



# **Traffic Impact Study (DRAFT)**

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Wishcamper Evergreen Subdivision

*Missoula, Montana*

December 17, 2021

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## 1.0 Introduction

This report documents a Traffic Impact Study (TIS) for the proposed Wishcamper Evergreen/Flynn Lane subdivision project (“Project”). This project is for a development of 254 residential units located in the northwestern part of Missoula’s urbanized area. This report describes the existing land uses and transportation facilities, provides the details of the accessibility and traffic projections for the proposed project, and identifies the estimated short term quantitative traffic impacts to the surrounding area. Specifically, the report provides information on the following:

- Study area and access
- Proposed development
- Existing traffic conditions
- Projected traffic conditions in 2026 with and without the Project
- Intersection control type recommendations after the Project opens

Article 3.4-J of the City of Missoula’s Subdivision Regulations indicates that the City Engineer may require a traffic study if a proposed subdivision would generate 200 or more average daily trips. The Project meets the trip generation requirement for a traffic study and this report documents the analysis conducted to meet that requirement.

Substantial background information and data for this study effort has been adapted from documents produced for the Mullan BUILD project in 2020/2021.

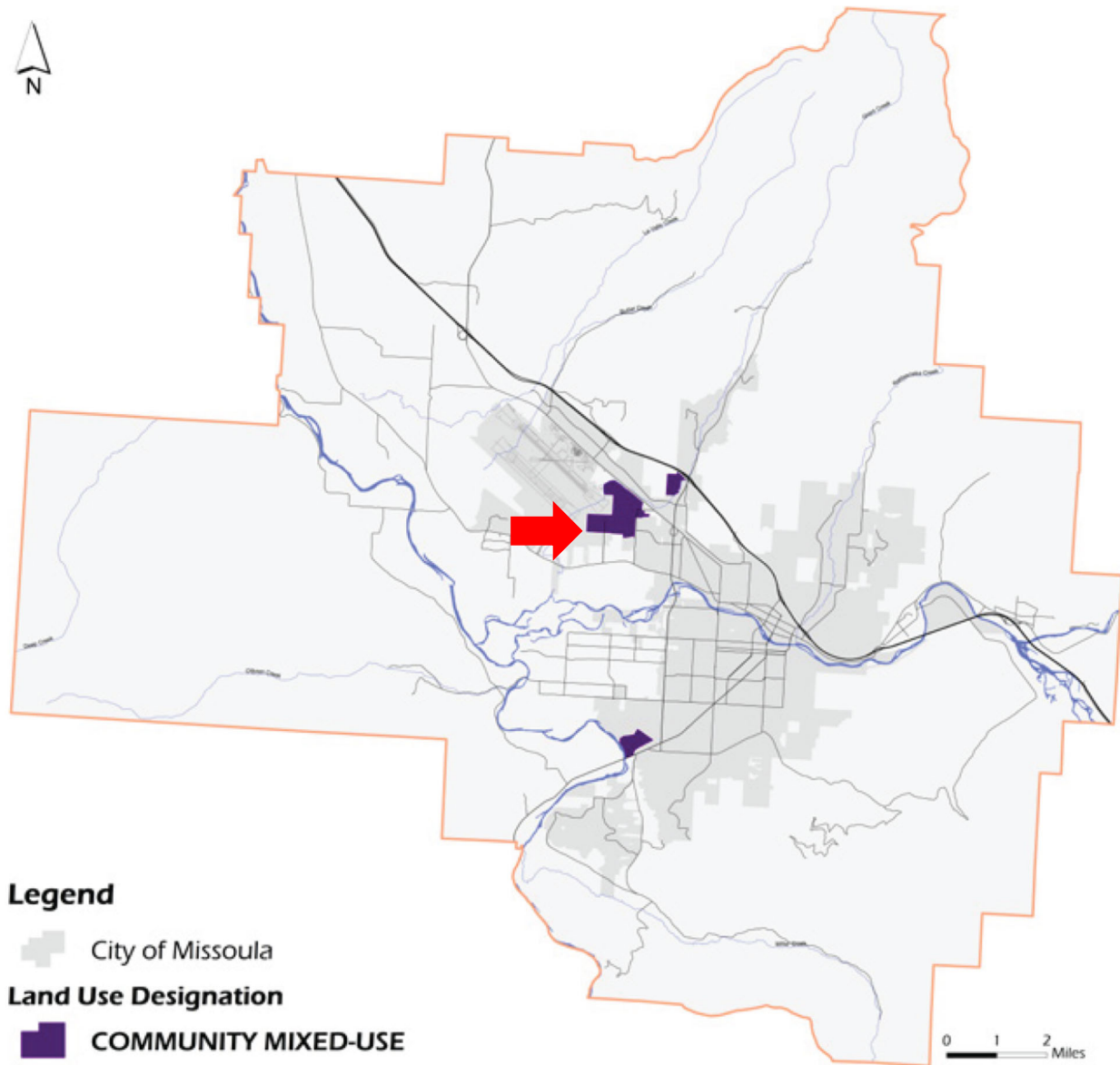
## 1.1 Study Area

### 1.1.1 Project Vicinity

The proposed Project is located along the west side of Flynn Lane in the northwestern part of Missoula, Montana. The Project site will be accessed via Flynn Lane at five new street connections between Camden Street and England Boulevard on the south. In addition to these new intersection approaches, traffic is also expected to use up to four alley connections to Flynn Lane. The intersections on Flynn Lane with Camden Street and England Boulevard will be examined with respect to traffic impacts for the analysis documented in this study. The Project location within Missoula County is shown in **Figure 1** by an arrow, along with its designation as part of a potential “Community Mixed Use” area.

**IMEG UPDATES:** All of the property is zoned as a Crossroads Center Neighborhood Unit within the Sxwtpqyen Neighborhoods Planned Area which is a residential, commercial, and civic use district. This zoning permits dwelling unit minimums of 6 units/acre (T3), and 12 units per/acre (T4-R/T4-O) with dwelling unit maximums of 8 units/acre (T3), and 36 units per/acre (T4-R/T4-O). These maximum and minimum standards comply with the 2021 Sxwtpqyen Neighborhoods Master Plan and the 2019 Missoula Land Use element by offering high density housing and cost-burdened options for Montana residents.

The applicable regional plan for this property is the Sxwtpqyen Neighborhoods Master Plan, but the project also aligns with the ‘Our Missoula’ 2035 City Growth Policy and the 2019 Missoula Land Use Element. The current land use for this property is Agricultural. According to the ‘Our Missoula’ 2035 City Growth Policy, some of the keys to a healthy built environment are “good connectivity, appropriate mixed-uses of land, a range of affordable housing choices, and a variety of active transportation options.”



Source: Missoula Area Land Use Element, Adopted June 6, 2019

**Figure 1: Project Location**

### 1.1.2 Related Planning Documents

The following plans completed prior to the onset of this TIS have helped to establish the key assumptions and general transportation framework:

- Missoula Connect 2050 Long Range Transportation Plan (Final, June 2021)
- Mullan Area Neighborhoods Master Plan (Final Draft, December 10, 2020)
- Mullan Area Master Plan Planned Multimodal Network (Draft, November 17, 2020)
- Mullan Area Master Plan Preliminary Circulation Analysis (Draft, March 16, 2020)
- Activate Missoula 2045 Pedestrian Facilities Master Plan (Final, Fall 2018)
- Activate Missoula 2045 Bicycle Facilities Master Plan (Final, March 2017)

- Activate Missoula 2045 Long Range Transportation Plan (Final, March 2017)

These transportation-focused documents were, in turn, developed by Missoula County, the City of Missoula, and the Missoula MPO to meet policy goals in such areas as affordable housing, growth management, neighborhood planning, public health, climate change, and others.

### 1.1.3 Land Uses

The planning documents referenced in the previous subsection have been under development for several years, and the proposed designations remain somewhat general and subject to additional change. For example, the Mullan Area Master Plan indicates that the Project area is planned for “Community Mixed Use”. The proposed land use map from Engage Missoula is shown in **Figure 1**.

#### Proposed Boundary of Future Land Use Map Amendment

##### Legend

-  Proposed Boundary of Future Land Use Map Amendment
- Land Use
-  Community Mixed Use
  -  Neighborhood Mixed Use
  -  Urban Center
  -  Regional Commercial and Services
  -  Open and Resource
  -  Parks and Open Lands
  -  Public and Quasi-Public
  -  Residential High
  -  Residential Medium High
  -  Residential Medium
  -  Residential Low
  -  Residential Rural
  -  Industrial Light
  -  Industrial Heavy



Figure 2: Engage Missoula Land Use in the Mullan Area

### 1.1.4 Surrounding Development Context

As indicated previously, the Evergreen Housing subdivision is part of a much larger development concept involving multiple landowners and developer interests. Its general boundaries are Flynn Lane/Mary Jane Boulevard on the east, Broadway St/US 10 W on the north, Dougherty Ditch and

farmland on the west, and Mullan Road and Hiawatha Road on the south. Developed land to the east and south is residential in nature (including Hellgate Elementary School due south), while land north and west of the site is currently farmed or largely otherwise vacant.

## **1.2 Area Accessibility**

### **1.2.1 Existing Road System**

Where it fronts the project site, Flynn Lane consists of two travel lanes with no shoulders. Some areas on the east side of Flynn Lane in this area have been paved for parking use by those who live in the homes that front Flynn Lane in this area. The posted speed limit on Flynn Lane is 35 mph. England Boulevard has two travel lanes with parallel parking lanes and curbs on both sides of the roadway, and a posted speed limit of 30 mph.

The following four intersections were studied:

1. Camden Street & Flynn Lane
2. England Boulevard & Flynn Lane
3. England Boulevard & Mary Jane Boulevard
4. England Boulevard & Connery Way

All intersections have one formal lane on each approach. The Connery Way intersection is controlled by a roundabout and the other three are two-way stop controlled. Flynn Lane traffic has the right of way at the first and second intersections. At the third, England Boulevard traffic proceeds with the right of way, while all Mary Jane Boulevard traffic must stop. These configurations and control types were assumed to be maintained and were tested for adequacy during the year the Project would open (under the assumptions documented here).

### **1.2.2 Transit and Non-Motorized Facilities**

No Mountain Line bus routes currently serve the Project area directly. Flynn Lane has a detached sidewalk on the east side for the entire fronting length of the Project. There are currently no dedicated facilities for bicycles in the study area.

