TRAFFIC ANALYSIS & DESIGN, INC.

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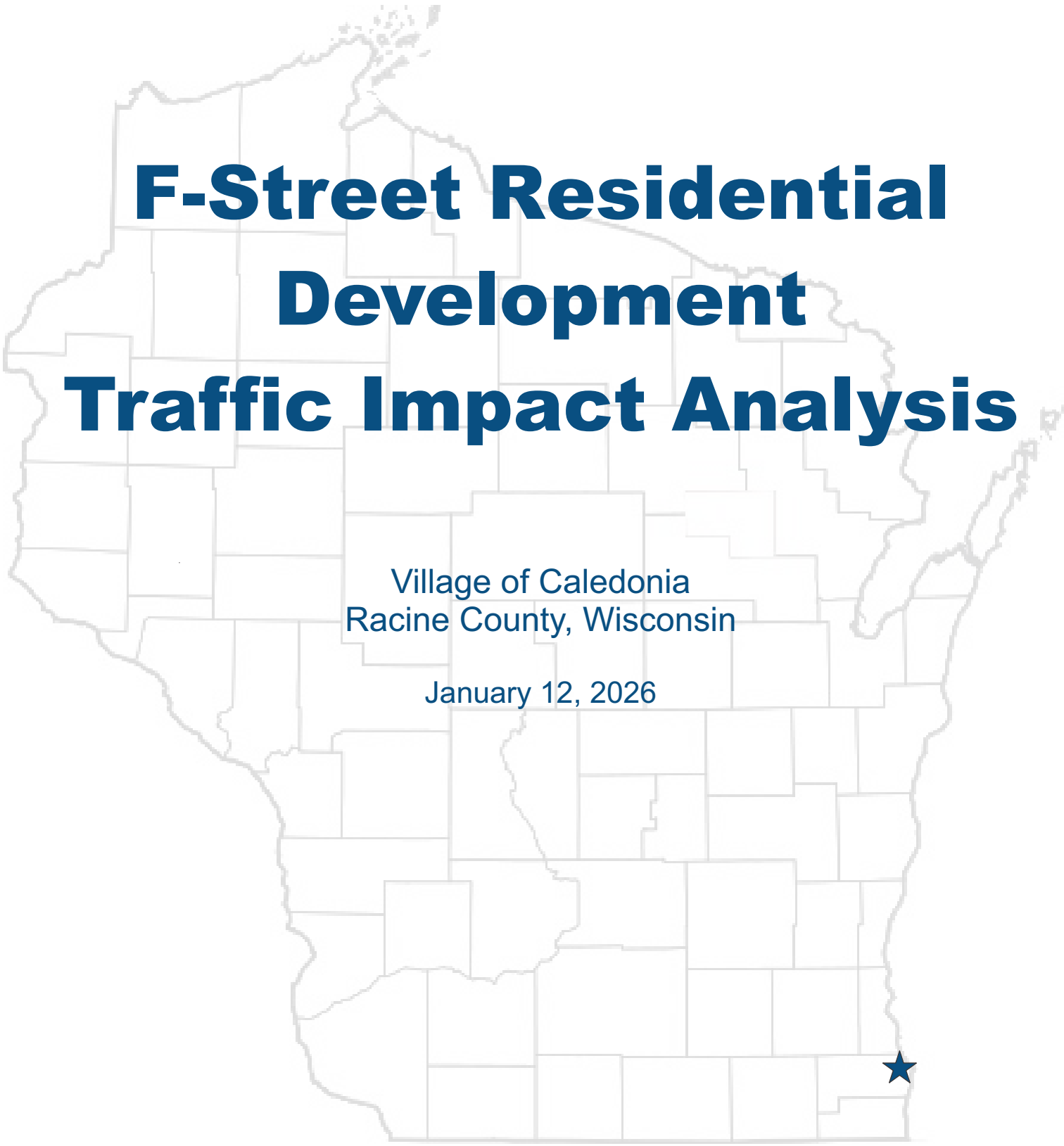
F-Street Residential Development Traffic Impact Analysis

Village of Caledonia
Racine County, Wisconsin

January 12, 2026



TRAFFIC IMPACT ANALYSIS
FOR:

F STREET RESIDENTIAL DEVELOPMENT

VILLAGE OF CALEDONIA, RACINE COUNTY, WISCONSIN

DATE SUBMITTED: January 12, 2026

PREPARED FOR:
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Milwaukee, WI 53233
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PREPARED BY:
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Phone: (800) 605-3091
Contact Persons: Don Lee, P.E. (WisDOT TIA Certification # SE05-804-046)
John Bieberitz, P.E., PTOE (WisDOT TIA Certification # SE05-804-044)

"I certify that this Traffic Impact Analysis has been prepared by me or under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering."

_____
Donald J. Lee, P.E.
Wisconsin Registration #35214-006
Traffic Analysis & Design, Inc.

F Street Residential Development
Traffic Impact Analysis
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LIST OF APPENDICES

CHAPTER I – INTRODUCTION & EXECUTIVE SUMMARY

PART A – PURPOSE OF REPORT AND STUDY OBJECTIVES

A residential development is being proposed to be located along the south side of Four Mile Road, immediately east of North Green Bay Road, in the Village of Caledonia, Racine County, Wisconsin. Traffic Analysis & Design, Inc. has been retained to determine the additional traffic expected to be generated by the development and to identify roadway modifications, if any, attributed to the new development for the opening year (2026) initial build and horizon year (2046) full build traffic scenarios. Assumptions for an adjacent residential off-site development (Lot 2), located immediately to the south, have also been included in the horizon year (2046) full build traffic volume scenario.

This report documents the procedures, findings, and conclusions of the traffic impact analysis. The analysis identifies recommended modifications based on existing intersection geometrics, background traffic volumes and additional traffic expected to be generated by the proposed on-site development and potential off-site development within the limits of the study area.

PART B – EXECUTIVE SUMMARY

The executive summary includes a description of the study area, description of the proposed on-site and off-site developments and conclusions based on the findings of the TIA.

B1. Location of Study Site with Respect to Area Roadway Network

Based on discussions with the Village of Caledonia and as shown in Exhibit 1-1, the study area for the proposed residential development includes the following intersections:

- Four Mile Road intersection with North Green Bay Road (existing one-way stop control)
- North Green Bay Road intersection with Packer Drive/Proposed West Drive (existing one-way stop control/proposed two-way stop control)
- Four Mile Road intersection with Proposed North Drive (proposed one-way stop control)

B2. On-Site Development Description and Timings

The following land uses are expected for the proposed on-site residential development:

Initial Build

- Multifamily (Low-Rise) Housing/LU220 – 130 units

As shown on the conceptual site plan in Exhibit 1-2A, the on-site residential development is proposed on a 9-acre open lot. A total of 130 dwelling units are proposed for the property within five 26-unit buildings. Parking, totaling 280 parking stalls, is proposed via garage, apron, and surface stalls within the site. Build out of the site is expected over the next several years; however, for traffic study purposes, full build out of the residential development site was assumed for opening year and is expected to be included in the Year 2026 Initial build traffic scenario.

B3. Off-Site Development Description and Timings

One off-site parcel (Lot 2) was identified within the study area, located immediately south of the on-site development. The Lot 2 development is not expected to provide cross access with the on-site development with one access point onto North Green Bay Road proposed to the south of Packer Drive and several private driveways proposed along the east side of North Green Bay

Road proposed to the south. The location of the off-site development parcel is shown on the overview map in Exhibit 1-1, and a potential conceptual site plan is provided in Exhibit 1-2B. Therefore, the following land uses are expected for the potential off-site residential development:

Full Build

- Single-Family Detached Housing/LU210 – 19 units

The timing for the build out of the off-site (Lot 2) parcel is unknown. For traffic study purposes, build out of the off-site (Lot 2) parcel was assumed for the horizon (2046) year and was therefore included in the Year 2046 full build traffic scenario.

B4. Generated Traffic

Upon initial build-out, the proposed on-site development is expected to generate 65 new trips (15 entering/50 exiting) during a typical weekday morning peak hour. During a typical weekday evening peak hour, the proposed on-site development is expected to generate 75 new trips (45 entering/30 exiting). On a typical weekday, the proposed development is expected to generate approximately 910 new trips (455 entering/455 exiting) under initial build conditions.

Upon full build-out, the potential off-site (Lot 2) development is expected to generate an additional 15 new trips (5 entering/10 exiting) during a typical weekday morning peak hour. During a typical weekday evening peak hour, the potential off-site (Lot 2) development is expected to generate an additional 20 new trips (15 entering/5 exiting). On a typical weekday, the potential off-site (Lot 2) development is expected to generate approximately 220 additional new trips (110 entering/110 exiting) under full build conditions.

B5. Site Access

As shown on the conceptual site plan in Exhibit 1-2A, two access points are proposed within the development via a full access roadway connection onto Four Mile Road, located about 600-feet east of the Four Mile Road intersection with North Green Bay Road and a second full access roadway connection onto North Green Bay Road, operating as the new east approach at the existing three-legged, one-way stop controlled Packer Drive intersection with North Green Bay Road. One additional full-access roadway connection is also assumed to the south, along North Green Bay Road, for the potential off-site (Lot 2) residential development at some point in the future.

B6. Year 2025 Existing Traffic – Recommended Modifications

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM*), 7th Edition*. Intersection operation is defined by "level of service." Level of Service (LOS) is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, represented by LOS 'A,' to very poor, represented by LOS 'F.' For the purpose of this study, LOS C or better was used to define desirable peak hour operating conditions.

The Year 2025 existing traffic volumes do not include any development. The analysis was conducted using existing intersection geometrics and traffic control. No modifications are recommended to accommodate the Year 2025 existing traffic volumes. *Modifications are for jurisdictional consideration and are not legally binding. The Village of Caledonia reserves the right to determine alternative solutions.*

All movements at the study area intersections are currently operating acceptably at LOS C or better under the Year 2025 existing traffic volume conditions under current traffic volume conditions except the northbound left-turn movement at the Four Mile Road intersection with

North Green Bay Road which is currently operating at LOS D during the typical weekday morning peak hour and at LOS E during the typical weekday evening peak hour.

B7. Year 2046 Background Traffic – Recommended Modifications

The Year 2046 background traffic volumes do not include any of the identified on-site or off-site developments; however, they do include general background growth within the general area. The analysis was conducted using existing intersection geometrics and traffic control. No modifications are recommended to accommodate the Year 2046 background traffic volumes. *Modifications are for jurisdictional consideration and are not legally binding. The Village of Caledonia reserves the right to determine alternative solutions.*

All movements at the study area intersections are expected to continue to operate acceptably at LOS C or better under the Year 2046 background traffic volume conditions under current traffic conditions except the northbound left-turn movement at the Four Mile Road intersection with North Green Bay Road which is expected to operate at LOS E during the typical weekday morning peak hour and at LOS F during the typical weekday evening peak hour.

B8. Year 2026 Initial Build Traffic – Recommended Modifications

The Year 2026 Initial build (with on-site development) traffic volumes include full build out of the on-site residential development site located along the south side of Four Mile Road, immediately east of North Green Bay Road as described above. The following modifications, as shown in Exhibit 1-3, are recommended to accommodate the Year 2026 Initial build (with on-site development) traffic volumes. *Modifications are for jurisdictional consideration and are not legally binding. The Village of Caledonia reserves the right to determine alternative solutions.*

Node 100: Four Mile Road & North Green Bay Road

- No modifications recommended.

Node 200: North Green Bay Road intersection & Packer Drive/Proposed West Drive

- Provide a new access road on the east approach.
- Provide stop sign control on the east approach of the new access road.

Node 300: Four Mile Road & Proposed North Drive

- Provide a new access road on the south approach.
- Provide stop sign control on the south approach of the new access road.
- Provide a westbound bypass lane along the north side of Four Mile Road at the new access road intersection.

Based on the site layout, with two new access drives onto North Green Bay Road and Four Mile Road, respectively; the overall traffic volumes for any specific turning movement at the new access drives are expected to be relatively low (about 20 vehicles or less during any peak period). With these expected volumes, all movements at the new access drives are expected to operate with minimal delay (less than 17 seconds) during all peak periods under initial build traffic conditions.

The recommendation for a bypass lane at the new North Drive intersection along Four Mile Road is based on the Racine County "Policy on Permits for Access Point" Guidelines (*Section 5m; Access Point Design Criteria*) that requires a bypass lane at any new "T" type intersection when the mainline AADT volumes are greater than 2,500 vehicles per day (vpd). Based on historic WisDOT AADT count information, the Four Mile Road AADT within the limits of the

new roadway connection under the existing (no development) conditions is approximately 10,000-vpd and the historic data shows volumes ranging from 8,000- to 12,000-vpd in the past. Therefore, even though Four Mile Road isn't a county-controlled facility, a bypass lane should be considered at the new roadway connection per the Racine County guidelines.

Sight distance was also evaluated at the two new access drives onto North Green Bay Road and Four Mile Road, respectively; and all required sight distance requirements are expected to be met.

Higher delays are currently being experienced for the northbound left-turn movements at the Four Mile Road intersection with North Green Bay Road during the typical weekday morning and weekday evening peak hours. These delays are expected to continue and increase under the Year 2046 background and Year 2026 Initial build (with on-site development) traffic volume conditions. A traffic signal warrant analysis was completed to determine if existing and/or future Initial Build traffic volumes would be high enough to reach the warrant thresholds needed for consideration of traffic signal installation. Based on the full traffic signal warrant analysis completed as part of this study, traffic signals are not expected to be met under the existing, background or initial build traffic volume scenarios. In order for traffic signal warrants to be met, traffic volumes on the minor street south approach would need to increase by about 600 percent (6 times the current volumes). Since the current and future traffic volumes at this intersection are far below the thresholds for meeting signal warrants, it is recommended that signals not be installed at this intersection. If the Village decides to modify the traffic control at this intersection, typically a four-way stop is installed first when those warrants are met, then followed by traffic signals once the traffic signal warrants are met. However, higher delays (LOS E/F) are expected for some movements at this intersection under all-way stop control. Therefore, all-way stop control should not be considered at this location and traffic signals could be considered at some point in the future once the traffic signal warrants are met.

The existing and expected higher delays for the northbound left-turn movements at the Four Mile Road intersection with North Green Bay Road under the Year 2025 existing, Year 2046 background and Year 2026 Initial build conditions all have a volume to capacity (v/c) ratio for these movements below 0.50 (about half the lane capacity for this movement) with maximum queue lengths of about two vehicles or less. Therefore, even though delays are expected to be higher (at about 48 seconds or less), extra capacity is expected to be available. The intersection should be monitored over time and traffic signals should be considered for the intersection once future development moves forward and traffic volumes reach a level where thresholds are potentially met at some point in the future.

B9. Year 2046 Full Build Traffic – Recommended Modifications

The Year 2046 full build (with on-site and off-site developments) traffic volumes include full build out of the on-site residential development site and the potential off-site residential development site as described above. The following additional modifications, as shown in Exhibit 1-3, are recommended to accommodate the Year 2046 full build (with on-site and off-site developments) traffic volumes. *Modifications are for jurisdictional consideration and are not legally binding. The Village of Caledonia reserves the right to determine alternative solutions.*

Node 100: Four Mile Road & North Green Bay Road

- No additional modifications
- Consider a higher level of traffic control when and if additional off-site development moves forward in the area.

Node 200: North Green Bay Road intersection & Packer Drive/Proposed West Drive

- No additional modifications.

Node 300: Four Mile Road & Proposed North Drive

- No additional modifications.

