EXHIBIT “I”

2022 LOCAL ROAD SAFETY PLAN

Local Road Safety Plan

A Systemic Safety Approach

City of Wenatchee
Department of Public Works
March 2022

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Introduction

The City of Wenatchee is committed to reducing or eliminating serious injury and fatality collisions on city roads. Typically, two approaches are used to reduce or eliminate collisions:

- The Spot Treatment Approach is a reactive method and is used to address specific locations where previous serious or fatal collisions have occurred
- The Systemic Safety Approach is a proactive method and is used to identify project locations by assessing public roads to determine areas with features flagged as high risk due to the association with previous serious or fatal collisions.

While the City utilizes both approaches to improve public safety; the primary focus of the City's Local Road Safety Plan is to facilitate Systemic Safety upgrades and improvements.

With a Systemic Safety Approach, the risk factors associated with serious injury or fatality collisions are used to identify locations that may be improved using engineering solutions. Locations with known high-risk features will be flagged and safety improvement projects for those locations will be prioritized accordingly. With a Systemic Approach, problem locations may be identified and corrected prior to the occurrence of serious or fatal collisions.

The City's Systemic Safety strategy was developed utilizing guidelines set forth in Washington State's Target Zero plan. The Target Zero plan emphasizes the importance of data-driven collision reduction strategies for the prioritization of low-cost, systemic projects that can be constructed in the near-term to improve safety for all drivers, cyclists and pedestrians on City roads.

Washington State Target Zero

Target Zero is the State's strategic highway safety plan with an ultimate goal of zero deaths or serious injuries on public roads by 2030. The plan was adopted in 2000 and it represents a collaboration of state, local and tribal agencies, law enforcement and many other private organizations.

From 2000 to 2014, annual traffic fatalities decreased 27% even with 18% population growth over the same period. This major improvement in safety was attributed to a number of factors including new or stricter laws, increased enforcement on targeted offenses, improved traffic safety equipment and rapidly evolving roadway engineering standards. From 2015 to 2017, traffic fatalities increased 23% and series injuries increased 7%, respectively, over the previous three-year period. The National Highway Traffic Safety Administration attributes the increase to job growth, lower fuel prices, and an increase in Vehicle Miles Traveled (VMT).

Target Zero Priorities

WSDOT cites that although improvements have been made, we are not on track to reach Target Zero by 2030. In order to reach this goal, we must utilize existing data to understand the root causes of crashes on our transportation infrastructure.

The City of Wenatchee utilized the 2019 Target Zero Priorities to identify locations and specific strategies for two priority levels:

> Priority Level 1: Factors that are associated with the largest number of fatalities and serious injuries in the state. Each of these factors is involved in at least 25% of fatality or serious injury collisions.

Priority Level 2: Factors that are not as common, occurring in less than 25% of total fatal and serious injury collisions.

While prioritizing locations and strategies, Target Zero recommends that established strategies should be chosen for implementation. Strategies are categorized as Proven or Recommended. Proven strategies have been determined to be effective through professional evaluation. Recommended strategies are documented best practices or Federal recommendations.

Additionally, Unknown strategies may also be considered. Unknown strategies are new or have limited evaluations. These strategies require additional evaluation to be included as part of a project and are included in Target Zero as a means of promoting and facilitating the development of innovative solutions.

Target Zero's plan is all-encompassing and refers to six implementation areas in order to achieve improved safety on public roads:

- Education and Outreach
- Enforcement
- Engineering
- Emergency Medical Services
- Evaluation
- Leadership/Policy

Education focuses on informing road-users on making good choices to improve their safety. Enforcement uses data-driven analysis to help law enforcement address target locations which have higher occurrences of fatal and serious injury collisions resulting from speeding or driver impairment. Engineering focuses on improved road design using practical solutions to reduce the number or severity of collisions. Emergency Medical Services promotes high-quality and rapid medical response to collisions. Evaluation entails collecting better data, gaining a greater understanding of the causes of fatal and serious injury collisions, and developing targeted strategies or initiatives to achieve the goal of Target Zero. Leadership/Policy notes that laws or rules may be changed or implemented in order to support safer roads.

For the City of Wenatchee's Local Road Safety Plan, the primary method used to improve safety on city roads will be the Engineering approach.

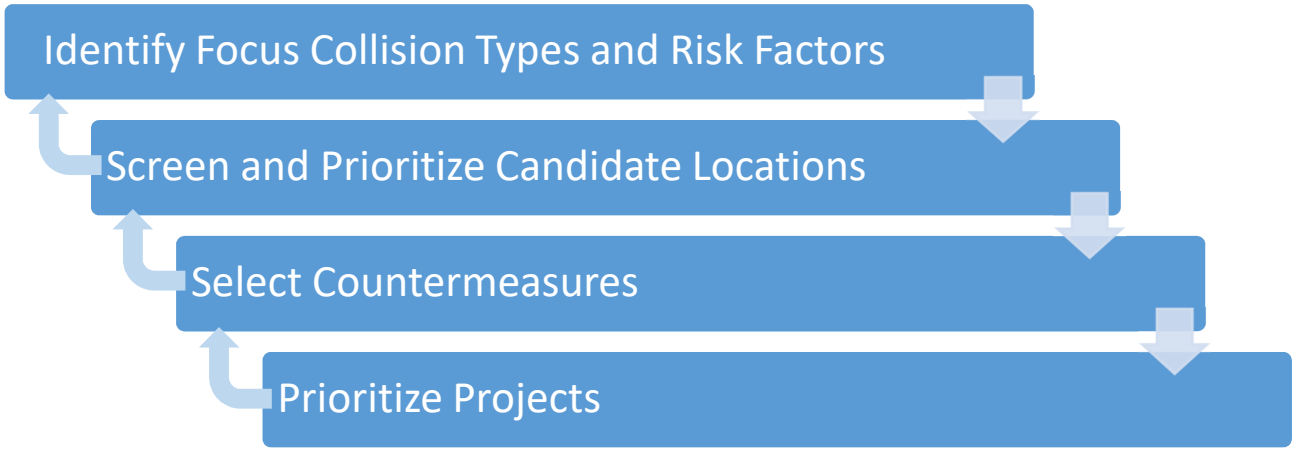
Limitations on Use

Under 23 U.S. Code § 409 and 23 U.S. Code § 148, safety data, reports, surveys, schedules, lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential collision sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from an occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

Identification of Relevant Risk Factors

In order to utilize a Systemic Safety Approach to determine the risk factors used to identify and prioritize project locations, historical collision patterns must first be analyzed and understood.

FHWA provided guidance for this process with its Systemic Safety Project Selection Tool. The guidance refers to the process as a 'Systemic Safety Planning Process'. The process is a Four-Step process which involves potential re-evaluation of the previous step. As the data is further analyzed, adjustments may need to be made to the previous step before continuing on. The process is detailed as follows:



Step 1 consists of identifying focus collision types and risk factors by evaluating relevant historical collision data. The identification of focus collision types and the associated risk factors requires the analysis of results from several data element types. At minimum, this data must include the **System Type** (state or local), the **Collision Type** (fixed object, rear-end, vehicle-pedestrian), the **Facility Type** (arterial or collector), the **Location Type** (urban, rural, intersection, segment) and **Location Characteristics** (topography, elements). Additional data may include **ADT**, **Roadway Features** (number of lanes, speed limit, pavement conditions) and **Intersection Features** (traffic control devices, lighting, type of intersection).

With all available data, the three major tasks which make up Step 1 are the following:

1. Select Focus Collision Types
2. Select Focus Facilities
3. Identify and Evaluate Risk Factors

Step 2 consists of screening locations to determine candidate locations based on present risk factors. Locations with higher numbers of risk factors and traffic volumes will be prioritized over locations with fewer risk factors. Similar to Step 1, three major tasks make up Step 2. These tasks are:

1. Identify Network Elements to Analyze
2. Conduct Risk Assessment
3. Prioritize Focus Facility Elements

Task 1 involves identifying the elements from focus facility types. For spot-based applications (curves and intersections), all relevant locations are identified first. For segment applications, corridors should be split into elements with consistent design. For the City, an effective way to identify individual segments is to divide corridors by cross-section.

Task 2 determines the number of risk factors present at each spot location or segment and Task 3 prioritizes the spot locations are segments with higher numbers of risk factors.

Step 3 consists of the selection of low-cost, proven countermeasures to reduce or eliminate risk factors at the candidate locations. Each candidate location will be analyzed to determine the type of countermeasure that will be implemented easiest and also be the most effective. These projects should be for the near-term and should not require major changes for effective implementation. The major tasks that make up Step 3 are:

1. Assemble Comprehensive List of Countermeasures
2. Evaluate/Screen Countermeasures
3. Select Countermeasures for Deployment

To complete Step 3, the City has attained a list of relevant countermeasures and screened them for effectiveness through available resources. Through screening, the City has eliminated those which are known to be poor or inconsistently performing from its list of countermeasures considered for deployment.

Step 4 consists of prioritizing selected projects. For the City, projects will be prioritized based on a cost-benefit analysis. The priority projects will be determined based on the best safety improvements for the lowest cost. The major tasks that make up Step 4 are:

1. Create Decision Process for Countermeasure Selection
2. Develop Safety Projects
3. Prioritize Safety Project Implementation

The first task involves developing a means to consistently assign countermeasures to focus facility locations. The second task involves applying the decision process to select one or more countermeasures to implement and the third task prioritizes the projects based on available funding, complexity or other considerations.

As previously mentioned, each step may require re-evaluation and modification before progressing onto the next.

WSDOT Data Analysis

WSDOT has provided a Collision Database Summary for January 1, 2016 to December 31, 2020. This data was compiled from collision reports filed by the Wenatchee Police Department, Chelan County Sheriff's Office and Washington State Patrol for collisions that occurred within the City of Wenatchee. The data includes information such as **collision type** (e.g. hit pedestrian, hit fixed object, rear-end collision), **roadway conditions** (e.g. lighting, weather/visibility, speed limit) and **contributing circumstances** (e.g. inattention, driving under the influence of alcohol or drugs, failure to obey signal). Data provided by WSDOT has been included in Appendix A. In addition to the WSDOT Crash Data provided, a City map highlighting the Fatal and Serious Injury collisions has been included in Appendix B.

Table 1 – WSDOT Data (Number of Serious Injury and Fatal Crashes)

	2016	2017	2018	2019	2020	*2016-20*	*%Δ 11-15 v 16-20*
Wenatchee	8	5	5	7	6	*31*	*29.2%*
Eastside Cities	188	192	203	187	242	*1,012*	*21.9%*
All Cities	1,053	1,031	1,068	1,026	1,068	*5,246*	*15.1%*
All Public Roads	2,410	2,455	2,433	2,454	2,606	*12,358*	*12.7%*

Table 2 – WSDOT Data (All Crashes)

	2016	2017	2018	2019	2020	*2016-20*	*%Δ 11-15 v 16-20*
Wenatchee	542	518	526	531	421	2538	5.3%
Eastside Cities	13,123	12,802	12,630	12,723	10,048	61,326	11.1%
All Cities	62,913	62,087	59,480	54,385	39,982	278,847	1.4%
All Public Roads	122,385	121,053	115,977	111,670	86,269	557,354	6.6%

As shown in the above tables, the City of Wenatchee's incidences of Fatal and Serious Injury Collisions are increasing faster than averages throughout the state of Washington. However, the total collision rates are not trending up as quickly as other cities on the Eastside of Washington State. This may partially be due to the significant growth the Wenatchee area has been experiencing in recent years as well as several other factors.

Table 3 below presents the overall average percentage rates for the state as compared with the same collision types for the City of Wenatchee.

Table 3 – WSDOT Data for Collision Statistics

	Fatal/Serious Injury Collisions Only		***Total Collisions***	
	City of Wenatchee	**Statewide (All Cities)**	**City of Wenatchee**	**Statewide (All Cities)**
Overall Collision Numbers				
# of Collisions	31	5,246	2,538	278,847
# of Fatal Collisions (% of Total)	4 (12.9%)	751 (14.3%)	4 (0.2%)	751 (0.3%)
# of Serious Injury Collisions (% of Total)	**27 (87.1%)**	4,494(85.7%)	27 (1.1%)	4,494 (1.6%)
# of Drug/Alcohol-Related Collisions	4 (12.9%)	757 (14.4%)	128 (5.0%)	14,834(5.3%)
Total # of Fatalities	4	786	4	786
Total # of Injuries	38	6,843	1,061	114,666
By Collision Type				
Hit Pedestrian	**32.3%**	29.5%	2.6%	2.9%
Hit Fixed Object	16.1%	16.8%	6.6%	11.1%
Angle (T)	9.7%	16.6%	**28.3%**	25.8%
Rearend	**12.9%**	4.9%	**29.9%**	23.5%
Hit Cyclist	6.5%	9.7%	1.3%	1.8%
By Junction Relationship				
Intersection Related	**54.8%**	47.5%	**50.7%**	50.4%
Non-Intersection (Not Related)	38.7%	44.0%	35.2%	35.4%
Driveway Related	6.5%	8.1%	**13.5%**	13.3%
By Driver Contributing Circumstances				
Inattention / Distraction[E]	19.4%	20.5%	**32.9%**	30.8%
Exceeding Safe / Stated Speed[E]	**32.3%**	19.0%	4.3%	7.9%
Under Influence of Alcohol / Drugs[E]	12.9%	15.1%	4.9%	5.1%
Failing to Yield	**12.9%**	12.2%	16.8%	19.7%
Following Too Closely	**9.7%**	2.0%	**20.2%**	10.6%
By Traffic Control				
No Traffic Control	**65.1%**	60.7%	**60.0%**	57.9%
Stop Sign	**14.0%**	8.1%	**9.3%**	9.1%
Signals	18.6%	28.2%	27.4%	29.9%
By Facility Use (Pedestrians)				
Roadway	**50.0%**	40.5%	**30.4%**	26.4%
Marked Crosswalk	30.0%	36.5%	47.8%	49.0%
Unmarked Crosswalk	**10.0%**	7.0%	5.8%	8.7%

Bold Text = Exceeds State's Average
E = Enforcement Related

Table 4 below looks further into which risk factors are common in Fatal / Serious Injury Collisions. Due to the increased probability that Hit Pedestrians and Hit Bicyclist crashes can result in a Fatal / Serious Injury Collisions, all Hit Pedestrian and Hit Bicyclist crashes were also analyzed.