### **1.2.3 Programmed Improvements**

The Missoula Connect 2050 Long Range Transportation Plan was published in June 2021 and describes a broad range of improvements throughout Missoula County to address mobility needs for all major modes of personal travel. The major roadway extension projects germane to Evergreen Housing are grouped together and described in the Plan as Project #130, Roadway Extensions for BUILD Grant Roads – Wye/Mullan Plan Collector Routes. It includes the extensions of (a) England Boulevard from Flynn Lane to west of George Elmer Drive, (b) Mary Jane Boulevard from Mullan Road to W Broadway Street, and (c) George Elmer Drive from Mullan Road to W Broadway Street. This Project does not extend England Boulevard all the way to George Elmer Drive. The Plan indicates a total cost estimate of approximately \$29.8 million. Other trail projects and improvements to surrounding facilities, in addition to the Evergreen Project's internal streets, will support high-quality access when the Mullan plan is complete.

Because these are long-term projects and this study was developed to assess the short-term intersection control types required to avoid traffic impacts due to Evergreen subdivision traffic, these major street connections were not assumed to be operational before the Project horizon year of 2026.

## 2.0 Proposed Development

The proposed subdivision is situated west of Flynn Lane, which is Missoula's current City limit in this area between England Boulevard and Camden Street. The subdivision is currently planned to include 260 residential lots on the site. Access will be via streets and alleys connecting to Flynn Lane, with future primary connections to the (a) west via England Boulevard and (b) north via Dougherty Drive. The project is currently planned to occur in nine (9) phases. The current subdivision site plan, provided by IMEG, is shown in Figure 3. The dashed line indicates a development restriction related to aircraft flight patterns, and as indicated earlier, Flynn Lane abuts the project on the east (the right side of this page).

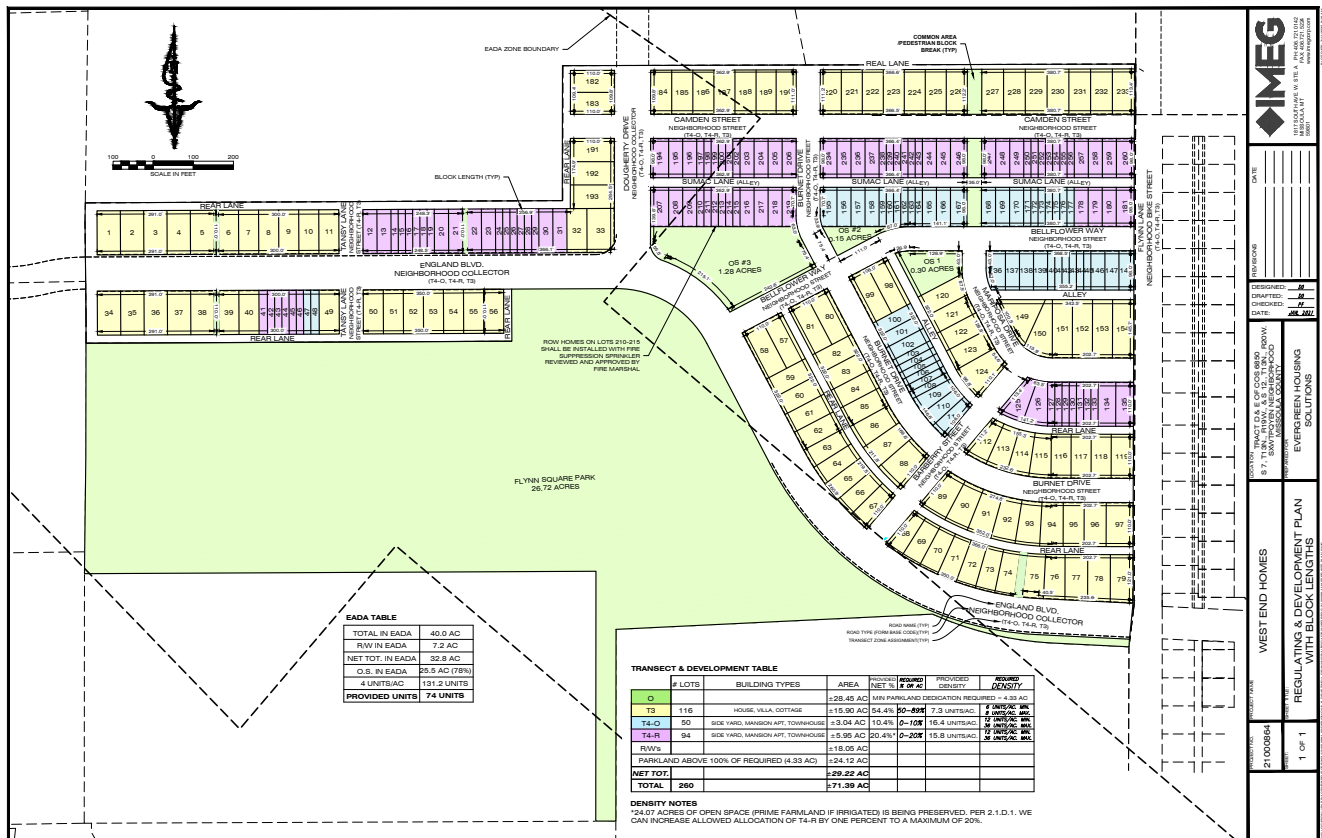


Figure 3: Wishcamper Evergreen Housing Subdivision Site Plan

## 3.0 Existing and Background Traffic Conditions

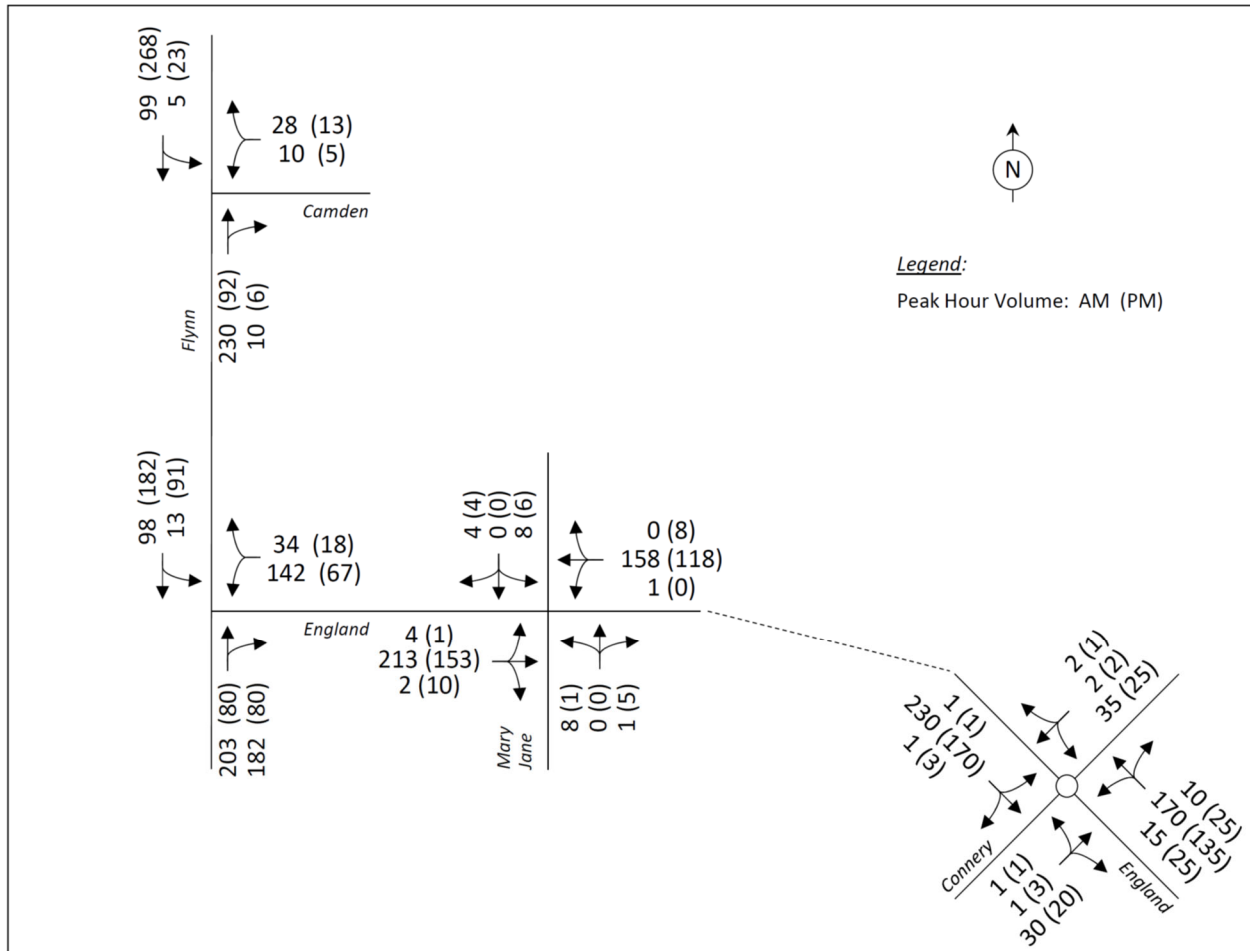
Traffic conditions were examined in terms of intersection operations and delay during peak hours for the project existing year (2020) and a projected fully-open year of 2026.



### 3.1 Traffic Volumes

#### 3.1.1 Existing Data

Peak hour intersection traffic volume data were taken from previous Mullan BUILD project work for the first three intersections. Traffic counts were collected on March 3<sup>rd</sup> and 4<sup>th</sup> 2020, before the State of Montana issued pandemic-related restrictions that impacted travel. For the fourth intersection, volumes were estimated using information about land use, street connectivity, and nearby traffic counts. This existing traffic count data is shown in **Figure 4**.



**Figure 4: 2020 Existing Peak Hour Traffic Volume Estimates**

#### 3.1.2 Future Background Traffic Estimates

A six-year horizon between the existing (2020) and future (2026) analysis years represents sufficient time for the entire Evergreen Project site to be developed in full, the properties to become fully occupied, and the occupants to have time to establish regular trip pattern behavior. This year was also chosen because at the time this study began, in late 2021, no ground had been broken for the Project. For simplicity in the short term, existing 2020 counts presented earlier were grown at a 1% annual rate to derive the “Background” peak hour traffic volume estimates that form the basis for measuring the

short-term intersection traffic control needs for the Project. **Figure 5** shows background intersection traffic.

