

# YOUTH WITH A MISSION SALEM CAMPUS EXPANSION

## TRANSPORTATION IMPACT STUDY

DECEMBER 2020

PREPARED FOR YOUTH WITH A MISSION SALEM

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## INTRODUCTION

This study evaluates the transportation impacts associated with the proposed expansion of the Youth with A Mission (YWAM) Salem Campus located on Battle Creek Road SE in Marion County, Oregon. The campus expansion will be implemented in multiple phases. However, this study considers full buildout only, which has been assumed to occur by 2025. Depending on circumstances, full buildout could take longer.

As proposed, the impact to the surrounding traffic system can be mitigated through the mitigation measures outlined herein. As mitigated, the expansion of the campus will not have a significant impact on the surrounding transportation system.

The purpose of this transportation impact analysis is to identify potential mitigation measures needed to offset impacts that the proposed expansion may have on the nearby transportation network. The impact analysis is focused on three study intersections, which were selected for evaluation in coordination with Marion County.<sup>1</sup> The study intersections are listed below:

- YWAM Existing Site Access Road/Battle Creek Road SE
- Delaney Road SE/Battle Creek Road SE
- Delaney Road SE/Parrish Gap Road SE

Table 1 on the following page lists important characteristics of the study area and proposed project.

**TABLE 1: KEY STUDY AREA AND PROPOSED DEVELOPMENT CHARACTERISTICS**

CHARACTERISTICS	INFORMATION
<b>STUDY AREA</b>	
NUMBER OF STUDY INTERSECTIONS	Three
ANALYSIS PERIOD	Weekday AM and PM Peak Hours (Peak hours are one hour between 7-9 AM and 4-6 PM, respectively)
<b>PROJECT SITE</b>	
EXISTING LAND USE	YWAM Salem Campus
PROPOSED DEVELOPMENT	Expansion of existing campus facilities including additional housing/dorms, an RV site, expanded dining and kitchen spaces, a new assembly hall, and sports field.
PROPOSED PROJECT ACCESSES	One existing full-access driveway on Battle Creek Road SE

<sup>1</sup> Email correspondence with Janelle Shanahan and Lani Radtke on June 18, 2020.

## EXISTING CONDITIONS

This chapter provides documentation of existing study area conditions, including the study area roadway network, pedestrian and bicycle facilities, and existing traffic volumes and operations. Supporting details for volumes and operations are provided in the appendix.

### STUDY AREA ROADWAY NETWORK

Key roadways in the study area are summarized in Table 2 along with their existing roadway characteristics. The functional classification of Battle Creek Road SE, Delaney Road SE, and Parrish Gap Road SE are found in the Marion County Rural Transportation System Plan.<sup>2</sup>

**TABLE 2: STUDY AREA ROADWAY CHARACTERISTICS (WITHIN THE VICINITY OF THE PROJECT)**

ROADWAY	CLASSIFICATION	NO. OF LANES	POSTED SPEED	SIDWALKS	BIKE FACILITIES	ON-STREET PARKING
BATTLE CREEK ROAD SE	Major Collector	2	Not Posted	No	No	No
DELANEY ROAD	Arterial	2	55 mph	No	No	No
PARRISH GAP ROAD	Minor Collector	2	Not Posted	No	No	No

### PEDESTRIAN AND BICYCLE FACILITIES

The project site is located in rural Marion County and there are no pedestrian or bicycle facilities on the study roadways.

### PUBLIC TRANSIT

There are no bus stops within 3 miles of the project site. There is one bus route provided by Cherriots that passes by the project site, Route 30X. This route provides service between Downtown Salem and Mill City.

### SAFETY PERFORMANCE

A crash analysis for the study area was conducted based on the most recent five years (2014 - 2018) of collision data available. Collision data was obtained from the ODOT Crash Analysis

<sup>2</sup> Figure 5-1, Marion County Rural Transportation System Plan, Updated 2005.

Reporting Unit website.<sup>3</sup> There were a total of seven collisions at the Delaney Road/Parrish Gap Road intersection and six collisions at the Delaney Road/Battle Creek Road intersection.

At the Delaney Road/Parrish Gap intersection, there was one fatal crash that occurred in 2016 in which a northbound left-turning vehicle failed to yield to the eastbound through vehicle on Delaney Road. The crash occurred during the daytime when it was raining. Five of the remaining six crashes were also turning related. One crash was a fixed object crash in which a northbound left turning vehicle ended up in the ditch on the north side of the intersection.

Of the six total crashes that occurred at the Delaney Road/Battle Creek Road intersection in the last five years (2014 – 2018), three resulted in a vehicle landing in the ditch on the south side of the intersection and two resulted in a vehicle hitting the bridge guardrail.

Table 3 summarizes the collision data for each intersection. As shown, both study intersections have calculated collision rates much higher than the 90th percentile collision rates.

**TABLE 3: 2014 -2018 ODOT COLLISION SEVERITY BY LOCATION**

INTERSECTION	COLLISIONS BY SEVERITY (5-YEAR)						COLLISIONS PER YEAR	CALCULATED COLLISION RATE <sup>A</sup>	90TH PERCENTILE COLLISION RATE
	FATAL	INJ. A	INJ. B	INJ. C	PDO	TOTAL			
<b>DELANEY RD/ PARRISH GAP RD</b>	1	0	0	1	5	7	1.4	<b>0.814</b>	0.475
<b>DELANEY RD/ BATTLE CREEK RD</b>	0	0	0	1	5	6	1.2	<b>0.828</b>	0.475

**BOLD/HIGHLIGHTED** = CALCULATED RATE EXCEEDS THE 90TH PERCENTILE RATE

<sup>A</sup> RATE CALCULATION = COLLISIONS / (AVERAGE DAILY TRAFFIC X 365 DAYS X NUMBER OF YEARS / 1 MILLION)  
[UNITS: CRASHES PER MILLION ENTERING VEHICLES]

A safety improvement project is currently being designed for the intersection of Delaney Road and Battle Creek Road. The project will replace the existing bridge on Delaney Road over Battle Creek and includes various intersection and roadway upgrades to improve traffic flow and safety. No additional safety improvements are recommended.

At the intersection of Delaney Road and Parrish Gap Road, there are several low-cost countermeasures that could improve safety.

- Install larger (or additional) Stop signs
- Install Stop Ahead pavement markings
- Install double-wide Stop bars
- Increase retro reflectivity of Stop signs

<sup>3</sup><https://zigzag.odot.state.or.us/>

## EXISTING TRAFFIC VOLUMES

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Existing AM and PM peak hour traffic operations were analyzed at the following study intersections.

- YWAM Existing Site Access Road/Battle Creek Road SE (minor street stop-controlled)
- Delaney Road SE/Battle Creek Road SE (stop-controlled southbound approach and stop-controlled eastbound left)
- Delaney Road SE/Parrish Gap Road SE (minor street stop-controlled)

Due to the COVID-19 closures of businesses and schools, current traffic counts were not able to be collected. Therefore, historical intersection turn movement counts at the two Delaney Road intersections (Battle Creek Road and Parrish Gap Road) from a previous transportation impact study<sup>4</sup> were utilized for this Impact analysis and were factored to represent 2020 typical traffic conditions. Using the Salem Keizer Area Transportation Study (SKATS) travel demand model, the estimated average annual growth on study area roadways is 3% per year from 2017 to 2043. This average annual growth rate of 3% was applied to the 2017 traffic counts to estimate 2020 volumes.

It should be noted that no historical traffic counts were available at the YWAM Existing Site Access/Battle Creek Road intersection. Therefore, traffic volumes were developed for that intersection based on knowledge of the existing campus operations. The existing campus operations and traffic-related assumptions are discussed in the following section.

## EXISTING YWAM CAMPUS OPERATIONS

- The YWAM campus facilitates a variety of educational programs that last between one week and three months at a time.
- Site generated traffic volumes differ for a "Typical Day" and a "Peak Day". "Peak Days" occur 4-6 times per year, at the start or end of programs. The four highest volume days occur when students arrive for the largest educational program (once per quarter). Students can arrive over the course of a full week; however, a large portion of students arrive on a Wednesday ("Peak Day"). It was conservatively assumed that half of the students arrive on a peak day and half of those peak day trips arrive during the AM peak hour. Some students arrive in their personal vehicle while other arrive via bus or are dropped off by family.
- As part of the educational programs, all students reside on-campus and do not generate "commuter" type vehicle trips during the peak hours. Classes and school activities end at 5:00 p.m. each weekday. Some students and on-site staff leave to get dinner, run errands, etc. in the evening on a typical day.

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<sup>4</sup> YWAM Base Expansion Transportation Impact Analysis, Associated Transportation Engineering & Planning, Inc., March 1, 2017.

- Approximately 60% of existing staff (55 people) currently reside on-campus while the remaining 40% (40 people) reside off-campus. Off-campus staff generate inbound vehicle trips in the morning and outbound vehicle trips in the evening.
- The campus currently has capacity for approximately 120 students and 95 staff.
- On average, there are about 25 deliveries and 5 visitors to the campus per day.
- The majority of student and staff traffic is oriented to/from the north (Salem).

#### EXISTING YWAM CAMPUS TRIP GENERATION

Trip generation is the method used to estimate the number of vehicles added to site roadways and the adjacent roadway network by a development during a specified period (e.g. the PM peak hour). Table 4 provides the existing campus trip generation estimates based on staff-described operations. As shown, the campus currently generates the following number of trips:

- Typical Day: 60 AM peak hour trips and 47 PM peak hour trips
- Peak Day: 110 AM peak hour trips and 72 PM peak hour trips.

