Traffic Impact Study

To:	**Mitch Nelson, Mountain View Land Developers, LLC**
From:	**Eli Farney, PE, PTOE**
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Mountain View Development

Johnstown, Colorado

Prepared By:

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Executive Summary

JR Engineering (JR) has completed a review of the traffic impacts resulting from the proposed Mountain View Development (Project) in Johnstown, Colorado (Town).

The objectives of this Traffic Impact Study (TIS, Study) are:

- Estimate site-generated traffic and route trips onto adjacent streets
- Analyze 2024 (Opening Day) and 2045 (Future Year) traffic operations
- Make recommendations for improvements to accommodate future traffic volumes

The methodology, content, and findings of this TIS are consistent with the following documents:

- **Weld County Engineering and Construction Criteria** – *Chapter 8.1 – Traffic Impact Studies*

Key Findings of this TIS

- Levels of Service
  - All movements operate at LOS C or better in 2022.
  - Nearly all movements are expected to operate at LOS C or better in 2024 with both background traffic and total traffic.
  - In 2045, some movements may operate at LOS E or F.
- Queue Lengths
  - No operational concerns are anticipated as a result of queue lengths.
- Improvements
  - A southbound left turn lane is recommended at the Parish & Molinar intersection.
  - WCR 46.5 may be widened in the future.
  - The intersection of Parish & Settler may become signalized in the future.

Introduction

JR has completed a review of the existing and forecasted traffic operations in the vicinity of the Mountain View Development. A vicinity map is included in **Figure 1**.

Figure 1: Vicinity Map

Land Use

The development is anticipated to contain the following land use:

- Low-rise multi-family residential
  - 125 dwelling units

Study Intersections

JR analyzed six intersections near the Project site. These intersections are listed below and shown in **Figure 2**.

Study intersections:

1. Parish Avenue & Molinar Street
2. Parish Avenue & Settler Way
3. Parish Avenue & WCR 46.5/Centennial Drive
4. WCR 46.5 & Mountain Bluebird Drive
5. Molinar Street & Mountain Bluebird Drive
6. Molinar Street & Condor Way

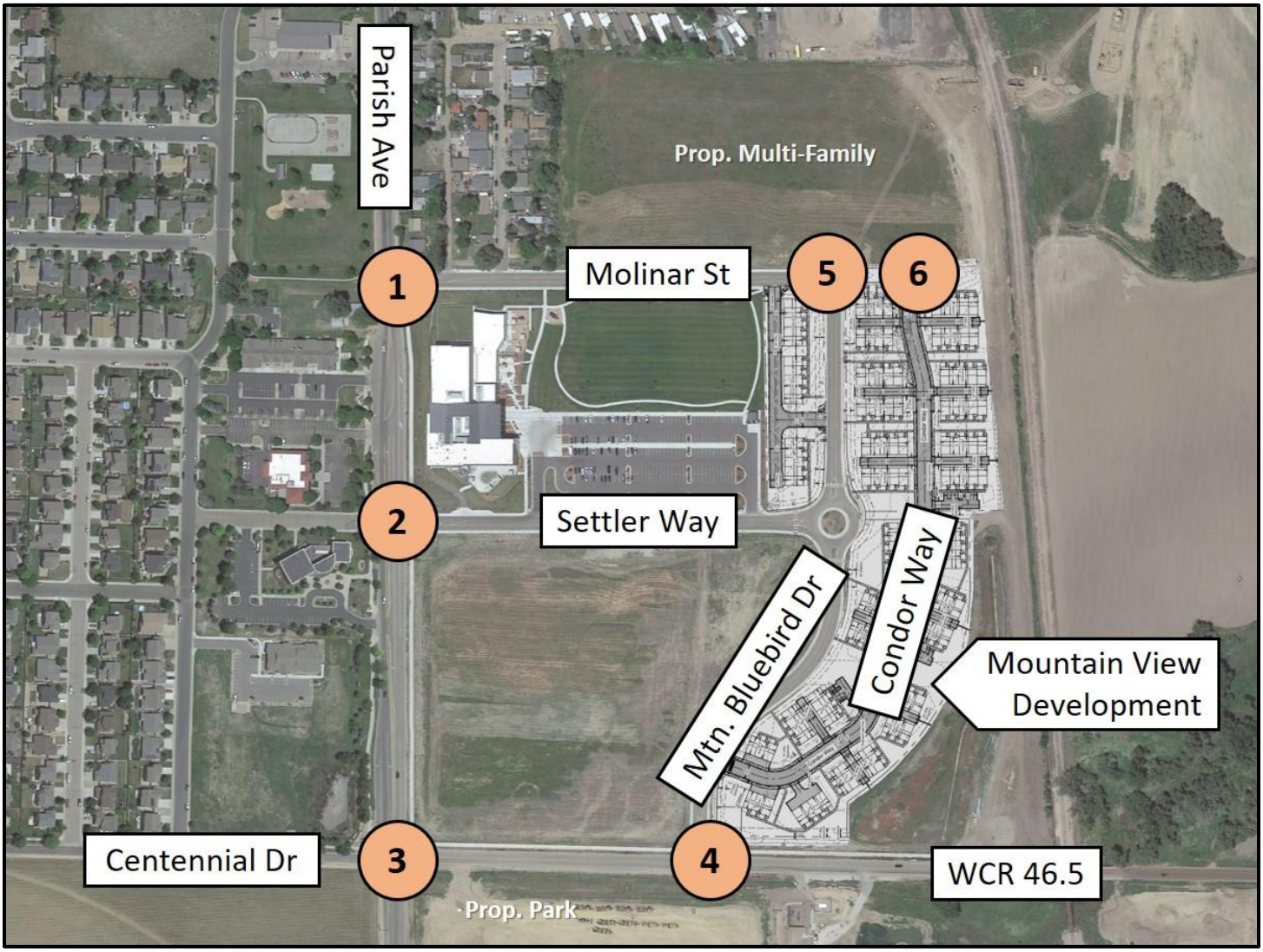


Figure 2: Study Intersections and Site Plan

Lane Geometry and Intersection Control

Lane Geometry

For the purposes of this Study, JR assumed that existing lane geometry would remain for the future scenarios, with two exceptions:

- The intersection of Parish & Molinar was modeled with a southbound left turn lane.
- The intersection of WCR 46.5 & Mountain Bluebird Drive is currently a T-intersection, but was modeled with a south leg.

Southbound Left at Parish & Molinar

JR recommends the addition of a southbound left turn lane at the intersection of Parish & Molinar. This would require on-street parking to be prohibited, and would be jointly funded between the Town and the Project. JR recommends that 100 feet of storage be provided based on anticipated queuing.

Future Widening of WCR 46.5

WCR 46.5 to the south of the Project site may be widened in the future. This would be a Town project.

Traffic Control on Molinar Street

JR recommends that traffic along Molinar Street be free-flowing at the intersections with Mountain Bluebird Drive and Condor Way. The northbound approach of Mountain Bluebird would be stop-controlled. Both the northbound and southbound approaches of Condor would also be stop-controlled. This configuration may help to prevent queuing issues along Molinar between these two intersections.

Signalization of Parish & Settler

The Parish & Settler intersection may become signalized in the future with additional developments. However, for the purposes of this Study, it was assumed that this intersection will not become signalized by 2045.

