TRAFFIC ANALYSIS & DESIGN, INC.

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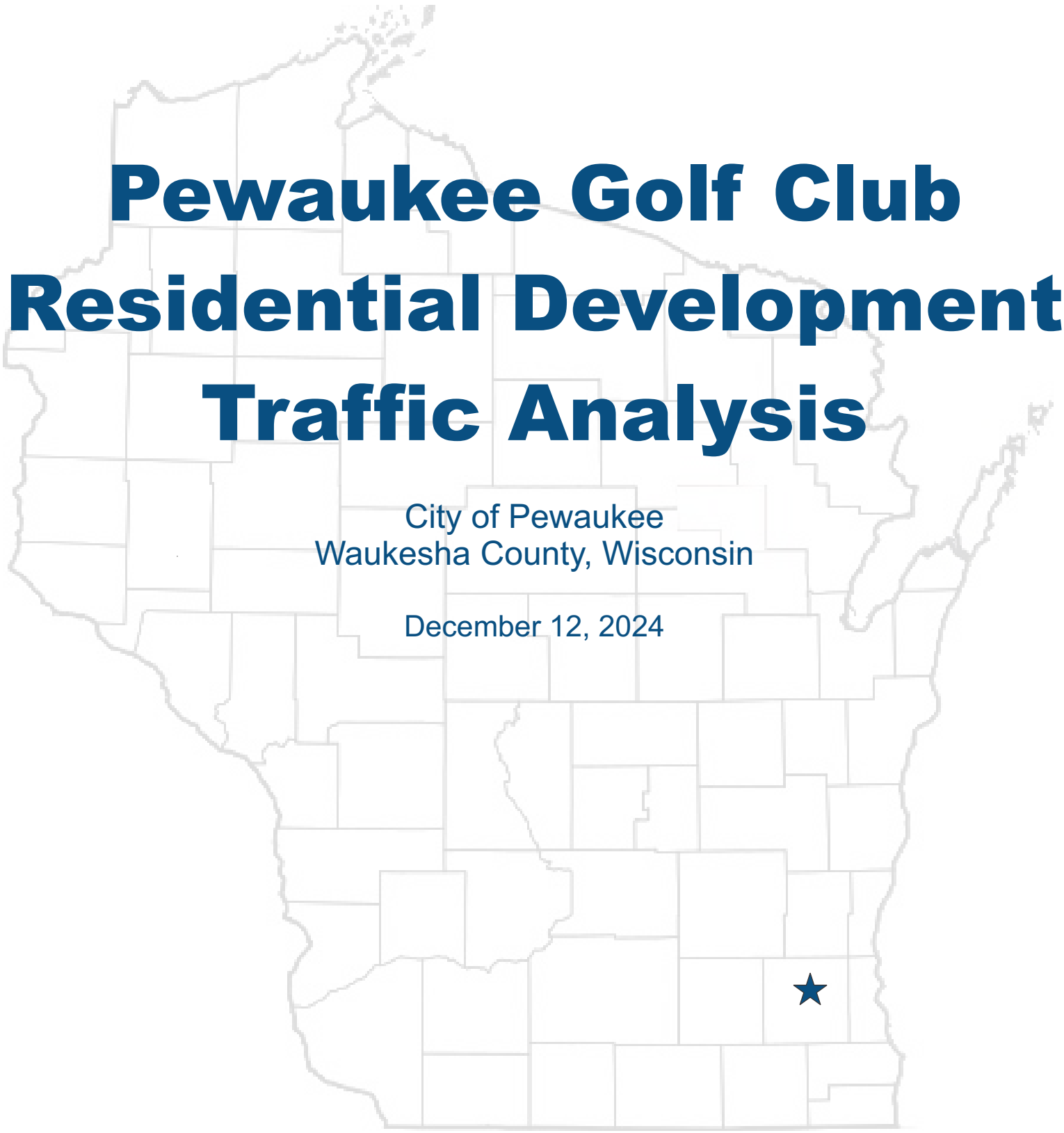
Pewaukee Golf Club Residential Development Traffic Analysis

City of Pewaukee
Waukesha County, Wisconsin

December 12, 2024



TRAFFIC IMPACT ANALYSIS
FOR:

PEWAUKEE GOLF CLUB
RESIDENTIAL DEVELOPMENT

CITY OF PEWAUKEE, WAUKESHA COUNTY, WISCONSIN

DATE SUBMITTED: December 12, 2024

PREPARED FOR:
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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.

Pewaukee Golf Club Residential Development
Traffic Impact Analysis
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CHAPTER I – INTRODUCTION & EXECUTIVE SUMMARY

PART A – PURPOSE OF REPORT AND STUDY OBJECTIVES

A residential development comprised of multifamily units and single-family homes is being proposed on the former Pewaukee Golf Club Course site and the remnant land from phase II of the Meadowbrook Village condominiums, located in the City of Pewaukee, Waukesha 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 (2025) full build traffic 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 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 development areas and conclusions based on the findings of the TIA.

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

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

- Meadowbrook Road/CTH G intersection with Fieldhack Drive (existing two-way stop control)
- Golf Road/CTH DR intersection with Meadowbrook Road/CTH G (existing traffic signal control)
- Golf Road/CTH DR intersection with Pewaukee Golf Club Drive (existing two-way stop control)
- Golf Road/CTH DR intersection with Grandview Boulevard/CTH T (existing traffic signal control)

B2. On-Site Development Description and Timings

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

Full Build

- Multifamily Housing (Low-Rise/Not Close to Rail)/LU220 – 283 units
- Single-Family Detached Housing/LU210 – 118 units
- Single-Family Detached Housing/LU210 (Rental) – 75 units

As shown on the conceptual site plan in Exhibits 1-2A&B, the on-site residential development is proposed on the site of the former Pewaukee Golf Club site. A total of 193 lots and 13 apartment buildings (283 apartment units) are proposed for the property on the approximately 160-acre site. The apartment buildings are proposed in the northeast quadrant of the site. Single-family parcels are proposed on the southern portion of the site and single-family rental parcels are proposed on the northwestern portion of the site, near the Meadowbrook Farms neighborhood. Full build out of the parcel is expected over the next several years; however, for traffic study purposes, build out of the residential development site was assumed for opening year and is expected to be included in the year 2025 build traffic scenario.

B3. Off-Site Development Description and Timings

No off-site developments have been identified for this study.

B4. Generated Traffic

Upon full build out, the proposed on-site development is expected to generate 250 new trips (60 entering/190 exiting) during a typical weekday morning peak hour. During a typical weekday evening peak hour, the proposed development is expected to generate 330 new trips (205 entering/125 exiting). On a typical weekday, the proposed development is expected to generate approximately 3,840 new trips (1,920 entering/1,920 exiting) under full build conditions.

B5. Site Access

Two access driveways are being proposed for the residential development. The main north/south access drive is proposed via the existing Pewaukee Golf Club driveway accessing Golf Road from the south. A secondary access drive is proposed to connect into the existing cul-de-sac along Milkweed Lane, immediately southeast of Fieldhack Drive.

B6. Year 2024 Existing Traffic – Recommended Modifications

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM), *6th 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 D or better was used to define desirable peak hour operating conditions.

The Year 2024 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 2024 existing traffic volumes.

All movements at the study area intersections are currently operating acceptably at LOS D or better under the Year 2024 existing traffic volume conditions under current traffic volume conditions.

B7. Year 2025 Build Traffic – Recommended Modifications

Year 2025 build (with development) traffic volumes include full build out of the residential development site located along the north side of Golf Road as described above. The following modifications, as shown in Exhibit 1-3, are recommended to accommodate the full build traffic volumes.

General

- Provide a cross-access connection within the site to Fieldhack Drive at a location just north of Milkweed Lane.

Node 100: Meadowbrook Road/CTH G & Fieldhack Drive

- No modifications recommended.

Node 200: Golf Road/CTH DR & Meadowbrook Road/CTH G

- No modifications recommended.

Node 300: Golf Road/CTH DR & Pewaukee Golf Club Drive

- Provide a dedicated right-turn lane into the site on the east approach.
- Construct an eastbound bypass lane along the south side of Golf Road at the main roadway connection.

Node 400: Golf Road/CTH DR & Grandview Boulevard/CTH T

- Consider adjusting signal timings.

