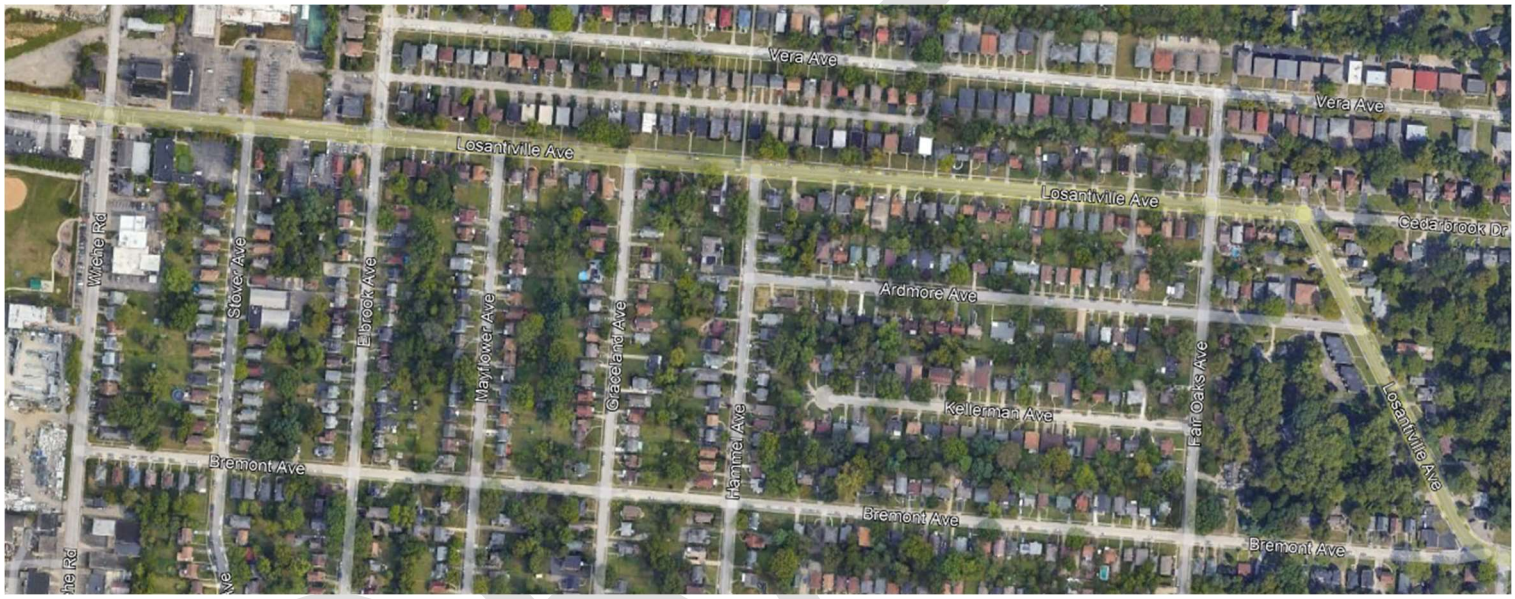
Losantiville Avenue Safety Study

Village of Golf Manor, Ohio



PREPARED FOR:
Village of Golf Manor
6450 Wiehe Rd.
Golf Manor, Ohio 45237

PREPARED BY:
TEC Engineering, Inc.
7288 Central Parke Blvd.
Mason, Ohio 45040

Contents

Appendix

1. Existing Conditions

Condition Summary

The project area consists of the full limits of Losantiville Avenue within the Village of Golf Manor. This includes 9 intersections and numerous driveways. Approximately 0.8 miles of Losantiville Avenue is included in the project area. Losantiville Avenue is a generally east-west roadway and is classified as a Major Collector with a posted speed of 25 mph within the project area. The following intersections were included in the study area:

- Losantiville Avenue & Wiehe Road
- Losantiville Avenue & Stover Avenue
- Losantiville Avenue & Elbrook Avenue
- Losantiville Avenue & Mayflower Avenue
- Losantiville Avenue & Graceland Avenue
- Losantiville Avenue & Hammel Avenue
- Losantiville Avenue & Fair Oaks Avenue
- Losantiville Avenue & Cedarbrook Drive
- Losantiville Avenue & Bremont Avenue/Englewood Avenue

The study area is highlighted in red in the following figure.

Figure 1.1 – Project Area

There are two signalized intersections within the study area: Losantiville Avenue & Wiehe Road, and Losantiville Avenue & Elbrook Avenue. Both traffic signals are span-wire type installations with a combination of 12” and 8” signal heads. The traffic signals operate in a pre-timed mode and no vehicle detection is present at the intersections.

A multi-way stop is present at Losantiville Avenue & Cedarbrook Drive. All other intersections are stop controlled side streets only.

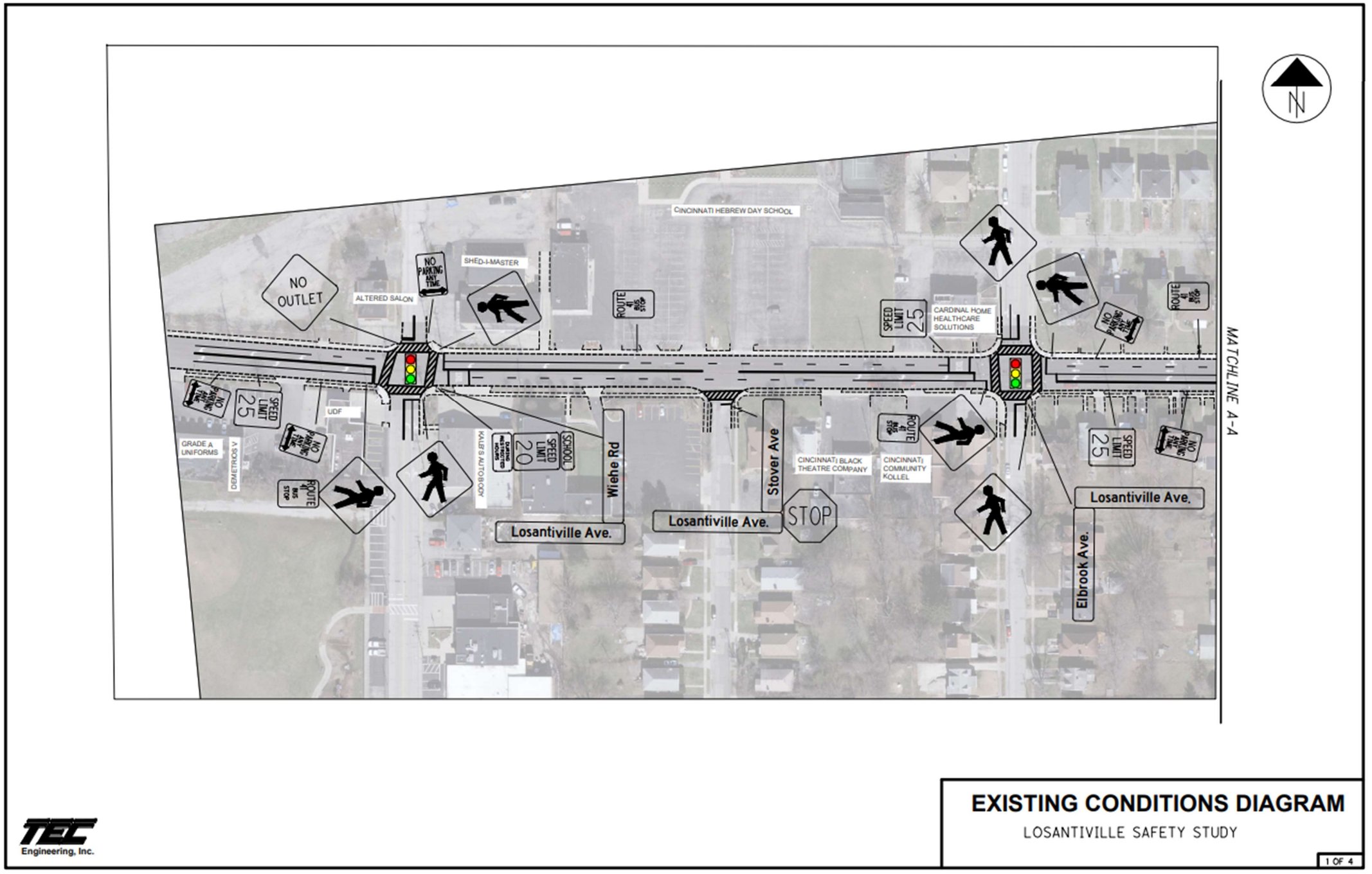
Continuous roadway lighting is provided along the corridor on the existing utility poles. Pavement markings are in fair condition.

Sidewalks are present along both sides of the Losantiville Ave throughout the full project limits. All marked crosswalks include traverse line crosswalk markings.

Losantiville Avenue transitions from a 4-lane roadway (without on-street parking) to a 2-lane roadway with on-street parking along the northside of the roadway.