Table 4 –Statistics of Potential Fatal / Serious Injury Collisions

	Potential Fatal/Serious Injury Collisions Only	
Overall Collision Numbers	**2016-2020**	**%**
# of Potential Fatal / Serious Injury Collisions	117*	100
By Collision Type		
Hit Pedestrian	65	55.6%
Hit Cyclist	33	28.2%
By Speed Limit		
25 MPH	25	21.4%
30 MPH	63	53.8%
By Junction Relationship		
Intersection Related	72	61.5%
Non-Intersection (Not Related)	25	21.4%
Driveway Related	20	17.1%
By Traffic Control		
No Traffic Control	36	30.8%
Signals	36	30.8%
Stop Sign	44	37.6%
Pedestrian Crosswalk?		
Yes	21	30.4%
No	33	47.8%
Pedestrian Crossing Distance		
≤ 34	8	6.8%
35-50	34	29.1%
> 50	28	23.9%
Driveway Present (w/in 100ft)		
Yes	111	94.9%
No	6	5.1%
On Street Parking?		
Yes	54	46.2%
No	63	53.8%
Land Use		
Residential	39	33.3%
Commercial	75	64.1%
Industrial	3	2.6%
Roadway Classification		
Arterial	91	77.8%
Local Access	22	18.8%
Pedestrian Generator Present?	**89**	76.1%
Yes	89	76.1%
No	28	23.9%

*Potential Fatal/Serious Injury Collisions is inclusive of 31 total fatal/serious injury crashes as well as 55 non-fatal/serious injury "Hit Pedestrian" and 31 non-fatal/serious injury "Hit Cyclist" incidences.

Targeted Focus Areas

The City of Wenatchee has chosen to establish Priority Levels for targeted safety projects based on the most common types of serious injury and fatal collisions. As 2016-2020 WSDOT data indicates, the most common serious injury and fatal collisions are Hit Pedestrians, Hit Fixed Objects, Sideswipe, Rear End and Angle (T) Crashes.

Potential Serious Injury and Fatal Collisions were evaluated to determine the Risk Factors listed in this section. Evaluation data is included for reference in the following section.

Priority Level 1 Collisions

Priority Level 1 collisions are Hit Pedestrians at Intersections. As Pedestrian Hits are the most common fatal/serious injury collision type in the City of Wenatchee, it is our top priority to reduce collisions involving pedestrians. Cyclists may also be included in this category if crossing at an intersection or using a crosswalk.

Table 5 – Priority Level 1 Risk Factors

Engineering Risk Factors	Enforcement/Education Risk Factors
30 MPH Speed Zones	Driver failing to yield
Crosswalks at Non-signalized Intersection or midblock crossings	Driver speeding
Poor Visibility / Poor Sight Distance	Driver inattention
Inadequate Signing / Lack of Advance Warning Signs	Pedestrian inattention
Arterial Roadway	Ped. crossing against traffic signal
Pedestrian Generator Proximity	DUI
Lack of Leading Pedestrian Intervals	
Pedestrian Crossing more than 35-ft	
Presence of Driveway	
On Street parking	
Commercial Land Use	

1) **30+ MPH Speed Zones** are a risk factor as higher speed collisions are more likely to result in a serious or fatal injury.
2) **Crosswalks at Non-Signalized Intersections or Midblock Crossings** are more likely to have vehicle-pedestrian or vehicle-cyclist collisions.
3) **Poor Visibility/Poor Sight Distance** includes all visibility factors such as inadequate lighting or obstructions at an intersection. Obstructions may include parked vehicles near a crosswalk, buildings or any other object that may reduce sight distance.
4) **Inadequate Signing/Lack of Advance Warning Signs** for crosswalks may reduce driver attentiveness for crossing pedestrians and increase the likelihood of a collision.
5) **Functional Classifications** of Principal Arterial and Minor Arterial. These roads have many pedestrian crossings with or without traffic signals and higher traffic volumes.
6) **Pedestrian Generator Proximity** is a risk factor. Crosswalks near Pedestrian Generators such as schools, bus stops or bus stations, medical facilities, government buildings or downtown areas are at higher risk for collisions.
7) **Lack of Leading Pedestrian Intervals** increases risk at signalized intersections. Leading Pedestrian Intervals have been shown to reduce crashes at intersections by approximately 60% according to the CMF Clearinghouse.

8) **Pedestrian Crossing greater than 35-ft** is a risk factor. For crossings longer than this, the pedestrian is placed in the path of traffic for a greater amount of time.
9) **Driveway Presence** within 100 ft is a risk factor as it increases potential encounters between Vehicles and Pedestrians.
10) **On Street Parking** is a risk factor as it reduces sight distance for pedestrian and vehicles especially when combined with other factors.
11) **Commercial Land Use** is a risk factor. This land use has a high volume of pedestrian and vehicle conflict points.

Priority Level 2 Collisions

Priority Level 2 collision types include Hit Pedestrian at Driveways, Hit Fixed Objects, Sideswipe, rear end and Angle (T) crashes. As these are the next most common fatal/serious injury collision types in the City of Wenatchee, it is a high priority to reduce collisions in this category. These fatal/serious injury collisions were reviewed and the following risk factors were identified as common at these crashes.

Table 6 - Priority Level 2 Risk Factors

Collision Type	Engineering Risk Factors	Enforcement/Education Risk Factors
Hit Pedestrian at Driveway	30 MPH Speed Zones	Driver failing to yield
	Poor Visibility / Poor Sight Distance	Driver speeding
	Roadways wider than 3 lanes	Driver inattention
	TWLTL	Pedestrian inattention
	On Street Parking	Ped. crossing against traffic signal
	Commercial Land Use	DUI
	Arterial Roadway	
	Pedestrian Generator Proximity	
Hit Fixed Objects and Sideswipe	30 MPH Speed Zones	Driver inattention
	Fixed Objects adjacent to Roadway (Utility Poles or Light Poles)	Driver speeding
	Roadway on Curve	DUI
	Truck Route	
	Poor Visibility / Poor Sight Distance	
	Commercial Land Use	
	Arterial Roadway	
Rear End	30 MPH Speed Zones	Driver inattention
	Poor Visibility / Poor Sight Distance	Driver speeding
	On Street Parking	Driver following too close
	Pedestrian Crosswalk	DUI
	Arterial Roadway	Pedestrian inattention
	Inadequate Signing / Lack of Advance Warning Signs	Ped. crossing against traffic signal
	Inadequate signal visibility	

	Pedestrian Crossing more than 35-ft	
	Pedestrian Generator Proximity	
Angle (T)	Uncontrolled Thru Movement	Driver disregarding traffic control devices
	Poor Visibility / Poor Sight Distance	Driver exceeding Speed Limit
	On Street Parking	Driver Inattention
	Inadequate signal visibility	Driver failing to Yield
	Four Leg Intersection	

1) **30+ MPH Speed Zones** are a risk factor as higher speed collisions are more likely to result in a serious or fatal injury.
2) **Poor Visibility/Poor Sight Distance** includes all visibility factors such as inadequate lighting or obstructions at intersections or driveways. Obstructions may include parked vehicles, buildings or any other object that may reduce sight distance.
3) **Roadways wider than 3 lanes** is a risk factor. These roadways have more traffic volume and also may make the driver more "rushed" to get out of or into traffic leading to crashes.
4) **Two-way-left-turn Lanes (TWLTL)** is a risk factor as these lanes are used to make turn movements into and out of driveways.
5) **On Street Parking** is a risk factor as it reduces sight distance for pedestrian and vehicles especially when combined with other factors.
6) **Commercial Land Use** is a risk factor. This land use has a high volume of pedestrians, bicyclists and vehicles.
7) **Functional Classifications** of Principal Arterials and Minor Arterials is a risk factor for Hit Pedestrian at Driveways, Hit Fixed Objects, and Rear End Collisions. These roads have many pedestrian crossings with or without traffic signals, higher traffic volumes and speeds.
8) **Pedestrian Generator Proximity** is a risk factor. Crosswalks near Pedestrian Generators such as schools, bus stops or bus stations, medical facilities, government buildings or downtown areas are at higher risk for collisions.
9) **Utility Poles or Light Poles** are a risk factor due to their common presence adjacent to the roadway. In many locations throughout the city they are located just beyond the edge of the roadway. At locations where it is possible to relocate Fixed Objects, this is the preferred solution.
10) **Curved Roadways** are common locations for off the road collisions which is a risk factor for fixed object collisions. They are also common locations for sideswipe collisions.
11) **Truck Routes** are common locations for sideswipe collisions.
12) **Pedestrian Crosswalks** are a risk factor. Pedestrians entering crosswalks in front of traffic can lead to rear end collisions.
13) **Inadequate Signing/Lack of Advance Warning Signs** for crosswalks may reduce driver attentiveness for crossing pedestrians and increase the likelihood of an emergency stop and then rear end collision.
14) **Inadequate signal visibility** is a risk factor because drivers become aware of stop conditions too late leading to Rear End and Angle (T) crashes.
15) **Pedestrian Crossings** more than 35-ft is a risk factor as these crossings put pedestrians in the path of traffic for longer durations. This can lead to emergency stops and then rear end collisions.
16) **Uncontrolled Thru Movement** is a risk factor. This is common at many Stop Sign Controlled intersections throughout the city. Angle (T) Collisions are more likely when only one road at an intersection is Stop Sign Controlled.
17) **4 Leg (or more) Intersections** are the most common locations for Angle (T) collisions.

Evaluation of Serious and Fatality Collisions

The Evaluation of the City Road System is based on current data provided by WSDOT for 2016-2020.

With Risk Factors determined, locations are identified and appropriate countermeasures are selected. These collisions were reviewed and the following risk factors were identified as common at these crashes. Please see Appendix C for Priority Level 1 Risk Factor Evaluation and Appendix D for Priority Level 2 Risk Factor Evaluation.

The table in Appendices C and D contain the results of the Evaluation of Potential Serious Injury and Fatal collisions which occurred on City Roads. The evaluation of these serious injury and fatal collisions allowed the City to determine and apply the Risk Factors to evaluate other locations.

Evaluation of the potential Serious and Fatal Collisions has been limited to engineering related risk factors. Future iterations of the City's Local Road Safety Plan may be a collaborative effort with the Wenatchee Police Department to include further detail on enforcement or education countermeasures and funding sources for those activities as well.

Systemic Safety Evaluation Process

In order to evaluate the City of Wenatchee's road system for risk factors throughout the City; the best approach is to evaluate intersection by intersection along an identified corridor. To streamline this process, the City has identified several key steps which will be utilized in our process.

1) Use Functional Classification to Determine Target Roads
Functional Classification is used to determine which roads are to be assessed. After determining Target Roads, the roads are divided into corridors based on their characteristics; these characteristics may be cross-section changes, speed limit changes or other variations.

2) Evaluate Intersections along a Corridor
Each intersection shall be evaluated along an identified Corridor for the presence of known Risk Factors.

3) Determine Project Locations
From intersection evaluation, locations with the highest number of Risk Factors will be flagged for Potential Project Locations.

4) Select Countermeasures
Select countermeasures based on overall effectiveness and cost/benefit to reduce or eliminate the presence of Risk Factors at the determined Potential Project Locations.

5) Program Projects
Combine Potential Project Locations into Safety Projects based on location/type of work/etc.
The total number of Risk Factors that may be reduced or eliminated will be evaluated and a cost estimate will be completed.

6) Add Safety Projects to Prioritized Project List
Prioritize Projects based on cost/benefit for reduction of Risk Factors and add to the Prioritized Project List.

Countermeasure Evaluation

With serious injury and fatality risk factors determined, the City of Wenatchee reviewed possible low-cost countermeasures to reduce or eliminate identified risk factors. Countermeasures have been evaluated using FHWA's Collision Modification Factors (CMF) Clearinghouse. The CMF Clearinghouse contains safety countermeasures and effectiveness ratings for reducing collisions based on present risks linked to corresponding collision types.

If the Collision Reduction Factor (CRF) is positive it indicates the percent reduction of collisions from the countermeasure. Negative CRFs indicate the countermeasure actually increased the number of collisions. Countermeasures with reported negative CRFs were not considered due to unproven effectiveness.