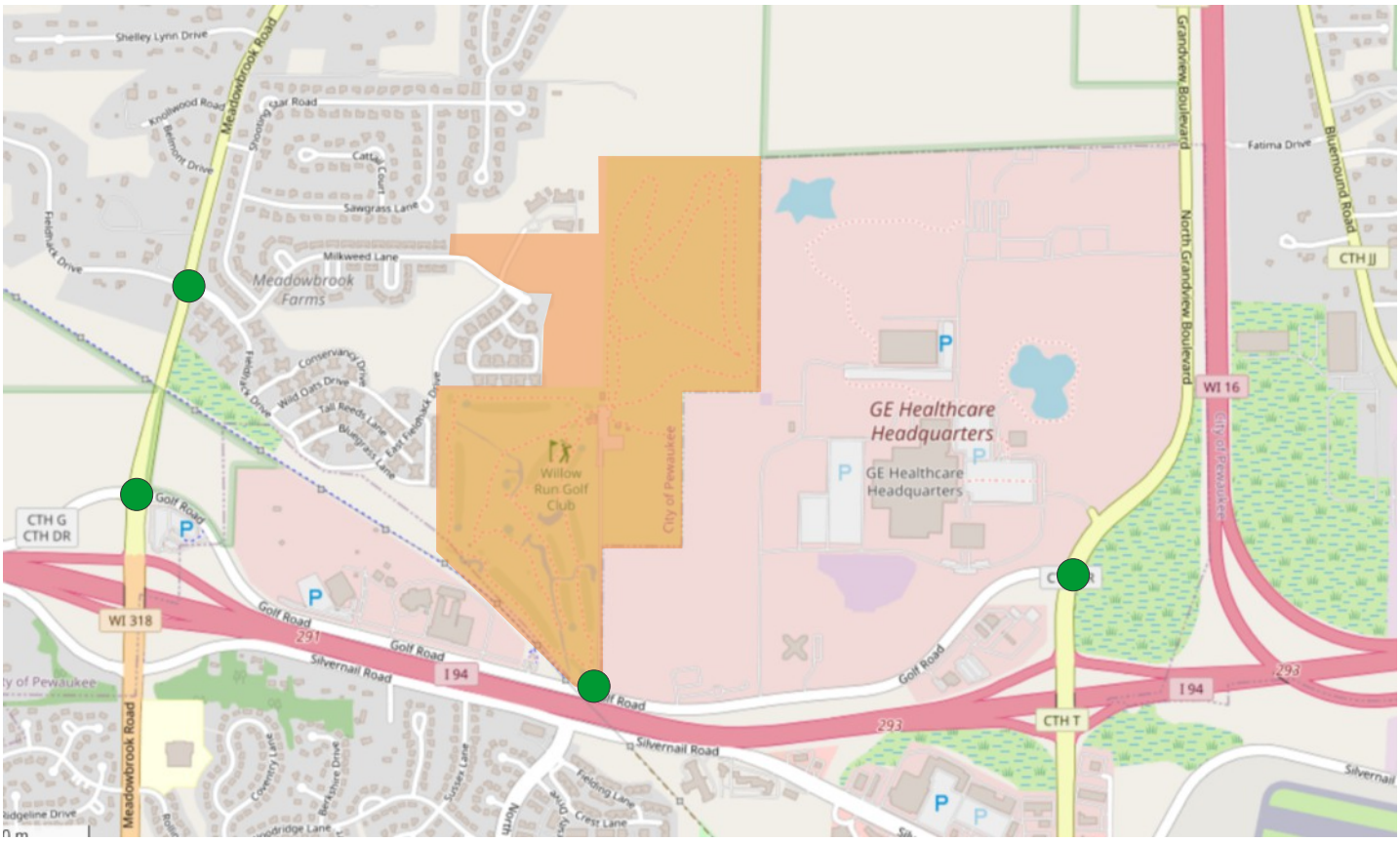
Based on the site layout and its relation to the existing Meadowbrook Farms neighborhood, some traffic is expected to utilize Milkweed Lane via Fieldhack Drive to access Meadowbrook Road/CTH G; however, this traffic is expected to be relatively low. With the main access drive onto Golf Road, the majority of the traffic to/from the site is expected to utilize the Golf Road access. The new trips for any specific turning movement at the Meadowbrook Road intersection with Fieldhack Drive are expected to be relatively low (about 20 vehicles or less during any peak period). With the expected volumes, all movements at the Meadowbrook Road intersection with Fieldhack Drive are expected to operate with relatively minor delays (less than 25 seconds) and minimal queueing (1 to 2 vehicles) during all peak periods.

The recommendation for a bypass lane at the main access drive along Golf Road/CTH DR is based on the Waukesha County Driveway Permit 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 Golf Road/CTH DR AADT within the limits of the roadway connection under the existing (no development) conditions is approximately 7,100-vpd. Therefore, a bypass lane is recommended at the roadway connection per the Waukesha County code.

With the recommended modifications, all movements at the study area intersections are expected to continue to operate at acceptable levels at LOS D or better under the year 2025 build (with proposed development) traffic conditions.

B8. Conclusion

All movements at the study area intersections are expected to operate safely and efficiently through the opening year with the full build out of the development and the modifications identified in this TIA.



LEGEND

- Study Intersection
- Site Location

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EXHIBIT 1-1
PROJECT OVERVIEW MAP

PEWAUKEE, WI

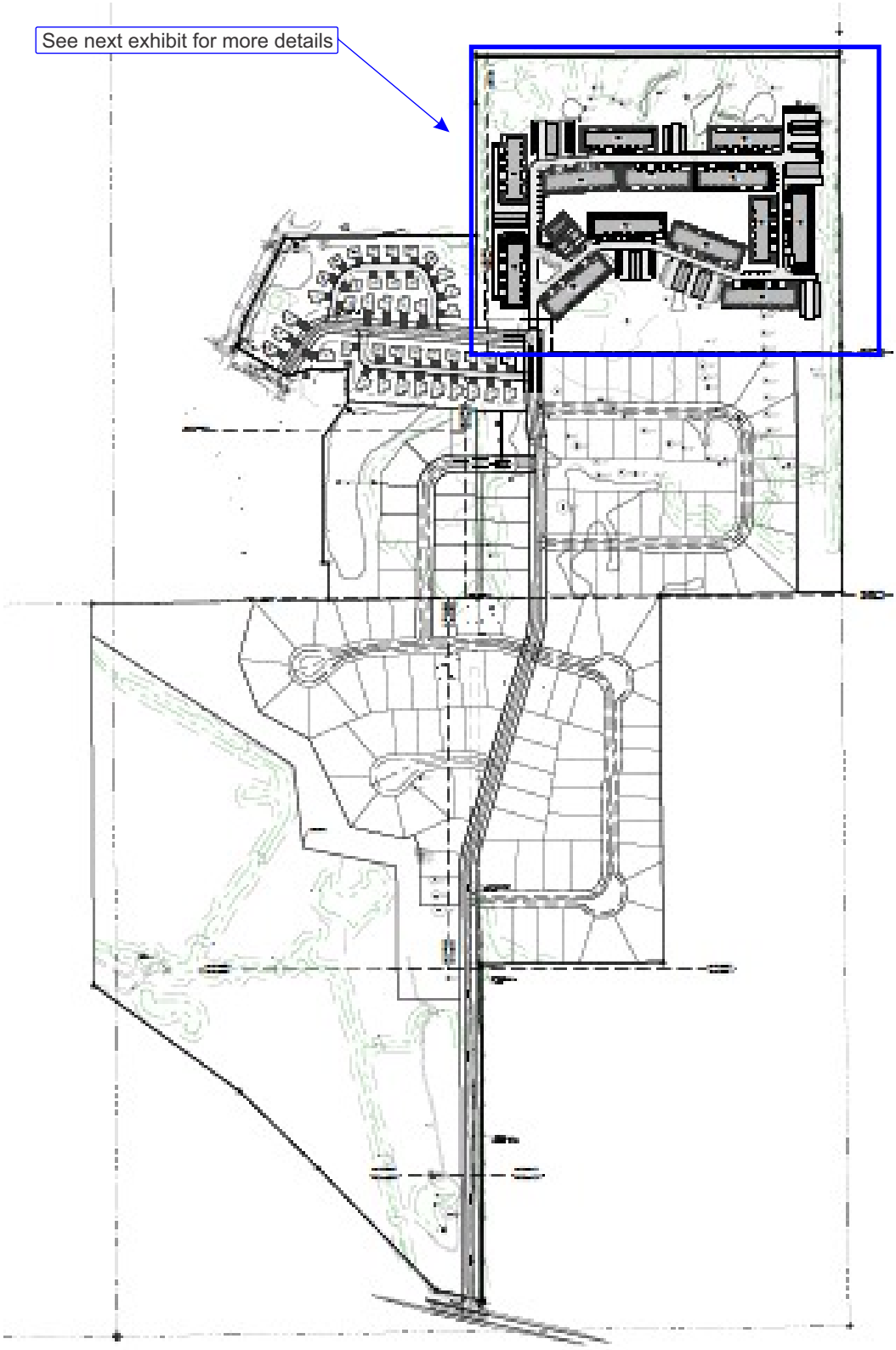

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EXHIBIT 1-2A
CONCEPTUAL SITE PLAN
OVERALL SITE PLAN

PEWAUKEE, WI

SITE PLAN – CURRENT

UNIT MATRIX - CENTRAL GREEN

TOTAL UNIT COUNT - 283

23 UNIT BUILDING - 9
19 UNIT BUILDING - 4

UNIT MIX:
JR 1 BED - 36 (13 %)
1 BED - 104 (37%)
2 BED - 117 (41%)
3 BED - 26 (9%)

DESIRED MIX:
JR 1 BED - 10%
1 BED - 40%
2 BED - 40%
3 BED - 10 %

PARKING COUNT:
170 - DETACHED GARAGES
220 - SURFACE STALLS
117 - ATTACHED STALLS
TOTAL: 507

CLUBHOUSE: 25

RINKA+

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EXHIBIT 1-2B
CONCEPTUAL SITE PLAN
MULTI-FAMILY PARCEL

PEWAUKEE, WI

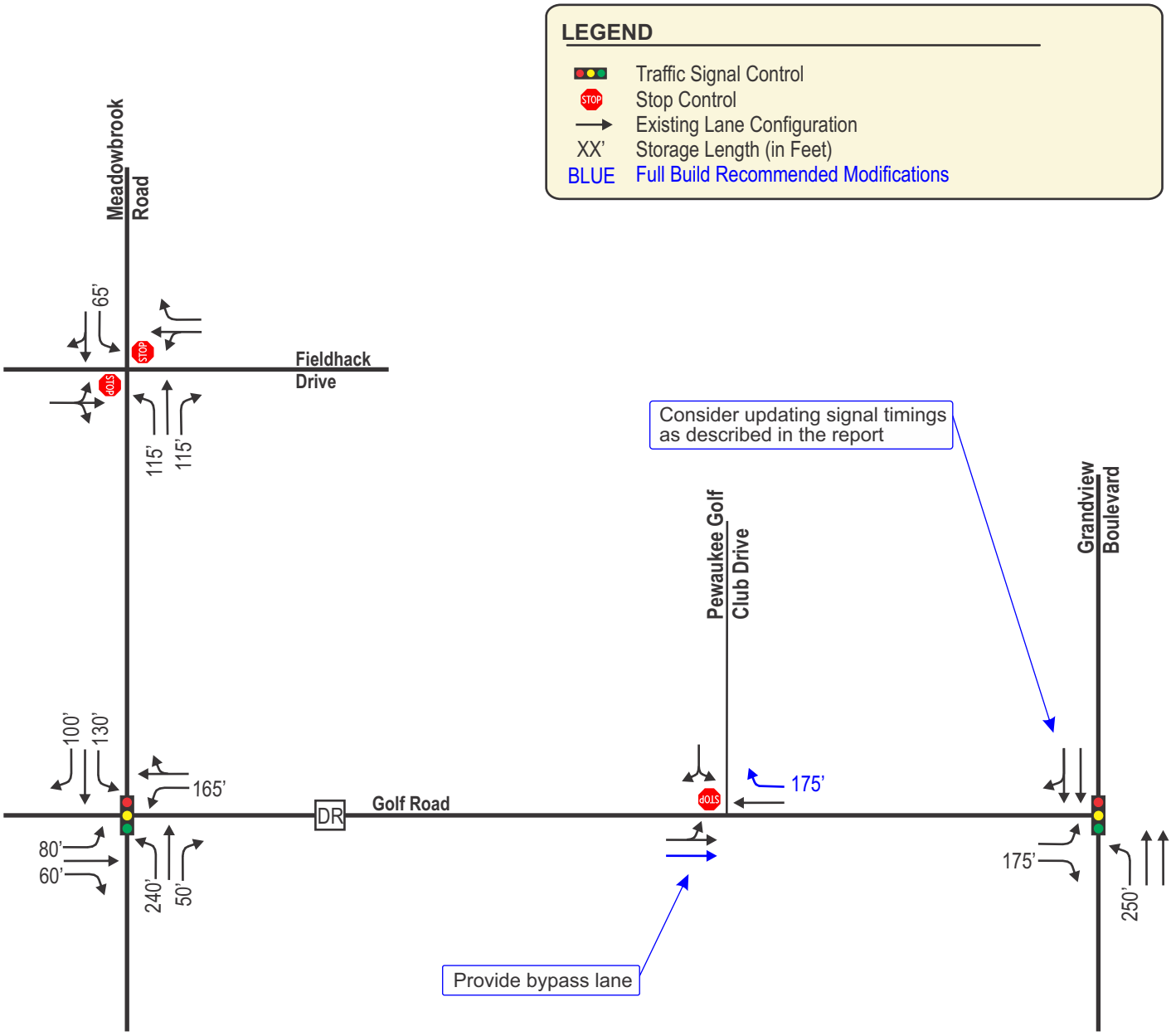

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EXHIBIT 1-3
RECOMMENDED MODIFICATIONS

