

**DETAILED TRAFFIC STUDY  
URSA OPERATING COMPANY, LLC  
BATTLEMENT MESA WELL PADS B & D  
GARFIELD COUNTY, COLORADO**



**OA Project No. 014-0495**

**October 2014**

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## 1.0 INTRODUCTION AND OBJECTIVE

This document summarizes the findings of a Detailed Traffic Study performed for two proposed well pads in the Piceance Basin near the town of Parachute, Colorado. The sites are located within the Battlement Mesa Planned Unit Development (PUD) which contains commercial, residential, and agricultural uses. A vicinity map is shown in **Figure 1 (Appendix A)**. The sites are approximately two travel miles southeast of Parachute, CO in the NW ¼ of Section 18, Township 7 South, Range 95 West of the Sixth Principal Meridian, Garfield County, Colorado. The subject sites encompass approximately 2 acres each. The parcel containing Pad B is operated by Ursa and owned by Battlement Mesa Partners. The other parcel containing Pad D is operated by Ursa and owned by Battlement Mesa Land Investments.

Ursa Operating Company, LLC (Ursa) is proposing to construct two well pads that will host between 25 and 28 production wells on each. It is expected that the lifespan of the pads will be approximately 20 years. The pads will be constructed, operated and reclaimed in four phases. For each pad, these phases include:

- Facility Construction (1 month)
- Drilling and Completions (7 months)
- Operations (20 years)
- Reclamation (2 weeks)

Access to the sites are proposed to be along Garfield County Road 307 (CR 307). Although it is being permitted under a different application, it is worth noting that Ursa will be constructing a pipeline in conjunction with these pads to transport water and product. This pipeline will be constructed in the interest of facilitating more efficient transport and reduce truck transport trips in and out of the PUD.

This traffic study was conducted to identify the traffic volumes associated with different phases of construction and operations of the pads and to analyze the estimated impacts of the anticipated volume increases on the surrounding roadway network. An Existing Background condition and Existing plus Site condition were analyzed as part of this study. Specific recommendations to help mitigate the traffic impacts are included at the end of this report.

## 2.0 DATA COLLECTION

The data collection effort included conducting peak hour turning movement counts, 24-hour directional counts, and documentation of current roadway geometrics and traffic control. Cross-section measurements and turn bay storage lengths were collected on each leg of the study intersections.

Olsson Associates (OA) conducted intersection turning movement counts on Wednesday, October 1, 2014 at the intersection of CR 307 & Battlement Mesa Parkway (CR 300). Additionally, turning movement counts were obtained for the intersection of CR 300 & Old Highway 6 from a previous study performed for the area. These counts were conducted in

September 2009. Traffic volumes were grown at 1% per year for 5 years to obtain 2014 volumes. The growth rate was found to be consistent with recent growth along Old Highway 6.

Daily traffic volumes were obtained from Garfield County Road and Bridge Department for the affected roadways under County jurisdiction. These counts were conducted in 2014. Additionally, a 24-hour count was conducted on Old Highway 6 along the haul route. The count was conducted on Tuesday, September 30, 2014 through Wednesday, October 1, 2014.

Each count was taken at 15-minute intervals. The peak hour counts were taken during in the AM and PM peak periods from 7AM to 9AM and 4PM to 6PM. The counts included heavy vehicle, bicycle, and pedestrian documentation at all locations. Existing traffic counts are shown in **Appendix B**.

## 2.0 EXISTING TRAFFIC CONDITIONS

Existing traffic conditions were evaluated to identify any existing deficiencies and to provide a baseline for comparison purposes.

### 2.1 Network Characteristics

Existing lane configurations and type of traffic control measures for the study intersections are illustrated in **Figure 4 (Appendix A)**. There are twelve roadways within the study area. Current network characteristics for these roadways are summarized in **Table 1** below. Data in this table was acquired from field observation, aerial photography, the Garfield County LUDC, and the Colorado Department of Transportation (CDOT) Federal Functional Classification Map.

TABLE 1: EXISTING NETWORK SUMMARY

Roadway	2014 ADT (vpd)	Section	Lane Width, ft	Surface	Posted Speed	Functional Classification
CR 215	720 <sup>4</sup>	2-Rural	12	Asph.	30 mph	Minor Collector
CR 300	500 <sup>4</sup>	2-Rural	11	Asph.	30 mph	Minor Collector
CR 300	3600 <sup>1</sup>	4-Urban	13	Asph.	35 mph	Major Collector
CR 300B	2360 <sup>4</sup>	4-Urban <sup>2</sup>	13	Asph.	35 mph	Minor Collector
CR 300C	360 <sup>4</sup>	3-Urban	12	Asph.	n/a	Second. Access
CR 300E	670 <sup>4</sup>	4-Urban <sup>2</sup>	13	Asph.	35 mph	Minor Collector
CR 300N	6840 <sup>4</sup>	4-Urban <sup>2</sup>	13	Asph.	35 mph	Major Collector
CR 300O	240 <sup>4</sup>	2-Rural	10	Asph.	25 mph	Second. Access
CR 300S	1880 <sup>4</sup>	4-Urban <sup>2</sup>	13	Asph.	35 mph	Minor Collector
CR 300W	4770 <sup>4</sup>	4-Urban <sup>2</sup>	13	Asph.	35 mph	Minor Collector
CR 301	250 <sup>4</sup>	2-Rural	12	Asph.	30 mph	Minor Collector
CR 307	270 <sup>4</sup>	2-Rural	13	Asph.	25 mph	Second. Access
Old Hwy 6	1280	2-Rural	12	Asph.	50 mph	R-A <sup>3</sup>

1. Estimated from 2002 count and 3% annual growth rate
2. Median divided with left-turn lanes.
3. CDOT Classification – Rural, controlled access facility
4. Traffic counts provided by Garfield County Road and Bridge

There are two planned haul routes for trucks during the construction, drilling, and completions of each pad. The lower route will be preferred as it minimizes the length of time that trucks will pass through the residential areas of Battlement Mesa. The lower haul route and upper haul route are shown in **Figure 2** and **Figure 3**, respectively (**Appendix A**).

Utilizing the lower route, regional trips to the facility will use the I-70 exit 72 (West Parachute) southwest of Parachute. Vehicles traveling to the site will drive southwest along Old Highway 6 for approximately 3 miles to CR 300 (Stone Quarry Road), then travel south to northeast for approximately 7.3 miles to CR 300S (S Battlement Pkwy), then travel west for approximately 0.5 miles to CR 307 (River Bluff Road), then travel southwest again approximately 0.2 miles to BMC D Access Road, and finally southeast approximately 200 feet to the pad. Vehicles traveling to BMC B will continue along CR 307 approximately 0.5 miles from BMC D Access Road to BMC B Access Road, then travel north approximately 0.2 miles to the pad.

The upper route will use the I-70 exit 75. Vehicles traveling to the site will drive southeast along CR 300 (N Battlement Pkwy) approximately 0.8 miles to CR 300W (W Battlement Pkwy), then travel south for approximately 1 mile to CR 307 (River Bluff Road), and then follow the same path as the lower route to the pads.

## 2.2 Existing Capacity Analysis

The Level of Service (LOS) for the site access was determined by performing peak-hour analyses utilizing Synchro 8.0 software, which is based on methodology found in the Highway Capacity Manual (HCM) 2010. For simplicity, the amount of control delay is equated to a grade or Level of Service (LOS) based on thresholds of driver acceptance. The amount of delay is assigned a letter grade A through F, LOS A representing little or no delay and LOS F representing very high delay. **Table 2** shows the delays associated with each LOS grade for unsignalized and signalized intersections, respectively.

TABLE 2: UNSIGNALIZED INTERSECTION LOS CRITERIA

Level-of-Service	Average Control Delay, s	
	Signalized	Unsignalized
A	$\leq 10$	$\leq 10$
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50
Highway Capacity Manual (HCM 2010)		

Capacity analyses were performed at the intersections of Old Highway 6 & CR 300 and CR 307 & CR 300 for the Existing (2014) conditions, as well as Existing plus Site conditions. The Existing and Existing plus Site traffic conditions were analyzed for the AM and PM peak hour conditions.

