ANSWERS. SOLUTIONS. RESULTS. CORRE

TRAFFIC IMPACT ANALYSIS

MULTI-FAMILY DEVELOPMENT
VILLAGE OF LAKE HALLIE
CHIPPEWA COUNTY

PREPARED FOR
ADVANCED ENGINEERING CONCEPTS

Prepared by:
CORRE, Inc.
1802 Warden Street
Eau Claire, WI 54703

Introduction

CORRE, Inc was retained to evaluate traffic impacts resulting from the proposed multi-family development located on the west side of 23rd Avenue, between Melby Road and CTH OO. The proposed development is within the Village of Lake Hallie, Chippewa County. See Attachment 1 for the proposed development location.

This report was conducted to find any impacts on the adjacent roadways (23rd Avenue to CTH OO) that new traffic or trips the development will generate.

Existing Conditions

The roadway, 23rd Avenue is classified as a local road and is a two-lane rural roadway with two 11-foot asphaltic pavement driving lanes and 2-4-foot turf shoulders. The roadway terrain is level. The posted speed on 23rd Avenue is 35 mph. Existing land use adjacent to the development site is primarily wooded with residential homes. There are several existing residential driveways and roadway intersections located along 23rd Avenue.

There are approximately 50 residential homes in the immediate area that use 23rd Avenue to access CTH OO. For this report it is assumed that residential traffic within the segment of 23rd Avenue is generated exclusively from the intersection of 125th Street (south limits) north to the CTH OO intersection.

There are no existing traffic counts available on 23rd Avenue or on nearby adjacent roads. It was assumed that the residents along the roadway make up the majority of the existing traffic and from the intersection of 22nd Avenue and125th Street to the north will utilize this roadway via CTH OO.

Proposed Development

The proposed multi-family development will be located on the north side of 23rd Avenue and covers approximately 5.4 acres. The proposed development will be a mid-rise (2-story) multi-family complex and will have four 10-unit buildings for a total of 40 units. See Attachment 2 for development layout. Currently there is no roadway or access into the proposed development site. Construction of the development is scheduled to start in 2020 and be finished in 2021.

Existing Traffic

As mentioned, there are approximately 50 residential homes in the immediate area that use the roadway 23rd Avenue to access CTH OO. From the Trip Generation Manual, Institute of Transportation, 10th Edition, a rate of 9.44 trips per residence was assumed to estimate 472 vehicles per day (VPD) on 23rd Avenue (See Attachment 3). From Attachment 3 we can also see that peak hour traffic volume occurs in the PM with 50 vehicles per hour (VPR).

Trip Generation / Trip Distribution

From the Trip Generation Manual, Institute of Transportation, 10th Edition, at full occupancy the proposed development would add 218 vehicle trips per day to the existing roadway 23rd Avenue (109 In/109 Out), and the Annual Daily Traffic (ADT) on 23th Avenue would increase to 690 vehicles per day (VPD).

The highest peak hour traffic volume was found to be in the PM with AM and Saturday traffic also calculated. See Attachment 4 for Trip Generations. The proposed development PM peak hour trips (16 trips) combined with existing traffic (50 PM peak hour trips) would total 66 vehicles. See Attachment 5 for Trip Distribution diagram.

Roadway Analysis

A Highway Capacity Software (HSC) Directional Two-Land Highway Segment Analysis was performed for the section of roadway 23rd Avenue to CTH OO using the combined existing traffic and the generated traffic from the proposed development. The results show that even with the additional trips from the development, the roadway segment will operate at Level of Service A, excellent conditions/low traffic congestion. See Attachment 6 for HCS results.

Level of Service (LOS) is a traffic performance alpha designation A thru F and is described as follows:

Level of Service A - (Excellent Conditions)
Level of Service B - (Very Good Conditions)
Level of Service C - (Good Conditions)
Level of Service D - (Moderately congested conditions)
Level of Service E - (Severely congested conditions)
Level of Service F - (Extremely congested conditions)

Capacity Analyses were not performed at intersections at or near CTH OO as the low total traffic numbers added to the roadway system will not have an adverse impact on operations.

Site Distance

The proposed development's access will intersect 23rd Avenue at two access points (driveways). Sight distance as referenced to in **WISDOT FDM 11-10, table 5.2** for each access point meets the desirable criteria for right turns out of the development (415 feet). Sight Distance for left turn out of the development meet the minimum criteria (390 feet). See Attachment 7 for sight distance requirements and photos.

