near the communities of Lowell, St. Joseph, Schererville, Highland, and Hammond. From Hammond, US 41 continues northwest into Chicago and becomes Lake Shore Drive.
- **Indiana State Route 53** travels north-south from I-90 in Gary, through Merrillville and Crown Point to US Route 231.
- **Cline Avenue/State Route 912** is located between US 12 in East Chicago and Griffith; the segment north of the Frank Borman Expressway is the only freeway in Northwest Indiana not designated an interstate highway.
- **US 30** is an east-west road through the center of Lake and Porter Counties, intersecting communities such as Valparaiso, Merrillville, Schererville, and Dyer. From Dyer, US 30 connects west into southern Cook County. A grade separation between US 30 and the CN railroad is included in the CMAP Transportation Improvement Program (TIP) (FY2014-2019).
- **US Routes 12 and 20** are two east-west oriented US designated routes that serve the northern reaches of Lake and Porter Counties

5. ENVIRONMENTAL CONSEQUENCES

Effects of the Project on traffic operations were evaluated based on changes at the regional and local level as a result of the Project service. The projected VMT and VHT for the NEPA Preferred Alternative, Commuter Rail Alternative Options, IHB Alternative Options, and Hammond Alternative Options 1 and 3, as well as the No Build Alternative, are presented in **Table 5-1**. VMT is similar among the Project Build Alternatives because there are comparatively small differences in ridership among the Build Alternatives.

Table 5-1 NICTD Annual Regional VMT and VHT in 2040

Alternative	VMT	Percent Difference of VMT No Build vs Build Alternatives	VHT	Percent Difference of VHT No Build vs Build Alternatives
2040 No Build Alternative	26,404,841	-	1,064,452	-
Commuter Rail Alternative Options	26,291,789	-0.4%	1,060,095	-0.4%
IHB Alternative Options	26,283,352	-0.5%	1,059,790	-0.4%
Hammond Alternative Options	26,282,479	-0.5%	1,059,738	-0.4%

SOURCE: FTA STOPS Model application (AECOM 2016).

5.1 Intersection Performance

5.1.1 No Build Alternative

A detailed analysis of the potential impacts of the No Build Alternative on the roadway system was performed to provide information about the quality of operations of existing roadways in planning horizon year 2040 and to enable a direct comparison of No Build Alternative and Build Alternatives impacts. The No Build Alternative analysis identified an increase in traffic delays as a result of expected increases in traffic volumes. Two intersections would operate at unacceptable LOS in the No Build Alternative. A comparison of the delay and LOS results for existing conditions and the No Build Alternative for these intersections is presented in **Table 5–1**. A table summarizing the delay and LOS for the 22 intersections analyzed for the No Build Alternative is included in **Appendix B**.

Table 5-2 Intersection LOS – Existing Conditions and No Build Alternative

Ref. #	Intersection Name	Traffic Control Type	Existing				No Build Alternative (2040)			
			Delay (sec/veh)		LOS		Delay (sec/veh)		LOS	
			AM	PM	AM	PM	AM	PM	AM	PM
2	Sheffield Avenue & Seminary Drive	TWSC	11.3	13.7	B	B	14.2	26.7	B	D
3	Sheffield Avenue & Northgate Drive	TWSC	12.2	13.5	B	B	16.9	25.2	C	D

SOURCE: AECOM 2016

The two intersections operating at unacceptable LOS, which are listed in **Table 5–1**, are at the southern end of the project. These intersections would fail as a result of the projected traffic growth along Main Street and Sheffield Avenue.

5.1.2 Build Alternatives

The effects on intersection performance were evaluated for each of the stations and the maintenance and storage facility sites included in the Build Alternatives. The proposed stations are the same for the Commuter Rail Alternative Options and the IHB Alternative Options (Munster/Dyer Main Street, Munster Ridge Road, South Hammond, and Downtown Hammond stations). The Hammond Alternative Options would include the Hammond Gateway Station instead of the Downtown Hammond Station. The intersections near the existing Hegewisch Station would only be affected by the Commuter Rail Alternative Options and the Hammond Alternative Options.

The Build Alternatives would affect the operations of some intersections within the Study Area as described within this section. However, if the mitigation for these impacts is implemented, there may be traffic benefits that would not be realized with the No Build Alternative. These potential operational improvements are described in **Section 6**.

Proposed Munster/Dyer Main Street Station

Of the four intersections analyzed surrounding the proposed Munster/Dyer Main Street Station, three intersections would be affected by the Project. Of these intersections, three would operate at an unacceptable LOS under No Build conditions in the PM peak hour. The delay and LOS in the No Build Alternative and Build Alternatives at these intersections are presented in **Table 5–2**). A table of the delay and LOS for all intersections analyzed for the Munster/Dyer Main Street Station is included in **Appendix C**. Mitigation options for these impacts can be found in **Section 6.1.1**.

Table 5-3 Impacted Intersections – Munster/Dyer Main Street Station

Ref #	Intersection Name	Control Type	No Build Alternative (2040)				Commuter Rail Alternative (2040)			
			Delay (sec/veh)		LOS		Delay (sec/veh)		LOS	
			AM	PM	AM	PM	AM	PM	AM	PM
Munster/Dyer Main Street Station										
2	Sheffield Avenue / Seminary Drive	TWSC	14.2	26.7	B	D	17.4	34.5	C	D
3	Sheffield Avenue / Northgate Drive	TWSC	16.9	25.2	C	D	25.9	44.2	D	E
4	Sheffield Avenue / Main Street	Signal	19.5	20.7	B	C	34.1	53.9	C	D

SOURCE: AECOM 2016

Proposed Munster Ridge Road Station

The Munster Ridge Road Station would not affect the surrounding intersections, which include:

- Ridge Road and North Driveway/Harrison Avenue (Intersection Reference #5),

- Ridge Road and Harrison Avenue/South Driveway (Intersection Reference #6), which would function as the parking lot access point
- Ridge Road and Manor Avenue (Intersection Reference #7)

All intersections would continue to operate at the same LOS as the No Build Alternative. A table of all intersections analyzed for the Munster Ridge Road Station is included in **Appendix C**.