**TABLE 4: YWAM CURRENT TRIP GENERATION**

	QUANTITY	AM PEAK HOUR TRIPS			PM PEAK HOUR TRIPS			DAILY WEEKDAY TRIPS
		IN	OUT	TOTAL	IN	OUT	TOTAL	
STUDENTS	120	0	0	0	0	5	5	30
ON-SITE STAFF	55	0	0	0	0	2	2	10
OFF-SITE STAFF	40	40	10	50	0	30	30	120
GUESTS/DELIVERIES	25	5	5	10	5	5	10	60
"TYPICAL DAY" TOTAL		45	15	60	5	42	47	220
STUDENTS	120	30	20	50	10	20	30	160
ON-SITE STAFF	55	0	0	0	0	2	2	10
OFF-SITE STAFF	40	40	10	50	0	30	30	120
GUESTS/DELIVERIES	25	5	5	10	5	5	10	60
"PEAK DAY" TOTAL		75	35	110	15	57	72	350

#### Comparison to Alternate Trip Generation Methods

Typically, trip generation data from the Institute of Transportation Engineers (ITE) Trip Generation Manual would be used to estimate the traffic volume generated by a development. However, none of the land uses provided in the Trip Generation Manual capture the nature of the YWAM campus, which includes a variety of facility types all intended for use by patrons already on-site. The most

similar land use types, a community college or high school, are applicable to much larger sites (average enrollment of 11,900 and 1,500, respectively) and it would not be appropriate to apply those trip generation estimates to a small site like YWAM. Therefore, the Trip Generation Manual was not applied, but the estimated trips from relevant land uses are shown in Table 5 for comparison purposes.

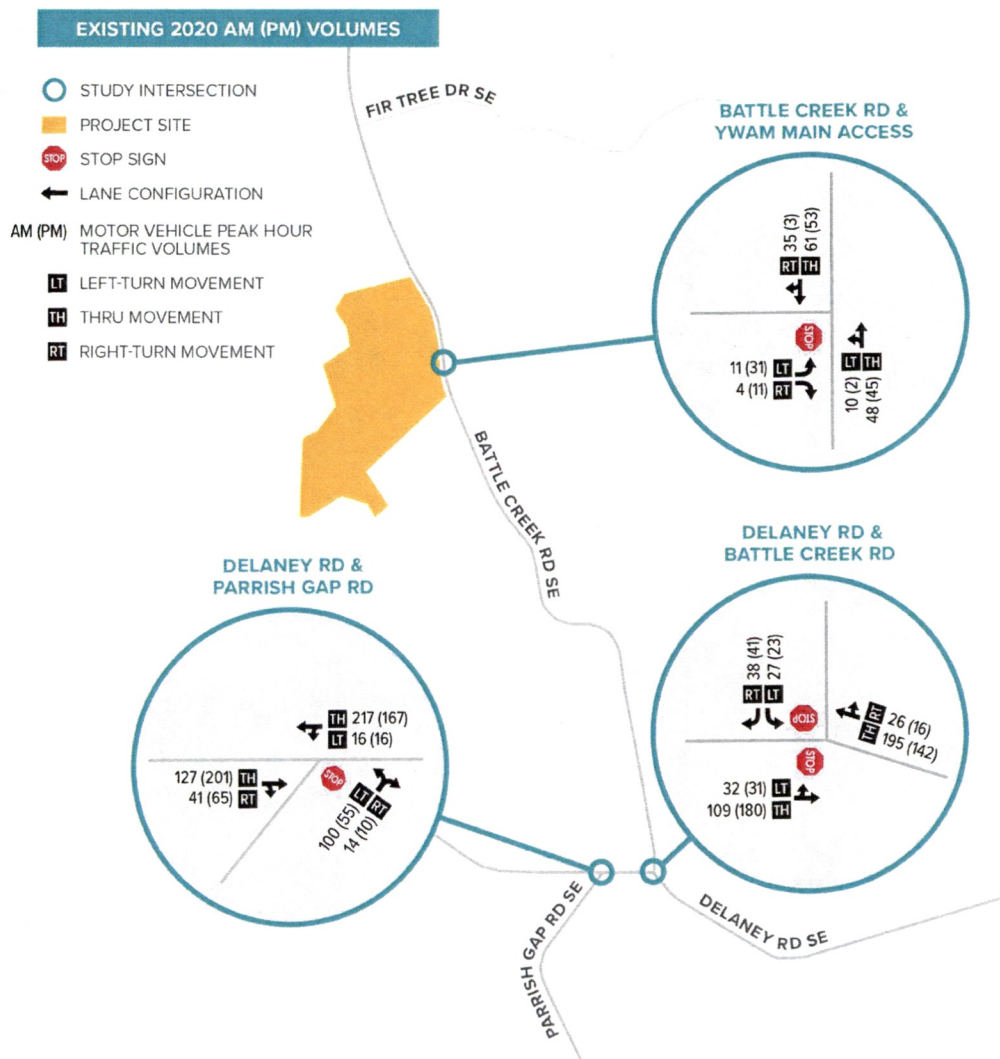
**TABLE 5: ITE TRIP GENERATION (FOR COMPARISON ONLY)**

LAND USE (ITE CODE)	QUANTITY	AM PEAK HOUR TRIPS			PM PEAK HOUR TRIPS			DAILY WEEKDAY TRIPS
		IN	OUT	TOTAL	IN	OUT	TOTAL	
<b>LOW RISE APARTMENTS (221)</b>	63 Dwelling Units	6	16	22	17	11	28	342
<b>CAMPGROUND/RV PARK (416)</b>	63 Occupied Camp Sites	5	8	13	12	6	18	-
<b>HIGH SCHOOL (530)</b>	120 students	41	21	62	8	9	17	244
<b>COMMUNITY COLLEGE (540)</b>	120 students	10	3	13	7	6	13	138

As shown in the table above, none of the individual land uses listed would generate more vehicle trips than what is shown in Table 4 for either the AM peak hour, PM peak hour, or a weekday when compared to the "Peak Day" trip generation in Table 4. If one of these land uses was evaluated to represent YWAM trip generation for this impact analysis, it would result in lower trip generation estimates and would not change the findings of the analysis.

The 2020 existing traffic volumes for a "Typical Day" are shown in Figure 1 on the following page. These volumes were used in the existing operating conditions analysis presented in this section (Table 6).





**FIGURE 1: EXISTING "TYPICAL DAY" AM AND PM PEAK HOUR VOLUMES**

## INTERSECTION PERFORMANCE MEASURES

Level of service (LOS) ratings and volume-to-capacity (v/c) ratios are two commonly used performance measures that provide a good picture of intersection operations.

- **Level of Service (LOS):** A "report card" rating (A through F) based on the average delay experienced by vehicles at the intersection. LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity.

- **Volume-to-capacity (v/c) ratio:** A decimal representation (typically between 0.00 and 1.00) of the proportion of capacity that is being used at a turn movement, approach leg, or intersection. It is determined by dividing the peak hour traffic volume by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases, and performance is reduced. If the ratio is greater than 1.00, the turn movement, approach leg, or intersection is oversaturated and usually results in excessive queues and long delays.

## REQUIRED OPERATING STANDARDS

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The study intersections are located within Marion County jurisdiction. All three intersections were analyzed as two-way stop controlled. The County's public work department states the following regarding operating standards.<sup>5</sup>

- All signalized and all-way stop controlled intersections shall operate at a Level of Service D or better (all individual movements shall operate at LOS E or better) with a Volume/Capacity ratio of 0.85 or less. **(Not applicable)**
- Other unsignalized intersections (including unsignalized private accesses) shall operate at **Level of Service E or better**, although LOS F may be allowed if the movement has a relatively low volume (as determined by County staff) and there is no indication that a safety problem will be created.

## EXISTING OPERATING CONDITIONS

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Existing traffic operations at the study intersections were determined for the AM and PM peak hours based on the Highway Capacity Manual (HCM) 6th Edition methodology for unsignalized intersections.<sup>6</sup> The results were then compared with the Marion County minimum acceptable LOS operating standard of LOS E or better. Table 6 on the following page lists the existing v/c ratio, delay, and LOS of each study intersection.

It should be noted that the intersection of Delaney Road/Battle Creek Road has stop signs on the southbound and eastbound approaches with a "Right Turn Permitted Without Stopping" sign on the eastbound right turn. In order to analyze the intersection operations in Synchro, the intersection was assumed to be stop-controlled on the southbound approach (Battle Creek Road) only.

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<sup>5</sup> Marion County Dept. of Public Works, TIA Requirements, Methodologies and Analysis Parameters.

<sup>6</sup> Highway Capacity Manual, 6th Edition, Transportation Research Board, 2016.

**TABLE 6: EXISTING INTERSECTION OPERATIONS – “TYPICAL DAY”**

STUDY INTERSECTION	OPERATING STANDARD	AM PEAK HOUR			PM PEAK HOUR		
		V/C RATIO	DELAY (SECS)	LOS	V/C RATIO	DELAY (SECS)	LOS
DELANEY RD/ PARRISH GAP RD	LOS E	0.32	15.5	A/C	0.14	12.7	A/B
DELANEY RD/ BATTLE CREEK RD	LOS E	0.08	13.2	A/B	0.05	12.0	A/B
BATTLE CREEK RD/ YWAM SITE DRIVEWAY	LOS E	0.03	9.5	A/A	0.05	9.2	A/A

**TWO-WAY STOP CONTROLLED INTERSECTION:**

v/c = Critical Movement Volume-to-Capacity Ratio

Delay = Critical Movement Approach Delay (sec.)

LOS = Level of Service (Major/Minor Road)

As shown, the existing intersection operations for all of the study intersections meet the County’s operating standards.

