APPENDIX 3

Mountain Home Downtown District Traffic Study

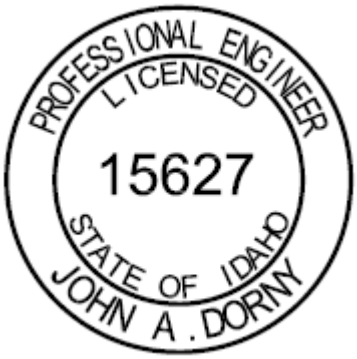
Mountain Home, ID

PREPARED FOR:

city of Mountain Home

PREPARED BY:

HORROCKS ENGINEERS



John Dorny, P.E.

BE-311-1702

February 7, 2017

This Appendix is a condensed version of the full 303-page Traffic Study. This Appendix contains only the Report, not the technical data. The full 303-page Study can be obtained by contacting the City of Mountain Home.

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Executive Summary

This traffic study includes analysis to assist efforts of the City of Mountain Home to revitalize the downtown area. The goals for the downtown area include revitalizing the look of the downtown core, improving pedestrian safety, and business development. This analysis investigates existing conditions as well as other scenarios to determine traffic performance throughout the study area. Improving the roadway infrastructure in the downtown area will assist the City's goals for the downtown area by creating improved pedestrian access, roadway safety and parking.

Analysis Conclusions

1. Existing Conditions Analysis
   - All study intersections operate at LOS B or better during the AM and PM peak hours
2. Existing Conditions – 20 Year Growth Analysis
   - All study intersections operate at LOS B or better during the AM and PM peak hours
3. Two-Lane Scenario Analysis
   - All study intersections operate at LOS B or better during the AM and PM peak hours
   - Average delay to vehicles decreased slightly when compared to existing conditions.
4. Two-Lane Scenario – 20 Year Growth Analysis
   - All study intersections operate at LOS B or better during the AM Peak hours and LOS C or better during the PM peak hours
5. One-Way Scenario
   - All study intersections operate at LOS B or better during the AM and PM peak hours
   - Average delay to vehicles on roads changed into one-way roads decreased, while it increased for vehicles at other intersections when compared to existing conditions.
6. One-Way Scenario – 20 Year Growth Analysis
   - All study intersections operate at LOS B or better during the AM peak hour and LOS C or higher during the PM peak hour

Analysis Recommendations

1. The preferred alternative is to reduce Main Street and 2nd East to two lanes
   - Reducing 200 North and 400 North to one-lane roads can be implemented with no significant impact to traffic flow on Main Street and 2nd East
2. On-street parking will be limited to the northeast side of Main Street and 2nd East
3. Include right-turn pocket on 2nd East at American Legion Boulevard, 5th North, and Jackson Street per ITD standards
4. Include a right-turn pocket on Main Street at 5th North per ITD standards
5. Coordinate with Fire Department to determine if closing southeast leg of 2nd East and Jackson Street is feasible
6. Install HAWK Signal on Main Street at American Legion Blvd. or Jackson Street to provide safety and efficiency for pedestrians if warranted per MUTCD
7. Removal of a travel lane on Main Street and 2nd East allows heavy truck traffic to make proper turning movements

Introduction

This report presents the findings of a Traffic Study performed for the City of Mountain Home as they plan the future of the downtown district area, including traffic flow and roadway geometry changes.

Goals for the Downtown Area

This traffic study will assist with the efforts of the City of Mountain Home to revitalize the downtown area. The following outlines the overall goals for the downtown area:

- Revitalize and improve the look of the downtown core
- Improve pedestrian safety
- Place making: Fountain, event venues, art, kids activities, etc.
- Business Development: Increase and diversify businesses downtown

Improving the roadway infrastructure in the downtown area will assist the City's goals for the downtown area by creating improved pedestrian access, roadway safety and parking.

Downtown Study Area

The downtown study area, included in **Figure 1** has 7 roadway segments and 11 intersections. The Mountain Home Air Force Base located to the southwest impacts traffic in the downtown study area. The following describes the roadway and intersection characteristics within the study area.

Roadway Characteristics

1. Main Street
    - Classified as a Principal Arterial south of American Legion Blvd and as a Minor Arterial north of American Legion Blvd.
    - One-way road in southeast direction
    - 3 Lanes
    - On-street parking and sidewalk on both sides of roadway
    - 25 mph speed limit
2. 2nd East
    - Classified as a Principal Arterial south of American Legion Blvd and Minor Arterial north of American Legion Blvd
    - One-way road in the northwest direction
    - 3 Lanes
    - On-street parking and sidewalk on both sides of roadway
    - 25 mph speed limit
3. 5th North
    - Classified as a Minor Arterial
    - On-street parking and sidewalk on both sides of roadway
    - 25 mph speed limit
4. 4th North
    - Classified as a Local Road
    - On-street parking and sidewalk on both sides of roadway
    - 20 mph speed limit
5. American legion Boulevard
    - Classified as a Principal Arterial
    - On-street parking and sidewalk on both sides of roadway

- 25 mph speed limit

6. 2nd North
   - Classified as a Local Road
   - On-street parking and sidewalk on both sides of roadway
   - 20 mph speed limit
7. Jackson Street
   - Classified as a Local Road
   - On-street parking and sidewalk on both sides of roadway
   - 20 mph speed limit

Intersection Characteristics

1. 2nd East and 5th North
   - Two way stop controlled intersection
   - Traffic turning left onto 2nd East has a left turn pocket
   - Traffic turning right onto 2nd East has a right turn pocket
2. Main Street and 5th North
   - Two way stop controlled intersection
   - Traffic turning left onto 5th north have a left turn pocket
3. 2nd East and 4th North
   - Two way stop controlled intersection
4. Main Street and 4th North
   - Two way stop controlled intersection
5. 2nd East and American Legion Boulevard
   - Signalized intersection
   - Shared thru left lane on American Legion Boulevard turning left onto 2nd East
6. 2nd East U-turn
   - U-turn from 2nd East to Main Street
   - No traffic control
   - Exiting traffic has dedicated lane
7. Main Street and American Legion Boulevard
   - Two way stop controlled intersection
   - The westbound approach of American Legion Boulevard has a dedicated left turn lane and a shared thru left lane onto Main Street
8. 2nd East and 2nd North
   - Two way stop controlled intersection
9. Main Street and 2nd North
   - Two way stop controlled intersection
10. 2nd East and Jackson Street
    - 5-leg signalized intersection
    - Traffic turning left from Jackson Street onto 2nd East has a left turn pocket
    - Traffic turning right from Jackson Street onto 2nd East has a right turn pocket
    - South approaches to the intersection are both one-way streets.
11. Main Street and Jackson Street
    - Two way stop controlled intersection
    - The left lane of Main Street is a dedicated left turn lane onto Jackson Street
    - Traffic turning left onto Main Street from Jackson Street has a left turn pocket

Figure 1: Study Area

Traffic Study Methodology

The following sections describe the methodology used to compete the study for the following items:

- Data Collection
- Traffic Modeling
- Level of Service
- 20-Year Traffic Projections
- Analysis Conditions

Data Collection

Intersection count data was collected for both AM and PM peak hour for all study area intersections. Existing data establishes a base condition for all analyses, which assists in estimating traffic flow for new traffic throughout the downtown area. The existing count data was collected in October, 2017. The existing turning movement counts for the AM and PM peak hours are included in **Figure 3** and **Figure 4** respectively (Existing Conditions Section).

Figure 2: Synchro Model

Traffic Modeling

The downtown district was modelled using the Synchro 10 software package. An image of the model is included in **Figure 2**. Synchro analyzes roadway networks on a macroscopic level. All intersections for this analysis were analyzed in Synchro using the Highway Capacity Manual's (HCM) 2010 Edition for all intersections.

There is a tool included as part of the Synchro 10 package called SimTraffic. SimTraffic simulates traffic conditions for every vehicle included in the traffic model. Each vehicle is modeled and displayed traversing the street network. This tool is useful for situations where non-typical intersections, such as Jackson Street and 2nd East, are analyzed. Sim Traffic within Synchro 10 was used to determine the performance of all intersections included in the study area.

Level of Service

Level of Service (LOS) is a term used by the HCM to describe the traffic operations of an intersection, based on congestion and delay. Measurements of LOS are vehicle delay and volume-to-capacity (v/c) ratios. LOS ranges from A (almost no congestion or delay) to F (traffic demand exceeds capacity and intersection experiences long queues and delay). LOS E is the threshold when the intersection exceeds an acceptable standard and intersection improvements are required in the state of Idaho. **Table 1**

includes the delay and v/c criteria used to assign a letter grade to an intersection for signalized and unsignalized intersections.

Table 1: LOS Delay Criteria

Level of Service	Average Control Delay (sec/veh)		Volume-to-Capacity Ratio (v/c)
	Signalized	Unsignalized	
A	≤ 10	≤ 10	V/C < 1.0
B	> 10 - 20	> 10 - 15	
C	> 20 - 35	> 15 - 25	
D	> 35 - 55	> 25 - 35	
E	> 55 - 80	> 35 - 50	
F	> 80	> 50	V/C ≥ 1.0

Corridor Delay

Average delay to a vehicle traveling the entire corridor was also calculated for both Main Street and 2nd East using SimTraffic within Synchro 10. For each arterial, the average delay to vehicles moving along the specific route was calculated for each intersection. In the case of Main Street, that would be the average delay from the intersections of the turnaround through Jackson Street. For 2nd East, delays from the intersections of Jackson Street through the turnaround were included. The delays used to calculate average delay across the corridor were average delays according to movement. In this case, through movement at each intersection was used. The Synchro reports for arterial level of service may be found in the Appendix.

20-Year Traffic Projections

To successfully analyze traffic conditions for future conditions, existing traffic is grown based on the projected growth in the surrounding area. To find an appropriate growth rate, growth factors for the roads within the study area were obtained from Idaho Transportation Department's Roadway Data Section. From the growth factors, a growth rate of 0.5% was chosen for all study roadways as shown in **Table 2**.