PEWAUKEE, WI

CHAPTER II – PROPOSED DEVELOPMENT

PART A – PROPOSED DEVELOPMENT

A1. Development Description and Site Location

A residential development comprised of multifamily units and single-family homes is being proposed on the former Pewaukee Golf Club Course site and the remnant land from phase II of the Meadowbrook Village condominiums, located in the City of Pewaukee, Waukesha County, Wisconsin. There are two access driveways being proposed for the residential development. The main north/south access drive is proposed via the existing Pewaukee Golf Club driveway accessing Golf Road from the south. A secondary access drive is proposed to connect into the existing cul-de-sac along Milkweed Lane, immediately southeast of Fieldhack Drive. A street map illustrating the location of the proposed development is shown in Exhibit 2-1.

A2. Land Use and Development Timing

The development site is located within the northern portion of the approximately 160-acre former Pewaukee Golf Club site on the north side of Golf Road. Directly west of the proposed development are the Meadowbrook Village condominiums, the Meadowbrook Farms neighborhood, and The Ingleside Hotel. Directly east of the proposed development is the GE Healthcare campus and the Lake Country Surgery Center/ Orthopedics center. Just under one mile east of the main north/south access drive is the Grandview Boulevard/CTH T and I-94 interchange. Also, just under one mile west of the main north/south access drive is the Meadowbrook Road/CTH G and I-94 interchange.

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

Full Build

- Multifamily Housing (Low-Rise/Not Close to Rail)/LU220 – 283 units
- Single-Family Detached Housing/LU210 – 118 units
- Single-Family Detached Housing/LU210 (Rental) – 75 units

As shown on the conceptual site plan in Exhibits 2-2A&B, the on-site residential development is proposed on the site of the former Pewaukee Golf Club site. A total of 193 lots and 13 apartment buildings (283 apartment units) are proposed for the property on the approximately 160-acre site. The apartment buildings are proposed in the northeast quadrant of the site. Single-family parcels are proposed on the southern portion of the site and single-family rental parcels are proposed on the northwestern portion of the site, near the Meadowbrook Farms neighborhood.

Full build out of the parcel is expected over the next several years; however, for traffic study purposes, build out of the residential development site was assumed for opening year and is expected to be included in the year 2025 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 City of Pewaukee, City of Waukesha, and the other surrounding communities within southeast Wisconsin.

B2. Area of Significant Traffic Impact

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

- Meadowbrook Road/CTH G intersection with Fieldhack Drive (existing two-way stop control)
- Golf Road/CTH DR intersection with Meadowbrook Road/CTH G (existing traffic signal control)
- Golf Road/CTH DR intersection with Pewaukee Golf Club Drive (existing two-way stop control)
- Golf Road/CTH DR intersection with Grandview Boulevard/CTH T (existing traffic signal control)

PART C – SITE ACCESSIBILITY

C1. Study Area Roadways

The study area roadways are discussed below:

Golf Road (CTH DR) is a two-lane east/west minor arterial highway with a 45 miles per hour (mph) speed limit. According to WisDOT, the year 2018 annual average daily traffic (AADT) volume on Golf Road near the site is 7,100 vehicles per day (vpd). Sidewalks exist along the south side of Golf Road for a short stretch from Meadowbrook Road to the Park-N-Ride lot located immediately east of Meadowbrook Road. In addition, the Lake County Recreational Trail terminates at Golf Road immediately west of the proposed development site main access road onto Golf Road.

Meadowbrook Road (CTH G) is a north/south two-lane divided principal arterial highway that transitions to a two-lane undivided highway immediately north of Golf Road. The posted speed limit on Meadowbrook Road is 35-mph within the limits of the study area. The Year 2022 WisDOT AADT volume on Meadowbrook Road was approximately 5,800-vpd north of Golf Road and 10,200-vpd to the south of Golf Road. Sidewalks exist along the east side of Meadowbrook Road from the south project limits up to a point about 850-feet north of Golf Road where the sidewalk terminates at the Lake County Recreational Trail crossing.

Grandview Boulevard (CTH T) is a north/south two-lane divided minor arterial highway with a posted speed limit of 45-mph within the limits of the study area. The Year 2022 WisDOT AADT volume on Grandview Boulevard was approximately 9,800-vpd north of Golf Road and 14,400-vpd to the south of Golf Road. CTH T does not have any sidewalks within the study area.

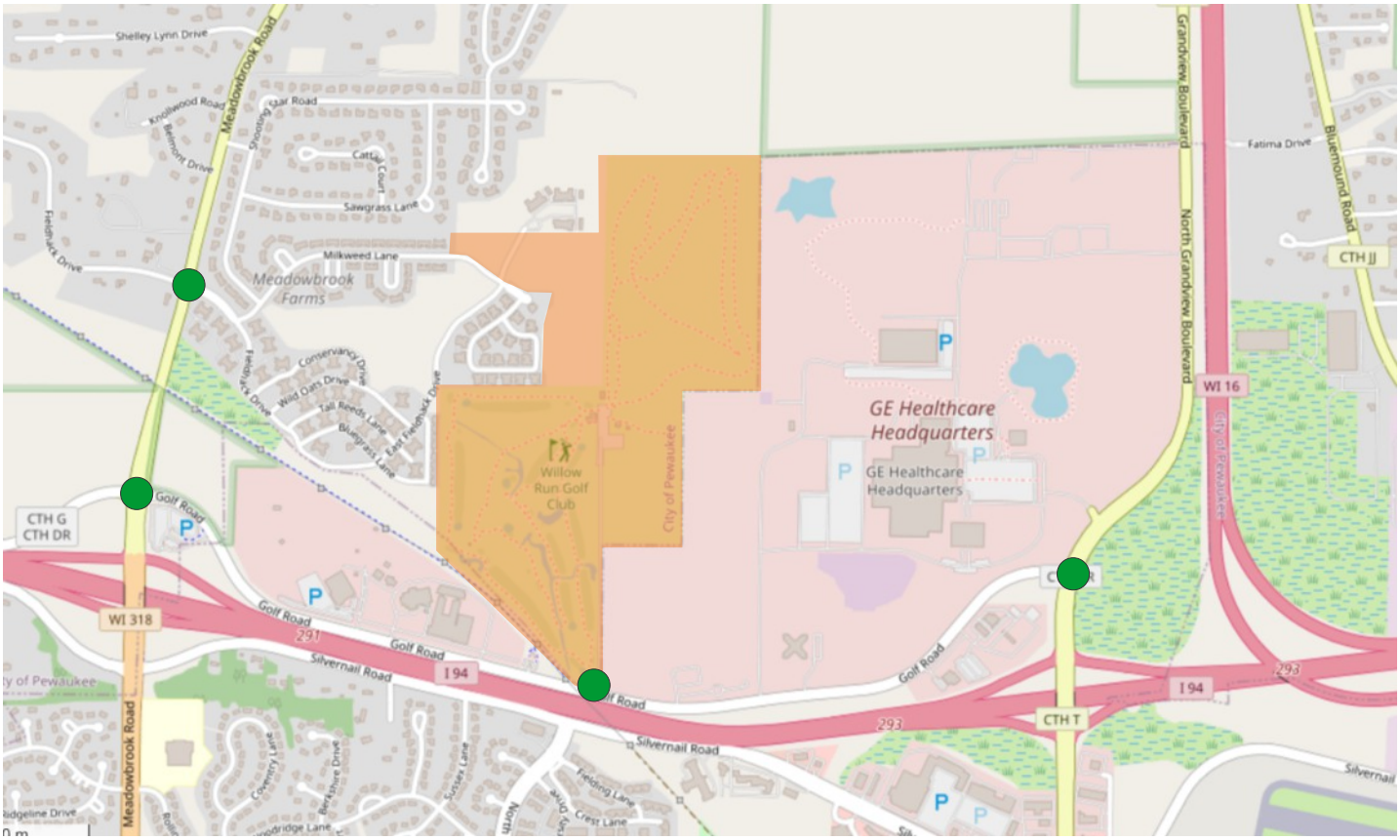
Fieldhack Drive is a winding local residential street that eventually connects to Meadowbrook Road to the west. Fieldhack Drive is curbed and is approximately 30-feet wide with a 25-mph speed limit. There are no sidewalks along Fieldhack Drive.

The Lake County Recreational Trail, which terminates at Golf Road, is located adjacent to the overall site along the southwest edge of the site. Other than at and adjacent to the Golf Road intersection with Meadowbrook Road as described above, sidewalks are not currently provided along any of the roadways within the limits of the study area. Narrow paved shoulders are provided along both sides of Golf Road within the limits of the proposed site; however, no other bike facilities are provided along any of the roadways within the limits of the study area.