## PROJECT IMPACTS

This section reviews the impacts that the proposed YWAM campus expansion may have on the surrounding transportation network. This analysis includes a site plan evaluation, trip generation, trip distribution, and future year traffic volumes and operating conditions.

### PROPOSED DEVELOPMENT

The proposed expansion of the YWAM Salem campus is expected to be built in phases. The overall expansion will consist of the addition of student, staff, and couples housing, parking for recreational vehicles, expanded kitchen and dining rooms, a new assembly hall, and a sports field. The expansion will accommodate an additional 180 students. There is a proposed site driveway north of the existing driveway.

### TRIP GENERATION

As discussed in the *Existing Traffic Volumes* section, the trip generation for this impact analysis was based on knowledge of the existing campus operations and not using the ITE Trip Generation Manual. The campus expansion will increase the capacity of the site to accommodate an additional 180 students and 70 more staff (40 on-site and 30 off-site).

The net increase in trip generation for the campus expansion was calculated based on the existing traffic patterns and a proportional increase in students and staff. For example, the number of students is currently 120 students, which generate 30 trips on a typical day and 160 trips on a peak day. The expansion will add capacity for another 180 students, which is 150% of the current

capacity. Therefore, the additional students will generate an estimated net increase of 46 (30 x 1.50) typical daily trips and 240 (160 x 1.50) peak daily trips. This same method was applied to the daily and peak hour trip generation for students, on-site staff, and off-site staff. The expansion is expected to double the number of deliveries /guests.

**TABLE 7: YWAM EXPANSION TRIP GENERATION**

	QUANTITY	AM PEAK HOUR TRIPS			PM PEAK HOUR TRIPS			DAILY WEEKDAY TRIPS
		IN	OUT	TOTAL	IN	OUT	TOTAL	
STUDENTS	180	0	0	0	0	8	8	46
ON-SITE STAFF	40	0	0	0	0	2	2	8
OFF-SITE STAFF	30	30	8	38	0	23	23	90
GUESTS/DELIVERIES	25	5	5	10	5	5	10	60
<b>"TYPICAL DAY" TOTAL</b>		<b>35</b>	<b>13</b>	<b>48</b>	<b>5</b>	<b>38</b>	<b>43</b>	<b>204</b>
STUDENTS	180	45	30	75	15	30	45	240
ON-SITE STAFF	40	0	0	0	0	2	2	8
OFF-SITE STAFF	30	30	8	38	0	23	23	90
GUESTS/DELIVERIES	25	5	5	10	5	5	10	60
<b>"PEAK DAY" TOTAL</b>		<b>80</b>	<b>43</b>	<b>123</b>	<b>20</b>	<b>60</b>	<b>80</b>	<b>398</b>

## TRIP DISTRIBUTION

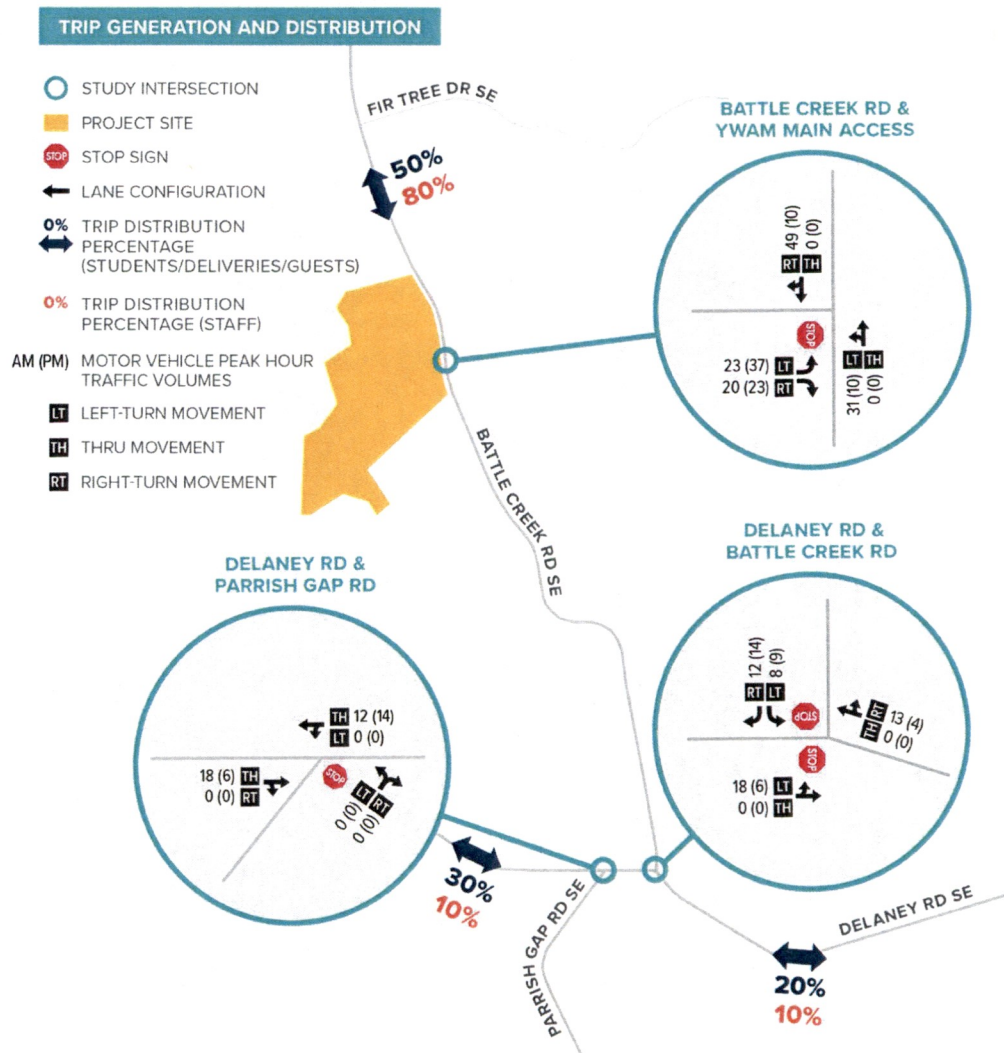
Trip distribution provides an estimate of where project-related trips would be coming from and going to. It is given as percentages at key gateways to the study area and is used to route project trips through the study intersections.

Based on the existing evening traffic counts, the distribution of existing traffic on Battle Creek Road is 20% to the north and 80% to the south. However, this is heavily influenced by commuter traffic between Salem and neighboring communities (traveling to Salem in the morning and leaving Salem in the evening). Per previous discussion about the campus operations, YWAM traffic is also oriented to/from Salem, but in opposite patterns (arriving from Salem in the morning, departing to Salem in the evening).

In an effort to conservatively estimate potential traffic impacts at the two study intersections located south of YWAM, a trip distribution of 50% to the north and 50% to the south on Battle Creek Road was applied to the student, guest, and delivery trips. A trip distribution of 80% to the north and 20% to the south on Battle Creek Road was applied to the staff trips (nearly all current

staff commute to and from Salem). Figure 3 shows both of the expected trip distributions and the project trip routing for the traffic generated by the campus expansion.

It should be noted that all of the project trips were assumed to use the existing site driveway (main access) on Battle Creek Road (worst case scenario). The proposed site driveway north of the existing driveway will primarily be used for the RV park, which will generate very low traffic volumes (a few trips per week).



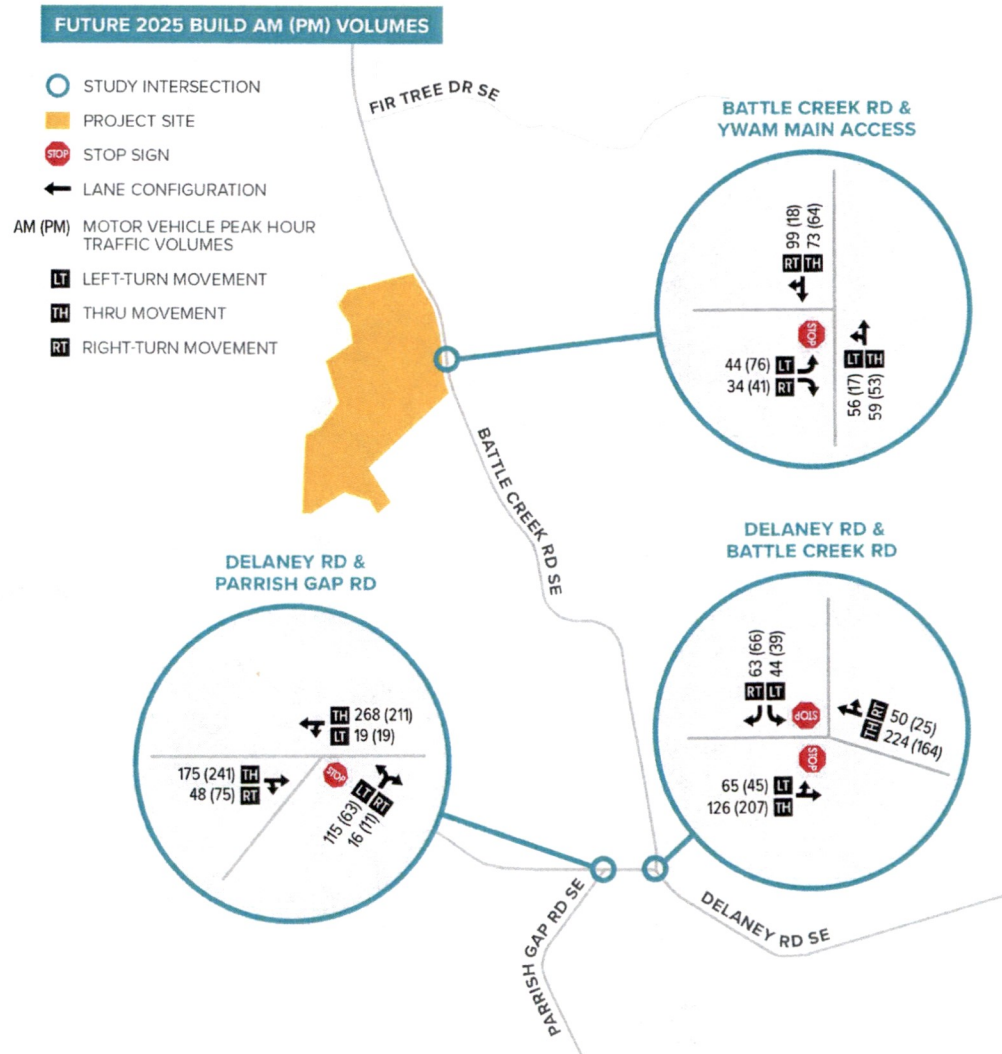
**FIGURE 2: TRIP DISTRIBUTION AND "PEAK DAY" PROJECT TRIPS**

## FUTURE ANALYSIS

Future operating conditions were analyzed at the study intersections on a "Peak Day" for the 2025 Build scenario. This scenario was selected as it represents the highest level of traffic generated by the YWAM Salem campus.