Target Zero Priority Crash Types for the City of Wenatchee and related countermeasures which were compiled from CMF Clearinghouse are listed below:

Priority Level 1 Countermeasures

Table 7 – Priority Level 1 Countermeasures

CMF Category	Engineering Countermeasure	CRF (%)	Cost	Complexity
Access Management	Provide a Raised Median/Pedestrian Refuge	28.9	High	Varies
Intersection Geometry	Convert Intersection to Roundabout	73	High	High
Intersection Traffic Control	Convert Minor-Road Stop Control to All-Way Stop Control	43	Low	Low
	Modify Signal Phasing (Implement a Leading Pedestrian Interval)	59	Varies	Varies
Highway Lighting	Provide Intersection Illumination	42-82[1]	Medium	Medium
Pedestrians	Install a Pedestrian Hybrid Beacon (PHB or HAWK)	54.7	High	Varies
	Increase Cycle Length for Pedestrian Crossing	50	Low	Low
	Install Rectangular Rapid Flashing Beacon	47.4	High	Varies
	Install High-Visibility Yellow, Continental-Type Crosswalk at Schools	37	Varies	Varies
	Install Advanced Yield or Stop Markings and Signs	25	Low	Low
	Extend Curbs at Intersection with Bulb Outs	*	High	Medium
	Install or Upgrade Signage and Delineation (Include Wayfinding Signage for Bicyclists)	*	Low	Varies
	Install crosswalk on one minor approach	65	Low	Low
Signs	Signing and Marking Improvements at Stop-Controlled Intersections	10	Low	Low
	Signing and Visibility Improvements at Signalized Intersections	10	Low	Low
	Reflective Markings on Signals	15	Low	Low

*Indicates CMF Clearinghouse has no data for the selected countermeasure

1: Range from several studies. 82% CRF for fatality reduction

Priority Level 2 Countermeasures

Table 8 – Priority Level 2 Countermeasures

CMF Category	Engineering Countermeasure	CRF (%)	Cost	Complexity	Collision Type
Access Management	Change driveway Type	44-84	Medium	Medium	Ped @ Driveway, Rear End
	Replace Two-Way Left Turn Lane with Raised Median	21	High	High	Angle (T)
Advanced Technology and ITS	Implement Automated Speed Enforcement Cameras	86	High	High	Angle (T)
Delineation	Increase Pavement Marking Retroreflectivity	Varies	Low	Low	Ped @ Driveway, Fixed Object / Sideswipe
	Install Wider Edge Lines (4 in. to 5 in. or 4 in. to 6 in.)	19-29.5	Low	Low	Ped @ Driveway, Fixed Object / Sideswipe
	Install No Parking Yellow Curb Marking	*	Low	Low	Ped @ Driveway, Rear End, Angle (T)
	Install Supplemental Intersection shaped pavement markings	69-76	Low	Low	Rear End, Angle (T)
	Provide "Stop Ahead" pavement markings	86-97	Low	Low	Rear End, Angle (T)
Intersection Geometry	Convert Intersection to Roundabout	91	High	High	Angle (T)
Intersection Traffic Control	Install a Traffic Signal	67	Low	Low	Angle (T)
	Add signal (additional primary head)	28	High	High	Rear End
	Adjust All-Red Clearance Interval	40	Medium	Varies	Angle (T)
	Change permissive left-turn phasing to protected only or protected/ permissive	38-41	High	High	Rear End
	Install Adaptive Traffic Signal Control	19	Varies	Varies	Angle (T)
	Add yellow retroreflective backing on signal heads	15	Low	Low	Read End, Angle (T)
	Increase Signal Indicator sizes	*	Medium	Low	Rear End, Angle (T)
	Install a Mini-Roundabout or Traffic Circle in Residential neighborhoods	*	Medium	Varies	Angle (T)
Highway Lighting	Install Lighting	54	High	High	Ped @ Driveway, Fixed Object / Sideswipe, Rear End
Pedestrians	Increase cycle length for pedestrian crossing	45	Low	Low	Rear End
Roadside	Remove or Relocate Fixed Objects Outside of Clear Zone	97.6	Varies	Varies	Fixed Object / Sideswipe
	Install Collision Cushions at Fixed Roadside Features	46-69	Medium	Medium	Fixed Object / Sideswipe
	Change Lateral Offset of Utility Poles	Varies	High	High	Fixed Object / Sideswipe
	Change Longitudinal Density of Utility Poles	Varies	High	High	Fixed Object / Sideswipe
Roadway	Install Shoulder Rumble Strips	23.49-35.84	High	High	Fixed Object / Sideswipe
Signs	Install Chevron Signs or Curve Warning Signs	23.6	Low	Low	Fixed Object / Sideswipe

*Indicates CMF Clearinghouse has no data for the selected countermeasure

Prioritized Project List

The list below contains the City of Wenatchee's priority projects with associated cost estimates.

Table 9 – Engineering/Construction Project List

No.	Project Name	Project Description	Project Type	Cost Estimate
1.	9th Street Corridor Improvements	Road Diet from 4 lanes to 3 lanes with bike lanes. Supplemental signal heads on westbound mast arms, retroreflective backplates, leading pedestrian intervals, signing and pavement markings. Based on HSIP funded Corridor Study.	Systemic	$1,186,473
2.	Washington – King – Buchanan Intersection Control	Install new curb bulb-outs and relocate existing crosswalks	Spot	$ 444,638
3.	Fifth and Emerson Pedestrian Crossing	Enhance an existing crosswalk with new curb ramps, signage, and Rectangular Rapid Flashing Beacons	Spot	$243,297
4.	SR 285 Couplet Signal Upgrades	Update signal heads to 12-inch indicators per MUTCD recommendation and add retroreflective backing	Systemic	$793,450
5.	SR 285 (Chelan and Mission) Driveways Curb Marking	Install yellow curb markings at driveways	Systemic	$178,780
6.	Idaho St Safety Improvements	Install new curb bulb-outs, pavement markings, signage, new traffic circle, and illumination	Systemic	$446,323
7.	Washington Park Pedestrian Crossing	Install new curb bulb-outs, ADA ramps, pavement markings, signage and Rectangular Rapid Flashing Beacons	Systemic	$256,755
8.	Crawford Ave. Pedestrian Crossing	Install a new crosswalk with curb bulb-outs, ADA ramps, pavement markings and signage	Systemic	$262,707
9.	Wilson St. Safety Improvements	Install new traffic circles and signage	Systemic	$165,899
10.	Cherry St. and Orondo Ave. Leading Pedestrian Intervals	Further analyze and implement Leading Pedestrian Intervals at 4 Intersections along this corridor.	Systemic	$10,000

Table 10 – Data Collection Project List

Number	Project Description	Project Goal	Cost Estimate
11.	Update City of Wenatchee Average Daily Traffic Counts	Obtain new traffic counts for classified roads within the City to aid in evaluation of the City's road system for future safety projects.	$ 50,000

Priority Project Justifications

9th Street Corridor Improvements Project

A 9th Street Corridor Analysis was completed through an HSIP-funded study in 2020. This study was selected due to multiple Priority Level 1 and Priority Level 2 collisions occurring on 9th Street between Miller Street and the BSNF Railroad Tracks. This project is the result of the study.

Washington – King – Buchanan Intersection Control

This project is a result of a Priority Level 1 – Hit Pedestrian at Intersection Crash. The City has in the short-term since converted this intersection to a 5-way stop. The intent of this project is to install curb bulb-outs and increased channelization and signing in order to shorten pedestrian crossing distances and increase intersection visibility to prevent this type of crash from happening again.

Fifth and Emerson Pedestrian Crossing

This project is a result of multiple Priority Level 1 crashes – Hit Pedestrian at Intersection. The intent of this project is to construct new pedestrian ramps, increase signage, and install a Rectangular Rapid Flashing Beacon.

SR 285 Couplet Signal Upgrades

The SR 285 Couplet is the location for approximately 19.5% of all collisions in the City of Wenatchee. Roughly 29.6% of collisions on the Couplet are Rear End Crashes and 25.4% are Angle (T) Crashes. These Priority Level 2 collisions on the SR 285 Couplet make up approximately 10.7% of all crashes in the City. As a countermeasure, the City would like to upgrade the signal indicator sizes to be all 12-inch, in conformance with MUTCD recommendations as well as provide retroreflective backing to these signals. These countermeasures will increase signal visibility and work to reduce Rear End and Angle (T) crashes.

SR 285 Couplet Driveways Curb Painting

As mentioned above, there is a large presence of Priority Level 2 Crashes on this corridor. In addition to Rear End and Angle (T) crashes, there have been several Hit Pedestrian at Driveway collisions on this segment of SR 285. The city proposes the use of Yellow Curb Markings to prohibit on street parking adjacent to driveways. This measure will increase sight distance for vehicles turning in and out of driveways allowing for less angle, rear end, pedestrian and sideswipe crashes.

Idaho St Safety Improvements

There are several Priority Level 1 Risk Factors present on Idaho Street. The intersections are inadequately signed and the pedestrian crossings are wide. The City proposes several intersection treatments (Traffic Circle, New Signage, Curb Bulb-outs, Pavement Markings, and Illumination) to reduce the risk of Hit Pedestrian at Intersection Collisions.

Washington Park Pedestrian Crossing

Washington St is a two-lane arterial road with pedestrian crossing distances greater than 35-ft at marked midblock crossings that do not have ADA ramps. The City proposes consolidating these crossings into one midblock crossing with curb bulb-outs, pavement markings, and RRFBs. These improvements will shorten the pedestrian travel distances while also increasing visibility for this crossing to a large pedestrian generator, Washington Park.

Crawford Ave Pedestrian Crossing

Crawford Ave is a two-lane arterial road with pedestrian crossing distances greater than 35-ft adjacent to a large pedestrian generator, Lincoln Park. The City proposes constructing a new pedestrian crossing with curb bulb-outs, pavement markings, and signage. These improvements will shorten the pedestrian travel distances while also increasing visibility for this crossing.

Wilson St Safety Improvements

There are several Priority Level 1 Risk Factors present on Wilson Street. The intersections are inadequately signed and the pedestrian crossings are wide. The City proposes to install traffic circles and new signage to reduce the risk of Hit Pedestrian at Intersection Collisions.

Cherry St / Orondo Ave Leading Pedestrian Intervals

There have been Priority Level 1 collisions each of the four signalized intersections along this corridor in the last five years. At these locations there are multiple pedestrian generators leading to a high number of potential vehicle/pedestrian conflicts. The city proposes the implementation of Leading Pedestrian Intervals at these intersections. Due to the low cost and the ability to implement these changes quickly, the City will plan on further analyzing these intersections and implementing the improvements using City funds.

City of Wenatchee Average Daily Traffic Counts

Average Daily Traffic (ADT) is a risk factor for all collision types and can be a great tool in helping to determine the location of further safety improvements. The goal of this project will be to obtain new traffic counts for classified roads within the City to aid in evaluation of the City's road system for future safety projects.

Awarded HSIP Project Status

City Project No.	Project Name	Designer	Project Description	Cost Estimate	Status
1910	9th Street Corridor Analysis	Perteet	Engineering Study for Design of 9th St. Corridor.	$30,000	Study completed, see Appendix E
1911	South Wenatchee Safety Improvements	City of Wenatchee	Install curb bulb outs, ADA ramps, signage, crosswalks and channelization improvements.	$225,000	Construction funding obligated. Construction planned for Summer 2022.
1912	Miller & Montana Pedestrian Crossing Improvements	City of Wenatchee	Install curb bulb outs, ADA ramps, signage and Rectangular Rapid Flashing Beacons	$244,400	Project Completed.

Conclusion

As discussed previously, the percent increase in Fatal and Serious Injury Crashes in Wenatchee is disproportionately large in comparison to other cities in the State. The results of the data analysis motivates the City of Wenatchee to seek low-cost safety features that target risk factors with higher rates of occurrence. City

roads have been identified utilizing specific risk criteria and prioritized for locations with greatest potential for risk factor reduction or elimination.

The City's Local Road Safety Plan will be updated every two years to evaluate the successes of the program, update the status of identified projects and to identify additional risk factors and apply new countermeasures as needed. In addition; criteria used to evaluate locations, such as ADT, should be updated concurrently.

Appendix A

WSDOT COLLISION DATA

2016-2020

Wenatchee

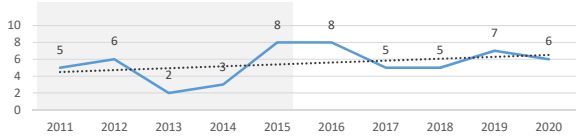
Crash Data Summary for 2016-2020

Note: For cities with populations over 27,500, data includes crashes on state highways managed by cities.

Fatal and Serious Injury Crashes

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2016-20	% Δ 11-15 v 16-20
Wenatchee	**5**	**6**	**2**	**3**	**8**	**8**	**5**	**5**	**7**	**6**	***31***	***29.2%***
Eastside Cities	161	186	153	153	177	188	192	203	187	242	*1,012*	*21.9%*
All Cities	870	998	828	901	959	1,053	1,031	1,068	1,026	1,068	*5,246*	*15.1%*
All Public Roads	2,262	2,289	2,020	2,127	2,264	2,410	2,455	2,433	2,454	2,606	*12,358*	*12.7%*

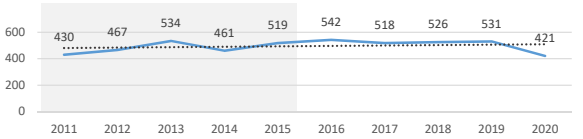
Wenatchee: Fatal and Serious Injury Crashes



All Crashes

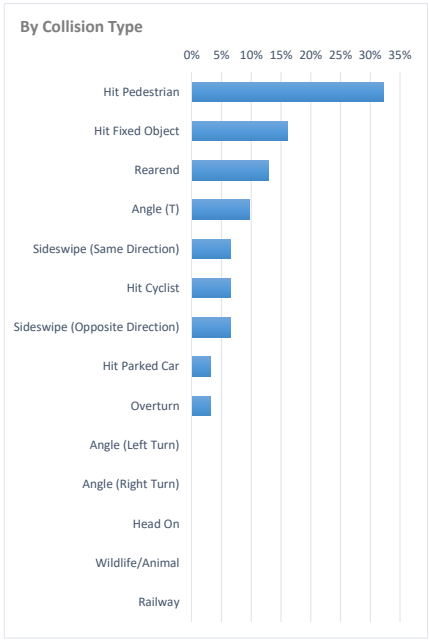
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2016-20	% Δ 11-15 v 16-20
Wenatchee	**430**	**467**	**534**	**461**	**519**	**542**	**518**	**526**	**531**	**421**	***2,538***	***5.3%***
Eastside Cities	10,537	10,647	10,750	11,023	12,221	13,123	12,802	12,630	12,723	10,048	*61,326*	*11.1%*
All Cities	52,241	52,480	52,783	56,240	61,193	62,913	62,087	59,480	54,385	39,982	*278,847*	*1.4%*
All Public Roads	98,945	99,613	99,762	107,674	117,060	122,385	121,053	115,977	111,670	86,269	*557,354*	*6.6%*

