Matt Martin

From: Joe Bessman <Joe@transightconsulting.com>
Sent: Friday, October 7, 2022 1:12 PM
To: Matt Martin
Cc: Paul Bertagna; Erik Huffman PE PLS CWRE LEED AP (ehuffman@beconeng.com)
Subject: 1237ReviewComments
Attachments: 1237ReviewComments.pdf

Follow Up Flag: Follow up
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Hi Matt,
Enclosed are my review comments on Sunset Meadows. ODOT was pretty vague about the requirements at OR 242/Hood, I would recommend that we have them work through a 30% design for the intersection but only be responsible for the northwest quadrant. Let me know if you have any questions!

Thanks,
Joe

Joe Bessman, PE
Principal, Owner

Transight Consulting, LLC
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TRANSIGHT CONSULTING, LLC
Transportation Engineering and Planning Services

Date:	October 7, 2022
To:	Matt Martin, City of Sisters
From:	Joe Bessman, PE
Project Reference No.:	1237
Project Name:	Sunset Meadows Review (Patterson Property)

This memorandum provides a formal review of the Sunset Meadows transportation materials that were prepared by Lancaster Mobley Engineering, as amended August 22, 2022. I have reviewed these materials and agree with the analysis and findings presented within the transportation study. The study identifies two transportation issues associated with this development:

- Delays along US 20 through the City core area; and
- Morning school period congestion at the OR 242/Hood Avenue intersection.

Each of these issues are discussed below.

US 20 Corridor

During the peak summer season, intersections along US 20 operate with high delays (but under capacity and operating at an acceptable ODOT mobility standards). This is a known issue, and the City's Transportation System Plan plans to address this need through the Alternate Route. This project aims to provide an alternative to through travelers and trucks that avoids the downtown commercial area. Contribution of the project toward the City's Transportation System Development Charges (SDC) will help the City of Sisters and ODOT implement this plan. Funding was recently secured for the US 20/Locust intersection, which is the most critical remaining element.

OR 242 / Hood Avenue Intersection

Due to the presence of the consolidated schools toward the west, much of the traffic at the OR 242/Hood Avenue intersection arrives within a narrow time period at the school arrival and dismissal periods. This consolidated traffic creates delays at the all-way stop-controlled intersection, but these delays dissipate quickly outside of these 20-minute window. The analysis prepared by Lancaster Mobley shows that the intersection operates over its carrying capacity during this peak 15-minute period, but operates with very low delays outside of these periods.

The analysis of the State system is complicated by the required analysis methodologies. This includes adjusting school year traffic counts to peak summertime conditions (when schools are closed) and assessing operations during the peak fifteen-minutes of the peak hour. Without these summertime traffic count adjustments analysis of the actual school year traffic counts shows that delays are low with the average delay in any approaching direction about 10 seconds with a queue of less than three vehicles.

As outlined within the analysis, the most critical time period occurs between 8:10 and 8:25 a.m., which coincides with the 8:30 start time at Sisters Middle School. With the planned relocation of the elementary

school, these peak school periods will experience even higher traffic, particularly as the elementary school start time is 8:35 a.m. As noted by the applicant, spreading these arrival/departure periods throughout the hour would allow the intersection to operate with substantially lower delays. Discussions held as part of the elementary school project also raised this issue. However, it was identified that the City's consolidated bussing and limited bus drivers currently provide limited flexibility in staggering the start and end times.

Accordingly, it is understood that this issue at this intersection is primarily a constraint of the school district, and we recognize that the proposed Sunset Meadows project provides only an incremental impact with its site-generated trips. Further, as discussed with the applicant the City's goal is not to widen the intersection and further increase capacity (which would provide a numerical solution but in reality would make the all-way stop more confusing for drivers), but rather to simplify the conflicts and enhance the pedestrian crossings. With plans to construct a mobility hub within the East Portal and relocate Sisters Elementary School, these safety-related improvements are considered the long-term vision for the intersection as the City and School District pursue school traffic safety and management strategies.

The City and ODOT have developed a conceptual improvement plan for the intersection as shown in Figure 1. The intent of this project is as follows:

- Reduce the number of approaches to simplify driver decisions at the all-way stop. Removing the low-volume southbound left-turn improves traffic operations by reducing conflicts with the higher-volume movements.
- Reconstruct the intersection corners with directional ramps. This design significantly reduces the crossing distance along this school route.
- Reconstruct the wide curb radii to reduce turning speeds and shorten the crossing distances.
- Complete and interconnect area sidewalks, with frontage Sunset Meadows frontage improvements providing better spacing between the multiuse pathway and the OR 242 highway.
- Extend and connect bicycle lanes throughout the intersection.

It is my understanding that implementation of this concept (and the broader connections and school zone improvements) will be provided through the City, ODOT, and private development. For Sunset Meadows I recommend the following be provided as the project's contribution toward these overall improvements:

- Sunset Meadows (or the first adjacent development project) prepare 30% design plans for the concept shown in Figure 1 to help identify issues, constraints, and utility modifications associated with the improvements.
- Sunset Meadows to complete the improvements shown on the northwest intersection quadrant along the site frontage, as well as associated restriping as a result of the modifications.
    - Installation of new curbing along the revised northwestern curb return
    - Installation of directional curb ramps in compliance with ADA requirements
    - Integration of the multiuse pathways with the new ramps
    - Relocation of signing and striping as required with the revised design.