The traffic volumes for future year 2025 Build scenario were estimated by adding on five years of background growth (using an average annual growth rate of 3%) to the 2020 existing volumes in addition to the project trips associated with the campus expansion. These volumes are shown in Figure 3 on the following page.



**FIGURE 3: FUTURE BUILD "PEAK DAY" AM AND PM PEAK HOUR VOLUMES (2025)**

## FUTURE INTERSECTION OPERATIONS

Future traffic operations at the study intersections were determined for the AM and PM peak hour based on the Highway Capacity Manual (HCM) 6th Edition methodology for unsignalized intersections. Table 8 on the following page lists the estimated v/c ratio, delay, and LOS of each study intersection for the future 2025 Build scenario on a "Peak Day".

**TABLE 8: FUTURE 2025 BUILD INTERSECTION OPERATIONS – “PEAK DAY”**

STUDY INTERSECTION	OPERATING STANDARD	AM PEAK HOUR			PM PEAK HOUR		
		V/C RATIO	DELAY (SECS)	LOS	V/C RATIO	DELAY (SECS)	LOS
DELANEY RD/ PARRISH GAP RD	LOS E	0.46	21.0	A/C	0.19	14.4	A/B
DELANEY RD/ BATTLE CREEK RD	LOS E	0.18	17.1	A/C	0.10	13.5	A/B
BATTLE CREEK RD/ YWAM SITE DRIVEWAY	LOS E	0.17	11.5	A/B	0.16	10.0	A/B

**TWO-WAY STOP CONTROLLED INTERSECTION:**

v/c = Critical Movement Volume-to-Capacity Ratio

Delay = Critical Movement Approach Delay (sec.)

LOS = Level of Service (Major/Minor Road)

As shown in the table above, all study intersections meet the County operating standard of LOS E under the 2025 Build scenario for a “Peak Day”, with an average delay per vehicle of less than 15 seconds. Because this scenario has the highest level of traffic volumes, operations were not reported for a “Typical Day”.

**SITE PLAN EVALUATION**

The following site plan evaluation is based on the draft site plan provided by YWAM. The site plan can be found in the appendix.

**SITE ACCESSSES**

There is one existing site driveway (main access) on Battle Creek Road. It is recommended that YWAM consider installing additional lighting or delineation near the main access and coordinate with Marion County about the potential for guide signage. The addition of lighting and guide signage will improve safety and make the campus entrance easier to find. Guide signage along Battle Creek Road (blue signs for key destinations) may also help visitors locate the property and site access, reducing the safety risks that unfamiliar drivers can introduce (slow speeds, distraction while navigating, and sudden stops).

**ON-SITE CIRCULATION**

The proposed site plan shows the on-site vehicular circulation. At the main entrance, vehicles must pass the info center and the security gates. Beyond the security gates and to the north, there is access to a large parking lot, the assembly hall, and classrooms. If vehicles continue to the west, the internal roadway splits to the north and south taking vehicles to various facilities on the campus. All of the drive aisles on-site are shown as 24’ wide, which is a sufficient width for two-way traffic.

On-site sidewalks and marked crosswalks are shown on the proposed site plan at key pedestrian connections between buildings. The on-site circulation appears to be sufficient for all modes of travel.

### **SIGHT DISTANCE**

There is one existing site driveway (main access) on Battle Creek Road and there are no proposed changes to its location or function. The required intersection sight distance needed for left-turning vehicles to make a safe turn is 500 feet (based on a speed of 45 mph).<sup>7</sup> A preliminary sight distance evaluation was completed at the existing site driveway and the available sight distance exceeds the minimum required.

### **PROJECT FRONTAGE**

The project site frontage on Battle Creek Road (Major Collector) is required to meet Marion County's rural geometric cross section standards.<sup>8</sup> The cross section standards for a rural collector road includes two 11' travel lanes and 5' gravel shoulders. Currently, the project site frontage along Battle Creek Road meets these cross-section requirements.

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<sup>7</sup>A Policy on Geometric Design of Highways and Streets, 7th Edition, AASHTO, 2018.

<sup>8</sup> Table 2, Engineering Standards, Marion County Public Works Department, Adopted April 11, 1990.



## PROJECT SUMMARY

The Salem campus of Youth With a Mission (YWAM) is proposing an expansion to accommodate future growth and improved facilities. Although the expansion will occur in phases, this traffic impact analysis evaluated full buildout of the expansion, which is expected to occur by 2025.

- The campus expansion will increase the capacity of the campus by 180 students and 70 staff. The proposed expansion will generate the following estimated net increase in traffic:
  - Typical Day: 48 AM peak hour trips and 43 PM peak hour trips
  - Peak Day: 123 AM peak hour trips and 80 PM peak hour trips.
- All study intersections meet County operating standards for a Peak Day in 2025. No mitigations are recommended.
- The intersection of Delaney Road/Battle Creek Road has a higher than expected frequency of crashes (based on 2014-2018 crash data). Marion County is currently designing upgrades to this intersection to improve traffic flow and safety. The amount of traffic added to this intersection by the YWAM expansion is not likely to have a significant effect on the safety performance of the intersection. No additional mitigations are recommended.
- The intersection of Delaney Road/Parrish Gap Road has a higher than expected frequency of crashes (based on 2014-2018 crash data). The amount of traffic added to this intersection by the YWAM expansion is not likely to have a significant effect on the safety performance of the intersection. However, because no improvement projects are planned by the County, it is recommended that YWAM coordinate with Marion County to facilitate installation of one or more low-cost safety countermeasures (signing and striping).
- To improve safety at the existing main access, it is recommended that additional lighting, delineation, and/or signing be installed to improve visibility of the access. Guide signage along Battle Creek Road (blue signs for key destinations) may also help visitors locate the property and site access, reducing the safety risks that unfamiliar drivers can introduce (slow speeds, distraction while navigating, and sudden stops).

APPENDIX

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## APPENDIX A: TRAFFIC COUNT DATA

# **Traffic Impact Analysis YWAM Base Expansion**

Marion County, Oregon

March 2, 2017

completed with  
MultiTech Engineering Services, Inc  
Salem, Oregon

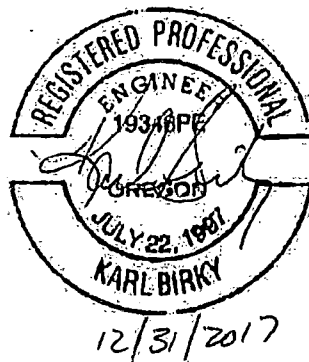
Prepared by:  
Associated Transportation Engineering & Planning, Inc.  
Salem, Oregon  
March 1, 2017  
16-340 YWAM Base Expansion TIA



# **Traffic Impact Analysis YWAM Base Expansion**

Marion County, Oregon

March 2, 2017



completed with  
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16-340 YWAM Base Expansion TIA



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## Appendices

Turning Movement Counts

ODOT Crash Data

Computer Modeling Printouts are on the enclosed CD

## Traffic Impact Analysis YWAM Base Expansion Marion County, Oregon



### Introduction:

Youth with a Mission (YWAM) Oregon base intends to expand on its existing site. Located on tax lots 100, 300, 400, 500, 600, 700, 800 and 1001 of tax map 8S3W25B in Marion County, Oregon, the 31.7 acre site is west of Battle Creek Rd and north of Delaney Rd in Marion County. The site will be expanded with access to Battlecreek Rd using the existing site access.

Residents of the YWAM base will use the Marion County transportation system and add traffic to the roadways. This analysis will consider the traffic impacts at the intersections of 1) The site access at Battle Creek Rd 2) Battle Creek Rd at Delaney Rd and 3) Delaney Rd at Parish Gap Rd. Crash data was provided by the ODOT Crash Data Unit for the most recent 5 years.



Figure 1 - Vicinity Map

### Summary of Findings:

The planned expansion of the YWAM base will generate an estimated 67 AM Peak hour trips and 70 PM Peak hour trips. The performance metrics at the studied intersections when the expansion is complete are shown in the following table with traffic from the .

	AM Peak hour		PM Peak hour	
	LOS	v/c	LOS	v/c
Access at Battle Creek Rd	A	0.005	A	0.011
Delaney Rd at Parish Gap Rd	B	0.219	B	0.094
Battle Creek Rd at Delaney Rd	A	0.336	A	0.255

Crash data from ODOT Crash Data Unit shows there were 6 crashes at the studied intersections in the last 5 years. None were fatal crashes, 2 were injury crashes and 4 were property damage only crashes.