Based on the capacity analysis for the existing conditions, all movements at both study intersections operate at LOS B or better for both peak hours. The 95<sup>th</sup> percentile queues in the turn lanes never exceed more than one vehicle. It should be noted that the heavy truck percentages along Old Highway 6 are approximately 15%. Capacity analysis summaries are shown in **Figure 4 (Appendix A)**. Detailed results are contained in **Appendix C**.

### **2.3 Existing Parcel**

Both parcels are currently undeveloped and located within the Battlement Mesa PUD. Pad B will be located next to a maintenance garage and storage facility for the PUD. The lot where Pad D is proposed is undeveloped, however residential uses of varying density abut the site on three sides. This lot is ultimately planned for a low density residential land use.

Both haul routes will pass through the Battlement Mesa PUD which contains a mix of residential, commercial, and industrial uses, but is primarily residential. The south half of the lower haul route will pass through rural agricultural uses.

## **3.0 SITE CHARACTERISTICS**

### **3.1 Trip Generation**

The proposed activity does not correspond to a trip generation land use within the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 8<sup>th</sup> Edition*. Therefore, a custom trip generation has been prepared based on historic data and expected site trips specific to similar sites as the one proposed here. This data, compiled in coordination with the owner, is found in **Appendix D** and includes the average daily trips and vehicle types for each. A 50% internal trip reduction was applied to each phase, excluding pipeline construction, to account for hauling between pads and trips from laborers within the Battlement Mesa PUD.

The pads will be constructed in phases as described below. **Table 3** summarizes the duration and expected trip generation of each phase.

There will be a three-week pad construction phase. During this phase, there will be an increase in traffic as equipment and construction materials are delivered to the site. All excess excavated material will be used as landscaping or stormwater berms at either site or at other pads within the PUD. Trips will generally include heavy trucks, approximately ten per day, and light trucks, approximately four per day. There is a potential that during the pad construction phases of each pad there would be additional truck traffic to haul waste material. This could result in 60 total trips per day for Pad B and 90 trips per day for Pad D. These periods of increased traffic would be relatively short in duration, less than one week. Trips related to pad construction will occur between 7AM and 8PM.



**Table 3**  
**TRIP GENERATION**  
**Battlement Mesa Pads B & D**  
**DETAILED TRAFFIC STUDY**  
**GARFIELD COUNTY, COLORADO**

Land Use	Units	Daily Trips			Trip Distribution		Total Daily Trips	
		Trip Gen. Avg. Rate	Internal Trip Reduction	Net Daily Trips	Enter	Exit	Enter	Exit
Well Pad Construction (21 days)	Pads	14	50%	7	50%	50%	4	4
Drilling (4 days)	Wells	25	50%	13	50%	50%	6	6
Completions (10 days)	Wells	16	50%	8	50%	50%	4	4
Production (20 years)	Pads	2	0%	2	50%	50%	1	1
Pipeline Construction (8 months)	Each	31	0%	31	50%	50%	16	16

Total

Land Use		AM Peak Hour Trips			Trip Distribution		Total AM Trips	
		Trip Gen. Avg. Rate/Eq.	Internal Trip Reduction	Net AM Peak Trips	Enter	Exit	Enter	Exit
Well Pad Construction (21 days)	Pads	4	50%	2	75%	25%	2	1
Drilling (4 days)	Wells	8	50%	4	90%	10%	4	0
Completions (10 days)	Wells	5	50%	3	80%	20%	2	1
Production (20 years)	Pads	1	0%	1	50%	50%	1	1
Pipeline Construction (8 months)	Each	4	0%	4	50%	50%	2	2

Total

Land Use		PM Peak Hour Trips			Trip Distribution		Total PM Trips	
		Trip Gen. Avg. Rate/Eq.	Internal Trip Reduction	Net PM Peak Trips	Enter	Exit	Enter	Exit
Well Pad Construction (21 days)	Pads	4	50%	2	25%	75%	1	2
Drilling (4 days)	Wells	8	50%	4	10%	90%	0	4
Completions (10 days)	Wells	5	50%	3	20%	80%	1	2
Production (20 years)	Pads	1	0%	1	50%	50%	1	1
Pipeline Construction (8 months)	Each	4	0%	4	50%	50%	2	2

Total

Phase		Daily	AM Peak	PM Peak
Drilling	1	13	4	4
Completions	2	16	5	5
Pad B & D Subtotal		29	9	9
Pipeline Construction	1	31	4	4
Total		60	13	13

The BMC B pad is slated for up to 25 total wells and the BMC D pad is slated for up to 28 total wells. The duration of drilling operations is four days per well, generating approximately 13 trips per day. The wells are expected to be drilled in groups of eight, moving back and forth between Pad B and Pad D until all wells on each pad are drilled. When one group of wells is drilled and the rig has moved to the opposite pad completions will begin for that pad. Completions are expected to occur over a ten-day period for each well. Due to the longer duration of completions as compared to drilling, it is likely that two completions efforts will occur simultaneously to keep pace. Well completions will generate approximately 16 trips per day per well. Trips related to drilling and completions activities will occur 24 hours a day as permitted by the Surface Use Agreement.

Ursa is also scheduled to construct a pipeline, to transport water to and from and product from the facility once the wells are in production. This project, being permitted under a concurrent application, is anticipated to generate an additional 31 trips to the PUD per day. This pipeline is being constructed to allow for transport of water and product in pipelines versus transport trucks in and out of the PUD. It is anticipated that the pipeline will be constructed in phases such that wells in production will be connected when completions are finished.

The most intense period of traffic generation for the two pads will be during the alternating drilling and completions operations. During these times, there will be one drilling crew and two completions crews working. It is assumed that half of these trips will remain within the PUD for a total of 28 trips per day. This is expected to last for approximately one year. At the end of the construction, drilling, and completions phase, trips will drop to two per pad per day for daily monitoring. Daily monitoring will occur between 7AM and 8PM. When considering concurrent pipeline construction, daily trips to and from the PUD will be approximately 60 vehicles per day. It is anticipated that there would be approximately 15 trips per peak hour.

### **3.2 Trip Distribution**

It is anticipated that all site traffic will utilize the lower route. As previously noted, this preferred route will be the lower one coming from the West Parachute I-70 exit 72. The upper route is planned to be used in the following instances:

- Heavy haul or overweight loads: These types of trips will be coordinated and permitted through Garfield County Road and Bridge on a case-by-case basis. Use of the upper route will always incorporate staggered loads.
- Restrictions on the lower route: for example, road construction on any part of the route that would limit the types of vehicles that could pass down the road
- Periodic small deliveries: Typically pickups with or without trailers used by roustabouts.

Based on this distribution and previously determined trip generation, site traffic was added to background traffic to determine total traffic volumes for the Existing plus Site scenario. These volumes are shown in **Figure 5 (Appendix A)**. These volumes reflect the short term, highest volume scenario to occur during the drilling and completions phases.

### **3.3 Existing plus Site Capacity Analysis**

With the addition of the site traffic, the capacity analysis reports all movements are expected to operate at LOS A at both study intersections in the AM and PM peak hours. Note that this is an improvement over the background conditions. It would not be expected that the LOS would improve with the increase in volume to an intersection; however, the existing volume at the eastbound approach is very low. Because, the existing volume is low, the added site traffic is comparatively high, and the added delay is comparatively low because these are right turns, the *average* delay is lower despite the single highest movement delay is likely slightly higher.

Capacity analysis summaries are shown in **Figure 5 (Appendix A)**. Detailed results are contained in **Appendix C**.

## **4.0 ROADWAY ANALYSIS**

### **4.1 State Highway Crossings and Access**

One highway managed by CDOT, Old Highway 6, is part of the lower roadway access to this site. As defined by the Colorado State Access Code, Old Highway 6 is classified as a Rural Restricted Access Highway (R-A). With this classification, auxiliary lanes are required for left turns greater than 10 vph and right turns greater than 25 vph in the peak hour. The existing volumes exceed this threshold, and appropriate auxiliary lanes exist today.