Proposed South Hammond Station

Two of the three intersections surrounding the South Hammond Station would operate at acceptable LOS under the Build Alternatives. The 173rd Street and Harrison Avenue intersection would fall below acceptable LOS to LOS D. The AWSC configuration at this intersection may not sufficiently support the projected traffic growth combined with the site-generated traffic from the South Hammond Station. Mitigation options for this intersection can be found in **Section 6.1.1**. A table of all intersections analyzed for the South Hammond Station is included in **Appendix C**.

Proposed Downtown Hammond Station

The intersections around the Downtown Hammond Station are not expected to reach the impact threshold and would continue to operate at an acceptable LOS. The intersections analyzed include:

- Hohman Avenue and Sibley Street (Intersection Reference #11)
- Hohman Avenue and Fayette Street (Intersection Reference #12)
- Hohman Avenue and Russell Street (Intersection Reference #13)
- Hohman Avenue and Douglas Street (Intersection Reference #14)
- Lyman Avenue and Douglas Street (Intersection Reference #15)
- Oakley Avenue and Douglas Street (Intersection Reference #16)
- Parking Lot Access on Oakley Avenue (Intersection Reference #24)
- Oakley Avenue and Fayette Street and Russell Street (Intersection Reference #17)
- Parking Lot Access on Fayette Street (Intersection Reference #25)
- Oakley Avenue and Sibley Street (Intersection Reference #18)

A table of the intersections analyzed for the Downtown Hammond Station is included in **Appendix C**.

Proposed Hammond Gateway Station (Hammond Alternative)

The intersections near the Hammond Gateway Station are not expected meet or exceed the impact threshold. These include:

- Dearborn Avenue and Gostlin Street (Intersection Reference #19)
- Sheffield Avenue and Gostlin Street (Intersection Reference #20)

A table of the intersections analyzed for the Hammond Gateway Station is included in **Appendix C**.

Existing Hegewisch Station

The Hegewisch Station is an existing station along the existing MED/SSL. The additional Project service at the station would be expected to translate to increased ridership at this location. There are two main intersections near the Hegewisch Station park-and-ride facilities:

- Brainard Avenue and Burnham Avenue (Intersection Reference #21)
- Torrence Avenue and Brainard Avenue and 130th Street (Intersection Reference #22)

The intersection of Brainard Avenue and Burnham Avenue would continue to operate at an acceptable LOS if served by the Project. A table of the intersections analyzed for the Build Alternatives is included in **Appendix C**.

The intersection of Torrence Avenue and Brainard Avenue and 130th Street was under construction as part of a project to eliminate two highway/rail at-grade crossings and increase intersection capacity. Therefore, a quantitative analysis of this intersection could not be completed. With most of the existing passengers accessing Hegewisch Station coming from points south and southeast of the station, it is anticipated that most new passengers would not use this intersection to access Hegewisch Station. As a result, the Project is not anticipated to impact this intersection.

Maintenance and Storage Facility Options

Three maintenance and storage facility options were considered for the Build Alternatives: Munster/Dyer Maintenance and/or Layover Facility, South Hammond Maintenance and Storage Facility, and North Hammond Maintenance Facility. The Hammond Alternative Options propose to include the North Hammond Maintenance Facility located near the Hammond Gateway Station with the layover facility to be located near the Munster/Dyer Main Street Station. The locations of the proposed maintenance facility options are shown on **Figure 1–2**. The parking lots associated with the maintenance facility options are sized for approximately 100 vehicles. Maintenance facility option-generated traffic volumes would be minimal and would occur outside of the peak hours. As a result, none of the proposed maintenance and storage facilities would result in substantial traffic impacts.

5.2 Highway/Rail At-Grade Crossing Performance

5.2.1 No Build Alternative

The projects listed in the TIP, which comprise the No Build Alternative, would cause no changes in highway/rail at-grade crossing performance.

5.2.2 Commuter Rail Alternative Options

The Commuter Rail Alternative Options would operate at grade for the majority of its length with a few sections on embankment or on structure to cross bodies of water or other existing infrastructure such as freight rail tracks. Thirteen new at-grade street crossings would be created by the Commuter Rail Alternative Options (listed from south to north):

- Fisher Street
- Ridge Road

- 173rd Street
- Detroit Street
- Highland Street
- 165th Street
- Kenwood Street
- Conkey Street
- Waltham Street
- Douglas Street
- Fayette Street
- Sibley Street
- Burnham Avenue

Of these proposed at-grade crossings, the highest volume per lane would occur on 173rd Street at the proposed grade crossing. At this location the gates would reach the vertical position 83 seconds after beginning their descent when a train is approaching. Based on the anticipated train schedule, the gates would close twice in the AM peak hour and once in the PM peak hour.

The resulting queue would clear in approximately 35 seconds after the gate ascends. As the queue would clear quickly, the new at-grade crossing would not substantially impact traffic operations at this location. The other 12 at-grade street crossings along the Commuter Rail Alternative Options would have lower traffic volumes and would experience shorter queues compared to 173rd Street. As a result, the new at-grade crossings of these other streets would have negligible impact on traffic operations.

5.2.3 IHB Alternative Options

The IHB Alternative Options would have the same proposed at-grade crossings as the Commuter Rail Alternative Options from Fisher Street north to Sibley Street. North of Sibley Street, the IHB Alternative Options include five highway/rail at-grade crossings along existing railroad ROW (listed from south to north):

- Driveway east of Morton Court
- State Line Avenue (adjacent to existing tracks)
- 132nd Street
- Doty Avenue
- Cottage Grove

Similar to the Commuter Rail Alternative Options, the IHB Alternative Options are anticipated to have the highest traffic volume per lane at the 173rd Street grade crossing. As described in **Section 5.2.2**, the traffic queue would clear in 35 seconds and the gates would only be closed twice in the AM peak hour and once in the PM peak hour; therefore, the new at-grade crossing would not substantially impact traffic operations at this location. The other at-grade crossings along the IHB Alternative Options would experience shorter queues compared to 173rd Street. As a result, the new at-grade crossings of these other streets would have negligible impact on traffic operations.