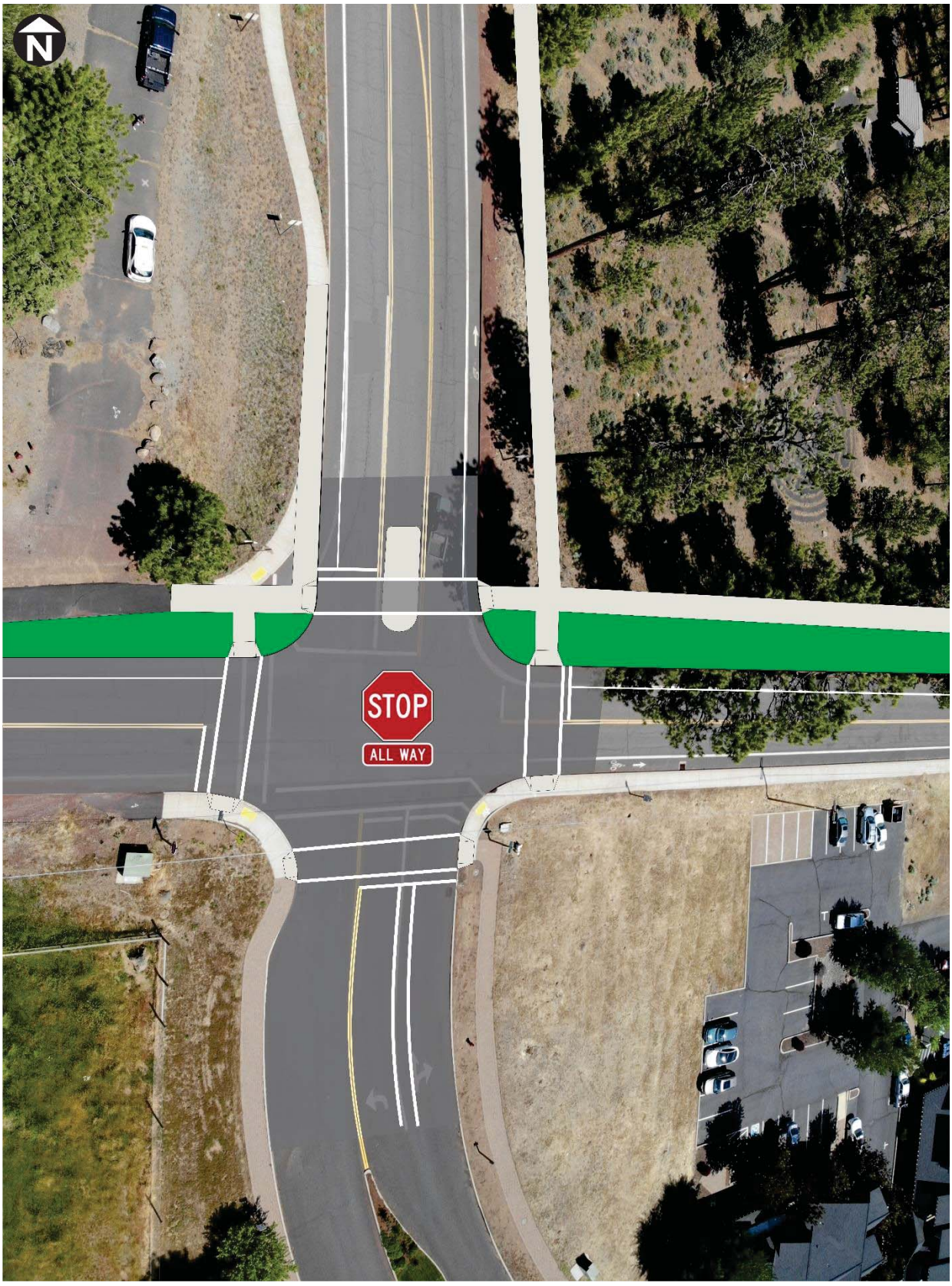


Figure 1. Conceptual OR 242/Hood Avenue Improvement Plan.

SITE PLAN REVIEW

In addition to these operational improvements, the following is also recommended:

- A 10-foot right-of-way dedication is recommended along OR 242, bringing the 60-foot ROW toward its 80-foot standard.
- All internal local streets and alleys to be constructed to standard City of Sisters structural and dimensional standards.
- Accessible ramps will be required at all internal street intersections in all directions.
- Fencing, signage, above-ground utilities, landscaping, and other obstructions should be sited outside of the intersection sight distance triangles with dimensions shown within project civil plans. Landscaping within this area should be maintained below a height of 2-feet, with tree canopies trimmed above 8-feet.
- Stop signs will be required at all minor-street approaches.

Thank you for the opportunity to provide these transportation materials, if you have any questions I can be reached at (503) 997-4473 or via email at joe@transightconsulting.com.

Attachment:

September 20, 2022 Review of OR 242/Hood Avenue

TRANSIGHT CONSULTING, LLC
Transportation Engineering and Planning Services

Date:	September 19, 2022
To:	Paul Bertagna, City of Sisters
From:	Joe Bessman, PE
Project Reference No.:	1237
Project Name:	OR 242/W Hood Avenue Configuration

The purpose of this memorandum is to provide a review of the OR 242/W Hood Avenue intersection in Sisters, Oregon. The intersection is located on the west side of the City, with the alignment of OR 242 located along the northern and western intersection approaches.

Intersection Context

Oregon Highway 242 (McKenzie Highway) connects the City of Sisters to OR 126, linking two federal wilderness areas and various historic, recreational, and scenic features along its route. It is also designated a scenic bikeway. Locally, the OR 242 route provides an access route to the City's churches and schools to the west, continuing south into the W Hood Avenue alignment that extends east parallel to W Cascade Avenue (US 20/OR 126).

Planned development activity surrounding the intersection includes a new mobility hub is planned at the East Portal site to provide intermodal service and support intercity transit, and a new residential project is planned south of The Pines within the Patterson property, the Woodlands residential project was approved on the east side of US 20, and relocation of Sisters Elementary School has been approved near the OR 242 intersection with Barclay Drive. There are also pending plans to rezone the church properties along Trinity Way to allow workforce and multifamily housing. The location of these projects and the supporting roadway network are shown in Figure 1.