Conclusion

The trips generated from the development will have very low impact to 23rd Avenue and other roadways connecting to CTH OO. The low levels of traffic added from the proposed development will not adversely impact the capacity of intersections near CTH OO**.**

The overall operations of 23rd Avenue, and the surrounding roadway network will continue to operate efficiently after the addition of the proposed development. Sight distances for both left and right turns out of the proposed development on 23rd Avenue meet the minimum Wisconsin Department of Transportation standards. To ensure all sight distances and vision angles are met, all trees or any other vision obstructions that are within the site should be removed during construction. No roadway upgrades to the adjacent roadway system or the intersection at CTH OO are recommended.

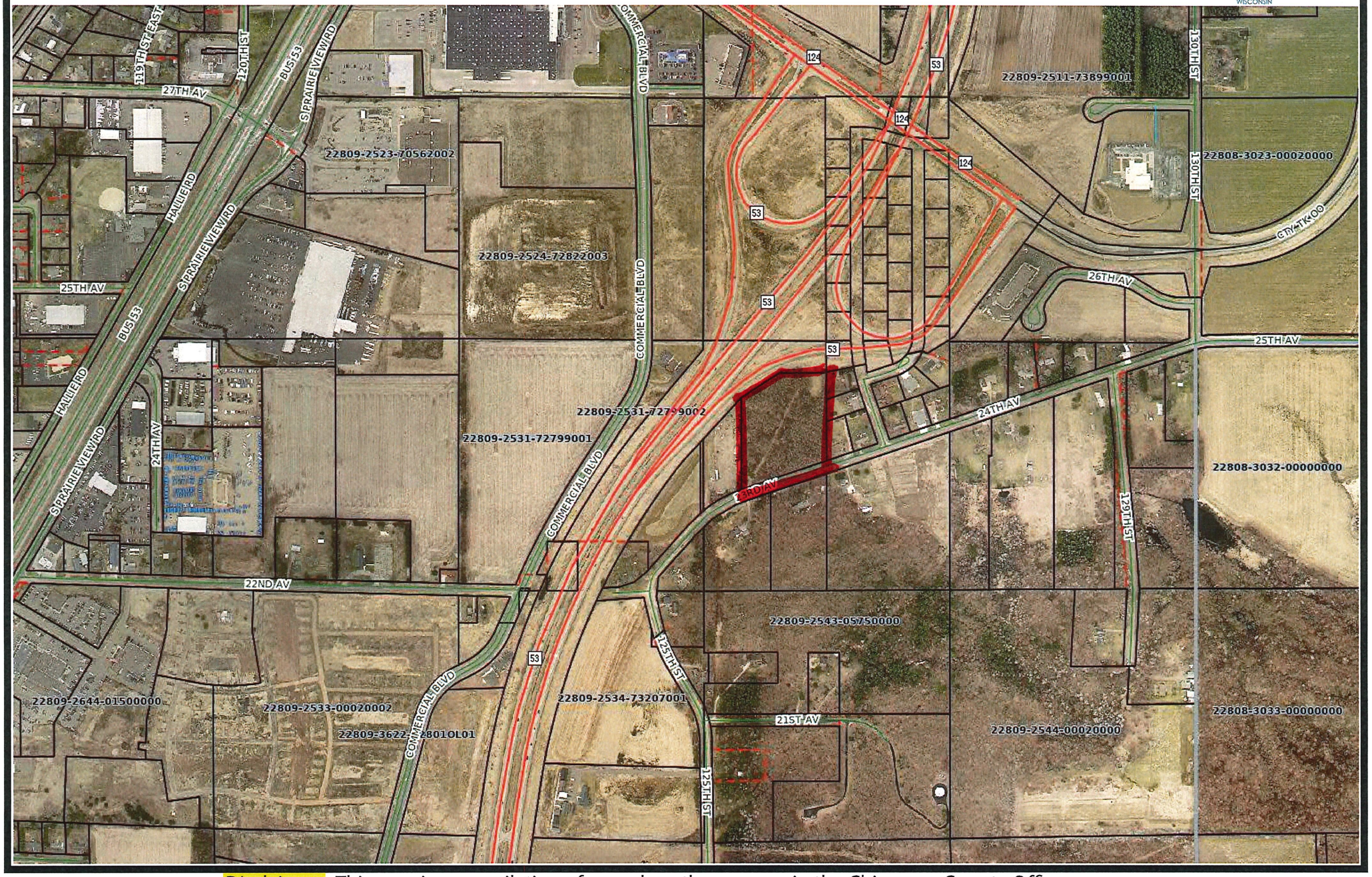
Prepared By

CORRE, Inc.