Traffic Volumes and Distribution

Existing Traffic Volumes

Existing traffic volumes were obtained on Thursday, October 6, 2022 by All Traffic Data Services for each of the Study intersections. Existing traffic volumes are included in **Figure 4**. Traffic counts are included in **Appendix A**.

Background Traffic

JR estimated background traffic volumes by applying a 3% annual growth rate to the existing traffic volumes to account for future regional development. This growth rate is based on the NFRMPO travel demand model.

Multi-Family Development North of Molinar Street

Background traffic also includes estimated site-generated traffic from a 143-unit multi-family development to the north of Molinar Street. Trips generated by this development were routed in a manner consistent with Project site-generated traffic (see "Distribution of Site-Generated Traffic" on the next page). The following trips are expected:

- Average Daily Trips: 964
- AM Peak Entering Site: 13
- AM Peak Exiting Site: 43
- PM Peak Entering Site: 46
- PM Peak Exiting Site: 27

Public Park South of WCR 46.5

JR also gave consideration to background traffic generated by a proposed park to the south of WCR 46.5. The development of this park is expected to create a south leg to the intersection of WCR 46.5 & Mountain Bluebird Drive. A nominal amount of background traffic was assumed at this intersection since parks typically generate little traffic during weekday peak hours.

Future background traffic volumes are shown in **Figure 6** (2024) and **Figure 8** (2045).

Site-Generated Traffic Volumes

Site-generated traffic volumes were estimated using ITE Trip Generation Manual, 11th Edition. The development is expected to produce the following trips:

- Average Daily Trips: 843
- AM Peak Entering Site: 12
- AM Peak Exiting Site: 38
- PM Peak Entering Site: 40
- PM Peak Exiting Site: 24

Site-generated traffic volumes are shown in **Figure 5**. A trip generation report is included in **Appendix B**.

Distribution of Site-Generated Traffic

Site-generated traffic was routed onto adjacent streets according to the distribution in **Figure 3**. The distribution is based on existing traffic volumes.

Figure 3: Site-Generated Traffic Distribution

Total Traffic

Total traffic is the sum of background and site-generated traffic. JR forecasted total traffic volumes at the Study intersections in the years 2024 (Opening Day) and 2045 (Future Year). Total traffic volumes are shown in **Figure 7** (2024) and **Figure 9** (2045).

Existing (2022) Traffic Volumes

Existing traffic volumes at the study intersections are included in **Figure 4**. Existing lane geometry is shown.

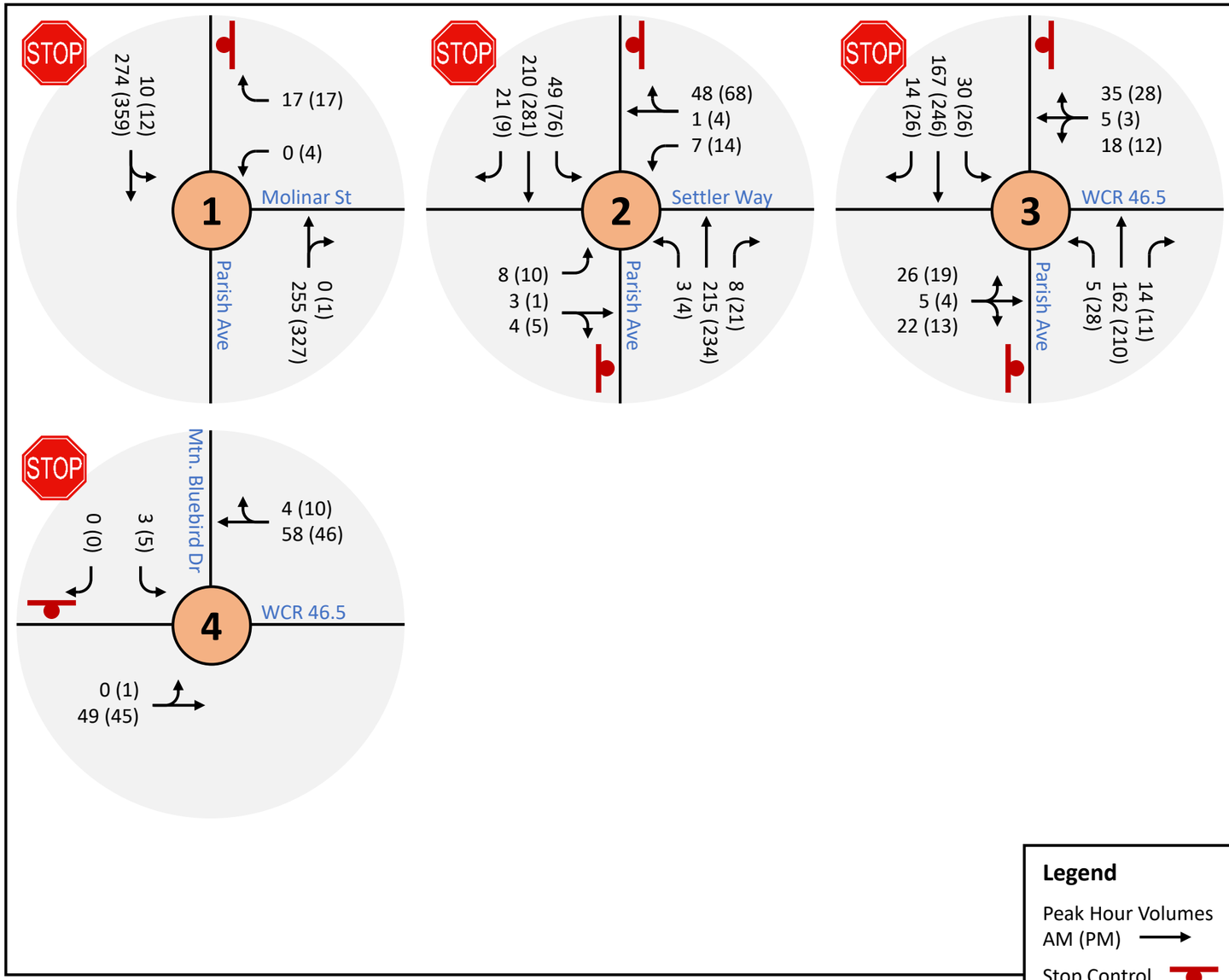


Figure 4: Existing (2022) Traffic Volumes

Site-Generated Traffic Volumes

Site-generated traffic volumes at the study intersections are included in **Figure 5**.