Table 2: Growth Rate

Source	Average Annual Growth Rate
ITD Roadway Data Section	0.5%

Analysis Scenarios

The following indicate the three analysis scenarios included in the traffic study:

- **Existing Conditions**
- **Two-Lane Scenario**
  - Reduce Main Street and 2nd East to two lanes
- **One-Way Scenario**
  - Reduce Main Street and 2nd East to two lanes
  - Convert 4th north into a southwest bound one-way road between Main Street and 2nd East
  - Convert 2nd North into a northeast bound one-way road between Main Street and 2nd East

For each scenario, existing as well as 20-year projected traffic data were used to determine roadway network performance. The following sections describe each scenario and roadway performance in detail.

Existing Conditions Analysis

The existing roadway conditions were added to the Synchro 10 traffic model and analyzed using SimTraffic. The roadway configuration and traffic data are included in **Figure 3** and **Figure 4** for the AM Peak and PM Peak hours respectively. Specific information regarding intersection performance can be found in the appendix.

Table 3 shows the existing traffic conditions at study intersections including average control delay per vehicle and corresponding level of service. Existing traffic conditions show acceptable LOS B or better conditions at all study intersections. During the AM and PM Peak hours, all intersections function at a LOS B or better. During the AM peak hour, the study intersection of 2nd East and Jackson Street has the greatest delay of 16.1 seconds. Average delay to vehicles on Main Street was 0.9 seconds, and average delay to vehicles on 2nd East was 24.9 seconds. During the PM peak hour, the study intersection of 2nd East and Jackson Street has the greatest delay. This intersection's average delay is 17.3 seconds. Average delay to vehicles on Main Street was 1.7 seconds, and average delay to vehicles on 2nd East was 31.7 seconds. No mitigations are recommended at this time. Specific information regarding intersection and corridor performance can be found in the appendix.

Table 3: Existing Conditions Analysis

No.	Intersection	Control Type	AM Peak Hour			PM Peak Hour		
			Average Control Delay (sec/veh)	Level of Service	V/C Ratio	Average Control Delay (sec/veh)	Level of Service	V/C Ratio
Existing Conditions Analysis								
1	2nd East & 5th North	TWSC	7.7	A	0.14	10.7	B	0.32
2	Main St. & 5th North	TWSC	7.7	A	0.32	10.8	B	0.45
3	2nd East & 4th North	TWSC	4.7	A	0.03	8.2	A	0.13
4	Main St & 4th North	TWSC	3.7	A	0.01	6.2	A	0.05
5	2nd East & American Legion Blvd	Signalized	9.4	A	0.46	12.6	B	0.72
6	Main St & U-Turn	Free	-	-	-	-	-	-
7	Main St & American Legion Blvd	TWSC	9.7	A	0.28	13.5	B	0.44
8	2nd East & 2nd North	TWSC	7.5	A	0.05	11.1	B	0.18
9	Main St & 2nd North	TWSC	5.7	A	0.02	7.6	A	0.10
10	2nd East & Jackson St	Signalized	16.1	B	0.60	17.3	B	0.65
11	Main St & Jackson St	TWSC	8.5	A	0.21	10.7	B	0.28

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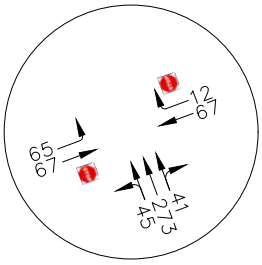

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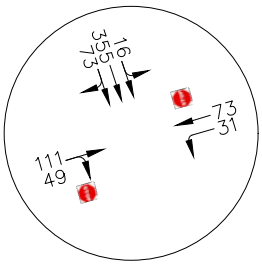

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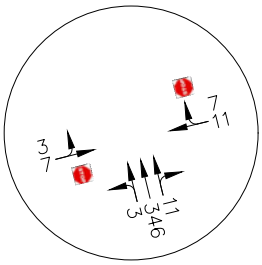

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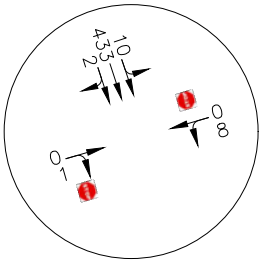

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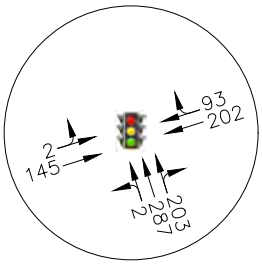

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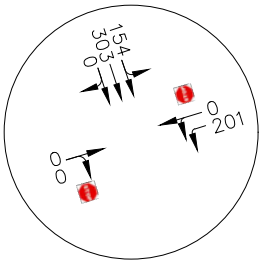

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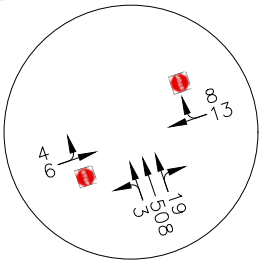

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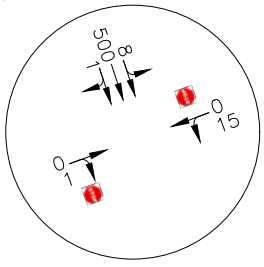

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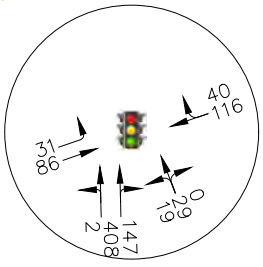

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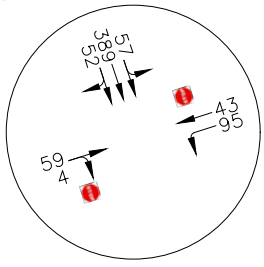

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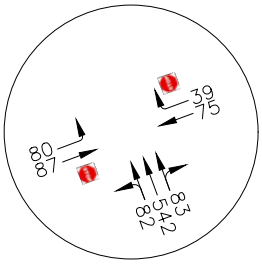
Mountain Home
Existing AM Traffic Volumes

FIGURE 3

SCALE: N/A

DATE: 10/2017

1 PM PEAK HOUR



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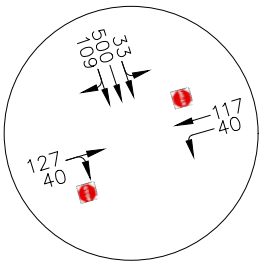

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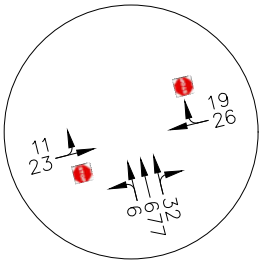

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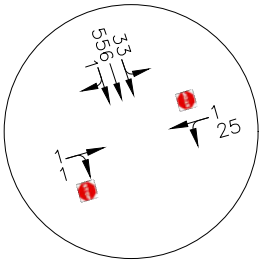

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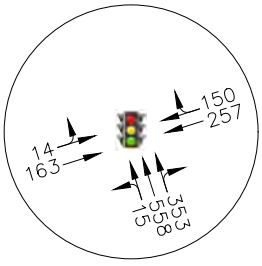

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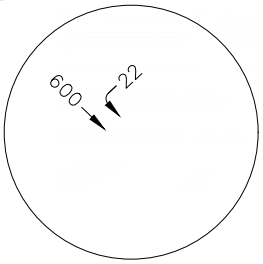

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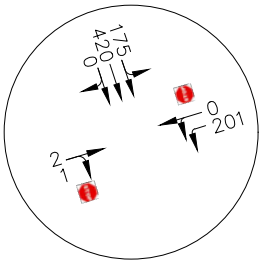

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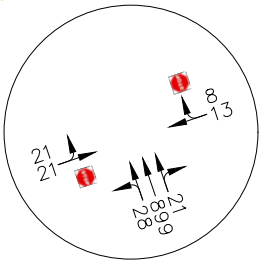

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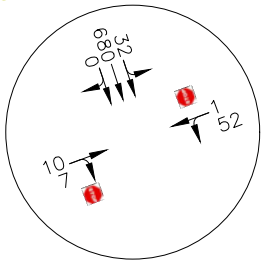

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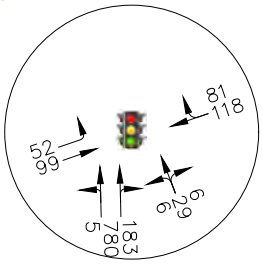

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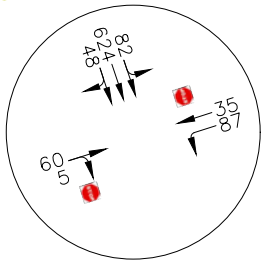

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Mountain Home
Existing Background PM Traffic Volumes

FIGURE 4

SCALE: N/A

DATE: 10/2017

Existing Conditions – 20-Year Growth Analysis

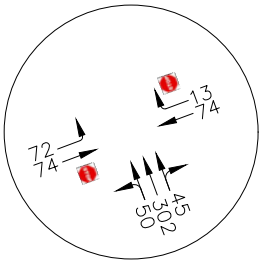
The existing background traffic was grown for 20 years from existing conditions to represent the 20-year existing scenario. Traffic volumes for the 20-year existing scenario are shown in **Figure 5** and **Figure 6**. 20-year traffic conditions show acceptable LOS C or better at all study intersections. During the AM Peak hour, all intersections function at a LOS B or better. During the AM peak hour, the study intersection at 2nd East and Jackson Street has the greatest average delay of 16.8 seconds. The intersection of Main Street and Jackson Street remained at LOS A, with an average delay of 9.4 seconds per vehicle. The intersection of Main Street and American Legion Blvd decreased from LOS A to LOS B, with an average delay of 12.0 seconds per vehicle. All other intersections do increase slightly in average delay to vehicles, but not enough to change LOS. Average delay to vehicles on Main Street was 1.1 seconds, and average delay to vehicles on 2nd East was 25.7 seconds, an increase of 0.2 and 0.8 seconds, respectively, over delays with existing traffic volumes.

During the PM peak hour, all intersections function at LOS C or better, with the exception of Main St. & American Eagle Blvd (LOS D). During the PM peak hour, the study intersection of Main St and American Legion Blvd. has the greatest delay of 28.5 seconds. LOS decreased from LOS B to LOS C at the intersections of Main St. & 5th North and 2nd East & American Legion Blvd. Average delay to vehicles on Main Street was 24.1 seconds, and average delay to vehicles on 2nd East was 41.1 seconds, an increase of 22.4 and 9.4 seconds, respectively, over delays with existing traffic volumes. No mitigations are recommended at this time. The analysis results are shown in **Table 4.** Further information regarding intersection and corridor performance can be found in the appendix.

