APPENDIX H.
COAL HOLLOW DEVELOPMENT ALTON COAL EIS - TRAFFIC TECHNICAL REPORT

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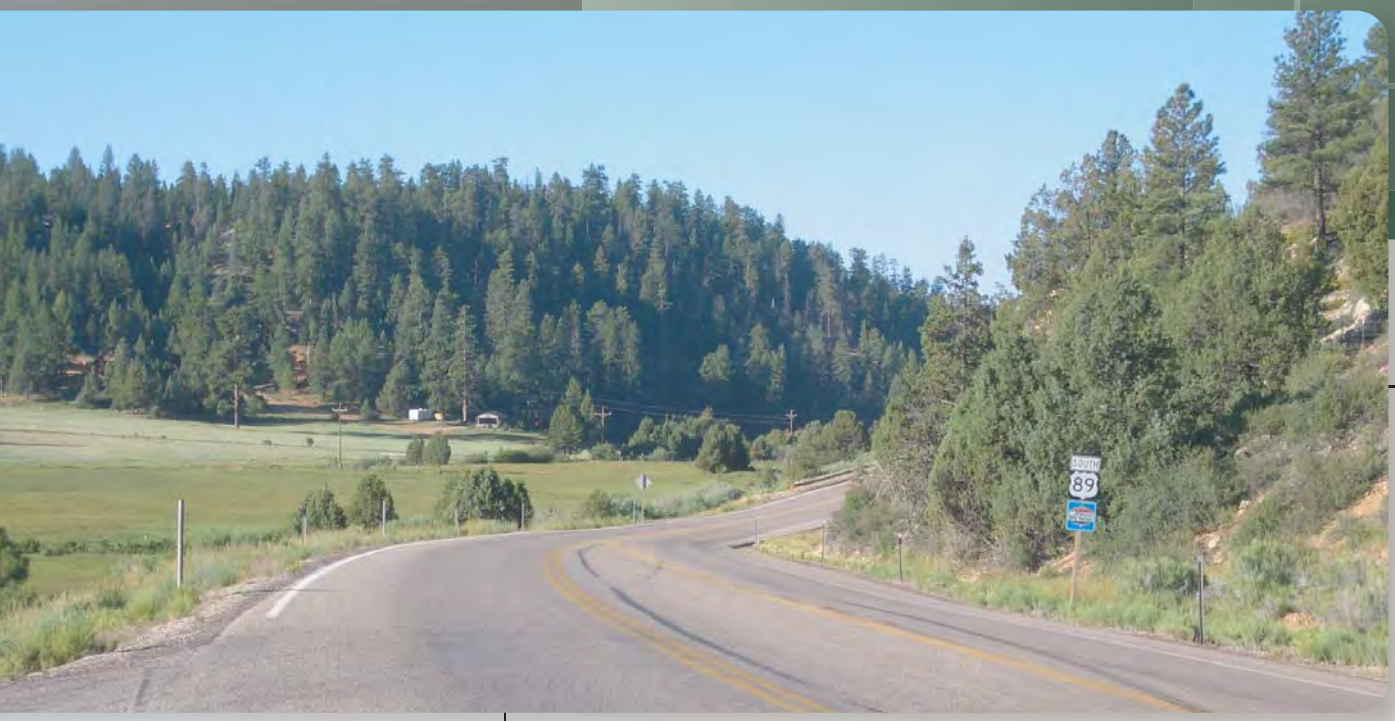

Coal Hollow Development
Alton Coal EIS - Traffic Technical Report

Submitted to:

SWCA Environmental Consultants
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APPENDICES

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Appendix B: Detailed of Service Reports
Appendix C: Detailed Crash Data

1. Introduction

This section provides a brief summary of the overall project, the traffic analysis methodology, the analysis scenarios, and the report organization.

1.1. Background

The Alton Coal Development, LLC is proposing a new coal mine near the town of Alton, Utah. The project study area is in Southern Utah south of Panguitch and Bryce Canyon National Park and north of Glendale. Figure 1 displays the study area location.

1.2. Study Purpose and Analysis Scenarios

This report documents the analysis of traffic operations associated with existing conditions, existing plus coal truck conditions, future 2020 background conditions, and future 2020 plus coal truck conditions. These scenarios will provide information on current traffic conditions and for comparison of the additional project coal trucks.

The one signalized intersection that was evaluated along the proposed truck route includes:

1) I-15 SB Off-ramp / SR-56 (Cedar City)

The four unsignalized intersections that were evaluated along the proposed truck route include:

1) US-89 / SR-14
2) US-89 / SR-12
3) US-89 / SR-143 (Main St. Panguitch)
4) US-89 / SR-20

Twenty-four hour pneumatic tube counts were recorded at the following locations:

1) US-89, approximately two miles south of the SR-14 junction
2) US-89, approximately three miles north of the SR-12 junction
3) US-89, approximately two miles south of the SR-20 junction
4) SR-20, just east of the summit (westbound upslope, eastbound downslope)

1.3. Analysis Methodology

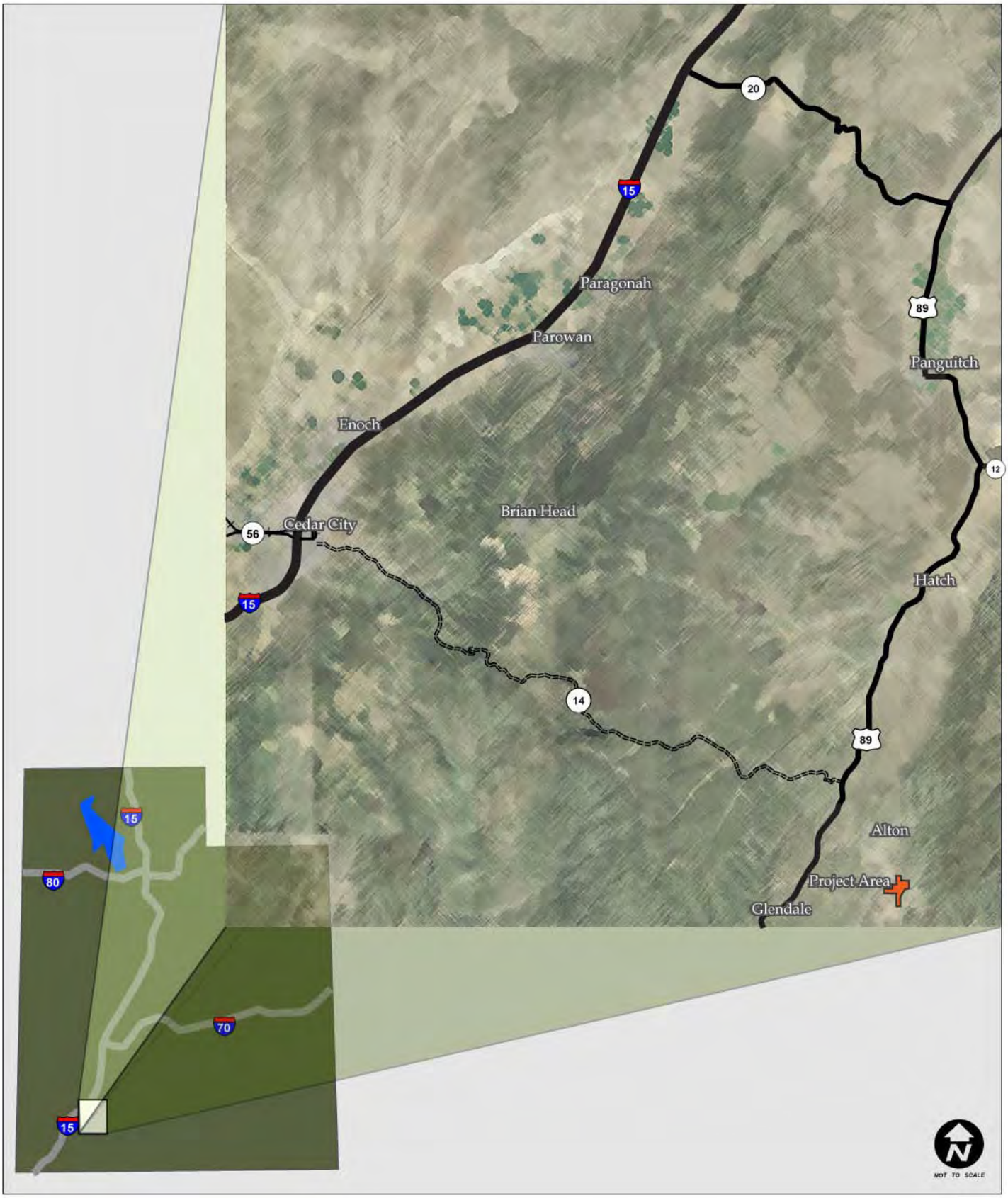
The Highway Capacity Manual 2000 (HCM 2000) methodology was used in this study to remain consistent with “state-of-the-practice” professional standards. Synchro and HCS software’s were used to apply this methodology.

1.3.1. Measures of Effectiveness

Two Measures of Effectiveness (MOEs) were used to quantify traffic conditions for the various scenarios. The MOEs for two lane highways are Level of Service (LOS) and Time-Spent-Following, and the MOEs used for intersections are LOS and delay (seconds per vehicle).

Intersection

LOS is a measure of traffic operating conditions, which varies from LOS A (the best) to LOS F (the worst). LOS reflects the amount of congestion and delay motorists experience at intersections. Table 1 describes the LOS and delay criteria from the *HCM 2000* for signalized and unsignalized intersections. The *HCM 2000* methodology has different quantitative evaluations for signalized and unsignalized intersections. For signalized intersections, the LOS is provided for the overall intersection (weighted average of all approach delays).



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STUDY AREA
COAL HOLLOW TRAFFIC TECHNICAL REPORT

FIGURE 1

For unsignalized intersections, LOS is reported based on the worst approach. Fehr & Peers has also calculated overall delay values for unsignalized intersections, which provides additional information and represents the overall intersection conditions rather than just the worst approach. Both are reported in their respective tables throughout the report.

Table 1
Intersection Level of Service Descriptions

Level of Service	Description of Traffic Conditions	Signalized Intersections	Unsignalized Intersections
		Average Delay[1] (sec / veh)	Delay[2] (sec / veh)
A	*Free Flow / Insignificant Delay* Extremely favorable progression. Individual users are virtually unaffected by others in the traffic stream.	0 to 10	0 to 10
B	*Stable Operations / Minimum Delays* Good progression. The presence of other users in the traffic stream becomes noticeable.	> 10 to 20	> 10 to 15
C	*Stable Operations / Acceptable Delays* Fair progression. The operation of individual users is affected by interactions with others in the traffic stream.	> 20 to 35	> 15 to 25
D	*Approaching Unstable Flows / Tolerable Delays* Marginal progression. Operating conditions are noticeably more constrained.	> 35 to 55	> 25 to 35
E	*Unstable Operations / Significant Delays Can Occur* Poor progression. Operating conditions are at or near capacity.	> 55 to 80	> 35 to 50
F	*Forced, Unpredictable Flows / Excessive Delays* Unacceptable progression with forced or breakdown of operating conditions.	> 80	> 50

1. Overall intersection LOS and average delay (seconds/vehicle) for all approaches.
2. Worst approach LOS and delay (seconds/vehicle) only.
Source: Fehr & Peers Descriptions, based on *Highway Capacity Manual,* 2000 Methodology (Transportation Research Board).

Two-Lane Highway Segment

The MOEs used for two-way segments are: LOS and Percent Time-Spent-Following. LOS is a measure of traffic flow conditions, which varies from LOS A (the best) to LOS F (the worst). For Class I highways, LOS reflects the percent time-spent-following and average travel speed. For Class II highways, LOS is defined by percent time-spent-following. Table 2 shows the association of LOS with Percent Time-Spent-Following and Average Travel Speed based on criteria from the *HCM 2000* for two-lane Class I highways and Table 3 for Class II highways (Chapter 20).

Table 2 Two-Lane Highways (Class I) Level of Service Descriptions		
Level of Service	**Percent Time-Spent Following**	**Average Travel Speed (mi/h)**
A	0 to 35	> 55
B	> 35 to 50	> 50 to 55
C	> 50 to 65	> 45 to 50
D	> 65 to 80	> 40 to 45
E	> 80	40 to 0
F	See note below[1]	

1. LOS F applies whenever the flow rate exceeds the segment capacity.
Source: *Highway Capacity Manual,* 2000 Methodology (Transportation Research Board).

Table 3 Two-Lane Highways (Class II) Level of Service Descriptions	
Level of Service	**Percent Time-Spent Following**
A	0 to 40
B	> 40 to 55
C	> 55 to 70
D	> 70 to 85
E	> 85
F	See note below[1]

1. LOS F applies whenever the flow rate exceeds the segment capacity.
Source: *Highway Capacity Manual,* 2000 Methodology (Transportation Research Board).

The *HCM 2000* states that Directional Segment methodology addresses three types of directional segments: extended directional segments, specific upgrades, and specific downgrades. The methodology for directional segments is analogous to the two-way segment methodology, except that it estimates traffic performance measures and LOS for one direction of travel at a time. However, the operational assessment of one direction of travel on a two-lane highway necessarily considers the opposing traffic volume.

1.4. Report Organization

The report is organized into the following four sections:

- ***Section 1 - Introduction*** discusses the purpose, analysis methodology, and organization of the report.

- ***Section 2 - Existing Conditions*** describes the existing roadway network, data collection efforts, traffic characteristics, and results.
- ***Section 3 – Existing Plus Trucks Conditions*** addresses existing volumes with the additional project coal trucks traffic conditions including traffic operational results.
- ***Section 4 – Future 2020 Background Conditions*** addresses future 2020 background (without project coal trucks) traffic conditions including a description of the traffic forecasting process and traffic operational results.
- ***Section 5 – Future 2020 Plus Trucks Conditions*** addresses future 2020 background volumes with the additional project coal trucks traffic conditions including the traffic operational results.
- ***Section 6 – Commonly Used Acronyms*** lists acronyms used in the report and their meanings.
- ***Section 7 - References*** lists the references cited throughout the report.

2. Existing Conditions

This section of the report describes the existing study area characteristics and summarizes the data collection effort. The purpose of the existing (year 2007) analysis is to evaluate the intersections and roadways during the peak travel periods of the day under existing traffic and geometric conditions. Technical data supporting these findings are included in the appendix.

2.1. Roadway Characteristics

There are four Federal and State roads along the proposed Alton Coal project haul route.

US-89 is a north/south state highway that extends through many cities and jurisdictional boundaries. In the project study area, a majority of US-89 is classified as a Category 2 (System Priority Rural) roadway. However, in the vicinity of towns of Hatch and Panguitch, US-89 is classified as a Category 4 (Regional Rural) roadway on the outskirts of town and a Category 7 (Community Rural) roadway in the center of town. US-89 has a two-lane cross section with occasional passing lanes on steep upgrades. The cross section is expanded to four-lanes through the town of Panguitch. US-89 also serves as the main tourist connection to National Parks such as Bryce Canyon and Zion Canyon. Within the study area, the speed limit is 65 mph except through the town of Hatch and Panguitch, where it is reduced to 40 mph and 35 mph respectively. The existing Average Daily Traffic (ADT) and percent heavy trucks along US-89 is as follows: 4,000 vpd and 18% trucks (South of SR-14 Junction), 4,100 vpd and 21% trucks (North of SR-12 Junction), 3,600 vpd and 25% trucks (South of SR-20 Junction).

SR-20 is an east/west state road that serves as a connector road between I-15 and US-89. SR-20 is classified as a Category 4 (Regional Rural) roadway. SR-20 has a two-lane cross section with a climbing lane for slower traffic on the steep updgrade towards the summit. SR-20 has a posted speed limit of 60 mph from the US-89 junction to the steep upgrade, 35 mph climbing the steep upgrade to the summit, and 65 mph from the summit to I-15. The existing ADT is 2,509 vpd with 27% heavy trucks.

I-15 is a four-lane divided interstate freeway that runs north/south through Utah and also traverses through the States of Idaho to the north and Nevada and Arizona to the south. Along the proposed coal truck haul route, I-15 has a speed limit of 75 mph from SR-20 to Cedar City. The existing ADT between SR-20 and Cedar City is 16,200 vpd with 26% heavy trucks.

SR-56 is an east/west state road that runs from SR-130 in Cedar City to the Nevada Stateline. SR-56 is labeled as 200 North running through the center of Cedar City. SR-56 is classified as a Category 5 (Regional Priority Urban) roadway through the center of Cedar City, a Category 3 (System Priority Urban) on the outskirts of Cedar City, a Category 4 (Regional Rural) outside of Cedar City, and a Category 9 (Other) towards the Nevada Stateline. SR-56 has a posted speed limit of 45 mph on the proposed coal truck haul route. The cross section varies from four-lanes in the center of Cedar City to two-lanes outside of the city. The existing ADT near the I-15 Junction is 8,600 vpd with 10% heavy trucks.

2.2. Land Use Characteristics

The project study area consists of a variety of land uses including residential and commercial through the towns and rural undeveloped areas outside of the towns.

2.3. Data Collection Effort

The data collection effort for the existing conditions included daily, a.m. and p.m. peak period traffic volumes, intersection geometry, GPS travel time runs, and accident information. This information was used provide a quantitative evaluation of existing traffic conditions.

2.3.1. Daily and Peak Hour Volume Counts

Twenty-four hour traffic counts were conducted from June 19 to June 25, 2007 at three locations on US-89 and one location on SR-20. These locations were selected to provide a general understanding of traffic conditions along the proposed coal truck haul route. Table 4 shows existing directional ADT volumes.

Table 4
Existing Average Daily Traffic (ADT) Volumes

Location	Direction of Travel		Total	Percentage Heavy Trucks
	Northbound[1]	Southbound[2]		
US-89 (south of SR-14)	2,110	1,866	3,978	24%
US-89 (north of SR-12)	2,064	1,998	4,062	26%
US-89 (south of SR-20)	1,790	1,806	3,596	25%
SR-20 (east of summit)	1,242	1,267	2,509	28%

1. Eastbound for the count on SR-20
2. Westbound for the count on SR-20
Source: Fehr & Peers, 2008

Peak period traffic counts were collected on June 19-26, 2007 at the following intersections:

- US-89 / SR-14 – (2-Way Stop)
- US-89 / SR-12 – (One-Way Stop/Yield)
- US-89 / SR-143 (Main St.) – (All-Way Stop)
- US-89 / SR-20 – (One-Way Stop)
- I-15 SB Off-ramp / SR-56 – (Signalized)

These counts were seasonally adjusted using information obtained from the Utah Department of Transportation (UDOT) permanent count stations. The appendix contains the traffic count data.

2.3.2. Intersection Geometry

Intersection geometries were measured during field visits to the study area.

2.4. Crash Information

UDOT Traffic and Safety generated a three-year crash history for US-89, SR-20, I-15, and SR-56. Accident rates are calculated by determining the number of accidents per million vehicle-miles traveled. Severity is a measure of damage that is caused by an accident. A severity of 1 indicates that the accident caused property damage and a severity of 5 indicates that there was a fatality; see Table 5 for these descriptions.

Table 5 Accident Severity	
Severity	**Description**
1	Property Damage
2	Possible Injury
3	Bruises and Abrasions
4	Broken Bones or Bleeding Wounds
5	Fatal
Source: UDOT, Division of Traffic and Safety CARS Codes, 2001.	

Accidents were summarized for the three-year period from 2003 to 2005. The detailed Operational Safety Report's (OSR) that were done by UDOT can be found in the Appendix. Below is a summary of the OSR's broken down by roadway:

US-89 – Mile Post (MP) 90.04 to 156.36 (Glendale to Jct. SR-20)

- Total Accidents: 287
- Total Fatalities: 0
- 3 Year Accident Average: 95.67

US-89 Summary

	Actual	Expected
Severity Rate:	1.59	1.70
Crash Rate:	2.59	1.46

As shown above, the actual rate of accidents over the three-year study period indicates that there is a higher occurrence of accidents than would be expected and a lower severity rate as would be expected for a roadway similar to US-89. The OSR states that the predominant crash type is the single vehicle, accounting for 81.2% or 233 of the total number of crashes. The following list shows the breakdown of the single vehicle crashes:

Crash Type	No.	% of Single Vehicle Crashes
1. Wildlife Related	126	51.1
2. Ran Off Road Right	63	27.0
3. Ran Off Road Left	24	10.3
4. Fixed Object	10	4.3
5. Domestic Animal Related	5	2.1
6. Other Object	4	1.7
7. Overturned in Roadway	1	0.5
	233	100.0%

US-20 – MP 0.00 to 20.61 (I-15 to Jct. US-89)

- Total Accidents: 79
- Total Fatalities: 0
- 3 Year Accident Average: 26.33

US-20 Summary

	Actual	Expected
Severity Rate:	1.50	1.72
Crash Rate:	2.59	1.96

As shown above, the actual rate of accidents over the three-year study period indicates that there is a higher occurrence of accidents than would be expected, but a lower severity rate than would be expected for a roadway similar to SR-20. The OSR states that the predominant crash type is the single vehicle, accounting for 86.1% or 68 of the total number of crashes. The following list shows the breakdown of the single vehicle crashes:

Crash Type	**No.**	**% of Single Vehicle Crashes**
1. Ran Off Road Right	31	45.5
2. Ran Off Road Left	12	17.7
3. Wildlife Related	12	17.7
4. Fixed Object	10	14.7
5. Other Non-Collision	3	4.4
	68	100.0%

The OSR states that there were no clusters of crashes at any location and approximately 70% of these crashes occurred under inclement weather conditions (snowy/icy). The main contributing factor for crashes where vehicles ran off the road was excessive speed.

I-15 – MP 59.05 to 100.2 (Cedar City to SR-20)

- Total Accidents: 441
- Total Fatalities: 14
- 3 Year Accident Average: 147.00

I-15 Summary

	Actual	Expected
Severity Rate:	2.01	1.83
Crash Rate:	0.75	0.87

As shown above, the actual rate of accidents over the three-year study period indicates that there is a lower occurrence of accidents than would be expected, but a higher severity rate than would be expected for a roadway similar to I-15. The OSR states that the predominant crash types are:

- Single Vehicle Crashes, accounting for 77.6% or 342 of the total number of crashes.
- Rear End Crashes, accounting for 11.1% or 49 of the total number of crashes.
- Same Direction Side Swipe, accounting for 9.8% or 43 of the total number of crashes.

The following list shows the breakdown of the single vehicle crashes:

Crash Type	**No.**	**% of Single Vehicle Crashes**
1. Ran Off Road Right	108	31.6
2. Ran Off Road Left	68	19.9
3. Ran Off Road Thru Median	44	12.9
4. Wildlife Related	39	11.4

5. Other Object	25	7.3
6. Fixed Object	23	6.7
7. Other Non-Collision	22	6.4
8. Overturned in Roadway	10	2.9
9. Pedestrian Related	1	0.3
10. Bicycle Related	1	0.3
11. Domestic Animal Related	1	0.3
	342	100.0%

The OSR states that there were no clusters of crashes at any location. The primary factors for crashes where vehicles ran off the road were:

1. Excessive speed
2. Falling asleep at the wheel
3. Other improper driver behavior

Rear end crashes occurred mostly as some drivers were following too closely and sideswipe crashes were caused primarily by drivers attempting an unsafe passing maneuver.

The total of 12 fatal crashes resulted in 14 fatalities. The following are the crashes that are associated with the fatal crashes:

Crash Type	**No.**
1. Running Off Road	11 (6 caused by falling asleep at the wheel)
2. Rear End	1
3. Pedestrian Related	1
4. Sideswipe	1
	12

SR-56 – MP 9.80 to 61.39

- Total Accidents: 174
- Total Fatalities: 2
- 3 Year Accident Average: 58.00

SR-56 Summary

	Actual	Expected
Severity Rate:	1.69	1.77
Crash Rate:	2.03	2.14

As shown above, the actual rate of accidents over the three-year study period indicates that there is a lower occurrence of accidents than would be expected and a lower severity rate as would be expected for a roadway similar to SR-56. The OSR states that the predominant crash types are:

- Single Vehicle Crashes, accounting for 48.3% or 84 of the total number of crashes.
- Rear End Crashes, accounting for 19.0% or 33 of the total number of crashes.
- Right Angle Crashes, accounting for 16.1% or 28 of the total number of crashes.
- Left Turn Crashes, accounting for 6.90% or 12 of the total number of crashes.

The following list shows the breakdown of the single vehicle crashes:

Crash Type	No.	% of Single Vehicle Crashes
1. Wildlife Related	34	40.5
2. Ran Off Road Left	16	19.0
3. Ran Off Road Right	16	19.0
4. Domestic Animal Related	6	7.1
5. Fixed Object	4	4.8
6. Other Non-Collision	3	3.6
7. Other Object	2	2.4
8. Bicycle Related	2	2.4
9. Pedestrian Related	1	1.2
	84	100.0%

The OSR states that there were no clusters of crashes at any location. The primary factors for crashes where vehicles ran off the road were:

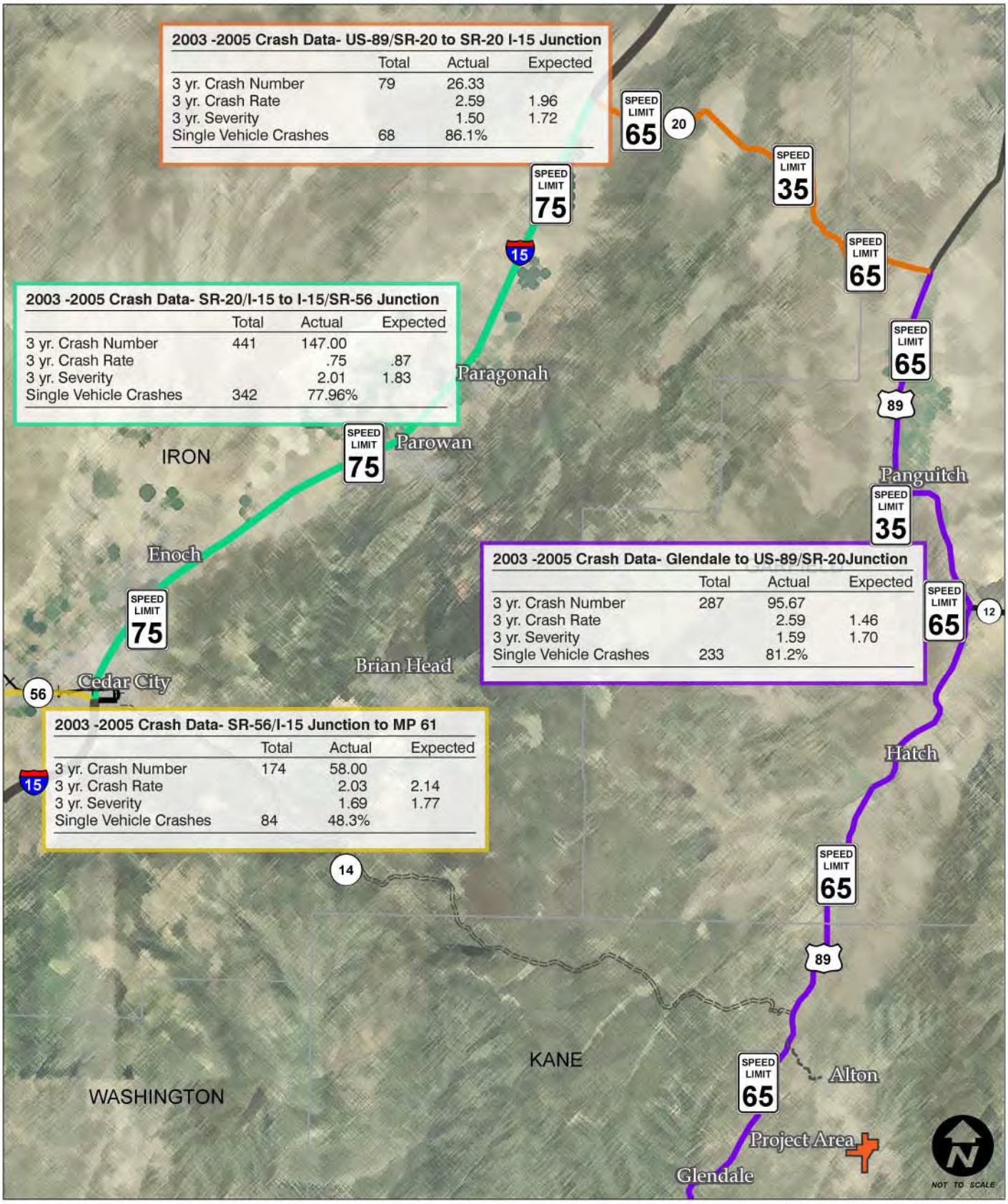
1. Excessive speed
2. Falling asleep at the wheel
3. Driving Under the Influence (DUI)

Rear end, left turn, and right angle crashes occurred mostly at intersections on the western boundary of Cedar City.

One of the two fatal crashes was the result of a single vehicle that ran off the road. The other fatal crash was the result of an eastbound driver crossing the centerline and impacting the westbound driver head on. Figure 2 shows the study roadways with the associated crash data.

2.4.1 Future Crash Information

It is difficult to project increases in crashes due to the increase in truck traffic from the project. Historic crash data may not be indicative of future crash trends due to the disproportionate increase in truck traffic relative to general traffic. Given the increase in truck traffic that is anticipated with the project, the total number of crashes due to trucks could potentially increase; however, there is no supporting evidence that increased traffic will result in a higher crash rate for an uncongested highway facility with a lower than expected crash rate currently.



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POSTED SPEEDS AND CRASH DATA
COAL HOLLOW DEVELOPMENT TRAFFIC TECHNICAL REPORT
FIGURE 2

2.5. Existing Traffic Conditions Results

The existing conditions analysis was done using the Highway Capacity Software (HCS) for the unsignalized intersections and the Synchro 6.0 software for the signalized intersection. HCS was also used for the roadway segment LOS analysis.

2.5.1. Intersection Conditions

Existing conditions MOEs are reported in LOS and delay. Table 6 displays the existing 2007 a.m. LOS and delay (seconds/vehicle) for the study intersections. Figure 3 shows the a.m. and p.m. intersection volumes and LOS results.

Table 6
Existing 2007 a.m. Peak Hour LOS and Delay

Intersection	Worst Approach[1]			Overall Intersection[2]	
	Approach	LOS	Delay	LOS	Delay
US-89 / SR-14	EB	A	9.4	A	3.8
US-89 / SR-12	WB	A	9.5	A	5.8
US-89 / SR-143 (Main St.)	SB	A	8.7	A	8.1
US-89 / SR-20	SB	A	9.5	A	8.1
I-15 SB Off-ramp / SR-56				C	21.1

Notes:
1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).

Source: Fehr & Peers, 2008

As shown in Table 6, all intersections operate at LOS C or better during the a.m. peak hour. Table 7 displays the existing 2007 p.m. LOS and delay for the study intersections.

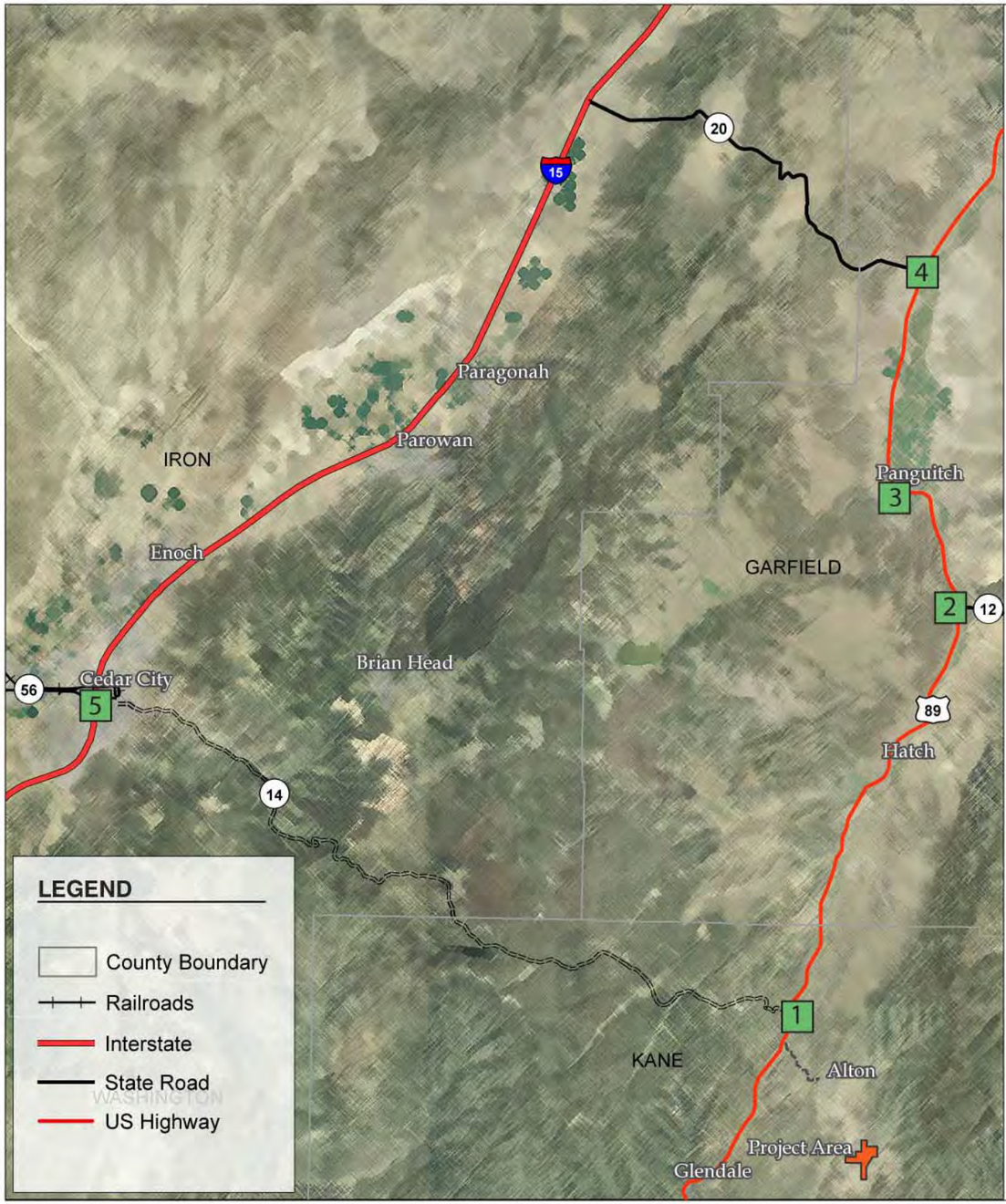
Table 7
Existing 2007 p.m. Peak Hour LOS and Delay

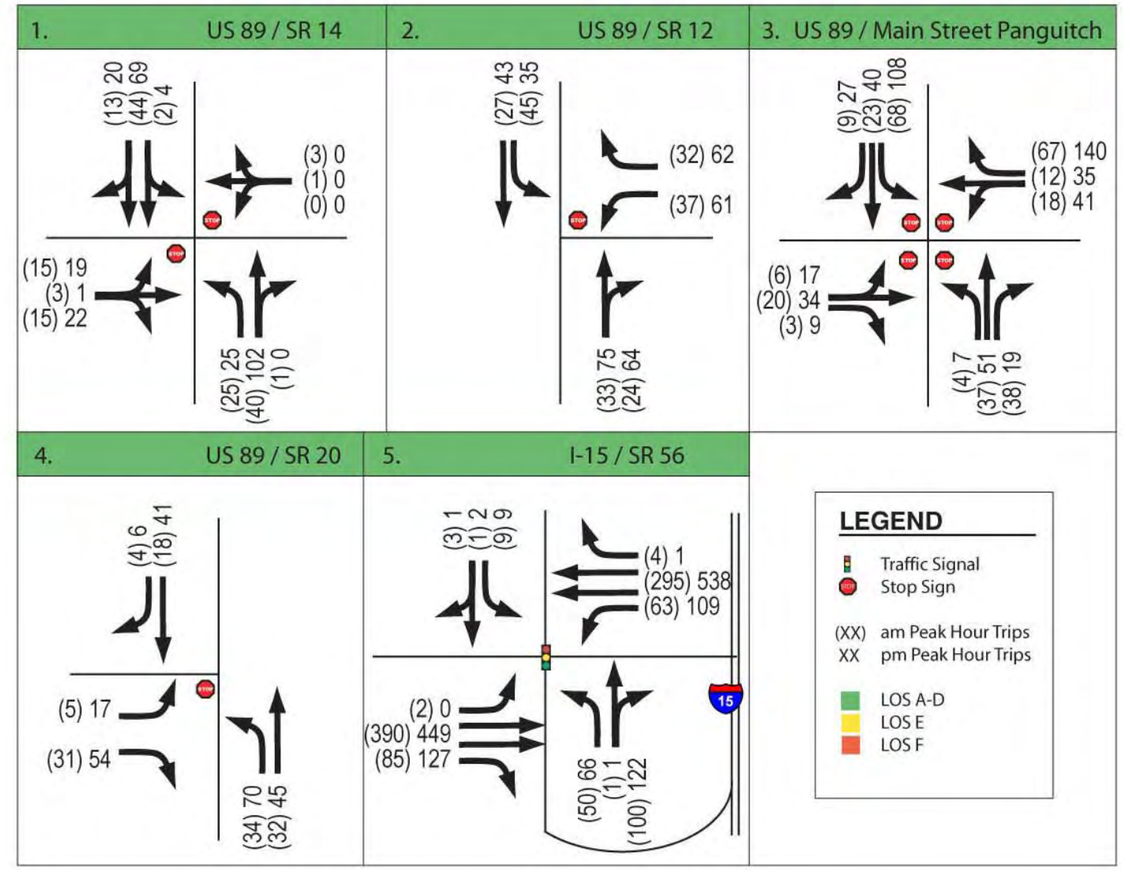
Intersection	Worst Approach[1]			Overall Intersection[2]	
	Approach	LOS	Delay	LOS	Delay
US-89 / SR-14	EB	A	9.8	A	2.1
US-89 / SR-12	WB	A	9.7	A	4.8
US-89 / SR-143 (Main St.)	SB	A	9.7	A	9.3
US-89 / SR-20	SB	A	9.8	A	7.5
I-15 SB Off-ramp / SR-56				C	20.6

Notes:
1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).

Source: Fehr & Peers, 2008

As shown in Table 7, all intersections operate at LOS C or better during the p.m. peak hour.





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EXISTING a.m. & p.m. TRAFFIC CONDITIONS
COAL HOLLOW DEVELOPMENT TRAFFIC TECHNICAL REPORT
FIGURE 3

2.5.2. Directional Segment Conditions

Table 8 displays the existing 2007 weekday and weekend LOS and Percent Time-Spent-Following for the study roadway segments. Figures 4 and 5 show the results of the weekday and weekend directional segment LOS analysis.

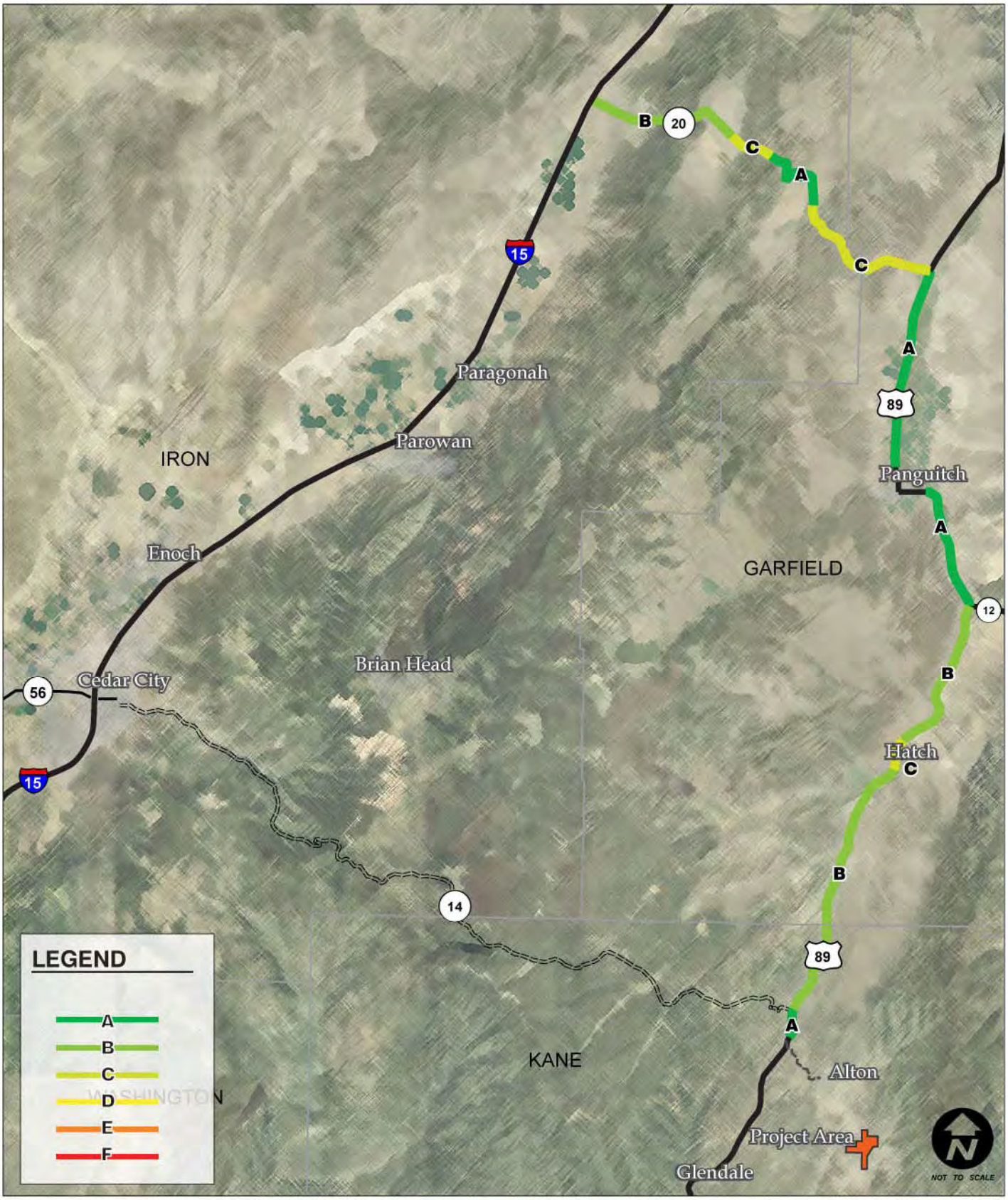
Table 8
Existing 2007 Directional Segment
Peak Hour LOS and Percent Time-Spent-Following

Intersection	Weekday			Weekend		
	Direction	LOS	% Time-Spent-Following	Direction	LOS	% Time-Spent-Following
US-89: Alton to SR-14	NB	A	33.3	NB	B	37.5
US-89: SR-14 to Hatch	NB	B	40.3	NB	B	45.2
US-89: Center of Hatch[1]	NB	C	87.0	NB	C	97.0
US-89: Hatch to SR-12	NB	B	39.5	NB	B	41.1
US-89: SR-12 to Panguitch	NB	A	27.6	NB	A	28.4
US-89: Panguitch to SR-20	NB	A	28.4	NB	A	30.8
SR-20: US-89 to Upslope	WB	C	33.4	WB	C	34.2
SR-20: Upslope to Summit[2]	WB	A	10.7	WB	A	13.7
SR-20: Summit to Downslope	WB	C	43.3	WB	C	45.2
SR-20: Downslope to I-15	WB	B	38.7	WB	C	39.0

Notes:
1. The analysis for the center of Hatch was done using HCS HIGHPLAN software due to the reduced highway speeds through town.
2. This segment of roadway was analyzed with a passing lane and as a Class II highway due to the low posted speed limit of 25 mph.

Source: Fehr & Peers, 2008

As shown in Table 8, all roadway segments operate at an LOS C or better except.



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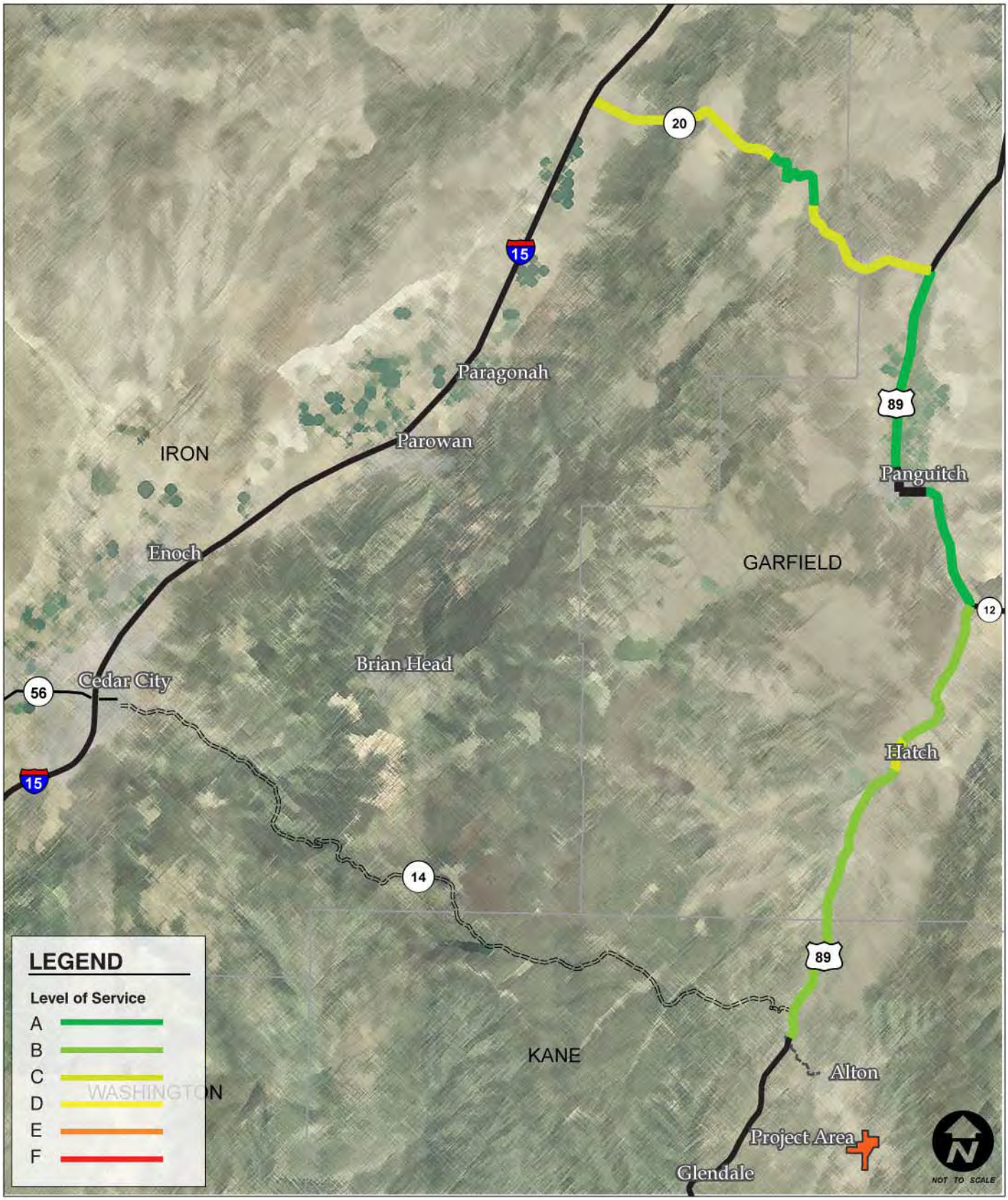
EXISTING WEEKDAY DIRECTIONAL LEVELS OF SERVICE
COAL HOLLOW DEVELOPMENT TRAFFIC TECHNICAL REPORT

FIGURE 4



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EXISTING WEEKEND DIRECTIONAL LEVELS OF SERVICE
COAL HOLLOW DEVELOPMENT TRAFFIC TECHNICAL REPORT

FIGURE 5

2.6. Travel Time Runs

Travel time runs were performed using a Global Positioning System (GPS) along the proposed coal truck haul route on US-89 and SR-20 traveling northbound on US-89 and westbound on SR-20. One travel time run was performed at free flow speeds and the other was performed while following a heavy truck to best simulate following a coal truck along the haul route.

Free Flow Run

	Travel Time (min)	Avg. Speed (mph)	Posted Speed (mph)
US-89: From Alton to SR-20	36	65	ranges from 35 to 65
SR-20: From US-89 to I-15	20	60	ranges from 25 to 65

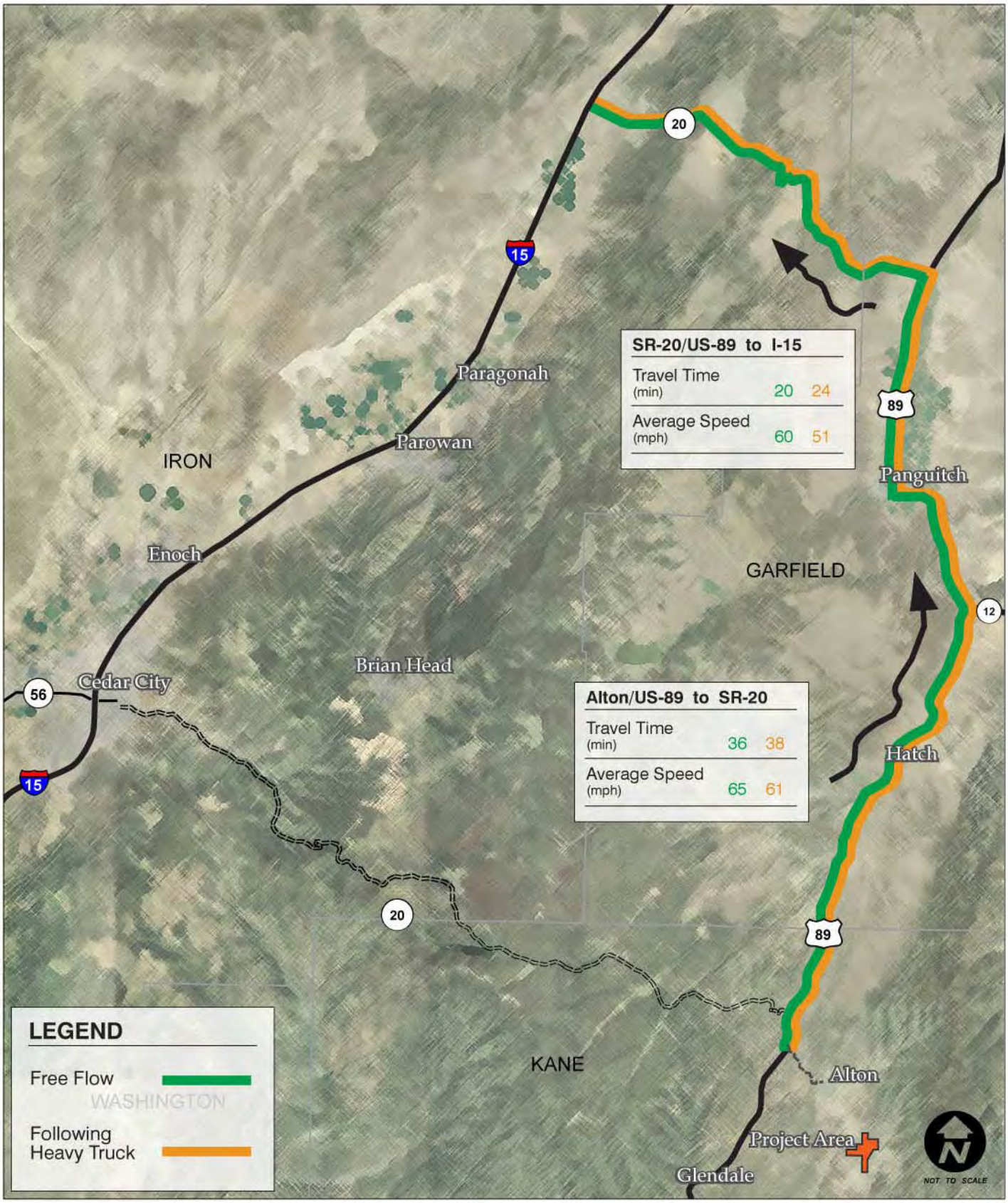
Following Heavy Truck

	Travel Time (min)	Avg. Speed (mph)	Posted Speed (mph)
US-89: From Alton to SR-20	38	61	ranges from 35 to 65
SR-20: From US-89 to I-15	24	51	ranges from 25 to 65

This shows that it takes an additional two minutes to travel from Alton to the SR-20 on US-89 while following a heavy truck and an additional four minutes to travel from US-89 to I-15 on SR-20. Figure 6 displays the travel time runs.

2.7. Existing Conditions Summary

Existing conditions at the study intersections have low delays per vehicle and little to no congestion. Existing conditions on the study roadways are low volumes with a substantial amount of capacity for future growth. Traffic generally flows at free flow speeds on all study roadways.



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TRAVEL TIME RUNS
COAL HOLLOW DEVELOPMENT TRAFFIC TECHNICAL REPORT

FIGURE 6

3. Existing Plus Trucks Conditions

This section of the report describes the existing plus trucks study area characteristics. The purpose of the existing plus trucks analysis is to evaluate the intersections and roadways during the peak travel periods of the day under existing traffic and geometric conditions plus the additional coal trucks that are proposed with the project coal mine. Technical data supporting these findings are included in the appendix.

Employees
The Alton Coal Development is estimating 100 employees for the mining operation. Based on a proposed estimated employee shift schedule and the work week schedule (Monday through Saturday), the project could generate between 25 and 50 (depending on how the shift schedules coincide) employee trips in the peak hours.

Due to the expected low number of employee trips generated by the mine development, the available capacity on the US-89 and the road to Alton, and the fact that a certain number of the employee trips will likely be captured internally to the town of Alton itself, no analysis was performed for employee generated traffic.

Trucks
The Alton Coal Development is proposing the mine operate 24 hours/day for six days a week (Monday through Saturday). The development estimates 150 coal trucks a day, or six trucks an hour, will be hauling coal from the mine site in Alton, UT north on US-89, west on SR-20, south on I-15, and west on SR-56 in Cedar City. The coal trucks are proposed to leave the coal mine site at nine and a half to ten minute headways.

3.1. Roadway Characteristics

The study roadways for the existing plus trucks conditions consists of the same geometry as the existing conditions; however, acceleration and deceleration lanes will need to be constructed at the proposed access onto US-89 near Alton.

3.2. Existing Plus Trucks Traffic Conditions Results

The existing plus trucks conditions analysis was done using HCS software for the unsignalized intersections and Synchro 6.0 software was used for the signalized intersection. HCS was also used for the roadway segment LOS analysis. As a conservative measure seven trucks an hour was used in the analysis.

Table 9 shows the increase in the percentage heavy trucks and the percentage increase in trucks with the additional trucks from the proposed development. The estimated 150 trucks were added in each direction to obtain the Existing + Project ADT and percentage of heavy trucks.

Table 9 Existing + Project Average Daily Traffic (ADT) Volumes					
Location	Direction of Travel		Total	Percentage Heavy Trucks[3]	Percentage Increase in Trucks[4]
	Northbound[1]	Southbound[2]			
US-89 (south of SR-14)	2,260	2,016	4,276	29%	31%
US-89 (north of SR-12)	2,214	2,148	4,362	31%	28%
US-89 (south of SR-20)	1,940	1,956	3,896	31%	33%
SR-20 (east of summit)	1,392	1,417	2,809	36%	43%

1. Eastbound for the count on SR-20
2. Westbound for the count on SR-20
3. The percent heavy trucks from existing volumes plus project truck volumes
4. The percent increase in heavy trucks with the addition of the project

Source: Fehr & Peers, 2008

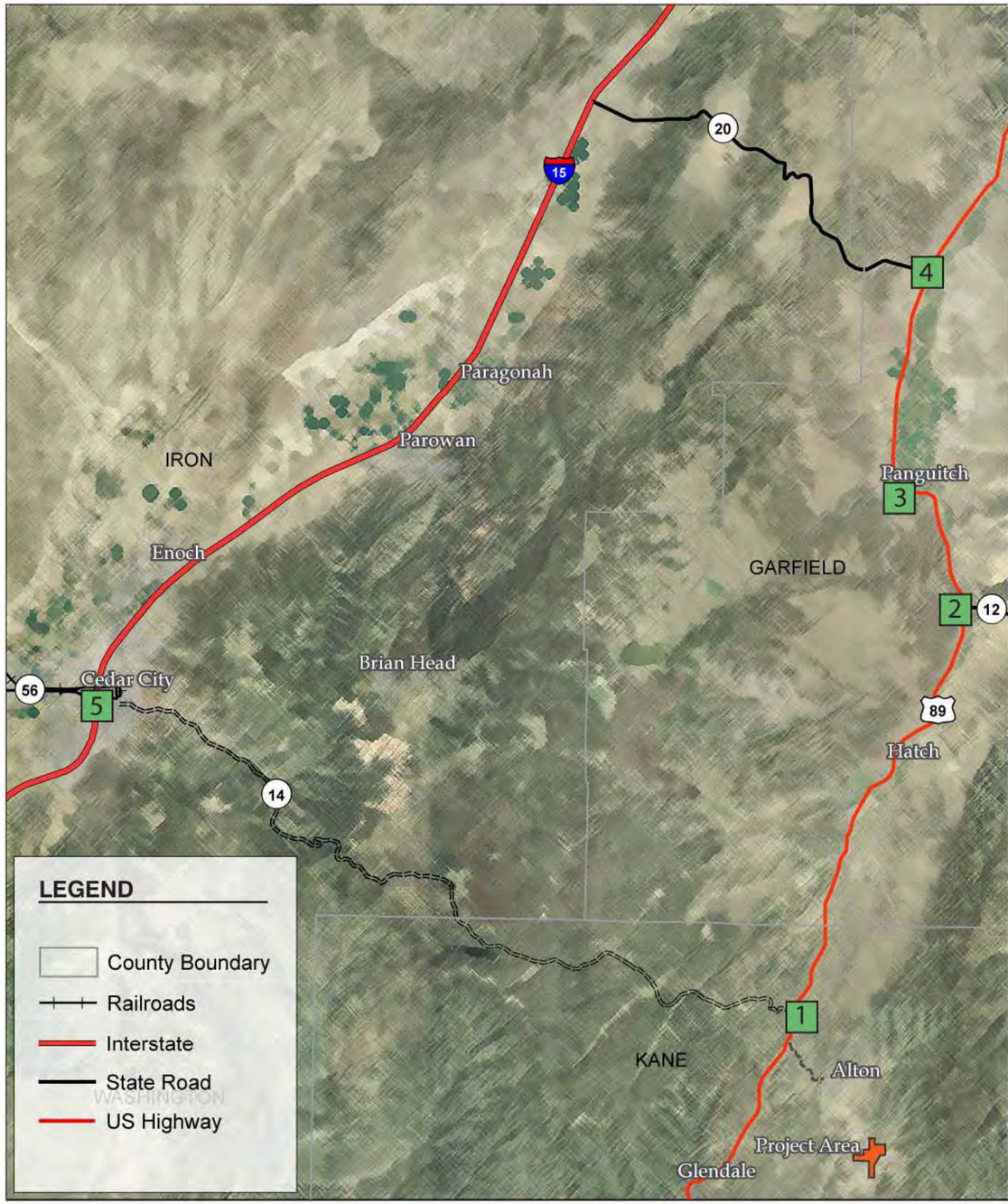
3.2.1. Intersection Conditions

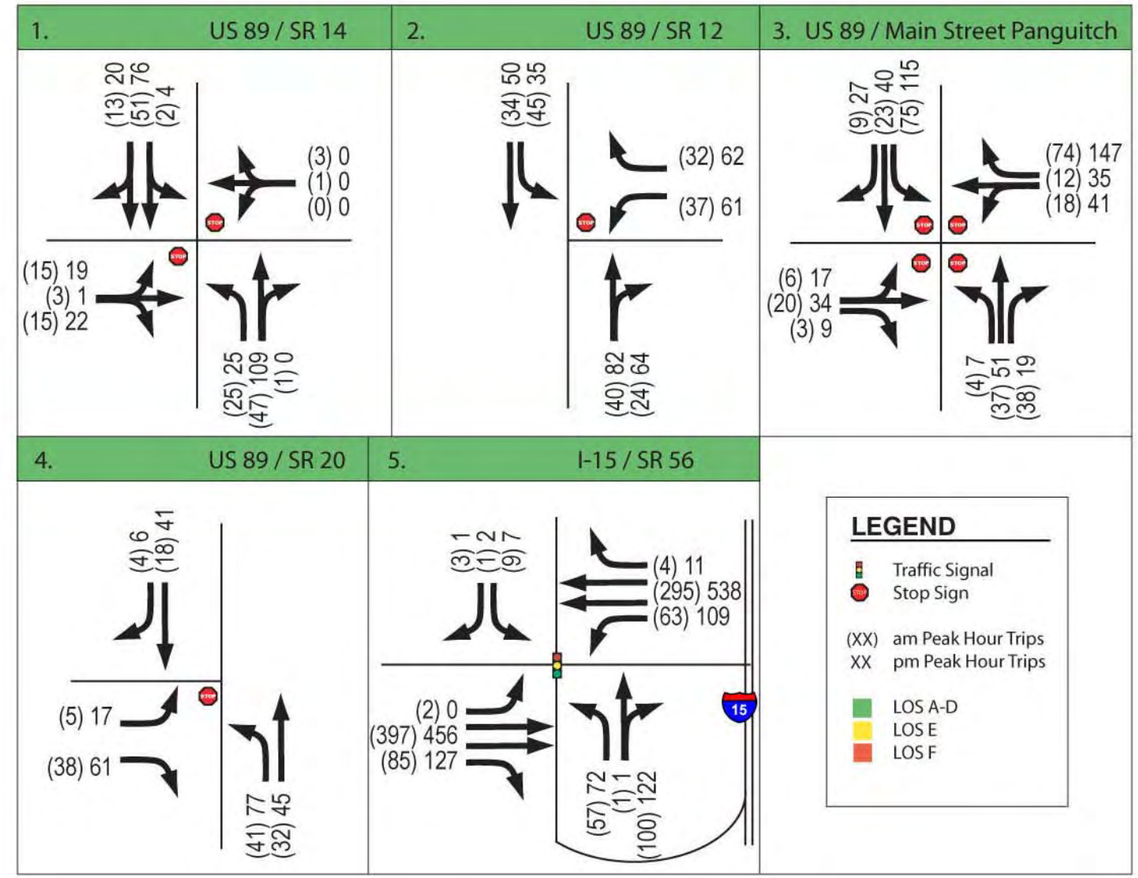
Existing plus trucks conditions MOEs are reported in LOS and delay. Table 9 displays the existing plus trucks a.m. LOS and delay for the study intersections. Figure 7 shows the a.m. and p.m. intersection volumes and LOS results.