### History and Existing Conditions:

The site is in rural Marion County is primarily open space. YWAM has been based on the property for many years and plans to add buildings on the site. The plan is to add 12 RV spaces (ITE 416), a 200 seat dining room, with dorms and a classroom for 300 persons. (This study will assume the trip generation is very similar to a university with 300 students (ITE 550)). 18 apartments (ITE 220) for staff and 8 hospitality units (ITE 220) for guests. Traffic from the planned additions will travel east to Battle Creek Rd and north toward Salem (20 % of trips) or south toward I-5 (50% of trips) or Turner (30% of trips).

Figure 2 shows the existing AM Peak hour and PM Peak hour performance metrics with existing traffic volumes.

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	YWAM Battle Creek Access	Two-way stop	HCM 6th Edition	EB Left	0.000	9.1	A
2	Delaney Rd at Parish Gap Rd	Two-way stop	HCM 6th Edition	NEB Left	0.206	13.2	B
3	Delaney Rd at Battle Creek Rd	All-way stop	HCM 6th Edition	NB Left	0.309	8.9	A

Existing AM Peak Hour Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	YWAM Battle Creek Access	Two-way stop	HCM 6th Edition	EB Left	0.000	9.1	A
2	Delaney Rd at Parish Gap Rd	Two-way stop	HCM 6th Edition	NEB Left	0.090	11.8	B
3	Delaney Rd at Battle Creek Rd	All-way stop	HCM 6th Edition	NB Left	0.229	8.3	A

Existing PM Peak Hour Summary

**Figure 2 - Existing Traffic Conditions**

### **Traffic Conditions when additions at the YWAM base are complete:**

The YWAM base would like to add 12 RV spaces (ITE 416), a 200 seat dining room, with dorms and a classroom for 300 persons. (This study will assume the trip generation is very similar to a university with 300 students (ITE 550)). 18 apartments (ITE 220) for staff and 8 hospitality units (ITE 220) for guests. The trip generation assumptions are summarized in the following table. The base additions will add 67 trips to the AM Peak hour traffic and 70 trips to the PM Peak hour traffic.

Use (ITE Code)	Number of Units	AM Peak Rate	New AM Trips	PM Peak Rate	New PM Trips
RV Space (416)	12 spaces	0.12/space	3	0.27/space	3
University (550)	300 students	0.17/student	51	0.17/student	51
Apartments (220)	18 apartments	0.51/apt	9	0.62/apt	11
Hospitality (220)	8 apartments	0.51/apt	4	0.62/apt	5
<b>Total</b>			<b>67 Trips</b>		<b>70 Trips</b>

This study will assume that 20% of the traffic will travel on Battle Creek Rd north of the site and 80 % on Battle Creek Rd south of the site.



ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	YWAM Battle Creek Access	Two-way stop	HCM 6th Edition	EB Left	0.005	9.7	A
2	Delaney Rd at Parish Gap Rd	Two-way stop	HCM 6th Edition	NEB Left	0.219	13.8	B
3	Delaney Rd at Battle Creek Rd	All-way stop	HCM 6th Edition	NB Left	0.336	9.2	A

2017 AM Peak Hour Summary with YWAM base additions

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	YWAM Battle Creek Access	Two-way stop	HCM 6th Edition	EB Left	0.011	9.6	A
2	Delaney Rd at Parish Gap Rd	Two-way stop	HCM 6th Edition	NEB Left	0.094	12.1	B
3	Delaney Rd at Battle Creek Rd	All-way stop	HCM 6th Edition	NB Left	0.255	8.5	A

2017 PM Peak Hour Summary with YWAM base additions

**Figure 3 – 2017 Traffic Conditions with YWAM base additions****Crash Data:**

The ODOT Crash Data Unit provided the following information about reported crashes at the shown intersections for the past 5 years.

Intersection	Fatal	Injury	Property Damage	Total Crashes
Battle Creek Rd @ Delaney Rd	0	2	2	4
Parrish Gap Rd @ Delaney Rd	0	0	2	2

**Figure 4 – Reported Crashes at Studied Intersections in 2010-2014****Summary:**

The planned expansion of the YWAM base in Marion County will add traffic to the transportation system. This study finds there is and will continue to be adequate capacity at the studied intersections when the additions are completed. Crash data from ODOT does not indicate significant safety problems at the intersections.



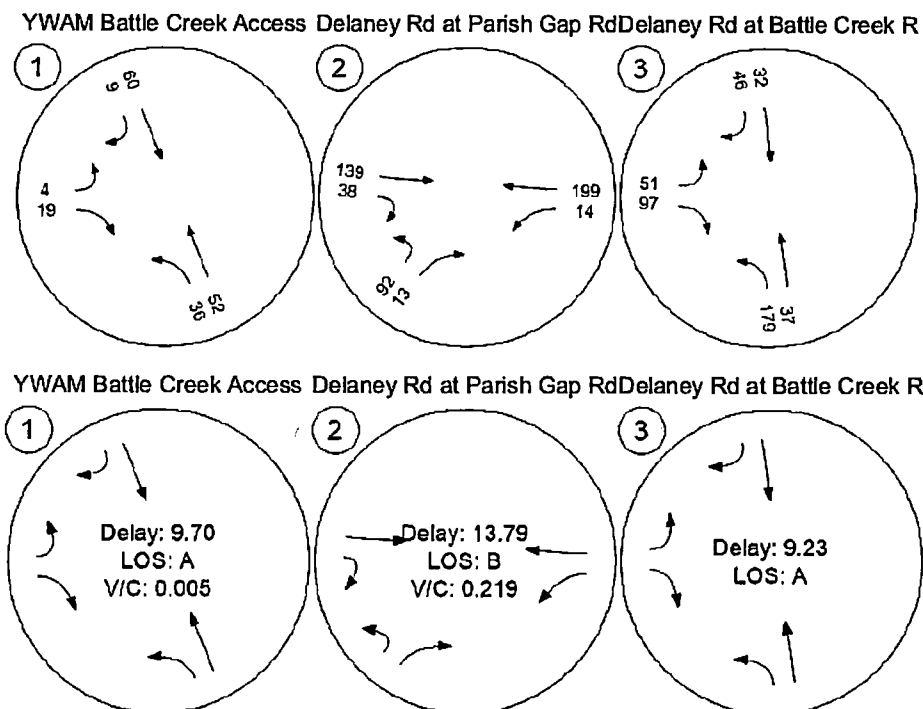


Figure 7 - 2017 AM Peak hour Counts and Performance Metrics with YWAM Base

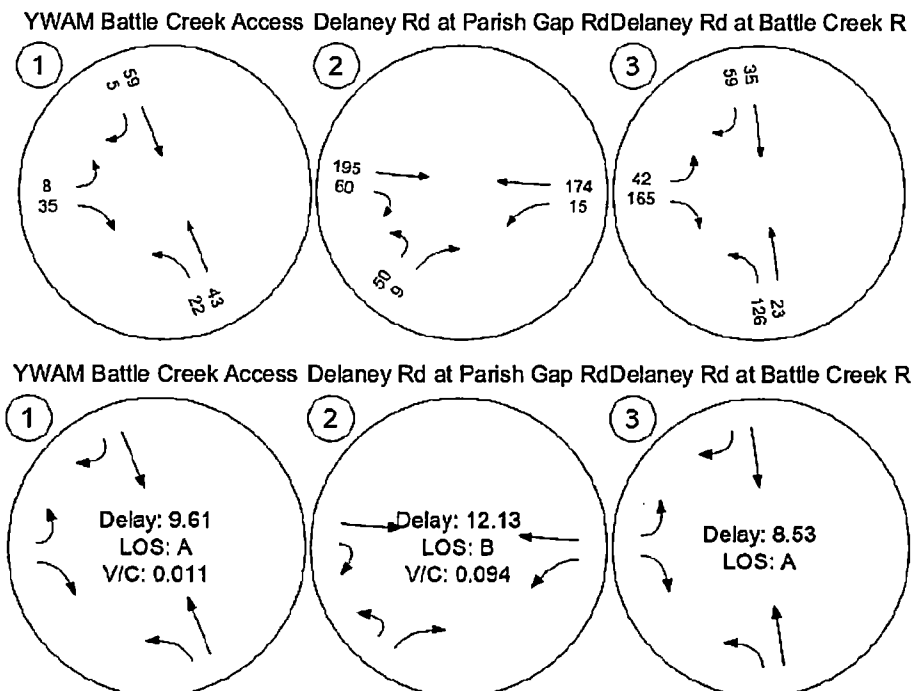


Figure 8 - 2017 PM Peak hour Counts and Performance Metrics with YWAM Base

## **APPENDIX B: SITE TRIP GENERATION**

# YWAM Trip Gen Estimates

## Assumptions:

- \*Students arrive once per quarter over the course of a full week, with the largest number of students arriving on a Wednesday. Assumed 1/2 of students arrive on peak day, and 1/2 of those arrive during AM peak
- \*School day ends at 5pm. Some students and on-site staff leave to get dinner, run errands, etc. in the evening
- \*Deliveries are pretty consistent throughout the day
- \*Students and staff tend to carpool. To be conservative, assume each student is one vehicle.
- \*All facilities are intended to serve on-site operations. Assembly hall \*may\* be rented out in the future, but likely not coinciding with school days (e.g., on a weekend)

## Existing Capacity

On-Site Students  
On-Site Staff  
Off-Site Staff  
Deliveries/guests  
Total

Vehicle Trips												
Typical Day							Peak Day (4-6 times per year)					
	AM In	AM Out	PM In	PM Out	Daily In	Daily Out	AM In	AM Out	PM In	PM Out	Daily In	Daily Out
120	0	0	0	5	15	15	30	20	10	20	80	80
55	0	0	0	2	5	5	0	0	0	2	5	5
40	40	10	0	30	60	60	40	10	0	30	60	60
25	5	5	5	5	30	30	5	5	5	5	30	30
	45	15	5	42	110	110	75	35	15	57	175	175