Existing Condition Diagrams

The existing condition diagrams for the full study area are presented in the following figures. These diagrams show physical conditions of the study area including pavement markings, signage, curb, signalization, etc.

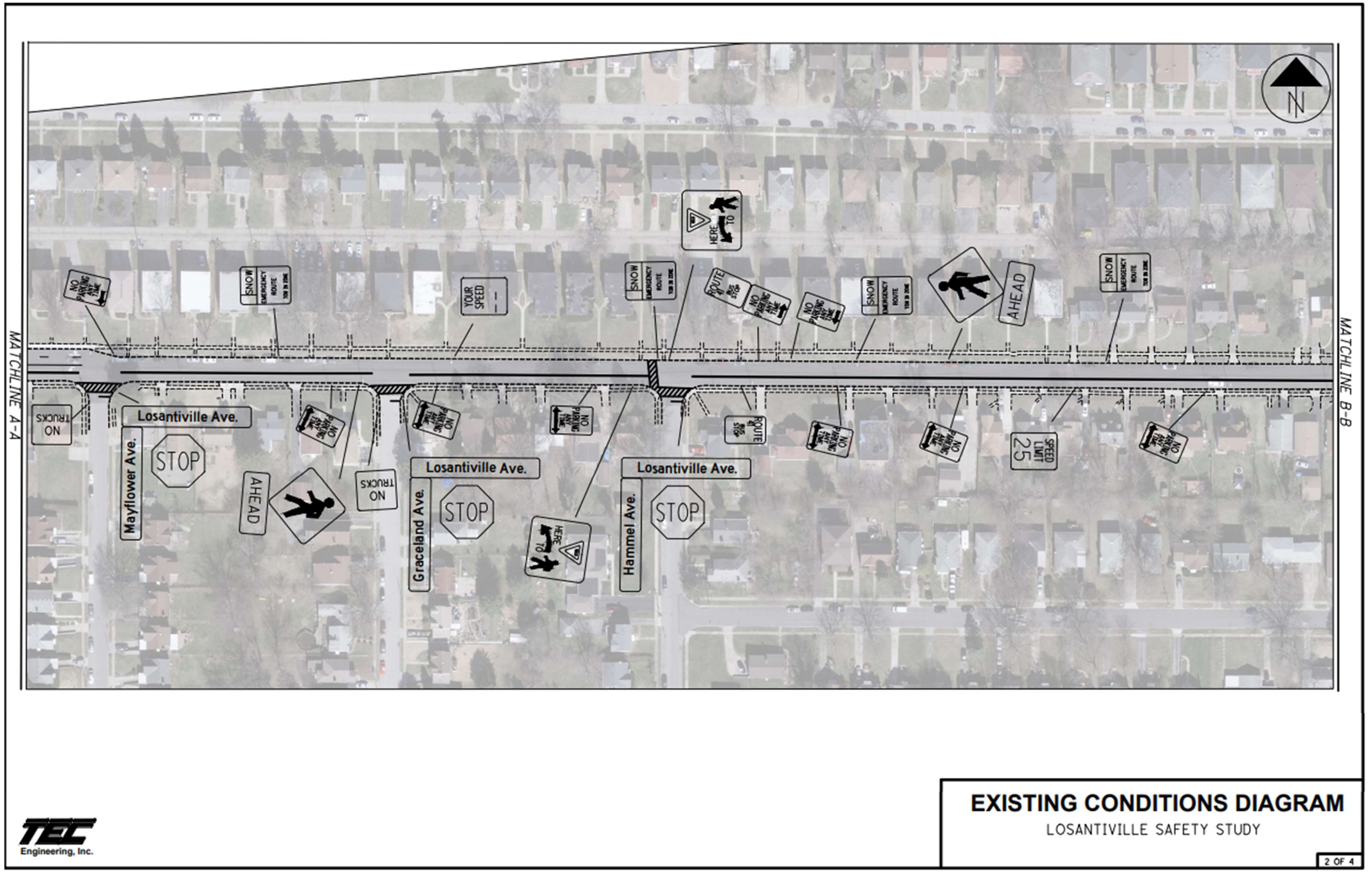


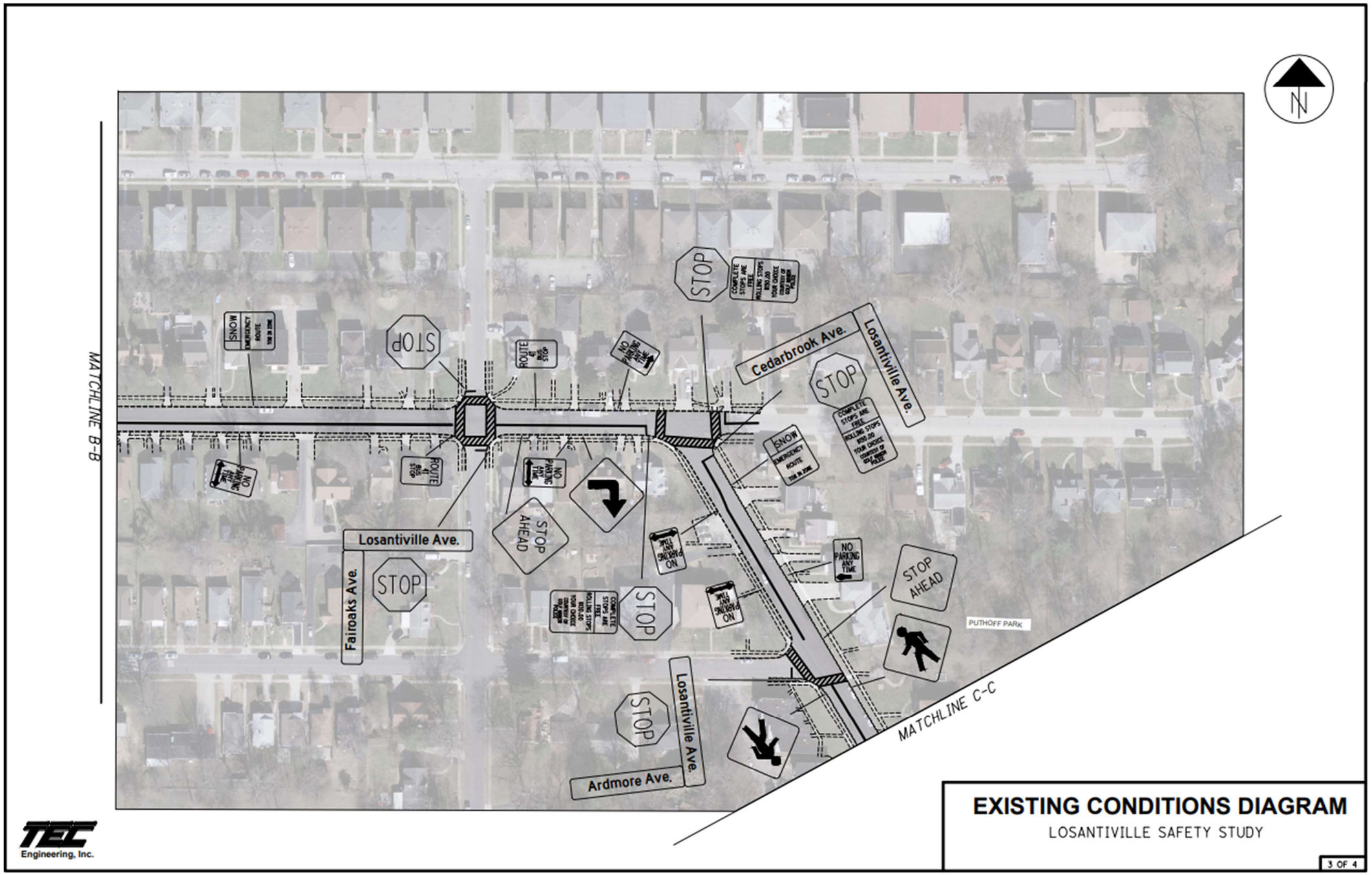
EXISTING CONDITIONS DIAGRAM

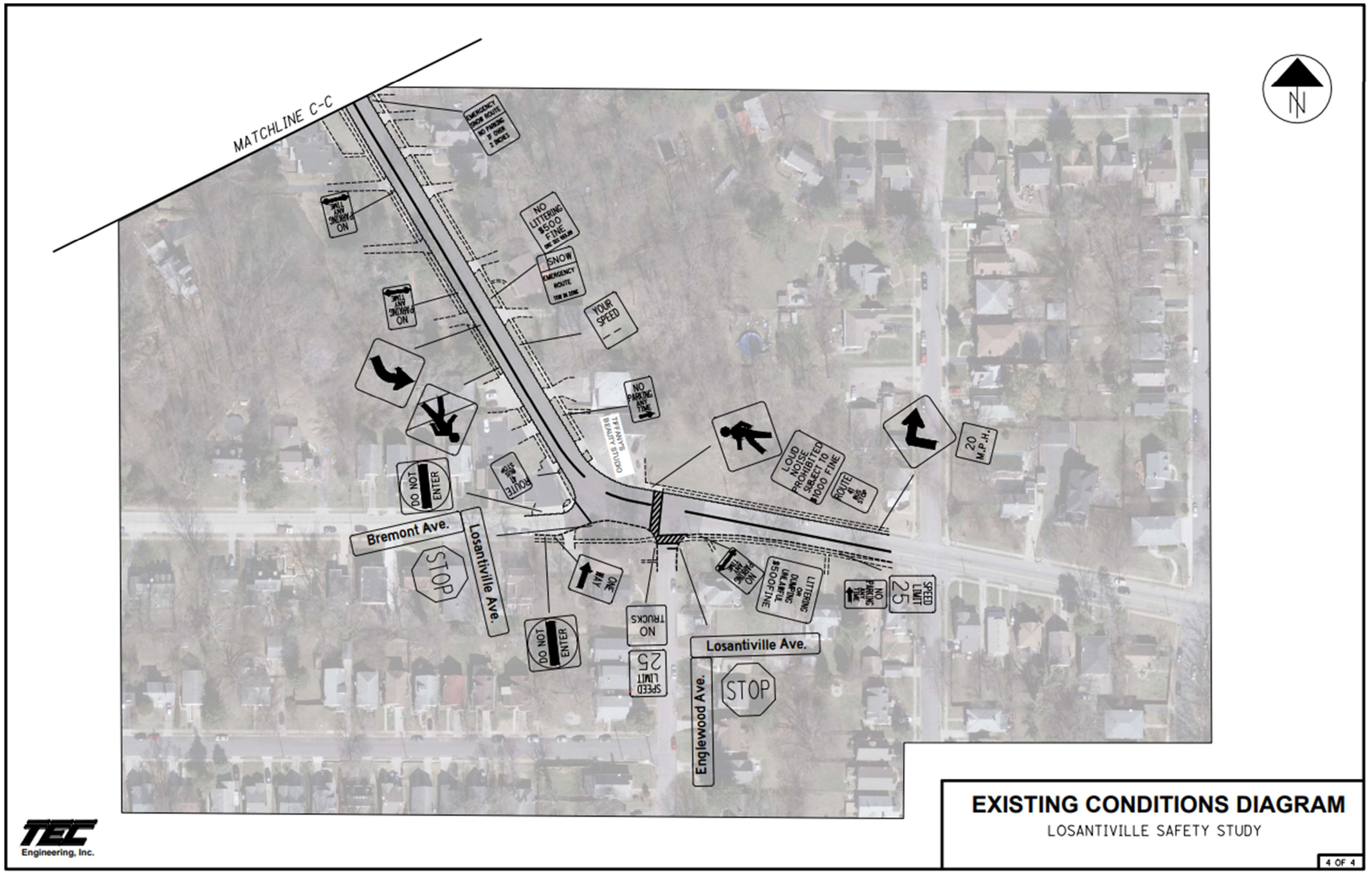
LOSANTIVILLE SAFETY STUDY

1 OF 4

TEC Engineering, Inc.


MATCHLINE A-A
MATCHLINE B-B
Losantiville Ave.
Losantiville Ave.
Losantiville Ave.
Mayflower Ave.
Graceland Ave.
Hammel Ave.
STOP
STOP
STOP
AHEAD
AHEAD
NO TRUCKS
NO TRUCKS
SNOW EMERGENCY ROUTE
NO PARKING ANY TIME
BUS STOP
YOUR SPEED
SPEED LIMIT 25
HERE TO
N
EXISTING CONDITIONS DIAGRAM
LOSANTIVILLE SAFETY STUDY
2 OF 4
TEC Engineering, Inc.


N
MATCHLINE B-B
STOP
SNOW EMERGENCY ROUTE
ROUTE 4 BUS STOP
NO PARKING ANY TIME
Cedarbrook Ave.
Losantiville Ave.
STOP
COMPLETE STOPS ARE FREE. ROLLING STOPS $150.00 YOUR CHOICE COURTESY OF
SNOW EMERGENCY ROUTE
NO PARKING ANY TIME
STOP AHEAD
PUTHOFF PARK
Losantiville Ave.
STOP AHEAD
Fairoaks Ave.
STOP
STOP
Losantiville Ave.
STOP
Ardmore Ave.
MATCHLINE C-C
EXISTING CONDITIONS DIAGRAM
LOSANTIVILLE SAFETY STUDY
3 OF 4
TEC Engineering, Inc.


MATCHLINE C-C
N
EMERGENCY SNOW ROUTE NO PARKING IF OVER 2 INCHES
NO LITTERING $500 FINE
SNOW EMERGENCY ROUTE
YOUR SPEED
NO PARKING ANY TIME
TIFFANY'S BEAUTY STUDIO
LOUD NOISE PROHIBITED SUBJECT TO $1000 FINE
ROUTE
20 M.P.H.
DO NOT ENTER
Bremont Ave.
Losantiville Ave.
STOP
ONE WAY
NO TRUCKS
SPEED LIMIT 25
Losantiville Ave.
Englewood Ave.
STOP
LITTERING OR DUMPING UNLAWFUL $500 FINE
NO PARKING ANY TIME
SPEED LIMIT 25
EXISTING CONDITIONS DIAGRAM
LOSANTIVILLE SAFETY STUDY
4 OF 4
TEC Engineering, Inc.

2. Traffic Volumes

TEC completed turning movement counts between Saturday, May 6th and Saturday, May 13th at the nine intersections within the study and the AM & PM peak were found to occur at 8:15-9:15 AM & 4:00-5:00 PM, respectively. A Saturday peak was also completed in the area; this peak occurs at 10:15-11:15 AM.

Mechanical traffic counts (including speed data) were conducted from May 6-10 to confirm peak times and volumes and provide speed related data for vehicles traveling in the study area. The data indicates an average weekday ADT between 4,000 and 5,000 vehicles per day within the study limits. Volume data is presented in *Appendix A*.

Speed data was collected at two locations along the corridor. The collected data is summarized in the following table.

Table 1: Collected Speed Data (5/6/23-5/10/23)

