

Ogden Valley Community Church  
9228 East/ 100 South  
Traffic Impact Study

Huntsville, UT

**October 2014**



A-Trans Engineering  
P.O. Box 521651  
Salt Lake City, Utah 84152  
(801) 949-0348 telephone  
(801) 582-6252 fax

TRAFFIC STUDY



# **Ogden Valley Community Church 9228 East/ 100 South Traffic Impact Analysis**

**Category II TIA**

**Huntsville, Utah**

October 2014

Prepared by:

**A-Trans Engineering**  
P.O. Box City, 521651  
Salt Lake City, Utah 84152  
(801) 949-0348  
atrans@comcast.net



## **Table of Contents**

Executive Summary .....	1
I. Introduction.....	2
II. Study Area and Existing Condition .....	5
III. Trip Generation.....	7
IV. Origin Destination.....	7
V. Growth .....	9
VI. Traffic Analysis .....	12
VII. Queue Length.....	14
VIII. Conflict Discussion.....	14
IX. Conclusion .....	18



## Table of Figures

Figure 1: Project Site Location .....	3
Figure 2: Conceptual Site Plan .....	4
Figure 3: 2014 Existing Traffic .....	6
Figure 4: Site Generated Traffic .....	8
Figure 5: Background Traffic .....	10
Figure 6: Total Traffic .....	11
Figure 7: Conflict Diagram.....	15
Figure 8: 7800 East/ 100 South Intersection.....	16



## **Table of Tables**

Table 1: Trip Generation ITE .....	7
Table 2: 2012 AADT and Future Projections .....	9
Table 3: Average Growth Rates and Growth Factors .....	9
Table 4: Intersection LOS-Delay Relationship .....	12
Table 5: 100 South/ 7800 East Intersection Analysis .....	13
Table 6: 100 South/ Access Intersection Analysis .....	13
Table 7: Queue Analysis .....	14



### **Executive Summary**

The Ogden Valley Community Church is proposed to be located at 9228 East / 100 South (SR 39) in Huntsville, Utah. The church is expected to meet on Sundays and have approximately 100 people. In addition, there are planned meetings every other Thursday evening with about 10 people in attendance. The 20 year expected growth of the church is to a maximum occupancy of up to 295 patrons. Based on this information, Sunday will be the peak period and the site is projected to generate 78 Sunday peak hour trips in 2015 and up to 232 Sunday peak hour trips at full build out. The site is planning one full motion accesses along 100 South. The following assumptions were made:

- Turning movement counts at 100 South / 7800 East yield a peak hour factor of 0.81. This is assumed at the intersection and for through traffic at the access. A PHF of 0.5 was applied to access ingress and egress due to the nature of a church in arriving and departing traffic.
- The church was assumed to have one session that begins and ends within a single hour. This would be the most critical traffic assumption.
- Growth rate of 1% is applied to the background traffic.
- Sunday peak hour trips are provided from land use 560. To provide conservative trip generation and analysis this trip rate was assumed for the opening of the site in 2015. In 2020 with the higher number of patrons the trip rate was multiplied by 2.95 which maintains the same people per vehicle rate of 2.5.
- Analysis was performed without an eastbound right turn lane for the access. The volumes warrant a left turn deceleration lane for a category 4 roadway but the analysis shows that operationally this is not necessary.
- ATR data along SR 39 show that October counts are 94.04% of the annual average.

All site accesses and included intersections operate with LOS A throughout the study period. The recommended access location is to align with 9200 East. With the access location at 9200 East, there are several residential accesses within 500 feet therefore a variance is required. Per the requirements for a category 4 roadway a left turn deceleration lane is required, however the capacity analysis shows that the left ingress will operate with LOS A without the left turn ingress lane.