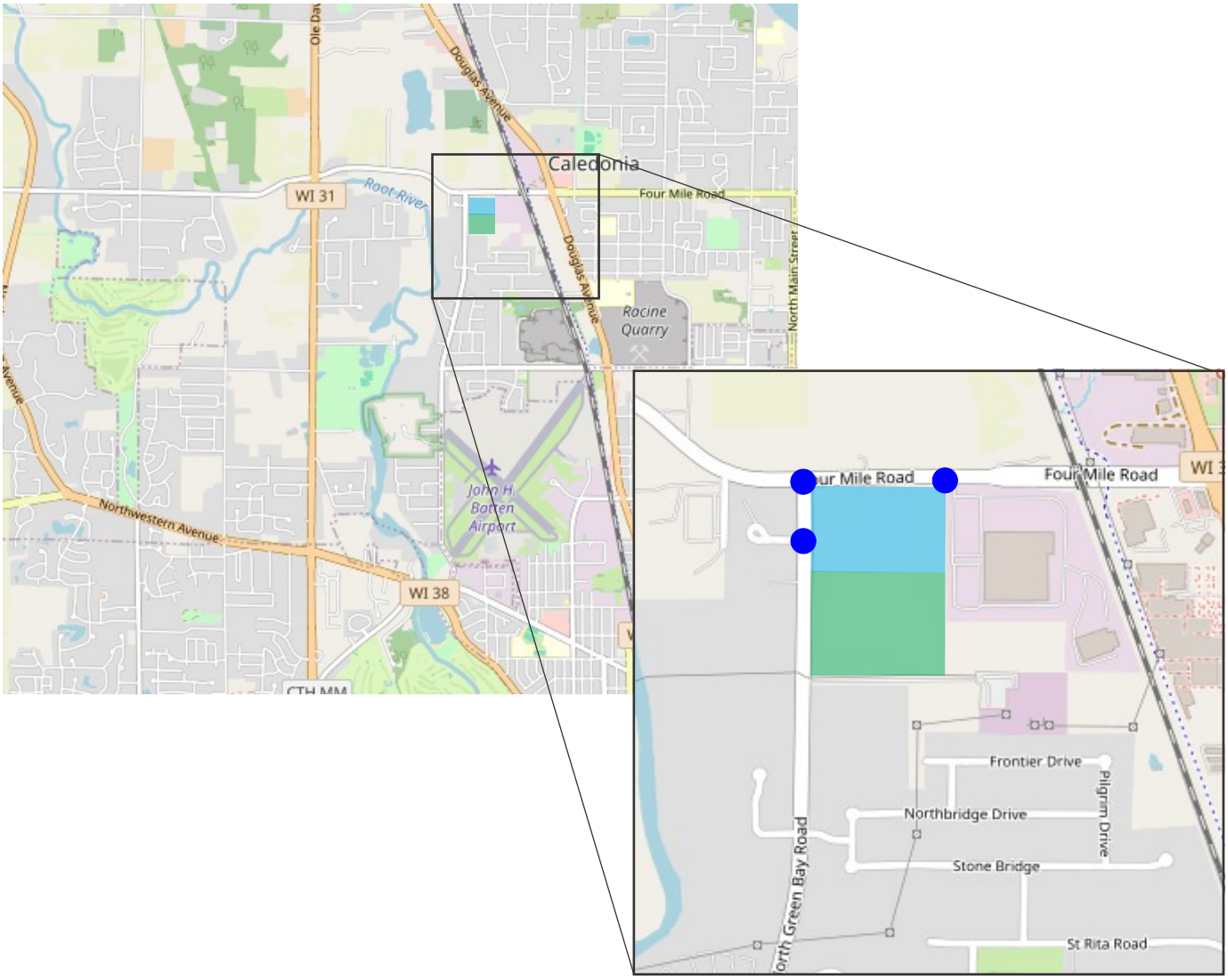
Based on the site layout, with two new access drives proposed for the on-site development onto North Green Bay Road and Four Mile Road, respectively; the overall traffic volumes for any specific turning movement at the new access drives are expected to be relatively low (about 20 vehicles or less during any peak period). With these expected volumes, all movements at the new access drives are expected to operate with minimal delay (less than 19 seconds) during all peak periods under the full build traffic conditions.

Higher delays are currently being experienced for the northbound left-turn movements at the Four Mile Road intersection with North Green Bay Road during the typical weekday morning and weekday evening peak hours. These delays are expected to continue and increase under the Year 2046 background and Year 2046 Full build (with on-site development) traffic volume conditions. A traffic signal warrant analysis was completed to determine if the future Full Build traffic volumes would be high enough to reach the warrant thresholds needed for consideration of traffic signal installation. Based on the full traffic signal warrant analysis completed as part of this study, traffic signals are not expected to be met under the full build traffic volume scenarios. In order for traffic signal warrants to be met, traffic volumes on the minor street south approach would need to increase by about 600 percent (6 times the current volumes). Since the current and future traffic volumes at this intersection are far below the thresholds for meeting signal warrants, it is recommended that signals not be installed at this intersection. If the Village decides to modify the traffic control at this intersection, typically a four-way stop is installed first when those warrants are met, then followed by traffic signals once the traffic signal warrants are met. However, higher delays (LOS E/F) are expected for some movements at this intersection under all-way stop control. Therefore, all-way stop control should not be considered at this location and traffic signals could be considered at some point in the future once the traffic signal warrants are met.

The existing and expected higher delays for the northbound left-turn movements at the Four Mile Road intersection with North Green Bay Road under the full build (with on-site and off-site developments) traffic volume condition, the higher delays are expected to increase to between 45 and 80 seconds for the weekday morning arrival and weekday afternoon discharge peak hours, respectively. It is noted that under the full build conditions, the v/c ratio is expected to be at or below 0.60 (about 2/3 the lane capacity for this movement) with maximum queue lengths of about three vehicles or less. To verify the analysis, a gap study was completed and there are anywhere from 112 to 141 excess gaps along Four Mile Road during the weekday morning and weekday evening peak period for additional left-turning movements beyond the existing and site new trip traffic assigned to the Four Mile Road intersection with North Green Bay Road. A higher number of gaps (211 to 417 excess gaps) are available for the other turning movements. These excess gaps confirm the analysis outputs showing extra capacity is expected to be available at this intersection even under future year Full Build traffic volumes. The intersection should be monitored over time and traffic signals should be considered for the intersection once future development moves forward and traffic volumes reach a level where traffic signal thresholds are potentially met at some point in the future.

B10. Conclusion

Except as noted, all movements at the study area intersections are expected to operate safely and efficiently through the horizon year with the full build out of the on-site and off-site (Lot 2) residential developments and the modifications identified in this TIA.



LEGEND

- Study Area Intersection
- On-Site Development
- Off-Site Development

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EXHIBIT 1-1
PROJECT OVERVIEW MAP

CALEDONIA, WISCONSIN

northterra real estate group
F STREET

5 MULTIFAMILY BUILDINGS
5x 26-unit buildings
Total 130 units
9 acres
14.4 units per acre

UNIT MIX

10	Studio	(8%)
70	1 Bed	(54%)
30	2 Bed	(23%)
20	2 Bed TH	(15%)

PARKING 2:1 UNITS
60 attached garage stalls
60 apron stalls
160 surface stalls
Net 280 parking stalls

LOT AREA
393,000 sf provided
345,000 sf required

SITE PLAN CONCEPT

F-STREET | CALEDONIA | KAHLER SLATER | COPYRIGHT 2025 | ALL RIGHTS RESERVED | 12/23/2025

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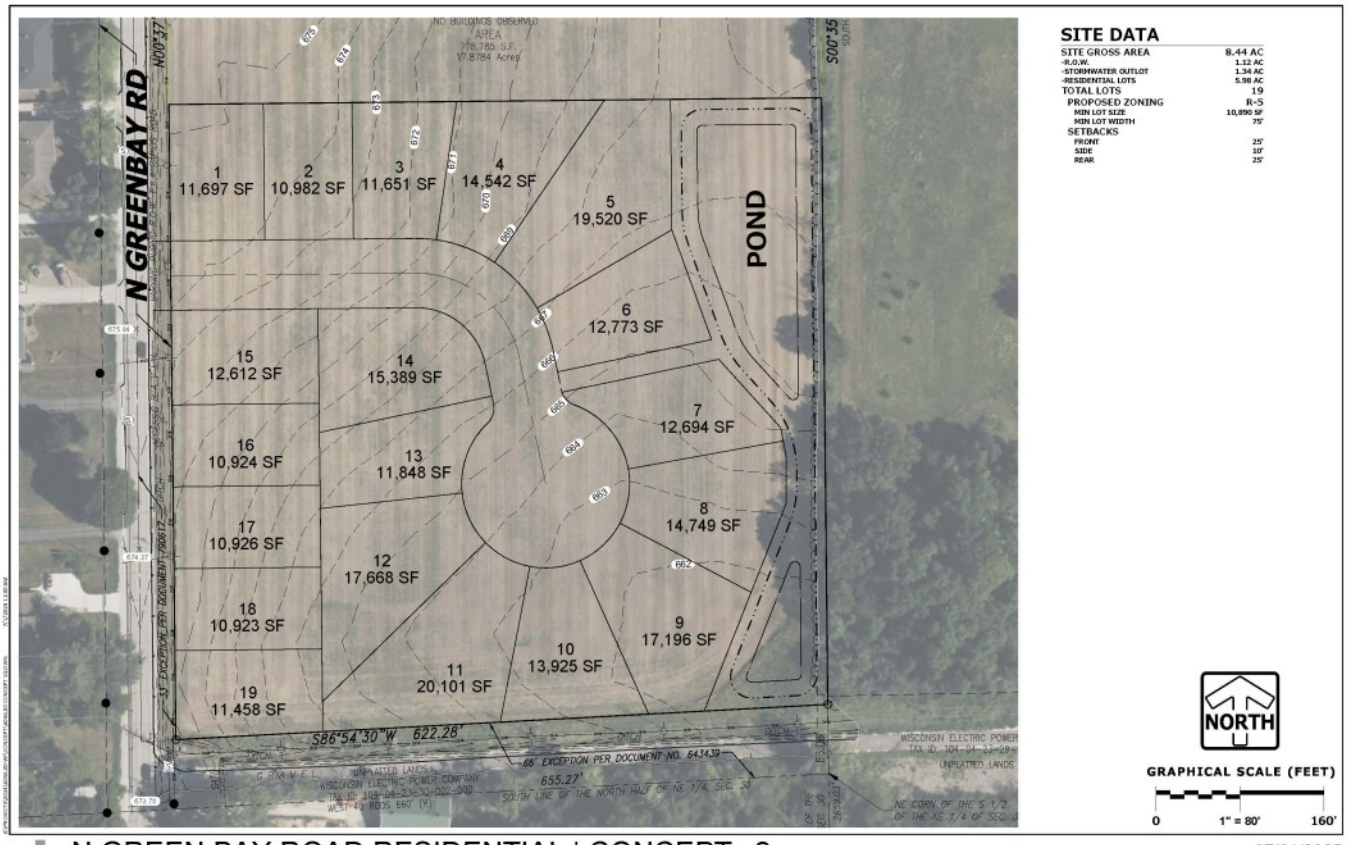
EXHIBIT 1-2A
ON-SITE CONCEPTUAL SITE PLAN

CALEDONIA, WISCONSIN



SITE DATA

SITE GROSS AREA	8.44 AC
-R.O.W.	1.12 AC
-STORMWATER OUTLOT	1.34 AC
-RESIDENTIAL LOTS	5.98 AC
TOTAL LOTS	19
PROPOSED ZONING	R-5
MIN LOT SIZE	10,890 SF
MIN LOT WIDTH	75'
SETBACKS	
FRONT	25'
SIDE	10'
REAR	25'

N GREEN BAY ROAD RESIDENTIAL | CONCEPT v2

07/01/2025

PINNACLE ENGINEERING GROUP

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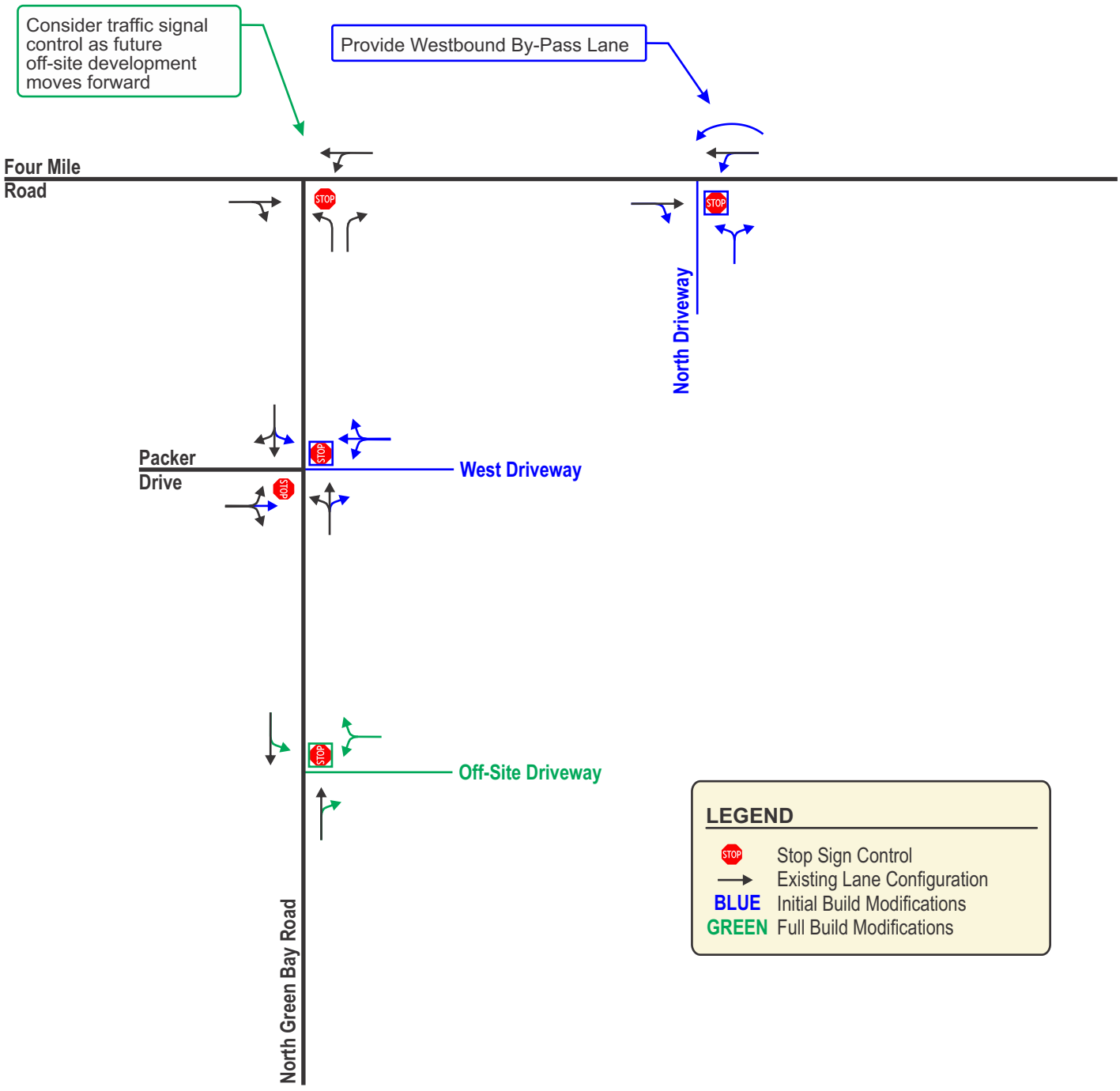
EXHIBIT 1-2B
OFF-SITE CONCEPTUAL SITE PLAN

CALEDONIA, WISCONSIN



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N

NOT TO SCALE

EXHIBIT 1-3
RECOMMENDED MODIFICATIONS

CALEDONIA, WISCONSIN

CHAPTER II – PROPOSED DEVELOPMENT

PART A – ON-SITE DEVELOPMENT

A1. Development Description and Site Location

A residential development is being proposed to be located along the south side of Four Mile Road, immediately east of North Green Bay Road, in the Village of Caledonia, Racine County, Wisconsin. Two access points are proposed within the development via a full access roadway connection onto Four Mile Road, located about 600-feet east of the Four Mile Road intersection with North Green Bay Road and a second full access roadway connection onto North Green Bay Road, operating as the new east approach at the existing three-legged, one-way stop controlled Packer Drive intersection with North Green Bay Road. An additional full-access roadway connection is also assumed to the south, along North Green Bay Road, for the potential off-site (Lot 2) residential development at some point in the future. A street map illustrating the location of the proposed on-site development and potential off-site development is shown in Exhibit 2-1.

A2. Land Use and Development Timing

The existing development site currently consists of an open parcel used for agricultural uses. Residential land uses are located adjacent to the site to the west and south. Additional residential properties are located along the north and south sides of Four Mile Road, adjacent to the site. A bar/restaurant is located immediately north/northwest of the site on the corner of the Four Mile Road intersection with North Green Bay Road. A light industrial building is located immediately to the east of the site with additional light industrial uses further to the west.

The following land uses are expected for the proposed on-site residential development:

Initial Build

- Multifamily (Low-Rise) Housing/LU220 – 130 units

As shown on the conceptual site plan in Exhibit 2-2A, the on-site residential development is proposed on a 9-acre open lot. A total of 130 dwelling units are proposed for the property within five 26-unit buildings. Parking, totaling 280 parking stalls, is proposed via garage, apron, and surface stalls within the site. Build out of the site is expected over the next several years; however, for traffic study purposes, full build out of the residential development site was assumed for opening year and is expected to be included in the Year 2026 Initial build traffic scenario.

PART B – STUDY AREA

B1. Influence Area

The proposed development is expected to draw trips both locally and within a larger regional area. The areas of significant influence include the Village of Caledonia and the other surrounding communities.