Figure 1. Site Vicinity Map. *Source: Deschutes County DIAL.*

With these development projects there are several improvements planned to area infrastructure. The East Portal mobility hub plans to improve its southern boundary to continue the east-west road alignment within a public right-of-way (it is currently within Forest Service owned lands). This will include construction of a new pathway along the north side of the road that will continue into the pathway toward the Middle and High Schools. This project will also improve the eastern edge of OR 242 as it continues north to US 20, along with enhancing regional transit connections for the City.

Currently, the intersection is controlled as an all-way stop, with marked crosswalks only on the southern and western approaches. East-west travel is supported with a single-lane approach, and separate dedicated left-turn lanes are available on the northbound and southbound approaches. The intersection contains a narrowed eastern approach as this was constructed along Forest Service property, and wide curb radii (particularly on the northwest corner). The northeast corner does not include accessible ramps, which will be completed along with the pathway extension with the East Portal mobility hub. Figure 2 illustrates the existing intersection configuration.

Existing Traffic Volumes and Travel Patterns

Traffic volumes at the OR 242/W Hood Avenue intersection vary seasonally, and depend on whether area schools are in session and whether the scenic highway is open. When the highway is open, ODOT sources cite that it only carries about 300 vehicles per day, so the schools have a much more significant impact on travel patterns. Figure 2 illustrates the peak morning and afternoon school hour traffic volumes.

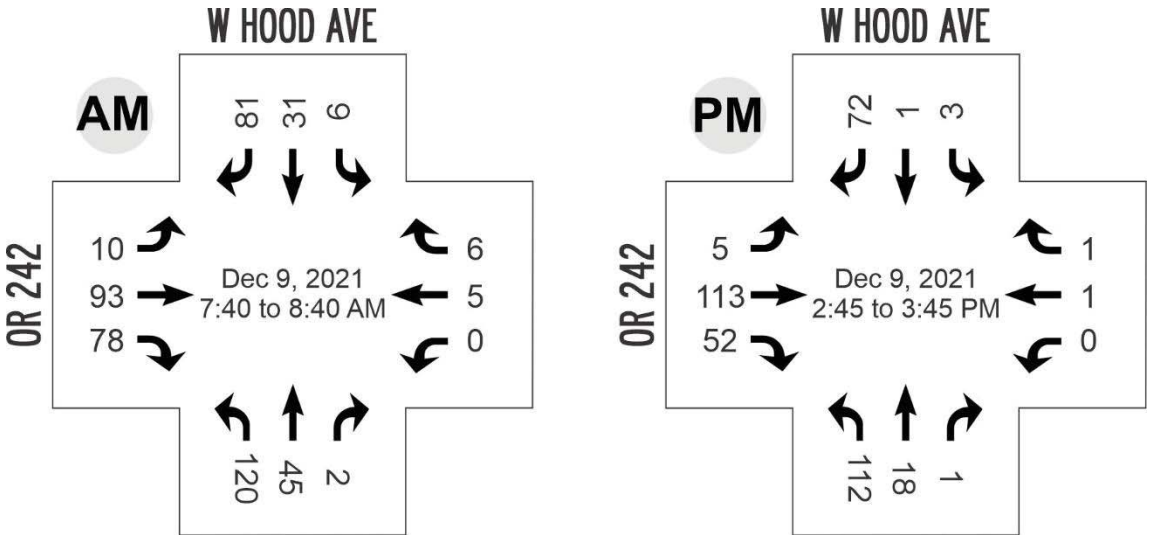


Figure 2. Vehicular traffic volumes at OR 242/Hood Avenue.

Comparison to historical evening commute data (4:10 to 5:10 p.m.) collected in mid-summer of 2020 shows that the traffic volumes vary with the summertime school closure, with increased north-south travel (62 southbound and 81 northbound), but with lower volumes to and from the west, resulting in about 15% lower travel volumes.

The wintertime traffic counts show fairly low pedestrian activity, with only two reported crossings along the southern intersection approach. Bicycle activity in the summer counts showed nine cyclists during the peak hour, with five of these eastbound, one southbound, and three traveling northbound. Trucks comprise a minor portion of the traffic flow, with all count periods showing about 2 percent of the overall traffic associated with trucks. ODOT data shows that most of these are single-unit box trucks.

Figure 3. Existing OR 242/W Hood Avenue intersection configuration.

Intersection Safety

Review of historical crash records shows that there have been no reported crashes at the intersection between January 2016 and December 2020. This pattern is similar to the OR 242 intersection with Brooks Camp Road and Trinity Way, showing a good overall safety performance along this corridor. The City's primary safety issues have been identified along the US 20 corridor as this serves much higher traffic volumes than OR 242.

The posted speed along OR 242 is 40 miles per hour directly west of the intersection, and this speed increases to 55 miles per hour beyond the western boundary of the middle school. Hood Avenue is posted at 30 miles per hour to the north of the intersection.

