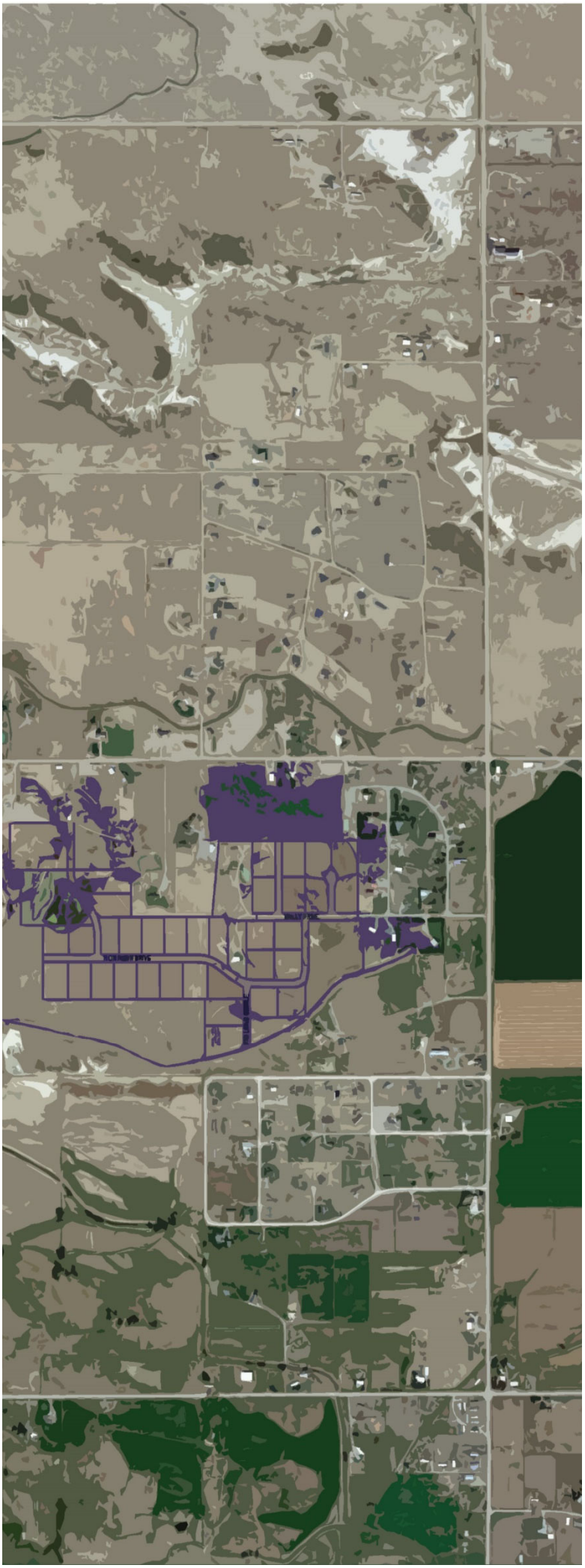

TRAFFIC IMPACT STUDY REPORT

for

Peila Subdivision

Yellowstone County, Montana

Prepared for

WWC Engineering

Prepared by

Marvin & Associates
Billings, MT 59102

April 27, 2023

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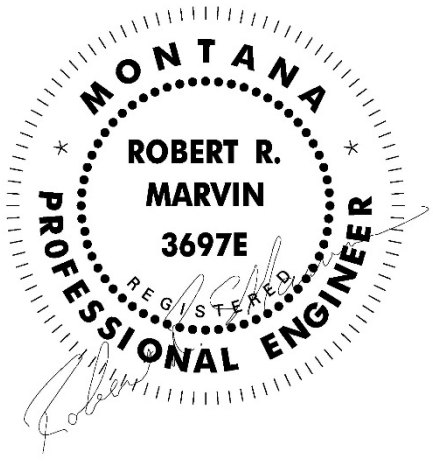

April 27, 2023
P.T.O.E. # 259

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Marvin & Associates

Peila Subdivision Property Development TIS

INTRODUCTION

This report summarizes a traffic impact study (TIS) performed for a new residential development in Yellowstone County. The following figures, tables, and narratives summarize the analysis of potential traffic impacts that could be associated with the proposed development. The Peila Subdivision development would involve 38 residential lots. The lots range in size from approximately 1.2 acres to 6.6 acres. One of the lots is located on a piece of land that does not have soil and drainage conditions that are considered suitable for building a structure.

This TIS focuses on potential impacts on key intersections within a one-mile radius of the development property along with the proposed site access intersections. Since this site is located within Yellowstone County with no direct access to a Montana Department of Transportation (MDT) route, it was assumed that review of impacts associated with the development would be solely by Yellowstone County

PROPOSED SITE DEVELOPMENT

The development property is located south of Yeoman Road and west of 12 Mile Road. The property is surrounded by large acreage residential tracts in the Bluegrass Subdivision on the north, south and west borders. The eastern border is adjacent to the Whitney Subdivision (see Figure 1 on the following page). The proposed subdivision development plan includes two accesses. The eastern access would be accommodated by a connection to Molly Drive, an existing gravel roadway that intersects with 12 Mile Road, approximately 1,200 feet south of Yeoman Road. An access to the north would be provided by connecting the subdivision street to Yeoman Road using Molly Drive West, an existing gravel road located approximately 3,700’ west of 12 Mile Road. The development plan would have internal street alignments allowing street connections to adjacent properties to the west and south, should future development occur on those properties.

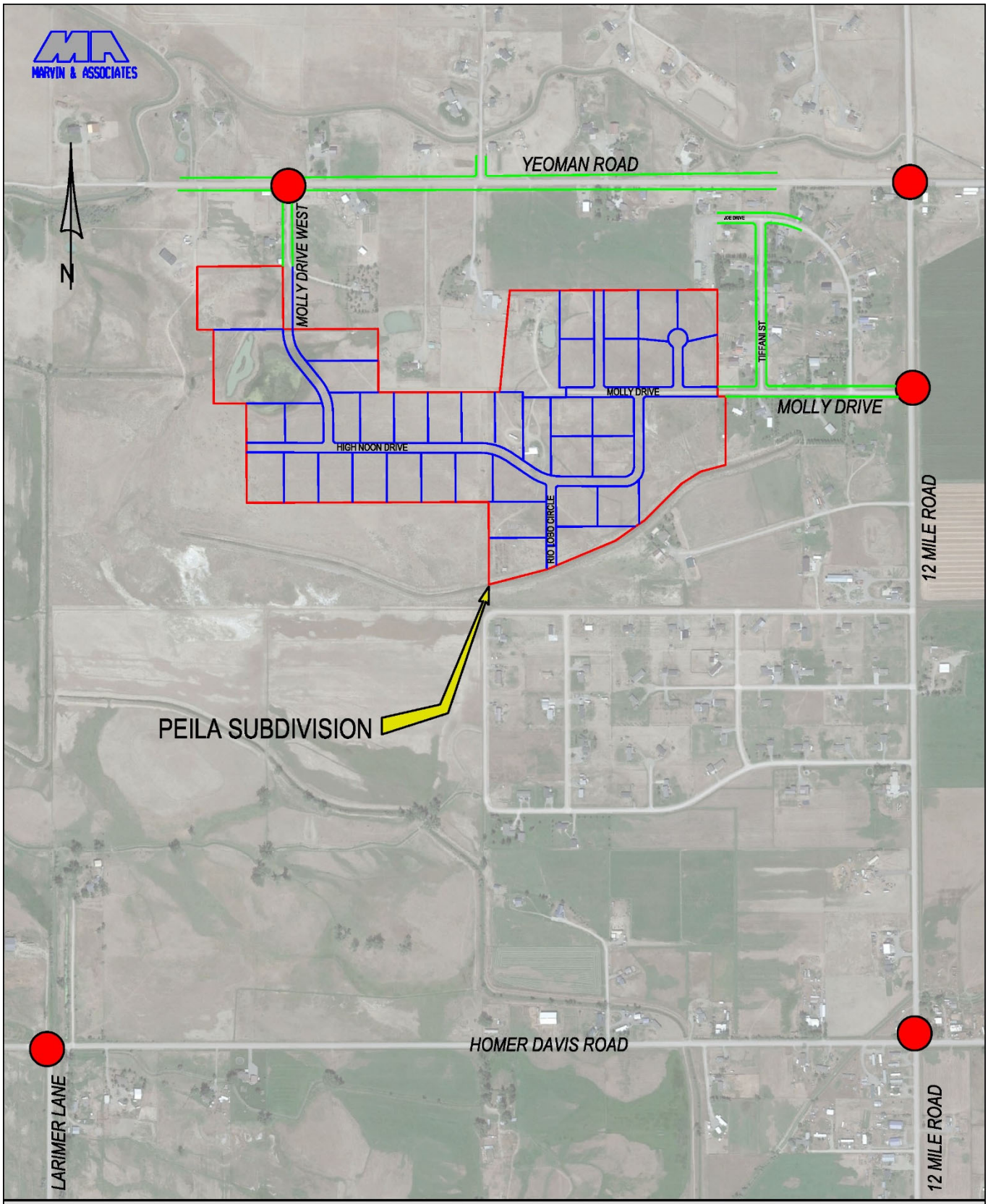


Figure 1. Peila Subdivsion Site and Study Intersections

EXISTING CONDITIONS

Roads & Intersections

Potentially impacted intersections within a one-mile radius of the site development are on Yeoman Road, 12 Mile Road, and Homer Davis Road. Since site generated traffic would directly access Yeoman at the existing intersection with Molly Drive West and on 12 Mile Road at the existing intersection with Molly Drive there would also be potential impacts at those intersections. Both intersections are currently three-legged intersections with stop control on Molly Drive West and on Molly Drive. The following narratives describe the roads included within this TIS:

- 12 Mile Road is a County Road classified as a Minor Rural Collector route that extends from Old Highway 312 north to Mailbox Road, a distance of approximately 5 miles. It has a 24' paved surface with a standard Yellowstone County Roadway cross section, within a 60' right-of-way.
- Yeoman Road is classified as a County Road that extends from a point approximately one mile west of 12 Mile Road to Frey Road on the east, a distance of approximately 4.5 miles. It has a 22' gravel surface west of 12 Mile Road and a 22' wide paved surface east of 12 Mile Road with a standard Yellowstone County Roadway cross section, within a 60' right-of-way.
- Homer Davis Road is classified as a County Road that extends from US 87 on the west to Shepherd Road on the east, a distance of approximately 6.1 miles. It has a 24' paved surface with a standard Yellowstone County Roadway cross section, within a 60' right-of-way.
- Larimer Road is a County Road that extends from Old Highway 312 on the south to Homer Davis Road on the north, a distance of approximately 2.0 miles. It has a 20' paved surface with a standard Yellowstone County Roadway cross section, within a 60' right-of-way.

The intersection of Yeoman Road and 12 Mile Road is near the apex of a vertical curve on 12 Mile Road. The Yeoman Road eastbound approach to the intersection is on relatively flat topography, while the westbound approach drops away from the intersection to the east. The high point of the vertical curve on 12 Mile Road is slightly north of the intersection and the northbound approach is on an upgrade to the intersection area. Yellowstone County commissioned a study of this intersection which was summarized in a report by Sanderson Stewart engineering on October 3, 2022. This report provides a detailed summary of physical and operational measures at this intersection. It was concluded that there is sufficient sight distance available at the intersection for the 55 mph speed limit, but the 85th % speeds are approximately 62 mph. A number of safety improvement alternatives were proposed, from new signing to lowering of the vertical curve. Further safety discussions are included within the Impact Mitigation section of this report.