C2. Alternative Modes of Transportation

Pedestrians and bicyclists may use their respective modes to access the area, though these alternate 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 Intersection
- Site Location

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EXHIBIT 2-1
PROJECT OVERVIEW MAP

PEWAUKEE, WI

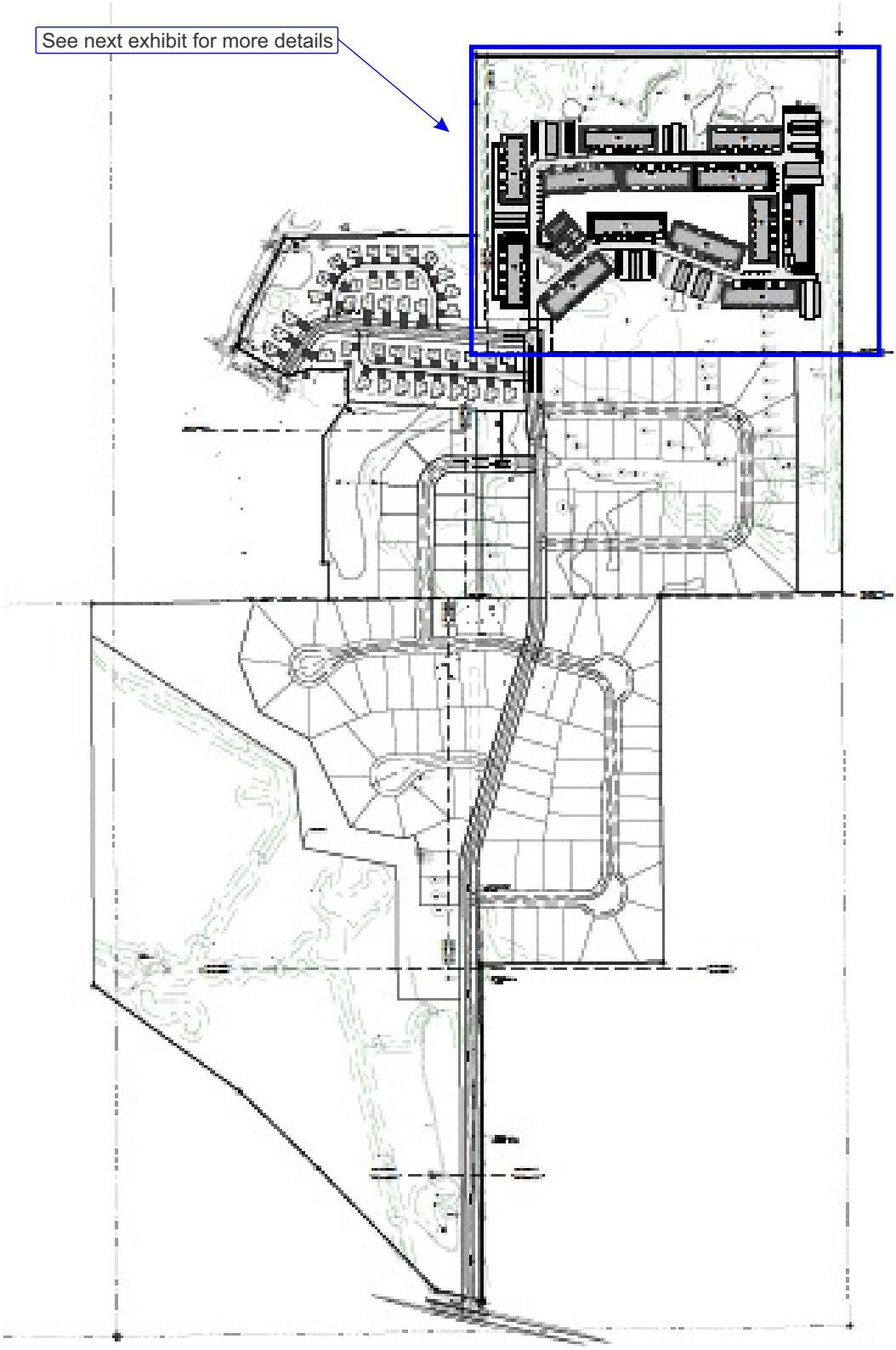

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EXHIBIT 2-2A
CONCEPTUAL SITE PLAN
OVERALL SITE PLAN

PEWAUKEE, WI

SITE PLAN – CURRENT

UNIT MATRIX - CENTRAL GREEN

TOTAL UNIT COUNT - 283

23 UNIT BUILDING - 9
19 UNIT BUILDING - 4

UNIT MIX:
JR 1 BED - 36 (13 %)
1 BED - 104 (37%)
2 BED - 117 (41%)
3 BED - 26 (9%)

DESIRED MIX:
JR 1 BED - 10%
1 BED - 40%
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PARKING COUNT:
170 - DETACHED GARAGES
220 - SURFACE STALLS
117 - ATTACHED STALLS
TOTAL: 507

CLUBHOUSE: 25

RINKA+

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EXHIBIT 2-2B
CONCEPTUAL SITE PLAN
MULTI-FAMILY PARCEL

PEWAUKEE, WI

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 early November of 2023, 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 Golf Road/CTH DR intersection with the Pewaukee Golf Club Access Drive. TADI supplemented this count with additional counts conducted in late January of 2024 at the Golf Road/CTH DR intersection with Grandview Boulevard/CTH T and the Fieldhack Drive intersection with Meadowbrook Road/CTH G. In addition, a 13-hour weekday turning movement count conducted in mid-April of 2023 was provided by WisDOT for the Golf Road/CTH DR intersection with Meadowbrook Road/CTH G.

Based on the turning movement counts; the weekday morning and weekday evening peak hours were identified as being 7:00 to 8:00 am and 3:45 to 4:45 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) *6th 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 D was used to define acceptable peak hour operating conditions. Descriptions of the various levels of service are as follows:

> ***LOS A*** is the highest level of service that can be achieved. Under this condition, intersection approaches appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation. At signalized intersections, average delays are less than 10 seconds. At unsignalized intersections, average delays are less than 10 seconds.
>
> ***LOS B*** represents stable operation. At signalized intersections, average vehicle delays are 10 to 20 seconds. At unsignalized intersections, average delays are 10 to 15 seconds.
>
> ***LOS C*** still represents stable operation, but periodic backups of a few vehicles may develop behind turning vehicles. Most drivers begin to feel restricted, but not objectionably so. At signalized intersections, average vehicle delays are 20 to 35 seconds. At unsignalized intersections, average delays are 15 to 25 seconds.
>
> ***LOS D*** represents increasing traffic restrictions as the intersection approaches instability. Delays to approaching vehicles may be substantial during short peaks within the peak period, but periodic clearance of long lines occurs, thus preventing excessive backups. At signalized intersections, average vehicle delays are 35 to 55 seconds. At unsignalized intersections, average delays are 25 to 35 seconds.

LOS E represents the capacity of the intersection. At signalized intersections, average vehicle delays are 55 to 80 seconds. At unsignalized intersections, average delays are 35 to 50 seconds.

LOS F represents jammed conditions where the intersection is over capacity and acceptable gaps for unsignalized intersections in the mainline traffic flow are minimal. At signalized intersections, average vehicle delays exceed 80 seconds. At unsignalized intersections, average delays exceed 50 seconds.

C2. Year 2024 Existing Traffic Operations – No Modifications

Exhibit 3-3 shows the Year 2024 existing traffic peak hour operating conditions at the study area intersections. The Year 2024 existing traffic analysis was conducted using the existing lane configurations shown in Exhibit 3-1 and the Year 2024 existing traffic volumes shown in Exhibit 3-2.

As shown in Exhibit 3-3, all study area intersections are currently operating acceptably at LOS D or better operations under the Year 2024 existing traffic volumes and current conditions during the weekday morning and weekday evening peak periods.

PART D – SOURCES OF DATA

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

- Turning movement traffic counts – TADI and WisDOT
- Existing traffic signal timings – Waukesha County
- Existing transportation detail – TADI and Google™ Earth
- On-site development information – Land by Label Development Co.

LEGEND

- Traffic Signal Control
- Stop Control
- Existing Lane Configuration
- XX' Existing Storage Length (in Feet)
- ***XX'*** Distance Between Roadways (in Feet)

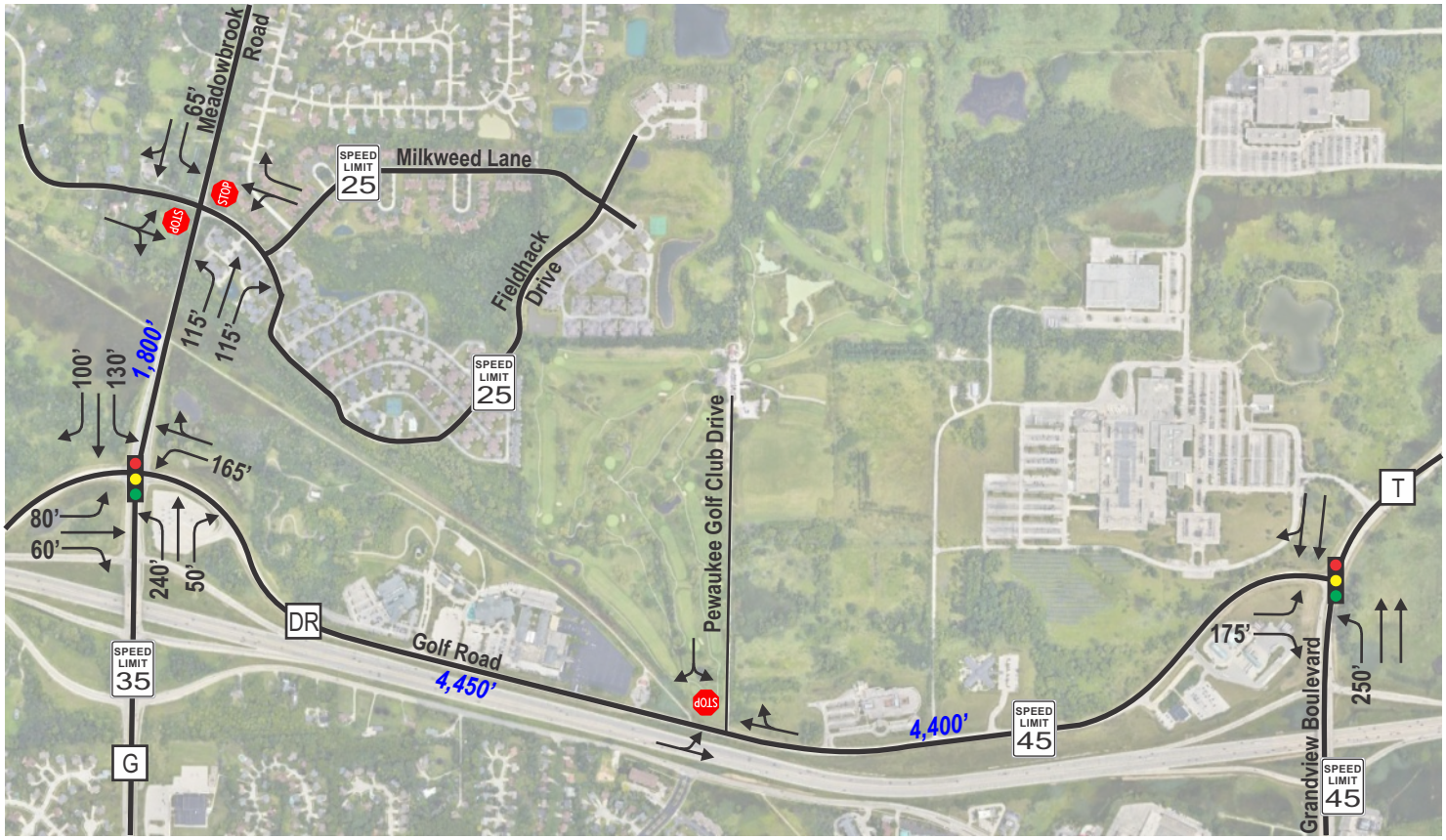

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EXHIBIT 3-1
EXISTING TRANSPORTATION DETAIL