5.2.4 Hammond Alternative Options

The Hammond Alternative Options would have the same proposed at-grade crossings as the Commuter Rail Alternative Options from Fisher Street north to Douglas Street. The Hammond Alternative Options do not propose any additional at-grade crossings; however, the Hammond Alternative Options would cross Burnham Avenue using the existing MED/SSL at-grade crossing.

Similar to the Commuter Rail Alternative Options, the Hammond Alternative Options are anticipated to have the highest traffic volume per lane at the 173rd Street grade crossing. As described in **Section 5.2.2**, the traffic queue would clear in 35 seconds and the gates would only close twice in the AM peak hour and once in the PM peak hour; therefore, the new at-grade crossing would not substantially impact traffic operations at this location. The other at-grade crossings would experience shorter queues compared to 173rd Street; therefore, the new at-grade crossings of these other streets would have negligible impact on traffic operations.

5.3 Street Network Connectivity

5.3.1 No Build Alternative

The projects comprising the No Build Alternative would cause no changes in street network connectivity.

5.3.2 Commuter Rail Alternative Options

The Commuter Rail Alternative Options would require road closures at some railroad crossing locations, such as where sufficient vertical clearance between the existing road and the proposed guideway structure is not feasible or to avoid introducing a new at-grade crossing.

North of downtown Hammond, the Commuter Rail Alternative Options would bend north and west to pass under the Hohman Avenue bridge structure while at-grade level with State Street and Willow Court. After crossing under Hohman Avenue, the proposed alignment of the Commuter Rail Alternative Options would turn to cross the IHB freight line at an angle approaching 90 degrees; the angled approach would minimize the length of the structure span as seen on **Figure 5–1**.

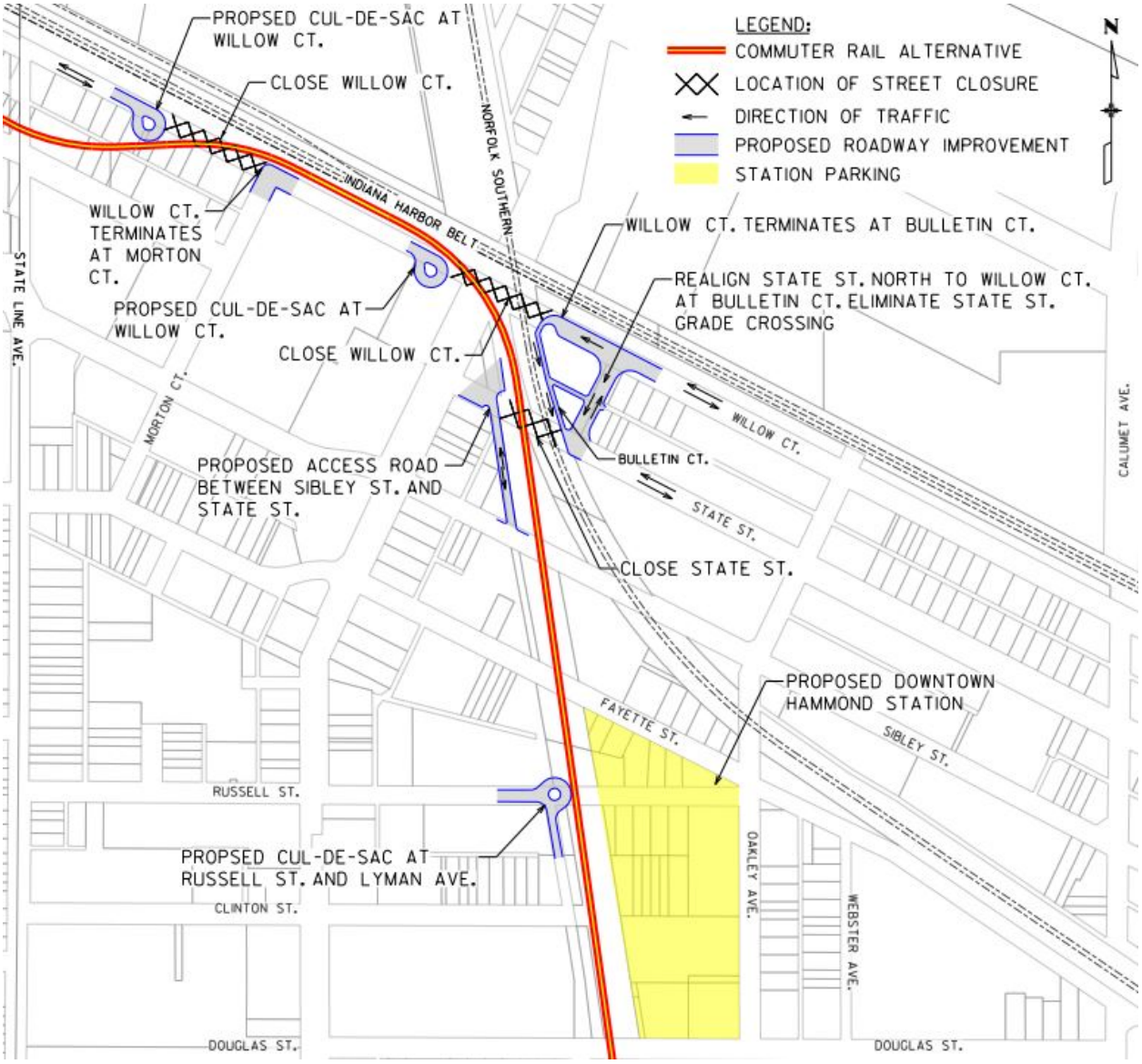


Figure 5-1 Commuter Rail Alternative Proposed Street Closures

Streets that would be affected include the following:

Russell Street

The Downtown Hammond Station proposed as part of the Commuter Rail Alternative Options would require the removal of Russell Street between Lyman Avenue and Oakley Avenue. Russell Street is currently a one-way eastbound street. Russell Street between Hohman Avenue and Lyman Avenue would be converted to two-way operation. This would require modifications to the traffic signal at Hohman Avenue and Russell Street to accommodate two-way traffic on the east leg. The intersection of Russell Street and Lyman Avenue would be designed as a cul-de-sac while maintaining the connection between these two streets as shown on **Figure 5–1**.