The intersections of Molly Drive West & Yeoman Road; Molly Drive & 12 Mile Road; and Homer Davis Road & Larimer Drive are all “T” intersections. More than sufficient sight distance is available at all three intersections. The intersection of Homer Davis Road and 12 Mile Road has four approaches and is stop controlled on Homer Davis Road. Sight distance at this intersection is unrestricted in all directions.

Existing Traffic Volumes

Both AM and PM turning movement counts were taken in March 2023 using Mio-Vision cameras at four existing study intersections (see Appendix A). Manual counts were taken at the intersection of Yeoman Road and Molly Drive West. Graphic summaries of those counts can be seen in Figure 2. In addition, current Average Weekday Traffic (AWT) volumes were calculated based on hourly variation data from a 12-hour count at the intersection of 12 Mile Road and Homer Davis Road (Appendix A). Montana Department of Transportation (MDT) count station records indicate that the Average Weekday Traffic (AWT) in March is approximately 1.06% of the annual average weekday traffic.

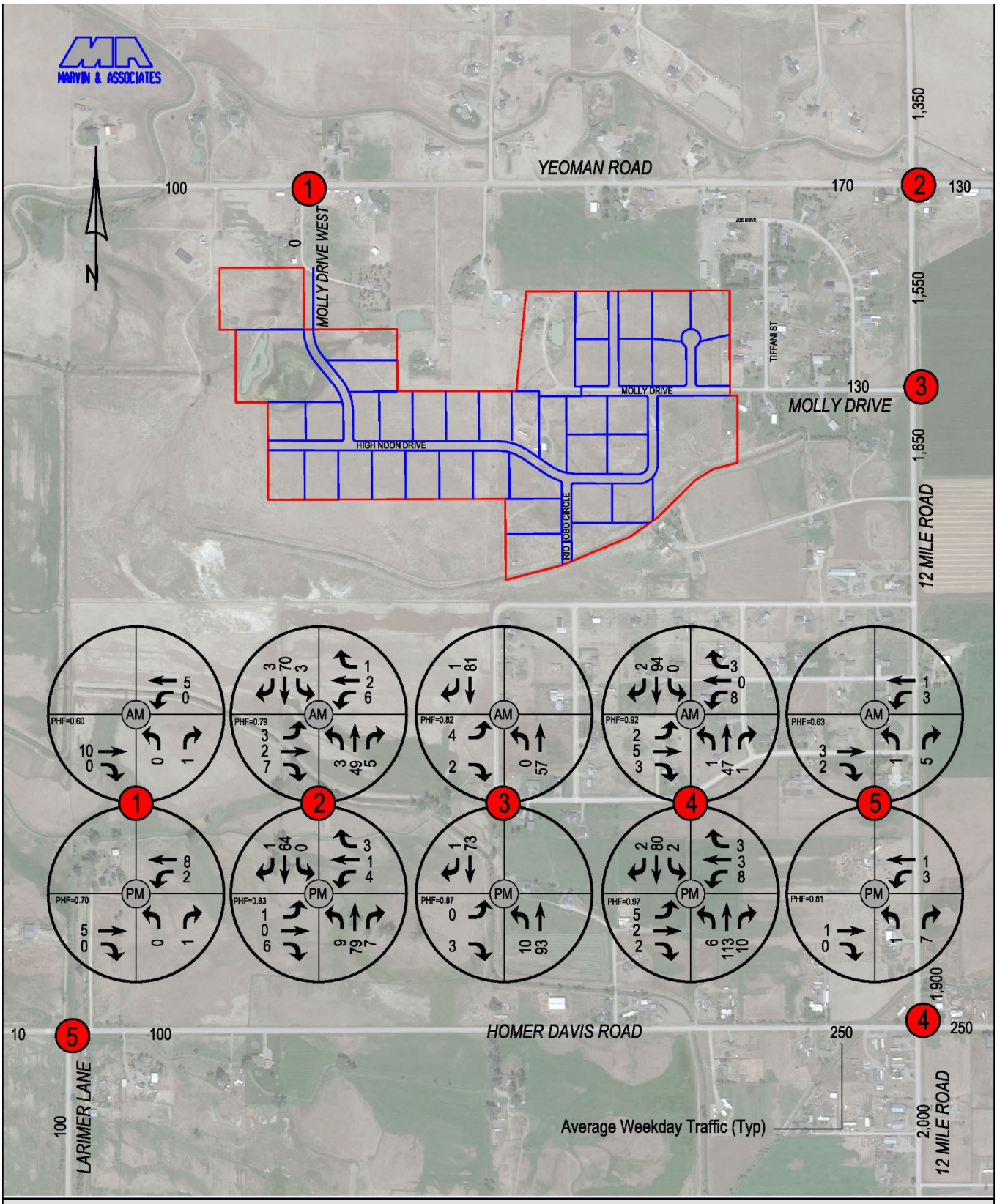


Figure 2. Year 2023 Existing Traffic Volumes

Speeds

A spot speed study was conducted on 12 Mile Road immediately north of the intersection with Molly Drive using a radar gun. The study was performed between 3:20 PM and 4:45 PM on April 12, 2023. Speed statistics can be found in Appendix B of this report. The 85th percentile speed in the southbound direction was approximately 58 mph while the northbound direction was approximately 60 mph. The 10 mph pace speeds were between 51 mph and 60 mph with approximately 71% of the vehicles within the pace. The mean speed for both directions of travel was approximately 55 mph. A speed study contained within the October 3, 2022, report for the Yeoman Road intersection with 12 Mile Road indicated that the 85th percentile speed in the southbound direction was 64 mph and was 62 mph in the northbound direction at a location immediately south of Yeoman Road. Since the earlier study was based on data collected over a period of several days the influence of off-peak hour travel would skew the statistical calculations higher than the spot speeds taken near the peak hour traffic period in this study.

The posted speed limit on 12 Mile Road is 55 mph from a point north of Yeoman Road south to its intersection with Homer Davis Road. South of Homer Davis Road, the speed limit is 45 mph to its intersection with Old Highway 312. The speed limit on Yeoman Road is 35 mph west of 12 Mile Road and 45 mph to the east of the intersection. The posted speed limit on Homer Davis Road is 55 mph while Larimer Road is posted at 50 mph.

Existing Capacity

Capacity calculations (see Appendix C) were completed for the study intersections based upon current operating conditions and the AM and PM hour traffic volumes shown in Figure 2. It was determined that all approaches and movements currently operate at Level of Service (LOS) “A” during both the AM and PM peak hour periods at all of the study intersections. Table 1 shows that the westbound approach on Homer Davis Road has the highest average vehicle delay at 9.9 seconds in the peak PM hour.

Table 1. Existing Traffic - Capacity Calculation Summary

		PEAK AM HOUR				PEAK PM HOUR		
Intersection	Int/App	Delay	LOS	Max Q	Int/App	Delay	LOS	Max Q
Yeoman Road & Molly Drive West	NB- Worst	8.4	A	0	NB- Worst	8.4	A	0
12 Mile Road & Yeoman Road	WB- Worst	9.7	A	0	WB- Worst	9.5	A	0
12 Mile Road & Molly Drive	EB- Worst	9.2	A	0	EB- Worst	8.7	A	0
12 Mile Road & Homer Davis Road	EB- Worst	9.6	A	0	WB- Worst	9.9	A	1
Homer Davis Road & Larimer Road	NB-Worst	8.4	A	1	NB-Worst	8.4	A	0

DEVELOPMENT TRAFFIC PROJECTIONS

Trip Generation

The proposed subdivision's residential land use is represented by the ITE Trip Generation Report, 11th Edition, Land Use Code 210 "Single Family Residential". Table 2 presents the average weekday trips (AWT) along with the AM and PM hour rates that were used within the TIS analysis. There would be 427 trips on the average weekday with 32 in the peak AM hour and 40 in the peak PM hour. Trips entering and exiting the site are indicated in Table 2 for both peak hour periods.

Table 2. Peila Subdivision Trip Generation Summary

ITE Trip Generation Report - 10th Edition			Average Weekday		Peak AM Hour				Peak PM Hour			
Development Area	No. of Units	Rate Units	Rate	Total Trips	Rate	Total Trips	Enter	Exit	Rate	Total Trips	Enter	Exit
Code 210 Single Family	**38**	DUs	*1*	427	*2*	32	8	24	*3*	40	25	15
Totals =	**38**			**427**		**32**	**8**	**24**		**40**	**25**	**15**

1 - Ln(T) = 0.92 Ln(X) + 2.71 *2 - T = 0.71(X)+4.80 (25% enter)* *3 - Ln(T) = 0.96 Ln(X) + 0.20 (63% enter)*

Since this development would be somewhat isolated from nearby trip attractors, it was assumed that pedestrian and bike trips would not contribute appreciably to the total number of trips. Thus, no reduction in the number of vehicular trips for alternate transportation modes can be made.

This subdivision development would not be conducive to attracting trips from existing traffic on adjacent roadways. Thus, it is unlikely that passerby trips would occur and no reductions in overall trip generation would be justified.

Trip Distribution

There are various methods available for determining the directional distribution of trips to and from site developments. For developments within large, urbanized areas, the task is best accomplished through the creation of a computerized transportation model of the urban street system, which includes the proposed development changes. When the creation of a model is not feasible, realistic estimates can be made by determining the distribution of existing traffic volumes on the surrounding street system. The existing distribution can then be applied to newly generated trips, with adjustments made based upon the likely trip origins and destinations associated with the particular development land use or uses. For Peila Subdivision, an existing conditions distribution was developed based upon area traffic patterns and an area of influence method, which considers the least travel time routing to external trip producers/attractors beyond the boundaries of the development. Results of the distribution analysis are summarized in Figure 3. It should also be noted that trips were divided between the two subdivision accesses based on a least travel time from internal residential units to and from external origins and destinations. The model resulted in approximately 80% of the site traffic would utilize the Molly Drive access while the remaining 20% would use the Molly Drive West access.