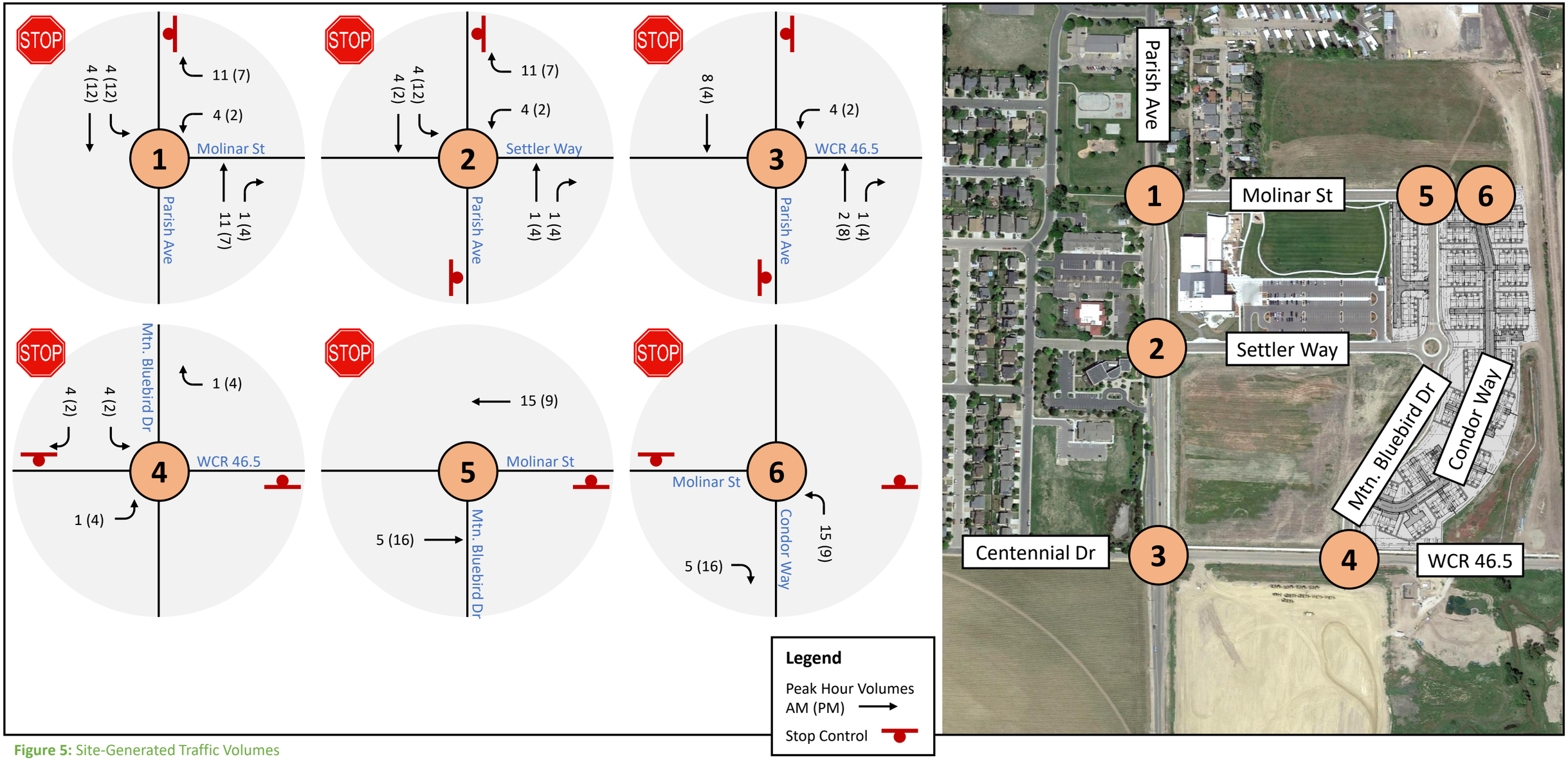
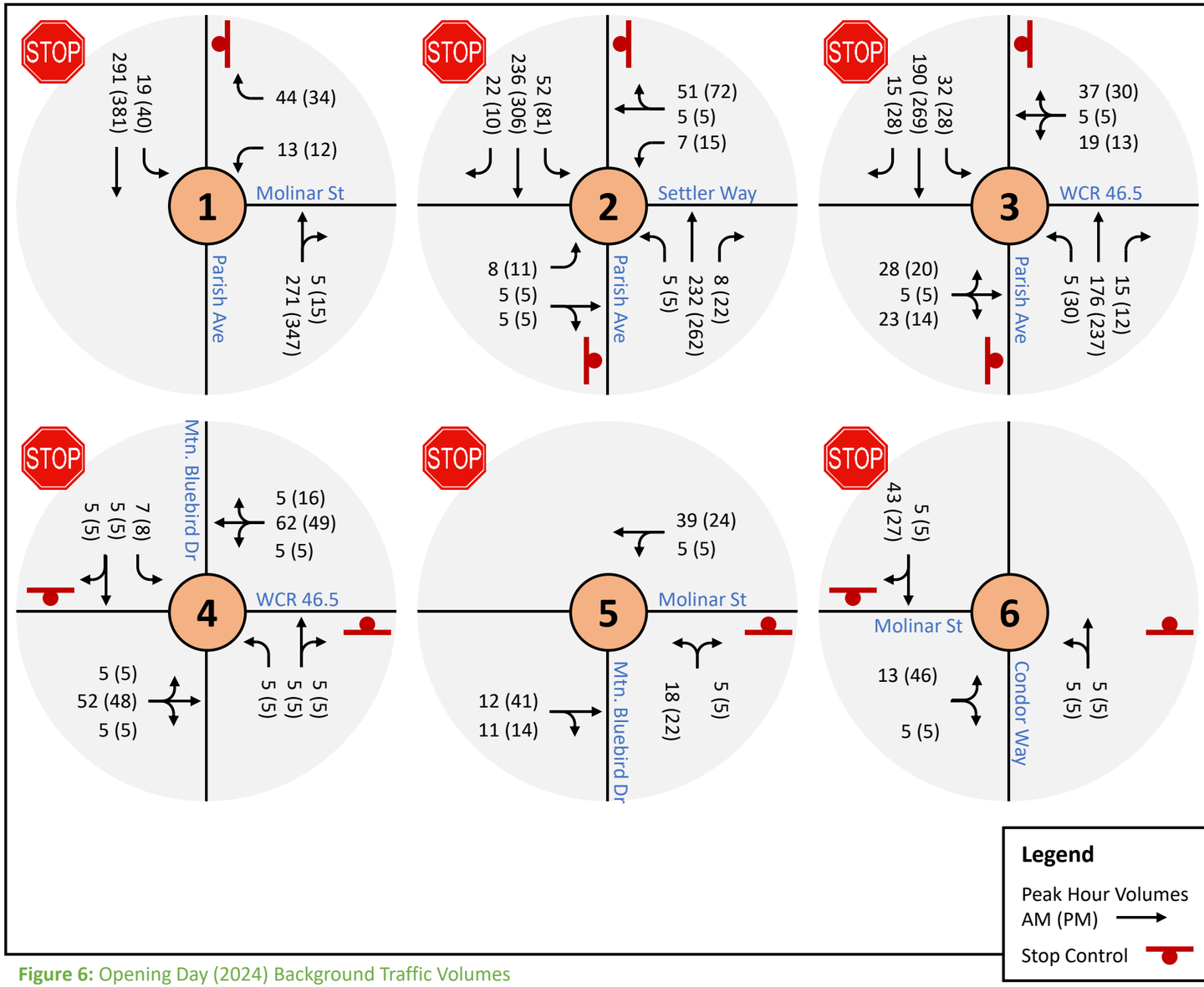


Figure 5: Site-Generated Traffic Volumes

Opening Day (2024) Background Traffic Volumes

2024 background traffic volumes at the study intersections are included in **Figure 6**. Lane geometry is shown.



