

SOUTH NEIGHBORHOOD IMPROVEMENT AUTHORITY AGENDA



Regular Meeting

February 12, 2024 at 6:00 PM

- 1) **CALL TO ORDER**
- 2) **ROLL CALL**
- 3) **APPROVAL OF AGENDA** - Items can be added or deleted from the Agenda by board action.
 - A. **APPROVAL OF FEBRUARY 12, 2024 AGENDA**
- 4) **APPROVAL OF MINUTES** - Items can be added or deleted from the Agenda by board action.
 - A. **APPROVAL OF AUGUST 14, 2023 MEETING**
- 5) **FINANCE REPORT**
 - A. **FINANCIAL REPORT ENDING JANUARY 31, 2024**
- 6) **PUBLIC COMMENT ON AGENDA ITEMS** Persons addressing the board are required to give their name and address for the record when called upon by the Chair. Members of the public shall be limited to speaking for a maximum of five (5) minutes. Comments should address AGENDA ITEM topics. Public Hearing items should be addressed during the PUBLIC HEARING portion of the meeting agenda. Non-Agenda items should be addressed during the PUBLIC COMMENT-NON-AGENDA ITEMS portion of the meeting agenda.
- 7) **PUBLIC HEARINGS & SUBSEQUENT BOARD ACTION**
- 8) **OLD BUSINESS**
- 9) **REPORTS AND RECOMMENDATIONS/NEW BUSINESS**
 - A. **2023 TIF ANNUAL REPORT**
 - B. **SOUTH KALAMAZOO/HUGHES STREET TRAFFIC STUDY**
 - C. **2024-2030 CAPITAL IMPROVEMENT PLAN**
- 10) **PUBLIC COMMENT ON NON-AGENDA ITEMS** Persons addressing the board are required to give their name and address for the record when called upon by the Chair. Members of the public shall be limited to speaking for a maximum of five (5) minutes. Comments should address NON-AGENDA ITEM topics. Public Hearing items should be addressed during the PUBLIC HEARING portion of the meeting agenda. Agenda items should be addressed during the PUBLIC COMMENT-AGENDA ITEMS portion of the meeting agenda.
- 11) **BOARD REPORTS**
- 12) **ADJOURNMENT**

**REGULAR BOARD
&
SEMI-ANNUAL INFORMATIONAL
MEETING MINUTES**

Monday, August 14, 2023 at 6:00 PM

Marshall City Hall; First Floor Training Room

1) CALL TO ORDER at 6:00 PM - By Vice Chairperson Lucy Blair.

2) ROLL CALL - Present: Lucy Blair, Ben Holben, Sean LeFere, Michael Murphy, and Ryan Underhill. Absent: Matt Davis, Derek Perry. With a quorum of all South Marshall Neighborhood Improvement Authority (SNIA) Board Members in attendance, Ms. Blair commenced the meeting.

Also Present: Eric Zuzga, Director of Community Services; William Dopp III, Finance Director and Treasurer; Marguerite Davenport, Director of Public Services.

3) APPROVAL OF AUGUST 14, 2023 SNIA MEETINGS AGENDA - Moved by Michael Murphy, and seconded by Ben Holben; the Meetings Agenda was unanimously approved by Board Members in attendance.

4) JUNE 30, 2023 FINANCIAL REPORT - Finance Director and Treasurer, William Dopp III, presented the City's written Revenue and Expenditure Report through 06/30/2023, the end of Fiscal Year 2023. See Attachment A. The Report shows current property tax revenues totaling \$23,227.25, which amount is roughly \$10,000 more than had been originally budgeted.

Mr. Dopp further explained that the expenditure of \$14,497.25 for Professional Services represents the cost of a traffic study at the intersection of S Kalamazoo Avenue and Hughes Street. For the details, see A. 2) under Section 9) below.

Upon motion by Mr. Murphy, seconded by Mr. Holben, Board Members unanimously accepted the City's Revenue and Expenditure Report, as written.

5) APPROVAL OF MINUTES - Moved by Ben Holben, and seconded by Ryan Underhill; the Board unanimously approved the March 13, 2023, Regular Board Meeting Minutes, as written.

6) PUBLIC COMMENT ON AGENDA ITEMS - None.

7) PUBLIC HEARINGS & SUBSEQUENT BOARD ACTION - Not applicable.

8) OLD BUSINESS - None.

9) REPORTS AND RECOMMENDATIONS/NEW BUSINESS

A. SEMI-ANNUAL INFORMATION REPORT -

1) DDA/LDFA Report -

For their information, Mr. Dopp discussed with Board Members certain highlights of the DDA/LDFA Report Included with these Minutes as Attachment B. The report is generally positive with respect to captured taxes and includes also a schedule of principal and interest due over a period of years.

2) S Kalamazoo/Hughes Traffic Study -

Also for current information only, Director of Public Services, Marguerite Davenport, discussed with those present a traffic study prepared in April 2023 by OHM, a firm which does similar work for different municipalities.

Ms. Davenport cautioned that the report is a draft working copy only because it does not take into account a substantial increase in the number of residential units now planned for approximately 100 total acres extending from the northwest corner of the intersection. From the 248 units originally proposed, the number has increased to more than 700 mixed, i.e. apartment, single family, etc., newly constructed residential units.

Current traffic concerns include the safety of both motorists and pedestrians who may be walking along or attempting to cross the intersection. These concerns peak in the afternoon with east-west traffic and are expected to become more pressing over the next several years. Ms. Davenport informed Board Members that two potential improvements have been identified - these are 1) improving the current light signal system; and 2) installing a single-lane roundabout. However, more information and further analyses will be needed and it is also expected that required actions will be complex.

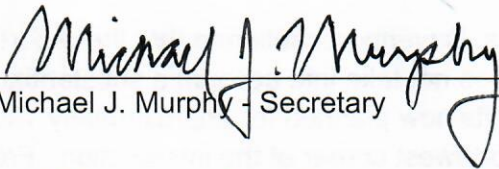
3) New City Website -

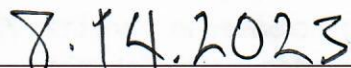
Mr. Zuzga discussed with Board Members there are new developments in the City's website, including that the Clerk's office is working with staff to upload the agendas/minutes of all City boards for the last 3 years by September 2023. The site includes additional information deemed important or as may be required by law.

B. EMERALD HILLS UPDATE - Norfolk Homes Developer Sean LeFere shared information that the golf course and restaurant remain focused on their quality of services and that more people are enjoying both venues. Housing development remains somewhat slow due to the lingering effects of higher interest rates and other factors; however, these seem to be improving and a significant influx of newcomers anticipated for Marshall beginning in the next several years is also expected to provide a boost.

10) BOARD REPORTS - None.

11) ADJOURNMENT - Having completed the agenda, Ms. Blair declared the Board adjourned at 6:57 PM.


Michael J. Murphy - Secretary


Date

GL NUMBER	DESCRIPTION	2022-23 AMENDED BUDGET	YTD BALANCE 06/30/2023	AVAILABLE BALANCE	% BDGT USED
Fund 251 - SOUTH NEIGHBORHOOD IMPROVEMENT AUTHORITY					
Revenues					
Dept 000					
251-000-402.00	Current Property Taxes	13,019.00	23,227.25	(10,208.25)	178.41
251-000-665.00	Interest	20.00	1,483.97	(1,463.97)	7,419.85
251-000-679.00	MISCELLANEOUS REVENUE	19,500.00	0.00	19,500.00	0.00
Total Dept 000		32,539.00	24,711.22	7,827.78	75.94
TOTAL REVENUES		32,539.00	24,711.22	7,827.78	75.94
Expenditures					
Dept 000					
251-000-801.00	Professional Services	3,000.00	14,497.25	(11,497.25)	483.24
251-000-805.00	Administrative Costs	0.00	500.00	(500.00)	100.00
251-000-955.00	COST ALLOCATION	2,963.00	2,963.00	0.00	100.00
251-000-994.00	Bond Interest Paid	26,010.00	26,010.00	0.00	100.00
Total Dept 000		31,973.00	43,970.25	(11,997.25)	137.52
TOTAL EXPENDITURES		31,973.00	43,970.25	(11,997.25)	137.52
Fund 251 - SOUTH NEIGHBORHOOD IMPROVEMENT AUTHORITY:					
TOTAL REVENUES		32,539.00	24,711.22	7,827.78	75.94
TOTAL EXPENDITURES		31,973.00	43,970.25	(11,997.25)	137.52
NET OF REVENUES & EXPENDITURES		566.00	(19,259.03)	19,825.03	3,402.66

SNIA
 Regular Board
 and
 Semi-Annual
 Informational
 Meetings
 8.14.2023

ATTACHMENT A

PARCEL INFORMATION

-----DDA/LDFA: S NIA-----

TOTAL PARCELS: 245
TAXABLE VALUE: 10,479,919
BASE VALUE: 8,376,566
CAPTURED VALUE: 2,103,353
PRE/MBT TAXABLE: 8,192,534
NON PRE/MBT TAXABLE: 2,287,385
PRE/MBT CAPTURED: 1,542,620
NON-PRE/MBT CAPTURED: 560,733
COM. PERS. TAXABLE: 10,000
IND. PERS. TAXABLE: 0
SPEC. ACT PERS. TAXABLE: 0
COM. PERS. CAPTURED: -3,200
IND. PERS. CAPTURED: 0
SPEC. ACT PERS. CAPTURED: 0

TAX HEADING

TAX BILLED

CAPTURED TAX

NET TOTAL

-----DDA/LDFA: S NIA-----

CITY GENERAL 183,115.49 23,463.85 159,651.64
CITY LEAF/BRUSH 7,868.75 1,007.55 6,861.20
CITY REC 9,622.70 1,232.21 8,390.49
DIAL-A- RIDE 9,622.70 1,232.21 8,390.49
CITY ROADS DEBT 21,338.04 0.00 21,338.04
LIBRARY OPER 17,602.24 0.00 17,602.24
SET 64,015.27 0.00 64,015.27
CALHOUN I.S.D. 32,860.58 0.00 32,860.58
K.C.C. 19,262.32 0.00 19,262.32
SCHOOL OPER 22,108.27 0.00 22,108.27
SCHOOL DEBT 32,007.22 0.00 32,007.22
D.D.A. 0.00 0.00 0.00
SCH SINKING FUND 5,273.73 0.00 5,273.73
COUNTY GENERAL 57,291.18 7,340.56 49,950.62
SCHOOL OPER FC 0.00 0.00 0.00
MILLAGE SPECIALS 0.00 0.00 0.00
TOTALS-----> 481,988.49 36,743.86 445,244.63

-----CAPTURED TAXES BREAKDOWN-----

POSITIVE CAPTURE NEGATIVE CAPTURE

CITY GENERAL 25,903.30 -2,439.45
CITY LEAF/BRUSH 1,112.40 -104.85
CITY REC 1,360.43 -128.22
DIAL-A- RIDE 1,360.43 -128.22
CITY ROADS DEBT 0.00 0.00
LIBRARY OPER 0.00 0.00
SET 0.00 0.00
CALHOUN I.S.D. 0.00 0.00
K.C.C. 2,724.13 -256.65
SCHOOL OPER 0.00 0.00
SCHOOL DEBT 0.00 0.00
D.D.A. 0.00 0.00
SCH SINKING FUND 0.00 0.00
COUNTY GENERAL 8,103.81 -763.25
SCHOOL OPER FC 0.00 0.00
MILLAGE SPECIALS 0.00 0.00
TOTALS-----> 40,564.50 -3,820.64

DDA/LDFA Report (Detail) FOR CITY OF MARSHALL
All Records
Special Population: Ad Valorem+Special Acts
Summer, Real & Personal Property
DDA/LDFA Chosen: S NIA, Adjusted Values (All Adjustments Included)
Include: All Parcels

S NIA
Regular Board
and
Semi-Annual
Informational
Meetings
8.14.2023
ATTACHMENT B

DDA/LDFA Report (Detail) FOR CITY OF MARSHALL
All Records
Special Population: Ad Valorem+Special Acts
Winter, Real & Personal Property
DDA/LDFA Chosen: S NIA, Adjusted Values (All Adjustments Included)
Include: All Parcels

PARCEL INFORMATION

-----DDA/LDFA: S NIA-----

TOTAL PARCELS: 245
TAXABLE VALUE: 10,479,919
BASE VALUE: 8,376,566
CAPTURED VALUE: 2,103,353
PRE/MBT TAXABLE: 8,192,534
NON PRE/MBT TAXABLE: 2,287,385
PRE/MBT CAPTURED: 1,542,620
NON-PRE/MBT CAPTURED: 560,733
COM. PERS. TAXABLE: 10,000
IND. PERS. TAXABLE: 0
SPEC. ACT PERS. TAXABLE: 0
COM. PERS. CAPTURED: -3,200
IND. PERS. CAPTURED: 0
SPEC. ACT PERS. CAPTURED: 0

TAX HEADING

TAX BILLED

CAPTURED TAX

NET TOTAL

-----DDA/LDFA: S NIA-----

COUNTY VETERANS 1,065.92 135.82 930.10
MEDICAL CARE 2,647.10 338.36 2,308.74
SENIOR MILLAGE 7,937.11 1,016.28 6,920.83
PARKS 2,129.58 272.07 1,857.51
COUNTY 911 10,454.98 1,338.97 9,116.01
CALHOUN I.S.D. 33,229.58 0.00 33,229.58
K.C.C. 19,261.23 2,467.37 16,793.86
SCHOOL OPER 22,108.27 0.00 22,108.27
SCHOOL DEBT 32,007.22 0.00 32,007.22
SCH SINKING FUND 5,273.73 0.00 5,273.73
MSL AMBUL. AUTH 7,369.39 0.00 7,369.39
SCHOOL OPER FC 0.00 0.00 0.00
MILLAGE SPECIALS 0.00 0.00 0.00
TOTALS-----> 143,484.11 5,568.87 137,915.24

-----CAPTURED TAXES BREAKDOWN-----

POSITIVE CAPTURE NEGATIVE CAPTURE

COUNTY VETERANS 150.06 -14.24
MEDICAL CARE 373.67 -35.31
SENIOR MILLAGE 1,122.04 -105.76
PARKS 300.49 -28.42
COUNTY 911 1,478.29 -139.32
CALHOUN I.S.D. 0.00 0.00
K.C.C. 2,724.01 -256.64
SCHOOL OPER 0.00 0.00
SCHOOL DEBT 0.00 0.00
SCH SINKING FUND 0.00 0.00
MSL AMBUL. AUTH 0.00 0.00
SCHOOL OPER FC 0.00 0.00
MILLAGE SPECIALS 0.00 0.00
TOTALS-----> 6,148.56 -579.69

CITY OF MARSHALL
Debt Service Analysis

FYE 6/30/2023

Component Units

Year	251-SNIA	
	2021 GOLT (Rebecca St)	
	Principal	Interest
2024	-	26,010
2025	-	26,010
2026	50,000	25,160
2027	50,000	23,460
2028	50,000	21,760
2029	55,000	19,975
2030	55,000	18,105
2031	60,000	16,150
2032	60,000	14,110
2033	60,000	12,070
2034	65,000	9,945
2035	65,000	7,735
2036	65,000	5,525
2037	65,000	3,315
2038	65,000	1,105
2039		
2040		
2041		
2042		
Total:	<u>\$ 765,000</u>	<u>\$ 230,435</u>

02/12/2024 04:25 PM
User: EZUZGA
DB: Marshall

REVENUE AND EXPENDITURE REPORT FOR CITY OF MARSHALL
PERIOD ENDING 01/31/2024
% Fiscal Year Completed: 58.74

Page: 1/1

GL NUMBER	DESCRIPTION	2023-24 AMENDED BUDGET	YTD BALANCE 01/31/2024	AVAILABLE BALANCE	% BDGT USED
Fund 251 - SOUTH NEIGHBORHOOD IMPROVEMENT AUTHORITY					
Revenues					
Dept 000					
251-000-402.00	Current Property Taxes	42,129.00	42,312.73	(183.73)	100.44
251-000-665.00	Interest	1,000.00	1,306.76	(306.76)	130.68
Total Dept 000		43,129.00	43,619.49	(490.49)	101.14
TOTAL REVENUES		43,129.00	43,619.49	(490.49)	101.14
Expenditures					
Dept 000					
251-000-801.00	Professional Services	0.00	8,379.00	(8,379.00)	100.00
251-000-805.00	Administrative Costs	500.00	500.00	0.00	100.00
251-000-955.00	COST ALLOCATION	3,111.00	2,222.25	888.75	71.43
251-000-994.00	Bond Interest Paid	26,010.00	13,005.00	13,005.00	50.00
Total Dept 000		29,621.00	24,106.25	5,514.75	81.38
TOTAL EXPENDITURES		29,621.00	24,106.25	5,514.75	81.38
Fund 251 - SOUTH NEIGHBORHOOD IMPROVEMENT AUTHORITY:					
TOTAL REVENUES		43,129.00	43,619.49	(490.49)	101.14
TOTAL EXPENDITURES		29,621.00	24,106.25	5,514.75	81.38
NET OF REVENUES & EXPENDITURES		13,508.00	19,513.24	(6,005.24)	144.46
BEG. FUND BALANCE		30,283.30	30,283.30		
END FUND BALANCE		43,791.30	49,796.54		



TO: SNIA Board of Directors

FROM: William Dopp III, Finance Director/Treasurer

SUBJECT: South Neighborhood Improvement Authority Annual Report

Pursuant to MCL 125.1665(3), the South Neighborhood Improvement Authority shall annually submit to the governing body (City Council) and the Michigan Tax Commission a report on the status of its tax increment financing activity and publish the report in a newspaper of general circulation. Public Act 57 outlines specifically what the format and contents of the report Tax Increment Financing Authorities shall submit.

BUDGET IMPACT: None.

RECOMMENDATION: The SNIA Board of Directors accept and place on file the FY23 SNIA Annual Report.

City of Marshall
South Neighborhood Improvement Authority
Annual Report Year ending 6/30/2023

Revenue:	Tax Increment Revenue	\$	23,227
	Interest	\$	1,484
	State reimbursement for PPT loss (Forms 5176 and 4650)	\$	-
	Other income (grants, fees, donations, etc.)	\$	-
	Total	\$	24,711

Tax Increment Revenues Received

From counties	\$	5,159
From cities	\$	15,271
From townships	\$	-
From villages	\$	-
From libraries	\$	-
From community colleges	\$	2,797
From regional authorities - MARSHALL AMBULANCE	\$	-
From local school districts-operating	\$	-
From local school districts-debt	\$	-
From intermediate school districts	\$	-
From State Education Tax (SET)	\$	-
From state share of IFT and other specific taxes (school taxes)	\$	-
Total	\$	23,227

Expenditures	Capital Outlay- Salaries, Construction	\$	-
	Admin	\$	500
	Bond Issuance Costs	\$	-
	Legal Services	\$	-
	Contracted Services	\$	-
	Professional Services	\$	17,460
		\$	-
		\$	-
	Debt Service - Principal	\$	-
	Debt Service - Interest	\$	26,010
	Debt Service - Bond Agent	\$	-
		\$	-
	Total	\$	43,970

Total outstanding	Principal	\$	765,000
bonded indebtedness	Interest	\$	230,435
	Total	\$	995,435

Kalamazoo Avenue at Hughes Street

Traffic Study - Draft Report

City of Marshall

Calhoun County, MI

October 2023



1. INTRODUCTION

South Kalamazoo Avenue (M-227) is a significant thoroughfare connecting the heart of the City of Marshall with development to the south. Developers have proposed two housing projects near this corridor, within the vicinity of the Hughes Street and Kalamazoo Avenue intersection. These developments have prompted the City of Marshall, in collaboration with the Calhoun County Road Department and Michigan Department of Transportation – Marshall TSC, to initiate a study that will determine the traffic impacts of these projects on the surrounding transportation network. This analysis will include identifying the impacts at the intersection of South Kalamazoo Avenue (M-227) and Hughes Street as well as the intersection of South Kalamazoo Avenue and Industrial Road. Where the potential for significant impacts is found, this study will further review potential improvements and alternatives to accommodate the forecasted increase in traffic.

South Kalamazoo Avenue is in Calhoun County and is classified as a minor arterial. The roadway is an undivided two-lane roadway within the study area. Kalamazoo Avenue has a posted speed limit of 50 mph south of Hughes Street, 40 mph north of Hughes Street and 30 mph north of Industrial Road. Hughes Street is an undivided two-lane roadway with a posted speed limit of 25 mph. The roadway serves residential homes to the east and west of Kalamazoo Avenue and provides access to Hughes Elementary School located approximately 0.25 mile east of the study intersection. Industrial Drive has a speed limit of 35 mph.

The intersection of **South Kalamazoo Avenue and Hughes Street** is a four-way intersection, with the eastbound and westbound approaches operating under STOP control. There is also an overhead flashing beacon at this location. The eastbound, northbound, and southbound approaches consist of a single lane to accommodate left turn/through/right turn movements. The westbound approach consists of a shared left turn/through lane and an exclusive right turn lane.

The intersection of **South Kalamazoo Avenue and Industrial Drive** forms a 3-legged intersection, with the west leg operating under STOP control. The northbound approach has a dedicated left turn lane, while the other approaches have one shared lane.

The study location is shown in **Figure 1**.

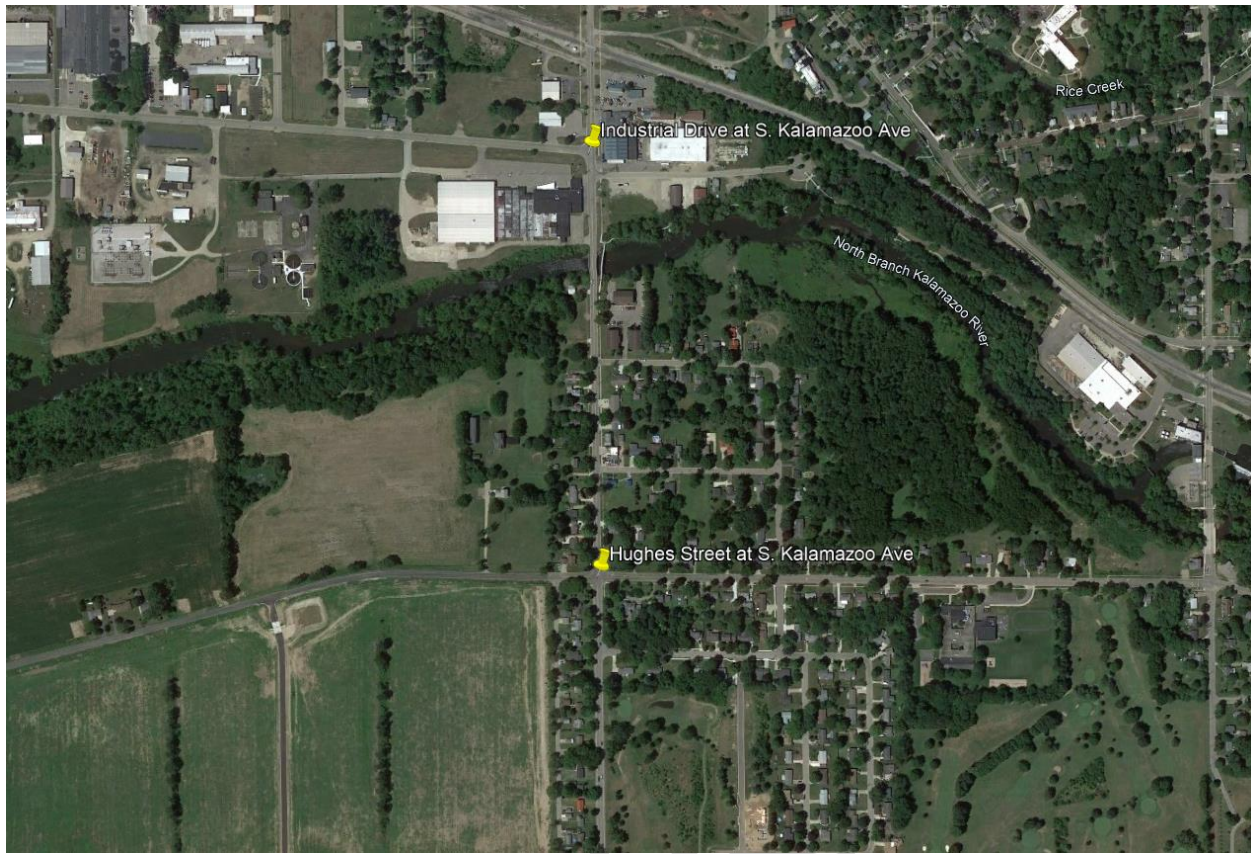


Figure 1: Location Map

2. PROPOSED DEVELOPMENT

The two proposed developments are mixed use but primarily residential in nature. Alwyn Downs is located to the southeast of South Kalamazoo Avenue and Hughes Street and is proposed to have two access roads onto South Kalamazoo Avenue and one access to Hughes Street approximately 2,000 feet to the east of the intersection. It will also tie into the existing neighborhood streets. The development will take place on the property of an existing 18-hole golf course. The proposed development consists of 98 units of single-family houses, 132 units of ranch duplexes and 120 units of multifamily housing in six three-story apartment buildings as well as maintaining a 9-hole golf course.