## Future Capacity (end of Phase 4)

On-Site Students  
On-Site Staff  
Off-Site Staff  
Deliveries/guests  
Total

Vehicle Trips												
Typical Day							Peak Day (4-6 times per year)					
	AM In	AM Out	PM In	PM Out	Daily In	Daily Out	AM In	AM Out	PM In	PM Out	Daily In	Daily Out
300	0	0	0	13	38	38	75	50	25	50	200	200
95	0	0	0	4	9	9	0	0	0	4	9	9
70	70	18	0	53	105	105	70	18	0	53	105	105
50	10	10	10	10	60	60	10	10	10	10	60	60
	80	28	10	80	212	212	155	78	35	117	374	374

## Net Increase

On-Site Students  
On-Site Staff  
Off-Site Staff  
Deliveries/guests  
Total

Vehicle Trips												
Typical Day							Peak Day (4-6 times per year)					
	AM In	AM Out	PM In	PM Out	Daily In	Daily Out	AM In	AM Out	PM In	PM Out	Daily In	Daily Out
180	0	0	0	8	23	23	45	30	15	30	120	120
40	0	0	0	2	4	4	0	0	0	2	4	4
30	30	8	0	23	45	45	30	8	0	23	45	45
25	5	5	5	5	30	30	5	5	5	5	30	30
	35	13	5	38	102	102	80	43	20	60	199	199

## APPENDIX C: CRASH DATA

## Crash Data 2014 -2018

## Salem YWAM TIA

DKS INTX #	001 Crash ID	005 Crash Hour	009 Jurisdiction	012 Hwy Number	014 Street Name	015 Intersecting Street Name
1	1667586	1P	Marion County		DELANEY RD SE	PARRISH GAP RD SE
1	1633507	5P	Marion County		DELANEY RD SE	PARRISH GAP RD SE
1	1734780	4P	Marion County		DELANEY RD SE	PARRISH GAP RD SE
1	1654857	5P	Marion County		DELANEY RD SE	PARRISH GAP RD SE
1	1704162	3A	Marion County		DELANEY RD SE	PARRISH GAP RD SE
1	1766733	5P	Marion County		DELANEY RD SE	PARRISH GAP RD SE
1	1550493	4P	Marion County		PARRISH GAP RD SE	DELANEY RD SE
2	1764275	5P	Marion County		BATTLECREEK RD SE	DELANEY RD SE
2	1806974	5P	Marion County		BATTLECREEK RD SE	DELANEY RD SE
2	1641662	6A	Marion County		BATTLECREEK RD SE	DELANEY RD SE
2	1554160	9A	Marion County		BATTLECREEK RD SE	DELANEY RD SE
2	1557014	10P	Marion County		DELANEY RD SE	BATTLECREEK RD SE
2	1565036	7A	Marion County		DELANEY RD SE	BATTLECREEK RD SE

## Crash Data 2014 -2018

## Salem YWAM TIA

018 Latitude	019 Longitude	021 Collision Type	022 Crash Cause	024 Crash Severity Detail	026 Lighting	030 Traffic Control
44.84130556	-122.9931722	TURN	NO-YIELD	Fatal	DAY	STOP SIGN
44.84130556	-122.9931722	TURN	NO-YIELD	PDO	DAY	STOP SIGN
44.84130556	-122.9931722	TURN	NO-YIELD	Possible Injury	DAY	STOP SIGN
44.84130556	-122.9931722	TURN	NO-YIELD	PDO	DAY	STOP SIGN
44.84130556	-122.9931722	FIX	IMP-TURN	PDO	DARK	STOP SIGN
44.84130556	-122.9931722	TURN	NO-YIELD	PDO	DAY	STOP SIGN
44.84130588	-122.9931726	TURN	IMP-TURN	PDO	DAY	STOP SIGN
44.84129167	-122.9915333	FIX	TOO-FAST	PDO	DAY	STOP SIGN
44.84129167	-122.9915333	TURN	F AVOID	PDO	DAY	STOP SIGN
44.84129167	-122.9915333	FIX	DEF BRKE	PDO	DAY	STOP SIGN
44.84129129	-122.9915338	FIX	IMP-TURN	PDO	DAY	STOP SIGN
44.84129129	-122.9915338	FIX	TOO-FAST	Possible Injury	DARK	STOP SIGN
44.84129129	-122.9915338	FIX	IMP-TURN	PDO	DAY	UNKNOWN



## Crash Data 2014 -2018

## Salem YWAM TIA

Year of 002 Crash Date	006 Region	007 County	035 Bike or Ped Flag group	038 Road Dept Flag	039 Intersection Flag	041 State Hwy Flag
2016	2	Marion	Neither	No	Yes	No
2015	2	Marion	Neither	No	Yes	No
2017	2	Marion	Neither	No	Yes	No
2015	2	Marion	Neither	No	Yes	No
2016	2	Marion	Neither	Yes	Yes	No
2017	2	Marion	Neither	No	Yes	No
2014	2	Marion	Neither	No	Yes	No
2017	2	Marion	Neither	Yes	Yes	No
2018	2	Marion	Neither	No	Yes	No
2015	2	Marion	Neither	Yes	Yes	No
2014	2	Marion	Neither	Yes	Yes	No
2014	2	Marion	Neither	Yes	Yes	No
2014	2	Marion	Neither	Yes	Yes	No

## Crash Data 2014 -2018

## Salem YWAM TIA

002 Crash Date	003 Crash Year	004 Crash Day	008 City Name	010 Urban Area	011 Hwy Name	016 Direction From Int	020 Crash Type
9/2/2016	2016	2				9	ANGL-OTH
2/13/2015	2015	13				9	ANGL-OTH
8/14/2017	2017	14				9	ANGL-OTH
2/13/2015	2015	13				9	ANGL-OTH
7/23/2016	2016	23				7	FIX OBJ
10/7/2017	2017	7				9	ANGL-OTH
1/13/2014	2014	13				5	ANGL-STP
9/17/2017	2017	17				1	FIX OBJ
6/19/2018	2018	19				7	S-OTHER
7/29/2015	2015	29				3	FIX OBJ
3/11/2014	2014	11				3	FIX OBJ
5/4/2014	2014	4				0	FIX OBJ
9/11/2014	2014	11				0	FIX OBJ

## Crash Data 2014 -2018

Salem YWAM TIA

023 Crash Event	025 Crash Severity Categ	027 Road Surface	028 Weather	031 Road Character	032 Posted Speed	033 Median Type
HILL INV	FAT	WET	RAIN	INTER	55	
	PDO	DRY	CLR	INTER		
	INJ	DRY	CLR	INTER		
	PDO	DRY	CLR	INTER		
DITCH	PDO	DRY	CLR	INTER		
	PDO	DRY	CLR	INTER		
	PDO	DRY	CLR	INTER		
GARDRAIL	PDO	WET	RAIN	INTER		
	PDO	DRY	CLR	INTER		
DITCH	PDO	DRY	CLR	INTER		
DITCH	PDO	UNK	UNK	INTER		
DITCH	INJ	UNK	UNK	INTER		
BR RAIL	PDO	DRY	CLR	INTER		

## Crash Data 2014 -2018

## Salem YWAM TIA

034 Func Class	035 Bike or Ped Flag	036 Bike Flag	037 Ped Flag	040 Driveway Rel Flag	042 Speeding Flag	043 Alcohol Flag	044 Drug Flag
R MN-ART	Neither	No	No	FALSE	FALSE	FALSE	FALSE
R MN-ART	Neither	No	No	FALSE	FALSE	FALSE	FALSE
R MN-ART	Neither	No	No	FALSE	FALSE	FALSE	FALSE
R MN-ART	Neither	No	No	FALSE	FALSE	FALSE	FALSE
R MN-ART	Neither	No	No	FALSE	FALSE	TRUE	FALSE
R MN-ART	Neither	No	No	FALSE	FALSE	FALSE	FALSE
R MN-ART	Neither	No	No	FALSE	FALSE	FALSE	FALSE
R MJ-COL	Neither	No	No	FALSE	TRUE	FALSE	FALSE
R MN-ART	Neither	No	No	FALSE	FALSE	FALSE	FALSE
R MN-ART	Neither	No	No	FALSE	FALSE	FALSE	FALSE
R MN-ART	Neither	No	No	FALSE	FALSE	FALSE	FALSE
R MN-ART	Neither	No	No	FALSE	TRUE	TRUE	FALSE
R MN-ART	Neither	No	No	FALSE	FALSE	FALSE	FALSE

## Crash Data 2014 -2018

## Salem YWAM TIA

045 Marijuana Flag	046 Lane Rdwy Dep Flag	047 Off Rdwy Flg	048 School Zone Flag	049 Work Zone Flag	050 Bike Under 21 Flag
FALSE	N	FALSE			No
FALSE	N	FALSE			No
FALSE	N	FALSE	0	0	No
FALSE	N	FALSE			No
FALSE	N	TRUE	0	0	No
FALSE	N	FALSE			No
FALSE	N	FALSE			No
FALSE	N	TRUE	0	0	No
FALSE	N	FALSE			No
FALSE	N	TRUE	0	0	No
FALSE	N	TRUE			No
FALSE	N	TRUE	0	0	No
FALSE	N	TRUE			No