Table 10 Existing Plus Trucks a.m. Peak Hour LOS and Delay					
Intersection	Worst Approach[1]			Overall Intersection[2]	
	Approach	LOS	Delay	LOS	Delay
US-89 / SR-14	EB	A	9.5	A	4.1
US-89 / SR-12	WB	A	9.5	A	5.5
US-89 / SR-143 (Main St.)	SB	A	8.9	A	8.3
US-89 / SR-20	SB	A	9.5	A	8.2
I-15 SB Off-ramp / SR-56				C	21.0

Notes:
1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).

Source: Fehr & Peers, 2008





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EXISTING PLUS TRUCKS A.M. & P.M. TRAFFIC CONDITIONS
COAL HOLLOW DEVELOPMENT TRAFFIC TECHNICAL REPORTS

FIGURE 7

As shown in Table 10, all intersections operate at LOS C or better during the a.m. peak hour. Table 10 displays the existing plus trucks p.m. LOS and delay for the study intersections.

Table 11
Existing Plus Trucks p.m. Peak Hour LOS and Delay

Intersection	Worst Approach[1]			Overall Intersection[2]	
	Approach	LOS	Delay	LOS	Delay
US-89 / SR-14	EB	A	9.9	A	2.5
US-89 / SR-12	WB	A	9.8	A	4.5
US-89 / SR-143 (Main St.)	SB	B	10.0	A	9.5
US-89 / SR-20	SB	A	9.8	A	7.5
I-15 SB Off-ramp / SR-56				C	20.6

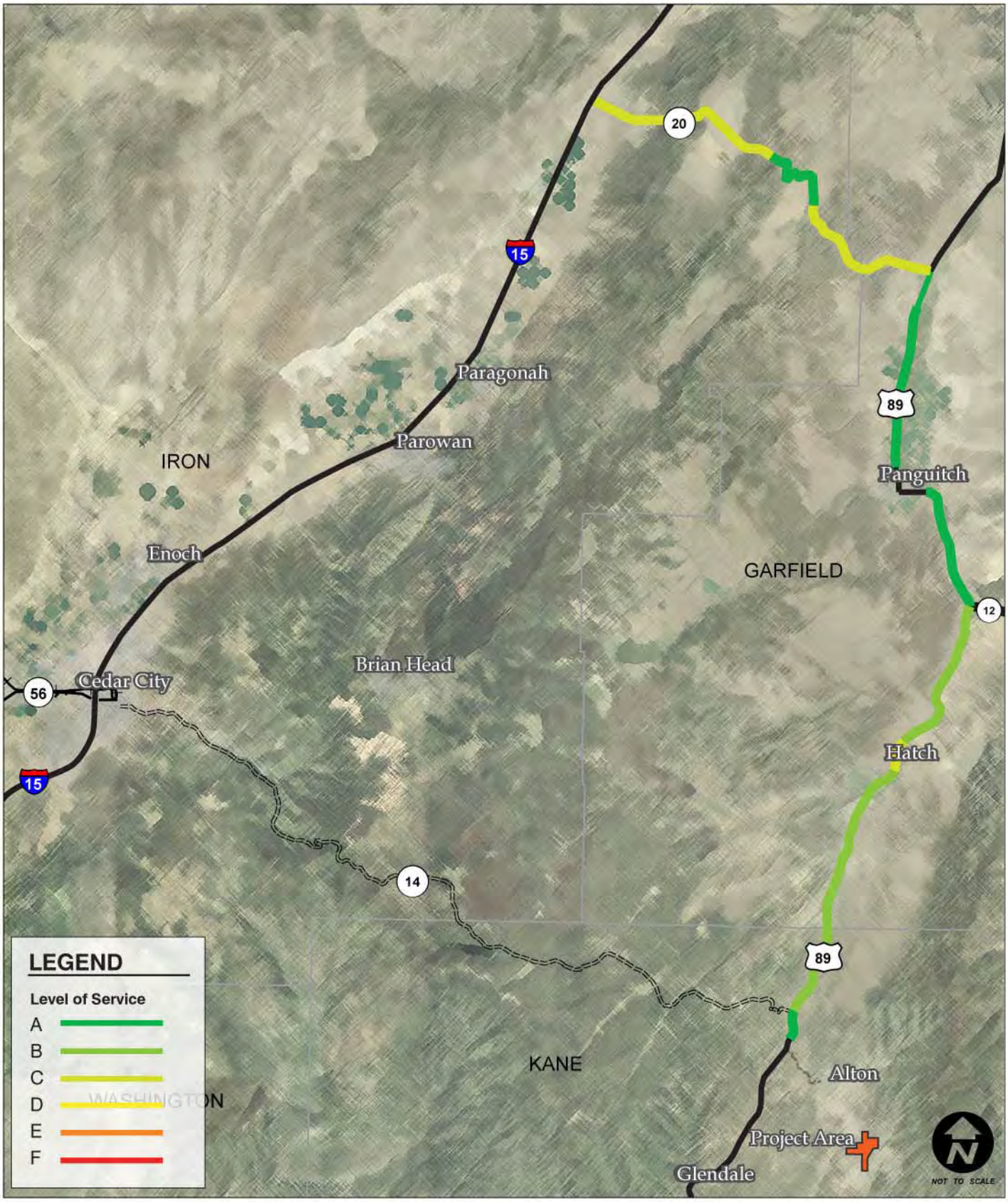
Notes:
1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).

Source: Fehr & Peers, 2008

As shown in Table 11, all intersections operate at LOS C or better during the p.m. peak hour.

3.2.2. Directional Segment Conditions

Existing plus trucks conditions MOEs for the two-lane highway directional segment analysis are reported in LOS and Percent Time-Spent-Following. Table 10 displays the existing plus trucks weekday and weekend LOS and Percent Time-Spent-Following for the study roadway segments. Figures 8 and 9 show the results of the weekday and weekend directional segment LOS analysis.



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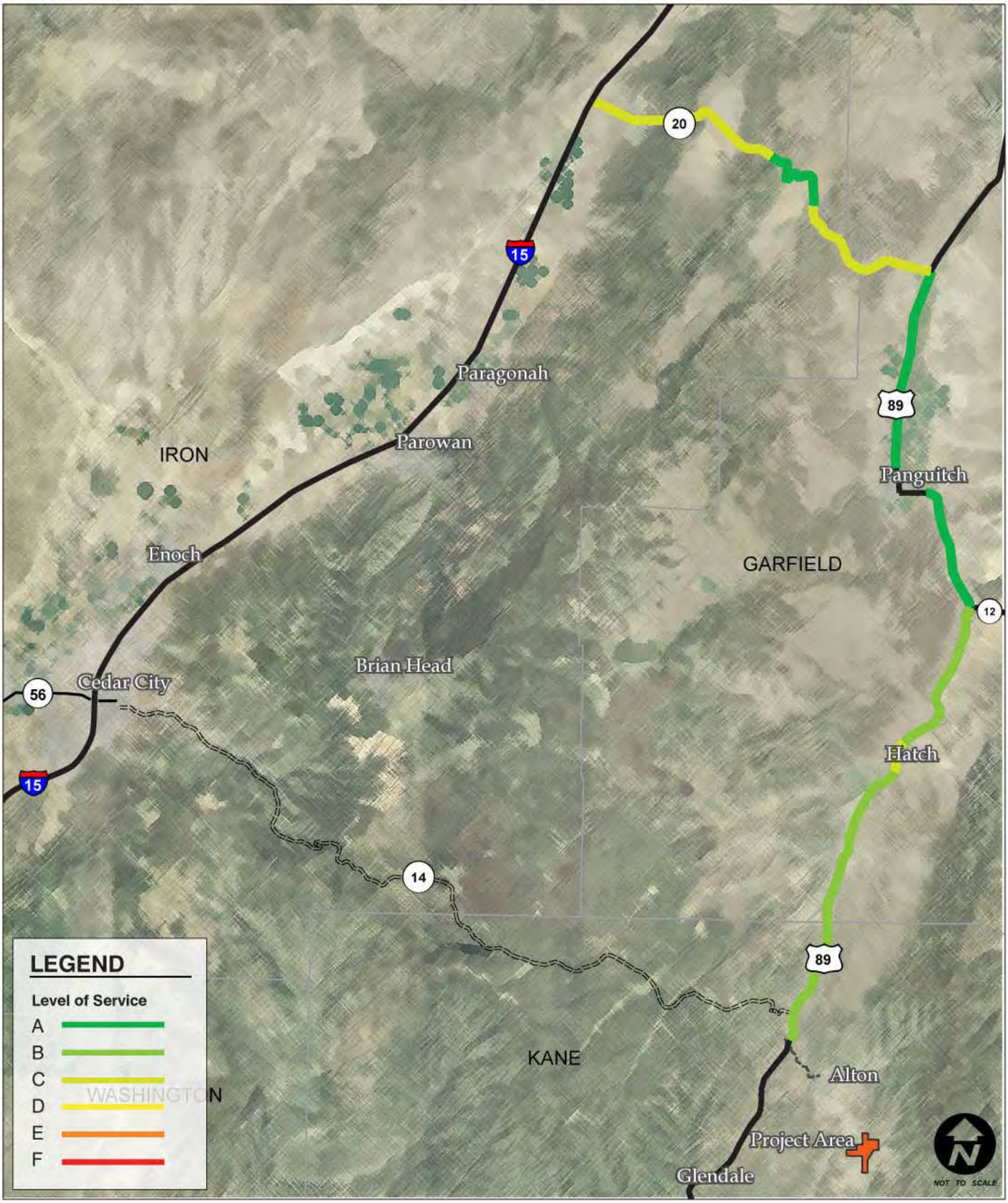
EXISTING PLUS TRUCKS
WEEKDAY DIRECTIONAL LEVELS OF SERVICE
COAL HOLLOW TRAFFIC TECHNICAL REPORT

FIGURE 8



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EXISTING PLUS TRUCKS
WEEKEND DIRECTIONAL LEVELS OF SERVICE
COAL HOLLOW DEVELOPMENT TRAFFIC TECHNICAL REPORT

FIGURE 9

Table 12
Existing Plus Trucks Directional Segment
Peak Hour LOS and Percent Time-Spent-Following

Intersection	Weekday			Weekend		
	Direction	LOS	% Time-Spent-Following	Direction	LOS	% Time-Spent-Following
US-89: Alton to SR-14	NB	A	34.5	NB	B	38.7
US-89: SR-14 to Hatch	NB	B	41.5	NB	B	46.3
US-89: Center of Hatch[1]	NB	C	91.0	NB	C	97.0
US-89: Hatch to SR-12	NB	B	41.1	NB	B	42.4
US-89: SR-12 to Panguitch	NB	A	28.1	NB	A	29.6
US-89: Panguitch to SR-20	NB	A	30.0	NB	A	31.9
SR-20: US-89 to Upslope	WB	C	34.3	WB	C	35.7
SR-20: Upslope to Summit[2]	WB	A	11.8	WB	A	14.8
SR-20: Summit to Downslope	WB	C	42.8	WB	C	48.7
SR-20: Downslope to I-15	WB	C	40.1	WB	C	40.9

Notes:
1. The analysis for the center of Hatch was done using HCS HIGHPLAN software due to the reduced highway speeds through town.
2. This segment of roadway was analyzed with a passing lane and as a Class II highway due to the low posted speed limit of 35 mph.

Source: Fehr & Peers, 2008

As shown in Table 12, all roadway segments operate at an LOS C or better.

3.3. Existing Plus Trucks Conditions Summary

Existing plus trucks conditions at the study intersections continue to have low delays per vehicle and little to no congestion. The intersections continue to operate at acceptable LOS with the additional heavy coal trucks. Existing plus trucks conditions on the study roadways are low volumes with a substantial amount of capacity for future growth.

4. Future 2020 Background Conditions

This section of the report describes the future 2020 background study area characteristics. The purpose of the 2020 background analysis is to evaluate the intersections and roadways during the peak travel periods of the day under future 2020 traffic and geometric conditions. Technical data supporting these findings are included in the appendix.

4.1. Roadway Characteristics

The study corridor for the 2020 background conditions consists of the same geometry as the existing conditions.

4.2. Traffic Forecasting Process

Twenty years of UDOT's historic data was used to develop the future 2020 traffic volumes for the roadways and intersections in the study area. The resulting future 2020 a.m. and p.m. peak hour traffic volumes are shown in Figure 10 on page 27. Table 13 shows the future 2020 ADT for the respective roadways.

Traffic volumes for the future year 2020 were forecasted using the following linear growth rates for thirteen years:

- 3.6% for US-89, SR-14 to Garfield County Line
- 1.8% for US-89, Garfield County Line to Hatch
- 2.1% for US-89, Hatch to SR-12
- 1.9% for US-89, SR-12 to east side of Panguitch
- 1.9% for US-89, East side of Panguitch to SR-143
- 1.5% for US-89, SR-143 to north side of Panguitch
- 1.8% for US-89, North side of Panguitch to SR-20
- 2.3% for SR-14, SR-148 to US-89
- 3.5% for SR-20, US-89 to Iron County Line
- 3.6% for SR-20, Iron County Line to I-15
- 1.1% for SR-56, I-15 Junction

Table 13
Future 2020 Average Daily Traffic (ADT) Volumes

Location	Direction of Travel		Total
	Northbound[1]	Southbound[2]	
US-89 (south of SR-14)	3,100	2,750	5,850
US-89 (north of SR-12)	2,600	2,500	5,100
US-89 (south of SR-20)	2,200	2,200	4,400
SR-20 (east of summit)	1,800	1,800	3,600

1. Eastbound for the count on SR-20
2. Westbound for the count on SR-20
Source: Fehr & Peers, 2008

4.3. Future 2020 Background Traffic Conditions Results

The future 2020 background conditions analysis was done using HCS software for the unsignalized intersections and Synchro 6.0 software was used for the signalized intersection. HCS was also used for the roadway segment LOS analysis.

4.3.1. Intersection Conditions

Future 2020 background conditions MOEs are reported in LOS and delay. Table 14 displays the future 2020 a.m. LOS and delay for the study intersections. Figure 10 shows the future 2020 a.m. and p.m. intersection volumes and LOS results.

Table 14
Future 2020 a.m. Peak Hour LOS and Delay

Intersection	Worst Approach[1]			Overall Intersection[2]	
	Approach	LOS	Delay	LOS	Delay
US-89 / SR-14	EB	A	9.9	A	3.6
US-89 / SR-12	WB	A	9.8	A	6.0
US-89 / SR-143 (Main St.)	SB	A	9.1	A	8.4
US-89 / SR-20	NB	A	9.5	A	8.0
I-15 SB Off-ramp / SR-56				C	20.4

Notes:
1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).

Source: Fehr & Peers, 2008

As shown in Table 14, all intersections operate at LOS C or better during the a.m. peak hour. Table 15 displays the future 2020 p.m. LOS and delay for the study intersections.

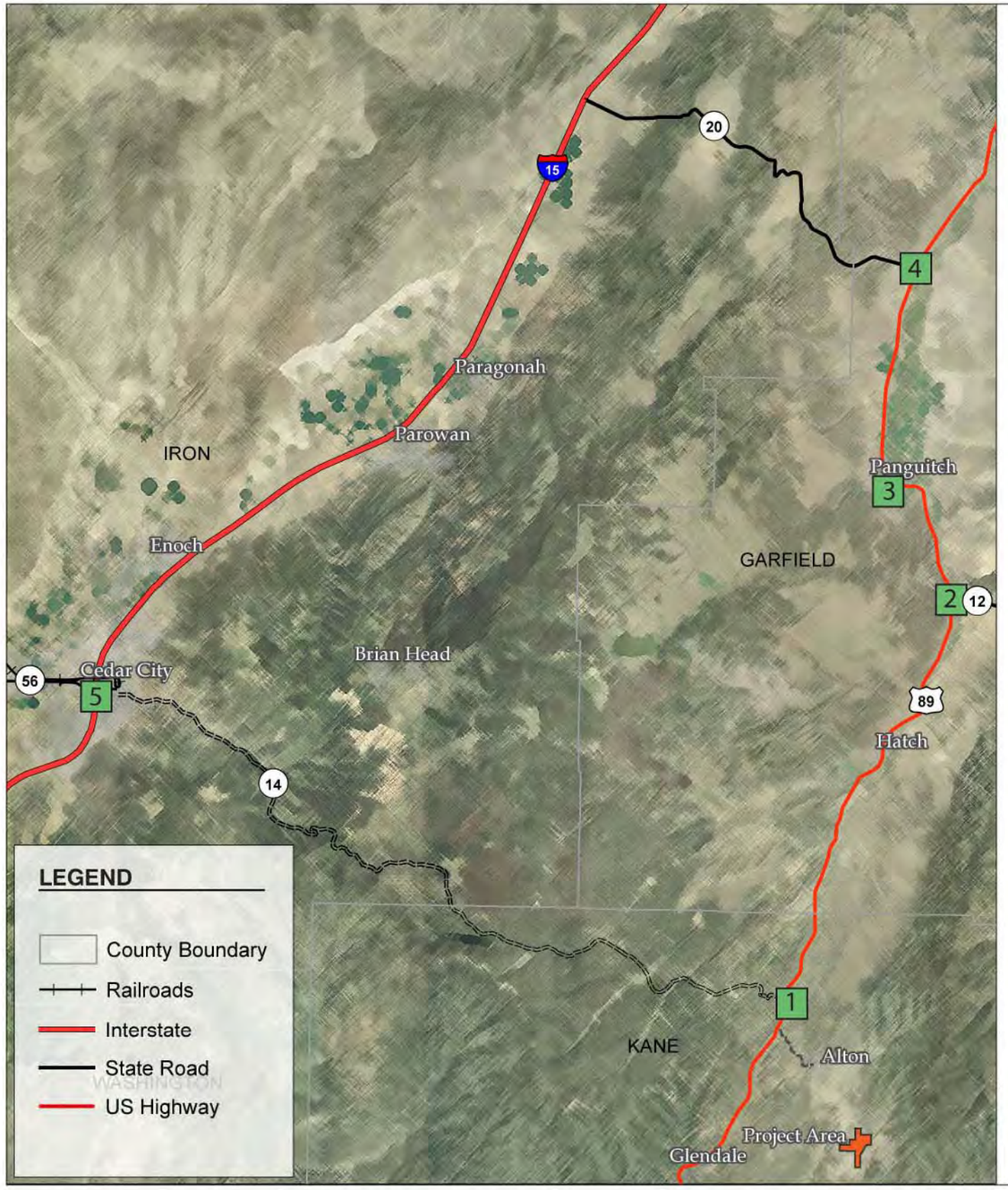
Table 15
Future 2020 p.m. Peak Hour LOS and Delay

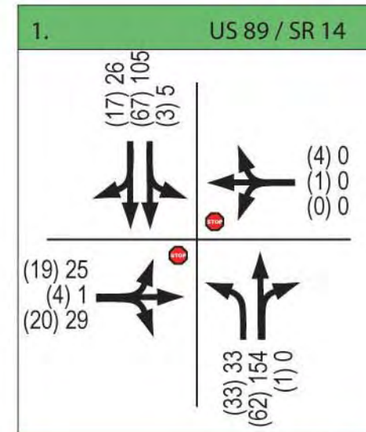
Intersection	Worst Approach[1]			Overall Intersection[2]	
	Approach	LOS	Delay	LOS	Delay
US-89 / SR-14	EB	B	10.7	A	2.5
US-89 / SR-12	WB	B	10.1	A	5.0
US-89 / SR-143 (Main St.)	SB	B	10.5	A	9.8
US-89 / SR-20	NB	B	10.1	A	7.7
I-15 SB Off-ramp / SR-56				C	19.5

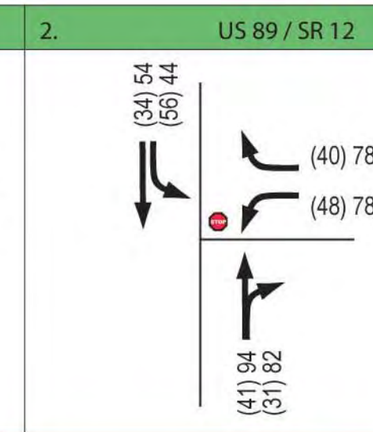
Notes:
1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).

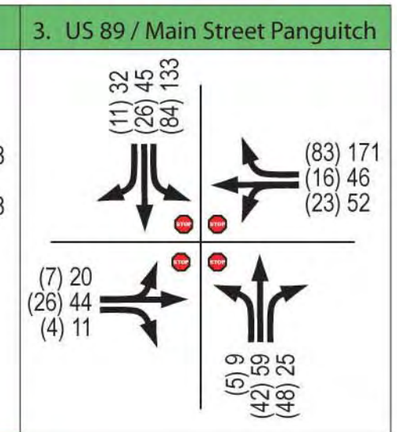
Source: Fehr & Peers, 2008

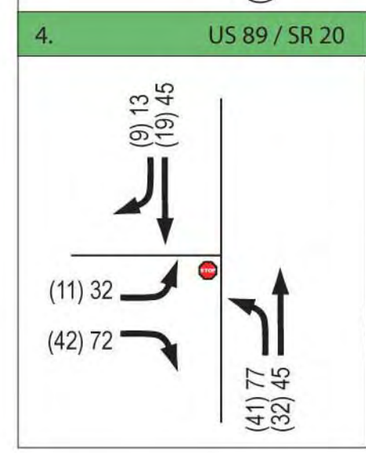
As shown in Table 15, all intersections operate at LOS C or better during the p.m. peak hour.

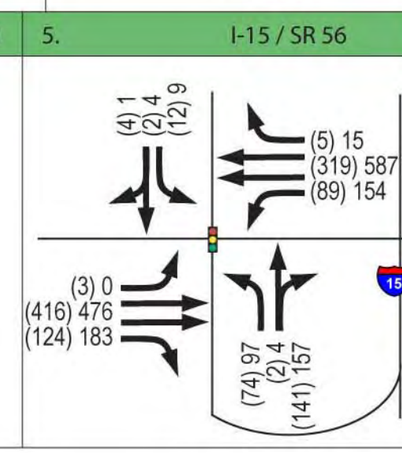












LEGEND

- Traffic Signal
- Stop Sign
- (XX) am Peak Hour Trips
- XX pm Peak Hour Trips
- LOS A-D
- LOS E
- LOS F

NOT TO SCALE

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FUTURE 2020 A.M. & P.M. TRAFFIC CONDITIONS
COAL HOLLOW DEVELOPMENT TRAFFIC TECHNICAL REPORT
FIGURE 10

4.3.2. Directional Segment Conditions

Future 2020 background conditions MOEs for the two-lane highway directional segment analysis are reported in LOS and Percent Time-Spent-Following. Table 16 displays the future 2020 weekday and weekend LOS and Percent Time-Spent-Following for the study roadway segments. Figures 11 and 12 show the results of the weekday and weekend directional segment LOS analysis.

Table 16
Future 2020 Directional Segment
Peak Hour LOS and Percent Time-Spent-Following

Intersection	Weekday			Weekend		
	Direction	LOS	% Time-Spent-Following	Direction	LOS	% Time-Spent-Following
US-89: Alton to SR-14	NB	B	45.8	NB	C	51.4
US-89: SR-14 to Hatch	NB	B	49.4	NB	C	54.8
US-89: Center of Hatch[1]	NB	C	95.0	NB	C	99.0
US-89: Hatch to SR-12	NB	B	47.5	NB	B	49.0
US-89: SR-12 to Panguitch	NB	A	33.0	NB	A	34.8
US-89: Panguitch to SR-20	NB	A	32.0	NB	B	39.9
SR-20: US-89 to Upslope	WB	D	35.7	WB	D	49.5
SR-20: Upslope to Summit[2]	WB	A	14.2	WB	A	18.5
SR-20: Summit to Downslope	WB	C	48.8	WB	D	63.0
SR-20: Downslope to I-15	WB	C	40.9	WB	C	55.2

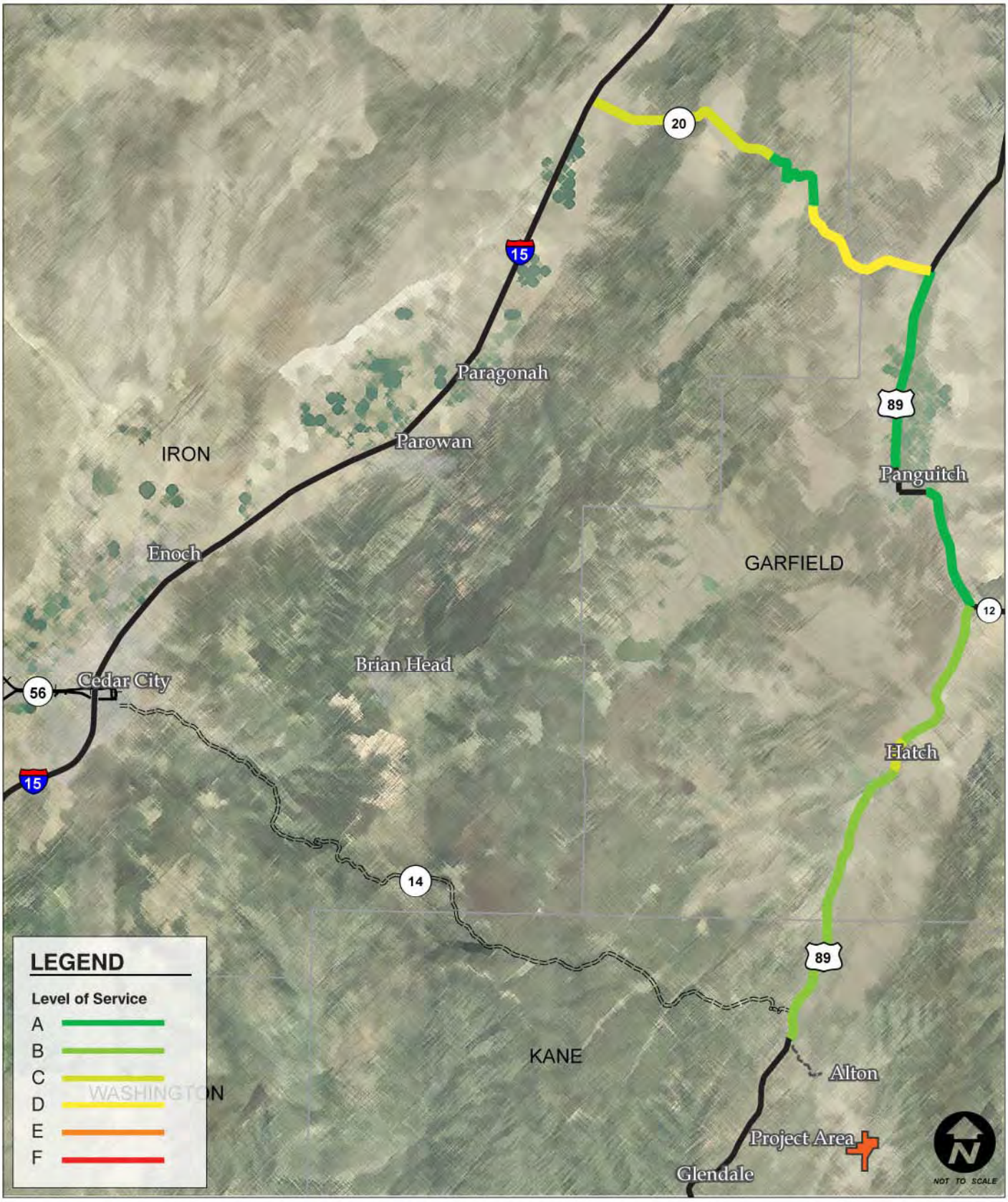
Notes:
1. The analysis for the center of Hatch was done using HCS HIGHPLAN software due to the reduced highway speeds through town.
2. This segment of roadway was analyzed with a passing lane and as a Class II highway due to the low posted speed limit of 25 mph.

Source: Fehr & Peers, 2008

As shown in Table 16, all roadway segments operate at an LOS D or better.

4.4. Future 2020 Background Conditions Summary

Future 2020 background conditions at the study intersections continue to have low delays per vehicle and little to no congestion. Future 2020 conditions on the study roadways continue to have relatively low traffic volumes and traffic is expected to travel at free flow speeds.



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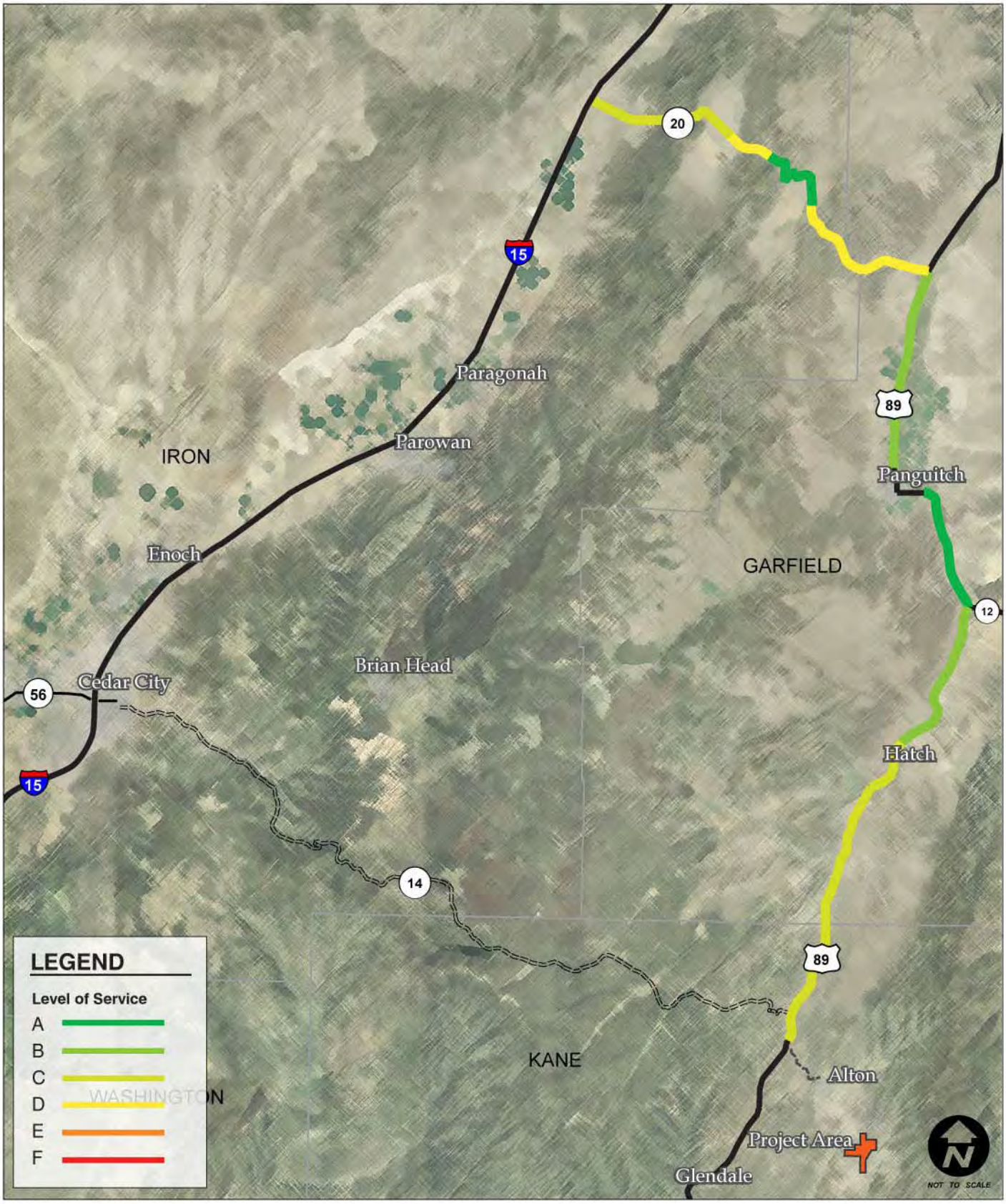
FUTURE 2020 BACKGROUND
WEEKDAY DIRECTIONAL LEVELS OF SERVICE
COAL HOLLOW TRAFFIC TECHNICAL REPORT

FIGURE 11



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FUTURE 2020 BACKGROUND
WEEKEND DIRECTIONAL LEVELS OF SERVICE
COAL HOLLOW DEVELOPMENT TRAFFIC TECHNICAL REPORT

FIGURE 12

5. Future 2020 Plus Trucks Conditions

This section of the report describes the future 2020 plus trucks study area characteristics. The purpose of the future 2020 plus trucks analysis is to evaluate the intersections and roadways during the peak travel periods of the day under future 2020 traffic and geometric conditions plus the additional coal trucks that are proposed with the project coal mine. Technical data supporting these findings are included in the appendix.

5.1. Roadway Characteristics

The study roadways for the future 2020 plus trucks conditions consists of the same geometry as the existing plus trucks conditions.

5.2. Future 2020 Plus Trucks Traffic Conditions Results

The future 2020 plus trucks conditions analysis was done using HCS software for the unsignalized intersections and Synchro 6.0 software was used for the signalized intersection. HCS was also used for the roadway segment LOS analysis. As a conservative measure seven trucks an hour was used in the analysis.

5.2.1. Intersection Conditions

Future plus trucks conditions MOEs are reported in LOS and delay. Table 17 displays the future 2020 plus trucks a.m. LOS and delay for the study intersections. Figure 13 shows the a.m. and p.m. intersection volumes and LOS results.

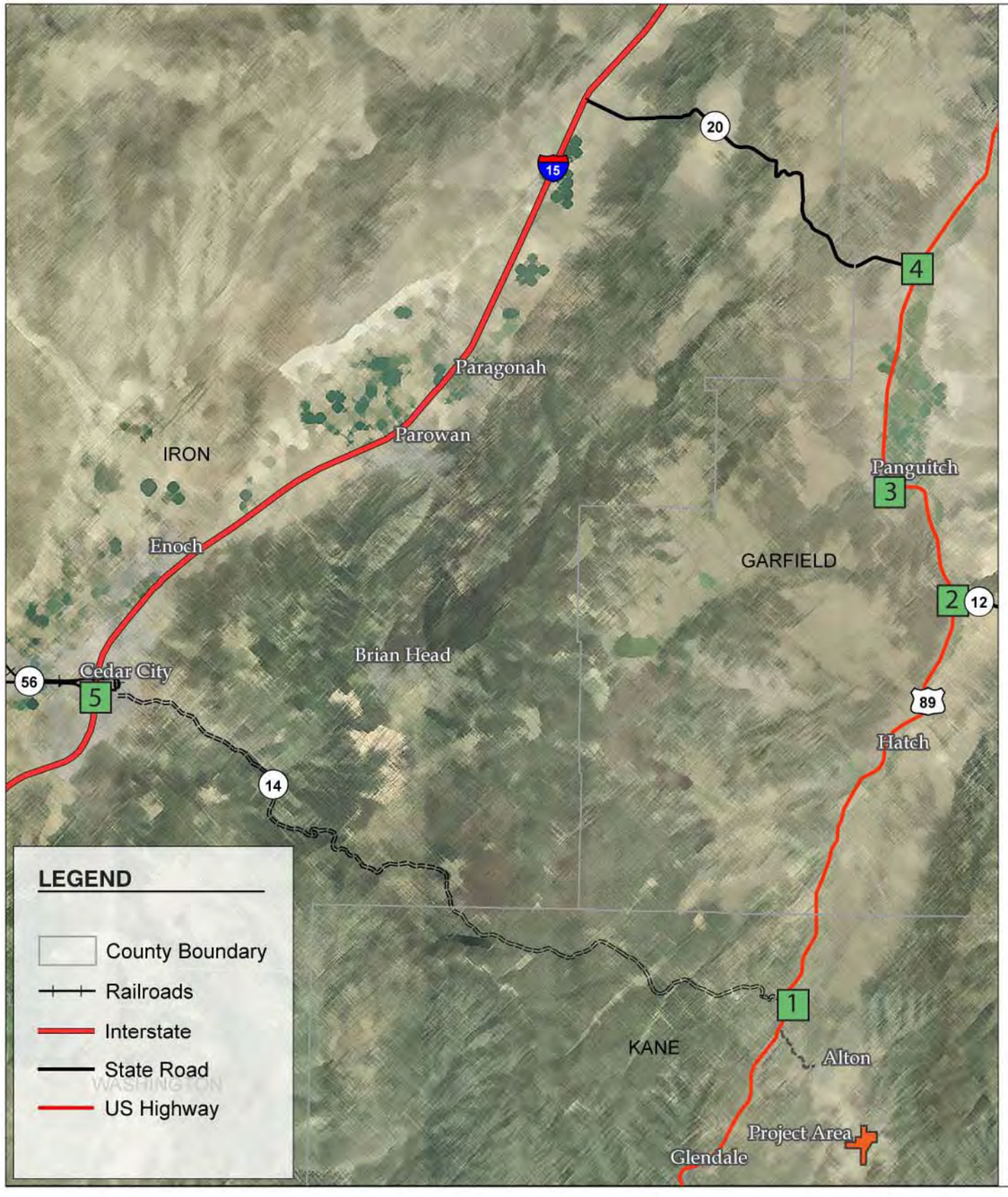
Table 17
Future 2020 Plus Trucks a.m. Peak Hour LOS and Delay

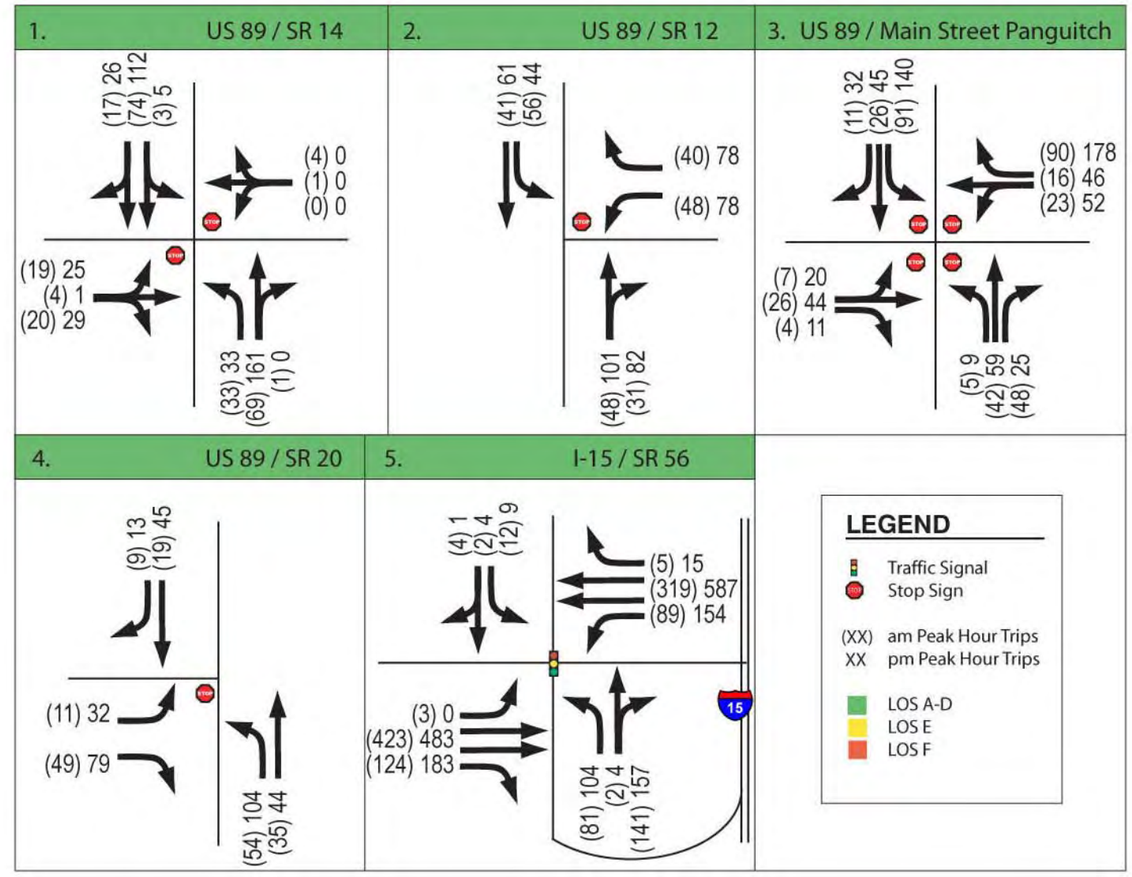
Intersection	Worst Approach[1]			Overall Intersection[2]	
	Approach	LOS	Delay	LOS	Delay
US-89 / SR-14	EB	B	10.0	A	3.4
US-89 / SR-12	WB	A	9.9	A	5.2
US-89 / SR-143 (Main St.)	SB	A	9.3	A	8.6
US-89 / SR-20	NB	A	9.6	A	7.9
I-15 SB Off-ramp / SR-56				C	20.2

Notes:
1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).

Source: Fehr & Peers, 2008

As shown in Table 17, all intersections operate at LOS C or better during the a.m. peak hour.





NOT TO SCALE

FEHR & PEERS
TRANSPORTATION CONSULTANTS

FUTURE 2020 PLUS TRUCKS A.M. & P.M. TRAFFIC CONDITIONS
COAL HOLLOW DEVELOPMENT TRAFFIC TECHNICAL REPORT
FIGURE 13

Table 18 displays the future 2020 plus trucks p.m. LOS and delay for the study intersections.

Table 18
Future 2020 Plus Trucks p.m. Peak Hour LOS and Delay

Intersection	Worst Approach[1]			Overall Intersection[2]	
	Approach	LOS	Delay	LOS	Delay
US-89 / SR-14	EB	B	10.8	A	2.4
US-89 / SR-12	WB	B	10.2	A	4.9
US-89 / SR-143 (Main St.)	SB	B	10.8	B	10.0
US-89 / SR-20	NB	B	10.2	A	7.7
I-15 SB Off-ramp / SR-56				B	19.4

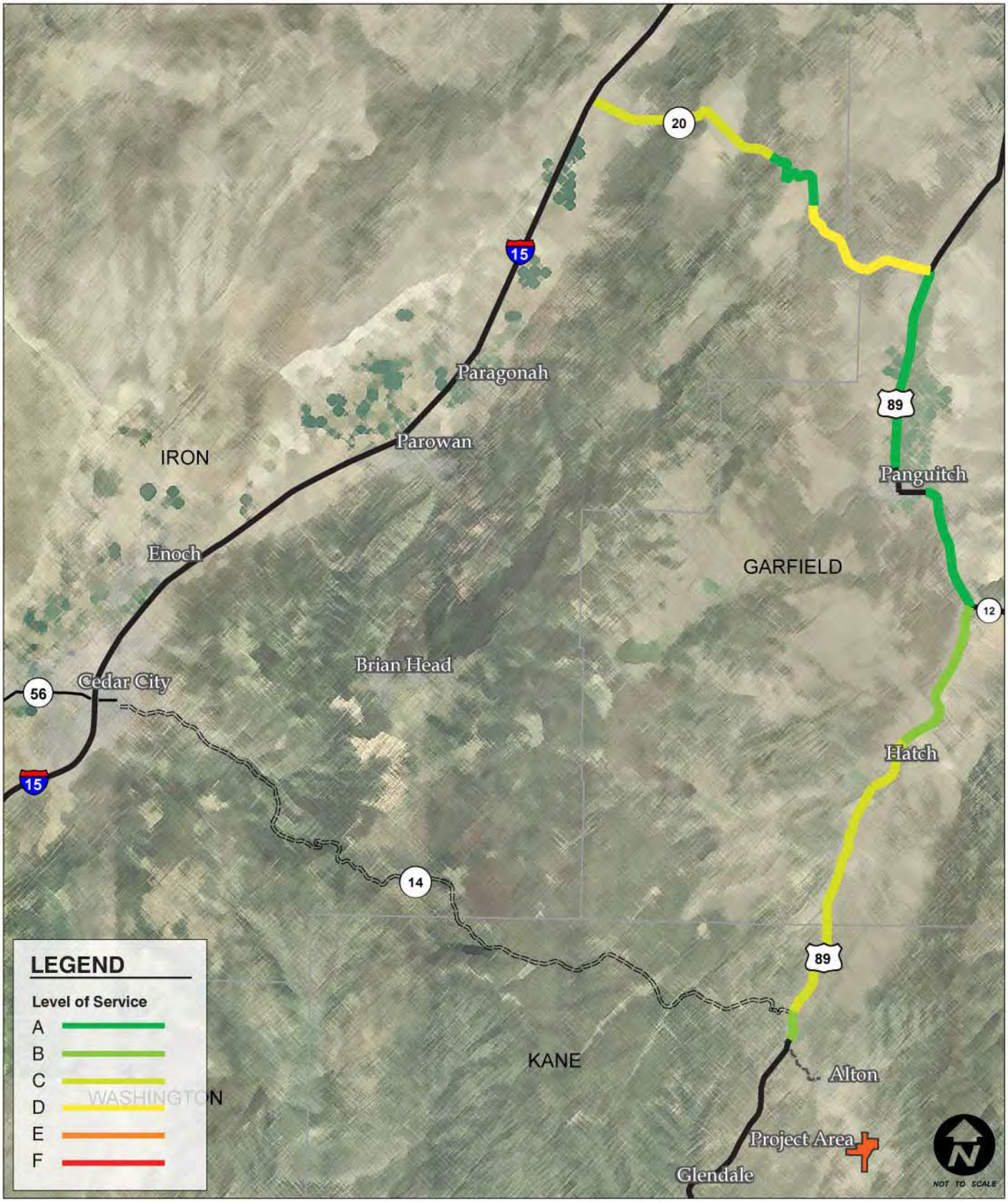
Notes:
1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle).

Source: Fehr & Peers, 2008

As shown in Table 18, all intersections operate at LOS B or better during the p.m. peak hour.

5.2.2. Directional Segment Conditions

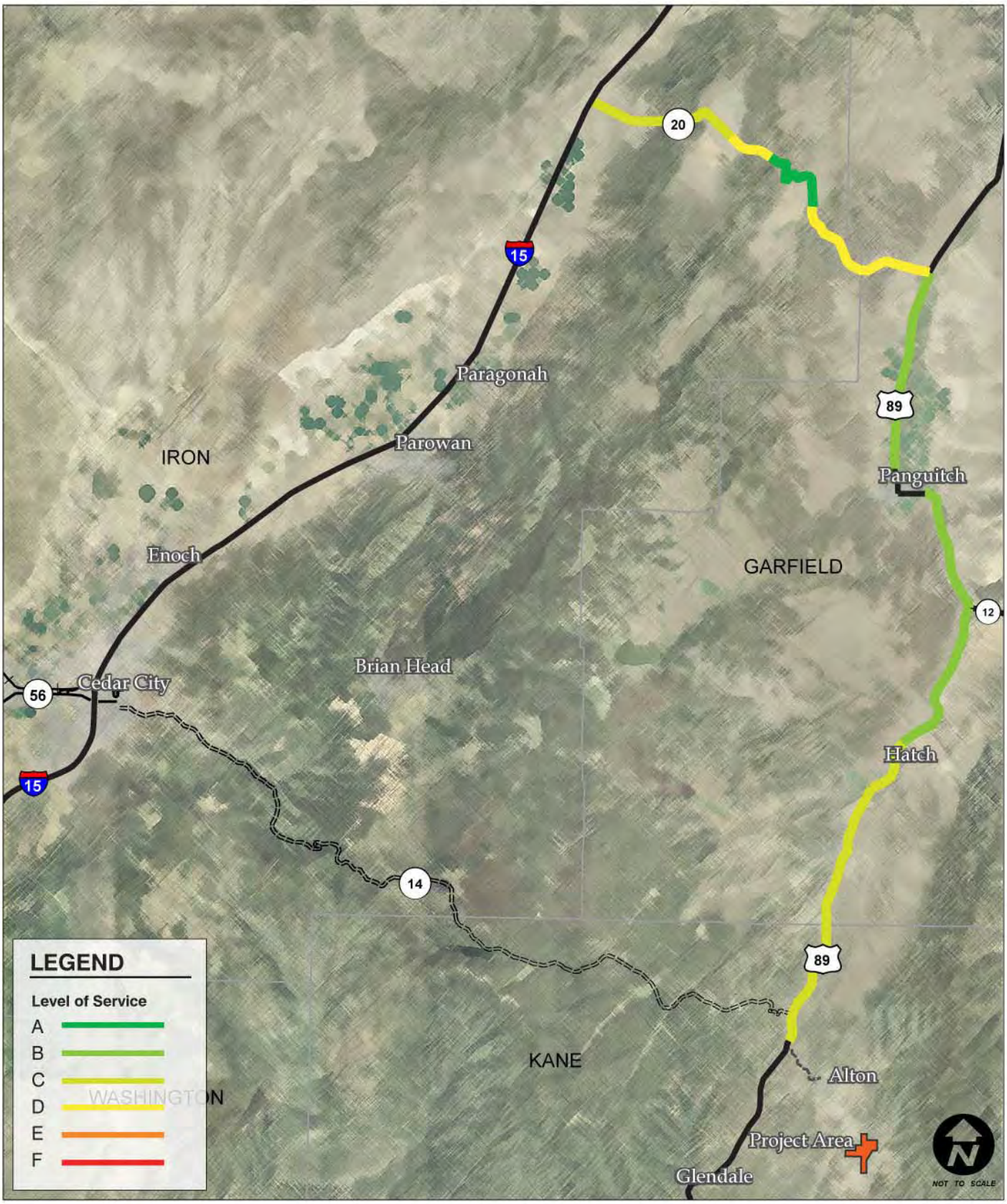
Future 2020 plus trucks conditions MOEs for the two-lane highway directional segment analysis are reported in LOS and Percent Time-Spent-Following. Table 19 displays the existing plus trucks weekday and weekend LOS and Percent Time-Spent-Following for the study roadway segments. Figures 14 and 15 show the results of the weekday and weekend directional segment LOS analysis.



FEHR & PEERS
TRANSPORTATION CONSULTANTS

FUTURE 2020 PLUS TRUCKS
WEEKDAY DIRECTIONAL LEVELS OF SERVICE
COAL HOLLOW DEVELPMENT TRAFFIC TECHNICAL REPORT

FIGURE 14



FEHR & PEERS
TRANSPORTATION CONSULTANTS

FUTURE 2020 PLUS TRUCKS
WEEKEND DIRECTIONAL LEVELS OF SERVICE
COAL HOLLOW TRAFFIC TECHNICAL REPORT

FIGURE 15

Table 19
Future 2020 Plus Trucks Directional Segment
Peak Hour LOS and Percent Time-Spent-Following

Intersection	Weekday			Weekend		
	Direction	LOS	% Time-Spent-Following	Direction	LOS	% Time-Spent-Following
US-89: Alton to SR-14	NB	B	47.0	NB	C	52.4
US-89: SR-14 to Hatch	NB	C	50.3	NB	C	55.6
US-89: Center of Hatch[1]	NB	C	96.0	NB	C	99.0
US-89: Hatch to SR-12	NB	B	48.7	NB	B	49.8
US-89: SR-12 to Panguitch	NB	A	34.1	NB	B	35.7
US-89: Panguitch to SR-20	NB	A	33.8	NB	B	41.0
SR-20: US-89 to Upslope	WB	D	36.8	WB	D	50.9
SR-20: Upslope to Summit[2]	WB	A	15.4	WB	A	19.7
SR-20: Summit to Downslope	WB	C	50.3	WB	D	65.8
SR-20: Downslope to I-15	WB	C	42.5	WB	C	56.6

Notes:
1. The analysis for the center of Hatch was done using HCS HIGHPLAN software due to the reduced highway speeds through town.
2. This segment of roadway was analyzed with a passing lane and as a Class II highway due to the low posted speed limit of 35 mph.

Source: Fehr & Peers, 2008

As shown in Table 19, all roadway segments operate at an LOS D or better.

5.3. Future 2020 Plus Trucks Conditions Summary

Future 2020 plus trucks conditions at the study intersections continue to have low delays per vehicle and little to no congestion. Future 2020 plus trucks conditions on the study roadways continue to have relatively low traffic volumes and traffic is expected to travel at free flow speeds. Based upon the accident history, there are not a lot of accidents involving truck traffic.

6. Commonly Used Acronyms

Table 20 Commonly Used Acronyms	
Acronym	**Definition**
ADT	Average Daily Traffic
GPS	Global Positioning System
HCM 2000	Highway Capacity Manual 2000
HCS	Highway Capacity Software
LOS	Level of Service
MOE	Measures of Effectiveness
MP	Mile Post
OSR	Operational Safety Report
UDOT	Utah Department of Transportation

7. References

Transportation Research Board. Highway Capacity Manual 2000. Washington, D. C.: National Research Council, 2000.

Utah Department of Transportation. Operational Safety Report #07-037; US-89, MP 90.04 to MP 156.36 (Glendale to Jct. SR-20). Safety Evaluation. UDOT, 2007.

Utah Department of Transportation. Operational Safety Report #07-038; SR-20, MP 0.00 to MP 20.61. (I-15 to Jct. US-89). Safety Evaluation. UDOT, 2007.

Utah Department of Transportation. Operational Safety Report #07-039; I-15, MP 59.05 to MP 100.02 (Cedar City to SR-20). Safety Evaluation. UDOT, 2007.

Utah Department of Transportation. Operational Safety Report #07-040; SR-56, MP 9.80 to MP 61.39. Safety Evaluation. UDOT, 2007.

Utah Department of Transportation, Division of Traffic and Safety. CARS Codes. UDOT, 2001.