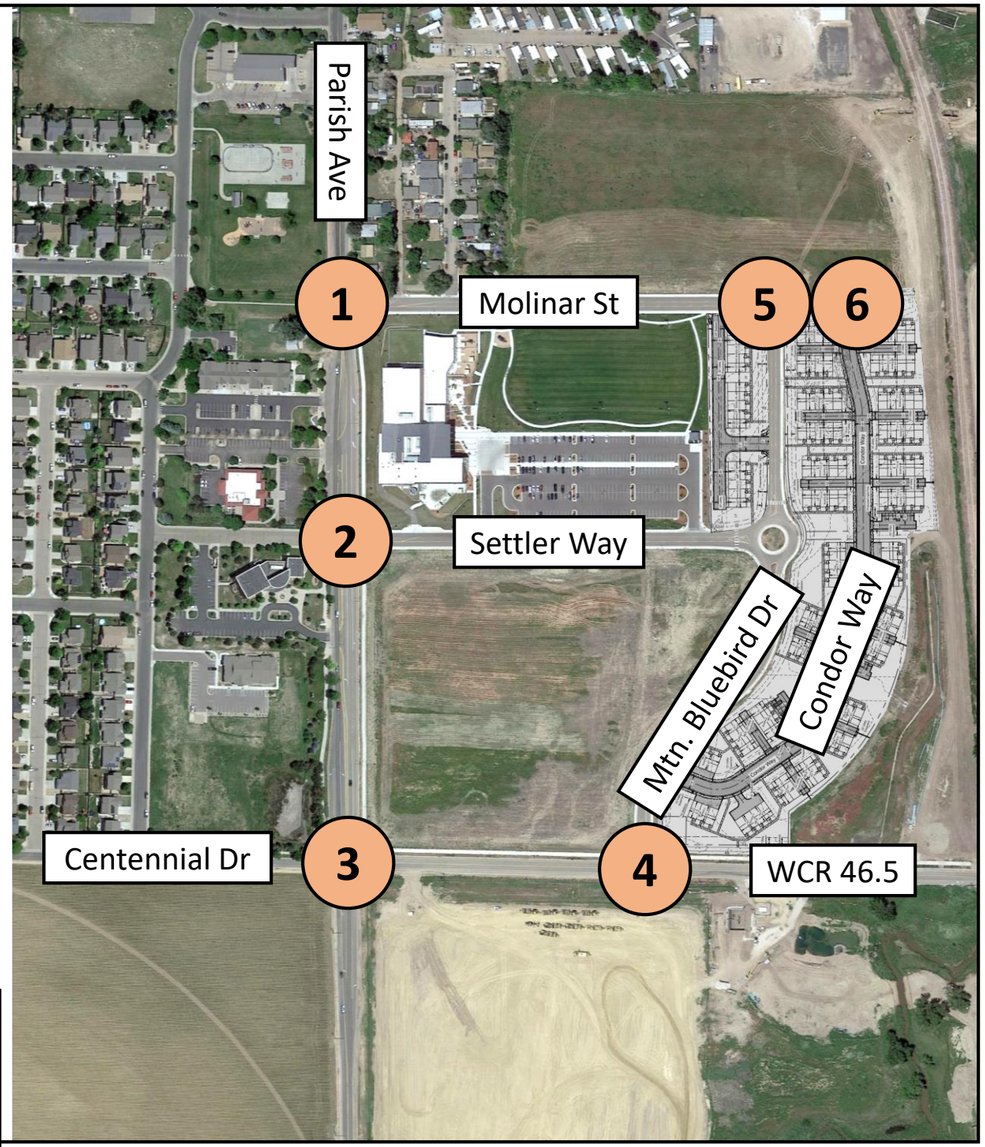
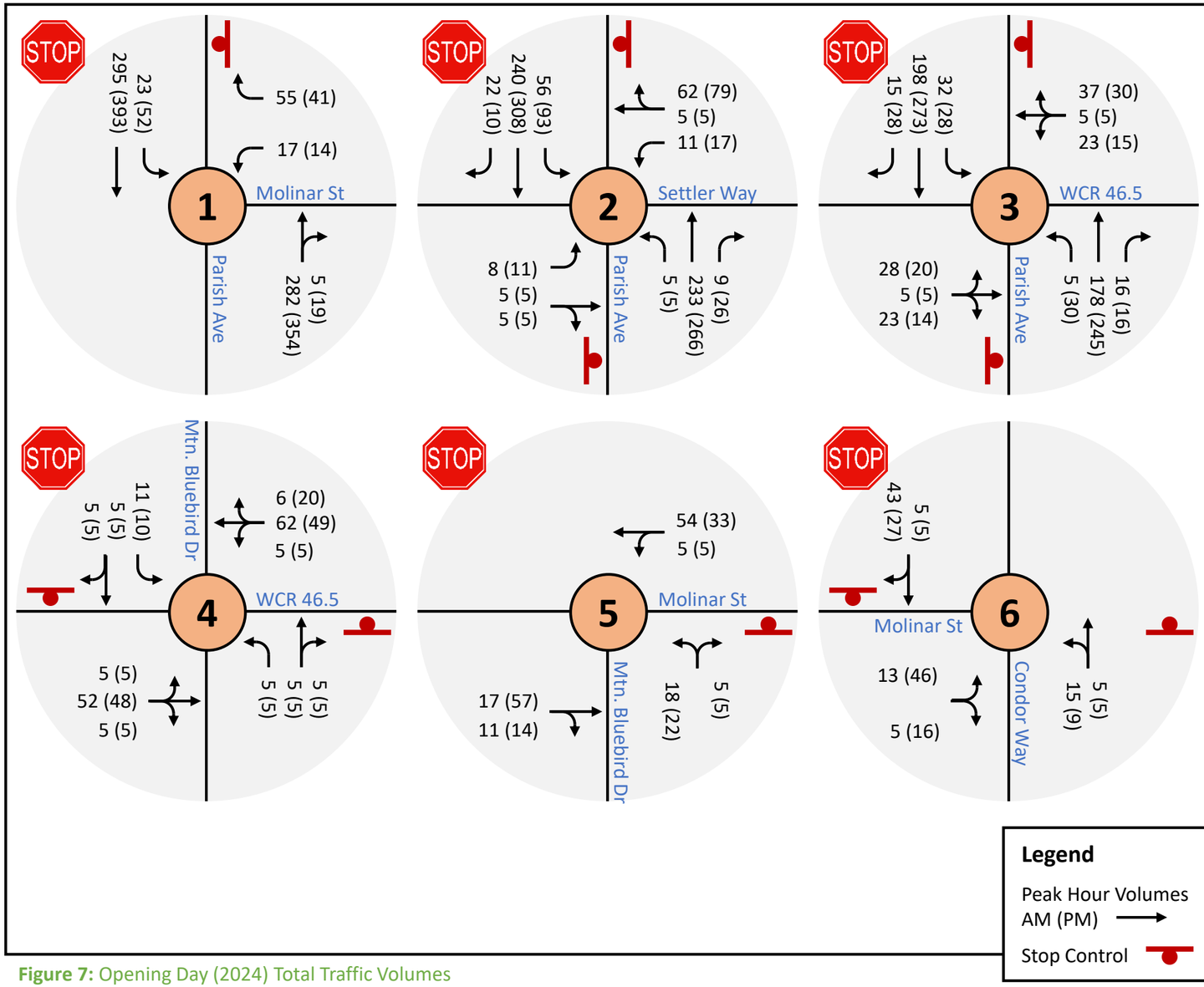


Figure 6: Opening Day (2024) Background Traffic Volumes

Opening Day (2024) Total Traffic Volumes

2024 total traffic volumes at the study intersections are included in **Figure 7**. Lane geometry is shown.