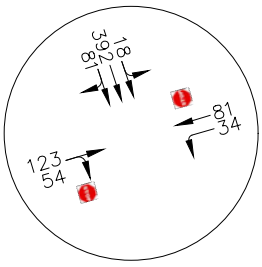
Table 4: Existing Conditions - 20-Year Growth Analysis

No.	Intersection	Control Type	AM Peak Hour			PM Peak Hour		
			Average Control Delay (sec/veh)	Level of Service	V/C Ratio	Average Control Delay (sec/veh)	Level of Service	V/C Ratio
Existing conditions – 20 Year Growth Analysis								
1	2nd East & 5th North	TWSC	7.9	A	0.17	12.0	B	0.40
2	Main St. & 5th North	TWSC	8.0	A	0.38	17.8	C	0.53
3	2nd East & 4th North	TWSC	5.8	A	0.04	9.5	A	0.15
4	Main St & 4th North	TWSC	6.4	A	0.01	20.1	C	0.05
5	2nd East & American Legion Blvd	Signalized	9.8	A	0.50	21.9	C	0.74
6	Main St & U-Turn	Free	-	-	-	-	-	-
7	Main St & American Legion Blvd	TWSC	12.0	B	0.34	28.5	D	0.53
8	2nd East & 2nd North	TWSC	7.4	A	0.06	15.5	C	0.23
9	Main St & 2nd North	TWSC	6.5	A	0.03	9.2	A	0.12
10	2nd East & Jackson St	Signalized	16.8	B	0.61	21.2	C	0.69
11	Main St & Jackson St	TWSC	9.4	A	0.25	10.2	B	0.31

1 AM PEAK HOUR



2 AM PEAK HOUR



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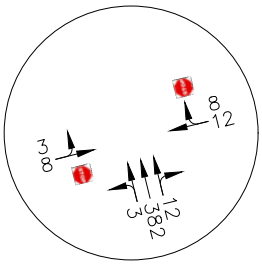

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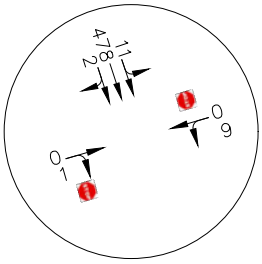

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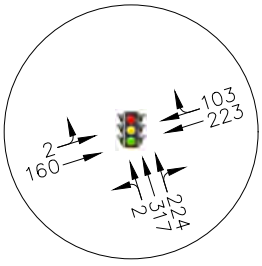
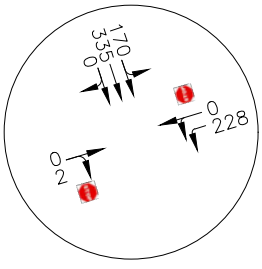
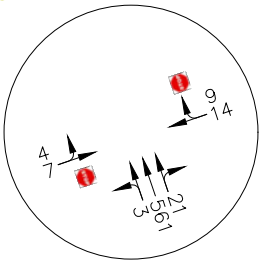


6 AM PEAK HOUR

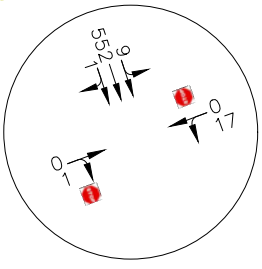
7 AM PEAK HOUR



8 AM PEAK HOUR



9 AM PEAK HOUR



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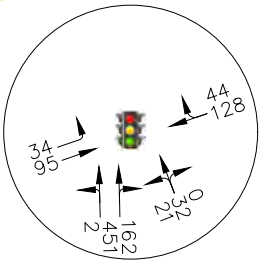

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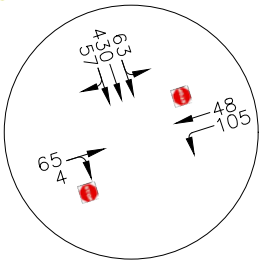

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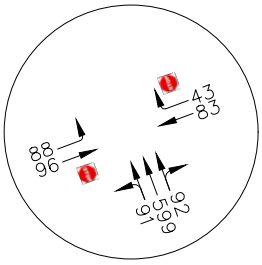
20-year Background AM Traffic Volumes

FIGURE 5

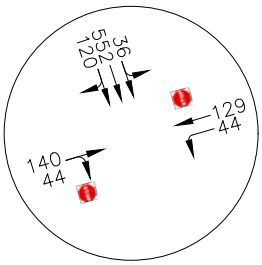
SCALE: N/A

DATE: 12/2017

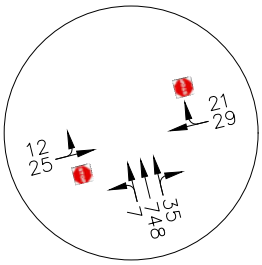
1 PM PEAK HOUR



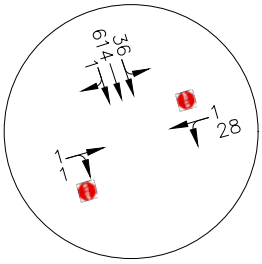
2 PM PEAK HOUR



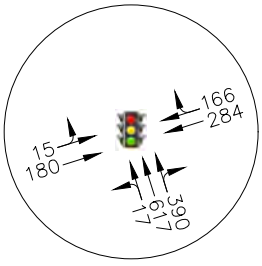
3 PM PEAK HOUR



4 PM PEAK HOUR

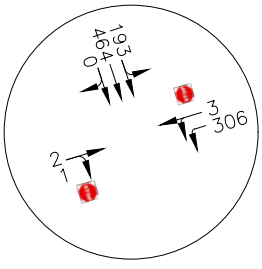


5 PM PEAK HOUR



6 PM PEAK HOUR

7 PM PEAK HOUR



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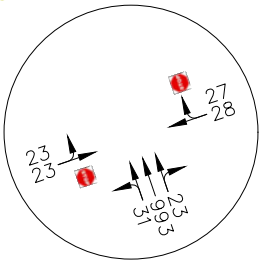

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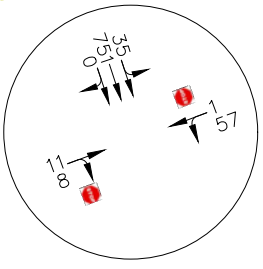

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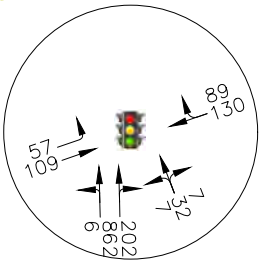
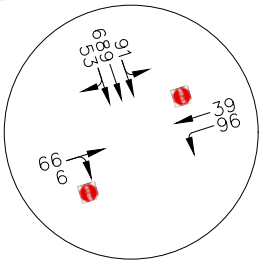


11 PM PEAK HOUR



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20-year Background PM Traffic Volumes

FIGURE 6

SCALE: N/A

DATE: 12/2017

Two-Lane Scenario Existing Conditions Analysis

The Two-Lane Scenario reduces Main Street and 2nd East to two lanes. **Figure 7** summarizes the configuration changes for this scenario. Traffic volumes remained the same for this scenario as those of the existing scenario. Roadway geometry changes were made by eliminating a thru lane over the entirety of Main Street through the intersection of Main Street and 2nd North. At the intersection of 2nd North, the trap left turn lane on the approach of Main Street and Jackson Street was eliminated, with the left turns being serviced by a shared thru-left lane. The middle thru lane from Jackson Street through 5th North on 2nd East was also eliminated in order to make 2nd East into a 2-lane road. Intersection configurations and lane geometries as well as traffic volumes are included for the AM and PM peak hours in **Figure 8** and **Figure 9** respectively.

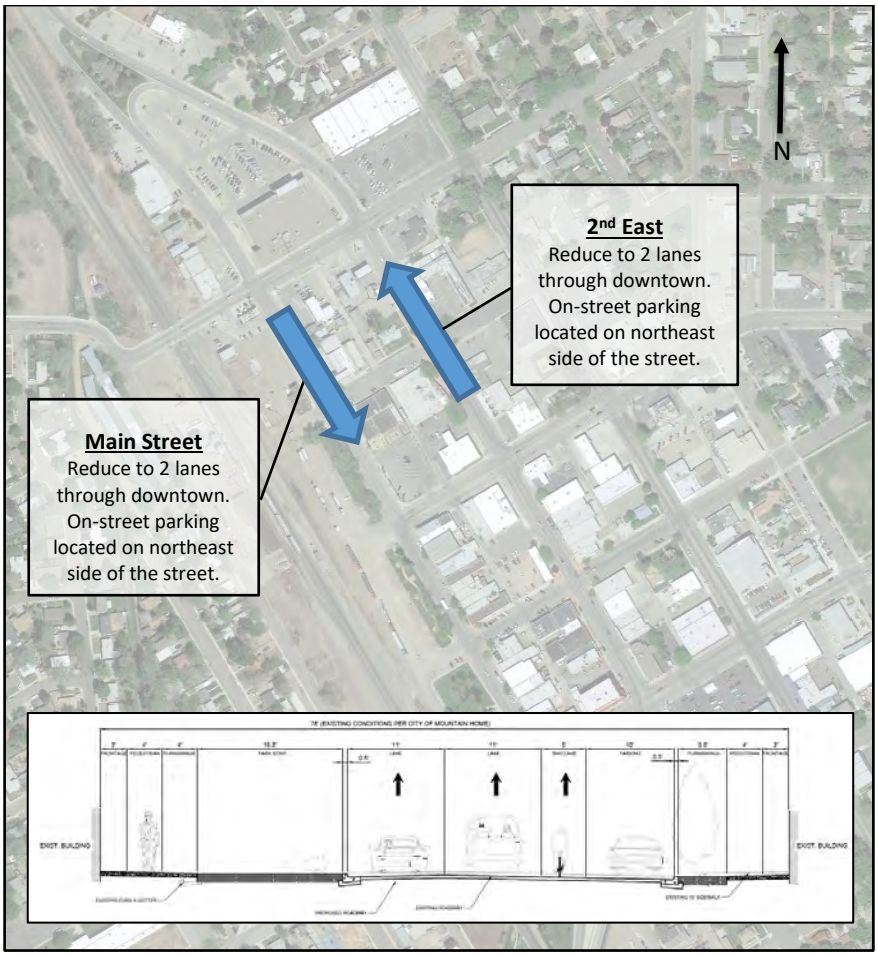


Figure 7: Two-Lane Scenario Summary

On-street parking will be maintained on the northeast side of Main Street and 2nd East. Parking on the southwest side of both streets will be converted into a parkstrip. A typical cross-section is included in **Figure 7**. Parking on one side of the road will reduce conflict points for through traffic and will improve pedestrian access by shortening crosswalk distances and visibility.