### **4.2 Railroad Crossings**

The access route for the site intersects one railroad at-grade crossing at CR 300, just southeast of Old Highway 6. There are existing gates and flashers for the at-grade crossing.

### **4.3 Intersection of Old Highway 6 & CR 300**

The intersection of Old Highway 6 & CR 300 is a two-way stop-controlled intersection. A stop sign controls northwest bound and southeast bound traffic on CR 300 at the intersection of that road with Old Highway 6. The major approach has a right-turn lane and a left-turn lane in both directions. Both minor approaches are single lane with channelized right-turn movements. The northeast leg of the intersection also has an acceleration lane for northeast bound traffic. This will be used by site traffic along the lower haul route. Given the amount of traffic estimated to be generated from the proposed facility, additional improvements at this intersection are not anticipated to be needed.

### **4.4 Intersection of CR 307 & CR 300**

The intersection of CR 307 & CR 300 is a “T” intersection with CR 307 having a single east leg approach. This leg is stop-controlled, and CR 300 is free in both directions with a northbound left-turn lane. CR 307 meets CR 300 in the middle of a horizontal curve, but appears to have adequate sight distance for all northbound left-turning vehicles as well as eastbound right-turning vehicles. There is a northbound left-turn lane in place and, based on the short queues shown in the capacity analysis, is anticipated to be adequate length. The southbound right-turn volumes counted as part of this study were shown to be less than 10 vehicles in both peak hours. There is not expected to be site traffic added to this movement, so a right-turn lane is not anticipated to be needed.

#### **4.5 Construction Haul Routes**

Much of the lower route is along Garfield County Road and Bridge preferred haul routes. The last portion along CR 300, CR 300S, and CR 307 are not along preferred haul routes. Coordination with Garfield County Road and Bridge will be necessary to verify that the proposed haul routes will be permitted. The same is true for the upper route and includes CR 300W.

Excluding CR 307, the daily traffic volumes on each of these roads is between 2000 vpd and 4000 vpd. During the peak of construction, these sites are anticipated to add approximately 30 vpd or 1% of the daily traffic volumes. This is anticipated to be approximately 10% on CR 307. That being said, the additional truck traffic has the potential to accelerate degradation of the roadways, especially on CR 307 where the volumes are low and the cross section of the roadway is narrow and pavement depths are likely thin. These are all factors that should be considered in the permitting of the haul routes. Ursa is bonded to operate on both routes.

#### **5.0 CONCLUSIONS**

Based on the expected trip generation rates discussed above, the increase in average daily traffic is expected to be up to 30 vpd (construction phase) in the vicinity of the site which is anticipated to increase traffic by approximately 1% on many of the impacted roadways. Daily traffic is anticipated to increase by approximately 10% on CR 307. At the end of construction, site traffic contributions will decrease to 2 vpd per site.

All movements at the access are anticipated to operate at acceptable levels of service throughout construction. The addition of site traffic, even in the height of construction, does not increase the existing volumes to amounts required for auxiliary lanes where they are not already provided. Once construction is complete, the daily volumes will reduce to approximately 4 vpd for the two sites. Based on the results of the analysis, no mitigation is recommended for the site.

Ursa will be required to adhere to Garfield County Road and Bridge criteria for securing heavy haul permits as well as permitting additional truck traffic along CR 300, CR 300S, and CR 307 within Battlement Mesa.