Location	Direction	85th percentile speed	10MPH Pace	% vehicles in pace
Losantiville Ave Between Elbrook & Hammel	EB	33 MPH	26-35 MPH	71.6%
	WB	33 MPH	26-35 MPH	71.0%
Losantiville Ave Between Bremont & Cedarbrook	NB	33 MPH	26-35 MPH	63.8%
	SB	33 MPH	26-35 MPH	69.9%

85th percentile speed is the speed at or below which 85 percent of all vehicles are observed to travel under free-flowing conditions at the data collection point. The 10-mph pace is the ten mile-per-hour range of speeds containing the greatest number of observed speeds and is a measure of speed dispersion. The speed study results indicate that the vehicle speeds along the study corridor are in line with typical operations of a 25mph roadway.

3. Crash Data

Crash Summary

Crash reports for the years 2020-2022 were obtained from the ODOT GIS Crash Analysis Tool (GCAT) and the Ohio Department of Public Services (ODPS) to determine crash trends in the study area of Losantiville Avenue between Wiehe Road and Englewood Ave. All information regarding the crashes was taken directly from GCAT and the OH-1 crash reports and has not been altered in any way. There were 8 crashes in 2020, 11 in 2021, and only 1 in 2022. There were 4 (20%) injury crashes, 16 (80%) property damage only crashes, and no fatal crashes during the study period.

This most prevalent crash type along the corridor was fixed object crashes (7, 35%). There were 3 angle crashes, 3 sideswipe-passing crashes, and 3 parked vehicle crashes. The remaining crash types include rear end (2), backing (1), and right turn (1). Sunday represents the day with the most crashes (5, 25%). No notable time the day pattern is evident. A majority of crashes happened on dry pavement (16, 80%) during daylight conditions (13, 65%). There were zero pedestrian related crashes in the study period.

The following summarizes crash trends observed from the crash reports obtained from GCAT and the Ohio Department of Public Safety:

1. The highest crash type within the study corridor is run off road/fixed object crashes. (7 total). These occurred sporadically throughout the corridor. Fire hydrants and utility poles were the most common objects struck.
2. Three angle crashes occurred along the corridor. Two occurred at the intersection of Losantiville Ave & Elbrook Ave. Both of these crashes involved a vehicle running a red light. The third angle crash occurred at Fair Oaks Ave.
3. Three sideswipe crashes and three parked vehicle crashes occurred intermittently along the corridor.

The following figures present the crash data in graphical form broken down through various criteria.