Traffic conditions show acceptable LOS B or better conditions at all study intersections. During the AM Peak hour, all intersections function at a LOS B or better. During the AM peak hour, the study intersection of 2nd East and Jackson Street has the greatest delay, which is 15.0 seconds. When delay and LOS is compared to existing traffic conditions, it can be noted that delay actually decreases for many intersections. This decrease in delay is quite small (usually under 0.5 seconds). This decrease is likely due to improvements in vehicle flow that two lanes offers over three lanes, especially with regards to crossing at two way stops. Average delay to vehicles on Main Street was 2.2 seconds, and average delay to vehicles on 2nd East was 24.1 seconds, an increase of 1.3 and decrease of 0.8 seconds, respectively, over delays with no-build existing conditions.

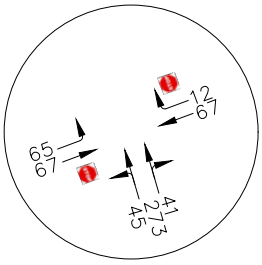
During the PM peak hour, all intersections function at a LOS of B or better. During the PM peak hour, the study intersection of 2nd East and Jackson Street has the greatest delay, which is 16.1 seconds. When delay

is compared to existing conditions, LOS improves from LOS B to LOS A for the intersection of Main Street and Jackson Street. Average delay to vehicles on Main Street was 3.6 seconds, and average delay to vehicles on 2nd East was 34.7 seconds, an increase of 1.9 and 3.0 seconds, respectively, over delays with no-build existing conditions. No mitigations are recommended at this time. The analysis is shown in **Table 5**. Specific information regarding intersection performance can be found in the appendix.

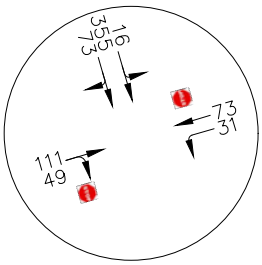
Table 5: Two Lane Scenario Existing Conditions Analysis

No.	Intersection	Control Type	AM Peak Hour			PM Peak Hour		
			Average Control Delay (sec/veh)	Level of Service	V/C Ratio	Average Control Delay (sec/veh)	Level of Service	V/C Ratio
Two Lane Scenario Analysis								
1	2nd East & 5th North	TWSC	7.5	A	0.14	10.9	B	0.32
2	Main St. & 5th North	TWSC	7.3	A	0.31	10.1	B	0.43
3	2nd East & 4th North	TWSC	5.3	A	0.03	8.9	A	0.12
4	Main St & 4th North	TWSC	3.9	A	0.01	5.7	A	0.05
5	2nd East & American Legion Blvd	Signalized	9.4	A	0.54	15.1	B	0.82
6	Main St & U-Turn	Free	-	-	-	-	-	-
7	Main St & American Legion Blvd	TWSC	8.9	A	0.32	12.1	B	0.54
8	2nd East & 2nd North	TWSC	6.4	A	0.05	11.8	B	0.17
9	Main St & 2nd North	TWSC	6.7	A	0.03	7.3	A	0.11
10	2nd East & Jackson St	Signalized	15.0	B	0.58	16.1	B	0.63
11	Main St & Jackson St	TWSC	7.8	A	0.21	9.6	A	0.28

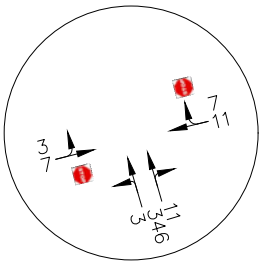
1 AM PEAK HOUR



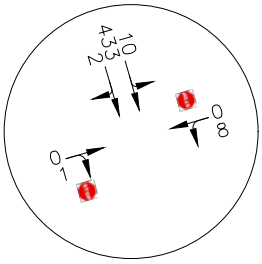
2 AM PEAK HOUR



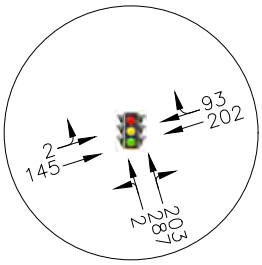
3 AM PEAK HOUR



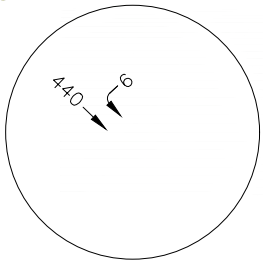
4 AM PEAK HOUR



5 AM PEAK HOUR



6 AM PEAK HOUR



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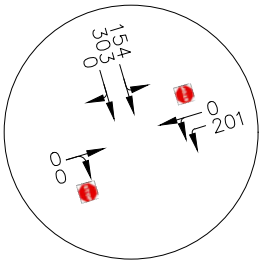
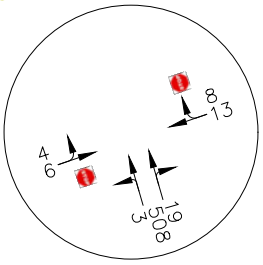
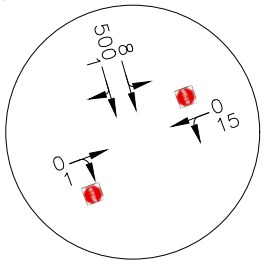


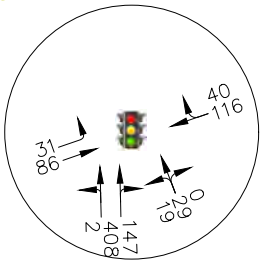
8 AM PEAK HOUR



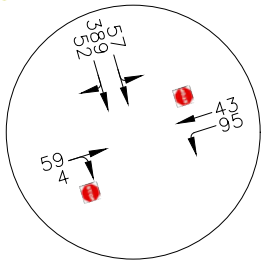
9 AM PEAK HOUR



10 AM PEAK HOUR



11 AM PEAK HOUR



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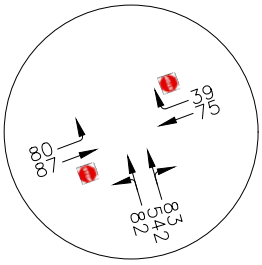
Two-Lane Scenario AM Traffic Volumes

FIGURE 8

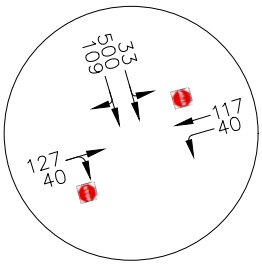
SCALE: N/A

DATE: 10/2017

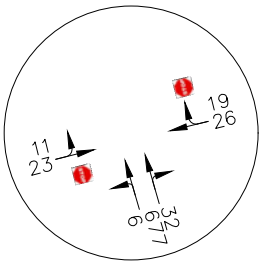
1 PM PEAK HOUR



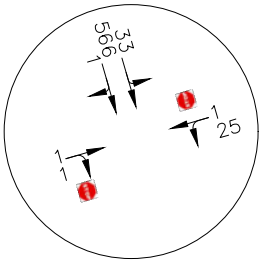
2 PM PEAK HOUR



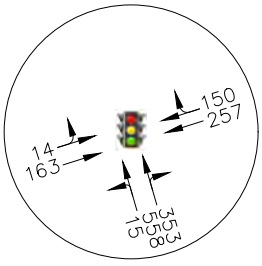
3 PM PEAK HOUR



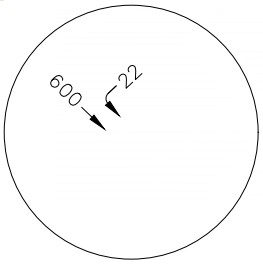
4 PM PEAK HOUR



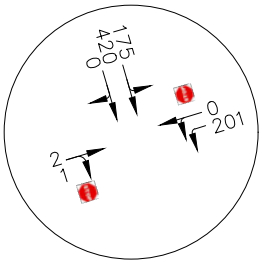
5 PM PEAK HOUR



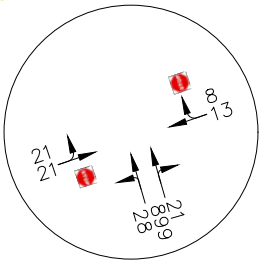
6 PM PEAK HOUR



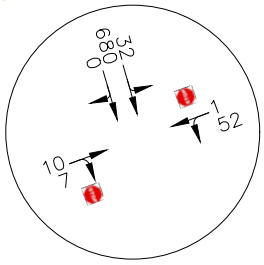
7 PM PEAK HOUR



8 PM PEAK HOUR



9 PM PEAK HOUR



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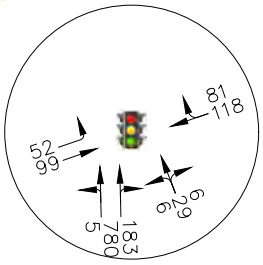
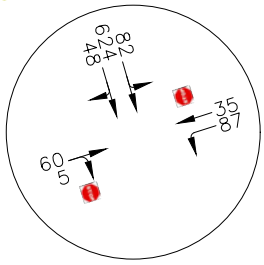


11 PM PEAK HOUR



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Two-Lane Scenario PM Traffic Volumes

FIGURE 9

SCALE: N/A

DATE: 10/2017

Two-Lane Scenario – 20-Year Growth Analysis

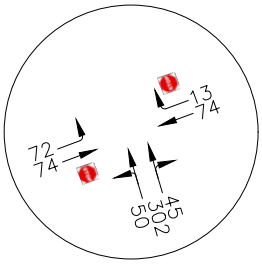
Traffic Volumes were grown for 20 years to represent the Two-Lane 20-year Scenario. Traffic Volumes can be found in **Figure 10** and **Figure 11**. 20-year traffic conditions in this scenario show an acceptable LOS B or better for all intersections. In the AM peak hour, the worst performing intersection is 2nd East and Jackson Street, which has a delay of 16.7 seconds. Average delay to vehicles on Main Street was 2.4 seconds, and average delay to vehicles on 2nd East was 27.1 seconds, an increase of 0.2 and 3.0 seconds, respectively, over delays with existing traffic volumes in the two-lane scenario.