APPENDIX

APPENDIX A
Traffic Counts

L2 Data Collection

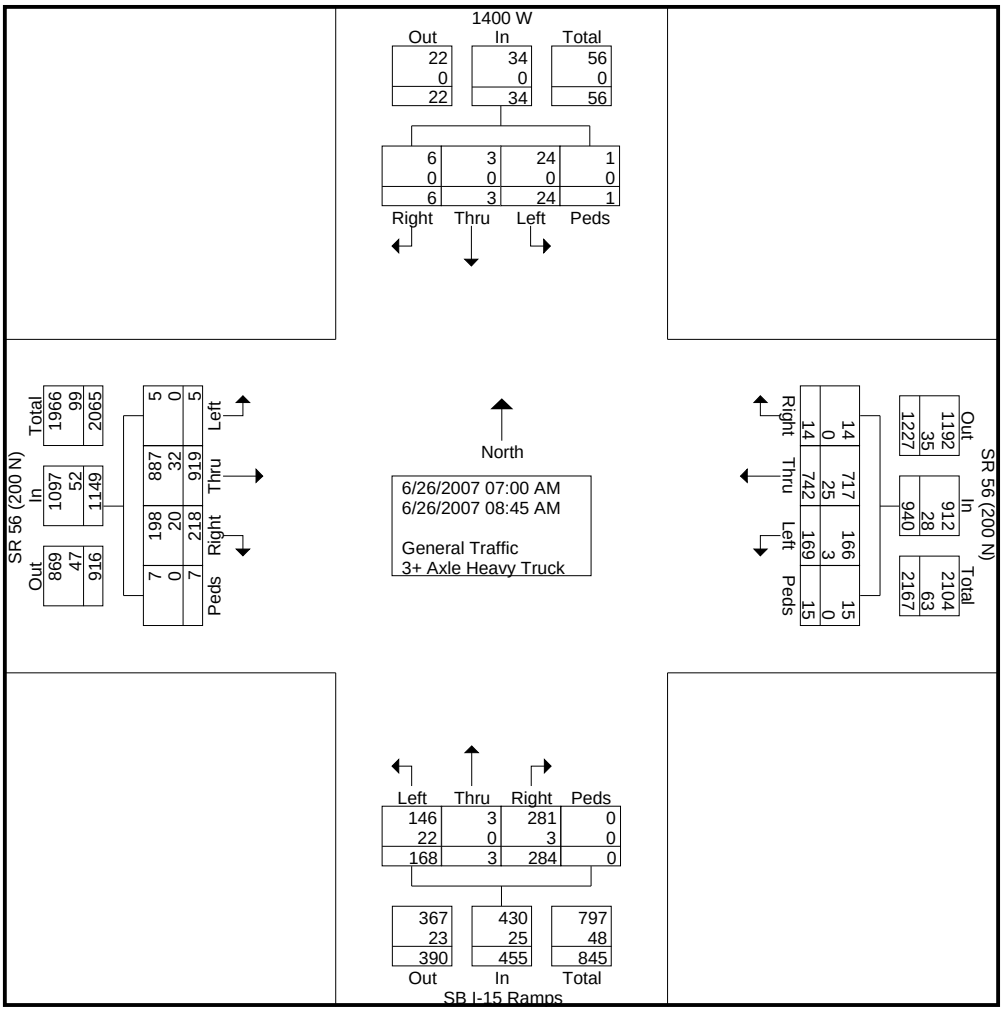
1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: I-15 SB Ramps / SR 56
City, State: Cedar City, Utah
Control: Signalized

File Name : 56 SB Ramps AM
Site Code : 1
Start Date : 6/26/2007
Page No : 1

Groups Printed- General Traffic - 3+ Axle Heavy Truck

	1400 W From North					SR 56 (200 N) From East					SB I-15 Ramps From South					SR 56 (200 N) From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	1	0	4	0	5	1	101	16	0	118	25	1	27	0	53	36	76	0	1	113	289
07:15 AM	0	2	1	0	3	2	76	12	2	92	24	1	28	0	53	23	89	0	1	113	261
07:30 AM	2	0	3	1	6	1	76	19	2	98	34	0	23	0	57	16	101	1	2	120	281
07:45 AM	0	0	4	0	4	3	91	38	4	136	66	0	24	0	90	27	127	1	2	157	387
Total	3	2	12	1	18	7	344	85	8	444	149	2	102	0	253	102	393	2	6	503	1218
08:00 AM	1	0	2	0	3	0	103	16	0	119	35	0	21	0	56	29	124	2	0	155	333
08:15 AM	0	0	1	0	1	2	94	17	3	116	27	0	12	0	39	32	111	0	0	143	299
08:30 AM	1	0	4	0	5	3	95	30	4	132	35	0	17	0	52	22	121	1	0	144	333
08:45 AM	1	1	5	0	7	2	106	21	0	129	38	1	16	0	55	33	170	0	1	204	395
Total	3	1	12	0	16	7	398	84	7	496	135	1	66	0	202	116	526	3	1	646	1360
Grand Total	6	3	24	1	34	14	742	169	15	940	284	3	168	0	455	218	919	5	7	1149	2578
Apprch %	17.6	8.8	70.6	2.9		1.5	78.9	18	1.6		62.4	0.7	36.9	0		19	80	0.4	0.6		
Total %	0.2	0.1	0.9	0	1.3	0.5	28.8	6.6	0.6	36.5	11	0.1	6.5	0	17.6	8.5	35.6	0.2	0.3	44.6	
General Traffic	6	3	24	1	34	14	717	166	15	912	281	3	146	0	430	198	887	5	7	1097	2473
% General Traffic	100	100	100	100	100	100	96.6	98.2	100	97	98.9	100	86.9	0	94.5	90.8	96.5	100	100	95.5	95.9
3+ Axle Heavy Truck	0	0	0	0	0	0	25	3	0	28	3	0	22	0	25	20	32	0	0	52	105
% 3+ Axle Heavy Truck	0	0	0	0	0	0	3.4	1.8	0	3	1.1	0	13.1	0	5.5	9.2	3.5	0	0	4.5	4.1



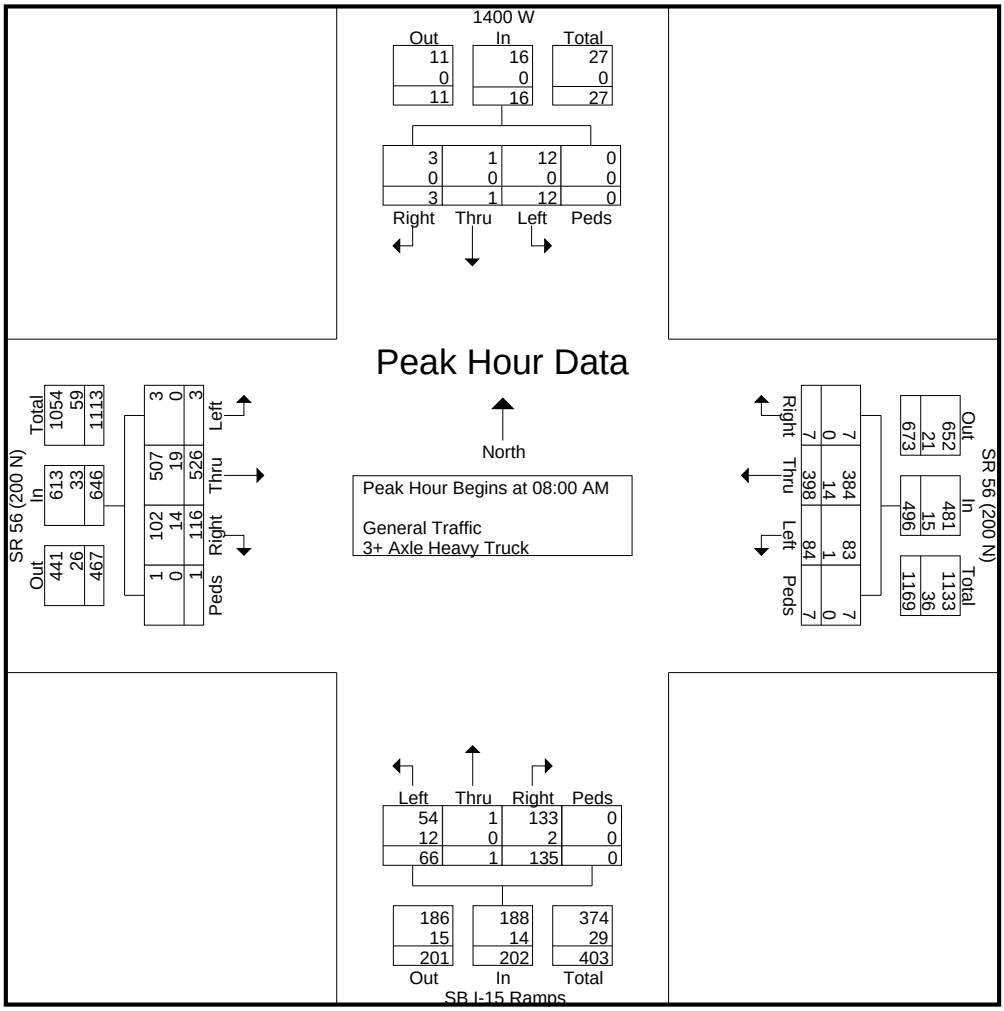
L2 Data Collection

1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: I-15 SB Ramps / SR 56
City, State: Cedar City, Utah
Control: Signalized

File Name : 56 SB Ramps AM
Site Code : 1
Start Date : 6/26/2007
Page No : 2

	1400 W From North					SR 56 (200 N) From East					SB I-15 Ramps From South					SR 56 (200 N) From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	**1**	0	2	0	3	0	103	16	0	119	35	0	**21**	0	**56**	29	124	**2**	0	155	333
08:15 AM	0	0	1	0	1	2	94	17	3	116	27	0	12	0	39	32	111	0	0	143	299
08:30 AM	1	0	4	0	5	**3**	95	**30**	**4**	**132**	35	0	17	0	52	22	121	1	0	144	333
08:45 AM	1	**1**	**5**	0	**7**	2	**106**	21	0	129	**38**	**1**	16	0	55	**33**	**170**	0	**1**	**204**	**395**
Total Volume	3	1	12	0	16	7	398	84	7	496	135	1	66	0	202	116	526	3	1	646	1360
% App. Total	18.8	6.2	75	0		1.4	80.2	16.9	1.4		66.8	0.5	32.7	0		18	81.4	0.5	0.2		
PHF	.750	.250	.600	.000	.571	.583	.939	.700	.438	.939	.888	.250	.786	.000	.902	.879	.774	.375	.250	.792	.861
General Traffic	3	1	12	0	16	7	384	83	7	481	133	1	54	0	188	102	507	3	1	613	1298
% General Traffic	100	100	100	0	100	100	96.5	98.8	100	97.0	98.5	100	81.8	0	93.1	87.9	96.4	100	100	94.9	95.4
3+ Axle Heavy Truck	0	0	0	0	0	0	14	1	0	15	2	0	12	0	14	14	19	0	0	33	62
% 3+ Axle Heavy Truck	0	0	0	0	0	0	3.5	1.2	0	3.0	1.5	0	18.2	0	6.9	12.1	3.6	0	0	5.1	4.6



L2 Data Collection

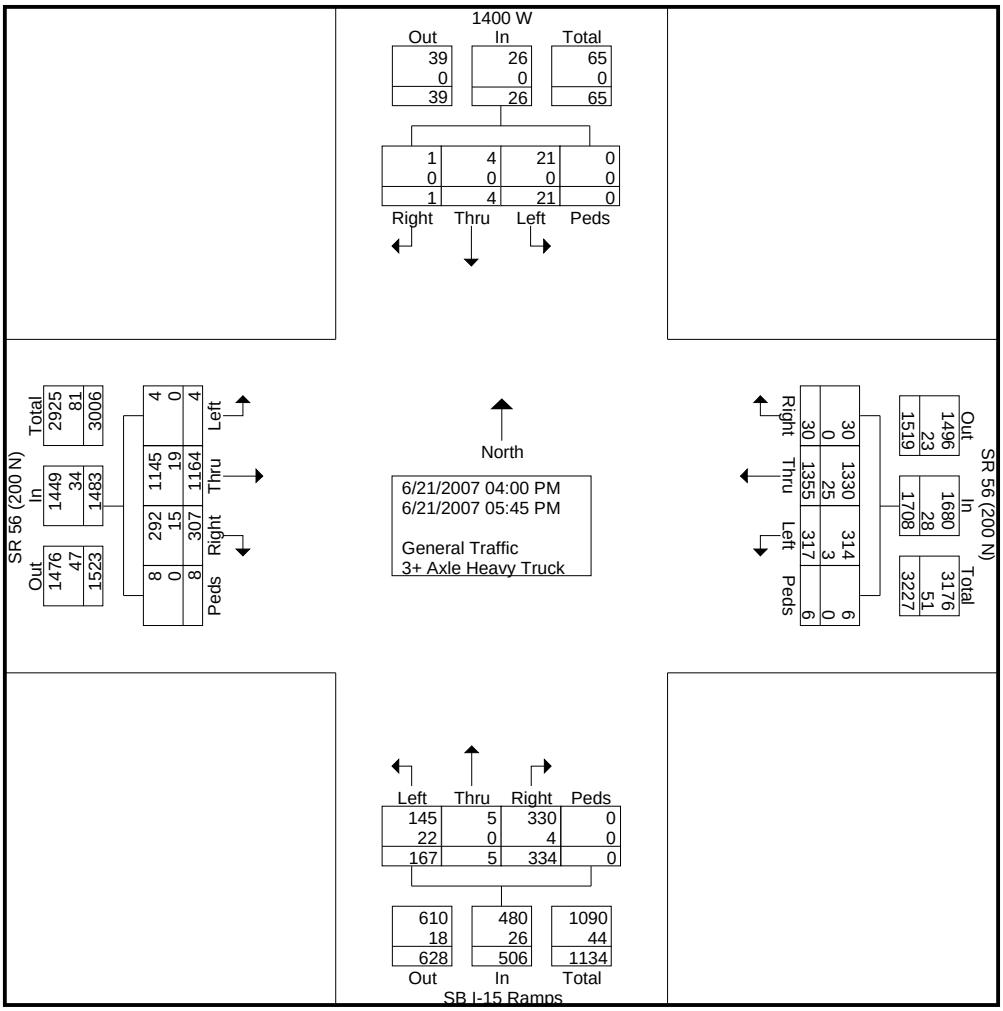
1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: I-15 SB Ramps / SR 56
City, State: Cedar City, Utah
Control: Signalized

File Name : 56 SB Ramps PM
Site Code : 1
Start Date : 6/21/2007
Page No : 1

Groups Printed- General Traffic - 3+ Axle Heavy Truck

	1400 W From North					SR 56 (200 N) From East					SB I-15 Ramps From South					SR 56 (200 N) From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	1	4	0	5	3	134	57	2	196	41	0	20	0	61	30	122	3	1	156	418
04:15 PM	0	1	0	0	1	3	150	28	2	183	47	2	20	0	69	40	132	1	2	175	428
04:30 PM	0	0	1	0	1	3	171	43	0	217	39	1	15	0	55	31	153	0	0	184	457
04:45 PM	0	0	3	0	3	2	168	45	1	216	42	1	24	0	67	47	155	0	1	203	489
Total	0	2	8	0	10	11	623	173	5	812	169	4	79	0	252	148	562	4	4	718	1792
05:00 PM	0	0	3	0	3	6	206	35	0	247	30	0	22	0	52	39	153	0	0	192	494
05:15 PM	1	1	2	0	4	3	193	40	0	236	34	1	17	0	52	38	146	0	4	188	480
05:30 PM	0	1	3	0	4	5	173	31	0	209	44	0	24	0	68	47	152	0	0	199	480
05:45 PM	0	0	5	0	5	5	160	38	1	204	57	0	25	0	82	35	151	0	0	186	477
Total	1	2	13	0	16	19	732	144	1	896	165	1	88	0	254	159	602	0	4	765	1931
Grand Total	1	4	21	0	26	30	1355	317	6	1708	334	5	167	0	506	307	1164	4	8	1483	3723
Apprch %	3.8	15.4	80.8	0		1.8	79.3	18.6	0.4		66	1	33	0		20.7	78.5	0.3	0.5		
Total %	0	0.1	0.6	0	0.7	0.8	36.4	8.5	0.2	45.9	9	0.1	4.5	0	13.6	8.2	31.3	0.1	0.2	39.8	
General Traffic	1	4	21	0	26	30	1330	314	6	1680	330	5	145	0	480	292	1145	4	8	1449	3635
% General Traffic	100	100	100	0	100	100	98.2	99.1	100	98.4	98.8	100	86.8	0	94.9	95.1	98.4	100	100	97.7	97.6
3+ Axle Heavy Truck	0	0	0	0	0	0	25	3	0	28	4	0	22	0	26	15	19	0	0	34	88
% 3+ Axle Heavy Truck	0	0	0	0	0	0	1.8	0.9	0	1.6	1.2	0	13.2	0	5.1	4.9	1.6	0	0	2.3	2.4



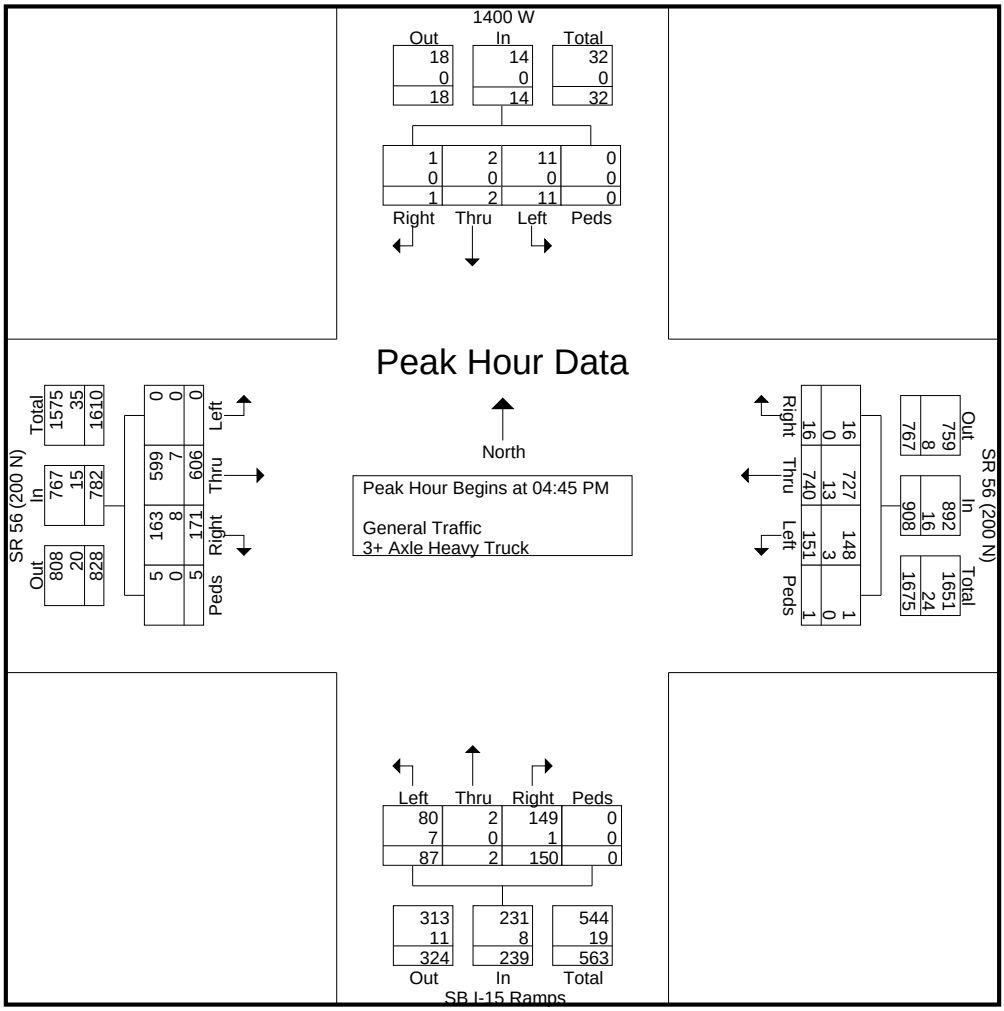
L2 Data Collection

1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: I-15 SB Ramps / SR 56
City, State: Cedar City, Utah
Control: Signalized

File Name : 56 SB Ramps PM
Site Code : 1
Start Date : 6/21/2007
Page No : 2

	1400 W From North					SR 56 (200 N) From East					SB I-15 Ramps From South					SR 56 (200 N) From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	0	**3**	0	3	2	168	**45**	**1**	216	42	**1**	**24**	0	67	**47**	**155**	0	1	**203**	489
05:00 PM	0	0	3	0	3	**6**	**206**	35	0	**247**	30	0	22	0	52	39	153	0	0	192	**494**
05:15 PM	**1**	**1**	2	0	**4**	3	193	40	0	236	34	1	17	0	52	38	146	0	**4**	188	480
05:30 PM	0	1	3	0	4	5	173	31	0	209	**44**	0	24	0	**68**	47	152	0	0	199	480
Total Volume	1	2	11	0	14	16	740	151	1	908	150	2	87	0	239	171	606	0	5	782	1943
% App. Total	7.1	14.3	78.6	0		1.8	81.5	16.6	0.1		62.8	0.8	36.4	0		21.9	77.5	0	0.6		
PHF	.250	.500	.917	.000	.875	.667	.898	.839	.250	.919	.852	.500	.906	.000	.879	.910	.977	.000	.313	.963	.983
General Traffic	1	2	11	0	14	16	727	148	1	892	149	2	80	0	231	163	599	0	5	767	1904
% General Traffic	100	100	100	0	100	100	98.2	98.0	100	98.2	99.3	100	92.0	0	96.7	95.3	98.8	0	100	98.1	98.0
3+ Axle Heavy Truck	0	0	0	0	0	0	13	3	0	16	1	0	7	0	8	8	7	0	0	15	39
% 3+ Axle Heavy Truck	0	0	0	0	0	0	1.8	2.0	0	1.8	0.7	0	8.0	0	3.3	4.7	1.2	0	0	1.9	2.0



L2 Data Collection

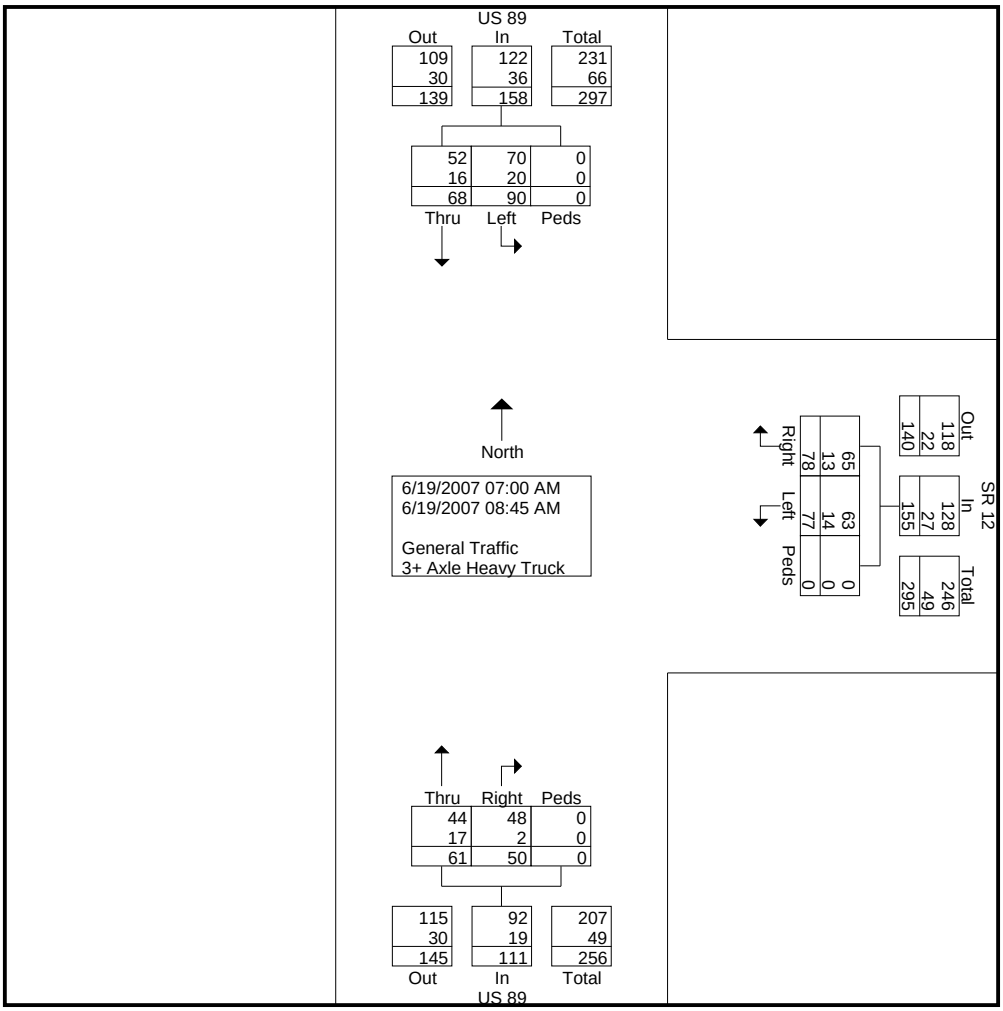
1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Larsen
Intersection: US 89 / SR 12
City, State: Panguitch, Utah
Control: Stop, Yield Signs

File Name : 89 12 AM
Site Code : 4
Start Date : 6/19/2007
Page No : 1

Groups Printed- General Traffic - 3+ Axle Heavy Truck

	US 89 From North				SR 12 From East				US 89 From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
07:00 AM	9	7	0	16	7	5	0	12	4	3	0	7	35
07:15 AM	8	4	0	12	5	7	0	12	1	6	0	7	31
07:30 AM	5	12	0	17	12	11	0	23	8	7	0	15	55
07:45 AM	11	11	0	22	13	7	0	20	6	4	0	10	52
Total	33	34	0	67	37	30	0	67	19	20	0	39	173
08:00 AM	4	9	0	13	8	5	0	13	8	4	0	12	38
08:15 AM	10	16	0	26	11	10	0	21	9	15	0	24	71
08:30 AM	14	11	0	25	8	15	0	23	10	16	0	26	74
08:45 AM	7	20	0	27	14	17	0	31	4	6	0	10	68
Total	35	56	0	91	41	47	0	88	31	41	0	72	251
Grand Total	68	90	0	158	78	77	0	155	50	61	0	111	424
Apprch %	43	57	0		50.3	49.7	0		45	55	0		
Total %	16	21.2	0	37.3	18.4	18.2	0	36.6	11.8	14.4	0	26.2	
General Traffic	52	70	0	122	65	63	0	128	48	44	0	92	342
% General Traffic	76.5	77.8	0	77.2	83.3	81.8	0	82.6	96	72.1	0	82.9	80.7
3+ Axle Heavy Truck													
% 3+ Axle Heavy Truck	23.5	22.2	0	22.8	16.7	18.2	0	17.4	4	27.9	0	17.1	19.3



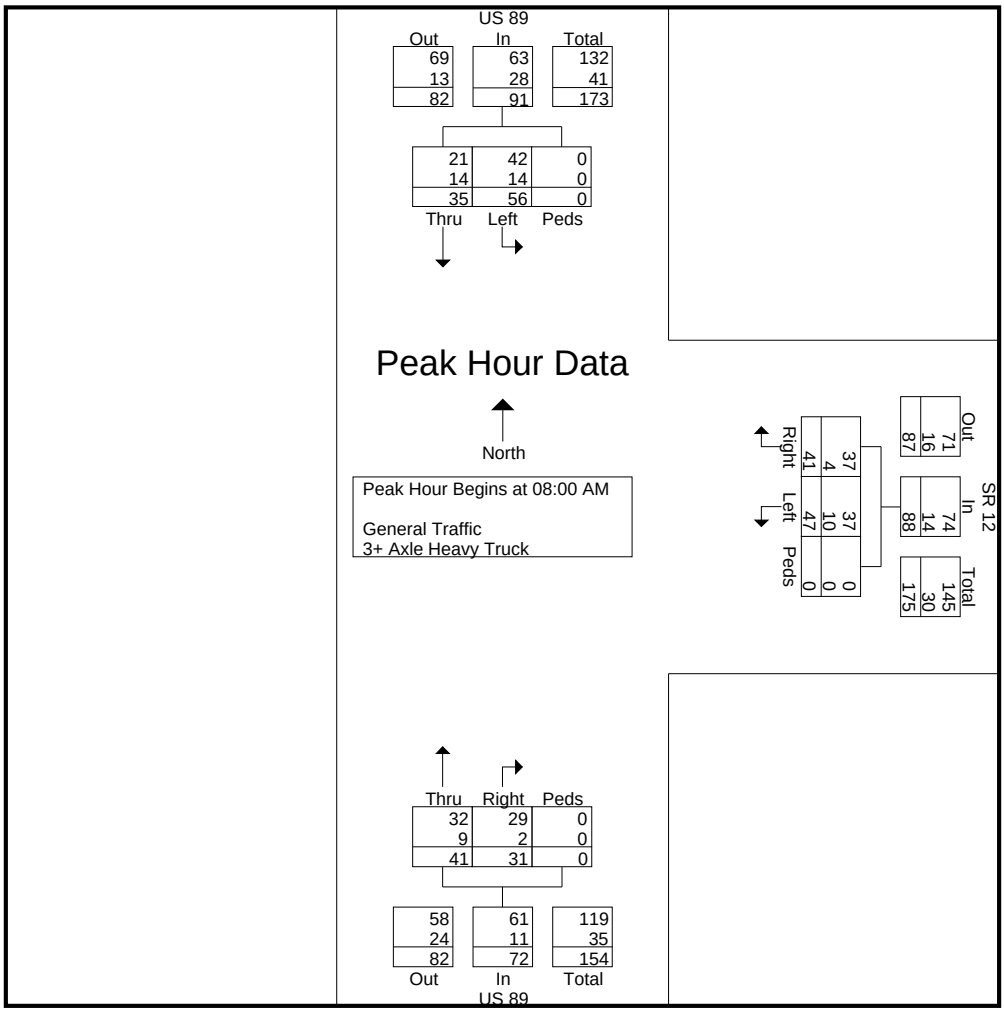
L2 Data Collection

1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Larsen
Intersection: US 89 / SR 12
City, State: Panguitch, Utah
Control: Stop, Yield Signs

File Name : 89 12 AM
Site Code : 4
Start Date : 6/19/2007
Page No : 2

	US 89 From North				SR 12 From East				US 89 From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	4	9	0	13	8	5	0	13	8	4	0	12	38
08:15 AM	10	16	0	26	11	10	0	21	9	15	0	24	71
08:30 AM	**14**	11	0	25	8	15	0	23	**10**	**16**	0	**26**	**74**
08:45 AM	7	**20**	0	**27**	**14**	**17**	0	**31**	4	6	0	10	68
Total Volume	35	56	0	91	41	47	0	88	31	41	0	72	251
% App. Total	38.5	61.5	0		46.6	53.4	0		43.1	56.9	0		
PHF	.625	.700	.000	.843	.732	.691	.000	.710	.775	.641	.000	.692	.848
General Traffic	21	42	0	63	37	37	0	74	29	32	0	61	198
% General Traffic	60.0	75.0	0	69.2	90.2	78.7	0	84.1	93.5	78.0	0	84.7	78.9
3+ Axle Heavy Truck													
% 3+ Axle Heavy Truck	40.0	25.0	0	30.8	9.8	21.3	0	15.9	6.5	22.0	0	15.3	21.1



L2 Data Collection

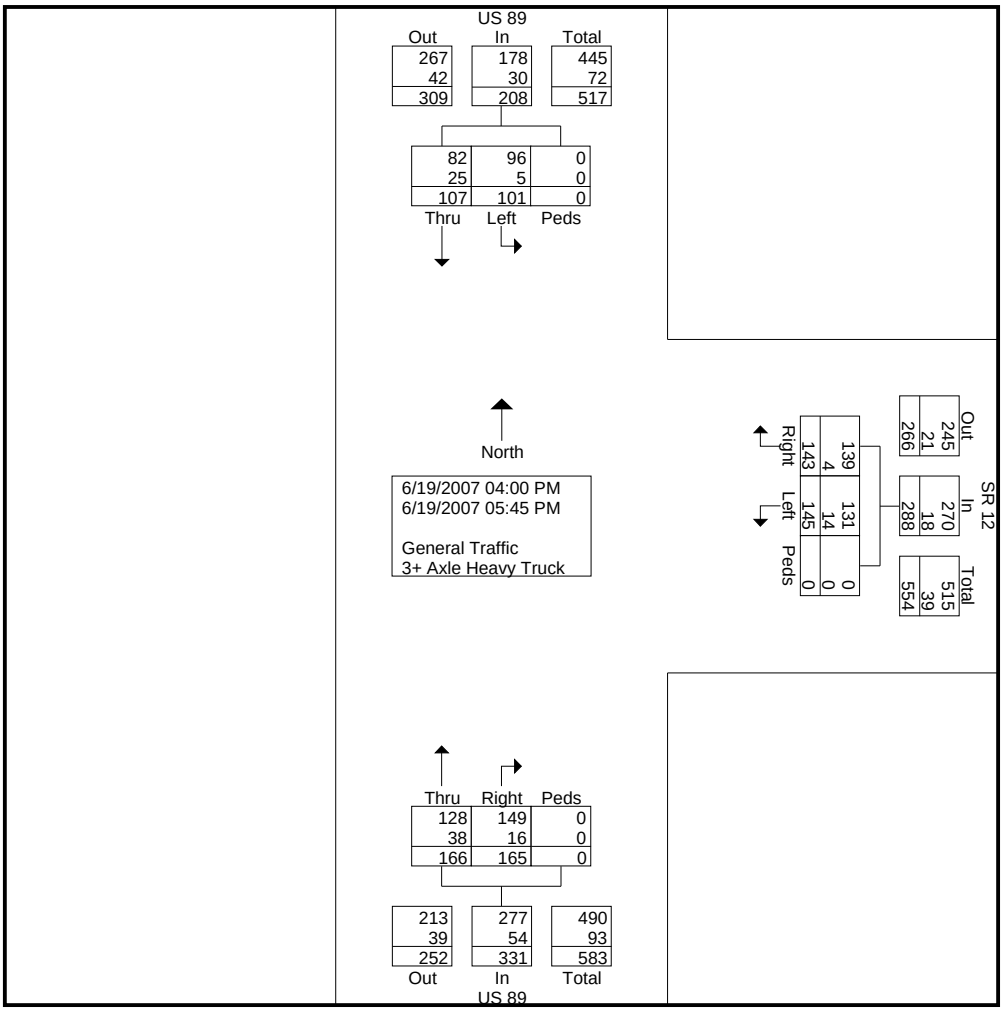
1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Larsen
Intersection: US 89 / SR 12
City, State: Panguitch, Utah
Control: Stop, Yield Signs

File Name : 89 12 PM
Site Code : 4
Start Date : 6/19/2007
Page No : 1

Groups Printed- General Traffic - 3+ Axle Heavy Truck

	US 89 From North				SR 12 From East				US 89 From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
04:00 PM	10	9	0	19	18	22	0	40	22	21	0	43	102
04:15 PM	16	13	0	29	26	21	0	47	24	22	0	46	122
04:30 PM	17	13	0	30	19	20	0	39	23	26	0	49	118
04:45 PM	12	10	0	22	17	15	0	32	13	28	0	41	95
Total	55	45	0	100	80	78	0	158	82	97	0	179	437
05:00 PM	14	10	0	24	8	18	0	26	27	14	0	41	91
05:15 PM	17	14	0	31	18	12	0	30	15	18	0	33	94
05:30 PM	14	16	0	30	16	19	0	35	15	22	0	37	102
05:45 PM	7	16	0	23	21	18	0	39	26	15	0	41	103
Total	52	56	0	108	63	67	0	130	83	69	0	152	390
Grand Total	107	101	0	208	143	145	0	288	165	166	0	331	827
Apprch %	51.4	48.6	0		49.7	50.3	0		49.8	50.2	0		
Total %	12.9	12.2	0	25.2	17.3	17.5	0	34.8	20	20.1	0	40	
General Traffic	82	96	0	178	139	131	0	270	149	128	0	277	725
% General Traffic	76.6	95	0	85.6	97.2	90.3	0	93.8	90.3	77.1	0	83.7	87.7
3+ Axle Heavy Truck													
% 3+ Axle Heavy Truck	23.4	5	0	14.4	2.8	9.7	0	6.2	9.7	22.9	0	16.3	12.3



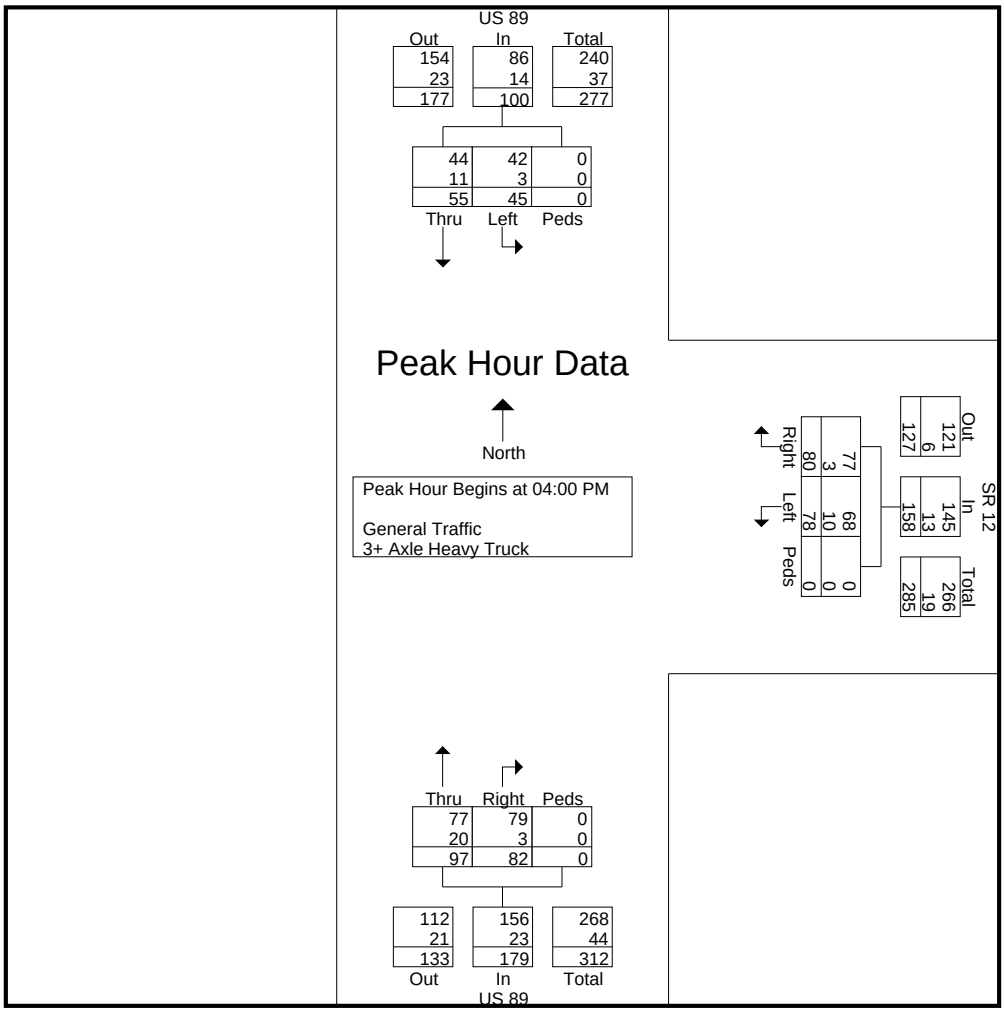
L2 Data Collection

1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Larsen
Intersection: US 89 / SR 12
City, State: Panguitch, Utah
Control: Stop, Yield Signs

File Name : 89 12 PM
Site Code : 4
Start Date : 6/19/2007
Page No : 2

	US 89 From North				SR 12 From East				US 89 From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	10	9	0	19	18	**22**	0	40	22	21	0	43	102
04:15 PM	16	**13**	0	29	**26**	21	0	**47**	**24**	22	0	46	**122**
04:30 PM	**17**	13	0	**30**	19	20	0	39	23	26	0	**49**	118
04:45 PM	12	10	0	22	17	15	0	32	13	**28**	0	41	95
Total Volume	55	45	0	100	80	78	0	158	82	97	0	179	437
% App. Total	55	45	0		50.6	49.4	0		45.8	54.2	0		
PHF	.809	.865	.000	.833	.769	.886	.000	.840	.854	.866	.000	.913	.895
General Traffic	44	42	0	86	77	68	0	145	79	77	0	156	387
% General Traffic	80.0	93.3	0	86.0	96.3	87.2	0	91.8	96.3	79.4	0	87.2	88.6
3+ Axle Heavy Truck													
% 3+ Axle Heavy Truck	20.0	6.7	0	14.0	3.8	12.8	0	8.2	3.7	20.6	0	12.8	11.4



L2 Data Collection

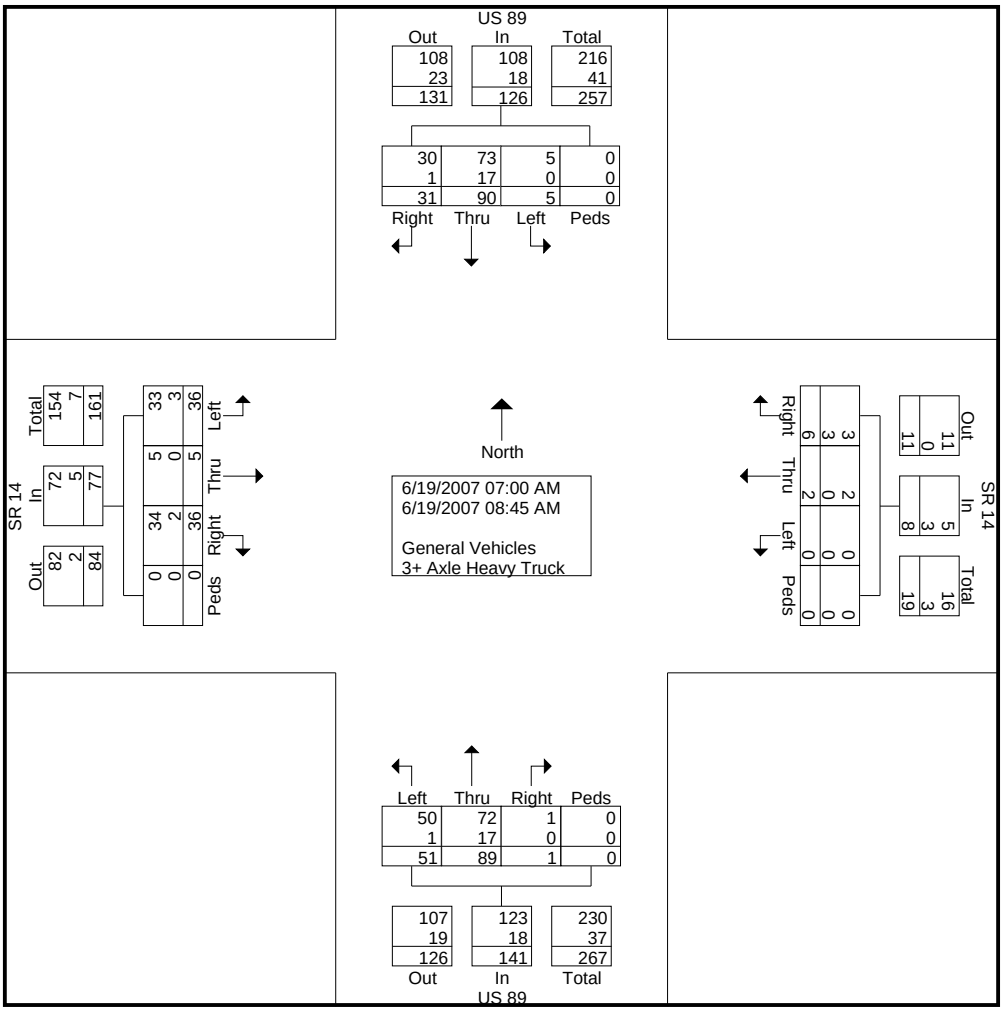
1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: US 89 / SR 14
City, State: Alton, Utah
Control: Stop Sign

File Name : 89 14 AM
Site Code : 5
Start Date : 6/19/2007
Page No : 1

Groups Printed- General Vehicles - 3+ Axle Heavy Truck

	US 89 From North					SR 14 From East					US 89 From South					SR 14 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	2	5	2	0	9	0	0	0	0	0	0	8	3	0	11	3	1	2	0	6	26
07:15 AM	1	8	0	0	9	3	1	0	0	4	0	9	8	0	17	7	0	8	0	15	45
07:30 AM	2	11	1	0	14	0	0	0	0	0	0	5	2	0	7	2	0	1	0	3	24
07:45 AM	10	10	0	0	20	0	0	0	0	0	0	16	7	0	23	4	1	6	0	11	54
Total	15	34	3	0	52	3	1	0	0	4	0	38	20	0	58	16	2	17	0	35	149
08:00 AM	5	11	0	0	16	0	0	0	0	0	0	14	11	0	25	3	1	4	0	8	49
08:15 AM	4	9	1	0	14	1	0	0	0	1	0	8	6	0	14	4	0	2	0	6	35
08:30 AM	5	14	1	0	20	1	0	0	0	1	1	16	5	0	22	10	1	5	0	16	59
08:45 AM	2	22	0	0	24	1	1	0	0	2	0	13	9	0	22	3	1	8	0	12	60
Total	16	56	2	0	74	3	1	0	0	4	1	51	31	0	83	20	3	19	0	42	203
Grand Total	31	90	5	0	126	6	2	0	0	8	1	89	51	0	141	36	5	36	0	77	352
Apprch %	24.6	71.4	4	0		75	25	0	0		0.7	63.1	36.2	0		46.8	6.5	46.8	0		
Total %	8.8	25.6	1.4	0	35.8	1.7	0.6	0	0	2.3	0.3	25.3	14.5	0	40.1	10.2	1.4	10.2	0	21.9	
General Vehicles	30	73	5	0	108	3	2	0	0	5	1	72	50	0	123	34	5	33	0	72	308
% General Vehicles	96.8	81.1	100	0	85.7	50	100	0	0	62.5	100	80.9	98	0	87.2	94.4	100	91.7	0	93.5	87.5
3+ Axle Heavy Truck	1	17	0	0	18	3	0	0	0	3	0	17	1	0	18	2	0	3	0	5	44
% 3+ Axle Heavy Truck	3.2	18.9	0	0	14.3	50	0	0	0	37.5	0	19.1	2	0	12.8	5.6	0	8.3	0	6.5	12.5



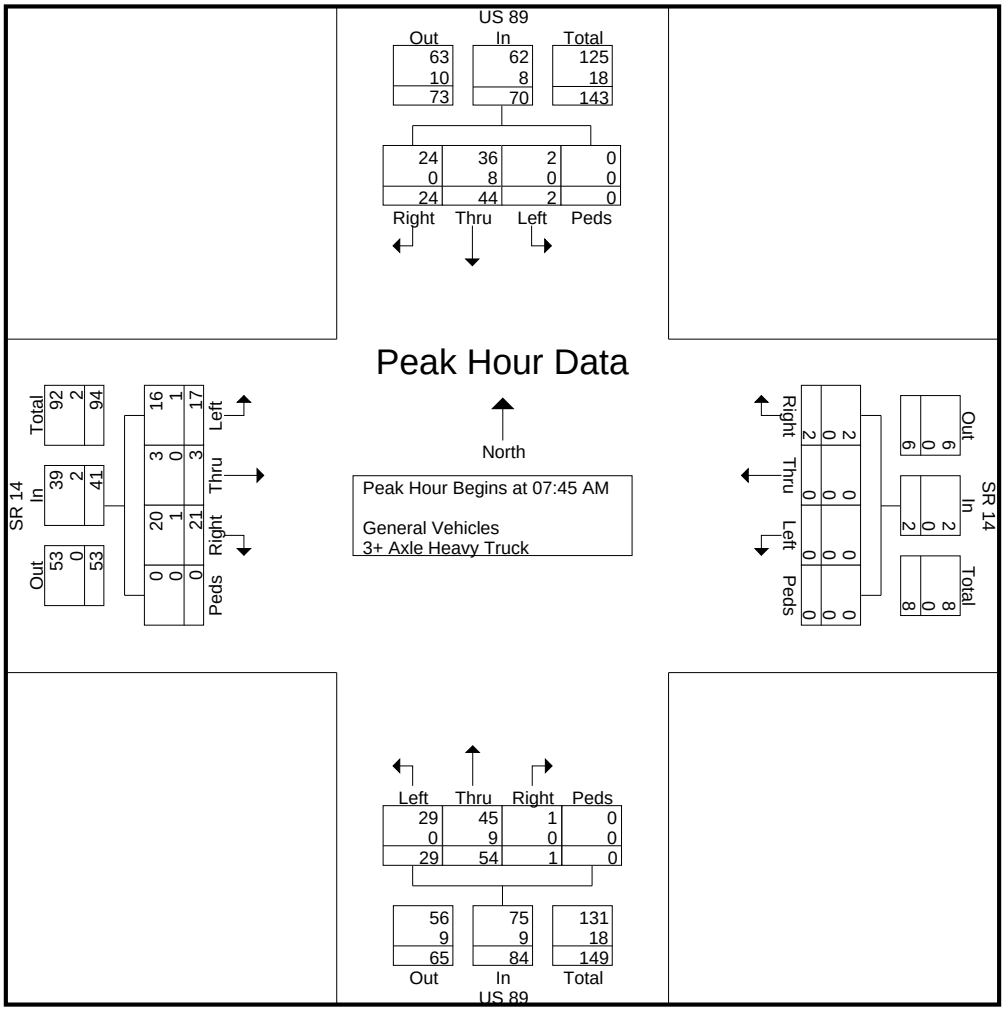
L2 Data Collection

1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: US 89 / SR 14
City, State: Alton, Utah
Control: Stop Sign

File Name : 89 14 AM
Site Code : 5
Start Date : 6/19/2007
Page No : 2

	US 89 From North					SR 14 From East					US 89 From South					SR 14 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:30 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**10**	10	0	0	**20**	0	0	0	0	0	0	**16**	7	0	23	4	**1**	**6**	0	11	54
08:00 AM	5	11	0	0	16	0	0	0	0	0	0	14	**11**	0	**25**	3	1	4	0	8	49
08:15 AM	4	9	**1**	0	14	**1**	0	0	0	**1**	0	8	6	0	14	4	0	2	0	6	35
08:30 AM	5	**14**	1	0	20	1	0	0	0	1	**1**	16	5	0	22	**10**	1	5	0	**16**	**59**
Total Volume	24	44	2	0	70	2	0	0	0	2	1	54	29	0	84	21	3	17	0	41	197
% App. Total	34.3	62.9	2.9	0		100	0	0	0		1.2	64.3	34.5	0		51.2	7.3	41.5	0		
PHF	.600	.786	.500	.000	.875	.500	.000	.000	.000	.500	.250	.844	.659	.000	.840	.525	.750	.708	.000	.641	.835
General Vehicles	24	36	2	0	62	2	0	0	0	2	1	45	29	0	75	20	3	16	0	39	178
% General Vehicles	100	81.8	100	0	88.6	100	0	0	0	100	100	83.3	100	0	89.3	95.2	100	94.1	0	95.1	90.4
3+ Axle Heavy Truck	0	8	0	0	8	0	0	0	0	0	0	9	0	0	9	1	0	1	0	2	19
% 3+ Axle Heavy Truck	0	18.2	0	0	11.4	0	0	0	0	0	0	16.7	0	0	10.7	4.8	0	5.9	0	4.9	9.6



L2 Data Collection

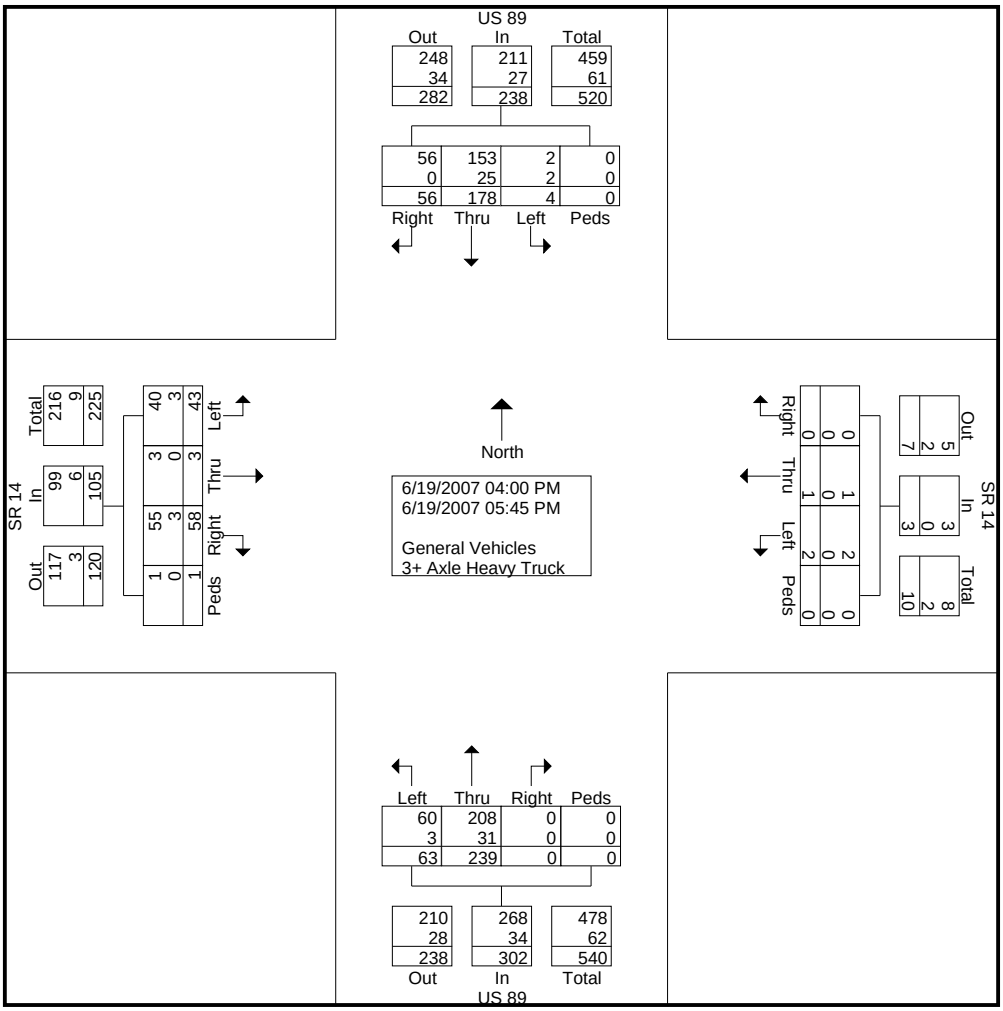
1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: US 89 / SR 14
City, State: Alton, Utah
Control: Stop Sign

File Name : 89 14 PM
Site Code : 5
Start Date : 6/19/2007
Page No : 1

Groups Printed- General Vehicles - 3+ Axle Heavy Truck

	US 89 From North					SR 14 From East					US 89 From South					SR 14 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	7	17	1	0	25	0	0	0	0	0	0	37	17	0	54	8	0	5	0	13	92
04:15 PM	8	21	1	0	30	0	0	0	0	0	0	34	4	0	38	4	0	6	0	10	78
04:30 PM	8	26	1	0	35	0	0	0	0	0	0	35	5	0	40	10	0	6	1	17	92
04:45 PM	4	25	1	0	30	0	0	0	0	0	0	23	7	0	30	6	1	6	0	13	73
Total	27	89	4	0	120	0	0	0	0	0	0	129	33	0	162	28	1	23	1	53	335
05:00 PM	9	23	0	0	32	0	1	0	0	1	0	21	6	0	27	9	0	5	0	14	74
05:15 PM	7	16	0	0	23	0	0	2	0	2	0	33	8	0	41	7	0	3	0	10	76
05:30 PM	8	24	0	0	32	0	0	0	0	0	0	40	7	0	47	4	0	6	0	10	89
05:45 PM	5	26	0	0	31	0	0	0	0	0	0	16	9	0	25	10	2	6	0	18	74
Total	29	89	0	0	118	0	1	2	0	3	0	110	30	0	140	30	2	20	0	52	313
Grand Total	56	178	4	0	238	0	1	2	0	3	0	239	63	0	302	58	3	43	1	105	648
Apprch %	23.5	74.8	1.7	0		0	33.3	66.7	0		0	79.1	20.9	0		55.2	2.9	41	1		
Total %	8.6	27.5	0.6	0	36.7	0	0.2	0.3	0	0.5	0	36.9	9.7	0	46.6	9	0.5	6.6	0.2	16.2	
General Vehicles	56	153	2	0	211	0	1	2	0	3	0	208	60	0	268	55	3	40	1	99	581
% General Vehicles	100	86	50	0	88.7	0	100	100	0	100	0	87	95.2	0	88.7	94.8	100	93	100	94.3	89.7
3+ Axle Heavy Truck	0	25	2	0	27	0	0	0	0	0	0	31	3	0	34	3	0	3	0	6	67
% 3+ Axle Heavy Truck	0	14	50	0	11.3	0	0	0	0	0	0	13	4.8	0	11.3	5.2	0	7	0	5.7	10.3



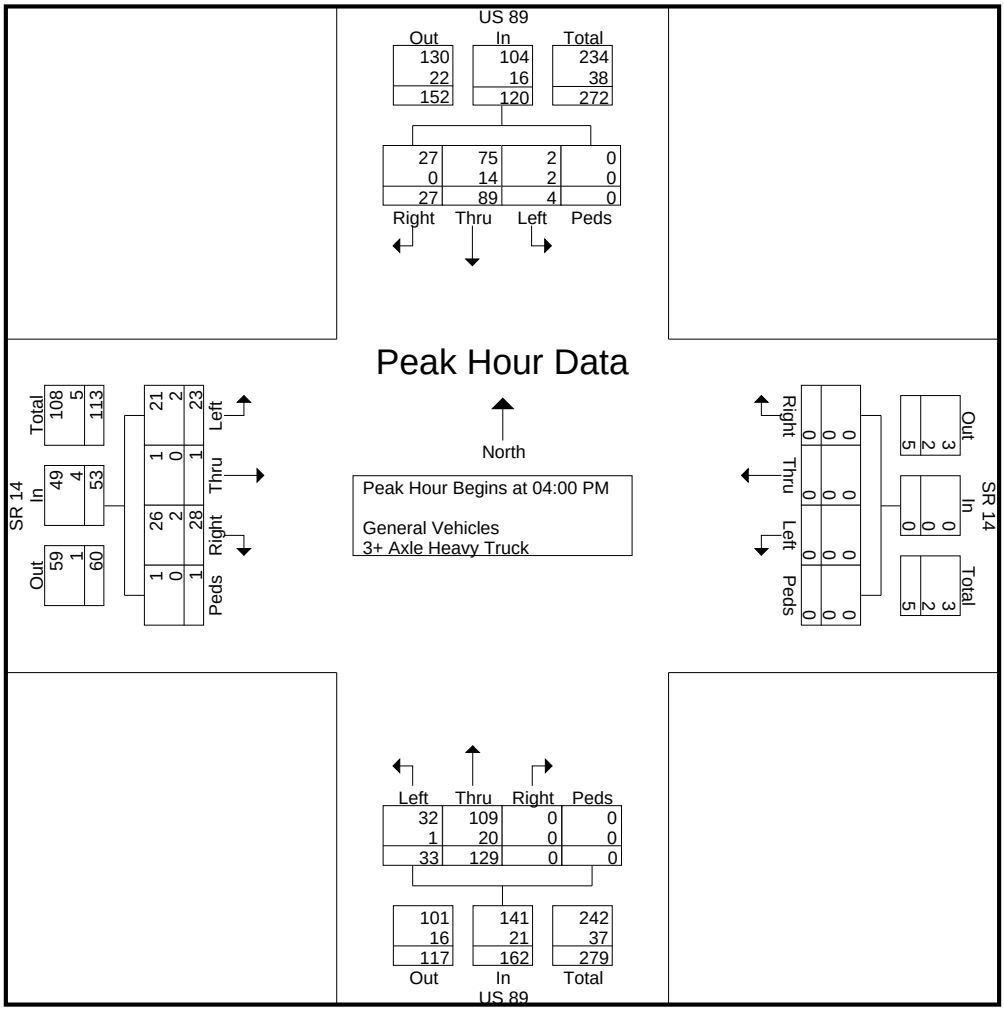
L2 Data Collection

1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: US 89 / SR 14
City, State: Alton, Utah
Control: Stop Sign

File Name : 89 14 PM
Site Code : 5
Start Date : 6/19/2007
Page No : 2

	US 89 From North					SR 14 From East					US 89 From South					SR 14 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	7	17	**1**	0	25	0	0	0	0	0	0	**37**	**17**	0	**54**	8	0	5	0	13	**92**
04:15 PM	**8**	21	1	0	30	0	0	0	0	0	0	34	4	0	38	4	0	**6**	0	10	78
04:30 PM	8	**26**	1	0	**35**	0	0	0	0	0	0	35	5	0	40	**10**	0	6	**1**	**17**	92
04:45 PM	4	25	1	0	30	0	0	0	0	0	0	23	7	0	30	6	**1**	6	0	13	73
Total Volume	27	89	4	0	120	0	0	0	0	0	0	129	33	0	162	28	1	23	1	53	335
% App. Total	22.5	74.2	3.3	0		0	0	0	0		0	79.6	20.4	0		52.8	1.9	43.4	1.9		
PHF	.844	.856	1.000	.000	.857	.000	.000	.000	.000	.000	.000	.872	.485	.000	.750	.700	.250	.958	.250	.779	.910
General Vehicles	27	75	2	0	104	0	0	0	0	0	0	109	32	0	141	26	1	21	1	49	294
% General Vehicles	100	84.3	50.0	0	86.7	0	0	0	0	0	0	84.5	97.0	0	87.0	92.9	100	91.3	100	92.5	87.8
3+ Axle Heavy Truck	0	14	2	0	16	0	0	0	0	0	0	20	1	0	21	2	0	2	0	4	41
% 3+ Axle Heavy Truck	0	15.7	50.0	0	13.3	0	0	0	0	0	0	15.5	3.0	0	13.0	7.1	0	8.7	0	7.5	12.2



L2 Data Collection

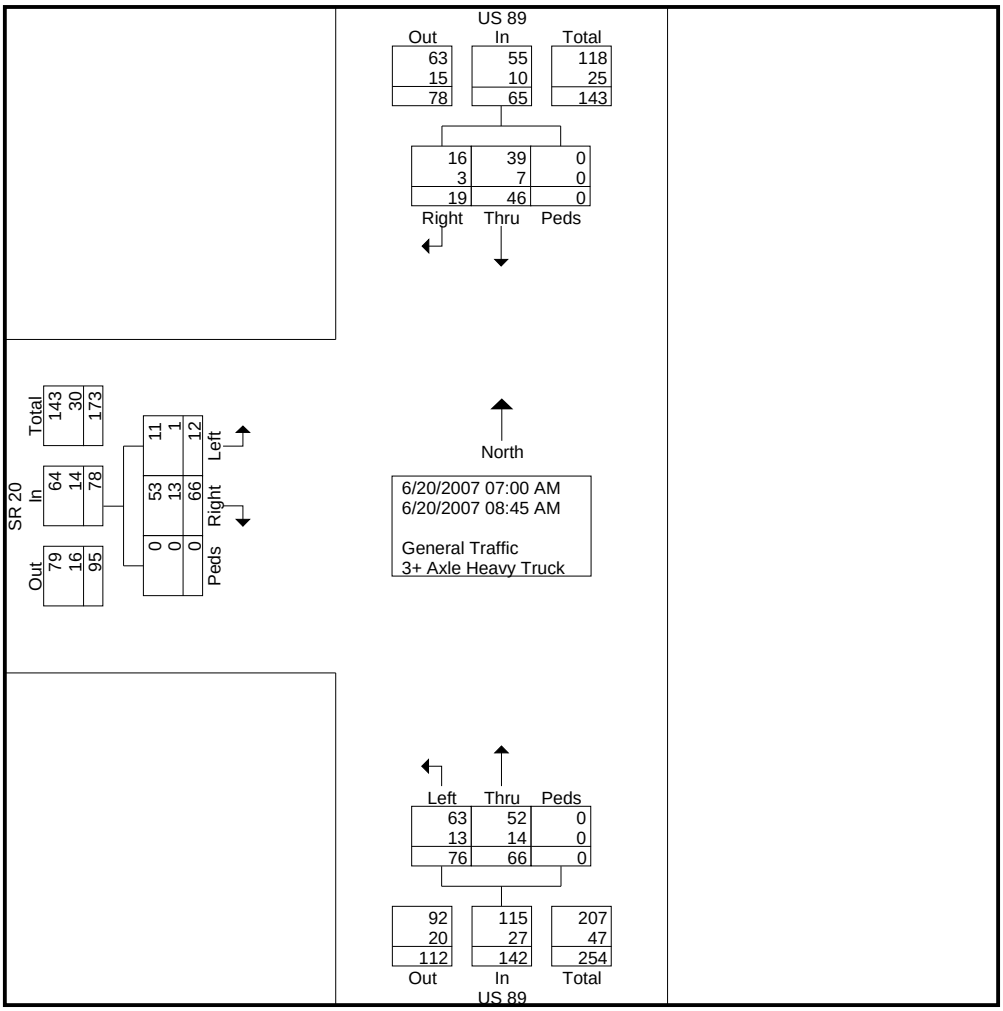
1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: US 89 / SR 20
City, State: Panguitch, Utah
Control: Stop Sign

File Name : 89 20 AM
Site Code : 2
Start Date : 6/20/2007
Page No : 1

Groups Printed- General Traffic - 3+ Axle Heavy Truck

	US 89 From North				US 89 From South				SR 20 From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
07:00 AM	3	1	0	4	5	3	0	8	4	1	0	5	17
07:15 AM	2	5	0	7	4	9	0	13	5	0	0	5	25
07:30 AM	6	5	0	11	6	8	0	14	2	2	0	4	29
07:45 AM	2	10	0	12	7	9	0	16	11	2	0	13	41
Total	13	21	0	34	22	29	0	51	22	5	0	27	112
08:00 AM	3	8	0	11	19	10	0	29	10	2	0	12	52
08:15 AM	1	4	0	5	10	15	0	25	13	4	0	17	47
08:30 AM	2	6	0	8	7	9	0	16	6	0	0	6	30
08:45 AM	0	7	0	7	8	13	0	21	15	1	0	16	44
Total	6	25	0	31	44	47	0	91	44	7	0	51	173
Grand Total	19	46	0	65	66	76	0	142	66	12	0	78	285
Apprch %	29.2	70.8	0		46.5	53.5	0		84.6	15.4	0		
Total %	6.7	16.1	0	22.8	23.2	26.7	0	49.8	23.2	4.2	0	27.4	
General Traffic	16	39	0	55	52	63	0	115	53	11	0	64	234
% General Traffic	84.2	84.8	0	84.6	78.8	82.9	0	81	80.3	91.7	0	82.1	82.1
3+ Axle Heavy Truck													
% 3+ Axle Heavy Truck	15.8	15.2	0	15.4	21.2	17.1	0	19	19.7	8.3	0	17.9	17.9



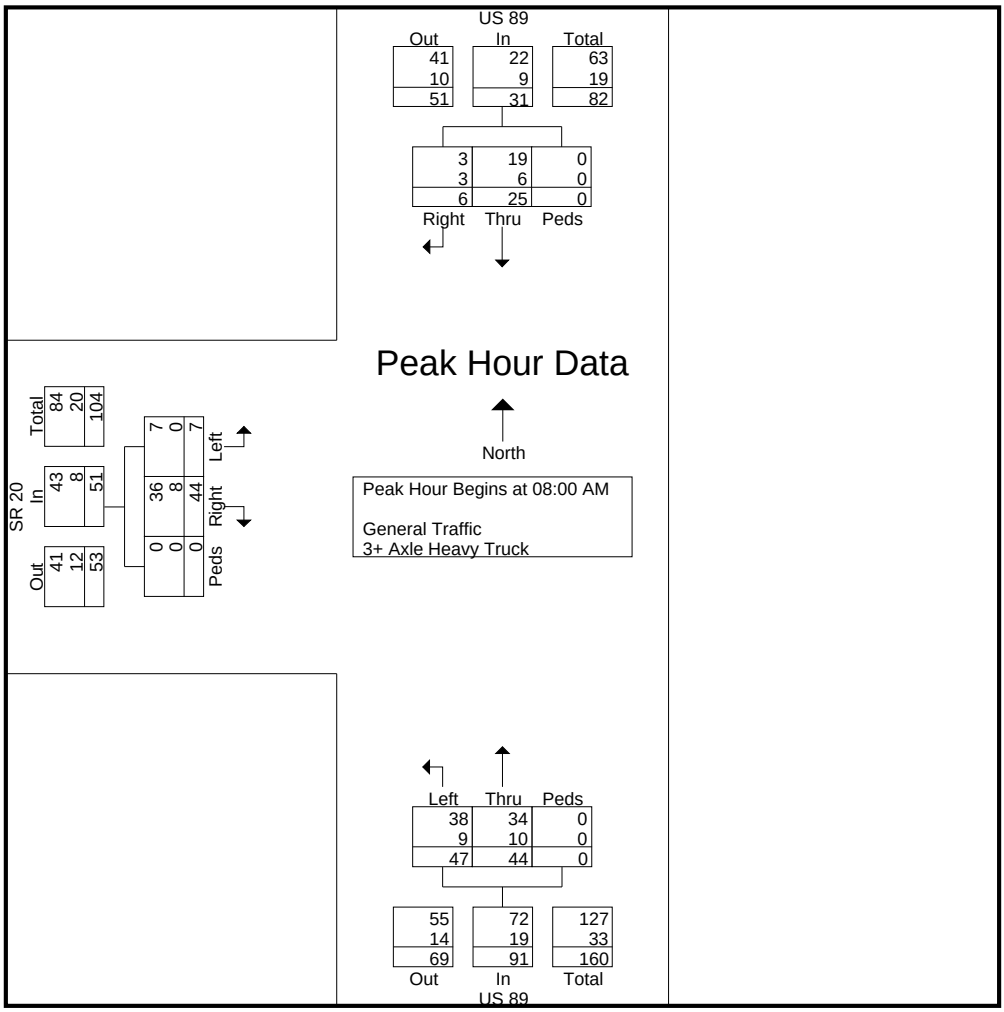
L2 Data Collection

1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: US 89 / SR 20
City, State: Panguitch, Utah
Control: Stop Sign