Figure 3.1 – Crash Frequency by Type

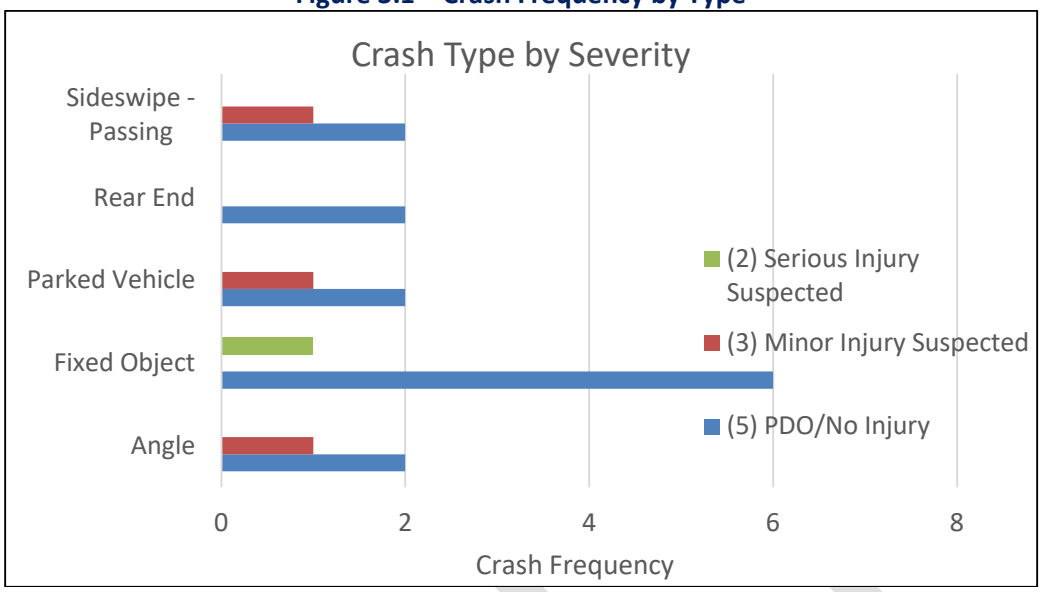


Figure 3.2 – Crash Frequency by Type

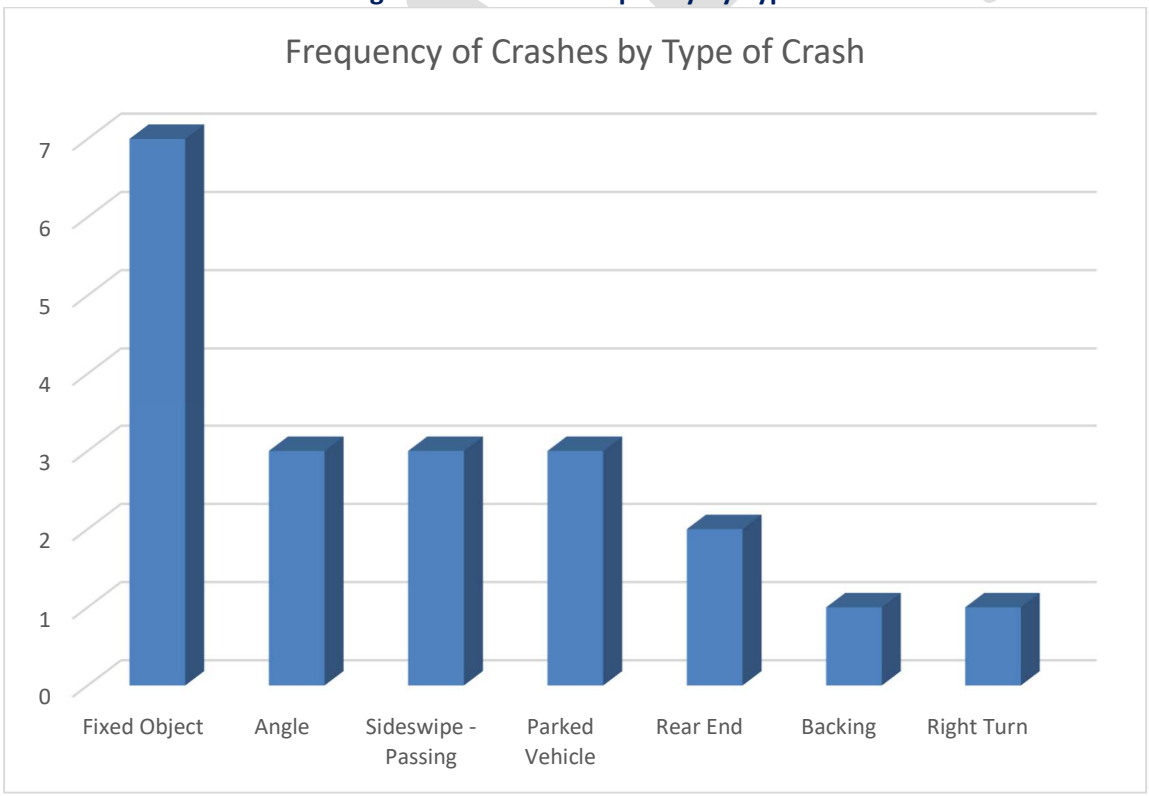
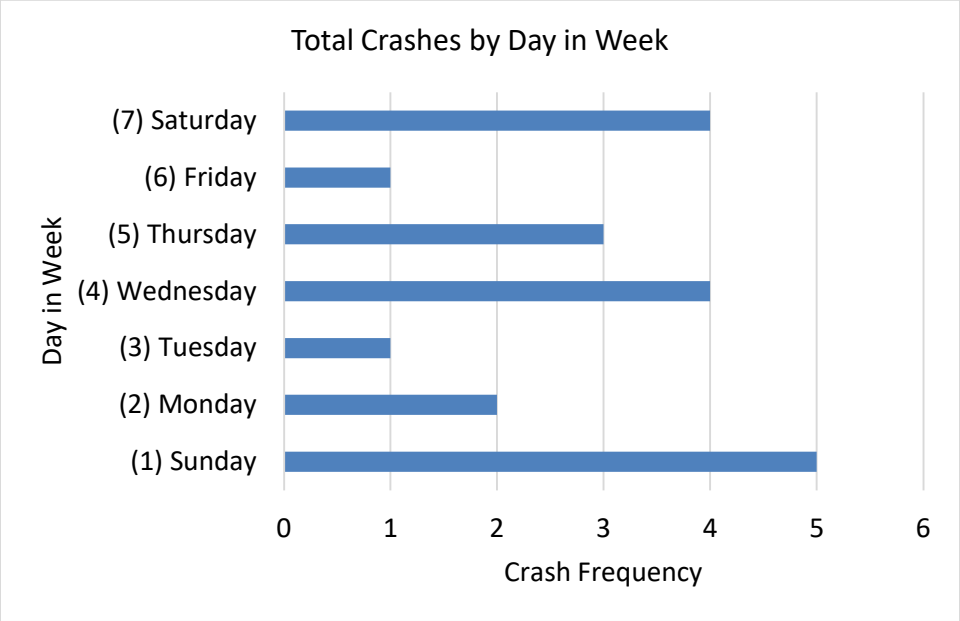