B2. Area of Significant Traffic Impact

Based on discussions with the Village of Caledonia and as shown in Exhibit 2-1, the study area for the proposed residential development includes the following intersections:

- Four Mile Road intersection with North Green Bay Road (existing one-way stop control)
- North Green Bay Road intersection with Packer Drive/Proposed West Drive (existing one-way stop control/proposed two-way stop control)

- Four Mile Road intersection with Proposed North Drive (proposed one-way stop control)

PART C – OFF-SITE LAND USE AND DEVELOPMENT

One off-site parcel (Lot 2) was identified within the study area, located immediately south of the on-site development. The Lot 2 development is not expected to provide cross access with the on-site development with one access point onto North Green Bay Road proposed to the south of Packer Drive and several private driveways proposed along the east side of North Green Bay Road proposed to the south. The location of the off-site development parcel is shown on the overview map in Exhibit 2-1, and a potential conceptual site plan is provided in Exhibit 2-2B. Therefore, the following land uses are expected for the potential off-site residential development:

Full Build

- Single-Family Detached Housing/LU210 – 19 units

The timing for the build out of the off-site (Lot 2) parcel is unknown. For traffic study purposes, build out of the off-site (Lot 2) parcel was assumed for the horizon (2046) year and was therefore included in the Year 2046 full build traffic scenario.

PART D – SITE ACCESSIBILITY

D1. Study Area Roadways

The study area roadways are discussed below:

Four Mile Road is an east/west two-lane undivided principal arterial with a posted speed limit of 40 miles per hour (mph) to the west of North Green Bay Road and 35-mph to the east. Four Mile Road is signed with a Class B weight limit restriction. According to the WisDOT, the Year 2021 average annual daily traffic volumes (AADT's) on Four Mile Road were approximately 9,700 vehicles per day (vpd) to the west of North Green Bay Road and 10,000-vpd to the east. Sidewalks are not currently provided along Four Mile Road within the limits of the study area.

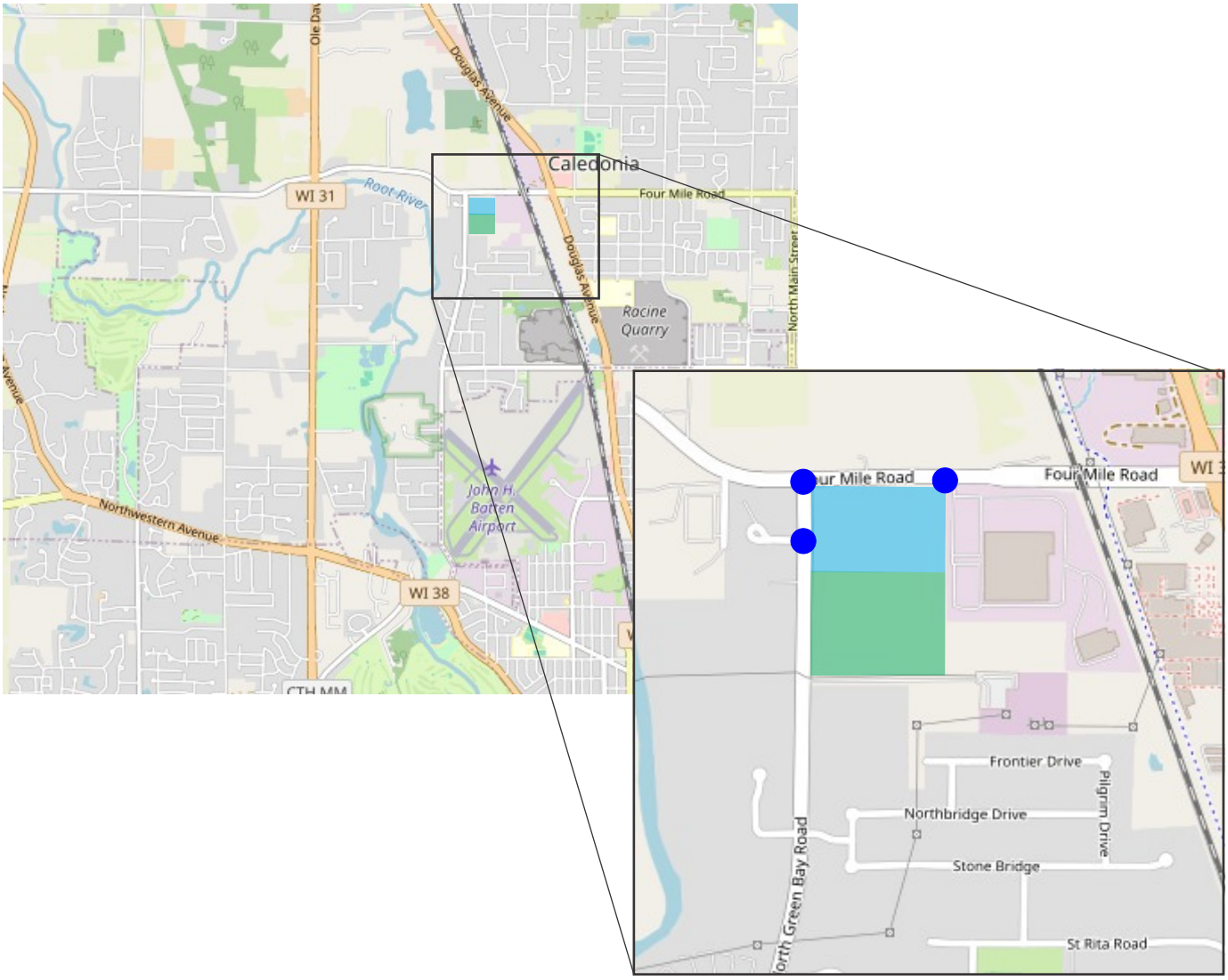
North Green Bay Road is a north/south two-lane undivided major collector with a posted speed limit of 35-mph. North Green Bay Road is signed with a Class B weight limit restriction. The Year 2021 WisDOT AADT's on North Green Bay Road were approximately 3,200-vpd to the south of Four Mile Road. Sidewalks are not currently provided along North Green Bay Road within the limits of the study area.

Packer Drive is an east/west two-lane undivided local street with a posted speed limit of 15-mph within the limits of the study area. There is currently no WisDOT AADT volume on Packer Drive. Sidewalks are not currently provided along Packer Drive within the limits of the study area.

Narrow paved shoulders are provided along both sides of Four Mile Road and North Green Bay Road within the limits of the study area; however, no other bike facilities are provided along any of the roadways within the limits of the study area.

D2. Alternative Modes of Transportation

Pedestrians and bicyclists may use their respective modes to access the area, though these alternative modes are expected to make up a very small portion of the overall trips to/from the study area. Therefore, for the purpose of this analysis, all traffic to and from the proposed residential development area was assumed to be by motor vehicle. Transit is not present within the community.



LEGEND

- Study Area Intersection
- On-Site Development
- Off-Site Development

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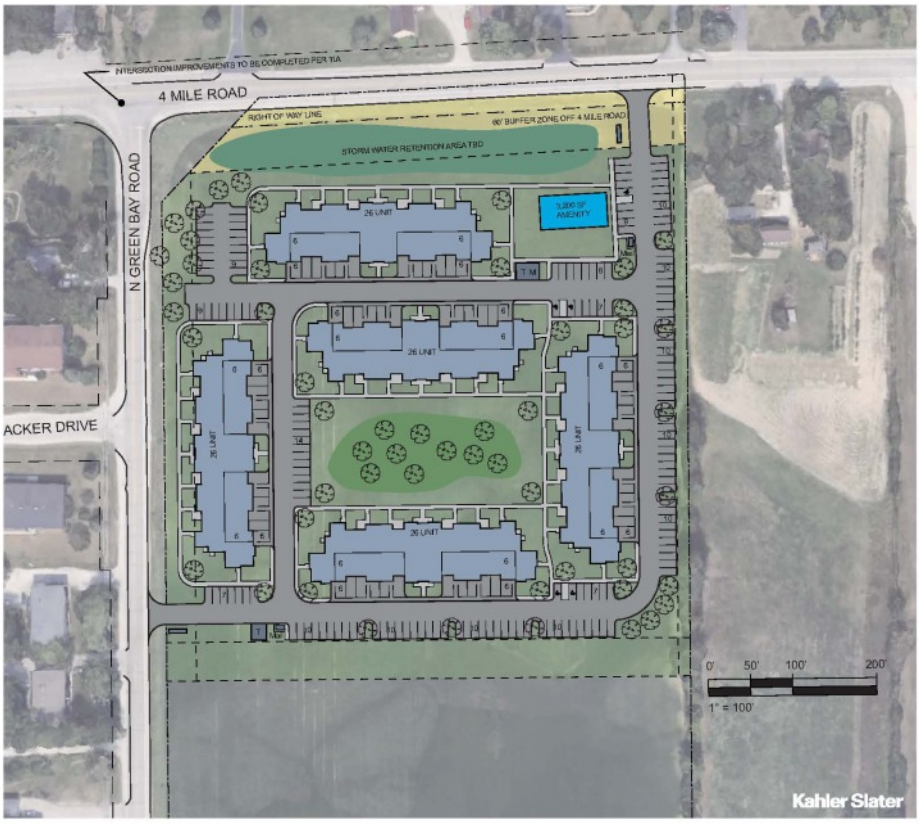
EXHIBIT 2-1
PROJECT OVERVIEW MAP

CALEDONIA, WISCONSIN



northterra real estate group

F STREET

5 MULTIFAMILY BUILDINGS

5x 26-unit buildings
Total 130 units
9 acres
14.4 units per acre

UNIT MIX

10	Studio	(8%)
70	1 Bed	(54%)
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20	2 Bed TH	(15%)

PARKING 2:1 UNITS

60 attached garage stalls
60 apron stalls
160 surface stalls
Net 280 parking stalls

LOT AREA

393,000 sf provided
345,000 sf required

SITE PLAN CONCEPT

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EXHIBIT 2-2A
ON-SITE CONCEPTUAL SITE PLAN

CALEDONIA, WISCONSIN

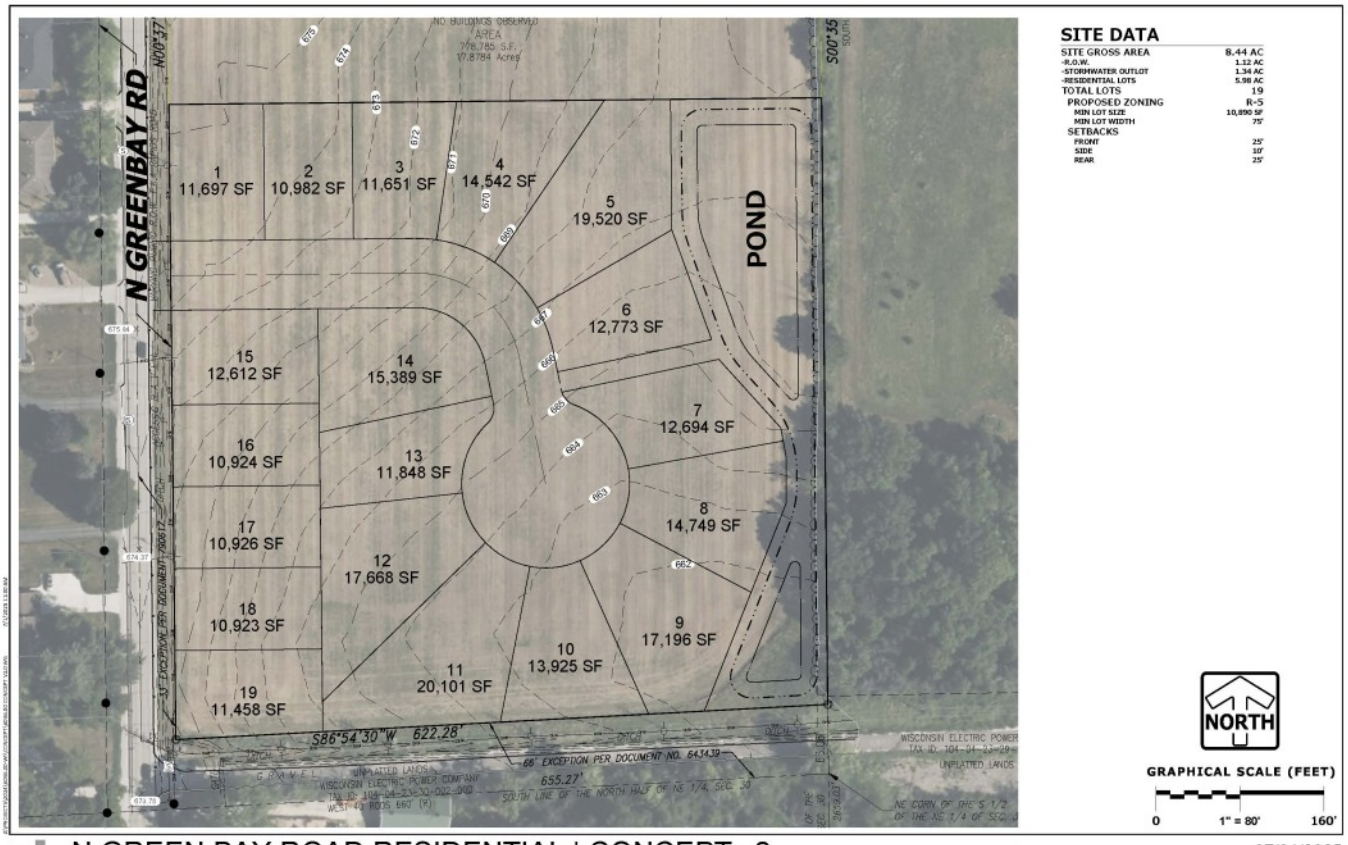

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EXHIBIT 2-2B
OFF-SITE CONCEPTUAL SITE PLAN

CALEDONIA, WISCONSIN

CHAPTER III – ANALYSIS OF EXISTING CONDITIONS

PART A – PHYSICAL CHARACTERISTICS

Exhibit 3-1 shows the existing transportation detail for the study area intersections. More specifically, the exhibit illustrates intersection lane configurations, intersection traffic controls, posted speed limits and approximate intersection spacing.

PART B – TRAFFIC VOLUMES

The weekday morning and weekday evening peak hours are expected to drive the improvements needed to adequately accommodate the proposed residential development, as they represent the highest trip generation for the site and the highest volumes along the adjacent highways. Therefore, in mid-May of 2025, TADI conducted weekday morning peak hour (6:00 to 9:00 am) and weekday evening peak hour (3:00 to 6:00 pm) turning movement traffic counts at the Four Mile Road intersection with North Green Bay Road and the North Green Bay Road intersection with Packer Drive. To complete a full traffic signal warrant analysis for this intersection, a supplemental count (9:00 am to 3:00 pm) was conducted to provide a full twelve (12) hours of data at the intersection. The updated count was conducted in January of 2026.

Based on the turning movement counts; the weekday morning and weekday evening peak hours were identified as being 7:15 to 8:15 am and 3:30 to 4:30 pm; respectively. The existing traffic volumes are shown in Exhibit 3-2. The traffic counts used to determine peak hour factors and truck percentages have been included in the appendix of this study.

PART C – CAPACITY LEVEL OF SERVICE

C1. Level of Service Definitions

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM), *7th Edition*. Intersection operation is defined by "level of service." Level of Service (LOS) is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, represented by LOS 'A,' to very poor, represented by LOS 'F.' For the purpose of this study, LOS C or better was used to define desirable peak hour operating conditions. Descriptions of the various levels of service are as follows:

Level of Service Definitions

LOS	Signalized Intersections Control Delay/Vehicle (sec/veh)	Unsignalized Intersections Avg. Control Delay (sec/veh)	Relative Delay
A	≤10	≤10	Short Delays
	Free-flow traffic operations at avearge travel speeds. Vehicles completely unimpeded in ability to maneuver. Minimal delay at signalized intersections.		
B	> 10 - 20	> 10 - 15	
	Reasonably unimpeded traffic operations at average travel speeds. Vehicle maneuverability slightly restricted. Low traffic delays.		
C	> 20 - 35	> 15 - 25	
	Stable traffic operations. Lane changes becoming more restricted. Travel speeds reduced to half of average free flow travel speeds. Longer intersection delays.		
D	> 35 - 55	> 25 - 35	Moderate Delays
	Small increases in traffic flow can cause increased delays. Delays likely attributable to increased traffic, reduced signal progression, and adverse timing.		
E	> 55 - 80	> 35 - 50	
	Significant delays. Travel speeds reduced to one-third of average free flow travel speed.		
F	> 80	> 50	Long Delays
	Extremely low speeds. Intersection congestion. Long delays. Extensive traffic queues at intersections.		

Source: Highway Capacity Manual, Transportation Research Board, Washington, D.C., 2010

C2. Year 2025 Existing Traffic Operations – No Modifications

Exhibit 3-3 shows the Year 2025 existing traffic peak hour operating conditions at the study area intersections. The Year 2025 existing traffic analysis was conducted using the existing lane configurations shown in Exhibit 3-1 and the Year 2025 existing traffic volumes shown in Exhibit 3-2.

As shown in Exhibit 3-3, all movements at the study area intersections are currently operating acceptably at LOS C or better under the Year 2025 existing traffic volume conditions under current traffic volume conditions except the northbound left-turn movement at the Four Mile Road intersection with North Green Bay Road which is currently operating at LOS D during the typical weekday morning peak hour and at LOS E during the typical weekday evening peak hour.