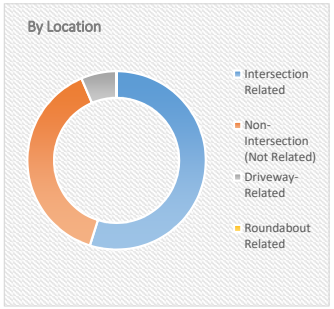
Wenatchee: All Crashes

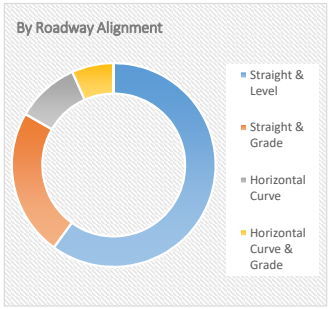


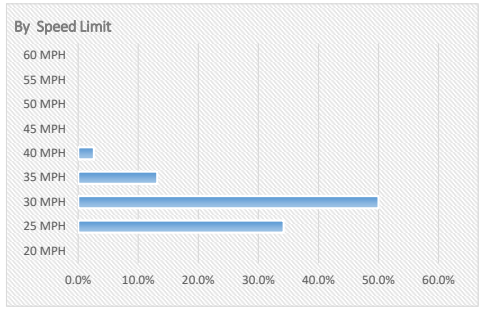
Wenatchee: Collision Factors

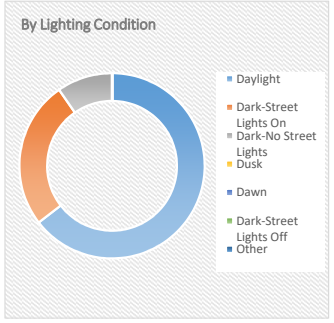
Fatal and Serious Injury Crashes, 2016-2020

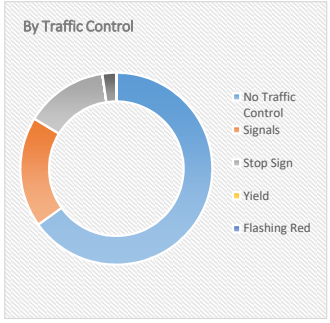


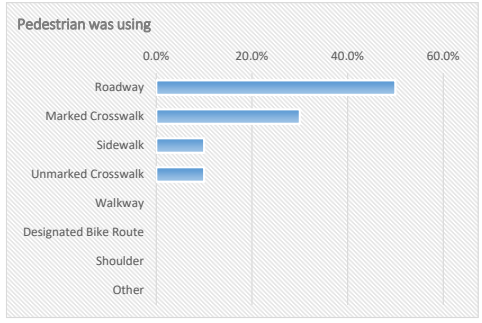












Under 23 U.S. Code 148 and 23 U.S. Code 409, safety data, reports, surveys, schedules, list complied or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising

2016-2020 Data
Wenatchee

Wenatchee

Fatal/Serious Injury Crashes Only

	All Roads		All Cities		Eastside Cities														All Roads		All Cities		Eastside Cities													
	2016-2020	%	2016-2020	%	2016-2020	%	2016-2020	%	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2016-2020	%	2016-2020	%	2016-2020	%	2016-2020	%	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Overall Numbers																																				
Total # of Collisions	12,358	-	5,246	-	1,012	-	31	-	6	7	5	5	8	8	3	2	6	5	557,354	-	278,847	-	61,326	-	2,538	-	421	531	526	518	542	519	461	534	467	430
# of Fatal Collisions	2,586	20.9%	751	14.3%	156	15.4%	4	12.9%	0	0	2	1	1	0	0	1	1	0	2,586	0.5%	751	0.3%	156	0.3%	4	0.2%	0	0	2	1	1	0	0	1	1	0
# of Serious Injury Collisions	9,771	79.1%	4,494	85.7%	856	84.6%	27	87.1%	6	7	3	4	7	8	3	1	5	5	9,771	1.8%	4,494	1.6%	856	1.4%	27	1.1%	6	7	3	4	7	8	3	1	5	5
# of Drug/Alcohol-Related Collisions	2,082	16.8%	757	14.4%	178	17.6%	4	12.9%	0	1	0	1	2	2	1	0	0	0	31,064	5.6%	14,834	5.3%	3,509	5.7%	128	5.0%	23	30	28	29	18	15	19	19	22	26
Total # of Fatalities	2,761	-	786	-	159	-	4	-	0	0	2	1	1	0	0	1	1	0	2,761	-	786	-	159	-	4	-	0	0	2	1	1	0	0	1	1	0
Total # of Injuries	16,645	-	6,843	-	1,313	-	38	-	8	9	4	8	9	8	4	1	5	7	224,374	-	114,666	-	24,440	-	1,061	-	164	207	212	234	244	218	180	244	200	181
By Collision Type																																				
Hit Pedestrian	2,125	17.2%	1,545	29.5%	292	28.9%	10	*32.3%*	3	3	1	1	2	4	0	1	3	2	9,947	1.8%	8,175	2.9%	1,468	2.4%	65	2.6%	13	12	13	15	12	11	7	7	9	8
Hit Fixed Object	3,404	27.5%	881	16.8%	158	15.6%	5	16.1%	1	0	0	1	3	2	1	1	0	1	103,151	18.5%	30,820	11.1%	6,620	10.8%	168	6.6%	32	37	30	35	34	39	29	28	38	33
Rearend	923	7.5%	255	4.9%	43	4.2%	4	12.9%	1	0	0	2	1	0	0	0	1	1	161,032	28.9%	65,619	23.5%	13,526	22.1%	759	29.9%	122	162	174	150	151	189	136	178	166	143
Angle (T)	1,435	11.6%	768	14.6%	201	19.9%	3	9.7%	0	0	1	1	1	1	1	0	0	1	97,319	17.5%	71,916	25.8%	18,524	30.2%	718	28.3%	122	145	153	150	148	127	119	143	119	107
Sideswipe (Same Direction)	266	2.2%	77	1.5%	15	1.5%	2	6.5%	0	1	0	0	1	0	0	0	0	0	49,829	8.9%	21,306	7.6%	3,399	5.5%	177	7.0%	30	34	32	41	40	30	28	25	24	26
Hit Cyclist	660	5.3%	510	9.7%	84	8.3%	2	6.5%	1	0	1	0	0	1	0	0	1	0	6,038	1.1%	5,054	1.8%	813	1.3%	33	1.3%	4	7	12	3	7	4	6	10	4	5
Sideswipe (Opposite Direction)	213	1.7%	54	1.0%	10	1.0%	2	6.5%	0	1	1	0	0	0	0	0	0	0	3,993	0.7%	1,787	0.6%	300	0.5%	11	0.4%	2	2	2	4	1	0	3	0	2	1
Hit Parked Car	209	1.7%	130	2.5%	24	2.4%	1	3.2%	0	1	0	0	0	0	1	0	0	0	30,150	5.4%	25,818	9.3%	6,610	10.8%	247	9.7%	39	54	43	54	57	52	49	39	30	34
Overturn	846	6.8%	167	3.2%	45	4.4%	1	3.2%	0	1	0	0	0	0	0	0	0	0	9,476	1.7%	1,423	0.5%	337	0.5%	11	0.4%	2	3	2	3	1	1	1	6	3	1
Angle (Left Turn)	864	7.0%	473	9.0%	89	8.8%	0	0.0%	0	0	0	0	0	0	0	0	1	0	39,676	7.1%	28,100	10.1%	5,929	9.7%	218	8.6%	37	44	38	39	60	44	54	60	45	42
Angle (Right Turn)	38	0.3%	21	0.4%	1	0.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	5,933	1.1%	4,286	1.5%	894	1.5%	21	0.8%	5	6	2	2	6	6	9	7	10	10
Head On	649	5.3%	170	3.2%	21	2.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	3,076	0.6%	1,425	0.5%	260	0.4%	14	0.6%	3	3	2	2	4	1	3	2	1	2
Wildlife/Animal	88	0.7%	5	0.1%	1	0.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	10,375	1.9%	495	0.2%	122	0.2%	3	0.1%	0	1	0	1	1	0	0	0	0	0
Railway	19	0.2%	11	0.2%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	198	0.0%	153	0.1%	17	0.0%	1	0.0%	0	0	1	0	0	0	1	0	0	0
Other	619	5.0%	179	3.4%	28	2.8%	1	3.2%	0	0	1	0	0	0	0	0	0	0	27,161	4.9%	12,470	4.5%	2,507	4.1%	92	3.6%	10	21	22	19	20	15	16	29	16	18
By Roadway Surface Condition																																				
Dry	9,255	74.9%	3,962	75.5%	866	85.6%	22	71.0%	2	7	3	4	6	6	3	1	5	5	377,213	67.7%	194,401	69.7%	48,130	78.5%	2,067	81.4%	355	433	447	386	446	422	371	492	355	374
Wet	2,563	20.7%	1,169	22.3%	106	10.5%	5	16.1%	3	0	1	0	1	0	0	1	1	0	143,913	25.8%	71,149	25.5%	6,750	11.0%	257	10.1%	46	55	62	49	45	43	54	27	66	25
Snow/Slush	143	1.2%	24	0.5%	12	1.2%	1	3.2%	0	0	1	0	0	0	0	0	0	0	14,053	2.5%	4,547	1.6%	3,054	5.0%	142	5.6%	13	38	11	50	30	23	22	5	29	9
Ice	219	1.8%	42	0.8%	17	1.7%	1	3.2%	0	0	0	0	1	1	0	0	0	0	14,942	2.7%	4,964	1.8%	2,701	4.4%	49	1.9%	5	2	4	23	15	17	10	6	11	22
Standing Water	20	0.2%	3	0.1%	1	0.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	1,439	0.3%	265	0.1%	23	0.0%	0	0.0%	0	0	0	0	0	1	1	0	1	0
Other	45	0.4%	10	0.2%	3	0.3%	1	3.2%	0	0	0	1	0	1	0	0	0	0	914	0.2%	291	0.1%	121	0.2%	14	0.6%	0	0	2	9	3	8	1	0	3	0
By Light Condition																																				
Daylight	6,706	54.3%	2,832	54.0%	550	54.3%	20	64.5%	1	6	3	5	5	6	2	2	6	3	368,072	66.0%	190,101	68.2%	43,227	70.5%	1,953	77.0%	327	407	423	381	415	405	362	412	351	330
Dark-Street Lights On	2,915	23.6%	1,855	35.4%	349	34.5%	8	25.8%	3	1	1	0	3	2	1	0	0	1	109,769	19.7%	65,654	23.5%	12,809	20.9%	453	17.8%	70	92	82	107	102	89	78	94	83	73
Dark-No Street Lights	1,931	15.6%	234	4.5%	62	6.1%	3	9.7%	2	0	1	0	0	0	0	0	0	0	45,482	8.2%	6,541	2.3%	1,809	2.9%	42	1.7%	8	11	11	9	3	5	8	8	6	5
Dusk	411	3.3%	178	3.4%	32	3.2%	0	0.0%	0	0	0	0	0	0	0	0	0	1	14,979	2.7%	7,825	2.8%	1,652	2.7%	49	1.9%	12	11	2	12	12	9	5	8	13	11
Dawn	221	1.8%	74	1.4%	4	0.4%	0	0.0%	0	0	0	0	0	0	0	0	0	0	10,661	1.9%	3,941	1.4%	694	1.1%	16	0.6%	2	3	3	4	4	5	3	6	4	7
Dark-Street Lights Off	92	0.7%	40	0.8%	10	1.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	3,094	0.6%	1,397	0.5%	339	0.6%	10	0.4%	1	2	4	1	2	4	2	2	5	2
Other	24	0.2%	8	0.2%	2	0.2%	0	0.0%	0	0	0	0	0	0	0	0	0	0	786	0.1%	398	0.1%	68	0.1%	8	0.3%	0	0	0	8	0	0	2	0	2	0
By Junction Relationship																																				
Intersection Related	3,963	32.1%	2,491	47.5%	511	50.5%	17	54.8%	4	4	2	2	5	7	1	0	2	2	207,030	37.1%	140,545	50.4%	32,654	53.2%	1,286	50.7%	224	257	265	269	271	263	233	307	256	229
Non-Intersection (Not Related)	7,593	61.4%	2,307	44.0%	408	40.3%	12	38.7%	2	2	3	2	3	0	2	2	3	2	295,261	53.0%	98,809	35.4%	19,983	32.6%	893	35.2%	136	199	177	185	196	193	152	150	141	139
Driveway-Related	763	6.2%	426	8.1%	83	8.2%	2	6.5%	0	1	0	1	0	1	0	0	1	1	50,499	9.1%	37,126	13.3%	8,044	13.1%	343	13.5%	55	72	78	63	75	63	75	75	69	61
Roundabout Related	39	0.3%	22	0.4%	10	1.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	4,564	0.8%	2,367	0.8%	645	1.1%	16	0.6%	6	3	6	1	0	0	1	2	1	1
By Roadway Curvature																																				
Straight & Level	6,524	52.8%	3,139	59.8%	676	66.8%	18	58.1%	3	3	3	5	4	5	3	2	5	4	336,836	60.4%	179,038	64.2%	43,825	71.5%	1,858	73.2%	299	400	404	381	374	294	315	426	366	317
Straight & Grade	1,904	15.4%	895	17.1%	119	11.8%	7	22.6%	2	1	2	0	2	1	0	0	1	1	90,207	16.2%	41,884	15.0%	6,417	10.5%	340	13.4%	47	50	59	66	118	108	81	73	80	87
Horizontal Curve	1,508	12.2%	386	7.4%	75	7.4%	3	9.7%	0	1	0	0	2	1	0	0	0	0	37,465	6.7%	11,977	4.3%	2,394	3.9%	66	2.6%	11	15	16	12	12	10	9	9	6	8
Horizontal Curve & Grade	1,406	11.7%	302	5.8%	33	3.3%	2	6.5%	1	1	0	0	0	0	0	0	0	0	35,640	6.4%	9,126	3.4%	1,206	2.0%	28	1.1%	4	3	3	11	7	5	8	1	7	6
Vertical Curve	392	3.2%	132	2.5%	17	1.7%	0	0.0%	0	0	0	0	0	0	0	0	0	0	12,729	2.3%	5,266	1.9%	822	1.3%	26	1.0%	6	6	4	6	4	11	7	4	4	1
Unknown	16	0.1%	9	0.2%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	718	0.1%	522	0.2%	36	0.1%	0	0.0%	0	0	0	0	0	0	22	21	4	11
Hit Fixed Object Crashes Only - By Fixed Object Hit																																				
Utility Pole	257	8.1%	105	12.9%	20	12.7%	2	50.0%	0	0	0	1	1	0	0	1	0	1	7,320	7.1%	3,019	9.5%	756	11.4%	20	13.0%	3	6	1	3	7	8	3	4	4	8
Curb / Raised Traffic Island	163	5.1%	114	14.0%	26	16.5%	1	25.0%	0	0	0	0	1	0	0	0	0	0	4,249	4.1%	3,014	9.5%	582	8.8%	17	11.0%	3	4	3	3	4	2	3	1	1	0
Guardrail	322	10.2%	34	4.2%	5	3.2%	1	25.0%	1	0	0	0	0	0	0	0	0	0	9,058	8.7%	968	3.0%	121	1.8%	3	1.9%	1	0	0	1	1	0	0	0	0	0
Fence	173	5.5%	60	7.4%	13	8.2%	0	0.0%	0	0	0	0	0	0	0	0	0	0	8,260	8.0%	3,687	11.6%	1,110	16.8%	18	11.7%	4	4	5	2	3	4	5	5	3	5
Tree / Stump (Stationary)	633	20.0%	190	23.3%	17	10.8%	0	0.0%	0	0	0	0	0	1	0	0	0	0	9,757	9.4%	4,282	13.5%	593	9.0%	14	9.1%	2	1	4	2	5	2	5	2	2	1
Traffic Signal Pole	26	0.8%	19	2.3%	1	0.6%	0	0.0%	0	0	0	0	0	0	0	0	0	0	983	0.9%	686	2.2%	172	2.6%	12	7.8%	3	5	0	3	1	2	0	1	2	2
Metal Sign Post	87	2.7%	40	4.9%	13	8.2%	0	0.0%	0	0	0	0	0	0	0	0	0	0	4,367	4.2%	1,990	6.3%	520	7.9%	10	6.5%	3	2	0	4	1	5	2	1	2	0
Retaining Wall	66	2.1%	35	4.3%	4	2.5%	0	0.0%	0	0	0	0	0	0	0	0	0	0	1,723	1.7%	1,099	3.5%	233	3.5%	8	5.2%	3	0	3	1	1	3	4	3	4	2
Building	40	1.3%	29	3.6%	8	5.1%	0	0.0%	0	0	0	0	0	0	1	0	0	0	1,465	1.4%	1,127	3.6%	313	4.7%	6	3.9%	1	0	3	2	0	1	2	1	4	1
Boulder (Stationary)	54	1.7%	8	1.0%	4	2.5%	0	0.0%	0	0	0	0	0	0	0	0	0	0	1,075	1.0%	398	1.3%	125	1.9%	5	3.2%	1	2	0	1	1	0	0	1	2	0
Fire Hydrant	10	0.3%	6	0.7%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	980	0.9%	747	2.4%	194	2.9%	5	3.2%	2	1	2	0	0	1	0	0	3	1
Earth Bank	304	9.6%	32	3.9%	7	4.4%	0	0.0%	0	0	0	0	0	1	0	0	0	0	6,450	6.2%	586	1.8%	114	1.7%	4	2.6%	1	1	1	0	1	1	0	1	0	1