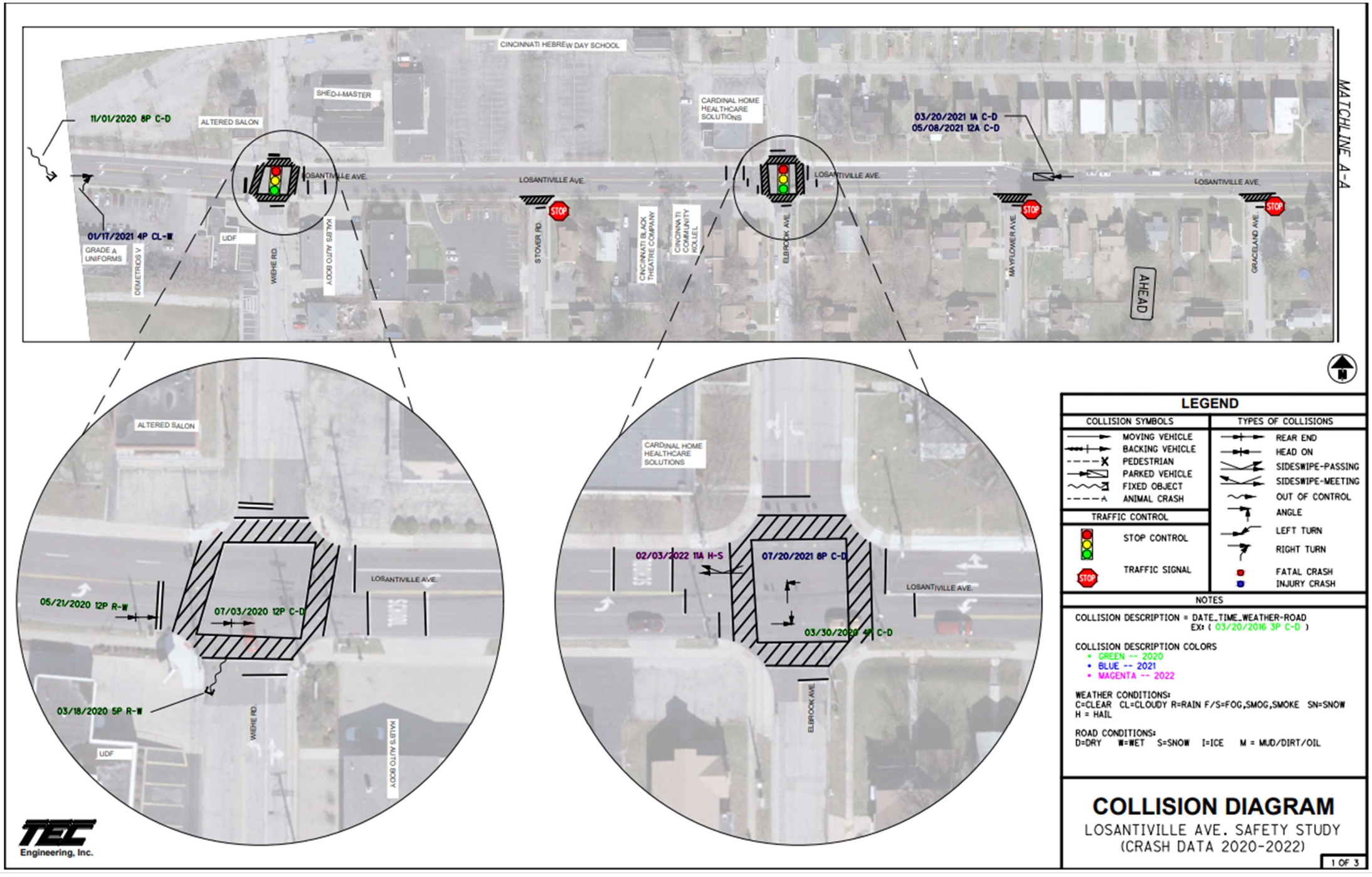
Figure 3.3 – Crash Frequency by Day of Week



A complete report of the crash analysis figures can be found in *Appendix B.*

Collision Diagrams

Collision diagrams for the analysis period of 2020-2022 are provided in the following figures. These diagrams present a visual representation of the crashes as they relate to locations throughout the study area.



LEGEND

COLLISION SYMBOLS	TYPES OF COLLISIONS
MOVING VEHICLE	REAR END
BACKING VEHICLE	HEAD ON
PEDESTRIAN	SIDESWIPE-PASSING
PARKED VEHICLE	SIDESWIPE-MEETING
FIXED OBJECT	OUT OF CONTROL
ANIMAL CRASH	ANGLE
TRAFFIC CONTROL	LEFT TURN
STOP CONTROL	RIGHT TURN
TRAFFIC SIGNAL	FATAL CRASH
	INJURY CRASH

NOTES

COLLISION DESCRIPTION = DATE_TIME_WEATHER-ROAD
EX: (03/20/2016 3P C-D)

COLLISION DESCRIPTION COLORS
- GREEN -- 2020
- BLUE -- 2021
- MAGENTA -- 2022

WEATHER CONDITIONS:
C=CLEAR CL=CLOUDY R=RAIN F/S=FOG,SMOG,SMOKE SN=SNOW
H = HAIL

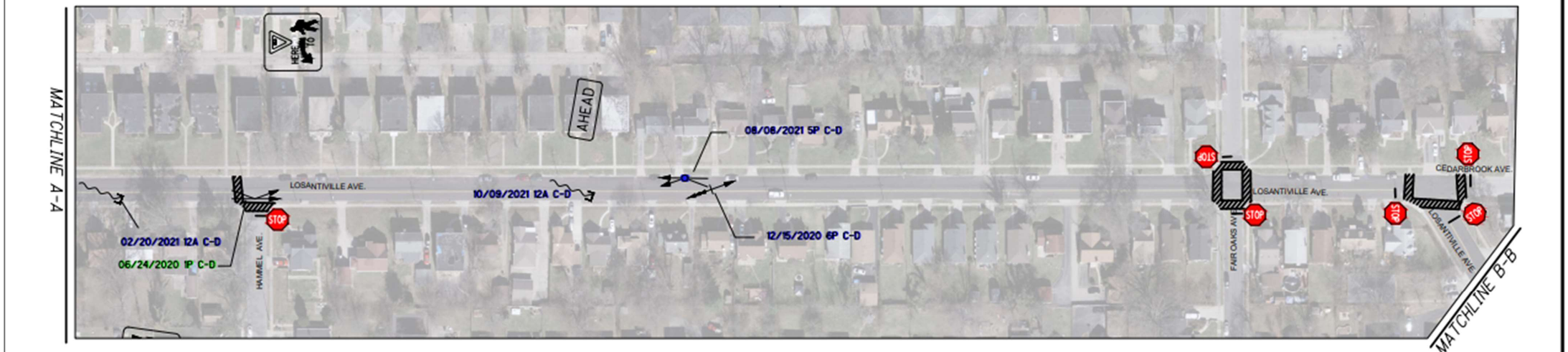
ROAD CONDITIONS:
D=DRY W=WET S=SNOW I=ICE M = MUD/DIRT/OIL

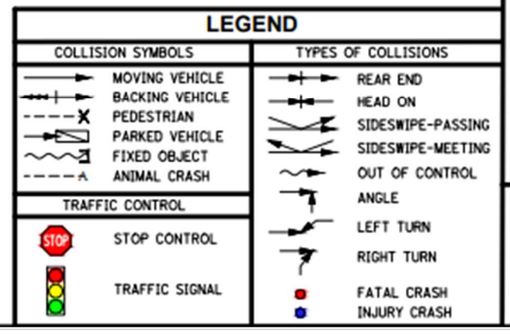
TEC Engineering, Inc.

COLLISION DIAGRAM

LOSANTIVILLE AVE. SAFETY STUDY
(CRASH DATA 2020-2022)

1 OF 3





NOTES

COLLISION DESCRIPTION = DATE_TIME_WEATHER-ROAD
EX: (03/20/2016 3P C-D)

COLLISION DESCRIPTION COLORS
- GREEN -- 2020
- BLUE -- 2021
- MAGENTA -- 2022

WEATHER CONDITIONS:
C=CLEAR CL=CLOUDY R=RAIN F/S=FOG,SMOG,SMOKE SN=SNOW
H= HAIL

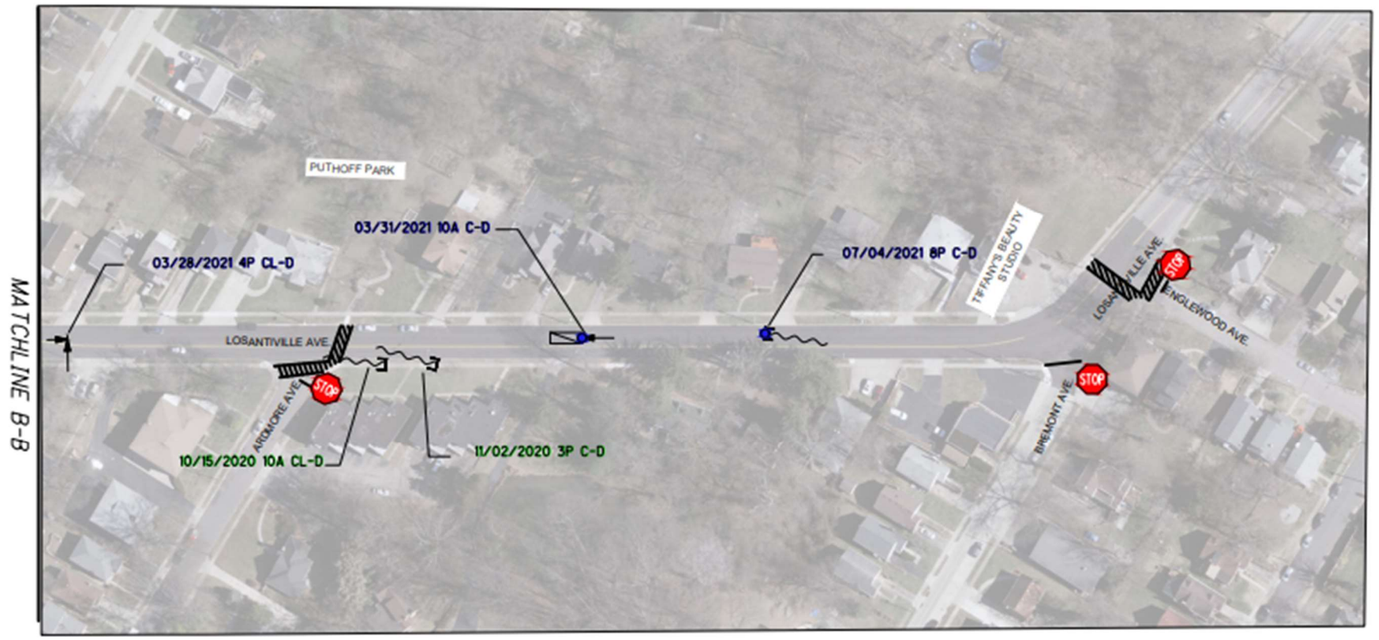
ROAD CONDITIONS:
D=DRY W=WET S=SNOW I=ICE M = MUD/DIRT/OIL

COLLISION DIAGRAM

LOSANTIVILLE AVE SAFETY STUDY
(CRASH DATA 2020-2022)

2 OF 3

TEC Engineering, Inc.