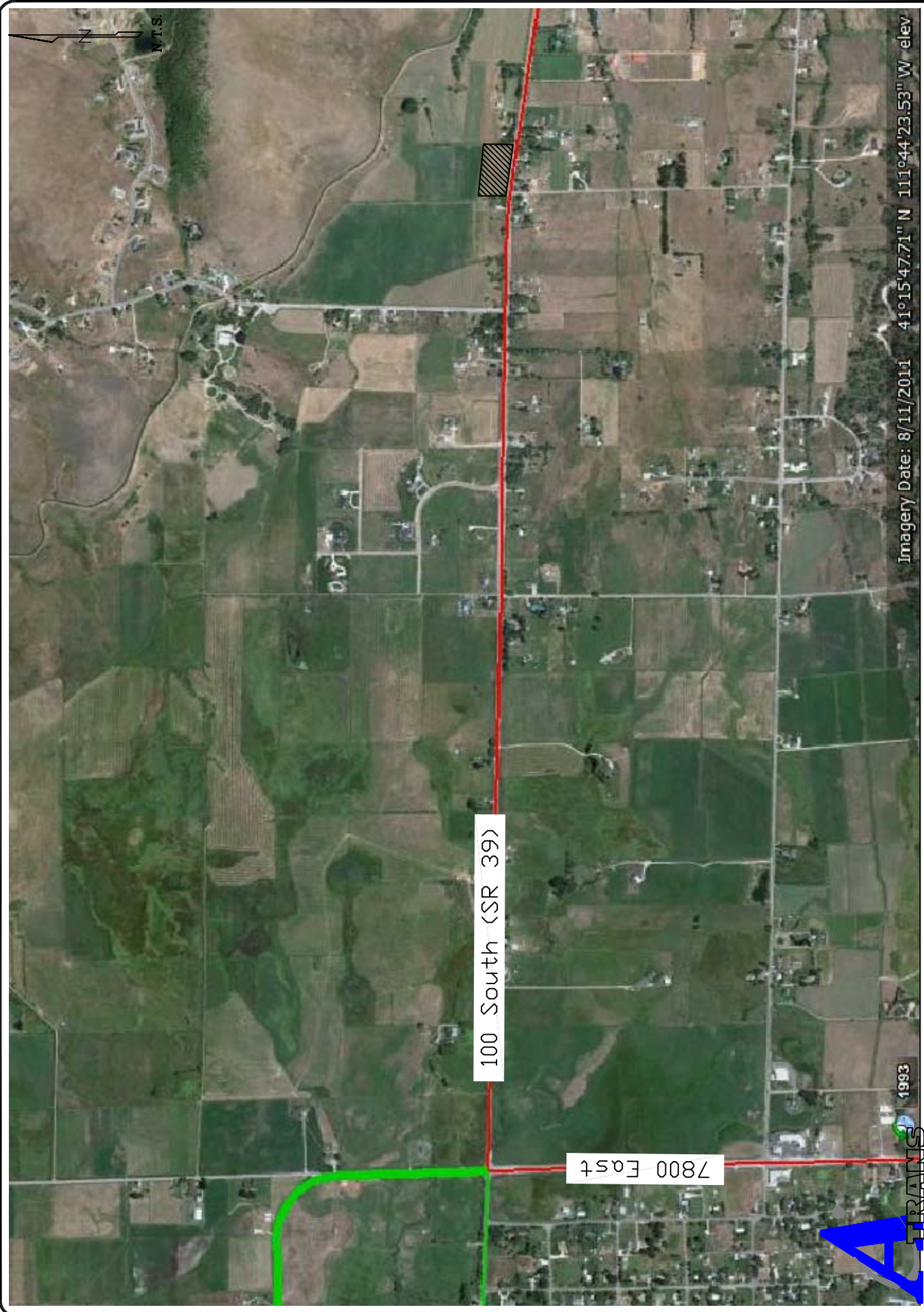


## **I. Introduction**

The following provides a traffic impact analysis for the proposed Ogden Valley Community Church at 9228 East / 100 South (SR 39) in Huntsville, Utah. The church is expected to meet on Sundays and have approximately 100 people with meetings every other Thursday evening with about 10 people in attendance. The 20 year expected growth of the church is to a maximum occupancy of 295 patrons. For the purpose of this analysis and to provide a conservative analysis 100 patrons are assumed in 2015 and 295 patrons are assumed in 2020. The site is projected to generate 78 Sunday peak hour trips. The site is planning one full motion accesses along 100 South. The following intersections are included in the analysis.

- 100 South/ 7800 East
- 100 South/ Access

Figure 1 shows the location of the site. Figure 2 shows the conceptual site plan.

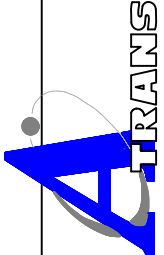
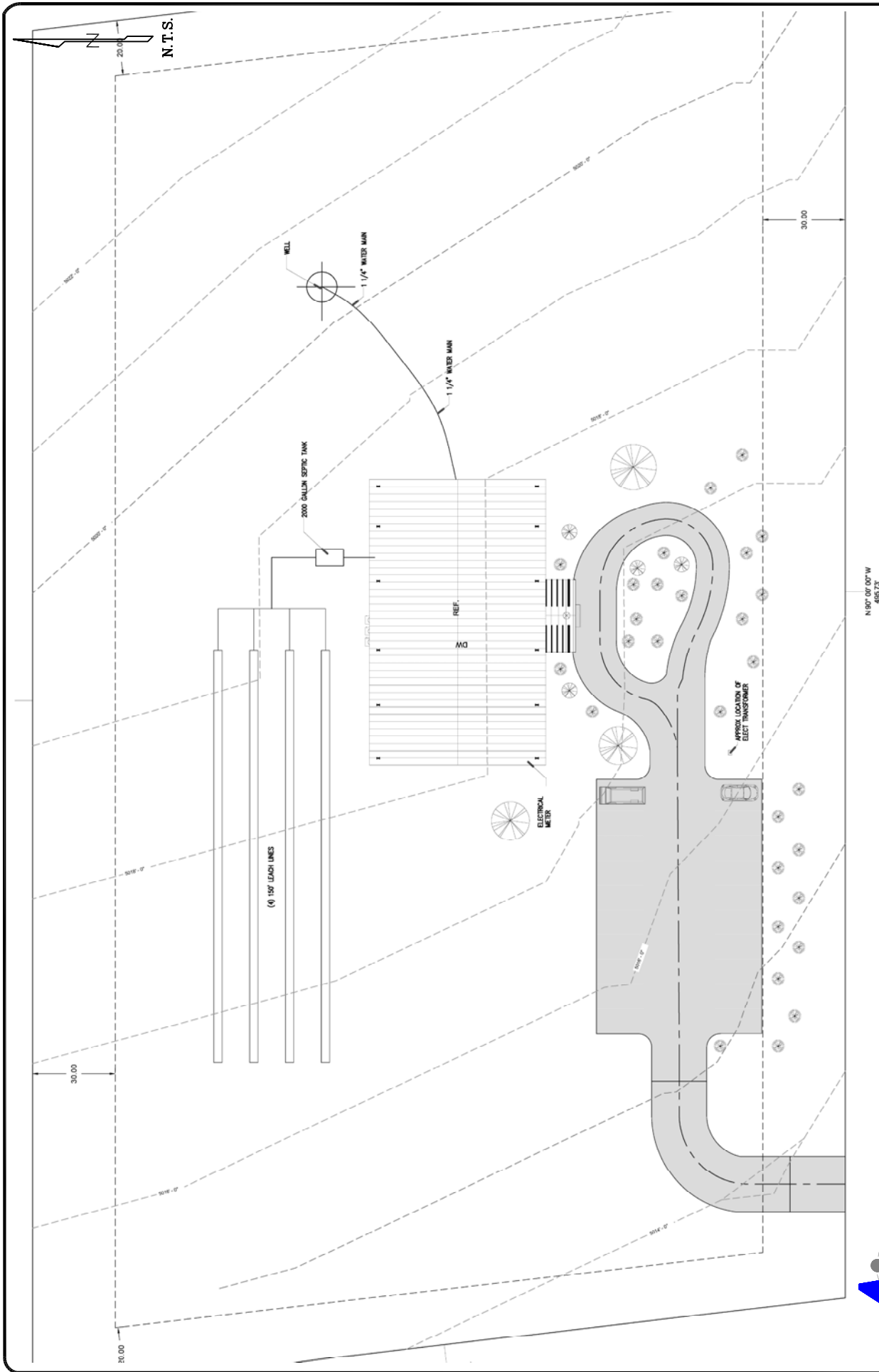