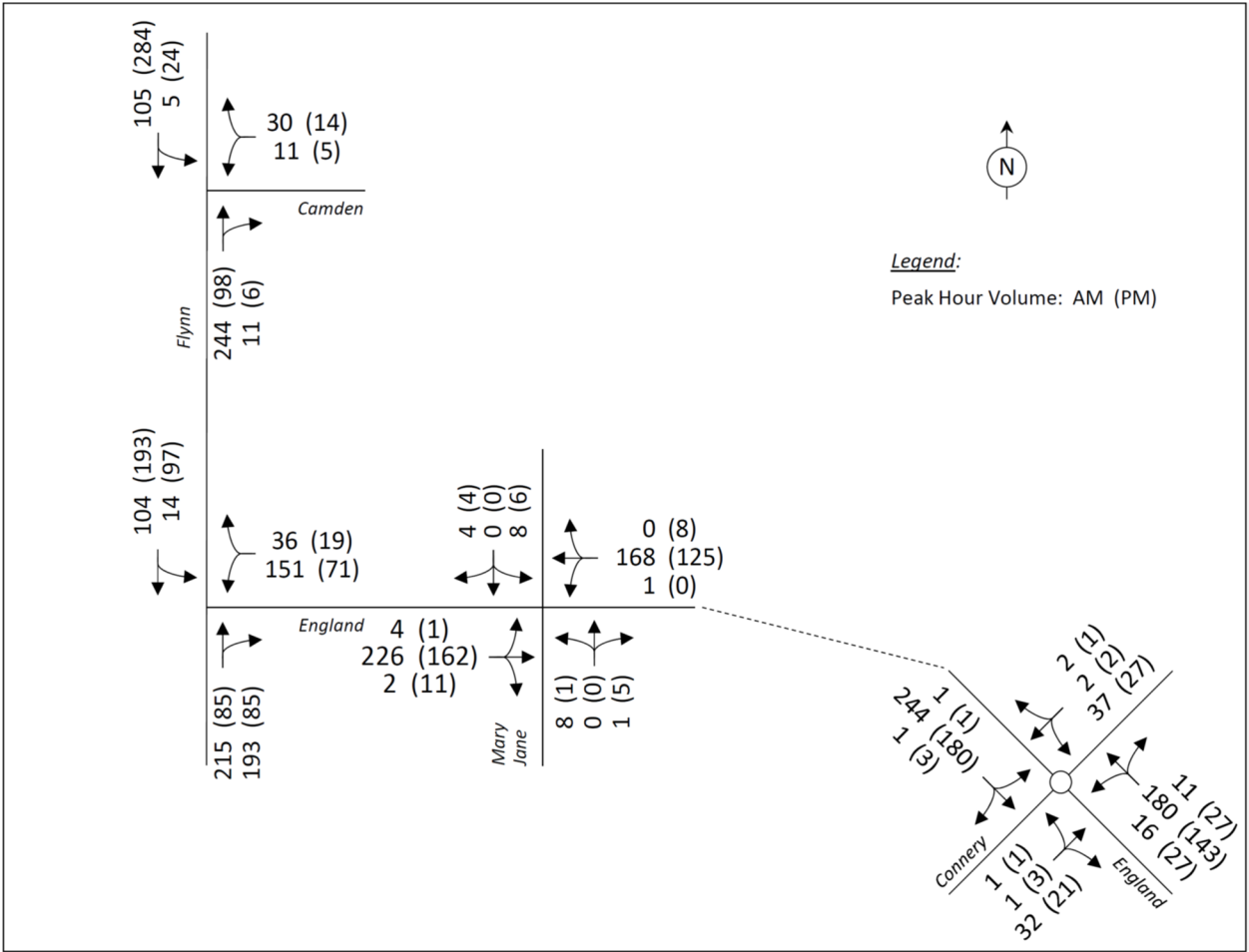


Figure 5: 2026 Background Peak Hour Traffic Volume Estimates

### 3.2 Measuring Intersection Performance

A deterministic software model using Highway Capacity Software (HCS) version 7 was developed and used to assess peak hour traffic operations quality for the stop-controlled intersections. HCS is designed to apply the procedures described in Transportation Research Board Special Report 209, the Highway Capacity Manual (HCM), which has been the industry standard for traffic operations analysis for over 60 years. The HCM and the HCS software use quantitative measures of traffic flow to determine the average delay experienced by a vehicle during the peak hour and assign letter grades (Level of Service, or LOS) to roadway facilities to communicate user satisfaction. The LOS ranges from A (best) to F (worst). The HCM criteria for assigning these LOS grades to unsignalized intersections are based on intersection delay as indicated in **Table 1**.

**Table 1: Stop-Controlled Intersection LOS Criteria**

LOS	Delay Range (sec/veh)	Description of Conditions
A	0 to 10	Minimal delay, nearly free-flowing conditions
B	>10 to 15	Low delay, queues unlikely
C	>15 to 25	Low to moderate delay, short queues possible
D	>25 to 35	Moderate delay, some queuing likely
E	>35 to 50	High delay, long queues possible
F	>50	Very unstable flow, driver behavior could be affected

Note: When volume exceeds capacity, LOS = F regardless of delay estimate.

Source: Transportation Research Board Special Report 209, Highway Capacity Manual (2016)

For the intersections in this study (stop-controlled on a minor street approach), LOS for the intersection is based on the lane group or approach with the worst delay. In most cases, this is a minor-street left turn movement on to the major street. When all-way stop control is used, a weighted average for all intersection approaches is used, but the LOS criteria for delay remain the same. The peak hour LOS standard used for this project is C (25 seconds per vehicle of delay or less).

The England Boulevard & Connery Way intersection was analyzed using Sidra, a second intersection analysis software that was designed more specifically for roundabouts. The same LOS thresholds apply, and overall intersection LOS is reported, similar to an all-way stop.

### 3.3 Intersection Operations Results

**Table 2** shows peak hour intersection LOS and delay for the existing and future background conditions.

**Table 2: Existing and Future Background LOS and Delay**

Study Area Intersection	2020 Existing	2026 Background
	AM Peak Hour	
1. Camden Street & Flynn Lane	B (10.3) – WB	B (10.5) – WB
2. England Boulevard & Flynn Lane	B (12.5) – WB	B (13.1) – WB
3. England Boulevard & Mary Jane Boulevard	B (11.2) – NB	B (11.5) – NB
4. England Boulevard & Connery Way	A (4.7)	A (4.8)
Study Area Intersection	PM Peak Hour	
1. Camden Street & Flynn Lane	A ( 9.8) - WB	A ( 9.8) - WB
2. England Boulevard & Flynn Lane	B (12.4) - WB	B (12.9) - WB
3. England Boulevard & Mary Jane Boulevard	A ( 8.6) – NB	A ( 8.6) – SB
4. England Boulevard & Connery Way	A (4.4)	A (4.5)

Note: Intersections 1 – 3 are the proposed site driveways, so they do not exist in these scenarios.

All intersections operate at LOS B or better during both peak hours in both the existing and future background scenarios. LOS and delay details from software output are contained in the appendix to this report.

## 4.0 Traffic Conditions with the Project

### 4.1 Trip Generation

Because there are two subtypes of housing proposed, there are two calculations that make up the trip generation estimate. The anticipated site-generated peak hour traffic is estimated using the regression equations provided in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11<sup>th</sup> Edition. ITE Land Use codes 210 – Single Family Residential and 220 – Low-Rise Multi Family Residential were used. Townhomes of 1 or 2 stories are included in the small number of housing types studied for ITE land use 220. They are only considered “multi-family” in the sense that they would share an interior wall with at least one other dwelling unit. Trip generation estimates are summarized in **Table 3**.

**Table 3: Project Trip Generation**

	Single Family Detached		Townhome		Project Totals	
ITE Land Use Code	(210)		(220)		254	
Dwelling Units (DU)	130		124			
Weekday						
Trip Equation	Ln(T) = 0.92 Ln(DU) + 2.68		T = 6.41(DU) + 75.31		1,907	
Trips	1,037		870			
AM Peak Hour of Site Traffic						
Trip Equation	T = 0.71(DU) + 7.23		T = 0.35 (DU) + 28.13		172	
Trips	100		72			
% In / % Out	26%	74%	24%	76%	43	129
Trips In / Out	26	74	17	55		
PM Peak Hour of Site Traffic						
Trip Equation	Ln(T) = 0.93 Ln(DU) + 0.36		T = 0.42(DU) + 34.78		216	
Trips	129		87			
% In / % Out	64%	36%	62%	38%	137	79
Trips In / Out	83	46	54	33		

Note that ITE equations for the peak hour of the generator (that is, the Project) were used rather than the more typical ones for the “peak hour of adjacent street traffic” because within the timeframe studied, after the Project is open its traffic is expected to represent a substantial proportion of overall trips at the intersections studied.

No discounts were assumed for internal, pass-by, or diverted trips. All Project-generated trips were considered to be new.

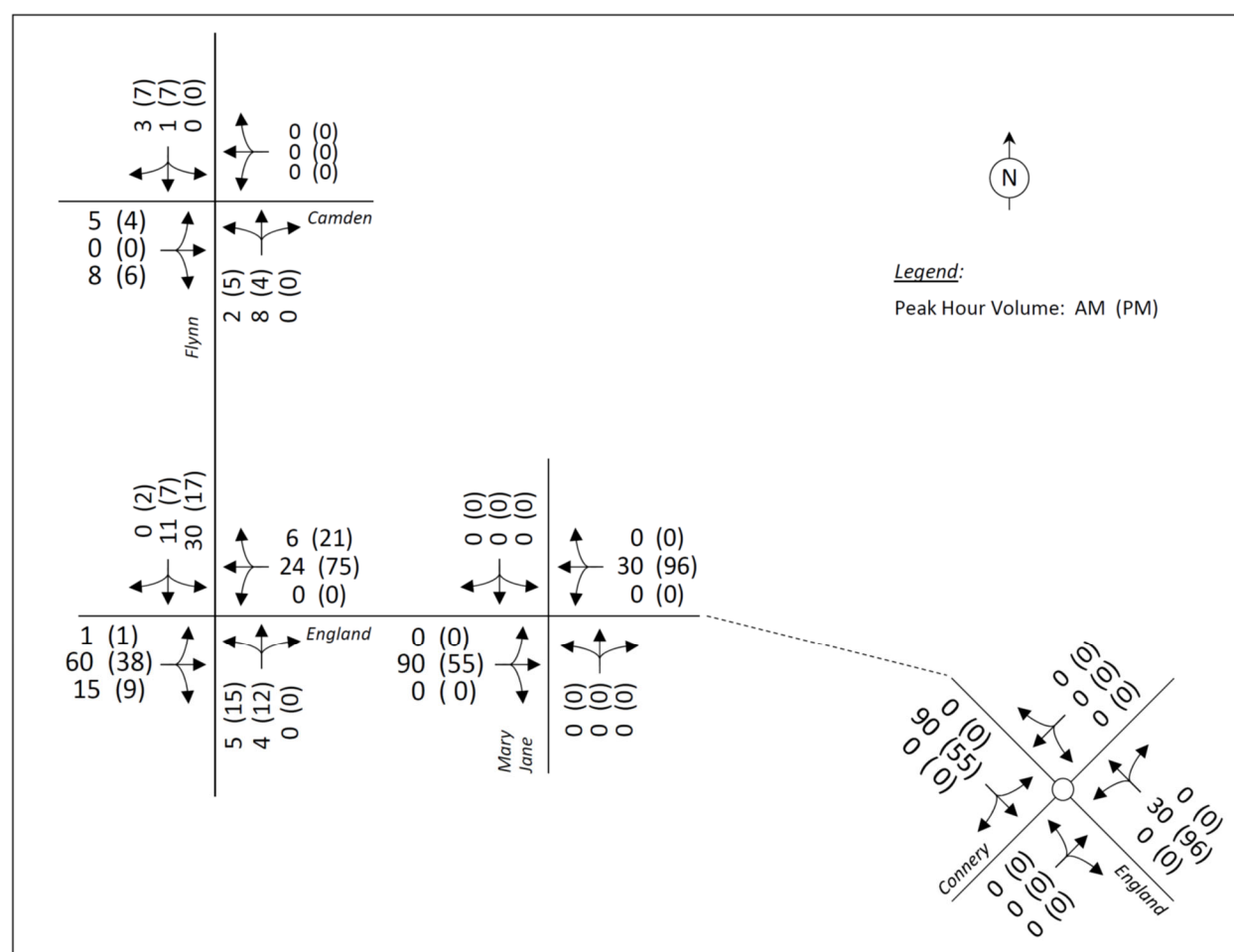
### 4.2 Trip Distribution and Assignment