During the PM peak hour, the worst performing intersection is 2nd East and Jackson Street, which has a delay of 17.8 seconds. The intersection of Main Street and Jackson Street decreases from LOS A to LOS B and the intersection of 2nd East and 2nd North decreases from LOS B to LOS C, but all other intersections remain the same LOS as existing traffic volumes. Average delay to vehicles on Main Street was 4.1 seconds, and average delay to vehicles on 2nd East was 40.1 seconds, an increase of 0.5 and 5.4 seconds, respectively, over delays with existing traffic volumes in the two-lane scenario. No mitigations are recommended at this time. The LOS analysis can be found below in **Table 6**. Specific information regarding intersection performance can be found in the appendix.

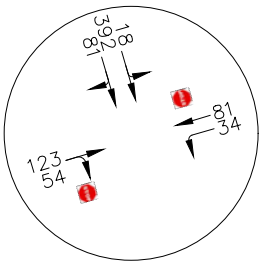
Table 6: Two-Lane Scenario – 20-year Growth Analysis

No.	Intersection	Control Type	AM Peak Hour			PM Peak Hour		
			Average Control Delay (sec/veh)	Level of Service	V/C Ratio	Average Control Delay (sec/veh)	Level of Service	V/C Ratio
Two Lane Scenario – 20 Year Growth Analysis								
1	2nd East & 5th North	TWSC	7.8	A	0.17	12.4	B	0.40
2	Main St. & 5th North	TWSC	7.8	A	0.37	11.4	B	0.52
3	2nd East & 4th North	TWSC	5.0	A	0.04	8.7	A	0.15
4	Main St & 4th North	TWSC	3.6	A	0.02	6.3	A	0.06
5	2nd East & American Legion Blvd	Signalized	10.4	B	0.60	15.4	B	0.83
6	Main St & U-Turn	Free	-	-	-	-	-	-
7	Main St & American Legion Blvd	TWSC	9.7	A	0.40	13.9	B	0.66
8	2nd East & 2nd North	TWSC	6.5	A	0.05	15.4	C	0.22
9	Main St & 2nd North	TWSC	5.8	A	0.03	8.9	A	0.15
10	2nd East & Jackson St	Signalized	16.7	B	0.62	17.8	B	0.68
11	Main St & Jackson St	TWSC	8.4	A	0.25	10.8	B	0.36

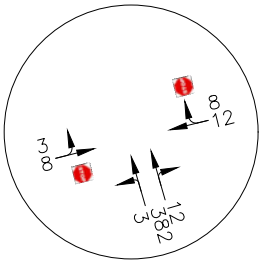
1 AM PEAK HOUR



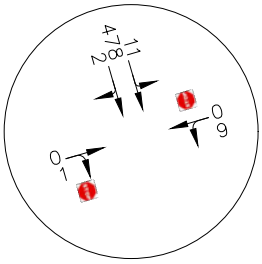
2 AM PEAK HOUR



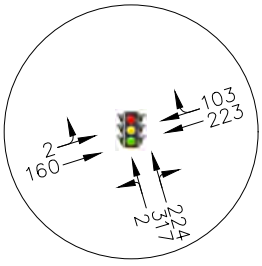
3 AM PEAK HOUR



4 AM PEAK HOUR

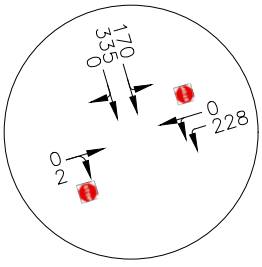


5 AM PEAK HOUR

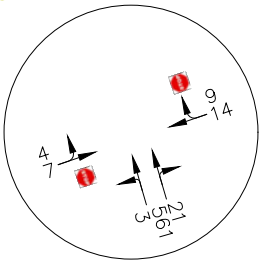


6 AM PEAK HOUR

7 AM PEAK HOUR



8 AM PEAK HOUR



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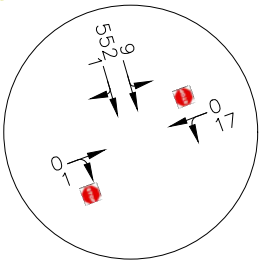

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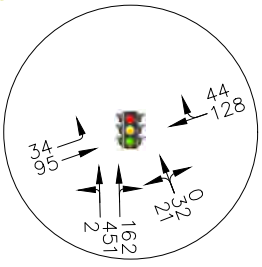
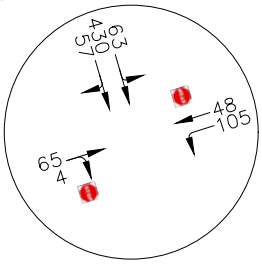


11 AM PEAK HOUR



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20-year Two-Lane Scenario AM Traffic Volumes

FIGURE 10

SCALE: N/A

DATE: 12/2017

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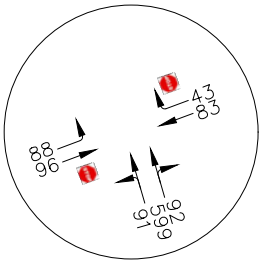
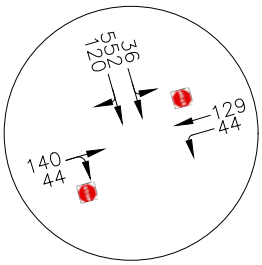
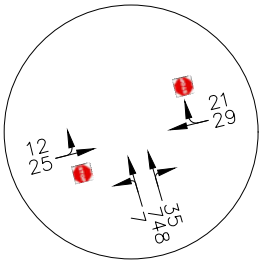


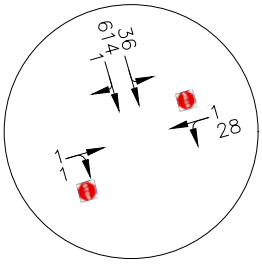
2 PM PEAK HOUR



3 PM PEAK HOUR



4 PM PEAK HOUR



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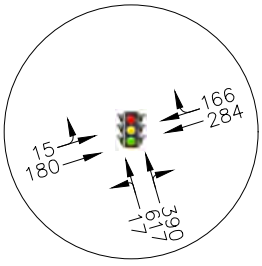

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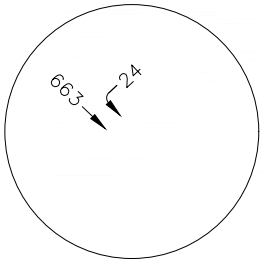
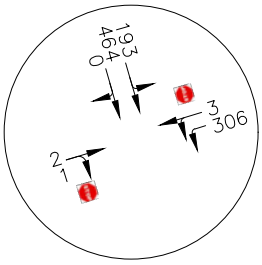
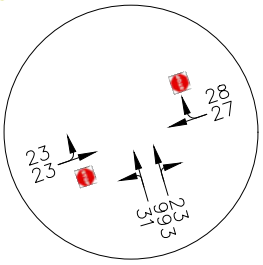


7 PM PEAK HOUR



8 PM PEAK HOUR



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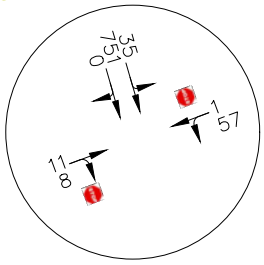

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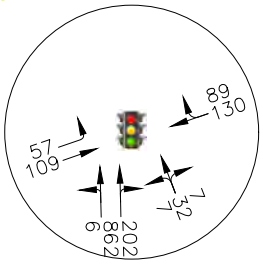

11 PM PEAK HOUR

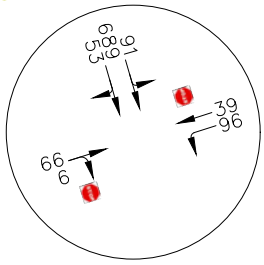

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FIGURE 11

SCALE: N/A

DATE: 12/2017

One-Way Scenario Existing Conditions Analysis

For the One-Way scenario, 4th North between Main Street and 2nd East was changed into a one-way road in the southwest direction. 2nd North between Main Street and 2nd East was also changed into a one-way road in the northeast direction. Traffic that would have used those roads were re-routed to utilize American Legion Boulevard. A summary of the scenario can be found in **Figure 12**. Traffic volumes as well as intersection geometries can be found in **Figure 13** and **Figure 14**.

On-street parking will be maintained on the northeast side of Main Street and 2nd East. Parking on the southwest side of both streets will be converted into a parkstrip. A typical cross-section is included in **Figure 12**. Parking on one side of the road will reduce conflict points for through traffic and will improve pedestrian access by shortening crosswalk distances and visibility.