File Name : 89 20 AM
Site Code : 2
Start Date : 6/20/2007
Page No : 2

	US 89 From North				US 89 From South				SR 20 From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	**3**	**8**	0	**11**	**19**	10	0	**29**	10	2	0	12	**52**
08:15 AM	1	4	0	5	10	**15**	0	25	13	**4**	0	**17**	47
08:30 AM	2	6	0	8	7	9	0	16	6	0	0	6	30
08:45 AM	0	7	0	7	8	13	0	21	**15**	1	0	16	44
Total Volume	6	25	0	31	44	47	0	91	44	7	0	51	173
% App. Total	19.4	80.6	0		48.4	51.6	0		86.3	13.7	0		
PHF	.500	.781	.000	.705	.579	.783	.000	.784	.733	.438	.000	.750	.832
General Traffic	3	19	0	22	34	38	0	72	36	7	0	43	137
% General Traffic	50.0	76.0	0	71.0	77.3	80.9	0	79.1	81.8	100	0	84.3	79.2
3+ Axle Heavy Truck													
% 3+ Axle Heavy Truck	50.0	24.0	0	29.0	22.7	19.1	0	20.9	18.2	0	0	15.7	20.8



L2 Data Collection

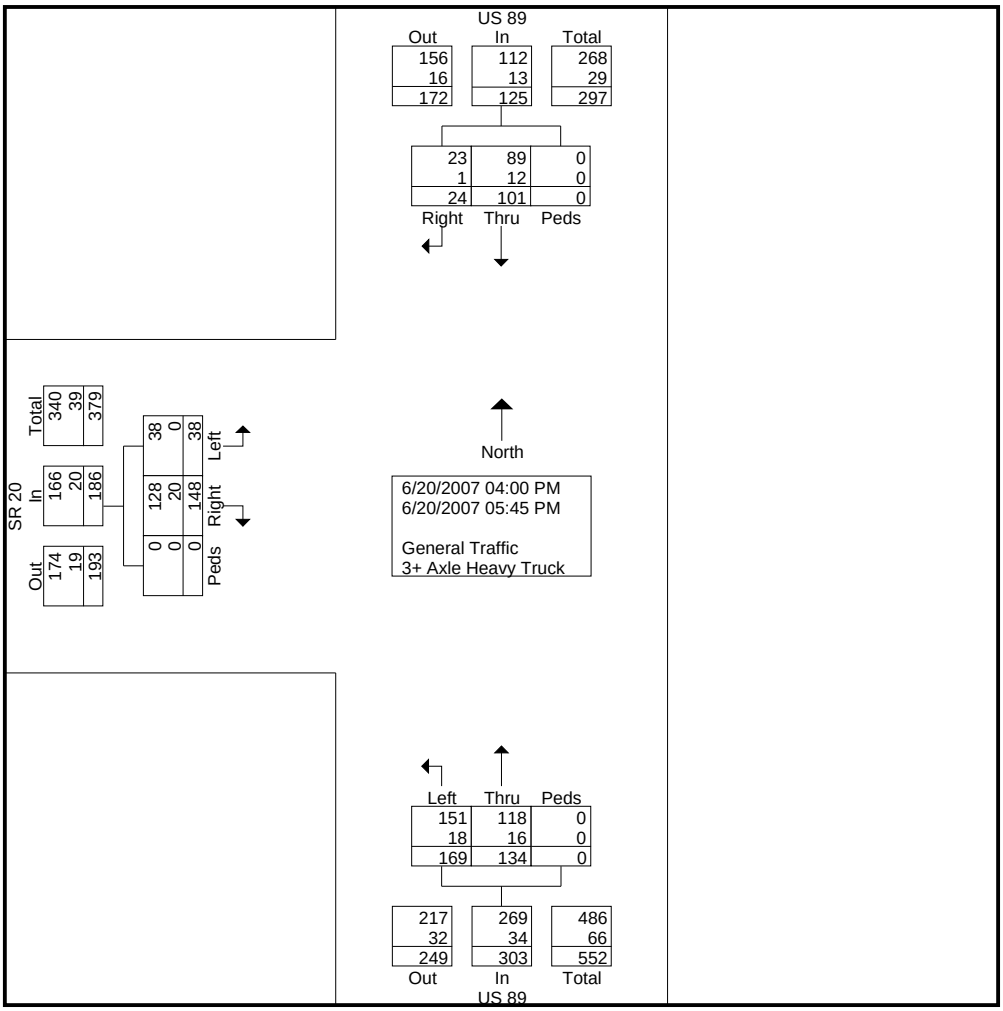
1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: US 89 / SR 20
City, State: Panguitch, Utah
Control: Stop Sign

File Name : 89 20 PM
Site Code : 2
Start Date : 6/20/2007
Page No : 1

Groups Printed- General Traffic - 3+ Axle Heavy Truck

	US 89 From North				US 89 From South				SR 20 From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
04:00 PM	2	18	0	20	14	26	0	40	15	9	0	24	84
04:15 PM	6	10	0	16	15	24	0	39	23	2	0	25	80
04:30 PM	0	14	0	14	16	22	0	38	19	7	0	26	78
04:45 PM	1	15	0	16	17	25	0	42	16	5	0	21	79
Total	9	57	0	66	62	97	0	159	73	23	0	96	321
05:00 PM	4	8	0	12	20	26	0	46	22	2	0	24	82
05:15 PM	3	8	0	11	26	15	0	41	20	5	0	25	77
05:30 PM	5	15	0	20	11	15	0	26	18	5	0	23	69
05:45 PM	3	13	0	16	15	16	0	31	15	3	0	18	65
Total	15	44	0	59	72	72	0	144	75	15	0	90	293
Grand Total	24	101	0	125	134	169	0	303	148	38	0	186	614
Apprch %	19.2	80.8	0		44.2	55.8	0		79.6	20.4	0		
Total %	3.9	16.4	0	20.4	21.8	27.5	0	49.3	24.1	6.2	0	30.3	
General Traffic	23	89	0	112	118	151	0	269	128	38	0	166	547
% General Traffic	95.8	88.1	0	89.6	88.1	89.3	0	88.8	86.5	100	0	89.2	89.1
3+ Axle Heavy Truck													
% 3+ Axle Heavy Truck	4.2	11.9	0	10.4	11.9	10.7	0	11.2	13.5	0	0	10.8	10.9



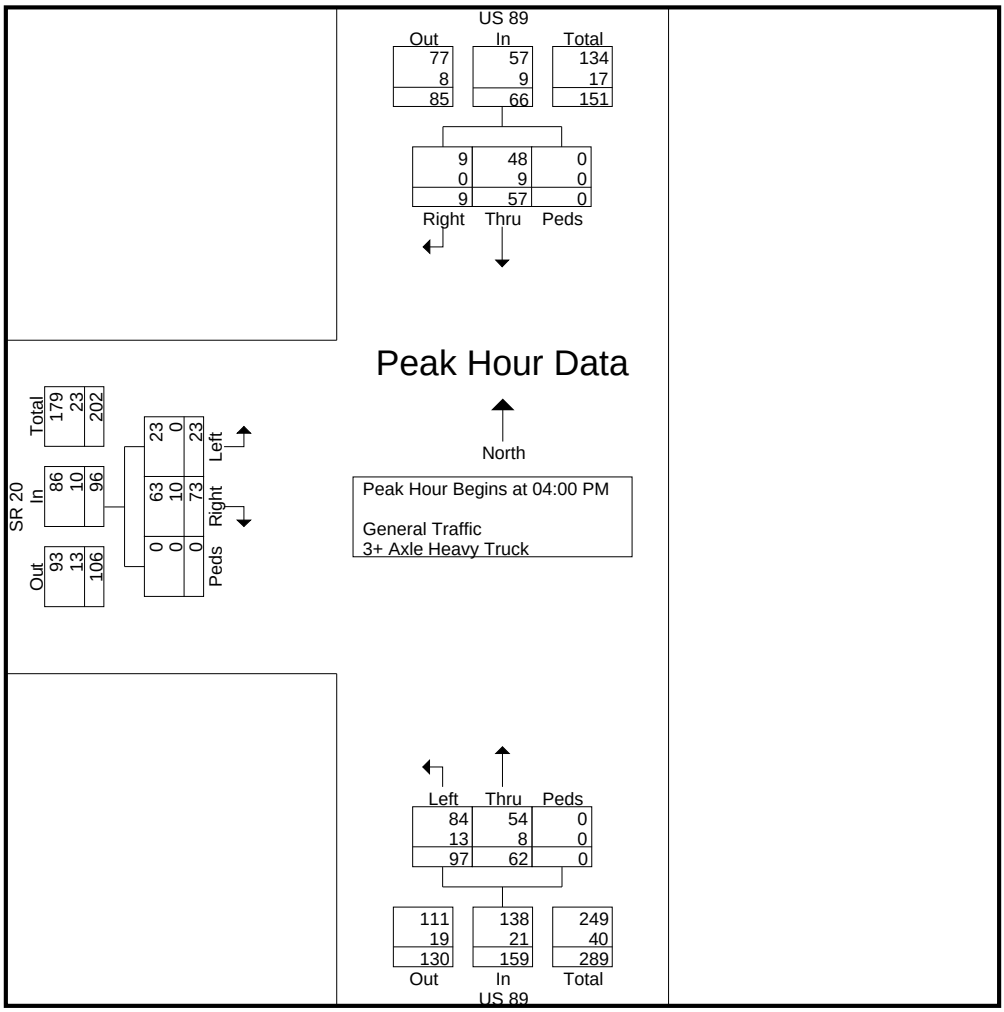
L2 Data Collection

1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: US 89 / SR 20
City, State: Panguitch, Utah
Control: Stop Sign

File Name : 89 20 PM
Site Code : 2
Start Date : 6/20/2007
Page No : 2

	US 89 From North				US 89 From South				SR 20 From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	2	**18**	0	**20**	14	**26**	0	40	15	**9**	0	24	**84**
04:15 PM	**6**	10	0	16	15	24	0	39	**23**	2	0	25	80
04:30 PM	0	14	0	14	16	22	0	38	19	7	0	**26**	78
04:45 PM	1	15	0	16	**17**	25	0	**42**	16	5	0	21	79
Total Volume	9	57	0	66	62	97	0	159	73	23	0	96	321
% App. Total	13.6	86.4	0		39	61	0		76	24	0		
PHF	.375	.792	.000	.825	.912	.933	.000	.946	.793	.639	.000	.923	.955
General Traffic	9	48	0	57	54	84	0	138	63	23	0	86	281
% General Traffic	100	84.2	0	86.4	87.1	86.6	0	86.8	86.3	100	0	89.6	87.5
3+ Axle Heavy Truck													
% 3+ Axle Heavy Truck	0	15.8	0	13.6	12.9	13.4	0	13.2	13.7	0	0	10.4	12.5



L2 Data Collection

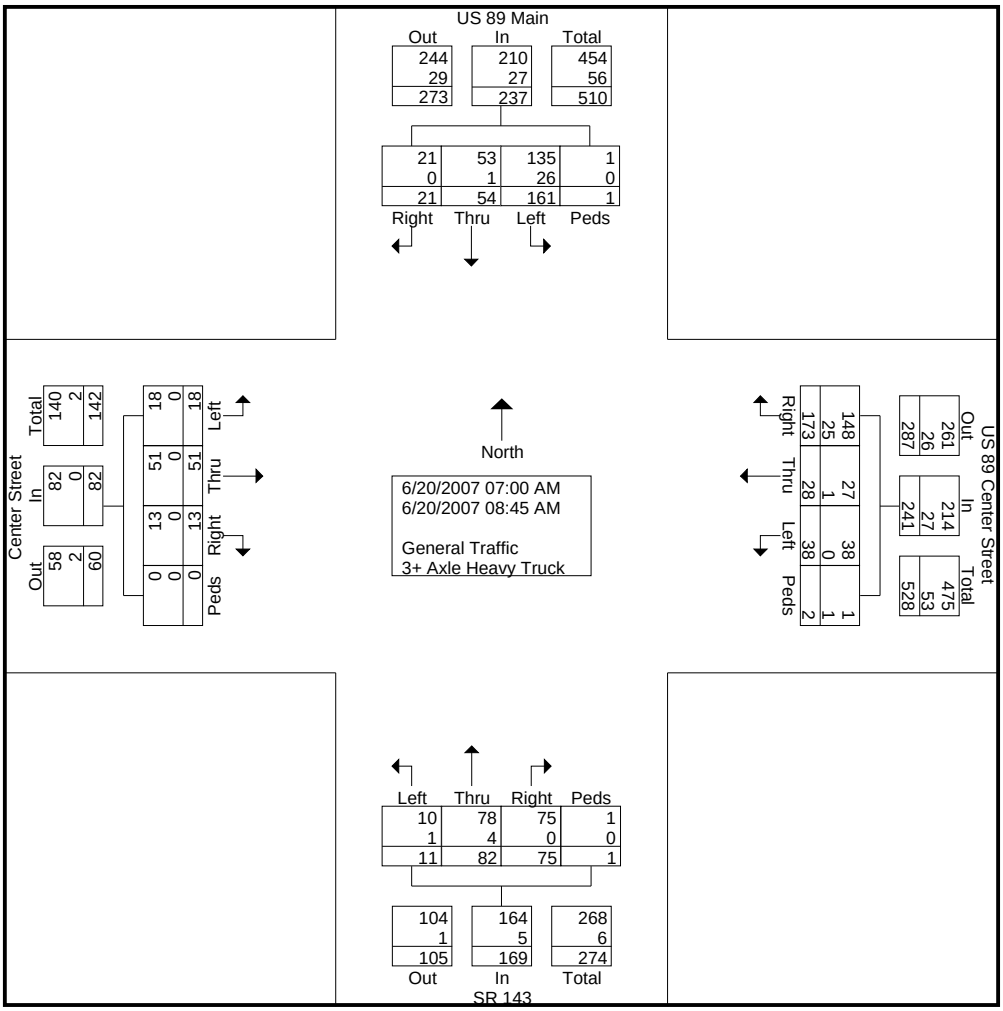
1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Larsen
Intersection: US 89 / Main / Center
City, State: Panguitch, Utah
Control: 4 Way Stop

File Name : 89 Main AM
Site Code : 3
Start Date : 6/20/2007
Page No : 1

Groups Printed- General Traffic - 3+ Axle Heavy Truck

	US 89 Main From North					US 89 Center Street From East					SR 143 From South					Center Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	1	4	12	1	18	19	6	1	1	27	6	4	3	0	13	3	4	1	0	8	66
07:15 AM	3	4	16	0	23	12	3	3	0	18	7	7	0	1	15	1	9	2	0	12	68
07:30 AM	1	9	21	0	31	24	2	1	0	27	4	4	1	0	9	1	5	3	0	9	76
07:45 AM	3	6	18	0	27	27	1	9	1	38	4	15	0	0	19	4	4	3	0	11	95
Total	8	23	67	1	99	82	12	14	2	110	21	30	4	1	56	9	22	9	0	40	305
08:00 AM	1	9	25	0	35	30	4	8	0	42	21	10	3	0	34	2	6	2	0	10	121
08:15 AM	2	7	22	0	31	20	5	5	0	30	6	8	2	0	16	1	11	3	0	15	92
08:30 AM	6	10	26	0	42	22	4	6	0	32	14	17	0	0	31	0	6	0	0	6	111
08:45 AM	4	5	21	0	30	19	3	5	0	27	13	17	2	0	32	1	6	4	0	11	100
Total	13	31	94	0	138	91	16	24	0	131	54	52	7	0	113	4	29	9	0	42	424
Grand Total	21	54	161	1	237	173	28	38	2	241	75	82	11	1	169	13	51	18	0	82	729
Apprch %	8.9	22.8	67.9	0.4		71.8	11.6	15.8	0.8		44.4	48.5	6.5	0.6		15.9	62.2	22	0		
Total %	2.9	7.4	22.1	0.1	32.5	23.7	3.8	5.2	0.3	33.1	10.3	11.2	1.5	0.1	23.2	1.8	7	2.5	0	11.2	
General Traffic	21	53	135	1	210	148	27	38	1	214	75	78	10	1	164	13	51	18	0	82	670
% General Traffic	100	98.1	83.9	100	88.6	85.5	96.4	100	50	88.8	100	95.1	90.9	100	97	100	100	100	0	100	91.9
3+ Axle Heavy Truck	0	1	26	0	27	25	1	0	1	27	0	4	1	0	5	0	0	0	0	0	59
% 3+ Axle Heavy Truck	0	1.9	16.1	0	11.4	14.5	3.6	0	50	11.2	0	4.9	9.1	0	3	0	0	0	0	0	8.1



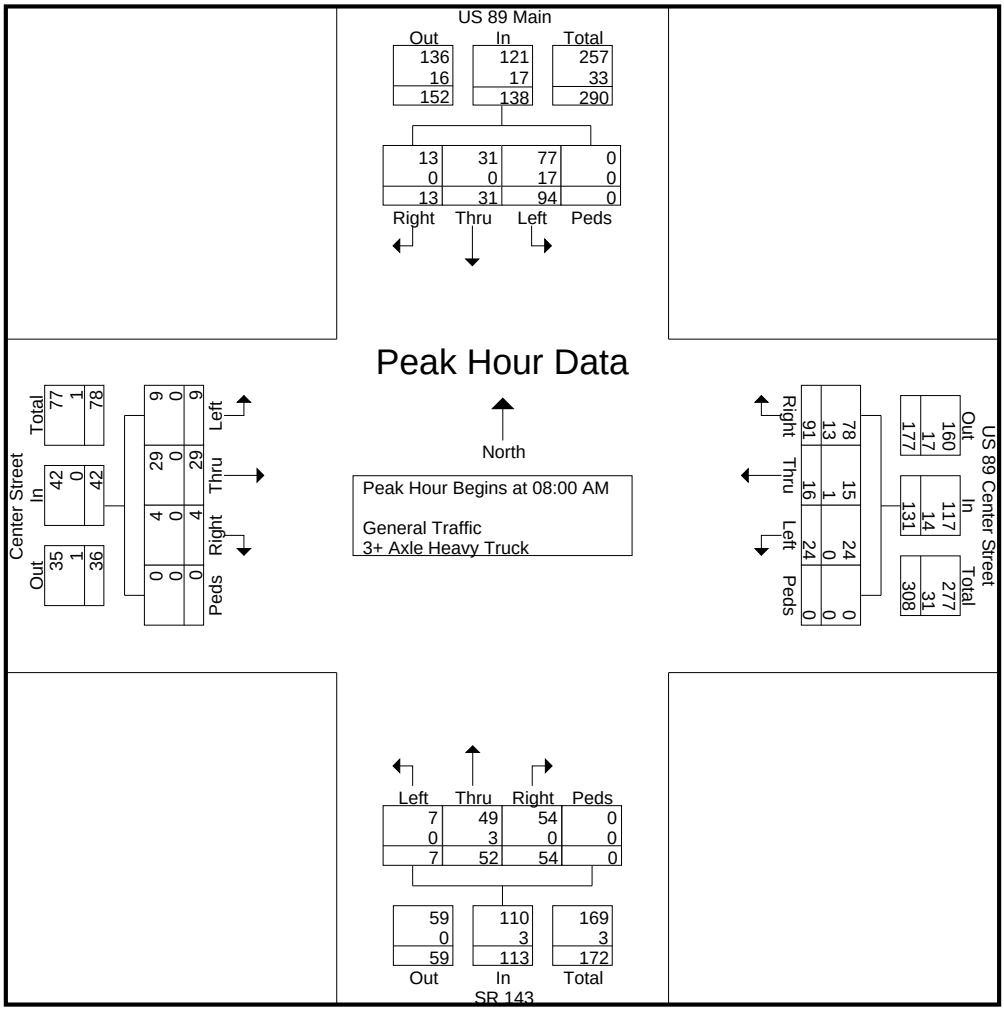
L2 Data Collection

1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Larsen
Intersection: US 89 / Main / Center
City, State: Panguitch, Utah
Control: 4 Way Stop

File Name : 89 Main AM
Site Code : 3
Start Date : 6/20/2007
Page No : 2

	US 89 Main From North					US 89 Center Street From East					SR 143 From South					Center Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	1	9	25	0	35	**30**	4	**8**	0	**42**	**21**	10	**3**	0	**34**	**2**	6	2	0	10	**121**
08:15 AM	2	7	22	0	31	20	**5**	5	0	30	6	8	2	0	16	1	**11**	3	0	**15**	92
08:30 AM	**6**	**10**	**26**	0	**42**	22	4	6	0	32	14	**17**	0	0	31	0	6	0	0	6	111
08:45 AM	4	5	21	0	30	19	3	5	0	27	13	17	2	0	32	1	6	**4**	0	11	100
Total Volume	13	31	94	0	138	91	16	24	0	131	54	52	7	0	113	4	29	9	0	42	424
% App. Total	9.4	22.5	68.1	0		69.5	12.2	18.3	0		47.8	46	6.2	0		9.5	69	21.4	0		
PHF	.542	.775	.904	.000	.821	.758	.800	.750	.000	.780	.643	.765	.583	.000	.831	.500	.659	.563	.000	.700	.876
General Traffic	13	31	77	0	121	78	15	24	0	117	54	49	7	0	110	4	29	9	0	42	390
% General Traffic	100	100	81.9	0	87.7	85.7	93.8	100	0	89.3	100	94.2	100	0	97.3	100	100	100	0	100	92.0
3+ Axle Heavy Truck	0	0	17	0	17	13	1	0	0	14	0	3	0	0	3	0	0	0	0	0	34
% 3+ Axle Heavy Truck	0	0	18.1	0	12.3	14.3	6.3	0	0	10.7	0	5.8	0	0	2.7	0	0	0	0	0	8.0



L2 Data Collection

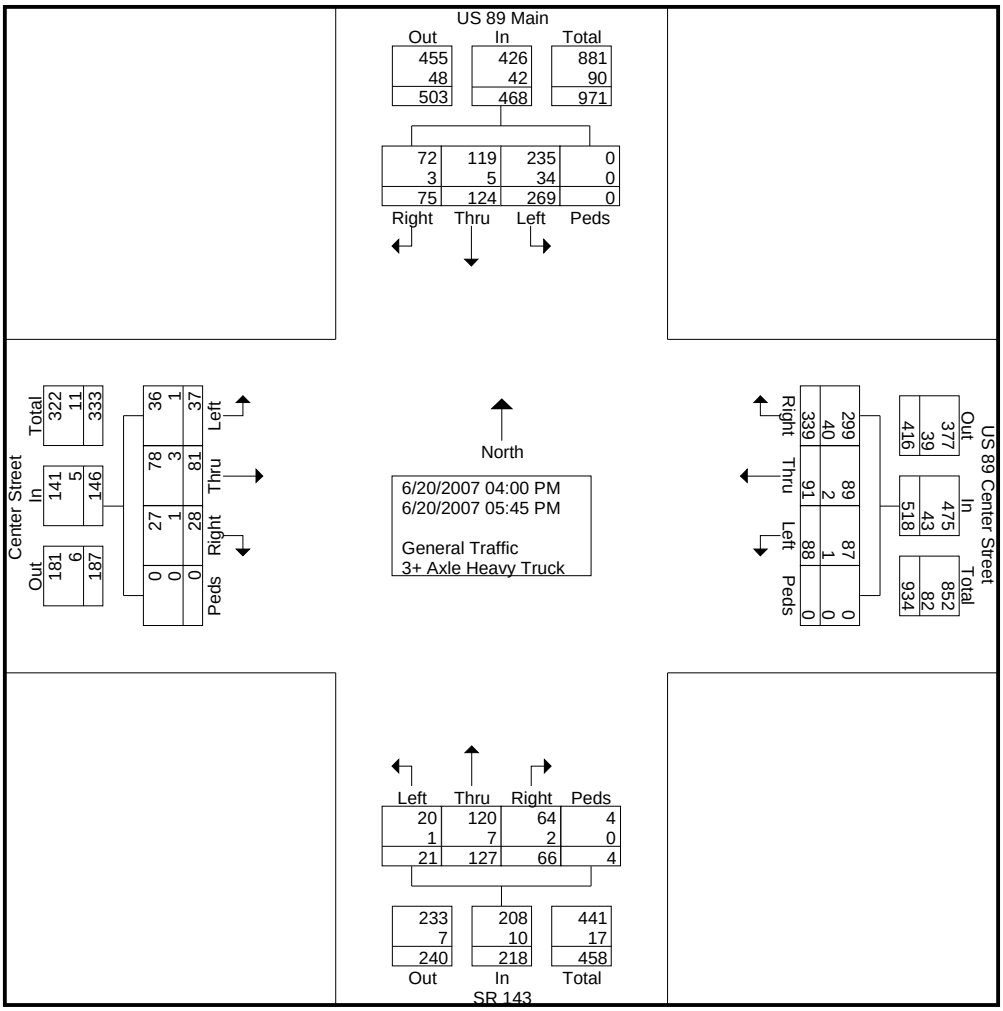
1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Larsen
Intersection: US 89 / Main / Center
City, State: Panguitch, Utah
Control: 4 Way Stop

File Name : 89 Main PM
Site Code : 3
Start Date : 6/20/2007
Page No : 1

Groups Printed- General Traffic - 3+ Axle Heavy Truck

	US 89 Main From North					US 89 Center Street From East					SR 143 From South					Center Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	8	16	28	0	52	31	9	11	0	51	11	16	3	0	30	3	5	5	0	13	146
04:15 PM	10	11	33	0	54	45	13	12	0	70	6	23	2	0	31	4	7	1	0	12	167
04:30 PM	10	10	41	0	61	38	8	8	0	54	7	18	1	0	26	2	8	5	0	15	156
04:45 PM	7	13	44	0	64	46	10	15	0	71	6	17	2	0	25	2	15	8	0	25	185
Total	35	50	146	0	231	160	40	46	0	246	30	74	8	0	112	11	35	19	0	65	654
05:00 PM	11	22	30	0	63	63	18	20	0	101	8	13	5	0	26	5	16	8	0	29	219
05:15 PM	7	20	30	0	57	36	8	10	0	54	12	17	2	4	35	4	13	3	0	20	166
05:30 PM	13	17	31	0	61	45	11	3	0	59	9	14	3	0	26	4	7	3	0	14	160
05:45 PM	9	15	32	0	56	35	14	9	0	58	7	9	3	0	19	4	10	4	0	18	151
Total	40	74	123	0	237	179	51	42	0	272	36	53	13	4	106	17	46	18	0	81	696
Grand Total	75	124	269	0	468	339	91	88	0	518	66	127	21	4	218	28	81	37	0	146	1350
Apprch %	16	26.5	57.5	0		65.4	17.6	17	0		30.3	58.3	9.6	1.8		19.2	55.5	25.3	0		
Total %	5.6	9.2	19.9	0	34.7	25.1	6.7	6.5	0	38.4	4.9	9.4	1.6	0.3	16.1	2.1	6	2.7	0	10.8	
General Traffic	72	119	235	0	426	299	89	87	0	475	64	120	20	4	208	27	78	36	0	141	1250
% General Traffic	96	96	87.4	0	91	88.2	97.8	98.9	0	91.7	97	94.5	95.2	100	95.4	96.4	96.3	97.3	0	96.6	92.6
3+ Axle Heavy Truck	3	5	34	0	42	40	2	1	0	43	2	7	1	0	10	1	3	1	0	5	100
% 3+ Axle Heavy Truck	4	4	12.6	0	9	11.8	2.2	1.1	0	8.3	3	5.5	4.8	0	4.6	3.6	3.7	2.7	0	3.4	7.4



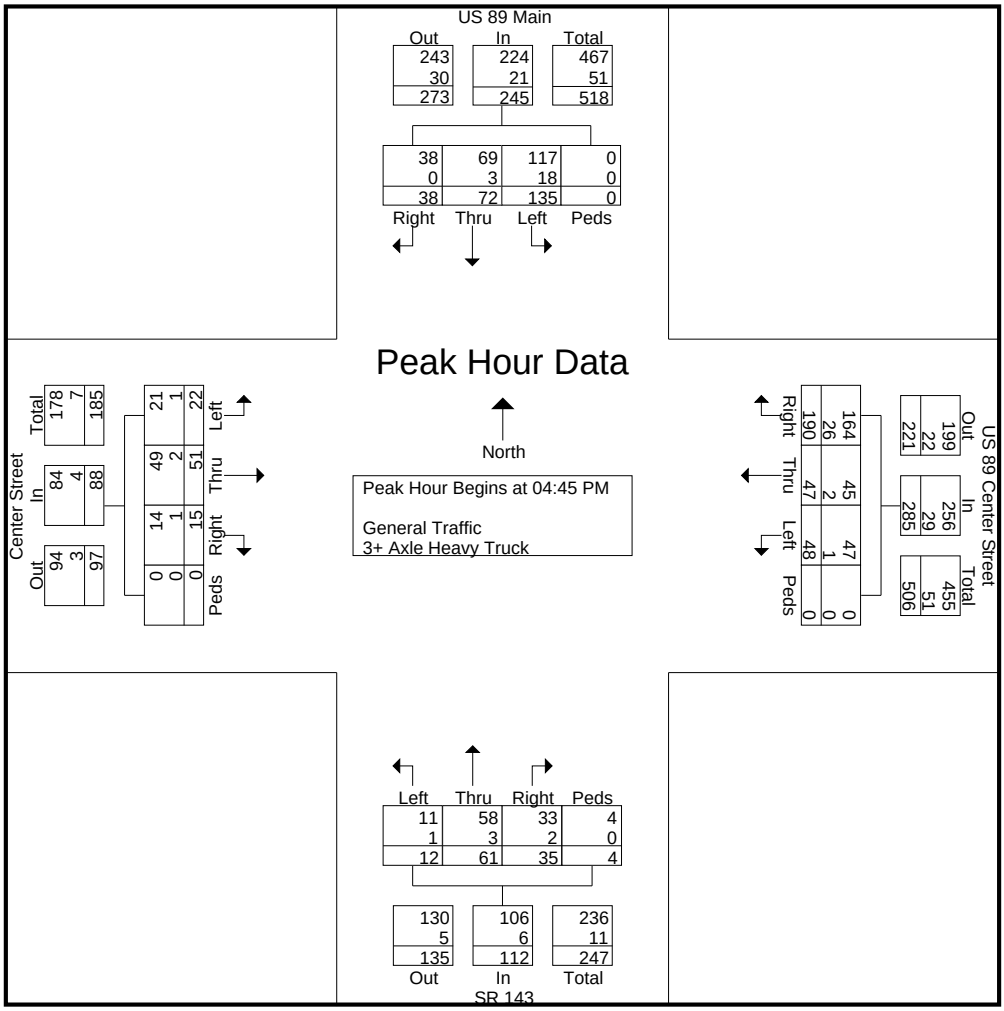
L2 Data Collection

1770 State Street #204
Boise, Idaho
(208) 860-7554

Tech: Larsen
Intersection: US 89 / Main / Center
City, State: Panguitch, Utah
Control: 4 Way Stop

File Name : 89 Main PM
Site Code : 3
Start Date : 6/20/2007
Page No : 2

	US 89 Main From North					US 89 Center Street From East					SR 143 From South					Center Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	7	13	**44**	0	**64**	46	10	15	0	71	6	**17**	2	0	25	2	15	**8**	0	25	185
05:00 PM	11	**22**	30	0	63	**63**	**18**	**20**	0	**101**	8	13	**5**	0	26	**5**	**16**	8	0	**29**	**219**
05:15 PM	7	20	30	0	57	36	8	10	0	54	**12**	17	2	**4**	**35**	4	13	3	0	20	166
05:30 PM	**13**	17	31	0	61	45	11	3	0	59	9	14	3	0	26	4	7	3	0	14	160
Total Volume	38	72	135	0	245	190	47	48	0	285	35	61	12	4	112	15	51	22	0	88	730
% App. Total	15.5	29.4	55.1	0		66.7	16.5	16.8	0		31.2	54.5	10.7	3.6		17	58	25	0		
PHF	.731	.818	.767	.000	.957	.754	.653	.600	.000	.705	.729	.897	.600	.250	.800	.750	.797	.688	.000	.759	.833
General Traffic	38	69	117	0	224	164	45	47	0	256	33	58	11	4	106	14	49	21	0	84	670
% General Traffic	100	95.8	86.7	0	91.4	86.3	95.7	97.9	0	89.8	94.3	95.1	91.7	100	94.6	93.3	96.1	95.5	0	95.5	91.8
3+ Axle Heavy Truck	0	3	18	0	21	26	2	1	0	29	2	3	1	0	6	1	2	1	0	4	60
% 3+ Axle Heavy Truck	0	4.2	13.3	0	8.6	13.7	4.3	2.1	0	10.2	5.7	4.9	8.3	0	5.4	6.7	3.9	4.5	0	4.5	8.2



L2 Data Collection

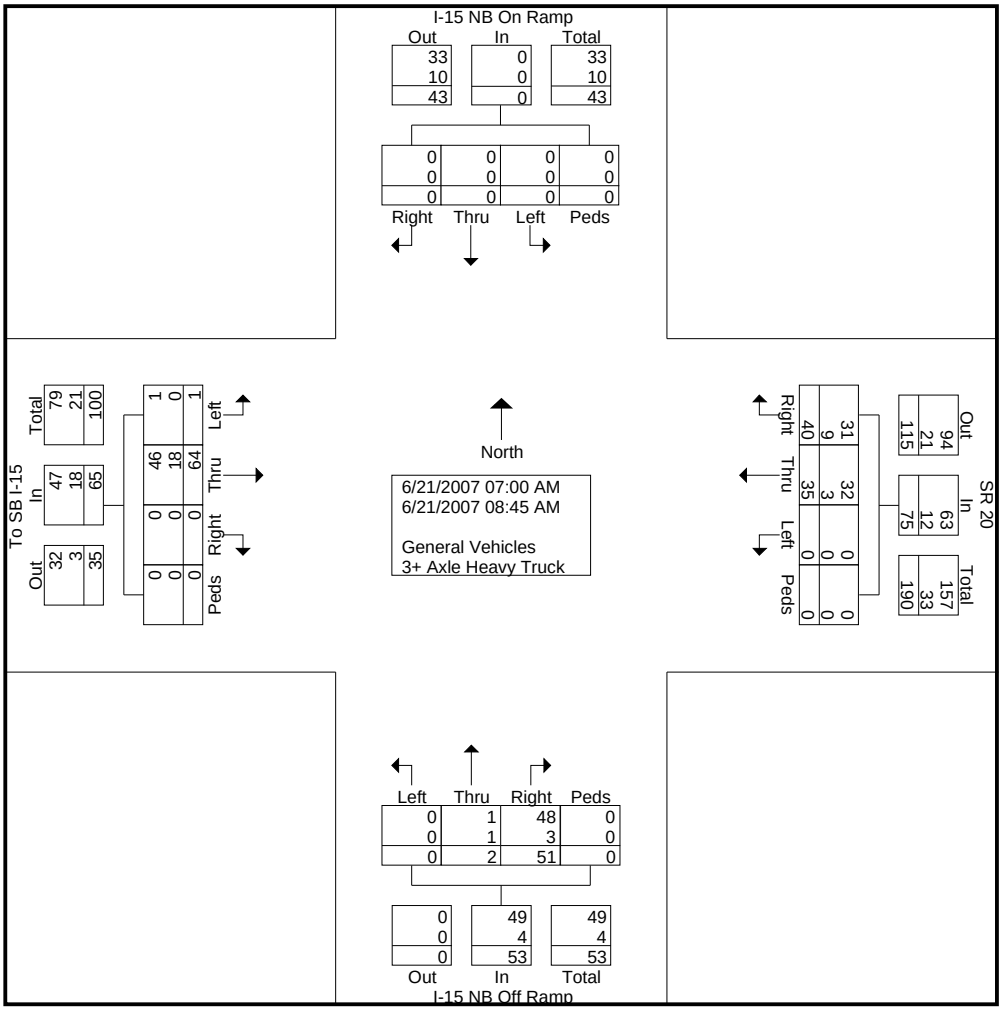
1770 W. State St. #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: I-15 NB Ramps / SR 20
City, State: Iron County, Utah
Control: Stop Sign

File Name : I 15 SR 20 AM NB
Site Code : 00000000
Start Date : 6/21/2007
Page No : 1

Groups Printed- General Vehicles - 3+ Axle Heavy Truck

	I-15 NB On Ramp From North					SR 20 From East					I-15 NB Off Ramp From South					To SB I-15 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	2	1	0	0	3	6	1	0	0	7	0	7	0	0	7	17
07:15 AM	0	0	0	0	0	4	5	0	0	9	8	0	0	0	8	0	7	0	0	7	24
07:30 AM	0	0	0	0	0	6	5	0	0	11	3	0	0	0	3	0	5	0	0	5	19
07:45 AM	0	0	0	0	0	5	2	0	0	7	6	0	0	0	6	0	4	0	0	4	17
Total	0	0	0	0	0	17	13	0	0	30	23	1	0	0	24	0	23	0	0	23	77
08:00 AM	0	0	0	0	0	1	7	0	0	8	8	0	0	0	8	0	9	1	0	10	26
08:15 AM	0	0	0	0	0	5	4	0	0	9	9	0	0	0	9	0	6	0	0	6	24
08:30 AM	0	0	0	0	0	9	6	0	0	15	7	1	0	0	8	0	15	0	0	15	38
08:45 AM	0	0	0	0	0	8	5	0	0	13	4	0	0	0	4	0	11	0	0	11	28
Total	0	0	0	0	0	23	22	0	0	45	28	1	0	0	29	0	41	1	0	42	116
Grand Total	0	0	0	0	0	40	35	0	0	75	51	2	0	0	53	0	64	1	0	65	193
Apprch %	0	0	0	0		53.3	46.7	0	0		96.2	3.8	0	0		0	98.5	1.5	0		
Total %	0	0	0	0	0	20.7	18.1	0	0	38.9	26.4	1	0	0	27.5	0	33.2	0.5	0	33.7	
General Vehicles																					
% General Vehicles	0	0	0	0	0	77.5	91.4	0	0	84	94.1	50	0	0	92.5	0	71.9	100	0	72.3	82.4
3+ Axle Heavy Truck																					
% 3+ Axle Heavy Truck	0	0	0	0	0	22.5	8.6	0	0	16	5.9	50	0	0	7.5	0	28.1	0	0	27.7	17.6



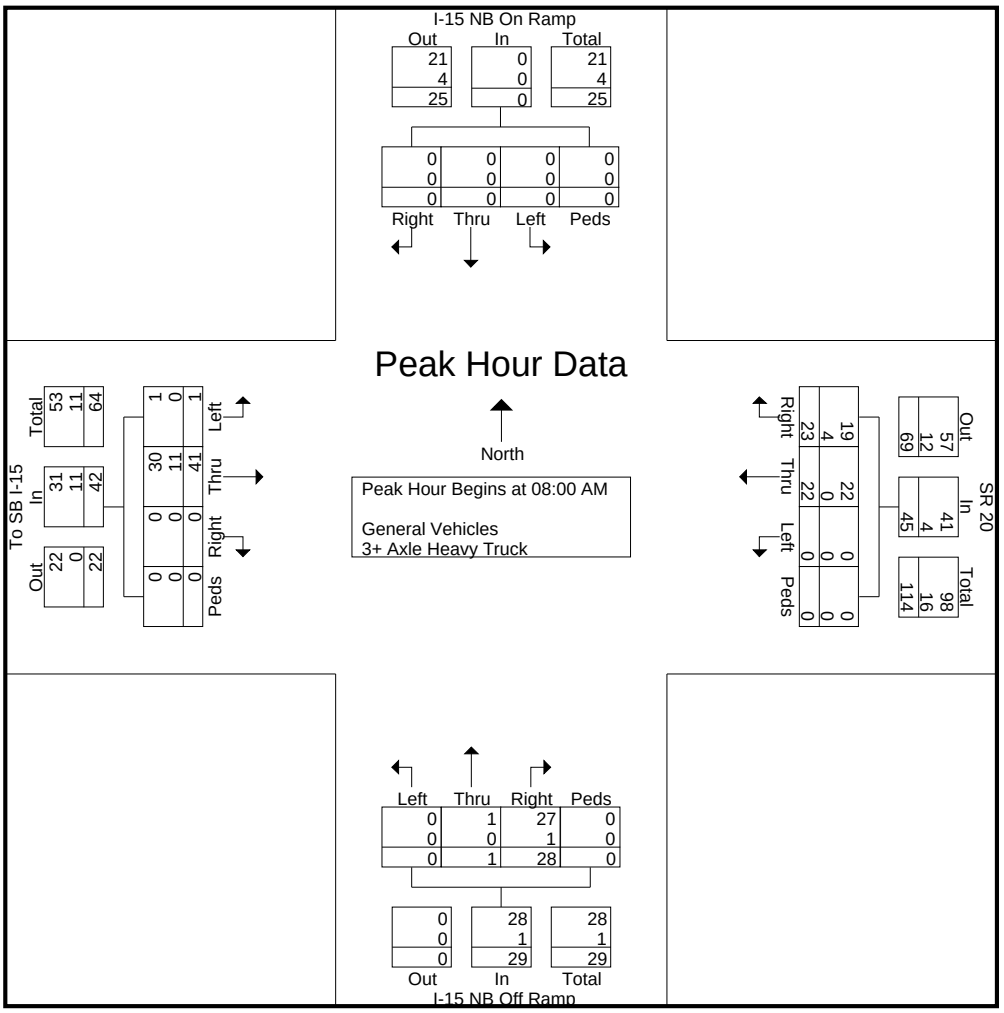
L2 Data Collection

1770 W. State St. #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: I-15 NB Ramps / SR 20
City, State: Iron County, Utah
Control: Stop Sign

File Name : I 15 SR 20 AM NB
Site Code : 00000000
Start Date : 6/21/2007
Page No : 2

	I-15 NB On Ramp From North					SR 20 From East					I-15 NB Off Ramp From South					To SB I-15 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	0	0	0	1	**7**	0	0	8	8	0	0	0	8	0	9	**1**	0	10	26
08:15 AM	0	0	0	0	0	5	4	0	0	9	**9**	0	0	0	**9**	0	6	0	0	6	24
08:30 AM	0	0	0	0	0	**9**	6	0	0	**15**	7	**1**	0	0	8	0	**15**	0	0	**15**	**38**
08:45 AM	0	0	0	0	0	8	5	0	0	13	4	0	0	0	4	0	11	0	0	11	28
Total Volume	0	0	0	0	0	23	22	0	0	45	28	1	0	0	29	0	41	1	0	42	116
% App. Total	0	0	0	0		51.1	48.9	0	0		96.6	3.4	0	0		0	97.6	2.4	0		
PHF	.000	.000	.000	.000	.000	.639	.786	.000	.000	.750	.778	.250	.000	.000	.806	.000	.683	.250	.000	.700	.763
General Vehicles % General Vehicles	0	0	0	0	0	82.6	100	0	0	91.1	96.4	100	0	0	96.6	0	73.2	100	0	73.8	86.2
3+ Axle Heavy Truck % 3+ Axle Heavy Truck	0	0	0	0	0	17.4	0	0	0	8.9	3.6	0	0	0	3.4	0	26.8	0	0	26.2	13.8



L2 Data Collection

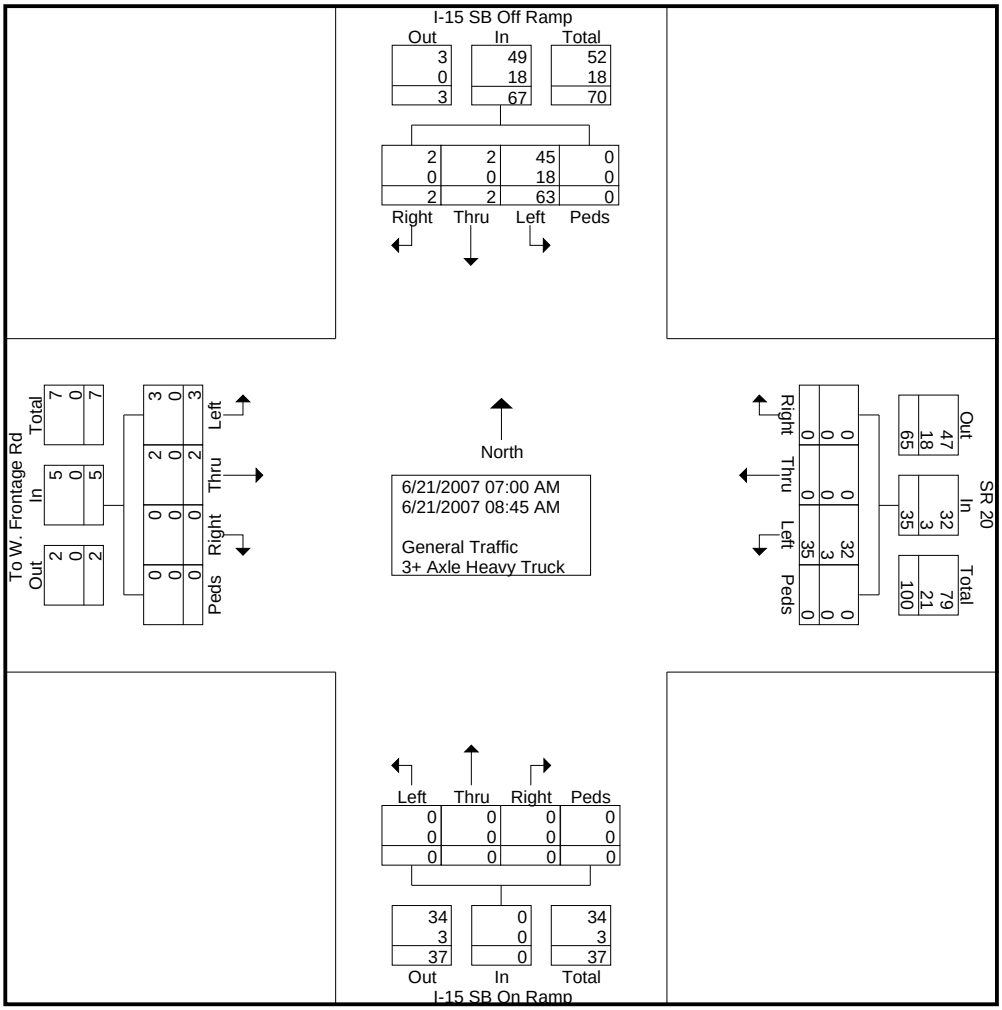
1770 W. State St. #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: I-15 SB Ramps / SR 20
City, State: Iron County, Utah
Control: Stop Sign

File Name : I 15 SR 20 AM SB
Site Code : 00000000
Start Date : 6/21/2007
Page No : 1

Groups Printed- General Traffic - 3+ Axle Heavy Truck

	I-15 SB Off Ramp From North					SR 20 From East					I-15 SB On Ramp From South					To W. Frontage Rd From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	6	0	6	0	0	1	0	1	0	0	0	0	0	0	1	3	0	4	11
07:15 AM	0	0	7	0	7	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	12
07:30 AM	0	0	5	0	5	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	10
07:45 AM	0	0	4	0	4	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	6
Total	0	0	22	0	22	0	0	13	0	13	0	0	0	0	0	0	1	3	0	4	39
08:00 AM	0	1	9	0	10	0	0	7	0	7	0	0	0	0	0	0	1	0	0	1	18
08:15 AM	0	0	6	0	6	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	10
08:30 AM	1	1	15	0	17	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	23
08:45 AM	1	0	11	0	12	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	17
Total	2	2	41	0	45	0	0	22	0	22	0	0	0	0	0	0	1	0	0	1	68
Grand Total	2	2	63	0	67	0	0	35	0	35	0	0	0	0	0	0	2	3	0	5	107
Apprch %	3	3	94	0		0	0	100	0		0	0	0	0		0	40	60	0		
Total %	1.9	1.9	58.9	0	62.6	0	0	32.7	0	32.7	0	0	0	0	0	0	1.9	2.8	0	4.7	
General Traffic % General Traffic	100	100	71.4	0	73.1	0	0	91.4	0	91.4	0	0	0	0	0	0	100	100	0	100	80.4
3+ Axle Heavy Truck % 3+ Axle Heavy Truck	0	0	28.6	0	26.9	0	0	8.6	0	8.6	0	0	0	0	0	0	0	0	0	0	19.6



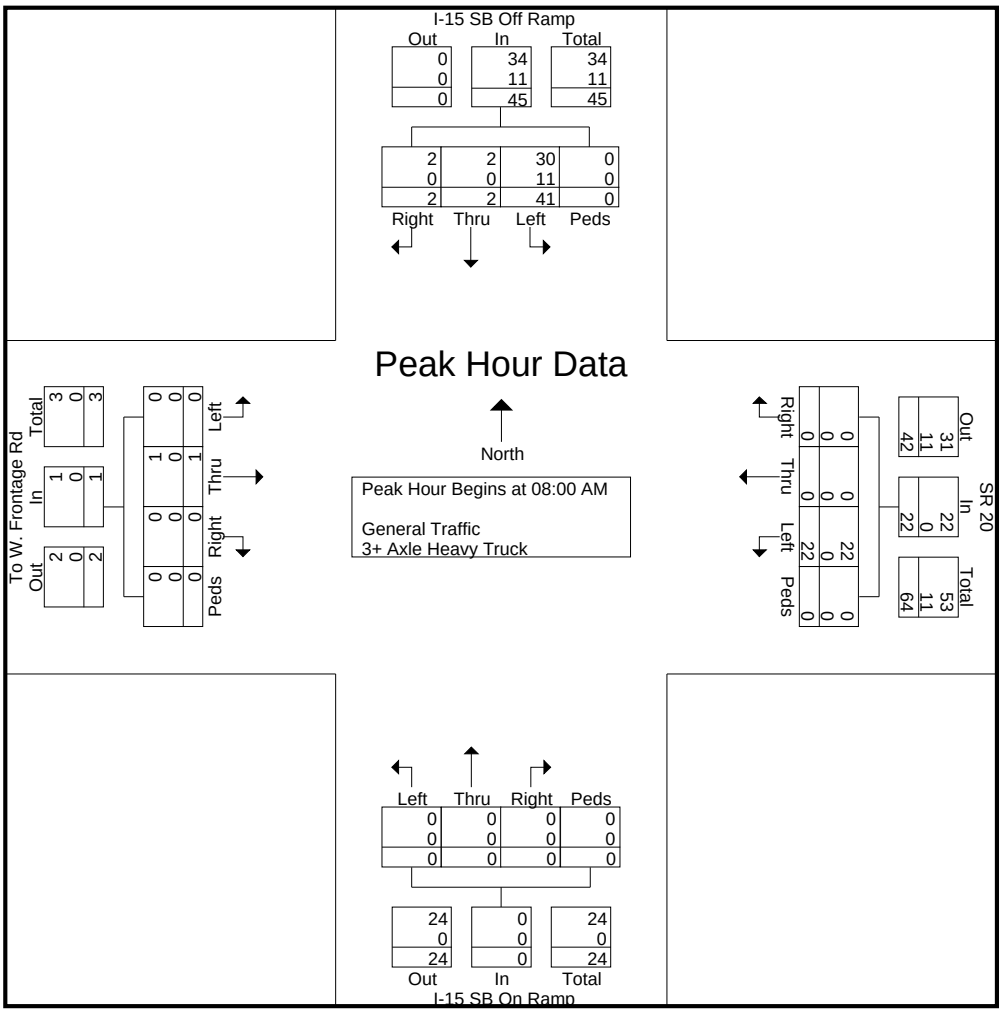
L2 Data Collection

1770 W. State St. #204
Boise, Idaho
(208) 860-7554

Tech: Judd
Intersection: I-15 SB Ramps / SR 20
City, State: Iron County, Utah
Control: Stop Sign

File Name : I 15 SR 20 AM SB
Site Code : 00000000
Start Date : 6/21/2007
Page No : 2

	I-15 SB Off Ramp From North					SR 20 From East					I-15 SB On Ramp From South					To W. Frontage Rd From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	**1**	9	0	10	0	0	**7**	0	**7**	0	0	0	0	0	0	**1**	0	0	**1**	18
08:15 AM	0	0	6	0	6	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	10
08:30 AM	**1**	1	**15**	0	**17**	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	**23**
08:45 AM	1	0	11	0	12	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	17
Total Volume	2	2	41	0	45	0	0	22	0	22	0	0	0	0	0	0	1	0	0	1	68
% App. Total	4.4	4.4	91.1	0		0	0	100	0		0	0	0	0		0	100	0	0		
PHF	.500	.500	.683	.000	.662	.000	.000	.786	.000	.786	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.739
General Traffic																					
% General Traffic	100	100	73.2	0	75.6	0	0	100	0	100	0	0	0	0	0	0	100	0	0	100	83.8
3+ Axle Heavy Truck																					
% 3+ Axle Heavy Truck	0	0	26.8	0	24.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.2



L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	19-Jun-07 Tue	WB	EB	Total
12:00 AM		2	3	5
12:15		4	6	10
12:30		0	4	4
12:45		0	3	3
01:00		2	0	2
01:15		3	1	4
01:30		1	1	2
01:45		2	1	3
02:00		0	3	3
02:15		1	1	2
02:30		0	0	0
02:45		1	1	2
03:00		1	0	1
03:15		1	0	1
03:30		2	2	4
03:45		1	0	1
04:00		3	3	6
04:15		1	1	2
04:30		1	0	1
04:45		3	2	5
05:00		2	2	4
05:15		0	0	0
05:30		1	2	3
05:45		1	5	6
06:00		6	6	12
06:15		5	2	7
06:30		6	10	16
06:45		5	6	11
07:00		4	4	8
07:15		12	6	18
07:30		6	5	11
07:45		7	14	21
08:00		12	13	25
08:15		6	8	14
08:30		8	12	20
08:45		14	12	26
09:00		16	12	28
09:15		16	9	25
09:30		18	10	28
09:45		14	13	27
10:00		15	14	29
10:15		**16**	28	**44**
10:30		**25**	15	**40**
10:45		**11**	**29**	**40**
11:00		**21**	**22**	**43**
11:15		13	**25**	38
11:30		12	**23**	35
11:45		15	14	29
Total		316	353	669
Percent		47.2%	52.8%	
Peak		10:15	10:45	10:15
Vol.		73	99	167
P.H.F.		0.730	0.853	0.949

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	19-Jun-07 Tue	WB	EB	Total
12:00 PM		13	30	43
12:15		20	14	34
12:30		19	22	41
12:45		23	14	37
01:00		23	19	42
01:15		17	**19**	36
01:30		22	**24**	46
01:45		22	**18**	40
02:00		16	**25**	41
02:15		19	17	36
02:30		20	13	33
02:45		18	15	33
03:00		**21**	18	**39**
03:15		**17**	25	**42**
03:30		**22**	16	**38**
03:45		**35**	15	**50**
04:00		17	12	29
04:15		19	16	35
04:30		16	11	27
04:45		18	18	36
05:00		14	21	35
05:15		17	12	29
05:30		12	15	27
05:45		21	19	40
06:00		14	19	33
06:15		19	13	32
06:30		16	14	30
06:45		16	20	36
07:00		15	15	30
07:15		9	13	22
07:30		12	10	22
07:45		8	9	17
08:00		12	10	22
08:15		10	11	21
08:30		5	7	12
08:45		12	8	20
09:00		1	7	8
09:15		12	11	23
09:30		8	8	16
09:45		4	7	11
10:00		1	11	12
10:15		3	6	9
10:30		7	5	12
10:45		7	5	12
11:00		3	5	8
11:15		4	5	9
11:30		9	11	20
11:45		4	6	10
Total		672	664	1336
Percent		50.3%	49.7%	
Peak		15:00	13:15	15:00
Vol.		95	86	169
P.H.F.		0.679	0.717	0.845

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	20-Jun-07 Wed	WB	EB	Total
12:00 AM		2	3	5
12:15		1	2	3
12:30		1	0	1
12:45		2	6	8
01:00		2	1	3
01:15		0	1	1
01:30		0	0	0
01:45		1	0	1
02:00		0	2	2
02:15		4	1	5
02:30		3	1	4
02:45		1	2	3
03:00		3	2	5
03:15		1	1	2
03:30		0	2	2
03:45		3	2	5
04:00		1	2	3
04:15		1	0	1
04:30		2	1	3
04:45		2	1	3
05:00		3	2	5
05:15		2	2	4
05:30		1	0	1
05:45		2	4	6
06:00		3	4	7
06:15		5	5	10
06:30		7	6	13
06:45		2	8	10
07:00		5	7	12
07:15		6	3	9
07:30		11	14	25
07:45		12	8	20
08:00		12	15	27
08:15		11	8	19
08:30		18	13	31
08:45		12	10	22
09:00		12	**18**	30
09:15		12	**28**	**40**
09:30		**22**	**13**	**35**
09:45		**23**	**18**	**41**
10:00		**19**	15	**34**
10:15		**18**	19	37
10:30		18	17	35
10:45		11	17	28
11:00		14	17	31
11:15		18	17	35
11:30		19	20	39
11:45		13	15	28
Total		341	353	694
Percent		49.1%	50.9%	
Peak		09:30	09:00	09:15
Vol.		82	77	150
P.H.F.		0.891	0.688	0.915

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	20-Jun-07 Wed	WB	EB	Total
12:00 PM		10	20	30
12:15		19	12	31
12:30		24	16	40
12:45		18	18	36
01:00		19	18	37
01:15		18	26	44
01:30		12	14	26
01:45		17	20	37
02:00		30	16	46
02:15		23	21	44
02:30		19	16	35
02:45		21	23	44
03:00		19	14	33
03:15		22	27	49
03:30		23	18	41
03:45		**22**	24	46
04:00		**26**	25	51
04:15		**24**	**27**	**51**
04:30		**32**	**18**	**50**
04:45		19	**26**	**45**
05:00		28	**27**	**55**
05:15		22	19	41
05:30		22	21	43
05:45		12	22	34
06:00		17	9	26
06:15		28	26	54
06:30		20	29	49
06:45		11	16	27
07:00		17	21	38
07:15		14	21	35
07:30		9	18	27
07:45		17	14	31
08:00		10	12	22
08:15		14	12	26
08:30		11	18	29
08:45		11	6	17
09:00		10	15	25
09:15		9	12	21
09:30		10	12	22
09:45		4	16	20
10:00		5	7	12
10:15		7	5	12
10:30		10	9	19
10:45		7	8	15
11:00		4	8	12
11:15		7	6	13
11:30		3	4	7
11:45		2	2	4
Total		758	794	1552
Percent		48.8%	51.2%	
Peak		15:45	16:15	16:15
Vol.		104	98	201
P.H.F.		0.813	0.845	0.914

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	21-Jun-07 Thu	WB	EB	Total
12:00 AM		4	1	5
12:15		1	4	5
12:30		4	1	5
12:45		2	0	2
01:00		0	0	0
01:15		0	4	4
01:30		0	0	0
01:45		4	0	4
02:00		1	3	4
02:15		1	3	4
02:30		0	1	1
02:45		2	3	5
03:00		2	1	3
03:15		2	3	5
03:30		1	0	1
03:45		3	1	4
04:00		5	1	6
04:15		1	7	8
04:30		1	0	1
04:45		1	0	1
05:00		4	2	6
05:15		1	1	2
05:30		2	2	4
05:45		1	1	2
06:00		3	5	8
06:15		2	2	4
06:30		9	7	16
06:45		3	5	8
07:00		2	11	13
07:15		10	14	24
07:30		9	10	19
07:45		7	9	16
08:00		8	12	20
08:15		17	23	40
08:30		10	18	28
08:45		10	14	24
09:00		11	20	31
09:15		17	20	37
09:30		11	21	32
09:45		14	17	31
10:00		11	20	31
10:15		**15**	18	33
10:30		**26**	**32**	**58**
10:45		**17**	**28**	**45**
11:00		**18**	**31**	**49**
11:15		13	**25**	**38**
11:30		18	24	42
11:45		20	24	44
Total		324	449	773
Percent		41.9%	58.1%	
Peak		10:15	10:30	10:30
Vol.		76	116	190
P.H.F.		0.731	0.906	0.819

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	21-Jun-07 Thu	WB	EB	Total
12:00 PM		21	30	51
12:15		8	18	26
12:30		34	32	66
12:45		26	24	50
01:00		23	12	35
01:15		12	26	38
01:30		24	**36**	60
01:45		19	**28**	47
02:00		13	**28**	**41**
02:15		22	**35**	**57**
02:30		27	31	**58**
02:45		30	30	**60**
03:00		12	27	39
03:15		19	31	50
03:30		12	23	35
03:45		29	25	54
04:00		20	20	40
04:15		21	31	52
04:30		14	20	34
04:45		27	25	52
05:00		17	31	48
05:15		**22**	29	51
05:30		**33**	30	63
05:45		**26**	24	50
06:00		**22**	22	44
06:15		22	23	45
06:30		27	23	50
06:45		16	16	32
07:00		21	32	53
07:15		16	17	33
07:30		14	20	34
07:45		17	9	26
08:00		11	13	24
08:15		15	8	23
08:30		13	21	34
08:45		11	15	26
09:00		7	12	19
09:15		8	5	13
09:30		8	16	24
09:45		14	17	31
10:00		11	13	24
10:15		6	13	19
10:30		11	7	18
10:45		8	18	26
11:00		5	13	18
11:15		8	7	15
11:30		4	4	8
11:45		7	7	14
Total		813	997	1810
Percent		44.9%	55.1%	
Peak		17:15	13:30	14:00
Vol.		103	127	216
P.H.F.		0.757	0.882	0.818

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	22-Jun-07 Fri	WB	EB	Total
12:00 AM		3	4	7
12:15		5	7	12
12:30		4	4	8
12:45		7	1	8
01:00		2	4	6
01:15		3	6	9
01:30		5	3	8
01:45		5	3	8
02:00		1	2	3
02:15		1	3	4
02:30		3	2	5
02:45		3	1	4
03:00		4	0	4
03:15		2	3	5
03:30		2	0	2
03:45		4	1	5
04:00		1	0	1
04:15		2	0	2
04:30		2	2	4
04:45		0	2	2
05:00		2	2	4
05:15		0	3	3
05:30		3	5	8
05:45		3	3	6
06:00		3	6	9
06:15		6	7	13
06:30		2	5	7
06:45		7	11	18
07:00		5	3	8
07:15		9	12	21
07:30		11	16	27
07:45		18	16	34
08:00		6	13	19
08:15		13	10	23
08:30		17	17	34
08:45		12	17	29
09:00		8	16	24
09:15		8	18	26
09:30		**16**	23	39
09:45		**17**	14	31
10:00		**21**	16	37
10:15		**22**	23	**45**
10:30		14	28	**42**
10:45		18	16	**34**
11:00		16	**22**	**38**
11:15		18	**22**	40
11:30		14	**21**	35
11:45		14	**30**	44
Total		362	443	805
Percent		45.0%	55.0%	
Peak		09:30	11:00	10:15
Vol.		76	95	159
P.H.F.		0.864	0.792	0.883