Intersection Considerations

Field review of the intersection along with review of the traffic operations information submitted as part of area projects noted the following characteristics:

- The southbound to eastbound traffic volumes are very low. With the configuration of the roadway network these movements reflect local trips from the area surrounding the East Portal returning to the highway.
- Northbound left-turns are the highest-volume movement during the school periods.
- There is no linkage today between the US 20 pathway and the OR 242 pathway due to the unimproved frontage along the East Portal. Sidewalks are present along the south side of this connection and link to the OR 242 pathway through the two marked crosswalks.
- The pedestrian crossings are very long. This is due to the single-ramp design on each corner of the intersection and the wide turning radii, along with the three-lane cross-sections on the north-south route. This design also supports faster turning speeds through the intersection.
- Bicycle lanes are not provided along the south approach (W Hood Avenue) despite its inclusion as part of the McKenzie Pass Scenic Bikeway that extends from Village Green City Park.
- There is ample carrying capacity at the intersection today to meet performance thresholds. During the school hours much of the traffic occurs during a brief time period spanning about 15 minutes in the morning (8:10 to 8:25 a.m.) and 25 minutes in the afternoon (3:10 to 3:35 p.m.). As the morning peak occurs during a narrower time period these volumes are higher than those in the afternoon.
- With an all-way stop-controlled intersection, the addition of unnecessary approaches can add confusion and reduce safety. It also makes it more difficult for motorists to see pedestrians as views can be blocked with the side-by-side movements.
- While the safety performance at the intersection is very good, the siting of the new elementary school to the west, new residential projects, and the addition of the East Portal mobility hub (and associated pathway improvements) will increase the amount of non-vehicular travel within this area.

Accordingly, we reviewed intersection improvement options that can be added incrementally with implementation to be provided with adjacent development projects, safety funding, or pavement enhancement projects. This improvement concept is illustrated in Figure 4.

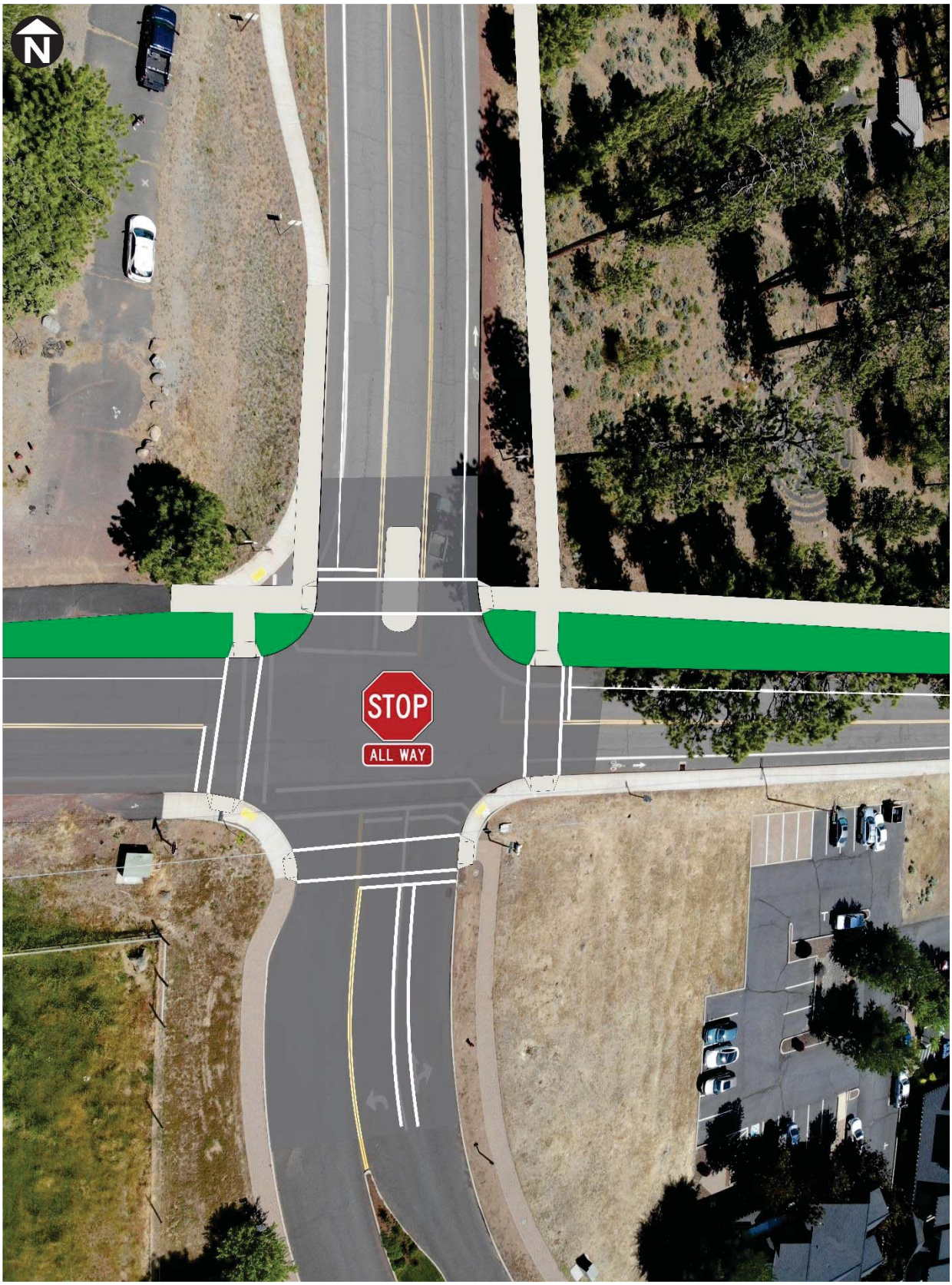


Figure 4. Conceptual improvement plan for OR 242/Hood Avenue Intersection.

Key elements of this improvement concept include the following:

- Removal of the southbound left-turn lane and replacement with a raised pedestrian island. With such a low volume of southbound trips this modification has virtually no impact on intersection capacity, but substantially improves the pathway crossing along the north side of OR 242 that continues to the schools.
- Reconstruction of the northwest radii. Removal of the sweeping right turn requires a lower turning speed at the intersection, reduces the pedestrian crossing distance, and relocates the pathway away from through travel on the highway.
- New curb ramps on all approaches, replacing the single-ramp design with a dual ramp design in conformance with current ADA requirements. This results in shorter crossings for pedestrians and clear orientation for wheelchair users and those with vision impairments.