A second development is planned within the northwest quadrant of the study intersection. The proposed Indigo development will have two driveways connecting to Hughes Street and consists of 103 units of modular single-family housing, 20 single family detached houses, 58 units of duplexes, 96 units of townhomes and 480 units of garden style apartments. The site plans for both developments can be found in **Appendix A**.

The trip generation calculations were performed for the developments utilizing the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. This manual includes data from numerous trip generation studies of different land uses that have been performed by public agencies, developers, consulting firms and associations and submitted to ITE. It serves as a tool for estimating the number of vehicle trips generated by a proposed development. For this study, the trip generation calculations will evaluate the weekday AM and PM peak periods.



Trip generation calculations associated with the two developments can be seen in **Table 1**.

Table 1: Trip Generation

Development	LUC	Land Use	Independent Variable		AM			PM		
					In	Out	Total	In	Out	Total
Alwyn Downs	210	Single-Family Detached Housing	98	Units	18	55	73	61	37	98
	215	Single-Family Attached Housing	132	Units	16	47	63	44	31	75
	220	Multifamily Housing (Low-Rise)	120	Units	14	46	60	45	27	72
	430	Golf Course	9	Holes	13	3	16	14	12	26
Total (Alwyn Downs):					61	151	212	164	107	271
Existing Use	430	Golf Course*	18	Holes	-25	-7	-32	-28	-24	-52
Alwyn Downs Net:					36	144	180	136	83	219
Indigo	210	Single-Family Detached Housing	123	Units	22	68	90	76	45	121
	215	Single-Family Attached Housing	154	Units	19	55	74	52	36	88
	220	Multifamily Housing (Low-Rise)	480	Units	41	131	172	143	84	227
Total (Indigo):					82	254	336	271	165	436
TOTAL (Alwyn Downs Net + Indigo):					118	398	516	407	248	655

*Represents the removal of the existing land use. See net amount for the total generated trips for the Alwyn Downs development.

2. TRAFFIC VOLUMES

Traffic Counts

Traffic data was collected by Quality Counts, LLC on Tuesday, March 7, 2023. The morning peak hour occurs between 7:00 am and 8:00 am, the midday peak hour occurs between 11:30 am and 12:30 pm, and the afternoon peak hour occurs between 3:30 pm and 4:30 pm. Existing traffic volume data can be found in **Appendix B** and the existing network traffic is shown on **Figure 2**.

Site Trip Distribution and Assignment

The new trips generated by the sites were distributed and assigned to the roadway network based on existing travel volumes and patterns in the study area, the surrounding land uses and engineering judgment. The trips were distributed as shown in Table 2.

Table 2: Trip Distribution Percentages

Roadway	Direction	AM Peak	PM Peak
Kalamazoo Avenue	North	30%	33%
	South	30%	35%
Hughes Street	West	10%	6%
	East	15%	14%
Industrial	Northeast	15%	12%

The trip assignment is shown on **Figure 3** and the build volumes are shown on **Figure 4**.



3. SAFETY ANALYSIS

A safety analysis was performed to explore the recent crash history at the study intersection. The primary focus of this analysis was to summarize and identify crash patterns. These patterns help identify safety concerns, some of which may be reduced by the proposed intersection improvements included in the remaining sections of this study. Particular attention was given to head-on and angle crashes, which tend to result in more serious injuries and greater property damage.

Crash data for the analysis was obtained from the Traffic Improvement Association's (TIA) Traffic Crash Analysis Tool (TCAT) in the form of a crash summary report. Detailed traffic crash reports (UD-10s) for the most severe, were downloaded and reviewed in detail. The crash data encompassed a period of five full years spanning January 1, 2018 through December 31, 2022. Historical Crash Data can be found in **Appendix C**.

Intersection Crash Analysis

A summary of the intersection crash data is shown in **Table 3**.

Table 3: Intersection Crash Summary – Kalamazoo Avenue at Hughes Street

Intersection	Crash Type							Injuries			
	Side Swipe Sm	Head On	Angle	Rear End	Single Vehicle	Other	TOTAL	Fatal	A-Level (Incapacitating)	B-Level (Non- Incapacitating)	C-Level (Possible)
Hughes at Kalamazoo	0	0	8	2	6	2	18	0	1	0	2
TOTAL	0	0	8	2	6	2	18	0	1	0	2
% TOTAL	0.0%	0.0%	44.4%	11.1%	33.3%	11.1%	100.0%	0.0%	5.6%	0.0%	11.1%

There were 18 total crashes at the study intersection during the five-year period. Angle crashes were the predominant crash type, accounting for 44% of all crashes. Most of the angle crashes were the result of eastbound and westbound vehicles failing to yield to northbound and southbound vehicles traveling on Kalamazoo Avenue.

During the analysis period, there were no crashes which resulted in a fatality. One of the angle collisions resulted in an A-level (incapacitating) injury, and 2 of the angle collisions resulted in a C-level (possible) injury. The remaining crashes resulted in property damage only (PDO). No crashes were reported that involved a pedestrian or bicyclist.

Further Considerations

Field observation showed that the sight distance to the south may be inadequate for the 50 mph speed limit. The majority of crashes that occurred during the analysis period were angle collisions. The introduction of a traffic signal or roundabout may help reduce the observed crash patterns by lowering speeds and increasing visibility of the intersection.



4. EXISTING TRAFFIC ANALYSIS

The study intersections were analyzed according to the methodologies published in the Highway Capacity Manual, 6th edition. For this project, Synchro Version 11 software was used to conduct the analysis for traditional intersections. Rodel software was used to conduct the analysis for intersections under roundabout control. Software printouts for the evaluations of the study intersections have been included in **Appendix D**. These software packages compute delay values based on factors such as number and type of lanes, intersection controls such as STOP signs or traffic signals, traffic volumes, pedestrian volumes, geometric characteristics, signal timing characteristics, roadway grade, speed limit, etc. This analysis determines the average delay experienced by vehicles. This value is an average across the entire peak hour, vehicles arriving during the busiest portion of the peak hour or arriving in a clustered group of vehicles instead of in a random pattern could experience longer delays. On the other hand, vehicles arriving during a lighter portion of the peak hour could experience a shorter delay. The average delay is used to determine the corresponding level of service (LOS) values for each intersection movement, as well as the intersection as a whole.

The LOS of an intersection is based on factors such as number and types of lanes, intersection controls such as STOP signs or traffic signals, traffic volumes, pedestrian volumes, etc. LOS is expressed as a letter grade, in a range from A thru F. In this context, 'A' represents the best conditions, with very little or no average delay to vehicles. LOS 'F' is the worst of conditions, equated with very large average delays and few gaps of acceptable length. The following tables identify level of service criteria for signalized and un-signalized intersections.

Table 4: Level of Service Criteria For Signalized Intersections

Level of Service	Average Delay/Vehicle (seconds)	Description
A	Less than or equal to 10	Most vehicles do not stop at all. Most arrive during the green phase. Little or no delay.
B	> 10 to 20	More vehicles stop than for LOS A. Still good progression thru lights. Short traffic delays.
C	> 20 to 35	Significant numbers of vehicles stop, although many pass thru without stopping.
D	> 35 to 55	Many vehicles stop. Individual signal cycle failures are noticeable. Progression is intermittent.
E	> 55 to 80	Considered to be the limit of acceptable delay. Individual cycle failures are frequent and progression is poor.
F	>80	Extreme and unacceptable traffic delays.

SOURCE: Transportation Research Board, Highway Capacity Manual 6th Edition.



Table 5: Level of Service Criteria For Unsignalized Intersections

Level of Service	Average Delay/Vehicle (seconds)	Description
A	0 to 10	Little or no delay, very low main street traffic
B	> 10 to 15	Short traffic delays, many acceptable gaps
C	> 15 to 25	Average traffic delays, frequent gaps still occur
D	> 25 to 35	Longer traffic delays, limited number of acceptable gaps
E	> 35 to 50	Very long traffic delays, very small number of acceptable gaps
F	>50	Extreme traffic delays, virtually no acceptable gaps in traffic

SOURCE: Transportation Research Board, Highway Capacity Manual 2010.

An intersection LOS 'D' is considered by many traffic safety professionals to be the minimum acceptable condition in an urban/suburban area. For rural areas, most highway agencies consider LOS 'C' the minimum. Given the location of the study intersection, LOS 'D' was utilized as the study goal.

Existing Conditions

The study intersections were evaluated under the existing conditions during the AM and PM peak periods. **Table 6** shows the intersections LOS and corresponding delays during the AM Peak Hour. **Table 7** shows the intersections LOS and corresponding delays during the PM Peak Hour.

Table 6: 2023 AM Peak Delay and Level of Service – Existing Volumes and Conditions

	Northbound		Southbound		Eastbound		Westbound		Intersection	
	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS
Kalamazoo Ave @ Hughes St	0.2	A	1.6	A	17.5	C	11.6	B	4.4	A
Kalamazoo Ave @ Industrial Park	1.4	A	0.0	A	11.1	B	N/A	N/A	2.3	A

Table 7: 2023 PM Peak Delay and Level of Service – Existing Volumes and Conditions

	Northbound		Southbound		Eastbound		Westbound		Intersection	
	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS
Kalamazoo Ave @ Hughes St	0.3	A	2.0	A	32.3	D	17.9	C	5.2	A
Kalamazoo Ave @ Industrial Park	1.5	A	0.0	A	13.5	B	N/A	N/A	2.9	A

The approaches at the study intersection of Kalamazoo Avenue and Hughes Street currently operate at an acceptable LOS during all peak hours although delays do reach LOS D for the eastbound approach during the PM Peak. The adjacent intersection of Kalamazoo Avenue and Industrial Park also experiences acceptable delay during all peak hours under existing conditions.



Development Conditions

The study intersections were evaluated under the conditions after the developments are fully constructed during the AM and PM peak periods with no changes to the intersection operation or geometry. **Table 8** shows the intersections LOS and corresponding delays during the AM Peak Hour. **Table 9** shows the intersection LOS and corresponding delays during the PM Peak Hour.

Table 8: AM Peak Delay and Level of Service – Development Volumes/Existing Conditions

	Northbound		Southbound		Eastbound		Westbound		Intersection	
	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS
Kalamazoo Ave @ Hughes St	1.2	A	1.4	A	152.4	F	16.8	C	45.2	E
Kalamazoo Ave @ Industrial Park	1.9	A	0.0	A	12.2	B	N/A	N/A	2.7	A

Table 9: PM Peak Delay and Level of Service – Development Volumes/Existing Conditions

	Northbound		Southbound		Eastbound		Westbound		Intersection	
	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS
Kalamazoo Ave @ Hughes St	1.7	A	1.5	A	2561.9	F	282.4	F	395.4	F
Kalamazoo Ave @ Industrial Park	1.8	A	0.0	A	19.1	C	N/A	N/A	3.9	A

With the addition of the traffic from the proposed developments the intersection of South Kalamazoo Avenue and Hughes Street will reach LOS F for the overall intersection and the stop-controlled approaches of Hughes Street will experience excessive delays and LOS F.

5. SIGNAL WARRANT ANALYSIS

The intersection of Kalamazoo Avenue at Hughes Street was evaluated against the various warrants for the installation of a traffic signal defined in the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). To consider the installation of a traffic signal at a location, the conditions of at least one signal warrant must be met. Satisfying one or more signal warrants does not require the installation of a signal but allows for further consideration of signalization. There are nine MMUTCD signal warrants, for the purposes of this study Warrants 1,2,3 and 7 were considered:

Warrant 1 – Eight Hour Vehicular Volume

This warrant requires one of two conditions to be satisfied for a minimum of 8 hours a day. The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal. The minimum vehicular volume condition for rural environments and/or smaller municipalities is 70 percent of the requirement for urban conditions. The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where a very high volume of major street traffic restricts entry of cross-street traffic, causing excessive delay. If neither condition is satisfied, a



combination of Conditions A and B can be applied, but only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems. Under existing traffic volumes, Warrant 1 is NOT satisfied.

Warrant 2 – Four Hour Vehicle Volume

This warrant is intended to be used where the volume of intersecting traffic is the principal reason to consider signalization. This warrant requires high volumes of intersection traffic for a minimum of 4 hours a day. Under existing traffic volumes, Warrant 2 is NOT satisfied.

Warrant 3 – Peak Hour

This warrant is intended for application where traffic conditions are such that, for a minimum of one hour of the day, minor street traffic suffers excessive delay entering or crossing the major street. Under existing traffic volumes, Warrant 3 is NOT satisfied as the minor street does not suffer undue delay during the peak periods.

Warrant 7 – Crash Experience

Crash data was reviewed as a part of Warrant 7 (Crash Experience) to determine if five or more reported crashes have occurred within a 12-month period, that would likely be corrected with the addition of a signal. The crash review at this intersection indicated that there are not more than five crashes per year that may be corrected with the addition of a signal.

Table 10: Traffic Signal Warrant Results

Summary of Warrants		
Warrant	Condition	Is Warrant Met
Data Has Been Validated		YES
WARRANT 1: Eight-Hour Vehicular Volume		NO
	Condition A	NO
	Condition B	NO
	Condition A&B	NO
WARRANT 2: Four-Hour Vehicular Volume	(70%)	NO
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	#N/A
	Condition A	#N/A
	Condition B	NO
WARRANT 7: Crash Experience		NO
	Condition A	NO
	Condition B	NO

Detailed warrant analysis is included in **Appendix E**. While none of the signal warrants are met with the existing traffic volumes five out of the eight hours for Warrant 1B are met and it is expected that the warrant would be satisfied with the increased traffic volumes from the proposed developments.



6. IMPROVEMENT CONCEPTS

The intersection of South Kalamazoo Avenue and Hughes Street was found to operate at a poor LOS after the addition of the new development traffic, in particular during the PM peak. The intersection of Industrial Road and South Kalamazoo Avenue is not significantly impacted, and no changes are recommended at this time. The following improvement alternatives were considered:

Signalized Intersection

This alternative modifies the intersection to a signalized intersection. This signal would also include pedestrian signals crossing both legs of Hughes Street and the south leg of South Kalamazoo Avenue. This option is not expected to require any right-of-way acquisition as there is an existing span wire flashing signal already in place.

Modifying the existing intersection to a signalized intersection will decrease delay at the stop-controlled approaches to the intersection, improve safety for pedestrians and may reduce crash patterns related to intersection visibility.

Single Lane Roundabout Intersection

This alternative includes the construction of a single lane roundabout at this intersection. Passenger vehicles are accommodated in the circulating roadway with larger vehicles using the provided truck apron for the required additional width. As with all roundabouts, all four approaches will be under yield control. This option will likely require a small amount of right-of-way acquisition as the existing roadways have 66' of right-of-way and a single lane roundabout is approximately 110' in diameter.

The installation of a roundabout at this location would improve capacity over the existing minor approach stop control. The roundabout approach geometry will help reduce speeds and help reduce the severity of crashes at this location.

Traffic Analysis of Improvement Alternatives

The intersection of South Kalamazoo Avenue and Hughes Street was evaluated for the selected concepts during each of the peak hour periods. This was compared to the existing geometry as well. **Table 11** shows the intersection LOS and delays during the AM Peak Hour and **Table 12** shows the intersection LOS and delays during the PM Peak Hour.

Table 11: South Kalamazoo and Hughes AM Peak Delay and Level of Service – Development Volumes

	Northbound		Southbound		Eastbound		Westbound		Intersection	
	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS
Existing Geometry	1.2	A	1.4	A	152.4	F	16.8	C	45.2	E
Signalized	8.7	A	9.9	A	17.5	B	13.6	B	12.2	B
Roundabout	5.5	A	6.8	A	6.4	A	5.8	A	6.7	A

**Table 12: South Kalamazoo and Hughes PM Peak Delay and Level of Service – Development Volumes**

	Northbound		Southbound		Eastbound		Westbound		Intersection	
	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS	Delay (Sec.)	LOS
Existing Geometry	1.7	A	1.5	A	2561.9	F	282.4	F	395.4	F
Signalized	11.9	B	10.7	B	21.1	C	17.7	B	13.5	B
Roundabout	11.7	B	11.1	B	8.1	A	7.3	A	10.4	B

Under existing geometry, the Hughes Street approaches experience delays, especially in the PM peak where the LOS is F and delays are extremely high. Both the roundabout and signalized alternatives show greatly reduced delays. With the signal, the Hughes Street approaches have a LOS C during the PM Peak, under roundabout control all approaches are LOS B or better.

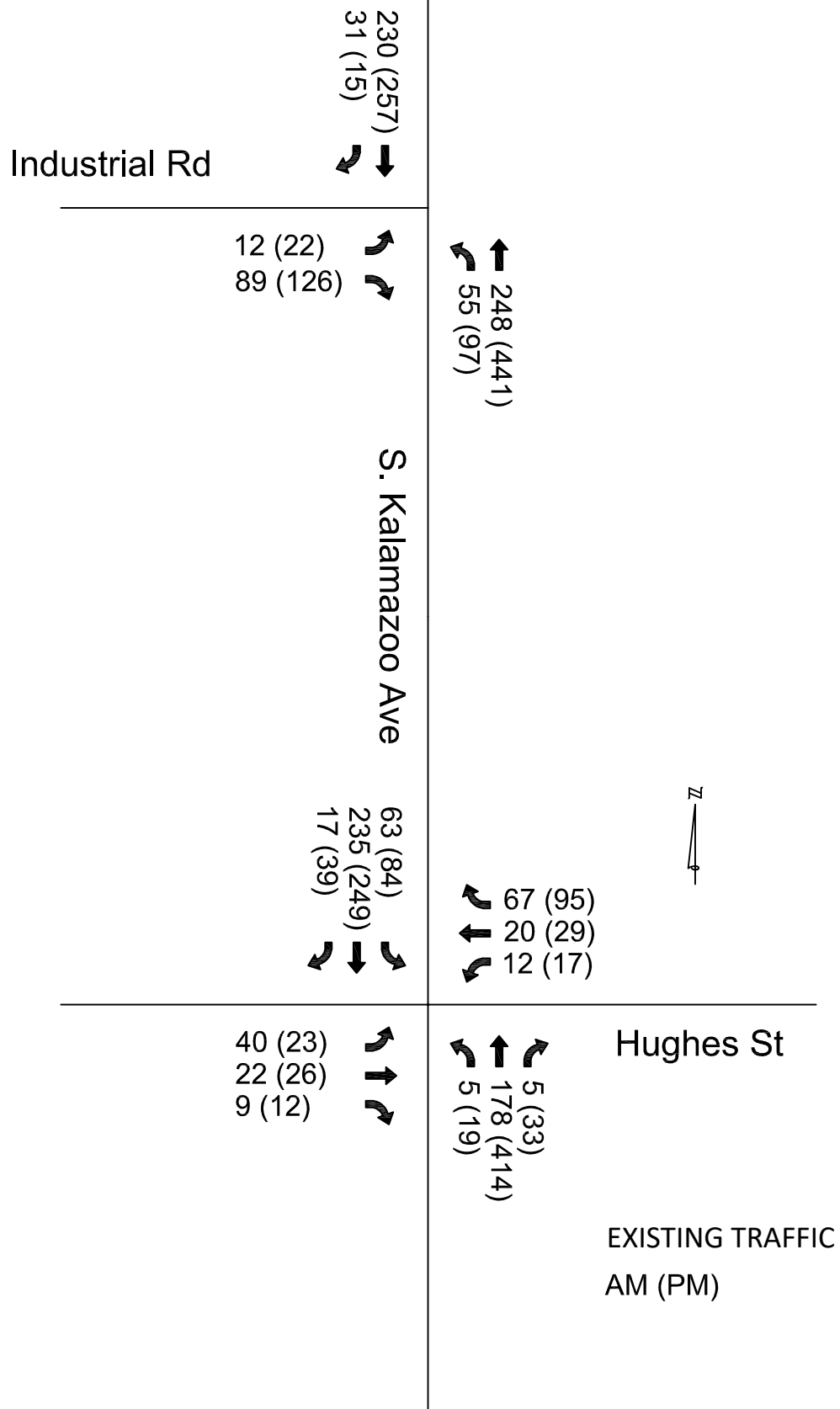
6. FINDINGS & RECOMMENDATIONS

Under existing conditions both the study intersections were found to operate with an adequate level of service. The intersection of Kalamazoo St and Industrial Rd is anticipated to continue to operate adequately with the addition of development traffic. Some existing condition safety concerns were noted with the number of angle crashes at Kalamazoo Street and Hughes Street. With the introduction of the development traffic the intersection of Kalamazoo St and Hughes St is expected to experience operational delays, in particular during the PM peak. While a signal is not warranted by traffic volumes at this time, it is expected that warrants would be met with the introduction of additional traffic at some point in the future. The addition of a traffic signal and the construction of a single lane roundabout at Kalamazoo St and Hughes St were both evaluated. Both options improve operations by reducing delays. The traffic signal will likely fit within the existing right-of-way. However, the traffic signal is not warranted by existing traffic volumes and will not address the issue of the angle crashes. The single lane roundabout alternative will improve operations at the intersection, reduce speeds and reduce the number of angle crashes. The roundabout alternative also does not require waiting for traffic volumes to increase enough to meet the requirements of a signal warrant prior to construction. The roundabout would require some right-of-way or easement acquisition, and more significant construction efforts.

Recommendation

While both alternatives improve traffic operations, the single lane roundabout is recommended for the Kalamazoo St and Hughes St intersection based on the crash history at the intersection and the ability to be installed prior to the development volumes meeting traffic signal warrants. An exhibit showing this alternative and a budgetary cost estimate are included in **Appendix F**.