## **APPENDIX A**

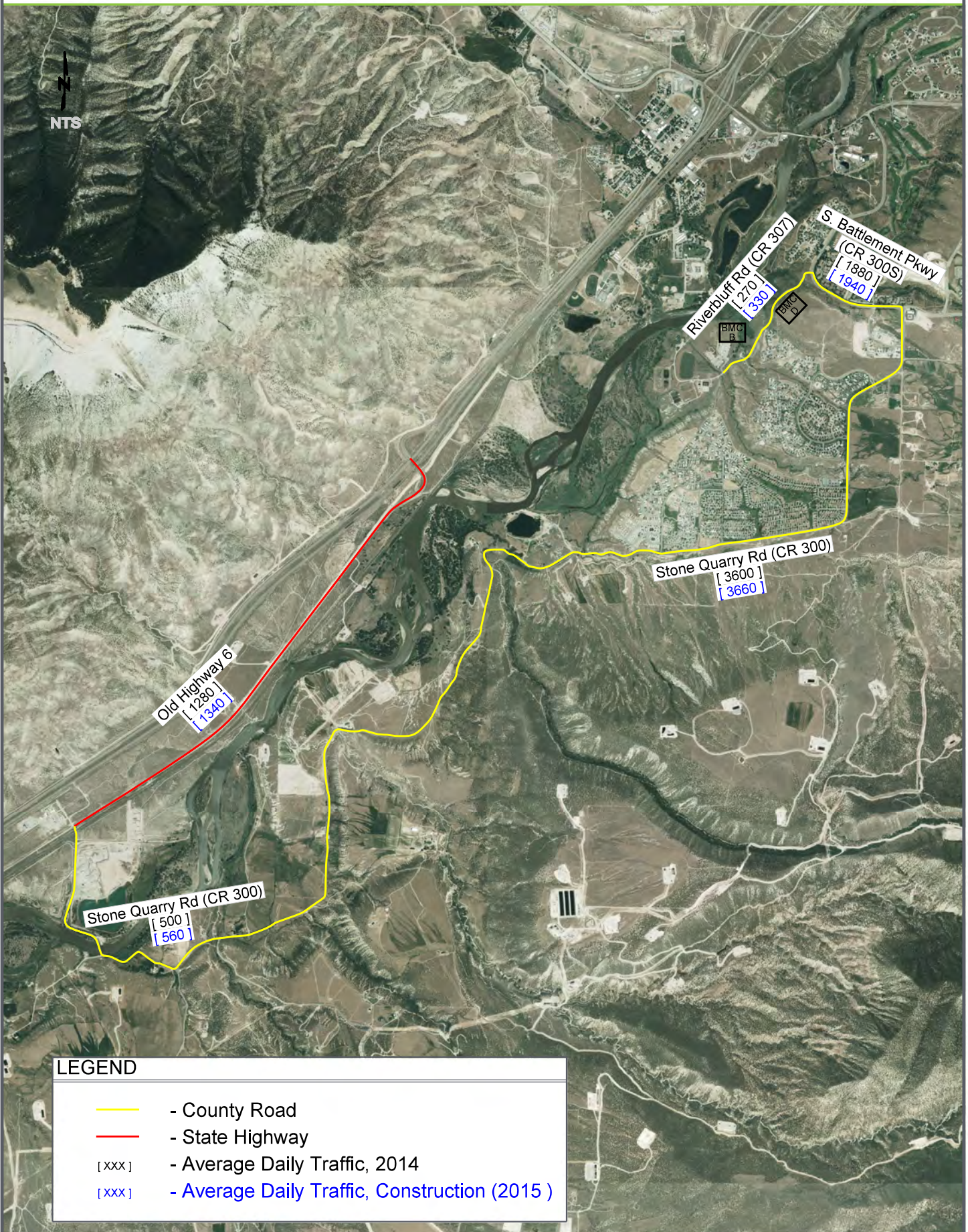
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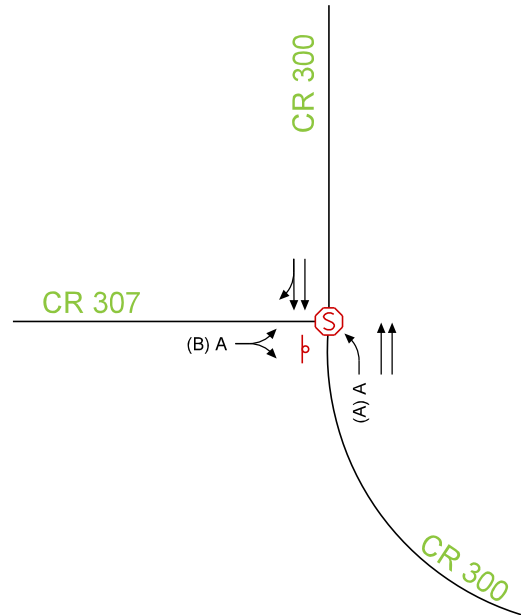
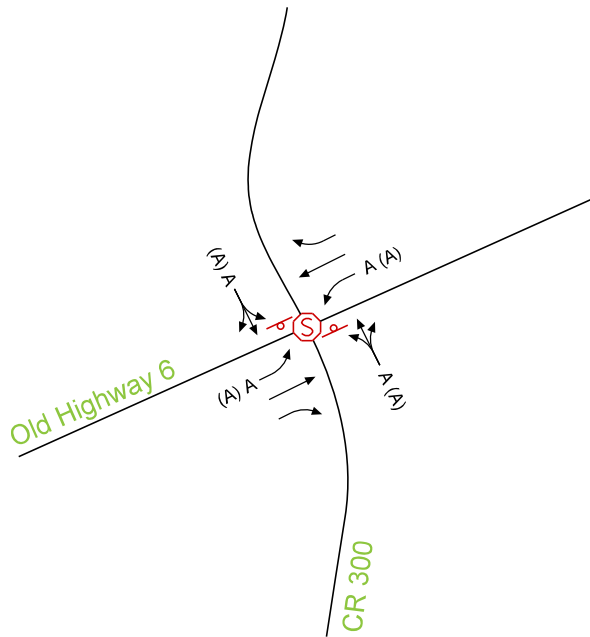
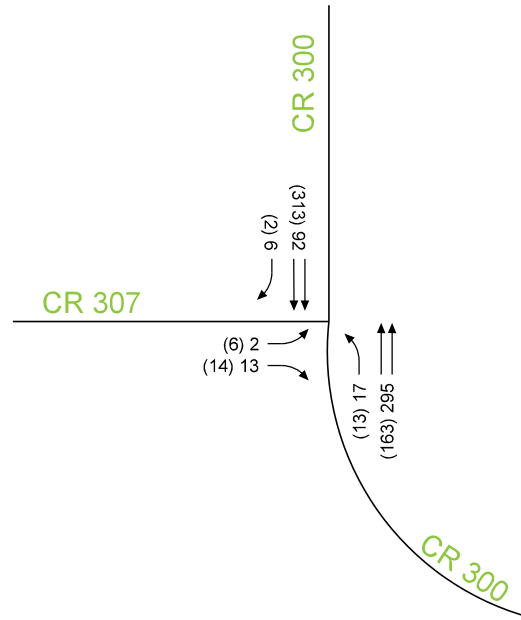
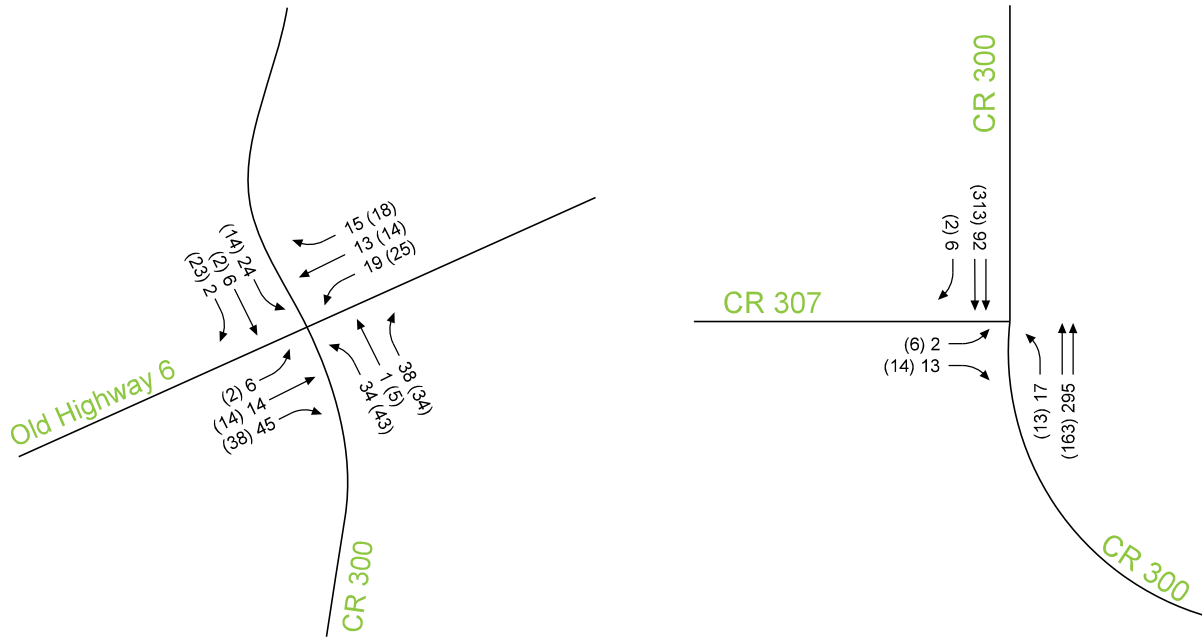
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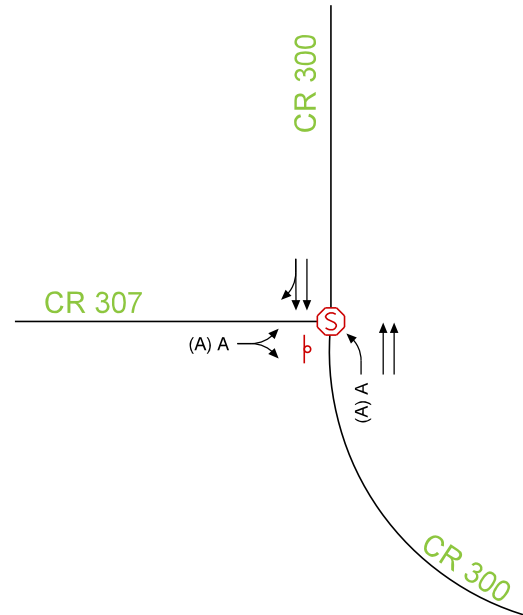
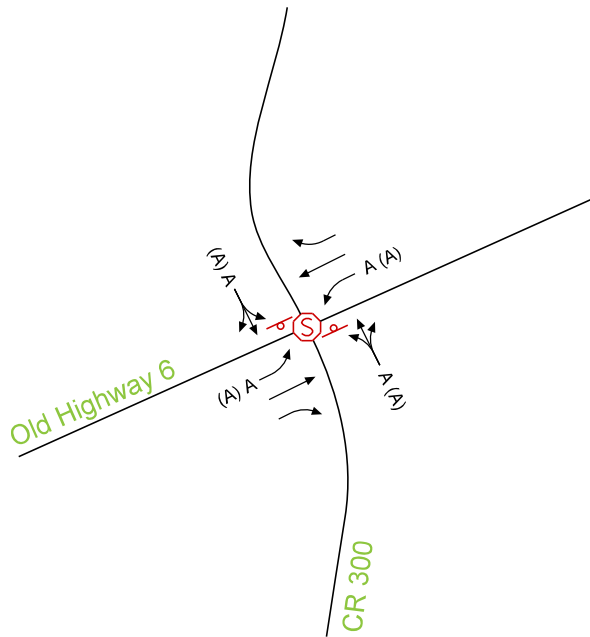
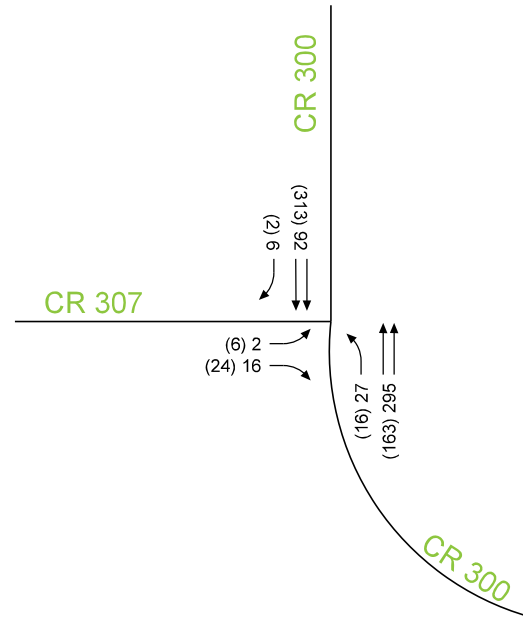
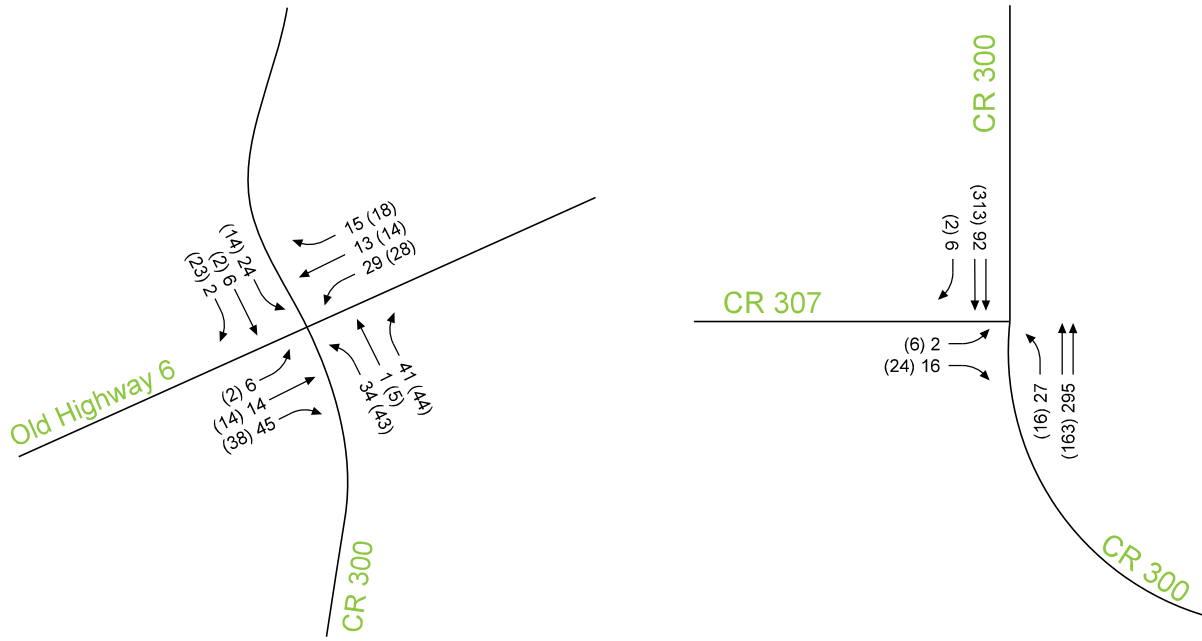
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LEGEND	
↖ AM (PM)	- Peak Hour Volume/ Peak Hour LOS
Ⓢ	- Stop Controlled Intersection
Ⓟ	- Stop Sign