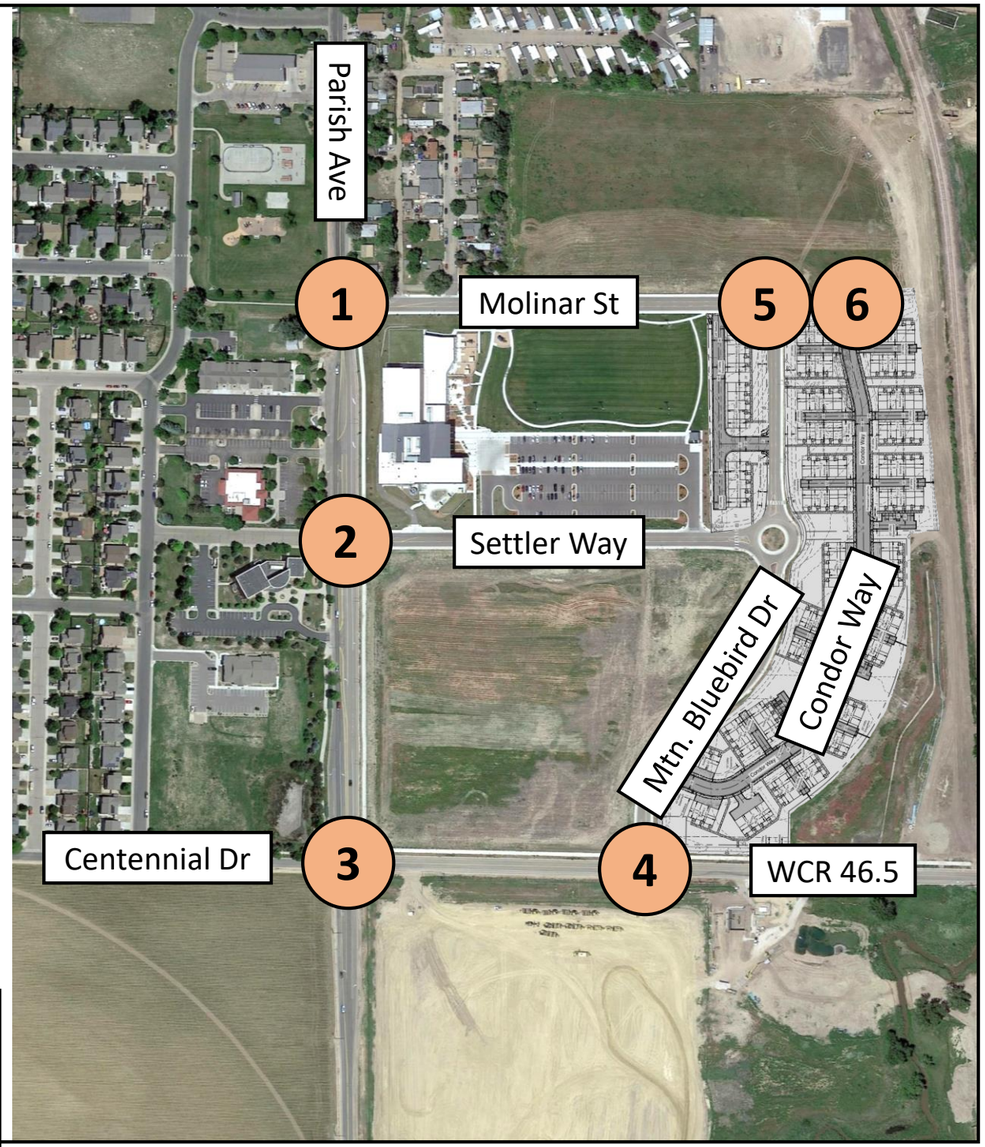
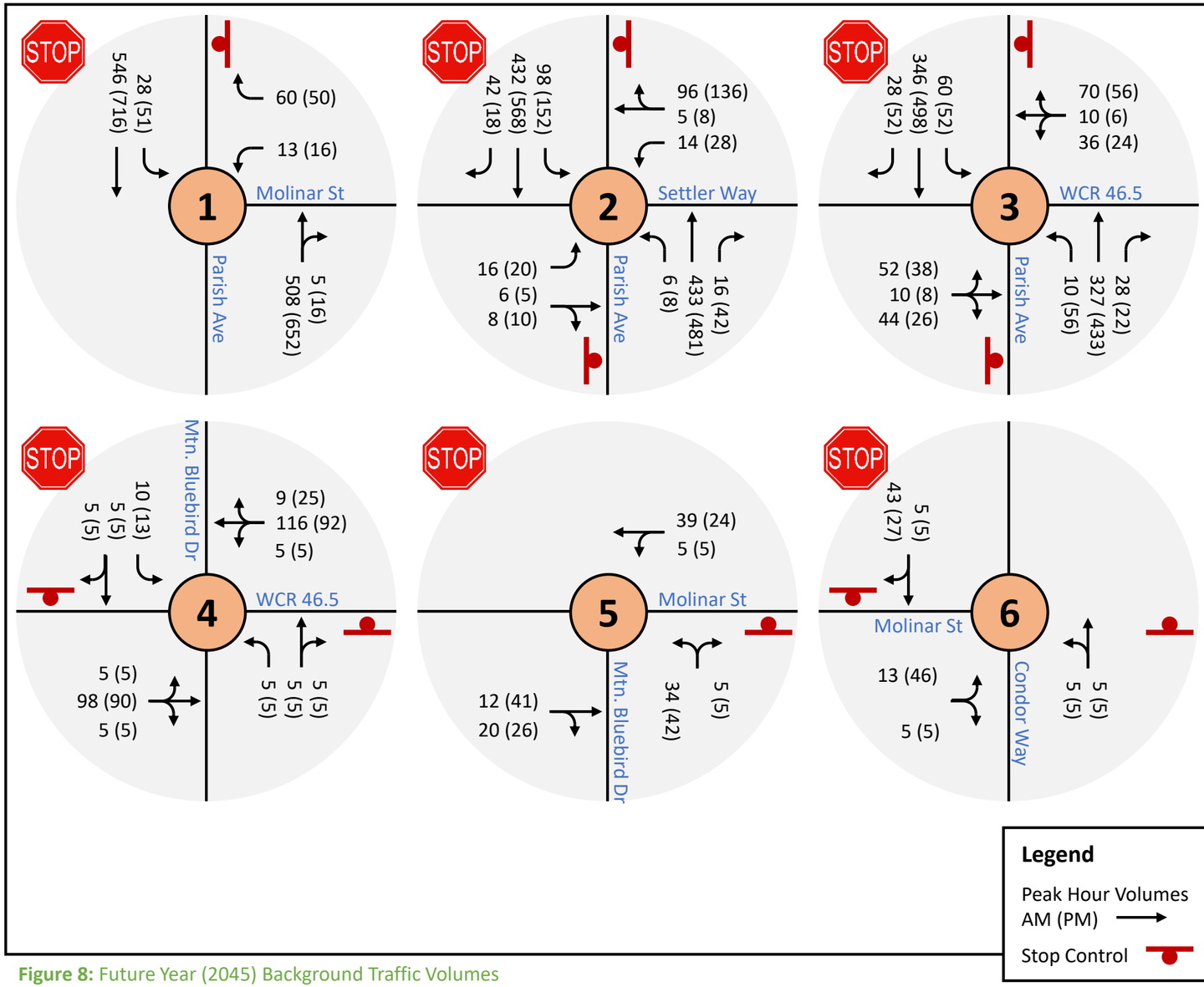


Figure 7: Opening Day (2024) Total Traffic Volumes

Future Year (2045) Background Traffic Volumes

2045 background traffic volumes at the study intersections are included in **Figure 8**. Lane geometry is shown.