Project Site Location

Figure 1

A-TRANS TRANSPORTATION ENGINEERING  
 P.O. BOX 521661, SLC, UT 84152  
 Phone: 801-949-0348 Fax: 801-582-6252





A-TRANS TRANSPORTATION ENGINEERING  
 P.O. BOX 521661, SLC, UT 84152  
 Phone: 801-949-0348 Fax: 801-582-6252

Figure 2

Conceptual Site Plan



## **II. Study Area and Existing Condition**

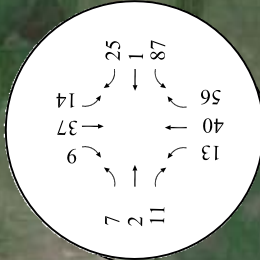
The Ogden Valley Community Church is located north of 100 South at 9228 East in Huntsville, Utah. The primary route considered within the study is as follows:

### 100 South

100 South is State Route 39. It is currently a 2 lane facility with one lane in each direction with a 2012 AADT of 1,935 vehicles per day.

Existing traffic counts were done at 100 South / 7800 East from 11:00 AM to 12:00 PM on Sunday October 12<sup>th</sup>. Figure 3 shows existing traffic counts. This intersection is a two way stop controlled intersection with the north/south movements free. There are separate north and southbound left turn lanes and a separate northbound right turn lane. All other movements are shared with the through movements.

SUN Peak



100 South (SR 39)

7800 East



TRANS 1993

Imagery Date: 8/11/2016 41°15'47.71" N 111°44'23.53" W

A-TRANS TRANSPORTATION ENGINEERING  
 P.O. BOX 521651, SLC, UT 84152  
 Phone: 801-949-0348 Fax: 801-582-6252

Figure 3

2014 Existing Traffic

N.T.S.

### III. Trip Generation

Trip generation for the site was done using The Institute of Transportation Engineers (ITE) *Trip Generation* (9<sup>th</sup> Edition) handbook. Sunday peak hour trips are provided from land use 560. To provide conservative trip generation and analysis this trip rate was assumed for the opening of the site in 2015. In 2020 with the higher number of patrons the trip rate was multiplied by 2.95 which maintains the same people per vehicle rate of 2.5. Table 1 shows the peak hour trips generated for the site.

**Table 1: Trip Generation ITE**

	Size	Land Use	Trip Rate	Trips	% In	% Out	Trips In	Trips Out
Church 2015	6,657	560	11.76	78	50%	50%	39	39
Church 2020	6,657	560	34.69	231	50%	50%	116	116

### IV. Origin Destination

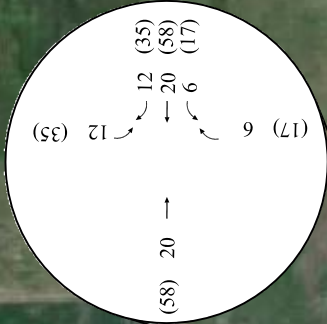
Project site traffic was applied to the origin-destination (O-D) for the site. Origin-destination was determined from evaluating the existing traffic patterns, the proximity of the interstate system and regional and community retail and employment centers. The origin-destination was determined as follows:

- 5% to/from east along 100 South
- 15% to/from south along 7800 East
- 30% to/from north along 7800 East
- 50% to/from west along 100 South

Site Traffic for 2015 and 2020 is shown in Figure 4.

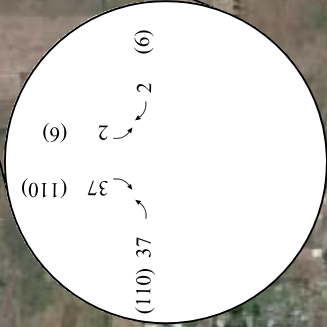
2015 <2020>

N.T.S.



100 South (SR 39)

7800 East



Imagery Date: 8/11/2016 41°15'47.71" N 111°44'23.53" W

TRANS 1993

A-TRANS TRANSPORTATION ENGINEERING  
 P.O. BOX 521651, SLC, UT 84152  
 Phone: 801-949-0348 Fax: 801-582-6252

Figure 4

Site Generated Traffic

**V. Growth**

Growth in the area was determined from considering historic growth along SR 39 and 7800 East. 2012 daily traffic volumes were determined from UDOT’s Average Annual Daily Traffic. The growth in the area has wide variance and shows negative growth along SR 39 in front of the site, therefore a growth rate of 1.0% was assumed. This yields a opening growth factor of 1.01 for 2015 and a growth factor for the 6 year future horizon of 1.06. The AADT and growth rates are shown in Table 2. Table 3 shows the growth rate and growth factor.