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LEGEND	
↖ AM (PM)	- Peak Hour Volume/ Peak Hour LOS
Ⓢ	- Stop Controlled Intersection
Ⓟ	- Stop Sign

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## **APPENDIX B**

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All Traffic Data Services, Inc  
 9660 W 44th Ave  
 Wheat Ridge, CO 80033  
**www.alltrafficdata.net**

Site Code: 1  
 Station ID: 1  
 OLD US HIGHWAY 6 E/O CO RD 300

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/30/14	0	0	0	0	0	2	0	0	0	0	0	0	0	2
01:00	0	1	0	0	0	1	0	0	0	0	0	0	0	2
02:00	0	1	0	0	0	1	0	0	0	0	0	0	0	2
03:00	0	0	0	0	0	3	0	0	0	0	0	0	0	3
04:00	0	6	7	0	0	1	0	0	0	0	0	0	0	14
05:00	0	23	26	0	2	14	0	0	0	0	0	0	0	65
06:00	1	28	37	0	2	4	0	1	0	0	0	0	0	73
07:00	1	36	34	0	2	5	2	0	2	0	0	0	0	82
08:00	0	16	27	0	0	6	0	0	0	0	0	0	0	49
09:00	0	20	22	0	0	4	0	0	0	0	0	0	0	46
10:00	0	16	13	0	1	3	0	0	1	0	0	0	0	34
11:00	0	11	23	0	0	6	0	1	1	0	0	0	0	42
12 PM	0	16	18	0	2	7	0	0	0	1	0	0	0	44
13:00	0	18	11	0	0	5	0	0	1	1	0	0	0	36
14:00	0	5	16	0	1	3	0	0	1	0	0	0	0	26
15:00	1	12	11	0	1	5	0	2	0	0	0	0	0	32
16:00	0	16	25	0	0	2	0	0	1	0	0	0	0	44
17:00	0	14	19	0	0	2	0	0	0	0	0	0	0	35
18:00	0	4	9	0	0	2	0	0	0	0	0	0	0	15
19:00	0	3	1	0	0	1	0	0	0	0	0	0	0	5
20:00	0	1	6	0	0	3	0	0	0	0	0	0	0	10
21:00	0	2	2	0	0	1	0	0	0	0	0	0	0	5
22:00	0	2	2	0	0	1	0	0	0	0	0	0	0	5
23:00	0	0	0	0	0	2	0	0	0	0	0	0	0	2
Total	3	251	309	0	11	84	2	4	7	2	0	0	0	673
Percent	0.4%	37.3%	45.9%	0.0%	1.6%	12.5%	0.3%	0.6%	1.0%	0.3%	0.0%	0.0%	0.0%	
AM Peak	06:00	07:00	06:00		05:00	05:00	07:00	06:00	07:00					07:00
Vol.	1	36	37		2	14	2	1	2					82
PM Peak	15:00	13:00	16:00		12:00	12:00		15:00	13:00	12:00				12:00
Vol.	1	18	25		2	7		2	1	1				44
Grand Total	3	251	309	0	11	84	2	4	7	2	0	0	0	673
Percent	0.4%	37.3%	45.9%	0.0%	1.6%	12.5%	0.3%	0.6%	1.0%	0.3%	0.0%	0.0%	0.0%	

All Traffic Data Services, Inc  
 9660 W 44th Ave  
 Wheat Ridge, CO 80033  
**www.alltrafficdata.net**