Beyond the improvements shown, the City should also explore whether there is adequate width to extend bicycle lanes south of the intersection along W Hood Avenue, as this route forms the McKenzie Pass Scenic Bikeway. The concept retains the all-way stop-control.

Traffic Operations

Operational analysis of the concept was prepared to assess whether the loss of the southbound left-turn lane provided any appreciable reduction in intersection capacity. Modeling of vehicular delays using the existing traffic counts in the morning and afternoon hours is summarized in Table 1 with the existing and modified intersection configurations.

Table 1. Summary of OR 242/W Hood Avenue Intersection Operations

Scenario	Intersection Level of Service	Intersection Delay	Volume-to-Capacity Ratio	95th Percentile Queue	Adequate?
	Weekday AM Peak Hour				
Existing Configuration	Overall: LOS B NBL: LOS B NBTR: LOS A EB: LOS A WB: LOS A SBL: LOS A SBTR: LOS A	Wtd Avg: 11.1s NBL: 10.6s NBTR: 8.6s EB: 9.8s WB: 8.2s SBL: 8.7s SBTR: 8.9s	NBL: 0.36 NBTR: 0.06 EB: 0.44 WB: 0.01 SBL: 0.01 SBTR: 0.20	NBL: 25 ft NBTR: 25 ft EB: 50 ft WB: 25 ft SBL: 25 ft SBTR: 25 ft	Yes
Modified Configuration	Overall: LOS B NBL: LOS B NBTR: LOS A EB: LOS B WB: LOS A SB: LOS A	Wtd Avg: 11.0s NBL: 12.2s NBTR: 8.6s EB: 11.4s WB: 8.2s SB: 8.9s	NBL: 0.36 NBTR: 0.06 EB: 0.44 WB: 0.01 SB: 0.19	NBL: 50 ft NBTR: 25 ft EB: 75 ft WB: 25 ft SB: 25 ft	Yes
	Weekday PM Peak Hour				
Existing Configuration	Overall: LOS A NBL: LOS B NBTR: LOS A EB: LOS A WB: LOS A SBL: LOS A SBTR: LOS A	Wtd Avg: 9.6S NBL: 10.6s NBTR: 8.6s EB: 9.8s WB: 8.2s SBL: 8.7s SBTR: 8.9s	NBL: 0.26 NBTR: 0.10 EB: 0.32 WB: 0.03 SBL: 0.01 SBTR: 0.21	NBL: 50 ft NBTR: 25 ft EB: 50 ft WB: 25 ft SBL: 25 ft SBTR: 25 ft	Yes
Modified Configuration	Overall: LOS A NBL: LOS B NBTR: LOS A EB: LOS B WB: LOS A SB: LOS A	Wtd Avg: 9.6s NBL: 10.6s NBTR: 8.6s EB: 9.8s WB: 8.1s SB: 8.8S	NBL: 0.26 NBTR: 0.10 EB: 0.32 WB: 0.03 SB: 0.20	NBL: 50 ft NBTR: 25 ft EB: 50 ft WB: 25 ft SB: 25 ft	Yes

Table 1 shows that there is virtually no change in intersection operations incurred as a result of shifting the low-volume of southbound left-turns into the through lane. In fact, the reduction in conflicting lanes provides a slight reduction in delays during the morning period. The advantages of this configuration, which include improved conflict identification, improved pedestrian crossings, and slower turning speeds are expected to outweigh the minor change in vehicular operations. This will be particularly true with the planned relocation of Sisters Elementary School.

While removal of the northbound left-turn lane could also be considered given the available intersection capacity, this treatment was not reviewed at this time. Thank you for the opportunity to provide these transportation materials, if you have any questions I can be reached at (503) 997-4473 or via email at joe@transightconsulting.com.

Attachments:

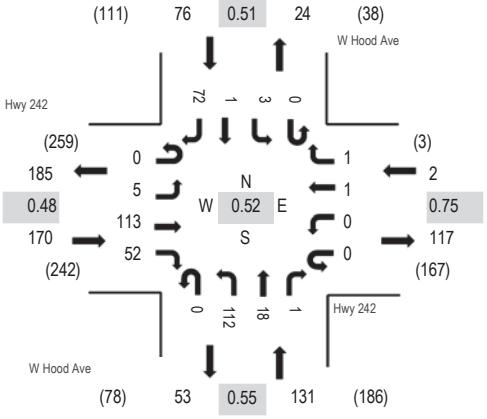
- Traffic Count Worksheets
- LOS Operational Analysis Worksheets

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

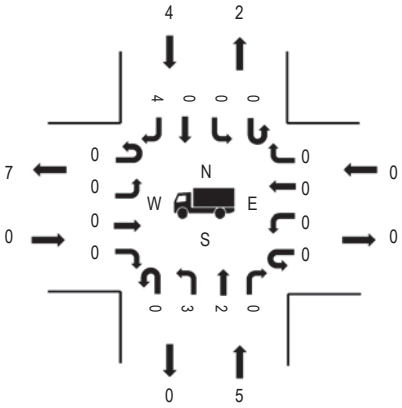
Location: 1 W Hood Ave & Hwy 242 AM
Date: Thursday, December 9, 2021
Peak Hour: 07:40 AM - 08:40 AM
Peak 15-Minutes: 08:10 AM - 08:25 AM

Peak Hour

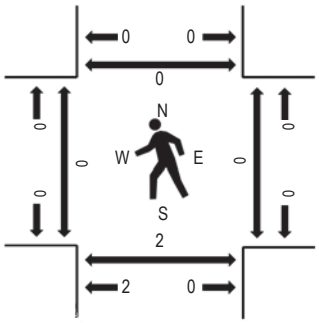
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	0.0%	0.48
WB	0.0%	0.75
NB	3.8%	0.55
SB	5.3%	0.51
All	2.4%	0.52