C3. Existing Traffic Gap Study

To measure the frequency of gaps in the Four Mile Road traffic stream, TADI conducted a gap study at the Four Mile Road intersection with North Green Bay Road during the typical weekday morning and weekday evening peak hours in early January of 2026. The data collection was conducted during the morning and afternoon on Wednesday, January 7th under favorable weather conditions with school in session during the weekday morning and weekday evening peak hours.

During the weekday peak hours, the length of gaps, in time, between vehicles traveling along Four Mile Road were counted. Critical gap and follow-up times for vehicle turning movements were calculated based on the Highway Capacity Manual (HCM) equations 17-1 and 17-2. These

equations include adjustment factors for heavy vehicles, grade, divided roadways, and intersection geometry. The gap analysis worksheet calculations and compiled gap counts are located in Appendix A.

Equivalent gaps (or capacity of gaps) are calculated by adding the number of gaps available for only one vehicle to turn, gaps long enough for two vehicles to turn, and gaps long enough for three vehicles to turn (without counting the same gaps twice). The equivalent gaps represent the number of additional turning movements that could be made beyond the existing turning movements already occurring. Table 1 summarizes the findings of the gap study for the Four Mile Road intersection with North Green Bay Road. The table shows the equivalent gaps calculated from the field counts, the net new site trips assigned to the turning movements at the intersection (includes on-site and off-site development), and the excess gaps available for additional turning movements above those numbers.

Table 1. Traffic Gap Study: Four Mile Road at North Green Bay Road Intersection

Intersection Direction	Equivalent Gaps	Net New Site Trips	Excess Gaps
AM Peak			
NB Right Turn from North Green Bay Road	262	10	252
NB Left Turn from North Green Bay Road	161	20	141
WB Left from Four Mile Road	417	0	417
PM Peak			
NB Right Turn from North Green Bay Road	221	10	211
NB Left Turn from North Green Bay Road	117	5	112
WB Left from Four Mile Road	415	10	405

As shown, there are anywhere from 112 to 141 excess gaps along Four Mile Road during the weekday morning and weekday evening peak period for additional left-turning movements beyond the existing and site new trip traffic assigned to the Four Mile Road intersection with North Green Bay Road. A higher number of gaps (211 to 417 excess gaps) are available for the other turning movements. These excess gaps show that even though slightly higher delays are expected to occur at the intersection, the intersection does have an adequate number of gaps under the Existing traffic conditions and is expected to still have an adequate number of gaps available under the Full Build traffic volumes. Therefore, the intersection is likely operating better than the model results show based on the field data.

PART D – SOURCES OF DATA

The following sources of data were obtained for use in conducting this traffic study:

- Turning movement traffic counts – TADI
- Gap analysis traffic counts – TADI
- Existing transportation detail – TADI and Google™ Earth
- On-site development information – F Street
- Off-site development information – F Street

LEGEND

- Traffic Signal Control
- Stop Sign Control
- Existing Lane Configuration
- XX' Distance Between Roadways (in Feet)
- Divided Roadway Median

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EXHIBIT 3-1
EXISTING TRANSPORTATION DETAIL

CALEDONIA, WISCONSIN

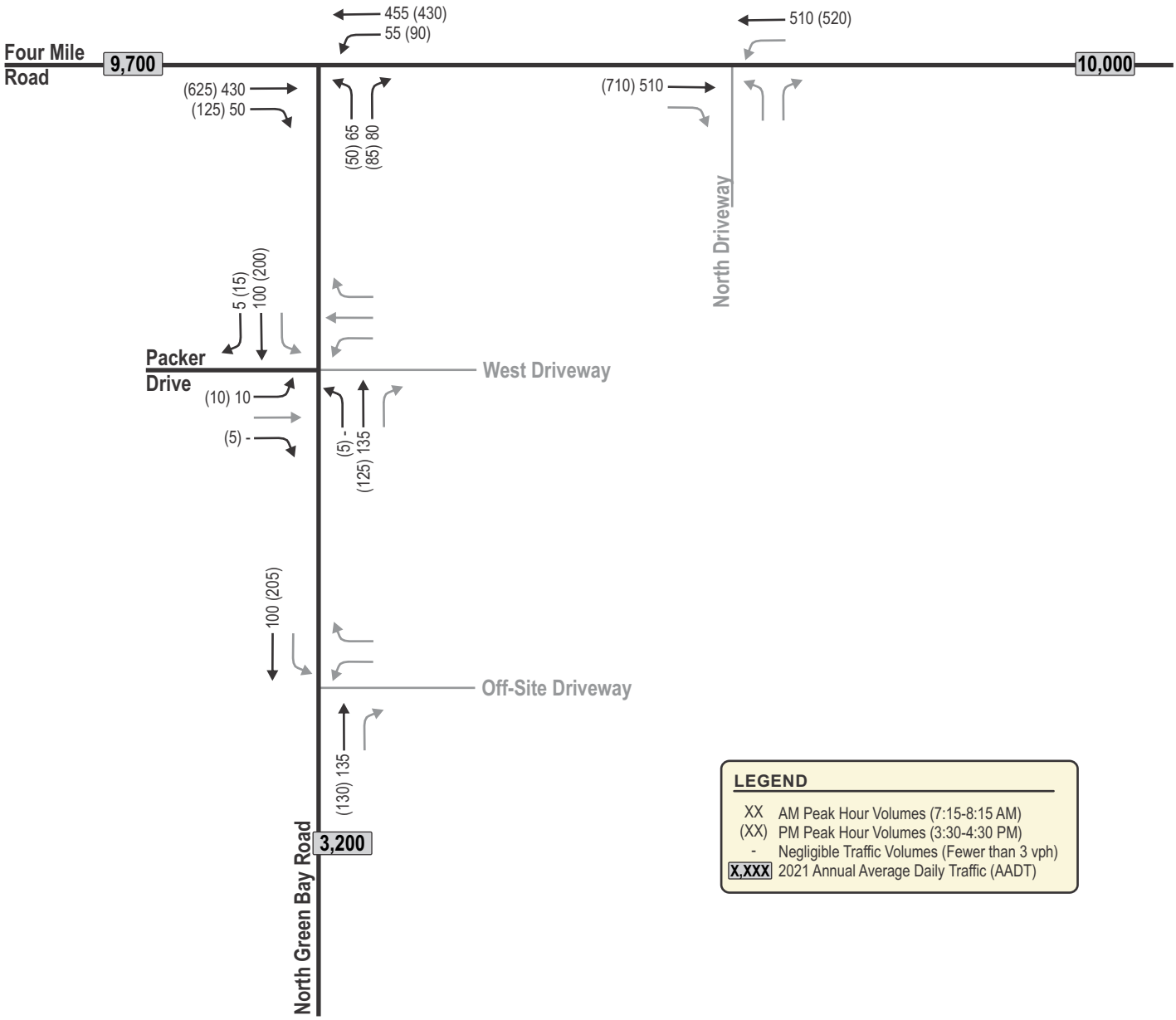

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EXHIBIT 3-2
YEAR 2025 EXISTING TRAFFIC VOLUMES

CALEDONIA, WISCONSIN

Exhibit 3-3
Year 2025 Existing Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Node 100: Four Mile Road & North Green Bay Road *One-Way Stop Control*		*Lanes →*	-	*1*		*1*		-	*1*	-	*1*	-		
	AM	LOS	-	*		A		-	D	-	B	-		
		Delay	-	*		8.6		-	28.8	-	12.3	-		
		v/c	-	-		-		-	0.32	-	-	-		
		Queue	-	*		25'		-	35'	-	25'	-		
	PM	LOS	-	*		A		-	E	-	C	-		
		Delay	-	*		9.8		-	42.4	-	15.3	-		
		v/c	-	-		-		-	0.35	-	-	-		
		Queue	-	*		25'		-	35'	-	25'	-		
Node 200: North Green Bay Road & Packer Drive *One-Way Stop Control*		*Lanes →*	-	*1*		*1*		-	*1*			-		
	AM	LOS	-	*		B		-	A			-		
		Delay	-	*		10.1		-	7.5			-		
		Queue	-	*		25'		-	25'			-		
	PM	LOS	-	*		B		-	A			-		
		Delay	-	*		10.6		-	7.8			-		
		Queue	-	*		25'		-	25'			-		

(-) indicates a movement that is prohibited or does not exist; (*) indicates a freeflow movement.
Delay is reported in seconds. Queue is the maximum of the 50th & 95th percentile queue, measured in feet.

CHAPTER IV – DEVELOPMENT TRAFFIC

PART A – BACKGROUND TRAFFIC FORECASTING

Historical WisDOT AADT volumes from the year 1990 through present day were collected along Four Mile Road and North Green Bay Road at the adjacent WisDOT count stations. Using this data, historical AADT trend lines were developed to determine the expected annual growth of traffic that may occur on the corridor between the present and horizon Year 2046. Based on the traffic projections (1990 – present) and assuming the historic trends will continue at a linear rate, traffic volumes at the study area intersection would be expected to increase at a rate of approximately 0.5-percent per year. This growth factor was applied to the turning movement volumes at the study area intersections to determine the Year 2046 background traffic volumes which are shown in Exhibit 4-2. The historic growth rate calculations are included in the Appendix of this report.

PART B – TRAFFIC FORECASTING

To address any potential future traffic impacts along study area roadways and at the intersections adjacent to the site, it is necessary to identify the hourly and daily volume of traffic generated by the proposed residential development. The traffic volumes expected to be generated by the proposed development are based on the size and type of the proposed uses, and on the fitted curve equations (FCE) as published in the Institute of Transportation Engineer's (ITE) *Trip Generation Manual, 11th Edition.*

B1. On-Site Trip Generation

The expected trip generation for the on-site residential development is shown in Exhibit 4-3A. As shown, upon initial build-out, the proposed on-site development is expected to generate 65 new trips (15 entering/50 exiting) during a typical weekday morning peak hour. During a typical weekday evening peak hour, the proposed on-site development is expected to generate 75 new trips (45 entering/30 exiting). On a typical weekday, the proposed development is expected to generate approximately 910 new trips (455 entering/455 exiting) under initial build conditions.

B2. Off-Site Trip Generation

The expected trip generation for the potential off-site (Lot 2) residential development is shown in Exhibit 4-3B. As shown, upon full build-out, the potential off-site (Lot 2) development is expected to generate an additional 15 new trips (5 entering/10 exiting) during a typical weekday morning peak hour. During a typical weekday evening peak hour, the potential off-site (Lot 2) development is expected to generate an additional 20 new trips (15 entering/5 exiting). On a typical weekday, the potential off-site (Lot 2) development is expected to generate approximately 220 additional new trips (110 entering/110 exiting) under full build conditions.

B3. Linked and Pass-by Trip Reductions

Due to the nature of the planned land use type, no internal linked or pass-by trips are assumed for the site. A linked trip occurs when a patron of one tenant visits another tenant within the site prior to exiting the site. Pass-by trips occur when motorists already on the highway system stop at a development site prior to continuing on their intended route (e.g., an existing motorist eastbound on Four Mile Road stops at the site prior to continuing eastbound on Four Mile Road).

B4. Trip Distribution

The trip distribution for the proposed on-site and potential off-site residential developments, listed below, shown in table format in Exhibits 4-3A&B and graphically on Exhibit 4-4, were determined based on the existing traffic counts, the type of proposed land uses, the location of adjacent transportation system, and anticipated growth areas outside the immediate study area.

- 40 percent to/from the west on Four Mile Road
- 45 percent to/from the east on Four Mile Road
- 15 percent to/from the south on North Green Bay Road

B5. Trip Assignment

Traffic was distributed to the study area intersections based on the above trip distribution. The new trips for the proposed on-site residential development were assigned to the study area and are shown in Exhibit 4-5. The potential off-site (Lot 2) residential development new trips are shown in Exhibit 4-7.

PART C – BUILD TRAFFIC

The Year 2026 Initial build traffic volumes are shown in Exhibit 4-11. The Year 2025 existing traffic volumes, Exhibit 3-2, were added to the on-site new trips, illustrated in Exhibit 4-5, to determine the Year 2026 Initial build traffic volumes.

The Year 2046 full build traffic volumes are shown in Exhibit 4-13. The Year 2046 background traffic volumes, Exhibit 4-2, were added to the on-site new trips, illustrated in Exhibit 4-5, and the off-site new trips, illustrated in Exhibit 4-7, to determine the Year 2046 full build traffic volumes.

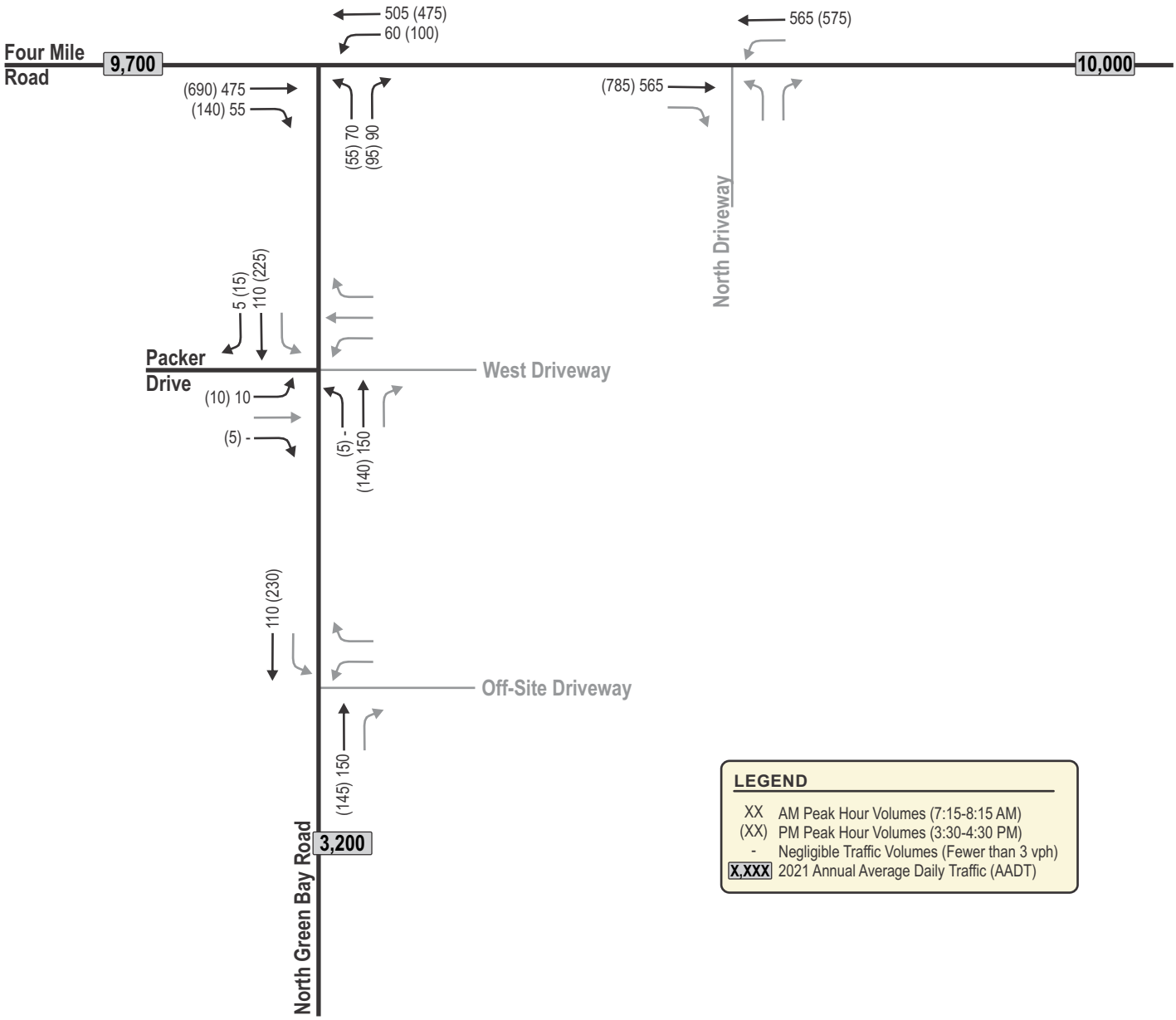

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EXHIBIT 4-2
YEAR 2046 BACKGROUND TRAFFIC VOLUMES

CALEDONIA, WISCONSIN

Exhibit 4-3A

On-Site Trip Generation Table[1]

Land Use	ITE Code	Proposed Size	Weekday Daily	AM Peak In	AM Peak Out	AM Peak Total	PM Peak In	PM Peak Out	PM Peak Total
Multifamily Housing (Low-Rise) (Not Close to Rail Transit)	220	130 Units	910 FCE	15 (24%)	50 (76%)	65 FCE	45 (63%)	30 (37%)	75 FCE
Total New Trips			**910**	**15**	**50**	**65**	**45**	**30**	**75**

[1] *ITE Trip Rates (X.XX) and/or Fitted Curve Equations (FCE) are from the ITE Trip Generation Manual, 11th Edition.*