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	22-Jun-07 Fri	WB	EB	Total
12:00 PM		19	22	41
12:15		19	30	49
12:30		25	34	59
12:45		16	27	43
01:00		28	33	61
01:15		37	31	68
01:30		18	31	49
01:45		20	23	43
02:00		25	29	54
02:15		27	27	54
02:30		21	39	60
02:45		17	31	48
03:00		22	28	50
03:15		23	22	45
03:30		**28**	**38**	**66**
03:45		**30**	**33**	**63**
04:00		**35**	**41**	**76**
04:15		**25**	**37**	**62**
04:30		19	25	44
04:45		23	24	47
05:00		30	30	60
05:15		27	36	63
05:30		23	31	54
05:45		23	37	60
06:00		25	29	54
06:15		22	44	66
06:30		19	30	49
06:45		10	25	35
07:00		18	24	42
07:15		15	27	42
07:30		14	22	36
07:45		6	18	24
08:00		13	23	36
08:15		11	27	38
08:30		18	26	44
08:45		9	31	40
09:00		9	36	45
09:15		21	20	41
09:30		14	20	34
09:45		9	14	23
10:00		15	14	29
10:15		9	13	22
10:30		10	7	17
10:45		12	10	22
11:00		9	7	16
11:15		5	9	14
11:30		6	4	10
11:45		8	5	13
Total		887	1224	2111
Percent		42.0%	58.0%	
Peak		15:30	15:30	15:30
Vol.		118	149	267
P.H.F.		0.797	0.847	0.878

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	23-Jun-07 Sat	WB	EB	Total
12:00 AM		7	18	25
12:15		3	7	10
12:30		5	4	9
12:45		5	10	15
01:00		4	2	6
01:15		1	8	9
01:30		5	2	7
01:45		0	3	3
02:00		5	4	9
02:15		4	5	9
02:30		1	4	5
02:45		1	2	3
03:00		2	2	4
03:15		1	0	1
03:30		3	1	4
03:45		2	0	2
04:00		0	1	1
04:15		1	3	4
04:30		3	3	6
04:45		2	2	4
05:00		3	2	5
05:15		3	3	6
05:30		3	4	7
05:45		0	7	7
06:00		4	8	12
06:15		2	8	10
06:30		9	7	16
06:45		7	5	12
07:00		4	7	11
07:15		2	9	11
07:30		4	16	20
07:45		9	15	24
08:00		6	12	18
08:15		15	6	21
08:30		17	15	32
08:45		17	11	28
09:00		13	24	37
09:15		9	21	30
09:30		21	20	41
09:45		12	17	29
10:00		18	29	47
10:15		15	17	32
10:30		26	18	44
10:45		21	**31**	52
11:00		**14**	**25**	**39**
11:15		**15**	**23**	**38**
11:30		**22**	**28**	**50**
11:45		**38**	27	**65**
Total		384	496	880
Percent		43.6%	56.4%	
Peak		11:00	10:45	11:00
Vol.		89	107	192
P.H.F.		0.586	0.863	0.738

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	23-Jun-07 Sat	WB	EB	Total
12:00 PM		18	25	43
12:15		28	19	47
12:30		24	25	49
12:45		43	16	59
01:00		23	28	51
01:15		26	19	45
01:30		23	22	45
01:45		24	28	52
02:00		21	19	40
02:15		18	29	47
02:30		31	17	48
02:45		**39**	19	58
03:00		**24**	**27**	**51**
03:15		**38**	**31**	**69**
03:30		**34**	**22**	**56**
03:45		37	**25**	**62**
04:00		16	25	41
04:15		20	29	49
04:30		29	21	50
04:45		41	15	56
05:00		18	11	29
05:15		20	19	39
05:30		37	24	61
05:45		32	18	50
06:00		32	17	49
06:15		25	14	39
06:30		21	12	33
06:45		20	18	38
07:00		21	17	38
07:15		27	16	43
07:30		19	7	26
07:45		18	18	36
08:00		8	8	16
08:15		13	18	31
08:30		14	11	25
08:45		17	7	24
09:00		11	6	17
09:15		13	3	16
09:30		20	4	24
09:45		17	9	26
10:00		25	5	30
10:15		25	2	27
10:30		30	5	35
10:45		14	4	18
11:00		11	5	16
11:15		13	8	21
11:30		13	4	17
11:45		6	8	14
Total		1097	759	1856
Percent		59.1%	40.9%	
Peak		14:45	15:00	15:00
Vol.		135	105	238
P.H.F.		0.785	0.847	0.862

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	24-Jun-07 Sun	WB	EB	Total
12:00 AM		3	3	6
12:15		6	1	7
12:30		2	5	7
12:45		2	1	3
01:00		1	1	2
01:15		3	2	5
01:30		1	2	3
01:45		3	1	4
02:00		0	1	1
02:15		2	1	3
02:30		1	1	2
02:45		2	0	2
03:00		3	0	3
03:15		2	3	5
03:30		1	3	4
03:45		2	0	2
04:00		1	0	1
04:15		1	1	2
04:30		3	1	4
04:45		1	0	1
05:00		3	1	4
05:15		2	0	2
05:30		1	1	2
05:45		0	4	4
06:00		3	3	6
06:15		5	2	7
06:30		2	8	10
06:45		3	3	6
07:00		5	3	8
07:15		7	4	11
07:30		10	6	16
07:45		11	6	17
08:00		7	10	17
08:15		23	9	32
08:30		19	12	31
08:45		10	12	22
09:00		24	24	48
09:15		37	11	48
09:30		26	24	50
09:45		26	8	34
10:00		30	18	48
10:15		19	23	42
10:30		33	**24**	**57**
10:45		36	**28**	**64**
11:00		**28**	**17**	**45**
11:15		**29**	**25**	**54**
11:30		**35**	15	50
11:45		**37**	18	55
Total		511	346	857
Percent		59.6%	40.4%	
Peak		11:00	10:30	10:30
Vol.		129	94	220
P.H.F.		0.872	0.839	0.859

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	24-Jun-07 Sun	WB	EB	Total
12:00 PM		42	19	61
12:15		36	24	60
12:30		51	26	77
12:45		36	13	49
01:00		38	29	67
01:15		38	**27**	**65**
01:30		32	**35**	**67**
01:45		34	**25**	**59**
02:00		**53**	**34**	**87**
02:15		**43**	21	64
02:30		**30**	17	47
02:45		**42**	22	64
03:00		39	22	61
03:15		39	28	67
03:30		37	13	50
03:45		32	23	55
04:00		38	21	59
04:15		34	23	57
04:30		38	31	69
04:45		43	19	62
05:00		35	19	54
05:15		44	15	59
05:30		38	23	61
05:45		23	11	34
06:00		23	27	50
06:15		29	13	42
06:30		32	22	54
06:45		38	16	54
07:00		30	9	39
07:15		21	5	26
07:30		16	10	26
07:45		25	11	36
08:00		18	14	32
08:15		20	11	31
08:30		12	11	23
08:45		22	18	40
09:00		13	10	23
09:15		8	12	20
09:30		14	7	21
09:45		14	8	22
10:00		15	9	24
10:15		11	5	16
10:30		5	5	10
10:45		2	2	4
11:00		9	5	14
11:15		2	6	8
11:30		6	2	8
11:45		3	2	5
Total		1303	780	2083
Percent		62.6%	37.4%	
Peak		14:00	13:15	13:15
Vol.		168	121	278
P.H.F.		0.792	0.864	0.799

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	25-Jun-07 Mon	WB	EB	Total
12:00 AM		7	2	9
12:15		1	3	4
12:30		2	3	5
12:45		3	2	5
01:00		0	3	3
01:15		3	1	4
01:30		3	2	5
01:45		3	4	7
02:00		1	2	3
02:15		1	1	2
02:30		3	0	3
02:45		2	1	3
03:00		4	0	4
03:15		5	1	6
03:30		8	2	10
03:45		2	0	2
04:00		4	1	5
04:15		1	0	1
04:30		0	0	0
04:45		2	1	3
05:00		4	1	5
05:15		0	1	1
05:30		4	1	5
05:45		6	4	10
06:00		6	4	10
06:15		7	5	12
06:30		1	9	10
06:45		14	8	22
07:00		3	3	6
07:15		9	2	11
07:30		11	8	19
07:45		12	14	26
08:00		11	11	22
08:15		11	15	26
08:30		8	15	23
08:45		6	11	17
09:00		17	15	32
09:15		9	7	16
09:30		**28**	13	41
09:45		**25**	19	44
10:00		**20**	16	36
10:15		**19**	**21**	**40**
10:30		28	**16**	**44**
10:45		10	**18**	**28**
11:00		26	**29**	**55**
11:15		24	16	40
11:30		19	17	36
11:45		20	15	35
Total		413	343	756
Percent		54.6%	45.4%	
Peak		09:30	10:15	10:15
Vol.		92	84	167
P.H.F.		0.821	0.724	0.759

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 13350 / 13131

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
SR20 E of Summit
Iron County, Utah

Start Time	25-Jun-07 Mon	WB	EB	Total
12:00 PM		18	23	41
12:15		23	**28**	**51**
12:30		25	**22**	**47**
12:45		19	**21**	**40**
01:00		16	**31**	**47**
01:15		10	21	31
01:30		15	26	41
01:45		18	23	41
02:00		14	21	35
02:15		22	16	38
02:30		11	22	33
02:45		18	19	37
03:00		21	13	34
03:15		17	17	34
03:30		23	14	37
03:45		21	15	36
04:00		17	30	47
04:15		12	23	35
04:30		**25**	17	42
04:45		**15**	24	39
05:00		**28**	26	54
05:15		**22**	20	42
05:30		22	13	35
05:45		16	17	33
06:00		22	15	37
06:15		19	16	35
06:30		16	13	29
06:45		13	9	22
07:00		9	16	25
07:15		22	8	30
07:30		12	8	20
07:45		20	18	38
08:00		5	5	10
08:15		9	6	15
08:30		10	9	19
08:45		8	7	15
09:00		9	9	18
09:15		11	5	16
09:30		9	7	16
09:45		8	6	14
10:00		5	6	11
10:15		7	1	8
10:30		2	9	11
10:45		5	5	10
11:00		5	4	9
11:15		8	4	12
11:30		4	4	8
11:45		4	0	4
Total		690	692	1382
Percent		49.9%	50.1%	
Peak		16:30	12:15	12:15
Vol.		90	102	185
P.H.F.		0.804	0.823	0.856
Grand Total		8871	8693	17564
Percent		50.5%	49.5%	
ADT		ADT 2,509	AADT 2,509	

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	19-Jun-07 Tue	SB	NB	Total
12:00 AM		2	9	11
12:15		4	1	5
12:30		5	1	6
12:45		4	1	5
01:00		4	3	7
01:15		0	1	1
01:30		2	4	6
01:45		2	2	4
02:00		1	1	2
02:15		3	1	4
02:30		1	0	1
02:45		2	6	8
03:00		2	5	7
03:15		0	3	3
03:30		0	1	1
03:45		2	4	6
04:00		1	2	3
04:15		5	2	7
04:30		1	2	3
04:45		2	2	4
05:00		4	2	6
05:15		2	1	3
05:30		2	2	4
05:45		4	6	10
06:00		3	7	10
06:15		4	4	8
06:30		2	4	6
06:45		15	7	22
07:00		5	12	17
07:15		9	7	16
07:30		6	16	22
07:45		13	26	39
08:00		19	9	28
08:15		19	16	35
08:30		12	16	28
08:45		11	21	32
09:00		19	27	46
09:15		19	26	45
09:30		22	17	39
09:45		21	23	44
10:00		25	20	45
10:15		32	**31**	**63**
10:30		27	**22**	**49**
10:45		23	**24**	**47**
11:00		**32**	**24**	**56**
11:15		**32**	16	48
11:30		**33**	29	62
11:45		**28**	20	48
Total		486	486	972
Percent		50.0%	50.0%	
Peak		11:00	10:15	10:15
Vol.		125	101	215
P.H.F.		0.947	0.815	0.853

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	19-Jun-07 Tue	SB	NB	Total
12:00 PM		27	18	45
12:15		**37**	33	**70**
12:30		**23**	33	**56**
12:45		**35**	33	**68**
01:00		**29**	24	**53**
01:15		25	31	56
01:30		24	34	58
01:45		26	27	53
02:00		21	23	44
02:15		30	27	57
02:30		29	33	62
02:45		26	34	60
03:00		34	17	51
03:15		27	**30**	57
03:30		32	**39**	71
03:45		18	**37**	55
04:00		26	**18**	44
04:15		17	28	45
04:30		22	37	59
04:45		23	20	43
05:00		24	32	56
05:15		26	18	44
05:30		16	27	43
05:45		19	22	41
06:00		22	22	44
06:15		28	24	52
06:30		18	16	34
06:45		18	18	36
07:00		24	14	38
07:15		33	17	50
07:30		8	17	25
07:45		15	12	27
08:00		11	12	23
08:15		13	9	22
08:30		13	19	32
08:45		5	6	11
09:00		16	11	27
09:15		6	10	16
09:30		17	7	24
09:45		13	5	18
10:00		8	9	17
10:15		14	8	22
10:30		6	6	12
10:45		5	7	12
11:00		8	5	13
11:15		6	10	16
11:30		6	10	16
11:45		10	5	15
Total		939	954	1893
Percent		49.6%	50.4%	
Peak		12:15	15:15	12:15
Vol.		124	124	247
P.H.F.		0.838	0.795	0.870

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	20-Jun-07 Wed	SB	NB	Total
12:00 AM		6	2	8
12:15		2	3	5
12:30		2	2	4
12:45		1	3	4
01:00		5	2	7
01:15		4	0	4
01:30		2	2	4
01:45		1	1	2
02:00		1	3	4
02:15		3	0	3
02:30		1	2	3
02:45		1	3	4
03:00		2	1	3
03:15		1	3	4
03:30		3	1	4
03:45		2	1	3
04:00		4	0	4
04:15		2	6	8
04:30		1	2	3
04:45		2	6	8
05:00		2	5	7
05:15		4	1	5
05:30		2	2	4
05:45		5	8	13
06:00		6	2	8
06:15		3	13	16
06:30		9	6	15
06:45		4	12	16
07:00		10	8	18
07:15		10	14	24
07:30		7	11	18
07:45		22	16	38
08:00		15	29	44
08:15		16	23	39
08:30		13	15	28
08:45		15	20	35
09:00		20	17	37
09:15		23	30	53
09:30		28	28	56
09:45		36	28	64
10:00		19	19	38
10:15		20	23	43
10:30		26	**37**	**63**
10:45		23	**22**	**45**
11:00		**26**	**24**	**50**
11:15		**26**	**28**	**54**
11:30		**27**	19	46
11:45		**36**	18	54
Total		499	521	1020
Percent		48.9%	51.1%	
Peak		11:00	10:30	10:30
Vol.		115	111	212
P.H.F.		0.799	0.750	0.828

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	20-Jun-07 Wed	SB	NB	Total
12:00 PM		39	20	59
12:15		28	32	60
12:30		24	25	49
12:45		24	34	58
01:00		27	22	49
01:15		27	24	51
01:30		32	30	62
01:45		31	39	70
02:00		31	39	70
02:15		25	30	55
02:30		26	38	64
02:45		27	30	57
03:00		26	29	55
03:15		**33**	27	60
03:30		**35**	27	62
03:45		**28**	42	70
04:00		**37**	25	62
04:15		33	**45**	**78**
04:30		31	**37**	**68**
04:45		32	**41**	**73**
05:00		30	**42**	**72**
05:15		28	34	62
05:30		34	27	61
05:45		34	29	63
06:00		25	32	57
06:15		32	21	53
06:30		28	23	51
06:45		35	29	64
07:00		27	18	45
07:15		28	16	44
07:30		26	23	49
07:45		26	17	43
08:00		21	11	32
08:15		17	19	36
08:30		19	13	32
08:45		24	6	30
09:00		17	12	29
09:15		21	16	37
09:30		8	10	18
09:45		10	6	16
10:00		22	7	29
10:15		14	17	31
10:30		7	11	18
10:45		11	7	18
11:00		13	8	21
11:15		11	4	15
11:30		8	8	16
11:45		3	8	11
Total		1175	1110	2285
Percent		51.4%	48.6%	
Peak		15:15	16:15	16:15
Vol.		133	165	291
P.H.F.		0.853	0.917	0.933

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	21-Jun-07 Thu	SB	NB	Total
12:00 AM		7	3	10
12:15		1	2	3
12:30		5	5	10
12:45		1	0	1
01:00		1	0	1
01:15		7	0	7
01:30		2	4	6
01:45		0	1	1
02:00		0	4	4
02:15		4	0	4
02:30		1	3	4
02:45		3	2	5
03:00		3	3	6
03:15		3	3	6
03:30		2	4	6
03:45		2	4	6
04:00		1	5	6
04:15		4	0	4
04:30		8	2	10
04:45		1	4	5
05:00		1	4	5
05:15		5	3	8
05:30		2	1	3
05:45		6	7	13
06:00		3	6	9
06:15		2	11	13
06:30		3	9	12
06:45		9	1	10
07:00		7	16	23
07:15		12	13	25
07:30		18	12	30
07:45		16	20	36
08:00		9	18	27
08:15		26	17	43
08:30		22	16	38
08:45		22	21	43
09:00		23	19	42
09:15		17	25	42
09:30		26	18	44
09:45		25	19	44
10:00		24	**22**	46
10:15		35	**30**	65
10:30		24	**26**	50
10:45		**53**	**25**	**78**
11:00		**36**	21	**57**
11:15		**30**	17	**47**
11:30		**33**	36	**69**
11:45		29	29	58
Total		574	511	1085
Percent		52.9%	47.1%	
Peak		10:45	10:00	10:45
Vol.		152	103	251
P.H.F.		0.717	0.715	0.804

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	21-Jun-07 Thu	SB	NB	Total
12:00 PM		32	20	52
12:15		43	36	79
12:30		32	40	72
12:45		46	25	71
01:00		34	26	60
01:15		32	37	69
01:30		49	24	73
01:45		40	24	64
02:00		49	26	**75**
02:15		**42**	29	**71**
02:30		**59**	55	**114**
02:45		**55**	32	**87**
03:00		**51**	23	74
03:15		35	30	65
03:30		57	34	91
03:45		35	29	64
04:00		44	39	83
04:15		55	22	77
04:30		36	**42**	78
04:45		34	**30**	64
05:00		61	**34**	95
05:15		31	**41**	72
05:30		28	28	56
05:45		36	34	70
06:00		34	36	70
06:15		38	25	63
06:30		29	30	59
06:45		28	26	54
07:00		20	28	48
07:15		28	20	48
07:30		24	22	46
07:45		28	17	45
08:00		25	17	42
08:15		19	18	37
08:30		19	14	33
08:45		21	12	33
09:00		16	21	37
09:15		18	18	36
09:30		10	19	29
09:45		29	11	40
10:00		21	20	41
10:15		18	13	31
10:30		14	11	25
10:45		13	11	24
11:00		16	9	25
11:15		10	5	15
11:30		9	9	18
11:45		9	6	15
Total		1512	1178	2690
Percent		56.2%	43.8%	
Peak		14:15	16:30	14:00
Vol.		207	147	347
P.H.F.		0.848	0.668	0.761

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	22-Jun-07 Fri	SB	NB	Total
12:00 AM		7	6	13
12:15		6	5	11
12:30		4	11	15
12:45		6	2	8
01:00		2	4	6
01:15		4	10	14
01:30		7	8	15
01:45		3	1	4
02:00		4	1	5
02:15		2	3	5
02:30		2	3	5
02:45		3	11	14
03:00		2	1	3
03:15		1	6	7
03:30		2	6	8
03:45		0	2	2
04:00		1	0	1
04:15		2	4	6
04:30		0	5	5
04:45		4	4	8
05:00		6	1	7
05:15		4	5	9
05:30		6	6	12
05:45		3	8	11
06:00		6	4	10
06:15		5	10	15
06:30		6	8	14
06:45		5	4	9
07:00		16	12	28
07:15		12	13	25
07:30		21	19	40
07:45		20	18	38
08:00		19	18	37
08:15		23	21	44
08:30		17	17	34
08:45		25	16	41
09:00		21	26	47
09:15		26	22	48
09:30		**46**	**41**	**87**
09:45		**36**	**32**	**68**
10:00		**35**	**43**	**78**
10:15		**32**	**36**	**68**
10:30		27	26	53
10:45		30	30	60
11:00		33	36	69
11:15		39	26	65
11:30		33	20	53
11:45		37	33	70
Total		651	644	1295
Percent		50.3%	49.7%	
Peak		09:30	09:30	09:30
Vol.		149	152	301
P.H.F.		0.810	0.884	0.865

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	22-Jun-07 Fri	SB	NB	Total
12:00 PM		32	33	65
12:15		25	25	50
12:30		46	17	63
12:45		47	34	81
01:00		32	40	72
01:15		36	28	64
01:30		39	36	75
01:45		34	51	85
02:00		27	34	61
02:15		52	36	88
02:30		30	29	59
02:45		50	34	84
03:00		29	36	65
03:15		46	**50**	**96**
03:30		31	**39**	**70**
03:45		**45**	**46**	**91**
04:00		**51**	**50**	**101**
04:15		**40**	32	72
04:30		**39**	32	71
04:45		36	46	82
05:00		27	36	63
05:15		46	32	78
05:30		43	41	84
05:45		41	35	76
06:00		32	29	61
06:15		33	30	63
06:30		43	27	70
06:45		32	22	54
07:00		32	18	50
07:15		28	20	48
07:30		33	17	50
07:45		27	17	44
08:00		17	12	29
08:15		35	24	59
08:30		33	12	45
08:45		27	14	41
09:00		42	20	62
09:15		36	21	57
09:30		31	10	41
09:45		21	20	41
10:00		15	11	26
10:15		21	15	36
10:30		17	15	32
10:45		16	11	27
11:00		15	6	21
11:15		8	6	14
11:30		6	12	18
11:45		4	7	11
Total		1528	1268	2796
Percent		54.6%	45.4%	
Peak		15:45	15:15	15:15
Vol.		175	185	358
P.H.F.		0.841	0.907	0.886

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	23-Jun-07 Sat	SB	NB	Total
12:00 AM		9	6	15
12:15		14	6	20
12:30		8	4	12
12:45		6	6	12
01:00		4	2	6
01:15		4	7	11
01:30		11	2	13
01:45		6	7	13
02:00		11	2	13
02:15		5	3	8
02:30		6	5	11
02:45		6	3	9
03:00		4	1	5
03:15		2	6	8
03:30		1	2	3
03:45		2	0	2
04:00		4	1	5
04:15		5	3	8
04:30		2	3	5
04:45		1	5	6
05:00		3	3	6
05:15		2	3	5
05:30		5	3	8
05:45		6	6	12
06:00		10	5	15
06:15		10	13	23
06:30		10	7	17
06:45		4	11	15
07:00		10	7	17
07:15		8	10	18
07:30		14	7	21
07:45		13	15	28
08:00		18	11	29
08:15		11	33	44
08:30		17	24	41
08:45		22	21	43
09:00		34	12	46
09:15		40	31	71
09:30		28	22	50
09:45		32	29	61
10:00		24	22	46
10:15		44	26	70
10:30		18	30	48
10:45		31	**32**	**63**
11:00		**41**	**18**	**59**
11:15		**32**	**34**	**66**
11:30		**33**	**40**	**73**
11:45		**36**	25	61
Total		667	574	1241
Percent		53.7%	46.3%	
Peak		11:00	10:45	10:45
Vol.		142	124	261
P.H.F.		0.807	0.775	0.894

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	23-Jun-07 Sat	SB	NB	Total
12:00 PM		39	34	73
12:15		30	23	53
12:30		36	61	97
12:45		**41**	34	75
01:00		**32**	33	65
01:15		**38**	19	57
01:30		**41**	49	90
01:45		34	30	64
02:00		29	27	56
02:15		39	37	76
02:30		49	28	**77**
02:45		35	**42**	**77**
03:00		22	**50**	**72**
03:15		39	**39**	**78**
03:30		41	**34**	75
03:45		27	34	61
04:00		31	28	59
04:15		37	36	73
04:30		33	49	82
04:45		30	32	62
05:00		26	40	66
05:15		27	43	70
05:30		24	37	61
05:45		37	37	74
06:00		32	34	66
06:15		24	25	49
06:30		35	31	66
06:45		20	20	40
07:00		19	36	55
07:15		21	19	40
07:30		30	25	55
07:45		25	17	42
08:00		25	16	41
08:15		14	17	31
08:30		31	16	47
08:45		10	17	27
09:00		14	14	28
09:15		7	23	30
09:30		9	19	28
09:45		9	32	41
10:00		8	30	38
10:15		9	47	56
10:30		5	26	31
10:45		4	22	26
11:00		8	17	25
11:15		5	19	24
11:30		11	6	17
11:45		4	3	7
Total		1196	1407	2603
Percent		45.9%	54.1%	
Peak		12:45	14:45	14:30
Vol.		152	165	304
P.H.F.		0.776	0.676	0.784

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	24-Jun-07 Sun	SB	NB	Total
12:00 AM		5	7	12
12:15		3	7	10
12:30		3	2	5
12:45		3	2	5
01:00		1	3	4
01:15		2	1	3
01:30		3	2	5
01:45		1	1	2
02:00		1	3	4
02:15		2	1	3
02:30		2	4	6
02:45		1	2	3
03:00		0	3	3
03:15		1	1	2
03:30		5	3	8
03:45		8	2	10
04:00		0	1	1
04:15		0	2	2
04:30		0	1	1
04:45		2	3	5
05:00		1	4	5
05:15		2	0	2
05:30		0	0	0
05:45		3	4	7
06:00		5	6	11
06:15		6	5	11
06:30		4	2	6
06:45		8	3	11
07:00		4	10	14
07:15		7	8	15
07:30		5	10	15
07:45		10	7	17
08:00		17	30	47
08:15		22	29	51
08:30		23	27	50
08:45		24	33	57
09:00		38	42	80
09:15		31	34	65
09:30		17	35	52
09:45		38	55	93
10:00		21	28	49
10:15		**34**	44	78
10:30		**37**	46	83
10:45		**30**	41	71
11:00		**30**	**59**	**89**
11:15		24	**60**	**84**
11:30		36	**52**	**88**
11:45		33	**56**	**89**
Total		553	781	1334
Percent		41.5%	58.5%	
Peak		10:15	11:00	11:00
Vol.		131	227	350
P.H.F.		0.862	0.946	0.941

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	24-Jun-07 Sun	SB	NB	Total
12:00 PM		47	39	86
12:15		35	**48**	83
12:30		35	**62**	97
12:45		34	**47**	81
01:00		34	**51**	85
01:15		32	42	74
01:30		**36**	41	77
01:45		**48**	50	**98**
02:00		**41**	48	**89**
02:15		**41**	44	**85**
02:30		35	47	**82**
02:45		30	57	87
03:00		35	54	89
03:15		33	48	81
03:30		37	45	82
03:45		36	53	89
04:00		26	49	75
04:15		38	51	89
04:30		24	39	63
04:45		39	48	87
05:00		28	50	78
05:15		34	57	91
05:30		25	52	77
05:45		32	35	67
06:00		22	43	65
06:15		34	36	70
06:30		19	51	70
06:45		30	34	64
07:00		27	38	65
07:15		21	20	41
07:30		17	19	36
07:45		17	26	43
08:00		21	27	48
08:15		19	10	29
08:30		15	21	36
08:45		20	20	40
09:00		26	14	40
09:15		12	15	27
09:30		15	12	27
09:45		9	16	25
10:00		11	13	24
10:15		9	7	16
10:30		5	5	10
10:45		6	10	16
11:00		6	8	14
11:15		7	11	18
11:30		7	4	11
11:45		4	11	15
Total		1214	1628	2842
Percent		42.7%	57.3%	
Peak		13:30	12:15	13:45
Vol.		166	208	354
P.H.F.		0.865	0.839	0.903

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	25-Jun-07 Mon	SB	NB	Total
12:00 AM		1	4	5
12:15		1	0	1
12:30		2	5	7
12:45		5	4	9
01:00		1	5	6
01:15		3	4	7
01:30		1	6	7
01:45		2	1	3
02:00		3	0	3
02:15		3	4	7
02:30		1	0	1
02:45		0	6	6
03:00		1	5	6
03:15		0	9	9
03:30		4	5	9
03:45		1	3	4
04:00		0	4	4
04:15		1	1	2
04:30		1	3	4
04:45		3	6	9
05:00		4	0	4
05:15		3	4	7
05:30		2	5	7
05:45		3	9	12
06:00		7	6	13
06:15		5	5	10
06:30		7	13	20
06:45		13	10	23
07:00		6	9	15
07:15		8	16	24
07:30		5	13	18
07:45		12	18	30
08:00		19	20	39
08:15		14	15	29
08:30		19	17	36
08:45		17	21	38
09:00		25	23	48
09:15		21	28	49
09:30		16	**33**	49
09:45		18	**32**	50
10:00		26	**29**	55
10:15		19	**33**	52
10:30		26	21	47
10:45		22	30	52
11:00		**27**	29	**56**
11:15		**36**	32	**68**
11:30		**29**	25	**54**
11:45		**37**	34	**71**
Total		480	605	1085
Percent		44.2%	55.8%	
Peak		11:00	09:30	11:00
Vol.		129	127	249
P.H.F.		0.872	0.934	0.877

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 11011

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR20
Garfield County, Utah

Start Time	25-Jun-07 Mon	SB	NB	Total
12:00 PM		25	29	54
12:15		35	28	63
12:30		36	23	59
12:45		30	18	48
01:00		34	21	55
01:15		30	24	54
01:30		38	35	73
01:45		26	23	49
02:00		34	29	63
02:15		30	18	48
02:30		25	21	46
02:45		31	22	53
03:00		24	22	46
03:15		31	40	71
03:30		27	29	56
03:45		24	24	48
04:00		31	29	60
04:15		30	30	60
04:30		30	18	48
04:45		**29**	**32**	**61**
05:00		**41**	**43**	**84**
05:15		**41**	**31**	**72**
05:30		**31**	**22**	**53**
05:45		26	28	54
06:00		30	25	55
06:15		30	27	57
06:30		23	17	40
06:45		21	16	37
07:00		17	26	43
07:15		24	20	44
07:30		13	14	27
07:45		14	20	34
08:00		11	13	24
08:15		10	15	25
08:30		12	10	22
08:45		16	17	33
09:00		12	19	31
09:15		16	8	24
09:30		8	13	21
09:45		9	12	21
10:00		6	12	18
10:15		9	7	16
10:30		2	11	13
10:45		10	7	17
11:00		7	11	18
11:15		5	7	12
11:30		6	4	10
11:45		5	4	9
Total		1055	974	2029
Percent		52.0%	48.0%	
Peak		16:45	16:45	16:45
Vol.		142	128	270
P.H.F.		0.866	0.744	0.804
Grand Total		12529	12641	25170
Percent		49.8%	50.2%	
ADT		ADT 3,596	AADT 3,596	

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	19-Jun-07 Tue	SB	NB	Total
12:00 AM		3	3	6
12:15		3	0	3
12:30		2	4	6
12:45		4	2	6
01:00		4	2	6
01:15		1	2	3
01:30		1	2	3
01:45		4	0	4
02:00		1	4	5
02:15		2	0	2
02:30		1	3	4
02:45		2	2	4
03:00		3	0	3
03:15		1	3	4
03:30		1	1	2
03:45		0	3	3
04:00		0	1	1
04:15		0	0	0
04:30		0	0	0
04:45		3	4	7
05:00		2	3	5
05:15		1	1	2
05:30		8	4	12
05:45		6	0	6
06:00		4	3	7
06:15		2	2	4
06:30		3	9	12
06:45		4	4	8
07:00		7	8	15
07:15		14	15	29
07:30		10	12	22
07:45		13	24	37
08:00		16	19	35
08:15		14	13	27
08:30		22	21	43
08:45		26	21	47
09:00		28	32	60
09:15		31	29	60
09:30		39	43	82
09:45		27	27	54
10:00		**34**	30	**64**
10:15		**34**	42	**76**
10:30		**36**	46	**82**
10:45		**38**	37	**75**
11:00		30	**27**	57
11:15		35	**35**	70
11:30		32	**56**	88
11:45		23	**40**	63
Total		575	639	1214
Percent		47.4%	52.6%	
Peak		10:00	11:00	10:00
Vol.		142	158	297
P.H.F.		0.910	0.705	0.844

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	19-Jun-07 Tue	SB	NB	Total
12:00 PM		40	**46**	**86**
12:15		41	**39**	**80**
12:30		20	**37**	**57**
12:45		25	**53**	**78**
01:00		26	35	61
01:15		**43**	42	85
01:30		**30**	38	68
01:45		**34**	32	66
02:00		**33**	42	75
02:15		30	33	63
02:30		29	43	72
02:45		36	43	79
03:00		38	37	75
03:15		28	28	56
03:30		27	35	62
03:45		33	43	76
04:00		26	42	68
04:15		22	39	61
04:30		34	38	72
04:45		33	30	63
05:00		30	31	61
05:15		24	32	56
05:30		25	54	79
05:45		35	23	58
06:00		26	30	56
06:15		12	33	45
06:30		28	23	51
06:45		25	26	51
07:00		21	23	44
07:15		22	14	36
07:30		20	19	39
07:45		23	19	42
08:00		17	20	37
08:15		24	11	35
08:30		13	15	28
08:45		15	10	25
09:00		21	13	34
09:15		5	13	18
09:30		9	12	21
09:45		12	7	19
10:00		11	6	17
10:15		11	7	18
10:30		14	10	24
10:45		10	11	21
11:00		13	7	20
11:15		6	4	10
11:30		2	5	7
11:45		3	3	6
Total		1105	1256	2361
Percent		46.8%	53.2%	
Peak		13:15	12:00	12:00
Vol.		140	175	301
P.H.F.		0.814	0.810	0.875

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	20-Jun-07 Wed	SB	NB	Total
12:00 AM		3	6	9
12:15		3	2	5
12:30		4	3	7
12:45		2	2	4
01:00		2	1	3
01:15		0	3	3
01:30		2	0	2
01:45		2	2	4
02:00		5	3	8
02:15		0	1	1
02:30		1	4	5
02:45		3	0	3
03:00		0	0	0
03:15		1	0	1
03:30		2	2	4
03:45		0	3	3
04:00		1	2	3
04:15		0	2	2
04:30		1	1	2
04:45		3	2	5
05:00		1	2	3
05:15		3	6	9
05:30		3	3	6
05:45		1	9	10
06:00		4	5	9
06:15		5	4	9
06:30		9	8	17
06:45		3	8	11
07:00		9	9	18
07:15		6	13	19
07:30		12	16	28
07:45		19	12	31
08:00		13	24	37
08:15		19	18	37
08:30		27	22	49
08:45		23	34	57
09:00		20	34	54
09:15		34	21	55
09:30		37	27	64
09:45		31	38	69
10:00		**28**	37	65
10:15		**38**	34	72
10:30		**43**	26	69
10:45		**41**	33	74
11:00		25	**29**	**54**
11:15		28	**62**	**90**
11:30		39	**40**	**79**
11:45		41	**40**	**81**
Total		597	653	1250
Percent		47.8%	52.2%	
Peak		10:00	11:00	11:00
Vol.		150	171	304
P.H.F.		0.872	0.690	0.844

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	20-Jun-07 Wed	SB	NB	Total
12:00 PM		27	39	66
12:15		**47**	40	87
12:30		**35**	50	85
12:45		**34**	38	72
01:00		**35**	26	61
01:15		30	35	65
01:30		24	49	73
01:45		32	40	72
02:00		48	34	82
02:15		31	33	64
02:30		33	47	80
02:45		24	29	53
03:00		30	42	72
03:15		27	30	57
03:30		31	39	70
03:45		47	45	**92**
04:00		33	33	**66**
04:15		39	**46**	**85**
04:30		28	**49**	**77**
04:45		37	**38**	75
05:00		33	**46**	79
05:15		33	36	69
05:30		29	30	59
05:45		31	31	62
06:00		30	33	63
06:15		25	27	52
06:30		33	24	57
06:45		19	38	57
07:00		32	20	52
07:15		20	17	37
07:30		25	24	49
07:45		20	19	39
08:00		17	21	38
08:15		26	15	41
08:30		25	13	38
08:45		13	9	22
09:00		21	14	35
09:15		14	7	21
09:30		14	16	30
09:45		13	19	32
10:00		12	10	22
10:15		13	4	17
10:30		9	10	19
10:45		12	7	19
11:00		5	7	12
11:15		14	8	22
11:30		10	6	16
11:45		9	7	16
Total		1229	1300	2529
Percent		48.6%	51.4%	
Peak		12:15	16:15	15:45
Vol.		151	179	320
P.H.F.		0.786	0.895	0.870

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	21-Jun-07 Thu	SB	NB	Total
12:00 AM		8	1	9
12:15		4	0	4
12:30		3	0	3
12:45		2	3	5
01:00		3	4	7
01:15		4	3	7
01:30		0	2	2
01:45		1	2	3
02:00		2	1	3
02:15		1	2	3
02:30		0	0	0
02:45		0	4	4
03:00		1	2	3
03:15		2	2	4
03:30		1	4	5
03:45		3	0	3
04:00		1	2	3
04:15		6	1	7
04:30		0	4	4
04:45		1	1	2
05:00		4	4	8
05:15		10	5	15
05:30		0	2	2
05:45		0	14	14
06:00		5	3	8
06:15		3	7	10
06:30		9	8	17
06:45		6	13	19
07:00		11	10	21
07:15		9	8	17
07:30		8	13	21
07:45		17	15	32
08:00		19	17	36
08:15		18	25	43
08:30		30	21	51
08:45		26	25	51
09:00		40	24	64
09:15		35	37	72
09:30		30	22	52
09:45		30	37	67
10:00		31	43	74
10:15		41	26	67
10:30		48	44	92
10:45		38	38	76
11:00		**35**	**63**	**98**
11:15		**36**	**37**	**73**
11:30		**53**	**61**	**114**
11:45		**40**	**52**	**92**
Total		675	712	1387
Percent		48.7%	51.3%	
Peak		11:00	11:00	11:00
Vol.		164	213	377
P.H.F.		0.774	0.845	0.827

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	21-Jun-07 Thu	SB	NB	Total
12:00 PM		34	**62**	96
12:15		29	**47**	76
12:30		32	**47**	79
12:45		25	**46**	71
01:00		30	38	68
01:15		37	40	77
01:30		27	51	78
01:45		40	45	85
02:00		34	51	85
02:15		34	35	69
02:30		39	32	71
02:45		31	37	68
03:00		29	53	82
03:15		41	35	76
03:30		36	40	76
03:45		31	50	81
04:00		33	55	88
04:15		**40**	33	73
04:30		**45**	29	74
04:45		**37**	51	**88**
05:00		**54**	46	**100**
05:15		29	47	**76**
05:30		38	40	**78**
05:45		37	35	72
06:00		24	29	53
06:15		30	43	73
06:30		31	32	63
06:45		24	24	48
07:00		27	23	50
07:15		25	22	47
07:30		14	26	40
07:45		30	20	50
08:00		24	19	43
08:15		24	24	48
08:30		14	21	35
08:45		19	19	38
09:00		17	19	36
09:15		18	20	38
09:30		16	15	31
09:45		16	19	35
10:00		6	20	26
10:15		12	11	23
10:30		13	10	23
10:45		14	9	23
11:00		13	7	20
11:15		6	7	13
11:30		8	11	19
11:45		9	9	18
Total		1276	1504	2780
Percent		45.9%	54.1%	
Peak		16:15	12:00	16:45
Vol.		176	202	342
P.H.F.		0.815	0.815	0.855

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	22-Jun-07 Fri	SB	NB	Total
12:00 AM		8	9	17
12:15		2	4	6
12:30		9	8	17
12:45		2	9	11
01:00		1	1	2
01:15		2	3	5
01:30		6	2	8
01:45		2	3	5
02:00		3	9	12
02:15		2	3	5
02:30		5	6	11
02:45		1	4	5
03:00		1	1	2
03:15		2	1	3
03:30		2	2	4
03:45		0	4	4
04:00		0	1	1
04:15		2	2	4
04:30		2	2	4
04:45		1	5	6
05:00		2	1	3
05:15		3	4	7
05:30		2	6	8
05:45		3	12	15
06:00		4	5	9
06:15		7	4	11
06:30		4	2	6
06:45		6	21	27
07:00		9	13	22
07:15		12	7	19
07:30		16	12	28
07:45		8	18	26
08:00		23	17	40
08:15		27	16	43
08:30		22	27	49
08:45		23	27	50
09:00		19	32	51
09:15		35	32	67
09:30		35	38	73
09:45		32	39	71
10:00		47	35	82
10:15		29	24	53
10:30		41	47	88
10:45		28	30	58
11:00		**37**	**44**	**81**
11:15		**53**	**43**	**96**
11:30		**36**	**42**	**78**
11:45		**38**	**46**	**84**
Total		654	723	1377
Percent		47.5%	52.5%	
Peak		11:00	11:00	11:00
Vol.		164	175	339
P.H.F.		0.774	0.931	0.883

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	22-Jun-07 Fri	SB	NB	Total
12:00 PM		30	39	69
12:15		38	37	75
12:30		36	40	76
12:45		28	38	66
01:00		37	**53**	90
01:15		26	**49**	75
01:30		36	**60**	96
01:45		22	**53**	75
02:00		35	51	86
02:15		28	43	71
02:30		**48**	51	**99**
02:45		**32**	61	**93**
03:00		**46**	48	**94**
03:15		**37**	49	**86**
03:30		29	41	70
03:45		19	59	78
04:00		34	56	90
04:15		23	54	77
04:30		40	40	80
04:45		48	43	91
05:00		31	43	74
05:15		36	32	68
05:30		19	48	67
05:45		32	44	76
06:00		39	38	77
06:15		27	28	55
06:30		33	26	59
06:45		17	29	46
07:00		20	25	45
07:15		35	18	53
07:30		35	23	58
07:45		18	21	39
08:00		25	26	51
08:15		21	21	42
08:30		13	28	41
08:45		12	19	31
09:00		28	13	41
09:15		20	16	36
09:30		13	15	28
09:45		13	11	24
10:00		21	17	38
10:15		15	16	31
10:30		20	11	31
10:45		9	5	14
11:00		18	13	31
11:15		7	9	16
11:30		9	11	20
11:45		10	6	16
Total		1268	1577	2845
Percent		44.6%	55.4%	
Peak		14:30	13:00	14:30
Vol.		163	215	372
P.H.F.		0.849	0.881	0.939

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	23-Jun-07 Sat	SB	NB	Total
12:00 AM		7	7	14
12:15		1	4	5
12:30		2	7	9
12:45		3	6	9
01:00		8	6	14
01:15		2	4	6
01:30		4	5	9
01:45		2	5	7
02:00		1	3	4
02:15		8	1	9
02:30		4	1	5
02:45		5	2	7
03:00		4	4	8
03:15		1	3	4
03:30		3	0	3
03:45		0	1	1
04:00		3	3	6
04:15		2	2	4
04:30		1	2	3
04:45		3	2	5
05:00		7	2	9
05:15		0	6	6
05:30		2	6	8
05:45		3	7	10
06:00		6	12	18
06:15		6	6	12
06:30		7	7	14
06:45		4	12	16
07:00		8	4	12
07:15		8	10	18
07:30		5	23	28
07:45		8	8	16
08:00		17	17	34
08:15		10	11	21
08:30		19	22	41
08:45		12	20	32
09:00		20	28	48
09:15		18	22	40
09:30		41	41	82
09:45		37	40	77
10:00		33	30	63
10:15		32	35	67
10:30		35	44	79
10:45		28	45	73
11:00		**53**	**56**	**109**
11:15		**27**	**50**	**77**
11:30		**43**	**47**	**90**
11:45		**29**	**50**	**79**
Total		582	729	1311
Percent		44.4%	55.6%	
Peak		11:00	11:00	11:00
Vol.		152	203	355
P.H.F.		0.717	0.906	0.814

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	23-Jun-07 Sat	SB	NB	Total
12:00 PM		32	49	81
12:15		42	52	94
12:30		41	42	83
12:45		28	46	74
01:00		28	51	79
01:15		30	36	66
01:30		19	54	73
01:45		33	41	74
02:00		34	36	70
02:15		30	51	81
02:30		33	35	68
02:45		43	47	90
03:00		29	47	76
03:15		**43**	44	87
03:30		**38**	48	86
03:45		**33**	53	86
04:00		**42**	33	75
04:15		32	**70**	**102**
04:30		39	**73**	**112**
04:45		38	**46**	**84**
05:00		39	**46**	**85**
05:15		27	39	66
05:30		42	39	81
05:45		34	29	63
06:00		33	36	69
06:15		33	45	78
06:30		34	23	57
06:45		23	36	59
07:00		19	25	44
07:15		9	14	23
07:30		32	23	55
07:45		17	15	32
08:00		21	24	45
08:15		27	28	55
08:30		21	29	50
08:45		19	18	37
09:00		18	22	40
09:15		15	10	25
09:30		18	15	33
09:45		17	6	23
10:00		15	6	21
10:15		11	7	18
10:30		13	7	20
10:45		12	6	18
11:00		5	7	12
11:15		4	4	8
11:30		8	4	12
11:45		3	5	8
Total		1256	1522	2778
Percent		45.2%	54.8%	
Peak		15:15	16:15	16:15
Vol.		156	235	383
P.H.F.		0.907	0.805	0.855

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	24-Jun-07 Sun	SB	NB	Total
12:00 AM		10	7	17
12:15		10	3	13
12:30		2	4	6
12:45		2	1	3
01:00		0	3	3
01:15		4	3	7
01:30		4	3	7
01:45		1	4	5
02:00		2	2	4
02:15		5	2	7
02:30		1	1	2
02:45		0	3	3
03:00		3	1	4
03:15		0	2	2
03:30		2	2	4
03:45		0	2	2
04:00		0	1	1
04:15		3	1	4
04:30		6	1	7
04:45		0	0	0
05:00		0	2	2
05:15		3	3	6
05:30		0	1	1
05:45		3	1	4
06:00		0	2	2
06:15		2	2	4
06:30		4	4	8
06:45		5	4	9
07:00		5	6	11
07:15		10	7	17
07:30		15	8	23
07:45		9	10	19
08:00		10	10	20
08:15		22	16	38
08:30		34	34	68
08:45		19	14	33
09:00		30	22	52
09:15		31	30	61
09:30		28	37	65
09:45		45	17	62
10:00		42	45	87
10:15		49	39	88
10:30		38	42	80
10:45		44	48	92
11:00		**51**	**49**	**100**
11:15		**51**	**43**	**94**
11:30		**48**	**49**	**97**
11:45		**47**	**51**	**98**
Total		700	642	1342
Percent		52.2%	47.8%	
Peak		11:00	11:00	11:00
Vol.		197	192	389
P.H.F.		0.966	0.941	0.973

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	24-Jun-07 Sun	SB	NB	Total
12:00 PM		41	**66**	**107**
12:15		**47**	**54**	**101**
12:30		**35**	**49**	**84**
12:45		**49**	**42**	**91**
01:00		**62**	43	105
01:15		47	54	101
01:30		32	41	73
01:45		34	64	98
02:00		40	36	76
02:15		40	56	96
02:30		55	40	95
02:45		40	44	84
03:00		43	62	105
03:15		38	51	89
03:30		45	39	84
03:45		40	42	82
04:00		38	40	78
04:15		33	59	92
04:30		41	58	99
04:45		36	38	74
05:00		41	42	83
05:15		40	56	96
05:30		40	46	86
05:45		27	52	79
06:00		39	48	87
06:15		33	32	65
06:30		27	30	57
06:45		25	27	52
07:00		24	27	51
07:15		23	31	54
07:30		40	23	63
07:45		21	12	33
08:00		17	28	45
08:15		9	26	35
08:30		15	17	32
08:45		24	17	41
09:00		11	17	28
09:15		8	17	25
09:30		25	10	35
09:45		12	4	16
10:00		10	13	23
10:15		13	8	21
10:30		7	13	20
10:45		9	10	19
11:00		6	10	16
11:15		7	10	17
11:30		2	4	6
11:45		4	3	7
Total		1395	1611	3006
Percent		46.4%	53.6%	
Peak		12:15	12:00	12:00
Vol.		193	211	383
P.H.F.		0.778	0.799	0.895

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	25-Jun-07 Mon	SB	NB	Total
12:00 AM		4	9	13
12:15		4	7	11
12:30		4	2	6
12:45		1	4	5
01:00		2	2	4
01:15		3	1	4
01:30		1	5	6
01:45		1	1	2
02:00		0	5	5
02:15		1	6	7
02:30		3	3	6
02:45		3	4	7
03:00		0	3	3
03:15		1	1	2
03:30		1	3	4
03:45		1	2	3
04:00		1	4	5
04:15		1	1	2
04:30		3	4	7
04:45		1	3	4
05:00		2	3	5
05:15		5	5	10
05:30		3	1	4
05:45		1	11	12
06:00		2	6	8
06:15		7	3	10
06:30		4	6	10
06:45		7	15	22
07:00		4	7	11
07:15		11	6	17
07:30		12	9	21
07:45		19	11	30
08:00		17	18	35
08:15		19	19	38
08:30		16	16	32
08:45		24	24	48
09:00		33	24	57
09:15		28	24	52
09:30		25	24	49
09:45		47	29	76
10:00		40	39	79
10:15		36	32	68
10:30		28	37	65
10:45		36	34	70
11:00		**39**	**40**	**79**
11:15		**32**	**31**	**63**
11:30		**40**	**42**	**82**
11:45		**42**	**37**	**79**
Total		615	623	1238
Percent		49.7%	50.3%	
Peak		11:00	11:00	11:00
Vol.		153	150	303
P.H.F.		0.814	0.893	0.924

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 12348

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 S of SR 14
Alton, Utah

Start Time	25-Jun-07 Mon	SB	NB	Total
12:00 PM		30	37	67
12:15		33	30	63
12:30		31	36	67
12:45		30	44	74
01:00		30	37	67
01:15		39	35	74
01:30		23	36	59
01:45		**42**	43	85
02:00		**32**	30	62
02:15		**32**	34	66
02:30		**53**	34	**87**
02:45		30	40	**70**
03:00		34	38	**72**
03:15		29	48	**77**
03:30		28	37	65
03:45		26	39	65
04:00		46	42	88
04:15		25	**39**	64
04:30		29	**47**	76
04:45		38	**38**	76
05:00		33	**44**	77
05:15		35	37	72
05:30		19	28	47
05:45		32	18	50
06:00		23	29	52
06:15		36	43	79
06:30		33	32	65
06:45		31	34	65
07:00		15	28	43
07:15		19	25	44
07:30		23	12	35
07:45		27	24	51
08:00		18	13	31
08:15		23	18	41
08:30		12	20	32
08:45		11	10	21
09:00		11	13	24
09:15		14	14	28
09:30		13	12	25
09:45		12	8	20
10:00		8	11	19
10:15		10	9	19
10:30		7	14	21
10:45		6	6	12
11:00		2	5	7
11:15		5	6	11
11:30		2	5	7
11:45		6	3	9
Total		1146	1285	2431
Percent		47.1%	52.9%	
Peak		13:45	16:15	14:30
Vol.		159	168	306
P.H.F.		0.750	0.875	0.869
Grand Total		13073	14776	27849
Percent		46.9%	53.1%	
ADT		ADT 3,978	AADT 3,978	

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	19-Jun-07 Tue	SB	NB	Total
12:00 AM		3	3	6
12:15		2	3	5
12:30		5	0	5
12:45		4	2	6
01:00		1	4	5
01:15		4	4	8
01:30		1	2	3
01:45		1	3	4
02:00		2	0	2
02:15		1	6	7
02:30		4	1	5
02:45		1	3	4
03:00		1	2	3
03:15		1	0	1
03:30		0	5	5
03:45		1	1	2
04:00		0	4	4
04:15		1	1	2
04:30		5	0	5
04:45		3	1	4
05:00		2	3	5
05:15		5	4	9
05:30		6	4	10
05:45		10	4	14
06:00		7	2	9
06:15		7	2	9
06:30		19	5	24
06:45		15	10	25
07:00		13	9	22
07:15		20	9	29
07:30		20	18	38
07:45		14	15	29
08:00		20	13	33
08:15		23	27	50
08:30		26	24	50
08:45		27	20	47
09:00		22	26	48
09:15		29	23	52
09:30		34	19	53
09:45		27	18	45
10:00		34	38	72
10:15		23	28	51
10:30		37	25	62
10:45		**37**	22	59
11:00		**26**	**35**	**61**
11:15		**35**	**30**	**65**
11:30		**39**	**22**	**61**
11:45		32	**33**	**65**
Total		650	533	1183
Percent		54.9%	45.1%	
Peak		10:45	11:00	11:00
Vol.		137	120	252
P.H.F.		0.878	0.789	0.875

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	19-Jun-07 Tue	SB	NB	Total
12:00 PM		26	34	60
12:15		32	31	63
12:30		36	37	73
12:45		29	34	63
01:00		**46**	29	75
01:15		**37**	28	65
01:30		**45**	34	79
01:45		**32**	34	66
02:00		36	37	73
02:15		31	34	65
02:30		42	37	79
02:45		19	30	49
03:00		31	33	64
03:15		40	49	89
03:30		32	35	67
03:45		27	25	52
04:00		20	**41**	61
04:15		37	**50**	**87**
04:30		21	**39**	**60**
04:45		21	**50**	**71**
05:00		34	34	**68**
05:15		27	36	63
05:30		31	35	66
05:45		22	39	61
06:00		24	37	61
06:15		25	35	60
06:30		29	33	62
06:45		22	14	36
07:00		21	29	50
07:15		22	24	46
07:30		20	15	35
07:45		33	21	54
08:00		16	17	33
08:15		13	23	36
08:30		13	17	30
08:45		15	14	29
09:00		7	13	20
09:15		10	15	25
09:30		9	16	25
09:45		12	16	28
10:00		13	19	32
10:15		8	11	19
10:30		12	6	18
10:45		6	12	18
11:00		4	15	19
11:15		7	9	16
11:30		2	11	13
11:45		4	5	9
Total		1101	1292	2393
Percent		46.0%	54.0%	
Peak		13:00	16:00	16:15
Vol.		160	180	286
P.H.F.		0.870	0.900	0.803

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	20-Jun-07 Wed	SB	NB	Total
12:00 AM		5	4	9
12:15		3	5	8
12:30		3	2	5
12:45		1	3	4
01:00		2	0	2
01:15		2	2	4
01:30		7	1	8
01:45		1	5	6
02:00		1	0	1
02:15		1	3	4
02:30		2	2	4
02:45		0	1	1
03:00		1	3	4
03:15		1	0	1
03:30		1	1	2
03:45		0	0	0
04:00		2	7	9
04:15		3	1	4
04:30		2	3	5
04:45		2	4	6
05:00		6	0	6
05:15		3	2	5
05:30		9	5	14
05:45		7	9	16
06:00		10	7	17
06:15		13	8	21
06:30		17	4	21
06:45		14	13	27
07:00		9	16	25
07:15		20	11	31
07:30		23	15	38
07:45		19	27	46
08:00		27	26	53
08:15		35	17	52
08:30		23	17	40
08:45		22	20	42
09:00		23	**32**	55
09:15		33	**33**	66
09:30		25	**31**	56
09:45		31	**33**	64
10:00		24	24	48
10:15		35	37	72
10:30		34	28	62
10:45		33	31	64
11:00		**28**	25	**53**
11:15		**40**	26	**66**
11:30		**31**	29	**60**
11:45		**45**	38	**83**
Total		679	611	1290
Percent		52.6%	47.4%	
Peak		11:00	09:00	11:00
Vol.		144	129	262
P.H.F.		0.800	0.849	0.789

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	20-Jun-07 Wed	SB	NB	Total
12:00 PM		32	39	71
12:15		44	30	74
12:30		33	36	69
12:45		28	31	59
01:00		33	30	63
01:15		31	46	77
01:30		**40**	35	**75**
01:45		**45**	56	**101**
02:00		**42**	44	**86**
02:15		**43**	41	**84**
02:30		37	33	70
02:45		31	27	58
03:00		35	40	75
03:15		39	32	71
03:30		40	42	82
03:45		32	36	68
04:00		24	38	62
04:15		31	**43**	74
04:30		36	**48**	84
04:45		47	**54**	101
05:00		29	**48**	77
05:15		29	27	56
05:30		35	53	88
05:45		30	41	71
06:00		31	31	62
06:15		34	38	72
06:30		20	32	52
06:45		29	47	76
07:00		26	25	51
07:15		32	26	58
07:30		23	17	40
07:45		30	16	46
08:00		31	27	58
08:15		21	20	41
08:30		20	13	33
08:45		14	15	29
09:00		21	18	39
09:15		16	16	32
09:30		17	8	25
09:45		13	18	31
10:00		12	22	34
10:15		16	17	33
10:30		11	12	23
10:45		8	9	17
11:00		15	8	23
11:15		12	7	19
11:30		5	11	16
11:45		5	4	9
Total		1308	1407	2715
Percent		48.2%	51.8%	
Peak		13:30	16:15	13:30
Vol.		170	193	346
P.H.F.		0.904	0.862	0.856

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	21-Jun-07 Thu	SB	NB	Total
12:00 AM		2	5	7
12:15		8	4	12
12:30		1	2	3
12:45		3	0	3
01:00		1	0	1
01:15		1	2	3
01:30		4	2	6
01:45		1	4	5
02:00		0	3	3
02:15		2	0	2
02:30		1	3	4
02:45		2	2	4
03:00		1	5	6
03:15		2	2	4
03:30		2	2	4
03:45		3	5	8
04:00		2	4	6
04:15		1	1	2
04:30		5	3	8
04:45		10	2	12
05:00		4	5	9
05:15		1	1	2
05:30		9	5	14
05:45		8	2	10
06:00		6	10	16
06:15		12	6	18
06:30		17	4	21
06:45		11	8	19
07:00		12	13	25
07:15		13	12	25
07:30		21	18	39
07:45		30	25	55
08:00		22	27	49
08:15		26	11	37
08:30		28	20	48
08:45		31	23	54
09:00		23	22	45
09:15		32	22	54
09:30		39	29	68
09:45		41	28	69
10:00		35	35	70
10:15		25	15	40
10:30		33	29	62
10:45		27	29	56
11:00		**53**	**25**	**78**
11:15		**47**	**46**	**93**
11:30		**35**	**50**	**85**
11:45		**37**	**32**	**69**
Total		730	603	1333
Percent		54.8%	45.2%	
Peak		11:00	11:00	11:00
Vol.		172	153	325
P.H.F.		0.811	0.765	0.874

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	21-Jun-07 Thu	SB	NB	Total
12:00 PM		45	39	84
12:15		26	41	67
12:30		44	39	83
12:45		39	38	77
01:00		48	37	85
01:15		36	42	78
01:30		46	34	80
01:45		50	38	88
02:00		35	28	63
02:15		42	49	91
02:30		41	41	82
02:45		**55**	40	95
03:00		**44**	39	83
03:15		**50**	48	98
03:30		**54**	41	95
03:45		39	40	79
04:00		41	38	79
04:15		47	**50**	**97**
04:30		47	**58**	**105**
04:45		35	**51**	**86**
05:00		43	**55**	**98**
05:15		43	26	69
05:30		28	52	80
05:45		46	36	82
06:00		32	38	70
06:15		35	38	73
06:30		33	32	65
06:45		35	47	82
07:00		29	41	70
07:15		30	27	57
07:30		31	24	55
07:45		28	24	52
08:00		26	20	46
08:15		30	20	50
08:30		29	13	42
08:45		25	24	49
09:00		33	26	59
09:15		20	17	37
09:30		28	27	55
09:45		15	25	40
10:00		20	15	35
10:15		16	20	36
10:30		16	19	35
10:45		10	13	23
11:00		15	11	26
11:15		9	16	25
11:30		11	7	18
11:45		7	8	15
Total		1587	1552	3139
Percent		50.6%	49.4%	
Peak		14:45	16:15	16:15
Vol.		203	214	386
P.H.F.		0.923	0.922	0.919

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	22-Jun-07 Fri	SB	NB	Total
12:00 AM		8	13	21
12:15		8	7	15
12:30		3	6	9
12:45		3	6	9
01:00		5	14	19
01:15		4	6	10
01:30		4	1	5
01:45		0	2	2
02:00		3	3	6
02:15		3	3	6
02:30		2	11	13
02:45		1	1	2
03:00		2	5	7
03:15		1	5	6
03:30		0	3	3
03:45		2	1	3
04:00		0	5	5
04:15		2	3	5
04:30		2	4	6
04:45		6	0	6
05:00		5	4	9
05:15		4	4	8
05:30		4	4	8
05:45		11	15	26
06:00		10	17	27
06:15		7	13	20
06:30		12	8	20
06:45		9	9	18
07:00		10	14	24
07:15		13	24	37
07:30		23	17	40
07:45		43	19	62
08:00		24	18	42
08:15		33	25	58
08:30		24	14	38
08:45		29	35	64
09:00		31	18	49
09:15		34	31	65
09:30		38	27	65
09:45		24	**55**	**79**
10:00		33	**41**	**74**
10:15		33	**37**	**70**
10:30		42	**38**	**80**
10:45		**45**	25	70
11:00		**34**	20	54
11:15		**36**	26	62
11:30		**52**	40	92
11:45		28	41	69
Total		750	738	1488
Percent		50.4%	49.6%	
Peak		10:45	09:45	09:45
Vol.		167	171	303
P.H.F.		0.803	0.777	0.823