## Crash Data 2014 -2018

## Salem YWAM TIA

051 Driver Under 21 Flag	052 Ped Under 21 Flag	053 Bike Over 64 Flag	054 Driver Over 64 Flag	055 Ped Over 64 Flag	056 Veh1 Action
No	No	No	Yes	No	NONE
No	No	No	No	No	NONE
No	No	No	Yes	No	NONE
Yes	No	No	No	No	NONE
No	No	No	No	No	NONE
No	No	No	No	No	NONE
No	No	No	No	No	NONE
No	No	No	No	No	NONE
No	No	No	No	No	NONE
No	No	No	No	No	NONE
Yes	No	No	No	No	NONE
No	No	No	No	No	NONE
No	No	No	No	No	NONE

## Crash Data 2014 -2018

## Salem YWAM TIA

057 Veh1 Movement	058 Veh1 From Direction	059 Veh1 To Direction	060 Veh1 Event	061 Veh1 Type	062 Veh1 Striking Flag
STRGHT	W	E		PSNGR CAR	TRUE
TURN-L	S	W		PSNGR CAR	TRUE
STRGHT	W	E		PSNGR CAR	TRUE
TURN-L	S	W		PSNGR CAR	TRUE
TURN-L	S	W		PSNGR CAR	TRUE
UNK	UN	UN		PSNGR CAR	TRUE
TURN-R	W	S		PSNGR CAR	TRUE
TURN-L	S	W		PSNGR CAR	TRUE
STRGHT	W	E		PSNGR CAR	TRUE
STRGHT	W	E	DITCH	SEMI TOW	TRUE
TURN-R	W	S	DITCH	PSNGR CAR	TRUE
TURN-R	W	S	DITCH	PSNGR CAR	TRUE
TURN-R	N	W	BR RAIL	PSNGR CAR	TRUE

## Crash Data 2014 -2018

## Salem YWAM TIA

063 Veh1 Hit-Run Flag	064 Veh1 Speed Flag	065 Veh2 Action	066 Veh2 Movement	067 Veh2 From Direction	068 Veh2 To Direction
FALSE	FALSE	GO A/STOP	TURN-L	S	W
FALSE	FALSE	NONE	TURN-L	E	S
FALSE	FALSE	GO A/STOP	TURN-L	S	W
FALSE	FALSE	NONE	TURN-L	E	S
FALSE	FALSE				
FALSE	FALSE	NONE	STRGHT	W	E
FALSE	FALSE	STOPPED	STOP	S	N
FALSE	FALSE				
FALSE	FALSE	STOPPED	STOP	W	E
FALSE	FALSE				
FALSE	FALSE				
FALSE	FALSE				
FALSE	FALSE				



## Crash Data 2014 -2018

## Salem YWAM TIA

069 Veh2 Event	070 Veh2 Type	071 Veh2 Striking Flag	072 Veh2 Hit-Run Flag	073 Veh2 Speed Flag	074 Driver1 AGE	075 Driver1 Error
	PSNGR CAR	FALSE	FALSE	FALSE	35	NONE
	PSNGR CAR	FALSE	FALSE	FALSE	30	NO ROW
	PSNGR CAR	FALSE	FALSE	FALSE	32	NONE
	PSNGR CAR	FALSE	FALSE	FALSE	31	NO ROW
		FALSE	FALSE	FALSE	0	NONE
	PSNGR CAR	FALSE	FALSE	FALSE	0	NONE
	PSNGR CAR	FALSE	FALSE	FALSE	26	WIDE TRN
		FALSE	FALSE	FALSE	0	NONE
	PSNGR CAR	FALSE	FALSE	FALSE	0	NONE
		FALSE	FALSE	FALSE	58	UNSF VEH
		FALSE	FALSE	FALSE	19	WIDE TRN
		FALSE	FALSE	FALSE	62	BASCRULE
		FALSE	FALSE	FALSE	38	CUT CORN

## Crash Data 2014 -2018

## Salem YWAM TIA

076 Driver1 Cause	077 Driver1 Alcohol Flag	078 Driver1 Drug Flag	079 Driver1 MJ Flag	080 Driver2 AGE	081 Driver2 Error
NO CODE	0	0		89	NO ROW
NO-YIELD				0	NONE
NO CODE	0	0	3	66	NO ROW
NO-YIELD				20	NONE
NO CODE	1				
NO CODE				0	NONE
IMP-TURN				54	NONE
NO CODE	0	0	3		
NO CODE				0	NONE
NO CODE	0	0			
IMP-TURN					
TOO-FAST	1				
IMP-TURN					

## Crash Data 2014 -2018

## Salem YWAM TIA

082 Driver2 Cause	083 Driver2 Alcohol Flag	084 Driver2 Drug Flag	085 Driver2 MJ Flag	086 Partic Type	088 Partic Action
NO-YIELD	9	9			
NO CODE					
NO-YIELD	0	0	3		
NO CODE					
NO CODE					
NO CODE					
NO CODE					

## Crash Data 2014 -2018

## Salem YWAM TIA

089 Partic Movement	090 Partic Location	091 Partic From Direction	092 Partic To Direction	093 Partic Error	094 Partic Cause

## Crash Data 2014 -2018

## Salem YWAM TIA

095 Partic Alcohol Flag	096 Partic Drug Flag	097 Partic MJ Flag	013 Hwy MP	017 Distance From Int	029 Lane Quantity	087 Partic Age
			4.159999847			
			4.159999847			
			4.159999847			
			4.159999847			
			4.159999847			
			4.159999847			
			9.010000229			
			0			
			0			
			0			
			4.239999771			
			4.239999771			

## Crash Data 2014 -2018

## Salem YWAM TIA

098 Tot Fatal Cnt	099 Tot Inj Cnt	100 Tot Inj A Cnt	101 Tot Inj B Cnt	102 Tot Inj C Cnt	103 Tot Ped Cnt	104 Tot Bike Cnt
1	1	0	0	1	0	0
0	0	0	0	0	0	0
0	2	0	0	2	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	1	0	0	1	0	0
0	0	0	0	0	0	0

Crash Data 2014 -2018  
Salem YWAM TIA

Fatal and Seriou Injury
1
0
0
0
0
0
0
0
0
0
0
0
0
0
0

## **APPENDIX D: HCM REPORTS – EXISTING**



HCM 6th TWSC  
1: Parrish Gap Rd & Delaney Rd

Salem YWAM TIA  
Existing AM - Typical Day

Intersection						
Int Delay, s/veh	3.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Vol, veh/h	127	41	16	217	100	14
Future Vol, veh/h	127	41	16	217	100	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	2	1	1	2	1	1
Mvmt Flow	181	59	23	310	143	20

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	240	0	567
Stage 1	-	-	-	-	211
Stage 2	-	-	-	-	356
Critical Hdwy	-	-	4.11	-	6.41
Critical Hdwy Stg 1	-	-	-	-	5.41
Critical Hdwy Stg 2	-	-	-	-	5.41
Follow-up Hdwy	-	-	2.209	-	3.509
Pot Cap-1 Maneuver	-	-	1333	-	487
Stage 1	-	-	-	-	827
Stage 2	-	-	-	-	711
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1333	-	477
Mov Cap-2 Maneuver	-	-	-	-	477
Stage 1	-	-	-	-	827
Stage 2	-	-	-	-	696

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	15.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	503	-	-	1333	-
HCM Lane V/C Ratio	0.324	-	-	0.017	-
HCM Control Delay (s)	15.5	-	-	7.7	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.4	-	-	0.1	-

HCM 6th TWSC  
2: Delaney Rd/Delaney Road & Battle Creek Road

Salem YWAM TIA  
Existing AM - Typical Day

Intersection						
Int Delay, s/veh	2.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Traffic Vol, veh/h	32	109	195	26	27	38
Future Vol, veh/h	32	109	195	26	27	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	25
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	1	2	2	1	1	1
Mvmt Flow	46	156	279	37	39	54

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	316	0	0	546	298
Stage 1	-	-	-	298	-
Stage 2	-	-	-	248	-
Critical Hdwy	4.11	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	3.509	3.309
Pot Cap-1 Maneuver	1250	-	-	500	744
Stage 1	-	-	-	755	-
Stage 2	-	-	-	796	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1250	-	-	480	744
Mov Cap-2 Maneuver	-	-	-	480	-
Stage 1	-	-	-	725	-
Stage 2	-	-	-	796	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1250	-	-	-	480	744
HCM Lane V/C Ratio	0.037	-	-	-	0.08	0.073
HCM Control Delay (s)	8	0	-	-	13.2	10.2
HCM Lane LOS	A	A	-	-	B	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3	0.2

HCM 6th TWSC  
3: Battle Creek Rd & YWAM Main Entrance

Salem YWAM TIA  
Existing AM - Typical Day

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			4	4	
Traffic Vol, veh/h	11	4	10	48	61	35
Future Vol, veh/h	11	4	10	48	61	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	16	6	14	69	87	50

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	209	112	137	0	-	0
Stage 1	112	-	-	-	-	-
Stage 2	97	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	784	947	1459	-	-	-
Stage 1	918	-	-	-	-	-
Stage 2	932	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	776	947	1459	-	-	-
Mov Cap-2 Maneuver	776	-	-	-	-	-
Stage 1	909	-	-	-	-	-
Stage 2	932	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	1.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1459	-	815	-	-
HCM Lane V/C Ratio	0.01	-	0.026	-	-
HCM Control Delay (s)	7.5	0	9.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 6th TWSC  
1: Parrish Gap Rd & Delaney Rd