2016-2020 Data
Wenatchee

Wenatchee

	Fatal/Serious Injury Crashes Only																		All Roads		All Cities		Eastside Cities													
	All Roads		All Cities		Eastside Cities																															
	2016-2020	%	2016-2020	%	2016-2020	%	2016-2020	%	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2016-2020	%	2016-2020	%	2016-2020	%	2016-2020	%	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Wood Sign Post	61	1.9%	12	1.5%	2	1.3%	0	0.0%	0	0	0	0	0	0	0	0	0	0	2,668	2.6%	941	3.0%	180	2.7%	4	2.6%	0	2	0	1	1	1	0	0	1	2
Utility Box	15	0.5%	6	0.7%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	883	0.9%	420	1.3%	105	1.6%	3	1.9%	0	1	0	1	1	2	1	0	0	1
Concrete Barrier	174	5.5%	29	3.6%	4	2.5%	0	0.0%	0	0	0	0	0	0	0	0	0	0	9,514	9.2%	737	2.3%	102	1.5%	3	1.9%	1	0	0	1	1	0	1	0	0	0
Mail Box	62	2.0%	17	2.1%	2	1.3%	0	0.0%	0	0	0	0	0	0	0	0	0	0	2,455	2.4%	943	3.0%	148	2.2%	3	1.9%	0	0	1	2	0	1	0	0	1	0
Roadway Ditch	400	12.6%	30	3.7%	4	2.5%	0	0.0%	0	0	0	0	0	0	0	0	0	0	13,429	13.0%	1,191	3.8%	125	1.9%	3	1.9%	0	1	1	1	0	0	0	0	0	0
Bridge Rail	47	1.5%	9	1.1%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	2,646	2.6%	462	1.5%	50	0.8%	1	0.6%	0	1	0	0	0	0	0	0	0	1
Rock Bank	34	1.1%	2	0.2%	1	0.6%	0	0.0%	0	0	0	0	0	0	0	0	0	0	592	0.6%	56	0.2%	18	0.3%	1	0.6%	0	0	1	0	0	0	0	0	0	0
Crash Cushions - Impact Attenuators	21	0.7%	1	0.1%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	728	0.7%	56	0.2%	10	0.2%	1	0.6%	1	0	0	0	0	0	0	0	0	0
Guide Post	8	0.3%	1	0.1%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	216	0.2%	73	0.2%	18	0.3%	1	0.6%	0	0	0	0	1	0	0	0	0	0
Misc. Debris on Road	16	0.5%	1	0.1%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	908	0.9%	185	0.6%	43	0.6%	0	0.0%	0	0	0	0	0	0	0	2	0	0
Temporary Traffic Sign / Barricade	9	0.3%	5	0.6%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	419	0.4%	144	0.5%	30	0.5%	0	0.0%	0	0	0	0	0	0	0	0	1	0
Culvert	46	1.5%	7	0.9%	1	0.6%	0	0.0%	0	0	0	0	0	0	0	0	0	0	765	0.7%	110	0.3%	10	0.2%	0	0.0%	0	0	0	0	0	0	0	0	0	1
Into River / Lake	10	0.3%	1	0.1%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	293	0.3%	44	0.1%	11	0.2%	0	0.0%	0	0	0	0	0	0	0	0	0	1
Other Objects	52	1.6%	23	2.8%	7	4.4%	0	0.0%	0	0	0	0	0	0	0	0	0	0	2,824	2.7%	1,283	4.0%	360	5.4%	12	7.8%	0	4	4	2	2	1	1	1	4	3
By Contributing Circumstance																																				
Exceeding Safe / Stated Speed	3,129	23.4%	945	19.0%	203	20.5%	10	32.3%	2	3	0	1	4	2	0	0	0	0	90,014	15.2%	22,638	7.9%	4,256	6.8%	125	4.3%	15	31	9	28	42	25	30	9	33	28
Inattention / Distraction	2,417	18.1%	1,016	20.5%	174	17.6%	6	19.4%	0	3	0	2	1	4	1	0	1	1	162,412	27.4%	88,410	30.8%	16,230	26.1%	949	32.9%	0	183	285	244	237	222	219	199	70	41
Failing to Yield	1,240	9.3%	608	12.2%	142	14.3%	4	12.9%	0	1	1	1	1	0	0	0	0	0	89,271	15.1%	56,677	19.7%	13,664	22.0%	484	16.8%	86	90	96	80	132	74	90	121	104	113
Under Influence of Alcohol / Drugs	2,473	18.5%	751	15.1%	166	16.8%	4	12.9%	0	1	0	1	2	2	1	0	0	0	32,271	5.4%	14,676	5.1%	3,568	5.7%	140	4.9%	29	31	27	32	21	17	18	19	20	24
Following Too Close	374	2.8%	101	2.0%	23	2.3%	3	9.7%	1	0	0	2	0	0	0	0	1	1	88,457	14.9%	30,416	10.6%	8,986	14.4%	582	20.2%	107	115	119	102	139	125	95	138	145	136
Over Centerline	455	3.4%	96	1.9%	10	1.0%	2	6.5%	0	0	1	0	1	0	0	0	0	1	4,445	0.7%	1,719	0.6%	367	0.6%	26	0.9%	0	1	6	12	7	4	1	7	13	11
Disregard Stop Sign	179	1.3%	67	1.3%	15	1.5%	1	3.2%	0	0	0	0	1	0	0	0	0	1	6,114	1.0%	4,351	1.5%	1,348	2.2%	36	1.2%	0	8	8	8	12	10	2	12	24	14
Apparently Ill	139	1.0%	61	1.2%	9	0.9%	1	3.2%	0	0	0	1	0	0	0	1	0	0	2,582	0.4%	1,161	0.4%	235	0.4%	11	0.4%	3	3	0	3	2	1	2	1	3	2
Disregard Signal	242	1.8%	174	3.5%	38	3.8%	0	0.0%	0	0	0	0	0	0	0	0	1	0	10,518	1.8%	8,086	2.8%	2,089	3.4%	80	2.8%	0	18	24	19	19	18	17	36	37	26
Improper Turn	149	1.1%	102	2.1%	13	1.3%	0	0.0%	0	0	0	0	0	0	0	0	0	0	11,475	1.9%	8,622	3.0%	1,582	2.5%	63	2.2%	0	0	19	27	17	25	21	21	33	21
Improper Backing	22	0.2%	10	0.2%	1	0.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	6,598	1.1%	5,157	1.8%	1,618	2.6%	58	2.0%	4	17	13	6	18	19	12	16	13	8
Operating Defective Equipment	306	2.3%	78	1.6%	16	1.6%	0	0.0%	0	0	0	0	0	0	0	0	0	0	11,908	2.0%	3,918	1.4%	945	1.5%	26	0.9%	3	6	3	6	8	13	5	9	16	9
Apparently Asleep	173	1.3%	32	0.6%	8	0.8%	0	0.0%	0	0	0	0	0	0	0	0	0	1	5,720	1.0%	1,392	0.5%	277	0.4%	25	0.9%	0	0	3	10	12	3	5	2	3	4
Improper Passing	301	2.3%	80	1.6%	9	0.9%	0	0.0%	0	0	0	0	0	0	0	0	0	0	6,940	1.2%	2,905	1.0%	431	0.7%	15	0.5%	1	8	3	1	2	2	0	4	2	5
Failing to Yield to Ped / Cyclist	280	2.1%	241	4.9%	43	4.3%	0	0.0%	0	0	0	0	0	1	0	0	2	2	2,609	0.4%	2,277	0.8%	380	0.6%	14	0.5%	0	0	7	4	3	5	3	6	7	8
On Wrong Side of Road	216	1.6%	53	1.1%	12	1.2%	0	0.0%	0	0	0	0	0	0	0	0	0	0	1,786	0.3%	899	0.3%	240	0.4%	13	0.5%	0	0	4	2	7	1	0	0	0	0
Apparently Fatigued	65	0.5%	13	0.3%	3	0.3%	0	0.0%	0	0	0	0	0	0	0	0	0	0	3,085	0.5%	1,000	0.3%	192	0.3%	11	0.4%	0	1	1	7	2	3	3	1	0	1
Improper U-Turn	73	0.5%	33	0.7%	1	0.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	3,410	0.6%	2,178	0.8%	270	0.4%	9	0.3%	2	1	2	2	2	0	2	2	3	0
Failing to Signal	9	0.1%	3	0.1%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	573	0.1%	280	0.1%	50	0.1%	3	0.1%	0	1	0	0	2	0	1	0	3	1
Disregard Yield Sign	22	0.2%	13	0.3%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	753	0.1%	560	0.2%	89	0.1%	1	0.0%	0	0	0	1	0	0	0	0	0	0
Improper Signal	10	0.1%	3	0.1%	1	0.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	611	0.1%	275	0.1%	54	0.1%	1	0.0%	0	1	0	0	0	1	0	1	0	0
Improper Parking Location	4	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	413	0.1%	282	0.1%	76	0.1%	1	0.0%	0	0	1	0	0	0	1	0	2	0
Other	1,040	7.8%	472	9.5%	100	10.1%	0	0.0%	0	0	0	0	0	1	1	0	0	0	50,610	8.5%	29,356	10.2%	5,229	8.4%	211	7.3%	0	0	62	77	72	63	51	66	42	33
By Motor Vehicle Type																																				
Light Truck/SUV	7,543	40.5%	2,952	38.5%	620	41.7%	19	43.2%	3	3	2	5	6	4	4	1	6	3	450,622	44.9%	228,058	43.7%	56,096	48.8%	2,780	54.3%	465	550	609	568	588	511	459	512	439	409
Passenger Car	7,448	40.0%	3,455	45.1%	607	40.8%	16	36.4%	3	3	2	4	4	5	1	1	1	5	499,309	49.7%	271,405	52.0%	54,667	47.5%	2,173	42.4%	350	482	408	415	518	486	444	511	455	409
Motorcycle	2,391	12.9%	878	11.5%	197	13.3%	5	11.4%	0	2	1	0	2	0	0	0	1	0	10,390	1.0%	4,471	0.9%	950	0.8%	34	0.7%	7	8	7	5	7	5	3	10	11	4
Heavy Truck	845	4.5%	187	2.4%	32	2.2%	3	6.8%	0	2	1	0	0	0	0	0	0	0	35,114	3.5%	12,261	2.3%	2,276	2.0%	97	1.9%	16	18	22	16	25	20	18	18	14	15
Bus	77	0.4%	65	0.8%	5	0.3%	1	2.3%	0	0	1	0	0	0	0	0	1	0	3,563	0.4%	2,637	0.5%	416	0.4%	22	0.4%	1	3	3	9	6	4	7	6	6	7
School Bus	26	0.1%	17	0.2%	4	0.3%	0	0.0%	0	0	0	0	0	0	0	0	0	0	1,764	0.2%	1,098	0.2%	277	0.2%	6	0.1%	0	0	2	0	4	1	0	0	2	1
Other	274	1.5%	113	1.5%	21	1.4%	0	0.0%	0	0	0	0	0	0	0	0	0	0	3,702	0.4%	1,896	0.4%	361	0.3%	11	0.2%	1	1	3	4	2	1	0	3	2	2
By Speed Limit																																				
20 MPH	169	1.1%	121	1.9%	13	1.1%	0	0.0%	0	0	0	0	0	0	0	0	1	3	11,936	1.5%	9,469	2.4%	1,582	1.8%	19	0.5%	4	5	6	1	3	9	8	4	7	5
25 MPH	1,900	12.4%	1,465	23.6%	261	22.0%	13	34.2%	4	2	2	1	4	1	2	1	0	0	127,511	15.9%	106,139	26.5%	23,756	27.0%	1,002	25.7%	167	223	217	191	204	217	220	266	194	188
30 MPH	1,673	10.9%	1,429	23.0%	422	35.6%	19	50.0%	1	5	2	6	5	3	2	1	8	3	111,350	13.9%	97,202	24.2%	30,197	34.3%	2,177	55.7%	311	451	450	454	511	400	407	451	506	413
35 MPH	4,196	27.3%	2,398	38.6%	349	29.4%	5	13.2%	1	0	1	2	1	1	0	0	0	1	228,316	28.5%	150,816	37.6%	26,932	30.6%	604	15.5%	90	86	142	149	137	117	97	111	81	116
40 MPH	1,070	7.0%	440	7.1%	63	5.3%	1	2.6%	0	0	0	0	1	0	0	0	0	0	49,098	6.1%	21,506	5.4%	3,046	3.5%	57	1.5%	14	17	4	2	20	2	8	30	22	5
45 MPH	1,008	6.6%	225	3.6%	40	3.4%	0	0.0%	0	0	0	0	0	0	0	0	0	0	37,034	4.6%	11,225	2.8%	1,467	1.7%	35	0.9%	0	0	4	0	31	2	3	0	0	9
50 MPH	1,778	11.6%	104	1.7%	29	2.4%	0	0.0%	0	0	0	0	0	0	0	0	0	0	39,208	4.9%	2,583	0.6%	638	0.7%	7	0.2%	0	0	0	0	7	0	0	0	0	2
55 MPH	1,278	8.3%	19	0.3%	10	0.8%	0	0.0%	0	0	0	0	0	0	0	0	0	0	30,054	3.7%	765	0.2%	194	0.2%	0	0.0%	0	0	0	0	0	0	0	0	0	0
60 MPH	2,271	14.8%	13	0.2%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	167,326	20.9%	1,306	0.3%	114	0.1%	5	0.1%	0	0	0	0	5	0	0	1	0	1
By Traffic Control																																				
No Traffic Control	13,759	74.8%	4,571	60.7%	928	63.4%	28	65.1%	4	5	6	8	5	6	3	2	6	6	681,993	68.9%	292,945	57.9%	63,733	57.9%	2,935	60.0%	416	596	646	584	693	607	546	553	491	420
Signals	2,907	15.8%	2,121	28.2%	355	24.3%	8	18.6%	3	2	0	0	3	1	0	0	3	1	211,131	21.3%	151,608	29.9%	30,502	27.7%	1,339	27.4%	272	290	223	252	302	304	274	366	303	289
Stop Sign	1,214	6.6%	608	8.1%	151	10.3%	6	14.0%	0	1	1	1	3	1	1	0	0	1	67,279	6.8%	46,221	9.1%	12,527	11.4%	454	9.3%	71	80	96	106	101	83	63	84	69	73
Yield	82	0.4%	42	0.6%	7	0.5%	0	0.0%	0	0	0	0	0	0	0	0	0	0	10,043	1.0%	4,916	1.0%	1,041	0.9%	17	0.3%	0	2	9	4	2	1	1	0	2	0
Flashing Red	32	0.2%	15	0.2%	2	0.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	1,922	0.2%	1,183	0.2%	362	0.3%	6	0.1%	0	2	4	0	0	1	0	2	0	0
Flashing Amber	56	0.3%	33	0.4%	1	0.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	2,204	0.2%	1,404	0.3%	304	0.3%	6	0.1%	1	2	1	0	2	0	3	0	1	1
Officer/Flagger	63	0.3%	12	0.2%	2	0.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	2,510	0.3%	966	0.2%	181	0.2%	5	0.1%	0	0	3	0	2	0	0	0	0	0