FIGURES



26 IN (134 IN)
0 (0)

Industrial Rd

0 (0)
17 IN (49 IN)

S. Kalamazoo Ave

4 IN (12 IN)
12 IN (49 IN)
37 IN (122 IN)

114 OUT (74 OUT)
1 IN, 38 OUT (2 IN, 23 OUT)
3 IN, 76 OUT (6 IN, 58 OUT)

119 OUT (85 OUT)
59 OUT (38 OUT)



13 OUT (10 OUT)
12 IN, 3 OUT (38 IN, 1 OUT)
1 IN, 8 OUT (4 IN, 7 OUT)

2 IN, 5 OUT (10 IN, 3 OUT)
52 OUT (38 OUT)
25 IN, 11 OUT (95 IN, 5 OUT)

Hughes St

DEVELOPMENT TRAFFIC

AM (PM)

Industrial Rd

256 (391)
31 (15)



12 (22)
106 (175)



S. Kalamazoo Ave

67 (96)
247 (298)
54 (161)



367 (526)
114 (135)



80 (105)
35 (68)
21 (38)



Hughes St

154 (97)
61 (51)
88 (76)



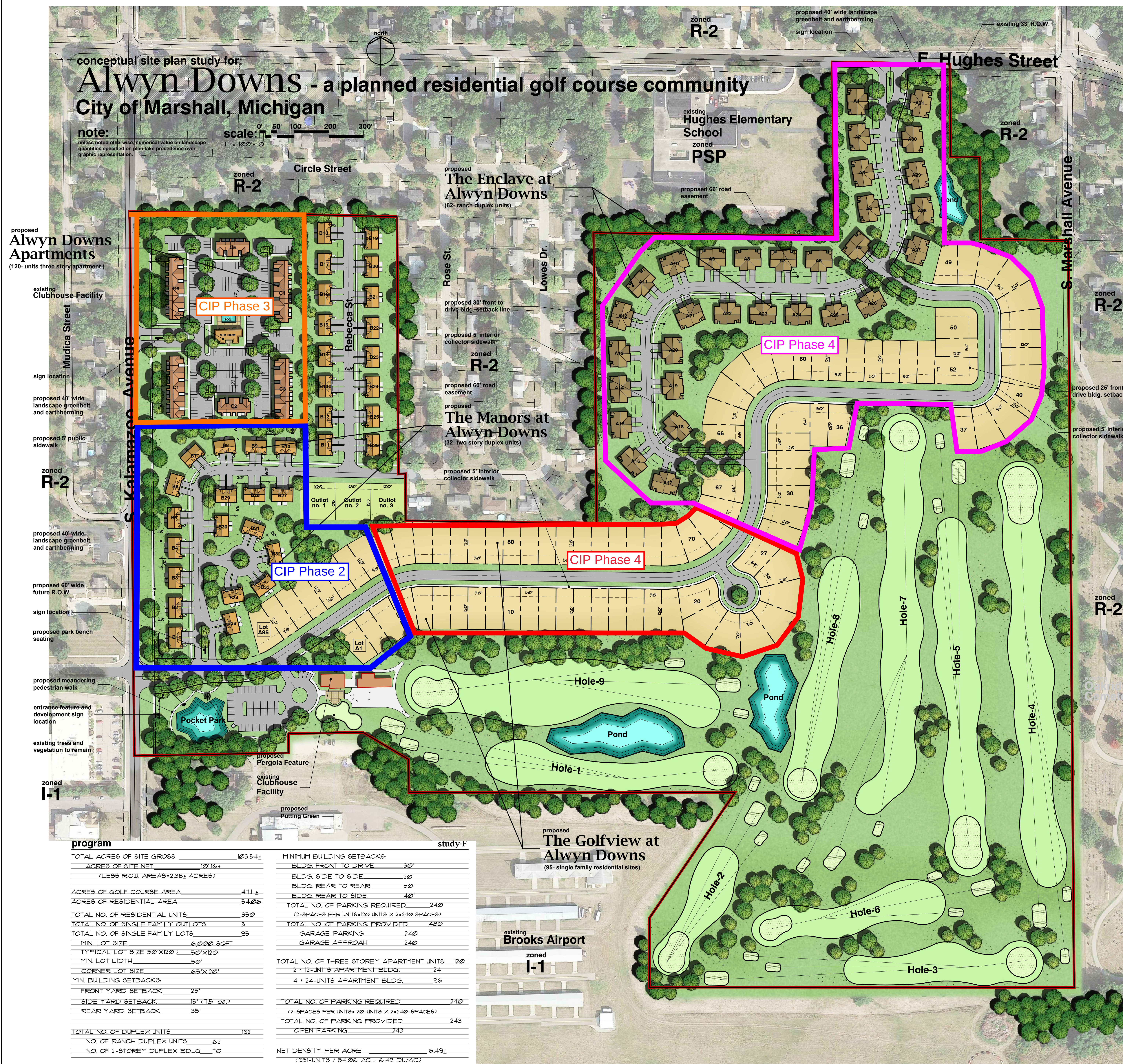
12 (46)
230 (452)
41 (119)



EXISTING TRAFFIC PLUS FULL
DEVELOPMENT TRAFFIC
AM (PM)

APPENDIX A

Site Plans

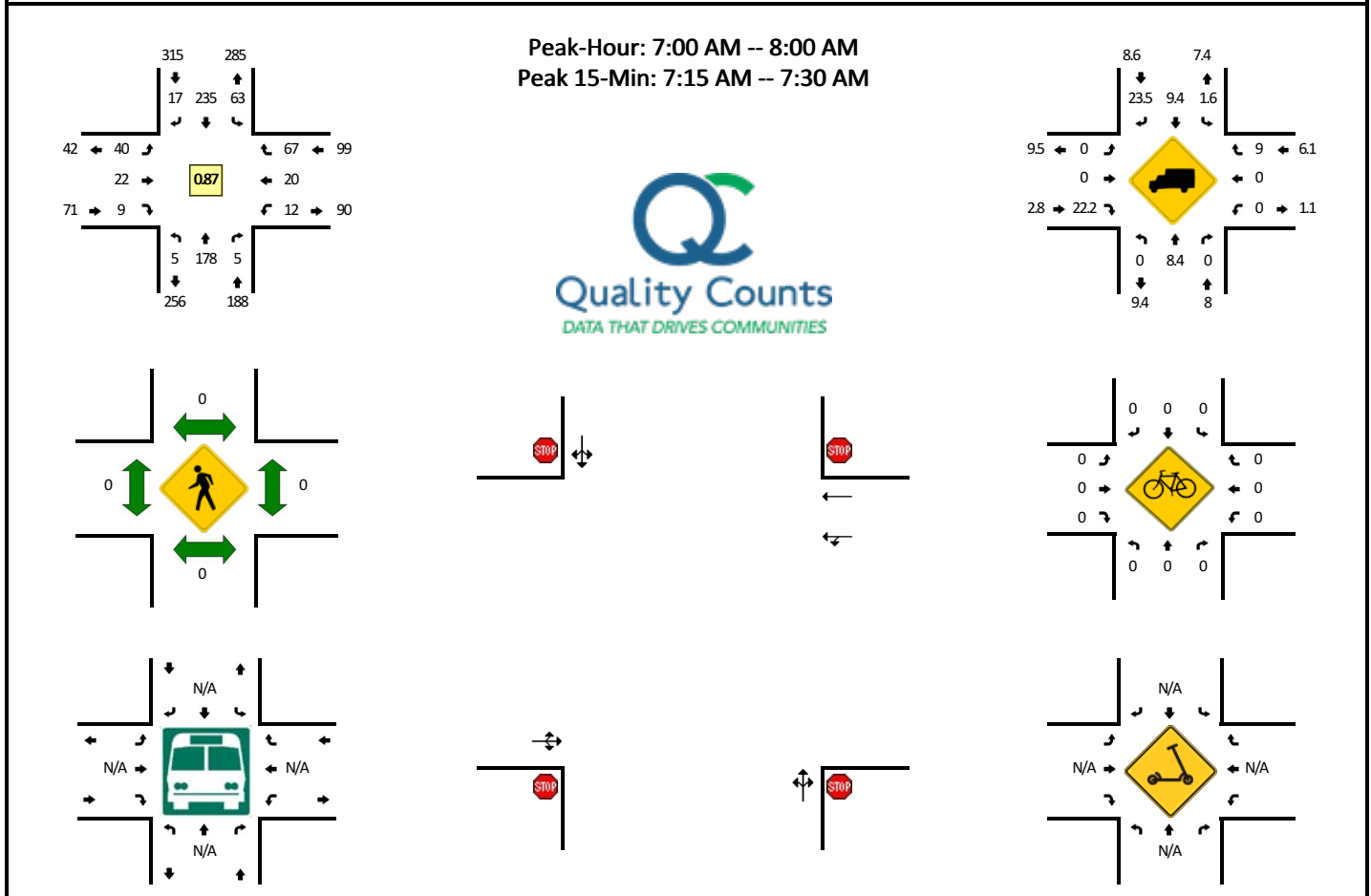


APPENDIX B

Traffic Counts

LOCATION: S Kalamazoo Ave -- W Hughes St
CITY/STATE: Marshall, MI

QC JOB #: 16046815
DATE: Tue, Mar 7 2023



15-Min Count Period Beginning At	S Kalamazoo Ave (Northbound)				S Kalamazoo Ave (Southbound)				W Hughes St (Eastbound)				W Hughes St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	1	32	1	0	8	75	0	0	8	2	4	0	3	7	9	0	150	
7:15 AM	2	59	2	0	11	66	7	0	20	6	0	0	3	1	16	0	193	
7:30 AM	1	49	1	0	24	42	7	0	7	8	2	0	5	6	20	0	172	
7:45 AM	1	38	1	0	20	52	3	0	5	6	3	0	1	6	22	0	158	673
8:00 AM	2	37	6	0	25	35	3	0	6	5	6	0	4	6	13	0	148	671
8:15 AM	2	52	5	0	35	38	4	0	7	10	0	0	2	4	11	0	170	648
8:30 AM	1	30	10	0	30	45	0	0	4	4	0	0	7	8	33	0	172	648
8:45 AM	5	34	6	0	12	35	2	0	5	6	0	0	1	8	17	0	131	621
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	8	236	8	0	44	264	28	0	80	24	0	0	12	4	64	0	772	
Heavy Trucks	0	4	0	0	4	20	4	0	0	0	0	0	0	0	20	0	52	
Buses																		
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																		

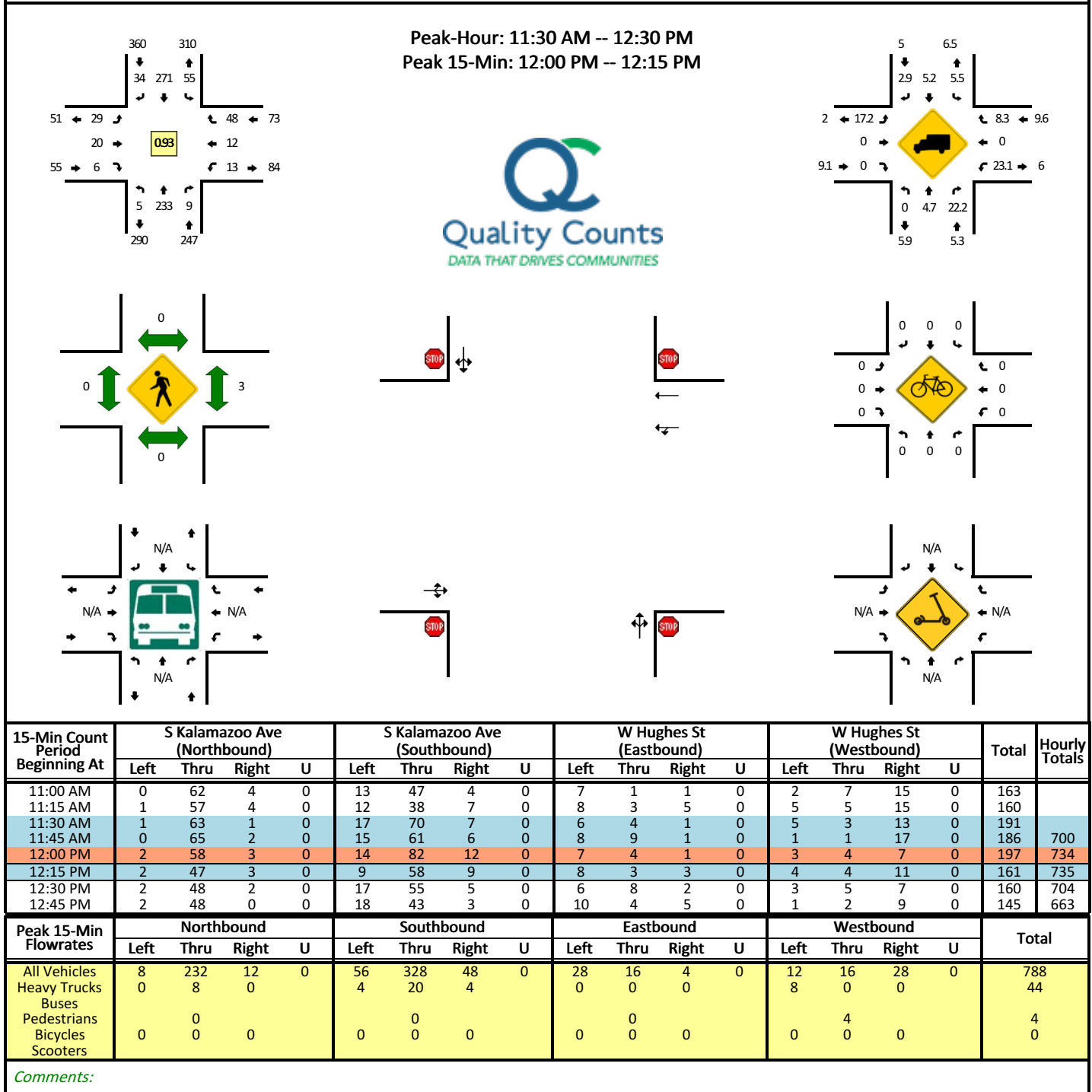
Comments:

Report generated on 3/9/2023 11:44 AM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

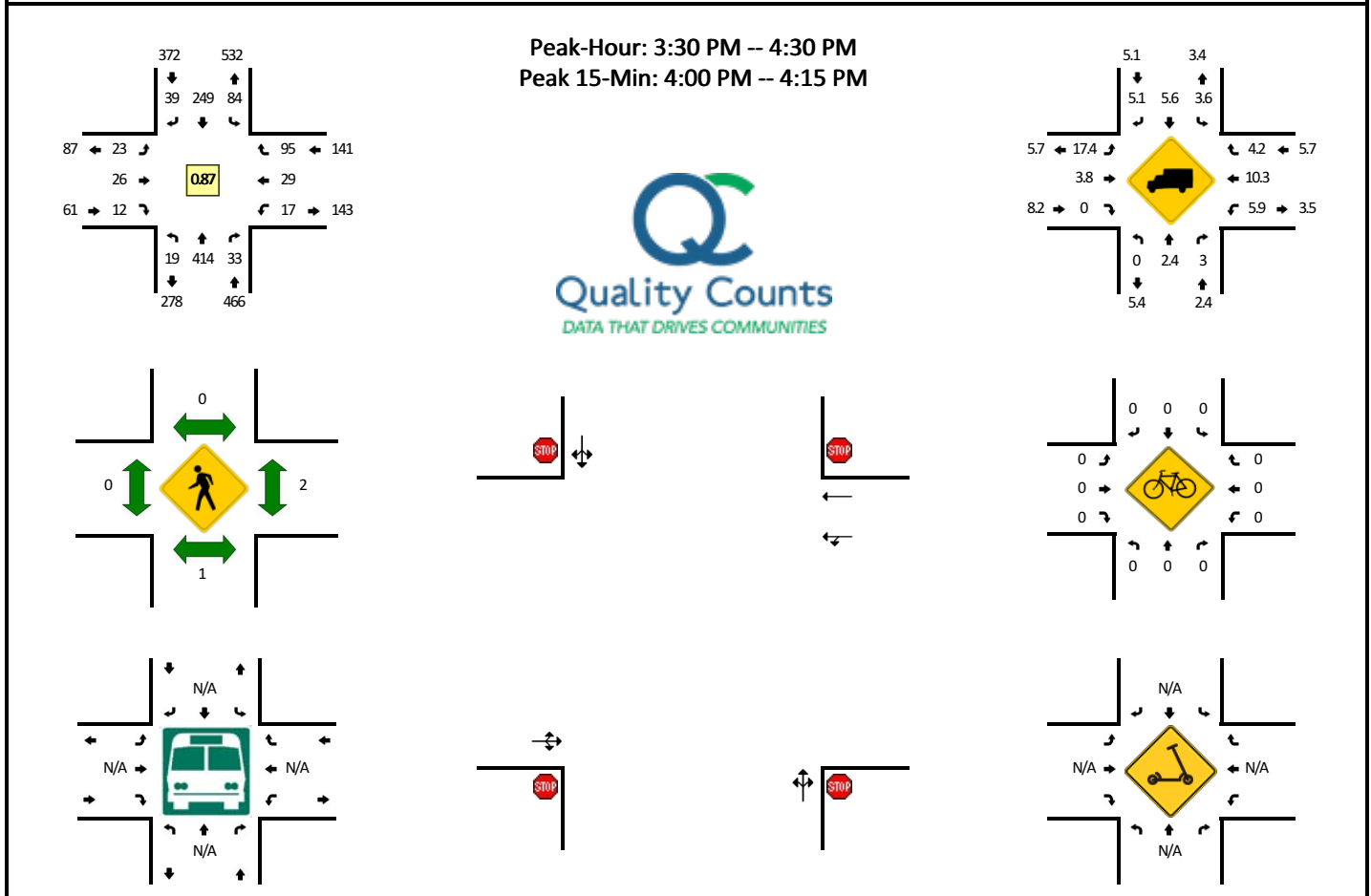
LOCATION: S Kalamazoo Ave -- W Hughes St
CITY/STATE: Marshall, MI

QC JOB #: 16046816
DATE: Tue, Mar 7 2023



LOCATION: S Kalamazoo Ave -- W Hughes St
CITY/STATE: Marshall, MI

QC JOB #: 16046817
DATE: Tue, Mar 7 2023

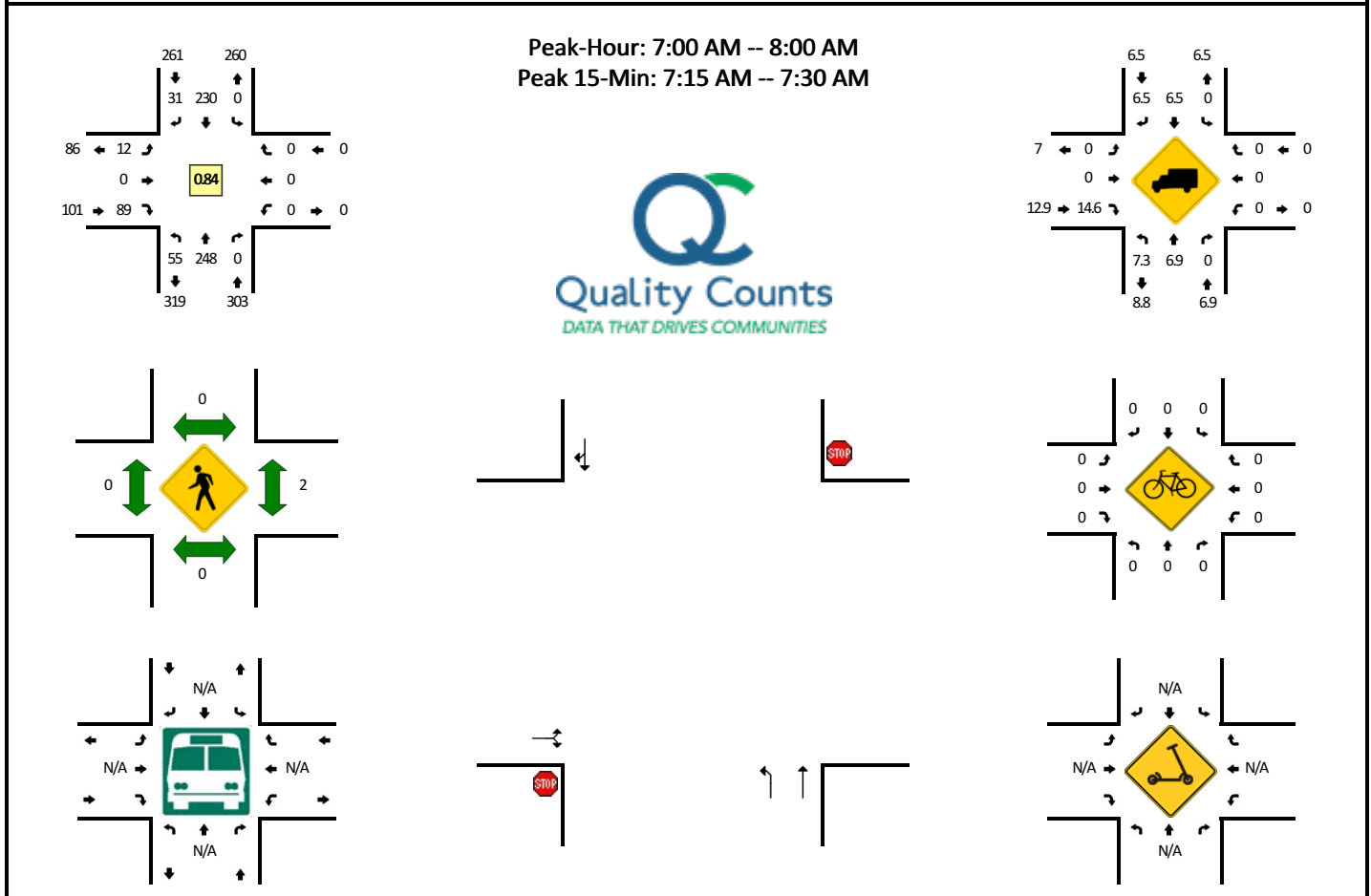


15-Min Count Period Beginning At	S Kalamazoo Ave (Northbound)				S Kalamazoo Ave (Southbound)				W Hughes St (Eastbound)				W Hughes St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	2	33	3	0	18	57	7	0	3	5	3	0	3	3	8	0	145	
2:15 PM	3	28	0	0	14	38	5	0	6	10	3	0	6	5	15	0	133	
2:30 PM	3	92	7	0	19	55	9	0	10	2	3	0	4	8	13	0	225	
2:45 PM	1	38	2	0	35	46	13	0	6	8	3	0	1	5	12	0	170	673
3:00 PM	3	54	8	0	23	57	11	0	9	6	5	0	2	11	32	0	221	749
3:15 PM	2	43	4	0	41	51	7	0	9	7	2	0	1	4	6	0	177	793
3:30 PM	8	125	6	0	24	56	8	0	9	3	4	0	4	10	31	0	288	856
3:45 PM	3	82	9	0	19	61	11	0	5	4	0	0	4	9	19	0	226	912
4:00 PM	4	126	8	0	26	81	7	0	3	11	7	0	2	1	23	0	299	990
4:15 PM	4	81	10	0	15	51	13	0	6	8	1	0	7	9	22	0	227	1040
4:30 PM	3	84	9	0	20	60	10	0	5	18	2	0	2	5	14	0	232	984
4:45 PM	4	53	2	0	18	46	9	0	12	6	3	0	3	7	15	0	178	936
5:00 PM	3	65	9	0	28	58	18	0	6	6	1	0	4	4	14	0	216	853
5:15 PM	2	43	5	0	24	48	13	0	11	6	1	0	5	7	13	0	178	804
5:30 PM	1	58	5	0	19	43	10	0	7	5	3	0	2	5	13	0	171	743
5:45 PM	2	39	5	0	31	41	15	0	4	7	1	0	4	5	6	0	160	725
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	16	504	32	0	104	324	28	0	12	44	28	0	8	4	92	0	1196	
Heavy Trucks	0	8	0		0	28	8		0	4	0		4	0	0		52	
Buses																		
Pedestrians		0				0				0				4			4	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																		

Comments:

LOCATION: S Kalamazoo Ave -- Industrial Rd
CITY/STATE: Marshall, MI

QC JOB #: 16046818
DATE: Tue, Mar 7 2023



15-Min Count Period Beginning At	S Kalamazoo Ave (Northbound)				S Kalamazoo Ave (Southbound)				Industrial Rd (Eastbound)				Industrial Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	9	41	0	0	0	55	5	0	2	0	26	0	0	0	0	0	138	
7:15 AM	11	91	0	0	0	65	9	0	1	0	21	0	0	0	0	0	198	
7:30 AM	19	66	0	0	0	56	7	0	6	0	16	0	0	0	0	0	170	
7:45 AM	16	50	0	0	0	54	10	0	3	0	26	0	0	0	0	0	159	665
8:00 AM	11	47	0	0	0	39	2	0	2	0	19	0	0	0	0	0	120	647
8:15 AM	20	50	0	0	0	57	4	0	3	0	22	0	0	0	0	0	156	605
8:30 AM	12	61	0	0	0	67	8	0	4	0	15	0	0	0	0	0	167	602
8:45 AM	12	50	0	0	0	42	11	0	7	0	10	0	0	0	0	0	132	575
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	44	364	0	0	0	260	36	0	4	0	84	0	0	0	0	0	792	
Heavy Trucks	0	4	0	0	0	24	0	0	0	0	4	0	0	0	0	0	32	
Buses																		
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																		

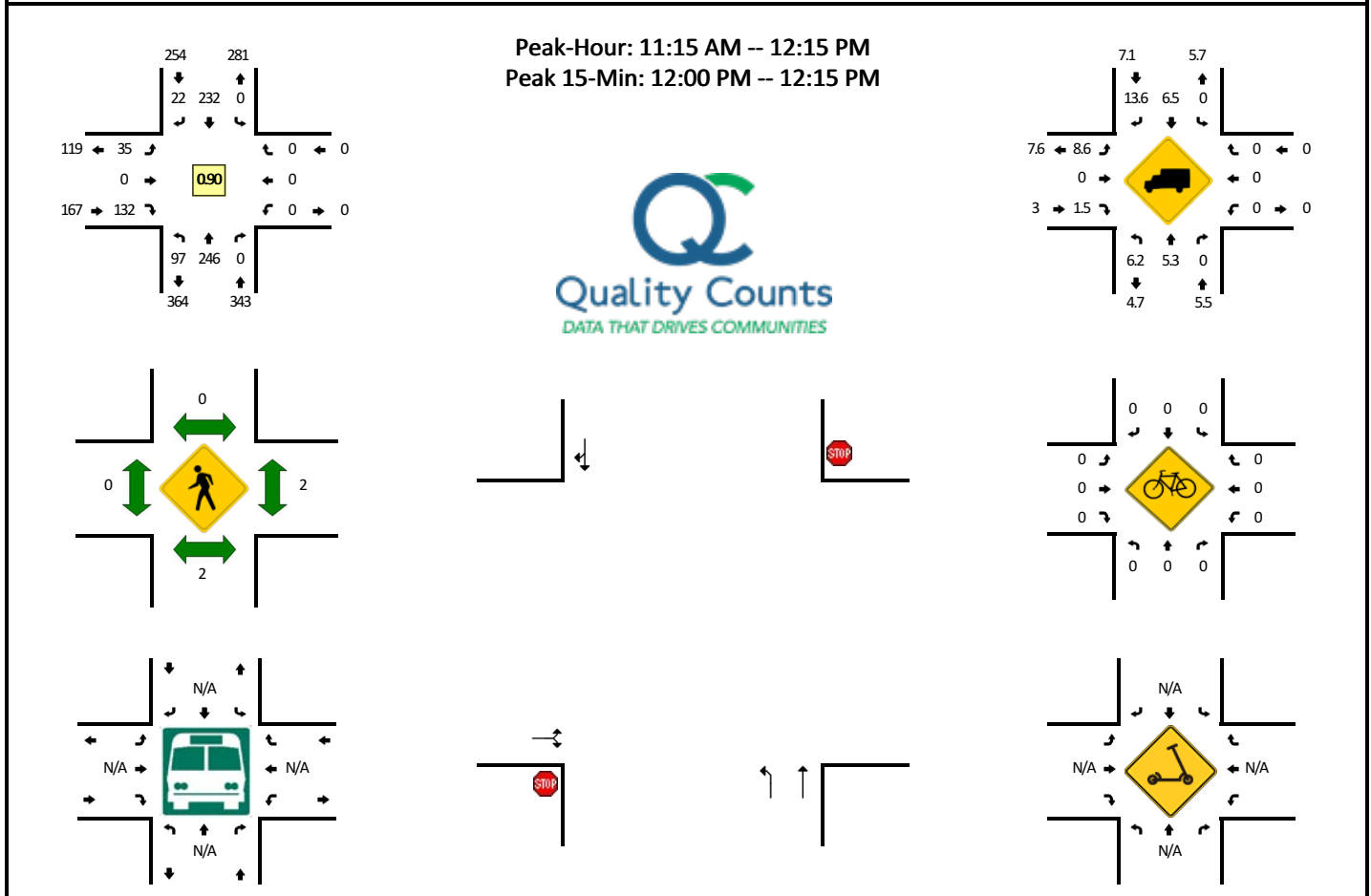
Comments:

Report generated on 3/9/2023 11:44 AM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: S Kalamazoo Ave -- Industrial Rd
CITY/STATE: Marshall, MI

QC JOB #: 16046819
DATE: Tue, Mar 7 2023



15-Min Count Period Beginning At	S Kalamazoo Ave (Northbound)				S Kalamazoo Ave (Southbound)				Industrial Rd (Eastbound)				Industrial Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
11:00 AM	22	69	0	0	0	44	5	0	1	0	23	0	0	0	0	0	164	
11:15 AM	21	60	0	0	0	41	7	0	11	0	24	0	0	0	0	0	164	
11:30 AM	30	58	0	0	0	59	4	0	6	0	37	0	0	0	0	0	194	
11:45 AM	29	63	0	0	0	56	5	0	9	0	31	0	0	0	0	0	193	715
12:00 PM	17	65	0	0	0	76	6	0	9	0	40	0	0	0	0	0	213	764
12:15 PM	17	52	0	0	0	49	9	0	2	0	27	0	0	0	0	0	156	756
12:30 PM	9	46	0	0	0	57	9	0	3	0	27	0	0	0	0	0	151	713
12:45 PM	18	57	0	0	0	44	9	0	4	0	21	0	0	0	0	0	153	673
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	68	260	0	0	0	304	24	0	36	0	160	0	0	0	0	0	852	
Heavy Trucks	0	8	0	0	0	20	4	0	0	0	4	0	0	0	0	0	36	
Buses																		
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Scooters																		

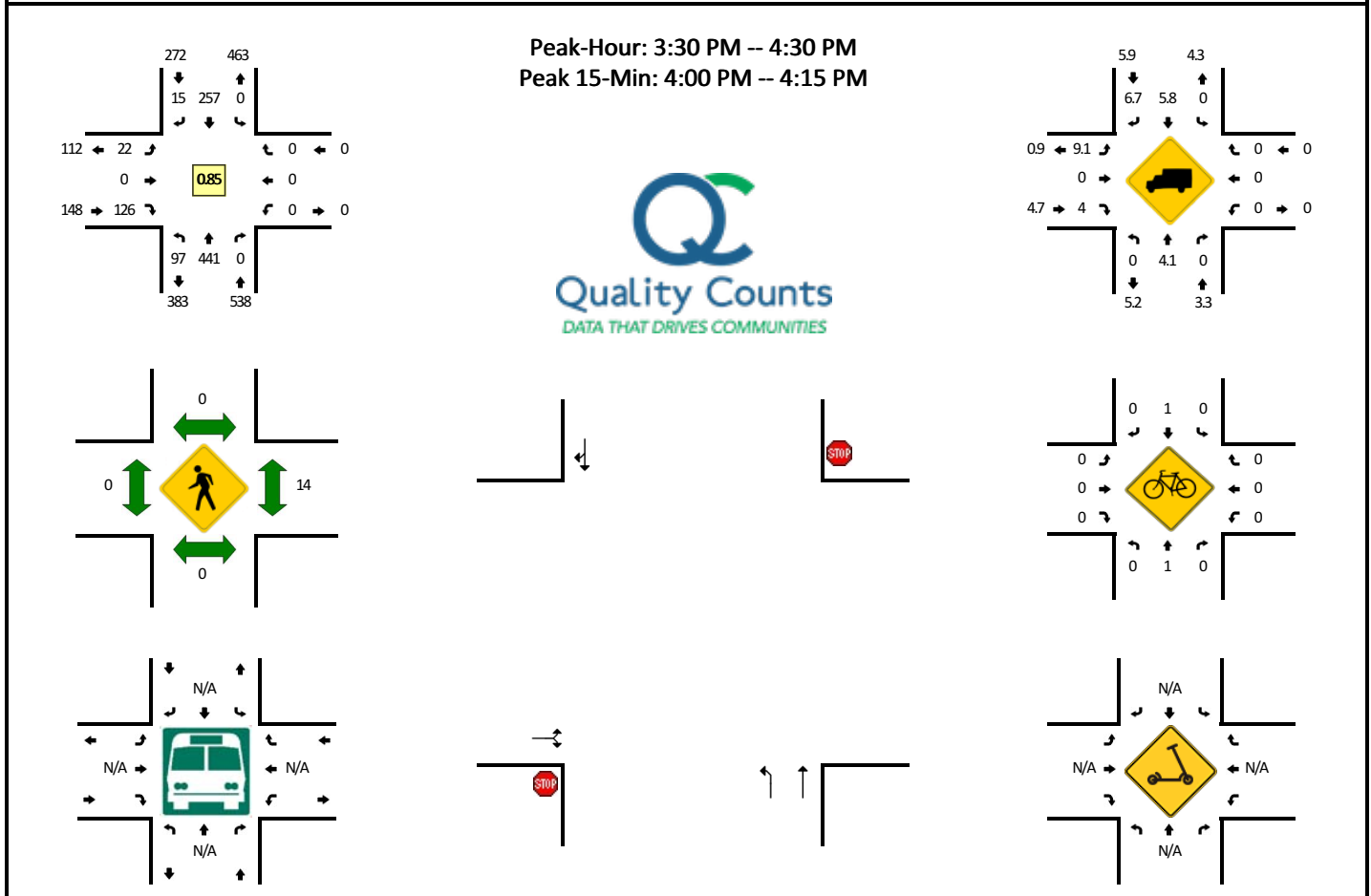
Comments:

Report generated on 3/9/2023 11:44 AM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: S Kalamazoo Ave -- Industrial Rd
CITY/STATE: Marshall, MI

QC JOB #: 16046820
DATE: Tue, Mar 7 2023



15-Min Count Period Beginning At	S Kalamazoo Ave (Northbound)				S Kalamazoo Ave (Southbound)				Industrial Rd (Eastbound)				Industrial Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	10	40	0	0	0	51	5	0	43	0	37	0	0	0	0	0	186	
2:15 PM	13	38	0	0	0	38	4	0	13	0	21	0	0	0	0	0	127	
2:30 PM	21	95	0	0	0	63	5	0	18	0	25	0	0	0	0	0	227	
2:45 PM	12	42	0	0	0	68	4	0	6	0	30	0	0	0	0	0	162	702
3:00 PM	25	74	0	0	0	70	5	0	11	0	32	0	0	0	0	0	217	733
3:15 PM	11	57	0	0	0	64	1	0	5	0	40	0	0	0	0	0	178	784
3:30 PM	25	140	0	0	0	66	6	0	3	0	25	0	0	0	0	0	265	822
3:45 PM	25	85	0	0	0	64	3	0	7	0	28	0	0	0	0	0	212	872
4:00 PM	34	118	0	0	0	77	4	0	8	0	41	0	0	0	0	0	282	937
4:15 PM	13	98	0	0	0	50	2	0	4	0	32	0	0	0	0	0	199	958
4:30 PM	32	81	0	0	0	66	5	0	6	0	26	0	0	0	0	0	216	909
4:45 PM	18	64	0	0	0	56	7	0	9	0	27	0	0	0	0	0	181	878
5:00 PM	25	71	0	0	0	75	2	0	9	0	33	0	0	0	0	0	215	811
5:15 PM	17	56	0	0	0	67	5	0	5	0	29	0	0	0	0	0	179	791
5:30 PM	12	66	0	0	0	59	5	0	6	0	17	0	0	0	0	0	165	740
5:45 PM	11	50	0	0	0	67	7	0	2	0	19	0	0	0	0	0	156	715
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	136	472	0	0	0	308	16	0	32	0	164	0	0	0	0	0	1128	
Heavy Trucks	0	12	0	0	0	28	0	0	4	0	16	0	0	0	0	0	60	
Buses																		
Pedestrians		0				0				0				40			40	
Bicycles	0	0	0		0	4	0		0	0	0		0	0	0		4	
Scoters																		

Comments:

APPENDIX C

Crash Data



Transportation Improvement Association

Crash Detail for 1/1/2018 - 12/31/2022

Criteria: WHERE A.AGENCY_ID = 14 AND cast(A.DATE_VAL as date) BETWEEN '01/01/2018' AND '12/31/2022' AND cast(A.DATE_VAL as date) BETWEEN '01/01/2018' AND '12/31/2022' AND

#1 Location: S KALAMAZOO (13.32) 5 feet Sof S HUGHES ST Crash ID: 1397693
 Date: 02/03/2018 Day: Sat Hour: 11a Weather: cloudy Roadway: wet Light: day
 Injy K: 0 Injy A: 0 Injy B: 0 Injy C: 1 Injy 0: 1 How: angle
 CVT: Marshall Area: w/i intersection HBD: N Drugs: N Complaint #: 18000099

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	enter rdwy	veh in transpt	none	none	none	failed to yield	car	rtside
2	W	go straight	veh in transpt	none	none	none	none	pickup	ctrfront

UD10: [1397693](#)

#2 Location: S KALAMAZOO (13.321) 0 feet Xof S HUGHES ST Crash ID: 1397699
 Date: 02/21/2018 Day: Wed Hour: 3pm Weather: clear Roadway: dry Light: day
 Injy K: 0 Injy A: 0 Injy B: 0 Injy C: 0 Injy 0: 3 How: angle
 CVT: Marshall Area: w/i intersection HBD: N Drugs: N Complaint #: 18000144

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	go straight	veh in transpt	none	none	none	none	car	lftrear
2	W	go straight	veh in transpt	none	none	none	failed to yield	pickup	ctrfront

UD10: [1397699](#)

#3 Location: NB S KALAMAZOO (13.317) 20 feet Wof N S HUGHES ST Crash ID: 1397730
 Date: 04/17/2018 Day: Tue Hour: 7am Weather: snow Roadway: ice Light: day
 Injy K: 0 Injy A: 0 Injy B: 0 Injy C: 0 Injy 0: 2 How: angle
 CVT: Marshall Area: w/i intersection HBD: N Drugs: N Complaint #: 18000297

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	W	go straight	veh in transpt	none	none	none	unable to stop	car	lftfront
2	N	go straight	veh in transpt	none	none	none	none	truck/bus	rtside

UD10: [1397730](#)

#4 Location: S KALAMAZOO (13.321) 0 feet Xof S HUGHES ST Crash ID: 1447973
 Date: 08/06/2018 Day: Mon Hour: 11a Weather: cloudy Roadway: dry Light: day
 Injy K: 0 Injy A: 0 Injy B: 0 Injy C: 0 Injy 0: 2 How: rr-end/lt
 CVT: Marshall Area: w/i intersection HBD: N Drugs: N Complaint #: 18000676

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	left turn	veh in transpt	none	none	none	none	car	ctrrear
2	S	go straight	veh in transpt	none	none	none	other	pickup	none

UD10: [1447973](#)

#5 **Location:** S KALAMAZOO (13.34) 100 feet Nof S HUGHES ST **Crash ID:** 1447972
Date: 08/07/2018 **Day:** Tue **Hour:** 11a **Weather:** clear **Roadway:** dry **Light:** day
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 3 **How:** other
CVT: Marshall **Area:** inter driveway **HBD:** N **Drugs:** N **Complaint #:** 18000681

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	start on rdwy	veh in transpt	none	none	none	failed to yield	pickup	none
2	S	avoid veh-angle	veh in transpt	none	none	none	imprp passing	car	rtside
3	S	left turn	veh in transpt	none	none	none	none	car	lftfront

UD10: [1447972](#)

#6 **Location:** W HUGHES (5.118) 0 feet Xof W KALAMAZOO AVE **Crash ID:** 1552547
Date: 11/21/2018 **Day:** Wed **Hour:** 8am **Weather:** cloudy **Roadway:** dry **Light:** dawn
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 2 **How:** angle
CVT: Marshall **Area:** w/i intersection **HBD:** N **Drugs:** N **Complaint #:** 18001028

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	W	start on rdwy	veh in transpt	none	none	none	failed to yield	car	ctrfront
2	S	go straight	veh in transpt	none	none	none	none	car	lftside

UD10: [1552547](#)

#7 **Location:** S KALAMAZOO (13.349) 150 feet Nof S HUGHES ST **Crash ID:** 1557607
Date: 11/29/2018 **Day:** Thu **Hour:** 7am **Weather:** cloudy **Roadway:** ice **Light:** dawn
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 1 **How:** single
CVT: Marshall **Area:** straight **HBD:** N **Drugs:** N **Complaint #:** 18001049

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	N	go straight	loss of control	none	none	none	speeding	car	lftside

UD10: [1557607](#)

#8 **Location:** S KALAMAZOO (13.323) 10 feet Nof S HUGHES ST **Crash ID:** 1571671
Date: 12/20/2018 **Day:** Thu **Hour:** 4pm **Weather:** cloudy **Roadway:** dry **Light:** day
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 2 **How:** angle
CVT: Marshall **Area:** w/i intersection **HBD:** N **Drugs:** N **Complaint #:** 18001115

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	E	left turn	veh in transpt	none	none	none	none	car	lftfront
2		go straight	veh in transpt	none	none	none	failed to yield	uncoded	roof

UD10: [1571671](#)



#9 Location: W HUGHES (5.118) 0 feet Xof W KALAMAZOO AVE **Crash ID:** 1791936
Date: 08/25/2019 **Day:** Sun **Hour:** 6pm **Weather:** clear **Roadway:** dry **Light:** day
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 2 **How:** angle
CVT: Marshall **Area:** w/i intersection **HBD:** N **Drugs:** N **Complaint #:** 19000702

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	E	enter rdwy	veh in transpt	none	none	none	disrgd traffic cntrl	car	rtfront
2	S	go straight	veh in transpt	none	none	none	none	car	ltfront

UD10: [1791936](#)

#10 Location: EB S KALAMAZOO (13.321) 0 feet Xof S HUGHES ST **Crash ID:** 1872342
Date: 11/16/2019 **Day:** Sat **Hour:** 12p **Weather:** clear **Roadway:** dry **Light:** day
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 5 **How:** rr-end
CVT: Marshall **Area:** w/i intersection **HBD:** N **Drugs:** N **Complaint #:** 19000968

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	NW	go straight	veh in transpt	none	none	none	unable to stop	car	ctrfront
2	N	slow/stop on rd	veh in transpt	none	none	none	none	pickup	ctrrear

UD10: [1872342](#)

#11 Location: KALAMAZOO (13.34) 100 feet Nof A DR N **Crash ID:** 1870944
Date: 11/19/2019 **Day:** Tue **Hour:** 5am **Weather:** clear **Roadway:** wet **Light:** dark/unltd
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 1 **How:** single
CVT: Marshall **Area:** straight **HBD:** N **Drugs:** N **Complaint #:** 19005271

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	go straight	animal	none	none	none	none	car	rtfront

UD10: [1870944](#)

#12 Location: NB S KALAMAZOO (13.321) 1 feet Wof N S HUGHES ST **Crash ID:** 2094076
Date: 09/25/2020 **Day:** Fri **Hour:** 4pm **Weather:** clear **Roadway:** dry **Light:** day
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 1 **Injy 0:** 1 **How:** angle
CVT: Marshall **Area:** w/i intersection **HBD:** N **Drugs:** N **Complaint #:** 20000670

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	E	go straight	veh in transpt	none	none	none	failed to yield	motorcycle	ltfront
2	S	go straight	veh in transpt	none	none	none	none	car	rtside

UD10: [2094076](#)

#13 Location: NB W HUGHES (5.104) 75 feet Wof N S KALAMAZOO AVE **Crash ID:** 2125080
Date: 10/29/2020 **Day:** Thu **Hour:** 8pm **Weather:** cloudy **Roadway:** dry **Light:** dark/unltd
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 1 **How:** single
CVT: Marshall **Area:** straight **HBD:** N **Drugs:** N **Complaint #:** 20000764

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	E	go straight	animal	none	none	none	none	car	rtfront

UD10: [2125080](#)



#14 Location: WB S KALAMAZOO (13.321) 0 feet Xof S HUGHES ST **Crash ID:** 2167686
Date: 12/23/2020 **Day:** Wed **Hour:** 4pm **Weather:** clear **Roadway:** dry **Light:** day
Injy K: 0 **Injy A:** 1 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 3 **How:** angle
CVT: Marshall **Area:** w/i intersection **HBD:** N **Drugs:** N **Complaint #:** 20000903

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	go straight	veh in transpt	none	none	none	none	car	rtside
2	E	go straight	veh in transpt	none	none	none	failed to yield	car	ctrfront

UD10: [2167686](#)

#15 Location: S KALAMAZOO (13.278) 100 feet Nof S CIRCLE DR ST **Crash ID:** 2277809
Date: 05/24/2021 **Day:** Mon **Hour:** 5am **Weather:** cloudy **Roadway:** wet **Light:** dark/ltd
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 1 **How:** single
CVT: Marshall **Area:** straight **HBD:** N **Drugs:** N **Complaint #:** 21000384

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	go straight	animal	none	none	none	none	car	rtfront

UD10: [2277809](#)

#16 Location: W HUGHES (5.116) 11 feet Wof S KALAMAZOO AVE **Crash ID:** 2355698
Date: 09/02/2021 **Day:** Thu **Hour:** 11a **Weather:** clear **Roadway:** dry **Light:** day
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 4 **How:** rr-end
CVT: Marshall **Area:** inter driveway **HBD:** N **Drugs:** N **Complaint #:** 21000619

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	E	slow/stop on rd	veh in transpt	none	none	none	none	other	ctrrear
2	E	go straight	veh in transpt	none	none	none	failed to yield	pickup	none

UD10: [2355698](#)

#17 Location: S KALAMAZOO (13.293) 150 feet Sof S HUGHES ST **Crash ID:** 2556848
Date: 02/27/2022 **Day:** Sun **Hour:** 2pm **Weather:** clear **Roadway:** dry **Light:** day
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 1 **How:** single
CVT: Marshall **Area:** straight **HBD:** N **Drugs:** N **Complaint #:** 22000156

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	go straight	animal	none	none	none	none	motorhome	rtfront

UD10: [2556848](#)

#18 Location: S KALAMAZOO (13.32) 5 feet Sof S HUGHES ST **Crash ID:** 2614662
Date: 06/19/2022 **Day:** Sun **Hour:** 10a **Weather:** clear **Roadway:** dry **Light:** day
Injy K: 0 **Injy A:** 0 **Injy B:** 0 **Injy C:** 0 **Injy 0:** 1 **How:** single
CVT: Marshall **Area:** w/i intersection **HBD:** N **Drugs:** N **Complaint #:** 22000484

Unit#	Veh Dir	Action Prior	Event 1	Event 2	Event 3	Event 4	Haz Action	Veh Type	Damage
1	S	go straight	animal	none	none	none	none	car	lftside

UD10: [2614662](#)

Crash Type

Count	Type
0	uncoded
6	single
0	head-on
0	head-on/lt
8	angle
2	rr-end
1	rr-end/lt
0	rr-end/rt
0	ss-same
0	ss-opp
0	back
1	other
0	unknown
Totals	18

Lighting Conditions

Count	Type
0	uncoded
13	day
2	dawn
0	dusk
1	dark/ltd
2	dark/unltd
0	other
0	unknown
Totals	18