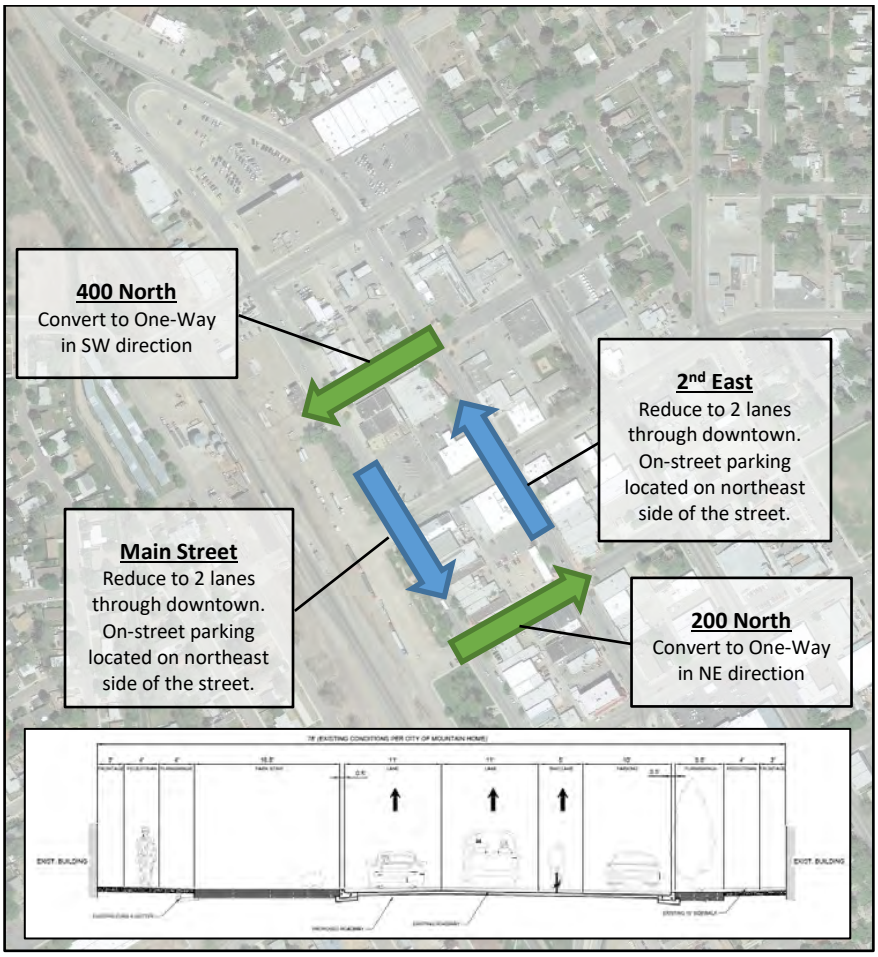


Figure 12: One-Way Scenario Summary

Analysis of traffic conditions in the one-way scenario show acceptable LOS B or better conditions at all study intersections. During the AM peak hour, all intersections function at a LOS B or better. During the AM peak hour, the intersection of 2nd East and Jackson Street has the greatest delay of 14.5 seconds. When compared to existing lane configurations, delay increased slightly at intersections which were not altered, but LOS remained unchanged between the two scenarios. Average delay to vehicles on Main Street was 2.2 seconds, and average delay to vehicles on 2nd East was 25.9 seconds, an increase 1.3 and 1.0 seconds, respectively, over delays with no-build existing conditions.

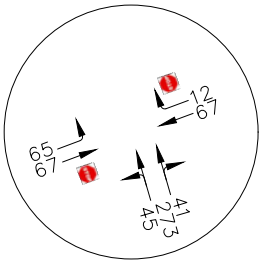
During the PM peak hour, all intersections function at a LOS of B or better. The intersection of 2nd East and American Legion Boulevard has the greatest delay of 17.7 seconds. When compared to existing lane configurations, delay at intersections not altered tended to increase, but the intersection of Main Street and Jackson Street increased from LOS B to LOS A. Otherwise, LOS remained the same between one-way traffic conditions and existing conditions. Average delay to vehicles on Main Street was 3.8 seconds, and average delay to vehicles on 2nd East was 39.8 seconds, an increase 2.1 and 8.1 seconds, respectively, over

delays with existing conditions. No mitigations are recommended at this time. The analysis is shown in **Table 7**. Specific information regarding intersection performance can be found in the appendix.

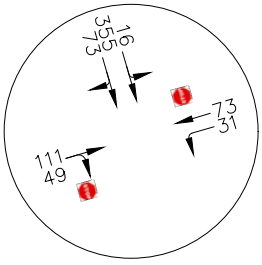
Table 7: One-Way Scenario Existing Conditions Analysis

No.	Intersection	Control Type	AM Peak Hour			PM Peak Hour		
			Average Control Delay (sec/veh)	Level of Service	V/C Ratio	Average Control Delay (sec/veh)	Level of Service	V/C Ratio
One-Lane Scenario Existing Conditions Analysis								
1	2nd East & 5th North	TWSC	8.3	A	0.14	12.5	B	0.32
2	Main St. & 5th North	TWSC	7.4	A	0.31	10.2	B	0.43
3	2nd East & 4th North	TWSC	4.9	A	0.02	8.5	A	0.08
4	Main St & 4th North	TWSC	3.2	A	0.01	5.9	A	0.05
5	2nd East & American Legion Blvd	Signalized	10.3	B	0.53	17.7	B	0.81
6	Main St & U-Turn	Free	-	-	-	-	-	-
7	Main St & American Legion Blvd	TWSC	9.0	A	0.36	12.1	B	0.70
8	2nd East & 2nd North	TWSC	6.0	A	0.02	14.5	B	0.15
9	Main St & 2nd North	TWSC	3.5	A	0.00	6.5	A	0.03
10	2nd East & Jackson St	Signalized	14.5	B	0.50	15.3	B	0.52
11	Main St & Jackson St	TWSC	7.7	A	0.21	9.6	A	0.29

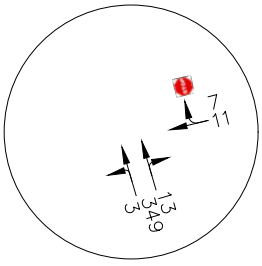
1 AM PEAK HOUR



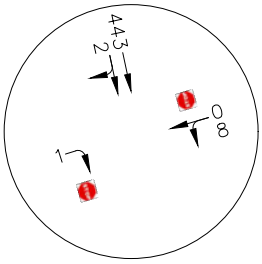
2 AM PEAK HOUR



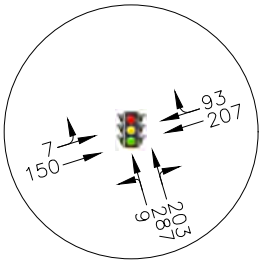
3 AM PEAK HOUR



4 AM PEAK HOUR

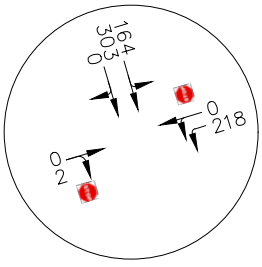


5 AM PEAK HOUR

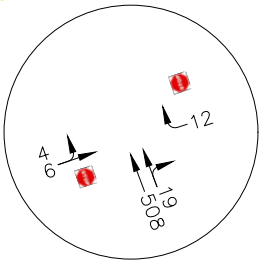


6 AM PEAK HOUR

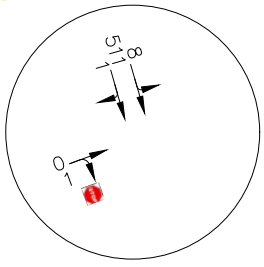
6 AM PEAK HOUR



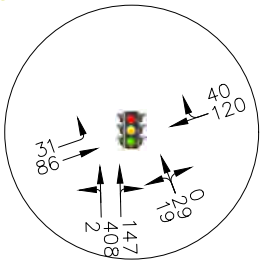
7 AM PEAK HOUR



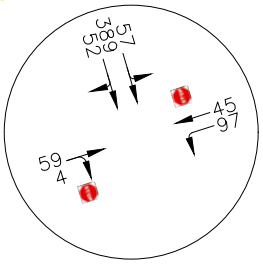
8 AM PEAK HOUR



9 AM PEAK HOUR



10 AM PEAK HOUR



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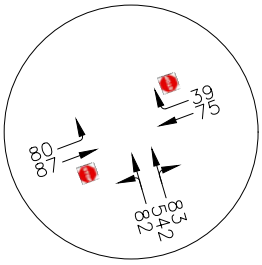
One-way AM Traffic Volumes

FIGURE 13

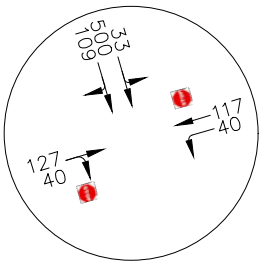
SCALE: N/A

DATE: 11/2017

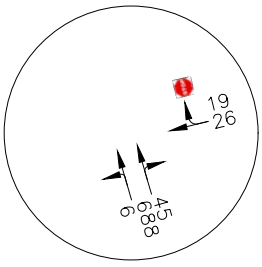
1 PM PEAK HOUR



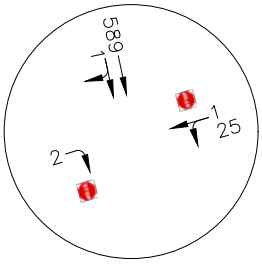
2 PM PEAK HOUR



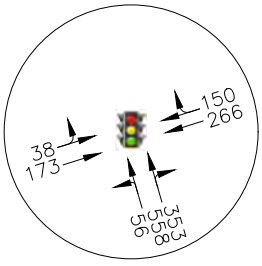
3 PM PEAK HOUR



4 PM PEAK HOUR

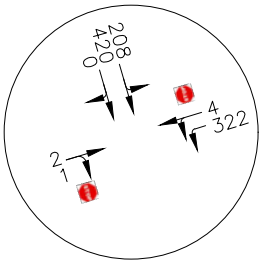


5 PM PEAK HOUR

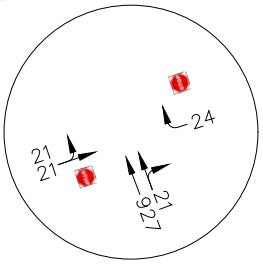


6 PM PEAK HOUR

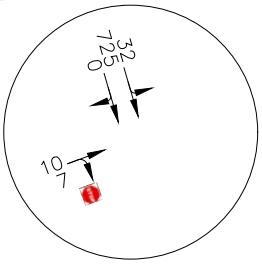
7 PM PEAK HOUR



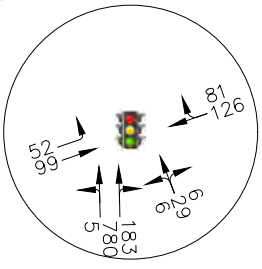
8 PM PEAK HOUR



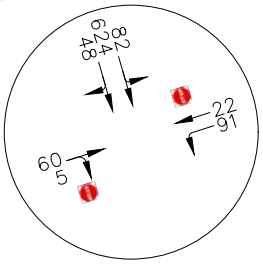
9 PM PEAK HOUR



10 PM PEAK HOUR



11 PM PEAK HOUR



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Existing PM Background Traffic Volumes
One-Way

FIGURE 14

SCALE: N/A

DATE: 10/2017

One-Way Scenario – 20-Year Growth Analysis

Traffic Volumes were grown for 20 years to represent the One-Way 20-year Scenario. Traffic volumes can be found in **Figure 15** and **Figure 16**. 20-year traffic conditions in this scenario show an acceptable LOS C or better for all intersections.