Salem YWAM TIA  
Existing PM - Typical Day

Intersection						
Int Delay, s/veh	1.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1			1	2	
Traffic Vol, veh/h	201	65	16	167	54	10
Future Vol, veh/h	201	65	16	167	54	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	1	1	2	1	1
Mvmt Flow	236	76	19	196	64	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	312	0	508	274
Stage 1	-	-	-	-	274	-
Stage 2	-	-	-	-	234	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1254	-	526	767
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	807	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1254	-	517	767
Mov Cap-2 Maneuver	-	-	-	-	517	-
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	793	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	12.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	545	-	-	1254	-
HCM Lane V/C Ratio	0.138	-	-	0.015	-
HCM Control Delay (s)	12.7	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

HCM 6th TWSC  
2: Delaney Rd/Delaney Road & Battle Creek Road

Salem YWAM TIA  
Existing PM - Typical Day

Intersection						
Int Delay, s/veh	2.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		↰	↱
Traffic Vol, veh/h	31	180	142	16	23	41
Future Vol, veh/h	31	180	142	16	23	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	25
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	1	2	2	1	1	1
Mvmt Flow	36	212	167	19	27	48

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	186	0	0 461 177
Stage 1	-	-	- 177 -
Stage 2	-	-	- 284 -
Critical Hdwy	4.11	-	- 6.41 6.21
Critical Hdwy Stg 1	-	-	- 5.41 -
Critical Hdwy Stg 2	-	-	- 5.41 -
Follow-up Hdwy	2.209	-	- 3.509 3.309
Pot Cap-1 Maneuver	1395	-	- 560 869
Stage 1	-	-	- 856 -
Stage 2	-	-	- 766 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1395	-	- 544 869
Mov Cap-2 Maneuver	-	-	- 544 -
Stage 1	-	-	- 831 -
Stage 2	-	-	- 766 -

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	10.3
HCM LOS	B		

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1395	-	-	-	544	869
HCM Lane V/C Ratio	0.026	-	-	-	0.05	0.056
HCM Control Delay (s)	7.7	0	-	-	12	9.4
HCM Lane LOS	A	A	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	0.2

HCM 6th TWSC  
3: Battle Creek Rd & YWAM Main Entrance

Salem YWAM TIA  
Existing PM - Typical Day

Intersection						
Int Delay, s/veh	2.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			4	4	
Traffic Vol, veh/h	31	11	2	45	53	3
Future Vol, veh/h	31	11	2	45	53	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	36	13	2	53	62	4

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	121	64	66	0	-	0
Stage 1	64	-	-	-	-	-
Stage 2	57	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	879	1006	1549	-	-	-
Stage 1	964	-	-	-	-	-
Stage 2	971	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	878	1006	1549	-	-	-
Mov Cap-2 Maneuver	878	-	-	-	-	-
Stage 1	963	-	-	-	-	-
Stage 2	971	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1549	-	908	-	-
HCM Lane V/C Ratio	0.002	-	0.054	-	-
HCM Control Delay (s)	7.3	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

## **APPENDIX E: HCM REPORTS – FUTURE**

HCM 6th TWSC  
1: Parrish Gap Rd & Delaney Rd

Salem YWAM TIA  
2025 Build AM - Peak Day

Intersection						
Int Delay, s/veh	4.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↖	↗
Traffic Vol, veh/h	175	48	19	268	115	16
Future Vol, veh/h	175	48	19	268	115	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	2	1	1	2	1	1
Mvmt Flow	250	69	27	383	164	23

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	319	0	722 285
Stage 1	-	-	-	-	285 -
Stage 2	-	-	-	-	437 -
Critical Hdwy	-	-	4.11	-	6.41 6.21
Critical Hdwy Stg 1	-	-	-	-	5.41 -
Critical Hdwy Stg 2	-	-	-	-	5.41 -
Follow-up Hdwy	-	-	2.209	-	3.509 3.309
Pot Cap-1 Maneuver	-	-	1247	-	395 756
Stage 1	-	-	-	-	766 -
Stage 2	-	-	-	-	653 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1247	-	384 756
Mov Cap-2 Maneuver	-	-	-	-	384 -
Stage 1	-	-	-	-	766 -
Stage 2	-	-	-	-	635 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	21
HCM LOS	C		

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	409	-	-	1247	-
HCM Lane V/C Ratio	0.458	-	-	0.022	-
HCM Control Delay (s)	21	-	-	8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2.3	-	-	0.1	-



HCM 6th TWSC  
2: Delaney Rd/Delaney Road & Battle Creek Road

Salem YWAM TIA  
2025 Build AM - Peak Day

Intersection						
Int Delay, s/veh	3.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	↔
Traffic Vol, veh/h	65	126	224	50	44	63
Future Vol, veh/h	65	126	224	50	44	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	25
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	1	2	2	1	1	1
Mvmt Flow	93	180	320	71	63	90

Major/Minor	Major1	Major2		Minor2	
Conflicting Flow All	391	0	-	0	722
Stage 1	-	-	-	-	356
Stage 2	-	-	-	-	366
Critical Hdwy	4.11	-	-	-	6.41
Critical Hdwy Stg 1	-	-	-	-	5.41
Critical Hdwy Stg 2	-	-	-	-	5.41
Follow-up Hdwy	2.209	-	-	-	3.509
Pot Cap-1 Maneuver	1173	-	-	-	395
Stage 1	-	-	-	-	711
Stage 2	-	-	-	-	704
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1173	-	-	-	360
Mov Cap-2 Maneuver	-	-	-	-	360
Stage 1	-	-	-	-	648
Stage 2	-	-	-	-	704

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	13.5
HCM LOS	B		

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1173	-	-	-	360	690
HCM Lane V/C Ratio	0.079	-	-	-	0.175	0.13
HCM Control Delay (s)	8.3	0	-	-	17.1	11
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.6	0.4

HCM 6th TWSC  
3: Battle Creek Rd & YWAM Main Entrance

Salem YWAM TIA  
2025 Build AM - Peak Day

Intersection						
Int Delay, s/veh	3.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Traffic Vol, veh/h	44	34	56	59	73	99
Future Vol, veh/h	44	34	56	59	73	99
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	63	49	80	84	104	141

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	419	175	245	0	-	0
Stage 1	175	-	-	-	-	-
Stage 2	244	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	595	874	1333	-	-	-
Stage 1	860	-	-	-	-	-
Stage 2	801	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	558	874	1333	-	-	-
Mov Cap-2 Maneuver	558	-	-	-	-	-
Stage 1	806	-	-	-	-	-
Stage 2	801	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.5	3.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1333	-	662	-	-
HCM Lane V/C Ratio	0.06	-	0.168	-	-
HCM Control Delay (s)	7.9	0	11.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-

HCM 6th TWSC  
1: Parrish Gap Rd & Delaney Rd

Salem YWAM TIA  
2025 Build PM - Peak Day

Intersection						
Int Delay, s/veh	2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1			1	1	
Traffic Vol, veh/h	241	75	19	211	63	11
Future Vol, veh/h	241	75	19	211	63	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	1	1	2	1	1
Mvmt Flow	284	88	22	248	74	13

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	372	0	620
Stage 1	-	-	-	-	328
Stage 2	-	-	-	-	292
Critical Hdwy	-	-	4.11	-	6.41
Critical Hdwy Stg 1	-	-	-	-	5.41
Critical Hdwy Stg 2	-	-	-	-	5.41
Follow-up Hdwy	-	-	2.209	-	3.509
Pot Cap-1 Maneuver	-	-	1192	-	453
Stage 1	-	-	-	-	732
Stage 2	-	-	-	-	760
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1192	-	443
Mov Cap-2 Maneuver	-	-	-	-	443
Stage 1	-	-	-	-	732
Stage 2	-	-	-	-	744

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	470	-	-	1192	-
HCM Lane V/C Ratio	0.185	-	-	0.019	-
HCM Control Delay (s)	14.4	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.1	-

HCM 6th TWSC  
2: Delaney Rd/Delaney Road & Battle Creek Road

Salem YWAM TIA  
2025 Build PM - Peak Day

Intersection						
Int Delay, s/veh	2.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		↰	↱
Traffic Vol, veh/h	45	207	164	25	39	66
Future Vol, veh/h	45	207	164	25	39	66
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	25
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	1	2	2	1	1	1
Mvmt Flow	53	244	193	29	46	78

Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	222	0	-	0	558	208
Stage 1	-	-	-	-	208	-
Stage 2	-	-	-	-	350	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1353	-	-	-	492	835
Stage 1	-	-	-	-	829	-
Stage 2	-	-	-	-	716	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1353	-	-	-	470	835
Mov Cap-2 Maneuver	-	-	-	-	470	-
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	716	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	11.2
HCM LOS	B		

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1353	-	-	-	470	835
HCM Lane V/C Ratio	0.039	-	-	-	0.098	0.093
HCM Control Delay (s)	7.8	0	-	-	13.5	9.8
HCM Lane LOS	A	A	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3	0.3

HCM 6th TWSC  
3: Battle Creek Rd & YWAM Main Entrance

Salem YWAM TIA  
2025 Build PM - Peak Day

Intersection						
Int Delay, s/veh	4.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Traffic Vol, veh/h	76	41	17	53	64	18
Future Vol, veh/h	76	41	17	53	64	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	89	48	20	62	75	21

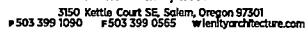
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	188	86	96	0	-	0
Stage 1	86	-	-	-	-	-
Stage 2	102	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	806	978	1510	-	-	-
Stage 1	942	-	-	-	-	-
Stage 2	927	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	795	978	1510	-	-	-
Mov Cap-2 Maneuver	795	-	-	-	-	-
Stage 1	929	-	-	-	-	-
Stage 2	927	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10	1.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1510	-	851	-	-
HCM Lane V/C Ratio	0.013	-	0.162	-	-
HCM Control Delay (s)	7.4	0	10	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

## **APPENDIX F: SITE PLAN**

**Project Area: 31.25 Acres**



**Salem, Oregon**