Traffic Counts - Motorized Vehicles

Interval Start Time	Hwy 242 Eastbound				Hwy 242 Westbound				W Hood Ave Northbound				W Hood Ave Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
7:00 AM	0	1	2	0	0	0	0	0	0	1	2	0	0	0	0	1	7	170
7:05 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	3	5	192
7:10 AM	0	0	7	1	0	0	0	0	0	2	0	0	0	0	0	2	12	218
7:15 AM	0	1	4	2	0	0	0	0	0	5	0	0	0	0	0	2	14	258
7:20 AM	0	0	4	0	0	0	0	0	0	3	0	0	0	0	0	2	9	305
7:25 AM	0	0	7	3	0	0	0	0	0	10	0	0	0	0	1	8	29	366
7:30 AM	0	0	8	2	0	0	0	0	0	4	0	0	0	0	0	4	18	371
7:35 AM	0	0	1	1	0	0	0	0	0	5	0	0	0	1	0	3	11	375
7:40 AM	0	1	4	3	0	0	0	0	0	4	1	0	0	1	0	3	17	379
7:45 AM	0	0	6	1	0	0	0	0	0	3	1	0	0	0	0	1	12	375
7:50 AM	0	1	3	2	0	0	0	0	0	6	1	0	0	1	0	3	17	379
7:55 AM	0	0	5	1	0	0	1	0	0	7	1	0	0	0	0	4	19	376
8:00 AM	0	0	5	4	0	0	0	0	0	13	2	0	0	0	0	5	29	372
8:05 AM	0	1	9	2	0	0	0	0	0	9	2	0	0	1	0	7	31	
8:10 AM	0	2	13	4	0	0	0	1	0	17	1	0	0	0	0	14	52	
8:15 AM	0	0	21	6	0	0	0	0	0	15	1	0	0	0	0	18	61	
8:20 AM	0	0	25	10	0	0	0	0	0	24	2	0	0	0	0	9	70	
8:25 AM	0	0	17	12	0	0	0	0	0	1	1	0	0	0	0	3	34	
8:30 AM	0	0	3	4	0	0	0	0	0	6	4	0	0	0	1	4	22	
8:35 AM	0	0	2	3	0	0	0	0	0	7	1	1	0	0	0	1	15	
8:40 AM	0	0	3	5	0	0	0	0	0	2	1	0	0	0	1	1	13	
8:45 AM	0	0	4	6	0	0	0	0	0	2	3	0	0	0	0	1	16	
8:50 AM	0	0	2	1	0	0	0	1	0	4	3	0	0	1	0	2	14	
8:55 AM	0	0	5	2	0	0	0	0	0	4	2	0	0	1	0	1	15	
Count Total	0	7	160	75	0	0	1	2	0	156	29	1	0	6	3	102	542	
Peak Hour	0	5	113	52	0	0	1	1	0	112	18	1	0	3	1	72	379	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0	7:30 AM	0	0	1	0	1
7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	0	3	0	1	4	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
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8:15 AM	0	0	0	2	2	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
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8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0	8:35 AM	0	2	0	0	2
8:40 AM	0	0	0	1	1	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0
8:45 AM	0	0	0	1	1	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	0	5	0	6	11	Count Total	0	0	0	0	0	Count Total	0	3	1	0	4
Peak Hour	0	5	0	4	9	Peak Hour	0	0	0	0	0	Peak Hour	0	3	0	0	3

ALL TRAFFIC DATA SERVICES
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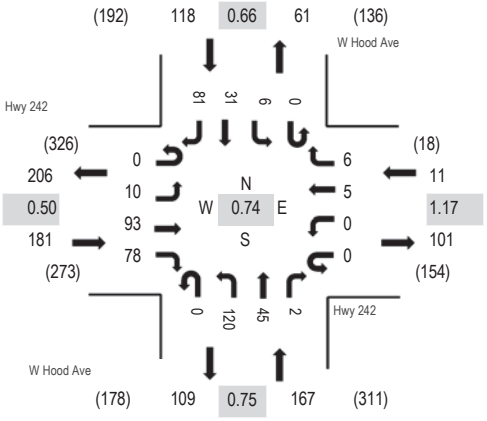
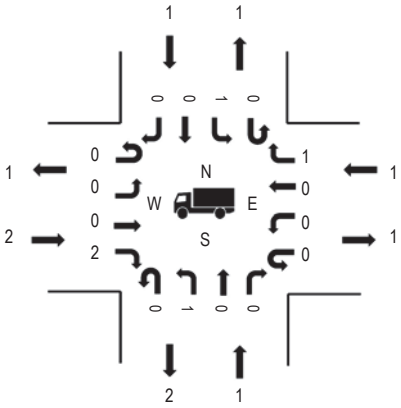
Peak Hour: 02:45 PM - 03:45 PM
Peak 15-Minutes: 03:10 PM - 03:25 PM

Peak Hour

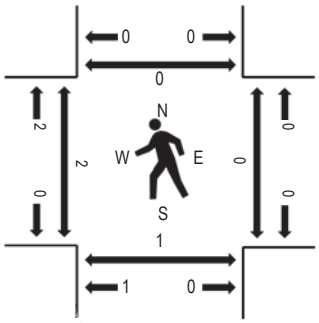
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	1.1%	0.50
WB	9.1%	1.17
NB	0.6%	0.75
SB	0.8%	0.66
All	1.0%	0.74