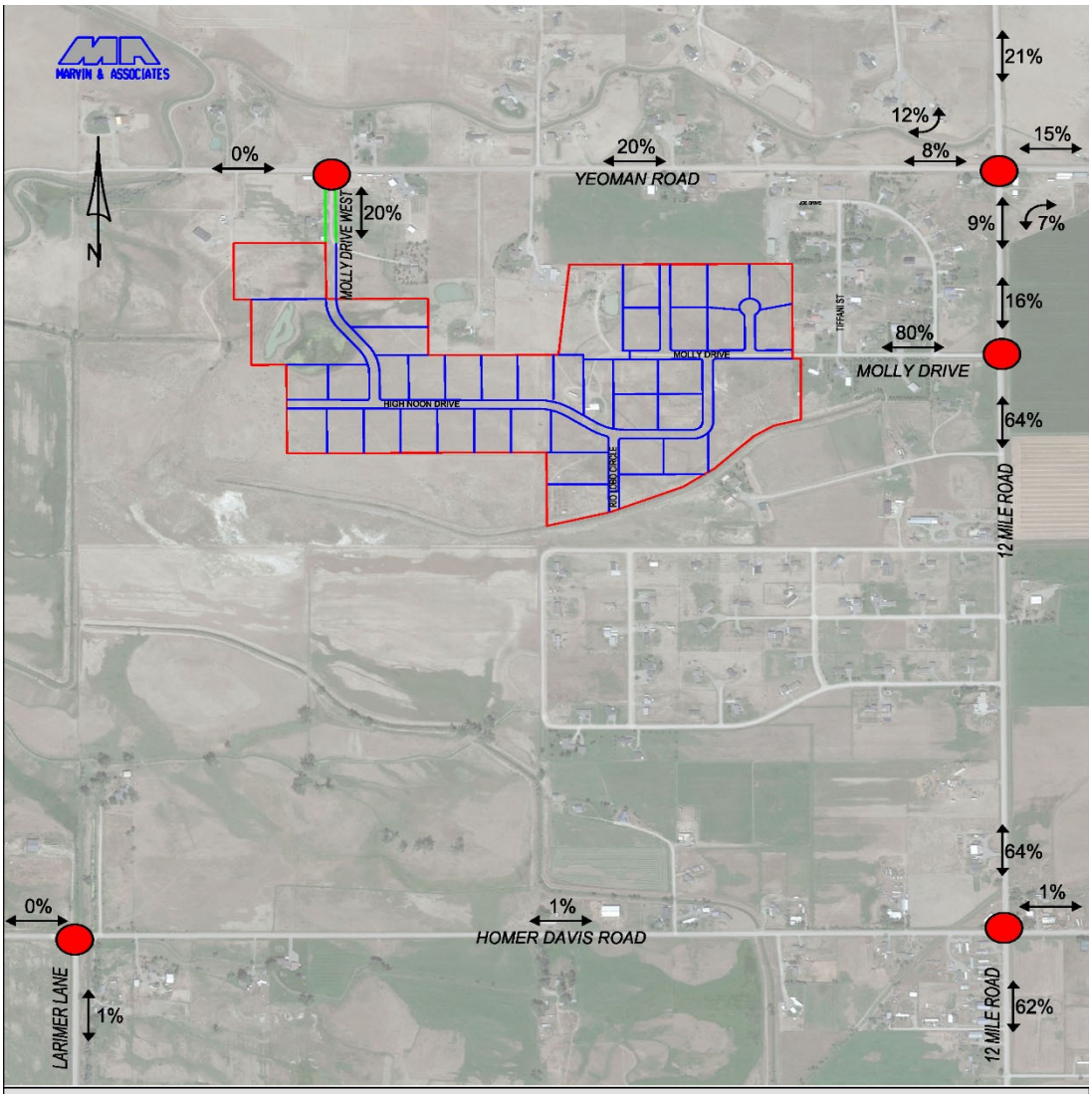


Figure 3. Trip Distribution Percentages

Traffic Assignment

Site traffic assignments were completed using the trip generation projections in Table 2 and the trip distribution percentages discussed in the preceding section. Traffic assignments shown in Figure 4 illustrate the peak AM and PM hour site traffic at the potentially impacted intersections and at site accesses, along with the average weekday vehicular site traffic assigned to the road system links. The traffic volumes shown in Figure 4 represent unconstrained conditions, which do not consider the effect capacity restrictions may have on movements into and out of the site.

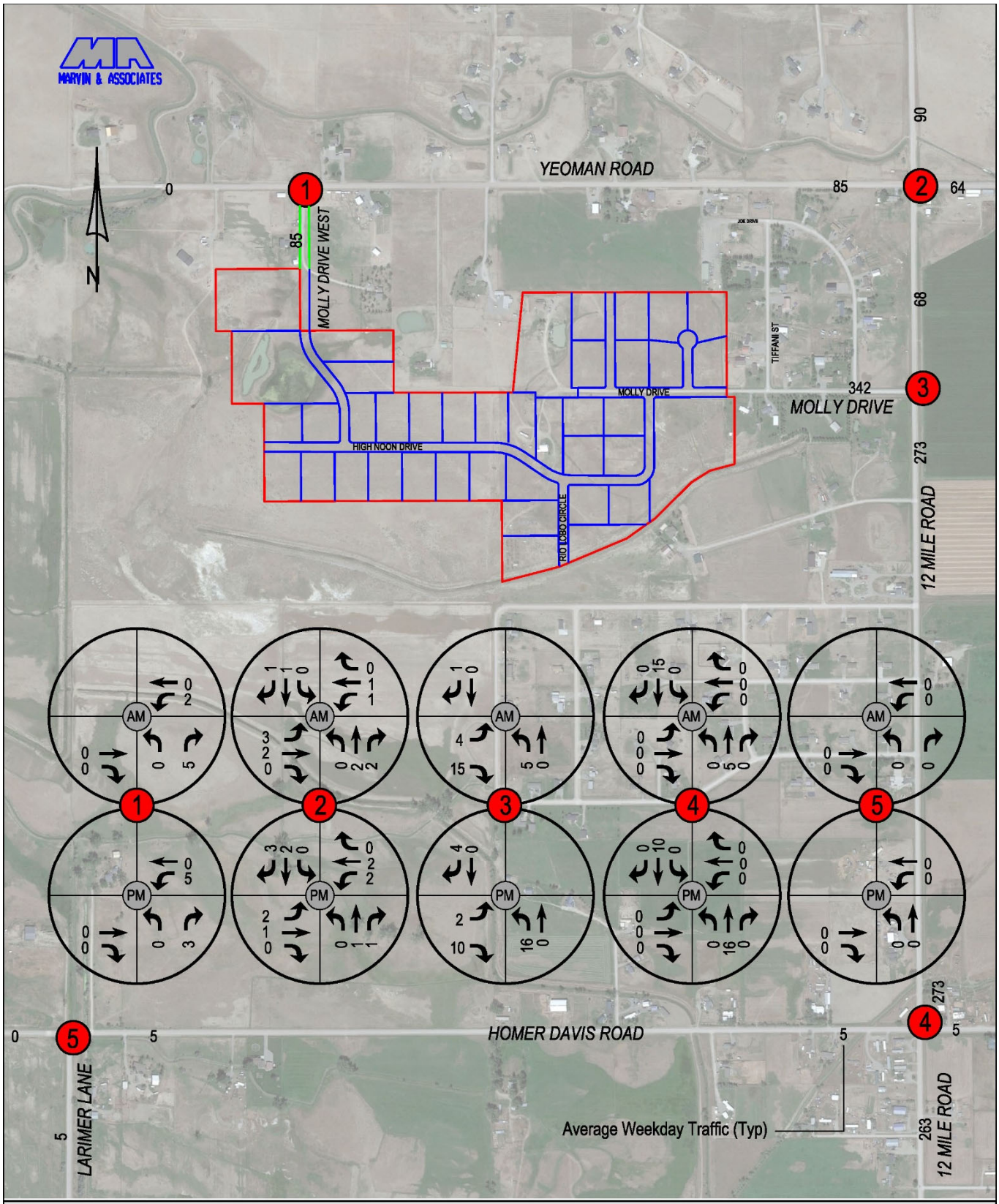


Figure 4. Site Generated Traffic Volume Assignment

TRAFFIC IMPACTS

Existing Plus Development Traffic Volumes

Figure 5 illustrates the combination of existing AM and PM design hour traffic volumes and development generated traffic at the potentially impacted intersections and site access intersections. Also shown in Figure 5 are the resultant AWT volumes and the relative percentage increase over existing traffic that would be attributable to this development. In this case, Molly Drive at its intersection with 12 Mile road would have the highest volume of site generated traffic and also the highest percentage increase of any of the area roads at 260% of existing volumes. Yeoman Road would have a 50% increase in traffic at its intersection with 12 Mile Road. The highest traffic increase on 12 Mile Road would be 17% immediately south of Molly Road.

It should be noted that traffic impacts on roads and streets that are less than 10% are not normally considered to be significant because daily traffic variations on any street or road routinely exceed 10%. In light of that, traffic increases on all of the other roads within the study area would be appreciably less than 10%, which indicates that any impacts on those streets would not be substantial or significant.

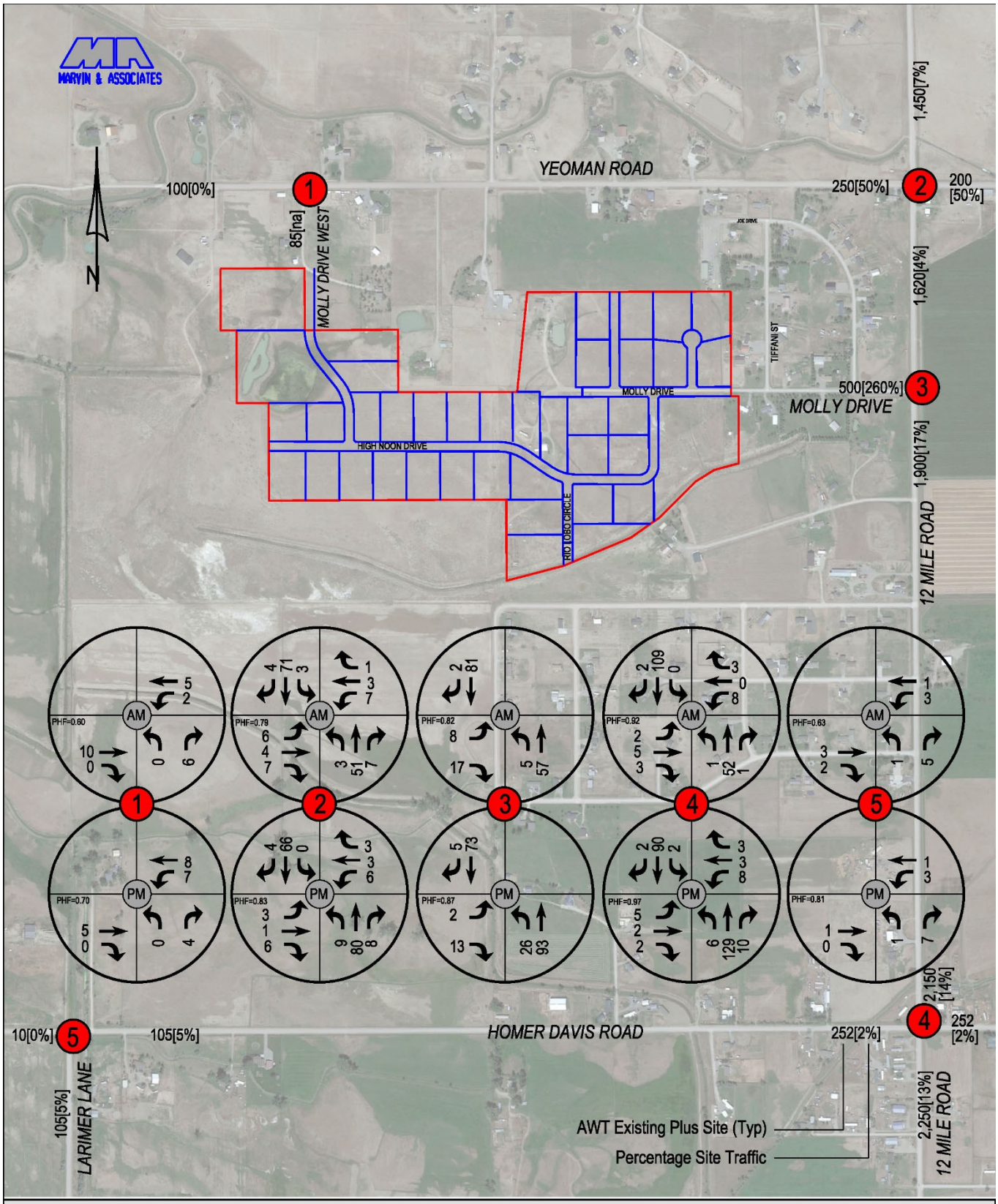


Figure 5. Existing 2023 Plus Site Generated Traffic Volumes

Existing Plus Site Traffic Capacity

Capacity calculations (see Appendix C) indicate that all approaches and all movements at the study intersections and at the site access intersections would still operate at LOS "A" during both the AM and PM hour periods if the development existed today. The only exception would be the intersection of Home Davis Road and 12 Mile Road where the westbound approach would operate at LOS "B" during the peak PM hour period. Table 3 indicates that all of the other intersections would remain at the same LOS in both the AM and PM peak hours with slight variations in delay and maximum vehicle queues.