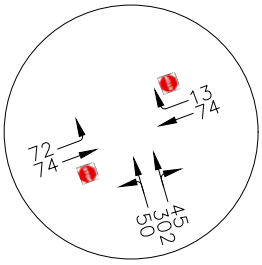
In the AM peak hour, the worst performing intersection is 2nd East and Jackson Street, which has a delay of 16.0 seconds. The intersection of 2nd East and American Legion Boulevard decreased from LOS A to LOS B, with an average delay of 10.8 seconds per vehicle. For all other intersections, while average delay did increase slightly, LOS remained the same as the one-way scenario with existing traffic volumes. Average delay to vehicles on Main Street was 2.4 seconds, and average delay to vehicles on 2nd East was 27.9 seconds, an increase of 0.2 and 2.0 seconds, respectively, over delays with existing traffic volumes in the one-way scenario.

During the PM peak hour, the worst performing intersection is 2nd East & 2nd North, which has a delay of 34.9 seconds. The intersection of 2nd East and 2nd North decreased from LOS B to LOS D, and the intersection of Main Street and Jackson Street decreased from LOS A to LOS B. The intersection of 2nd East and American Legion Blvd also decreased from LOS B to LOS C. All other LOS values remained the same as the one-way scenario with existing traffic volumes. Average delay to vehicles on Main Street was 4.1 seconds, and average delay to vehicles on 2nd East was 47.0 seconds, an increase of 0.3 and 7.2 seconds, respectively, over delays with existing traffic volumes in the one-way scenario. No mitigations are recommended at this time. The LOS analysis can be found below in **Table 8**. Specific information regarding intersection performance can be found in the appendix.

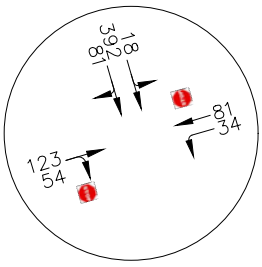
Table 8: One-Way Scenario – 20-Year Growth Analysis

No.	Intersection	Control Type	AM Peak Hour			PM Peak Hour		
			Average Control Delay (sec/veh)	Level of Service	V/C Ratio	Average Control Delay (sec/veh)	Level of Service	V/C Ratio
One-Way Scenario – 20 Year Growth Analysis								
1	2nd East & 5th North	TWSC	8.4	A	0.17	15.3	B	0.40
2	Main St. & 5th North	TWSC	7.7	A	0.37	11.1	B	0.52
3	2nd East & 4th North	TWSC	5.4	A	0.03	9.3	A	0.10
4	Main St & 4th North	TWSC	3.8	A	0.02	6.1	A	0.06
5	2nd East & American Legion Blvd	Signalized	10.8	B	0.58	20.3	C	0.85
6	Main St & U-Turn	Free	-	-	-	-	-	
7	Main St & American Legion Blvd	TWSC	10.0	B	0.44	14.2	B	0.87
8	2nd East & 2nd North	TWSC	6.3	A	0.03	34.9	D	0.19
9	Main St & 2nd North	TWSC	5.0	A	0.00	7.5	A	0.04
10	2nd East & Jackson St	Signalized	16.0	B	0.54	17.3	B	0.56
11	Main St & Jackson St	TWSC	8.8	A	0.26	11.2	B	0.38

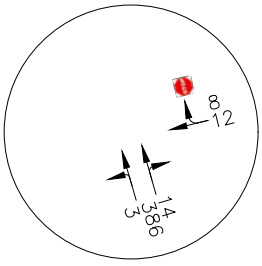
1 AM PEAK HOUR



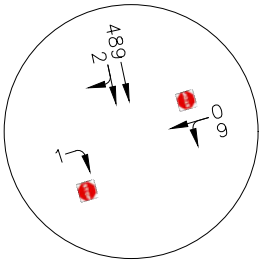
2 AM PEAK HOUR



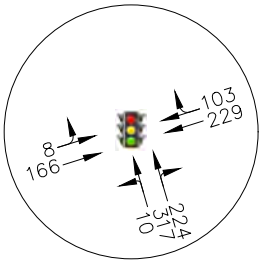
3 AM PEAK HOUR



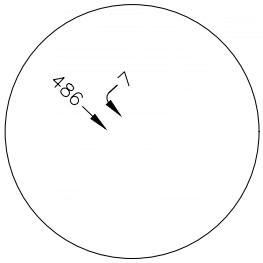
4 AM PEAK HOUR



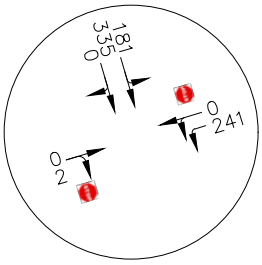
5 AM PEAK HOUR



6 AM PEAK HOUR



7 AM PEAK HOUR



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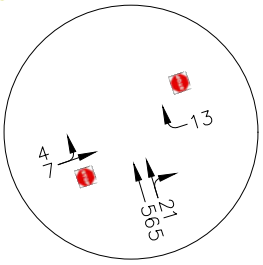

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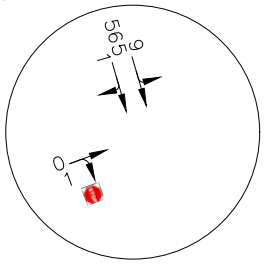

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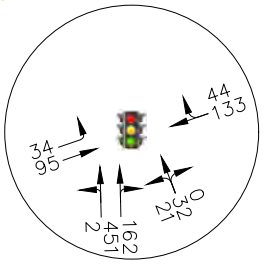

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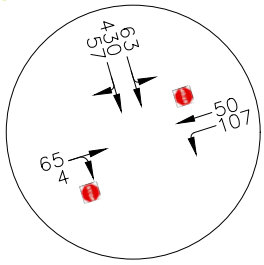

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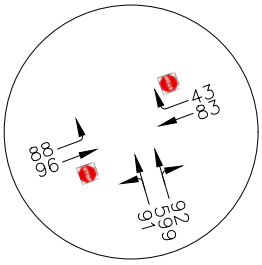
Mountain Home
20-year AM Traffic Volumes
One-Way

FIGURE 15

SCALE: N/A

DATE: 12/2017

1 PM PEAK HOUR



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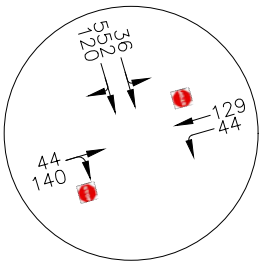
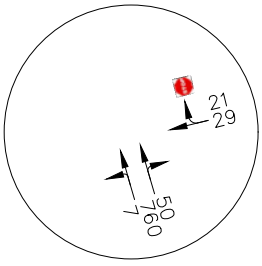


3 PM PEAK HOUR



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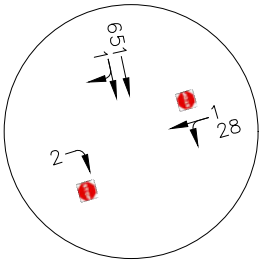
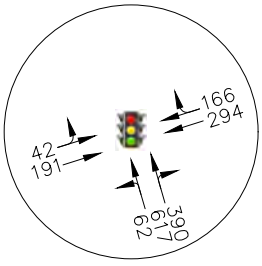
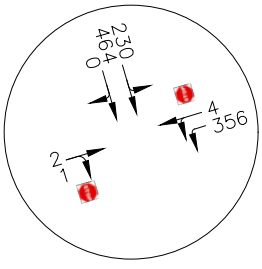


5 PM PEAK HOUR

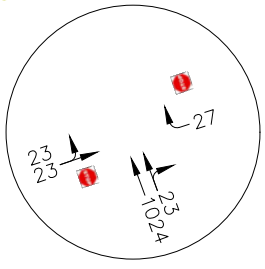


6 PM PEAK HOUR

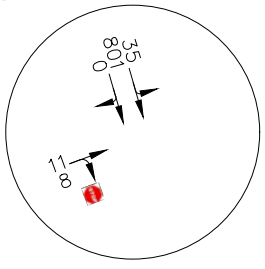
7 PM PEAK HOUR



8 PM PEAK HOUR



9 PM PEAK HOUR



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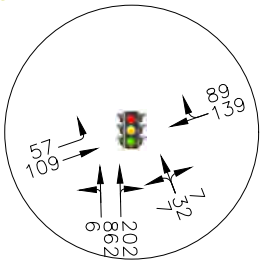
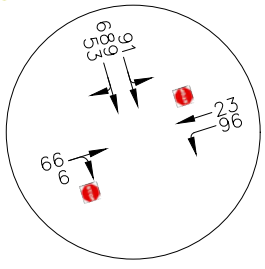


11 PM PEAK HOUR



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One-Way

FIGURE 16

SCALE: N/A

DATE: 12/2017

Other Recommendations

The following are recommendations based on observations based on the traffic data as well as field observations:

1. Right turn pockets

   It was observed that there are a significant number of right turning vehicles from 2nd East onto American Legion Blvd, 5th North, and Jackson Street, as well as vehicles turning from Main Street to 5th North. The analysis does not show a deficiency there, but adding a right turn pocket will improve traffic flow. The 2012 ITD Traffic Manual section 450 contains guidelines for warranting right turn pockets. With a right turn volume of over 90 vehicles during the peak hour at each intersection, a right turn pocket for the following intersections meets the warrants as recommended by ITD section 450:

   - 2nd East and American Legion Boulevard
   - 2nd East and 5th North
   - 2nd East and Jackson Street
   - Main Street and 5th North

2. Remove Southeast leg of intersection at Jackson Street and 2nd East

   A 5-leg intersection, especially in the downtown area, is not desirable. The Fire department is located close to this intersection and uses this leg of the intersection. It is recommended the City coordinate with the Fire Department to find all alternatives to re-route trucks so this leg of the intersection can be eliminated. This is only justified if there are minimal increases in response time due to removing the leg of the intersection.