At less than ½-mile long, Russell Street serves mostly local traffic. The change in the configuration of Russell Street is not expected to impact traffic operations because the properties along Russell Street would still be accessible with the new configuration. In addition,

access across the proposed track would be feasible along Fayette Street (located one block to the north) or Douglas Street (located two blocks to the south).

State Street East of Hohman Avenue

From Columbia Avenue, State Street is slightly more than 1 mile in length, bending northwest to Willow Court after crossing the two main tracks of the NS freight line where it terminates just east of Hohman Avenue. The Commuter Rail Alternative Options would use the ROW of this segment of State Street. The Project would create a new roadway connection between State Street and Willow Court east of the NS freight line, as shown on **Figure 5–1**.

Access from Sibley Street to the existing parking lot in the triangle of State Street and Hohman Avenue would be provided by using the bus lane from the Dan Rabin Transit Center, which is not currently used by transit operations. Along Sibley Street in this area, traffic volumes are relatively low; in November 2014 the AM peak hour traffic count was 45 vehicles and the PM peak hour count was 58 vehicles. Based on existing and anticipated future traffic volumes, eliminating this NS freight line grade crossing would not substantially impact traffic operations and would have a safety benefit by eliminating potential train/vehicle conflicts.

Willow Court

As the Commuter Rail Alternative Options extend under the Hohman Avenue underpass, the tracks would use the Willow Court ROW, requiring closure of the street at the at-grade crossing. Willow Court is proposed to continue to connect to Bulletin Court, which would be reversed to a one-way southbound street with the exit onto State Street. A new roadway connection between Willow Court and State Street would be included to maintain network connectivity as shown on **Figure 5–1**.

A cul-de-sac of Willow Court would also be developed west of Hohman Avenue, maintaining access via Morton Court to a grocery store on the south side of Willow Court. It is proposed that this section of Morton Court be modified to function more like an alley. On the west leg of the intersection with Morton Court, the proposed alignment would be on embankment, which would restrict access along this leg. This intersection would be revised to only support northbound-to-eastbound and westbound-to-southbound movements. West of the embankment, Willow Court would terminate as a cul-de-sac.

The portion of the Commuter Rail Alternative Options on the embankment parallel to the section of Willow Court (between Morton Court and State Line Avenue) would conflict with the existing private access to Northlake Auto Recyclers. This private driveway would need to be closed; however, access to the property would be maintained via the existing Industrial Drive on the north side of the IHB freight line tracks.

In the AM peak period, Willow Court traffic volumes ranged from 140 to 180 vehicles between State Line Avenue and Morton Court based on counts taken in November 2014. PM peak period counts ranged from 170 to 230 vehicles. Traffic currently utilizing Willow Court could instead use Sibley Street, located two blocks to the south, with minimal out-of-direction travel. While the proposed cul-de-sacs would affect through traffic, access to developed properties along Willow Court would be maintained and an existing at-grade rail crossing would be eliminated. Therefore, the Commuter Rail Alternative Options are not expected to have substantial impacts to traffic currently utilizing Willow Court.

5.3.3 IHB Alternative Options

The IHB Alternative Options would require road closures at some railroad crossing locations, such as where sufficient vertical clearance between the existing road and the proposed guideway structure is not feasible or to avoid introducing a new at-grade crossing. North of the proposed Downtown Hammond Station, the IHB Alternative Options would bend north and west to pass under the Hohman Avenue bridge structure over State Street and Willow Court ROW. After crossing under Hohman Avenue, the proposed alignment of the IHB Alternative Options would be parallel to the existing IHB tracks as seen on **Figure 5–2**. Streets that would be affected include the following:

Russell Street

The IHB Alternative Options would have the same effects on street connectivity around the Downtown Hammond Station as those described under the Commuter Rail Alternative Options.

State Street East of Hohman Avenue

East of Hohman Avenue, the IHB Alternative Options would have the same effects on street connectivity as those described under the Commuter Rail Alternative Options.

Willow Court

As the IHB Alternative Options would extend through the Hohman Avenue underpass, the tracks would use the Willow Court ROW, requiring closure of the street at the at-grade crossing. Willow Court is proposed to continue to connect to Bulletin Court, which would be reversed to a one-way southbound street with the exit onto State Street. A new roadway connection between Willow Court and State Street is proposed to maintain network connectivity as shown on **Figure 5–2**.

A cul-de-sac of Willow Court would also be developed west of Hohman Avenue, maintaining access via Morton Court to a grocery store on the south side of Willow Court. It is proposed that this section of Morton Court be modified to function more like an alley. While the proposed cul-de-sacs would affect through traffic, access to developed properties along Willow Court would be maintained and an existing at-grade rail crossing would be eliminated. Therefore, the IHB Alternative Options are not expected to have substantial impacts to traffic currently utilizing Willow Court.

5.3.4 Hammond Alternative Options

The Hammond Alternative Options would require road closures where the proposed alignment would cross the existing street network, such as where sufficient vertical clearance between the existing road and the proposed guideway structure is not feasible or to avoid introducing a new at-grade crossing. Changes to the street connectivity would occur in Hammond as shown on **Figure 5–3**.