**Table 2: 2012 AADT and Future Projections**

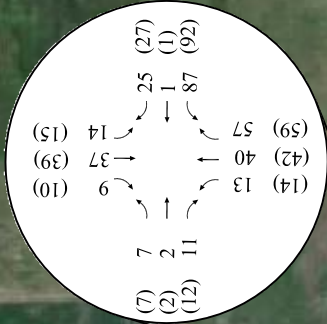
Year	SR 39		SR 39		RT 3469		RT 3468	
	AADT	Growth	AADT	Growth	AADT	Growth	AADT	Growth
2003	1985		3040		1813			
2004	1975	-1%	3320	9%	2830	56%		
2005	2005	2%	3160	-5%	2925	3%		
2006	2060	3%	4765	51%	3170	8%		
2007	1885	-8%	4680	-2%	3190	1%	500	
2008	1820	-3%	4555	-3%	3105	-3%	1040	108%
2009	1850	2%	4595	1%	3160	2%	1060	2%
2010	1870	1%	4515	-2%	3220	2%	1080	2%
2011	1955	5%	3950	-13%	2055	-36%	1075	0%
2012	1935	-1%	5595	42%	2015	-2%	1055	-2%
Average Growth		<b>-0.21%</b>		<b>8.78%</b>		<b>2.23%</b>		<b>0.37%</b>

**Table 3: Average Growth Rates and Growth Factors**

	Growth Rate	Years	Analysis Year	Growth Factor
Average Growth from 2014 - 2020	1.00%	1	2015	1.01
		6	2020	1.06

Background traffic is derived by multiplying the existing traffic by the growth factor. 2015/2020 Background Traffic is shown in Figure 5. Total traffic in the area for the future projection years is derived by adding the non-site volume forecasts to the site trip distribution. 2015/2020 Total Traffic is shown in Figure 6.

2015 <2020>



100 South (SR 39)

7800 East



TRANS 1993

Imagery Date: 8/11/2016 41°15'47.71" N 111°44'23.53" W

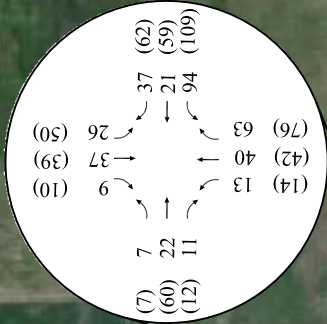
A-TRANS TRANSPORTATION ENGINEERING  
P.O. BOX 521651, SLC, UT 84152  
Phone: 801-949-0348 Fax: 801-582-6252

Figure 5

Background Traffic

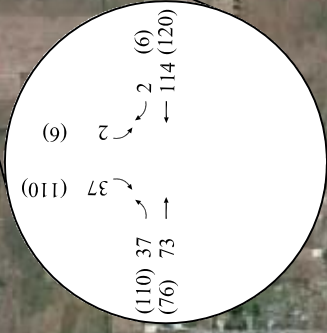
N.T.S.

2015 <2020>



100 South (SR 39)

7800 East



TRANS 1993

Imagery Date: 8/11/2016 41°15'47.71" N 111°44'23.53" W

A-TRANS TRANSPORTATION ENGINEERING  
 P.O. BOX 521651, SLC, UT 84152  
 Phone: 801-949-0348 Fax: 801-582-6252

Figure 6

Total Projected Traffic

N.T.S.



**VI. Traffic Analysis**

The 2010 Highway Capacity Manual defines the Level of Service (LOS) for both signalized and unsignalized intersections as a range of average experienced delay. LOS is a qualitative rating of traveler satisfaction from A to F whereby LOS A is good and LOS F poor. Table 4 shows the LOS range by delay for unsignalized and signalized intersections and accesses.

**Table 4: Intersection LOS-Delay Relationship**

	Unsignalized	Signalized
Level of Service	Total Delay per Vehicle (sec)	Total Delay per Vehicle (sec)
A	≤ 10.0	≤ 10.0
B	> 10.0 and ≤ 15.0	> 10.0 and ≤ 20.0
C	> 15.0 and ≤ 25.0	> 20.0 and ≤ 35.0
D	> 25.0 and ≤ 35.0	> 35.0 and ≤ 55.0
E	> 35.0 and ≤ 50.0	> 55.0 and ≤ 80.0
F	> 50.0	> 80.0

The intersection and access analysis evaluates the performance of each intersection and access using the measure of performance of delay and level of service (LOS). Table 5 and Table 6 show the intersection and access analysis.

The optimal location for the site access would be to align with 9200 South.

**Assumptions**

- Turning movement counts at 100 South/ 7800 East yield a peak hour factor of 0.81. This is assumed at the intersection and for through traffic at the access. A PHF of 0.5 was applied to access ingress and egress.
- The church was assumed to have one session that begins and ends within a single hour.
- Analysis was performed without a eastbound right turn lane for the access. The volumes warrant a left turn deceleration lane for a category 4 roadway but the analysis shows that operationally this is not necessary.
- ATR data along SR 39 show that October counts are 94.04% of the annual average.

**Analysis Results**

Based on the analysis, all intersections and accesses operate at a LOS A throughout the study period.