Table 3. Existing Plus Site Traffic - Capacity Calculation Summary

		PEAK AM HOUR				PEAK PM HOUR		
Intersection	Int/App	Delay	LOS	Max Q	Int/App	Delay	LOS	Max Q
Yeoman Road & Molly Drive West	NB- Worst	8.4	A	0	NB- Worst	8.4	A	0
12 Mile Road & Yeoman Road	WB- Worst	9.8	A	1	WB- Worst	9.8	A	1
12 Mile Road & Molly Drive	EB- Worst	9.1	A	1	EB- Worst	9.0	A	1
12 Mile Road & Homer Davis Road	EB- Worst	9.7	A	0	WB- Worst	10.1	B	1
Homer Davis Road & Larimer Road	NB-Worst	8.4	A	0	NB-Worst	8.4	A	0

Safety Considerations

An evaluation of available sight distance for each of the new site accesses was completed based upon geometric conditions. It was determined that there is adequate intersection sight distance for all of the site traffic movements at the new site accesses based on the 85th percentile speeds. The only intersection with sight distance concerns is the 12 Mile Road and Yeoman Road intersection as previously mentioned within this report.

Geometric guidelines for right turn lane warrants on street facilities with 2 traffic lane facilities were used to determine if right turn entry movements would create potential safety issues. Since the number of right turn movements at all of the accesses and study intersections would be substantially less than 40 vehicles in the peak hours, warrants were not met.

Figure 28.4C in MDT's Traffic Engineering Manual provides warrant nomographs for left turn lanes on two lanes highways with speed limits of 60 mph or greater. By inspection, it is apparent that none of the study intersections would have near enough traffic to warrant an auxiliary left turn lane.

Future Traffic

An examination of MDT traffic count data indicates that historic traffic volumes on Old Highway 312 provided the only documented historical traffic volume information near the study area. The average annual traffic growth on that facility was less than 1% over a 10-year period. Thus, a 1% annual traffic increase was used to determine future traffic increases in the background traffic. It was assumed that the study subdivision could be fully developed within a 10-year period and future traffic volumes were calculated for the year 2033. Figure 6 presents the calculated traffic volumes for the year 2033 based on an annual growth rate of 1%, which was applied to existing traffic with site generated traffic volumes added for the AM, PM, and average weekday conditions.

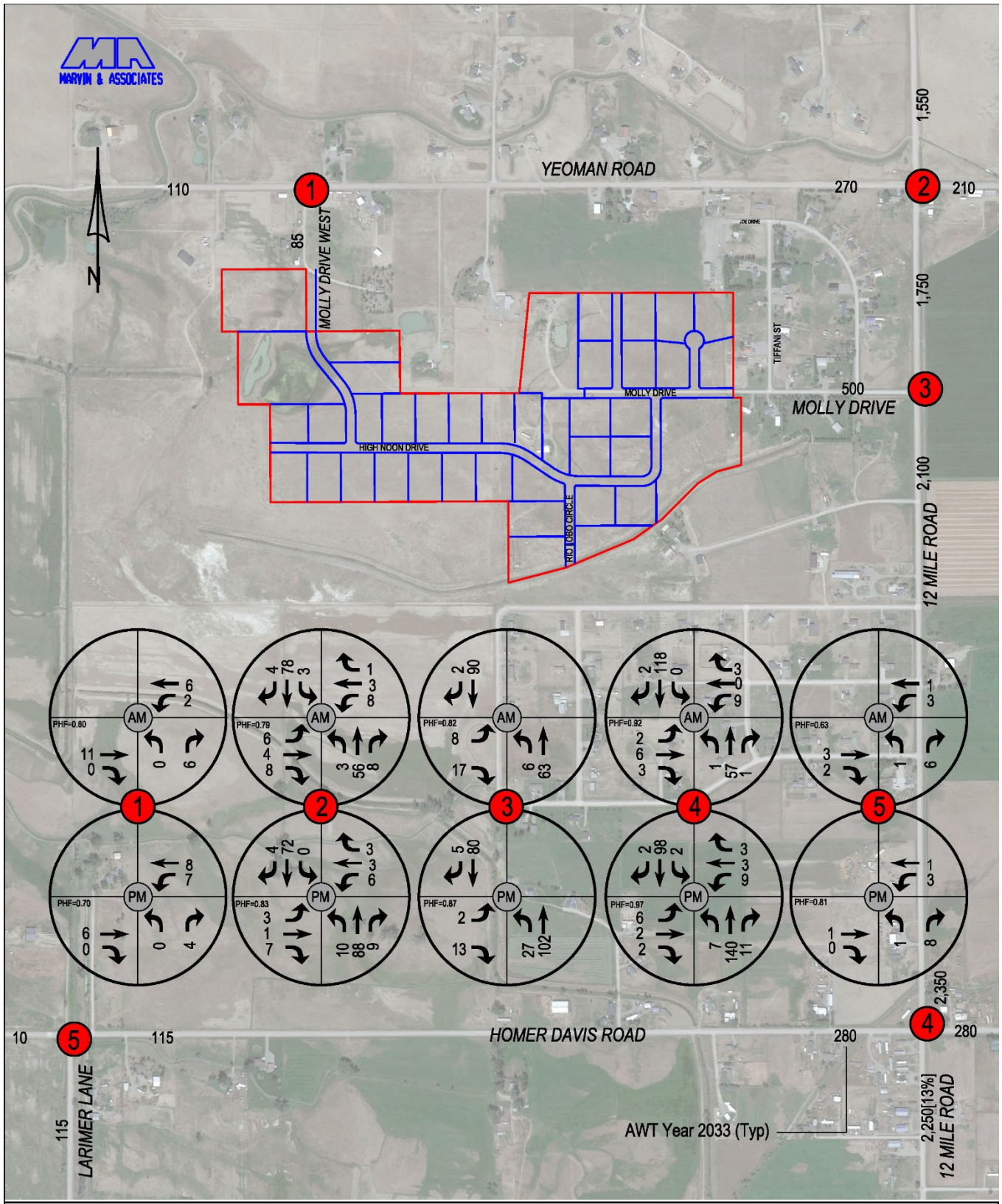


Figure 6. Year 2033 Plus Site Generated Traffic Volumes

Future Capacity

Table 4 present future capacity calculations based on the future traffic volumes shown in Figure 6. Two of the study intersections would only gain 1 or 2 vehicles at the assumed growth rate, by the year 2033, and there would be no difference in operations from the existing plus site traffic analysis. The three intersections shown in Table 4 would all operate at a LOS "B" or better in the year 2033 and there would be ample capacity remaining to accommodate much larger growth in the future.

Table 4. Year 2033 Traffic - Capacity Calculation Summary

		PEAK AM HOUR				PEAK PM HOUR		
Intersection	Int/App	Delay	LOS	Max Q	Int/App	Delay	LOS	Max Q
12 Mile Road & Yeoman Road	WB- Worst	10.0	B	1	WB- Worst	10.0	B	1
12 Mile Road & Molly Drive	EB- Worst	9.2	A	1	EB- Worst	9.0	A	1
12 Mile Road & Homer Davis Road	EB- Worst	9.8	A	0	WB- Worst	10.3	B	1

Future Safety

Additional traffic at the study intersections in the year 2033 would not be sufficient to increase the warrant values for auxiliary turn lanes at the study intersections. The 12 Mile Road and Yeoman intersections would experience incremental increases in the likelihood of crashes related to insufficient sight distance based on 85th percentile speeds that exceed the posted speed limit.

MITIGATING MEASURES

The only intersection that would have the potential to be impacted by site development within the near future would be the 12 Mile Road and Yeoman Road intersection. In order to reduce the potential for increased crash experience, alternative improvements would need to be implemented. The October 3, 2022, intersection study by Sanderson Stewart outlined a number of potential alternatives ranging from oversized signing to reconstruction of the vertical curve. Since reconstruction represents the highest cost alternative, it should be considered the ultimate improvement. The other alternatives should be considered since one or a combination of alternatives could result in reduced crash potential until substantial traffic increases are seen in future years.

CONCLUSIONS & RECOMMENDATIONS

The Peila Subdivision development would not substantially impact the safety and efficiency of any of the study roads and intersections. However, site traffic would incrementally increase exposure to crash potential at the intersection of 12 Mile Road and Yeoman Road. This impact would need to be mitigated to some degree. Since the safety concern involves vehicles exceeding the existing 55 mph speed limit, efforts should be directed at reducing travel speeds through the intersection area. The following recommendations are made in an effort to mitigate the sight distance and speed related concerns at the 12 Mile Road and Yeoman Road intersection:

1. Add sign-mounted intelligent transportation systems using lights that could be radar activated to flash only when traffic is exceeding the advisory speeds. These signs would require periodic enforcement of the speed limit so that daily travelers would not become complacent over time.
2. Add transverse rumble strips to 12 Mile Road, especially on the 12 Mile Road southbound approach.
3. Prune the tree limbs south of the intersection to improve visibility and cut grass and weeds along the shoulders of the roadway.