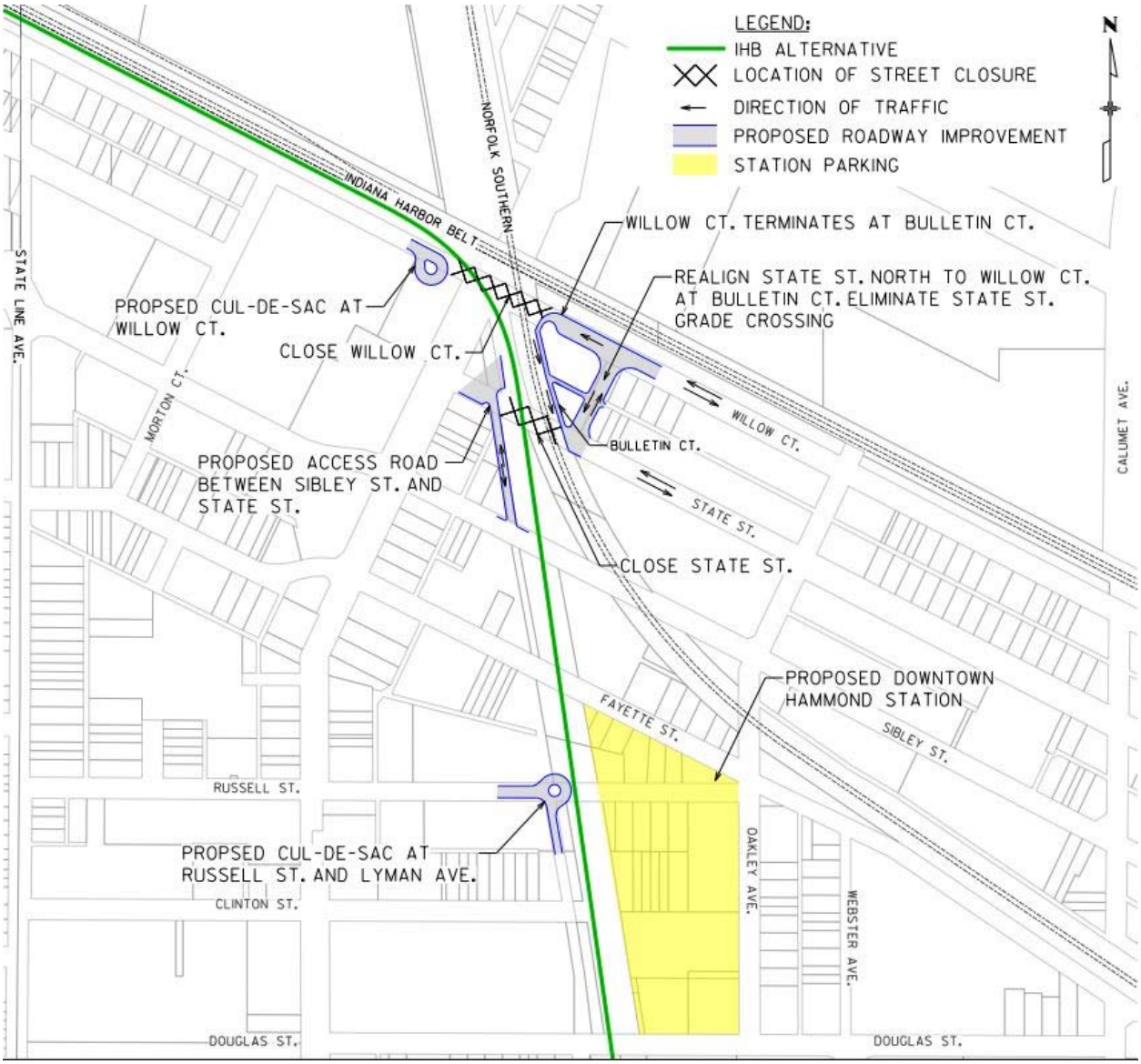


Figure 5-2 IHB Alternative Proposed Street Closures

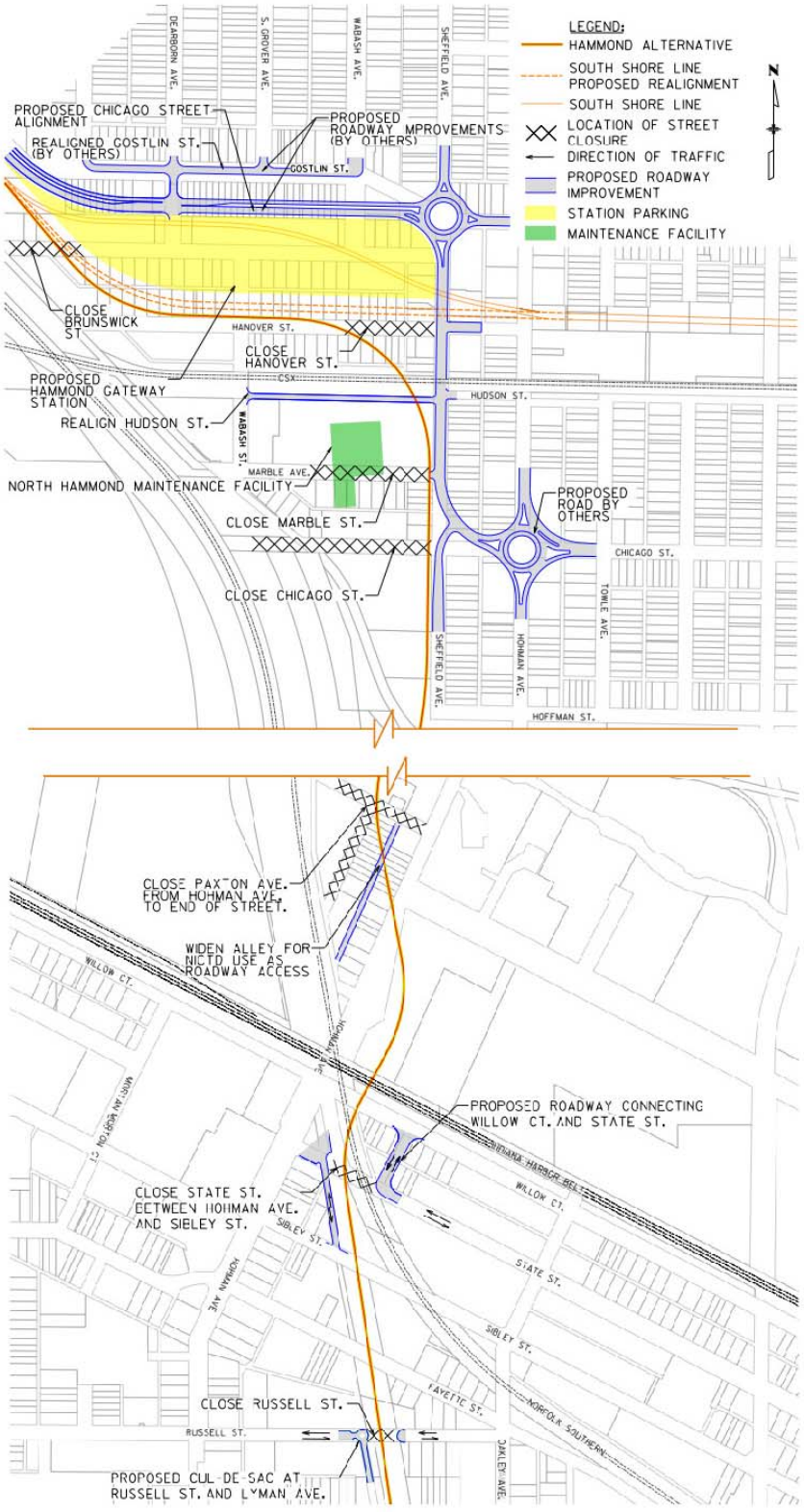


Figure 5-3 Hammond Alternative Proposed Street Closures

Streets that would be affected include the following:

North of Grand Calumet River

With the Hammond Alternative Options, much of the land area between the Project connection with the existing MED/SSL near the state line and the Grand Calumet River is proposed to be redeveloped for the Hammond Gateway Station and the North Hammond Maintenance Facility. South of Gostlin Street, Dearborn Street would be reconfigured as the entrance to the station parking lot. Wabash Avenue would remain open between the CSX freight line and Marble Avenue.

Hanover Street (west of Sheffield Avenue) and Marble Avenue (between Wabash Avenue and Sheffield Avenue) would be developed as part of the Hammond Alternative Options. Hudson Street would be extended west of Sheffield Street to connect to Wabash Avenue, which would provide access to the remaining portion of Marble Street and the North Hammond Maintenance Facility.

State Street East of Hohman Avenue

The Hammond Alternative Options would affect State Street in a similar manner to the Commuter Rail Alternative Options. East of the NS freight line, a new two-way roadway would connect State Street and Willow Court east of the NS freight line, as shown on **Figure 5–3**.

Russell Street

The Hammond Alternative Options are proposed to transition from an elevated structure at Fayette Street to an at-grade alignment north of Douglas Street in downtown Hammond. The track would be on retained fill or on embankment throughout the vertical transition and there would not be sufficient clearance over Russell Street. As a result, Russell Street between Lyman Avenue and Oakley Avenue would be closed.

This closure would require modifications to the traffic signal at Hohman Avenue and Russell Street to accommodate two-way traffic on the east leg. The intersection of Russell Street and Lyman Avenue would be designed as a cul-de-sac while maintaining the connection between these two streets as shown on **Figure 5–3**. East of the proposed Hammond Alternative Options track alignment, Russell Street would become a cul-de-sac to continue to provide access to properties between the proposed track and Oakley Avenue.

5.4 Construction-Related Impacts

Construction of any of the Build Alternatives would temporarily affect roadway operations during construction of new highway/rail at-grade crossings and during construction of parking lots and access points. Project construction activities may result in detours or one-way roadway operations, which could temporarily increase traffic delays.

6. MITIGATION

6.1 Long-Term Operating Effects

6.1.1 Intersection Performance

The No Build Alternative would not result in any long-term impacts on traffic operations and, therefore, would not require mitigation. Potential mitigation strategies to reduce or minimize the impacts on intersection performance as a result of the Build Alternatives were evaluated using Synchro 8. These mitigation strategies for the intersections that would be affected near each station are described below. As the Project design advances, NICTD would coordinate with agencies having jurisdiction and/or maintenance responsibility of affected roadways as well as emergency services regarding Project effects on intersection performance.