**Table 5: 100 South/ 7800 East Intersection Analysis**

	EBLTR		WBLTR		NBL		SBL	
2014 Existing	9.4	A	10.4	B	7.4	A	7.5	A
2015 Background	10.6	B	11.5	B	7.4	A	7.5	A
2015 Total	10.6	B	11.5	B	7.4	A	7.5	A
2020 Background	10.7	B	11.7	B	7.4	A	7.5	A
2020 Total	12.6	B	15	C	7.4	A	7.6	A

**Table 6: 100 South/ Access Intersection Analysis**

	EBL		SBLR	
2015 Total	3.7	A	9.5	A
2020 Total	6.0	A	11.1	B

### VII. Queue Length

Based on the projected traffic, queue storage length requirements can be determined. To determine if sufficient storage space exists to accommodate the projected demand, the intersection and accesses included in this traffic study are analyzed for queue storage capacity. The queue lengths are provided by the HCS analysis. Once the storage length is determined, this can typically be compared to the available storage length within the provided turn pockets or between intersections.

A minimum 100-foot storage at unsignalized intersections is recommended regardless of the queue analysis findings. Table 7 shows the minimum recommended queue storage length that should be provided based on the critical unsignalized and signalized calculation and projected traffic demand.

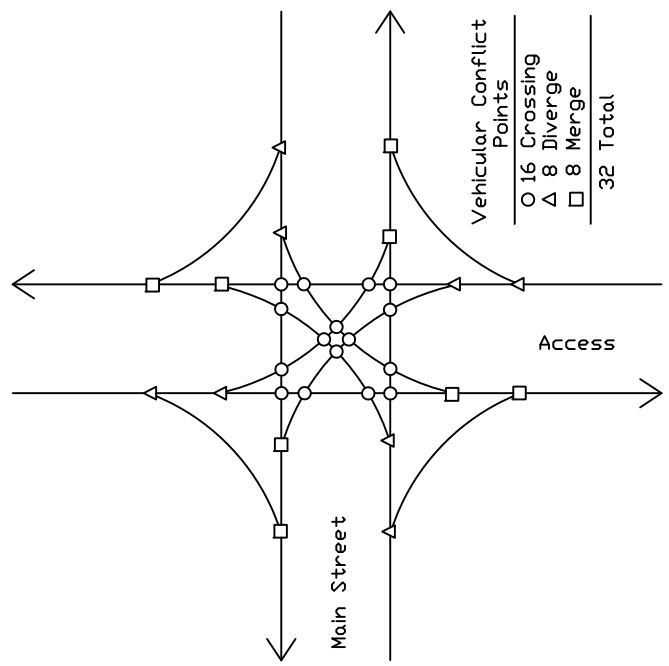
**Table 7: Queue Analysis**

	EB	WB	NB	SB
100 South/ 7800 East	100	100	100	100
100 South/ Access		100		100

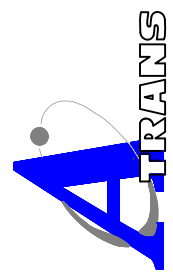
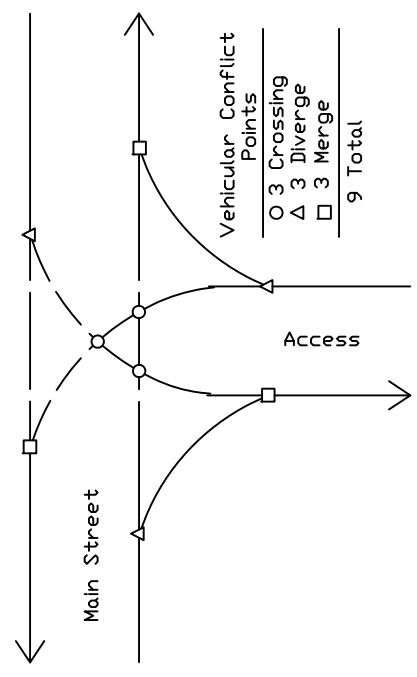
### VIII. Conflict Discussion

The addition of any new accesses will generate vehicular conflict movements. The conflict is generated when two or more movements interfere with each other. For example in a typical intersection northbound and westbound movements cannot proceed at the same time since they interfere with each other. The conflict movements are further classified into 3 categories: crossing, diverging, and merging. At a four-way, unsignalized intersection there are a total of 32 conflicting movements. At a three-way, full movement access, there are nine conflict points. Why the access locations relative to each other are important is because when these accesses get too close to one another, the number of additional or overlapping conflict points increases, thereby reducing safety. This is the safety premise behind the access management of roadway facilities (ITE Transportation and Land Development, 2<sup>nd</sup> edition). Figure 7 shows a conflict diagram.

Conflict Points at a Four-Way Intersection



Conflict Points Caused by the Proposed Accesses



**Figure 8: 7800 East/ 100 South Intersection**



## IX. Access and Roadway Requirements

The site is located along 100 South (SR 39) at approximately mile post 3.5 and has a posted speed limit of 55 MPH. SR 39 is a Category 4 roadway and is not a part of the National Highway System. Per Administrative Rule R930-6, roadway spacing is measured from end of radius to end of radius and a category 4 roadway has a recommended signal spacing of 2,640 feet, city street spacing of 660 feet and an access spacing of 500 feet. The recommended access location is to align with 9200 East. With the access location at 9200 East there are several residential accesses within 500 feet therefore a variance is required.