Project trips were assigned to the street network based on the assumption that traffic would be oriented primarily toward N Reserve Street to the east, with smaller amounts oriented to W Broadway

Street to the north and Mullan Road to the south. The following assumptions, along with the low level of specific trips indicated by the trip generation estimate, drove the trip distribution for the Project:

- About 60-70% of site trips would enter and leave via either Camden and England Boulevard, while the remainder would use the seven streets, rear lanes, and alleys proposed to connect Flynn Lane between Camden and England, independent of those trips' regional orientation.
- Mary Jane Boulevard would not yet be extended between Mullan Road and W Broadway Street before the Project opens, and only the part of the England Boulevard extension identified in the Missoula Connect 2050 LRTP that is part of this subdivision would be constructed—it would not yet connect to George Elmer Drive east of the Project site.
- No Project traffic would be oriented to the existing England Boulevard neighborhood east of Flynn Lane.

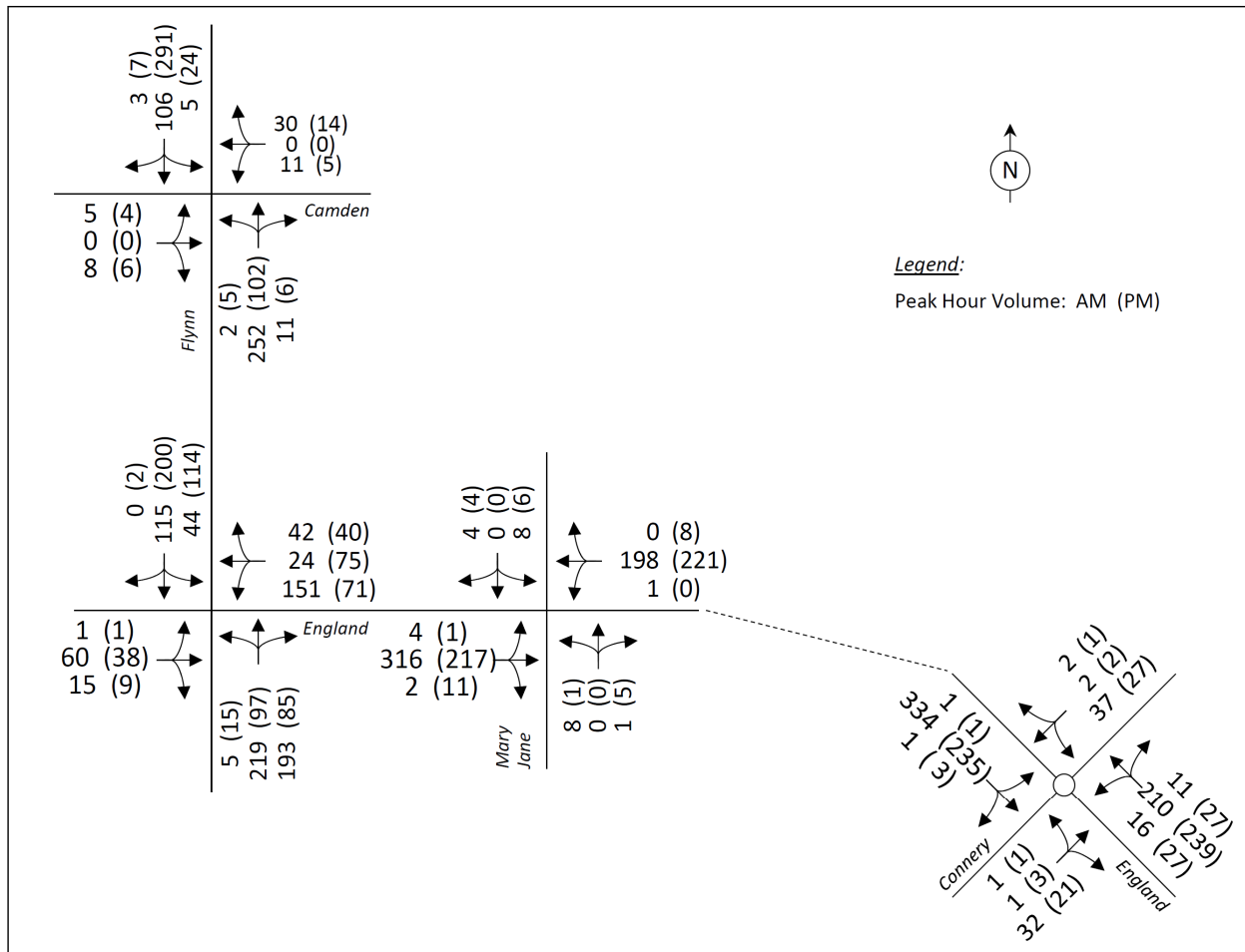
The proximate directional distribution and assignment percentages assumed for this project are 10% to the north on Flynn Lane, 20% to the south on Flynn Lane, and 70% to the east on England Boulevard. A schematic diagram of the peak hour Project-generated trips is shown in **Figure 6**.



### Figure 6: Peak Hour Project Trips

### 4.3 Future Conditions with the Project

The 2026 peak hour traffic volume estimates with the project were derived by simply adding Project-generated traffic to the 2026 Background traffic, and these are shown in schematic form in **Figure 7**. Some single-vehicle discrepancies could exist due to rounding. **Table 4** shows the comparison of intersection LOS and delay between the “2026 Background” and “2026 With Project” scenarios. LOS and delay details from traffic analysis software output are contained in the appendix to this report.



**Figure 7: 2026 Peak Hour Traffic Volume Estimates with the Project**

**Table 4: 2026 Comparison of Background and Project LOS and Delay**

Study Area Intersection	2026 Background	2026 With Project
	AM Peak Hour	
1. Camden Street & Flynn Lane	B (10.5) – WB	B (10.8) – WB
2. England Boulevard & Flynn Lane	B (13.1) – WB	D (25.8) – WB
3. England Boulevard & Mary Jane Boulevard	B (11.5) – NB	B (12.9) – NB
4. England Boulevard & Connery Way	A (4.8)	A (5.5)
Study Area Intersection	PM Peak Hour	
1. Camden Street & Flynn Lane	A ( 9.8) – WB	B (11.4) – EB
2. England Boulevard & Flynn Lane	B (12.9) – WB	C (23.4) – WB
3. England Boulevard & Mary Jane Boulevard	A ( 8.6) – SB	A ( 9.7) – NB
4. England Boulevard & Connery Way	A (4.5)	A (5.1)

The addition of project trips would result in satisfactory operations in 2026 under the existing control at three of the four intersections studied. At England Boulevard & Flynn Lane, the existing two-way stop control would result in an AM peak hour LOS of D, with delay less than one second beyond the threshold for satisfactory LOS. The volume of traffic turning left out of the existing residential area to go south on Flynn Lane (traffic that is not oriented to the Project) is the primary driver of the LOS result indicated. These findings could indicate that under the assumptions documented here, the England Boulevard & Flynn Lane intersection could benefit from either early implementation of a longer-term intersection control modification or a temporary change to help mitigate peak hour delay impacts of the Project.

According to analysis conducted by others for the Mullan BUILD project, future extension of Mary Jane Boulevard from Mullan Road to W Broadway Street will be accompanied by a downgrading of Flynn Lane and, in turn, a high likelihood that some north-south through traffic on Flynn will shift east to Mary Jane Boulevard, in part to avoid potential peak period congestion and speed restrictions associated with Hellgate Elementary School. While that extension and its potential effects are considered to be outside the scope of the Evergreen Housing Project, it could point to the viability of early implementation of potential longer-term BUILD project changes as a potential solution.

The fact that in the short term the overall approach volumes remain higher on Flynn Lane than on England Boulevard makes it difficult to show that flipping the stop configuration such that Flynn Lane traffic stops (while England Boulevard does not) would be effective in producing satisfactory LOS. However, testing of this intersection with a hypothetical to all-way stop control, by adding stop signs to the Flynn Lane approaches when the Project is fully open, indicates that it would operate at LOS B in the AM peak hour, similar to the Background condition. All-way stop control also has the advantage of better general safety performance for pedestrians when speeds are low, as they are proposed to be for Flynn Lane in the long-term BUILD plan.

## 5.0 Conclusions and Recommendations

This report documents the analysis of the proposed Wishcamper Evergreen Subdivision. As an early-phase part of the overall Mullan BUILD plan for the northwestern Missoula area, it includes 254

residential units with street and alley connections to Flynn Lane. The purpose of this analysis was to determine whether the traffic generated by this development prior to the expansion of the surrounding roadway network would result in the need for any short-term traffic control changes at key intersections that would carry most of the Project traffic.

Analysis of the Camden & Flynn, England & Flynn, England & Mary Jane, and England & Connery intersections indicates that under 2020 (pre-Covid) conditions as well as in five years without the project being built, all four would operate at LOS B or better in both the AM and PM peak hours.

Trips generated by the Project were estimated using the ITE Trip Generation manual (11<sup>th</sup> Edition) and assigned to the street network based on the following distribution/orientation: 10% north to/from W Broadway Street, 20% south to/from Mullan Road, and 70% east on England Boulevard. The Project would generate just over 1,900 trips per weekday after it is completely open and occupied.