PEWAUKEE, WI

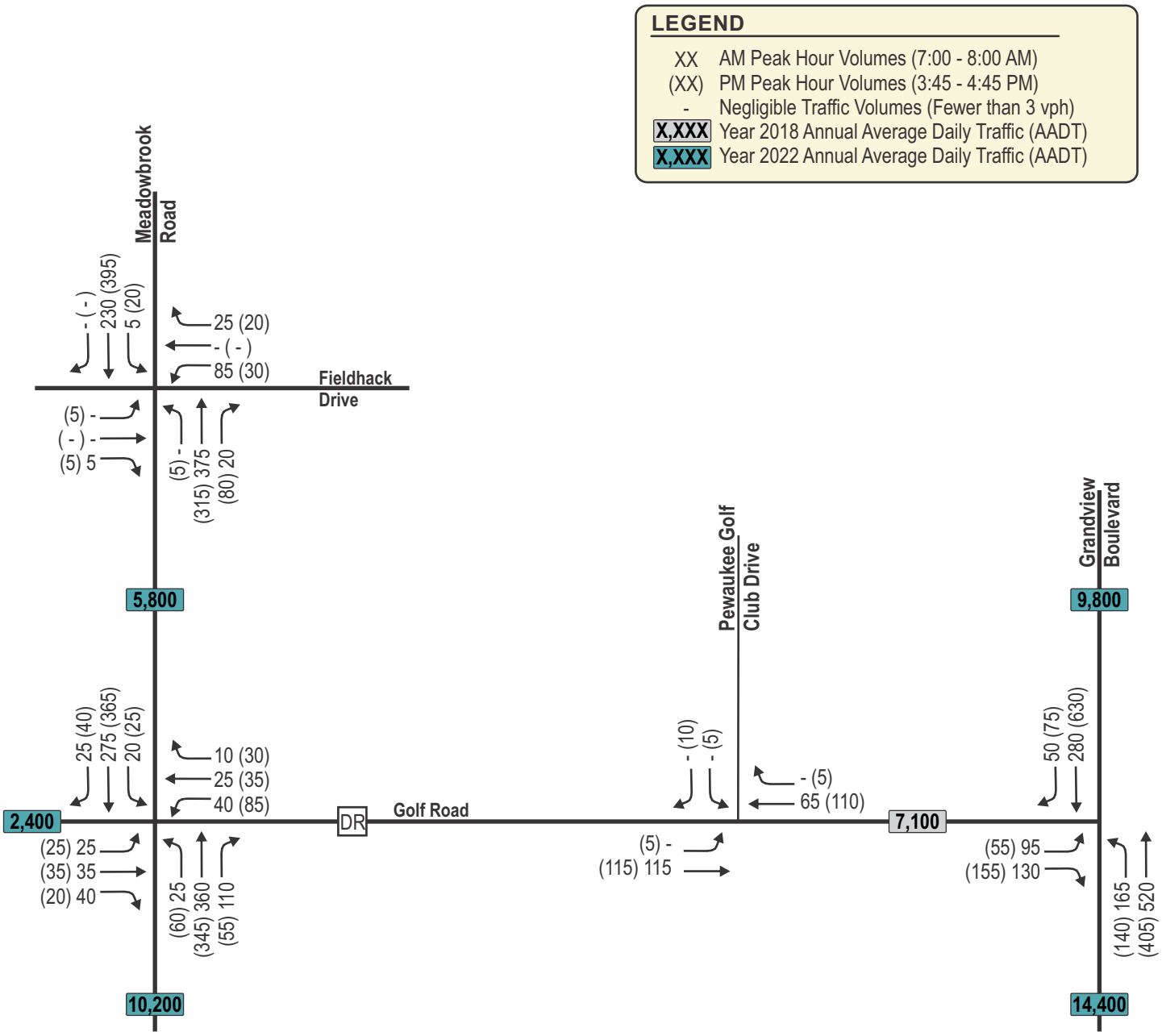

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EXHIBIT 3-2
YEAR 2024 EXISTING TRAFFIC VOLUMES

PEWAUKEE, WI

Exhibit 3-3
Year 2024 Existing Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay
			Eastbound			Westbound			Northbound			Southbound			
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙	
Node 100: Fieldhack Drive & Meadowbrook Road *Two-Way Stop Control*		*Lanes->*	*1*			*1*		*1*	*1*	*1*	*1*	*1*	*1*		
	AM	LOS	B			C		B	A	*	*	A	*		
		Delay	11.2			17.2		10.0	7.8	*	*	8.2	*		
		Queue	25'			25'		25'	25'	*	*	25'	*		
	PM	LOS	C			C		A	A	*	*	A	*		
		Delay	16.4			20.3		9.6	8.2	*	*	8.3	*		
		Queue	25'			25'		25'	25'	*	*	25'	*		
Node 200: Golf Road & Meadowbrook Road *Traffic Signal Control*		*Lanes->*	*1*	*1*	*1*	*1*	*1*		*1*	*1*	*1*	*1*	*1*	*1*	
	AM	LOS	D	D	D	D	D		A	A	A	A	A	A	B
		Delay	40.1	38.9	38.8	41.1	38.9		3.5	5.6	4.3	3.7	5.3	4.2	11.1
		Queue	40'	50'	40'	55'	45'		25'	150'	30'	25'	110'	25'	
	PM	LOS	D	D	D	D	D		A	A	A	A	A	A	B
		Delay	39.6	37.1	36.5	41.7	38.1		4.2	6.3	4.8	4.5	7.3	5.4	13.0
		Queue	40'	45'	25'	95'	55'		25'	145'	25'	25'	155'	25'	
Node 300: Golf Road & Access Driveway *One-Way Stop Control*		*Lanes->*	*1*		-	-	*1*		-			*1*			
	AM	LOS	A		-	-	*		-			A			
		Delay	7.4		-	-	*		-			9.1			
		Queue	25'		-	-	*		-			25'			
	PM	LOS	A		-	-	*		-			A			
		Delay	7.5		-	-	*		-			9.4			
		Queue	25'		-	-	*		-			25'			
Node 400: Golf Road & Grandview Boulevard *Traffic Signal Control*		*Lanes->*	*1*	-	*1*	-			*1*	*2*		-	*2*		
	AM	LOS	D	-	D	-			A	A		-	A		A
		Delay	37.7	-	37.3	-			3.6	3.0		-	6.5		9.2
		Queue	95'	-	85'	-			40'	60'		-	65'		
	PM	LOS	D	-	D	-			A	A		-	A		A
		Delay	39.3	-	46.8	-			3.7	2.5		-	6.9		9.3
		Queue	70'	-	115'	-			30'	45'		-	140'		

(-) 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 – 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*.

A1. On-Site Trip Generation

The expected trip generation for the on-site residential development is shown in Exhibit 4-3. As shown, upon full build out, the proposed on-site development is expected to generate 250 new trips (60 entering/190 exiting) during a typical weekday morning peak hour. During a typical weekday evening peak hour, the proposed development is expected to generate 330 new trips (205 entering/125 exiting). On a typical weekday, the proposed development is expected to generate approximately 3,840 new trips (1,920 entering/1,920 exiting) under full build conditions.

A2. 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 Golf Road/CTH DR stops at the site prior to continuing eastbound on Golf Road/CTH DR). With no linked or pass-by trips, this study represents a worst-case or highest volume scenario for the traffic analysis.

A3. Trip Distribution

The trip distribution for the proposed on-site residential development, listed below, shown in table format in Exhibit 4-3, and graphically in Exhibit 4-4, was determined based on the existing traffic counts, the type of proposed land uses, the location of existing populations, and anticipated growth areas outside the immediate study area.

- 10 percent to/from the north on Meadowbrook Road/CTH G
- 30 percent to/from the south on Meadowbrook Road/CTH G
- 20 percent to/from the north on Grandview Boulevard/CTH T
- 40 percent to/from the south on Grandview Boulevard/CTH T

A4. Trip Assignment

Traffic was distributed to the study area intersections based on the above trip distribution. The build new trips for the proposed on-site residential development were assigned to the study area and are shown in Exhibit 4-5. It is noted that due to the location of the residential parcels in relation to the existing transportation system, some traffic is expected to utilize Milkweed Lane via Fieldhack Drive to access Meadowbrook Road/CTH G.