### Auxiliary Lane Requirements:

- (I) A left turn deceleration lane with taper and storage length is required for any access with a projected peak hour left ingress turning volume greater than 10 vehicles per hour. The taper length must be included in the required deceleration length.
- (II) A right turn deceleration lane and taper length is required for any access with a projected peak hour right ingress turning volume greater than 25 vehicles per hour. The taper length must be included in the required deceleration length.
- (III) A right turn acceleration lane and taper length is required for any access with a projected peak hour right turning volume greater than 50 vehicles per hour when the posted speed on the highway is greater than 40 mph. The taper length must be included in the required acceleration length. A right turn acceleration lane may also be required at a signalized intersection if a free-right turn is needed to maintain an appropriate level of service for the intersection.
- (IV) Right turn deceleration and acceleration lanes are generally not required on roadways with three or more travel lanes in the direction of the right turn.
- (V) A left turn acceleration lane may be required if it will be a benefit to the safety and operation of the roadway.
- (VI) A left turn acceleration lane is generally not required where the posted speed is less than 45 mph, the intersection is signalized, or the acceleration lane would interfere with the left turn ingress movements to any other access.

Per the requirements for a category 4 roadway a left turn deceleration lane is required.



## **X. Conclusion**

The Ogden Valley Community Church is located at 9228 East/ 100 South (SR 39) in Huntsville, Utah. The church is expected to meet on Sundays and have approximately 100 people and have meetings every other Thursday evening with about 10 people in attendance. The 20 year expected growth of the church is to a maximum occupancy of 295 patrons. The site is projected to generate 78 Sunday peak hour trips in 2015 and 232 Sunday peak hour trips at full build out. The site is planning one full motion accesses along 100 South.

All site accesses and included intersections operate with LOS A throughout the study period. The recommended access location is to align with 9200 East. With the access location at 9200 East there are several residential accesses within 500 feet therefore a variance is required. Per the requirements for a category 4 roadway a left turn deceleration lane is required, however the capacity analysis shows that the left ingress will operate with LOS A without the left turn ingress lane.



**APPENDICES**

Appendix A	Traffic Counts and Projections
Appendix B	Intersection Analyses
Appendix C	Access Analyses





## **Appendix A    Traffic Counts and Projections**

## AM PEAK HOUR VOLUMES

INTERSECTION: **7800 East** and **100 South**

Ped = 3

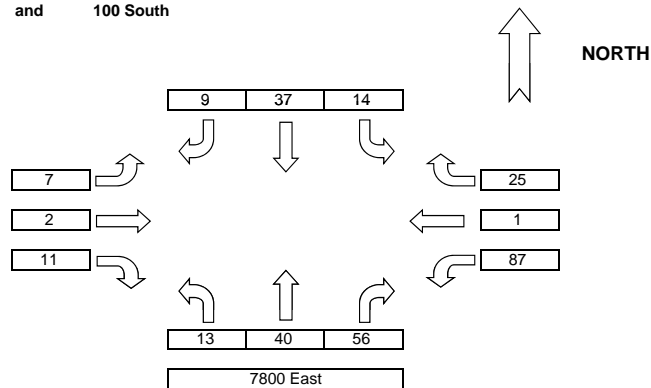
N-S STREET: **7800 East**  
E-W STREET: **100 South**

PK HR VOLUME:	302
PHF:	0.81
PEAK HOUR:	
FROM:	TO:
11:00 AM	12:00 PM

COUNT DATE: **October 12, 2014**  
Day of the Week: **Sunday**  
NOTES:

COUNT TIME:  
FROM: **11:00 AM**  
TO: **12:00 PM**

100 South



### AM Traffic

COUNT DATA INPUT:

Name: Julie

Name: Julie

Name: Julie

Name: Julie

TIME PERIOD	FROM:	TO:	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL 5' VOLUMES	TOTAL 15' VOLUMES	PEDESTRIAN	
			NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR			E/W	N/S
11:00 AM	11:05 AM	11:05 AM	3	2	4	2	0	1	1	3	3	5	0	2	26	74	0	2
11:05 AM	11:10 AM	11:10 AM	2	1	3	2	0	1	0	0	1	11	0	4	25	68	0	0
11:10 AM	11:15 AM	11:15 AM	2	0	5	0	0	1	2	4	0	6	0	3	23	59	0	0
11:15 AM	11:20 AM	11:20 AM	1	2	8	0	0	2	1	2	0	3	0	1	20	63	0	0
11:20 AM	11:25 AM	11:25 AM	1	5	2	1	0	0	1	1	0	3	0	2	16	68	0	0
11:25 AM	11:30 AM	11:30 AM	0	5	4	0	0	1	2	4	0	8	0	3	27	88	0	0
11:30 AM	11:35 AM	11:35 AM	0	5	6	1	0	0	1	3	2	7	0	0	25	91	0	0
11:35 AM	11:40 AM	11:40 AM	2	2	6	1	0	0	3	8	0	10	1	3	36	93	0	0
11:40 AM	11:45 AM	11:45 AM	1	4	8	0	1	1	0	3	0	10	0	2	30	85	0	0
11:45 AM	11:50 AM	11:50 AM	0	6	4	0	1	0	0	1	0	12	0	3	27	74	0	0
11:50 AM	11:55 AM	11:55 AM	0	8	5	0	0	1	2	3	2	5	0	2	28	47	1	0
11:55 AM	12:00 PM	12:00 PM	1	0	1	0	0	3	1	5	1	7	0	0	19	19	0	0