With one exception, the addition of Project trips would result in LOS C or better in both peak hours at all four intersections studied. The exception is additional delay for westbound left turning traffic in the AM peak hour at the England & Flynn intersection (#2) that would result in average delay 0.8 seconds beyond the 25.0-second limit for LOS C. While it is worth noting that this result could be sensitive to small changes in Project assumptions such as the number and type of lots included, orientation of traffic (90% of project-generated trips would pass through the affected intersection), 2026 opening year, and assignment of traffic to Project access points, it is nonetheless the result that has been produced by Project assumptions. Intersections #1, 3, and 4 could keep their existing traffic control and still meet the LOS requirement in both peak hours.

The construction scheduling relationship between the Project and major roadway improvements and other developments in the surrounding area is not known at this time. As such, the assumptions, analysis, and standards applied for the analysis documented here indicate that if any change to intersection traffic control in the study area were to be needed as a result of Project impacts, it would be the conversion of the England & Flynn intersection from two-way stop control to all-way stop control.

The implementation of this potential control change should be considered carefully in light of other factors at work beyond just intersection delay. For example, the City should account for pedestrian behavior, bicycle travel patterns (if any), observed speeds on Flynn, pavement markings, lighting, crash history, and the landscaping and lighting factors that drive intersection design from a safety standpoint.

Finally, the long-term nature of the Mullan BUILD plan carries with a lack of support for final intersection control decisions because those decisions for individual intersections rest on land use and road network variables that will only be established gradually over one to two decades. As indicated by the fact that the England & Flynn intersection delay very nearly met the LOS C delay limit, all-way stop conversion would only become necessary when the subdivision's occupancy is close to complete. At that time, other conditions around the Project and/or the Mullan BUILD program could change this recommendation.



## **Appendix:**

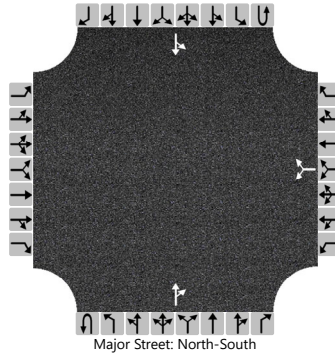
### **LOS and Delay Analysis Software Output**

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	HDR	Intersection	Camden & Flynn
Agency/Co.	Missoula City/County	Jurisdiction	Missoula City/County
Date Performed	12/12/2021	East/West Street	Camden Street
Analysis Year	2020	North/South Street	Flynn Lane
Time Analyzed	AM Existing	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Wishcamper Evergreen Subdivision		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						10		28			230	10		5	99	
Percent Heavy Vehicles (%)						10		10						10		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.50		6.30						4.20		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.59		3.39						2.29		

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						41								5		
Capacity, c (veh/h)						716								1258		
v/c Ratio						0.06								0.00		
95% Queue Length, Q <sub>95</sub> (veh)						0.2								0.0		
Control Delay (s/veh)						10.3								7.9		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)					10.3								0.4			
Approach LOS					B											

# HCS7 Two-Way Stop-Control Report

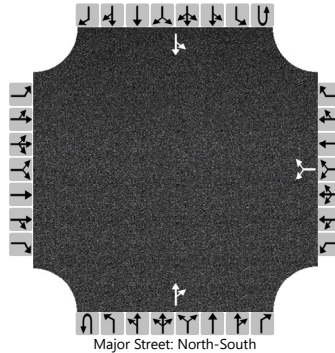
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/12/2021
Analysis Year	2020
Time Analyzed	AM Existing
Intersection Orientation	North-South
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	England & Flynn
Jurisdiction	Missoula City/County
East/West Street	England Boulevard
North/South Street	Flynn Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						142		34			203	182		13	98	
Percent Heavy Vehicles (%)						10		10						10		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.50		6.30						4.20		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.59		3.39						2.29		

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						191								14		
Capacity, c (veh/h)						671								1099		
v/c Ratio						0.29								0.01		
95% Queue Length, Q <sub>95</sub> (veh)						1.2								0.0		
Control Delay (s/veh)						12.5								8.3		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)					12.5								1.1			
Approach LOS					B											

# HCS7 Two-Way Stop-Control Report

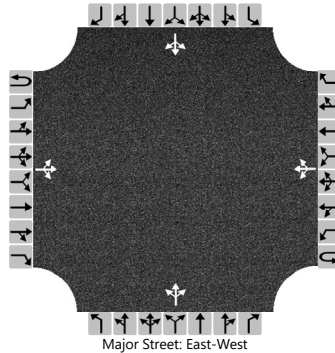
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/12/2021
Analysis Year	2020
Time Analyzed	AM Existing
Intersection Orientation	East-West
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	England & Mary Jane
Jurisdiction	Missoula City/County
East/West Street	England Boulevard
North/South Street	Mary Jane Boulevard
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		4	213	2		1	158	0		8	0	1		8	0	4
Percent Heavy Vehicles (%)		12				12				12	12	12		12	12	12
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.22				4.22				7.22	6.62	6.32		7.22	6.62	6.32
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.31				2.31				3.61	4.11	3.41		3.61	4.11	3.41

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		4				1					10				13	
Capacity, c (veh/h)		1347				1277					590				791	
v/c Ratio		0.00				0.00					0.02				0.02	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.1				0.1	
Control Delay (s/veh)		7.7				7.8					11.2				9.6	
Level of Service (LOS)		A				A					B				A	
Approach Delay (s/veh)	0.2				0.1				11.2				9.6			
Approach LOS									B				A			

# MOVEMENT SUMMARY

 **Site: 4 [England & Connery (Site Folder: General)]**

Wishcamper Evergreen Subdivision  
Site Category: Existing AM  
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: Connery Way														
3	L2	1	12.0	1	12.0	0.039	4.4	LOS A	0.1	3.9	0.42	0.28	0.42	15.4
8	T1	1	12.0	1	12.0	0.039	4.4	LOS A	0.1	3.9	0.42	0.28	0.42	21.0
18	R2	30	12.0	33	12.0	0.039	4.4	LOS A	0.1	3.9	0.42	0.28	0.42	23.4
Approach		32	12.0	35	12.0	0.039	4.4	LOS A	0.1	3.9	0.42	0.28	0.42	23.2
East: England														
1	L2	15	12.0	16	12.0	0.173	4.4	LOS A	0.8	20.9	0.04	0.00	0.04	22.8
6	T1	170	12.0	185	12.0	0.173	4.4	LOS A	0.8	20.9	0.04	0.00	0.04	22.1
16	R2	10	12.0	11	12.0	0.173	4.4	LOS A	0.8	20.9	0.04	0.00	0.04	23.7
Approach		195	12.0	212	12.0	0.173	4.4	LOS A	0.8	20.9	0.04	0.00	0.04	22.2
North: Connery														
7	L2	35	12.0	38	12.0	0.043	4.1	LOS A	0.2	4.4	0.35	0.21	0.35	23.1
4	T1	2	12.0	2	12.0	0.043	4.1	LOS A	0.2	4.4	0.35	0.21	0.35	18.9
14	R2	2	12.0	2	12.0	0.043	4.1	LOS A	0.2	4.4	0.35	0.21	0.35	17.0
Approach		39	12.0	42	12.0	0.043	4.1	LOS A	0.2	4.4	0.35	0.21	0.35	22.7
West: England														
5	L2	1	12.0	1	12.0	0.218	5.1	LOS A	1.0	27.2	0.21	0.09	0.21	12.4
2	T1	230	12.0	250	12.0	0.218	5.1	LOS A	1.0	27.2	0.21	0.09	0.21	25.2
12	R2	1	12.0	1	12.0	0.218	5.1	LOS A	1.0	27.2	0.21	0.09	0.21	19.2
Approach		232	12.0	252	12.0	0.218	5.1	LOS A	1.0	27.2	0.21	0.09	0.21	25.1
All Vehicles		498	12.0	541	12.0	0.218	4.7	LOS A	1.0	27.2	0.17	0.08	0.17	23.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Users\lnalerson\Documents\Work\Projects\Missoula Evergreen Wishcamper Flynn IMEG\LOS Analysis\EX-AM-4\_EngCon.sip9

# HCS7 Two-Way Stop-Control Report

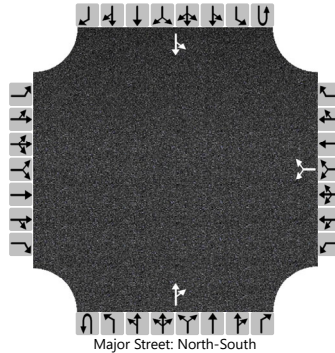
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/12/2021
Analysis Year	2020
Time Analyzed	PM Existing
Intersection Orientation	North-South
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	Camden & Flynn
Jurisdiction	Missoula City/County
East/West Street	Camden Street
North/South Street	Flynn Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						5		13			92	6		23	268	
Percent Heavy Vehicles (%)						10		10						10		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.50		6.30						4.20		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.59		3.39						2.29		

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						20								25		
Capacity, c (veh/h)						777								1436		
v/c Ratio						0.03								0.02		
95% Queue Length, Q <sub>95</sub> (veh)						0.1								0.1		
Control Delay (s/veh)						9.8								7.6		
Level of Service (LOS)						A								A		
Approach Delay (s/veh)					9.8								0.7			
Approach LOS					A											

# HCS7 Two-Way Stop-Control Report

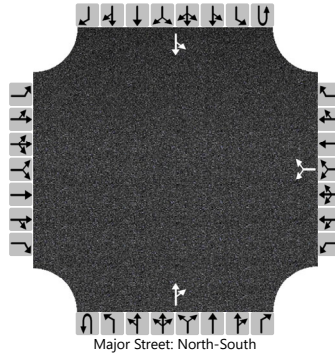
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/12/2021
Analysis Year	2020
Time Analyzed	PM Existing
Intersection Orientation	North-South
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	England & Flynn
Jurisdiction	Missoula City/County
East/West Street	England Boulevard
North/South Street	Flynn Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						67		18			80	80		91	182	
Percent Heavy Vehicles (%)						10		10						10		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.50		6.30						4.20		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.59		3.39						2.29		

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						92								99		
Capacity, c (veh/h)						581								1356		
v/c Ratio						0.16								0.07		
95% Queue Length, Q <sub>95</sub> (veh)						0.6								0.2		
Control Delay (s/veh)						12.4								7.9		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)					12.4								3.1			
Approach LOS					B											