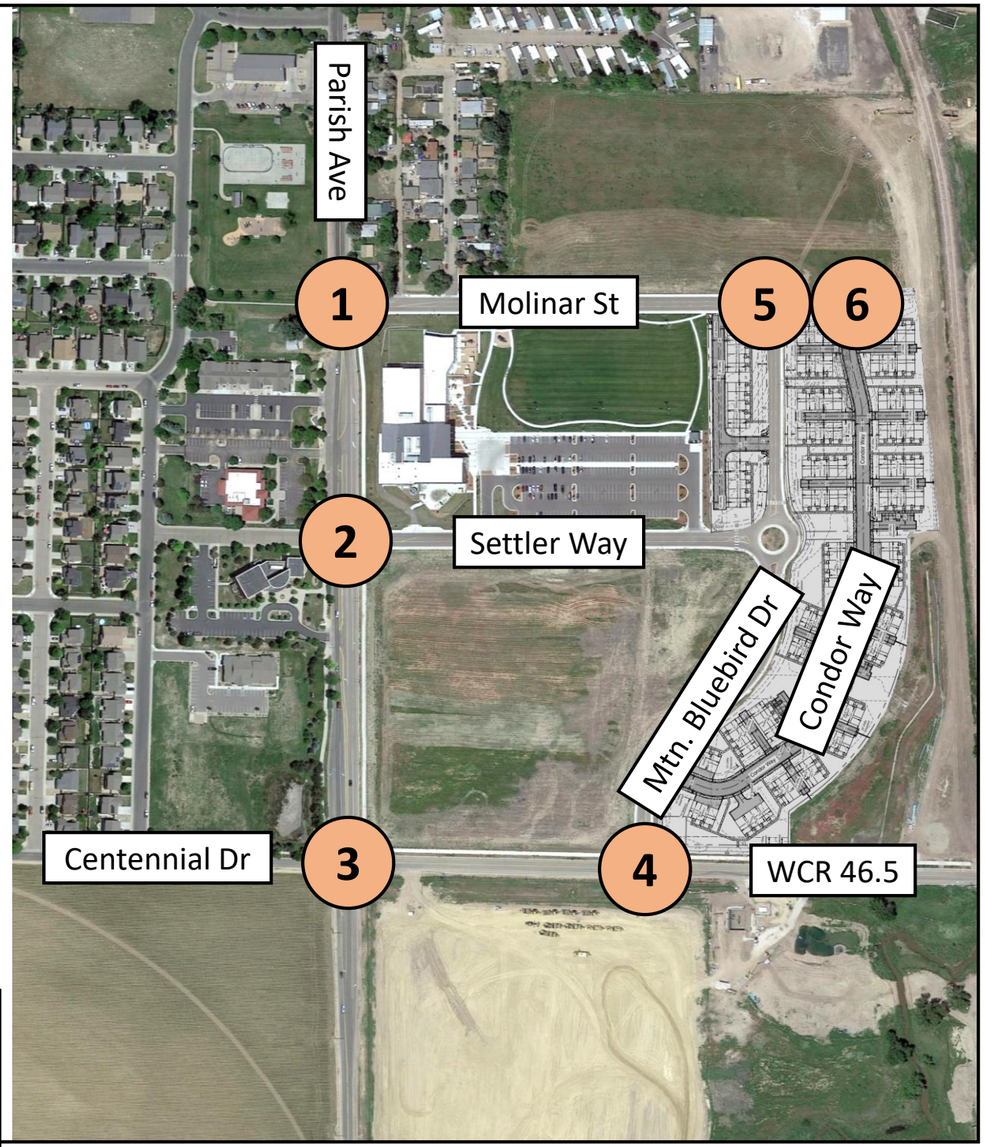
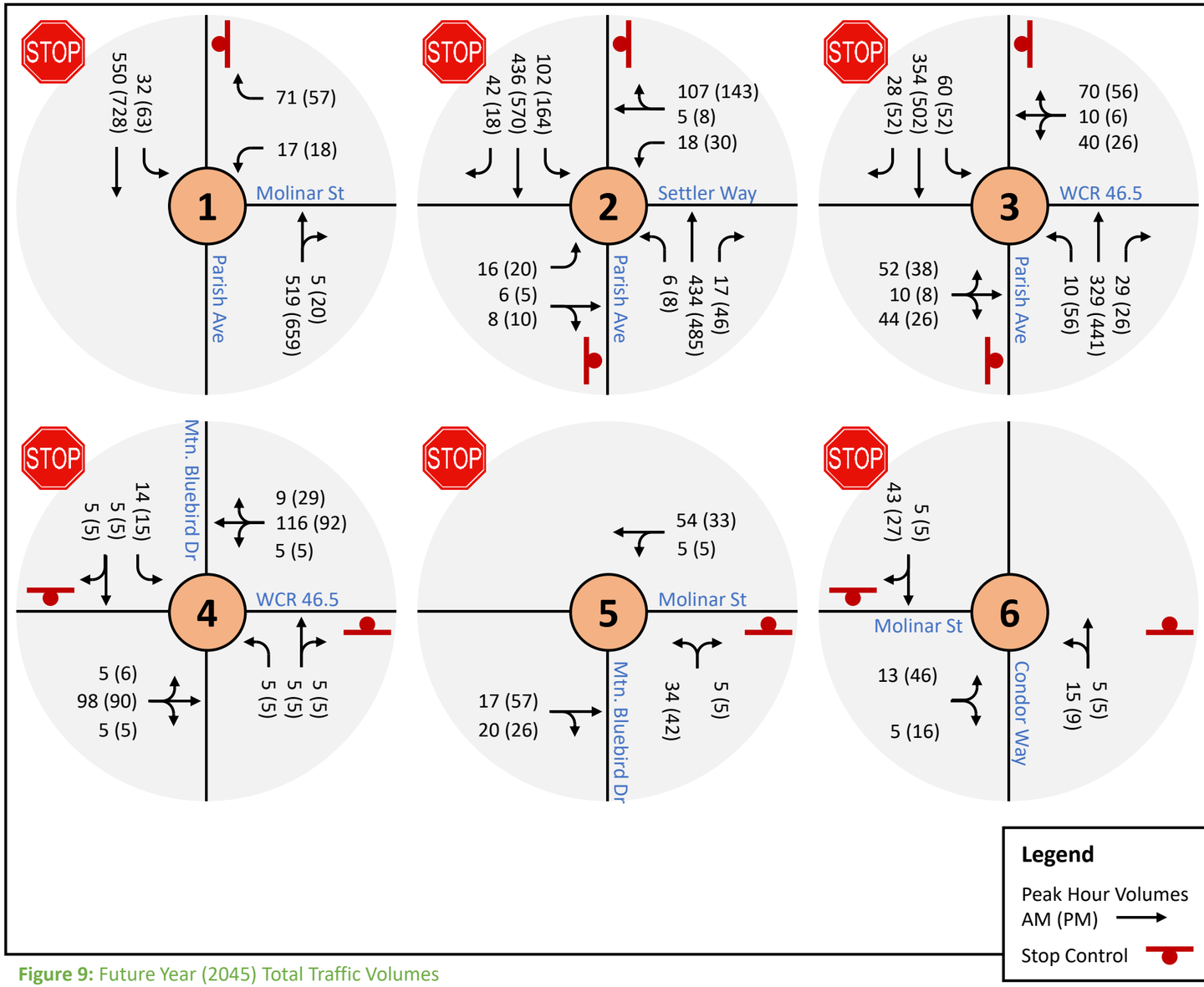


Figure 8: Future Year (2045) Background Traffic Volumes

Future Year (2045) Total Traffic Volumes

2045 total traffic volumes at the study intersections are included in **Figure 9**. Lane geometry is shown.