# Historic Growth

AADT from UDOT Traffic on Utah Highways

SR 39			SR 39		
Year	AADT	Growth	Year	AADT	Growth
2003	1985	#DIV/0!	2003	3040	#DIV/0!
2004	1975	-1%	2004	3320	9%
2005	2005	2%	2005	3160	-5%
2006	2060	3%	2006	4765	51%
2007	1885	-8%	2007	4680	-2%
2008	1820	-3%	2008	4555	-3%
2009	1850	2%	2009	4595	1%
2010	1870	1%	2010	4515	-2%
2011	1955	5%	2011	3950	-13%
2012	1935	-1%	2012	5595	42%
		<b>-0.21%</b>		<b>Avg</b>	<b>8.78%</b>

Rt 3469			SR 39		
Year	AADT	Growth	Year	AADT	Growth
2003	1813	#DIV/0!	2003		#DIV/0!
2004	2830	56%	2004		#DIV/0!
2005	2925	3%	2005		#DIV/0!
2006	3170	8%	2006		#DIV/0!
2007	3190	1%	2007	500	#DIV/0!
2008	3105	-3%	2008	1040	108%
2009	3160	2%	2009	1060	2%
2010	3220	2%	2010	1080	2%
2011	2055	-36%	2011	1075	0%
2012	2015	-2%	2012	1055	-2%
		<b>2.23%</b>		<b>Avg</b>	<b>0.37%</b>

1.00%	Growth Factor	Years	Analysis Year
	1.01	1	2015
	1.06	6	2020

# TRIP GENERATION

ITE 7th Ed	Size	Land Use	Trip Rate		Trips		In / Out %		New	
			SUN	Daily	AM	Daily	SUN	INSUN	Out	SUN
Church 2015	6.657	560	11.76	36.63	78	244	50%	50%	39	39
Church 2035	6.657	560	11.76	36.63	231	719	50%	50%	116	116
			0	0	0	0	0%	0%	0	0
			0	0	0	0	0%	0%	0	0
<b>Total</b>					<b>309</b>	<b>963</b>			<b>155</b>	<b>155</b>

Trip Distribution

100 South/ 7800 East			1.01		1.06		
	2014	2015	2020	2015	2015	2020	2020
AM	Existing	Site	Site	Background	Total	Background	Total
EBL	7			7	7	7	7
EBT	2	20	58	2	22	2	60
EBR	11			11	11	12	12
WBL	87	6	17	88	94	92	109
WBT	1	20	58	1	21	1	59
WBR	25	12	35	25	37	27	62
NBL	13			13	13	14	14
NBT	40			40	40	42	42
NBR	56	6	17	57	63	59	76
SBL	14	12	35	14	26	15	50
SBT	37			37	37	39	39
SBR	9			9	9	10	10

100 South/ Access			1.01		1.06		
	2014	2015	2020	2015	2015	2020	2020
AM	Existing	Site	Site	Background	Total	Background	Total
EBL		37	110	0	37	0	110
EBT	72			73	73	76	76
EBR				0	0	0	0
WBL				0	0	0	0
WBT	113			114	114	120	120
WBR		2	6	0	2	0	6
NBL				0	0	0	0
NBT				0	0	0	0
NBR				0	0	0	0
SBL		2	6	0	2	0	6
SBT				0	0	0	0
SBR		37	110	0	37	0	110























## **Appendix B    Intersection Analyses**

# HCM Unsignalized Intersection Capacity Analysis

## 3: 100 South & 7800 East

10/15/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	2	11	87	1	25	13	40	56	14	37	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	9	2	14	107	1	31	16	49	69	17	46	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	199	236	51	177	173	49	57			119		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	199	236	51	177	173	49	57			119		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	86	100	97	99			99		
cM capacity (veh/h)	724	650	1017	760	705	1019	1548			1470		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	25	140	16	49	69	17	57					
Volume Left	9	107	16	0	0	17	0					
Volume Right	14	31	0	0	69	0	11					
cSH	848	805	1548	1700	1700	1470	1700					
Volume to Capacity	0.03	0.17	0.01	0.03	0.04	0.01	0.03					
Queue Length 95th (ft)	2	16	1	0	0	1	0					
Control Delay (s)	9.4	10.4	7.4	0.0	0.0	7.5	0.0					
Lane LOS	A	B	A			A						
Approach Delay (s)	9.4	10.4	0.9			1.7						
Approach LOS	A	B										
Intersection Summary												
Average Delay			5.2									
Intersection Capacity Utilization			26.9%	ICU Level of Service	A							
Analysis Period (min)			15									

# HCM Unsignalized Intersection Capacity Analysis

## 3: 100 South & 7800 East

10/15/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↖	↗	↗	↖	↖
Volume (veh/h)	7	22	11	94	21	37	13	40	63	26	37	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	9	27	14	116	26	46	16	49	78	32	46	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	256	275	51	219	202	49	57			127		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	256	275	51	219	202	49	57			127		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	96	99	83	96	96	99			98		
cM capacity (veh/h)	631	612	1017	686	671	1019	1548			1459		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	49	188	16	49	78	32	57
Volume Left	9	116	16	0	0	32	0
Volume Right	14	46	0	0	78	0	11
cSH	691	743	1548	1700	1700	1459	1700
Volume to Capacity	0.07	0.25	0.01	0.03	0.05	0.02	0.03
Queue Length 95th (ft)	6	25	1	0	0	2	0
Control Delay (s)	10.6	11.5	7.4	0.0	0.0	7.5	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	10.6	11.5	0.8			2.7	
Approach LOS	B	B					

Intersection Summary	
Average Delay	6.5
Intersection Capacity Utilization	30.0%
ICU Level of Service	A
Analysis Period (min)	15