Site Code: 1  
 Station ID: 1  
 OLD US HIGHWAY 6 E/O CO RD 300

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/30/14	0	1	0	0	0	2	0	0	0	0	0	0	0	3
01:00	0	0	0	0	0	1	0	0	0	0	0	0	0	1
02:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00	0	0	2	0	1	3	0	0	0	0	0	0	0	6
04:00	0	0	0	0	0	2	0	0	0	0	0	0	0	2
05:00	0	4	11	0	3	4	0	0	0	0	0	0	0	22
06:00	0	10	23	0	10	1	0	0	1	0	0	0	0	45
07:00	0	8	7	0	5	5	0	1	0	0	0	0	0	26
08:00	1	6	13	0	6	4	0	1	0	1	0	0	0	32
09:00	0	7	13	0	1	5	1	0	0	0	0	0	0	27
10:00	0	9	14	0	6	6	0	1	0	0	0	0	0	36
11:00	2	4	22	0	5	5	0	0	1	0	0	0	0	39
12 PM	1	8	27	0	7	8	0	0	0	0	0	0	0	51
13:00	0	8	19	0	4	2	0	0	0	0	0	0	0	33
14:00	0	4	28	0	10	7	0	2	2	0	0	0	0	53
15:00	1	14	26	0	5	6	0	1	0	0	0	0	0	53
16:00	1	20	29	0	5	11	0	0	2	0	0	0	0	68
17:00	0	26	33	0	11	2	0	2	1	0	0	0	0	75
18:00	0	6	15	0	4	2	0	0	0	0	0	0	0	27
19:00	0	2	6	0	4	2	0	0	0	0	0	0	0	14
20:00	0	0	3	0	1	0	0	0	0	0	0	0	0	4
21:00	0	1	1	0	4	2	0	0	0	0	0	0	0	8
22:00	0	2	2	0	0	6	0	0	0	0	0	0	0	10
23:00	0	0	3	0	0	1	0	0	0	0	0	0	0	4
Total	6	142	297	0	92	87	1	8	7	1	0	0	0	641
Percent	0.9%	22.2%	46.3%	0.0%	14.4%	13.6%	0.2%	1.2%	1.1%	0.2%	0.0%	0.0%	0.0%	
AM Peak	11:00	06:00	06:00		06:00	10:00	09:00	07:00	06:00	08:00				06:00
Vol.	2	10	23		10	6	1	1	1	1				45
PM Peak	12:00	17:00	17:00		17:00	16:00		14:00	14:00					17:00
Vol.	1	26	33		11	11		2	2					75
Grand Total	6	142	297	0	92	87	1	8	7	1	0	0	0	641
Percent	0.9%	22.2%	46.3%	0.0%	14.4%	13.6%	0.2%	1.2%	1.1%	0.2%	0.0%	0.0%	0.0%	



## Light Passenger Vehicles

**Name** Tilda Evans  
**Date** 10/01/2014  
**Time Period** 7:00-9:00 am  
**Intersection** CR 300 & CR 307  
**Weather** raining

**W Battlement Parkway (CR 300)**

int.	trucks	peds/bikes
00-15	15	1
15-30	33	1
30-45	29	1
45-60	26	1
00-15	22	1
15-30	26	2
30-45	28	2
45-60	14	

**River Bluff Road (CR 307)**

int.	trucks	peds/bikes
00-15	2	1
15-30	3	3
30-45	8	1
45-60	3	2
00-15	3	2
15-30		
30-45		
45-60		

**Apartment (no entry)**

int.	trucks	peds/bikes
00-15		
15-30		
30-45		
45-60		
00-15		
15-30		
30-45		
45-60		

**S Battlement Parkway (CR 300)**

int.	trucks	peds/bikes
00-15	84	6
15-30	86	10
30-45	48	1
45-60	71	
00-15	64	2
15-30	48	2
30-45	23	3
45-60	28	3

## Heavy Vehicles

**Name** Tilda Evans

**Date** 10/01/2014

**Time Period** 7:00-9:00 am

**Intersection** CR 300 & CR 307

**Weather** raining

**W Battlement Parkway (CR 300)**

**River Bluff Road (CR 307)**

**Apartments (no entry)**

**S Battlement Parkway (CR 300)**

**North**

Time Period	Trucks	Cars	Peds	Bikes
00-15	2	2		
15-30	1			
30-45				
45-60	3			
00-15	1			
15-30				
30-45	2			
45-60				



# Light Passenger Vehicles

Name Tilda Evans

Date 10/01/2014

Time Period 4:00-6:00 pm

Intersection

CR 300 & CR 307

Weather raining

			54		45-60
			86		30-45
			66		15-30
			61		00-15
			64		45-60
			67		30-45
			72		15-30
			102		00-15
	1				
	1				

int. trucks peds bikes

W Battlement Parkway (CR 300)

					int.
					00-15
					15-30
					30-45
					45-60
					00-15
					15-30
					30-45
					45-60
					int.
					00-15
					15-30
					30-45
					45-60
					int.
					00-15
					15-30
					30-45
					45-60

River Bluff Road (CR 307)



North

Apartments (no entry)

					int.
					00-15
					15-30
					30-45
					45-60
					00-15
					15-30
					30-45
					45-60
					int.
					00-15
					15-30
					30-45
					45-60

S Battlement Parkway (CR 300)

					int.
					00-15
					15-30
					30-45
					45-60
					00-15
					15-30
					30-45
					45-60
					int.
					00-15
					15-30
					30-45
					45-60

# Heavy Vehicles

Name Tilda Evans

Date 10/01/2014

Time Period 4:00-6:00 pm

Intersection

CR 300 & CR 307

Weather raining

			1		45-60
					30-45
					15-30
			2		00-15
			2		45-60
			2		30-45
			2		15-30
			2		00-15
trucks					int.
pedals					bikes

W Battlement Parkway (CR 300)

						int.
						00-15
						15-30
						30-45
						45-60
						00-15
						15-30
						30-45
						45-60
trucks						int.
pedals						bikes

River Bluff Road (CR 307)



Apartments (no entry)

						int.
						00-15
						15-30
						30-45
						45-60
						00-15
						15-30
						30-45
						45-60
trucks						int.
pedals						bikes

S Battlement Parkway (CR 300)

						int.
						00-15
	1					15-30
		1				30-45
		2				45-60
						00-15
						15-30
						30-45
		1				45-60
trucks					pedals	bikes
					int.	

## **APPENDIX C**

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Intersection									
Int Delay, s/veh	4.7								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	6	14	45	19	13	15	34	1	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop
Storage Length	350	-	350	350	-	350	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15
Mvmt Flow	7	15	49	21	14	16	37	1	41
Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	14	0	0	15	0	0	87	83	15
Stage 1	-	-	-	-	-	-	28	28	-
Stage 2	-	-	-	-	-	-	59	55	-
Critical Hdwy	4.25	-	-	4.25	-	-	7.25	6.65	6.35
Critical Hdwy Stg 1	-	-	-	-	-	-	6.25	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.25	5.65	-
Follow-up Hdwy	2.335	-	-	2.335	-	-	3.635	4.135	3.435
Pot Cap-1 Maneuver	1523	-	-	1522	-	-	868	783	1028
Stage 1	-	-	-	-	-	-	957	847	-
Stage 2	-	-	-	-	-	-	921	824	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1523	-	-	1522	-	-	848	769	1028
Mov Cap-2 Maneuver	-	-	-	-	-	-	802	724	-
Stage 1	-	-	-	-	-	-	953	843	-
Stage 2	-	-	-	-	-	-	899	813	-
Approach	EB			WB			NB		
HCM Control Delay, s	0.7			3			7.3		
HCM LOS							A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	1668	1523	-	-	1522	-	-	826	
HCM Lane V/C Ratio	0.048	0.004	-	-	0.014	-	-	0.042	
HCM Control Delay (s)	7.3	7.4	-	-	7.4	-	-	9.6	
HCM Lane LOS	A	A	-	-	A	-	-	A	
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1	



Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	24	6	2
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	Stop
Storage Length	-	-	-
Veh in Median Storage, #	-	1	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	15	15	15
Mvmt Flow	26	7	2
Major/Minor	Minor2		
Conflicting Flow All	84	83	14
Stage 1	55	55	-
Stage 2	29	28	-
Critical Hdwy	7.25	6.65	6.35
Critical Hdwy Stg 1	6.25	5.65	-
Critical Hdwy Stg 2	6.25	5.65	-
Follow-up Hdwy	3.635	4.135	3.435
Pot Cap-1 Maneuver	872	783	1029
Stage 1	925	824	-
Stage 2	956	847	-
Platoon blocked, %			
Mov Cap-1 Maneuver	824	769	1029
Mov Cap-2 Maneuver	788	724	-
Stage 1	921	813	-
Stage 2	912	843	-
Approach	SB		
HCM Control Delay, s	9.6		
HCM LOS	A		
Minor Lane/Major Mvmt			