2016-2020 Data
Wenatchee

Wenatchee

Fatal/Serious Injury Crashes Only

	All Roads		All Cities		Eastside Cities														All Roads		All Cities		Eastside Cities											
	2016-2020	%	2016-2020	%	2016-2020	%	2016-2020	%	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2016-2020	%	2016-2020	%	2016-2020	%	2016-2020	%	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
RR Signal	27	0.1%	12	0.2%	3	0.2%	0	0.0%	0	0	0	0	0	0	0	0	0	0	695	0.1%	451	0.1%	136	0.1%	3	0.1%	0	0	1	0	2	0	0	0	0	0
Other Traffic Control	229	1.2%	101	1.3%	14	1.0%	1	2.3%	0	1	0	0	0	0	0	0	0	0	10,186	1.0%	5,244	1.0%	1,004	0.9%	116	2.4%	33	28	30	24	1	0	1	12	25	28
Unknown	23	0.1%	16	0.2%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	1,773	0.2%	1,380	0.3%	198	0.2%	7	0.1%	0	6	0	1	0	0	2	4	2	2
By Roadway Type																																				
Two Way - Undivided	11,862	47.3%	4,575	44.2%	960	48.2%	27	45.0%	4	6	2	7	8	6	2	0	7	6	432,449	38.7%	251,200	46.0%	59,632	50.4%	2,265	43.4%	356	510	401	435	563	491	458	595	553	586
Two Way - Divided, no Barrier	6,910	27.6%	3,461	33.4%	521	26.2%	17	28.3%	4	6	4	0	3	2	0	4	0	0	277,460	24.8%	171,620	31.4%	30,161	25.5%	1,679	32.1%	282	312	404	336	345	245	227	205	42	8
One Way	624	2.5%	343	3.3%	126	6.3%	12	20.0%	0	2	2	2	6	0	4	0	4	0	48,407	4.3%	23,640	4.3%	8,446	7.1%	705	13.5%	84	157	155	165	144	173	166	126	182	119
Two Way - Divided, with Barrier	3,948	15.8%	1,093	10.6%	212	10.7%	2	3.3%	0	0	0	2	0	2	0	0	0	0	266,625	23.9%	52,773	9.7%	9,747	8.2%	319	6.1%	48	65	57	67	82	81	59	62	26	17
Center-Two Way Left Turn Lane	638	2.5%	482	4.7%	95	4.8%	2	3.3%	2	0	0	0	0	0	0	0	0	3	30,241	2.7%	23,332	4.3%	5,673	4.8%	102	2.0%	9	16	35	15	27	41	25	36	102	89
Driveway	146	0.6%	108	1.0%	24	1.2%	0	0.0%	0	0	0	0	0	0	0	0	0	2	8,568	0.8%	6,901	1.3%	1,353	1.1%	59	1.1%	12	13	10	4	20	8	14	40	60	64
Alley	38	0.2%	36	0.3%	10	0.5%	0	0.0%	0	0	0	0	0	0	0	0	0	0	2,273	0.2%	2,178	0.4%	676	0.6%	18	0.3%	4	4	2	2	6	12	6	6	4	2
Interchange Ramp	448	1.8%	62	0.6%	4	0.2%	0	0.0%	0	0	0	0	0	0	0	0	0	0	33,587	3.0%	4,195	0.8%	507	0.4%	9	0.2%	0	0	0	0	9	0	0	0	0	2
Reversible Road	49	0.2%	23	0.2%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	1,634	0.1%	738	0.1%	83	0.1%	2	0.0%	0	0	0	2	0	2	0	0	0	0
Other	390	1.6%	162	1.6%	38	1.9%	0	0.0%	0	0	0	0	0	2	0	0	0	0	15,067	1.3%	9,083	1.7%	2,057	1.7%	64	1.2%	12	10	18	12	12	2	5	2	4	4
Unknown	10	0.0%	6	0.1%	0	0.0%	0	0.0%	0	0	0	0	0	2	0	0	0	0	1,083	0.1%	785	0.1%	68	0.1%	1	0.0%	0	0	1	0	0	2	2	17	4	0
By Roadway Surface Type																																				
Blacktop	15,849	86.0%	6,589	87.3%	1,409	96.2%	43	97.7%	6	9	7	9	12	7	4	2	9	8	826,233	83.3%	447,647	88.1%	105,904	96.2%	4,737	96.5%	773	983	958	952	1,071	940	819	925	786	690
Gravel	159	0.9%	20	0.3%	7	0.5%	1	2.3%	1	0	0	0	0	0	0	0	0	0	3,508	0.4%	1,091	0.2%	436	0.4%	7	0.1%	2	1	2	0	2	1	1	2	0	1
Concrete	2,080	11.3%	883	11.7%	37	2.5%	0	0.0%	0	0	0	0	0	0	0	0	0	0	152,742	15.4%	55,279	10.9%	3,015	2.7%	141	2.9%	17	27	49	15	33	50	65	87	97	114
Dirt	98	0.5%	11	0.1%	4	0.3%	0	0.0%	0	0	0	0	0	0	0	0	0	0	1,391	0.1%	440	0.1%	181	0.2%	6	0.1%	0	3	0	1	2	1	1	1	1	0
Brick or Wood Block	10	0.1%	4	0.1%	2	0.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	979	0.1%	622	0.1%	132	0.1%	5	0.1%	0	0	2	1	2	1	1	2	0	0
Other	208	1.1%	27	0.4%	6	0.4%	0	0.0%	0	0	0	0	0	1	0	0	0	0	5,050	0.5%	1,151	0.2%	367	0.3%	12	0.2%	1	0	8	2	1	4	0	1	4	3
Unknown	18	0.1%	16	0.2%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	2,180	0.2%	1,767	0.3%	45	0.0%	0	0.0%	0	0	0	0	0	0	3	3	5	5
By Contributing Circumstance (Ped Only)																																				
Inattention / Distraction	276	20.3%	189	20.7%	39	22.5%	2	66.7%	0	0	1	0	1	3	0	0	0	0	1,113	26.3%	851	26.5%	170	28.1%	6	28.6%	0	0	2	2	2	5	1	0	0	0
Failing to Yield	400	29.4%	275	30.2%	64	37.0%	1	33.3%	0	0	0	0	1	1	0	0	2	0	1,096	25.9%	835	26.0%	196	32.3%	11	52.4%	2	0	4	3	2	3	1	2	2	1
Exceeding Safe / Stated Speed	4	0.3%	2	0.2%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	13	0.3%	10	0.3%	3	0.5%	1	4.8%	0	0	0	0	1	0	0	0	0	0
Under Influence of Alcohol / Drugs	155	11.4%	83	9.1%	22	12.7%	0	0.0%	0	0	0	0	0	0	0	0	0	0	422	10.0%	282	8.8%	63	10.4%	0	0.0%	0	0	0	0	0	0	0	0	0	1
Failure to Use Crosswalk	177	13.0%	148	16.2%	19	11.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	550	13.0%	459	14.3%	49	8.1%	0	0.0%	0	0	0	0	0	0	1	1	0	0
Disregard Stop Sign	3	0.2%	3	0.3%	1	0.6%	0	0.0%	0	0	0	0	0	0	0	0	0	0	18	0.4%	15	0.5%	3	0.5%	0	0.0%	0	0	0	0	0	0	1	0	0	0
Other	287	21.1%	169	18.5%	24	13.9%	0	0.0%	0	0	0	0	0	0	0	0	0	0	795	18.8%	582	18.1%	95	15.7%	3	14.3%	0	0	0	2	1	2	0	0	1	0
By Facility Used (Ped Only)																																				
Roadway	1,088	46.6%	685	40.5%	123	38.7%	5	50.0%	1	1	1	0	2	1	0	0	2	0	3,245	29.8%	2,350	26.4%	451	28.2%	21	30.4%	3	2	7	6	3	4	1	1	2	1
Marked Crosswalk	718	30.8%	618	36.5%	103	32.4%	3	30.0%	2	1	0	0	0	2	0	0	1	1	4,946	45.5%	4,355	49.0%	690	43.1%	33	47.8%	7	9	4	9	4	3	4	5	4	6
Sidewalk	114	4.9%	105	6.2%	18	5.7%	1	10.0%	0	1	0	0	0	0	0	0	0	0	753	6.9%	695	7.8%	123	7.7%	7	10.1%	2	1	2	0	2	0	0	0	0	0
Unmarked Crosswalk	142	6.1%	118	7.0%	32	10.1%	1	10.0%	0	0	0	1	0	0	0	0	0	1	879	8.1%	776	8.7%	197	12.3%	4	5.8%	0	2	0	1	1	1	2	0	1	2
Walkway	10	0.4%	8	0.5%	2	0.6%	0	0.0%	0	0	0	0	0	0	0	0	0	0	70	0.6%	62	0.7%	8	0.5%	1	1.4%	1	0	0	0	0	0	0	0	1	0
Designated Bike Route	4	0.2%	2	0.1%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	30	0.3%	25	0.3%	5	0.3%	1	1.4%	0	0	0	0	1	0	0	0	0	0
Shoulder	120	5.1%	44	2.6%	8	2.5%	0	0.0%	0	0	0	0	0	0	0	1	0	0	418	3.8%	204	2.3%	31	1.9%	0	0.0%	0	0	0	0	0	1	0	1	1	0
Other	138	5.9%	111	6.6%	32	10.1%	0	0.0%	0	0	0	0	0	1	0	0	0	0	537	4.9%	420	4.7%	97	6.1%	2	2.9%	0	0	1	0	1	3	1	0	0	0
By Contributing Circumstance (Bike Only)																																				
Failing to Yield	114	27.3%	81	26.5%	20	39.2%	2	100.0%	1	0	1	0	0	0	0	0	1	0	807	25.8%	647	25.5%	155	30.4%	5	27.8%	2	0	2	0	1	0	3	4	2	1
Inattention / Distraction	95	22.7%	71	23.2%	6	11.8%	0	0.0%	0	0	0	0	0	0	0	0	0	0	822	26.3%	661	26.0%	136	26.7%	4	22.2%	0	0	2	1	1	0	1	1	0	0
Disregard Stop Sign	21	5.0%	14	4.6%	4	7.8%	0	0.0%	0	0	0	0	0	0	0	0	0	0	150	4.8%	126	5.0%	32	6.3%	4	22.2%	0	1	0	0	3	0	0	0	0	0
On Wrong Side of Road	13	3.1%	8	2.6%	1	2.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	171	5.5%	126	5.0%	28	5.5%	1	5.6%	0	0	0	0	1	0	0	0	0	0
Disregard Signal	29	6.9%	27	8.8%	1	2.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	152	4.9%	134	5.3%	20	3.9%	1	5.6%	0	0	1	0	0	0	0	0	0	1
Exceeding Safe / Stated Speed	24	5.7%	17	5.6%	0	0.0%	0	0.0%	0	0	0	0	0	1	0	0	0	0	158	5.1%	133	5.2%	13	2.5%	1	5.6%	0	0	0	0	1	1	0	0	0	0
Headlight Violation	1	0.2%	1	0.3%	1	2.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	41	1.3%	37	1.5%	11	2.2%	1	5.6%	0	0	1	0	0	0	0	0	0	0
Under Influence of Alcohol / Drugs	18	4.3%	10	3.3%	3	5.9%	0	0.0%	0	0	0	0	0	0	0	0	1	0	66	2.1%	48	1.9%	17	3.3%	0	0.0%	0	0	0	0	0	0	1	0	1	0
Other	50	12.0%	37	12.1%	10	19.6%	0	0.0%	0	0	0	0	0	0	0	0	0	0	422	13.5%	355	14.0%	52	10.2%	1	5.6%	0	0	1	0	0	0	0	1	0	0
By Facility Used (Bike Only)																																				
Roadway	341	50.7%	260	50.3%	45	52.3%	2	100.0%	1	0	1	0	0	1	0	0	1	0	2,366	38.9%	1,968	38.8%	332	40.2%	11	32.4%	2	2	4	0	3	1	2	7	2	4
Marked Crosswalk	79	11.8%	58	11.2%	13	15.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	1,048	17.2%	866	17.1%	152	18.4%	7	20.6%	1	1	4	0	1	3	1	2	1	1
Sidewalk	53	7.9%	47	9.1%	13	15.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	830	13.6%	731	14.4%	170	20.6%	6	17.6%	1	2	1	1	1	0	1	0	1	0
Designated Bike Route	104	15.5%	95	18.4%	5	5.8%	0	0.0%	0	0	0	0	0	0	0	0	0	0	1,024	16.8%	936	18.5%	39	4.7%	4	11.8%	0	1	0	1	2	0	0	0	0	0
Shoulder	63	9.4%	29	5.6%	7	8.1%	0	0.0%	0	0	0	0	0	0	0	0	0	0	416	6.8%	234	4.6%	41	5.0%	2	5.9%	0	1	1	0	0	0	0	0	0	0
Unmarked Crosswalk	17	2.5%	16	3.1%	1	1.2%	0	0.0%	0	0	0	0	0	0	0	0	0	0	197	3.2%	170	3.4%	54	6.5%	1	2.9%	0	0	0	0	1	0	1	1	0	1
Walkway	1	0.1%	1	0.2%	0	0.0%	0	0.0%	0	0	0	0	0	0	0	0	0	0	33	0.5%	30	0.6%	5	0.6%	1	2.9%	0	0	1	0	0	0	0	0	0	0
Other	14	2.1%	11	2.1%	2	2.3%	0	0.0%	0	0	0	0	0	0	0	0	0	0	167	2.7%	138	2.7%	32	3.9%	2	5.9%	0	0	1	1	0	0	1	0	0	0