Munster/Dyer Main Street Station

The three intersections impacted by the Build Alternatives are Sheffield Avenue / Seminary Drive, Sheffield Avenue / Northgate Drive, and Sheffield Avenue / Main Street. The potential impact to Sheffield Avenue / Seminary Drive could be mitigated by striping the west leg to include a right-turn lane, which would reduce delay below the impact threshold.

The potential impact at Sheffield Avenue / Northgate Drive could be mitigated by signalizing the intersection, which would reduce the delays below the impact threshold. The intersection meets MUTCD traffic signal warrant 3 under build conditions. A warrant is a condition that an intersection must meet to satisfy a signal installation. Traffic signal warrant 3 represents peak hour travel conditions (FHWA 2009).

The impact at Sheffield Avenue / Main Street would be mitigated to improve the operations by upgrading the traffic signal equipment to an actuated traffic signal and retiming the signal and adding channelization at the intersection. This would include adding a right-turn lane to the south leg and widening Main Street to accommodate a right-turn lane, through lane and left-turn lane in the westbound direction and two travel lanes in the eastbound direction. The station entrance would be designed with one travel lane in the westbound direction and a left-turn lane, two through lanes, and a right-turn lane in the eastbound direction. These design features would improve the PM peak hour operations to LOS D and the AM peak hour would continue to operate at an acceptable LOS. The competing demand for the traffic signal green time in the PM peak hour exists between opposing traffic on the east and west legs. Vehicles exiting the station would conflict with the demand of vehicles turning left from the east leg to the south leg. Only one train would be scheduled to arrive at the proposed Munster/Dyer Main Street Station during the PM peak period and the reduced operational level would occur primarily after passengers disembark the outbound train.

South Hammond Station

The intersection of 173rd Street and Harrison Avenue could be striped to include an eastbound to southbound right-turn lane, which would help the intersection operate at an acceptable LOS. There is sufficient roadway width to make this change without widening the intersection.

6.1.2 Highway/Rail At-Grade Crossing Performance

To avoid the potential for incidents, crossings would be equipped with gates and bells to warn of oncoming trains. The trains would also have warning devices such as horns. Bells, gates, and horns would be activated according to NICTD operating procedures and Federal Railroad Administration (FRA) safety guidelines (FRA 2016). As the Project design advances, NICTD would coordinate with agencies having jurisdiction and/or maintenance of affected roadways as well as emergency services and school districts regarding highway/rail at-grade crossings.