TRIP DISTRIBUTION (New Trips)

West on Four Mile Road	40%	360	5	20	20	10	
East on Four Mile Road	45%	410	5	25	20	15	
South on Green Bay Road	15%	140	5	5	5	5	
	100%	***910***	***15***	***50***	***45***	***30***	

Exhibit 4-3B

Off-Site (Lot 2) Trip Generation Table[1]

Land Use	ITE Code	Proposed Size	Weekday Daily	AM Peak In	AM Peak Out	AM Peak Total	PM Peak In	PM Peak Out	PM Peak Total
Single-Family Detached Housing	210	19 Units	220 FCE	5 (26%)	10 (74%)	15 FCE	15 (63%)	5 (37%)	20 FCE
Total New Trips			**220**	**5**	**10**	**15**	**15**	**5**	**20**

[1] *ITE Trip Rates (X.XX) and/or Fitted Curve Equations (FCE) are from the ITE Trip Generation Manual, 11th Edition.*

TRIP DISTRIBUTION (New Trips)

West on Four Mile Road	40%	90	0	5	5	0	
East on Four Mile Road	45%	100	0	5	5	5	
South on Green Bay Road	15%	30	5	0	5	0	
	100%	***220***	***5***	***10***	***15***	***5***	

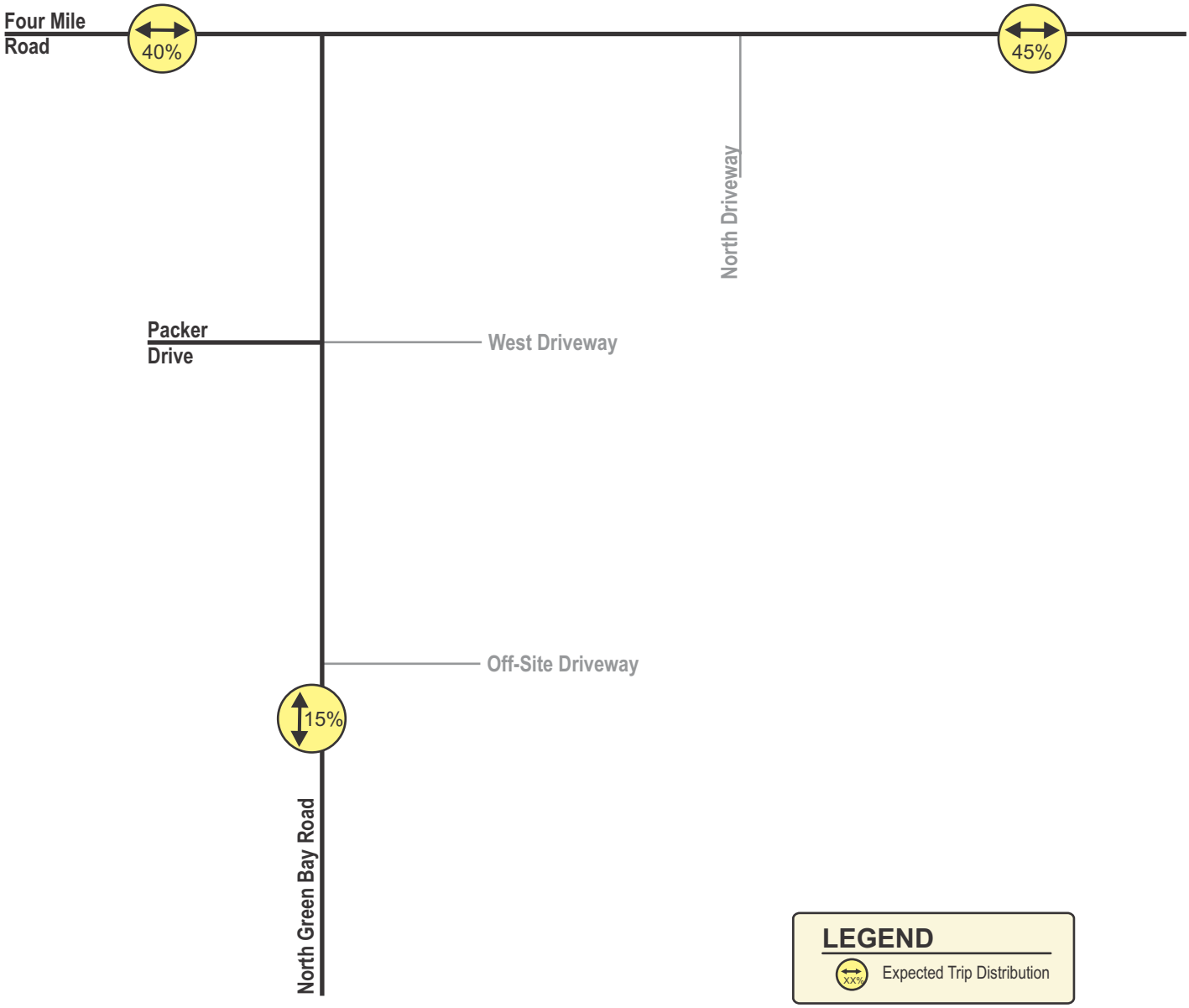

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EXHIBIT 4-4
TRIP DISTRIBUTION DIAGRAM

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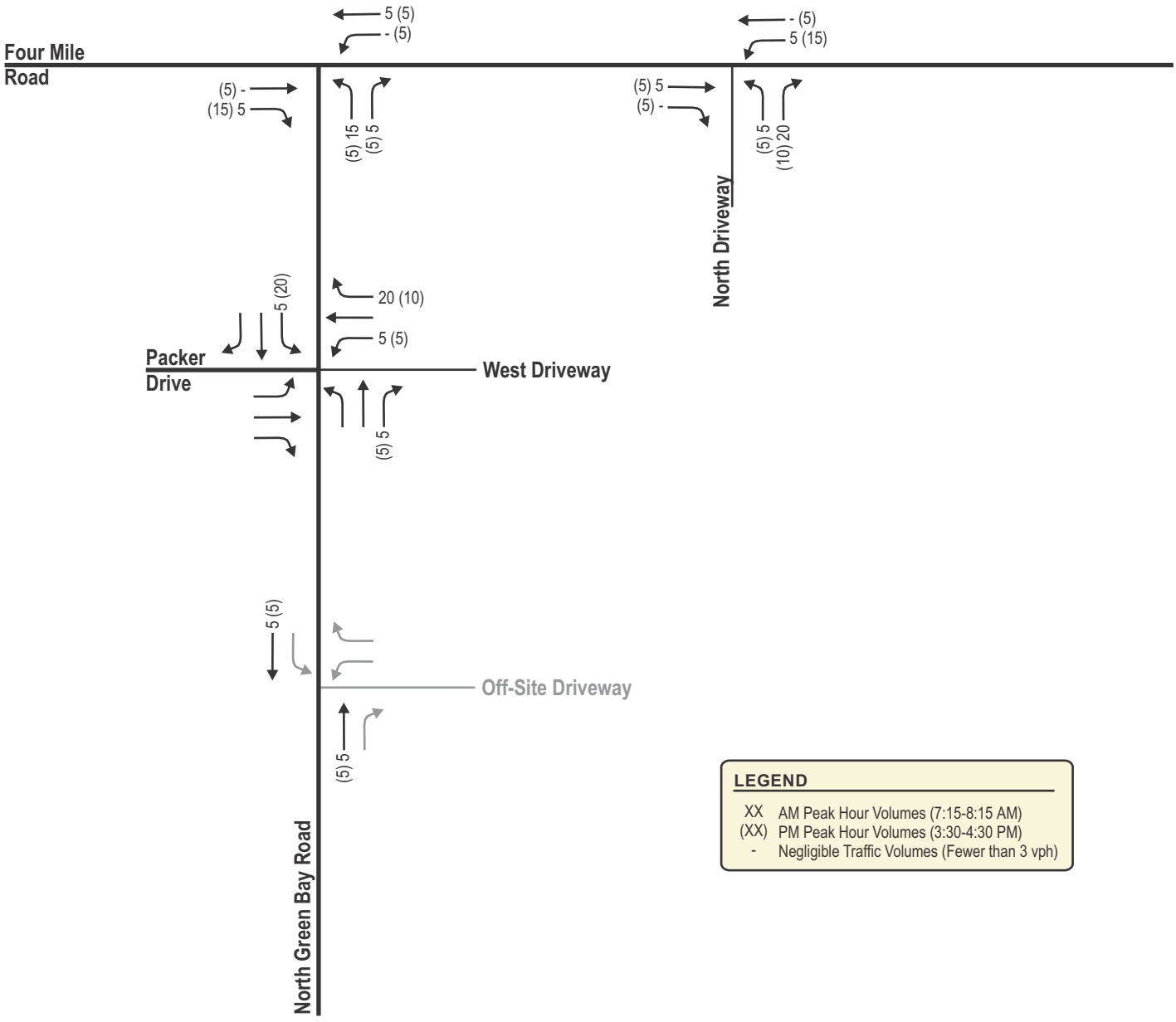

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EXHIBIT 4-5
ON-SITE NEW TRIPS

CALEDONIA, WISCONSIN

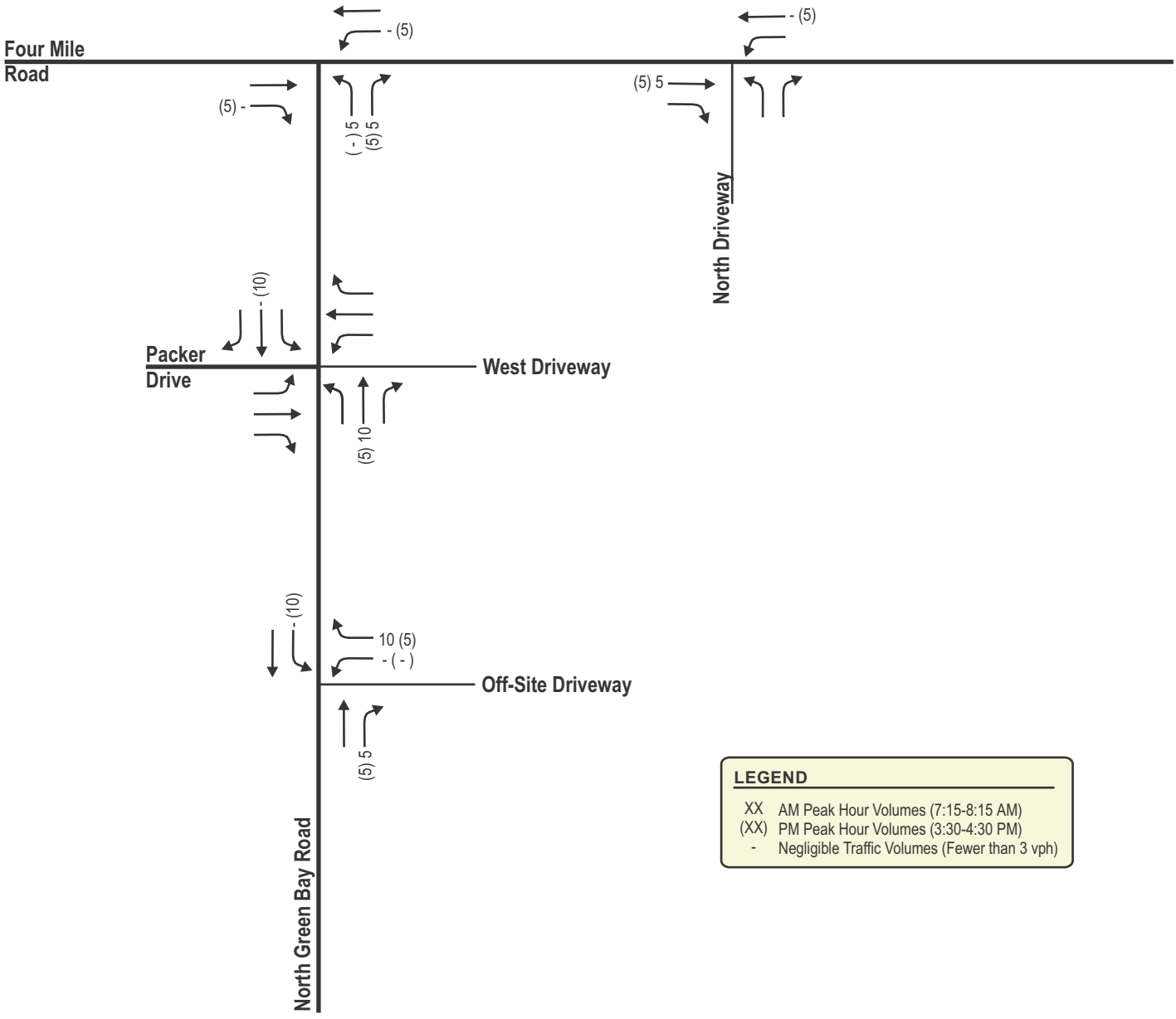

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EXHIBIT 4-7
OFF-SITE (LOT 2) NEW TRIPS