Under 23 U.S. Code 148 and 23 U.S. Code 409, safety data, reports, surveys, schedules, list complied or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such report,

Appendix B

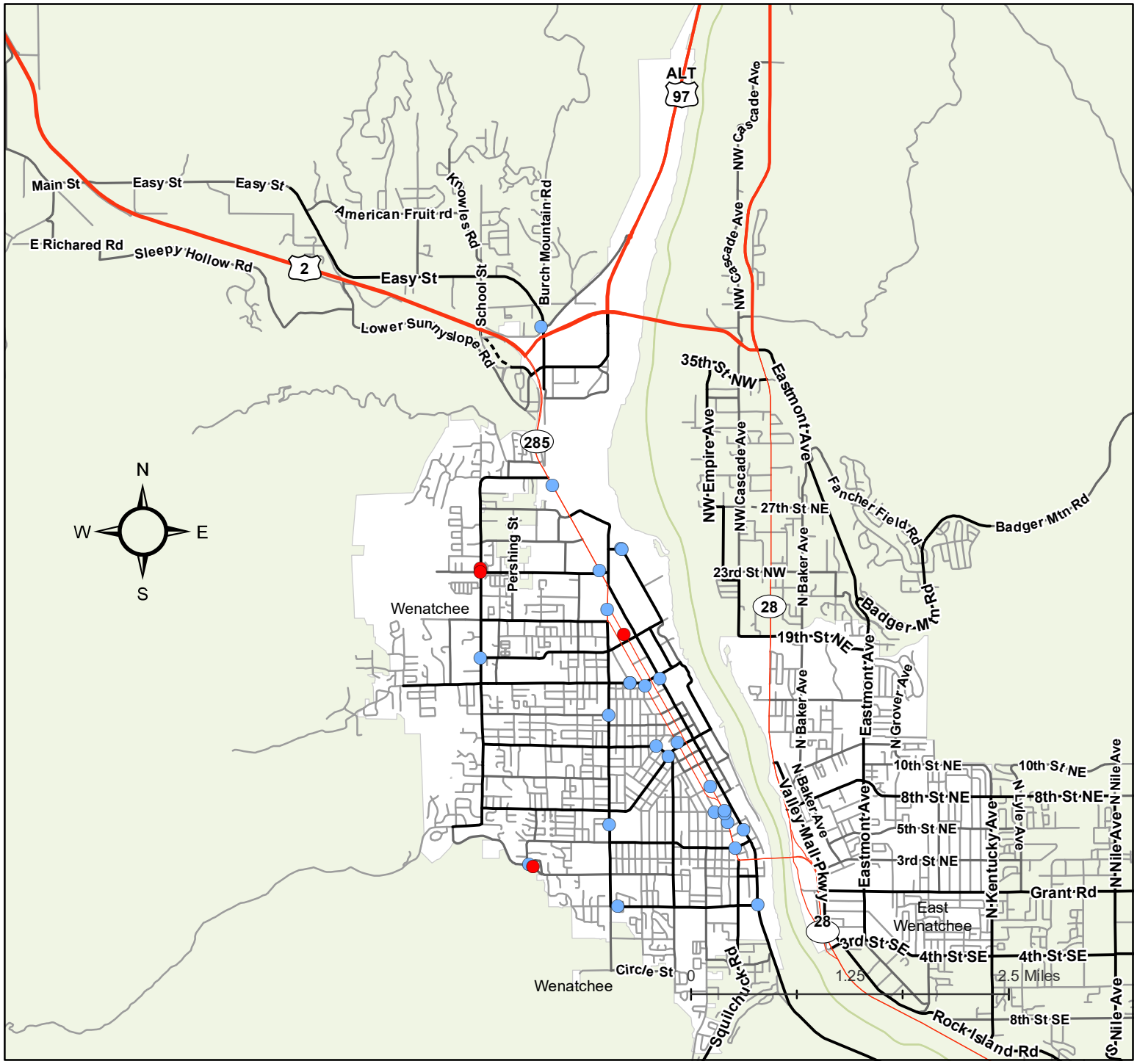
WSDOT COLLISION MAP

2016-2020

2016 - 2020 Fatal and Suspected Serious Injury Crashes

City of Wenatchee

Under 23 U.S. Code § 148 and 23 U.S. Code § 409, safety data, reports, surveys, schedules, lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



Washington State Department of Transportation

WSDOT - Transportation Data, GIS and Modeling Office
Crash Data and Reporting Branch – KM

Legend

- Fatal Injury (4)
- Suspected Serious Injury (26)

- County Line
- County
- City
- Tribal Land
- U.S. Interstate
- U.S. Highway
- State Route
- Local Roads

Appendix C

PRIORITY LEVEL 1

Risk Factor Evaluation

City of Wenatchee

Priority Level 1 - Hit Pedestrian at Intersection

Risk Factors Assessment

Location	Serious Injury/ Fatal crash?	30+ MPH?	Intersection Related?	Stop Controlled?	X-walk?	Lack of Pedestrian Signs	X-ing distance > 35ft?	Driveway presence w/in 100ft?	On-street parking?	Commercial Land Use?	Arterial?	Pedestrian generator?
5th St at N Emerson Ave*	Y	Y	Y	Y	Y		Y	Y		Y	Y	Y
At Wenatchee High School driveway			Y	Y	Y	Y		Y				Y
Cashmere St at Ferry St		Y	Y	Y	Y	Y	Y	Y	Y			
Cashmere St at Lewis St			Y	Y		Y		Y	Y			
Chelan Ave at 3rd St		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Chelan Ave at 5th St*		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
Chelan Ave at 9th St*		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
Chelan Ave at Orondo Ave		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
Chelan Ave at Yakima St*		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
Cherry St at S Miller St*			Y		Y	Y	Y	Y			Y	Y
Easy St at Ohme Garden Rd		Y	Y	Y		Y		Y		Y	Y	Y
Elliott Ave S at John St			Y	Y		Y	Y	Y	Y			Y
Euclid Ave at Gunn Rd		Y	Y	Y		Y		Y			Y	Y
Helper Dr at Maple St		Y	Y	Y		Y		Y				Y
Maple St at Princeton Ave N		Y	Y	Y	Y		Y	Y			Y	Y
Marr St at S Chelan Ave			Y	Y		Y	Y	Y	Y			Y
Methow St at Lewis St			Y	Y		Y		Y	Y			
Miller St at 3rd St*		Y	Y	Y	Y		Y	Y			Y	Y
Miller St at Bryan Ter		Y	Y	Y	Y	Y	Y	Y				Y
Miller St at Orchard Ave	Y		Y	Y	Y		y	Y			Y	Y
Mission St at 2nd St		Y	Y		Y	Y	Y	Y	Y	Y	Y	
Mission St at 9th St*		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
Mission St at Bridge St		Y	Y	Y	Y	Y		Y		Y	Y	
Mission St at Crawford Ave			Y		Y	Y	Y	Y			Y	Y
Mission St at Ferry St*		Y	Y		Y	Y	Y	Y		Y	Y	Y
Mission St at Lewis St			Y	Y	Y	Y	Y	Y		Y		Y
Mission St at Orondo Ave		Y	Y		Y		Y	Y	Y	Y	Y	
Monroe St at Russell St			Y	Y		Y		Y				Y
Peachey St at Cascade St			Y	Y		Y		Y	Y			Y
Peachey St at S Chelan Ave	Y		Y	Y	Y	Y	Y	Y	Y			Y
Poplar Ave at Concord Pl			Y	Y		Y	Y	Y	Y			Y
Russell St at Kittitas St			Y	Y		Y	Y	Y			Y	
Spokane St at Highland Dr			Y	Y		Y		Y	Y			
Spokane St at S Wenatchee Ave		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
Washington St at King St	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wenatchee Ave at 1st St			Y		Y	Y	Y	Y	Y	Y	Y	Y
Wenatchee Ave at 9th St*		Y	Y		Y	Y	Y	Y		Y	Y	Y
Wenatchee Ave at Crawford Ave	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

City of Wenatchee

Priority Level 1 - Hit Pedestrian at Intersection

Risk Factors Assessment

Location	Serious Injury/ Fatal crash?	30+ MPH?	Intersection Related?	Stop Controlled?	X-walk?	Lack of Pedestrian Signs	X-ing distance > 35ft?	Driveway presence w/in 100ft?	On-street parking?	Commercial Land Use?	Arterial?	Pedestrian generator?
Wenatchee Ave at Ferry St		Y	Y		Y	Y	Y	Y		Y	Y	Y
Wenatchee Ave at Maiden Ln		Y	Y		Y	Y	Y	Y		Y	Y	Y
Wenatchee Ave at Maple St*		Y	Y		Y	Y	Y	Y		Y	Y	Y
Wenatchee Ave at Marr St		Y	Y	Y	Y	Y	Y	Y			Y	Y
Wenatchee Ave at McKittrick St		Y	Y	Y	Y	Y		Y		Y	Y	
Wenatchee Ave at N Miller St		Y	Y			Y		Y		Y	Y	Y
Wenatchee Ave at Oronda Ave			Y		Y	Y	Y	Y	Y	Y	Y	Y
Wenatchee Ave at Thurston			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wenatchee Ave at Yakima			Y		Y	Y	Y	Y	Y	Y		Y
Western Ave at Springwater St		Y	Y	Y		Y	Y	Y	Y		Y	Y

* Multiple Priority Level 1 Crashes at this location

Appendix D

PRIORITY LEVEL 2

Risk Factor Evaluation

City of Wenatchee

Priority Level 2 - Hit Pedestrian at Driveway

Risk Factors Assessment

Location	Primary Collision	Serious Injury/ Fatal crash?	30+ MPH?	Commercial Land Use?	Arterial?	At Driveway	Left or right turn lanes?	>3 Lanes?	TWLTL?	On-street parking?	Pedestrian generator present?
5th St (136 ft E of N Miller St)	Pedalcyclist strikes moving vehicle turning right		Y	Y	Y	Y	Y				Y
Chelan Ave (just North of Spokane St)	Vehicle entering traffic (EB) strikes pedalcyclist		Y	Y	Y	Y				Y	
Helper Dr at Maple St	Vehicle turning right (EB) hits pedestrian		Y			Y			Y		Y
Highland Dr (0.09 miles S of Peachey St)	Vehicle going straight (NB) hits pedalcyclist					Y				Y	
Lars Ln, 376 ft SE of Shady Ln	Vehicle backing hits pedestrian					Y				Y	
Miller St (at Taco Bell North entrance)	Vehicle turning right (SB) hits Pedalcyclist		Y	Y	Y	Y	Y	Y	Y		
Miller St at 4th St	Vehicle turning right (SB) hits Pedalcyclist		Y		Y	Y	Y		Y		Y
Miller St, 309 ft S of 7th St	Vehicle hits pedestrian (SB) - all other actions		Y	Y	Y	Y		Y	Y		Y
Miller St, at Albertson's driveway*	Vehicle turning left (SB) hits pedestrian		Y	Y	Y	Y	Y	Y			Y
Mission St (near McDonalds)	Pedalcyclist strikes moving vehicle turning left (WB)		Y	Y	Y	Y				Y	
Olympus Dr, 184 ft S of Rainier St	Vehicle backing hits pedestrian					Y				Y	
Wenatchee Ave (near Washington Trust Bank)	Pedalcyclist strikes moving vehicle entering traffic (EB)		Y	Y	Y	Y	Y	Y	Y		
Wenatchee Ave (near Wendy's/Starbucks)*	Vehicle entering traffic (WB) strikes pedalcyclist	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wenatchee Ave, 0.15 miles SE of US-2 Bus W	Vehicle turning right (SB) hits pedestrian		Y	Y	Y	Y		Y		Y	Y
Wenatchee Ave, 111 ft NW of 7th St	Vehicle going straight (WB) hits pedestrian		Y	Y	Y	Y		Y	Y		Y
Wenatchee Ave, 270 ft NW of E 9th St	Vehicle turning right (NB) hits pedestrian		Y	Y	Y	Y		Y	Y		Y
Wenatchee Ave, near Circle K	Vehicle turning right (NB) hits pedestrian	Y	Y	Y	Y	Y		Y			Y