6.1.3 Street Network Connectivity

Current Project designs include several measures to maintain adequate street network connectivity under all Build Alternatives. As the Project design advances, NICTD would coordinate with agencies having jurisdiction and/or maintenance responsibility of affected roadways as well as emergency services regarding changes to the roadway network.

6.2 Short-Term Construction Effects

The Build Alternatives would be designed with construction mitigation techniques to minimize temporary traffic impacts. Maintenance of traffic and sequence of construction would be planned and scheduled so as to minimize traffic delays and inconvenience.

7. REFERENCES

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APPENDIX A
Existing Traffic Operational Analysis

INTERSECTION		Control Type	Existing					
			Volume		Delay (sec/veh)		LOS	
Munster/Dyer Main Street Station			AM	PM	AM	PM	AM	PM
1	Sheffield Ave & 213th St	Signal	700	1247	11.9	14.1	B	B
2	Sheffield Ave & Seminary Dr	TWSC	82	104	11.3	13.7	B	B
3	Sheffield Ave & Northgate Dr	TWSC	98	115	12.2	13.5	B	B
4	Sheffield Ave & Main St	Signal	659	973	15.4	14.6	B	B

INTERSECTION		Control Type	Existing					
			Volume		Delay (sec/veh)		LOS	
Munster Ridge Road Station			AM	PM	AM	PM	AM	PM
5	Ridge Rd & North Dwy/Harrison Ave	Signal	1373	1741	8.0	7.1	A	A
6	Ridge Rd & Harrison (Parking Lot Access)	Signal	1388	1824	3.2	4.1	A	A
7	Ridge Rd & Manor Ave	Signal	1396	1885	4.8	7.9	A	A

INTERSECTION		Control Type	Existing					
			Volume		Delay (sec/veh)		LOS	
South Hammond Station			AM	PM	AM	PM	AM	PM
8	169th & Harrison Ave	AWSC	229	285	7.6	8.0	A	A
9	173rd & Harrison Ave	AWSC	642	750	9.4	10.5	A	B
23	Parking Lot Access on 173rd	TWSC	-	-	-	-	-	-
10	173rd & Lyman Ave	TWSC	65	72	12.2	11.8	B	B

INTERSECTION		Control Type	Existing					
			Volume		Delay (sec/veh)		LOS	
Downtown Hammond Station			AM	PM	AM	PM	AM	PM
11	Hohman Ave & Sibley St	Signal	1631	1968	17.3	19.8	B	B
12	Hohman Ave & Fayette St	Signal	1168	1205	6.2	11.7	A	B
13	Hohman Ave & Russell St	Signal	1160	1093	8.2	3.9	A	A
14	Hohman Ave & Douglas St	Signal	1193	1221	6.4	4.7	A	A
15	Lyman Ave & Douglas St	TWSC	96	68	9.1	8.7	A	A
16	Oakley Ave & Douglas St	TWSC	18	38	8.8	8.8	A	A
24	Parking Lot Access on Oakley	TWSC	-	-	-	-	-	-
17	Oakley Ave & Fayette St & Russell St	AWSC	131	130	7.4	7.2	A	A
25	Parking Lot Access on Fayette	TWSC	-	-	-	-	-	-
18	Oakley Ave & Sibley St	Signal	186	279	6.9	5.4	A	A

INTERSECTION		Control Type	Existing					
			Volume		Delay (sec/veh)		LOS	
Hammond Gateway Station			AM	PM	AM	PM	AM	PM
19	Dearborn Ave & Gostlin St	TWSC[1]	44	47	12.2	16.2	B	C
20	Sheffield Ave & Gostlin St	Signal[2]	692	1045	7.7	7.9	A	A

INTERSECTION		Control Type	Existing					
			Volume		Delay (sec/veh)		LOS	
Hegewisch Station			AM	PM	AM	PM	AM	PM
21	Brainard Ave & Burnham Ave	Signal	1396	2208	24.3	25.5	C	C
22	Brainard Ave & Torrence Ave & 130th St	Signal	1423	1718	14.3	18.6	B	B

Notes:

1. Signalized in the No Build and Build Alternative
2. Roundabout in the No Build and Build Alternative

APPENDIX B
No Build 2040 Traffic Operational Analysis

INTERSECTION		Control Type	No Build					
			Volume		Delay (sec/veh)		LOS	
Munster/Dyer Main Street Station			AM	PM	AM	PM	AM	PM
1	Sheffield Ave & 213th St	Signal	900	1580	13.2	16.3	B	B
2	Sheffield Ave & Seminary Dr	TWSC	130	150	14.2	26.7	B	D
3	Sheffield Ave & Northgate Dr	TWSC	160	190	16.9	25.2	C	D
4	Sheffield Ave & Main St	Signal	1020	1640	19.5	20.7	B	C

INTERSECTION		Control Type	No Build					
			Volume		Delay (sec/veh)		LOS	
Munster Ridge Road Station			AM	PM	AM	PM	AM	PM
5	Ridge Rd & North Dwy/Harrison Ave	Signal	1980	2540	14.1	9.3	B	A
6	Ridge Rd & Harrison (Parking Lot Access)	Signal	2140	2770	5.1	5.9	A	A
7	Ridge Rd & Manor Ave	Signal	2080	2800	7.3	11.5	A	B

INTERSECTION		Control Type	No Build					
			Volume		Delay (sec/veh)		LOS	
South Hammond Station			AM	PM	AM	PM	AM	PM
8	169th & Harrison Ave	AWSC	730	870	11.8	17.2	B	C
9	173rd & Harrison Ave	AWSC	950	1040	12.7	15.9	B	C
23	Parking Lot Access on 173rd	TWSC	-	-	-	-	-	-
10	173rd & Lyman Ave	TWSC	130	140	15.5	16.0	C	C