ATTACHMENT 1

Map

Printed 05/12/2020 Scale = 1:681'



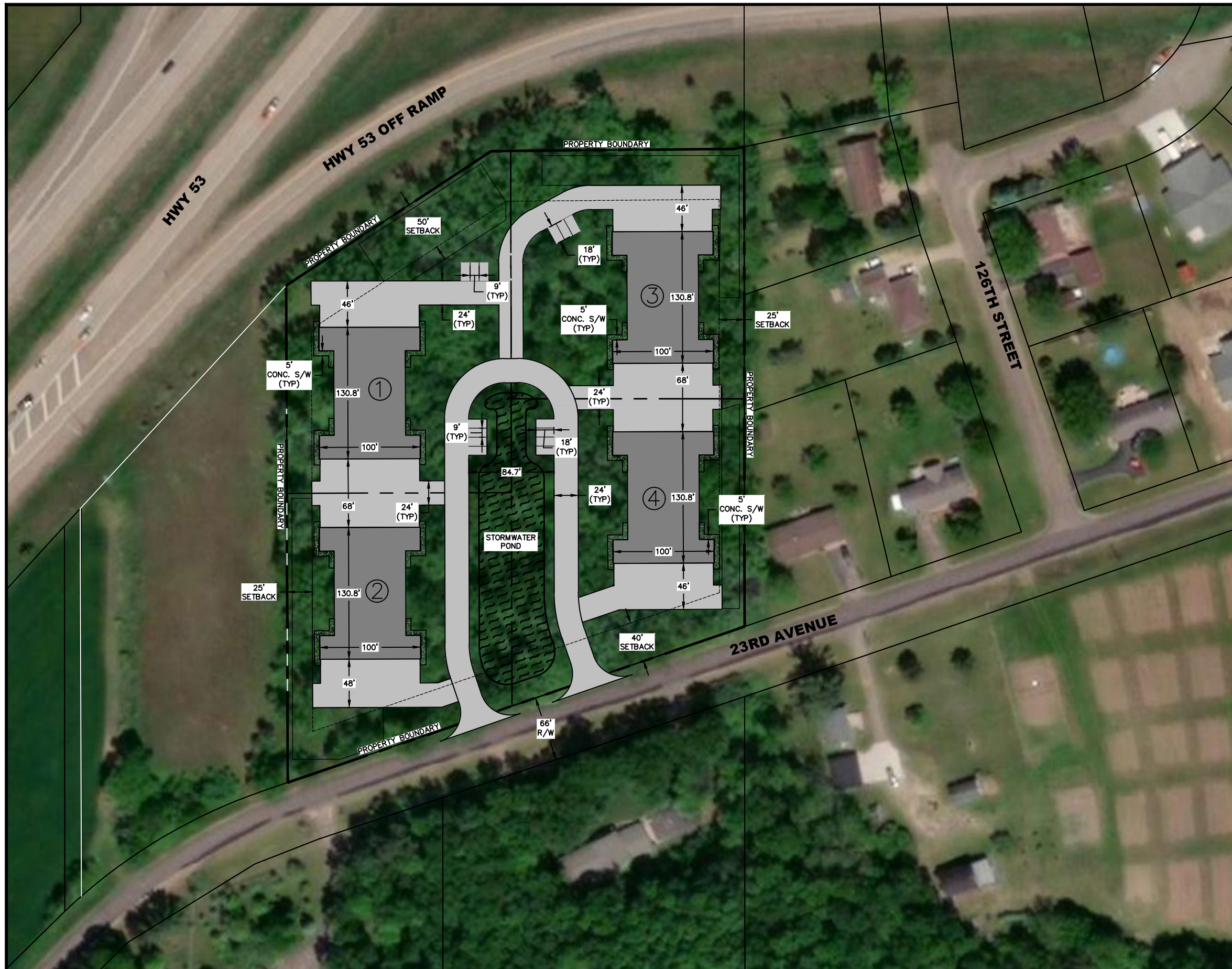
Disclaimer: This map is a compilation of records as they appear in the Chippewa County Offices affecting the area shown and is to be used only for reference purposes.

Map

Printed 06/09/2020 Scale = 1:762'

Disclaimer: This map is a compilation of records as they appear in the Chippewa County Offices affecting the area shown and is to be used only for reference purposes.