Traffic Counts - Motorized Vehicles

Interval Start Time	Hwy 242 Eastbound				Hwy 242 Westbound				W Hood Ave Northbound				W Hood Ave Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
2:00 PM	0	2	3	4	0	0	0	0	0	4	8	0	0	0	1	3	25	324
2:05 PM	0	1	1	5	0	0	0	0	0	7	8	1	0	0	1	2	26	329
2:10 PM	0	1	5	4	0	0	0	1	0	3	10	0	0	1	1	4	30	343
2:15 PM	0	0	3	6	0	0	1	2	0	8	2	0	0	3	5	1	31	367
2:20 PM	0	0	4	2	0	0	0	0	0	5	4	0	0	1	2	2	20	386
2:25 PM	0	1	4	1	0	0	0	0	0	7	5	0	0	1	3	5	27	424
2:30 PM	0	0	3	3	0	0	0	0	0	11	5	0	0	0	3	3	28	448
2:35 PM	0	0	2	2	0	0	1	0	0	8	4	0	0	0	2	2	21	467
2:40 PM	0	0	2	5	0	0	0	0	0	3	7	1	0	0	2	4	24	475
2:45 PM	0	0	3	3	0	0	1	1	0	9	5	0	0	1	3	9	35	477
2:50 PM	0	1	5	2	0	0	0	0	0	9	6	0	0	1	2	0	26	470
2:55 PM	0	0	5	3	0	0	1	0	0	9	1	0	0	0	2	10	31	474
3:00 PM	0	1	2	2	0	0	0	0	0	9	3	0	0	2	3	8	30	470
3:05 PM	0	1	2	3	0	0	1	1	0	16	4	0	0	0	2	10	40	
3:10 PM	0	1	2	5	0	0	1	3	0	19	3	0	0	1	2	17	54	
3:15 PM	0	2	15	9	0	0	0	0	0	11	6	0	0	0	3	4	50	
3:20 PM	0	2	21	13	0	0	1	0	0	11	6	0	0	0	0	4	58	
3:25 PM	0	2	15	16	0	0	0	0	0	8	4	0	0	1	1	4	51	
3:30 PM	0	0	13	14	0	0	0	1	0	9	1	1	0	0	6	2	47	
3:35 PM	0	0	6	6	0	0	0	0	0	4	2	1	0	0	3	7	29	
3:40 PM	0	0	4	2	0	0	0	0	0	6	4	0	0	0	4	6	26	
3:45 PM	0	1	4	4	0	0	0	0	0	6	6	0	0	0	1	6	28	
3:50 PM	0	0	6	5	0	0	1	0	0	6	3	2	0	0	2	5	30	
3:55 PM	0	0	5	3	0	0	0	1	0	7	3	0	0	1	2	5	27	
Count Total	0	16	135	122	0	0	8	10	0	195	110	6	0	13	56	123	794	
Peak Hour	0	10	93	78	0	0	5	6	0	120	45	2	0	6	31	81	477	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
2:00 PM	0	0	0	0	0	2:00 PM	0	0	0	0	0	2:00 PM	0	0	0	0	0
2:05 PM	0	0	0	0	0	2:05 PM	0	0	0	0	0	2:05 PM	1	1	0	0	2
2:10 PM	1	0	0	0	1	2:10 PM	0	0	0	0	0	2:10 PM	0	0	0	0	0
2:15 PM	0	0	0	1	1	2:15 PM	0	0	0	0	0	2:15 PM	0	0	0	0	0
2:20 PM	0	0	0	1	1	2:20 PM	0	0	0	0	0	2:20 PM	0	0	0	0	0
2:25 PM	1	0	0	1	2	2:25 PM	0	0	0	0	0	2:25 PM	0	0	0	0	0
2:30 PM	0	0	0	0	0	2:30 PM	0	0	0	0	0	2:30 PM	0	0	0	0	0
2:35 PM	0	0	0	0	0	2:35 PM	0	0	0	0	0	2:35 PM	2	2	0	0	4
2:40 PM	0	0	0	0	0	2:40 PM	0	0	0	0	0	2:40 PM	0	0	0	0	0
2:45 PM	0	0	0	0	0	2:45 PM	0	0	0	0	0	2:45 PM	0	0	0	0	0
2:50 PM	0	0	0	0	0	2:50 PM	0	0	0	0	0	2:50 PM	0	0	0	0	0
2:55 PM	0	0	0	0	0	2:55 PM	0	0	0	0	0	2:55 PM	1	1	0	0	2
3:00 PM	0	0	0	1	1	3:00 PM	0	0	0	0	0	3:00 PM	0	0	0	0	0
3:05 PM	0	1	0	0	1	3:05 PM	0	0	0	0	0	3:05 PM	0	0	0	0	0
3:10 PM	0	0	1	0	1	3:10 PM	0	0	0	0	0	3:10 PM	0	0	0	0	0
3:15 PM	0	0	0	0	0	3:15 PM	0	0	0	0	0	3:15 PM	0	0	0	0	0
3:20 PM	0	0	0	0	0	3:20 PM	0	0	0	0	0	3:20 PM	0	0	0	0	0
3:25 PM	0	0	0	0	0	3:25 PM	0	0	0	0	0	3:25 PM	0	0	0	0	0
3:30 PM	2	0	0	0	2	3:30 PM	0	0	0	0	0	3:30 PM	1	0	0	0	1
3:35 PM	0	0	0	0	0	3:35 PM	0	0	0	0	0	3:35 PM	0	0	0	0	0
3:40 PM	0	0	0	0	0	3:40 PM	0	0	0	0	0	3:40 PM	0	0	0	0	0
3:45 PM	0	0	0	0	0	3:45 PM	0	0	0	0	0	3:45 PM	1	1	0	0	2
3:50 PM	0	0	1	0	1	3:50 PM	0	0	0	0	0	3:50 PM	0	0	0	0	0
3:55 PM	0	0	0	0	0	3:55 PM	0	0	0	0	0	3:55 PM	0	0	0	0	0
Count Total	4	1	2	4	11	Count Total	0	0	0	0	0	Count Total	6	5	0	0	11
Peak Hour	2	1	1	1	5	Peak Hour	0	0	0	0	0	Peak Hour	2	1	0	0	3