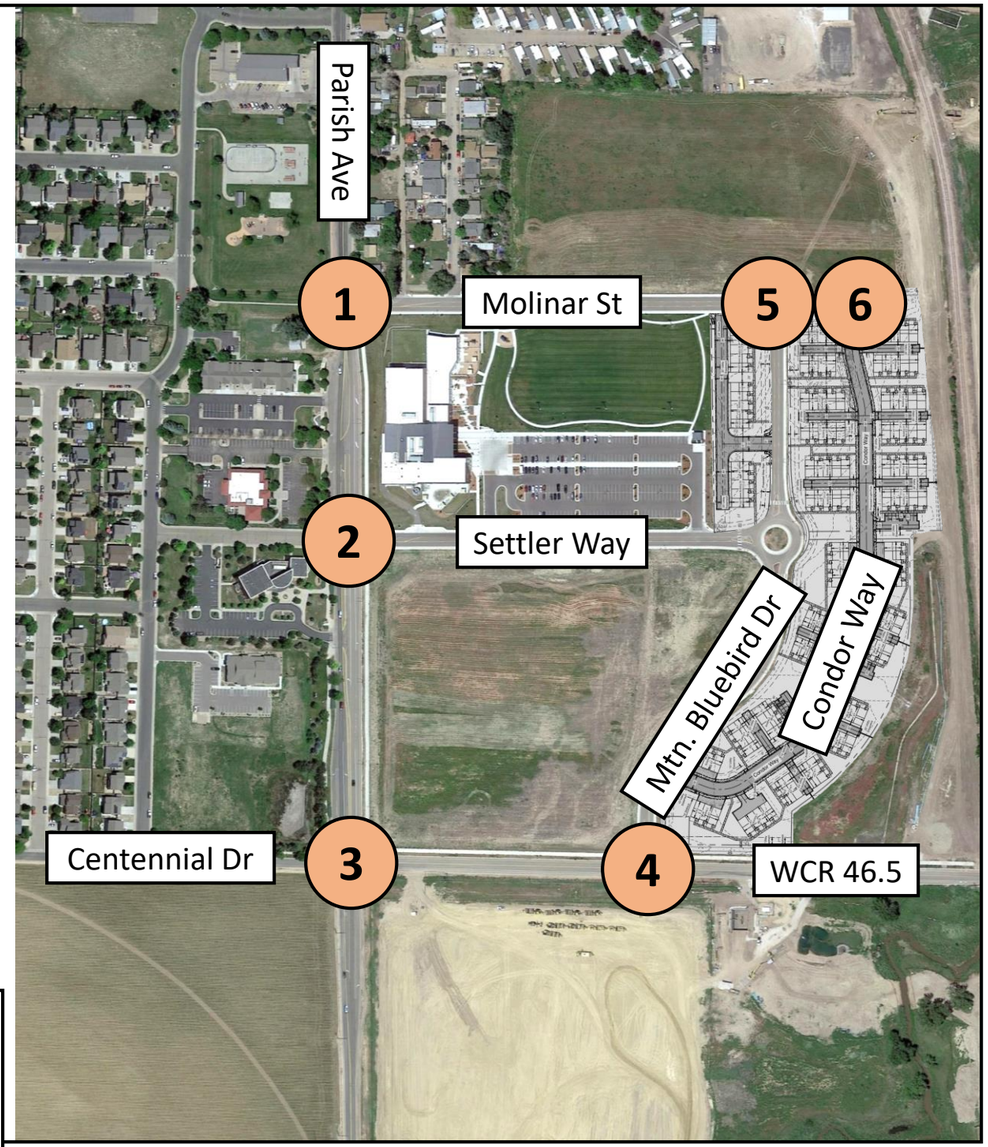


Figure 9: Future Year (2045) Total Traffic Volumes

Traffic Operations Analysis

Traffic operations were analyzed using HCM 6th Edition methodology. Synchro reports are included in **Appendix C**.

Traffic Modeling Parameters

JR considered traffic modeling parameters such as peak hour factor and heavy vehicle percentage. **Table 1** summarizes the parameters considered, and the justification for values used. The values for these parameters are contained within the Synchro reports in **Appendix C**.

Table 1: Traffic Modeling Parameters

Parameter	Justification
Peak Hour Factor (existing)	For existing traffic volumes (2022), JR used peak hour factors counted by All Traffic Data Services.
Peak Hour Factor (future)	For future traffic volumes (2024 and 2045), JR used values suggested by the Synchro 11 software, which are based on a Poisson distribution.
Heavy Vehicle Percentage	JR assumed 2% heavy vehicles at all Study intersections, which is consistent with the values counted by All Traffic Data Services.
Saturated Flow Rate (protected)	JR used values calculated in the Synchro 11 software, which are based on HCM 6th Edition.
Saturated Flow Rate (permitted)	JR used values calculated in the Synchro 11 software, which are based on HCM 6th Edition.

Levels of Service

JR analyzed each of the Study intersections for peak hour level of service (LOS). **Table 2** includes the LOS for each movement in the existing condition (2022). **Table 3** includes the forecasted LOS for background traffic and total traffic in the year 2024. **Table 4** includes the forecasted LOS for background traffic and total traffic in the year 2045.

Table 2: 2022 (Existing) Levels of Service

Intersection	Movement/Approach	AM Peak LOS	PM Peak LOS
1: Parish Avenue & Molinar Street	WB Left	A	C
	WB Right	B	B
	SB Approach	A	A
2: Parish Avenue & Settler Way	EB Left	C	C
	EB Through/Right	B	B
	WB Left	C	C
	WB Through/Right	B	B
	NB Left	A	A
	SB Left	A	A
3: Parish Avenue & WCR 46.5 / Centennial Drive	EB Approach	B	B
	WB Approach	B	B
	NB Left	A	A
	SB Left	A	A
4: WCR 46.5 & Mountain Bluebird Drive	EB Approach	A	A
	SB Left	A	A
	SB Right	A	A

Table 3: 2024 (Opening Day) Levels of Service

Intersection	Movement/ Approach	AM Peak LOS		PM Peak LOS	
		Background Traffic	Total Traffic	Background Traffic	Total Traffic
1: Parish Avenue & Molinar Street	WB Left	B	B	C	C
	WB Right	B	B	B	B
	SB Left	A	A	A	A
2: Parish Avenue & Settler Way	EB Left	C	C	C	D
	EB Through/Right	B	B	B	B
	WB Left	C	C	C	C
	WB Through/Right	B	B	B	B
	NB Left	A	A	A	A
	SB Left	A	A	A	A
3: Parish Avenue & WCR 46.5 / Centennial Drive	EB Approach	B	B	C	C
	WB Approach	B	B	B	B
	NB Left	A	A	A	A
	SB Left	A	A	A	A
4: WCR 46.5 & Mountain Bluebird Drive	EB Approach	A	A	A	A
	WB Approach	A	A	A	A
	NB Left	A	A	A	A
	NB Through/Right	A	A	A	A
	SB Left	A	A	A	A
	SB Through/Right	A	A	A	A
5: Molinar Street & Mtn. Bluebird	WB Approach	A	A	A	A
	NB Approach	A	A	A	A
6: Molinar Street & Condor Way	NB Approach	A	A	A	A
	SB Approach	A	A	A	A