APPENDIX A

Traffic Count Volumes

Study Name 12 Mile and Yeoman
Start Date 03/23/2023
Start Time 7:00 AM
Site Code
Project Peila Subdivison TIS

Type Road
Classification Totals

	12 Mile Southbound			Yeoman Road Westbound			12 Mile Northbound			Yeoman Road Eastbound			Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Entering
7:00 AM	0	10	0	0	0	0	1	3	0	6	1	1	22
7:15 AM	0	16	0	0	1	1	0	4	2	2	0	0	26
7:30 AM	0	13	1	0	0	0	3	12	1	0	0	1	31
7:45 AM	0	16	1	0	0	1	3	14	1	2	2	2	42
8:00 AM	1	26	0	0	2	2	1	14	1	1	0	1	49
8:15 AM	2	14	1	0	0	2	1	9	1	1	0	0	31
8:30 AM	0	14	1	1	0	1	0	12	0	3	0	0	32
8:45 AM	0	15	0	0	0	1	0	11	1	2	0	0	30
Peak AM Hour =	**3**	**70**	**3**	**1**	**2**	**6**	**5**	**49**	**3**	**7**	**2**	**3**	**154**
PHF =	**0.79**												
4:00 PM	1	14	0	1	1	2	3	12	1	0	0	2	37
4:15 PM	1	21	0	2	0	3	2	21	1	2	0	0	53
4:30 PM	0	16	0	1	1	0	1	20	4	1	0	1	45
4:45 PM	0	12	0	0	0	1	1	19	2	1	0	0	36
5:00 PM	0	15	0	0	0	0	3	19	2	2	0	0	41
5:15 PM	0	8	0	0	0	0	0	23	1	2	0	0	34
5:30 PM	0	14	0	0	0	1	0	20	3	1	0	0	39
5:45 PM	0	11	0	0	0	1	0	15	2	0	0	2	31
Peak AM Hour =	**1**	**64**	**0**	**3**	**1**	**4**	**7**	**79**	**9**	**6**	**0**	**1**	**175**
PHF =	**0.83**												

Study Name 12 Mile Road and Molly Drive
Start Date 03/23/2023
Start Time 7:00 AM
Site Code
Project Peila Subdivision TIS

Type Road
Classification Totals

	12 Mile Road Southbound			n/a Westbound			12 Mile Road Northbound			Molly Road Eastbound			Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Entering
7:00 AM	0	16						4	0	6		0	26
7:15 AM	0	19						6	0	6		0	31
7:30 AM	0	13						14	1	1		1	30
7:45 AM	0	17						16	0	1		3	37
8:00 AM	1	27						15	0	0		1	44
8:15 AM	0	19						12	0	1		0	32
8:30 AM	0	18						14	0	0		0	32
8:45 AM	0	18						12	0	2		0	32
Peak AM Hour =	**1**	**81**	**0**	**0**	**0**	**0**	**0**	**57**	**0**	**2**	**0**	**4**	**145**
PHF =	**0.82**												
4:00 PM	2	14						17	0	2		0	35
4:15 PM	0	26						23	2	1		0	52
4:30 PM	0	17						25	1	1		0	44
4:45 PM	0	14						20	3	1		0	38
5:00 PM	1	16						25	4	0		0	46
5:15 PM	0	9						25	3	0		0	37
5:30 PM	0	16						22	5	2		0	45
5:45 PM	0	11						22	2	1		0	36
Peak PM Hour =	**1**	**73**	**0**	**0**	**0**	**0**	**0**	**93**	**10**	**3**	**0**	**0**	**180**
PHF =	**0.87**												

Study Name 12 Mile Road and Homer Davis Road
Start Date 03/23/2023
Start Time 7:00 AM
Site Code
Project Peila Subdivison TIS

Type Road
Classification Totals

	12 Mile Road Southbound			Homer Davis Road Westbound			12 Mile Road Northbound			Homer Davis Road Eastbound			Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Entering
7:00 AM	0	28	1	0	0	1	0	3	0	1	0	0	34
7:15 AM	1	28	1	0	0	3	0	5	0	1	1	1	41
7:30 AM	2	14	0	2	0	5	1	10	1	1	1	1	38
7:45 AM	0	24	1	0	1	1	1	8	0	1	1	2	40
8:00 AM	1	24	0	0	0	4	0	14	0	0	1	1	45
8:15 AM	0	23	0	3	0	2	0	12	0	1	0	0	41
8:30 AM	0	24	0	0	0	0	1	10	1	1	2	0	39
8:45 AM	1	23	0	0	0	2	0	11	0	1	2	1	41
Peak AM Hour =	**2**	**94**	**0**	**3**	**0**	**8**	**1**	**47**	**1**	**3**	**5**	**2**	**166**
PHF =	**0.92**												
4:00 PM	0	17	0	1	1	1	2	22	2	0	0	0	46
4:15 PM	2	23	0	0	0	3	3	27	0	1	0	1	60
4:30 PM	0	24	1	0	0	2	1	27	2	1	1	2	61
4:45 PM	0	16	0	2	1	1	1	29	1	0	1	2	54
5:00 PM	0	17	1	1	2	2	5	30	3	0	0	0	61
5:15 PM	1	7	3	1	0	2	4	30	0	0	0	2	50
5:30 PM	0	18	0	0	0	2	2	32	3	0	0	0	57
5:45 PM	0	14	0	2	0	2	3	22	1	0	0	0	44
Peak PM Hour =	**2**	**80**	**2**	**3**	**3**	**8**	**10**	**113**	**6**	**2**	**2**	**5**	**236**
PHF =	**0.97**												

Study Name Homer Davis and Larimer Lane
Start Date 03/23/2023
Start Time 7:00 AM
Site Code
Project Peila Subdivision TIS

Type Road
Classification Totals

	n/a Southbound			Homer Davis Road Westbound			Larimer Lane Northbound			Homer Davis Road Eastbound			Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Enteing
7:00 AM					0	1	0		0	0	0		1
7:15 AM					0	1	0		1	1	1		4
7:30 AM					1	2	2		0	1	0		6
7:45 AM					0	0	2		0	1	0		3
8:00 AM					0	1	0		0	0	1		2
8:15 AM					0	0	1		1	0	2		4
8:30 AM					0	1	2		1	0	1		5
8:45 AM					3	0	1		0	0	0		4
Peak AM Hour =	**0**	**0**	**0**	**0**	**1**	**3**	**5**	**0**	**1**	**2**	**3**	**0**	**15**
PHF =	**0.63**												
4:00 PM					1	0	0		0	0	0		1
4:15 PM					0	2	0		0	1	1		4
4:30 PM					0	1	2		0	0	0		3
4:45 PM					0	0	3		0	0	0		3
5:00 PM					1	2	0		0	0	0		3
5:15 PM					0	0	2		1	0	1		4
5:30 PM					0	0	1		0	1	0		2
5:45 PM					0	0	0		0	0	0		0
Peak PM Hour =	**0**	**0**	**0**	**0**	**1**	**3**	**7**	**0**	**1**	**0**	**1**	**0**	**13**
PHF =	**0.81**												

12 Mile Road Hourly Traffic Volumes				
Beginning Hour	**NB**	**SB**	**NB + SB**	**% AWT**
7:00 AM	29	100	129	6.7%
8:00 AM	49	96	145	7.5%
9:00 AM	41	49	90	4.6%
10:00 AM	44	46	90	4.6%
11:00 AM	65	67	132	6.8%
12:00 PM	49	53	102	5.3%
1:00 PM	61	59	120	6.2%
2:00 PM	70	49	119	6.1%
3:00 PM	93	60	153	7.9%
4:00 PM	117	83	200	10.3%
5:00 PM	135	61	196	10.1%
6:00 PM	125	46	171	8.8%
12 Hr Totals	878	769	1647	85.0%
AWT Calculated	**1033**	**905**	**1938**	**100.0%**

APPENDIX B

Spot Speed Study

SPOT SPEED STUDY ANALYSIS (Counter)

Marvin & Associates

SITE : **12 Mile Road North of Molly Drive**
DIRECTION: Southbound
DATE: 4/12/23
TIME: 1.4 Hours

SPEED RANGE	SPEED VALUE	SPEED FREQUENCY	CUMULATIVE FREQUENCY	RELATIVE FREQ (%)	CUMULATIVE FREQ (%)
0 to 15	15	0	0	0.00%	0.00%
16 to 20	20	0	0	0.00%	0.00%
21 to 25	25	0	0	0.00%	0.00%
26 to 30	30	0	0	0.00%	0.00%
31 to 35	35	0	0	0.00%	0.00%
36 to 40	40	1	1	1.47%	1.47%
41 to 45	45	4	5	5.88%	7.35%
46 to 50	50	13	18	19.12%	26.47%
51 to 55	55	29	47	42.65%	69.12%
56 to 60	60	19	66	27.94%	97.06%
61 to 65	65	2	68	2.94%	100.00%
66 to 70	70	0	68	0.00%	100.00%

TOTAL VEHICLES = 68

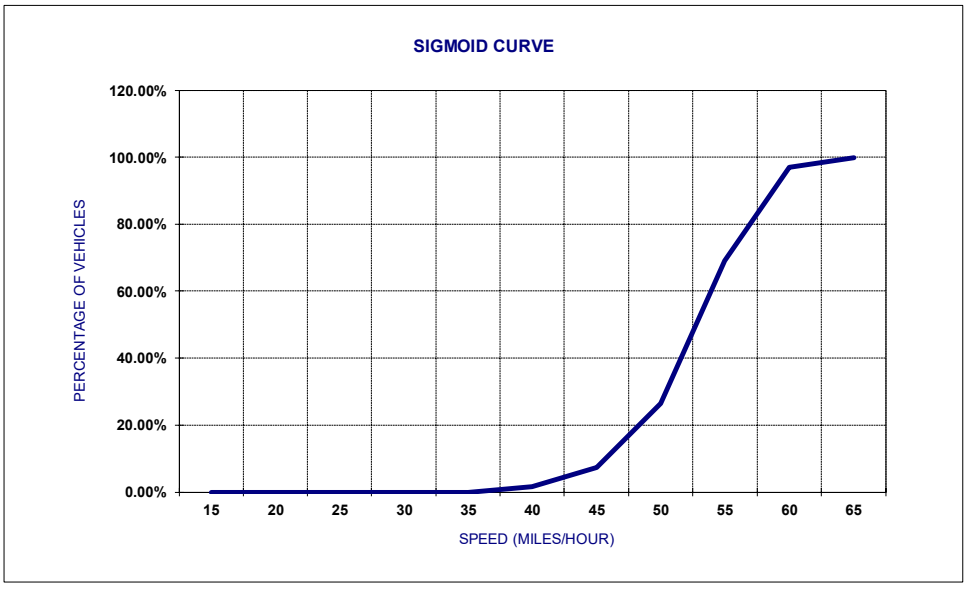
MEAN SPEED = 54.93 mph

85TH PERCENTILE = 57.84 mph

PACE SPEED = 51 mph TO 60 mph

Number of Vehicles in Pace = 48

% of Total Vehicles in Pace = 70.6%



SPOT SPEED STUDY ANALYSIS (Counter)

Marvin & Associates

SITE : **12 Mile Road North of Molly Drive**
DIRECTION: Northbound
DATE: 4/12/23
TIME: 1.4 Hours