LEGEND

COLLISION SYMBOLS	TYPES OF COLLISIONS
MOVING VEHICLE	REAR END
BACKING VEHICLE	HEAD ON
PEDESTRIAN	SIDESWIPE-PASSING
PARKED VEHICLE	SIDESWIPE-MEETING
FIXED OBJECT	OUT OF CONTROL
ANIMAL CRASH	ANGLE
TRAFFIC CONTROL	LEFT TURN
STOP CONTROL	RIGHT TURN
TRAFFIC SIGNAL	FATAL CRASH
	INJURY CRASH

NOTES

COLLISION DESCRIPTION = DATE_TIME_WEATHER-ROAD
EX: (03/20/2016 3P C-D)

COLLISION DESCRIPTION COLORS
- GREEN -- 2020
- BLUE -- 2021
- MAGENTA -- 2022

WEATHER CONDITIONS:
C=CLEAR CL=CLOUDY R=RAIN F/S=FOG,SMOG,SMOKE
SN=SNOW V H= HAIL

ROAD CONDITIONS:
D=DRY W=WET S=SNOW I=ICE M = MUD/DIRT/OIL

COLLISION DIAGRAM

LOSANTIVILLE AVE SAFETY STUDY
(CRASH DATA 2020-2022)

3 OF 3

TEC Engineering, Inc.

4. Capacity Analysis

The software program, Synchro, was used to analyze capacity at the study intersections. Synchro uses the methods prescribed in the Highway Capacity Manual to determine the Level-of-Service (LOS). LOS is defined in terms of delay and is a measure of driver discomfort and intersection performance with respect to vehicular capacity and quality of service provided to road users. Delay refers to total average stopped delay experienced by motorists at the referenced intersection. The level of service is classified into six different levels, ranging from A to F. Capacity analysis worksheets are provided in *Appendix C*. Table 2 shows the definitions of each level for unsignalized and signalized intersections, respectively:

Table 2: LOS Definitions

Level of Service	Signalized Delay	Stop Control Delay	Description
A	<10 seconds per vehicle	<10 seconds per vehicle	Very low delay
B	10-20 seconds per vehicle	10-15 seconds per vehicle	Good Progression
C	20-35 seconds per vehicle	15-25 seconds per vehicle	Limit of acceptable delay
D	35-55 seconds per vehicle	25-35 seconds per vehicle	Start of traffic breakdown
E	55-80 seconds per vehicle	35-50 seconds per vehicle	High delay
F	>80 seconds per vehicle	>50 seconds per vehicle	Congested conditions, unacceptable delay

Table 3: Wiehe Rd & Losantiville Ave Capacity Analysis Summary (Signalized)

	AM Existing				PM Existing				SAT Existing			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EBLT	A	9.6	0.01	10′	A	9.5	0.01	7′	A	0	0	84′
EBTR	B	12.6	0.37	110′	B	12.5	0.37	128′	B	10.5	0.17	28′
EB Approach	B	12.5	-	-	B	12.5	-	-	B	10.5	-	-
WBL	A	2.0	0.06	49′	A	2.1	0.08	44′	A	0.8	0.03	72′
WBTR	A	1.5	0.31	114′	A	1.2	0.26	107′	A	0.9	0.16	37′
WB Approach	A	1.6	-	-	A	1.3	-	-	A	0.9	-	-
NBL	B	15.7	0.06	43′	B	16.1	0.09	40′	B	15.8	0.06	37′
NBTR	B	15.8	0.07	38′	B	16.6	0.16	50′	B	15.6	0.05	33′
NB Approach	B	15.7	-	-	B	16.4	-	-	B	15.7	-	-
SBLTR	B	15.3	0.02	15′	B	15.2	0.01	8′	B	15.2	0.01	6′
SB Approach	B	15.3	-	-	B	15.2	-	-	B	15.2	-	-
Intersection	**A**	**8.2**	**-**	**-**	**A**	**9.1**	**-**	**-**	**A**	**7.3**	**-**	**-**

Table 4: Stover Ave & Losantiville Ave Capacity Analysis Summary (Unsignalized)

	AM Existing				PM Existing				SAT Existing			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EB Approach	A	0	-	-	A	0	-	-	A	0	-	-
WBL	A	7.8	0.006	10'	A	8.0	0.017	26'	A	8.0	0.017	6''
WBT	A	0	0	-	A	0.1	-	-	A	0.1	-	-
WB Approach	-	0.2	-	-	-	0.7	-	-	-	0.7	-	-
NB Approach	B	10.4	-	36'	B	11.3	0.034	36'	B	11.3	0.034	19'

Table 5: Elbrook Ave & Losantiville Ave Capacity Analysis Summary (Signalized)

	AM Existing				PM Existing				SAT Existing			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EBLT	A	1.2	0.13	28'	A	1.8	0.23	68'	A	0.7	0.04	28'
EBTR	A	1.0	0.20	53'	A	1.4	0.29	105'	A	0.8	0.14	53'
EB Approach	A	1.1	-	-	A	1.5	-	-	A	0.8	-	-
WBL	A	9.5	0.01	5'	A	9.7	0.03	24'	A	9.4	0.01	5'
WBTR	B	10.2	0.14	40'	B	10.6	0.17	48'	A	9.7	0.09	73'
WB Approach	B	10.2	-	-	B	10.5	-	-	A	9.8	-	-
NBLTR	B	15.5	0.05	73'	B	15.6	0.06	41'	B	15.5	0.04	37'
NB Approach	B	15.5	-	-	B	15.6	-	-	B	15.5	-	-
SBL	B	15.7	0.07	37'	B	15.9	0.09	49'	B	15.4	0.03	36'
SBTR	B	17.9	0.27	36'	B	16.6	0.16	76'	B	16.0	0.10	52'
SB Approach	B	17.4	-	-	B	16.3	-	-	B	15.8	-	-
Intersection	**A**	**9.0**	**-**	**-**	**A**	**7.6**	**-**	**-**	**A**	**8.1**	**-**	**-**

Table 6: Mayflower Ave & Losantiville Ave Capacity Analysis Summary (Unsignalized)

	AM Existing				PM Existing				SAT Existing			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EB Approach	A	0	-	-	A	0	-	-	A	0	-	-
WBL	A	7.7	0.009	15'	A	7.8	0.019	16'	A	7.5	0.003	6'
WBT	A	0	-	-	A	0	-	-	A	0	-	-
WB Approach	A	0.5	-	-	A	0.7	-	-	A	0.2	-	-
NB Approach	B	10.8	0.043	36'	B	11.7	0.043	36'	A	9.9	0.016	25'

Table 7: Graceland Ave & Losantiville Ave Capacity Analysis Summary (Unsignalized)

	AM Existing				PM Existing				SAT Existing			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EB Approach	A	0	-	-	A	0	-	-	A	0	-	-
WBL	A	7.7	0.006	14′	A	8.0	0.009	21′	A	7.4	0.005	8′
WBT	A	0	-	-	A	0	-	-	A	0	-	-
WB Approach	A	0.3	-	-	A	0.3	-	-	A	0.4	-	-
NB Approach	B	10.2	0.061	36′	B	12.1	0.038	46′	B	10.0	0.032	26′

Table 8: Hammel Ave & Losantiville Ave Capacity Analysis Summary (Unsignalized)

	AM Existing				PM Existing				SAT Existing			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EB Approach	A	0	-	-	A	0	-	-	A	0	-	-
WBL	A	7.6	0.006	8′	A	7.7	0.015	21′	A	7.5	0.008	6′
WBT	A	0	-	-	A	0	-	-	A	0	-	-
WB Approach	A	0.3	-	-	A	0.5	-	-	A	0.6	-	-
NB Approach	B	10.4	0.051	43′	B	11.9	0.091	46′	A	9.9	0.027	33′

Table 9: Fair Oaks Ave & Losantiville Ave Capacity Analysis Summary (Unsignalized)

	AM Existing				PM Existing				SAT Existing			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EBL	A	7.6	0.011	18′	A	7.8	0.015	33′	A	7.5	0.008	13′
EBT	A	0	-	-	A	0	-	-	A	0	-	-
EB Approach	A	0.6	-	-	A	0.8	-	-	A	0.7	-	-
WBL	A	7.6	0.006	12′	A	7.6	0.014	10′	A	7.4	0.005	14′
WBT	A	0	-	-	A	0	-	-	A	0	-	-
WB Approach	A	0..3	-	-	A	0.6	-	-	A	0.4	-	-
NB Approach	B	11.0	0.079	49′	B	11.5	0.048	41′	B	10.6	0.048	38′
SB Approach	B	10.9	0.062	44′	B	11.3	0.084	44′	B	10.2	0.075	46′