CALEDONIA, WISCONSIN

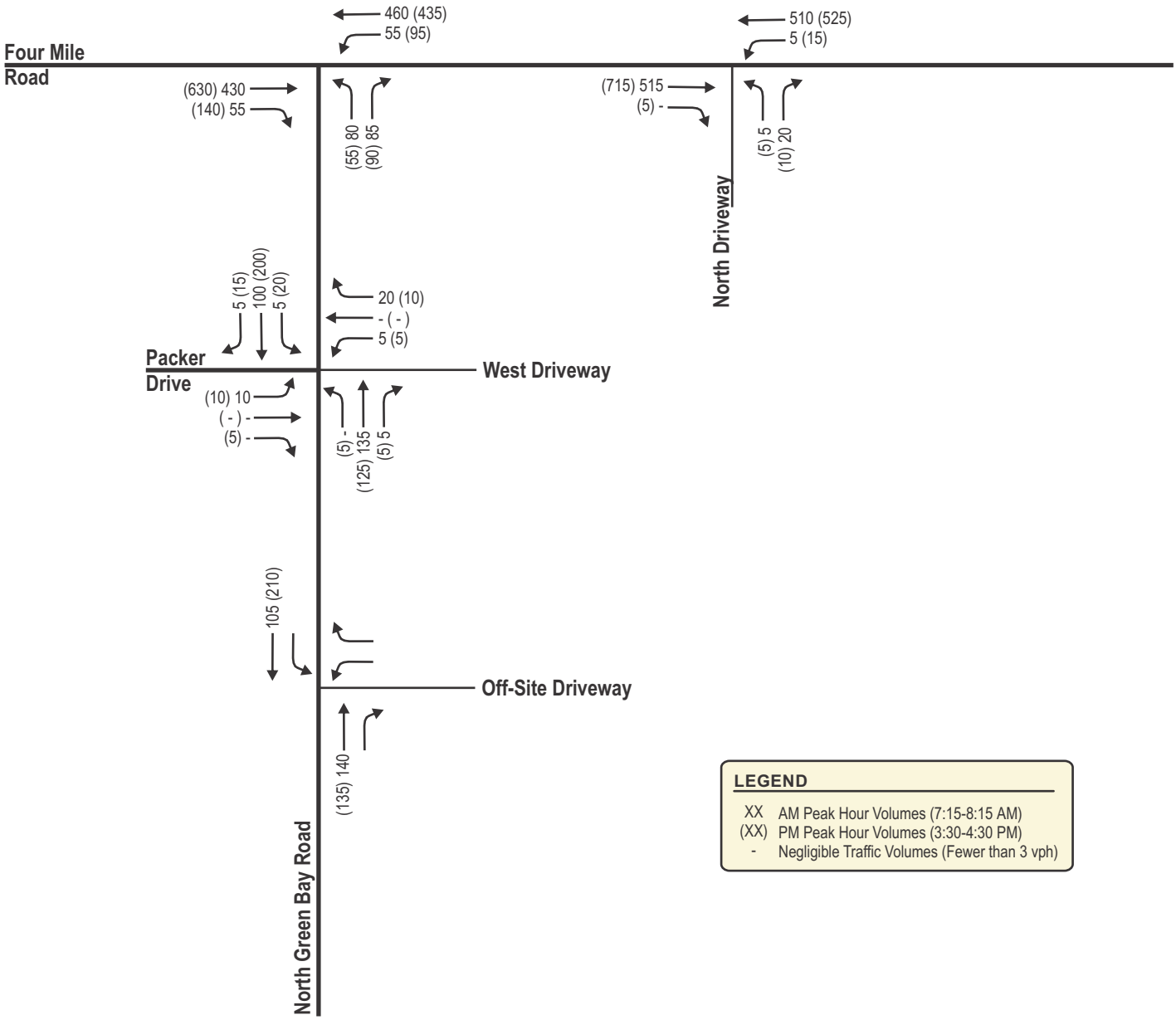

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EXHIBIT 4-11
YEAR 2026 INITIAL BUILD TRAFFIC VOLUMES

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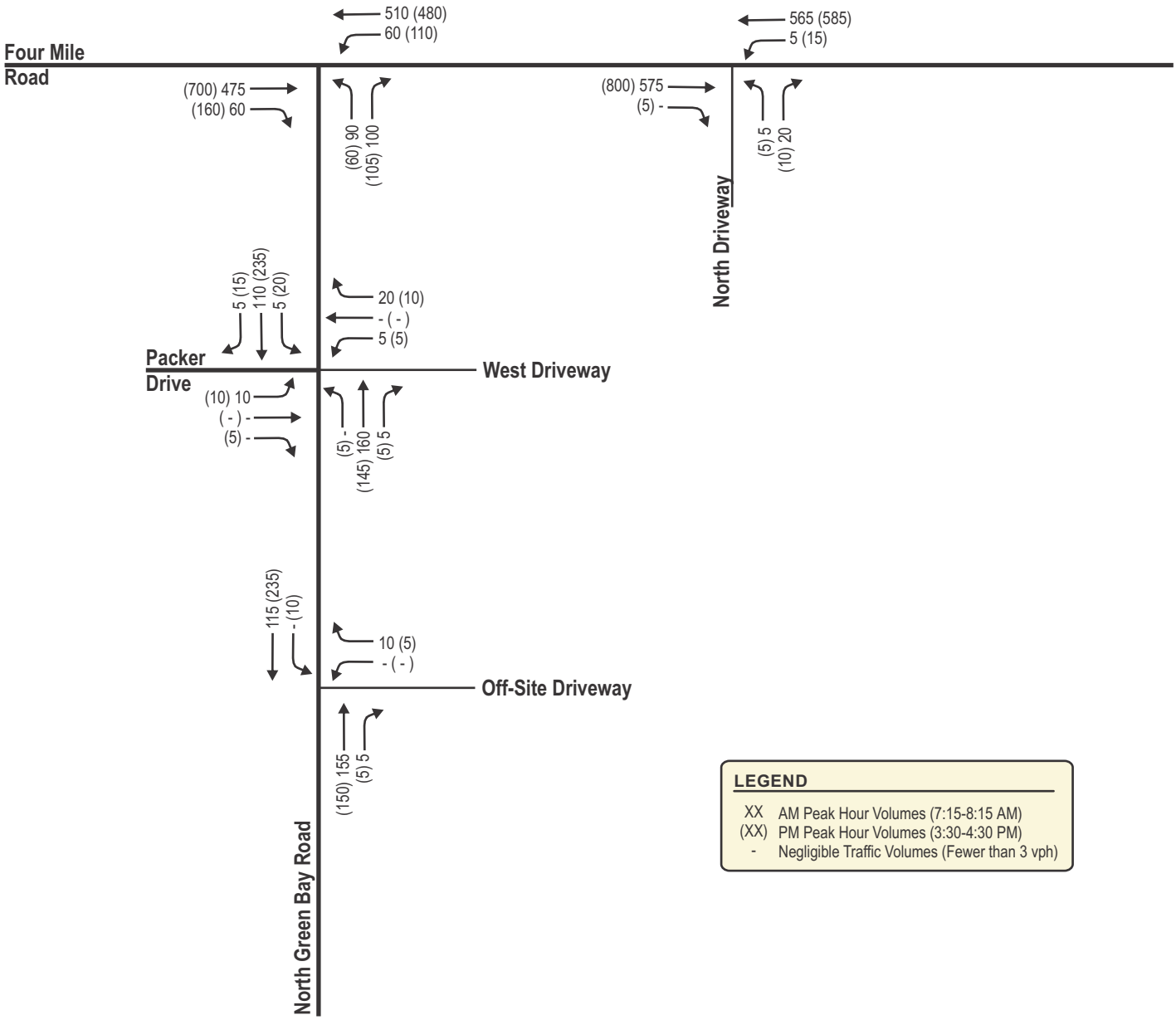

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EXHIBIT 4-13
YEAR 2046 FULL BUILD TRAFFIC VOLUMES

CALEDONIA, WISCONSIN

CHAPTER V – TRAFFIC AND IMPROVEMENT ANALYSIS

PART A – SITE ACCESS

Two access points are proposed within the development via a full access roadway connection onto Four Mile Road, located about 600-feet east of the Four Mile Road intersection with North Green Bay Road and a second full access roadway connection onto North Green Bay Road, operating as the new east approach at the existing three-legged, one-way stop controlled Packer Drive intersection with North Green Bay Road. One additional full-access roadway connection is also assumed to the south, along North Green Bay Road, for the potential off-site (Lot 2) residential development at some point in the future.

PART B – CAPACITY LEVEL OF SERVICE ANALYSIS

B1. Year 2046 Background Traffic Operating Conditions – No Modifications

Exhibit 5-2 shows the Year 2046 background traffic peak hour operating conditions at the study area intersections. The Year 2046 background traffic volumes include only the calculated yearly background growth rate which reflects general growth in the overall area. The Year 2046 background traffic analysis was conducted using existing intersection configurations and traffic control.

As shown, all movements are expected to continue to operate at LOS C or better conditions during the typical weekday morning and weekday evening peak periods except the northbound left-turn movement at the Four Mile Road intersection with North Green Bay Road which is expected to operate at LOS E during the typical weekday morning peak hour and at LOS F during the typical weekday evening peak hour under the Year 2046 background traffic volume conditions.

B2. Year 2026 Initial Build Traffic Operating Conditions – No Modifications

Exhibit 5-3 shows the Year 2026 Initial build traffic peak hour operating conditions at the study area intersections. Year 2026 Initial build traffic volumes include full build out of the on-site residential development located along the south side of Four Mile Road, immediately east of North Green Bay Road. The Year 2026 Initial build traffic analysis was conducted using existing intersection configurations and traffic control.

As shown, all movements are expected to continue to operate at LOS C or better conditions during the typical weekday morning and weekday evening peak periods except the northbound left-turn movement at the Four Mile Road intersection with North Green Bay Road which is expected to operate at LOS D during the typical weekday morning peak hour and at LOS E during the typical weekday evening peak hour under the Year 2026 Initial build traffic volume conditions.

B3. Year 2046 Full Build Traffic Operating Conditions – No Modifications

Exhibit 5-5 shows the Year 2046 full build traffic peak hour operating conditions at the study area intersections. The Year 2046 full build traffic volumes include full build out of the on-site residential development located along the south side of Four Mile Road, immediately east of North Green Bay Road as well as the potential residential off-site development located immediately to the south. The Year 2046 full build traffic analysis was conducted using existing intersection configurations and traffic control.

As shown, all movements are expected to continue to operate at LOS C or better conditions during the typical weekday morning and weekday evening peak periods except the northbound left-turn movement at the Four Mile Road intersection with North Green Bay Road which is

expected to operate at LOS E during the typical weekday morning peak hour and at LOS F during the typical weekday evening peak hour under the Year 2046 full build traffic volume conditions.

B4. Year 2046 Background Traffic Operating Conditions – *With Modifications*

No modifications to the existing transportation system are recommended to accommodate the Year 2046 background traffic conditions. Recommended modifications are summarized in *Chapter VI – Recommendations and Conclusion*.

B5. Year 2026 Initial Build Traffic Operating Conditions – *With Modifications*

Modifications to the existing transportation system are recommended to accommodate the Year 2026 Initial build traffic conditions. Recommended modifications are summarized in *Chapter VI – Recommendations and Conclusion*.

As shown in Exhibit 5-13, all movements are expected to continue to operate at LOS C or better conditions during the typical weekday morning and weekday evening peak periods except the northbound left-turn movement at the Four Mile Road intersection with North Green Bay Road which is expected to operate at LOS D during the typical weekday morning peak hour and at LOS E during the typical weekday evening peak hour under the Year 2026 Initial build traffic volume conditions with the recommended modifications implemented.

B6. Year 2046 Full Build Traffic Operating Conditions – *With Modifications*

Modifications to the existing transportation system are recommended to accommodate the Year 2046 full build traffic conditions. Recommended modifications are summarized in *Chapter VI – Recommendations and Conclusion*.

As shown in Exhibit 5-14, all movements are expected to continue to operate at LOS C or better conditions during the typical weekday morning and weekday evening peak periods except the northbound left-turn movement at the Four Mile Road intersection with North Green Bay Road which is expected to operate at LOS E during the typical weekday morning peak hour and at LOS F during the typical weekday evening peak hour under the Year 2046 full build traffic volume conditions with the recommended modifications implemented.

PART C – QUEUEING ANALYSIS

To estimate storage length requirements for turn bays at the study area intersections with modifications, a queuing analysis has been conducted. Note that the 95th percentile probable queue lengths were used for the design of turn bay storage at stop sign controlled intersections. The following is a list of where the results of the queuing analysis can be found.

- Year 2025 Existing Traffic Expected Maximum Queues – Exhibit 3-3 & 5-18
- Year 2046 Background Traffic Expected Maximum Queues – Exhibit 5-2 & 5-20
- Year 2026 Initial Build Traffic Expected Maximum Queues – Exhibit 5-13 & 5-21
- Year 2046 Full Build Traffic Expected Maximum Queues – Exhibit 5-14 & 5-23

PART D – PEDESTRIAN, BICYCLE AND TRANSIT CONSIDERATIONS

Narrow paved shoulders are provided along both sides of Four Mile Road and North Green Bay Road within the limits of the study area; however, no other bike facilities are provided along any of the roadways within the limits of the study area. Therefore, for the purpose of this analysis, all traffic to and from the proposed residential development area was assumed to be by motor vehicle.

Transit is not present within the community.

PART E – SPEED CONSIDERATIONS/SIGHT DISTANCE

Note that the sight distance measurements discussed in this report are based on on-line aerial and street view photography. The party responsible for designing the intersection is responsible for cross-checking, verifying, and designing for all applicable sight distances.

The proposed North access drive connections onto Four Mile Road and the proposed West access drive connections onto North Green Bay Road should be designed for intersection sight distance (ISD) in accordance with the latest edition of the American Association of State Highway Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* and in accordance with the latest WisDOT FDM design guidelines (Procedure 11-10-5).

Sight distance evaluation for these new connection roadways was completed using a design speed of 5 mph above the posted speed limit, which equals 40-mph for right-turn movements (looking left) and left-turn movements (looking right). AASHTO and WisDOT minimum intersection sight distance calculations for the new connection roadway are included in Appendix A.

Based on a review of on-line imagery, all sight distance requirements are expected to be met at the proposed North access drive connection onto Four Mile Road and the proposed West access drive connections onto North Green Bay Road. Stopping sight distance (SSD) was also evaluated and SSD was also expected to be met for both new access drives in both directions of travel.

PART F – TRAFFIC GAP STUDY

Based on the traffic analysis, northbound traffic at the Four Mile Road intersection with North Green Bay Road is experiencing higher than acceptable delays under the existing, background, initial build, and full build traffic volume scenarios. However, queues are shown to be minimal with 2- to 3-vehicles expected during the highest peak hours.

As previously discussed in *Chapter III – Analysis of Existing Conditions,* a gap study was completed at the Four Mile Road intersection with North Green Bay Road during the typical weekday morning and weekday evening peak hours in early January of 2026. Based on the results of the study, there are anywhere from 112 to 141 excess gaps along Four Mile Road during the weekday morning and weekday evening peak period for additional left-turning movements beyond the existing and site new trip traffic assigned to the Four Mile Road intersection with North Green Bay Road. A higher number of gaps (211 to 417 excess gaps) are available for the other turning movements. As shown, adequate gaps are also currently available for all movements at the intersection. For this reason, left turning vehicles to and from the south approach of the intersection are likely operating better than the model results show and are likely expected to experience acceptable delays at the Four Mile Road intersection with North Green Bay Road with no pavement modifications.

All data pertaining to the gap study is included in the Appendix of this report.

PART G – WARRANTS

G1. All-Way Stop Control Warrants

Warrants should be viewed as guidelines to help decide whether all-way stop control may be installed. Meeting warrants does not translate to a legal requirement for their installation.

The need for a higher level of traffic control was evaluated at the Four Mile Road intersection with North Green Bay Road under the Year 2026 Initial build and Year 2046 full build traffic volume conditions. For the study, the warrant analysis assumes Four Mile Road as a major roadway with one approach lane and the minor street (North Green Bay Road) movements as a

one-lane minor street approach. Based on the WisDOT Traffic Signal Design Manual (TSDM), since the minor street (North Green Bay Road) has a dedicated right-turn lane, the minor street right-turn volume should not be included in the warrant analysis. Therefore, the right-turn volume at this intersection was not included in the analysis.

The MUTCD provides guidance for the installation of all-way stop control including the following main volume warrant, which was evaluated as part of this study:

- All-way stop control *should* be considered when for each of the same eight-hours the volumes on the major street approaches (Four Mile Road) are greater than 300 vehicles per hour and the side street approaches are greater than 200 vehicles per hour.

For the Four Mile Road intersection with North Green Bay Road, the analysis was completed using the Year 2046 full build traffic volumes. Using the 100-percent volume threshold and using the 12 hours of data collected as part of this study, the warrant isn't expected to be met for any of the required eight hours. Therefore, the all-way stop control warrant is not met based on the 8-hour evaluation at the Four Mile Road intersection with North Green Bay Road, regardless of the build scenario studied. Traffic volumes would have to increase by about 800 percent (8 times the current volumes) over the 8-hour period for the all-way stop warrant to be met.

Completed warrant analysis worksheets are included in the Appendix of this report.

G2. Traffic Signal Warrants

Warrants should be viewed as guidelines to help decide whether traffic signal controls may be installed. Meeting warrants does not translate to a legal requirement for their installation.

Completed signal warrant analysis worksheets as well as crash plots are included in the Appendix of this report. Development-related traffic was included based on the WisDOT hourly distributions of traffic for the proposed land use types for the development site. All applicable warrants were evaluated using twelve hours of data collected as part of this study under urban thresholds.

Traffic signal warrants were investigated at the Four Mile Road intersection with North Green Bay Road under the Year 2026 Initial build and Year 2046 full build traffic volume conditions in accordance with the MUTCD, 11th Edition. As previously stated in the AWSC warrant discussion above, Four Mile Road was analyzed as a major street with one lane on each approach. The North Green Bay Road approach was analyzed as a minor street with one lane. Per WisDOT guidelines, none of the minor street right-turn movements were included in the warrant analysis.

Based on the signal warrant analysis, none of the applicable warrants were met at the Four Mile Road intersection with North Green Bay Road under the Year 2026 Initial build nor the Year 2046 background traffic volume conditions. In order for traffic signal warrants to be met, traffic volumes on the minor street south approach would need to increase by about 600 percent (6 times the current volumes). It is also noted that only four crashes were reported at this intersection over the past 5 years (about 1 per year). In order for the crash warrant to be met, in general, a pattern of at least five crashes over a 12-month period would be required. Therefore, since none of the warrants were met under the Year 2046 full build traffic volume conditions (which includes background growth and full build out of the on-site and off-site developments), the intersection should be monitored over time and traffic signals should be considered at the intersection as future development moves forward and once volumes reach a level where the traffic signal warrant thresholds are met at some point in the future.

Since the current and future traffic volumes at this intersection are far below the thresholds for meeting signal warrants, it is recommended that signals not be installed at this intersection. If the Village decides to modify the traffic control at this intersection, typically a four-way stop is installed first when those warrants are met, then followed by traffic signals once the traffic signal warrants are met. However, higher delays (LOS E/F) are expected for some movements at this intersection under all-way stop control. Therefore, all-way stop control should not be considered at this location and traffic signals could be considered at some point in the future once the traffic signal warrants are met.

G3. Turn Lane Criteria at Proposed Access Drives

Right-turn Lane Analysis - NCHRP Report 457

As referenced in the FDM, NCHRP Report 457 provides guidance for inclusion of a right-turn lane on a high-speed roadway based on the expected peak hour right-turn volume in relation to the major road peak hour through volume as well as the 85th percentile speed limit. Since the posted speed limit at the two proposed roadways is 35-mph, a 40-mph speed was assumed for the 85th percentile speed. As shown in the graph in the Appendix, a dedicated right-turn lane is not warranted at either of the proposed access drives. Calculation spreadsheets/tables for both locations are provided in the appendix of this report.

Bypass Lane Analysis

Specific volume criteria are not provided in the FDM for inclusion of bypass lanes at intersections on two-lane highways. However, based on the Racine County "Policy on Permits for Access Point" Guidelines (*Section 5m; Access Point Design Criteria*), a bypass lane is required at any new "T" type intersection when the mainline AADT volumes are greater than 2,500-vpd. Based on historic WisDOT AADT count information, the Four Mile Road AADT within the limits of the new North access drive connection under the existing (no development) conditions is approximately 10,000-vpd and the historic data shows volumes ranging from 8,000- to 12,000-vpd in the past. Therefore, even though Four Mile Road isn't a county-controlled facility, a bypass lane should be considered at the new roadway connection per the Racine County guidelines.