PART B – BUILD TRAFFIC

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

Exhibit 4-3
On-Site Trip Generation Table

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	283 Units	1,890 FCE	25 (24%)	85 (76%)	110 FCE	90 (63%)	50 (37%)	140 FCE
Single-Family Detached Housing - Southern Area	210	118 Units	1,180 FCE	20 (26%)	65 (74%)	85 FCE	70 (63%)	45 (37%)	115 FCE
Single-Family Detached Housing - Western Area	210	75 Units	770 FCE	15 (26%)	40 (74%)	55 FCE	45 (63%)	30 (37%)	75 FCE
Total New Trips			**3,840**	**60**	**190**	**250**	**205**	**125**	**330**

TRIP DISTRIBUTION

North on Meadowbrook Road	10%	390	5	15	20	15	
South on Meadowbrook Road	30%	1150	15	60	60	40	
North on Grandview Boulevard	20%	770	15	40	40	25	
South on Grandview Boulevard	40%	1530	25	75	85	45	
	100%	***3840***	***60***	***190***	***205***	***125***	

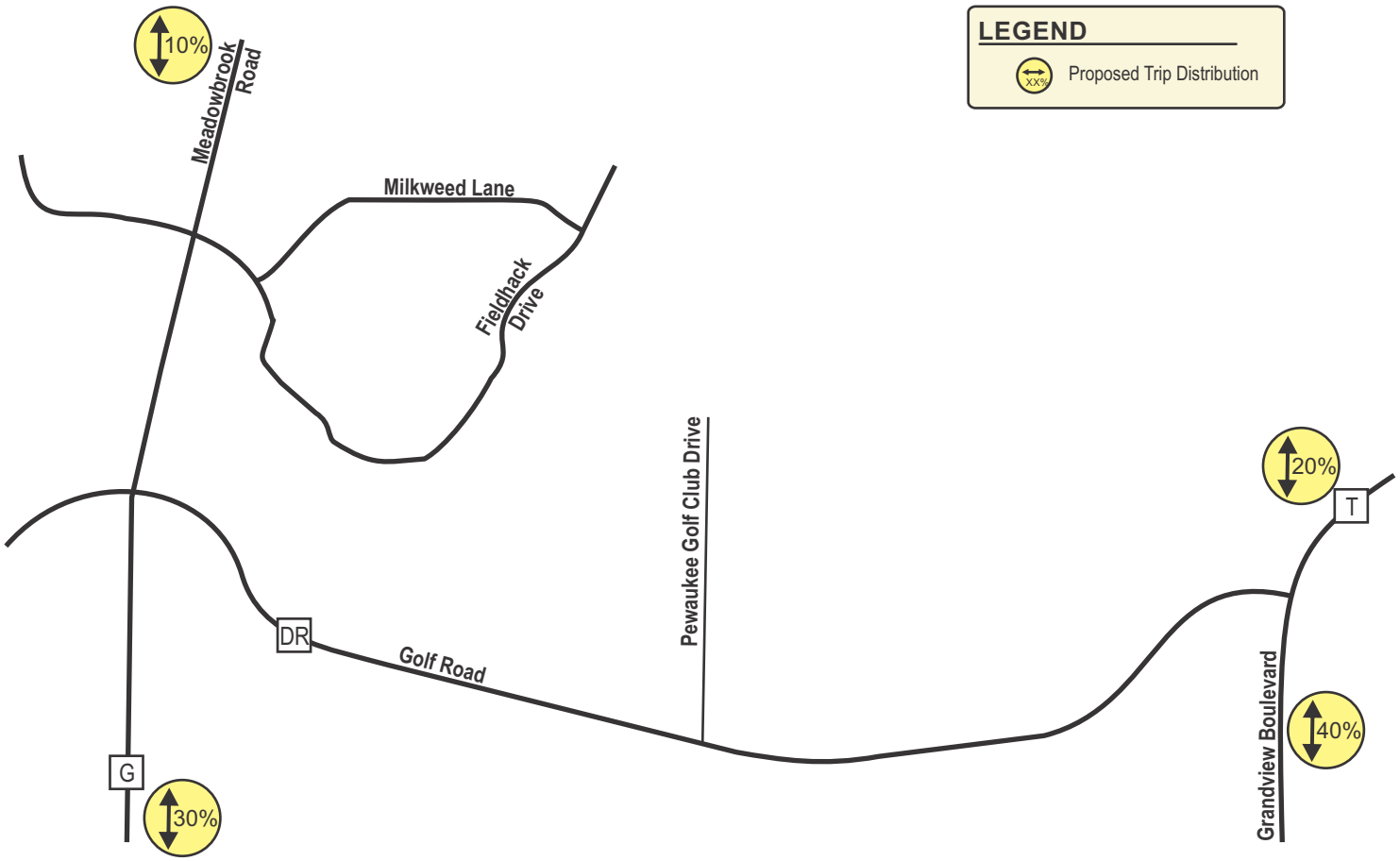

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EXHIBIT 4-4
TRIP DISTRIBUTION

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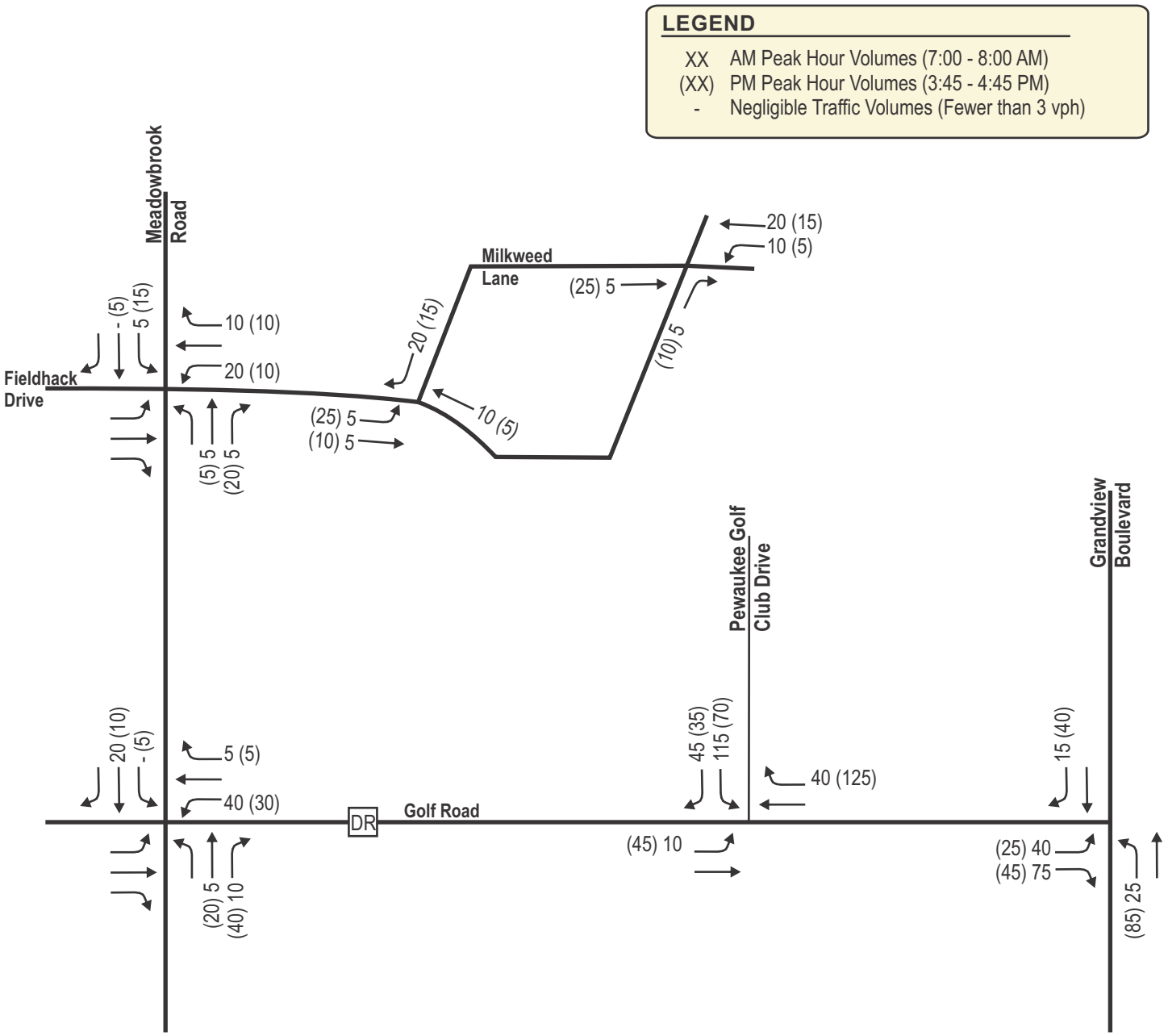

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EXHIBIT 4-5
NEW TRIPS

PEWAUKEE, WI

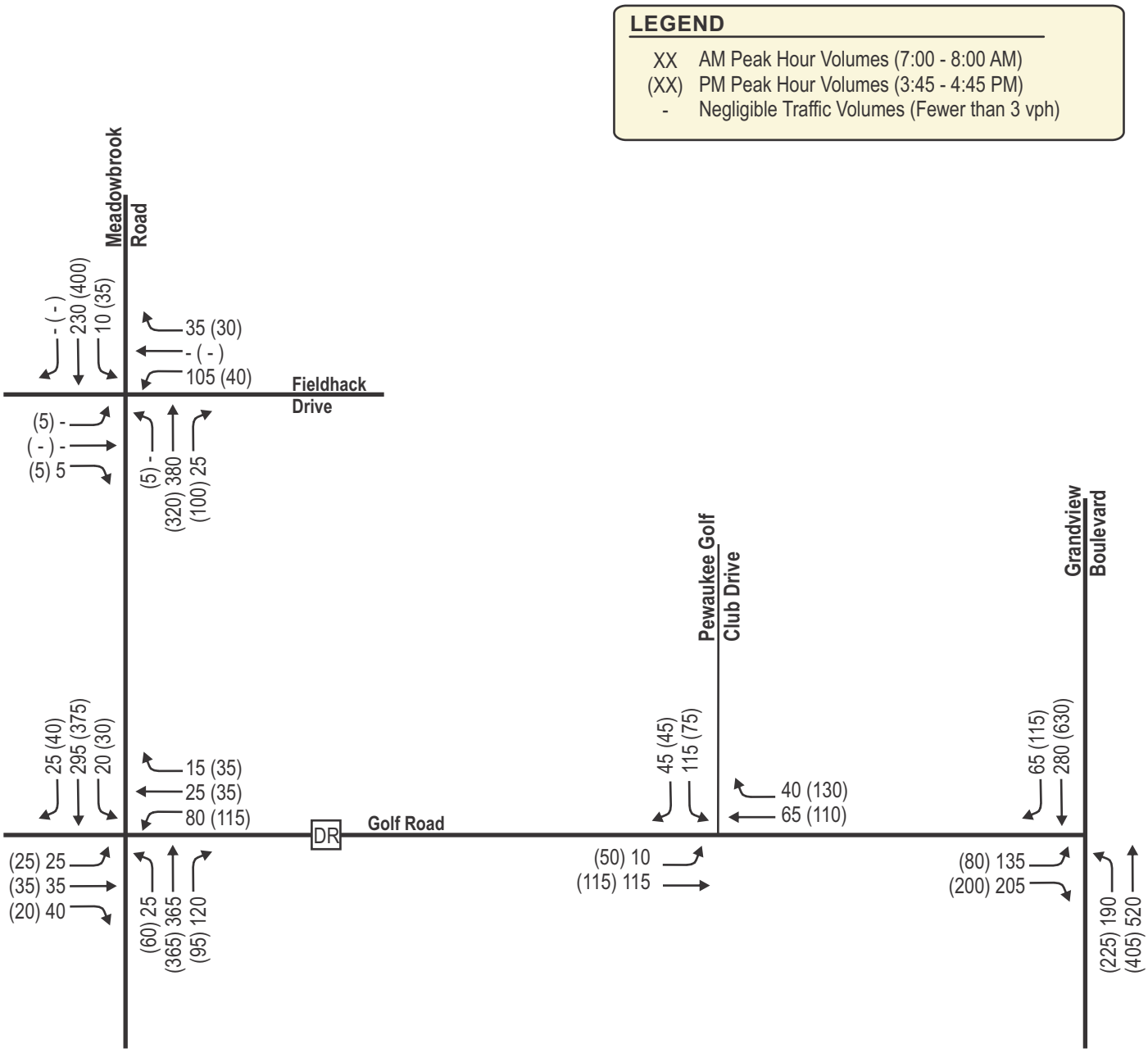

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EXHIBIT 4-11
BUILD TRAFFIC VOLUMES