ATTACHMENT 2



NORTH

0 25 50 100

MULTI-FAMILY DEVELOPMENT

LOT SIZE:	5.4 ACRES
EXISTING IMPERVIOUS AREA:	0.00 SF (0.00 AC.)
PROPOSED USE:	MULTI-FAMILY
PROPOSED BUILDINGS:	42,560 SF (0.98 AC.)
PROPOSED PAVEMENTS:	64,700 SF (1.49 AC.)
TOTAL IMPERVIOUS LOT COVERAGE:	107,260 SF (2.47 AC.)

LOT COVERAGE = (46% OF TOTAL LOT)

STORM WATER FACILITY: WETPOND & INFILTRATION FACILITY

PARKING STALLS:

16 GARAGE STALL PER BUILDING
16 SURFACE STALLS IN FRONT OF GARAGE
32 STALLS/BLDG = 128 STALLS TOTAL

14 VISITOR STALLS

REQUIRED LOT SIZE
10-PLEX = 20,000+8*3,000=44,000 SQ-FT.

CONCEPT LOT SIZE
LOT 1=62,260 SQ-FT
LOT 2=55,700 SQ-FT
LOT 3=57,350 SQ-FT
LOT 4=61,540 SQ-FT

NO.	DATE	REVISIONS	DRAFTED BY	DESIGN BY	CHECKED
–	–	–	–	–	–

PROJ. NO. 20087

AEC

ADVANCED ENGINEERING CONCEPTS
1360 INTERNATIONAL DR, SUITE #1
EAU CLAIRE, WI 54701
PH: 715-552-0330
info@aec.engineering
COPYRIGHT 2020 AEC LLC.

PLANNED UNIT DEVELOPMENT

MULTI-FAMILY DEVELOPMENT
23RD AVENUE
VILLAGE OF LAKE HALLIE
CHIPPEWA COUNTY, WI

DWG NAME 190XX PGX XXXXX

DATE APRIL 2020

1 / 1

ATTACHMENT 3

Multi-Family Development -Village of Lake Hallie
Estimated Existing Traffic
Chippewa County Wisconsin

Land Use	ITE Code	Development Units	Rate	Weekday Daily	Rate	AM Peak Total	AM Peak Enter	AM Peak Exit	Rate	PM Peak Total	PM Peak Enter	PM Peak Exit	Rate	SAT Peak Total	SAT Peak Enter	SAT Peak Exit
Single Family Detached	210	50	9.44	472	0.76	38	10	28	1.00	50	32	18	0.93	47	23	24
Housing							26%	74%			64%	36%			49%	51%
Total				472		38	10	29		50	33	18		47	23	25

Notes:
All trip generation rates and enter/exit splits based on Trip Generation, Institude of Transportation Engineers, 10th Edtion.