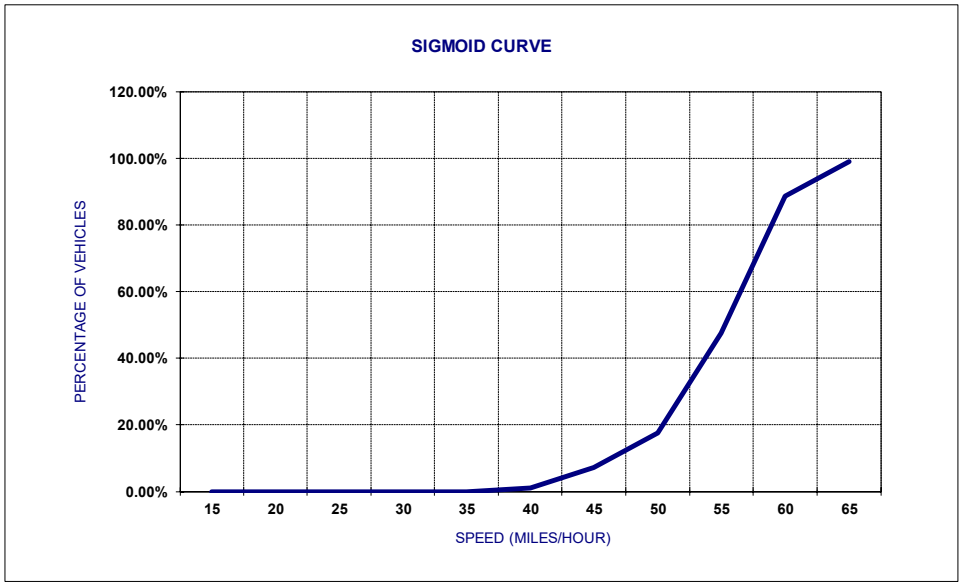
SPEED RANGE	SPEED VALUE	SPEED FREQUENCY	CUMULATIVE FREQUENCY	RELATIVE FREQ (%)	CUMULATIVE FREQ (%)
0 to 15	15	0	0	0.00%	0.00%
16 to 20	20	0	0	0.00%	0.00%
21 to 25	25	0	0	0.00%	0.00%
26 to 30	30	0	0	0.00%	0.00%
31 to 35	35	0	0	0.00%	0.00%
36 to 40	40	1	1	1.03%	1.03%
41 to 45	45	6	7	6.19%	7.22%
46 to 50	50	10	17	10.31%	17.53%
51 to 55	55	29	46	29.90%	47.42%
56 to 60	60	40	86	41.24%	88.66%
61 to 65	65	10	96	10.31%	98.97%
66 to 70	80	1	97	1.03%	100.00%
				0.00%	

TOTAL VEHICLES = 97

MEAN SPEED = 56.24 mph

85TH PERCENTILE = 59.56 mph

PACE SPEED = 51 mph TO 60 mph
Number of Vehicles in Pace = 69
% of Total Vehicles in Pace = 71.1%



SPOT SPEED STUDY ANALYSIS (Counter)

Marvin & Associates

SITE : **12 Mile Road North of Molly Drive**
DIRECTION: NB & SB
DATE: 4/12/23
TIME: 1.4 Hours

SPEED RANGE	SPEED VALUE	SPEED FREQUENCY	CUMULATIVE FREQUENCY	RELATIVE FREQ (%)	CUMULATIVE FREQ (%)
0 to 15	15	0	0	0.00%	0.00%
16 to 20	20	0	0	0.00%	0.00%
21 to 25	25	0	0	0.00%	0.00%
26 to 30	30	0	0	0.00%	0.00%
31 to 35	35	0	0	0.00%	0.00%
36 to 40	40	2	2	1.21%	1.21%
41 to 45	45	10	12	6.06%	7.27%
46 to 50	50	23	35	13.94%	21.21%
51 to 55	55	58	93	35.15%	56.36%
56 to 60	60	59	152	35.76%	92.12%
61 to 65	65	12	164	7.27%	99.39%
66 to 70	70	1	165	0.61%	100.00%

TOTAL VEHICLES = **165** 750

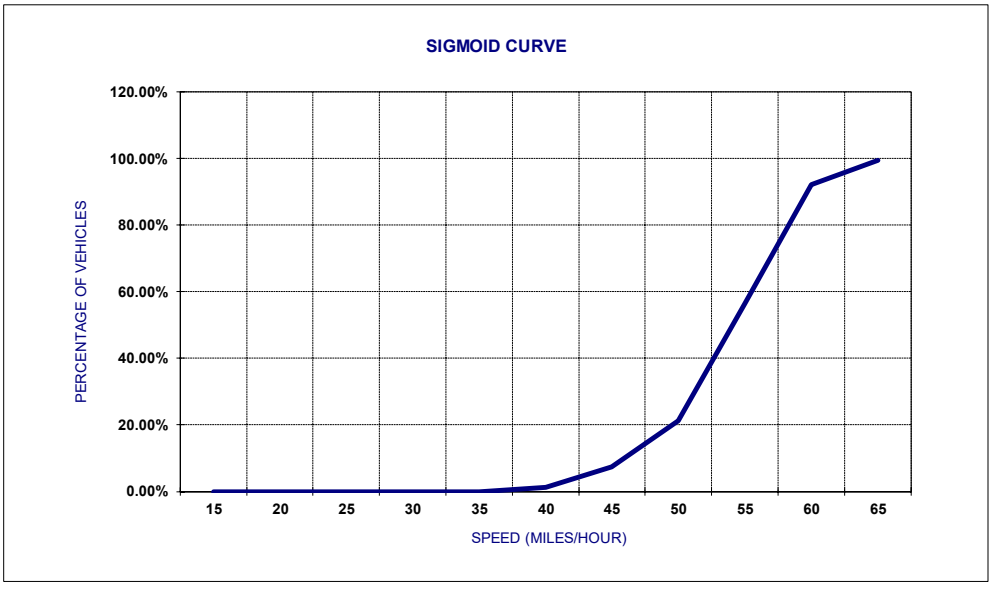
MEAN SPEED = **56.12** mph

85TH PERCENTILE = **59.00** mph

PACE SPEED = **51** mph TO **60** mph

Number of Vehicles in Pace = **117**

% of Total Vehicles in Pace = **70.9%**



APPENDIX C-1

Existing Capacity Calculations

HCS Two-Way Stop-Control Report

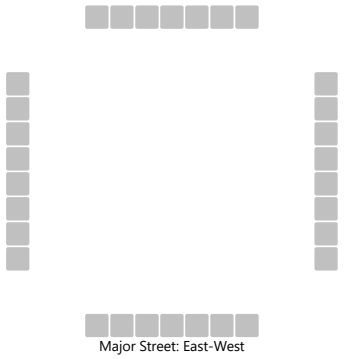
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Existing
Intersection Orientation	East-West
Project Description	Peila Subdivision TIS

Site Information

Intersection	Yeoman & W Molly
Jurisdiction	Yellowstone County
East/West Street	Yeoman Road
North/South Street	West Molly Drive
Peak Hour Factor	0.60
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			10	0		0	5			0		1				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						0					2					
Capacity, c (veh/h)						1594					1059					
v/c Ratio						0.00					0.00					
95% Queue Length, Q_{95} (veh)						0.0					0.0					
Control Delay (s/veh)						7.3	0.0				8.4					
Level of Service (LOS)						A	A				A					
Approach Delay (s/veh)					0.0				8.4							
Approach LOS					A				A							

HCS Two-Way Stop-Control Report

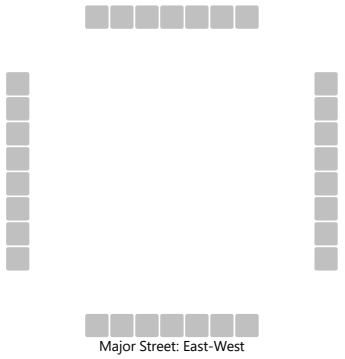
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Existing
Intersection Orientation	East-West
Project Description	Peila Subdivision TIS

Site Information

Intersection	Yeoman & W Molly
Jurisdiction	Yellowstone County
East/West Street	Yeoman Road
North/South Street	West Molly Drive
Peak Hour Factor	0.60
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			5	0		2	8			0		1				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						3					2					
Capacity, c (veh/h)						1605					1071					
v/c Ratio						0.00					0.00					
95% Queue Length, Q_{95} (veh)						0.0					0.0					
Control Delay (s/veh)						7.2	0.0				8.4					
Level of Service (LOS)						A	A				A					
Approach Delay (s/veh)					1.5				8.4							
Approach LOS					A				A							

HCS Two-Way Stop-Control Report

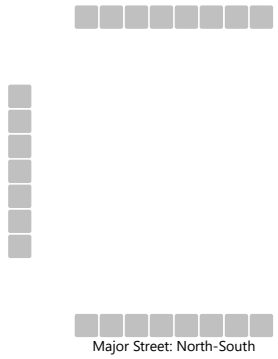
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Existing
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Yeoman Rd
Jurisdiction	Yellowstone County
East/West Street	Yeoman Road
North/South Street	12 Mile Road
Peak Hour Factor	0.79
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	2	7		6	2	1		3	49	5		3	70	3
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			15				11			4				4		
Capacity, c (veh/h)			863				776			1496				1526		
v/c Ratio			0.02				0.01			0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.0			0.0				0.0		
Control Delay (s/veh)			9.2				9.7			7.4	0.0	0.0		7.4	0.0	0.0
Level of Service (LOS)			A				A			A	A	A		A	A	A
Approach Delay (s/veh)	9.2				9.7				0.4				0.3			
Approach LOS	A				A				A				A			

HCS Two-Way Stop-Control Report

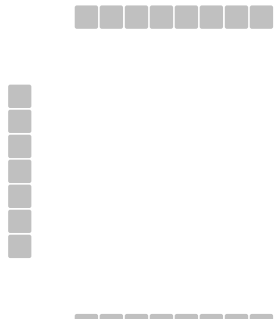
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Existing
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Yeoman Rd
Jurisdiction	Yellowstone County
East/West Street	Yeoman Road
North/South Street	12 Mile Road
Peak Hour Factor	0.83
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	0	6		4	1	3		9	79	7		0	64	0
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			8				10			11				0		
Capacity, c (veh/h)			939				802			1515				1482		
v/c Ratio			0.01				0.01			0.01				0.00		
95% Queue Length, Q_{95} (veh)			0.0				0.0			0.0				0.0		
Control Delay (s/veh)			8.9				9.5			7.4	0.1	0.1		7.4	0.0	0.0
Level of Service (LOS)			A				A			A	A	A		A	A	A
Approach Delay (s/veh)	8.9				9.5				0.8				0.0			
Approach LOS	A				A				A				A			

HCS Two-Way Stop-Control Report

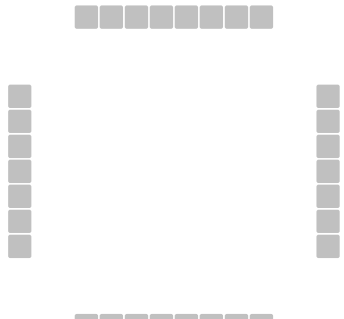
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Hour Existing
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Molly Dr
Jurisdiction	Yellowstone County
East/West Street	Molly Drive
North/South Street	12 Mile Road
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		4		2						0	57				81	1
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			7							0						
Capacity, c (veh/h)			859							1486						
v/c Ratio			0.01							0.00						
95% Queue Length, Q_{95} (veh)			0.0							0.0						
Control Delay (s/veh)			9.2							7.4	0.0					
Level of Service (LOS)			A							A	A					
Approach Delay (s/veh)		9.2								0.0						
Approach LOS		A								A						