# HCS7 Two-Way Stop-Control Report

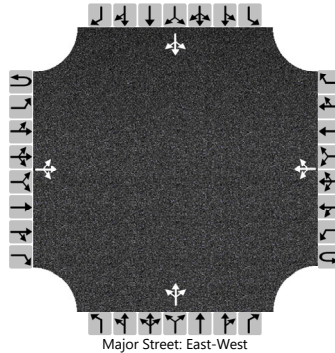
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/12/2021
Analysis Year	2020
Time Analyzed	PM Existing
Intersection Orientation	East-West
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	England & Mary Jane
Jurisdiction	Missoula City/County
East/West Street	England Boulevard
North/South Street	Mary Jane Boulevard
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	153	10		0	118	8		1	0	5		6	0	4
Percent Heavy Vehicles (%)		12				12				12	12	12		12	12	12
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.22				4.22				7.22	6.62	6.32		7.22	6.62	6.32
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.31				2.31				3.61	4.11	3.41		3.61	4.11	3.41

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		1				0					7				11	
Capacity, c (veh/h)		1388				1341					1016				1033	
v/c Ratio		0.00				0.00					0.01				0.01	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.0				0.0	
Control Delay (s/veh)		7.6				7.7					8.6				8.5	
Level of Service (LOS)		A				A					A				A	
Approach Delay (s/veh)	0.1				0.0				8.6				8.5			
Approach LOS									A				A			



# MOVEMENT SUMMARY

 **Site: 4 [England & Connery (Site Folder: General)]**

Wishcamper Evergreen Subdivision  
Site Category: Existing PM  
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: Connery Way														
3	L2	1	12.0	1	12.0	0.027	4.0	LOS A	0.1	2.7	0.36	0.21	0.36	15.9
8	T1	3	12.0	3	12.0	0.027	4.0	LOS A	0.1	2.7	0.36	0.21	0.36	21.6
18	R2	20	12.0	22	12.0	0.027	4.0	LOS A	0.1	2.7	0.36	0.21	0.36	23.7
Approach		24	12.0	26	12.0	0.027	4.0	LOS A	0.1	2.7	0.36	0.21	0.36	23.3
East: England														
1	L2	25	12.0	27	12.0	0.164	4.3	LOS A	0.7	19.7	0.05	0.01	0.05	22.6
6	T1	135	12.0	147	12.0	0.164	4.3	LOS A	0.7	19.7	0.05	0.01	0.05	21.9
16	R2	25	12.0	27	12.0	0.164	4.3	LOS A	0.7	19.7	0.05	0.01	0.05	23.5
Approach		185	12.0	201	12.0	0.164	4.3	LOS A	0.7	19.7	0.05	0.01	0.05	22.2
North: Connery														
7	L2	25	12.0	27	12.0	0.030	3.8	LOS A	0.1	3.1	0.32	0.18	0.32	23.3
4	T1	2	12.0	2	12.0	0.030	3.8	LOS A	0.1	3.1	0.32	0.18	0.32	19.1
14	R2	1	12.0	1	12.0	0.030	3.8	LOS A	0.1	3.1	0.32	0.18	0.32	17.2
Approach		28	12.0	30	12.0	0.030	3.8	LOS A	0.1	3.1	0.32	0.18	0.32	22.9
West: England														
5	L2	1	12.0	1	12.0	0.164	4.5	LOS A	0.7	19.3	0.20	0.08	0.20	12.6
2	T1	170	12.0	185	12.0	0.164	4.5	LOS A	0.7	19.3	0.20	0.08	0.20	25.6
12	R2	3	12.0	3	12.0	0.164	4.5	LOS A	0.7	19.3	0.20	0.08	0.20	19.7
Approach		174	12.0	189	12.0	0.164	4.5	LOS A	0.7	19.3	0.20	0.08	0.20	25.4
All Vehicles		411	12.0	447	12.0	0.164	4.4	LOS A	0.7	19.7	0.15	0.06	0.15	23.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Users\nal arson\Documents\Work\Projects\Missoula Evergreen Wishcamper Flynn IMEG\LOS Analysis\EX-PM-4\_EngCon.sip9

# HCS7 Two-Way Stop-Control Report

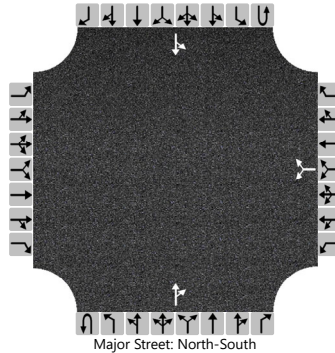
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/12/2021
Analysis Year	2026
Time Analyzed	AM Background
Intersection Orientation	North-South
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	Camden & Flynn
Jurisdiction	Missoula City/County
East/West Street	Camden Street
North/South Street	Flynn Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						11		30			244	11		5	105	
Percent Heavy Vehicles (%)						10		10						10		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.50		6.30						4.20		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.59		3.39						2.29		

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						45								5		
Capacity, c (veh/h)						699								1241		
v/c Ratio						0.06								0.00		
95% Queue Length, Q <sub>95</sub> (veh)						0.2								0.0		
Control Delay (s/veh)						10.5								7.9		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)					10.5								0.4			
Approach LOS					B											

# HCS7 Two-Way Stop-Control Report

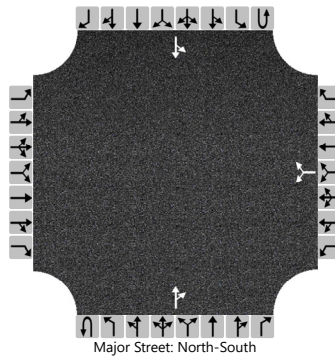
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/12/2021
Analysis Year	2026
Time Analyzed	AM Background
Intersection Orientation	North-South
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	England & Flynn
Jurisdiction	Missoula City/County
East/West Street	England Boulevard
North/South Street	Flynn Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						151		36			215	193		14	104	
Percent Heavy Vehicles (%)						10		10						10		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.50		6.30						4.20		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.59		3.39						2.29		

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						203								15		
Capacity, c (veh/h)						645								1075		
v/c Ratio						0.32								0.01		
95% Queue Length, Q <sub>95</sub> (veh)						1.3								0.0		
Control Delay (s/veh)						13.1								8.4		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)					13.1								1.1			
Approach LOS					B											

# HCS7 Two-Way Stop-Control Report

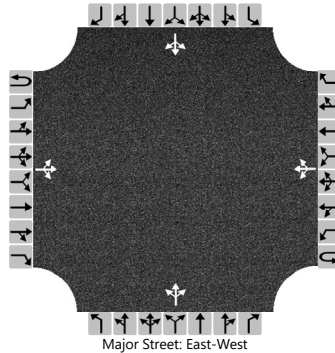
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/12/2021
Analysis Year	2026
Time Analyzed	AM Background
Intersection Orientation	East-West
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	England & Mary Jane
Jurisdiction	Missoula City/County
East/West Street	England Boulevard
North/South Street	Mary Jane Boulevard
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		4	226	2		1	168	0		8	0	1		8	0	4
Percent Heavy Vehicles (%)		12				12				12	12	12		12	12	12
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.22				4.22				7.22	6.62	6.32		7.22	6.62	6.32
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.31				2.31				3.61	4.11	3.41		3.61	4.11	3.41

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		4				1					10				13	
Capacity, c (veh/h)		1334				1262					567				761	
v/c Ratio		0.00				0.00					0.02				0.02	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.1				0.1	
Control Delay (s/veh)		7.7				7.9					11.5				9.8	
Level of Service (LOS)		A				A					B				A	
Approach Delay (s/veh)	0.2				0.1				11.5				9.8			
Approach LOS									B				A			

# MOVEMENT SUMMARY

 **Site: 4 [England & Connery (Site Folder: General)]**

Wishcamper Evergreen Subdivision  
Site Category: Background AM  
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: Connery Way														
3	L2	1	12.0	1	12.0	0.043	4.5	LOS A	0.2	4.3	0.43	0.30	0.43	15.4
8	T1	1	12.0	1	12.0	0.043	4.5	LOS A	0.2	4.3	0.43	0.30	0.43	20.9
18	R2	32	12.0	35	12.0	0.043	4.5	LOS A	0.2	4.3	0.43	0.30	0.43	23.3
Approach		34	12.0	37	12.0	0.043	4.5	LOS A	0.2	4.3	0.43	0.30	0.43	23.1
East: England														
1	L2	16	12.0	17	12.0	0.183	4.5	LOS A	0.8	22.5	0.04	0.01	0.04	22.7
6	T1	180	12.0	196	12.0	0.183	4.5	LOS A	0.8	22.5	0.04	0.01	0.04	22.0
16	R2	11	12.0	12	12.0	0.183	4.5	LOS A	0.8	22.5	0.04	0.01	0.04	23.6
Approach		207	12.0	225	12.0	0.183	4.5	LOS A	0.8	22.5	0.04	0.01	0.04	22.2
North: Connery														
7	L2	37	12.0	40	12.0	0.046	4.1	LOS A	0.2	4.7	0.36	0.22	0.36	23.0
4	T1	2	12.0	2	12.0	0.046	4.1	LOS A	0.2	4.7	0.36	0.22	0.36	18.8
14	R2	2	12.0	2	12.0	0.046	4.1	LOS A	0.2	4.7	0.36	0.22	0.36	16.9
Approach		41	12.0	45	12.0	0.046	4.1	LOS A	0.2	4.7	0.36	0.22	0.36	22.7
West: England														
5	L2	1	12.0	1	12.0	0.232	5.2	LOS A	1.1	29.3	0.22	0.09	0.22	12.3
2	T1	244	12.0	265	12.0	0.232	5.2	LOS A	1.1	29.3	0.22	0.09	0.22	25.0
12	R2	1	12.0	1	12.0	0.232	5.2	LOS A	1.1	29.3	0.22	0.09	0.22	19.0
Approach		246	12.0	267	12.0	0.232	5.2	LOS A	1.1	29.3	0.22	0.09	0.22	25.0
All Vehicles		528	12.0	574	12.0	0.232	4.8	LOS A	1.1	29.3	0.17	0.08	0.17	23.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Users\nal arson\Documents\Work\Projects\Missoula Evergreen Wishcamper Flynn IMEG\LOS Analysis\BG-AM-4\_EngCon.sip9

# HCS7 Two-Way Stop-Control Report

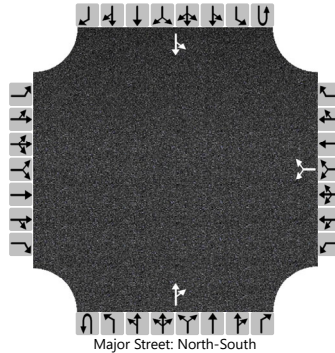
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/12/2021
Analysis Year	2026
Time Analyzed	PM Background
Intersection Orientation	North-South
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	Camden & Flynn
Jurisdiction	Missoula City/County
East/West Street	Camden Street
North/South Street	Flynn Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						5		14			98	6		24	284	
Percent Heavy Vehicles (%)						10		10						10		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.50		6.30						4.20		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.59		3.39						2.29		