Table 4: 2045 (Future Year) Levels of Service

Intersection	Movement/ Approach	AM Peak LOS		PM Peak LOS	
		Background Traffic	Total Traffic	Background Traffic	Total Traffic
1: Parish Avenue & Molinar Street	WB Left	D	D	E	F (55s)
	WB Right	B	B	B	C
	SB Left	A	A	A	A
2: Parish Avenue & Settler Way	EB Left	E	E	F (173s)	F (211s)
	EB Through/Right	C	C	C	C
	WB Left	E	E	F (93s)	F (109s)
	WB Through/Right	B	B	C	C
	NB Left	A	A	A	A
	SB Left	A	A	A	A
3: Parish Avenue & WCR 46.5 / Centennial Drive	EB Approach	D	E	F (72s)	F (76s)
	WB Approach	C	D	E	E
	NB Left	A	A	A	A
	SB Left	A	A	A	A
4: WCR 46.5 & Mountain Bluebird Drive	EB Approach	A	A	A	A
	WB Approach	A	A	A	A
	NB Left	A	A	A	A
	NB Through/Right	A	A	A	A
	SB Left	B	B	B	B
	SB Through/Right	A	A	A	A
5: Molinar Street & Mtn. Bluebird	WB Approach	A	A	A	A
	NB Approach	A	A	A	A
6: Molinar Street & Condor Way	NB Approach	A	A	A	A
	SB Approach	A	A	A	A

Discussion on Levels of Service

In the existing condition, all movements operate at LOS C or better.

In the 2024 condition, nearly all movements are expected to operate at LOS C or better with both background traffic and total traffic. The EBL movement at Parish & Settler is expected to operate at LOS D in the PM peak hour with total traffic.

In the 2045 condition, some movements are expected to operate at LOS E or F. This is primarily a result of increased background traffic volumes in the future.

Queue Lengths

JR analyzed each of the Study intersections for 95th percentile queue lengths using HCM 6th Edition methodology. **Table 5** includes the queue lengths for the year 2022 with existing traffic. **Table 6** includes the queue lengths for the year 2024 with total traffic. **Table 7** includes the queue lengths for the year 2045 with total traffic.

Table 5: 2022 (Existing) 95th Percentile Queue Lengths

Intersection	Movement/Approach	AM Peak Queue (ft)	PM Peak Queue (ft)
1: Parish Avenue & Molinar Street	WB Left	<25	<25
	WB Right	<25	<25
	SB Approach	<25	<25
2: Parish Avenue & Settler Way	EB Left	<25	<25
	EB Through/Right	<25	<25
	WB Left	<25	<25
	WB Through/Right	<25	<25
	NB Left	<25	<25
	SB Left	<25	<25
3: Parish Avenue & WCR 46.5 / Centennial Drive	EB Approach	<25	<25
	WB Approach	<25	<25
	NB Left	<25	<25
	SB Left	<25	<25
4: WCR 46.5 & Mountain Bluebird Drive	EB Approach	<25	<25
	SB Left	<25	<25
	SB Right	<25	<25

Table 6: 2024 (Opening Day) 95th Percentile Queue Lengths

Intersection	Movement/Approach	AM Peak Queue (ft)	PM Peak Queue (ft)
1: Parish Avenue & Molinar Street	WB Left	<25	<25
	WB Right	<25	<25
	SB Left	<25	<25
2: Parish Avenue & Settler Way	EB Left	<25	<25
	EB Through/Right	<25	<25
	WB Left	<25	<25
	WB Through/Right	<25	<25
	NB Left	<25	<25
	SB Left	<25	<25
3: Parish Avenue & WCR 46.5 / Centennial Drive	EB Approach	<25	<25
	WB Approach	<25	<25
	NB Left	<25	<25
	SB Left	<25	<25
4: WCR 46.5 & Mountain Bluebird Drive	EB Approach	<25	<25
	WB Approach	<25	<25
	NB Left	<25	<25
	NB Through/Right	<25	<25
	SB Left	<25	<25
	SB Through/Right	<25	<25
5: Molinar Street & Mountain Bluebird Drive	WB Approach	<25	<25
	NB Approach	<25	<25
6: Molinar Street & Condor Way	NB Approach	<25	<25
	SB Approach	<25	<25

Table 7: 2045 (Future Year) 95th Percentile Queue Lengths

Intersection	Movement/Approach	AM Peak Queue (ft)	PM Peak Queue (ft)
1: Parish Avenue & Molinar Street	WB Left	<25	<25
	WB Right	<25	<25
	SB Left	<25	<25
2: Parish Avenue & Settler Way	EB Left	<25	60
	EB Through/Right	<25	<25
	WB Left	<25	58
	WB Through/Right	25	55
	NB Left	<25	<25
	SB Left	<25	<25
3: Parish Avenue & WCR 46.5 / Centennial Drive	EB Approach	75	95
	WB Approach	60	70
	NB Left	<25	<25
	SB Left	<25	<25
4: WCR 46.5 & Mountain Bluebird Drive	EB Approach	<25	<25
	WB Approach	<25	<25
	NB Left	<25	<25
	NB Through/Right	<25	<25
	SB Left	<25	<25
	SB Through/Right	<25	<25
5: Molinar Street & Mountain Bluebird Drive	WB Approach	<25	<25
	NB Approach	<25	<25
6: Molinar Street & Condor Way	NB Approach	<25	<25
	SB Approach	<25	<25

Discussion on Queue Lengths

Due to low traffic volumes at the stop-controlled movements, queue lengths are expected to be nominal in all scenarios, including the 2045 Future Year. No operational issues as a result of queuing are anticipated.

JR gave particular consideration to queuing along Mountain Bluebird Drive between WCR 46.5 and Condor Way. An existing southbound left turn lane at WCR 46.5 & Mountain Bluebird contains 85 feet of storage, which is sufficient to handle 95th percentile queues in 2045. No queuing issues are anticipated at this location. JR also does not anticipate any sight distance concerns.

Traffic Signal at Parish & Settler

The intersection of Parish & Settler may meet signal warrants in the future. However, this Study assumes that the intersection will not become signalized by 2045. Signalization would likely improve traffic operations on the minor approaches to the intersection. JR believes that this is an ideal location for a signal, as it could improve safety for accessing Town Hall, police department, library, and YMCA.

Conclusion

Below is a summary of the conclusions and findings of this TIS.

Levels of Service

All movements operate at LOS C or better in 2022. Nearly all movements are expected to operate at LOS C or better in 2024 with both background traffic and total traffic. In 2045, some movements may operate at LOS E or F due to increased background traffic volumes.

Queue Lengths

No operational concerns are anticipated as a result of queue lengths.

Improvements

JR recommends that a southbound left turn lane be added to the intersection of Parish & Molinar, which would require on-street parking to be prohibited. This improvement would be jointly funded between the Town and the Project. JR recommends that the turn lane include 100 feet of storage.

Additional improvements may help traffic operations. Specifically, WCR 46.5 may be widened in the future. Also, the intersection of Parish & Settler could become signalized in the future.