INTERSECTION		Control Type	No Build					
			Volume		Delay (sec/veh)		LOS	
Downtown Hammond Station			AM	PM	AM	PM	AM	PM
11	Hohman Ave & Sibley St	Signal	2160	2560	17.0	32.4	B	C
12	Hohman Ave & Fayette St	Signal	1670	1700	6.8	9.0	A	A
13	Hohman Ave & Russell St	Signal	1730	1630	9.1	5.1	A	A
14	Hohman Ave & Douglas St	Signal	1830	1860	8.3	6.3	A	A
15	Lyman Ave & Douglas St	TWSC	160	120	10.2	9.5	B	A
16	Oakley Ave & Douglas St	TWSC	40	70	9.0	9.1	A	A
24	Parking Lot Access on Oakley	TWSC	-	-	-	-	-	-
17	Oakley Ave & Fayette St & Russell St	AWSC	230	230	7.6	7.4	A	A
25	Parking Lot Access on Fayette	TWSC	-	-	-	-	-	-
18	Oakley Ave & Sibley St	Signal	370	530	10.5	5.5	B	A

INTERSECTION		Control Type	No Build					
			Volume		Delay (sec/veh)		LOS	
Hammond Gateway Station			AM	PM	AM	PM	AM	PM
19	Dearborn Ave & Gostlin St	TWSC[1]	1320	1880	10.0	11.2	B	B
20	Sheffield Ave & Gostlin St	Signal[2]	1200	1760	10.2	12.7	B	B

INTERSECTION		Control Type	No Build					
			Volume		Delay (sec/veh)		LOS	
Hegewisch Station			AM	PM	AM	PM	AM	PM
21	Brainard Ave & Burnham Ave	Signal	1540	2420	24.5	28.1	C	C
22	Brainard Ave & Torrence Ave & 130th St	Signal	1720	2050	17.8	28.4	B	C

Notes:

1. Signalized in the No Build and Build Alternative
2. Roundabout in the No Build and Build Alternative

APPENDIX C
Build 2040 Traffic Operational Analysis

INTERSECTION		Control Type	BUILD ALTERNATIVES						BUILD ALTERNATIVES WITH MITIGATION					
			Volume		Delay (sec/veh)		LOS		Volume		Delay (sec/veh)		LOS	
Munster/Dyer Main Street Station			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	Sheffield Ave & 213th St	Signal	1200	1820	15.2	23.7	B	C	-	-	-	-	-	-
2	Sheffield Ave & Seminary Dr	TWSC	130	150	17.4	34.5	C	D	-	150	-	24.6	-	C
3	Sheffield Ave & Northgate Dr	TWSC	160	190	25.9	44.2	D	E	-	1910	-	4.4	-	A
4	Sheffield Ave & Main St	Signal	1840	2290	34.1	53.9	C	D	-	2290	-	37.9	-	D

INTERSECTION		Control Type	BUILD ALTERNATIVES					
			Volume		Delay (sec/veh)		LOS	
Munster Ridge Road Station			AM	PM	AM	PM	AM	PM
5	Ridge Rd & North Dwy/Harrison Ave	Signal	2010	2570	14.4	6.1	B	A
6	Ridge Rd & Harrison (Parking Lot Access)	Signal	2200	2830	5.6	6.3	A	A
7	Ridge Rd & Manor Ave	Signal	2110	2830	7.5	11.4	A	B

INTERSECTION		Control Type	BUILD ALTERNATIVES						BUILD ALTERNATIVES WITH MITIGATION					
			Volume		Delay (sec/veh)		LOS		Volume		Delay (sec/veh)		LOS	
South Hammond Station			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
8	169th & Harrison Ave	AWSC	790	920	12.6	19.8	B	C	-	-	-	-	-	-
9	173rd & Harrison Ave	AWSC	1050	1170	14.7	26.4	B	D	-	1170	-	16.5	-	C
23	Parking Lot Access on 173rd	TWSC	120	200	11.4	24.1	B	C	-	-	-	-	-	-
10	173rd & Lyman Ave	TWSC	130	140	17.9	17.8	C	C	-	-	-	-	-	-

INTERSECTION		Control Type	BUILD ALTERNATIVES					
			Volume		Delay (sec/veh)		LOS	
Downtown Hammond Station			AM	PM	AM	PM	AM	PM
11	Hohman Ave & Sibley St	Signal	2170	2570	17.6	32.4	B	C
12	Hohman Ave & Fayette St	Signal	1730	1760	7	9.3	A	A
13	Hohman Ave & Russell St	Signal	1730	1680	9.1	6.2	A	A
14	Hohman Ave & Douglas St	Signal	1890	1910	8.7	6.8	A	A
15	Lyman Ave & Douglas St	TWSC	160	120	10.8	9.6	B	A
16	Oakley Ave & Douglas St	TWSC	110	190	9.6	10.7	A	B
24	Parking Lot Access on Oakley	TWSC	170	100	6.3	8.6	A	A
17	Oakley Ave & Fayette St & Russell St	AWSC	290	290	8.2	7.9	A	A
25	Parking Lot Access on Fayette	TWSC	20	20	8.1	9.1	A	A
18	Oakley Ave & Sibley St	Signal	390	550	10.6	4.2	B	A

INTERSECTION		Control Type	BUILD ALTERNATIVES					
			Volume		Delay (sec/veh)		LOS	
Hammond Gateway Station			AM	PM	AM	PM	AM	PM
19	Dearborn Ave & Gostlin St	TWSC[1]	1370	1850	9.2	11.1	A	B
20	Sheffield Ave & Gostlin St	Signal[2]	1340	1870	14.1	13.2	B	B

INTERSECTION		Control Type	BUILD ALTERNATIVES					
			Volume		Delay (sec/veh)		LOS	
Hegewisch Station			AM	PM	AM	PM	AM	PM
21	Brainard Ave & Burnham Ave	Signal	1600	2470	25.9	27.9	C	C
22	Brainard Ave & Torrence Ave & 130th St	Signal	1740	2070	19.3	29.9	B	C

Notes:

1. Signalized in the No Build and Build Alternative
2. Roundabout in the No Build and Build Alternative