Weather Conditions

Count	Type
0	uncoded
10	clear
7	cloudy
0	fog
0	rain
1	snow
0	wind
0	sleet/hail
0	blowing snow
0	blowing sand
0	smoke
0	unknown
Totals	18

Road Condition

Count	Type
0	uncoded
13	dry
3	wet
2	ice
0	snow
0	mud
0	slush
0	debris
0	water
0	sand
0	oily
0	other
0	unknown
Totals	18

Crashes by Month

Count	Type
0	January
3	February
0	March
1	April
1	May
1	June
0	July
3	August
2	September
1	October
4	November
2	December
Totals	18

Hazardous Action

Count	Type
17	none
1	speeding
0	spd too slow
8	failed to yield
1	disrgd traffic cntrl
0	wrong way
0	left of center
1	imprp passing
0	imprp lane use
0	imprp turn
0	imprp/no signal
0	imprp backing
2	unable to stop
1	other
0	unknown
0	reckls driving
0	carels driving
Totals	31

Unit Type

Count	Type
0	Bicyclist
0	Engineer
31	Vehicle
0	Pedestrian
Totals	31

Crashes by Year

Count	Type
8	2018
3	2019
3	2020
2	2021
2	2022
Totals	18

Crash Severity

	Fatal	A	B	C	No Injy	Total
Persons	0	1	0	2	0	3
Crashes	0	1	0	2	15	18

Alcohol in Crashes

	Fatal	A	B	C	PDO	Total
Drinking	0	0	0	0	0	0
Not Drinking	0	1	0	2	15	18
Totals	0	1	0	2	15	18

Crashes per Hour by Day

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
12a-1a	0	0	0	0	0	0	0	0
1a-2a	0	0	0	0	0	0	0	0
2a-3a	0	0	0	0	0	0	0	0
3a-4a	0	0	0	0	0	0	0	0
4a-5a	0	0	0	0	0	0	0	0
5a-6a	0	1	1	0	0	0	0	2
6a-7a	0	0	0	0	0	0	0	0
7a-8a	0	0	1	0	1	0	0	2
8a-9a	0	0	0	1	0	0	0	1
9a-10a	0	0	0	0	0	0	0	0
10a-11a	1	0	0	0	0	0	0	1
11a-12p	0	1	1	0	1	0	1	4
12p-1p	0	0	0	0	0	0	1	1
1p-2p	0	0	0	0	0	0	0	0
2p-3p	1	0	0	0	0	0	0	1
3p-4p	0	0	0	1	0	0	0	1
4p-5p	0	0	0	1	1	1	0	3
5p-6p	0	0	0	0	0	0	0	0
6p-7p	1	0	0	0	0	0	0	1
7p-8p	0	0	0	0	0	0	0	0
8p-9p	0	0	0	0	1	0	0	1
9p-10p	0	0	0	0	0	0	0	0
10p-11p	0	0	0	0	0	0	0	0
11p-12a	0	0	0	0	0	0	0	0
Totals	3	2	3	3	4	1	2	18

Authority: 1949 PA 300, Sec.257-622
Compliance: Required MSP UD-10E
Penalty: \$100 and/or 90 days (Rev 11/2020)

External # 0024534
Crash ID 2167686

Page 01 of 01
File Class 9300-1

Incident # 20000903

Reviewer BROWN, SEAN

STATE OF MICHIGAN TRAFFIC CRASH REPORT

ORI MI 1356000		Department Name Marshall Police Department			
Crash Date 12/23/2020	Crash Time 16:05	No. of Units 02	Crash Type Angle	Special Circumstances ☒ None ☐ Fleeing Police ☐ Hit and Run ☐ Unknown ☐ School Bus ☐ Animal	Special Checks ☐ Fatal ☐ Non-Traffic Area ☐ ORV/Snowmobile
County 13 - Calhoun	Traffic Control Stop Sign	Relation to Roadway On the Road		Weather Clear	Area INTR Within Intersection
City/Twsp 60 - Marshall	Contributing Circumstances 1st None 2nd		Light Daylight	Road Surface Condition Dry	Total Lanes 02 Speed Limit 40 Posted Yes
Work Zone (if applicable) Type Workers Present Activity Location					

LOCATION	Prefix S	Primary Road Name KALAMAZOO	Road Type AVE	Suffix	Divided Roadway W
	Distance / Direction AT Trafficway Not Physically Divided				
	Prefix S	Intersecting Road Name HUGHUES	Road Type ST	Suffix	Divided Roadway

UNIT / DRIVER	Unit Number 01	Unit Known Yes	State MI	Driver License Number #####	Date of Birth (Age) ####/####/#### (22)	License Type ☒ Operator ☐ Chauffeur ☐ Moped	Endorsements ☐ Cycle ☐ Farm ☐ Recreation	Sex M	Race	Total Occupants 03	Hazardous Action None
	Unit Type MV	Driver Information ##### BATTLE CREEK, MI 49017-5491 (###) ###-####				Driver is Owner No	Injury O	Position Front - Left	Restraint Shoulder and Lap Belt		
	Driver Condition at Time of Crash 1st Appeared Normal 2nd				Driver Distracted By Not Distracted		Ejected	Trapped	Airbag Deployed Not Deployed		
	Hospital NONE		Ambulance NONE								
	Alcohol Suspected No	Contributing Factor No	Alcohol Test Type ☐ Breath ☐ Blood ☐ Urine ☐ Field ☐ PBT ☐ Refused ☐ Not Offered		Alcohol Test Results ☐ Pending Test Results:		Interlock Device No				
	Drug Suspected No	Contributing Factor No	Drug Test Type ☐ Blood ☐ Urine ☐ Field ☐ Refused ☐ Not Offered		Drug Test Results ☐ Pending Test Results:		Citation Issued ☐ Hazardous ☐ Other				
	Vehicle Registration DME9843	State MI	Vehicle Description 2002	Make CHEVROLET	Model TAHOE	Color BLUE					
	VIN 1GNEK13Z82J278438	Vehicle Type Passenger Car, SUV, Van	Special Vehicles Not Applicable	Private Trailer Type	Vehicle Defect						
	Automation System(s) in Vehicle No		Automation System Level in Vehicle			Automation System Level Engaged at Time of Crash					
	Insurance Company #####		Insurance Policy # #####			Towed By BUDS TOWING		Towed To BUDS TOWING			

PASSENGERS	Passenger Information ##### ALBION CITY, MI 49224 (###) ###-####				Date of Birth (Age) ####/####/#### (28)	Sex M	Race	Position Front - Right	Restraint Shoulder and Lap Belt
					Injury O	Ejected	Trapped	Airbag Deployed Not Deployed	
	Hospital NONE				Ambulance NONE				
	Passenger Information				Date of Birth (Age)	Sex	Race	Position	Restraint
					Injury	Ejected	Trapped	Airbag Deployed	

TRUCK / BUS	Carrier Information				USDOT	MC	MPSC
					Driver's CDL Type OH OP OT ON OS OX	CDL Exempt ☐ Farm ☐ Other	
	GVWR/GCWR ☐ 10,000 lbs. or Less ☐ 10,001 - 26,000 lbs. ☐ Greater than 26,000 lbs.	Vehicle Configuration		Cargo Body Type	Medical Card	Hazardous Material ☐ Placard ☐ Cargo Spill	ID #

OWNERS	Owner Information ##### ##### #####		Owner Information	
	#####, ## #####-#### (###) ###-####			

Damaged Property	Public	Owner & Phone
------------------	--------	---------------

Unit Number 02	Unit Known Yes	State MI	Driver License Number #####	Date of Birth (Age) ####/###/#### (48)	License Type ● Operator ○ Chauffeur ○ Moped	Endorsements ○ Cycle ○ Farm ○ Recreation	Sex M	Race	Total Occupants 01	Hazardous Action Failed to Yield
Unit Type MV	Driver Information ##### MARSHALL, MI 49068-1912 (###) ###-####				Driver is Owner No	Injury A	Position Front - Left		Restraint Shoulder and Lap Belt	
Driver Condition at Time of Crash 1st Appeared Normal				2nd		Driver Distracted By Unknown		Ejected	Trapped	Airbag Deployed Deployed - Front
Hospital NONE					Ambulance MARSHALL FIRE DEPT					
Alcohol Suspected No	Contributing Factor No	Alcohol Test Type ○ Breath ○ Blood ○ Urine ○ Field ○ PBT ○ Refused ○ Not Offered			Alcohol Test Results ○ Pending Test Results:		Interlock Device No			
Drug Suspected No	Contributing Factor No	Drug Test Type ○ Blood ○ Urine ○ Field ○ Refused ○ Not Offered			Drug Test Results ○ Pending Test Results:		Citation Issued ● Hazardous ○ Other			
Vehicle Registration 3MCP31	State MI	Vehicle Description Year 2002	Make HONDA	Model CR-V	Color SILVER OR ALUMI					
VIN JHLRD78832C076802	Vehicle Type Passenger Car, SUV, Van		Special Vehicles Not Applicable	Private Trailer Type	Vehicle Defect					
Automation System(s) in Vehicle No		Automation System Level in Vehicle			Automation System Level Engaged at Time of Crash					
Insurance Company #####		Insurance Policy # #####			Towed By BUDS TOWING		Towed To BUDS TOWING			
Location of Greatest Damage 01	First Impact 01	Extent of Damage (Power Unit and/or Trailers) Disabling Damage		Vehicle Direction E	Vehicle Use Private		Action Prior Going Straight Ahead			
Sequence of Events ● 17 - Motor Veh in Transport										
● indicates MOST harmful event)										
PASSENGERS	Passenger Information				Date of Birth (Age)	Sex	Race	Position	Restraint	
					Injury	Ejected	Trapped	Airbag Deployed		
	Hospital				Ambulance					
	Passenger Information				Date of Birth (Age)	Sex	Race	Position	Restraint	
				Injury	Ejected	Trapped	Airbag Deployed			
Hospital				Ambulance						
TRUCK/BUS	Carrier Information				USDOT	MC	MPSC			
					Driver's CDL Type	Endorsements OH OP OT ON OS OX	CDL Exempt ○ Farm ○ Other			
	GVWR/GCWR ○ 10,000 lbs. or Less ○ 10,001 - 26,000 lbs. ○ Greater than 26,000 lbs.	Vehicle Configuration		Cargo Body Type	Medical Card	Hazardous Material ○ Placard ○ Cargo Spill		ID #	Class #	
OWNERS	Owner Information				Owner Information					
WITNESS	Witness Information				Witness Information					
Investigated at Scene Yes	Reported Date (Time) 12/23/2020 (20:21)	1st Investigator Name (Badge) HYDE, BRIANNA (72)			2nd Investigator Name (Badge)			Photos No		
Narrative Unit 1 stated that he was going S/B on S Kalamazoo Ave when he noticed Unit 2 going E/B on A Dr (Hughes St). Unit 1 stated that while going through the intersection he noticed that Unit 2 wasn't stopped and tried to get out of the way. Unit 1 stated that he was unable to get out of the way fast enough and Unit 2 struck the passenger side of the vehicle causing it to spin in circles until the finally stopped at the edge of the road on S Kalamazoo Ave. Unit 2 stated that he was at the stop sign of the intersection and there was another vehicle on the other side of Hughes St. Unit 2 stated it appeared to him that the driver of the other vehicle waved him along to go. Unit 2 stated that he looked both ways before crossing and did not notice the vehicles there.					Diagram Indicate North S KALAMAZOO AVE Unit 2 Drawing Not To Scale.					

APPENDIX D

OPERATIONAL ANALYSIS

HCM 6th TWSC
3: Kalamazoo Avenue & W Hughes Street

03/29/2023

Intersection												
Int Delay, s/veh	4.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕		↕			↕	
Traffic Vol, veh/h	40	22	9	12	20	67	5	178	5	63	235	17
Future Vol, veh/h	40	22	9	12	20	67	5	178	5	63	235	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	50	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	24	10	13	22	73	5	193	5	68	255	18
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	653	608	264	623	615	196	273	0	0	198	0	0
Stage 1	400	400	-	206	206	-	-	-	-	-	-	-
Stage 2	253	208	-	417	409	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	380	410	775	398	407	845	1290	-	-	1375	-	-
Stage 1	626	602	-	796	731	-	-	-	-	-	-	-
Stage 2	751	730	-	613	596	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	317	385	775	357	382	845	1290	-	-	1375	-	-
Mov Cap-2 Maneuver	317	385	-	357	382	-	-	-	-	-	-	-
Stage 1	623	567	-	793	728	-	-	-	-	-	-	-
Stage 2	663	727	-	546	561	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	17.5		11.6			0.2			1.6			
HCM LOS	C		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1290	-	-	364	372	845	1375	-	-			
HCM Lane V/C Ratio	0.004	-	-	0.212	0.094	0.086	0.05	-	-			
HCM Control Delay (s)	7.8	0	-	17.5	15.7	9.7	7.8	0	-			
HCM Lane LOS	A	A	-	C	C	A	A	A	-			
HCM 95th %tile Q(veh)	0	-	-	0.8	0.3	0.3	0.2	-	-			

HCM 6th TWSC
6: Kalamazoo Avenue & Industrial Road

03/29/2023

Intersection						
Int Delay, s/veh	2.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	89	55	248	230	31
Future Vol, veh/h	12	89	55	248	230	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	125	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	97	60	270	250	34

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	657	267	284
Stage 1	267	-	-
Stage 2	390	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	430	772	1278
Stage 1	778	-	-
Stage 2	684	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	410	772	1278
Mov Cap-2 Maneuver	410	-	-
Stage 1	741	-	-
Stage 2	684	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	1.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1278	-	699	-	-
HCM Lane V/C Ratio	0.047	-	0.157	-	-
HCM Control Delay (s)	8	-	11.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	-	-

HCM 6th TWSC
3: Kalamazoo Avenue & W Hughes Street

03/29/2023

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	26	12	17	29	95	19	414	33	84	249	39
Future Vol, veh/h	23	26	12	17	29	95	19	414	33	84	249	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	50	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	28	13	18	32	103	21	450	36	91	271	42
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1052	1002	292	1005	1005	468	313	0	0	486	0	0
Stage 1	474	474	-	510	510	-	-	-	-	-	-	-
Stage 2	578	528	-	495	495	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	204	242	747	220	241	595	1247	-	-	1077	-	-
Stage 1	571	558	-	546	538	-	-	-	-	-	-	-
Stage 2	501	528	-	556	546	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	135	212	747	176	211	595	1247	-	-	1077	-	-
Mov Cap-2 Maneuver	135	212	-	176	211	-	-	-	-	-	-	-
Stage 1	558	501	-	533	526	-	-	-	-	-	-	-
Stage 2	380	516	-	462	490	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	32.3		17.9		0.3		2					
HCM LOS	D		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1247	-	-	197 197 595	1077	-	-					
HCM Lane V/C Ratio	0.017	-	-	0.337 0.254 0.174	0.085	-	-					
HCM Control Delay (s)	7.9	0	-	32.3 29.4 12.3	8.7	0	-					
HCM Lane LOS	A	A	-	D D B	A A	-	-					
HCM 95th %tile Q(veh)	0.1	-	-	1.4 1 0.6	0.3	-	-					

HCM 6th TWSC
6: Kalamazoo Avenue & Industrial Road

03/29/2023

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	126	97	441	257	15
Future Vol, veh/h	22	126	97	441	257	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	125	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	137	105	479	279	16
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	976	287	295	0	-	0
Stage 1	287	-	-	-	-	-
Stage 2	689	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	279	752	1266	-	-	-
Stage 1	762	-	-	-	-	-
Stage 2	498	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	256	752	1266	-	-	-
Mov Cap-2 Maneuver	256	-	-	-	-	-
Stage 1	699	-	-	-	-	-
Stage 2	498	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	13.5	1.5		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1266	-	584	-	-	
HCM Lane V/C Ratio	0.083	-	0.275	-	-	
HCM Control Delay (s)	8.1	-	13.5	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0.3	-	1.1	-	-	

HCM 6th TWSC
3: Kalamazoo Avenue & W Hughes Street

09/26/2023

Intersection												
Int Delay, s/veh	45.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	154	61	88	21	35	80	41	230	12	67	247	54
Future Vol, veh/h	154	61	88	21	35	80	41	230	12	67	247	54
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	50	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	167	66	96	23	38	87	45	250	13	73	268	59
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	853	797	298	872	820	257	327	0	0	263	0	0
Stage 1	444	444	-	347	347	-	-	-	-	-	-	-
Stage 2	409	353	-	525	473	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	279	319	741	271	310	782	1233	-	-	1301	-	-
Stage 1	593	575	-	669	635	-	-	-	-	-	-	-
Stage 2	619	631	-	536	558	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	204	284	741	178	276	782	1233	-	-	1301	-	-
Mov Cap-2 Maneuver	204	284	-	178	276	-	-	-	-	-	-	-
Stage 1	568	535	-	640	608	-	-	-	-	-	-	-
Stage 2	494	604	-	381	519	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	152.4		16.8			1.2			1.4			
HCM LOS	F		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1233	-	-	278 229 782	1301	-	-					
HCM Lane V/C Ratio	0.036	-	-	1.185 0.266 0.111	0.056	-	-					
HCM Control Delay (s)	8	0	-	152.4 26.3 10.2	7.9	0	-					
HCM Lane LOS	A	A	-	F D B	A	A	-					
HCM 95th %tile Q(veh)	0.1	-	-	14.8 1 0.4	0.2	-	-					

HCM 6th TWSC
6: Kalamazoo Avenue & Industrial Road

09/26/2023

Intersection						
Int Delay, s/veh	2.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	106	114	367	256	31
Future Vol, veh/h	12	106	114	367	256	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	125	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	115	124	399	278	34
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	942	295	312	0	-	0
Stage 1	295	-	-	-	-	-
Stage 2	647	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	292	744	1248	-	-	-
Stage 1	755	-	-	-	-	-
Stage 2	521	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	263	744	1248	-	-	-
Mov Cap-2 Maneuver	263	-	-	-	-	-
Stage 1	680	-	-	-	-	-
Stage 2	521	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	12.2	1.9		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1248	-	627	-	-	
HCM Lane V/C Ratio	0.099	-	0.205	-	-	
HCM Control Delay (s)	8.2	-	12.2	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0.3	-	0.8	-	-	

HCM 6th TWSC

3: Kalamazoo Avenue & W Hughes Street

09/26/2023

Intersection												
Int Delay, s/veh	395.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↗		↕			↕	
Traffic Vol, veh/h	97	51	76	38	68	105	119	452	46	96	298	161
Future Vol, veh/h	97	51	76	38	68	105	119	452	46	96	298	161
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	50	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	105	55	83	41	74	114	129	491	50	104	324	175
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	1488	1419	412	1463	1481	516	499	0	0	541	0	0
Stage 1	620	620	-	774	774	-	-	-	-	-	-	-
Stage 2	868	799	-	689	707	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	~ 102	137	640	107	125	559	1065	-	-	1028	-	-
Stage 1	476	480	-	391	408	-	-	-	-	-	-	-
Stage 2	347	398	-	436	438	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	~ 19	97	640	~ 41	88	559	1065	-	-	1028	-	-
Mov Cap-2 Maneuver	~ 19	97	-	~ 41	88	-	-	-	-	-	-	-
Stage 1	393	411	-	323	337	-	-	-	-	-	-	-
Stage 2	178	328	-	281	375	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, \$	2561.9		282.4			1.7			1.5			
HCM LOS	F		F									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1065	-	-	39 62 559 1028	-	-	-					
HCM Lane V/C Ratio	0.121	-	-	6.243 1.858 0.204 0.102	-	-	-					
HCM Control Delay (s)	8.8	0	\$ 2561.9	\$ 549.2 13.1 8.9 0	-	-	-					
HCM Lane LOS	A	A	-	F F B A A	-	-	-					
HCM 95th %tile Q(veh)	0.4	-	-	28.7 10.7 0.8 0.3	-	-	-					
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s			+: Computation Not Defined			*: All major volume in platoon				

HCM 6th TWSC
6: Kalamazoo Avenue & Industrial Road

09/26/2023

Intersection						
Int Delay, s/veh	3.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	175	135	526	391	15
Future Vol, veh/h	22	175	135	526	391	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	125	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	190	147	572	425	16

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1299	433	441	0	-	0
Stage 1	433	-	-	-	-	-
Stage 2	866	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	178	623	1119	-	-	-
Stage 1	654	-	-	-	-	-
Stage 2	412	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	155	623	1119	-	-	-
Mov Cap-2 Maneuver	155	-	-	-	-	-
Stage 1	568	-	-	-	-	-
Stage 2	412	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.1	1.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1119	-	466	-	-
HCM Lane V/C Ratio	0.131	-	0.46	-	-
HCM Control Delay (s)	8.7	-	19.1	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.5	-	2.4	-	-

HCM 6th Signalized Intersection Summary

3: Kalamazoo Avenue & W Hughes Street

09/26/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	154	61	88	21	35	80	41	230	12	67	247	54
Future Volume (veh/h)	154	61	88	21	35	80	41	230	12	67	247	54
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	167	66	96	23	38	87	45	250	13	73	268	59
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	297	106	121	229	333	444	153	744	36	182	607	122
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.49	0.49	0.49	0.49	0.49	0.49
Sat Flow, veh/h	667	377	430	459	1188	1585	143	1530	74	196	1247	250
Grp Volume(v), veh/h	329	0	0	61	0	87	308	0	0	400	0	0
Grp Sat Flow(s),veh/h/ln	1474	0	0	1647	0	1585	1746	0	0	1693	0	0
Q Serve(g_s), s	8.8	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	10.1	0.0	0.0	1.2	0.0	2.1	5.0	0.0	0.0	7.1	0.0	0.0
Prop In Lane	0.51		0.29	0.38		1.00	0.15		0.04	0.18		0.15
Lane Grp Cap(c), veh/h	523	0	0	562	0	444	933	0	0	910	0	0
V/C Ratio(X)	0.63	0.00	0.00	0.11	0.00	0.20	0.33	0.00	0.00	0.44	0.00	0.00
Avail Cap(c_a), veh/h	836	0	0	900	0	787	933	0	0	910	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.3	0.0	0.0	13.2	0.0	13.5	7.8	0.0	0.0	8.3	0.0	0.0
Incr Delay (d2), s/veh	1.3	0.0	0.0	0.1	0.0	0.2	0.9	0.0	0.0	1.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	0.0	0.5	0.0	0.7	1.4	0.0	0.0	2.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.5	0.0	0.0	13.3	0.0	13.7	8.7	0.0	0.0	9.9	0.0	0.0
LnGrp LOS	B	A	A	B	A	B	A	A	A	A	A	A
Approach Vol, veh/h		329			148			308			400	
Approach Delay, s/veh		17.5			13.6			8.7			9.9	
Approach LOS		B			B			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		30.0		19.3		30.0		19.3				
Change Period (Y+Rc), s		6.0		5.5		6.0		5.5				
Max Green Setting (Gmax), s		24.0		24.5		24.0		24.5				
Max Q Clear Time (g_c+I1), s		7.0		12.1		9.1		4.1				
Green Ext Time (p_c), s		1.5		1.7		2.1		0.6				
Intersection Summary												
HCM 6th Ctrl Delay				12.2								
HCM 6th LOS				B								