HCS Two-Way Stop-Control Report

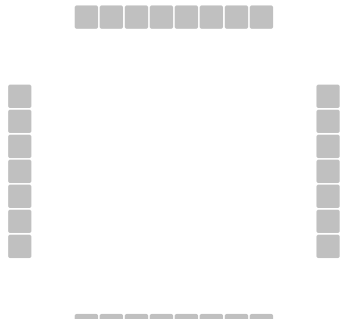
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Hour Existing
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Molly Dr
Jurisdiction	Yellowstone County
East/West Street	Molly Drive
North/South Street	12 Mile Road
Peak Hour Factor	0.87
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		0		3						10	93				73	1
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			3							11						
Capacity, c (veh/h)			972							1505						
v/c Ratio			0.00							0.01						
95% Queue Length, Q_{95} (veh)			0.0							0.0						
Control Delay (s/veh)			8.7							7.4	0.1					
Level of Service (LOS)			A							A	A					
Approach Delay (s/veh)		8.7								0.8						
Approach LOS		A								A						

HCS Two-Way Stop-Control Report

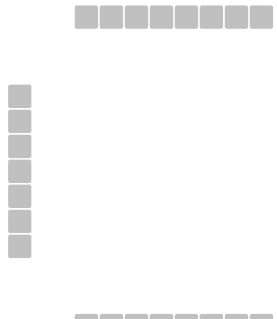
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Hour Existing
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Homer Davis
Jurisdiction	Yellowstone County
East/West Street	Homer Davis Road
North/South Street	12 Mile Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		2	5	3		8	0	3		1	47	1		0	94	2
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			11				12			1				0		
Capacity, c (veh/h)			801				842			1481				1547		
v/c Ratio			0.01				0.01			0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.0				0.0			0.0				0.0		
Control Delay (s/veh)			9.6				9.3			7.4	0.0	0.0		7.3	0.0	0.0
Level of Service (LOS)			A				A			A	A	A		A	A	A
Approach Delay (s/veh)	9.6				9.3				0.2				0.0			
Approach LOS	A				A				A				A			

HCS Two-Way Stop-Control Report

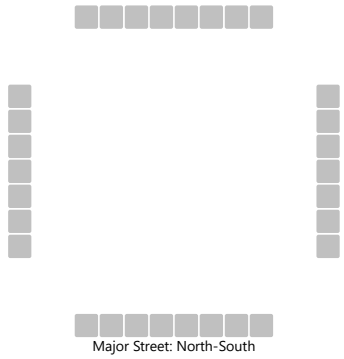
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Hour Existing
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Homer Davis
Jurisdiction	Yellowstone County
East/West Street	Homer Davis Road
North/South Street	12 Mile Road
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		5	2	2		8	3	3		6	113	10		2	80	2
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			9				14			6				2		
Capacity, c (veh/h)			749				745			1506				1453		
v/c Ratio			0.01				0.02			0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.0		
Control Delay (s/veh)			9.9				9.9			7.4	0.0	0.0		7.5	0.0	0.0
Level of Service (LOS)			A				A			A	A	A		A	A	A
Approach Delay (s/veh)	9.9				9.9				0.4				0.2			
Approach LOS	A				A				A				A			

HCS Two-Way Stop-Control Report

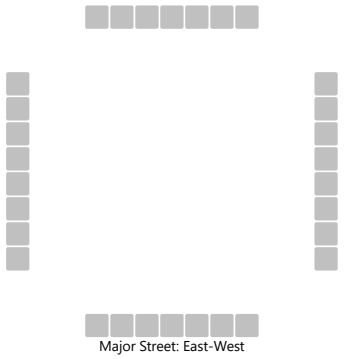
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Existing
Intersection Orientation	East-West
Project Description	Peila Subdivision TIS

Site Information

Intersection	Homer Davis & Larimer
Jurisdiction	Yellowstone County
East/West Street	Homer Davis Road
North/South Street	Larimer Road
Peak Hour Factor	0.63
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			3	2		3	1			1		5				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						5					10					
Capacity, c (veh/h)						1606					1059					
v/c Ratio						0.00					0.01					
95% Queue Length, Q_{95} (veh)						0.0					0.0					
Control Delay (s/veh)						7.2	0.0				8.4					
Level of Service (LOS)						A	A				A					
Approach Delay (s/veh)					5.4				8.4							
Approach LOS					A				A							

HCS Two-Way Stop-Control Report

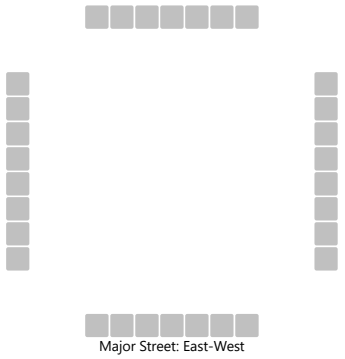
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Existing
Intersection Orientation	East-West
Project Description	Peila Subdivision TIS

Site Information

Intersection	Homer Davis & Larimer
Jurisdiction	Yellowstone County
East/West Street	Homer Davis Road
North/South Street	Larimer Road
Peak Hour Factor	0.81
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			1	0		3	1			1		7				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						4					10					
Capacity, c (veh/h)						1615					1070					
v/c Ratio						0.00					0.01					
95% Queue Length, Q_{95} (veh)						0.0					0.0					
Control Delay (s/veh)						7.2	0.0				8.4					
Level of Service (LOS)						A	A				A					
Approach Delay (s/veh)					5.4				8.4							
Approach LOS					A				A							

APPENDIX C-2

Existing Plus Site Traffic Capacity Calculations

HCS Two-Way Stop-Control Report

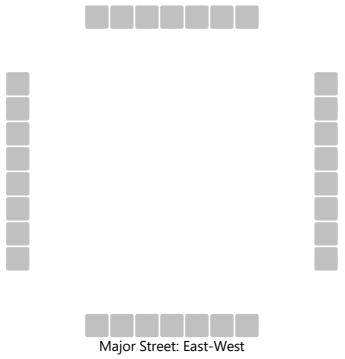
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Existing Plus
Intersection Orientation	East-West
Project Description	Peila Subdivision TIS

Site Information

Intersection	Yeoman & W Molly
Jurisdiction	Yellowstone County
East/West Street	Yeoman Road
North/South Street	West Molly Drive
Peak Hour Factor	0.60
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			10	0		2	5			0		6				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						3					10					
Capacity, c (veh/h)						1594					1059					
v/c Ratio						0.00					0.01					
95% Queue Length, Q_{95} (veh)						0.0					0.0					
Control Delay (s/veh)						7.3	0.0				8.4					
Level of Service (LOS)						A	A				A					
Approach Delay (s/veh)					2.1				8.4							
Approach LOS					A				A							

HCS Two-Way Stop-Control Report

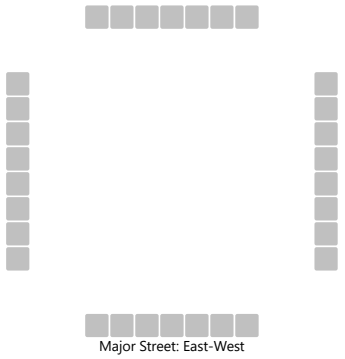
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Existing Plus
Intersection Orientation	East-West
Project Description	Peila Subdivision TIS

Site Information

Intersection	Yeoman & W Molly
Jurisdiction	Yellowstone County
East/West Street	Yeoman Road
North/South Street	West Molly Drive
Peak Hour Factor	0.70
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			5	0		7	8			0		4				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						10					6					
Capacity, c (veh/h)						1607					1072					
v/c Ratio						0.01					0.01					
95% Queue Length, Q_{95} (veh)						0.0					0.0					
Control Delay (s/veh)						7.3	0.0				8.4					
Level of Service (LOS)						A	A				A					
Approach Delay (s/veh)					3.4				8.4							
Approach LOS					A				A							

HCS Two-Way Stop-Control Report

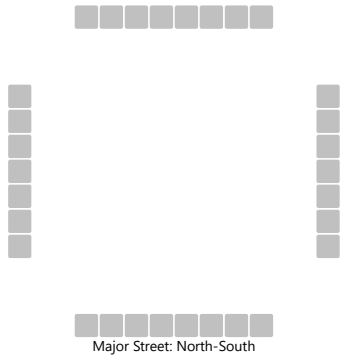
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Hour Existing Plus
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Molly Dr
Jurisdiction	Yellowstone County
East/West Street	Molly Drive
North/South Street	12 Mile Road
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		8		17						5	57				81	2
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			30							6						
Capacity, c (veh/h)			899							1485						
v/c Ratio			0.03							0.00						
95% Queue Length, Q_{95} (veh)			0.1							0.0						
Control Delay (s/veh)			9.1							7.4	0.0					
Level of Service (LOS)			A							A	A					
Approach Delay (s/veh)		9.1								0.6						
Approach LOS		A								A						

HCS Two-Way Stop-Control Report

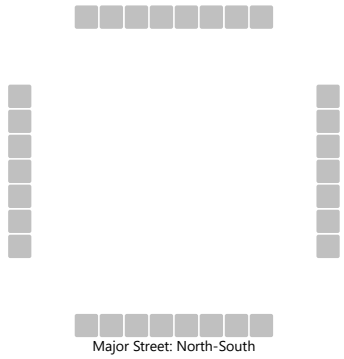
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Hour Existing Plus
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Molly Dr
Jurisdiction	Yellowstone County
East/West Street	Molly Drive
North/South Street	12 Mile Road
Peak Hour Factor	0.87
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		2		13						26	93				73	5
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			17							30						
Capacity, c (veh/h)			926							1499						
v/c Ratio			0.02							0.02						
95% Queue Length, Q_{95} (veh)			0.1							0.1						
Control Delay (s/veh)			9.0							7.4	0.2					
Level of Service (LOS)			A							A	A					
Approach Delay (s/veh)		9.0								1.8						
Approach LOS		A								A						

HCS Two-Way Stop-Control Report

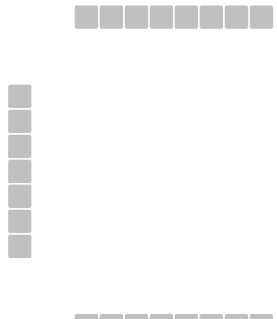
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Existing Plus
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Yeoman Rd
Jurisdiction	Yellowstone County
East/West Street	Yeoman Road
North/South Street	12 Mile Road
Peak Hour Factor	0.79
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		6	4	7		7	3	1		3	51	7		4	71	3
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			22				14			4				5		
Capacity, c (veh/h)			819				758			1494				1520		
v/c Ratio			0.03				0.02			0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.0				0.0		
Control Delay (s/veh)			9.5				9.8			7.4	0.0	0.0		7.4	0.0	0.0
Level of Service (LOS)			A				A			A	A	A		A	A	A
Approach Delay (s/veh)	9.5				9.8				0.4				0.4			
Approach LOS	A				A				A				A			

HCS Two-Way Stop-Control Report

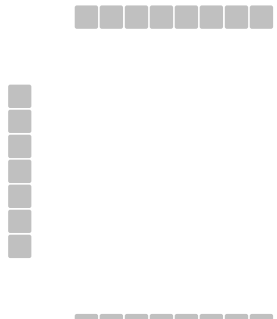
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Existing Plus
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Yeoman Rd
Jurisdiction	Yellowstone County
East/West Street	Yeoman Road
North/South Street	12 Mile Road
Peak Hour Factor	0.83
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	1	6		6	3	3		9	80	8		0	66	4
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			12				14			11				0		
Capacity, c (veh/h)			854				763			1506				1479		
v/c Ratio			0.01				0.02			0.01				0.00		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.0		
Control Delay (s/veh)			9.3				9.8			7.4	0.1	0.1		7.4	0.0	0.0
Level of Service (LOS)			A				A			A	A	A		A	A	A
Approach Delay (s/veh)	9.3				9.8				0.7				0.0			
Approach LOS	A				A				A				A			