Exhibit 5-2
Year 2046 Background Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Node 100: Four Mile Road & North Green Bay Road *One-Way Stop Control*		*Lanes→*	-	*1*		*1*		-	*1*	-	*1*		-	
	AM	LOS	-	*		A		-	E	-	B		-	
		Delay	-	*		8.8		-	37.2	-	13.1		-	
		v/c	-	-		-		-	0.40	-	-		-	
		Queue	-	*		25'		-	45'	-	25'		-	
	PM	LOS	-	*		B		-	F	-	C		-	
		Delay	-	*		10.3		-	63.0	-	17.1		-	
		v/c	-	-		-		-	0.49	-	-		-	
		Queue	-	*		25'		-	55'	-	25'		-	
Node 200: North Green Bay Road & Packer Drive *One-Way Stop Control*		*Lanes→*	-	*1*		*1*		-	*1*				-	
	AM	LOS	-	*		B		-	A				-	
		Delay	-	*		10.2		-	7.5				-	
		Queue	-	*		25'		-	25'				-	
	PM	LOS	-	*		B		-	A				-	
		Delay	-	*		11.0		-	7.8				-	
		Queue	-	*		25'		-	25'				-	

(-) indicates a movement that is prohibited or does not exist; (*) indicates a freeflow movement.
Delay is reported in seconds. Queue is the maximum of the 50th & 95th percentile queue, measured in feet.

Exhibit 5-3
Year 2026 Initial Build Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Node 100: Four Mile Road & North Green Bay Road *One-Way Stop Control*		*Lanes→*	-	*1*		*1*		-	*1*	-	*1*		-	
	AM	LOS	-	*		A		-	D	-	B		-	
		Delay	-	*		8.7		-	31.9	-	12.4		-	
		v/c	-	-		-		-	0.39	-	-		-	
		Queue	-	*		25'		-	45'	-	25'		-	
	PM	LOS	-	*		A		-	E	-	C		-	
		Delay	-	*		9.9		-	47.7	-	15.7		-	
		v/c	-	-		-		-	0.41	-	-		-	
		Queue	-	*		25'		-	45'	-	25'		-	
Node 200: North Green Bay Road & Packer Drive/Proposed West Drive *One-Way Stop Control*		*Lanes→*	*1*			*1*			*1*			*1*		
	AM	LOS	B			A			A			A		
		Delay	10.6			9.6			7.5			7.7		
		Queue	25'			25'			25'			25'		
	PM	LOS	B			B			A			A		
		Delay	11.6			10.3			7.8			7.6		
		Queue	25'			25'			25'			25'		
Node 300: Four Mile Road & Proposed North Driveway *One-Way Stop Control*		*Lanes→*	-	*1*		*1*		-	*1*			-		
	AM	LOS	-	*		A		-	B			-		
		Delay	-	*		8.6		-	14.0			-		
		Queue	-	*		25'		-	25'			-		
	PM	LOS	-	*		A		-	C			-		
		Delay	-	*		9.2		-	18.3			-		
		Queue	-	*		25'		-	25'			-		

(-) indicates a movement that is prohibited or does not exist; (*) indicates a freeflow movement.
Delay is reported in seconds. Queue is the maximum of the 50th & 95th percentile queue, measured in feet.

Exhibit 5-5
Year 2046 Full Build Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Node 100: Four Mile Road & North Green Bay Road *One-Way Stop Control*		*Lanes→*	-	*1*		*1*		-	*1*	-	*1*		-	
	AM	LOS	-	*		A		-	E	-	B		-	
		Delay	-	*		8.9		-	44.8	-	13.3		-	
		v/c	-	-		-		-	0.53	-	-		-	
		Queue	-	*		25'		-	70'	-	25'		-	
	PM	LOS	-	*		B		-	F	-	C		-	
		Delay	-	*		10.5		-	79.3	-	18.0		-	
		v/c	-	-		-		-	0.59	-	-		-	
		Queue	-	*		25'		-	70'	-	30'		-	
Node 200: North Green Bay Road & Packer Drive/Proposed West Drive *One-Way Stop Control*		*Lanes→*	*1*			*1*			*1*			*1*		
	AM	LOS	B			A			A			A		
		Delay	11.0			9.8			7.5			7.7		
		Queue	25'			25'			25'			25'		
	PM	LOS	B			B			A			A		
		Delay	12.2			10.7			7.9			7.6		
		Queue	25'			25'			25'			25'		
Node 300: Four Mile Road & Proposed North Driveway *One-Way Stop Control*		*Lanes→*	-	*1*		*1*		-	*1*			-		
	AM	LOS	-	*		A		-	C			-		
		Delay	-	*		8.8		-	15.2			-		
		Queue	-	*		25'		-	25'			-		
	PM	LOS	-	*		A		-	C			-		
		Delay	-	*		9.6		-	20.9			-		
		Queue	-	*		25'		-	25'			-		

(-) indicates a movement that is prohibited or does not exist; (*) indicates a freeflow movement.
Delay is reported in seconds. Queue is the maximum of the 50th & 95th percentile queue, measured in feet.

Exhibit 5-13
Year 2026 Initial Build Traffic Peak Hour Operating Conditions
With Modified Geometrics and Traffic Control

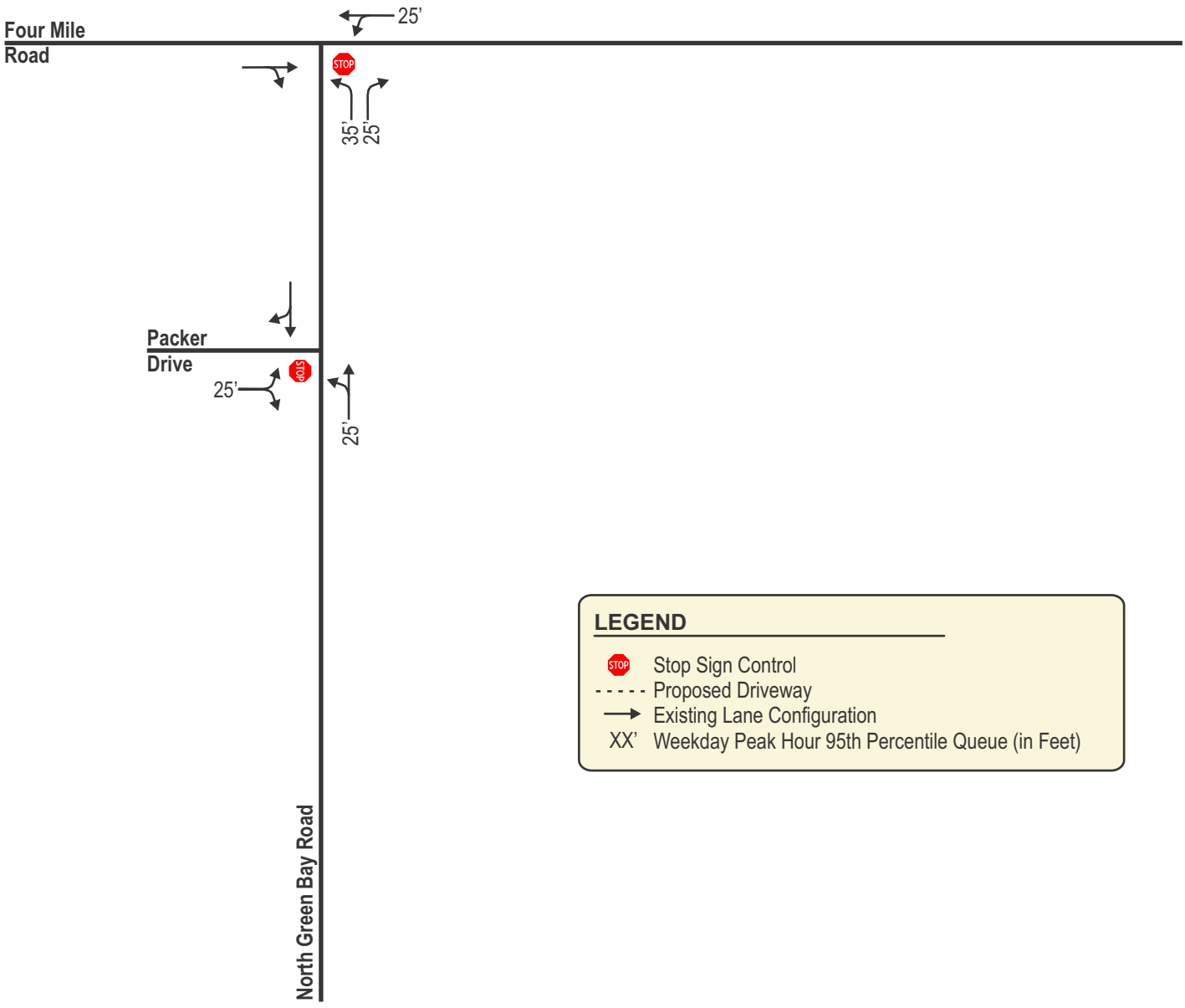
Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Node 100: Four Mile Road & North Green Bay Road *One-Way Stop Control*		*Lanes→*	-	*1*		*1*		-	*1*	-	*1*		-	
	AM	LOS	-	*		A		-	D	-	B		-	
		Delay	-	*		8.7		-	31.9	-	12.4		-	
		v/c	-	-		-		-	0.39	-	-		-	
		Queue	-	*		25'		-	45'	-	25'		-	
	PM	LOS	-	*		A		-	E	-	C		-	
		Delay	-	*		9.9		-	47.7	-	15.7		-	
		v/c	-	-		-		-	0.41	-	-		-	
		Queue	-	*		25'		-	45'	-	25'		-	
Node 200: North Green Bay Road & Packer Drive/Proposed West Drive *One-Way Stop Control*		*Lanes→*	*1*			*1*			*1*			*1*		
	AM	LOS	B			A			A			A		
		Delay	10.6			9.6			7.5			7.7		
		Queue	25'			25'			25'			25'		
	PM	LOS	B			B			A			A		
		Delay	11.6			10.3			7.8			7.6		
		Queue	25'			25'			25'			25'		
Node 300: Four Mile Road & Proposed North Driveway *One-Way Stop Control*		*Lanes→*	-	*1*		*2*		-	*1*			-		
	AM	LOS	-	*		A		-	B			-		
		Delay	-	*		8.6		-	13.1			-		
		Queue	-	*		25'		-	25'			-		
	PM	LOS	-	*		A		-	C			-		
		Delay	-	*		9.3		-	16.3			-		
		Queue	-	*		25'		-	25'			-		

(-) indicates a movement that is prohibited or does not exist; (*) indicates a freeflow movement.
Delay is reported in seconds. Queue is the maximum of the 50th & 95th percentile queue, measured in feet.

Exhibit 5-14
Year 2046 Full Build Traffic Peak Hour Operating Conditions
With Modified Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Node 100: Four Mile Road & North Green Bay Road *One-Way Stop Control*		*Lanes→*	-	*1*		*1*		-	*1*	-	*1*		-	
	AM	LOS	-	*		A		-	E	-	B		-	
		Delay	-	*		8.9		-	44.8	-	13.3		-	
		v/c	-	-		-		-	0.53	-	-		-	
		Queue	-	*		25'		-	70'	-	25'		-	
	PM	LOS	-	*		B		-	F	-	C		-	
		Delay	-	*		10.5		-	79.3	-	18.0		-	
		v/c	-	-		-		-	0.59	-	-		-	
		Queue	-	*		25'		-	70'	-	30'		-	
Node 200: North Green Bay Road & Packer Drive/Proposed West Drive *One-Way Stop Control*		*Lanes→*	*1*			*1*			*1*			*1*		
	AM	LOS	B			A			A			A		
		Delay	11.0			9.8			7.5			7.7		
		Queue	25'			25'			25'			25'		
	PM	LOS	B			B			A			A		
		Delay	12.2			10.7			7.9			7.6		
		Queue	25'			25'			25'			25'		
Node 300: Four Mile Road & Proposed North Driveway *One-Way Stop Control*		*Lanes→*	-	*1*		*2*		-	*1*			-		
	AM	LOS	-	*		A		-	B			-		
		Delay	-	*		8.8		-	14.0			-		
		Queue	-	*		25'		-	25'			-		
	PM	LOS	-	*		A		-	C			-		
		Delay	-	*		9.6		-	18.1			-		
		Queue	-	*		25'		-	25'			-		

(-) indicates a movement that is prohibited or does not exist; (*) indicates a freeflow movement.
Delay is reported in seconds. Queue is the maximum of the 50th & 95th percentile queue, measured in feet.



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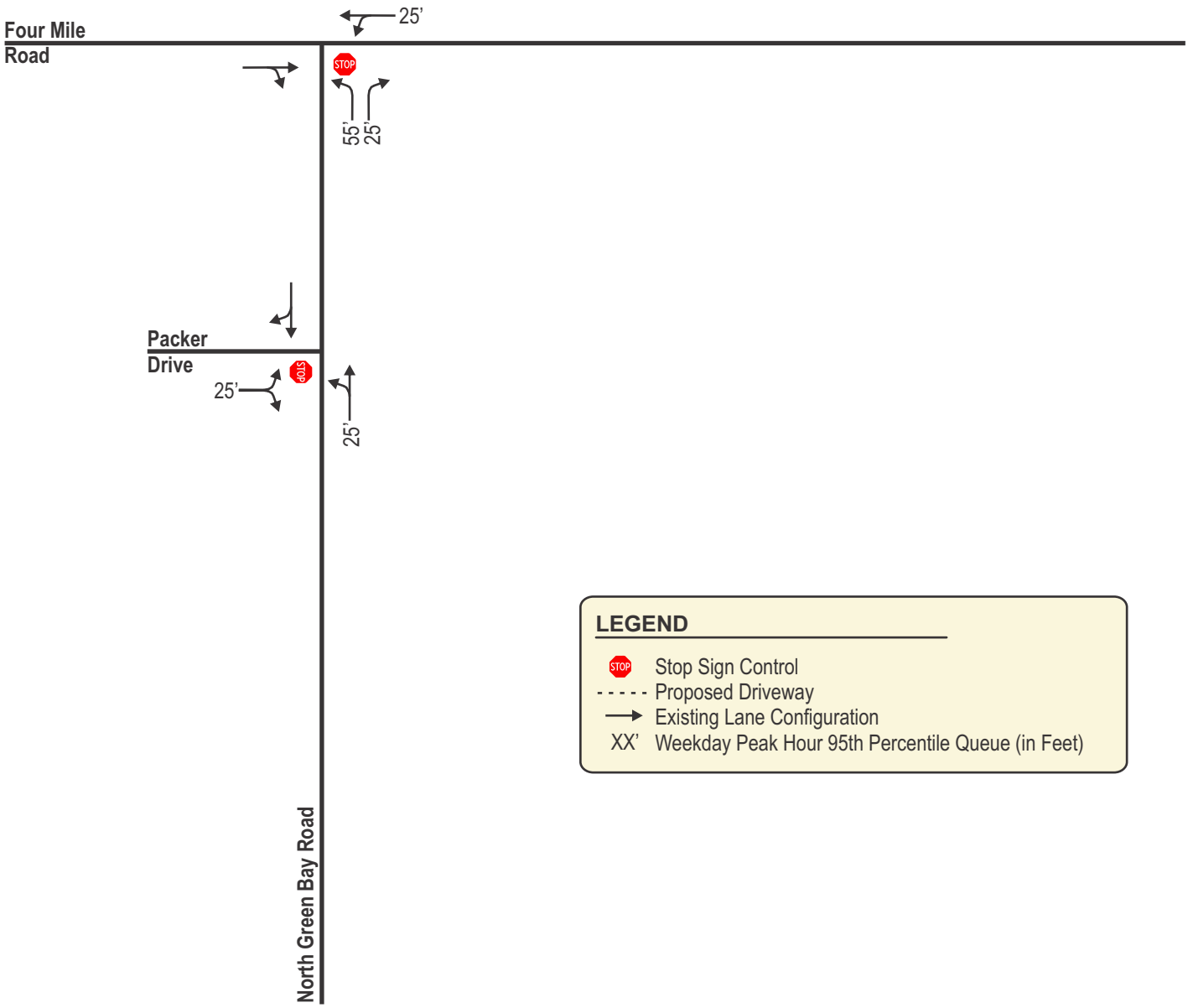
N
NOT TO SCALE