3. HAWK Pedestrian Signal on Main Street at American Legion Blvd. and Jackson St.

   The city is anticipating more pedestrians to access the future park located between Main Street and the railroad tracks. To ensure safety and efficiency for pedestrians, it is recommended to install a High-intensity Activated Crosswalk (HAWK) signals on Main Street at either American Legion Blvd. or Jackson Street. A HAWK signal, shown in **Figure 17**, provides safety to pedestrians by requiring vehicles to stop at the crosswalk and is efficient to the vehicle traffic by allowing vehicles to pass through the signal if a small number of pedestrians are crossing. The following describes how the HAWK signal will function when implemented:

Figure 17: HAWK Signal
Source: bikewalkkc.org

   1. When pedestrian presses the button, HAWK Signal flashes Yellow to indicate the crossings has been initiated
   2. HAWK Signal shows solid yellow indicating drivers to stop
   3. HAWK Signal shows double solid red during the pedestrian walk interval
   4. HAWK Signal shows alternating flashing red during pedestrian countdown interval (vehicles can proceed if no pedestrians are located in the crosswalk)
   5. HAWK Signal goes dark indicating vehicles are free to pass through the crosswalk.

The 2009 Manual on Uniform Traffic Control Devices (MUTCD) provides guidelines for warranting HAWK signals. These can be found in Chapter 4F of the MUTCD, and include the following:

1. One or more signal warrants in section 4C of the MUTCD is met
2. An engineering study finds that gaps in traffic are not adequate to permit pedestrians to cross or if pedestrian delay is excessive
3. An engineering study finds that the plotted point representing the total vehicles per hour on the major street and the corresponding total of all pedestrians crossing the major street for 1 hour of an average day falls above the curve found in 4F-1.

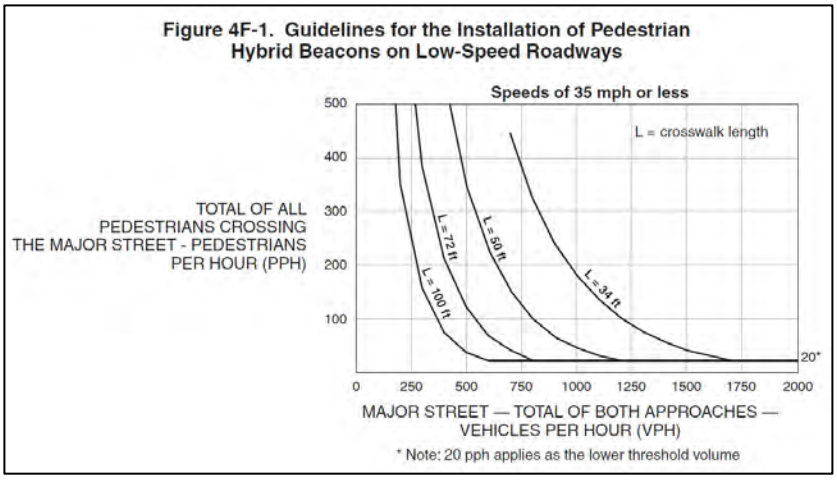


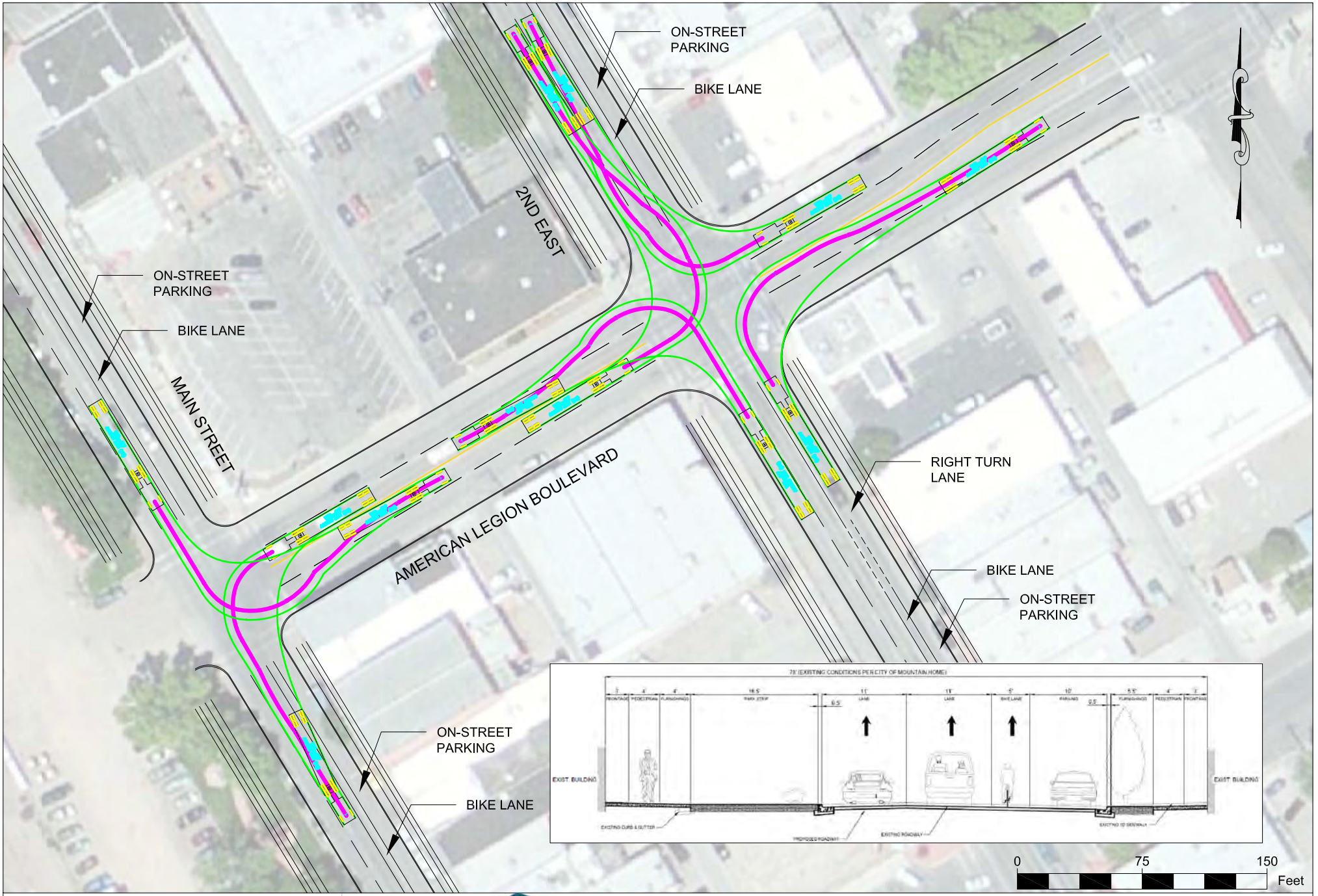
Figure 18: MUTCD HAWK Warrant

Table 4F-1 in the MUTCD includes the HAWK warrant and is included in **Figure 18**. The criteria to warrant the HAWK signal is dependent on the number of pedestrians per hour, the hourly volume on the major roadway, and the crosswalk length. The current length of the crossings on Main Street are over 50 feet and will be reduced as part of the revitalization of the downtown area. As the crosswalk length is shortened, the number of pedestrians per hour required to warrant the HAWK signal increases significantly.

Mountain Home is planning to develop the land southwest of Main Street as a park. Included are many events which will attract visitors to the park. With limited parking on site, it is expected to generate many pedestrians crossing Main Street. It is anticipated that the HAWK signal will be warranted and it is recommended the City conduct a warrant analysis when the HAWK signal is desired. If the HAWK signal is not warranted, the City plans to incorporate a safe crossing for pedestrians and will coordinate with ITD to determine the best solution.

4. Truck Turning Analysis

- There are heavy vehicles that utilize Main Street, 2nd East, and American Legion Blvd. Analysis of truck turning radii was completed at on American Legion Blvd at Main Street and 2nd East to ensure that reducing a lane on Main Street and 2nd East would not impact the heavy truck turning movements. A program called "AutoTURN" was used in AutoCAD to draw out heavy truck turning movements to ensure there was adequate room for truck turning traffic and is shown in **Figure 19**. Per the analysis, removing a travel lane on Main Street and 2nd East allows truck traffic to make proper turning movements.



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city of Mountain Home

FIGURE 19: TRUCK ANALYSIS

Analysis Conclusions

1. Existing Conditions Analysis
   - All study intersections operate at LOS B or better during the AM and PM peak hours
2. Existing Conditions – 20 Year Growth Analysis
   - All study intersections operate at LOS B or better during the AM and PM peak hours
3. Two-Lane Scenario Analysis
   - All study intersections operate at LOS B or better during the AM and PM peak hours
   - Average delay to vehicles decreased slightly when compared to existing conditions.
4. Two-Lane Scenario – 20 Year Growth Analysis
   - All study intersections operate at LOS B or better during the AM Peak hours and LOS C or better during the PM peak hours
5. One-Way Scenario
   - All study intersections operate at LOS B or better during the AM and PM peak hours
   - Average delay to vehicles on roads changed into one-way roads decreased, while it increased for vehicles at other intersections when compared to existing conditions.
6. One-Way Scenario – 20 Year Growth Analysis
   - All study intersections operate at LOS B or better during the AM peak hour and LOS C or higher during the PM peak hour

Analysis Recommendations

1. The preferred alternative is to reduce Main Street and 2nd East to two lanes
   - Reducing 200 North and 400 North to one-lane roads can be implemented with no significant impact to traffic flow on Main Street and 2nd East
2. On-street parking will be limited to the northeast side of Main Street and 2nd East
3. Include right-turn pocket on 2nd East at American Legion Boulevard, 5th North, and Jackson Street per ITD standards
4. Include a right-turn pocket on Main Street at 5th North per ITD standards
5. Coordinate with Fire Department to determine if closing southeast leg of 2nd East and Jackson Street is feasible
6. Install HAWK Signals on Main Street at American Legion Blvd. or Jackson Street to provide safety and efficiency for pedestrians if warranted per MUTCD
7. Removal of a travel lane on Main Street and 2nd East allows heavy truck traffic to make proper turning movements

Appendix