PEWAUKEE, WI

CHAPTER V – TRAFFIC AND IMPROVEMENT ANALYSIS

PART A – SITE ACCESS

Two access driveways are being proposed for the residential development. The main north/south access drive is proposed via the existing Pewaukee Golf Club driveway accessing Golf Road from the south. A secondary access drive is proposed to connect into the existing cul-de-sac along Milkweed Lane, immediately southeast of Fieldhack Drive.

PART B – CAPACITY LEVEL OF SERVICE ANALYSIS

B1. Year 2025 build Traffic Operating Conditions – No Modifications

Exhibit 5-3 shows the year 2025 build traffic peak hour operating conditions at the study area intersections. The year 2025 build traffic analysis was conducted using existing intersection configurations and traffic control with full buildout of the proposed development.

As shown, all movements are expected to continue to operate at LOS D or better conditions during the typical weekday morning and weekday evening peak periods except the eastbound right-turn movements at the Golf Road/CTH DR intersection with Grandview Boulevard/CTH T which are expected to operate at LOS E during the typical weekday evening peak period under the year 2025 build traffic peak hour operating conditions.

B2. Year 2025 build Traffic Operating Conditions – *With Modifications*

Modifications, which include minor traffic signal timing modifications, to accommodate the year 2025 build traffic volumes (with development) are summarized in *Chapter VI – Recommendations and Conclusion*.

As shown in Exhibit 5-12, all movements are expected to operate at LOS D or better conditions during the typical weekday morning and weekday evening peak periods under the year 2025 build traffic volumes 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 2024 Existing Traffic Expected Maximum Queues – Exhibit 3-3 & 5-18
- Year 2025 build Traffic Expected Maximum Queues – Exhibit 5-12 & 5-21

PART D – PEDESTRIAN, BICYCLE AND TRANSIT CONSIDERATIONS

The Lake County Recreational Trail, which terminates at Golf Road, is located adjacent to the overall site along the southwest edge of the site. Other than at and adjacent to the Golf Road intersection with Meadowbrook Road as described above, sidewalks are not currently provided along any of the roadways within the limits of the study area. Narrow paved shoulders are provided along both sides of Golf Road within the limits of the proposed site; however, no other bike facilities are provided along any of the roadways within the limits of the study area.

Pedestrians and bicyclists may use their respective modes to access the area, though these alternate 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.

PART E – TURN LANE AND BYPASS LANE WARRANTS

Left-turn Lane Analysis - Facilities Development Manual

FDM Section 11-25-5, Table 5.2, provides guidance on warranting left-turn lanes at intersections on two-lane highways. Based on the volume criteria provided and using a design speed of 5-mph over the posted speed, or 50-mph, a dedicated eastbound left-turn lane is not expected to be warranted at the main north/south access drive along Golf Road under full build traffic volume conditions. Advancing (eastbound through) volumes along the highway would need to increase by over 380 vehicles during the AM peak hour and over 85 vehicles during the PM peak hour for the warrant to be met. Calculation spreadsheets/tables 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 Waukesha County Driveway Permit 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 vehicles per day (vpd). Based on historic WisDOT AADT count information, the Golf Road/CTH DR AADT within the limits of the roadway connection under the existing (no development) conditions is approximately 7,100-vpd. Therefore, a bypass lane is required at the roadway connection per the Waukesha County code.

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 proposed roadway is 45-mph, a 50-mph speed was assumed for the 85th percentile speed. As shown in the graph in the Appendix, utilizing a PM peak hour volume of 240 and a right-turn volume of 130 (projected), the right-turn warrant is expected to be met. With about 130 right-turn movements expected during the weekday PM peak hour, a dedicated right-turn lane is warranted at the main north/south access drive.

Exhibit 5-3
Year 2024 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												I/S LOS & Delay
			Eastbound			Westbound			Northbound			Southbound			
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙	
Node 100: Fieldhack Drive & Meadowbrook Road *Two-Way Stop Control*		*Lanes->*	*1*			*1*		*1*	*1*	*1*	*1*	*1*	*1*		
	AM	LOS	B			C		A	A	*	*	A	*		
		Delay	11.3			18.5		9.9	7.8	*	*	8.3	*		
		Queue	25'			35'		25'	25'	*	*	25'	*		
	PM	LOS	C			C		A	A	*	*	A	*		
		Delay	17.8			23.2		9.7	8.3	*	*	8.5	*		
		Queue	25'			25'		25'	25'	*	*	25'	*		
Node 200: Golf Road & Meadowbrook Road *Traffic Signal Control*		*Lanes->*	*1*	*1*	*1*	*1*	*1*		*1*	*1*	*1*	*1*	*1*	*1*	
	AM	LOS	D	D	D	D	D		A	A	A	A	A	A	B
		Delay	38.6	37.1	37.0	41.7	37.3		4.0	6.4	4.9	4.2	6.1	4.7	12.6
		Queue	40'	50'	40'	95'	45'		25'	160'	35'	25'	125'	25'	
	PM	LOS	D	D	C	D	D		A	A	A	A	A	A	B
		Delay	37.7	35.2	34.7	41.0	36.1		5.0	7.5	5.7	5.1	8.3	6.1	13.9
		Queue	40'	45'	25'	135'	60'		25'	155'	30'	25'	160'	25'	
Node 300: Golf Road & Access Driveway *One-Way Stop Control*		*Lanes->*	*1*		-	-	*1*		-			*1*			
	AM	LOS	A		-	-	*		-			B			
		Delay	7.5		-	-	*		-			10.8			
		Queue	25'		-	-	*		-			25'			
	PM	LOS	A		-	-	*		-			B			
		Delay	8.0		-	-	*		-			12.5			
		Queue	25'		-	-	*		-			25'			
Node 400: Golf Road & Grandview Boulevard *Traffic Signal Control*		*Lanes->*	*1*	-	*1*	-			*1*	*2*	-	*2*			
	AM	LOS	D	-	D	-			A	A	-	A			B
		Delay	46.5	-	50.0	-			4.7	3.9	-	7.8			14.3
		Queue	150'	-	155'	-			45'	60'	-	70'			
	PM	LOS	D	-	E	-			A	A	-	A			B
		Delay	38.3	-	56.2	-			5.0	3.0	-	8.1			11.6
		Queue	95'	-	165'	-			50'	45'	-	160'			

(-) 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 5-12
Year 2024 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												I/S LOS & Delay
			Eastbound			Westbound			Northbound			Southbound			
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙	
Node 100: Fieldhack Drive & Meadowbrook Road *Two-Way Stop Control*		*Lanes->*	*1*			*1*		*1*	*1*	*1*	*1*	*1*	*1*		
	AM	LOS	B			C		A	A	*	*	A	*		
		Delay	11.3			18.5		9.9	7.8	*	*	8.3	*		
		Queue	25'			35'		25'	25'	*	*	25'	*		
	PM	LOS	C			C		A	A	*	*	A	*		
		Delay	17.8			23.2		9.7	8.3	*	*	8.5	*		
		Queue	25'			25'		25'	25'	*	*	25'	*		
Node 200: Golf Road & Meadowbrook Road *Traffic Signal Control*		*Lanes->*	*1*	*1*	*1*	*1*	*1*		*1*	*1*	*1*	*1*	*1*	*1*	
	AM	LOS	D	D	D	D	D		A	A	A	A	A	A	B
		Delay	38.6	37.1	37.0	41.7	37.3		4.0	6.4	4.9	4.2	6.1	4.7	12.6
		Queue	40'	50'	40'	95'	45'		25'	160'	35'	25'	125'	25'	
	PM	LOS	D	D	C	D	D		A	A	A	A	A	A	B
		Delay	37.7	35.2	34.7	41.0	36.1		5.0	7.5	5.7	5.1	8.3	6.1	13.9
		Queue	40'	45'	25'	135'	60'		25'	155'	30'	25'	160'	25'	
Node 300: Golf Road & Access Driveway *One-Way Stop Control*		*Lanes->*	*2*		-	-	*1*	*1*	-			*1*			
	AM	LOS	A		-	-	*	*	-			B			
		Delay	7.5		-	-	*	*	-			10.2			
		Queue	25'		-	-	*	*	-			25'			
	PM	LOS	A		-	-	*	*	-			B			
		Delay	8.0		-	-	*	*	-			11.2			
		Queue	25'		-	-	*	*	-			25'			
Node 400: Golf Road & Grandview Boulevard *Traffic Signal Control*		*Lanes->*	*1*	-	*1*	-			*1*	*2*	-	*2*			
	AM	LOS	D	-	D	-			A	A	-	A			B
		Delay	46.5	-	50.0	-			4.7	3.9	-	7.8			14.3
		Queue	150'	-	155'	-			45'	60'	-	70'			
	PM	LOS	D	-	D	-			A	A	-	A			B
		Delay	38.3	-	52.6	-			5.0	3.0	-	8.1			11.3
		Queue	95'	-	155'	-			55'	45'	-	165'			

(-) 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.