HCS Two-Way Stop-Control Report

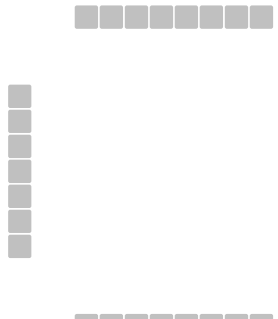
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Hour Existing Plus
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Homer Davis
Jurisdiction	Yellowstone County
East/West Street	Homer Davis Road
North/South Street	12 Mile Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		2	5	3		8	0	3		1	52	1		0	109	2
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			11				12			1				0		
Capacity, c (veh/h)			780				820			1461				1540		
v/c Ratio			0.01				0.01			0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.0				0.0			0.0				0.0		
Control Delay (s/veh)			9.7				9.5			7.5	0.0	0.0		7.3	0.0	0.0
Level of Service (LOS)			A				A			A	A	A		A	A	A
Approach Delay (s/veh)	9.7				9.5				0.1				0.0			
Approach LOS	A				A				A				A			

HCS Two-Way Stop-Control Report

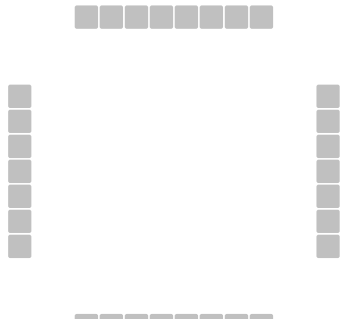
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Hour Existing Plus
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Homer Davis
Jurisdiction	Yellowstone County
East/West Street	Homer Davis Road
North/South Street	12 Mile Road
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		5	2	2		8	3	3		6	129	10		2	90	2
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			9				14			6				2		
Capacity, c (veh/h)			724				719			1493				1433		
v/c Ratio			0.01				0.02			0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.0		
Control Delay (s/veh)			10.0				10.1			7.4	0.0	0.0		7.5	0.0	0.0
Level of Service (LOS)			B				B			A	A	A		A	A	A
Approach Delay (s/veh)	10.0				10.1				0.3				0.2			
Approach LOS	B				B				A				A			

HCS Two-Way Stop-Control Report

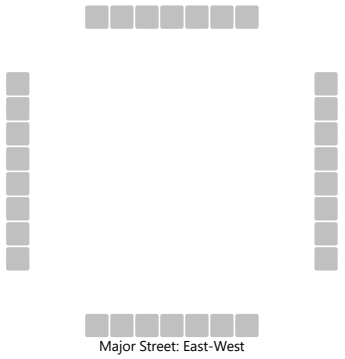
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Existing Plus
Intersection Orientation	East-West
Project Description	Peila Subdivision TIS

Site Information

Intersection	Homer Davis & Larimer
Jurisdiction	Yellowstone County
East/West Street	Homer Davis Road
North/South Street	Larimer Road
Peak Hour Factor	0.63
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			3	2		3	1			1		5				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						5					10					
Capacity, c (veh/h)						1606					1059					
v/c Ratio						0.00					0.01					
95% Queue Length, Q_{95} (veh)						0.0					0.0					
Control Delay (s/veh)						7.2	0.0				8.4					
Level of Service (LOS)						A	A				A					
Approach Delay (s/veh)					5.4				8.4							
Approach LOS					A				A							

HCS Two-Way Stop-Control Report

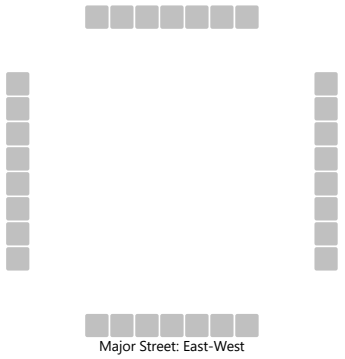
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Existing Pus
Intersection Orientation	East-West
Project Description	Peila Subdivision TIS

Site Information

Intersection	Homer Davis & Larimer
Jurisdiction	Yellowstone County
East/West Street	Homer Davis Road
North/South Street	Larimer Road
Peak Hour Factor	0.81
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			1	0		3	1			1		7				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						4					10					
Capacity, c (veh/h)						1615					1070					
v/c Ratio						0.00					0.01					
95% Queue Length, Q_{95} (veh)						0.0					0.0					
Control Delay (s/veh)						7.2	0.0				8.4					
Level of Service (LOS)						A	A				A					
Approach Delay (s/veh)					5.4				8.4							
Approach LOS					A				A							

APPENDIX C-3

Year 2033 Traffic Capacity Calculations

HCS Two-Way Stop-Control Report

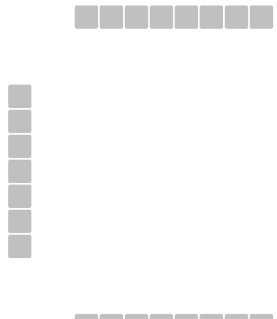
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Year 2033
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Yeoman Rd
Jurisdiction	Yellowstone County
East/West Street	Yeoman Road
North/South Street	12 Mile Road
Peak Hour Factor	0.79
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		7	5	8		8	3	1		3	56	8		4	78	3
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			25				15			4				5		
Capacity, c (veh/h)			801				739			1483				1510		
v/c Ratio			0.03				0.02			0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.0				0.0		
Control Delay (s/veh)			9.6				10.0			7.4	0.0	0.0		7.4	0.0	0.0
Level of Service (LOS)			A				A			A	A	A		A	A	A
Approach Delay (s/veh)	9.6				10.0				0.4				0.4			
Approach LOS	A				A				A				A			

HCS Two-Way Stop-Control Report

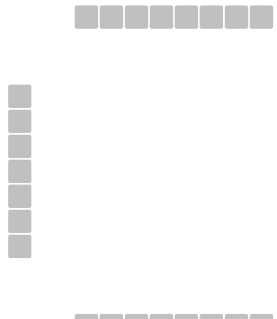
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Year 2033
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Yeoman Rd
Jurisdiction	Yellowstone County
East/West Street	Yeoman Road
North/South Street	12 Mile Road
Peak Hour Factor	0.83
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	1	7		7	3	3		10	88	9		0	73	4
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			13				16			12				0		
Capacity, c (veh/h)			847				739			1495				1465		
v/c Ratio			0.02				0.02			0.01				0.00		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.0		
Control Delay (s/veh)			9.3				10.0			7.4	0.1	0.1		7.5	0.0	0.0
Level of Service (LOS)			A				A			A	A	A		A	A	A
Approach Delay (s/veh)	9.3				10.0				0.8				0.0			
Approach LOS	A				A				A				A			

HCS Two-Way Stop-Control Report

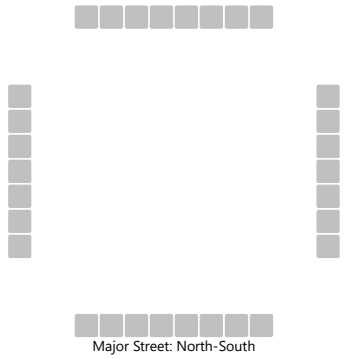
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Year 2033
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Molly Dr
Jurisdiction	Yellowstone County
East/West Street	Molly Drive
North/South Street	12 Mile Road
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		9		19						6	63				89	2
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			34							7						
Capacity, c (veh/h)			883							1473						
v/c Ratio			0.04							0.00						
95% Queue Length, Q_{95} (veh)			0.1							0.0						
Control Delay (s/veh)			9.2							7.5	0.0					
Level of Service (LOS)			A							A	A					
Approach Delay (s/veh)		9.2								0.7						
Approach LOS		A								A						

HCS Two-Way Stop-Control Report

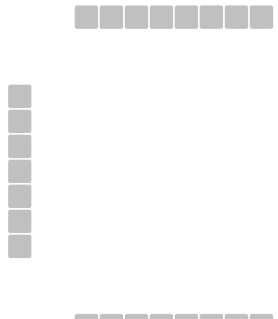
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Hour Year 2033
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Molly Dr
Jurisdiction	Yellowstone County
East/West Street	Molly Drive
North/South Street	12 Mile Road
Peak Hour Factor	0.87
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		2		14						29	102				80	6
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.23						4.13						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.33						2.23						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			18							33						
Capacity, c (veh/h)			914							1488						
v/c Ratio			0.02							0.02						
95% Queue Length, Q_{95} (veh)			0.1							0.1						
Control Delay (s/veh)			9.0							7.5	0.2					
Level of Service (LOS)			A							A	A					
Approach Delay (s/veh)		9.0								1.8						
Approach LOS		A								A						

HCS Two-Way Stop-Control Report

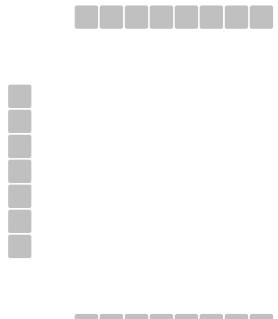
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	AM Hour Year 2033
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Homer Davis
Jurisdiction	Yellowstone County
East/West Street	Homer Davis Road
North/South Street	12 Mile Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		2	6	3		9	0	3		1	57	1		0	120	2
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			12				13			1				0		
Capacity, c (veh/h)			757				795			1446				1533		
v/c Ratio			0.02				0.02			0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.0				0.0			0.0				0.0		
Control Delay (s/veh)			9.8				9.6			7.5	0.0	0.0		7.3	0.0	0.0
Level of Service (LOS)			A				A			A	A	A		A	A	A
Approach Delay (s/veh)	9.8				9.6				0.1				0.0			
Approach LOS	A				A				A				A			

HCS Two-Way Stop-Control Report

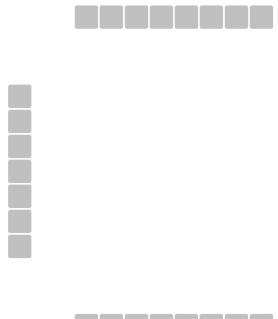
General Information

Analyst	R Marvin
Agency/Co.	Marvin Associates
Date Performed	4/17/2023
Analysis Year	2023
Time Analyzed	PM Hour Year 2033
Intersection Orientation	North-South
Project Description	Peila Subdivision TIS

Site Information

Intersection	12 Mile Rd & Homer Davis
Jurisdiction	Yellowstone County
East/West Street	Homer Davis Road
North/South Street	12 Mile Road
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		6	2	2		9	3	3		7	134	11		2	99	2
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			10				15			7				2		
Capacity, c (veh/h)			703				701			1481				1426		
v/c Ratio			0.01				0.02			0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.0		
Control Delay (s/veh)			10.2				10.3			7.4	0.0	0.0		7.5	0.0	0.0
Level of Service (LOS)			B				B			A	A	A		A	A	A
Approach Delay (s/veh)	10.2				10.3				0.4				0.2			
Approach LOS	B				B				A				A			