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	22-Jun-07 Fri	SB	NB	Total
12:00 PM		41	27	68
12:15		47	29	76
12:30		38	35	73
12:45		34	56	90
01:00		44	46	90
01:15		31	55	86
01:30		51	49	100
01:45		46	37	83
02:00		46	31	77
02:15		34	42	76
02:30		52	49	101
02:45		46	50	96
03:00		40	**66**	106
03:15		29	**44**	73
03:30		45	**55**	100
03:45		**48**	**51**	**99**
04:00		**39**	45	**84**
04:15		**57**	42	**99**
04:30		**52**	67	**119**
04:45		43	36	79
05:00		35	39	74
05:15		33	42	75
05:30		33	37	70
05:45		36	46	82
06:00		25	35	60
06:15		31	35	66
06:30		31	28	59
06:45		22	35	57
07:00		29	17	46
07:15		38	23	61
07:30		21	17	38
07:45		28	34	62
08:00		29	19	48
08:15		12	16	28
08:30		14	17	31
08:45		24	19	43
09:00		16	26	42
09:15		14	18	32
09:30		17	14	31
09:45		22	13	35
10:00		13	22	35
10:15		17	4	21
10:30		12	11	23
10:45		12	11	23
11:00		12	7	19
11:15		7	10	17
11:30		10	9	19
11:45		8	6	14
Total		1464	1522	2986
Percent		49.0%	51.0%	
Peak		15:45	15:00	15:45
Vol.		196	216	401
P.H.F.		0.860	0.806	0.842

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	23-Jun-07 Sat	SB	NB	Total
12:00 AM		0	6	6
12:15		1	5	6
12:30		3	2	5
12:45		8	8	16
01:00		2	3	5
01:15		2	6	8
01:30		3	4	7
01:45		1	3	4
02:00		5	5	10
02:15		3	2	5
02:30		6	1	7
02:45		9	4	13
03:00		3	1	4
03:15		2	2	4
03:30		1	3	4
03:45		1	0	1
04:00		1	2	3
04:15		1	3	4
04:30		3	1	4
04:45		4	3	7
05:00		2	2	4
05:15		1	7	8
05:30		2	6	8
05:45		3	6	9
06:00		3	12	15
06:15		6	10	16
06:30		6	6	12
06:45		4	6	10
07:00		11	9	20
07:15		3	7	10
07:30		3	10	13
07:45		14	32	46
08:00		17	13	30
08:15		27	12	39
08:30		26	9	35
08:45		21	17	38
09:00		32	25	57
09:15		30	27	57
09:30		29	20	49
09:45		46	37	83
10:00		34	45	79
10:15		31	39	70
10:30		24	39	63
10:45		**46**	**49**	**95**
11:00		**27**	**60**	**87**
11:15		**43**	**50**	**93**
11:30		**49**	**46**	**95**
11:45		44	38	82
Total		643	703	1346
Percent		47.8%	52.2%	
Peak		10:45	10:45	10:45
Vol.		165	205	370
P.H.F.		0.842	0.854	0.974

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	23-Jun-07 Sat	SB	NB	Total
12:00 PM		40	**65**	105
12:15		27	**56**	83
12:30		36	**31**	67
12:45		45	**44**	89
01:00		41	58	99
01:15		19	41	60
01:30		39	50	89
01:45		41	37	78
02:00		37	38	75
02:15		34	52	86
02:30		45	36	81
02:45		38	52	90
03:00		28	42	70
03:15		42	45	87
03:30		**50**	37	87
03:45		**49**	37	86
04:00		**40**	48	**88**
04:15		**45**	31	**76**
04:30		44	62	**106**
04:45		42	49	**91**
05:00		39	41	80
05:15		35	39	74
05:30		34	45	79
05:45		42	39	81
06:00		45	35	80
06:15		39	29	68
06:30		23	32	55
06:45		17	28	45
07:00		15	25	40
07:15		37	8	45
07:30		20	25	45
07:45		22	19	41
08:00		24	23	47
08:15		16	20	36
08:30		17	24	41
08:45		16	20	36
09:00		18	8	26
09:15		9	18	27
09:30		10	11	21
09:45		8	7	15
10:00		24	5	29
10:15		23	5	28
10:30		13	6	19
10:45		11	4	15
11:00		7	10	17
11:15		6	2	8
11:30		3	3	6
11:45		5	1	6
Total		1360	1443	2803
Percent		48.5%	51.5%	
Peak		15:30	12:00	16:00
Vol.		184	196	361
P.H.F.		0.920	0.754	0.851

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	24-Jun-07 Sun	SB	NB	Total
12:00 AM		7	7	14
12:15		6	3	9
12:30		3	2	5
12:45		0	1	1
01:00		5	1	6
01:15		2	3	5
01:30		1	4	5
01:45		1	1	2
02:00		2	3	5
02:15		1	0	1
02:30		1	3	4
02:45		1	4	5
03:00		2	2	4
03:15		1	1	2
03:30		0	2	2
03:45		0	2	2
04:00		5	2	7
04:15		4	0	4
04:30		1	2	3
04:45		1	0	1
05:00		0	1	1
05:15		2	1	3
05:30		0	3	3
05:45		2	0	2
06:00		1	2	3
06:15		5	1	6
06:30		3	2	5
06:45		3	4	7
07:00		7	4	11
07:15		15	9	24
07:30		7	16	23
07:45		7	6	13
08:00		18	16	34
08:15		25	13	38
08:30		24	21	45
08:45		37	25	62
09:00		41	18	59
09:15		23	24	47
09:30		41	24	65
09:45		38	27	65
10:00		**47**	32	79
10:15		**43**	25	68
10:30		**40**	30	70
10:45		**42**	**55**	**97**
11:00		43	**41**	**84**
11:15		47	**48**	**95**
11:30		30	**41**	**71**
11:45		43	35	78
Total		678	567	1245
Percent		54.5%	45.5%	
Peak		10:00	10:45	10:45
Vol.		172	185	347
P.H.F.		0.915	0.841	0.894

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	24-Jun-07 Sun	SB	NB	Total
12:00 PM		**47**	**56**	**103**
12:15		**56**	**47**	**103**
12:30		**49**	**60**	**109**
12:45		**42**	**43**	**85**
01:00		39	40	79
01:15		36	49	85
01:30		35	46	81
01:45		44	39	83
02:00		44	32	76
02:15		50	65	115
02:30		30	45	75
02:45		35	59	94
03:00		43	29	72
03:15		27	53	80
03:30		36	43	79
03:45		31	64	95
04:00		52	46	98
04:15		25	46	71
04:30		34	40	74
04:45		39	48	87
05:00		45	49	94
05:15		25	51	76
05:30		42	45	87
05:45		22	43	65
06:00		37	52	89
06:15		21	45	66
06:30		17	39	56
06:45		42	34	76
07:00		29	23	52
07:15		15	24	39
07:30		12	23	35
07:45		20	33	53
08:00		19	14	33
08:15		16	19	35
08:30		19	19	38
08:45		12	19	31
09:00		17	22	39
09:15		16	21	37
09:30		8	13	21
09:45		15	19	34
10:00		9	14	23
10:15		11	6	17
10:30		6	18	24
10:45		9	7	16
11:00		2	9	11
11:15		3	11	14
11:30		4	9	13
11:45		5	6	11
Total		1292	1637	2929
Percent		44.1%	55.9%	
Peak		12:00	12:00	12:00
Vol.		194	206	400
P.H.F.		0.866	0.792	0.870

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	25-Jun-07 Mon	SB	NB	Total
12:00 AM		4	3	7
12:15		2	6	8
12:30		1	9	10
12:45		4	2	6
01:00		2	2	4
01:15		0	7	7
01:30		1	5	6
01:45		1	1	2
02:00		2	5	7
02:15		4	1	5
02:30		1	6	7
02:45		0	5	5
03:00		2	7	9
03:15		0	2	2
03:30		0	2	2
03:45		2	4	6
04:00		1	0	1
04:15		2	2	4
04:30		1	3	4
04:45		3	2	5
05:00		2	4	6
05:15		3	4	7
05:30		5	5	10
05:45		7	6	13
06:00		7	4	11
06:15		10	10	20
06:30		13	5	18
06:45		13	10	23
07:00		13	9	22
07:15		14	9	23
07:30		19	15	34
07:45		14	19	33
08:00		17	18	35
08:15		21	16	37
08:30		23	28	51
08:45		25	32	57
09:00		25	17	42
09:15		29	37	66
09:30		21	30	51
09:45		23	34	57
10:00		25	30	55
10:15		39	35	74
10:30		25	27	52
10:45		39	**35**	**74**
11:00		**32**	**34**	**66**
11:15		**39**	**28**	**67**
11:30		**34**	**36**	**70**
11:45		**41**	30	71
Total		611	641	1252
Percent		48.8%	51.2%	
Peak		11:00	10:45	10:45
Vol.		146	133	277
P.H.F.		0.890	0.899	0.936

L2 Data Collection

1770 West State Street #204
Boise, Idaho 83702
(208) 860-7554

Project #: FEHR0021
Type: Volume / Direction
Tech: Vawdrey / Judd
Counter: 10009

Tube Da
Date Start: 19-Jun-07
Date End: 25-Jun-07
US89 E of Panguitch
Panguitch, Utah

Start Time	25-Jun-07 Mon	SB	NB	Total
12:00 PM		28	40	68
12:15		29	29	58
12:30		41	27	68
12:45		41	19	60
01:00		23	21	44
01:15		27	28	55
01:30		38	35	73
01:45		**41**	26	67
02:00		**41**	26	67
02:15		**40**	27	67
02:30		**41**	28	69
02:45		34	41	75
03:00		39	30	69
03:15		30	37	67
03:30		34	28	62
03:45		28	37	65
04:00		23	**37**	60
04:15		32	**40**	72
04:30		31	**40**	71
04:45		28	**52**	**80**
05:00		42	35	**77**
05:15		37	34	**71**
05:30		35	40	**75**
05:45		46	34	80
06:00		26	32	58
06:15		13	20	33
06:30		33	30	63
06:45		22	20	42
07:00		19	28	47
07:15		12	28	40
07:30		19	28	47
07:45		13	15	28
08:00		19	17	36
08:15		14	23	37
08:30		8	19	27
08:45		14	11	25
09:00		11	14	25
09:15		10	19	29
09:30		11	13	24
09:45		10	14	24
10:00		12	13	25
10:15		9	11	20
10:30		8	8	16
10:45		3	19	22
11:00		4	6	10
11:15		4	10	14
11:30		8	7	15
11:45		5	3	8
Total		1136	1199	2335
Percent		48.7%	51.3%	
Peak		13:45	16:00	16:45
Vol.		163	169	303
P.H.F.		0.886	0.813	0.947
Grand Total		13989	14448	28437
Percent		49.2%	50.8%	
ADT		ADT 4,062	AADT 4,062	

APPENDIX B
Detailed Level of Service Reports

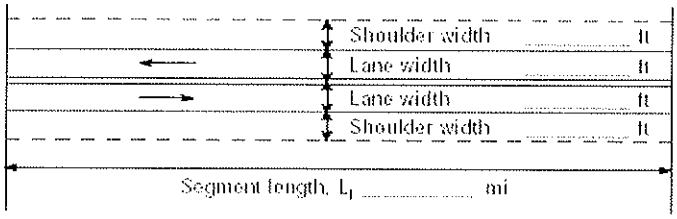
Existing Conditions

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Alton / SR-14*
Date Performed	*7/24/2007*	Jurisdiction	*Kane County, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length *1.60* mi Up/down *3.0*

Peak-hour factor, PHF *0.85*

No-passing zone *20%*

% Trucks and Buses , P_T *18 %*

% Recreational vehicles, P_R *12%*

Access points/ *mi* *1*

Analysis direction vol., V_d *137*veh/h

Opposing direction vol., V_o *113*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*6.1*	*6.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.4*	*1.4*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.509*	*0.509*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.99*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*317*	*265*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.9 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*62.2 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*55.8 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*1.000*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*161*	*133*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*17.8*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*34.1*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*33.3*	

Level of Service and Other Performance Measures

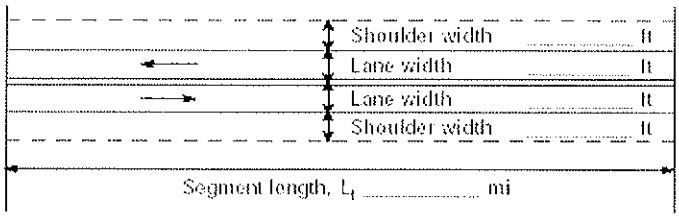
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.19*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t(V/PHF)$	*64*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*219*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*1.1*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Alton / SR-14*
Date Performed	*7/24/2007*	Jurisdiction	*Kane County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length *1.60* mi Up/down *3.0*

Peak-hour factor, PHF *0.85*

No-passing zone *20%*

% Trucks and Buses , P_T *25 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *1*

Analysis direction vol., V_d *167*veh/h

Opposing direction vol., V_o *134*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*6.1*	*6.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.4*	*1.4*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.426*	*0.426*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.99*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*461*	*375*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.6 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*62.2 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*54.1 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*1.000*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*196*	*158*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*21.2*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*36.6*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*37.5*	

Level of Service and Other Performance Measures

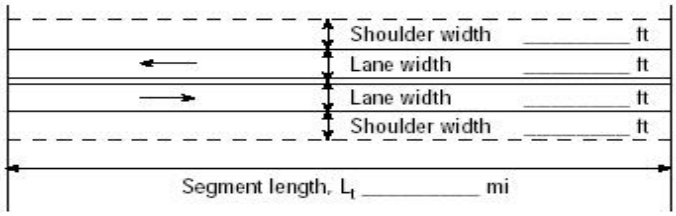
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.27*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*79*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*267*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*1.5*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-14 / Hatch*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield County, Utah*
Analysis Time Period	*Weekday Average*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *30%*

% Trucks and Buses , P_T *18 %*

% Recreational vehicles, P_R *12%*

Access points/ *mi* *1*

Analysis direction vol., V_d *137*veh/h

Opposing direction vol., V_o *113*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.888*	*0.888*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*181*	*150*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.1 mi/h*	Free-flow speed, FFS_d (FSS=BFFS-f_{LS}-f_A)	*63.5 mi/h*
		Average travel speed, ATS=FFS-0.00776v_p-f_{np}	*58.8 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.982*	*0.982*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*164*	*135*
Base percent time-spent-following[4], BPTSF(%)=100(1-$e^{av_d^b}$)	*18.1*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*40.4*	
Percent time-spent-following, PTSF(%)=BPTSF+f_{np}	*40.3*	

Level of Service and Other Performance Measures

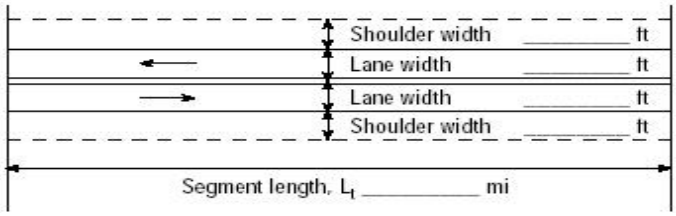
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, v/c=V_p/ 1,700	*0.11*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=0.25L_t(V/PHF)	*471*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	*1603*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*8.0*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-14 / Hatch*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield County, Utah*
Analysis Time Period	*Weekend*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *30%*

% Trucks and Buses , P_T *25 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *1*

Analysis direction vol., V_d *167*veh/h

Opposing direction vol., V_o *134*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.851*	*0.851*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*231*	*185*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.5 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.7 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.976*	*0.976*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*201*	*162*
Base percent time-spent-following[4], BPTSF(%)=$100(1-e^{av_d^b})$	*21.6*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*42.5*	
Percent time-spent-following, PTSF(%)=BPTSF+f_{np}	*45.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, v/c=V_p/ 1,700	*0.14*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t$(V/PHF)	*575*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*1954*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*10.0*

HIGHPLAN 2002 Conceptual Planning Analysis

Description/File Information

Filename	HP_preview.xml	**Date Prepared**	7/25/2007		
Program	HIGHPLAN	**Version**	1.2.0		
Analyst	JB	**Agency**	FP	**District**	Hatch, UT
Road Name	US-89	**From/To**	Hatch		
Analysis Type	Segment	**Peak Direction**	Northbound	**Study Period**	K100
User Notes	Weekday Average				

Facility Data

Roadway Variables				Traffic Variables			
Area Type	Rural developed	**# Thru Lanes**	2	**AADT**	2668	**% Heavy Vehicles**	18
Class	3	**Terrain**	Level	**K**	.0937	**Base Capacity**	1700
Posted Speed	40	**Median**	No	**D**	.526	**Local Adj. Factor**	.92
Free Flow Speed	45	**Left Turn Lanes**	No	**PHF**	.85	**Adjusted Capacity**	1033
Pass Lane Spacing	N/A	**% NPZ**	100				

LOS Results

v/c Ratio	0.16	**Density**	N/A	**PTSF**	87.00	**ATS**	37.00	**% FFS**	83.0	**LOS**	C

Service Volume Tables

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	120	350	520	660
2					
3					
4					
Lanes	**Hourly Volume In Both Directions**				
2	0	230	660	980	1260
4					
6					
8					
Lanes	**Annual Average Daily Traffic**				
2	0	2500	7000	10500	13400
4					
6					
8					
Lanes	**Maximum v/c Ratio**				
1	0.00	0.15	0.37	0.56	0.71
2					
3					
4					

HIGHPLAN 2002 Conceptual Planning Analysis

Description/File Information

Filename	HP_preview.xml	**Date Prepared**	7/25/2007		
Program	HIGHPLAN	**Version**	1.2.0		
Analyst	JB	**Agency**	FP	**District**	Hatch, UT
Road Name	US-89	**From/To**	Hatch		
Analysis Type	Segment	**Peak Direction**	Northbound	**Study Period**	K100
User Notes	Weekend				

Facility Data

Roadway Variables				Traffic Variables			
Area Type	Rural developed	**# Thru Lanes**	2	**AADT**	2930	**% Heavy Vehicles**	25
Class	3	**Terrain**	Level	**K**	.10273	**Base Capacity**	1700
Posted Speed	40	**Median**	No	**D**	.534	**Local Adj. Factor**	.92
Free Flow Speed	45	**Left Turn Lanes**	No	**PHF**	.85	**Adjusted Capacity**	1001
Pass Lane Spacing	N/A	**% NPZ**	100				

LOS Results

v/c Ratio	0.18	**Density**	N/A	**PTSF**	97.00	**ATS**	37.00	**% FFS**	82.0	**LOS**	C

Service Volume Tables

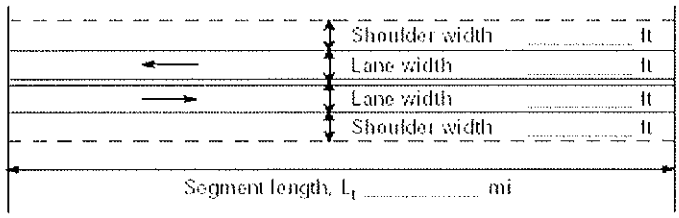
	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	120	350	520	660
2					
3					
4					
Lanes	**Hourly Volume In Both Directions**				
2	0	220	650	980	1240
4					
6					
8					
Lanes	**Annual Average Daily Traffic**				
2	0	2100	6300	9500	12100
4					
6					
8					
Lanes	**Maximum v/c Ratio**				
1	0.00	0.14	0.37	0.56	0.71
2					
3					
4					

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Hatch / SR-12*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.87*

No-passing zone *35%*

% Trucks and Buses , P_T *21 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *1*

Analysis direction vol., V_d *138*veh/h

Opposing direction vol., V_o *127*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.872*	*0.872*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*182*	*167*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.5 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*58.2 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.979*	*0.979*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*162*	*149*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*17.9*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*44.9*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*39.5*	

Level of Service and Other Performance Measures

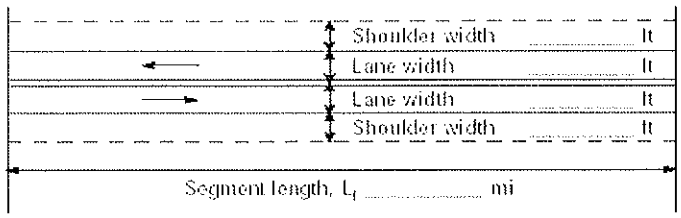
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.11*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*309*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1076*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*5.3*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Hatch / SR-12*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *35%*

% Trucks and Buses , P_T *15 %*

% Recreational vehicles, P_R *21%*

Access points/ *mi* *1*

Analysis direction vol., V_d *146*veh/h

Opposing direction vol., V_o *133*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.905*	*0.905*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*190*	*173*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.6 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*58.0 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.985*	*0.985*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*174*	*159*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*19.1*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*46.0*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*41.1*	

Level of Service and Other Performance Measures

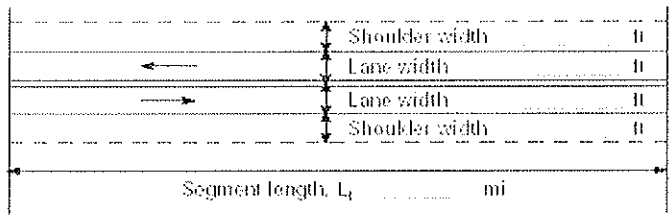
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.11*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*335*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1139*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*5.8*

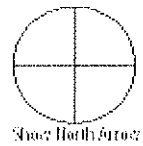
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-12 / Panguitch*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.87*

No-passing zone *5%*

% Trucks and Buses , P_T *21 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *2*

Analysis direction vol., V_d *138*veh/h

Opposing direction vol., V_o *127*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.872*	*0.872*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_f/(PHF*f_{HV}*f_G)$	*182*	*167*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.5 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.7 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.2 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*58.8 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.979*	*0.979*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_f/(PHF*f_{HV}*f_G)$	*162*	*149*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*17.9*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*18.6*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*27.6*	

Level of Service and Other Performance Measures

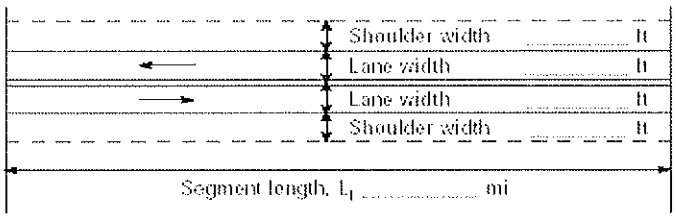
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.11*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*226*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*787*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*3.8*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-12 / Panguitch*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *5%*

% Trucks and Buses , P_T *15 %*

% Recreational vehicles, P_R *21%*

Access points/ *mi* *2*

Analysis direction vol., V_d *146*veh/h

Opposing direction vol., V_o *133*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.905*	*0.905*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*190*	*173*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.5 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.8 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.2 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*58.6 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.985*	*0.985*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*174*	*159*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*19.1*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*19.4*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*28.4*	

Level of Service and Other Performance Measures

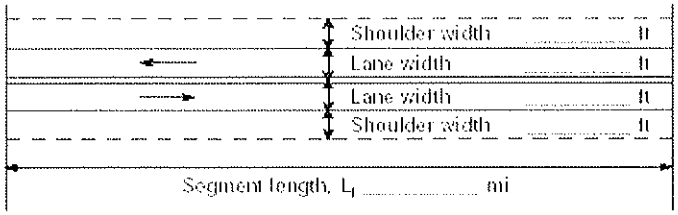
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.11*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*245*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*832*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*4.2*

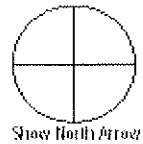
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Panguitch / SR-20*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.86*

No-passing zone *15%*

% Trucks and Buses , P_T *25 %*

% Recreational vehicles, P_R *12%*

Access points/ *mi* *3*

Analysis direction vol., V_d *107veh/h*

Opposing direction vol., V_o *112veh/h*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.851*	*0.851*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*146*	*153*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.8 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.5 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.0 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*59.1 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.976*	*0.976*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*128*	*133*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*14.5*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*27.2*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*28.4*	

Level of Service and Other Performance Measures

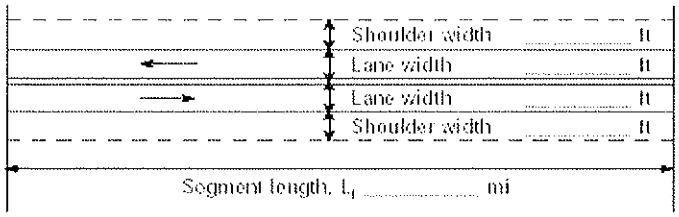
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.09*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t(V/PHF)$	*292*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*1006*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*4.9*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Panguitch / SR-20*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.94*

No-passing zone *15%*

% Trucks and Buses , P_T *36 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *3*

Analysis direction vol., V_d *154*veh/h

Opposing direction vol., V_o *113*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.799*	*0.799*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*205*	*151*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.8 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.5 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*63.0 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*58.7 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.965*	*0.965*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*170*	*125*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*18.7*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*28.4*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*30.8*	

Level of Service and Other Performance Measures

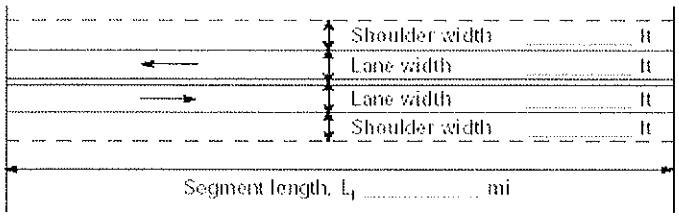
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.12*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t(V/PHF)$	*385*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*1448*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*6.6*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*US-89 / Upslope*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *45%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *0*

Analysis direction vol., V_d *73veh/h*

Opposing direction vol., V_o *82veh/h*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.841*	*0.841*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*102*	*115*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*50.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.1 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*48.7 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*45.9 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.974*	*0.974*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*88*	*99*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*10.3*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*43.6*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*33.4*	

Level of Service and Other Performance Measures

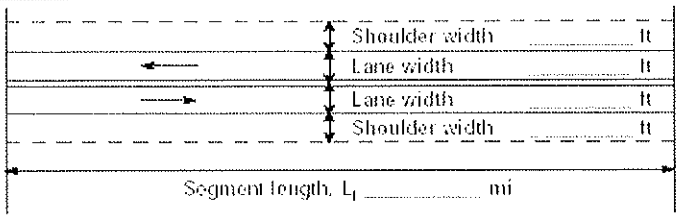
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.06*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*182*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*621*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*4.0*

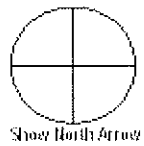
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*US-89 / Upslope*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *45%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *0*

Analysis direction vol., V_d *114*veh/h

Opposing direction vol., V_o *82*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.841*	*0.841*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*159*	*115*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*50.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.1 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*48.7 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*45.4 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.974*	*0.974*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*138*	*99*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*15.6*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*44.7*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*34.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	C
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.09*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*285*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*969*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*6.3*

2

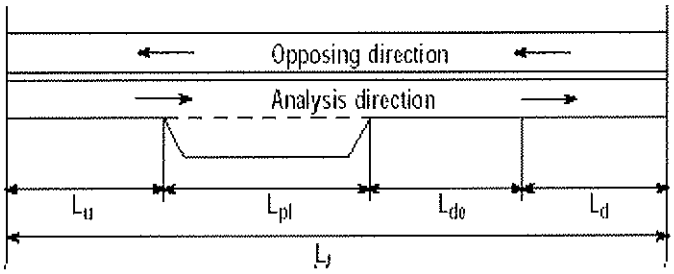
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Upslope / Summit*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data

☐ Class I highway ☑ Class II highway



Show North Arrow

Total length of analysis segment, L_t (*mi*)	*2.3*
Length of two-lane highway upstream of the passing lane, L_u (*mi*)	*0.0*
Length of passing lane including tapers , L_{pl} (*mi*)	*2.2*
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	*36.0*
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	*18.4*
Level of service[1], LOS_d (from Directional Two-Lane Highway Segment Worksheet)	*A*
Average Travel Speed	
Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (*mi*) (Exhibit 20-23)	*1.70*
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (*mi*) $L_d=L_t-(L_u+L_{pl}+L_{de})$	*-1.60*
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	*1.10*
Average travel speed including passing lane[2], $ATS_{pl} = (ATS_d * L_t) / (L_u+L_d+(L_{pl}/f_{pl})+ (2L_{de}/(1+f_{pl})))$	*39.5*
Percent Time-Spent-Following	
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (*mi*)(Exhibit 20-23)	*13.00*
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (*mi*)$=L_t-(L_u+L_{pl}+L_{de})$	*-12.90*
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl}(Exhibit 20-24)	*0.58*
Percent time-spent-following including passing lane[3], $PTSF_{pl}$(%) $PTSF_{pl}= PTSF_d[L_u+L_d+f_{pl}L_{pl}+((1+f_{pl})/2)L_{de}]/L_t$	*10.7*

2

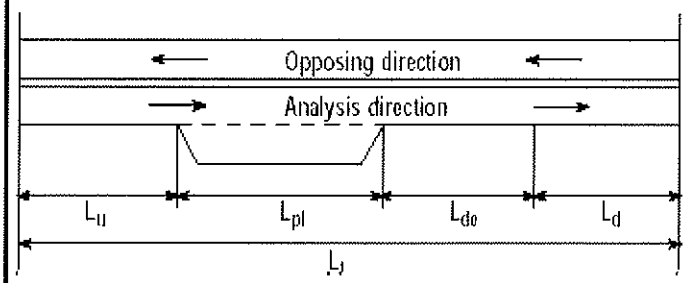
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Upslope / Summit*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data

☐ Class I highway ☑ Class II highway



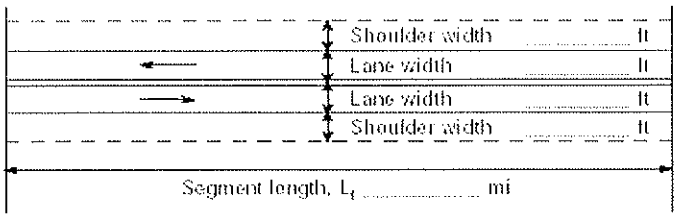
Total length of analysis segment, L_t (*mi*)	*2.3*
Length of two-lane highway upstream of the passing lane, L_u (*mi*)	*0.0*
Length of passing lane including tapers , L_{pl} (*mi*)	*2.0*
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	*34.9*
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	*23.6*
Level of service[1], LOS_d (from Directional Two-Lane Highway Segment Worksheet)	*A*
Average Travel Speed	
Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (*mi*) (Exhibit 20-23)	*1.70*
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (*mi*) $L_d=L_t-(L_u+L_{pl}+L_{de})$	*-1.40*
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	*1.11*
Average travel speed including passing lane[2], $ATS_{pl} = (ATS_d * L_t) / (L_u+L_d+(L_{pl}/f_{pl})+(2L_{de}/(1+f_{pl}))$)	*38.7*
Percent Time-Spent-Following	
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (*mi*)(Exhibit 20-23)	*13.00*
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (*mi*)$=L_t-(L_u+L_{pl}+L_{de})$	*-12.70*
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl}(Exhibit 20-24)	*0.58*
Percent time-spent-following including passing lane[3], $PTSF_{pl}$(%) $PTSF_{pl}= PTSF_d[L_u+L_d+f_{pl}L_{pl}+((1+f_{pl})/2)L_{de}]/L_t$	*13.7*

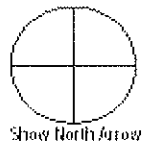
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Summit / Downslope*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length *1.30* mi Up/down *7.1*

Peak-hour factor, PHF *0.85*

No-passing zone *100%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *1*

Analysis direction vol., V_d *73*veh/h

Opposing direction vol., V_o *82*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*12.9*	*12.9*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.6*	*1.6*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.233*	*0.233*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.91*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*369*	*456*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.6 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*49.4 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*2.8*	*2.8*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.673*	*0.673*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*128*	*143*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*14.5*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*54.5*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*43.3*	

Level of Service and Other Performance Measures

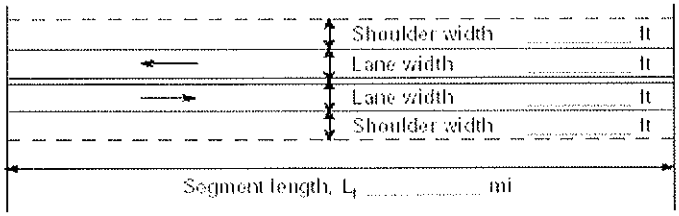
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.22*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t(V/PHF)$	*28*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*95*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*0.6*

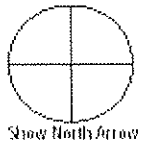
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Summit / Downslope*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length *1.30* mi Up/down *7.1*

Peak-hour factor, PHF *0.85*

No-passing zone *100%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *1*

Analysis direction vol., V_d *114*veh/h

Opposing direction vol., V_o *82*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*12.9*	*12.9*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.6*	*1.6*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.233*	*0.233*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.91*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*576*	*456*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.6 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*47.8 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*2.8*	*2.8*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.673*	*0.673*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*199*	*143*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*21.5*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*56.8*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*45.2*	

Level of Service and Other Performance Measures

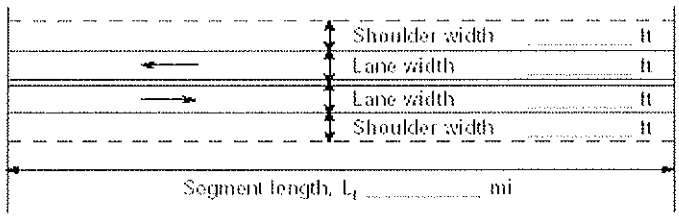
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.34*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*44*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*148*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*0.9*

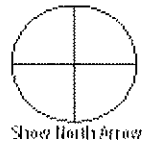
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Downslope / I-15*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday average*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length *4.00* mi Up/down *3.4*

Peak-hour factor, PHF *0.85*

No-passing zone *70%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *1*

Analysis direction vol., V_d *73*veh/h

Opposing direction vol., V_o *82*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*9.1*	*9.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.5*	*1.5*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.307*	*0.307*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.94*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*280*	*334*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*3.0 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*50.7 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.5*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.881*	*0.881*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*97*	*109*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*11.3*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*51.8*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*38.7*	

Level of Service and Other Performance Measures

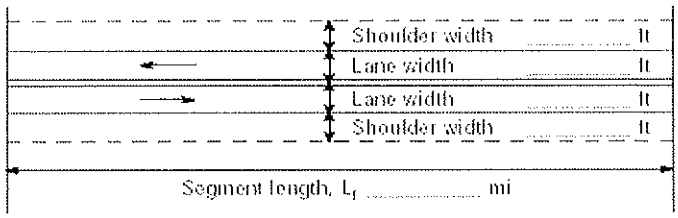
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.16*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*167*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*569*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*3.3*

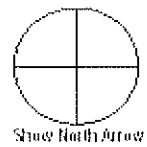
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Downslope / I-15*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length *4.00* mi Up/down *3.4*

Peak-hour factor, PHF *0.85*

No-passing zone *70%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *1*

Analysis direction vol., V_d *114*veh/h

Opposing direction vol., V_o *82*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*9.1*	*9.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.5*	*1.5*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.307*	*0.307*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.94*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*437*	*334*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*3.0 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*49.5 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.5*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.881*	*0.881*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*152*	*109*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*17.0*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*52.8*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*39.0*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.26*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t(V/PHF)$	*262*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*889*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*5.3*

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	Bjornstad
Agency/Co.	Fehr & Peers
Date Performed	7/30/2007
Analysis Time Period	8:00 - 9:00

Site Information

Intersection	US-89 / Main Street
Jurisdiction	Panguitch, UT
Analysis Year	2007

Project ID 06-721 Coal Hollow EIS

East/West Street: US-89 / Center Street

North/South Street: SR-143 / US-89

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	6	20	3	18	12	67
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	4	37	38	68	23	9
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	L	TR
PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Flow Rate (veh/h)	28	3	33	76	46	43	77	36
% Heavy Vehicles	0	0	6	14	5	0	18	0
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2	0.0	0.6	0.0	0.1	0.0	1.0	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	0.3
Prop. Heavy Vehicle	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1	-0.7	0.4	-0.5	0.1	-0.7	0.8	-0.2

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.02	0.00	0.03	0.07	0.04	0.04	0.07	0.03
hd, final value (s)	5.21	4.40	5.44	4.57	5.07	4.25	5.72	4.72
x, final value	0.04	0.00	0.05	0.10	0.06	0.05	0.12	0.05
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	2.9	2.1	3.1	2.3	2.8	1.9	3.4	2.4

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	278	253	283	326	296	293	327	286
Delay (s/veh)	8.13	7.11	8.42	7.76	8.13	7.17	9.21	7.65
LOS	A	A	A	A	A	A	A	A
Approach: Delay (s/veh)	8.03		7.96		7.66		8.72	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.14							
Intersection LOS	A							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	Bjornstad
Agency/Co.	Fehr & Peers
Date Performed	7/30/2007
Analysis Time Period	16:15 - 17:15

Site Information

Intersection	US-89 / Main Street
Jurisdiction	Panguitch, UT
Analysis Year	2007

Project ID 06-721 Coal Hollow EIS

East/West Street: US-89 / Center Street

North/South Street: SR-143 / US-89

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	17	34	9	41	35	140
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	7	51	19	108	40	27
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	L	TR
PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Flow Rate (veh/h)	58	10	89	164	67	22	127	78
% Heavy Vehicles	4	7	6	14	5	6	13	4
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.3	0.0	0.5	0.0	0.1	0.0	1.0	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	0.4
Prop. Heavy Vehicle	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2	-0.6	0.4	-0.5	0.1	-0.6	0.7	-0.2

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.05	0.01	0.08	0.15	0.06	0.02	0.11	0.07
hd, final value (s)	5.80	4.99	5.75	4.91	5.70	4.96	6.13	5.20
x, final value	0.09	0.01	0.14	0.22	0.11	0.03	0.22	0.11
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.5	2.7	3.4	2.6	3.4	2.7	3.8	2.9

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	308	260	339	414	317	272	377	328
Delay (s/veh)	9.10	7.76	9.40	9.03	9.08	7.81	10.52	8.56
LOS	A	A	A	A	A	A	B	A
Approach: Delay (s/veh)	8.90		9.16		8.76		9.77	
LOS	A		A		A		A	
Intersection Delay (s/veh)	9.28							
Intersection LOS	A							

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*US-89 / SR-12*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Panguitch, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007*
Analysis Time Period	*8:00 - 9:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-12* | North/South Street: *US-89*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		33	24	45	27	
Peak-Hour Factor, PHF	1.00	0.85	0.85	0.85	0.85	1.00
Hourly Flow Rate, HFR (veh/h)	0	0	0	43	0	37
Percent Heavy Vehicles	0	--	--	25	--	--
Median Type	Undivided					
RT Channelized			1			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				37		32
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.85	1.00	0.85
Hourly Flow Rate, HFR (veh/h)	52	31	0	0	38	28
Percent Heavy Vehicles	0	0	0	21	0	10
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		52	43		37			
C (m) (veh/h)		1436	747		1012			
v/c		0.04	0.06		0.04			
95% queue length		0.11	0.18		0.11			
Control Delay (s/veh)		7.6	10.1		8.7			
LOS		A	B		A			
Approach Delay (s/veh)	--	--	9.5					
Approach LOS	--	--	A					

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DELAY 5.8

LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*US-89 / SR-12*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Panguitch, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007*
Analysis Time Period	*16:00 - 17:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-12* | North/South Street: *US-89*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*75*	*64*	*35*	*43*	
Peak-Hour Factor, PHF	*1.00*	*0.89*	*0.89*	*0.89*	*0.89*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*68*	*0*	*69*
Percent Heavy Vehicles	*0*	--	--	*25*	--	--
Median Type	*Undivided*					
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*1*	*1*		*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*61*		*62*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.89*	*1.00*	*0.89*
Hourly Flow Rate, HFR (veh/h)	*39*	*48*	*0*	*0*	*84*	*71*
Percent Heavy Vehicles	*0*	*0*	*0*	*13*	*0*	*4*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*1*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (veh/h)		*39*	*68*		*69*			
C (m) (veh/h)		*1380*	*733*		*970*			
v/c		*0.03*	*0.09*		*0.07*			
95% queue length		*0.09*	*0.31*		*0.23*			
Control Delay (s/veh)		*7.7*	*10.4*		*9.0*			
LOS		*A*	*B*		*A*			
Approach Delay (s/veh)	--	--	*9.7*					
Approach LOS	--	--	*A*					

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DELAY 4.79

LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*US-89 / SR-14*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Panguitch, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007*
Analysis Time Period	*8:00 - 9:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-14* | North/South Street: *US-89*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	25	40	1	2	44	13
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	17	3	17	0	1	3
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	2	0
Configuration	L		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	15	3	15	0	1	3
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	2	51	15	29	47	1
Percent Heavy Vehicles	6	0	5	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT		LTR			LTR	
v (veh/h)	29	2		4			37	
C (m) (veh/h)	1549	1572		917			852	
v/c	0.02	0.00		0.00			0.04	
95% queue length	0.06	0.00		0.01			0.14	
Control Delay (s/veh)	7.4	7.3		8.9			9.4	
LOS	A	A		A			A	
Approach Delay (s/veh)	--	--	8.9			9.4		
Approach LOS	--	--	A			A		

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DELAY 3.78

LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*US-89 / SR-14*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Panguitch, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007*
Analysis Time Period	*16:00 - 17:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-14*	North/South Street: *US-89*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	25	102	0	4	69	20
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Hourly Flow Rate, HFR (veh/h)	20	1	24	0	0	0
Percent Heavy Vehicles	3	--	--	50	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	2	0
Configuration	L		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	19	1	22	0	0	0
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Hourly Flow Rate, HFR (veh/h)	4	75	21	27	112	0
Percent Heavy Vehicles	9	0	7	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT		LTR			LTR	
v (veh/h)	27	4		0			45	
C (m) (veh/h)	1488	1186					791	
v/c	0.02	0.00					0.06	
95% queue length	0.06	0.01					0.18	
Control Delay (s/veh)	7.5	8.0					9.8	
LOS	A	A					A	
Approach Delay (s/veh)	--	--				9.8		
Approach LOS	--	--				A		

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DELAY 2.12
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	US-89 / SR-20
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	7/19/2007	Analysis Year	2007
Analysis Time Period	8:00 - 9:00		

Project Description	06-721 Coal Hollow EIS
East/West Street: SR-20	North/South Street: US-89
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5		31			
Peak-Hour Factor, PHF	0.84	1.00	0.84	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	5	0	36	0	0	0
Percent Heavy Vehicles	18	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	34	32			18	4
Peak-Hour Factor, PHF	0.84	0.84	1.00	1.00	0.84	0.84
Hourly Flow Rate, HFR (veh/h)	40	38	0	0	21	4
Percent Heavy Vehicles	19	23	0	0	24	50
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	1
Configuration	L	T			T	R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		L	T			T	R
v (veh/h)	5		40	38			21	4
C (m) (veh/h)	1524		923	842			802	960
v/c	0.00		0.04	0.05			0.03	0.00
95% queue length	0.01		0.14	0.14			0.08	0.01
Control Delay (s/veh)	7.4		9.1	9.5			9.6	8.8
LOS	A		A	A			A	A
Approach Delay (s/veh)	--	--	9.3			9.5		
Approach LOS	--	--	A			A		

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DELAY 8.05
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	*Fehr & Peers*
Date Performed	*7/19/2007*
Analysis Time Period	*16:00 - 17:00*

Site Information

Intersection	*US-89 / SR-20*
Jurisdiction	*Panguitch, UT*
Analysis Year	*2007*

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-20* | North/South Street: *US-89*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	17		54			
Peak-Hour Factor, PHF	0.95	1.00	0.95	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	17	0	56	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	70	45			41	6
Peak-Hour Factor, PHF	0.95	0.95	1.00	1.00	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	73	47	0	0	43	6
Percent Heavy Vehicles	13	13	0	0	16	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	1
Configuration	L	T			T	R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		L	T			T	R
v (veh/h)	17		73	47			43	6
C (m) (veh/h)	1636		861	828			766	1091
v/c	0.01		0.08	0.06			0.06	0.01
95% queue length	0.03		0.28	0.18			0.18	0.02
Control Delay (s/veh)	7.2		9.6	9.6			10.0	8.3
LOS	A		A	A			A	A
Approach Delay (s/veh)	--	--	9.6			9.8		
Approach LOS	--	--	A			A		

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DELAY 7.53
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*I-15 / SR-20 NB*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Iron County, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007*
Analysis Time Period	*8:00 - 9:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-20* | North/South Street: *I-15*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*1*	*27*			*15*	*15*
Peak-Hour Factor, PHF	*0.85*	*0.85*	*0.91*	*0.91*	*0.85*	*0.85*
Hourly Flow Rate, HFR (veh/h)	*1*	*31*	*0*	*0*	*17*	*17*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*0*	*1*	*19*			
Peak-Hour Factor, PHF	*0.85*	*0.85*	*0.85*	*0.91*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*0*	*1*	*22*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*4*	*50*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*			*LTR*				
v (veh/h)	*1*			*23*				
C (m) (veh/h)	*1591*			*1026*				
v/c	*0.00*			*0.02*				
95% queue length	*0.00*			*0.07*				
Control Delay (s/veh)	*7.3*			*8.6*				
LOS	*A*			*A*				
Approach Delay (s/veh)	--	--	*8.6*					
Approach LOS	--	--	*A*					

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DELAY 2.63
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*I-15 / SR-20 SB*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Iron County, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007*
Analysis Time Period	*8:00 - 9:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-20*	North/South Street: *I-15*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*1*	*0*	*15*	*0*	
Peak-Hour Factor, PHF	*0.85*	*0.85*	*0.85*	*0.85*	*0.85*	*0.85*
Hourly Flow Rate, HFR (veh/h)	*0*	*1*	*0*	*17*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*27*	*2*	*2*
Peak-Hour Factor, PHF	*0.85*	*0.85*	*0.85*	*0.85*	*0.85*	*0.85*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*31*	*2*	*2*
Percent Heavy Vehicles	*0*	*0*	*4*	*27*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*					*LTR*	
v (veh/h)		*17*					*35*	
C (m) (veh/h)		*1635*					*913*	
v/c		*0.01*					*0.04*	
95% queue length		*0.03*					*0.12*	
Control Delay (s/veh)		*7.2*					*9.1*	
LOS		*A*					*A*	
Approach Delay (s/veh)	--	--				*9.1*		
Approach LOS	--	--				*A*		

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DELAY 9.38
LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3471	1442	1787	3471	1615	1529	1566		1800	1667	
Flt Permitted	0.48	1.00	1.00	0.36	1.00	1.00	0.76	1.00		0.68	1.00	
Satd. Flow (perm)	903	3471	1442	673	3471	1615	1215	1566		1291	1667	
Volume (vph)	2	390	85	63	295	4	50	1	100	9	1	3
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	2	453	99	73	343	5	58	1	116	10	1	3
RTOR Reduction (vph)	0	0	77	0	0	4	0	39	0	0	1	0
Lane Group Flow (vph)	2	453	22	73	343	1	58	78	0	10	3	0
Confl. Peds. (#/hr)							1		1	5		5
Heavy Vehicles (%)	0%	4%	12%	1%	4%	0%	18%	0%	2%	0%	0%	0%
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	13.8	13.8	13.8	13.8	13.8	13.8	44.2	44.2		44.2	44.2	
Effective Green, g (s)	15.8	15.8	15.8	15.8	15.8	15.8	46.2	46.2		46.2	46.2	
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.23	0.23	0.66	0.66		0.66	0.66	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	204	783	325	152	783	365	802	1034		852	1100	
v/s Ratio Prot		c0.13			0.10			c0.05			0.00	
v/s Ratio Perm	0.00		0.02	0.11		0.00	0.05			0.01		
v/c Ratio	0.01	0.58	0.07	0.48	0.44	0.00	0.07	0.08		0.01	0.00	
Uniform Delay, d1	21.0	24.1	21.3	23.5	23.3	21.0	4.2	4.3		4.1	4.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	1.0	0.1	2.4	0.4	0.0	0.2	0.1		0.0	0.0	
Delay (s)	21.0	25.2	21.4	25.9	23.7	21.0	4.4	4.4		4.1	4.1	
Level of Service	C	C	C	C	C	C	A	A		A	A	
Approach Delay (s)		24.5			24.0			4.4			4.1	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	21.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.95	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3574	1538	1770	3539	1615	1668	1582		1805	1805	
Flt Permitted		1.00	1.00	0.37	1.00	1.00	0.76	1.00		0.68	1.00	
Satd. Flow (perm)		3574	1538	687	3539	1615	1327	1582		1292	1805	
Volume (vph)	0	449	127	109	538	11	65	2	111	7	2	1
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	478	135	116	572	12	69	2	118	7	2	1
RTOR Reduction (vph)	0	0	99	0	0	9	0	45	0	0	0	0
Lane Group Flow (vph)	0	478	36	116	572	3	69	75	0	7	3	0
Confl. Peds. (#/hr)							3		3			
Heavy Vehicles (%)	0%	1%	5%	2%	2%	0%	8%	0%	1%	0%	0%	0%
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		16.8	16.8	16.8	16.8	16.8	41.2	41.2		41.2	41.2	
Effective Green, g (s)		18.8	18.8	18.8	18.8	18.8	43.2	43.2		43.2	43.2	
Actuated g/C Ratio		0.27	0.27	0.27	0.27	0.27	0.62	0.62		0.62	0.62	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		960	413	185	950	434	819	976		797	1114	
v/s Ratio Prot		0.13			0.16			c0.08			0.00	
v/s Ratio Perm			0.09	c0.17		0.01	0.05			0.01		
v/c Ratio		0.50	0.09	0.63	0.60	0.01	0.08	0.08		0.01	0.00	
Uniform Delay, d1		21.6	19.2	22.5	22.3	18.8	5.4	5.4		5.2	5.1	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4	0.1	6.5	1.1	0.0	0.2	0.2		0.0	0.0	
Delay (s)		22.0	19.3	29.0	23.4	18.8	5.6	5.5		5.2	5.1	
Level of Service		C	B	C	C	B	A	A		A	A	
Approach Delay (s)		21.4			24.3			5.6			5.2	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	20.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

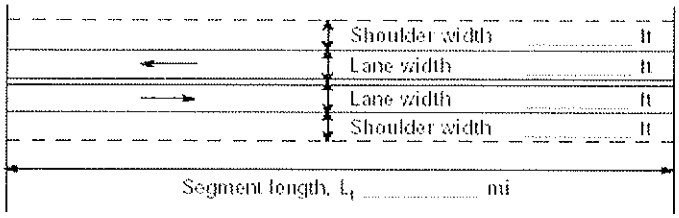
Existing + Project Conditions

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Alton / SR-14*
Date Performed	*7/24/2007*	Jurisdiction	*Kane County, UT*
Analysis Time Period	*Weekday Average with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length *1.60* mi Up/down *3.0*

Peak-hour factor, PHF *0.85*

No-passing zone *20%*

% Trucks and Buses , P_T *22 %*

% Recreational vehicles, P_R *11%*

Access points/ *mi* *1*

Analysis direction vol., V_d *144*veh/h

Opposing direction vol., V_o *120*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*6.1*	*6.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.4*	*1.4*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.462*	*0.462*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.99*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*367*	*310*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.7 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*62.2 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*55.2 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*1.000*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*169*	*141*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*18.6*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*34.9*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*34.5*	

Level of Service and Other Performance Measures

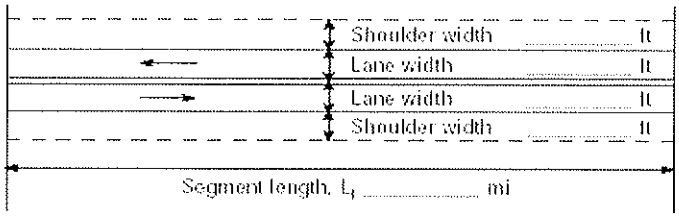
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.22*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*68*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*230*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*1.2*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Alton / SR-14*
Date Performed	*7/30/2007*	Jurisdiction	*Kane County, UT*
Analysis Time Period	*Weekend with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length *1.60* mi Up/down *3.0*

Peak-hour factor, PHF *0.85*

No-passing zone *20%*

% Trucks and Buses , P_T *28 %*

% Recreational vehicles, P_R *17%*

Access points/ *mi* *1*

Analysis direction vol., V_d *174*veh/h

Opposing direction vol., V_o *141*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*6.1*	*6.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.4*	*1.4*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.401*	*0.401*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.99*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*511*	*420*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.5 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*62.2 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*53.5 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*1.000*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*205*	*166*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*22.0*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*37.3*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*38.7*	

Level of Service and Other Performance Measures

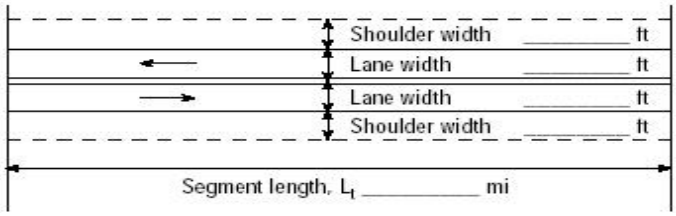
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.30*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*82*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*278*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*1.5*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-14 / Hatch*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield County, Utah*
Analysis Time Period	*Weekday Average with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *30%*

% Trucks and Buses , P_T *22 %*

% Recreational vehicles, P_R *11%*

Access points/ *mi* *1*

Analysis direction vol., V_d *144*veh/h

Opposing direction vol., V_o *120*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.867*	*0.867*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*196*	*163*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.2 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*58.4 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.978*	*0.978*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*173*	*144*
Base percent time-spent-following[4], BPTSF(%)=$100(1-e^{av_d^b})$	*19.0*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*41.2*	
Percent time-spent-following, PTSF(%)=BPTSF+f_{np}	*41.5*	

Level of Service and Other Performance Measures

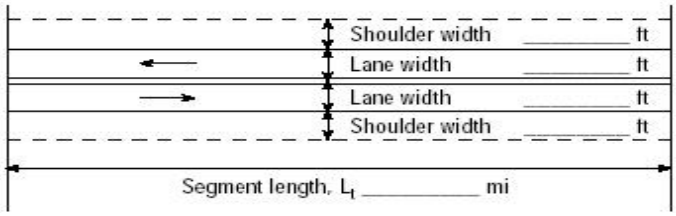
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, v/c=V_p/ 1,700	*0.12*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t$(V/PHF)	*496*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*1685*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*8.5*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-14 / Hatch*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield County, Utah*
Analysis Time Period	*Weekend with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *30%*

% Trucks and Buses , P_T *28 %*

% Recreational vehicles, P_R *17%*

Access points/ *mi* *1*

Analysis direction vol., V_d *174*veh/h

Opposing direction vol., V_o *141*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.836*	*0.836*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*245*	*198*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.6 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.4 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.973*	*0.973*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*210*	*171*
Base percent time-spent-following[4], BPTSF(%)=$100(1-e^{av_d^b})$	*22.5*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*43.3*	
Percent time-spent-following, PTSF(%)=BPTSF+f_{np}	*46.3*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, v/c=V_p/ 1,700	*0.14*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t$(V/PHF)	*599*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*2036*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*10.4*

HIGHPLAN 2002 Conceptual Planning Analysis

Description/File Information

Filename	HP_preview.xml	**Date Prepared**	7/31/2007		
Program	HIGHPLAN	**Version**	1.2.0		
Analyst	JB	**Agency**	FehrandPeers	**District**	Hatch, UT
Road Name	US-89	**From/To**	Hatch		
Analysis Type	Segment	**Peak Direction**	Northbound	**Study Period**	K100
User Notes	Weekday Average W/ TRUCK				

Facility Data

Roadway Variables				Traffic Variables			
Area Type	Rural developed	**# Thru Lanes**	2	**AADT**	3004	**% Heavy Vehicles**	22
Class	3	**Terrain**	Level	**K**	.0879	**Base Capacity**	1700
Posted Speed	40	**Median**	No	**D**	.52	**Local Adj. Factor**	.92
Free Flow Speed	45	**Left Turn Lanes**	No	**PHF**	.85	**Adjusted Capacity**	1014
Pass Lane Spacing	N/A	**% NPZ**	100				

LOS Results

v/c Ratio	0.17	**Density**	N/A	**PTSF**	91.00	**ATS**	37.00	**% FFS**	83.0	**LOS**	C

Service Volume Tables

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	120	340	510	650
2					
3					
4					
Lanes	**Hourly Volume In Both Directions**				
2	0	230	660	980	1250
4					
6					
8					
Lanes	**Annual Average Daily Traffic**				
2	0	2600	7500	11100	14200
4					
6					
8					
Lanes	**Maximum v/c Ratio**				
1	0.00	0.15	0.37	0.55	0.71
2					
3					
4					

HIGHPLAN 2002 Conceptual Planning Analysis

Description/File Information

Filename	HP_preview.xml	**Date Prepared**	7/31/2007		
Program	HIGHPLAN	**Version**	1.2.0		
Analyst	JB	**Agency**	FehrandPeers	**District**	Hatch, UT
Road Name	US-89	**From/To**	Hatch		
Analysis Type	Segment	**Peak Direction**	Northbound	**Study Period**	K100
User Notes	Weekend with Trucks				

Facility Data

Roadway Variables				Traffic Variables			
Area Type	Rural developed	**# Thru Lanes**	2	**AADT**	3266	**% Heavy Vehicles**	28
Class	3	**Terrain**	Level	**K**	.0964	**Base Capacity**	1700
Posted Speed	40	**Median**	No	**D**	.5306	**Local Adj. Factor**	.92
Free Flow Speed	45	**Left Turn Lanes**	No	**PHF**	.85	**Adjusted Capacity**	988
Pass Lane Spacing	N/A	**% NPZ**	100				

LOS Results

v/c Ratio	0.18	**Density**	N/A	**PTSF**	97.00	**ATS**	37.00	**% FFS**	82.0	**LOS**	C

Service Volume Tables

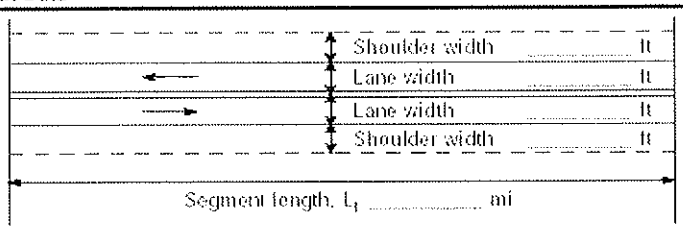
	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	110	340	510	660
2					
3					
4					
Lanes	**Hourly Volume In Both Directions**				
2	0	210	650	970	1240
4					
6					
8					
Lanes	**Annual Average Daily Traffic**				
2	0	2200	6700	10100	12900
4					
6					
8					
Lanes	**Maximum v/c Ratio**				
1	0.00	0.14	0.37	0.56	0.71
2					
3					
4					

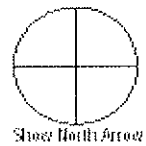
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	Bjornstad	Highway / Direction of Travel	US-89
Agency or Company	Fehr & Peers	From/To	Hatch / SR-12
Date Performed	7/30/2007	Jurisdiction	Garfield Couty, UT
Analysis Time Period	Weekday Average with Trucks	Analysis Year	2007

Project Description: 06-721 Coal Hollow EIS

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF 0.87

No-passing zone 35%

% Trucks and Buses , P_T 25 %

% Recreational vehicles, P_R 17%

Access points/ mi 1

Analysis direction vol., V_d 145veh/h

Opposing direction vol., V_o 134veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	1.7	1.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.851	0.851
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	196	181

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	mi/h	Base free-flow speed[3], $BFFS_{FM}$	65.0 mi/h
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	1.3 mi/h
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	mi/h	Adj. for access points[3], f_A (Exhibit 20-5)	0.3 mi/h
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	2.7 mi/h	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	63.5 mi/h
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	57.8 mi/h

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	1.1	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.976	0.976
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	1.00	1.00
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	171	158
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	18.8	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	46.4	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	41.1	

Level of Service and Other Performance Measures

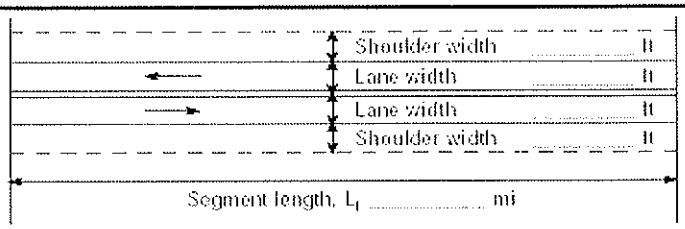
Level of service, LOS (Exhibit 20-3 or 20-4)	B
Volume to capacity ratio, $v/c=V_p/1{,}700$	0.12
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)$=0.25L_t(V/PHF)$	325
Peak-hour vehicle-miles of travel, VMT_{60}(veh- mi)$=V*L_t$	1131
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	5.6

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Hatch / SR-12*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekend with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *35%*

% Trucks and Buses , P_T *19 %*

% Recreational vehicles, P_R *20%*

Access points/ *mi* *1*

Analysis direction vol., V_d *153*veh/h

Opposing direction vol., V_o *140*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.883*	*0.883*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*204*	*187*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.8 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.7 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.981*	*0.981*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*183*	*168*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*20.0*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*46.9*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*42.4*	

Level of Service and Other Performance Measures

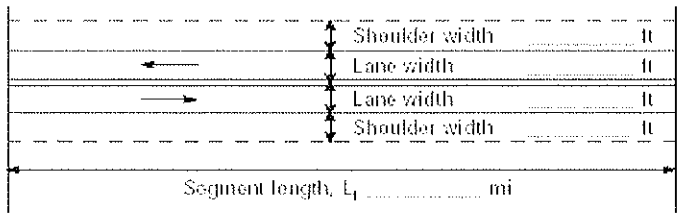
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.12*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t(V/PHF)$	*351*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*1193*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*6.1*

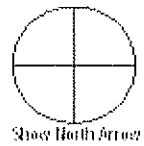
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-12 / Panguitch*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekday Average with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.87*

No-passing zone *5%*

% Trucks and Buses , P_T *25 %*

% Recreational vehicles, P_R *17%*

Access points/ *mi* *2*

Analysis direction vol., V_d *145*veh/h

Opposing direction vol., V_o *134*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.851*	*0.851*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*196*	*181*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.5 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.9 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*63.2 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*58.4 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.976*	*0.976*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*171*	*158*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*18.8*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*19.3*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*28.1*	

Level of Service and Other Performance Measures

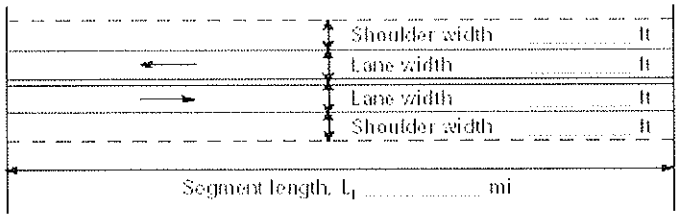
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.12*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*237*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*826*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*4.1*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	Bjornstad	Highway / Direction of Travel	US-89
Agency or Company	Fehr & Peers	From/To	SR-12 / Panguitch
Date Performed	7/24/2007	Jurisdiction	Garfield Couty, UT
Analysis Time Period	Weekend with Trucks	Analysis Year	2007