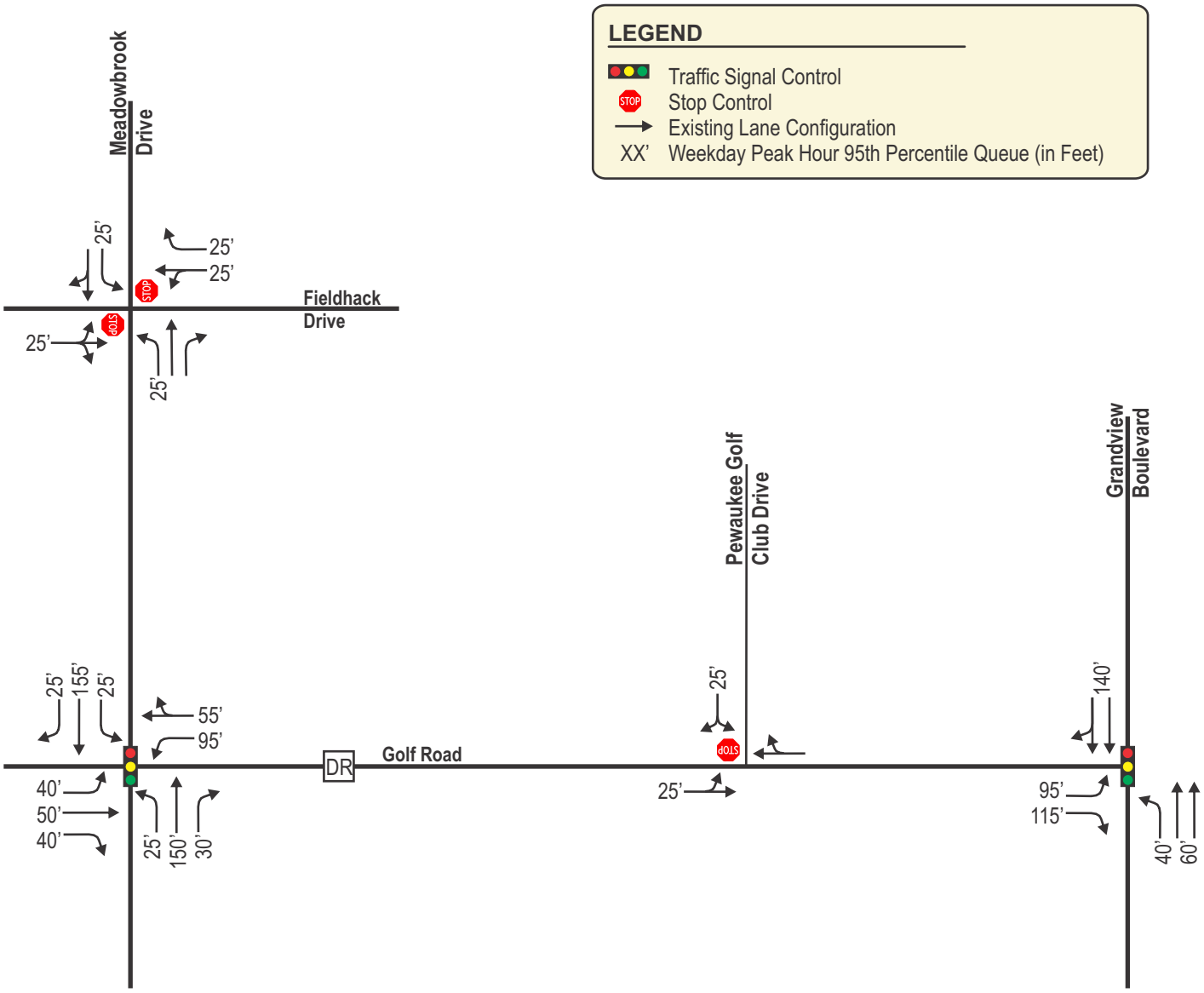

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EXHIBIT 5-18
EXISTING TRAFFIC
MAXIMUM QUEUE LENGTHS

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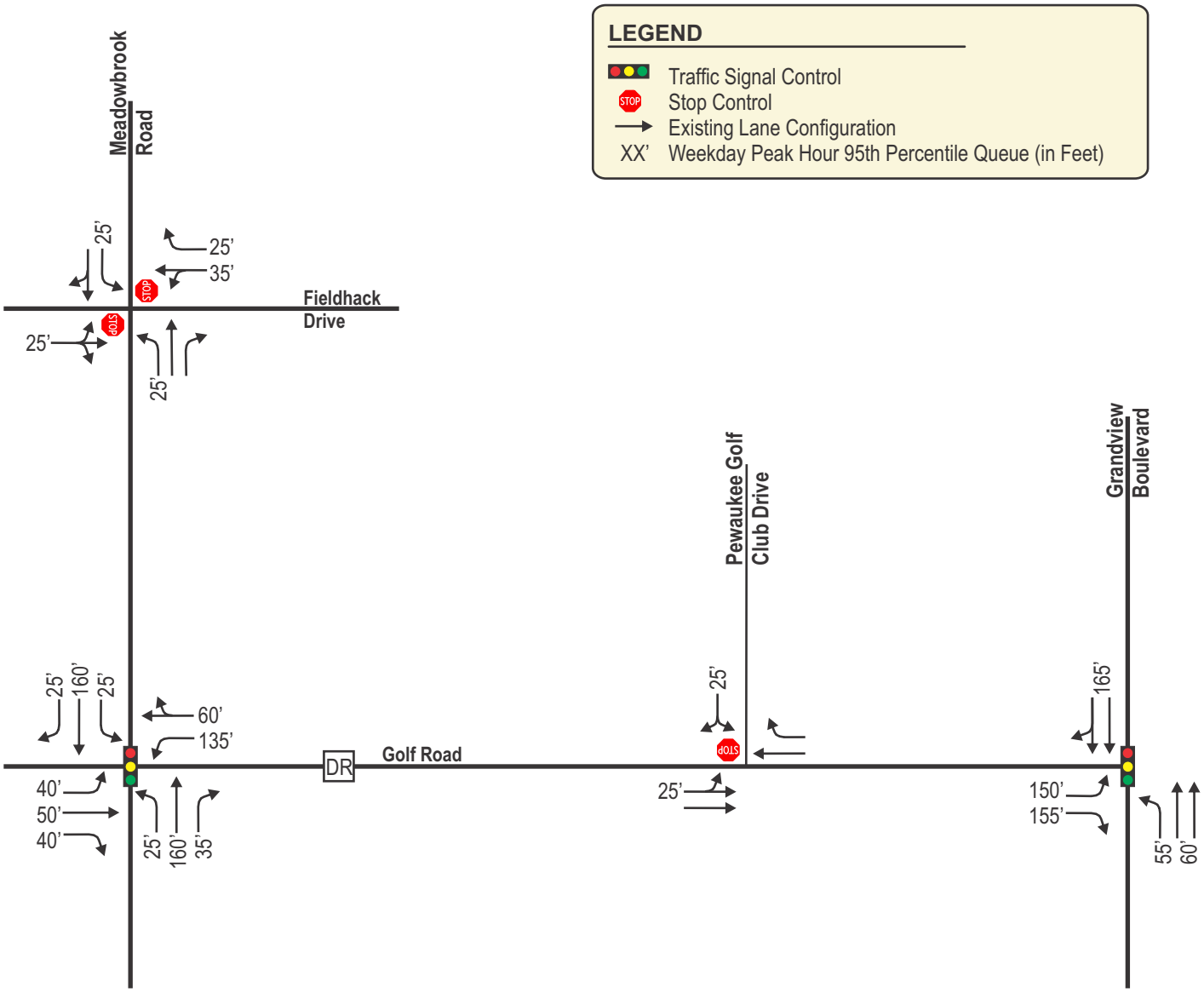

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N
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EXHIBIT 5-21
FULL BUILD TRAFFIC
MAXIMUM QUEUE LENGTHS

PEWAUKEE, WI

CHAPTER VI – RECOMMENDATIONS AND CONCLUSION

PART A – RECOMMENDATIONS

A1. Year 2024 Existing Traffic – Recommended Modifications

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM), *6th 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 D or better was used to define desirable peak hour operating conditions.

The Year 2024 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 2024 existing traffic volumes.

All movements at the study area intersections are currently operating acceptably at LOS D or better under the Year 2024 existing traffic volume conditions under current traffic volume conditions.

A2. Year 2025 build Traffic – Recommended Modifications

Year 2025 build (with development) traffic volumes include full build out of the residential development site located along the north side of Golf Road as described above. The following modifications, as shown in Exhibit 1-3, are recommended to accommodate the full build traffic volumes.

General

- Provide a cross-access connection within the site to Fieldhack Drive at a location just north of Milkweed Lane.

Node 100: Meadowbrook Road/CTH G & Fieldhack Drive

- No modifications recommended.

Node 200: Golf Road/CTH DR & Meadowbrook Road/CTH G

- No modifications recommended.

Node 300: Golf Road/CTH DR & Pewaukee Golf Club Drive

- Provide a dedicated right-turn lane into the site on the east approach.
- Construct an eastbound bypass lane along the south side of Golf Road at the main roadway connection.

Node 400: Golf Road/CTH DR & Grandview Boulevard/CTH T

- Consider adjusting signal timings.

Based on the site layout and its relation to the existing Meadowbrook Farms neighborhood, some traffic is expected to utilize Milkweed Lane via Fieldhack Drive to access Meadowbrook Road/CTH G; however, this traffic is expected to be relatively low. With the main access drive onto Golf Road, the majority of the traffic to/from the site is expected to utilize the Golf Road access. The new trips for any specific turning movement at the Meadowbrook Road intersection with Fieldhack Drive are expected to be relatively low (about 20 vehicles or less during any peak period). With the expected volumes, all movements at the Meadowbrook Road intersection with

Fieldhack Drive are expected to operate with relatively minor delays (less than 25 seconds) and minimal queueing (1 to 2 vehicles) during all peak periods.

The recommendation for a bypass lane at the main access drive along Golf Road/CTH DR is based on the Waukesha County Driveway Permit 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 Golf Road/CTH DR AADT within the limits of the roadway connection under the existing (no development) conditions is approximately 7,100-vpd. Therefore, a bypass lane is recommended at the roadway connection per the Waukesha County code.

With the recommended modifications, all movements at the study area intersections are expected to continue to operate at acceptable levels at LOS D or better under the year 2025 build (with proposed development) traffic conditions.

PART B – CONCLUSION

All movements at the study area intersections are expected to operate safely and efficiently through the opening year with the full build out of the development and the modifications identified in this TIA.