# HCM Unsignalized Intersection Capacity Analysis

## 3: 100 South & 7800 East

10/15/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↑	↖	↖	↘	↘
Volume (veh/h)	7	22	11	94	21	37	13	40	63	26	37	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	9	27	14	116	26	46	16	49	78	32	46	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	256	275	51	219	202	49	57			127		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	256	275	51	219	202	49	57			127		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	96	99	83	96	96	99			98		
cM capacity (veh/h)	631	612	1017	686	671	1019	1548			1459		

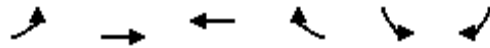
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	49	188	16	49	78	32	57
Volume Left	9	116	16	0	0	32	0
Volume Right	14	46	0	0	78	0	11
cSH	691	743	1548	1700	1700	1459	1700
Volume to Capacity	0.07	0.25	0.01	0.03	0.05	0.02	0.03
Queue Length 95th (ft)	6	25	1	0	0	2	0
Control Delay (s)	10.6	11.5	7.4	0.0	0.0	7.5	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	10.6	11.5	0.8			2.7	
Approach LOS	B	B					

Intersection Summary		
Average Delay		6.5
Intersection Capacity Utilization	30.0%	ICU Level of Service
Analysis Period (min)		15
		A

# HCM Unsignalized Intersection Capacity Analysis

## 7: 100 South & Access

10/15/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Volume (veh/h)	37	73	114	2	2	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.50	0.81	0.81	0.50	0.50	0.50
Hourly flow rate (vph)	74	90	141	4	4	74
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	145				381	143
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	145				381	143
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				99	92
cM capacity (veh/h)	1438				589	905

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	164	145	78
Volume Left	74	0	4
Volume Right	0	4	74
cSH	1438	1700	881
Volume to Capacity	0.05	0.09	0.09
Queue Length 95th (ft)	4	0	7
Control Delay (s)	3.7	0.0	9.5
Lane LOS	A		A
Approach Delay (s)	3.7	0.0	9.5
Approach LOS			A

Intersection Summary			
Average Delay		3.5	
Intersection Capacity Utilization	22.6%		ICU Level of Service A
Analysis Period (min)	15		

# HCM Unsignalized Intersection Capacity Analysis

## 3: 100 South & 7800 East

10/15/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↑	↖	↖	↗	↗
Volume (veh/h)	7	22	12	98	21	39	14	42	65	27	39	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	9	27	15	121	26	48	17	52	80	33	48	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	269	288	54	230	214	52	60			132		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	269	288	54	230	214	52	60			132		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	95	99	82	96	95	99			98		
cM capacity (veh/h)	616	601	1013	672	661	1016	1543			1453		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	51	195	17	52	80	33	60
Volume Left	9	121	17	0	0	33	0
Volume Right	15	48	0	0	80	0	12
cSH	685	732	1543	1700	1700	1453	1700
Volume to Capacity	0.07	0.27	0.01	0.03	0.05	0.02	0.04
Queue Length 95th (ft)	6	27	1	0	0	2	0
Control Delay (s)	10.7	11.7	7.4	0.0	0.0	7.5	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	10.7	11.7	0.9			2.7	
Approach LOS	B	B					

Intersection Summary		
Average Delay		6.5
Intersection Capacity Utilization	30.4%	ICU Level of Service
Analysis Period (min)		15
		A

# HCM Unsignalized Intersection Capacity Analysis

## 3: 100 South & 7800 East

10/15/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↖	↗	↖	↖	↗
Volume (veh/h)	7	60	12	109	59	62	14	42	76	50	39	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	9	74	15	135	73	77	17	52	94	62	48	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	377	358	54	310	270	52	60			146		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	377	358	54	310	270	52	60			146		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	86	99	75	88	92	99			96		
cM capacity (veh/h)	467	538	1013	544	602	1016	1543			1436		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	98	284	17	52	94	62	60
Volume Left	9	135	17	0	0	62	0
Volume Right	15	77	0	0	94	0	12
cSH	571	640	1543	1700	1700	1436	1700
Volume to Capacity	0.17	0.44	0.01	0.03	0.06	0.04	0.04
Queue Length 95th (ft)	15	57	1	0	0	3	0
Control Delay (s)	12.6	15.0	7.4	0.0	0.0	7.6	0.0
Lane LOS	B	C	A			A	
Approach Delay (s)	12.6	15.0	0.8			3.8	
Approach LOS	B	C					

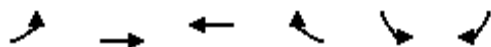
### Intersection Summary

Average Delay	9.1
Intersection Capacity Utilization	35.7%
ICU Level of Service	A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 7: 100 South & Access

10/15/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Volume (veh/h)	110	76	120	6	6	110
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.50	0.81	0.81	0.50	0.50	0.50
Hourly flow rate (vph)	220	94	148	12	12	220
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	160				688	154
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	160				688	154
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	84				97	75
cM capacity (veh/h)	1419				348	892

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	314	160	232
Volume Left	220	0	12
Volume Right	0	12	220
cSH	1419	1700	825
Volume to Capacity	0.16	0.09	0.28
Queue Length 95th (ft)	14	0	29
Control Delay (s)	6.0	0.0	11.1
Lane LOS	A		B
Approach Delay (s)	6.0	0.0	11.1
Approach LOS			B

Intersection Summary			
Average Delay		6.3	
Intersection Capacity Utilization		33.9%	ICU Level of Service
Analysis Period (min)		15	A