HCM 6th Signalized Intersection Summary

3: Kalamazoo Avenue & W Hughes Street

09/26/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	97	51	76	38	68	105	119	452	46	96	298	161
Future Volume (veh/h)	97	51	76	38	68	105	119	452	46	96	298	161
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	105	55	83	41	74	114	129	491	50	104	324	175
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	203	95	105	185	286	353	215	710	68	190	527	261
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.56	0.56	0.56	0.56	0.56	0.56
Sat Flow, veh/h	478	428	470	418	1281	1585	239	1264	121	198	939	465
Grp Volume(v), veh/h	243	0	0	115	0	114	670	0	0	603	0	0
Grp Sat Flow(s),veh/h/ln	1375	0	0	1699	0	1585	1624	0	0	1601	0	0
Q Serve(g_s), s	6.3	0.0	0.0	0.0	0.0	3.2	2.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.1	0.0	0.0	2.7	0.0	3.2	15.0	0.0	0.0	12.6	0.0	0.0
Prop In Lane	0.43		0.34	0.36		1.00	0.19		0.07	0.17		0.29
Lane Grp Cap(c), veh/h	403	0	0	470	0	353	993	0	0	978	0	0
V/C Ratio(X)	0.60	0.00	0.00	0.24	0.00	0.32	0.67	0.00	0.00	0.62	0.00	0.00
Avail Cap(c_a), veh/h	580	0	0	666	0	549	993	0	0	978	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.7	0.0	0.0	17.2	0.0	17.4	8.2	0.0	0.0	7.8	0.0	0.0
Incr Delay (d2), s/veh	1.5	0.0	0.0	0.3	0.0	0.5	3.7	0.0	0.0	2.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	0.0	1.1	0.0	1.1	3.9	0.0	0.0	3.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.1	0.0	0.0	17.4	0.0	17.9	11.9	0.0	0.0	10.7	0.0	0.0
LnGrp LOS	C	A	A	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h	243		229				670			603		
Approach Delay, s/veh	21.1		17.7				11.9			10.7		
Approach LOS	C		B				B			B		
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	36.0		17.4		36.0		17.4					
Change Period (Y+Rc), s	6.0		5.5		6.0		5.5					
Max Green Setting (Gmax), s	30.0		18.5		30.0		18.5					
Max Q Clear Time (g_c+I1), s	17.0		11.1		14.6		5.2					
Green Ext Time (p_c), s	3.7		0.9		3.8		0.8					
Intersection Summary												
HCM 6th Ctrl Delay			13.5									
HCM 6th LOS			B									

Operational Data

Main Geometry (ft)

Approach and Entry Geometry

Leg	Leg Names	Approach Bearing (deg)	Grade Separation G	Half Width V	Approach Lanes n	Entry Width E	Entry Lanes n	Flare Length L'	Entry Radius R	Entry Angle Phi
1	S Kalamazoo NB	0	0	12.00	1	16.50	1	40.00	66.00	30.00
2	Hughes EB	90	0	12.00	1	16.50	1	40.00	66.00	30.00
3	S Kalamazoo SB	180	0	12.00	1	16.50	1	40.00	66.00	30.00
4	Hughes WB	270	0	12.00	1	16.50	1	40.00	66.00	30.00

Circulating and Exit Geometry

Leg	Leg Names	Inscribed Diameter D	Circulating Width C	Circulating Lanes nc	Exit Width Ex	Exit Lanes nex	Exit Half Width Vx	Exit Half Width Lanes nvx
1	S Kalamazoo NB	100.00	18.00	1	15.00	1	12.00	1
2	Hughes EB	100.00	18.00	1	15.00	1	12.00	1
3	S Kalamazoo SB	100.00	18.00	1	15.00	1	12.00	1
4	Hughes WB	100.00	18.00	1	15.00	1	12.00	1

Capacity Modifiers and Capacity Calibration (veh/hr)

Leg	Leg Names	Entry Capacity		Entry Calibration		Approach Road			Exit Road		
		Capacity + or -	XWalk Factor	Intercept + or -	Slope Factor	V (ft)	Default Capacity	Calib Capacity	V (ft)	Default Capacity	Calib Capacity
1	S Kalamazoo NB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
2	Hughes EB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
3	S Kalamazoo SB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
4	Hughes WB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0

Operational Results

2023 AM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	S Kalamazoo NB	None	291		127		495	1002		0.2910	
2	Hughes EB	None	312		301		117	911		0.3427	
3	S Kalamazoo SB	None	379		264		349	930		0.4075	
4	Hughes WB	None	140		482		161	816		0.1717	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	S Kalamazoo NB	None	6.85		6.85	1.08		A		A
2	Hughes EB	None	7.89		7.89	1.39		A		A
3	S Kalamazoo SB	None	8.58		8.58	1.82		A		A
4	Hughes WB	None	6.46		6.46	0.56		A		A

2023 AM Peak - 15 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow		Average VCR	
			Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass
1	S Kalamazoo NB	None	317		138		538		996	0.3181
2	Hughes EB	None	339		327		128		897	0.3781
3	S Kalamazoo SB	None	412		286		379		918	0.4487
4	Hughes WB	None	152		524		175		794	0.1917

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	S Kalamazoo NB	None	5.52		5.52	1.08		A		A
2	Hughes EB	None	6.39		6.39	1.39		A		A
3	S Kalamazoo SB	None	6.82		6.82	1.82		A		A
4	Hughes WB	None	5.81		5.81	0.56		A		A

Global Results

Performance and Accidents

2023 AM Peak Global Performance

Parameter	Units	Entries	Bypasses	Total
Arrive Flows	veh/hr	1123		1123
Capacity	veh/hr	3658		3658
Average Delay	sec/veh	6.69		6.69
L.O.S. (Signal)	A – F	A		A
L.O.S. (Unsig)	A – F	A		A
Total Delay	veh.hrs	2.09		2.09

Operational Data

Main Geometry (ft)

Approach and Entry Geometry

Leg	Leg Names	Approach Bearing (deg)	Grade Separation G	Half Width V	Approach Lanes n	Entry Width E	Entry Lanes n	Flare Length L'	Entry Radius R	Entry Angle Phi
1	S Kalamazoo NB	0	0	12.00	1	16.50	1	40.00	66.00	30.00
2	Hughes EB	90	0	12.00	1	16.50	1	40.00	66.00	30.00
3	S Kalamazoo SB	180	0	12.00	1	16.50	1	40.00	66.00	30.00
4	Hughes WB	270	0	12.00	1	16.50	1	40.00	66.00	30.00

Circulating and Exit Geometry

Leg	Leg Names	Inscribed Diameter D	Circulating Width C	Circulating Lanes nc	Exit Width Ex	Exit Lanes nex	Exit Half Width Vx	Exit Half Width Lanes nvx
1	S Kalamazoo NB	100.00	18.00	1	15.00	1	12.00	1
2	Hughes EB	100.00	18.00	1	15.00	1	12.00	1
3	S Kalamazoo SB	100.00	18.00	1	15.00	1	12.00	1
4	Hughes WB	100.00	18.00	1	15.00	1	12.00	1

Capacity Modifiers and Capacity Calibration (veh/hr)

Leg	Leg Names	Entry Capacity		Entry Calibration		Approach Road			Exit Road		
		Capacity + or -	XWalk Factor	Intercept + or -	Slope Factor	V (ft)	Default Capacity	Calib Capacity	V (ft)	Default Capacity	Calib Capacity
1	S Kalamazoo NB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
2	Hughes EB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
3	S Kalamazoo SB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
4	Hughes WB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0

Operational Results

2023 PM Peak - 60 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)					Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow	Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass		Entry	Bypass	Entry	Bypass
1	S Kalamazoo NB	None	617		202		500	1021		0.6042	
2	Hughes EB	None	224		609		210	802		0.2791	
3	S Kalamazoo SB	None	555		267		566	986		0.5627	
4	Hughes WB	None	211		491		331	866		0.2437	

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	S Kalamazoo NB	None	11.67		11.67	4.20		B		B
2	Hughes EB	None	8.09		8.09	1.11		A		A
3	S Kalamazoo SB	None	11.07		11.07	3.57		B		B
4	Hughes WB	None	7.26		7.26	0.91		A		A

2023 PM Peak - 15 minutes

Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Exit Flow		Capacity	
			Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass
1	S Kalamazoo NB	None	671		219		543		1012	0.6628
2	Hughes EB	None	243		661		228		774	0.3144
3	S Kalamazoo SB	None	603		290		615		974	0.6194
4	Hughes WB	None	229		533		359		843	0.2720

Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	S Kalamazoo NB	None	9.29		9.29	4.20		A		A
2	Hughes EB	None	6.93		6.93	1.11		A		A
3	S Kalamazoo SB	None	8.81		8.81	3.57		A		A
4	Hughes WB	None	6.19		6.19	0.91		A		A

APPENDIX E

Traffic Signal Warrant Analysis

Summary of Warrants			
Spot Number:	0		
Major Street:	Kalamazoo Avenue	Minor Street:	Hughes Street
Intersection:	Kalamazoo Avenue at Hughes Street		
City/Twp:	Marshall		
Date Performed:	3/10/2023	Performed By:	Megan Jauch
Date Volumes Collected:	3/7/2023		
Warrant	Condition	Is Warrant Met	
Data Has Been Validated		YES	
WARRANT 1: Eight-Hour Vehicular Volume		NO	
	Condition A	NO	
	Condition B	NO	
	Condition A&B	NO	
WARRANT 2: Four-Hour Vehicular Volume	(70%)	NO	
WARRANT 3: Peak-Hour Vehicular Volume	(70%)	#N/A	
	Condition A	#N/A	
	Condition B	NO	
WARRANT 4: Pedestrian Volume	(70%)	NO	
	Four Hour	N/A	
	Peak Hour	N/A	
	(Threshold) HAWK	NO	
	(Threshold) RRFB	NO	
WARRANT 5: School Crossing		NO	
WARRANT 6: Coordinated Signal System		NO	
WARRANT 7: Crash Experience		NO	
	Condition A	NO	
	Condition B	NO	
WARRANT 8: Roadway Network		NO	
WARRANT 9: Intersection Near a Grade Crossing		#N/A	
Issue to Be Addressed by Signalization:			
0			

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 1: Eight-Hour Vehicular Volume

Intersection:	Kalamazoo Avenue @ Hughes Street		
Date	3/10/2023	by	Megan Jauch

1	: No. of Lanes on Major St?
2	: No. of Lanes on Minor St?
50	: Speed limit or 85th Percentile? (MPH)
YES	: Is the intersection within an Isolated community?
6780	: if answer 4 is Yes, then what is the of the population isolated community?
YES	: Have other remedial measures been tried?

USE 70% FOR WARRANTS 1A AND 1B. USE 56% FOR WARRANT 1A&B

	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
Time	N-S	E-W											
00:01 - 01:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
01:00 - 02:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
02:00 - 03:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
03:00 - 04:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
04:00 - 05:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
05:00 - 06:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
06:00 - 07:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
07:00 - 08:00	503	99	350	140	NO	525	70	NO	280	112	420	56	NO
08:00 - 09:00	454	114	350	140	NO	525	70	NO	280	112	420	56	YES
09:00 - 10:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
10:00 - 11:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
11:00 - 12:00	557	89	350	140	NO	525	70	YES	280	112	420	56	NO
12:00 - 13:00	542	61	350	140	NO	525	70	NO	280	112	420	56	NO
13:00 - 14:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
14:00 - 15:00	528	83	350	140	NO	525	70	YES	280	112	420	56	NO
15:00 - 16:00	716	133	350	140	NO	525	70	YES	280	112	420	56	YES
16:00 - 17:00	744	110	350	140	NO	525	70	YES	280	112	420	56	NO
17:00 - 18:00	585	82	350	140	NO	525	70	YES	280	112	420	56	NO
18:00 - 19:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
19:00 - 20:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
20:00 - 21:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
21:00 - 22:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
22:00 - 23:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO
23:00 - 00:00	0	0	350	140	NO	525	70	NO	280	112	420	56	NO

Number of Hours that met the warrant 1A =	0
Number of Hours that met the warrant 1B =	5
Number of Hours that met the warrant 1 A & B =	2

A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	NO
B. Is the Interruption of Continuous Traffic Met? (Condition B)	NO
C. Combination of Warrants A and B Criteria Met?	NO

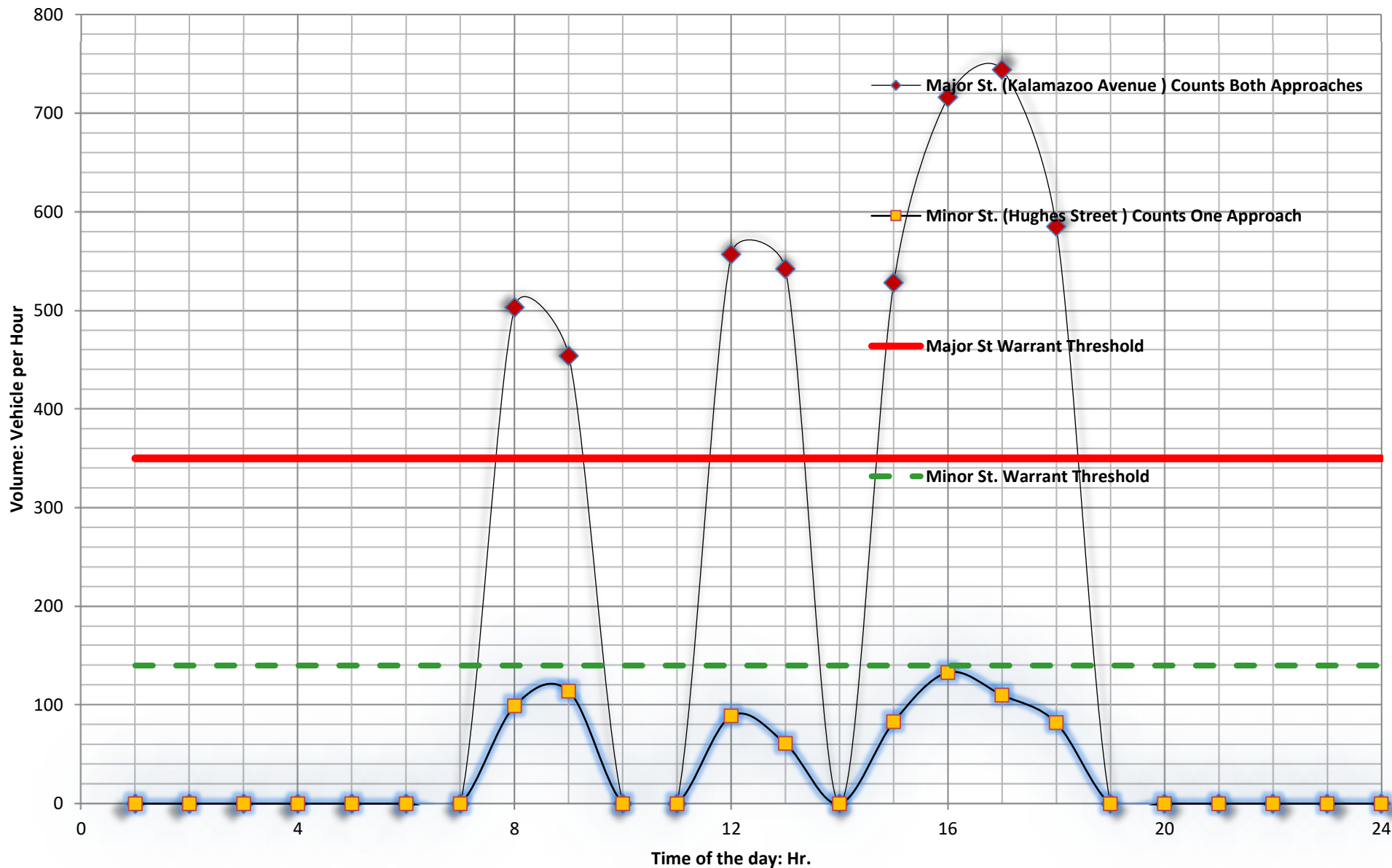


FIGURE 1: WARRANT 1A

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? YES

Spot Number:

Kalamazoo Avenue @ Hughes Street

NO. OF LANES ON MAJOR ST.? 1

NO. OF LANES ON MINOR ST.? 2

Number of Hours that met the Warrant: 3/7/2023 0

Does this intersection meet Warrant 1A for signal installation? NO

Data Collection Date:

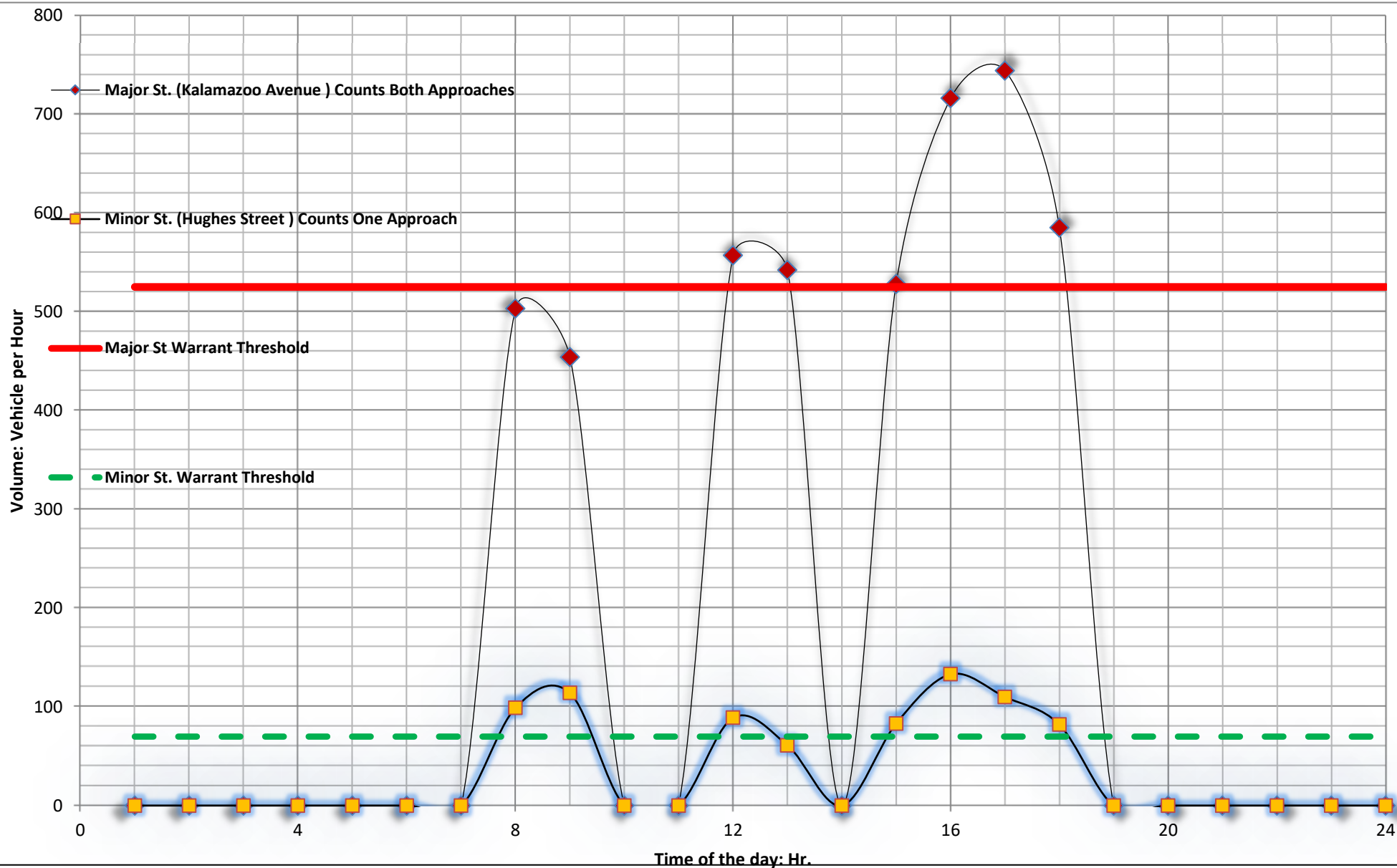


FIGURE 1: WARRANT 1B

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 70% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? YES

Spot Number:

Kalamazoo Avenue @ Hughes Street

NO. OF LANES ON MAJOR ST.? 1

NO. OF LANES ON MINOR ST.? 2

Number of Hours that met the Warrant: 5

Does this intersection meet Warrant 1B for signal installation? NO

Data Collection Date: 3/7/2023

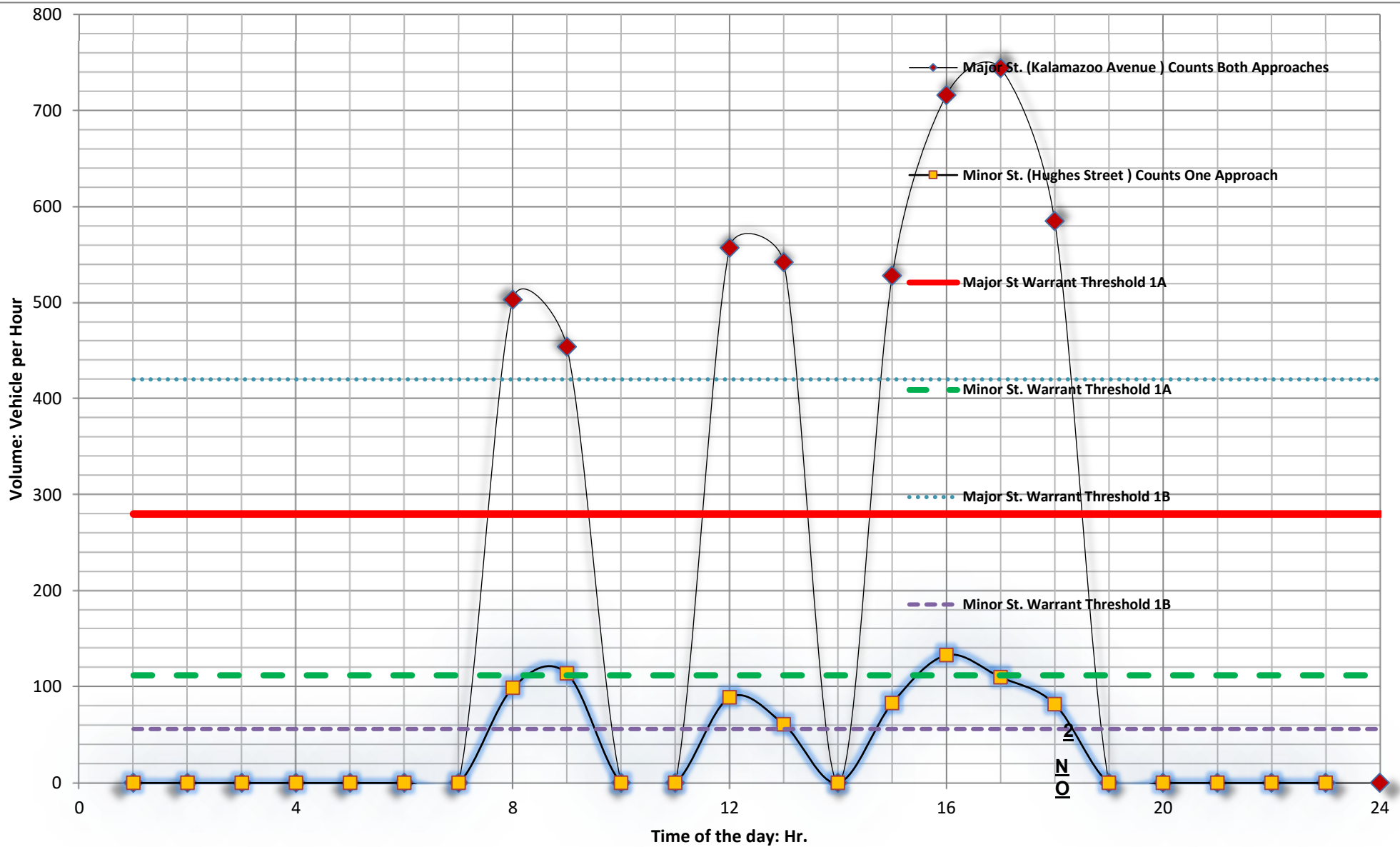


FIGURE 3: WARRANT 1A&B

IS THERE A REDUCTION IN THE WARRANT THRESHOLDS TO 56% ...