Intersection							
Int Delay, s/veh	0.6						
Movement	EBL	EBR		NBL	NBT	SBT	SBR
Vol, veh/h	2	13		17	295	92	6
Conflicting Peds, #/hr	0	0		0	0	0	0
Sign Control	Stop	Stop		Free	Free	Free	Free
RT Channelized	-	None		-	None	-	None
Storage Length	0	-		125	-	-	-
Veh in Median Storage, #	1	-		-	0	0	-
Grade, %	0	-		-	0	0	-
Peak Hour Factor	92	92		92	92	92	92
Heavy Vehicles, %	2	2		2	2	2	2
Mvmt Flow	2	14		18	321	100	7
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	300	53		107	0	-	0
Stage 1	103	-		-	-	-	-
Stage 2	197	-		-	-	-	-
Critical Hdwy	6.84	6.94		4.14	-	-	-
Critical Hdwy Stg 1	5.84	-		-	-	-	-
Critical Hdwy Stg 2	5.84	-		-	-	-	-
Follow-up Hdwy	3.52	3.32		2.22	-	-	-
Pot Cap-1 Maneuver	667	1003		1482	-	-	-
Stage 1	910	-		-	-	-	-
Stage 2	817	-		-	-	-	-
Platoon blocked, %				-	-	-	-
Mov Cap-1 Maneuver	659	1003		1482	-	-	-
Mov Cap-2 Maneuver	687	-		-	-	-	-
Stage 1	910	-		-	-	-	-
Stage 2	807	-		-	-	-	-
Approach	EB		NB		SB		
HCM Control Delay, s	8.9		0.4		0		
HCM LOS	A						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR		
Capacity (veh/h)	1482	-	945	-	-		
HCM Lane V/C Ratio	0.012	-	0.017	-	-		
HCM Control Delay (s)	7.5	-	8.9	-	-		
HCM Lane LOS	A	-	A	-	-		
HCM 95th %tile Q(veh)	0	-	0.1	-	-		

Intersection									
Int Delay, s/veh	4.8								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	14	38	25	14	18	43	5	34
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop
Storage Length	350	-	350	350	-	350	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15
Mvmt Flow	2	15	41	27	15	20	47	5	37
Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	15	0	0	15	0	0	91	90	15
Stage 1	-	-	-	-	-	-	20	20	-
Stage 2	-	-	-	-	-	-	71	70	-
Critical Hdwy	4.25	-	-	4.25	-	-	7.25	6.65	6.35
Critical Hdwy Stg 1	-	-	-	-	-	-	6.25	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.25	5.65	-
Follow-up Hdwy	2.335	-	-	2.335	-	-	3.635	4.135	3.435
Pot Cap-1 Maneuver	1522	-	-	1522	-	-	863	776	1028
Stage 1	-	-	-	-	-	-	966	853	-
Stage 2	-	-	-	-	-	-	907	812	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1522	-	-	1522	-	-	828	761	1028
Mov Cap-2 Maneuver	-	-	-	-	-	-	782	718	-
Stage 1	-	-	-	-	-	-	965	852	-
Stage 2	-	-	-	-	-	-	867	798	-
Approach	EB			WB			NB		
HCM Control Delay, s	0.3			3.2			7.9		
HCM LOS							A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	1324	1522	-	-	1522	-	-	1743	
HCM Lane V/C Ratio	0.067	0.001	-	-	0.018	-	-	0.024	
HCM Control Delay (s)	7.9	7.4	-	-	7.4	-	-	7.1	
HCM Lane LOS	A	A	-	-	A	-	-	A	
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.1	

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	14	2	23
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	Stop
Storage Length	-	-	-
Veh in Median Storage, #	-	1	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	15	15	15
Mvmt Flow	15	2	25

Major/Minor	Minor2		
Conflicting Flow All	92	90	15
Stage 1	70	70	-
Stage 2	22	20	-
Critical Hdwy	7.25	6.65	6.35
Critical Hdwy Stg 1	6.25	5.65	-
Critical Hdwy Stg 2	6.25	5.65	-
Follow-up Hdwy	3.635	4.135	3.435
Pot Cap-1 Maneuver	862	776	1028
Stage 1	908	812	-
Stage 2	964	853	-
Platoon blocked, %			
Mov Cap-1 Maneuver	814	761	1028
Mov Cap-2 Maneuver	783	716	-
Stage 1	907	798	-
Stage 2	922	852	-

Approach SB

HCM Control Delay, s	7.1
HCM LOS	A

Minor Lane/Major Mvmt

Intersection							
Int Delay, s/veh	0.6						
Movement	EBL	EBR		NBL	NBT	SBT	SBR
Vol, veh/h	6	14		13	163	313	2
Conflicting Peds, #/hr	0	0		0	0	0	0
Sign Control	Stop	Stop		Free	Free	Free	Free
RT Channelized	-	None		-	None	-	None
Storage Length	0	-		125	-	-	-
Veh in Median Storage, #	1	-		-	0	0	-
Grade, %	0	-		-	0	0	-
Peak Hour Factor	92	92		92	92	92	92
Heavy Vehicles, %	2	2		2	2	2	2
Mvmt Flow	7	15		14	177	340	2
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	458	171		342	0	-	0
Stage 1	341	-		-	-	-	-
Stage 2	117	-		-	-	-	-
Critical Hdwy	6.84	6.94		4.14	-	-	-
Critical Hdwy Stg 1	5.84	-		-	-	-	-
Critical Hdwy Stg 2	5.84	-		-	-	-	-
Follow-up Hdwy	3.52	3.32		2.22	-	-	-
Pot Cap-1 Maneuver	531	843		1214	-	-	-
Stage 1	692	-		-	-	-	-
Stage 2	895	-		-	-	-	-
Platoon blocked, %					-	-	-
Mov Cap-1 Maneuver	525	843		1214	-	-	-
Mov Cap-2 Maneuver	583	-		-	-	-	-
Stage 1	692	-		-	-	-	-
Stage 2	885	-		-	-	-	-
Approach	EB		NB		SB		
HCM Control Delay, s	10		0.6		0		
HCM LOS	B						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR		
Capacity (veh/h)	1214	-	744	-	-		
HCM Lane V/C Ratio	0.012	-	0.029	-	-		
HCM Control Delay (s)	8	-	10	-	-		
HCM Lane LOS	A	-	B	-	-		
HCM 95th %tile Q(veh)	0	-	0.1	-	-		

Intersection									
Int Delay, s/veh	4.9								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	6	14	45	29	13	15	34	1	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop
Storage Length	350	-	350	350	-	350	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15
Mvmt Flow	7	15	49	32	14	16	37	1	45
Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	14	0	0	15	0	0	108	105	15
Stage 1	-	-	-	-	-	-	28	28	-
Stage 2	-	-	-	-	-	-	80	77	-
Critical Hdwy	4.25	-	-	4.25	-	-	7.25	6.65	6.35
Critical Hdwy Stg 1	-	-	-	-	-	-	6.25	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.25	5.65	-
Follow-up Hdwy	2.335	-	-	2.335	-	-	3.635	4.135	3.435
Pot Cap-1 Maneuver	1523	-	-	1522	-	-	841	761	1028
Stage 1	-	-	-	-	-	-	957	847	-
Stage 2	-	-	-	-	-	-	897	806	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1523	-	-	1522	-	-	817	742	1028
Mov Cap-2 Maneuver	-	-	-	-	-	-	777	703	-
Stage 1	-	-	-	-	-	-	953	843	-
Stage 2	-	-	-	-	-	-	869	789	-
Approach	EB			WB			NB		
HCM Control Delay, s	0.7			3.8			7.3		
HCM LOS							A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	1682	1523	-	-	1522	-	-	802	
HCM Lane V/C Ratio	0.049	0.004	-	-	0.021	-	-	0.043	
HCM Control Delay (s)	7.3	7.4	-	-	7.4	-	-	9.7	
HCM Lane LOS	A	A	-	-	A	-	-	A	
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.1	

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	24	6	2
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	Stop
Storage Length	-	-	-
Veh in Median Storage, #	-	1	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	15	15	15
Mvmt Flow	26	7	2