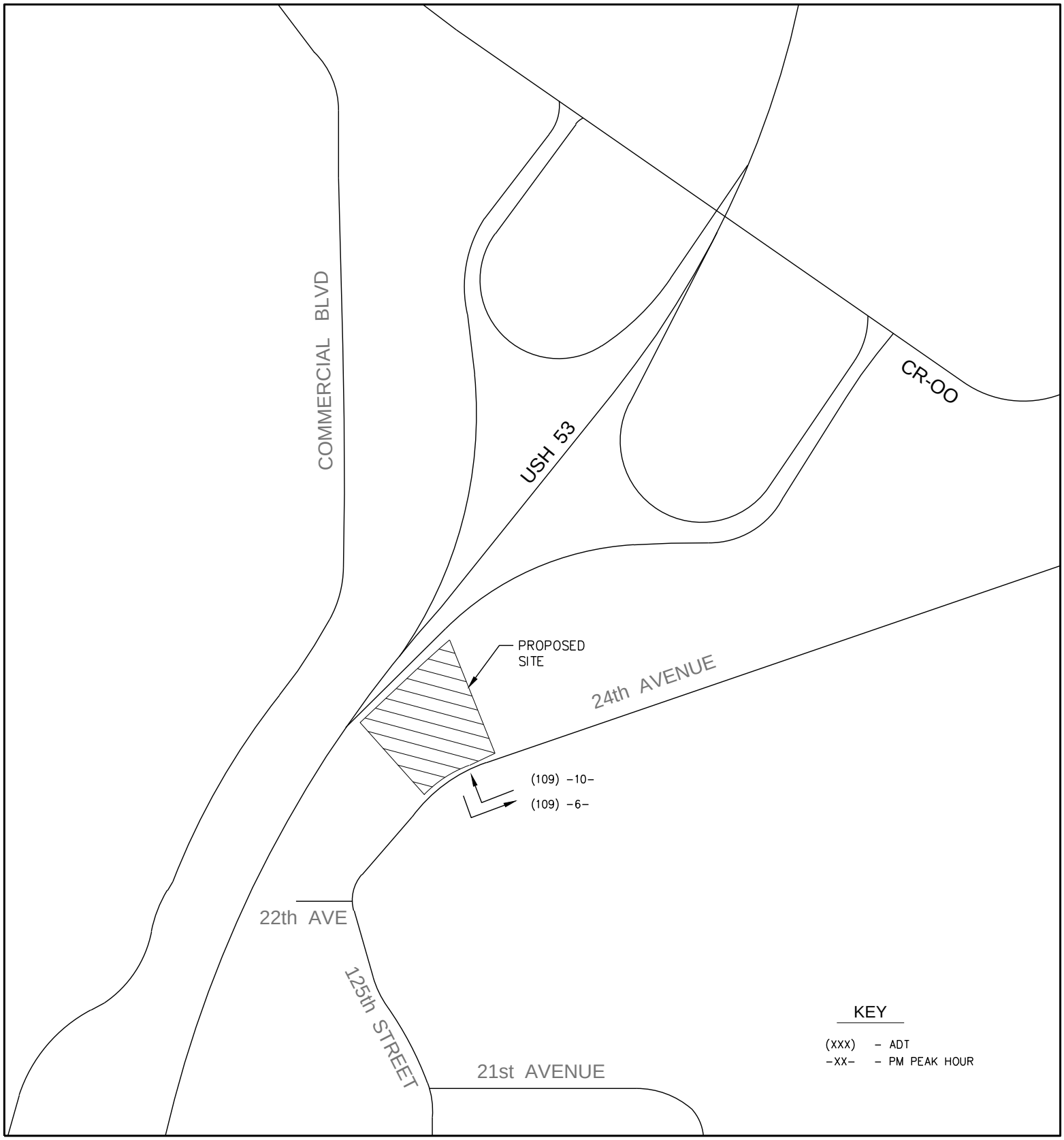
ATTACHMENT 4

Multi-Family Development -Village of Lake Hallie
Trip Generation Table
Chippewa County Wisconsin

Land Use	ITE Code	Development Units	Rate	Weekday Daily	Rate	AM Peak Total	AM Peak Enter	AM Peak Exit	Rate	PM Peak Total	PM Peak Enter	PM Peak Exit	Rate	SAT Peak Total	SAT Peak Enter	SAT Peak Exit
Multi Family Housing	221	40	5.44	218	0.32	13	4	9	0.41	16	10	6	0.44	18	9	9
(Mid Rise)							27%	73%			60%	40%			49%	51%
Total				218		13	4	9		16	10	6		18	9	9

Notes:
All trip generation rates and enter/exit splits based on Trip Generation, Institude of Transportation Engineers, 10th Edtion.

ATTACHMENT 5



TRIP DISTRIBUTION DIAGRAM

AVERAGE DAILY TRAFFIC
WEEKDAY PM PEAK HOUR

ATTACHMENT 6

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	CGH
Agency/Co.	CORRE INC
Date Performed	6/29/2020
Analysis Time Period	PM Peak
Highway	23rd Avenue
From/To	125th Street/CTH OO
Jurisdiction	Village of Hallie
Analysis Year	2020
Description Local Road Analyze	

Input Data

Highway class Class 3			Peak hour factor, PHF	0.90	
Shoulder width	2.0	ft	% Trucks and buses	4	%
Lane width	11.0	ft	% Trucks crawling	0.0	%
Segment length	0.8	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	16	/mi

Analysis direction volume, Vd 43 veh/h
Opposing direction volume, Vo 23 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.9		1.9	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.965		0.965	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	50	pc/h	26	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	3.0*	mi/h
Adj. for access point density,(note-3) fA	4.0	mi/h
Free-flow speed, FFSd	38.0	mi/h
Adjustment for no-passing zones, fnp	2.4	mi/h
Average travel speed, ATSd	35.0	mi/h
Percent Free Flow Speed, PFFS	92.1	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	0.996		0.996	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	48	pc/h	26	pc/h
Base percent time-spent-following,(note-4) BPTSFd	5.9	%		
Adjustment for no-passing zones, fnp	51.2			
Percent time-spent-following, PTSFd	39.1	%		