EXHIBIT 5-18
YEAR 2026 EXISTING TRAFFIC VOLUMES
MAXIMUM QUEUE LENGTHS

CALEDONIA, WISCONSIN



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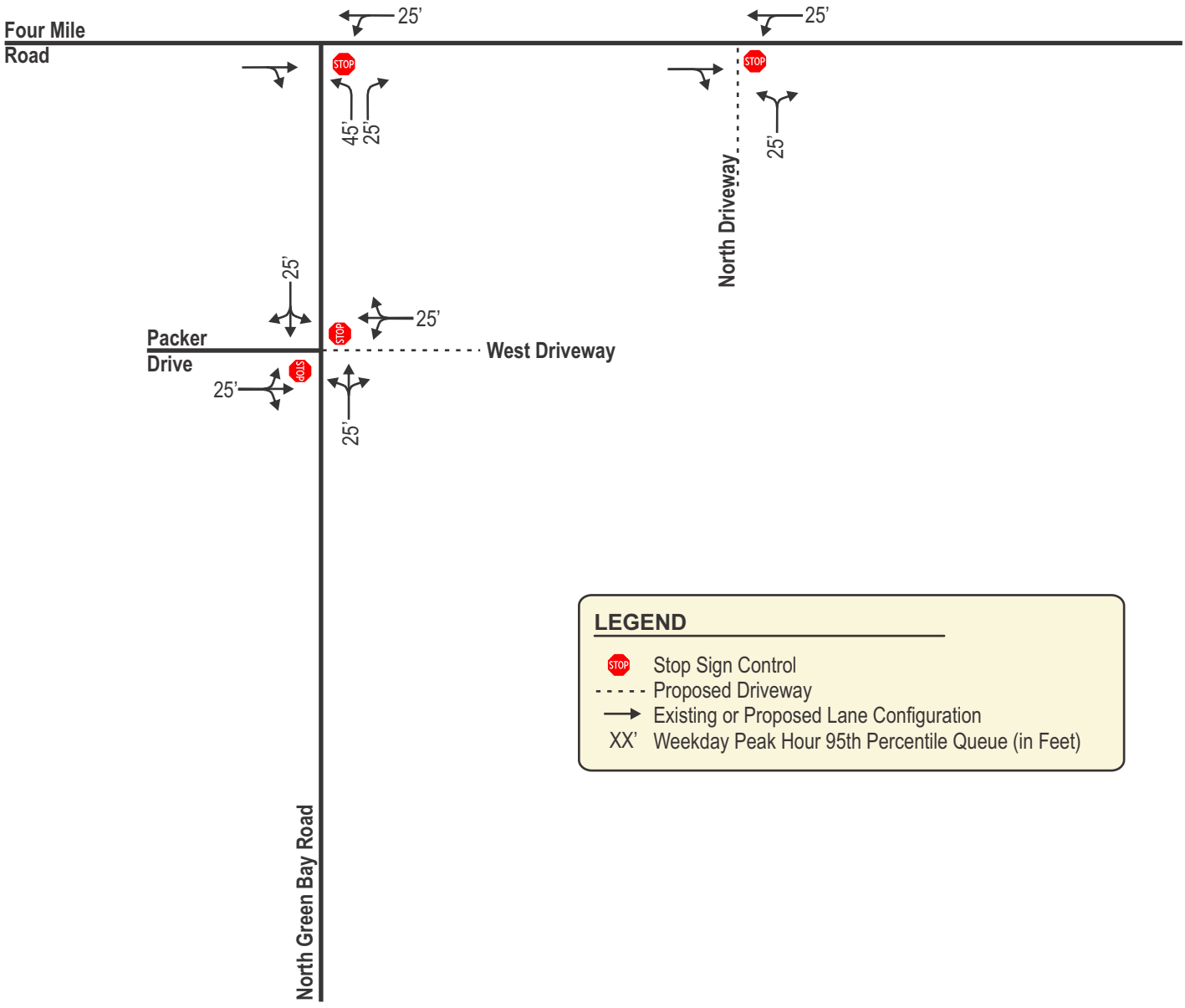
N
NOT TO SCALE

EXHIBIT 5-20
YEAR 2046 BACKGROUND TRAFFIC VOLUMES
MAXIMUM QUEUE LENGTHS

CALEDONIA, WISCONSIN



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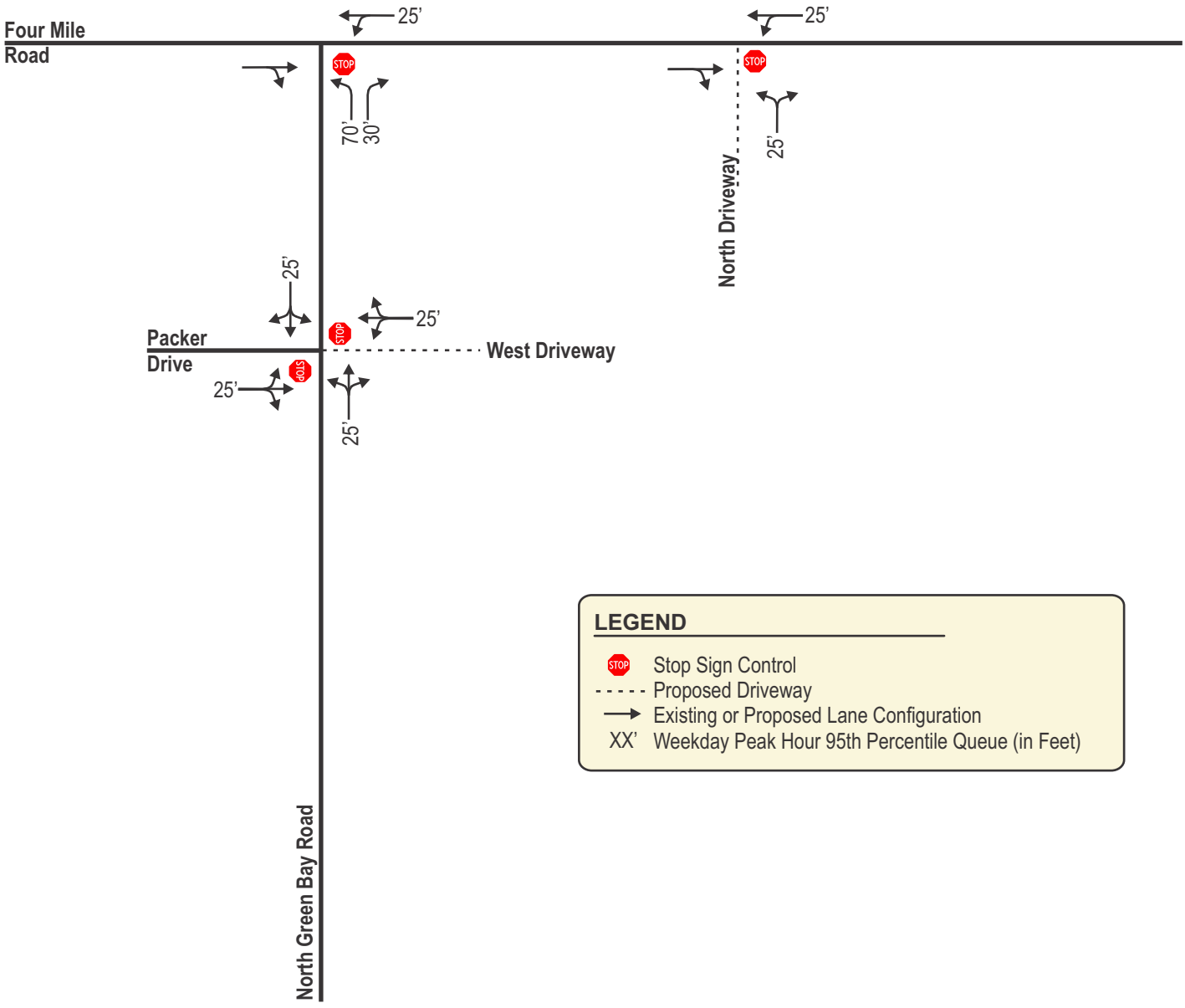
N

NOT TO SCALE

EXHIBIT 5-21
YEAR 2026 INITIAL BUILD TRAFFIC VOLUMES
MAXIMUM QUEUE LENGTHS

CALEDONIA, WISCONSIN



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N
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EXHIBIT 5-23
YEAR 2046 FULL BUILD TRAFFIC VOLUMES
MAXIMUM QUEUE LENGTHS

CALEDONIA, WISCONSIN

CHAPTER VI – RECOMMENDATIONS AND CONCLUSION

PART A – RECOMMENDATIONS

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM*), 7th Edition*. Intersection operation is defined by "level of service." Level of Service (LOS) is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, represented by LOS 'A,' to very poor, represented by LOS 'F.' For the purpose of this study, LOS C or better was used to define desirable peak hour operating conditions.

A1. Year 2025 Existing Traffic – Recommended Modifications

The Year 2025 existing traffic volumes do not include any development. The analysis was conducted using existing intersection geometrics and traffic control. No modifications are recommended to accommodate the Year 2025 existing traffic volumes. *Modifications are for jurisdictional consideration and are not legally binding. The Village of Caledonia reserves the right to determine alternative solutions.*

All movements at the study area intersections are currently operating acceptably at LOS C or better under the Year 2025 existing traffic volume conditions under current traffic volume conditions except the northbound left-turn movement at the Four Mile Road intersection with North Green Bay Road which is currently operating at LOS D during the typical weekday morning peak hour and at LOS E during the typical weekday evening peak hour.

A2. Year 2046 Background Traffic – Recommended Modifications

The Year 2046 background traffic volumes do not include any of the identified on-site or off-site developments; however, they do include general background growth within the general area. The analysis was conducted using existing intersection geometrics and traffic control. No modifications are recommended to accommodate the Year 2046 background traffic volumes. *Modifications are for jurisdictional consideration and are not legally binding. The Village of Caledonia reserves the right to determine alternative solutions.*

All movements at the study area intersections are expected to continue to operate acceptably at LOS C or better under the Year 2046 background traffic volume conditions under current traffic conditions except the northbound left-turn movement at the Four Mile Road intersection with North Green Bay Road which is expected to operate at LOS E during the typical weekday morning peak hour and at LOS F during the typical weekday evening peak hour.

A3. Year 2026 Initial Build Traffic – Recommended Modifications

The Year 2026 Initial build (with on-site development) traffic volumes include full build out of the on-site residential development site located along the south side of Four Mile Road, immediately east of North Green Bay Road as described above. The following modifications, as shown in Exhibit 1-3, are recommended to accommodate the Year 2026 Initial build (with on-site development) traffic volumes. *Modifications are for jurisdictional consideration and are not legally binding. The Village of Caledonia reserves the right to determine alternative solutions.*

Node 100: Four Mile Road & North Green Bay Road

- No modifications recommended.

Node 200: North Green Bay Road intersection & Packer Drive/Proposed West Drive

- Provide a new access road on the east approach.
- Provide stop sign control on the east approach of the new access road.

Node 300: Four Mile Road & Proposed North Drive

- Provide a new access road on the south approach.
- Provide stop sign control on the south approach of the new access road.
- Provide a westbound bypass lane along the north side of Four Mile Road at the new access road intersection.

Based on the site layout, with two new access drives onto North Green Bay Road and Four Mile Road, respectively; the overall traffic volumes for any specific turning movement at the new access drives are expected to be relatively low (about 20 vehicles or less during any peak period). With these expected volumes, all movements at the new access drives are expected to operate with minimal delay (less than 17 seconds) during all peak periods under initial build traffic conditions.

The recommendation for a bypass lane at the new North Drive intersection along Four Mile Road is based on the Racine County "Policy on Permits for Access Point" Guidelines (*Section 5m; Access Point Design Criteria*) that requires a bypass lane at any new "T" type intersection when the mainline AADT volumes are greater than 2,500 vehicles per day (vpd). Based on historic WisDOT AADT count information, the Four Mile Road AADT within the limits of the new roadway connection under the existing (no development) conditions is approximately 10,000-vpd and the historic data shows volumes ranging from 8,000- to 12,000-vpd in the past. Therefore, even though Four Mile Road isn't a county-controlled facility, a bypass lane should be considered at the new roadway connection per the Racine County guidelines.

Sight distance was also evaluated at the two new access drives onto North Green Bay Road and Four Mile Road, respectively; and all required sight distance requirements are expected to be met.

Higher delays are currently being experienced for the northbound left-turn movements at the Four Mile Road intersection with North Green Bay Road during the typical weekday morning and weekday evening peak hours. These delays are expected to continue and increase under the Year 2046 background and Year 2026 Initial build (with on-site development) traffic volume conditions. A traffic signal warrant analysis was completed to determine if existing and/or future Initial Build traffic volumes would be high enough to reach the warrant thresholds needed for consideration of traffic signal installation. Based on the full traffic signal warrant analysis completed as part of this study, traffic signals are not expected to be met under the existing, background or initial build traffic volume scenarios. In order for traffic signal warrants to be met, traffic volumes on the minor street south approach would need to increase by about 600 percent (6 times the current volumes). Since the current and future traffic volumes at this intersection are far below the thresholds for meeting signal warrants, it is recommended that signals not be installed at this intersection. If the Village decides to modify the traffic control at this intersection, typically a four-way stop is installed first when those warrants are met, then followed by traffic signals once the traffic signal warrants are met. However, higher delays (LOS E/F) are expected for some movements at this intersection under all-way stop control. Therefore, all-way stop control should not be considered at this location and traffic signals could be considered at some point in the future once the traffic signal warrants are met.

The existing and expected higher delays for the northbound left-turn movements at the Four Mile Road intersection with North Green Bay Road under the Year 2025 existing, Year 2046 background and Year 2026 Initial build conditions all have a volume to capacity (v/c) ratio for these movements below 0.50 (about half the lane capacity for this movement) with maximum

queue lengths of about two vehicles or less. Therefore, even though delays are expected to be higher (at about 48 seconds or less), extra capacity is expected to be available. The intersection should be monitored over time and traffic signals should be considered for the intersection once future development moves forward and traffic volumes reach a level where thresholds are potentially met at some point in the future.

A4. Year 2046 Full Build Traffic – Recommended Modifications

The Year 2046 full build (with on-site and off-site developments) traffic volumes include full build out of the on-site residential development site and the potential off-site residential development site as described above. The following additional modifications, as shown in Exhibit 1-3, are recommended to accommodate the Year 2046 full build (with on-site and off-site developments) traffic volumes. *Modifications are for jurisdictional consideration and are not legally binding. The Village of Caledonia reserves the right to determine alternative solutions.*

Node 100: Four Mile Road & North Green Bay Road

- No additional modifications
- Consider a higher level of traffic control when and if additional off-site development moves forward in the area.

Node 200: North Green Bay Road intersection & Packer Drive/Proposed West Drive

- No additional modifications.

Node 300: Four Mile Road & Proposed North Drive

- No additional modifications.

Based on the site layout, with two new access drives proposed for the on-site development onto North Green Bay Road and Four Mile Road, respectively; the overall traffic volumes for any specific turning movement at the new access drives are expected to be relatively low (about 20 vehicles or less during any peak period). With these expected volumes, all movements at the new access drives are expected to operate with minimal delay (less than 19 seconds) during all peak periods under the full build traffic conditions.

Higher delays are currently being experienced for the northbound left-turn movements at the Four Mile Road intersection with North Green Bay Road during the typical weekday morning and weekday evening peak hours. These delays are expected to continue and increase under the Year 2046 background and Year 2046 Full build (with on-site development) traffic volume conditions. A traffic signal warrant analysis was completed to determine if the future Full Build traffic volumes would be high enough to reach the warrant thresholds needed for consideration of traffic signal installation. Based on the full traffic signal warrant analysis completed as part of this study, traffic signals are not expected to be met under the full build traffic volume scenarios. In order for traffic signal warrants to be met, traffic volumes on the minor street south approach would need to increase by about 600 percent (6 times the current volumes). Since the current and future traffic volumes at this intersection are far below the thresholds for meeting signal warrants, it is recommended that signals not be installed at this intersection. If the Village decides to modify the traffic control at this intersection, typically a four-way stop is installed first when those warrants are met, then followed by traffic signals once the traffic signal warrants are met. However, higher delays (LOS E/F) are expected for some movements at this intersection under all-way stop control. Therefore, all-way stop control should not be considered at this

location and traffic signals could be considered at some point in the future once the traffic signal warrants are met.

The existing and expected higher delays for the northbound left-turn movements at the Four Mile Road intersection with North Green Bay Road under the full build (with on-site and off-site developments) traffic volume condition, the higher delays are expected to increase to between 45 and 80 seconds for the weekday morning arrival and weekday afternoon discharge peak hours, respectively. It is noted that under the full build conditions, the v/c ratio is expected to be at or below 0.60 (about 2/3 the lane capacity for this movement) with maximum queue lengths of about three vehicles or less. To verify the analysis, a gap study was completed and there are anywhere from 112 to 141 excess gaps along Four Mile Road during the weekday morning and weekday evening peak period for additional left-turning movements beyond the existing and site new trip traffic assigned to the Four Mile Road intersection with North Green Bay Road. A higher number of gaps (211 to 417 excess gaps) are available for the other turning movements. These excess gaps confirm the analysis outputs showing extra capacity is expected to be available at this intersection even under future year Full Build traffic volumes. The intersection should be monitored over time and traffic signals should be considered for the intersection once future development moves forward and traffic volumes reach a level where traffic signal thresholds are potentially met at some point in the future.

PART B – CONCLUSION

Except as noted, all movements at the study area intersections are expected to operate safely and efficiently through the horizon year with the full build out of the on-site and off-site (Lot 2) residential developments and the modifications identified in this TIA.