Intersection	
Intersection Delay, s/veh	11.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	113	52	0	1	1	112	18	1	3	1	72
Future Vol, veh/h	5	113	52	0	1	1	112	18	1	3	1	72
Peak Hour Factor	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Heavy Vehicles, %	0	0	0	0	0	0	4	4	4	5	5	5
Mvmt Flow	10	217	100	0	2	2	215	35	2	6	2	138
Number of Lanes	0	1	0	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	1
HCM Control Delay	11.5	8.2	11.7	9.1
HCM LOS	B	A	B	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	3%	0%	100%	0%
Vol Thru, %	0%	95%	66%	50%	0%	1%
Vol Right, %	0%	5%	31%	50%	0%	99%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	112	19	170	2	3	73
LT Vol	112	0	5	0	3	0
Through Vol	0	18	113	1	0	1
RT Vol	0	1	52	1	0	72
Lane Flow Rate	215	37	327	4	6	140
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.361	0.056	0.433	0.006	0.01	0.199
Departure Headway (Hd)	6.028	5.486	4.767	5.208	6.318	5.112
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	590	646	749	690	570	706
Service Time	3.823	3.28	2.832	3.216	4.018	2.812
HCM Lane V/C Ratio	0.364	0.057	0.437	0.006	0.011	0.198
HCM Control Delay	12.2	8.6	11.5	8.2	9.1	9.1
HCM Lane LOS	B	A	B	A	A	A
HCM 95th-tile Q	1.6	0.2	2.2	0	0	0.7

Intersection	
Intersection Delay, s/veh	11
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	113	52	0	1	1	112	18	1	3	1	72
Future Vol, veh/h	5	113	52	0	1	1	112	18	1	3	1	72
Peak Hour Factor	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Heavy Vehicles, %	0	0	0	0	0	0	4	4	4	5	5	5
Mvmt Flow	10	217	100	0	2	2	215	35	2	6	2	138
Number of Lanes	0	1	0	0	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	11.4	8.2	11.7	8.9
HCM LOS	B	A	B	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	100%	0%	3%	0%	4%
Vol Thru, %	0%	95%	66%	50%	1%
Vol Right, %	0%	5%	31%	50%	95%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	112	19	170	2	76
LT Vol	112	0	5	0	3
Through Vol	0	18	113	1	1
RT Vol	0	1	52	1	72
Lane Flow Rate	215	37	327	4	146
Geometry Grp	7	7	2	2	5
Degree of Util (X)	0.36	0.056	0.432	0.006	0.191
Departure Headway (Hd)	6.012	5.47	4.756	5.189	4.694
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	594	649	752	694	754
Service Time	3.799	3.257	2.815	3.189	2.786
HCM Lane V/C Ratio	0.362	0.057	0.435	0.006	0.194
HCM Control Delay	12.2	8.6	11.4	8.2	8.9
HCM Lane LOS	B	A	B	A	A
HCM 95th-tile Q	1.6	0.2	2.2	0	0.7

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	93	78	0	5	8	120	45	2	6	31	81
Future Vol, veh/h	10	93	78	0	5	8	120	45	2	6	31	81
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Heavy Vehicles, %	1	1	1	9	9	9	1	1	1	1	1	1
Mvmt Flow	14	126	105	0	7	11	162	61	3	8	42	109
Number of Lanes	0	1	0	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	1
HCM Control Delay	9.8	8.2	10	8.9
HCM LOS	A	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	6%	0%	100%	0%
Vol Thru, %	0%	96%	51%	38%	0%	28%
Vol Right, %	0%	4%	43%	62%	0%	72%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	120	47	181	13	6	112
LT Vol	120	0	10	0	6	0
Through Vol	0	45	93	5	0	31
RT Vol	0	2	78	8	0	81
Lane Flow Rate	162	64	245	18	8	151
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.261	0.093	0.316	0.024	0.013	0.205
Departure Headway (Hd)	5.798	5.264	4.651	4.972	5.903	4.887
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	616	676	770	714	603	730
Service Time	3.562	3.028	2.694	3.044	3.671	2.654
HCM Lane V/C Ratio	0.263	0.095	0.318	0.025	0.013	0.207
HCM Control Delay	10.6	8.6	9.8	8.2	8.7	8.9
HCM Lane LOS	B	A	A	A	A	A
HCM 95th-tile Q	1	0.3	1.4	0.1	0	0.8

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	93	78	0	5	8	120	45	2	6	31	81
Future Vol, veh/h	10	93	78	0	5	8	120	45	2	6	31	81
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Heavy Vehicles, %	1	1	1	9	9	9	1	1	1	1	1	1
Mvmt Flow	14	126	105	0	7	11	162	61	3	8	42	109
Number of Lanes	0	1	0	0	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	1
HCM Control Delay	9.8	8.1	10	8.8
HCM LOS	A	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1
Vol Left, %	100%	0%	6%	0%	5%
Vol Thru, %	0%	96%	51%	38%	26%
Vol Right, %	0%	4%	43%	62%	69%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	120	47	181	13	118
LT Vol	120	0	10	0	6
Through Vol	0	45	93	5	31
RT Vol	0	2	78	8	81
Lane Flow Rate	162	64	245	18	159
Geometry Grp	7	7	2	2	5
Degree of Util (X)	0.26	0.093	0.315	0.024	0.201
Departure Headway (Hd)	5.782	5.248	4.633	4.95	4.537
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	618	679	773	717	786
Service Time	3.543	3.008	2.678	3.022	2.598
HCM Lane V/C Ratio	0.262	0.094	0.317	0.025	0.202
HCM Control Delay	10.6	8.6	9.8	8.1	8.8
HCM Lane LOS	B	A	A	A	A
HCM 95th-tile Q	1	0.3	1.4	0.1	0.7