1- DUE TO SPEED? YES

2- DUE TO ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000? YES

Spot Number:

Kalamazoo Avenue @ Hughes Street

NO. OF LANES ON MAJOR ST.? 1

NO. OF LANES ON MINOR ST.? 2

Number of Hours that met the Warrant:

Does this intersection meet Warrant 1A&B for signal installation?

Data Collection Date: 3/7/2023

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 2: Four-Hour Vehicular Volume

Spot Number:	0
Intersection:	Kalamazoo Avenue @ Hughes Street
Date	3/10/2023 by Megan Jauch

1	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
50	: Speed limit or 85th Percentile? (MPH)
YES	: Is the intersection within an Isolated community?
6780	: What is the of the population isolated community?

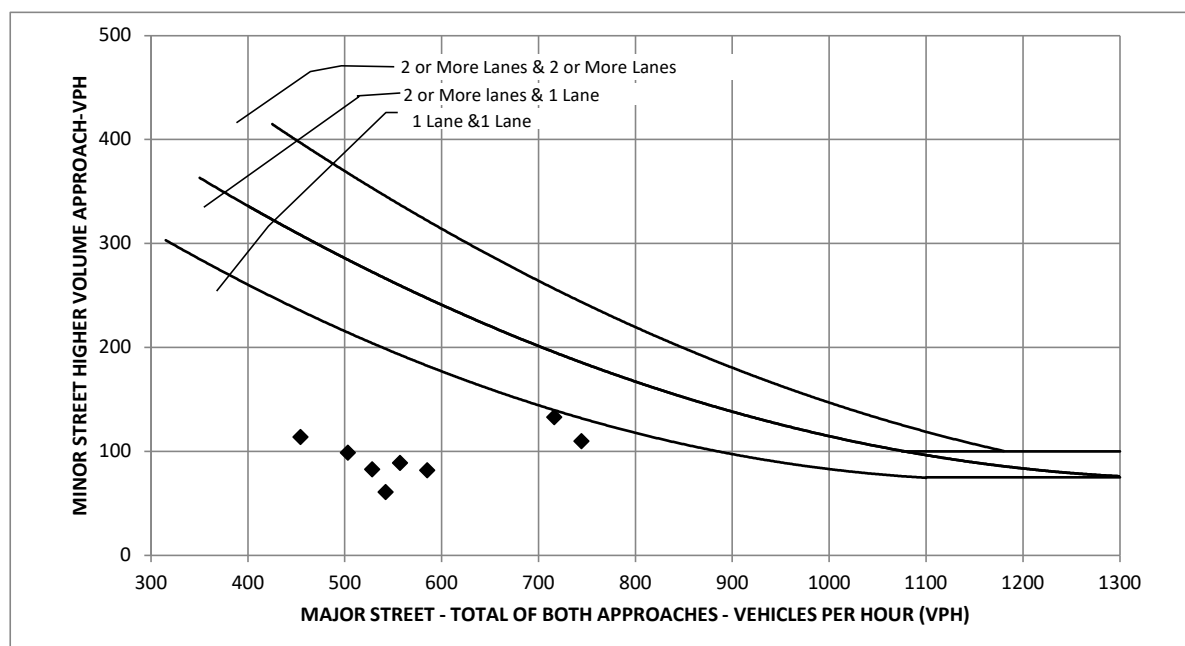


How Many Hours Are Met	1
Is Warrant (70%) Met?	NO

Michigan Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(70%): Peak-Hour Vehicular Volume

Spot Number:	0
Intersection:	Kalamazoo Avenue @ Hughes Street
Date:	3/10/2023 by Megan Jauch

1	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
50	: Speed limit or 85th Percentile? (MPH)
YES	: Is the intersection within an Isolated community?
6780	: What is the of the population isolated community?



How Many Hours Are Met

0

Is Warrant (70%) Met?

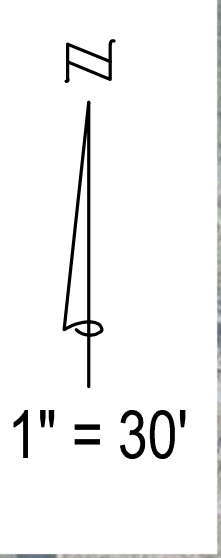
NO

APPENDIX F

Concept Rendering and Cost Estimate

S KALAMAZOO AVE & W HUGHES ST

ROUNDBABOUT CONCEPT



W HUGHES ST

S KALAMAZOO AVE



- EXISTING ROW
- PROPERTY LINE
- - - PROPOSED HIGHWAY EASEMENT
- PROPOSED ROADWAY
- PROPOSED WALK

Kalamazoo & Hughes: Roundabout Cost Estimate

Item	Qty	Unit	Unit Price	Amount
Mobilization	1	LSUM	\$ 123,000.00	\$ 123,000.00
Pavt, Rem	30	Syd	\$ 10.00	\$ 300.00
HMA surface, Rem	3900	Syd	\$ 9.00	\$ 35,100.00
Curb and Gutter, Rem	1400	Ft	\$ 13.00	\$ 18,200.00
Sidewalk, Rem	130	Syd	\$ 10.00	\$ 1,300.00
Excavation	2100	Cyd	\$ 23.00	\$ 48,300.00
Embankment	700	Cyd	\$ 18.00	\$ 12,600.00
Agg Base, 10 inch (Road)	4100	Syd	\$ 25.00	\$ 102,500.00
Agg Base, 6 inch (Driveways)	1200	Syd	\$ 15.00	\$ 18,000.00
HMA (9 inch)	1600	Ton	\$ 130.00	\$ 208,000.00
HMA (4 inch Driveways)	10	Ton	\$ 150.00	\$ 1,500.00
Conc Pavt, Misc (Driveways)	50	Syd	\$ 45.00	\$ 2,250.00
Conc, Pavt, Misc, Decorative Colored, 8 inch (Truck Pad)	500	Syd	\$ 110.00	\$ 55,000.00
Conc, Pavt, Misc, Decorative Colored, 6 inch (Islands)	400	Syd	\$ 90.00	\$ 36,000.00
Curb and Gutter	2800	Ft	\$ 35.00	\$ 98,000.00
Sidewalk, Conc, 4 inch	9000	Sft	\$ 4.50	\$ 40,500.00
Drainage	1	LSUM	\$ 150,000.00	\$ 150,000.00
Permanent Marking and Signing	1	LSUM	\$ 25,000.00	\$ 25,000.00
Lighting	1	LSUM	\$ 40,000.00	\$ 40,000.00
Signal, Rem	1	LSUM	\$ 10,000.00	\$ 10,000.00
MOT	1	LSUM	\$ 50,000.00	\$ 50,000.00
Restoration	3400	Syd	\$ 7.00	\$ 23,800.00
subtotal				\$ 1,099,350.00
Contingency			25%	\$ 274,838.00
TOTAL CONSTRUCTION COST				\$ 1,374,188.00

FUND	Department	Project Title	Priority Ranking	Estimated Useful Life	Source of Funding	Project Narrative/Purpose	2024-2025 Expenditure	2025-2026 Expenditure	2026-2027 Expenditure	2027-2028 Expenditure	2028-2029 Expenditure	2029-2030 Expenditure	City Expenditure	Other Funds or Grant Share	Total Expenditure
101	DPW	DPW building master plan	2	10	General Fund	I would like to add a DPW building master plan, to maximize space for the building at 619 Homer Rd. This will help the city understand the changes needed to maximize space.	\$40,000						\$40,000		\$40,000
101	DPW	South Driveway Improvements	1	30	General Fund	The south door out of the DPW garage is narrow and the driveway has a small radius curve immediately outside the building which prevents the door from being used by some DPW equipment. This project would include widening the north (entry) and south (exit) door of the DPW garage and installing a new driveway connecting the south door to Homer Road. This would allow all vehicles to use the south door safely. This would prevent the vehicles that currently don't fit from having to back up 200' inside the building to exit the building after loading/washing. Currently, 1 vehicle doesn't fit out the south door. In the future, however, plow trucks are expected to get wider and will not be able to fit out the door.		\$75,000					\$75,000		\$75,000
101	PSB	Carpet Replacement	2	12	General Fund	Replace approx. 9,786 sq. ft. of carpet on the 1st and 2nd floors of PSB including lobby and hallways.	\$25,000	\$25,000					\$50,000		\$50,000
101	PSB	Asphalt Mill and Pave			General Fund	Mill and Pave sections of asphalt behind fence		\$25,000				\$25,000	\$50,000		\$50,000
101	City wide	S Kalamazoo Pathway - River District	2	20	General Fund	10-foot-wide pathway along the east side of Kalamazoo Ave to create a stronger connection between the Downtown and the River District. Amenities would match our downtown benches and trash cans. The concept would also include similar lighting to the downtown, although that is not part of the estimate provided by the consultant. The plan also incorporates completing the sidewalk gaps along the west side, but at a standard width used throughout the City.	\$465,000						\$465,000		\$465,000
101	City wide	Sidewalk repairs		20	General Fund	Sidewalk Repairs	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000		\$125,000		\$125,000
TOTAL							\$555,000	\$150,000	\$25,000	\$25,000	\$25,000	\$25,000	\$805,000	\$0	\$805,000
101	Parks	Stuarts Landing Improvements	3	30	Grants & other	Rehabilitation of Stuart's Landing including the following updates: replace canoe/kayak launch, a new shelter, a linear path around the site, improved shoreline and river access, and related improvements.			\$910,000				\$0	\$910,000	\$910,000
101	Parks	Repair Brooks Fountain	1	25	General Fund	The Brooks Fountain is in need structural repairs	\$750,000						\$750,000		\$750,000
101	Parks	Carver Park Fountain Replacement/Repair	2	30	General Fund	Carver Park Fountain has been deteriorating for several years. After a review of the fountain and discussions with Council the decision was made to utilize the fountain until the end of it's useful life and then execute a complete replacement.	\$40,000						\$40,000		\$40,000
101	Parks	Riverwalk Repairs Phase 1	1	30	General Fund	Replace structural beams along riverwalk. Fix and replace fencing and deckboards. Trim and remove trees throughout riverwalk.	\$350,000						\$350,000		\$350,000
101	Parks	Riverwalk Repairs Phase 1B			General Fund	Replace structural beams along riverwalk. Fix and replace fencing and deckboards. Trim and remove trees throughout riverwalk.		\$200,000					\$200,000	\$150,000	\$350,000
101	Parks	Riverwalk Repairs Phase 2			General Fund	Replace structural beams along riverwalk. Fix and replace fencing and deckboards. Trim and remove trees throughout riverwalk.			\$200,000				\$200,000	\$150,000	\$350,000
101	Parks	Riverwalk Repairs Phase 2B			General Fund	Replace structural beams along riverwalk. Fix and replace fencing and deckboards. Trim and remove trees throughout riverwalk.				\$500,000			\$500,000		\$500,000
101	Parks	Riverwalk Repairs Phase 3			General Fund	Replace structural beams along riverwalk. Fix and replace fencing and deckboards. Trim and remove trees throughout riverwalk.					\$500,000		\$500,000		\$500,000

FUND	Department	Project Title	Priority Ranking	Estimated Useful Life	Source of Funding	Project Narrative/Purpose	2024-2025 Expenditure	2025-2026 Expenditure	2026-2027 Expenditure	2027-2028 Expenditure	2028-2029 Expenditure	2029-2030 Expenditure	City Expenditure	Other Funds or Grant Share	Total Expenditure
101	Parks	Riverwalk Repairs Phase 3B			General Fund	Replace structural beams along riverwalk. Fix and replace fencing and deckboards. Trim and remove trees throughout riverwalk.						\$500,000	\$500,000		\$500,000
101	Parks	Riverwalk Extension	3	30	General Fund	Extend Riverwalk west of Kalamazoo towards Historic Bridge Park, partner with County						\$3,500,000	\$0	\$3,500,000	\$3,500,000
101	Parks	Athletic Field Renovations	2	7	General Fund	Athletic Field Resurface, clay replacement for pitching areas and batters boxes, level outfield with sand, replace all base pegs, new bases for all fields, fencing repairs		\$100,000					\$100,000	\$75,000	\$175,000
101	Parks	Ketchum Park Great Lawn	2	50	General Fund	LOWER KETCHUM COMMONS AND PROMENADE Work related to the establishment of the lower lawn commons, drainage system, and its perimeter pedestrian walkway. Also included is the main path between parking on Montgomery Street and the Rotary Bridge. Construction Cost: \$143,000 Construction and Soft Costs: \$185,900						\$1,285,900	\$0	\$1,285,900	\$1,285,900
101	Parks	Ketchum Park Parking Lot	4	15	General Fund	Mill and repave parking lot/paint parking spots				\$35,000			\$35,000		\$35,000
101	Parks	Sand Volleyball Court Renovations	2	20	General Fund	Replace all fencing at Volleyball courts, remove current sand and equipment. Replace with sugar sand. Replace post with new. Replace nets.		\$100,000					\$100,000	\$100,000	\$200,000
101	Parks	Skate Park Equipment	2	30	General Fund	Adding up to date & safe skateboard equipment to existing skatepark	\$100,000						\$100,000	\$100,000	\$200,000
101	Parks	Kids Kingdom Renovation	2	30	General Fund	Replace dilapidated equipment with new equipment @ Kids Kingdom. Update with state of the art play structure with accessible equipment for all.				\$1,000,000			\$0	\$1,000,000	\$1,000,000
TOTAL							\$1,240,000	\$400,000	\$1,110,000	\$1,535,000	\$500,000	\$5,285,900	\$3,375,000	\$7,270,900	\$10,645,900
101	Fire	Storage Shed	2	20	General Fund	Fire Department has very little storage area for maintenance equipment. We are currently using an old trailer to store lawn equipment and other limited use items. Marshall High School wood shop teacher has volunteered to build shed if we buy materials. I have material list for a 12X20 storage shed with an overhead door to store all this equipment.	\$25,000						\$25,000		\$25,000
101	Fire	Self-Contained Breathing Apparatus	3	10	General Fund/Grants	Our current Self Contained Breathing Apparatus was purchased in the beginning of 2018. They have a life expectancy of 10 to 15 years. This is mandated by MIOSHA and is National Fire Protection Association and Manufactures recommendations. We will need to replace these by the end of 2031.						\$250,000	\$250,000		\$250,000
101	Fire	Auxiliary Fire Equipment	4	25	General Fund	We have auxiliary equipment such as compressor and fill station for SCBA Bottles and Oxygen Bottles and a hose washer for cleaning soiled fire hose after fires. These are items that will eventually need replaced in the future. They last a long time be we need to plan for replacement through the CIP. Is it better to plan a yearly contribution to CIP or just fund we needed if they need replaced.						\$75,000	\$75,000		\$75,000
101	Fire	Staff Vehicles	2	10	General Fund	Replace a 2013 and 2015 Ford Inceptor former MPD Vehicle with a Pickup Truck or SUV that is better suited for Fire Dept. needs. These vehicles were hard use as MPD vehicles before MFD received them. Average life span as a MPD vehicle is 5 years and then re-purposed or sold to another department or outside buyer for lighter use. Would like a Pickup to replace vehicle currently used by MFD Fire Inspection Division. This pickup could serve multi purposes for MFD. Of course to be used by Inspection Division to conduct inspections and respond to emergencies if needed during this time, used as a plow truck to keep parking lot and front ramp cleared of snow, used to pick up and transport equipment after a fire or when needed. Fire Chief vehicle could be replaced with either a truck or suv for use by Chief and be set up as a command and control vehicle for emergency scenes.	\$60,000		\$60,000				\$120,000		\$120,000
101	Fire	Replace Fire Engine	1	20	General Fund	Replace Fire Engine	\$800,000						\$800,000		\$800,000

FUND	Department	Project Title	Priority Ranking	Estimated Useful Life	Source of Funding	Project Narrative/Purpose	2024-2025 Expenditure	2025-2026 Expenditure	2026-2027 Expenditure	2027-2028 Expenditure	2028-2029 Expenditure	2029-2030 Expenditure	City Expenditure	Other Funds or Grant Share	Total Expenditure
101	Fire	Audio Visual Upgrades	2	10	General Fund	Audio visual upgrades to the Training Room	\$25,000						\$25,000		\$25,000
TOTAL							\$910,000	\$0	\$60,000	\$0	\$0	\$325,000	\$1,295,000	\$0	\$1,295,000
101	Police	Taser Upgrade	3	5-7 years	General Fund	The Police Department issues each sworn officer the Axon Taser X-2 weapon as a less than lethal use of force option. National studies have shown the Taser as an effective means of applying force at a distance, thus minimizing the risks of injury to patrol officers from a physical altercation. Axon only warranties their devices for 5 years, and have typically phased in a newer model every five years. As they are a weapon that can cause injury or death, we should strive to keep the warranty in place. This is both for officer safety (if Taser malfunctions due to age), and to some degree of liability mitigation, as Taser may not legally support us if we are using an out of warranty device.				\$35,000			\$35,000		\$35,000
101	Police	Vehicle Changeover	2	5	General Fund	Cover labor to outfit all equipment to new vehicle, buy emergency lighting, radio and equipment console, weapons rack, video camera and radio upgrades, radars, bumpers, cage with restraints, and decal the vehicle for police use.	\$30,000	\$30,000	\$30,000				\$90,000		\$90,000
101	Police	Firearm Replacement	3	10-15 years	General Fund	Replacement of glock pistols and shot guns. Includes red dot sights, holsters and accessories.			\$30,000				\$30,000		\$30,000
101	Police	Community Camera Project	2	5-7 years	General Fund	A community camera program is an integrated camera system that will improve the safety of the Marshall Communtiy. The program includes surveillance cameras at the city parks, traffic cameras to monitor high traffic areas, and software that will use LPR, AI, and dispatch integration to assist law enforcement and first responders.		\$250,000						\$250,000	\$250,000
101	Police	MVR/Body Camera Change Over	1	5-7 years	General Fund	Moble Car Camera and Body Camera replacement.	\$140,000						\$140,000		\$140,000
TOTAL							\$170,000	\$280,000	\$60,000	\$35,000	\$0	\$0	\$295,000	\$250,000	\$545,000
202	Major Streets	West Drive and Verona Road Reconstruction	2	15	Small Urban Grant/Act 51	Reconstruction of West Dr. from W. Michigan Ave. to Verona and Verona Rd. from West Dr. to W. Mansion St. and the extension of sidewalk routes on the south side of Verona. Project has been designated as an MDOT Small Urban Proj. with \$385,000 in federal funding allocated.	\$385,000						\$0	\$385,000	\$385,000
203	Local Streets	Replace and Mill/Pave High St	2	25	Act 51	Part of the Watermain Replacement Project for High St between Michigan Ave. and Forest St. The watermain replacement will be resurfaced, remaining area will be mill and pave. Sidewalks and ADA ramps will be installed as needed.	\$330,000						\$330,000		\$330,000
203	Local Streets	Fountain St. Paving	2	25	Act 51	Part of the Watermain Replacement Project for Fountain St between W. Hanover to Arms St. The watermain replacement will be resurfaced, remaining area will be mill and pave. Sidewalks and ADA ramps will be installed as needed.	\$183,000						\$183,000		\$183,000
TOTAL							\$898,000	\$0	\$0	\$0	\$0	\$0	\$513,000	\$385,000	\$898,000
207	MRLEC	MRLEC Flooring	3	10	MRLEC Operations	MRLEC building has several capeted areas that are highly trafficked, The carpet will be 10 years old in 2025	\$50,000						\$50,000		\$50,000
207	MRLEC	Front Parking Lot Expansion	3	40	MRLEC Operations	A need for additional parking has been identified at MRLEC. There are numerous times each month where the parking lot is overflowing because of trainings or events at MRLEC. The expansion will help solve this issue. The estimated cost (with assistance of the Marshall DPW) of expanding the parking lot is \$50,000. The new section will be added to the 5 year maintenance schedule for resurfacing.		\$100,000					\$100,000		\$100,000

FUND	Department	Project Title	Priority Ranking	Estimated Useful Life	Source of Funding	Project Narrative/Purpose	2024-2025 Expenditure	2025-2026 Expenditure	2026-2027 Expenditure	2027-2028 Expenditure	2028-2029 Expenditure	2029-2030 Expenditure	City Expenditure	Other Funds or Grant Share	Total Expenditure
207	MRLEC	MRLEC Barn Expansion	1	40	MRLEC Operations	The MRLEC agencies have identified a need for an added secured storage area for vehicles held for evidence. Currently we are all being asked to hold vehicles for evidence when involved in major crimes. The delayed time frame is leading to vehicles being parked in the storage area of our shared barn. An addition is being proposed to be added to the MRLEC barn to individually secure 8-10 vehicles. The building would be on the east side of the building and would require new construction.			\$250,000				\$250,000		\$250,000
TOTAL							\$50,000	\$100,000	\$250,000	\$0	\$0	\$0	\$400,000	\$0	\$400,000
208	Recreation	Replacement of Athletic Field Light System	3	30	Recreation Fund	The current lights on diamond #1 & #2 are approaching the end of their expected life. The entire system should be replaced.				\$300,000			\$300,000		\$300,000
208	Recreation	Seal Coating Athletic Field Parking Lot & Pathways. Striping of Parking Lot	4	12	Recreation Fund	Seal Coating Athletic Field Parking Lot & Pathways is considered routine maintenance.	\$50,000					\$50,000	\$100,000		\$100,000
208	Recreation	Athletic Fields- Batting Cages	2	15	Recreation Fund	Two batting cages-35"x70'			\$30,000				\$30,000		\$30,000
208	Recreation	Eaton Park Development	2	30	Recreation Fund/Local Grants	Construction of a new park facility that would provide pickle ball courts, splash pad, bathroom facility, new ADA improvements for accessing the athletic fields from the south, new playground, parking lots, and a basketball court.	\$3,000,000						\$0	\$3,000,000	\$3,000,000
208	Recreation	Recreation Athletic Facility	4	30	Grants/Fund Raising	Construction of a Recreation Center that would include 2 basketball courts, community room, etc					\$6,000,000		\$6,000,000		\$6,000,000
TOTAL							\$3,050,000	\$0	\$30,000	\$300,000	\$6,000,000	\$50,000	\$6,430,000	\$3,000,000	\$9,430,000
211	Farmer's Market	Farmer's Market Pavilion	3	40	Farmer's Market/Donations	Farmer's Market pavilion will include a covered area for the farmer's market. The space design will consider supporting a winter market, event space (in conjunction with social district), and maintaining parking.			\$500,000				\$500,000	\$500,000	\$1,000,000
TOTAL							\$0	\$0	\$500,000	\$0	\$0	\$0	\$500,000	\$500,000	\$1,000,000
247	NE NIA	Eastside Redevelopment Infrastructure	1	20	NIA TIF Capture	Infrastructure necessary to allow the redevelopment of the Land Bank property off of East Dr/Mann. Extension of water, sewer, storm sewer, roads, and sidewalks for the development. Does not include electric or fiber extension at this time.			\$1,341,900				\$1,341,900		\$1,341,900
247	NE NIA	Mann Extension	3	20	NIA TIF Capture	Infrastructure necessary to allow the extension of Mann to O'Keefe allowing the development of 10 acres for additional housing opportunities. Extension of water, sewer, storm sewer, roads, and sidewalks for the development.	\$1,520,700						\$1,520,700		\$1,520,700
247	NE NIA	Pratt Park Future Phases	3	20	NIA TIF Capture	Infrastructure necessary to allow for the development of future phases of Pratt Park for housing opportunities. Extension of water, sewer, storm sewer, roads, and sidewalks for the development.					\$3,172,800		\$3,172,800		\$3,172,800
247	NE NIA	Briarwood Extension	1	20	NIA TIF Capture	Infrastructure necessary to allow the development of Briarwood and the extension of Forest to O'Keefe. Extension of water, sewer, storm sewer, roads, and sidewalks for the development.	\$547,100						\$547,100		\$547,100
TOTAL							\$2,067,800	\$0	\$1,341,900	\$0	\$3,172,800	\$0	\$6,582,500	\$0	\$6,582,500