Table 10: Cedarbrook & Losantiville Ave Capacity Analysis Summary (Unsignalized)

	AM Existing				PM Existing				SAT Existing			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EB Approach	A	8.0	0.216	70′	A	9.5	0.203	67′	A	7.3	0.132	58′
WB Approach	A	7.8	0.05	48′	A	8.1	0.063	50′	A	7.6	0.039	44′
NB Approach	A	8.8	0.2	52′	A	8.0	0.291	63′	A	8.2	0.152	47′
Intersection	**A**	**8.3**	**-**	**-**	**A**	**8.8**	**-**	**-**	**A**	**7.7**	**-**	**-**

Table 11: Bremont Ave & Losantiville Ave Capacity Analysis Summary (Unsignalized)

	AM Existing				PM Existing				SAT Existing			
	LOS	Delay (sec/veh)	v/c	95th %ile	LOS	Delay (sec/veh)	v/c	95th %ile	LOS	Delay (sec/veh)	v/c	95th %ile
EB Approach	A	9.5	0.07	5′	A	9.4	0.06	5′	A	9.2	0.045	3′

5. Areas of Concern

Based on meetings with local officials, field/existing conditions reviews, and crash data analysis, the following potential and/or perceived safety issues have been identified:

Pedestrian Safety:
Uncontrolled marked pedestrian crossings are located in areas where on-street parking is also present. Visibility of a pedestrian starting their crossing may be limited to vehicles in the traveled way.

Maintaining and improving pedestrian safety throughout the corridor is a concern of the Village.

Speeding:
Village manager indicated concerns with speed issues at Bremont. 85th percentile speed measured at 33mph (posted speed 25mph).

Lane Utilization:
The existing four lane pavement section between Wiehe and Elbrook can lead to driver confusion and additional lane transitions. Four lane section requires longer pedestrian crossings, and limits left turn movement visibility. A road diet should be considered for this roadway section.

Stop Sign Compliance:
Police indicated concerns with vehicles running stop sign @ Bremont.

Roadside Hazards:
Crash data shows that offset to roadside objects is a crash concern along the corridor. Most prevalent crash type is fixed object crash.

Area Signage:
Crosswalk signage does not appear to fully meet OMUTCD standards: Mid-block crossing signage at Losantiville Ave & Hammel Ave does not meet MUTCD standards/guidance. The yield here to pedestrian signs do not appear to be the correct signs.

Curve/Turn Warning signage @ Bremont: Turn warning one direction, Curve in the other.

Speed limit signage seems limited in the eastern portion of the corridor.

6. Safety Improvements

The following countermeasures were identified as having the potential for immediate safety benefits on the study corridor. The following table details the countermeasures.

Table 12: Countermeasures

Countermeasure	Area of Concern Addressed (if applicable)	Reason for Improvement
Upgrade Pedestrian Signage	Pedestrian Safety Area Signage	Improved pedestrian crossing notification and visibility. Consistency with MUTCD standards.
Road Diet	Lane Utilization Pedestrian Safety Roadside Hazards	Goal is to get some area back to allow reduced crossing widths, additional lateral clearance to roadside hazards, and provide area for future traffic signal construction (based on limited R/W and overhead utilities).
Bump-outs	Pedestrian Safety	Bump outs at key intersections to decrease crossing width and improve visibility of pedestrians.
Speed calming	Speeding	Install speed calming devices in high speed areas or areas of specific concern.
Traffic Signal Upgrades	General	The addition of retroreflective backplates will improve signal head visibility and draw attention to the signals. This should improve driver reactions and reduce the amount of red-light running scenarios.
Widening/Added Parking along Losantiville	Roadside Hazards Pedestrian Safety	Widening of Losantiville east of Elbrook to allow parking on both sides of the roadway – provides for additional on-street parking and additional buffer for sidewalks from traveled way.
Widening/Curb Deflection @ Bremont	Stop Sign Compliance Speeding Pedestrian Safety	Horizontal curb deflection could be designed at the Bremont intersection to reinforce the need to Bremont to stop and to physically require the Bremont approach to slow down before entering Losantiville Avenue.

Upgrade Pedestrian Signage

Signage at the uncontrolled pedestrian crossings within the study area should be upgraded to meet OMUTCD standards. Mid-block crossing signage at Losantiville Ave & Hammel Ave does not meet MUTCD standards/guidance. The yield here to pedestrian signs do not appear to be the correct signs. Replace signage in this area to standard warning signage or consider Rectangular Rapid Flashing Beacon (RRFB). Research suggests RRFBs can result in motorist yielding rates as high as 98 percent at marked crosswalks. RRFBs are placed on both sides of a crosswalk below the pedestrian crossing sign and above the diagonal downward arrow plaque pointing at the crossing. The flashing pattern can be activated with

pushbuttons or passive (e.g., video or infrared) pedestrian detection, and should be unlit when not activated.

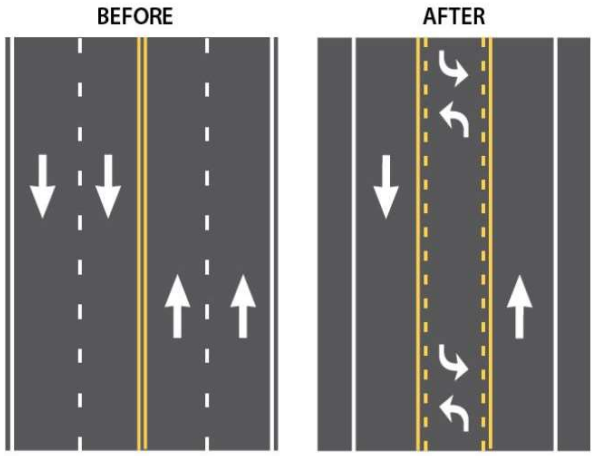
Upgraded signage/RRFB should also be considered at Losantiville Ave & Englewood Ave crossing.

Road Diet

Roadway Diet refers to reducing the number of travel lanes on a given roadway. In the case of Losantiville Ave, this would mean restriping the existing four lane section into a three-lane section with turn lanes (two-way left-turn lane between intersections). The 3-lane section would be centered on the existing roadway cross section and provide additional lateral clearance.

A road diet would apply to the section of Losantiville Ave from approximately 300' west of Wiehe Rd to Mayflower Ave. There are several factors that must be considered for road diets including, but not limited to the following:

- The reduction in lanes and more enclosed roadway can result in lower travel speeds.
- Lane reduction and reduced speeds draws more driver attention to roadways, reducing crashes on roadway segments.



Capacity analysis was completed for the potential road diet section from Wiehe Rd to Mayflower Ave. A 1% growth rate was applied for 10 years to all impacted intersections and roadway network modified. The results of the capacity analysis are provided in the tables below. Based on the capacity analysis results, a road diet is shown to have negligible impact on capacity results at the modified intersections and is therefore considered a viable option for implementation.

Table 13: Wiehe Rd & Losantiville Ave Capacity Analysis Summary (Signalized)

	AM Road Diet				PM Road Diet				SAT Road Diet			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EBL	A	9.6	0.02	11′	A	9.5	0.01	4′	A	0.0	0	0′
EBTR	B	13.1	0.41	130′	B	13.0	0.41	170′	B	10.6	0.18	90′
EB Approach	B	13.0	-	-	B	12.9	-	-	B	10.6	-	-
WBL	A	2.3	0.07	49′	A	2.5	0.10	53′	A	0.9	0.03	28′
WBTR	A	1.7	0.34	118′	A	1.3	0.28	125′	A	0.9	0.17	73′
WB Approach	A	1.7	-	-	A	1.5	-	-	A	0.9	-	-
NBL	B	15.7	0.06	39′	B	16.2	0.10	52′	B	15.8	0.07	55′
NBTR	B	15.9	0.08	43′	B	16.8	0.17	52′	B	15.6	0.05	33′
NB Approach	B	15.8	-	-	B	16.5	-	-	B	15.7	-	-
SBLTR	B	15.3	0.02	18′	B	15.2	0.01	9′	B	15.2	0.01	0′
SB Approach	B	15.3	-	-	B	15.2	-	-	B	15.2	-	-
Intersection	**A**	**8.5**	**-**	**-**	**A**	**9.4**	**-**	**-**	**A**	**7.3**	**-**	**-**

Table 14: Stover Ave & Losantiville Ave Capacity Analysis Summary (Unsignalized)