Major/Minor	Minor2		
Conflicting Flow All	106	105	14
Stage 1	77	77	-
Stage 2	29	28	-
Critical Hdwy	7.25	6.65	6.35
Critical Hdwy Stg 1	6.25	5.65	-
Critical Hdwy Stg 2	6.25	5.65	-
Follow-up Hdwy	3.635	4.135	3.435
Pot Cap-1 Maneuver	844	761	1029
Stage 1	901	806	-
Stage 2	956	847	-
Platoon blocked, %			
Mov Cap-1 Maneuver	791	742	1029
Mov Cap-2 Maneuver	765	703	-
Stage 1	897	789	-
Stage 2	909	843	-

Approach SB

HCM Control Delay, s	9.7
HCM LOS	A

Minor Lane/Major Mvmt

Intersection							
Int Delay, s/veh	0.8						
Movement	EBL	EBR		NBL	NBT	SBT	SBR
Vol, veh/h	2	16		27	295	92	6
Conflicting Peds, #/hr	0	0		0	0	0	0
Sign Control	Stop	Stop		Free	Free	Free	Free
RT Channelized	-	None		-	None	-	None
Storage Length	0	-		125	-	-	-
Veh in Median Storage, #	1	-		-	0	0	-
Grade, %	0	-		-	0	0	-
Peak Hour Factor	92	92		92	92	92	92
Heavy Vehicles, %	2	2		2	2	2	2
Mvmt Flow	2	17		29	321	100	7
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	322	53		107	0	-	0
Stage 1	103	-		-	-	-	-
Stage 2	219	-		-	-	-	-
Critical Hdwy	6.84	6.94		4.14	-	-	-
Critical Hdwy Stg 1	5.84	-		-	-	-	-
Critical Hdwy Stg 2	5.84	-		-	-	-	-
Follow-up Hdwy	3.52	3.32		2.22	-	-	-
Pot Cap-1 Maneuver	647	1003		1482	-	-	-
Stage 1	910	-		-	-	-	-
Stage 2	796	-		-	-	-	-
Platoon blocked, %					-	-	-
Mov Cap-1 Maneuver	634	1003		1482	-	-	-
Mov Cap-2 Maneuver	666	-		-	-	-	-
Stage 1	910	-		-	-	-	-
Stage 2	780	-		-	-	-	-
Approach	EB	NB			SB		
HCM Control Delay, s	8.9	0.6			0		
HCM LOS	A						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR		
Capacity (veh/h)	1482	-	950	-	-		
HCM Lane V/C Ratio	0.02	-	0.021	-	-		
HCM Control Delay (s)	7.5	-	8.9	-	-		
HCM Lane LOS	A	-	A	-	-		
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-		

Intersection									
Int Delay, s/veh	4.9								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	14	38	28	14	18	43	5	44
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop
Storage Length	350	-	350	350	-	350	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15
Mvmt Flow	2	15	41	30	15	20	47	5	48
Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	15	0	0	15	0	0	97	96	15
Stage 1	-	-	-	-	-	-	20	20	-
Stage 2	-	-	-	-	-	-	77	76	-
Critical Hdwy	4.25	-	-	4.25	-	-	7.25	6.65	6.35
Critical Hdwy Stg 1	-	-	-	-	-	-	6.25	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.25	5.65	-
Follow-up Hdwy	2.335	-	-	2.335	-	-	3.635	4.135	3.435
Pot Cap-1 Maneuver	1522	-	-	1522	-	-	855	770	1028
Stage 1	-	-	-	-	-	-	966	853	-
Stage 2	-	-	-	-	-	-	901	807	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1522	-	-	1522	-	-	819	754	1028
Mov Cap-2 Maneuver	-	-	-	-	-	-	775	712	-
Stage 1	-	-	-	-	-	-	965	852	-
Stage 2	-	-	-	-	-	-	859	791	-
Approach	EB			WB			NB		
HCM Control Delay, s	0.3			3.5			7.6		
HCM LOS							A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	1472	1522	-	-	1522	-	-	1743	
HCM Lane V/C Ratio	0.068	0.001	-	-	0.02	-	-	0.024	
HCM Control Delay (s)	7.6	7.4	-	-	7.4	-	-	7.1	
HCM Lane LOS	A	A	-	-	A	-	-	A	
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.1	



Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	14	2	23
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	Stop
Storage Length	-	-	-
Veh in Median Storage, #	-	1	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	15	15	15
Mvmt Flow	15	2	25

Major/Minor	Minor2		
Conflicting Flow All	98	96	15
Stage 1	76	76	-
Stage 2	22	20	-
Critical Hdwy	7.25	6.65	6.35
Critical Hdwy Stg 1	6.25	5.65	-
Critical Hdwy Stg 2	6.25	5.65	-
Follow-up Hdwy	3.635	4.135	3.435
Pot Cap-1 Maneuver	854	770	1028
Stage 1	902	807	-
Stage 2	964	853	-
Platoon blocked, %			
Mov Cap-1 Maneuver	797	754	1028
Mov Cap-2 Maneuver	770	710	-
Stage 1	901	791	-
Stage 2	912	852	-

Approach SB

HCM Control Delay, s	7.1
HCM LOS	A

Minor Lane/Major Mvmt

Intersection							
Int Delay, s/veh	0.8						
Movement	EBL	EBR		NBL	NBT	SBT	SBR
Vol, veh/h	6	24		16	163	313	2
Conflicting Peds, #/hr	0	0		0	0	0	0
Sign Control	Stop	Stop		Free	Free	Free	Free
RT Channelized	-	None		-	None	-	None
Storage Length	0	-		125	-	-	-
Veh in Median Storage, #	1	-		-	0	0	-
Grade, %	0	-		-	0	0	-
Peak Hour Factor	92	92		92	92	92	92
Heavy Vehicles, %	2	2		2	2	2	2
Mvmt Flow	7	26		17	177	340	2
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	464	171		342	0	-	0
Stage 1	341	-		-	-	-	-
Stage 2	123	-		-	-	-	-
Critical Hdwy	6.84	6.94		4.14	-	-	-
Critical Hdwy Stg 1	5.84	-		-	-	-	-
Critical Hdwy Stg 2	5.84	-		-	-	-	-
Follow-up Hdwy	3.52	3.32		2.22	-	-	-
Pot Cap-1 Maneuver	527	843		1214	-	-	-
Stage 1	692	-		-	-	-	-
Stage 2	889	-		-	-	-	-
Platoon blocked, %					-	-	-
Mov Cap-1 Maneuver	520	843		1214	-	-	-
Mov Cap-2 Maneuver	581	-		-	-	-	-
Stage 1	692	-		-	-	-	-
Stage 2	877	-		-	-	-	-
Approach	EB		NB		SB		
HCM Control Delay, s	9.9		0.7		0		
HCM LOS	A						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR		
Capacity (veh/h)	1214	-	773	-	-		
HCM Lane V/C Ratio	0.014	-	0.042	-	-		
HCM Control Delay (s)	8	-	9.9	-	-		
HCM Lane LOS	A	-	A	-	-		
HCM 95th %tile Q(veh)	0	-	0.1	-	-		

## **APPENDIX D**

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Stages of Development		Trip Generation				Vehicle Types								
		Duration (days/location)		Average Trips/Day	Max Trips/Day	Total Trips/Phase	Total Trips/Phase				Trips/Day			
							Light Truck	Heavy Truck	Drill Rig	Heavy Equipment	Light Truck	Heavy Truck	Drill Rig	Heavy Equipment
Construction of the Drill Pad requiring little excavation		21 Pad		14	60	290	84	202		4	4	10	0	0
Construction of the Drill Pad requiring significant excavation and material removal														
Drilling Operations		21 Pad		14	90	380	84	292		4	4	14	0	0
		4 Well		25	42	125	75	47	2	2	19	12	1	1
Completion Operations		10 Well		16	36	160	80	80			8	8	0	0
Production		9,400 Pad		2	2	29,200	14,600	14,600			2	2	0	0
Reclamation		14 Pad		10	25	140	95	34		11	7	2	0	1
Pipeline Construction		60 Mile		31	46	1844	1200	540		120	20	9	0	2



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