## Delay, Queue Length, and Level of Service

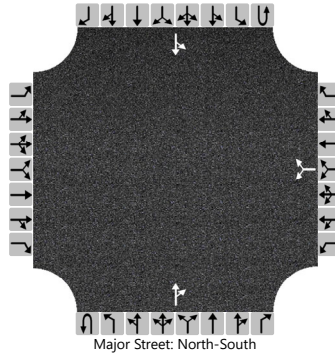
Flow Rate, v (veh/h)						21								26		
Capacity, c (veh/h)						769								1428		
v/c Ratio						0.03								0.02		
95% Queue Length, Q <sub>95</sub> (veh)						0.1								0.1		
Control Delay (s/veh)						9.8								7.6		
Level of Service (LOS)						A								A		
Approach Delay (s/veh)					9.8								0.7			
Approach LOS					A											

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	HDR	Intersection	England & Flynn
Agency/Co.	Missoula City/County	Jurisdiction	Missoula City/County
Date Performed	12/12/2021	East/West Street	England Boulevard
Analysis Year	2026	North/South Street	Flynn Lane
Time Analyzed	PM Background	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Wishcamper Evergreen Subdivision		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						71		19			85	85		97	193	
Percent Heavy Vehicles (%)						10		10						10		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.50		6.30						4.20		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.59		3.39						2.29		

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						98								105		
Capacity, c (veh/h)						550								1343		
v/c Ratio						0.18								0.08		
95% Queue Length, Q <sub>95</sub> (veh)						0.6								0.3		
Control Delay (s/veh)						12.9								7.9		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)					12.9								3.1			
Approach LOS					B											

# HCS7 Two-Way Stop-Control Report

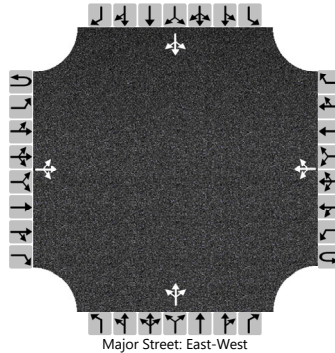
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/12/2021
Analysis Year	2026
Time Analyzed	PM Background
Intersection Orientation	East-West
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	England & Mary Jane
Jurisdiction	Missoula City/County
East/West Street	England Boulevard
North/South Street	Mary Jane Boulevard
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	162	11		0	125	8		1	0	5		6	0	4
Percent Heavy Vehicles (%)		12				12				12	12	12		12	12	12
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.22				4.22				7.22	6.62	6.32		7.22	6.62	6.32
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.31				2.31				3.61	4.11	3.41		3.61	4.11	3.41

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		1				0					7				11	
Capacity, c (veh/h)		1379				1328					1002				1005	
v/c Ratio		0.00				0.00					0.01				0.01	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.0				0.0	
Control Delay (s/veh)		7.6				7.7					8.6				8.6	
Level of Service (LOS)		A				A					A				A	
Approach Delay (s/veh)	0.1				0.0				8.6				8.6			
Approach LOS									A				A			



# MOVEMENT SUMMARY

 **Site: 4 [England & Connery (Site Folder: General)]**

Wishcamper Evergreen Subdivision  
Site Category: Background PM  
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: Connery Way														
3	L2	1	12.0	1	12.0	0.029	4.0	LOS A	0.1	2.9	0.37	0.22	0.37	15.8
8	T1	3	12.0	3	12.0	0.029	4.0	LOS A	0.1	2.9	0.37	0.22	0.37	21.5
18	R2	21	12.0	23	12.0	0.029	4.0	LOS A	0.1	2.9	0.37	0.22	0.37	23.7
Approach		25	12.0	27	12.0	0.029	4.0	LOS A	0.1	2.9	0.37	0.22	0.37	23.3
East: England														
1	L2	27	12.0	29	12.0	0.175	4.4	LOS A	0.8	21.2	0.05	0.01	0.05	22.6
6	T1	143	12.0	155	12.0	0.175	4.4	LOS A	0.8	21.2	0.05	0.01	0.05	21.9
16	R2	27	12.0	29	12.0	0.175	4.4	LOS A	0.8	21.2	0.05	0.01	0.05	23.4
Approach		197	12.0	214	12.0	0.175	4.4	LOS A	0.8	21.2	0.05	0.01	0.05	22.2
North: Connery														
7	L2	27	12.0	29	12.0	0.033	3.9	LOS A	0.1	3.3	0.34	0.19	0.34	23.2
4	T1	2	12.0	2	12.0	0.033	3.9	LOS A	0.1	3.3	0.34	0.19	0.34	19.0
14	R2	1	12.0	1	12.0	0.033	3.9	LOS A	0.1	3.3	0.34	0.19	0.34	17.1
Approach		30	12.0	33	12.0	0.033	3.9	LOS A	0.1	3.3	0.34	0.19	0.34	22.9
West: England														
5	L2	1	12.0	1	12.0	0.174	4.7	LOS A	0.8	20.7	0.21	0.09	0.21	12.5
2	T1	180	12.0	196	12.0	0.174	4.7	LOS A	0.8	20.7	0.21	0.09	0.21	25.5
12	R2	3	12.0	3	12.0	0.174	4.7	LOS A	0.8	20.7	0.21	0.09	0.21	19.6
Approach		184	12.0	200	12.0	0.174	4.7	LOS A	0.8	20.7	0.21	0.09	0.21	25.4
All Vehicles		436	12.0	474	12.0	0.175	4.5	LOS A	0.8	21.2	0.15	0.07	0.15	23.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Users\lnalrson\Documents\Work\Projects\Missoula Evergreen Wishcamper Flynn IMEG\LOS Analysis\BG-PM-4\_EngCon.sip9

# HCS7 Two-Way Stop-Control Report

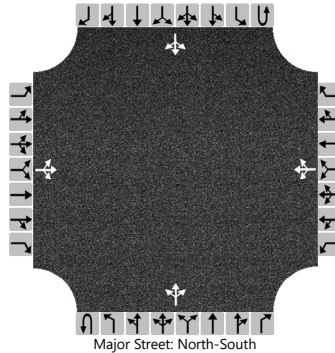
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/13/2021
Analysis Year	2026
Time Analyzed	AM With Project
Intersection Orientation	North-South
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	Camden & Flynn
Jurisdiction	Missoula City/County
East/West Street	Camden Street
North/South Street	Flynn Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		5	0	8		11	0	30		2	252	11		5	106	3
Percent Heavy Vehicles (%)		10	10	10		10	10	10		10				10		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.20	6.60	6.30		7.20	6.60	6.30		4.20				4.20		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.59	4.09	3.39		3.59	4.09	3.39		2.29				2.29		

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			14			45				2				5		
Capacity, c (veh/h)			692			667				1421				1232		
v/c Ratio			0.02			0.07				0.00				0.00		
95% Queue Length, Q <sub>95</sub> (veh)			0.1			0.2				0.0				0.0		
Control Delay (s/veh)			10.3			10.8				7.5				7.9		
Level of Service (LOS)			B			B				A				A		
Approach Delay (s/veh)	10.3				10.8				0.1				0.4			
Approach LOS	B				B											

# HCS7 Two-Way Stop-Control Report

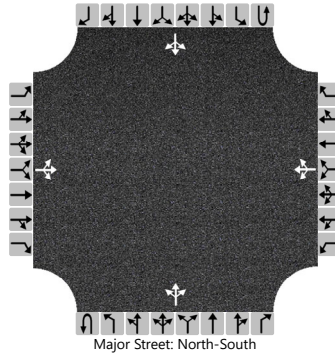
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/13/2021
Analysis Year	2026
Time Analyzed	AM With Project
Intersection Orientation	North-South
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	England & Flynn
Jurisdiction	Missoula City/County
East/West Street	England Boulevard
North/South Street	Flynn Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	60	15		151	24	42		5	219	193		44	115	0
Percent Heavy Vehicles (%)		10	10	10		10	10	10		10				10		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.20	6.60	6.30		7.20	6.60	6.30		4.20				4.20		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.59	4.09	3.39		3.59	4.09	3.39		2.29				2.29		

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			83				236			5				48		
Capacity, c (veh/h)			429				403			1413				1071		
v/c Ratio			0.19				0.59			0.00				0.04		
95% Queue Length, Q <sub>95</sub> (veh)			0.7				3.6			0.0				0.1		
Control Delay (s/veh)			15.4				25.8			7.6				8.5		
Level of Service (LOS)			C				D			A				A		
Approach Delay (s/veh)	15.4				25.8				0.1				2.7			
Approach LOS	C				D											

# HCS7 All-Way Stop Control Report

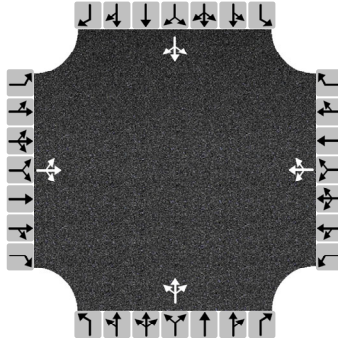
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/13/2021
Analysis Year	2026
Analysis Time Period (hrs)	0.25
Time Analyzed	AM With Project - AWSC
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	England & Flynn
Jurisdiction	Missoula City/County
East/West Street	England Boulevard
North/South Street	Flynn Lane
Peak Hour Factor	0.92

## Lanes



## Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1	60	15	151	24	42	5	219	193	44	115	0
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	83			236			453			173		
Percent Heavy Vehicles	10			10			10			10		

## Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.073			0.210			0.403			0.154		
Final Departure Headway, hd (s)	6.15			5.94			5.09			5.82		
Final Degree of Utilization, x	0.141			0.389			0.640			0.279		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	4.15			3.94			3.09			3.82		

## Capacity, Delay and Level of Service

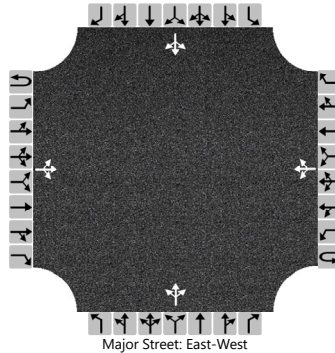
Flow Rate, v (veh/h)	83			236			453			173		
Capacity	585			606			708			618		
95% Queue Length, Q <sub>95</sub> (veh)	0.5			1.8			4.7			1.1		
Control Delay (s/veh)	10.2			12.7			16.7			11.1		
Level of Service, LOS	B			B			C			B		
Approach Delay (s/veh)	10.2			12.7			16.7			11.1		
Approach LOS	B			B			C			B		
Intersection Delay, s/veh   LOS	14.1						B					

# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	HDR	Intersection	England & Mary Jane
Agency/Co.	Missoula City/County	Jurisdiction	Missoula City/County
Date Performed	12/13/2021	East/West Street	England Boulevard
Analysis Year	2026	North/South Street	Mary Jane Boulevard
Time Analyzed	AM With Project	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Wishcamper Evergreen Subdivision		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		4	316	2		1	198	0		8	0	1		8	0	4
Percent Heavy Vehicles (%)		12				12				12	12	12		12	12	12
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.22				4.22				7.22	6.62	6.32		7.22	6.62	6.32
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.31				2.31				3.61	4.11	3.41		3.61	4.11	3.41

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		4				1					10				13	
Capacity, c (veh/h)		1298				1160					463				622	
v/c Ratio		0.00				0.00					0.02				0.02	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.1				0.1	
Control Delay (s/veh)		7.8				8.1					12.9				10.9	
Level of Service (LOS)		A				A					B				B	
Approach Delay (s/veh)	0.1				0.0				12.9				10.9			
Approach LOS									B				B			

# MOVEMENT SUMMARY

 **Site: 4 [England & Connery (Site Folder: General)]**

Wishcamper Evergreen Subdivision  
Site Category: With Project AM  
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: Connery Way														
3	L2	1	12.0	1	12.0	0.048	5.2	LOS A	0.2	4.7	0.50	0.38	0.50	14.9
8	T1	1	12.0	1	12.0	0.048	5.2	LOS A	0.2	4.7	0.50	0.38	0.50	20.2
18	R2	32	12.0	35	12.0	0.048	5.2	LOS A	0.2	4.7	0.50	0.38	0.50	22.8
Approach		34	12.0	37	12.0	0.048	5.2	LOS A	0.2	4.7	0.50	0.38	0.50	22.6
East: England														
1	L2	16	12.0	17	12.0	0.210	4.8	LOS A	1.0	26.5	0.04	0.01	0.04	22.6
6	T1	210	12.0	228	12.0	0.210	4.8	LOS A	1.0	26.5	0.04	0.01	0.04	21.9
16	R2	11	12.0	12	12.0	0.210	4.8	LOS A	1.0	26.5	0.04	0.01	0.04	23.5
Approach		237	12.0	258	12.0	0.210	4.8	LOS A	1.0	26.5	0.04	0.01	0.04	22.0
North: Connery														
7	L2	37	12.0	40	12.0	0.048	4.3	LOS A	0.2	4.9	0.39	0.25	0.39	22.9
4	T1	2	12.0	2	12.0	0.048	4.3	LOS A	0.2	4.9	0.39	0.25	0.39	18.7
14	R2	2	12.0	2	12.0	0.048	4.3	LOS A	0.2	4.9	0.39	0.25	0.39	16.8
Approach		41	12.0	45	12.0	0.048	4.3	LOS A	0.2	4.9	0.39	0.25	0.39	22.6
West: England														
5	L2	1	12.0	1	12.0	0.327	6.3	LOS A	1.7	45.7	0.24	0.11	0.24	11.9
2	T1	344	12.0	374	12.0	0.327	6.3	LOS A	1.7	45.7	0.24	0.11	0.24	24.2
12	R2	1	12.0	1	12.0	0.327	6.3	LOS A	1.7	45.7	0.24	0.11	0.24	18.1
Approach		346	12.0	376	12.0	0.327	6.3	LOS A	1.7	45.7	0.24	0.11	0.24	24.1
All Vehicles		658	12.0	715	12.0	0.327	5.5	LOS A	1.7	45.7	0.19	0.09	0.19	23.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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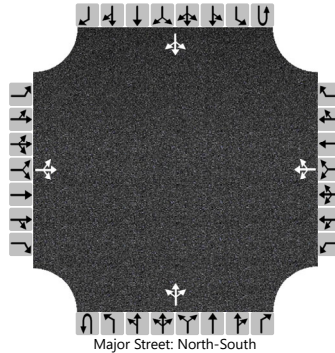
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# HCS7 Two-Way Stop-Control Report

## General Information

Analyst	HDR	Intersection	Camden & Flynn
Agency/Co.	Missoula City/County	Jurisdiction	Missoula City/County
Date Performed	12/13/2021	East/West Street	Camden Street
Analysis Year	2026	North/South Street	Flynn Lane
Time Analyzed	PM With Project	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Wishcamper Evergreen Subdivision		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		4	0	6		5	0	14		5	102	6		24	291	7
Percent Heavy Vehicles (%)		10	10	10		10	10	10		10				10		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.20	6.60	6.30		7.20	6.60	6.30		4.20				4.20		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.59	4.09	3.39		3.59	4.09	3.39		2.29				2.29		

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			11			21				5				26		
Capacity, c (veh/h)			572			723				1192				1423		
v/c Ratio			0.02			0.03				0.00				0.02		
95% Queue Length, Q <sub>95</sub> (veh)			0.1			0.1				0.0				0.1		
Control Delay (s/veh)			11.4			10.1				8.0				7.6		
Level of Service (LOS)			B			B				A				A		
Approach Delay (s/veh)	11.4				10.1				0.4				0.7			
Approach LOS	B				B											

# HCS7 Two-Way Stop-Control Report

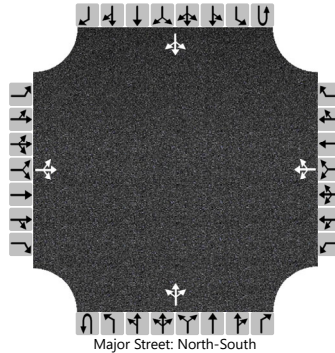
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/13/2021
Analysis Year	2026
Time Analyzed	PM With Project
Intersection Orientation	North-South
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	England & Flynn
Jurisdiction	Missoula City/County
East/West Street	England Boulevard
North/South Street	Flynn Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	38	9		71	75	40		15	97	85		114	200	2
Percent Heavy Vehicles (%)		10	10	10		10	10	10		10				10		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.20	6.60	6.30		7.20	6.60	6.30		4.20				4.20		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.59	4.09	3.39		3.59	4.09	3.39		2.29				2.29		

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			52			202				16				124		
Capacity, c (veh/h)			382			394				1304				1328		
v/c Ratio			0.14			0.51				0.01				0.09		
95% Queue Length, Q <sub>95</sub> (veh)			0.5			2.8				0.0				0.3		
Control Delay (s/veh)			15.9			23.4				7.8				8.0		
Level of Service (LOS)			C			C				A				A		
Approach Delay (s/veh)	15.9				23.4				0.7				3.4			
Approach LOS	C				C											



# HCS7 Two-Way Stop-Control Report

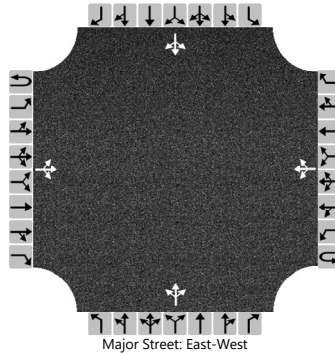
## General Information

Analyst	HDR
Agency/Co.	Missoula City/County
Date Performed	12/13/2021
Analysis Year	2026
Time Analyzed	PM With Project
Intersection Orientation	East-West
Project Description	Wishcamper Evergreen Subdivision

## Site Information

Intersection	England & Mary Jane
Jurisdiction	Missoula City/County
East/West Street	England Boulevard
North/South Street	Mary Jane Boulevard
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	217	11		0	221	8		1	0	5		6	0	4
Percent Heavy Vehicles (%)		12				12				12	12	12		12	12	12
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.22				4.22				7.22	6.62	6.32		7.22	6.62	6.32
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.31				2.31				3.61	4.11	3.41		3.61	4.11	3.41

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		1				0					7				11	
Capacity, c (veh/h)		1260				1262					928				780	
v/c Ratio		0.00				0.00					0.01				0.01	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.0				0.0	
Control Delay (s/veh)		7.9				7.9					8.9				9.7	
Level of Service (LOS)		A				A					A				A	
Approach Delay (s/veh)	0.0				0.0				8.9				9.7			
Approach LOS									A				A			

# MOVEMENT SUMMARY

 **Site: 4 [England & Connery (Site Folder: General)]**

Wishcamper Evergreen Subdivision  
Site Category: With Project PM  
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] ft				
South: Connery Way														
3	L2	1	12.0	1	12.0	0.031	4.3	LOS A	0.1	3.0	0.42	0.27	0.42	15.6
8	T1	3	12.0	3	12.0	0.031	4.3	LOS A	0.1	3.0	0.42	0.27	0.42	21.2
18	R2	21	12.0	23	12.0	0.031	4.3	LOS A	0.1	3.0	0.42	0.27	0.42	23.5
Approach		25	12.0	27	12.0	0.031	4.3	LOS A	0.1	3.0	0.42	0.27	0.42	23.1
East: England														
1	L2	27	12.0	29	12.0	0.260	5.3	LOS A	1.3	34.7	0.05	0.01	0.05	22.2
6	T1	239	12.0	260	12.0	0.260	5.3	LOS A	1.3	34.7	0.05	0.01	0.05	21.5
16	R2	27	12.0	29	12.0	0.260	5.3	LOS A	1.3	34.7	0.05	0.01	0.05	23.0
Approach		293	12.0	318	12.0	0.260	5.3	LOS A	1.3	34.7	0.05	0.01	0.05	21.7
North: Connery														
7	L2	27	12.0	29	12.0	0.037	4.4	LOS A	0.1	3.7	0.42	0.28	0.42	22.9
4	T1	2	12.0	2	12.0	0.037	4.4	LOS A	0.1	3.7	0.42	0.28	0.42	18.6
14	R2	1	12.0	1	12.0	0.037	4.4	LOS A	0.1	3.7	0.42	0.28	0.42	16.8
Approach		30	12.0	33	12.0	0.037	4.4	LOS A	0.1	3.7	0.42	0.28	0.42	22.5
West: England														
5	L2	1	12.0	1	12.0	0.226	5.2	LOS A	1.0	28.3	0.22	0.10	0.22	12.3
2	T1	235	12.0	255	12.0	0.226	5.2	LOS A	1.0	28.3	0.22	0.10	0.22	25.1
12	R2	3	12.0	3	12.0	0.226	5.2	LOS A	1.0	28.3	0.22	0.10	0.22	19.1
Approach		239	12.0	260	12.0	0.226	5.2	LOS A	1.0	28.3	0.22	0.10	0.22	25.0
All Vehicles		587	12.0	638	12.0	0.260	5.1	LOS A	1.3	34.7	0.16	0.07	0.16	23.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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