Level of Service and Other Performance Measures

Level of service, LOS	A	
Volume to capacity ratio, v/c	0.03	
Peak 15-min vehicle-miles of travel, VMT15	9	veh-mi
Peak-hour vehicle-miles of travel, VMT60	32	veh-mi
Peak 15-min total travel time, TT15	0.3	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.8	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	35.0	mi/h
Percent time-spent-following, PTSFd (from above)	39.1	
Level of service, LOSd (from above)	A	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	35
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	47.8
Effective width of outside lane, We	23.20
Effective speed factor, St	3.84
Bicycle LOS Score, BLOS	2.35
Bicycle LOS	B

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

ATTACHMENT 7

Table 5.2 Intersection Sight Distance [A] Criteria for Intersection Control Cases B1, B2, and B3 - Stop on Minor Road[22]

	Case B1 - Left turn from the minor road [B]			Case B2 - Right turn from the minor road [C]			Case B3 - Crossing maneuver from the minor road [D]		
Design vehicle	**P**	**SU**	**WB**	**P**	**SU**	**WB**	**P**	**SU**	**WB**
Eye height (feet)	3.5	7.6	7.6	3.5	7.6	7.6	3.5	7.6	7.6
Time gap (sec) **UPPER MINIMUM** (MINIMUM)	**10.0** (7.5)	**12.0** (9.5)	**13.0** (11.5)	**8.0** (6.5)	**10.0** (8.5)	**12.0** (10.5)	**7.0** (6.5)	**10.0** (8.5)	**13.0** (10.5)
Mainline Design Speed (mph)	**ISD (feet) UPPER MIN** (MIN)	**ISD (feet) UPPER MIN** (MIN)	**ISD (feet) UPPER MIN** (MIN)	**ISD (feet) UPPER MIN** (MIN)	**ISD (feet) UPPER MIN** (MIN)	**ISD (feet) UPPER MIN** (MIN)	**ISD (feet) UPPER MIN** (MIN)	**ISD (feet) UPPER MIN** (MIN)	**ISD (feet) UPPER MIN** (MIN)
25	**370** (280)	**445** (350)	**480** (425)	**295** (240)	**370** (315)	**445** (390)	**260** (240)	**370** (315)	**480** (390)
30	**445** (335)	**530** (420)	**575** (510)	**355** (290)	**445** (375)	**530** (465)	**310** (290)	**445** (375)	**575** (465)
35	**515** (390)	**620** (490)	**670** (595)	**415** (335)	**515** (440)	**620** (545)	**365** (335)	**515** (440)	**670** (545)
40	**590** (445)	**710** (560)	**765** (680)	**475** (385)	**590** (500)	**710** (620)	**415** (385)	**590** (500)	**765** (620)
45	**665** (500)	**795** (630)	**860** (765)	**530** (430)	**665** (565)	**795** (695)	**465** (430)	**665** (565)	**860** (695)
50	**735** (555)	**885** (700)	**960** (850)	**590** (480)	**735** (625)	**885** (775)	**515** (480)	**735** (625)	**960** (775)
55	**810** (610)	**975** (770)	**1055** (930)	**650** (530)	**810** (690)	**975** (850)	**570** (530)	**810** (690)	**1055** (850)
60	**885** (665)	**1060** (840)	**1150** (1015)	**710** (575)	**885** (750)	**1060** (930)	**620** (575)	**885** (750)	**1150** (930)
65	**960** (720)	**1150** (910)	**1245** (1100)	**765** (625)	**960** (815)	**1150** (1005)	**670** (625)	**960** (815)	**1245** (1005)
70	**1030** (775)	**1235** (980)	**1340** (1185)	**825** (670)	**1030** (875)	**1235** (1085)	**725** (670)	**1030** (875)	**1340** (1085)

[22] (*15) NCHRP Report 383*: *Intersection Sight Distance*. TRB, National Research Council, 1996.
(*16)* Intersections at Grade. In *FHWA-RD-01-051: Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians* Federal Highway Administration Turner-Fairbank Research Center, 2001, Section I. https://www.federallabs.org/labs/federal-highway-administration-fhwa-turner-fairbank-highway-research-center-tfhrc *(17) ISD and vision triangle recomm vs 1990 GDHS.xls.* Wisconsin DOT, 2004.

Sight Photos

From the Site looking North

Looking at the site from the South