Project Description: 06-721 Coal Hollow EIS

Input Data



☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF 0.85

No-passing zone 5%

% Trucks and Buses , P_T 19 %

% Recreational vehicles, P_R 20%

Access points/ mi 2

Analysis direction vol., V_d 153veh/h

Opposing direction vol., V_o 140veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	1.7	1.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.883	0.883
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	204	187

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	mi/h	Base free-flow speed[3], $BFFS_{FM}$	65.0 mi/h
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	1.3 mi/h
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	mi/h	Adj. for access points[3], f_A (Exhibit 20-5)	0.5 mi/h
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	1.9 mi/h	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	63.2 mi/h
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	58.2 mi/h

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	1.1	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.981	0.981
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	1.00	1.00
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	183	168
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	20.0	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	20.1	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	29.6	

Level of Service and Other Performance Measures

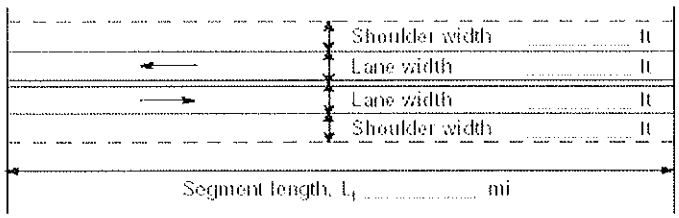
Level of service, LOS (Exhibit 20-3 or 20-4)	A
Volume to capacity ratio, $v/c=V_p/1{,}700$	0.12
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)$=0.25L_t(V/PHF)$	256
Peak-hour vehicle-miles of travel, VMT_{60}(veh- mi)$=V*L_t$	872
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	4.4

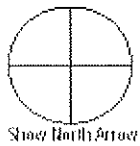
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Panguitch / SR-20*
Date Performed	*7/30/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekday Average with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.86*

No-passing zone *15%*

% Trucks and Buses , P_T *30 %*

% Recreational vehicles, P_R *11%*

Access points/ *mi* *3*

Analysis direction vol., V_d *114*veh/h

Opposing direction vol., V_o *119*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.826*	*0.826*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*160*	*167*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.8 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.7 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*63.0 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*58.7 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.971*	*0.971*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*137*	*143*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*15.5*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*28.4*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*30.0*	

Level of Service and Other Performance Measures

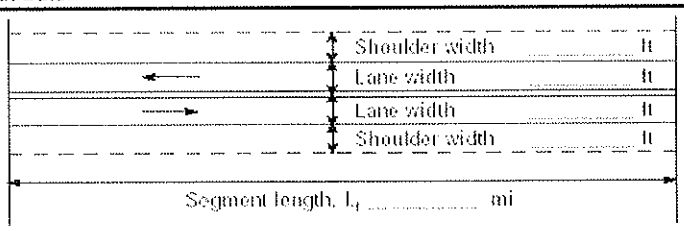
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.09*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*312*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1072*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*5.3*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Panguitch / SR-20*
Date Performed	*7/24/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekend with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.94*

No-passing zone *15%*

% Trucks and Buses , P_T *38 %*

% Recreational vehicles, P_R *13%*

Access points/ *mi* *3*

Analysis direction vol., V_d *161*veh/h

Opposing direction vol., V_o *120*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.790*	*0.790*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*217*	*162*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.8 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.6 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.0 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*58.4 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.963*	*0.963*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*178*	*133*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*19.5*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*29.0*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*31.9*	

Level of Service and Other Performance Measures

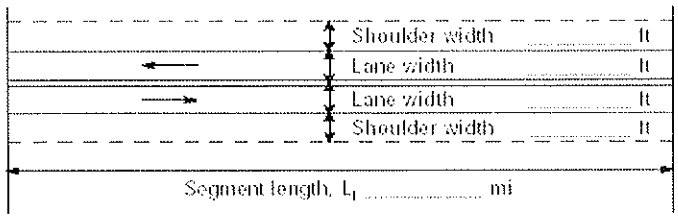
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.13*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*402*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1513*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*6.9*

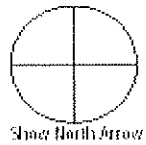
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*US-89 / Upslope*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *45%*

% Trucks and Buses , P_T *33 %*

% Recreational vehicles, P_R *13%*

Access points/ *mi* *0*

Analysis direction vol., V_d *80*veh/h

Opposing direction vol., V_o *89*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.812*	*0.812*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*116*	*129*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*50.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.3 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*48.7 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*45.5 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.968*	*0.968*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*97*	*108*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*11.3*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*43.6*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*34.3*	

Level of Service and Other Performance Measures

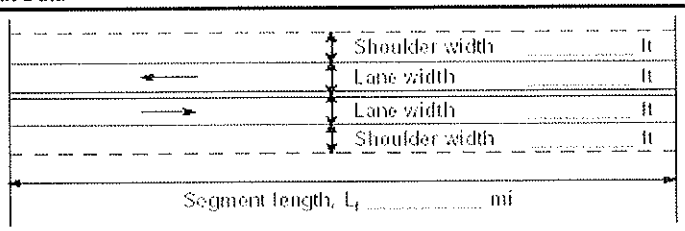
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.07*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*200*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*680*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*4.4*

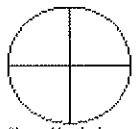
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	Bjornstad	Highway / Direction of Travel	SR-20
Agency or Company	Fehr & Peers	From/To	US-89 / Upslope
Date Performed	7/24/2007	Jurisdiction	Iron County, UT
Analysis Time Period	Weekend with Trucks	Analysis Year	2007

Project Description: 06-721 Coal Hollow EIS

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF 0.85

No-passing zone 45%

% Trucks and Buses, P_T 31 %

% Recreational vehicles, P_R 13%

Access points/ mi 0

Analysis direction vol., V_d 121veh/h

Opposing direction vol., V_o 89veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	1.7	1.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.822	0.822
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	173	127

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	mi/h	Base free-flow speed[3], $BFFS_{FM}$	50.0 mi/h
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	1.3 mi/h
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	mi/h	Adj. for access points[3], f_A (Exhibit 20-5)	0.0 mi/h
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	1.3 mi/h	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	48.7 mi/h
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	45.1 mi/h

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	1.1	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.970	0.970
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	1.00	1.00
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	147	108
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	16.5	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	45.5	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	35.7	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	C
Volume to capacity ratio, $v/c=V_p/1{,}700$	0.10
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)$=0.25L_t(V/PHF)$	302
Peak-hour vehicle-miles of travel, VMT_{60}(veh- mi)$=V*L_t$	1029
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	6.7

2

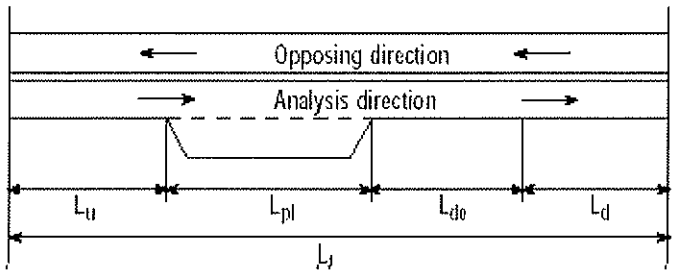
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Upslope / Summit*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data

☐ Class I highway ☑ Class II highway



Total length of analysis segment, L_t (*mi*)	*2.3*
Length of two-lane highway upstream of the passing lane, L_u (*mi*)	*0.0*
Length of passing lane including tapers , L_{pl} (*mi*)	*2.2*
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	*35.2*
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	*20.3*
Level of service[1], LOS_d (from Directional Two-Lane Highway Segment Worksheet)	*A*
Average Travel Speed	
Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (*mi*) (Exhibit 20-23)	*1.70*
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (*mi*) $L_d=L_t-(L_u+L_{pl}+L_{de})$	*-1.60*
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	*1.10*
Average travel speed including passing lane[2], $ATS_{pl} = (ATS_d * L_t) / (L_u+L_d+(L_{pl}/f_{pl})+ (2L_{de}/(1+f_{pl})))$	*38.7*
Percent Time-Spent-Following	
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (*mi*)(Exhibit 20-23)	*13.00*
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (*mi*)$=L_t-(L_u+L_{pl}+L_{de})$	*-12.90*
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl}(Exhibit 20-24)	*0.58*
Percent time-spent-following including passing lane[3], $PTSF_{pl}$(%) $PTSF_{pl}= PTSF_d[L_u+L_d+f_{pl}L_{pl}+((1+f_{pl})/2)L_{de}]/L_t$	*11.8*

2

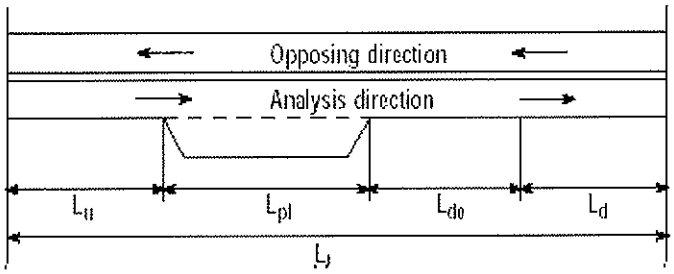
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Upslope / Summit*
Date Performed	*7/30/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data

☐ Class I highway ☑ Class II highway



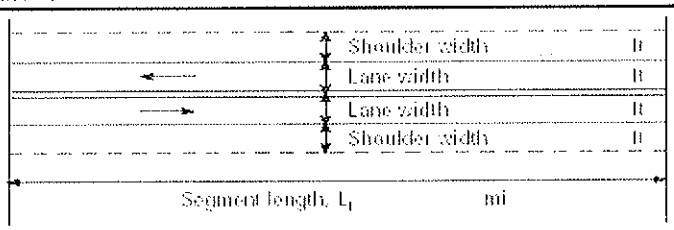
Total length of analysis segment, L_t (*mi*)	*2.3*
Length of two-lane highway upstream of the passing lane, L_u (*mi*)	*0.0*
Length of passing lane including tapers , L_{pl} (*mi*)	*2.0*
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	*33.6*
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	*25.4*
Level of service[1], LOS_d (from Directional Two-Lane Highway Segment Worksheet)	*A*
Average Travel Speed	
Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (*mi*) (Exhibit 20-23)	*1.70*
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (*mi*) $L_d=L_t-(L_u+L_{pl}+L_{de})$	*-1.40*
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	*1.11*
Average travel speed including passing lane[2], $ATS_{pl} = (ATS_d * L_t) / (L_u+L_d+(L_{pl}/f_{pl})+ (2L_{de}/(1+f_{pl})))$	*37.3*
Percent Time-Spent-Following	
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (*mi*)(Exhibit 20-23)	*13.00*
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (*mi*)$=L_t-(L_u+L_{pl}+L_{de})$	*-12.70*
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl}(Exhibit 20-24)	*0.58*
Percent time-spent-following including passing lane[3], $PTSF_{pl}$(%) $PTSF_{pl}= PTSF_d[L_u+L_d+f_{pl}L_{pl}+((1+f_{pl})/2)L_{de}]/L_t$	*14.8*

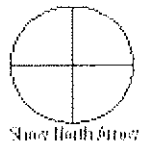
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Summit / Downslope*
Date Performed	*7/30/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length *1.30* mi Up/down *7.1*

Peak-hour factor, PHF *0.85*

No-passing zone *100%*

% Trucks and Buses , P_T *33 %*

% Recreational vehicles, P_R *13%*

Access points/ *mi* *1*

Analysis direction vol., V_d *80*veh/h

Opposing direction vol., V_o *89*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*12.9*	*12.9*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.6*	*1.6*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.200*	*0.200*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*0.91*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_f/(PHF*f_{HV}*f_G)$	*518*	*524*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.3 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*48.1 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*2.8*	*2.8*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.627*	*0.627*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_f/(PHF*f_{HV}*f_G)$	*150*	*167*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*16.8*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*55.1*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*42.8*	

Level of Service and Other Performance Measures

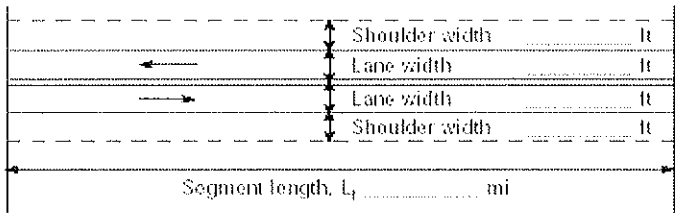
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.30*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*31*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*104*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*0.6*

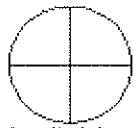
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Summit / Downslope*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length *1.30* mi Up/down *7.1*

Peak-hour factor, PHF *0.85*

No-passing zone *100%*

% Trucks and Buses , P_T *32 %*

% Recreational vehicles, P_R *13%*

Access points/ *mi* *1*

Analysis direction vol., V_d *121*veh/h

Opposing direction vol., V_o *89*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*12.9*	*12.9*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.6*	*1.6*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.205*	*0.205*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.91*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*696*	*562*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.1 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*46.5 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*2.8*	*2.8*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.635*	*0.635*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*224*	*165*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*23.7*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*58.8*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*48.7*	

Level of Service and Other Performance Measures

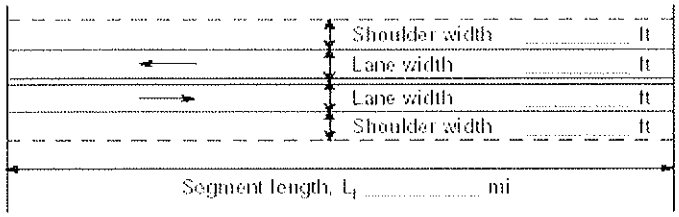
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.41*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*46*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*157*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*1.0*

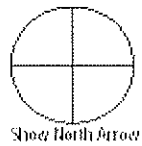
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Downslope / I-15*
Date Performed	*7/30/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday average with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length *4.00* mi Up/down *3.4*

Peak-hour factor, PHF *0.85*

No-passing zone *70%*

% Trucks and Buses , P_T *33 %*

% Recreational vehicles, P_R *13%*

Access points/ *mi* *1*

Analysis direction vol., V_d *80*veh/h

Opposing direction vol., V_o *89*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*9.1*	*9.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.5*	*1.5*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.268*	*0.268*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.94*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*352*	*416*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.5 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*50.0 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.5*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.858*	*0.858*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*110*	*122*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*12.7*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*52.1*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*40.1*	

Level of Service and Other Performance Measures

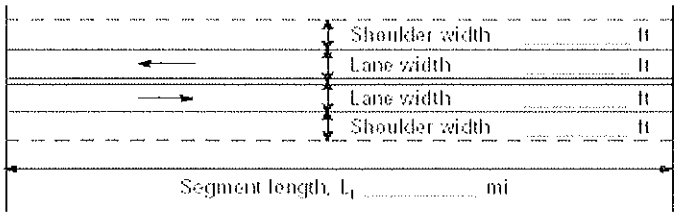
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.21*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*184*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*624*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*3.7*

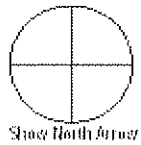
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Bjornstad*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Downslope / I-15*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend with Trucks*	Analysis Year	*2007*

Project Description: *06-721 Coal Hollow EIS*

Input Data





☐ Class I highway ☐ Class II highway

Terrain ☐ Level ☐ Rolling

Grade Length *4.00* mi Up/down *3.4*

Peak-hour factor, PHF *0.85*

No-passing zone *70%*

% Trucks and Buses , P_T *31 %*

% Recreational vehicles, P_R *13%*

Access points/ *mi* *1*

Analysis direction vol., V_d *121*veh/h

Opposing direction vol., V_o *89*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*9.1*	*9.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.5*	*1.5*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.280*	*0.280*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.94*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*509*	*398*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.6 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*48.8 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.5*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.866*	*0.866*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*164*	*121*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*18.1*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*53.6*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*40.9*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.30*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*278*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*944*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*5.7*

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	Bjornstad
Agency/Co.	Fehr & Peers
Date Performed	7/30/2007
Analysis Time Period	8:00 - 9:00

Site Information

Intersection	US-89 / Main Street
Jurisdiction	Panguitch, UT
Analysis Year	2007 with Trucks

Project ID 06-721 Coal Hollow EIS

East/West Street: US-89 / Center Street

North/South Street: SR-143 / US-89

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	6	20	3	18	12	74
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	4	37	38	75	23	9
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	L	TR
PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Flow Rate (veh/h)	28	3	33	84	46	43	85	36
% Heavy Vehicles	0	0	6	23	5	0	27	0
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2	0.0	0.6	0.0	0.1	0.0	1.0	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	0.3
Prop. Heavy Vehicle	0.0	0.0	0.1	0.2	0.0	0.0	0.3	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1	-0.7	0.4	-0.3	0.1	-0.7	1.0	-0.2

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.02	0.00	0.03	0.07	0.04	0.04	0.08	0.03
hd, final value (s)	5.25	4.44	5.47	4.75	5.11	4.28	5.90	4.75
x, final value	0.04	0.00	0.05	0.11	0.07	0.05	0.14	0.05
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	2.9	2.1	3.2	2.5	2.8	2.0	3.6	2.4

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	278	253	283	334	296	293	335	286
Delay (s/veh)	8.17	7.16	8.46	8.05	8.17	7.21	9.55	7.68
LOS	A	A	A	A	A	A	A	A
Approach: Delay (s/veh)	8.07		8.16		7.71		8.99	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.32							
Intersection LOS	A							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	Bjornstad
Agency/Co.	Fehr & Peers
Date Performed	7/30/2007
Analysis Time Period	16:15 - 17:15

Site Information

Intersection	US-89 / Main Street
Jurisdiction	Panguitch, UT
Analysis Year	2007 with Trucks

Project ID 06-721 Coal Hollow EIS

East/West Street: US-89 / Center Street

North/South Street: SR-143 / US-89

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	17	34	9	41	35	147
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	7	51	19	115	40	27
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	L	TR
PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Flow Rate (veh/h)	58	10	89	172	67	22	135	78
% Heavy Vehicles	4	7	6	19	5	6	19	4
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.3	0.0	0.5	0.0	0.1	0.0	1.0	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	0.4
Prop. Heavy Vehicle	0.0	0.1	0.1	0.2	0.0	0.1	0.2	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2	-0.6	0.4	-0.4	0.1	-0.6	0.8	-0.2

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.05	0.01	0.08	0.15	0.06	0.02	0.12	0.07
hd, final value (s)	5.85	5.04	5.78	5.03	5.75	5.00	6.27	5.23
x, final value	0.09	0.01	0.14	0.24	0.11	0.03	0.23	0.11
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.6	2.7	3.5	2.7	3.4	2.7	4.0	2.9

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	308	260	339	422	317	272	385	328
Delay (s/veh)	9.16	7.81	9.45	9.32	9.13	7.86	10.88	8.60
LOS	A	A	A	A	A	A	B	A
Approach: Delay (s/veh)	8.96		9.36		8.82		10.04	
LOS	A		A		A		B	
Intersection Delay (s/veh)	9.47							
Intersection LOS	A							

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*US-89 / SR-12*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Panguitch, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007 with Trucks*
Analysis Time Period	*8:00 - 9:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-12* | North/South Street: *US-89*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		40	24	45	34	
Peak-Hour Factor, PHF	1.00	0.85	0.85	0.85	0.85	1.00
Hourly Flow Rate, HFR (veh/h)	0	0	0	43	0	37
Percent Heavy Vehicles	0	--	--	25	--	--
Median Type	Undivided					
RT Channelized			1			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				37		32
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.85	1.00	0.85
Hourly Flow Rate, HFR (veh/h)	52	39	0	0	47	28
Percent Heavy Vehicles	0	0	0	21	0	10
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		52	43		37			
C (m) (veh/h)		1425	730		1000			
v/c		0.04	0.06		0.04			
95% queue length		0.11	0.19		0.12			
Control Delay (s/veh)		7.6	10.2		8.7			
LOS		A	B		A			
Approach Delay (s/veh)	--	--	9.5					
Approach LOS	--	--	A					

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DELAY 5.45

LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*US-89 / SR-12*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Panguitch, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007 with Trucks*
Analysis Time Period	*16:00 - 17:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-12*	North/South Street: *US-89*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		82	64	35	50	
Peak-Hour Factor, PHF	1.00	0.89	0.89	0.89	0.89	1.00
Hourly Flow Rate, HFR (veh/h)	0	0	0	68	0	69
Percent Heavy Vehicles	0	--	--	25	--	--
Median Type	Undivided					
RT Channelized			1			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				61		62
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.89	1.00	0.89
Hourly Flow Rate, HFR (veh/h)	39	56	0	0	92	71
Percent Heavy Vehicles	0	0	0	13	0	4
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		39	68		69			
C (m) (veh/h)		1370	717		960			
v/c		0.03	0.09		0.07			
95% queue length		0.09	0.31		0.23			
Control Delay (s/veh)		7.7	10.5		9.0			
LOS		A	B		A			
Approach Delay (s/veh)	--	--	9.8					
Approach LOS	--	--	A					

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DELAY 4.52
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Bjornstad	Intersection	US-89 / SR-14
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	7/19/2007	Analysis Year	2007 with Trucks
Analysis Time Period	8:00 - 9:00		

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-14 | North/South Street: US-89

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	25	47	1	2	51	13
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	29	55	1	2	59	15
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	2	0
Configuration	L		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	15	3	15	0	1	3
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	17	3	17	0	1	3
Percent Heavy Vehicles	6	0	5	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT		LTR			LTR	
v (veh/h)	29	2		4			37	
C (m) (veh/h)	1538	1562		903			837	
v/c	0.02	0.00		0.00			0.04	
95% queue length	0.06	0.00		0.01			0.14	
Control Delay (s/veh)	7.4	7.3		9.0			9.5	
LOS	A	A		A			A	
Approach Delay (s/veh)	--	--	9.0			9.5		
Approach LOS	--	--	A			A		

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DELAY 4.08

LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*US-89 / SR-14*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Panguitch, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007 with Trucks*
Analysis Time Period	*16:00 - 17:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-14* | North/South Street: *US-89*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	25	109	0	4	76	20
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Hourly Flow Rate, HFR (veh/h)	20	1	24	0	0	0
Percent Heavy Vehicles	3	--	--	50	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	2	0
Configuration	L		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	19	1	22	0	0	0
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Hourly Flow Rate, HFR (veh/h)	4	83	21	27	119	0
Percent Heavy Vehicles	9	0	7	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT		LTR			LTR	
v (veh/h)	27	4		0			45	
C (m) (veh/h)	1478	1177					778	
v/c	0.02	0.00					0.06	
95% queue length	0.06	0.01					0.18	
Control Delay (s/veh)	7.5	8.1					9.9	
LOS	A	A					A	
Approach Delay (s/veh)	--	--	9.9					
Approach LOS	--	--	A					

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DELAY 2.47
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*US-89 / SR-20*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Panguitch, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007 with Trucks*
Analysis Time Period	*8:00 - 9:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-20*	North/South Street: *US-89*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5		38			
Peak-Hour Factor, PHF	0.84	1.00	0.84	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	5	0	45	0	0	0
Percent Heavy Vehicles	18	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	41	32			18	4
Peak-Hour Factor, PHF	0.84	0.84	1.00	1.00	0.84	0.84
Hourly Flow Rate, HFR (veh/h)	48	38	0	0	21	4
Percent Heavy Vehicles	32	23	0	0	24	50
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	1
Configuration	L	T			T	R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		L	T			T	R
v (veh/h)	5		48	38			21	4
C (m) (veh/h)	1524		894	842			792	960
v/c	0.00		0.05	0.05			0.03	0.00
95% queue length	0.01		0.17	0.14			0.08	0.01
Control Delay (s/veh)	7.4		9.3	9.5			9.7	8.8
LOS	A		A	A			A	A
Approach Delay (s/veh)	--	--	9.4			9.5		
Approach LOS	--	--	A			A		

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DELAY 8.15

LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*US-89 / SR-20*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Panguitch, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007 with Trucks*
Analysis Time Period	*16:00 - 17:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-20* | North/South Street: *US-89*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	17		61			
Peak-Hour Factor, PHF	0.95	1.00	0.95	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	17	0	64	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	77	45			41	6
Peak-Hour Factor, PHF	0.95	0.95	1.00	1.00	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	81	47	0	0	43	6
Percent Heavy Vehicles	21	13	0	0	16	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	1
Configuration	L	T			T	R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		L	T			T	R
v (veh/h)	17		81	47			43	6
C (m) (veh/h)	1636		843	828			758	1091
v/c	0.01		0.10	0.06			0.06	0.01
95% queue length	0.03		0.32	0.18			0.18	0.02
Control Delay (s/veh)	7.2		9.7	9.6			10.0	8.3
LOS	A		A	A			B	A
Approach Delay (s/veh)	--	--	9.7			9.8		
Approach LOS	--	--	A			A		

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DELAY 7.45
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Bjornstad*	Intersection	*I-15 / SR-20 NB*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Iron County, UT*
Date Performed	*7/19/2007*	Analysis Year	*2007 with Trucks*
Analysis Time Period	*8:00 - 9:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-20* | North/South Street: *I-15*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*1*	*34*			*15*	*15*
Peak-Hour Factor, PHF	*0.85*	*0.85*	*0.91*	*0.91*	*0.85*	*0.85*
Hourly Flow Rate, HFR (veh/h)	*1*	*39*	*0*	*0*	*17*	*17*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*0*	*1*	*26*			
Peak-Hour Factor, PHF	*0.85*	*0.85*	*0.85*	*0.91*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*0*	*1*	*30*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*4*	*50*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*			*LTR*				
v (veh/h)	*1*			*31*				
C (m) (veh/h)	*1591*			*1019*				
v/c	*0.00*			*0.03*				
95% queue length	*0.00*			*0.09*				
Control Delay (s/veh)	*7.3*			*8.6*				
LOS	*A*			*A*				
Approach Delay (s/veh)	--	--	*8.6*					
Approach LOS	--	--	*A*					

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DELAY 2.98

LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Bjornstad	Intersection	I-15 / SR-20 SB
Agency/Co.	Fehr & Peers	Jurisdiction	Iron County, UT
Date Performed	7/19/2007	Analysis Year	2007 with Trucks
Analysis Time Period	8:00 - 9:00		

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-20	North/South Street: I-15
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		1	0	22	0	
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	0	1	0	25	0	0
Percent Heavy Vehicles	0	--	--	32	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				27	2	2
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	0	0	0	31	2	2
Percent Heavy Vehicles	0	0	4	27	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	1	0
Configuration					LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT					LTR	
v (veh/h)		25					35	
C (m) (veh/h)		1446					888	
v/c		0.02					0.04	
95% queue length		0.05					0.12	
Control Delay (s/veh)		7.5					9.2	
LOS		A					A	
Approach Delay (s/veh)	--	--	9.2					
Approach LOS	--	--	A					

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DELAY 9.44
LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3406	1442	1787	3471	1615	1366	1566		1800	1667	
Flt Permitted	0.48	1.00	1.00	0.36	1.00	1.00	0.76	1.00		0.68	1.00	
Satd. Flow (perm)	904	3406	1442	676	3471	1615	1086	1566		1291	1667	
Volume (vph)	2	390	85	63	295	4	50	1	100	9	1	3
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	2	453	99	73	343	5	58	1	116	10	1	3
RTOR Reduction (vph)	0	0	77	0	0	4	0	40	0	0	1	0
Lane Group Flow (vph)	2	453	22	73	343	1	58	77	0	10	3	0
Confl. Peds. (#/hr)							1		1	5		5
Heavy Vehicles (%)	0%	6%	12%	1%	4%	0%	32%	0%	2%	0%	0%	0%
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	13.9	13.9	13.9	13.9	13.9	13.9	44.1	44.1		44.1	44.1	
Effective Green, g (s)	15.9	15.9	15.9	15.9	15.9	15.9	46.1	46.1		46.1	46.1	
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.23	0.23	0.66	0.66		0.66	0.66	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	205	774	328	154	788	367	715	1031		850	1098	
v/s Ratio Prot		c0.13			0.10			c0.07			0.00	
v/s Ratio Perm	0.00		0.07	0.11		0.00	0.05			0.01		
v/c Ratio	0.01	0.59	0.07	0.47	0.44	0.00	0.08	0.08		0.01	0.00	
Uniform Delay, d1	21.0	24.1	21.2	23.4	23.2	20.9	4.3	4.3		4.1	4.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	1.1	0.1	2.3	0.4	0.0	0.2	0.1		0.0	0.0	
Delay (s)	21.0	25.2	21.3	25.7	23.6	20.9	4.5	4.4		4.1	4.1	
Level of Service	C	C	C	C	C	C	A	A		A	A	
Approach Delay (s)		24.5			23.9			4.5			4.1	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.95	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3505	1538	1770	3539	1615	1526	1582		1805	1805	
Flt Permitted		1.00	1.00	0.36	1.00	1.00	0.76	1.00		0.68	1.00	
Satd. Flow (perm)		3505	1538	678	3539	1615	1214	1582		1292	1805	
Volume (vph)	0	456	127	109	538	11	72	2	111	7	2	1
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	485	135	116	572	12	77	2	118	7	2	1
RTOR Reduction (vph)	0	0	99	0	0	9	0	45	0	0	0	0
Lane Group Flow (vph)	0	485	36	116	572	3	77	75	0	7	3	0
Confl. Peds. (#/hr)							3		3			
Heavy Vehicles (%)	0%	3%	5%	2%	2%	0%	18%	0%	1%	0%	0%	0%
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		16.9	16.9	16.9	16.9	16.9	41.1	41.1		41.1	41.1	
Effective Green, g (s)		18.9	18.9	18.9	18.9	18.9	43.1	43.1		43.1	43.1	
Actuated g/C Ratio		0.27	0.27	0.27	0.27	0.27	0.62	0.62		0.62	0.62	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		946	415	183	956	436	747	974		796	1111	
v/s Ratio Prot		0.14			0.16			c0.08			0.00	
v/s Ratio Perm			0.09	c0.17		0.01	0.06			0.01		
v/c Ratio		0.51	0.09	0.63	0.60	0.01	0.10	0.08		0.01	0.00	
Uniform Delay, d1		21.6	19.1	22.5	22.2	18.7	5.5	5.4		5.2	5.2	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5	0.1	7.0	1.0	0.0	0.3	0.2		0.0	0.0	
Delay (s)		22.1	19.2	29.5	23.3	18.7	5.8	5.6		5.2	5.2	
Level of Service		C	B	C	C	B	A	A		A	A	
Approach Delay (s)		21.5			24.2			5.7			5.2	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	20.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

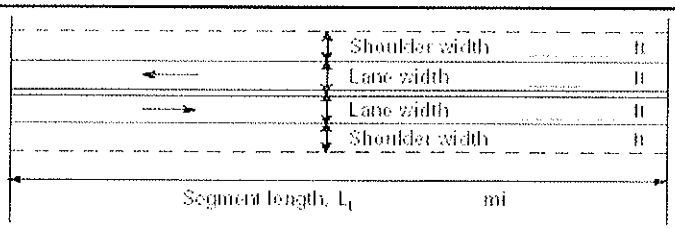
Future Conditions

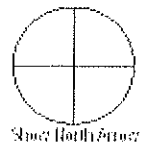
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Alton / SR-14*
Date Performed	*9/12/2007*	Jurisdiction	*Kane County, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





Class I highway ■ Class II highway ■

Terrain ■ Level ■ Rolling

Grade Length *1.60* mi Up/down *3.0*

Peak-hour factor, PHF *0.85*

No-passing zone *20%*

% Trucks and Buses , P_T *22 %*

% Recreational vehicles, P_R *11%*

Access points/ *mi* *1*

Analysis direction vol., V_d *201*veh/h

Opposing direction vol., V_o *166*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*6.1*	*6.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.4*	*1.4*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.462*	*0.462*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*0.99*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*519*	*423*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.5 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*62.1 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*53.3 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.978*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*236*	*200*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*24.8*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*38.8*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*45.8*	

Level of Service and Other Performance Measures

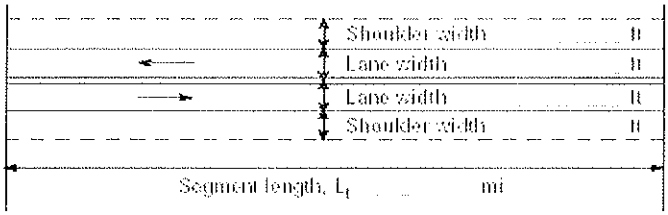
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.31*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*95*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*322*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*1.8*

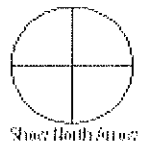
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Alton / SR-14*
Date Performed	*9/12/2007*	Jurisdiction	*Kane County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length *1.60* mi Up/down *3.0*

Peak-hour factor, PHF *0.85*

No-passing zone *20%*

% Trucks and Buses , P_T *25 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *1*

Analysis direction vol., V_d *246*veh/h

Opposing direction vol., V_o *197*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*6.1*	*6.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.4*	*1.4*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.426*	*0.426*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.99*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*679*	*552*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.3 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*62.2 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*51.3 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*1.000*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*289*	*232*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*30.4*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*37.9*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*51.4*	

Level of Service and Other Performance Measures

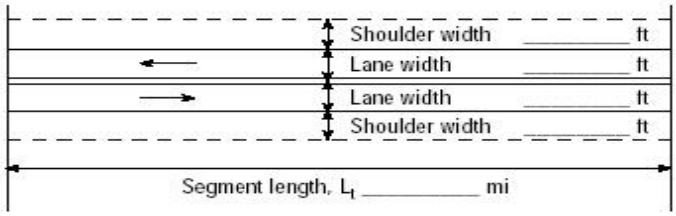
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.40*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*116*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*394*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*2.3*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-14 / Hatch*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield County, Utah*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *30%*

% Trucks and Buses , P_T *18 %*

% Recreational vehicles, P_R *12%*

Access points/ *mi* *1*

Analysis direction vol., V_d *201*veh/h

Opposing direction vol., V_o *166*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.888*	*0.888*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*266*	*220*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.6 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.1 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.982*	*0.982*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*241*	*199*
Base percent time-spent-following[4], BPTSF(%)=$100(1-e^{av_d^b})$	*25.2*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*44.2*	
Percent time-spent-following, PTSF(%)=BPTSF+f_{np}	*49.4*	

Level of Service and Other Performance Measures

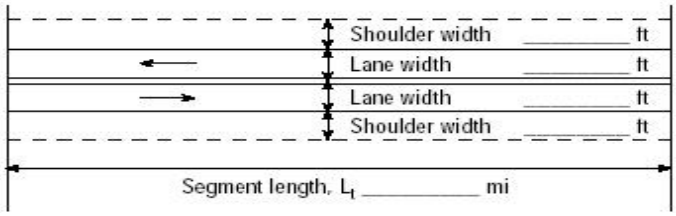
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, v/c=V_p/ 1,700	*0.16*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t$(V/PHF)	*692*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*2352*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*12.1*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-14 / Hatch*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield County, Utah*
Analysis Time Period	*Weekend*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *30%*

% Trucks and Buses , P_T *25 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *1*

Analysis direction vol., V_d *246*veh/h

Opposing direction vol., V_o *197*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.2*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.952*	*0.851*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*304*	*272*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.4 mi/h*	Free-flow speed, FFS_d (FSS=BFFS-f_{LS}-f_A)	*63.5 mi/h*
		Average travel speed, ATS=FFS-0.00776v_p-f_{np}	*56.6 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.976*	*0.976*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*297*	*238*
Base percent time-spent-following[4], BPTSF(%)=100(1-$e^{av_d^b}$)	*31.2*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*42.5*	
Percent time-spent-following, PTSF(%)=BPTSF+f_{np}	*54.8*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, v/c=V_p/ 1,700	*0.18*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=0.25L_t(V/PHF)	*847*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	*2878*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*15.0*

HIGHPLAN 2002 Conceptual Planning Analysis

Description/File Information

Filename	HP_preview.xml	**Date Prepared**	9/12/2007		
Program	HIGHPLAN	**Version**	1.2.0		
Analyst	PS	**Agency**	FP	**District**	Hatch, UT
Road Name	US-89	**From/To**	Hatch		
Analysis Type	Segment	**Peak Direction**	Northbound	**Study Period**	K100
User Notes	2020 Weekday Average				

Facility Data

Roadway Variables				Traffic Variables			
Area Type	Rural developed	**# Thru Lanes**	2	**AADT**	3388	**% Heavy Vehicles**	18
Class	3	**Terrain**	Level	**K**	.0937	**Base Capacity**	1700
Posted Speed	40	**Median**	No	**D**	.526	**Local Adj. Factor**	.92
Free Flow Speed	45	**Left Turn Lanes**	No	**PHF**	.85	**Adjusted Capacity**	1148
Pass Lane Spacing	N/A	**% NPZ**	100				

LOS Results

v/c Ratio	0.16	**Density**	N/A	**PTSF**	95.00	**ATS**	37.00	**% FFS**	83.0	**LOS**	C

Service Volume Tables

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	130	380	570	740
2					
3					
4					
Lanes	**Hourly Volume In Both Directions**				
2	0	250	730	1090	1400
4					
6					
8					
Lanes	**Annual Average Daily Traffic**				
2	0	2700	7800	11600	14900
4					
6					
8					
Lanes	**Maximum v/c Ratio**				
1	0.00	0.14	0.37	0.55	0.71
2					
3					
4					

HIGHPLAN 2002 Conceptual Planning Analysis

Description/File Information

Filename	HP_preview.xml	**Date Prepared**	9/12/2007		
Program	HIGHPLAN	**Version**	1.2.0		
Analyst	PS	**Agency**	FP	**District**	Hatch, UT
Road Name	US-89	**From/To**	Hatch		
Analysis Type	Segment	**Peak Direction**	Northbound	**Study Period**	K100
User Notes	2020 Weekend				

Facility Data

Roadway Variables				Traffic Variables			
Area Type	Rural developed	**# Thru Lanes**	2	**AADT**	3721	**% Heavy Vehicles**	25
Class	3	**Terrain**	Level	**K**	.10273	**Base Capacity**	1700
Posted Speed	40	**Median**	No	**D**	.534	**Local Adj. Factor**	.92
Free Flow Speed	45	**Left Turn Lanes**	No	**PHF**	.85	**Adjusted Capacity**	1112
Pass Lane Spacing	N/A	**% NPZ**	100				

LOS Results

v/c Ratio	0.20	**Density**	N/A	**PTSF**	99.00	**ATS**	37.00	**% FFS**	81.0	**LOS**	C

Service Volume Tables

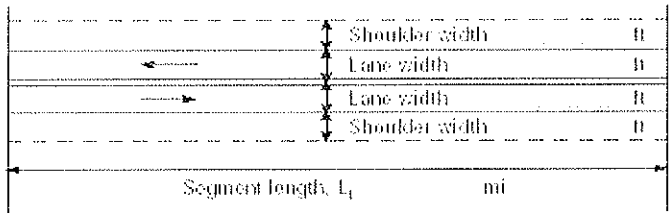
	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1	0	130	380	580	740
2					
3					
4					
Lanes	**Hourly Volume In Both Directions**				
2	0	250	720	1080	1390
4					
6					
8					
Lanes	**Annual Average Daily Traffic**				
2	0	2400	7000	10500	13500
4					
6					
8					
Lanes	**Maximum v/c Ratio**				
1	0.00	0.15	0.37	0.56	0.71
2					
3					
4					

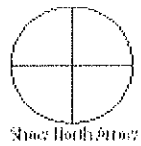
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Hatch / SR-12*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





Class I highway ■ Class II highway ■

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.87*

No-passing zone *35%*

% Trucks and Buses , P_T *21 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *1*

Analysis direction vol., V_d *175*veh/h

Opposing direction vol., V_o *161*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.872*	*0.872*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*231*	*212*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.9 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.2 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.979*	*0.979*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*205*	*189*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*22.0*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*49.0*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*47.5*	

Level of Service and Other Performance Measures

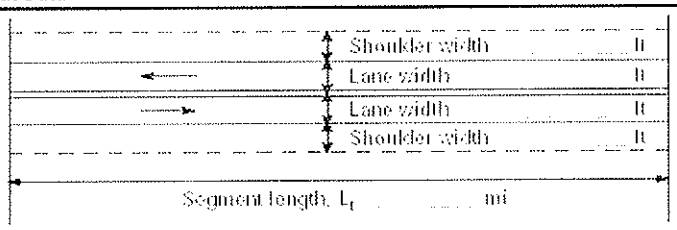
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.14*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*392*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1365*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*6.9*

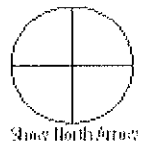
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Hatch / SR-12*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *35%*

% Trucks and Buses , P_T *15 %*

% Recreational vehicles, P_R *21%*

Access points/ *mi* *1*

Analysis direction vol., V_d *185*veh/h

Opposing direction vol., V_o *169*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.905*	*0.905*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*240*	*220*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.8 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.1 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.985*	*0.985*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*221*	*202*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*23.5*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*48.7*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*49.0*	

Level of Service and Other Performance Measures

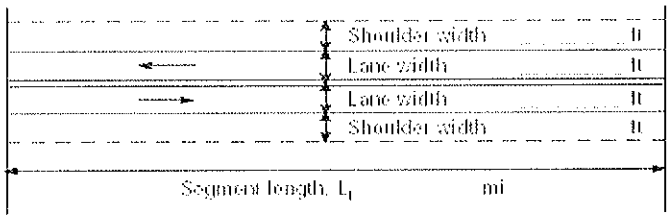
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.14*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*424*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1443*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*7.4*

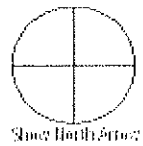
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-12 / Panguitch*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





Class I highway ■ Class II highway ■

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.87*

No-passing zone *5%*

% Trucks and Buses , P_T *21 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *2*

Analysis direction vol., V_d *173*veh/h

Opposing direction vol., V_o *159*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.872*	*0.872*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*228*	*210*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.5 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.1 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.2 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.7 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.979*	*0.979*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*203*	*187*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*21.8*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*21.5*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*33.0*	

Level of Service and Other Performance Measures

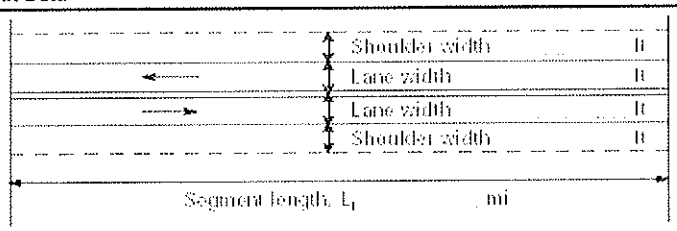
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.13*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*283*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*986*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*4.9*

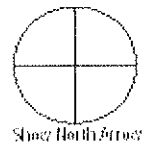
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-12 / Panguitch*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





Class I highway ■ Class II highway ■

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *5%*

% Trucks and Buses , P_T *15 %*

% Recreational vehicles, P_R *21%*

Access points/ *mi* *2*

Analysis direction vol., V_d *183*veh/h

Opposing direction vol., V_o *166*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.905*	*0.905*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*238*	*216*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.5 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.0 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.2 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.6 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.985*	*0.985*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*219*	*198*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*23.3*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*21.9*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*34.8*	

Level of Service and Other Performance Measures

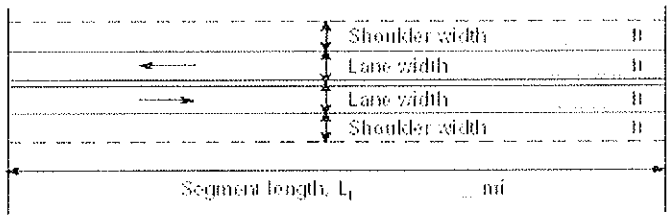
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.14*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*307*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1043*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*5.3*

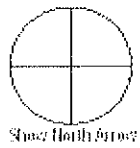
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	Stinger	Highway / Direction of Travel	US-89
Agency or Company	Fehr & Peers	From/To	Panguitch / SR-20
Date Performed	9/12/2007	Jurisdiction	Garfield Couty, UT
Analysis Time Period	Weekday Average	Analysis Year	2020

Project Description: 06-721 Coal Hollow EIS

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF 0.86

No-passing zone 15%

% Trucks and Buses , P_T 25 %

% Recreational vehicles, P_R 12%

Access points/ mi 3

Analysis direction vol., V_d 132veh/h

Opposing direction vol., V_o 138veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	1.7	1.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.851	0.851
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	180	189

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	mi/h	Base free-flow speed[3], $BFFS_{FM}$	65.0 mi/h
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	1.3 mi/h
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	mi/h	Adj. for access points[3], f_A (Exhibit 20-5)	0.8 mi/h
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	2.0 mi/h	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	63.0 mi/h
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	58.1 mi/h

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	1.1	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.976	0.976
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	1.00	1.00
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	157	164
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	17.4	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	29.9	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	32.0	

Level of Service and Other Performance Measures

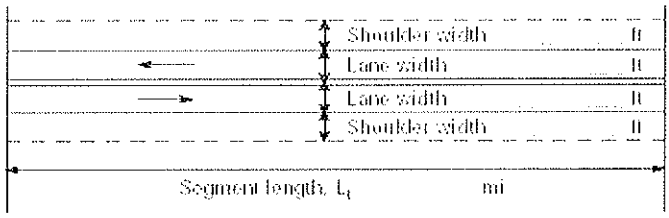
Level of service, LOS (Exhibit 20-3 or 20-4)	A
Volume to capacity ratio, $v/c=V_p/1{,}700$	0.11
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)$=0.25L_t(V/PHF)$	361
Peak-hour vehicle-miles of travel, VMT_{60}(veh- mi)$=V*L_t$	1241
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	6.2

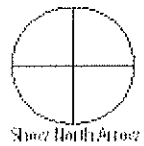
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Panguitch / SR-20*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





Class I highway ■ Class II highway ■

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.94*

No-passing zone *15%*

% Trucks and Buses , P_T *36 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *3*

Analysis direction vol., V_d *189*veh/h

Opposing direction vol., V_o *139*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.799*	*0.799*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*252*	*185*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.8 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.9 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.0 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.7 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.965*	*0.965*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*208*	*153*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*22.3*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*30.6*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*39.9*	

Level of Service and Other Performance Measures

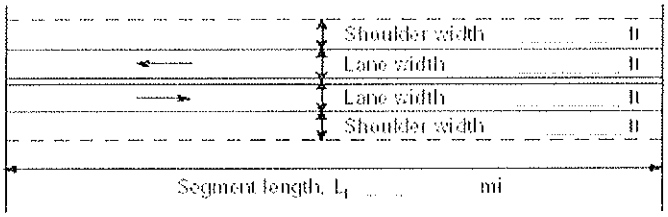
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.15*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*472*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1777*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*8.2*

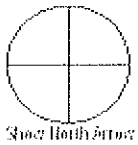
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*US-89 / Upslope*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





Class I highway ■ Class II highway ■

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *45%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *0*

Analysis direction vol., V_d *107*veh/h

Opposing direction vol., V_o *121*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.841*	*0.841*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*150*	*169*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*50.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.8 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*48.7 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*44.4 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.974*	*0.974*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*129*	*146*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*14.6*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*44.8*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*35.7*	

Level of Service and Other Performance Measures

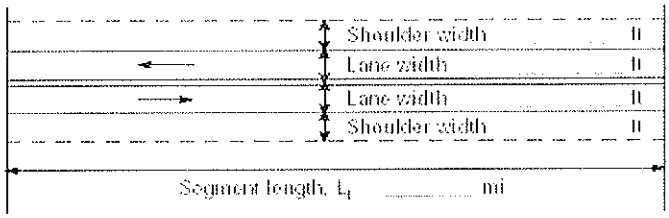
Level of service, LOS (Exhibit 20-3 or 20-4)	*D*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.09*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*267*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*910*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*6.0*

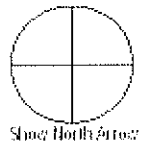
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*US-89 / Upslope*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





Class I highway ■ Class II highway ■

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *45%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *0*

Analysis direction vol., V_d *168*veh/h

Opposing direction vol., V_o *121*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.841*	*0.841*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*235*	*169*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*50.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.8 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*48.7 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*43.7 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.974*	*0.974*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*203*	*146*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*21.8*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*47.5*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*49.5*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*D*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.14*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*420*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1428*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*9.6*

2

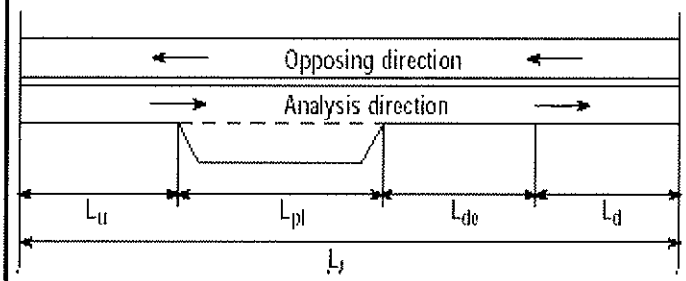
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Upslope / Summit*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data

☐ Class I highway ☑ Class II highway



Total length of analysis segment, L_t (*mi*)	*2.3*
Length of two-lane highway upstream of the passing lane, L_u (*mi*)	*0.0*
Length of passing lane including tapers , L_{pl} (*mi*)	*2.2*
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	*34.1*
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	*24.5*
Level of service[1], LOS_d (from Directional Two-Lane Highway Segment Worksheet)	*A*
Average Travel Speed	
Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (*mi*) (Exhibit 20-23)	*1.70*
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (*mi*) $L_d=L_t-(L_u+L_{pl}+L_{de})$	*-1.60*
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	*1.10*
Average travel speed including passing lane[2], $ATS_{pl} = (ATS_d * L_t) / (L_u+L_d+(L_{pl}/f_{pl})+ (2L_{de}/(1+f_{pl})))$	*37.5*
Percent Time-Spent-Following	
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (*mi*)(Exhibit 20-23)	*13.00*
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (*mi*)$=L_t-(L_u+L_{pl}+L_{de})$	*-12.90*
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl}(Exhibit 20-24)	*0.58*
Percent time-spent-following including passing lane[3], $PTSF_{pl}$(%) $PTSF_{pl}= PTSF_d[L_u+L_d+f_{pl}L_{pl}+((1+f_{pl})/2)L_{de}]/L_t$	*14.2*

2

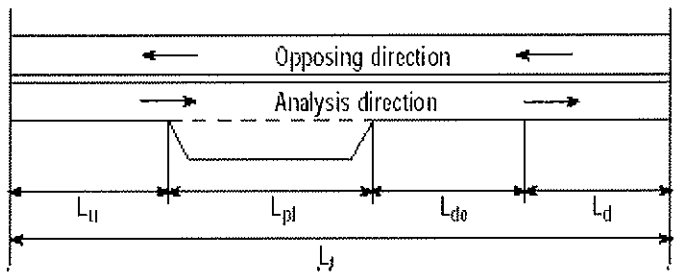
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

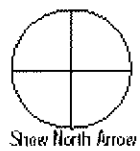
General Information		Site Information	
Analyst	*Stinger*	Highway of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Upslope / Summit*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data

☒ Class I highway ☒ Class II highway





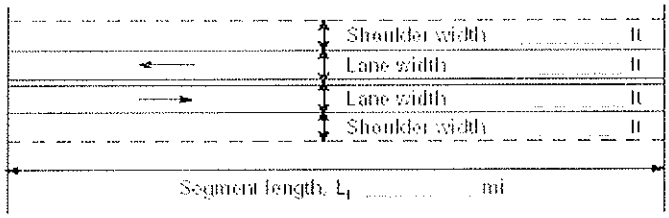
Total length of analysis segment, L_t (*mi*)	*2.3*
Length of two-lane highway upstream of the passing lane, L_u (*mi*)	*0.0*
Length of passing lane including tapers , L_{pl} (*mi*)	*2.0*
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	*31.6*
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	*31.9*
Level of service[1], LOS_d (from Directional Two-Lane Highway Segment Worksheet)	*A*
Average Travel Speed	
Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (*mi*) (Exhibit 20-23)	*1.70*
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (*mi*) $L_d=L_t-(L_u+L_{pl}+L_{de})$	*-1.40*
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	*1.11*
Average travel speed including passing lane[2], $ATS_{pl} = (ATS_d * L_t) / (L_u+L_d+(L_{pl}/f_{pl})+ (2L_{de}/(1+f_{pl})))$	*35.0*
Percent Time-Spent-Following	
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (*mi*)(Exhibit 20-23)	*11.87*
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (*mi*)$=L_t-(L_u+L_{pl}+L_{de})$	*-11.57*
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl}(Exhibit 20-24)	*0.58*
Percent time-spent-following including passing lane[3], $PTSF_{pl}$(%) $PTSF_{pl}= PTSF_d[L_u+L_d+f_{pl}L_{pl}+((1+f_{pl})/2)L_{de}]/L_t$	*18.5*

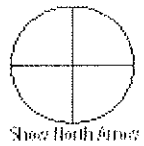
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Summit / Downslope*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length *1.30* mi Up/down *7.1*

Peak-hour factor, PHF *0.85*

No-passing zone *100%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *1*

Analysis direction vol., V_d *107*veh/h

Opposing direction vol., V_o *121*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*12.9*	*12.9*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.6*	*1.6*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.233*	*0.233*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.91*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*541*	*672*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.8 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*47.3 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*2.8*	*2.8*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.673*	*0.673*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*187*	*212*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*20.7*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*60.1*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*48.8*	

Level of Service and Other Performance Measures

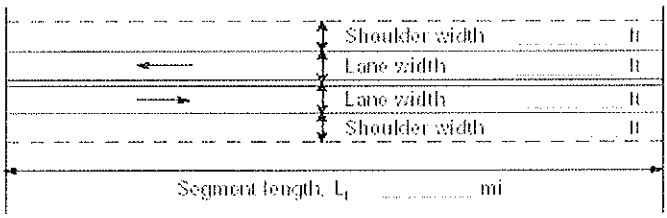
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.32*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*41*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*139*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*0.9*

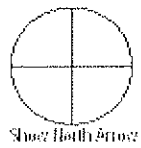
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Summit / Downslope*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





Class I highway ■ Class II highway ■

Terrain ■ Level ■ Rolling

Grade Length *1.30* mi Up/down *7.1*

Peak-hour factor, PHF *0.85*

No-passing zone *100%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *1*

Analysis direction vol., V_d *168*veh/h

Opposing direction vol., V_o *121*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*12.9*	*12.9*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.6*	*1.6*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.233*	*0.233*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.91*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*849*	*672*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.8 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*44.9 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*2.8*	*2.8*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.673*	*0.673*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*294*	*212*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*30.2*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*56.5*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*63.0*	

Level of Service and Other Performance Measures

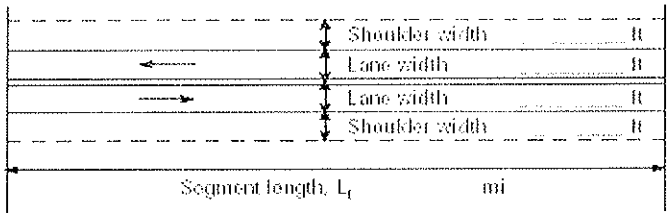
Level of service, LOS (Exhibit 20-3 or 20-4)	*D*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.50*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*64*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*218*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*1.4*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Downslope / I-15*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday average*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data



Class I highway ■ Class II highway ■

Terrain ■ Level ■ Rolling

Grade Length *4.00* mi Up/down *3.4*

Peak-hour factor, PHF *0.85*

No-passing zone *70%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *1*

Analysis direction vol., V_d *107*veh/h

Opposing direction vol., V_o *121*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*9.1*	*9.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.5*	*1.5*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.307*	*0.307*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.94*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*410*	*493*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.2 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*49.3 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.5*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.881*	*0.881*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*143*	*162*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*16.1*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*53.0*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*40.9*	

Level of Service and Other Performance Measures

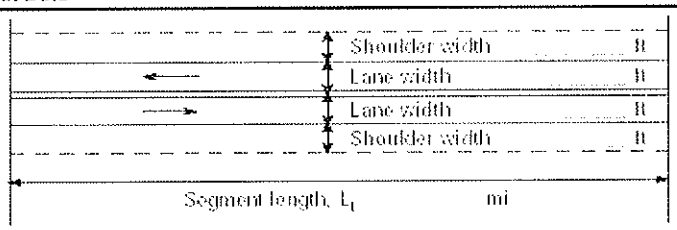
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.24*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*245*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*835*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*5.0*

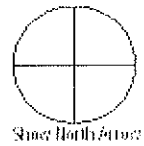
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Downslope / I-15*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020*

Project Description: *06-721 Coal Hollow EIS*

Input Data





Class I highway Class II highway

Terrain Level Rolling

Grade Length *4.00* mi Up/down *3.4*

Peak-hour factor, PHF *0.85*

No-passing zone *70%*

% Trucks and Buses , P_T *27 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *1*

Analysis direction vol., V_d *160*veh/h

Opposing direction vol., V_o *121*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*9.1*	*9.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.5*	*1.5*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.307*	*0.307*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*0.94*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*613*	*493*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.2 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*47.7 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.5*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.881*	*0.881*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*214*	*162*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*22.8*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*56.8*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*55.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.36*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*367*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1248*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*7.7*

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	Stinger
Agency/Co.	Fehr & Peers
Date Performed	9/11/2007
Analysis Time Period	8:00 - 9:00

Site Information

Intersection	US-89 / SR-12
Jurisdiction	Panguitch, UT
Analysis Year	2020

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-12 | North/South Street: US-89

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		41	31	56	34	
Peak-Hour Factor, PHF	1.00	0.85	0.85	0.85	0.85	1.00
Hourly Flow Rate, HFR (veh/h)	0	48	36	65	39	0
Percent Heavy Vehicles	0	--	--	25	--	--
Median Type	Undivided					
RT Channelized			1			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				48		40
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.85	1.00	0.85
Hourly Flow Rate, HFR (veh/h)	0	0	0	56	0	47
Percent Heavy Vehicles	0	0	0	21	0	10
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		65	56		47			
C (m) (veh/h)		1424	698		999			
v/c		0.05	0.08		0.05			
95% queue length		0.14	0.26		0.15			
Control Delay (s/veh)		7.6	10.6		8.8			
LOS		A	B		A			
Approach Delay (s/veh)	--	--	9.8					
Approach LOS	--	--	A					

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DELAY 6.0
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Stinger	Intersection	US-89 / SR-12
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	9/11/2007	Analysis Year	2020
Analysis Time Period	16:00 - 17:00		

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-12 | North/South Street: US-89

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		94	82	44	54	
Peak-Hour Factor, PHF	1.00	0.89	0.89	0.89	0.89	1.00
Hourly Flow Rate, HFR (veh/h)	0	105	92	49	60	0
Percent Heavy Vehicles	0	--	--	25	--	--
Median Type	Undivided					
RT Channelized			1			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				78		78
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.89	1.00	0.89
Hourly Flow Rate, HFR (veh/h)	0	0	0	87	0	87
Percent Heavy Vehicles	0	0	0	13	0	4
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		49	87		87			
C (m) (veh/h)		1354	678		944			
v/c		0.04	0.13		0.09			
95% queue length		0.11	0.44		0.30			
Control Delay (s/veh)		7.8	11.1		9.2			
LOS		A	B		A			
Approach Delay (s/veh)	--	--	10.1					
Approach LOS	--	--	B					

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DELAY 5.0
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Stinger	Intersection	US-89 / SR-14
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	9/11/2007	Analysis Year	2020
Analysis Time Period	8:00 - 9:00		

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-14 | North/South Street: US-89

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	33	62	1	3	67	17
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	38	72	1	3	78	19
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	2	0
Configuration	L		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	19	4	20	0	1	4
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	22	4	23	0	1	4
Percent Heavy Vehicles	6	0	5	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT		LTR			LTR	
v (veh/h)	38	3		5			49	
C (m) (veh/h)	1509	1540		886			784	
v/c	0.03	0.00		0.01			0.06	
95% queue length	0.08	0.01		0.02			0.20	
Control Delay (s/veh)	7.4	7.3		9.1			9.9	
LOS	A	A		A			A	
Approach Delay (s/veh)	--	--	9.1			9.9		
Approach LOS	--	--	A			A		

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DELAY 3.6
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Stinger*	Intersection	*US-89 / SR-14*
Agency/Co.	*Fehr & Peers*	Jurisdiction	*Panguitch, UT*
Date Performed	*9/11/2007*	Analysis Year	*2020*
Analysis Time Period	*16:00 - 17:00*		

Project Description *06-721 Coal Hollow EIS*

East/West Street: *SR-14* | North/South Street: *US-89*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	33	154	0	5	105	26
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Hourly Flow Rate, HFR (veh/h)	36	169	0	5	115	28
Percent Heavy Vehicles	3	--	--	50	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	2	0
Configuration	L		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	25	1	29	0	0	0
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Hourly Flow Rate, HFR (veh/h)	27	1	31	0	0	0
Percent Heavy Vehicles	9	0	7	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT		LTR			LTR	
v (veh/h)	36	5		0			59	
C (m) (veh/h)	1430	1117					688	
v/c	0.03	0.00					0.09	
95% queue length	0.08	0.01					0.28	
Control Delay (s/veh)	7.6	8.2					10.7	
LOS	A	A					B	
Approach Delay (s/veh)	--	--				10.7		
Approach LOS	--	--				B		

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DELAY 2.5

LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Stinger	Intersection	US-89 / SR-20
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	9/11/2007	Analysis Year	2020
Analysis Time Period	8:00 - 9:00		

Project Description	06-721 Coal Hollow EIS
East/West Street: SR-20	North/South Street: US-89
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	11		42			
Peak-Hour Factor, PHF	0.84	1.00	0.84	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	13	0	50	0	0	0
Percent Heavy Vehicles	18	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	47	35			19	9
Peak-Hour Factor, PHF	0.84	0.84	1.00	1.00	0.84	0.84
Hourly Flow Rate, HFR (veh/h)	55	41	0	0	22	10
Percent Heavy Vehicles	19	23	0	0	24	50
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	1
Configuration	L	T			T	R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		L	T			T	R
v (veh/h)	13		55	41			22	10
C (m) (veh/h)	1524		885	821			767	960
v/c	0.01		0.06	0.05			0.03	0.01
95% queue length	0.03		0.20	0.16			0.09	0.03
Control Delay (s/veh)	7.4		9.3	9.6			9.8	8.8
LOS	A		A	A			A	A
Approach Delay (s/veh)	--	--	9.5			9.5		
Approach LOS	--	--	A			A		