	AM Road Diet				PM Road Diet				SAT Road Diet			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EB Approach	A	0	-	-	A	0	-	-	A	0	-	-
WBL	A	7.8	0.007	12′	A	8.1	0.019	20′	A	7.5	0.006	8′
WBT	A	0	0	-	A	0	-	-	A	0	-	-
WB Approach	-	0.2	-	-	-	0.6	-	-	-	0.4	-	-
NB Approach	B	11.5	0.038	38′	B	12.8	0.046	40′	B	10.2	0.025	30′

Table 15: Elbrook Ave & Losantiville Ave Capacity Analysis Summary (Signalized)

	AM Road Diet				PM Road Diet				SAT Road Diet			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EBLT	A	1.9	0.16	56′	A	3.5	0.29	102′	A	0.9	0.04	34′
EBTR	A	1.1	0.23	93′	A	1.5	0.32	136′	A	0.9	0.15	63′
EB Approach	A	1.3	-	-	A	2.1	-	-	A	0.9	-	-
WBL	A	9.5	0.01	8′	A	9.7	0.03	22′	A	9.4	0.01	8′
WBTR	B	11.5	0.28	113′	B	12.4	0.36	139′	B	10.6	0.18	89′
WB Approach	B	11.5	-	-	B	12.3	-	-	B	10.6	-	-
NBLTR	B	15.6	0.06	50′	B	15.6	0.06	47′	B	15.5	0.05	33′
NB Approach	B	15.6	-	-	B	15.6	-	-	B	15.5	-	-
SBL	B	15.8	0.08	45′	B	16.0	0.10	49′	B	15.4	0.04	32′
SBTR	B	18.2	0.30	107′	B	16.8	0.18	81′	B	16.1	0.11	54′
SB Approach	B	17.7	-	-	B	16.5	-	-	B	15.9	-	-
Intersection	**A**	**9.5**	**-**	**-**	**A**	**8.5**	**-**	**-**	**A**	**8.4**	**-**	**-**

Table 16: Mayflower Ave & Losantiville Ave Capacity Analysis Summary (Unsignalized)

	AM Road Diet				PM Road Diet				SAT Road Diet			
	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue	LOS	Delay (sec/veh)	v/c	95th %ile Queue
EB Approach	A	0	-	-	A	0	-	-	A	0	-	-
WBL	A	7.8	0.01	16′	A	7.9	0.021	26′	A	7.6	0.003	6′
WBT	A	0	-	-	A	0	-	-	A	0	-	-
WB Approach	A	0.5	-	-	A	0.7	-	-	A	0.2	-	-
NB Approach	B	11.1	0.05	37′	B	12.2	0.05	38′	B	10.0	0.018	23′

Bump-outs

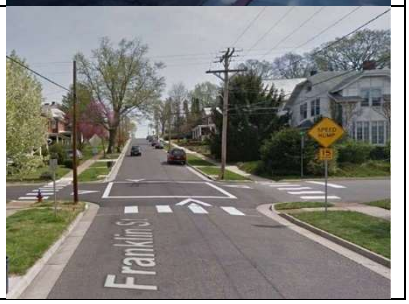
Bump-outs extend the curb into the street on both sides of the street at pedestrian crossings, effectively making the pedestrian crossing shorter. Bump-outs can be provided at intersections or midblock locations. Bump-outs at intersections decrease the time that a pedestrian is in the street and vulnerable to being hit by a car. Bump-outs also can provide additional space on intersection corners for necessary equipment such as traffic signal poles, signage, etc. Bump-outs at midblock extensions are applicable at marked midblock pedestrian crossings. Many communities combine bump-outs with signage and flashing lights at these crossings to help keep pedestrians in these crossings safer.

Because bump-outs narrow a roadway, they can impact traffic movements for larger trucks and vans. The size and configuration of a curb extension installation needs to accommodate these larger vehicles. However, if well thought out, curb extensions can be designed properly to accommodate the turning radius of these larger vehicles where necessary.

Bump-outs can be considered at key project intersections and mid-block crossing locations along Losantiville Avenue.

Speed Calming

Collected speed data indicates the 85th percentile speeds are in line with similar roadways with a posted speed limit of 25mph. Active speed calming ("your speed" signage) is present along the corridor. If additional speed calming is desired, several options are available for speed calming along Losantiville Ave as described in the table below:

Measure	Description	Picture
Speed Hump	Raised perpendicular mound extending across each travel path. Typically, 3"-4" high. Meant for low volume roadways (less than 5,000 ADT)	
Speed Cushion	Similar to a speed hump but installed with cutouts meant for wide track vehicles such as emergency vehicles but spaced so that passenger vehicles must still pass over the speed cushion.	
Speed Table	Similar to a speed hump but is wide enough at the top to fit the entirety of a passenger vehicle.	
Raised Crosswalk	Speed table with a marked crosswalk on top.	
Raised Intersection	Flat, raised area covering the entirety of an intersection. Calms traffic on each approach of the intersection.	

Traffic Signal Upgrades

Backplates added to a traffic signal indication improve the visibility of the illuminated face of the signal by introducing a controlled-contrast background. The improved visibility of a signal head with a backplate is made even more conspicuous by framing it with a retroreflective border. Signal heads that have backplates equipped with retroreflective borders are more visible and conspicuous in both daytime and nighttime conditions. This treatment is recognized as a human factors enhancement of traffic signal visibility, conspicuity, and orientation for both older and color vision deficient drivers. This countermeasure is also advantageous during periods of power outages when the signals would otherwise be dark, providing a visible cue for motorists. Installation of backplates is included on USDOT's list of Intersection Proven Safety Countermeasures.

Widening/Additional On-street Parking in the section east of Mayflower

Crash data indicates a higher than typical occurrence of fixed object crashes on this corridor. In the section of Losantiville east of Mayflower, roadside hazards have minimal buffer along the south side of the roadway. The wide tree lawn on the north side of the roadway provides right-of-way which could be used to widen the overall roadway cross section to provide on-street parking along both sides of the roadway and serve to increase the buffer between travel lanes and the roadside hazards (poles, fire hydrants, etc.) frequently being hit along this corridor. While parking demand was not analyzed as a part of this study, if the desire for additional on-street parking in this area exists, widening to provide this parking may also lead to a reduction of speeds (traffic calming) and a reduction in the number of fixed object crashes.

Widening/Curb Deflection @ Bremont/Englewood

The existing geometry of the Losantiville & Bremont intersection provides a direct/straight pathway for eastbound Bremont motorists onto eastbound Losantiville Avenue. The Village Police have indicated that this movement experiences poor stop sign compliance. Crash analysis did not indicate any crashes associated with stop sign compliance at this location, but improvements could be made to make the EB right from Bremont less direct. This would help reinforce the need to slow down and stop before making this movement. This improvement is shown conceptually shown below.

7. Recommendations and Conclusions

Based on the analysis presented within this report, the recommended improvements on Losantiville Avenue within the study area are summarized below

1. Restripe Losantiville Ave from approximately 300' west of Wiehe Rd to Mayflower Ave to provide a 3-lane section with turn lanes at intersections (two-way left-turn lane between intersections). This will improve safety by providing a center turn lane which protects vehicles waiting to turn left into the multiple businesses/residences along this section. It will also allow for additional buffer between the edge of the travel lane and fixed objects located at the edge of pavement. Finally, a reduction in the number of travel lanes has been shown to reduce travel speeds along a corridor.

2. Upgrade uncontrolled marked pedestrian crossings along the corridor. At the crossing near Hammel and the crossing near Bremont, provide at minimum curb bumpouts to shorten the crossing distance, make pedestrians more visible, and provide a space to place signage to get it closer to the travel lane for better visibility for drivers. Consider installation of a pushbutton activated RRFB to further warn drivers of a pedestrian in the crosswalk. As an additional measure the crosswalk could be raised. This elevates pedestrians for better visibility and also acts as a traffic calming/speed reduction measure. Vertical deflection should be discussed with the fire department to ensure response times are not greatly impacted.

   At the other intersections along the corridor, and particularly at Fair Oaks since the crossings across Losantiville are marked, curb bumpouts should be considered.

3. Bremont/Englewood intersection improvements – Revise overall pavement width to reinforce the required stop on Bremont. This improvement would also provide indirect speed calming due to tighter roadway widths. A shorter pedestrian crossing at Englewood could also be implemented which would reduce crossing time for pedestrians.

4. At the time of the next repaving project for this corridor, carefully review all signage along the corridor to ensure compliance with current standards and update as necessary.

5. Rebuild existing signalized Intersections at Wiehe and Elbrook. Planned signal reconstruction should include upgrades backplates and retroreflective tape to improve signal head visibility. Curb bumpouts are recommended on each corner to shorten crossings for pedestrians and provide right-of-way for new signal poles. Truck turning movement should be examined during design to ensure access throughout the area is not hindered by the proposed design. Side street detection should be provided to allow the intersections to operate more efficiently and avoid serving the side street when a vehicle is

not present. ADA compliant curb ramps should be provided as well as MUTCD complaint pedestrian heads and pushbuttons.