FUND	Department	Project Title	Priority Ranking	Estimated Useful Life	Source of Funding	Project Narrative/Purpose	2024-2025 Expenditure	2025-2026 Expenditure	2026-2027 Expenditure	2027-2028 Expenditure	2028-2029 Expenditure	2029-2030 Expenditure	City Expenditure	Other Funds or Grant Share	Total Expenditure
248	Downtown Development Authority	South Activation Zone	2	30	General fund Loan/RAP Grant	The City and DDA have embarked on design for a Activation Zone in the area including parking lots 9, 10, and 11 as well as improved garbage management and a social area within Lot 10. On street parking is also part of the project in the 200 block of West Green Street and the 100 block of South Jefferson Street.	\$300,000						\$300,000	\$654,400	\$954,400
248	Downtown Development Authority	North Activation Zone	2	30	DDA Revenues/Grants	The proposed Social Area will be a 4,000 square foot community area with tables and chairs in the northern portion of lot 10 along the south alley. The proposed trash component will be a coral for business use. The businesses to be served are those located along Michigan Avenue between Eagle Street and Jefferson Streets.				\$500,000	\$100,000		\$600,000		\$600,000
248	Downtown Development Authority	DDA Parking Lots (8,13,14,15)	2	15	DDA Revenues	Mill and pave downtown parking lots #8, 13, 14, 15			\$78,400				\$78,400		\$78,400
248	Downtown Development Authority	DDA Parking Lots (1, 4, 5, 6, 7)	2	20	DDA Revenues	Mill and pave downtown parking lots #1, 4, 5, 6, 7	\$115,200						\$115,200		\$115,200
248	Downtown Development Authority	Sound System Upgrades	3	15	DDA Revenues	Improve the downtown sound system and incorporate cameras for events and security. This is an estimate as this has not been explored with vendors at this time.		\$90,000					\$90,000		\$90,000
TOTAL							\$415,200	\$90,000	\$78,400	\$500,000	\$100,000	\$0	\$1,183,600	\$654,400	\$1,838,000
250	LDFA	Oliver Drive Extension	3	30	LDFA reserves and possible Bond	Extension of Oliver Drive, water, and sewer infrastructure to serve over 100 acres of undeveloped Industrial zoned property					\$550,000		\$550,000		\$550,000
250	LDFA	Udell Property Lift Station	3	30	LDFA reserves and possible Bond	Addition of a new sanitary lift station to serve 100+ acres of industrial zoned property. Exact location of station on property to be determined.				\$400,000			\$400,000		\$400,000
250	LDFA	Land Acquisition	2	50	LDFA reserves and possible Bond	Explore land acuisition possibilities.	\$500,000						\$500,000		\$500,000
250	LDFA	Pedestrian Path LDFA	2	15	LDFA reserves and possible Bond	Construction of an 8' wide patch connecting the Industrial Park to the south NIA and rest of town. Council has made a goal of increased walkability and we have seen an increased level of pedestrian activity to and from the Industrial Park.			\$166,700				\$166,700		\$166,700
250	LDFA	Pratt Avenue Rehabilitation	2	15	LDFA reserves and possible Bond	Mill and overlay of Pratt Avenue as it will be in need of maintenance due to age and condition.		\$413,500					\$413,500		\$413,500
TOTAL							\$500,000	\$413,500	\$166,700	\$400,000	\$550,000	\$0	\$2,030,200	\$0	\$2,030,200
251	S NIA	Hughes Street Infrastructure Extension	3	30	S NIA TIF Capture	Extension of sewer, electric, fiber, streets, etc. to add or create buildable lots	TBD						TBD		TBD
251	S NIA	Emerald Hills Phase 2	1	20	S NIA TIF Capture	Extension of sewer, electric, fiber, streets, etc. to add or create buildable lots		\$2,161,700					\$2,161,700		\$2,161,700
251	S NIA	Emerald Hills Phase 3	1	20	S NIA TIF Capture	Infrastructure necessary to allow the construction of the third phase of the emerald hills subdivision which includes the planned multi-family units (6 buildings). Extension of water, sewer, storm sewer, roads, and sidewalks for the development.		\$780,000					\$780,000		\$780,000
251	S NIA	Emerald Hills Phase 4	1	20	S NIA TIF Capture	Infrastructure necessary to allow the construction of the fourth phase of the emerald hills subdivision which includes 42 housing units. Extension of water, sewer, storm sewer, roads, and sidewalks for the development.				\$1,142,100			\$1,142,100		\$1,142,100

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251	S NIA	Emerald Hills Phase 5	1	20	S NIA TIF Capture	Infrastructure necessary to allow the construction of the second phase of the emerald hills subdivision which is 98 housing units. Extension of water, sewer, storm sewer, roads, and sidewalks for the development.						\$3,550,600	\$3,550,600		\$3,550,600
251	S NIA	Emerald Hills Pedestrian Path	3	15	S NIA TIF Capture	8' wide path built between Circle Drive and the Airport on the east side of South Kalamazoo. This would improve walkability for the proposed development, Fairway meadows, and the surrounding neighborhood. This would be a connection between downtown and the extension of a path from the airport to the industrial park (which is included in LDFA CIP).			\$118,300				\$118,300		\$118,300
TOTAL							\$0	\$2,941,700	\$118,300	\$1,142,100	\$0	\$3,550,600	\$7,752,700	\$0	\$7,752,700
295	Airport	Pavement Marking and Crack Sealing	1	10	General Fund 5%, FAA Allocation 90%, State 5%	Replacement of pavement markings and crack sealing as necessary. Participation in the MDOT crack sealing program to prolong the life of the airport runway and taxiways.		\$1,500			\$1,100		\$2,600	\$61,750	\$64,350
295	Airport	North Perimeter Fence	2	20	General Fund 5%, FAA Allocation 90%, State 5%	Design and installation of a fence on the north perimeter of the airport property for safety reasons (wildlife and proximity to new Emerald Hills Development.				\$1,500	\$17,500		\$19,000	\$352,500	\$371,500
295	Airport	North Apron and West Parallel Taxiway Rehabilitation	1	15	General Fund 5%, FAA Allocation 90%, State 5%	Engineering and Construction of North Apron and West Parallel Taxiway	\$39,500						\$39,500	\$750,500	\$790,000
295	Airport	Airport Master Plan (ALP Update)	2	20	General Fund 5%, FAA Allocation 90%, State 5%	Update of the Airport Master Layout Plan which is used as a guide for future development on the airport grounds. Funding is \$225,000 Federal, \$12,500 State, and \$12,500 City.			\$12,500				\$12,500	\$237,500	\$250,000
295	Airport	Construction Hangar Taxiway	3	20	General Fund 5%, FAA Allocation 90%, State 5%	Construct a new hangar taxiway to provide access to new T-hangar buildings east of the current buildings. New hangars would be a partnership with a third party. Project would only move forward if hangars were constructed.	\$1,250	\$11,250					\$12,500	\$237,500	\$250,000
295	Airport	Main Hangar Improvements	1	25	General Fund 5%, FAA Allocation 90%, State 5%	The roof over the main hangar and the space leased by Griswold Aviation is nearing the end of life and needs to be replaced. The City would need to fund \$13,000 (2023 \$1250 and 2024 \$11,750) of the improvements and the Feds/State \$247,000 (2023 \$23,750 and 2024 \$223,250).	\$1,500	\$13,500					\$15,000	\$285,000	\$300,000
295	Airport	Land Acquisition	3	50	General Fund/LDFA	Purchase of 66.34 acres from the Udelл Trust for airport and Industrial Park expansion. Purchase would have to be funded by City/LDFA and reimbursement for portion used by airport can be pursued using our annual allocation.		\$35,000	(\$25,000)				\$10,000	\$590,000	\$600,000
TOTAL							\$42,250	\$61,250	(\$12,500)	\$1,500	\$18,600	\$0	\$111,100	\$2,514,750	\$2,625,850
582	Electric	Replace Tie 1 and 2 underground cable	4	40 years	Electric Fund	A portion of the two main express feeder cables from Pearl St. Substation to the Powerhouse are underground and in a duct system. They have been in service for 35 years and have met their life expectancy. The feeder cables are the main source of power to the City's electric load and are the connection to the grid for the City's internal generation. Because they are a critical component of the electric system the cables should be modernized.			\$2,500,000				\$2,500,000		\$2,500,000
582	Electric	Replace Windows	3	50	Electric Fund	Existing windows are the original single pane steel framed and not energy efficient. Many of the window sills and frames are deteriorated to the point that water is coming in and further damaging the building.	\$25,000	\$50,000	\$50,000	\$50,000	\$50,000		\$225,000		\$225,000
582	Electric	Pearl St. Substation 7.2/12.5 KV Upgrade	1	40	Electric Fund - Revenue Bond	Modernize obsolete 7.2/12.5 KV cubicle breaker and bus systems with open-air system to improve operations and increase safety	\$1,000,000						\$1,000,000		\$1,000,000
582	Electric	Pole Replacement and Line Reconstruction	2	40	Electric Fund	Wooden poles have an estimated service life of 33-40 years. To maintain safe, reliable electric service, replacement of old and unsafe poles must be performed on an annual basis.	\$82,400	\$84,872	\$87,418	\$90,041			\$344,731		\$344,731

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582	Electric	AMI Project	2	20	Electric Fund - Bond	The Automated Metering Infrastructure (AMI) Project consists of hardware, software, communications and metering that will allow electric meters to be read remotely, in the same manner that water meters are now read. The system is designed to reduce operating expenses and provide additional services to customers.	\$206,000	\$212,180	\$218,545	\$229,475			\$866,200		\$866,200
582	Electric	Underground Cable Replacement	2	40	Electric Fund	Replace 40 year old underground electric system in the Waldon Pond Apartment Complex, Homer Road, Circle/Rose/Lowe Subdivision & Polo Club Apartments	\$515,000	\$530,450	\$546,365				\$1,591,815		\$1,591,815
582	Electric	Additional Local Generating Resources	3	50	Bond	The Power Plant's primary functions include emergency backup power in the event of a transmission system or substation failure, as well as helping meet Midcontinent Independent System Operator (MISO) capacity requirements that are based on the City's peak electric demand. The City's average demand is approximately 20 MW, and 2022 peak demand exceeded 29 MW. CAT Generators are being added in 2024, but the need will continue. Additional generation should be planned for 2027/2028 to continue to help meet the City's MISO capacity obligations while also providing additional emergency backup service.				\$3,600,000			\$3,600,000		\$3,600,000
582	Electric	Distribution Tranformer Replacements	3	40	Electric Fund	The estimated service life of electric distribution system transformers is 25-40 years. The City has numerous electric distribution system transformers that are approaching or exceed 40 years of service. Some are live-front transformers with exposed cable and terminals, which are dangerous to staff and the public. In addition to new growth and voltage conversion, proactively replacing old transformers rather than running to failure is a goal of the department.	\$200,000	\$210,000	\$220,500	\$231,525	\$243,100		\$1,105,125		\$1,105,125
582	Electric	Rewind Hydroelectric Generating Units #1 and #3	1	50	Electric Fund	Hydroelectric Generating Unit #3 was installed in 1919. Unit #1 was installed in 1928. Neither unit appears to have been rewound since they were installed. Unit #1 generator windings were tested and inspected earlier this year. Visual inspection shows insulating material flaking off of the generator windings. Based on megger tests, the windings insulation appears to be failing. The City received two 2023 quotes for rewinding Hydroelectric Unit #1 generator at a cost of approximately \$250,000. Rewinding the generator will improve its reliability and also result in increased capacity, and energy and Renewable Energy Credits/Certificates (RECs) production. Unit #1 generator rewind is scheduled for FY2025, followed by Unit #3 rewind in FY2026.	\$250,000	\$250,000					\$500,000		\$500,000
582	Electric	Plant 2 Space Heater Replacements	1	20	Electric Fund	Plant 2, which houses Generator #6, has five electric heaters that provide building space heat. Only one of the five heaters, installed in 1977, still works, making it difficult to effectively heat Plant 2 during cold weather.		\$75,000					\$75,000		\$75,000

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582	Electric	Circuit Upgrade / Voltage Upgrade	2	50	Electric Fund	The municipal electric distribution system currently has two operating voltages, 4,160 volts and 12,470 volts. Circuits on each system cannot be directly tied together for maintenance and reliability purposes, limiting operational flexibility and reliability. The 4,160-volt system has greater resistance losses and less power-carrying capability than if its circuits were operated at 12,470 volts. Staff estimates approximately one-half of the electric distribution system operates at 4,160 volts. These 4,160-volt circuits should be upgraded to 12,470-volt operation as time and funds allow.	\$400,000	\$412,000	\$424,360	\$437,091	\$450,204		\$2,123,654		\$2,123,654
TOTAL							\$2,678,400	\$1,824,502	\$4,047,188	\$4,638,132	\$743,304	\$0	\$13,931,525	\$0	\$13,931,525
588	DART	Bus Replacement		7	Federal, State, City	Replacment of Two Busses each year			\$260,000	\$260,000			\$0.00	\$520,000	\$520,000
TOTAL									\$260,000	\$260,000				\$520,000	\$520,000
590	Wastewater	Wastewater Rate Study	1	4	Wastewater Fund	It has been several years since the City has commissioned a rate study from a consultant. The past few years our rate reviews have been a collaboration between Michigan Rural Water Association and City Staff. MRWA no longer provides this service due to staffing levels. City Staff will be involved with the process but a consultant with appropriate experience will be hire to perform the evaluation and provide rate recommendations.			\$35,000				\$35,000		\$35,000
590	Wastewater	Wastewater Laboratory Remodel	3	25	Wastewater Fund	Full remodel of outdated laboratory built in 1975, including cabinets, counter tops, fixtures, flooring, lighting, and lab safety equipment. We plan on retaining much of the existing lab equipment as that has been updated regularly.			\$250,000				\$250,000		\$250,000
590	Wastewater	Channel Monster Cartridge Replacement	2	5	Wastewater Fund	Replace the cutter cartridge in the Channel Monster as recommended by the manufacture.		\$40,000					\$40,000		\$40,000
590	Wastewater	WW Superintendent Vehicle	1	15	Wastewater Fund	Wastewater Superintendent does not currently have a vehicle assigned. He typically has to use his personal vehicle for City business throughout the day due to Staff utilizing the Departments other two trucks for maintenance work. This presents a liability issue for the City. Superintendent's personal vehicle does not have emergency lighting, so safety is a concern when visiting job sites around the City.	\$50,000						\$50,000		\$50,000
590	Wastewater	Muffin Monster cartridge replacement	2	5	Wastewater Fund	Replace the cutter cartridge in the in-line Muffin Monsters as recommended by the manufacture.				\$30,000			\$30,000		\$30,000
590	Wastewater	Aeration Blower Replacement	1	15	MEDC - Wastewater Fund - SRF Bonds	The current aeration blowers were installed in 1999. Since that time our aeration needs have changed and these blowers provide more air than necessary. Technology has advanced to a level that we can meet today's needs and retain the ability to meet future needs by replacing our current centrifugal blower with one that may be controlled by VFD. The current blowers cannot by controlled by a VFD and must run and full speed.		\$100,000					\$100,000		\$100,000
590	Wastewater	Headworks & Equalization Basin Improvements	1	20	MEDC - Possible SRF Bonds	Headworks improvements including grit removal and fine screening will extend the life of the downstream equipment.		\$20,000,000					\$20,000,000		\$20,000,000
590	Wastewater	Master Plan	2	10	Wastewater Fund	Update the 2008 Master Plan	\$25,000						\$25,000		\$25,000
590	Wastewater	Sewer Lining	1	30	Wastewater Fund	Project will line sewers which have experienced failure and root penetration.	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$360,000		\$360,000
590	Wastewater	New Sludge Thickening/De-watering Process	2	20	Wastewater Fund	The current equipment wil be 20 years old and the polymer agent used in the process is no longer produced. A suitable replacement is not expected. We have enough polymer to last about 4 years. With a new system, Class A biosolids may be achieved.			\$500,000				\$500,000		\$500,000
590	Wastewater	Clarifier Rehabilitation	3	25	Wastewater Fund	Rehabilitate concrete and steel structures in each of 4 clarifiers due to age and corrosion. Rehab/Replace clarifier drive mechanisms due to age and wear. Coat all concrete surfaces with marine grade coating.							\$0		\$0
TOTAL							\$135,000	\$20,200,000	\$845,000	\$90,000	\$60,000	\$60,000	\$21,390,000	\$0	\$21,390,000

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591	Water	S. Marshall Ave. Water Main Replacement (Michigan to Spruce)	2	100	Water Fund	Replace undersized 6" cast iron water main on S. Marshall from Michigan to Spruce St. This main was installed in 1958 and will be past it's useful life.						\$600,000	\$600,000		\$600,000
591	Water	S. Marshall Ave. Water Main(Spruce to Clinton), line Clinton to Powerhouse	2	100	Water Fund	Replace 4" main on S. Marshall from Spruce to Clinton. This main is undersized and past its useful life. Line water main from Clinton to the Powerhouse. This main can be structurally lined under the railroad tracks and spillway to keep the project cost down.						\$700,000	\$700,000		\$700,000
591	Water	Replace Filter Media in Water Treatment Plant	1	15	Water Fund	The current media in each of the 4 filters in the water plant is past its useful life. The media was replaced in 2006 and had a useful life of 15 years. Testing on the existing media shows significant failure. This media needs to be replaced to help keep the water for the City safe to drink.	\$315,000						\$315,000		\$315,000
591	Water	S. Kalamazoo water main lining	2	50	Water Fund	Line water main from Brooks Fountain south to Railroad tracks. Replacement of valves, hydrants and services through the entire area.					\$550,000		\$550,000		\$550,000
591	Water	Cosmopolitan Water Main Lining	1	25	Water Fund	The current water main on Cosmopolitan has very poor water quality and flow. This technology of lining a water main can extend the useful life of the infrastructure, increase the structural integrity of the pipe, increase the flow, and help solve the water quality issue in the area.	\$400,000						\$400,000		\$400,000
591	Water	Hanover St. water main replacement/water main lining	2	100		Replace/line aging 6" water main on Hanover from S. Marshall to S. Kalamazoo. This main is past it's useful life and is known to be in poor condition.					\$1,110,200		\$1,110,200		\$1,110,200
591	Water	Replace 10" Cast Iron Water Main on High St.	2	100	Water Fund	Replace 10" water main on High St. from Michigan Ave. to Forest St. Also replace all lead services, hydrants, valves, and connections. The size of the water main and amount of flow is causing water quality issues.				\$901,000			\$901,000		\$901,000
591	Water	Replace 6" Water Main on Fountain St.	2	100	Water Fund	Replace 6" water main on Fountain St. from Hanover to Arms St. Currently 6" cast iron with poor water quality.				\$563,000			\$563,000		\$563,000
591	Water	500,000 Tower Maintenance	1	25	Water Fund	2019 Maintenance Inspection identified several items that needed to be addressed. These were not critical issues so we have decided to lump them into the 200,000 tower project in 2026.	\$35,000						\$35,000		\$35,000
591	Water	200,000 Water Tower Painting	1	15	Water Fund	2019 Water Tower inspection identified that the water tower would need an exterior overcoat in approximately 5-6 years.	\$120,000						\$120,000		\$120,000
591	Water	Replace Water Main on N. Gordon	2	100		Replace aging 6" water mian on N. Gordon from Mansion to Forest. Increase size to 8" for better fire flow and water quality.			\$963,300				\$963,300		\$963,300
591	Water	New Water Treatment Plant	1	60	Water Fund Bond	Replace Water Treatment Plant. Build new iron removal plant on North side of E. Green St. across from existing plant.					\$5,000,000		\$5,000,000		\$5,000,000
591	Water	Replace 6" water main on E. Michigan between Gordon and Marshall	1	100	Water Fund	Replace 6" water main on E. Michigan with 8". This is the only section of Michigan Ave that has not been replaced. This replaceent would complete the Michigan Ave loop through the City. The existing water main was installed in 1950, and is past its useful life.		\$330,300					\$330,300		\$330,300
591	Water	Replace 6" water main on Rose St. and Oak	1	100	Water Fund	Replace 6" water main on Rose St and Oak. This section of water main was built in 1959 and is known to have low water quality. This is the only section in that area that has not been replaced, and will significantly improve water flow and quality with a new 8" water main.		\$503,100					\$503,100		\$503,100
591	Water	Replace 6" water main at Walden Pond Apartments	2	100	Water Fund	Replace 6" cast iron water main at Walden Pond Apts. from Verona to Arms. This section of water main is known to have poor water quality and is aging past it's useful life.				\$527,700			\$527,700		\$527,700

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591	Water	Water Withdrawal	1	N/A	Water Fund	Per America's Water Infrastructure Act of 2018 The City of Marshall Water Department is required to complete a Reliability Study every 5 years. The Department completed their first study in 2020. This report was required to analyze 20 year water demand versus 20 year water supply for the community. The results are that the Water Department's water supply is not adequate for the anticipated future demand.	\$75,000	\$75,000					\$150,000		\$150,000
591	Water	Replace Water Main on Sibley Ln	1	100	Water Fund	Replace 6" water main on Sibley Ln. with new 8" water main. The existing water main is cast iron built in 1956 and is at its useful life. Although we don't have water main breaks on this section, it is time to replace this water main and upgrade the infrastructure to improve water quality and water flow.			\$650,000				\$650,000		\$650,000
591	Water	Replace Water Main on Mulberry St	1	100	Water Fund	Replace 6" water main on Mulberry from Hanover to Prospect. The existing water main was installed in 1957 and is at its useful life. The water main also has a history of water main breaks through the replacement area. The new water main would upsize to 8", and replace all lead connections to residents.			\$650,000				\$650,000		\$650,000
TOTAL							\$945,000	\$908,400	\$2,263,300	\$1,991,700	\$6,660,200	\$1,300,000	\$14,068,600	\$0	\$14,068,600
661	Motor Pool	2024 Purchases	1	Variable	Motor Pool	Replace 5 units							\$0		\$0
661	Motor Pool	2025 Purchases	1	Variable	Motor Pool	Replace 6 units	\$203,000						\$203,000		\$203,000
661	Motor Pool	2026 Purchases	1	Variable	Motor Pool	Replace 1 unit		\$254,000					\$254,000		\$254,000
661	Motor Pool	2027 Purchases	1	Variable	Motor Pool	Replace 1 unit			\$500,000				\$500,000		\$500,000
TOTAL							\$203,000	\$254,000	\$500,000				\$957,000		\$957,000
711	Cemetery	Cemetery Road Paving Project	2	20	Cemetery Trust Fund	Finishing the drives in the cemetery will provide a clean and solid surface during inclement weather for those visiting their loved ones during a funeral service.	\$18,000						\$18,000		\$18,000
711	Cemetery	Cemetery Expansion to Meet Future Demand	2	150	Cemetery Trust Fund	Cemetery has two sections left holding 500 spaces for purchase. The number available will shrink exponentially as families begin having trouble finding blocks of spaces available for family plots. This will drive many to seek alternate locations. \$35,000 Design - \$100,000 Construction.		\$35,000	\$100,000				\$135,000		\$135,000
TOTAL							\$18,000	\$35,000	\$100,000	\$0	\$0	\$0	\$153,000	\$0	\$153,000
GRAND TOTAL							\$13,877,650	\$27,658,352	\$11,743,288	\$10,918,432	\$17,829,904	\$10,596,500	\$81,773,225	\$15,095,050	\$96,868,275
GENERAL FUND TOTALS							\$2,875,000	\$830,000	\$1,255,000	\$1,595,000	\$525,000	\$5,635,900	\$5,770,000	\$7,520,900	\$13,290,900