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DELAY 8.01
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Stinger	Intersection	US-89 / SR-20
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	9/11/2007	Analysis Year	2020
Analysis Time Period	16:00 - 17:00		

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-20 | North/South Street: US-89

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	32		72			
Peak-Hour Factor, PHF	0.95	1.00	0.95	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	33	0	75	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	98	44			45	13
Peak-Hour Factor, PHF	0.95	0.95	1.00	1.00	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	103	46	0	0	47	13
Percent Heavy Vehicles	13	13	0	0	16	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	1
Configuration	L	T			T	R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		L	T			T	R
v (veh/h)	33		103	46			47	13
C (m) (veh/h)	1636		795	788			710	1091
v/c	0.02		0.13	0.06			0.07	0.01
95% queue length	0.06		0.44	0.19			0.21	0.04
Control Delay (s/veh)	7.2		10.2	9.9			10.4	8.3
LOS	A		B	A			B	A
Approach Delay (s/veh)	--	--	10.1			10.0		
Approach LOS	--	--	B			A		

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DELAY 7.7
LOS A

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	Stinger
Agency/Co.	Fehr & Peers
Date Performed	9/11/2007
Analysis Time Period	8:00 - 9:00

Site Information

Intersection	US-89 / Main Street
Jurisdiction	Panguitch, UT
Analysis Year	2020

Project ID 06-721 Coal Hollow EIS

East/West Street: US-89 / Center Street

North/South Street: SR-143 / US-89

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	7	26	4	23	16	83
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	5	42	48	84	26	11
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	L	TR
PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Flow Rate (veh/h)	36	4	44	94	52	54	95	41
% Heavy Vehicles	0	0	6	14	5	0	18	0
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2	0.0	0.6	0.0	0.1	0.0	1.0	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	0.3
Prop. Heavy Vehicle	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1	-0.7	0.4	-0.5	0.1	-0.7	0.8	-0.2

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.03	0.00	0.04	0.08	0.05	0.05	0.08	0.04
hd, final value (s)	5.34	4.54	5.55	4.69	5.21	4.38	5.84	4.83
x, final value	0.05	0.01	0.07	0.12	0.08	0.07	0.15	0.05
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.0	2.2	3.2	2.4	2.9	2.1	3.5	2.5

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	286	254	294	344	302	304	345	291
Delay (s/veh)	8.34	7.27	8.65	8.04	8.33	7.38	9.60	7.81
LOS	A	A	A	A	A	A	A	A
Approach: Delay (s/veh)	8.23		8.23		7.85		9.06	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.40							
Intersection LOS	A							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	Stinger
Agency/Co.	Fehr & Peers
Date Performed	9/11/2007
Analysis Time Period	16:15 - 17:15

Site Information

Intersection	US-89 / Main Street
Jurisdiction	Panguitch, UT
Analysis Year	2020

Project ID 06-721 Coal Hollow EIS

East/West Street: US-89 / Center Street

North/South Street: SR-143 / US-89

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	20	44	11	52	46	171
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	9	59	25	133	45	32
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	L	TR
PHF	0.85	0.85	0.85	1.00	0.85	0.85	0.85	0.85
Flow Rate (veh/h)	74	12	115	171	79	29	156	89
% Heavy Vehicles	4	7	6	14	5	6	13	4
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.3	0.0	0.5	0.0	0.1	0.0	1.0	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	0.4
Prop. Heavy Vehicle	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2	-0.6	0.4	-0.5	0.1	-0.6	0.7	-0.2

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.07	0.01	0.10	0.15	0.07	0.03	0.14	0.08
hd, final value (s)	6.04	5.24	5.95	5.12	5.93	5.19	6.32	5.38
x, final value	0.12	0.02	0.19	0.24	0.13	0.04	0.27	0.13
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.7	2.9	3.7	2.8	3.6	2.9	4.0	3.1

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	324	262	365	421	329	279	406	339
Delay (s/veh)	9.60	8.03	10.05	9.46	9.52	8.11	11.39	8.90
LOS	A	A	B	A	A	A	B	A
Approach: Delay (s/veh)	9.38		9.70		9.14		10.49	
LOS	A		A		A		B	
Intersection Delay (s/veh)	9.84							
Intersection LOS	A							

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3471	1442	1787	3471	1615	1529	1567		1800	1678	
Flt Permitted	0.45	1.00	1.00	0.34	1.00	1.00	0.75	1.00		0.65	1.00	
Satd. Flow (perm)	864	3471	1442	646	3471	1615	1212	1567		1235	1678	
Volume (vph)	3	416	124	89	319	5	74	2	141	12	2	4
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	3	484	144	103	371	6	86	2	164	14	2	5
RTOR Reduction (vph)	0	0	109	0	0	5	0	59	0	0	2	0
Lane Group Flow (vph)	3	484	35	103	371	1	86	107	0	14	5	0
Confl. Peds. (#/hr)							1		1	5		5
Heavy Vehicles (%)	0%	4%	12%	1%	4%	0%	18%	0%	2%	0%	0%	0%
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	15.0	15.0	15.0	15.0	15.0	15.0	43.0	43.0		43.0	43.0	
Effective Green, g (s)	17.0	17.0	17.0	17.0	17.0	17.0	45.0	45.0		45.0	45.0	
Actuated g/C Ratio	0.24	0.24	0.24	0.24	0.24	0.24	0.64	0.64		0.64	0.64	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	210	843	350	157	843	392	779	1007		794	1079	
v/s Ratio Prot		0.14			0.11			c0.11			0.00	
v/s Ratio Perm	0.00		0.10	c0.16		0.00	0.07			0.01		
v/c Ratio	0.01	0.57	0.10	0.66	0.44	0.00	0.11	0.11		0.02	0.00	
Uniform Delay, d1	20.1	23.3	20.6	23.9	22.5	20.1	4.8	4.8		4.5	4.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	1.0	0.1	9.5	0.4	0.0	0.3	0.2		0.0	0.0	
Delay (s)	20.2	24.3	20.7	33.3	22.8	20.1	5.1	5.0		4.6	4.5	
Level of Service	C	C	C	C	C	C	A	A		A	A	
Approach Delay (s)		23.4			25.1			5.0			4.5	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	20.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.97	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3574	1538	1770	3539	1615	1668	1584		1805	1843	
Flt Permitted		1.00	1.00	0.37	1.00	1.00	0.75	1.00		0.65	1.00	
Satd. Flow (perm)		3574	1538	691	3539	1615	1325	1584		1233	1843	
Volume (vph)	0	476	183	154	587	15	97	4	157	9	4	1
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	506	195	164	624	16	103	4	167	10	4	1
RTOR Reduction (vph)	0	0	135	0	0	11	0	71	0	0	0	0
Lane Group Flow (vph)	0	506	60	164	624	5	103	100	0	10	5	0
Confl. Peds. (#/hr)							3		3			
Heavy Vehicles (%)	0%	1%	5%	2%	2%	0%	8%	0%	1%	0%	0%	0%
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		19.6	19.6	19.6	19.6	19.6	38.4	38.4		38.4	38.4	
Effective Green, g (s)		21.6	21.6	21.6	21.6	21.6	40.4	40.4		40.4	40.4	
Actuated g/C Ratio		0.31	0.31	0.31	0.31	0.31	0.58	0.58		0.58	0.58	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		1103	475	213	1092	498	765	914		712	1064	
v/s Ratio Prot		0.14			0.18			c0.11			0.00	
v/s Ratio Perm			0.13	c0.24		0.01	0.08			0.01		
v/c Ratio		0.46	0.13	0.77	0.57	0.01	0.13	0.11		0.01	0.00	
Uniform Delay, d1		19.5	17.4	21.9	20.3	16.8	6.8	6.7		6.3	6.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3	0.1	15.4	0.7	0.0	0.4	0.2		0.0	0.0	
Delay (s)		19.8	17.5	37.3	21.0	16.8	7.2	6.9		6.3	6.3	
Level of Service		B	B	D	C	B	A	A		A	A	
Approach Delay (s)		19.2			24.3			7.0			6.3	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

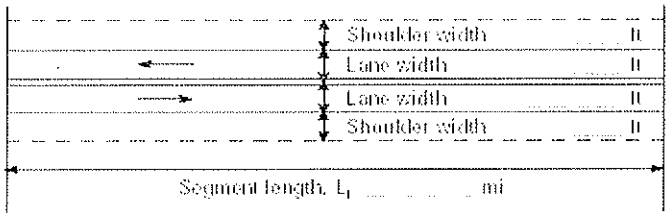
Future + Project Conditions

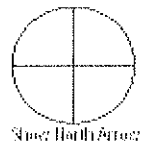
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Alton / SR-14*
Date Performed	*9/12/2007*	Jurisdiction	*Kane County, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length *1.60* mi Up/down *3.0*

Peak-hour factor, PHF *0.85*

No-passing zone *20%*

% Trucks and Buses , P_T *26 %*

% Recreational vehicles, P_R *11%*

Access points/ *mi* *1*

Analysis direction vol., V_d *208*veh/h

Opposing direction vol., V_o *173*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*6.1*	*6.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.4*	*1.4*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.422*	*0.422*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*0.99*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*588*	*482*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.4 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*62.1 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*52.4 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.975*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*245*	*209*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*25.9*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*39.1*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*47.0*	

Level of Service and Other Performance Measures

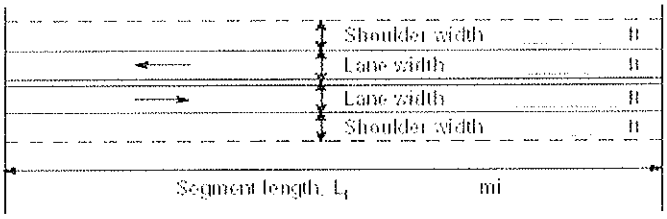
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.35*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*98*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*333*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*1.9*

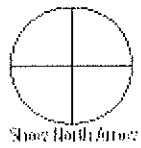
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Alton / SR-14*
Date Performed	*9/12/2007*	Jurisdiction	*Kane County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length *1.60* mi Up/down *3.0*

Peak-hour factor, PHF *0.85*

No-passing zone *20%*

% Trucks and Buses , P_T *28 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *1*

Analysis direction vol., V_d *253*veh/h

Opposing direction vol., V_o *204*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*6.1*	*6.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.4*	*1.4*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.400*	*0.400*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*744*	*600*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.2 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*62.1 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*50.4 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.973*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*298*	*247*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*31.6*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*38.1*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*52.4*	

Level of Service and Other Performance Measures

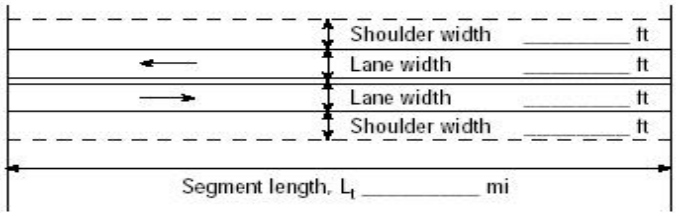
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.44*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*119*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*405*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*2.4*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-14 / Hatch*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield County, Utah*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *30%*

% Trucks and Buses , P_T *22 %*

% Recreational vehicles, P_R *12%*

Access points/ *mi* *1*

Analysis direction vol., V_d *208*veh/h

Opposing direction vol., V_o *173*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.867*	*0.867*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*282*	*235*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.5 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*56.9 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.978*	*0.978*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*250*	*208*
Base percent time-spent-following[4], BPTSF(%)=$100(1-e^{av_d^b})$	*26.3*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*43.9*	
Percent time-spent-following, PTSF(%)=BPTSF+f_{np}	*50.3*	

Level of Service and Other Performance Measures

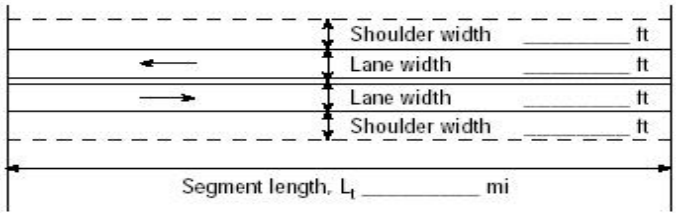
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, v/c=V_p/ 1,700	*0.17*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t$(V/PHF)	*716*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*2434*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*12.6*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-14 / Hatch*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield County, Utah*
Analysis Time Period	*Weekend*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data



☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *30%*

% Trucks and Buses , P_T *28 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *1*

Analysis direction vol., V_d *253*veh/h

Opposing direction vol., V_o *205*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.2*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.947*	*0.836*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*314*	*288*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.3 mi/h*	Free-flow speed, FFS_d ($FSS=BFFS-f_{LS}-f_A$)	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*56.5 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.973*	*0.973*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*306*	*248*
Base percent time-spent-following[4], BPTSF(%)=$100(1-e^{av_d^b})$	*32.3*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*42.3*	
Percent time-spent-following, PTSF(%)=BPTSF+f_{np}	*55.6*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, v/c=V_p/ 1,700	*0.18*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t$(V/PHF)	*871*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*2960*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*15.4*

HIGHPLAN 2002 Conceptual Planning Analysis

Description/File Information

Filename	HP_ preview.xml	Date Prepared	9/12/2007		
Program	HIGHPLAN	Version	1.2.0		
Analyst	PS	Agency	FP	District	Hatch, UT
Road Name	US-89	From/To	Hatch		
Analysis Type	Segment	Peak Direction	Northbound	Study Period	K100
User Notes	2020 Weekday Average+Trucks				

Facility Data

Roadway Variables				Traffic Variables			
Area Type	Rural developed	# Thru Lanes	2	AADT	3556	% Heavy Vehicles	19
Class	3	Terrain	Level	K	.0937	Base Capacity	1700
Posted Speed	40	Median	No	D	.526	Local Adj. Factor	.92
Free Flow Speed	45	Left Turn Lanes	No	PHF	.85	Adjusted Capacity	1143
Pass Lane Spacing	N/A	% NPZ	100				

LOS Results

v/c Ratio	0.17	Density	N/A	PTSF	96.00	ATS	37.00	% FFS	82.0	LOS	C

Service Volume Tables

	A	B	C	D	E
Lanes	Hourly Volume In Peak Direction				
1	0	130	380	570	740
2					
3					
4					
Lanes	Hourly Volume In Both Directions				
2	0	250	730	1090	1400
4					
6					
8					
Lanes	Annual Average Daily Traffic				
2	0	2700	7800	11600	14900
4					
6					
8					
Lanes	Maximum v/c Ratio				
1	0.00	0.14	0.37	0.55	0.71
2					
3					
4					

HIGHPLAN 2002 Conceptual Planning Analysis

Description/File Information

Filename	HP_preview.xml	Date Prepared	9/12/2007		
Program	HIGHPLAN	Version	1.2.0		
Analyst	PS	Agency	FP	District	Hatch, UT
Road Name	US-89	From/To	Hatch		
Analysis Type	Segment	Peak Direction	Northbound	Study Period	K100
User Notes	2020 Weekend+Trucks				

Facility Data

Roadway Variables				Traffic Variables			
Area Type	Rural developed	# Thru Lanes	2	AADT	3889	% Heavy Vehicles	26
Class	3	Terrain	Level	K	.10273	Base Capacity	1700
Posted Speed	40	Median	No	D	.534	Local Adj. Factor	.92
Free Flow Speed	45	Left Turn Lanes	No	PHF	.85	Adjusted Capacity	1107
Pass Lane Spacing	N/A	% NPZ	100				

LOS Results

v/c Ratio	0.21	Density	N/A	PTSF	99.00	ATS	37.00	% FFS	81.0	LOS	C

Service Volume Tables

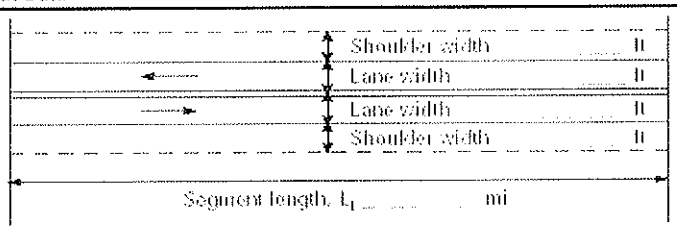
	A	B	C	D	E
Lanes	Hourly Volume In Peak Direction				
1	0	130	380	580	740
2					
3					
4					
Lanes	Hourly Volume In Both Directions				
2	0	240	720	1080	1390
4					
6					
8					
Lanes	Annual Average Daily Traffic				
2	0	2300	7000	10500	13500
4					
6					
8					
Lanes	Maximum v/c Ratio				
1	0.00	0.14	0.37	0.56	0.71
2					
3					
4					

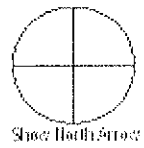
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Hatch / SR-12*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.87*

No-passing zone *35%*

% Trucks and Buses , P_T *25 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *1*

Analysis direction vol., V_d *182*veh/h

Opposing direction vol., V_o *168*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.851*	*0.851*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*246*	*227*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.8 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.0 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.976*	*0.976*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*214*	*198*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*22.8*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*49.8*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*48.7*	

Level of Service and Other Performance Measures

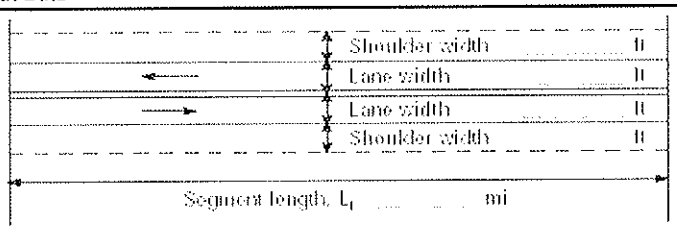
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.14*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*408*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1420*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*7.2*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Hatch / SR-12*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data



■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *35%*

% Trucks and Buses , P_T *19 %*

% Recreational vehicles, P_R *21%*

Access points/ *mi* *1*

Analysis direction vol., V_d *192*veh/h

Opposing direction vol., V_o *176*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.883*	*0.883*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_f/(PHF*f_{HV}*f_G)$	*256*	*235*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.8 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*56.9 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.981*	*0.981*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_f/(PHF*f_{HV}*f_G)$	*230*	*211*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*24.6*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*48.3*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*49.8*	

Level of Service and Other Performance Measures

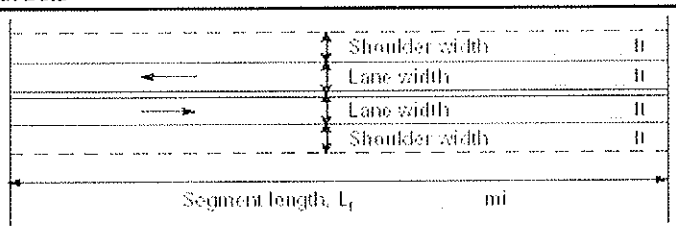
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.15*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*440*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1498*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*7.7*

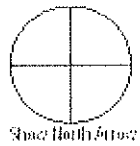
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*SR-12 / Panguitch*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.87*

No-passing zone *5%*

% Trucks and Buses , P_T *25 %*

% Recreational vehicles, P_R *18%*

Access points/ *mi* *2*

Analysis direction vol., V_d *180*veh/h

Opposing direction vol., V_o *166*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.851*	*0.851*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*243*	*224*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.5 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.0 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.2 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.6 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.976*	*0.976*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*212*	*196*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*22.7*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*22.1*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*34.1*	

Level of Service and Other Performance Measures

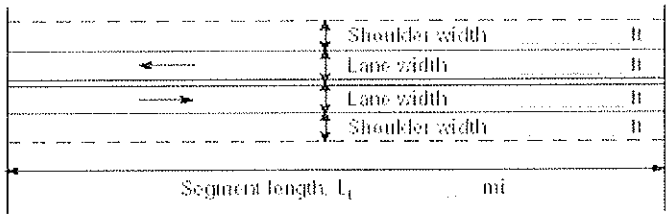
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.14*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*295*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1026*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*5.1*

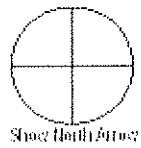
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	Stinger	Highway / Direction of Travel	US-89
Agency or Company	Fehr & Peers	From/To	SR-12 / Panguitch
Date Performed	9/12/2007	Jurisdiction	Garfield Couty, UT
Analysis Time Period	Weekend	Analysis Year	2020+Trucks

Project Description: 06-721 Coal Hollow EIS

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF 0.85

No-passing zone 5%

% Trucks and Buses , P_T 19 %

% Recreational vehicles, P_R 21%

Access points/ mi 2

Analysis direction vol., V_d 190veh/h

Opposing direction vol., V_o 173veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	1.7	1.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.883	0.883
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	253	231

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	mi/h	Base free-flow speed[3], $BFFS_{FM}$	65.0 mi/h
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	1.3 mi/h
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	mi/h	Adj. for access points[3], f_A (Exhibit 20-5)	0.5 mi/h
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	2.0 mi/h	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	63.2 mi/h
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	57.4 mi/h

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	1.1	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.981	0.981
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	1.00	1.00
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	228	207
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	24.3	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	21.8	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	35.7	

Level of Service and Other Performance Measures

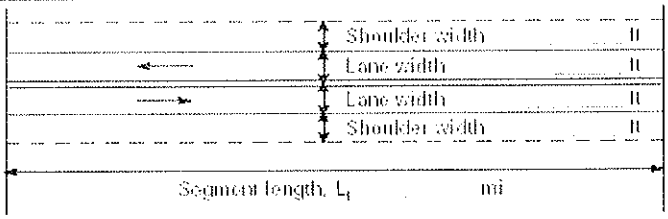
Level of service, LOS (Exhibit 20-3 or 20-4)	B
Volume to capacity ratio, $v/c=V_p/1{,}700$	0.15
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)$=0.25L_t(V/PHF)$	319
Peak-hour vehicle-miles of travel, VMT_{60}(veh- mi)$=V*L_t$	1083
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	5.6

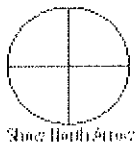
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Panguitch / SR-20*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.86*

No-passing zone *15%*

% Trucks and Buses , P_T *30 %*

% Recreational vehicles, P_R *12%*

Access points/ *mi* *3*

Analysis direction vol., V_d *139*veh/h

Opposing direction vol., V_o *145*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.826*	*0.826*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*196*	*204*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.8 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.1 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.0 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.8 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.971*	*0.971*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*166*	*174*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*18.3*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*31.6*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*33.8*	

Level of Service and Other Performance Measures

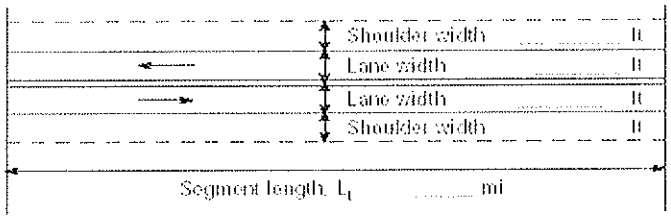
Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.12*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*380*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1307*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*6.6*

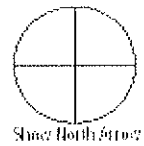
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*US-89*
Agency or Company	*Fehr & Peers*	From/To	*Panguitch / SR-20*
Date Performed	*9/12/2007*	Jurisdiction	*Garfield Couty, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.94*

No-passing zone *15%*

% Trucks and Buses , P_T *40 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *3*

Analysis direction vol., V_d *196*veh/h

Opposing direction vol., V_o *146*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.781*	*0.781*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*267*	*199*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*65.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.8 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.1 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*63.0 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*57.3 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.962*	*0.962*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*217*	*162*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*23.1*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*31.2*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*41.0*	

Level of Service and Other Performance Measures

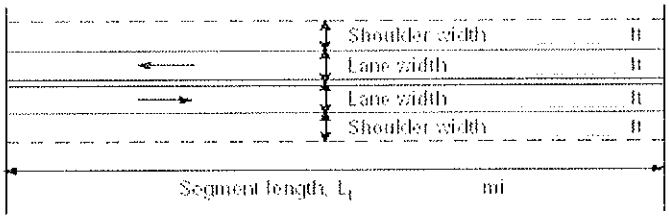
Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.16*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*490*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1842*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*8.6*

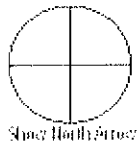
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*US-89 / Upslope*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average with Trucks*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *45%*

% Trucks and Buses , P_T *32 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *0*

Analysis direction vol., V_d *114*veh/h

Opposing direction vol., V_o *128*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.817*	*0.817*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*164*	*184*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*50.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.0 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*48.7 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*44.0 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.969*	*0.969*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*138*	*155*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*15.6*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*45.1*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*36.8*	

Level of Service and Other Performance Measures

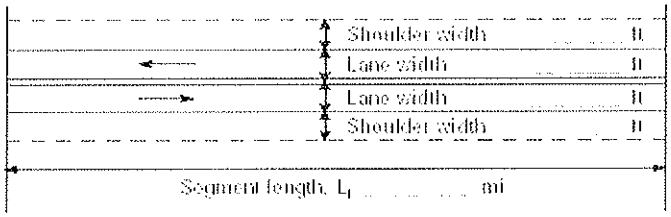
Level of service, LOS (Exhibit 20-3 or 20-4)	*D*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.10*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*285*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*969*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*6.5*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*US-89 / Upslope*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data



Class I highway Class II highway

Terrain Level Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.85*

No-passing zone *45%*

% Trucks and Buses , P_T *33 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *0*

Analysis direction vol., V_d *175*veh/h

Opposing direction vol., V_o *128*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.812*	*0.812*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*253*	*185*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*50.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.0 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*48.7 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*43.3 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.968*	*0.968*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*213*	*156*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*22.7*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*48.8*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*50.9*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*D*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.15*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*437*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1488*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*10.1*

2

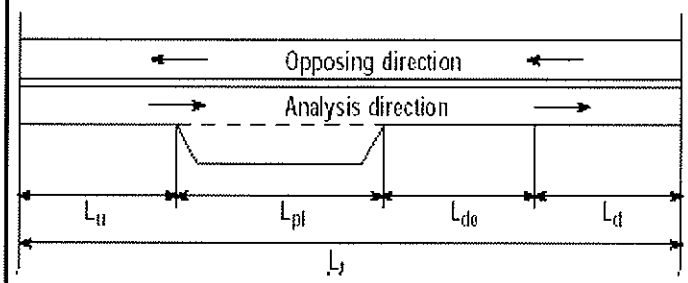
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

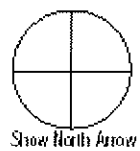
General Information		Site Information	
Analyst	*Stinger*	Highway of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Upslope / Summit*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data

☐ Class I highway ☑ Class II highway





Total length of analysis segment, L_t (*mi*)	*2.3*
Length of two-lane highway upstream of the passing lane, L_u (*mi*)	*0.0*
Length of passing lane including tapers , L_{pl} (*mi*)	*2.2*
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	*32.0*
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	*26.5*
Level of service[1], LOS_d (from Directional Two-Lane Highway Segment Worksheet)	*A*
Average Travel Speed	
Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (*mi*) (Exhibit 20-23)	*1.70*
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (*mi*) $L_d=L_t-(L_u+L_{pl}+L_{de})$	*-1.60*
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	*1.11*
Average travel speed including passing lane[2], $ATS_{pl} = (ATS_d * L_t) / (L_u+L_d+(L_{pl}/f_{pl})+(2L_{de}/(1+f_{pl})))$	*35.5*
Percent Time-Spent-Following	
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (*mi*)(Exhibit 20-23)	*13.00*
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (*mi*)$=L_t-(L_u+L_{pl}+L_{de})$	*-12.90*
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl}(Exhibit 20-24)	*0.58*
Percent time-spent-following including passing lane[3], $PTSF_{pl}$(%) $PTSF_{pl}= PTSF_d[L_u+L_d+f_{pl}L_{pl}+((1+f_{pl})/2)L_{de}]/L_t$	*15.4*

2

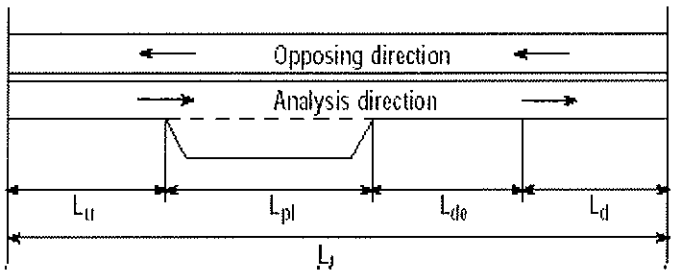
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Upslope / Summit*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data

☐ Class I highway ☑ Class II highway



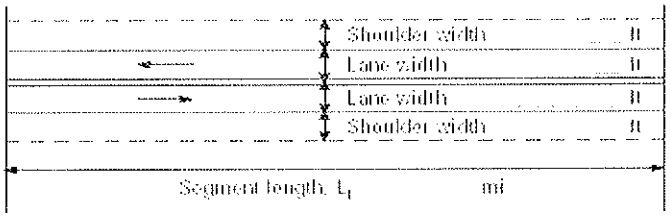
Total length of analysis segment, L_t (*mi*)	*2.3*
Length of two-lane highway upstream of the passing lane, L_u (*mi*)	*0.0*
Length of passing lane including tapers , L_{pl} (*mi*)	*2.0*
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	*29.1*
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	*33.9*
Level of service[1], LOS_d (from Directional Two-Lane Highway Segment Worksheet)	*A*
Average Travel Speed	
Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (*mi*) (Exhibit 20-23)	*1.70*
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (*mi*) $L_d=L_t-(L_u+L_{pl}+L_{de})$	*-1.40*
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	*1.11*
Average travel speed including passing lane[2], $ATS_{pl} = (ATS_d * L_t) / (L_u+L_d+(L_{pl}/f_{pl})+ (2L_{de}/(1+f_{pl})))$	*32.2*
Percent Time-Spent-Following	
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (*mi*)(Exhibit 20-23)	*11.36*
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (*mi*)$=L_t-(L_u+L_{pl}+L_{de})$	*-11.06*
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl}(Exhibit 20-24)	*0.58*
Percent time-spent-following including passing lane[3], $PTSF_{pl}$(%) $PTSF_{pl}= PTSF_d[L_u+L_d+f_{pl}L_{pl}+((1+f_{pl})/2)L_{de}]/L_t$	*19.7*

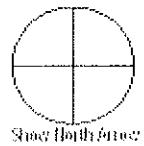
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Summit / Downslope*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday Average*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length *1.30* mi Up/down *7.1*

Peak-hour factor, PHF *0.85*

No-passing zone *100%*

% Trucks and Buses , P_T *33 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *1*

Analysis direction vol., V_d *114*veh/h

Opposing direction vol., V_o *128*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*12.9*	*12.9*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.6*	*1.6*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.200*	*0.200*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*0.91*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*739*	*755*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.5 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*45.3 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*2.8*	*2.8*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.627*	*0.627*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*214*	*240*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*23.9*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*55.8*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*50.3*	

Level of Service and Other Performance Measures

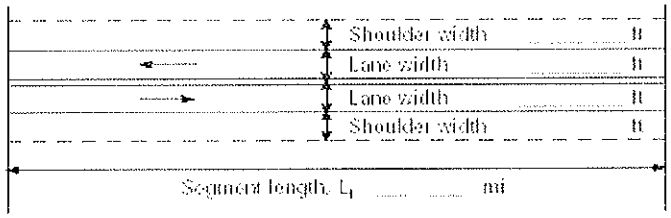
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.43*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*44*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*148*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*1.0*

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Summit / Downslope*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data



Class I highway ■ Class II highway ■

Terrain ■ Level ■ Rolling

Grade Length	*1.30* mi	Up/down	*7.1*
Peak-hour factor, PHF	*0.85*		
No-passing zone	*100%*		
% Trucks and Buses , P_T	*32 %*		
% Recreational vehicles, P_R	*14%*		
Access points/ *mi*	*1*		

Analysis direction vol., V_d *175*veh/h

Opposing direction vol., V_o *128*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*12.9*	*12.9*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.6*	*1.6*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.204*	*0.204*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*0.91*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*1107*	*737*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.6 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*42.6 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*2.8*	*2.8*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.635*	*0.635*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*324*	*237*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*33.4*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*56.0*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*65.8*	

Level of Service and Other Performance Measures

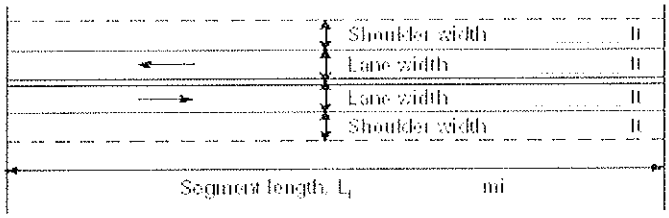
Level of service, LOS (Exhibit 20-3 or 20-4)	*D*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.65*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*67*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*227*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*1.6*

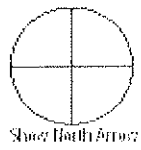
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Downslope / I-15*
Date Performed	*7/24/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekday average*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data





■ Class I highway ■ Class II highway

Terrain ■ Level ■ Rolling

Grade Length *4.00* mi Up/down *3.4*

Peak-hour factor, PHF *0.85*

No-passing zone *70%*

% Trucks and Buses , P_T *33 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *1*

Analysis direction vol., V_d *114*veh/h

Opposing direction vol., V_o *128*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*9.1*	*9.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.5*	*1.5*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.267*	*0.267*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*0.94*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*534*	*564*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.9 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*48.0 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.5*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.858*	*0.858*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*156*	*175*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*17.4*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*53.4*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*42.5*	

Level of Service and Other Performance Measures

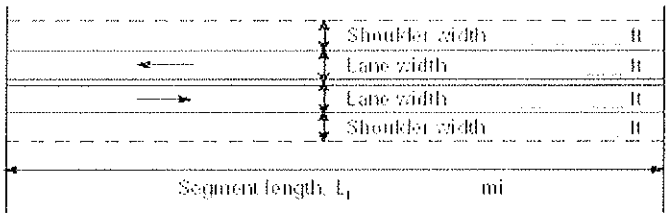
Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.31*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*262*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*889*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*5.5*

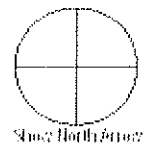
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Stinger*	Highway / Direction of Travel	*SR-20*
Agency or Company	*Fehr & Peers*	From/To	*Downslope / I-15*
Date Performed	*9/12/2007*	Jurisdiction	*Iron County, UT*
Analysis Time Period	*Weekend*	Analysis Year	*2020+Trucks*

Project Description: *06-721 Coal Hollow EIS*

Input Data





Class I highway ■ Class II highway ■

Terrain ■ Level ■ Rolling

Grade Length *4.00* mi Up/down *3.4*

Peak-hour factor, PHF *0.85*

No-passing zone *70%*

% Trucks and Buses , P_T *32 %*

% Recreational vehicles, P_R *14%*

Access points/ *mi* *1*

Analysis direction vol., V_d *167*veh/h

Opposing direction vol., V_o *128*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*9.1*	*9.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.5*	*1.5*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.273*	*0.273*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*0.95*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*757*	*551*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*60.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*1.3 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.3 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*1.9 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*58.5 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*46.4 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.5*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.862*	*0.862*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*228*	*175*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*24.1*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*57.5*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*56.6*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.45*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*383*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*1303*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*8.3*

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Stinger	Intersection	US-89 / SR-12
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	9/11/2007	Analysis Year	2020+Trucks
Analysis Time Period	8:00 - 9:00		

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-12 | North/South Street: US-89

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		48	31	56	41	
Peak-Hour Factor, PHF	1.00	0.85	0.85	0.85	0.85	1.00
Hourly Flow Rate, HFR (veh/h)	0	56	36	65	48	0
Percent Heavy Vehicles	0	--	--	25	--	--
Median Type	Undivided					
RT Channelized			1			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				48		40
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.85	1.00	0.85
Hourly Flow Rate, HFR (veh/h)	0	0	0	56	0	47
Percent Heavy Vehicles	0	0	0	21	0	10
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		65	56		47			
C (m) (veh/h)		1414	681		988			
v/c		0.05	0.08		0.05			
95% queue length		0.14	0.27		0.15			
Control Delay (s/veh)		7.7	10.8		8.8			
LOS		A	B		A			
Approach Delay (s/veh)	--	--	9.9					
Approach LOS	--	--	A					

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LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Stinger	Intersection	US-89 / SR-12
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	9/11/2007	Analysis Year	2020+Trucks
Analysis Time Period	16:00 - 17:00		

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-12 | North/South Street: US-89

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		101	82	44	61	
Peak-Hour Factor, PHF	1.00	0.89	0.89	0.89	0.89	1.00
Hourly Flow Rate, HFR (veh/h)	0	113	92	49	68	0
Percent Heavy Vehicles	0	--	--	25	--	--
Median Type	Undivided					
RT Channelized			1			0
Lanes	0	1	1	1	1	0
Configuration		T	R	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				78		78
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.89	1.00	0.89
Hourly Flow Rate, HFR (veh/h)	0	0	0	87	0	87
Percent Heavy Vehicles	0	0	0	13	0	4
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			1
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L	L		R			
v (veh/h)		49	87		87			
C (m) (veh/h)		1345	663		934			
v/c		0.04	0.13		0.09			
95% queue length		0.11	0.45		0.31			
Control Delay (s/veh)		7.8	11.2		9.2			
LOS		A	B		A			
Approach Delay (s/veh)	--	--	10.2					
Approach LOS	--	--	B					

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DELAY 4.9
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Stinger	Intersection	US-89 / SR-14
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	9/11/2007	Analysis Year	2020+Trucks
Analysis Time Period	8:00 - 9:00		

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-14 | North/South Street: US-89

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	33	69	1	3	74	17
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	38	81	1	3	87	19
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	2	0
Configuration	L		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	19	4	20	0	1	4
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	22	4	23	0	1	4
Percent Heavy Vehicles	6	0	5	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT		LTR			LTR	
v (veh/h)	38	3		5			49	
C (m) (veh/h)	1498	1528		871			768	
v/c	0.03	0.00		0.01			0.06	
95% queue length	0.08	0.01		0.02			0.20	
Control Delay (s/veh)	7.5	7.4		9.2			10.0	
LOS	A	A		A			B	
Approach Delay (s/veh)	--	--	9.2			10.0		
Approach LOS	--	--	A			B		

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DELAY 3.4

LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Stinger	Intersection	US-89 / SR-14
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	9/11/2007	Analysis Year	2020+Trucks
Analysis Time Period	16:00 - 17:00		

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-14 | North/South Street: US-89

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	33	161	0	5	112	26
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Hourly Flow Rate, HFR (veh/h)	36	176	0	5	123	28
Percent Heavy Vehicles	3	--	--	50	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	0	2	0
Configuration	L		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	25	1	29	0	0	0
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Hourly Flow Rate, HFR (veh/h)	27	1	31	0	0	0
Percent Heavy Vehicles	9	0	7	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT		LTR			LTR	
v (veh/h)	36	5		0			59	
C (m) (veh/h)	1420	1109					675	
v/c	0.03	0.00					0.09	
95% queue length	0.08	0.01					0.29	
Control Delay (s/veh)	7.6	8.3					10.8	
LOS	A	A					B	
Approach Delay (s/veh)	--	--				10.8		
Approach LOS	--	--				B		

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DELAY 2.4
LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Stinger	Intersection	US-89 / SR-20
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	9/11/2007	Analysis Year	2020+Trucks
Analysis Time Period	8:00 - 9:00		

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-20 | North/South Street: US-89

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	11		49			
Peak-Hour Factor, PHF	0.84	1.00	0.84	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	13	0	58	0	0	0
Percent Heavy Vehicles	18	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	54	35			19	9
Peak-Hour Factor, PHF	0.84	0.84	1.00	1.00	0.84	0.84
Hourly Flow Rate, HFR (veh/h)	64	41	0	0	22	10
Percent Heavy Vehicles	32	23	0	0	24	50
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	1
Configuration	L	T			T	R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		L	T			T	R
v (veh/h)	13		64	41			22	10
C (m) (veh/h)	1524		857	821			759	960
v/c	0.01		0.07	0.05			0.03	0.01
95% queue length	0.03		0.24	0.16			0.09	0.03
Control Delay (s/veh)	7.4		9.5	9.6			9.9	8.8
LOS	A		A	A			A	A
Approach Delay (s/veh)	--	--	9.6			9.5		
Approach LOS	--	--	A			A		

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DELAY 7.9

LOS A

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Stinger	Intersection	US-89 / SR-20
Agency/Co.	Fehr & Peers	Jurisdiction	Panguitch, UT
Date Performed	9/11/2007	Analysis Year	2020+Trucks
Analysis Time Period	16:00 - 17:00		

Project Description 06-721 Coal Hollow EIS

East/West Street: SR-20 | North/South Street: US-89

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	32		79			
Peak-Hour Factor, PHF	0.95	1.00	0.95	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	33	0	83	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	0	1	0	0	0
Configuration	L		R			
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	104	44			45	13
Peak-Hour Factor, PHF	0.95	0.95	1.00	1.00	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	109	46	0	0	47	13
Percent Heavy Vehicles	20	13	0	0	16	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	1	1	0	0	1	1
Configuration	L	T			T	R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L		L	T			T	R
v (veh/h)	33		109	46			47	13
C (m) (veh/h)	1636		780	788			704	1091
v/c	0.02		0.14	0.06			0.07	0.01
95% queue length	0.06		0.48	0.19			0.21	0.04
Control Delay (s/veh)	7.2		10.4	9.9			10.5	8.3
LOS	A		B	A			B	A
Approach Delay (s/veh)	--	--	10.2			10.0		
Approach LOS	--	--	B			B		

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DELAY 7.7

LOS A

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	Stinger
Agency/Co.	Fehr & Peers
Date Performed	9/11/2007
Analysis Time Period	8:00 - 9:00

Site Information

Intersection	US-89 / Main Street
Jurisdiction	Panguitch, UT
Analysis Year	2020+Trucks

Project ID 06-721 Coal Hollow EIS

East/West Street: US-89 / Center Street

North/South Street: SR-143 / US-89

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	7	26	4	23	16	90
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	5	42	48	91	26	11
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	L	TR
PHF	0.88	0.88	0.88	1.00	0.88	0.88	0.88	0.88
Flow Rate (veh/h)	36	4	44	90	52	54	103	41
% Heavy Vehicles	0	0	6	22	5	0	26	0
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2	0.0	0.6	0.0	0.1	0.0	1.0	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	0.3
Prop. Heavy Vehicle	0.0	0.0	0.1	0.2	0.0	0.0	0.3	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1	-0.7	0.4	-0.3	0.1	-0.7	0.9	-0.2

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.03	0.00	0.04	0.08	0.05	0.05	0.09	0.04
hd, final value (s)	5.37	4.57	5.58	4.85	5.22	4.39	5.97	4.83
x, final value	0.05	0.01	0.07	0.12	0.08	0.07	0.17	0.05
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.1	2.3	3.3	2.6	2.9	2.1	3.7	2.5

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	286	254	294	340	302	304	353	291
Delay (s/veh)	8.37	7.30	8.68	8.22	8.34	7.40	9.90	7.81
LOS	A	A	A	A	A	A	A	A
Approach: Delay (s/veh)	8.27		8.37		7.86		9.30	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.55							
Intersection LOS	A							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	Stinger
Agency/Co.	Fehr & Peers
Date Performed	9/11/2007
Analysis Time Period	16:15 - 17:15

Site Information

Intersection	US-89 / Main Street
Jurisdiction	Panguitch, UT
Analysis Year	2020+Trucks

Project ID 06-721 Coal Hollow EIS

East/West Street: US-89 / Center Street

North/South Street: SR-143 / US-89

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	20	44	11	52	46	178
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	9	59	25	140	45	32
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LT	R	LT	R	L	TR
PHF	0.85	0.85	0.85	1.00	0.85	0.85	0.85	0.85
Flow Rate (veh/h)	74	12	115	178	79	29	164	89
% Heavy Vehicles	4	7	6	18	5	6	18	4
No. Lanes	2		2		2		2	
Geometry Group	5		5		5		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.3	0.0	0.5	0.0	0.1	0.0	1.0	0.0
Prop. Right-Turns	0.0	1.0	0.0	1.0	0.0	1.0	0.0	0.4
Prop. Heavy Vehicle	0.0	0.1	0.1	0.2	0.0	0.1	0.2	0.0
hLT-adj	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2	-0.6	0.4	-0.4	0.1	-0.6	0.8	-0.2

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.07	0.01	0.10	0.16	0.07	0.03	0.15	0.08
hd, final value (s)	6.09	5.29	5.99	5.23	5.98	5.23	6.44	5.41
x, final value	0.13	0.02	0.19	0.26	0.13	0.04	0.29	0.13
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.8	3.0	3.7	2.9	3.7	2.9	4.1	3.1

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	324	262	365	428	329	279	414	339
Delay (s/veh)	9.66	8.08	10.10	9.74	9.58	8.16	11.78	8.94
LOS	A	A	B	A	A	A	B	A
Approach: Delay (s/veh)	9.44		9.88		9.20		10.78	
LOS	A		A		A		B	
Intersection Delay (s/veh)	10.04							
Intersection LOS	B							

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3406	1442	1787	3471	1615	1516	1567		1800	1678	
Flt Permitted	0.46	1.00	1.00	0.34	1.00	1.00	0.75	1.00		0.65	1.00	
Satd. Flow (perm)	868	3406	1442	639	3471	1615	1202	1567		1235	1678	
Volume (vph)	3	423	124	89	319	5	81	2	141	12	2	4
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	3	492	144	103	371	6	94	2	164	14	2	5
RTOR Reduction (vph)	0	0	108	0	0	5	0	59	0	0	2	0
Lane Group Flow (vph)	3	492	36	103	371	1	94	107	0	14	5	0
Confl. Peds. (#/hr)							1		1	5		5
Heavy Vehicles (%)	0%	6%	12%	1%	4%	0%	19%	0%	2%	0%	0%	0%
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	15.3	15.3	15.3	15.3	15.3	15.3	42.7	42.7		42.7	42.7	
Effective Green, g (s)	17.3	17.3	17.3	17.3	17.3	17.3	44.7	44.7		44.7	44.7	
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.64	0.64		0.64	0.64	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	215	842	356	158	858	399	768	1001		789	1072	
v/s Ratio Prot		0.14			0.11			c0.11			0.00	
v/s Ratio Perm	0.00		0.10	c0.16		0.00	0.08			0.01		
v/c Ratio	0.01	0.58	0.10	0.65	0.43	0.00	0.12	0.11		0.02	0.00	
Uniform Delay, d1	19.9	23.2	20.3	23.6	22.2	19.9	5.0	4.9		4.6	4.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	1.0	0.1	9.3	0.4	0.0	0.3	0.2		0.0	0.0	
Delay (s)	19.9	24.2	20.5	32.9	22.6	19.9	5.3	5.1		4.7	4.6	
Level of Service	B	C	C	C	C	B	A	A		A	A	
Approach Delay (s)		23.4			24.7			5.2			4.6	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	20.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.97	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3505	1538	1770	3539	1615	1566	1584		1805	1843	
Flt Permitted		1.00	1.00	0.37	1.00	1.00	0.75	1.00		0.65	1.00	
Satd. Flow (perm)		3505	1538	682	3539	1615	1244	1584		1233	1843	
Volume (vph)	0	483	183	154	587	15	104	4	157	9	4	1
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	514	195	164	624	16	111	4	167	10	4	1
RTOR Reduction (vph)	0	0	134	0	0	11	0	71	0	0	0	0
Lane Group Flow (vph)	0	514	61	164	624	5	111	100	0	10	5	0
Confl. Peds. (#/hr)							3		3			
Heavy Vehicles (%)	0%	3%	5%	2%	2%	0%	15%	0%	1%	0%	0%	0%
Turn Type	Perm		Perm	Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		19.8	19.8	19.8	19.8	19.8	38.2	38.2		38.2	38.2	
Effective Green, g (s)		21.8	21.8	21.8	21.8	21.8	40.2	40.2		40.2	40.2	
Actuated g/C Ratio		0.31	0.31	0.31	0.31	0.31	0.57	0.57		0.57	0.57	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		1092	479	212	1102	503	714	910		708	1058	
v/s Ratio Prot		0.15			0.18			c0.11			0.00	
v/s Ratio Perm			0.13	c0.24		0.01	0.09			0.01		
v/c Ratio		0.47	0.13	0.77	0.57	0.01	0.16	0.11		0.01	0.00	
Uniform Delay, d1		19.4	17.3	21.9	20.1	16.6	7.0	6.8		6.4	6.4	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3	0.1	16.0	0.7	0.0	0.5	0.2		0.0	0.0	
Delay (s)		19.8	17.4	37.9	20.8	16.7	7.4	7.0		6.4	6.4	
Level of Service		B	B	D	C	B	A	A		A	A	
Approach Delay (s)		19.1			24.2			7.2			6.4	
Approach LOS		B			C			A			A	

Intersection Summary

HCM Average Control Delay	19.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX C
Crash Data

State of Utah

JON M. HUNTSMAN, JR.
Governor

GARY R. HERBERT
Lieutenant Governor

DEPARTMENT OF TRANSPORTATION

JOHN R. NJORD, P.E.
Executive Director

CARLOS M. BRACERAS, P.E.
Deputy Director

August 15, 2007

Preston Stinger
Transportation Engineer
Fehr & Peers
2180 South 1300 East, Suite 220
Salt Lake City, UT 84106

Re: Operational Safety Report #07-037; US-89, MP 90.04 to MP 156.36 (Glendale to Jct. SR-20). Safety Evaluation.

Dear Mr. Stinger:

We have evaluated the crash history for the subject section of US-89 for the three-year period of 2003 through 2005, with the following results:

RURAL OTHER PRINCIPAL ARTERIAL		ACTUAL				EXPECTED
		2003	2004	2005	TOTAL/AVG	
Number of Crashes		82	104	101	287/95.67	
Crash Rate		2.25	2.85	2.68	2.59	1.46
Severity		1.61	1.46	1.52	1.59	1.70
Single Vehicle Crashes	81.2%				233	

Crash data indicates that the crash rate of this section is higher than the expected and the severity is lower than the expected. The predominant crash type was the single vehicle, accounting for 81.2% or 233 of the total number of crashes. The breakdown of these crashes by type, number, and percent is as follows:

CRASH TYPE	**No.**	**% OF SINGLE VEH. CRASHES**
1. Wildlife Related	126	54.1
2. Ran Off Road Right	63	27.0
3. Ran Off Road Left	24	10.3
4. Fixed Object	10	4.3

CRASH TYPE	No.	% OF SINGLE VEH. CRASHES
5. Domestic Animal Related	5	2.1
6. Other Object	4	1.7
7. Overturned in Roadway	1	0.5
	233	100.0%

We recommend that the following items be considered during design of the project to reduce the number/severity of/or the potential for crashes:

1. Several sections of guardrail though this segment of US-89 need to be upgraded with regards to height, hardware, and the removal of Texas Turndown sections, replacing them with adequate end treatments.
2. Replace all concrete barrier using wire rope loop for the barrier pin connections
3. Various CMP culverts are inside the clear zone and need to be extended.
4. Dilapidated or defaced signs need to be upgraded to current MUTCD standards.
5. We recommend installing bicycle safe drainage grates through the towns of Glendale and Panguitch.
6. It is also recommended to eliminate unused or unnecessary driveway cuts through the two towns mentioned above.
7. Upgrade disabled pedestrian ramps to current ADA standards, meeting also UDOT Standard Drawing GW-5.
8. Various locations with steep slopes might have guardrail warranted.
9. Several concrete box culverts within this segment of US-89 lie inside the clear zone at distances ranging from 4 feet to 12 feet, thus needing to be extended.
10. Stop sign at Alton Road needs to be moved ahead closer to US-89. Currently, in its present location, it sits too far back from the main highway at approximately 70 feet ±.
11. Construct both a right turn and an acceleration lane NB at the intersection with Alton Road.
12. Construct an exclusive right turn lane EB at the intersection with SR-14.
13. Extend the climbing lane NB along US-89 to just past the crest of the vertical curve at the intersection with SR-14.
14. Ideally, it would be advisable to relocate the intersection of US-89 and SR-14 to the top of the crest of the vertical curve for better sight distance to the north. In its current location, this intersection provides excellent sight distance to the south only.

Source documents are available at the Division of Traffic and Safety for additional analysis. If questions arise, please call me at 801-965-4045.

Sincerely,

John L. Leonard, P.E.
Traffic and Safety Operations Engineer

cc:	Robert Hull	John Leonard	Zeke Gonzalez
	Roland Stanger, FHWA	Troy Torgerson, R-4	Mike Miles, R-4

State of Utah

JON M. HUNTSMAN, JR.
Governor

GARY R. HERBERT
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DEPARTMENT OF TRANSPORTATION

JOHN R. NJORD, P.E.
Executive Director

CARLOS M. BRACERAS, P.E.
Deputy Director

August 15, 2007

Preston Stinger
Transportation Engineer
Fehr & Peers
2180 South 1300 East, Suite 220
Salt Lake City, Utah 84106

Re: Operational Safety Report #07-038; SR-20, MP 0.00 to MP 20.61. (I-15 to Jct. US-89). Safety Evaluation.

Dear Mr. Stinger:

We have evaluated the crash history for the subject section of SR-20 for the three-year period of 2003 through 2005, with the following results:

RURAL MINOR ARTERIAL		ACTUAL				EXPECTED
		2003	2004	2004	TOTAL/AVG	
Number of Crashes		26	28	25	79/26.33	
Crash Rate		2.56	2.76	2.46	2.59	1.96
Severity		1.35	1.39	1.76	1.50	1.72
Single Vehicle Crashes	86.1%				68	

Crash data indicates that the crash rate of this section is higher than the expected and the severity is lower than the expected. The predominant crash type was the single vehicle, accounting for 86.1% or 68 of the total number of crashes. The distribution of these crashes by type, number, and percent of single vehicle crashes is as follows:

CRASH TYPE	No.	% OF SINGLE VEH. CRASHES
1. Ran Off Road Right	31	45.5
2. Ran Off Road Left	12	17.7
3. Wildlife Related	12	17.7
4. Fixed Object	10	14.7
5. Other Non-Collision	3	4.4
	TOTAL = 68	100.0%

There were no clusters of crashes at any location. Approximately 70% of these crashes occurred under snowy/icy conditions. With regards to all types of crashes, 53% occurred in dry weather conditions and 60% during daytime hours. The main contributing factor for crashes where vehicles ran off the road was excessive speed; the objects most commonly struck were a dirt embankment, followed by guardrail.

This state road was widened and improved within the last 3 to 4 years, and many, if not all of its features were upgraded, such as flattening of side slopes, guardrail, end treatments, drainage, signing, shoulders, etc. Therefore, based on our crash analysis, in its current geometric condition, and after our field review, we feel that this facility does not present safety deficiencies that need to be corrected.

Source documents are available at the Division of Traffic and Safety for additional analysis. If questions arise, please call me at 801-965-4045.

Sincerely,

John L. Leonard, P.E.
Traffic and Safety Operations Engineer

cc: Robert Hull John Leonard Zeke Gonzalez

Roland Stanger, FHWA Troy Torgerson, R-4 Mike Miles, R-4

State of Utah

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Deputy Director

August 15, 2007

Preston Stinger
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2180 South 1300 East, Suite 220
Salt Lake City, Utah 84106

Re: Operational Safety Report #07-039; I-15 from MP 59.05 to MP 100.02 (Cedar City to SR-20). Safety Evaluation.

Dear Mr. Stinger:

We have evaluated the crash history for the subject section of I-15 for the three-year period of 2003 through 2005, with the following results:

RURAL INTERSTATE		ACTUAL				EXPECTED
		2003	2004	2005	TOTAL/AVG	
Number of Crashes		140	146	155	441/147.00	
Crash Rate		0.71	0.74	0.79	0.75	0.87
Severity		2.11	1.96	1.95	2.01	1.83
Single Vehicle Crashes	77.6%				342	
Rear End Crashes	11.1%				49	
Same Dir. Side Swipe	9.8%				43	

Crash data indicates that the crash rate of this section is lower than the expected and the severity is higher than the expected. The predominant crash types are listed on the table above.

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Single vehicle crashes were distributed by type, number, and percent as follows:

CRASH TYPE	No.	% OF SINGLE VEH. CRASHES
1. Ran Off Road Right	108	31.6
2. Ran Off Road Left	68	19.9
3. Ran Off Road Through Median	44	12.9
4. Wildlife Related	39	11.4
5. Other Object	25	7.3
6. Fixed Object	23	6.7
7. Other Non-Collision	22	6.4
8. Overturned in Roadway	10	2.9
9. Pedestrian Related	1	0.3
10. Bicycle Related	1	0.3
11. Domestic Animal Related	1	0.3
	TOTAL = 342	100.0%

There where no significant clusters of crashes at any location. The first primary factor to crashes where vehicles ran off the road was “excessive speed”, followed by “falling asleep at the wheel”, and “other improper driver behavior”. Rear end crashes occurred mostly as some drivers were following other drivers too closely and sideswipe crashes were caused primarily by drivers attempting an unsafe passing maneuver.

There were a total of 12 fatal crashes that occurred within this segment of interstate and these crashes resulted in 14 fatalities. These fatal crashes were associated with vehicles running off the road (11); one was the result of a rear end collision, one was pedestrian related, and the last one resulted out of a sideswipe crash. Six of the fatal run off the road crashes were caused by drivers falling asleep at the wheel.

We recommend that the following items be considered during design of the project to reduce the number/severity of/or the potential for crashes:

1. Ensure that continuous shoulder rumble strips are in place.
2. Upgrade guardrail to height standards and replace Texas Turndown sections with adequate end treatments.
3. Along with number 2 above, install guardrail transition elements.
4. Replace all concrete barrier using wire rope loop for the barrier pin connections.
5. Upgrade signing as needed to meet the most current edition of the MUTCD.
6. Ensure that all breakaway installations are placed at the required height from the ground level to ensure proper operation.
7. Ensure that wood signposts requiring drilling for breakaway operations are drilled appropriately.
8. Correct localized areas of shoulder edge rut.

9. Side slopes appear to be adequate.
10. Verify that roadside delineators are placed at the correct spacing and that those that are missing or damaged are replaced accordingly.
11. Extend CMP and concrete box culverts that lie inside the clear zone.

Source documents are available at the Division of Traffic and Safety for additional analysis. If questions arise, please call me at 801-965-4045.

Sincerely,

John L. Leonard, P.E.
Traffic and Safety Operations Engineer

cc:	Robert Hull	John Leonard	Zeke Gonzalez
	Roland Stanger, FHWA	Troy Torgerson, R-4	Mike Miles, R-4

State of Utah

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CARLOS M. BRACERAS, P.E.
Deputy Director

August 15, 2007

Preston Stinger
Transportation Engineer
Fehr & Peers
2180 South 1300 East, Suite 220
Salt Lake City, UT 84106

RE: Operational Safety Report # 07-040; SR-56 from MP 9.80 to MP 61.39. Safety Evaluation

Dear Mr. Stinger:

We have evaluated the crash history for the subject section of SR-56 for the three-year period of 2003 through 2005, with the following results:

MAJOR COLLECTOR/MINOR ARTERIAL		ACTUAL				EXPECTED
		2003	2004	2005	TOTAL/AVG	
Number of Crashes		58	49	67	174/58.00	
Crash Rate		2.04	1.73	2.32	2.03	2.14
Severity		1.83	1.49	1.75	1.69	1.77
Single Vehicle Crashes	48.3%				84	
Rear End Crashes	19.0%				33	
Right Angle Crashes	16.1%				28	
Left Turn Crashes	6.90%				12	

Crash data indicates that both the crash rate and severity of this section are lower than the expected. The predominant crash types are listed on the table above.

Single vehicle crashes were distributed by type, number, and percentage as follows:

CRASH TYPE	No.	% OF SINGLE VEH. CRASHES
1. Wildlife Related	34	40.5
2. Ran Off Road Left	16	19.0
3. Ran Off Road Right	16	19.0
4. Domestic Animal Related	6	7.1
5. Fixed Object	4	4.8
6. Other Non-Collision	3	3.6
7. Other Object	2	2.4
8. Bicycle Related	2	2.4
9. Pedestrian Related	1	1.2
	TOTAL = 84	100.0%

There were no significant clusters of crashes at any location. Primary contributing factors to crashes where vehicles left the roadway included: “Excessive speed”; “Falling asleep at the wheel”, and a few “DUI’s”. Rear end, left turn, and right angle crashes were mainly concentrated at intersections along the western boundaries of the city. With regards to all types of crashes, approximately 80% occurred in dry weather conditions and 70% occurred in the daytime.

There were two fatal crashes within this segment of SR-56. A distracted EB driver who crossed the centerline and impacted a WB vehicle head on caused one of these crashes. The second one was the result of a single vehicle that left the roadway.

We recommend that the following items be considered during design of the project to reduce the number/severity of/or the potential for crashes:

1. Upgrade signing to current MUTCD standards.
2. Replace all concrete barrier using wire rope loop for the barrier pin connections
3. Various drainage issues, such as bicycle safe drainage grates, extension of CPMs, and concrete box culverts.
4. Upgrade disabled pedestrian ramps to current ADA standards meeting also UDOT Standard Drawing GW-5.
5. Various highway signs near the intersection with Lund Highway appear to create too much clutter, as they are too close to each other, specifically obscuring the RR X-ing sign.
6. Ensure that wood signposts are properly drilled.
7. Install T-intersection signing at Iron Springs Road for SB traffic.
8. No shoulders past Iron Springs Road continuing west.
9. Rock outcrop is too close (2’) to the travel lane in the WB direction of travel at MP 48.9±.

10. Concrete box culvert headwall at MP 47.2 is at 2’ from the travel lane; needs to be extended.
11. Create WB right turn lane and an EB left turn lane into the housing community directly across the UDOT shed.
12. Paint stop bars at all stop controlled intersections.
13. Install turning lanes into the post office in the town of Beryl.
14. Improve attenuation application at the structure at MP 32 just east of the town of New Castle.

Source documents are available at the Division of Traffic and Safety for additional analysis. If questions arise, please call me at 801-965-4045.

Sincerely,

John L. Leonard, P.E.
Traffic and Safety Operations Engineer

cc:	Robert Hull	John Leonard	Zeke González
	Roland Stanger, FHWA	Troy Torgerson, R-4	Mike Miles, R-4