* Multiple Priority Level 2 - Hit Pedestrian Crashes at this location

City of Wenatchee

Priority Level 2 - Hit Fixed Object / Sideswipe

Risk Factors Assessment

Location	Primary Collision	Serious Injury/ Fatal crash?	30+ MPH?	Commercial Land Use?	Arterial?	Roadway on Curve	Fixed Objects Adjacent to Roadway?	Truck Route
Wenatchee Ave, 200 ft NW of 4th Street	Vehicle heading NB hit fixed object (street light pole or base)	Yes		Y	Y		Y	Y
Mission St, near Subway	Vehicle heading NB, Person fell from vehicle	Yes	Y	Y	Y		Y	Y
Mission St at Miller St	Same direction (NB) - one stopped - sideswipe	Yes	Y	Y	Y	Y	Y	Y
Chelan Ave, near Memorial Park	From same direction (SB) - both going straight - both moving - sideswipe	Yes	Y	Y	Y		Y	Y
Melody Ln., 75 ft W of Easy St	Vehicle Overturned (turning too fast- SB)	Yes		Y		Y		
Western Ave , 155 ft north of Maple St	Vehicle heading NB -Hit fixed object (utility pole, then fence)	Yes	Y		Y		Y	Y
Pearview Cir at Crawford Ave	Motorcycle (NB) hit parked vehicle	Yes						
Skyline Dr, 0.13 miles NW of Red Apple Rd*	From opposite direction (EB) - both going straight - sideswipe - then guardrial	Yes				Y	Y	
Walla Walla Ave, 0.1 miles E of N Miller St*	Motorcycle turning (NB) too fast hit curb	Yes		Y	Y	Y		Y

* Multiple Priority Level 2 - Hit Fixed Object / Sideswipe at this location

City of Wenatchee

Priority Level 2 - Rear End

Risk Factors Assessment

Location	Primary Collision	Serious Injury/ Fatal crash?	30+ MPH?	Pedestrian crosswalk?	Arterial?	Lack of Pedstrian Signs	X-ing distance > 50ft?	Pedestrian generator present?
Mission St at Peachey St*	Both going straight (NB) - both moving - rear end	Y	Y	Y	Y	Y	Y	Yes
Western Ave at 9th St	From same direction (SB) - both going straight - one stopped - rear end	Y	Y	Y	Y		Y	Yes
Miller at Montana St	From same direction (NB) - both going straight - one stopped - rear end	Y	Y	Y	Y	Y	Y	Yes

Appendix E

Ninth Street Corridor Analysis

PERTEET

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CORRIDOR STUDY

9th Street

Submitted to
City of Wenatchee

October 2020

perteet.com

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EXECUTIVE SUMMARY

9th Street is a minor arterial in Wenatchee that terminates at N Western Avenue to the west and Walla Walla Avenue to the east. In between, 9th Street abuts Wenatchee Valley College and the Confluence Health Wenatchee Valley Hospital campus.

The City of Wenatchee (City) hired Perteet Inc. (Perteet) to evaluate the existing corridor configuration and performance of 9th Street between N Miller Street and the BNSF railroad tracks. The City's goal for this corridor study was to evaluate roadway cross section options to enhance both pedestrian and bicyclist safety and provide an efficient corridor for local business access and freight movements.

In general, 9th Street in the study area is a four-lane roadway with two travel lanes per direction. The total curb-to-curb roadway width varies throughout the corridor. West of N Mission Street, the roadway width is 44 feet, with all travel lanes widths at 11 feet. Between N Mission Street and N Wenatchee Avenue, the total width is 40 feet with 10-foot wide travel lanes. East of N Wenatchee Avenue, the roadway width is 46 feet with 11-foot wide inside lanes and 12-foot wide outside lanes. There are no exclusive left-turn lanes in the corridor; left-turn movements are made from shared lanes with through traffic at all intersections within the study limits.

Though all four existing signalized intersections perform at level of service A or B, there are crash patterns that could be improved by revisions to the corridor cross section and/or signalization.

We evaluated four different alternative configurations for the 9th Street corridor within our study limits:

A. Three-Lane, Permissive Left-Turn Phasing: Reduce the number of travel lanes from four to three, with the center lane operating as a left-turn lane at intersections and a two-way left-turn lane (TWLTL) at select segment locations. Maintain existing curb lines and sidewalks. Use available pavement from the vehicle lane reduction to install directional bike lanes on either side of 9th Street. Maintain permissive left-turn phasing for the 9th Street left-turn movements.
B. Three-Lane, Protected-Permissive Left-Turn Phasing: Same lane configuration as Alternative A with protected-permissive left-turn phasing instead of permissive left-turn phasing for 9th Street left-turn movements.
C. Four-Lane, Protected-Permissive Left-Turn Phasing: Maintain existing lane configurations in the corridor. Maintain existing curb lines and sidewalks. Modify signal phasing to provide protected-permissive left-turn phasing for the 9th Street left-turn movements at N Chelan Avenue and at N Miller Street (other locations must have permissive phasing to avoid a left-turn trap[1]).
D. Four-Lane, Split Phasing: Same lane configuration as Alternative C with split phasing for the eastbound and westbound 9th Street approaches.

Our Preferred Alternative combines elements of Alternative A and B through the corridor. This combination will result in a consistent roadway cross-section through the study limits, with varying left-turn treatments at intersections:

- Protected-permissive left-turn phasing for 9th Street traffic at N Miller Street and at N Wenatchee Avenue and

[1] A left-turn trap (or "yellow trap") occurs when one left-turn lane with permissive turns changes to a yellow indication while the opposing through traffic remains under a green indication. In this situation, the left-turning vehicle may assume that the opposing direction has also received a yellow indication and proceed through the intersection, resulting in a crash.

- Permissive left-turn phasing for 9th Street traffic at N Chelan Avenue and at N Mission Street.

The Preferred Alternative necessitates signal head changes, mast-arm pole replacements, and revised intersection detection.

To fit within the existing curb lines, the Preferred Alternative will have varying lane widths through the corridor, which are shown in Table 1.

Table 1. Typical lane widths by corridor segment.

Segment	Through Lane Width (feet)	Center Lane Width (feet)	Bike Lane Width (feet)	Total Width (feet)
N Miller Street to N Emerson Avenue	11	11	5.5	44
N Emerson Avenue to N Chelan Avenue	11	11	5.5	44
N Chelan Avenue to N Mission Street	11	11	5.5	44
N Mission Street to N Wenatchee Avenue	10	10	5	40
N Wenatchee Avenue to BNSF Railroad	11	11	6.5	46

In addition to the features noted above, we recommend the following design elements to improve safety and corridor operations:

- Supplemental signal heads for westbound movements and retroreflective backplates on all vehicle signal heads for enhanced visibility
- Leading pedestrian intervals at N Chelan Avenue and at N Mission Street
- Bicycle and intersection signing

We developed a planning-level opinion of cost for the Preferred Alternative assuming the following major construction elements:

- Removal of existing channelization
- Installation of new channelization
- Installation of new signing
- Replacement of vehicle detection systems
- Replacement of select signal mast arms and poles
- Relocation of signal heads
- Installation of new left-turn signal heads at N Miller Street and at N Wenatchee Avenue, which necessitates mast-arm pole/foundation replacements. This work would trigger intersection-wide ADA pushbutton upgrades and sidewalk/curb ramp reconstruction.
- Installation of westbound supplemental signal heads on pole shafts

We estimate the completed Preferred Alternative with all recommended elements will cost $859,000 (2023 $). This cost includes construction, design and construction engineering, mobilization, traffic control, survey, environmental permits and mitigation, 20% contingency, and 5% annual inflation. Project costs could be reduced if proposed signal equipment has already been procured, construction occurs prior to 2023, or optional project elements are delayed or removed from the scope.

The intersection upgrades at 9th Street and N Miller Street and at 9th Street and N Wenatchee Avenue account for over half of the anticipated project cost. Removing the protected-permissive signal phases for westbound and eastbound turn movements at those intersections would reduce the overall project cost to $381,000 (2023 $).

The Preferred Alternative was presented to City of Wenatchee's Council in July 2020. Following that, the Preferred Alternative was shared with the public via an online outreach tool called a "storymap." This outreach effort illustrated the proposed project channelization and allowed for users to provide comments on the proposed elements. The outreach effort and all comments received are included in Appendix H.

1.0 INTRODUCTION

9th Street is a minor arterial in Wenatchee that terminates at N Western Avenue to the west and Walla Walla Avenue to the east. In between, 9th Street abuts Wenatchee Valley College and the Confluence Health Wenatchee Valley Hospital campus.

The City of Wenatchee (City) hired Perteet Inc. (Perteet) to evaluate the existing corridor configuration and performance of 9th Street between N Miller Street and the BNSF railroad tracks. The City's intent for this corridor study was to evaluate roadway cross section options to enhance both pedestrian and bicyclist safety and provide an efficient corridor for local business access and freight movements.

1.1 Study Area

The study limits span 9th Street between N Miller Street and the BNSF mainline railroad tracks, which are west of N Piere Street. See Figure 1-1. The total length of the study area is approximately 0.35 miles.

We evaluated traffic operations at the four existing traffic signals within the study area:

1. N Miller Street at 9th Street
2. N Chelan Avenue (SR 285 southbound couplet) at 9th Street
3. N Mission Street (SR 285 northbound couplet) at 9th Street
4. N Wenatchee Avenue at 9th Street

Additionally, we reviewed the unsignalized intersection of 9th Street at N Emerson Avenue as part of our safety analysis.

1.2 Existing Conditions

9th Street has one typical cross section through the study area, with deviations from that section at either end of the study area limits.

1.2.1 Existing Cross Section

In general, 9th Street is a four-lane roadway with two travel lanes per direction. The total curb-to-curb roadway width varies throughout the corridor. West of N Mission Street, the roadway width is 44 feet, with all travel lanes widths at 11 feet. Between N Mission Street and N Wenatchee Avenue, the total width is 40 feet with 10-foot wide travel lanes. East of N Wenatchee Avenue, the roadway width is 46 feet with 11-foot wide inside lanes and 12-foot wide outside lanes. This four-lane section begins approximately 175 feet west of N Chelan Avenue and ends approximately 170 feet east of N Wenatchee Avenue. Between these limits, 9th Street does not have any dedicated turn lanes at intersections or driveways; the four-lane section is preserved without any interruptions.

At the intersection with N Miller Street, 9th Street has exclusive right-turn, through, and left-turn approach lanes on the west side of the intersection. A large island separates the right-turn lane from the rest of the approach lanes. On the departure side of the intersection for eastbound traffic, there is a single travel lane, though pavement width for that lane measures at 20 feet. Westbound movements at the intersection are via two travel lanes, consistent with the other four-lane sections of the corridor, and those two lanes merge into one westbound lane west of N Miller Street. See Figure 1-2.

Figure 1-1. Study area.

Figure 1-2. Lane configurations on 9th Street at N Miller Street and at N Emerson Avenue.

Figure 1-2 also shows the intersection of 9th Street at N Emerson Avenue. At that location, 9th Street has two travel lanes in the westbound direction and the single wide eastbound lane. A parking lane on the south side of 9th Street starts approximately 60 feet east of N Emerson Avenue. The parking lane is marked for approximately 105 feet.

Between N Wenatchee Avenue and the BNSF railroad, 9th Street transitions from a four-lane to a two-lane roadway, as shown in Figure 1-3.

Figure 1-3. Lane configurations on 9th Street near BNSF railroad.

Throughout the study area there is continuous sidewalk on both sides of 9th Street, with the exception of the easternmost 280 feet on the south side of 9th Street near the railroad, where sidewalk is not in place today. There is also no existing pedestrian crossing on the south side of 9th Street across the BNSF railroad. See Figure 1-4. Note that the City is developing a design to revise the railroad crossing with pedestrian facilities.

Figure 1-4. BNSF railroad crossing (facing west).

There are no existing bike facilities along 9th Street in the study limits. The City's GIS notes a bike lane on N Emerson Avenue north and south of 9th Street. However, this bicycle facility is not channelized along N Emerson, though it is signed as a bike route.

1.2.2 Access and Additional Modal Networks

Figures 1-5 and 1-6 display the study area and the driveways, transit stops, and freight routes in the vicinity.

Transit through the area is operated by Link Transit, which runs northbound-southbound routes on N Miller Street, N Chelan Avenue, N Mission Street, and N Wenatchee Avenue across 9th Street. Additionally, Route 7 runs eastbound on 9th Street from the N Mission Street to the west study limits with one stop on the north side of 9th Street west of N Chelan Avenue.

We assume emergency vehicles use 9th Street and all of the cross streets within our study limits except for N Emerson Avenue as standard routes, as all of those roads are classified as arterials. Outside of an emergency situation on N Emerson Avenue, we assume this street is not used as a regular emergency route due to the parking on either side of the street and the two-lane configuration.

Figure 1-5. Driveway access points and bus stops.

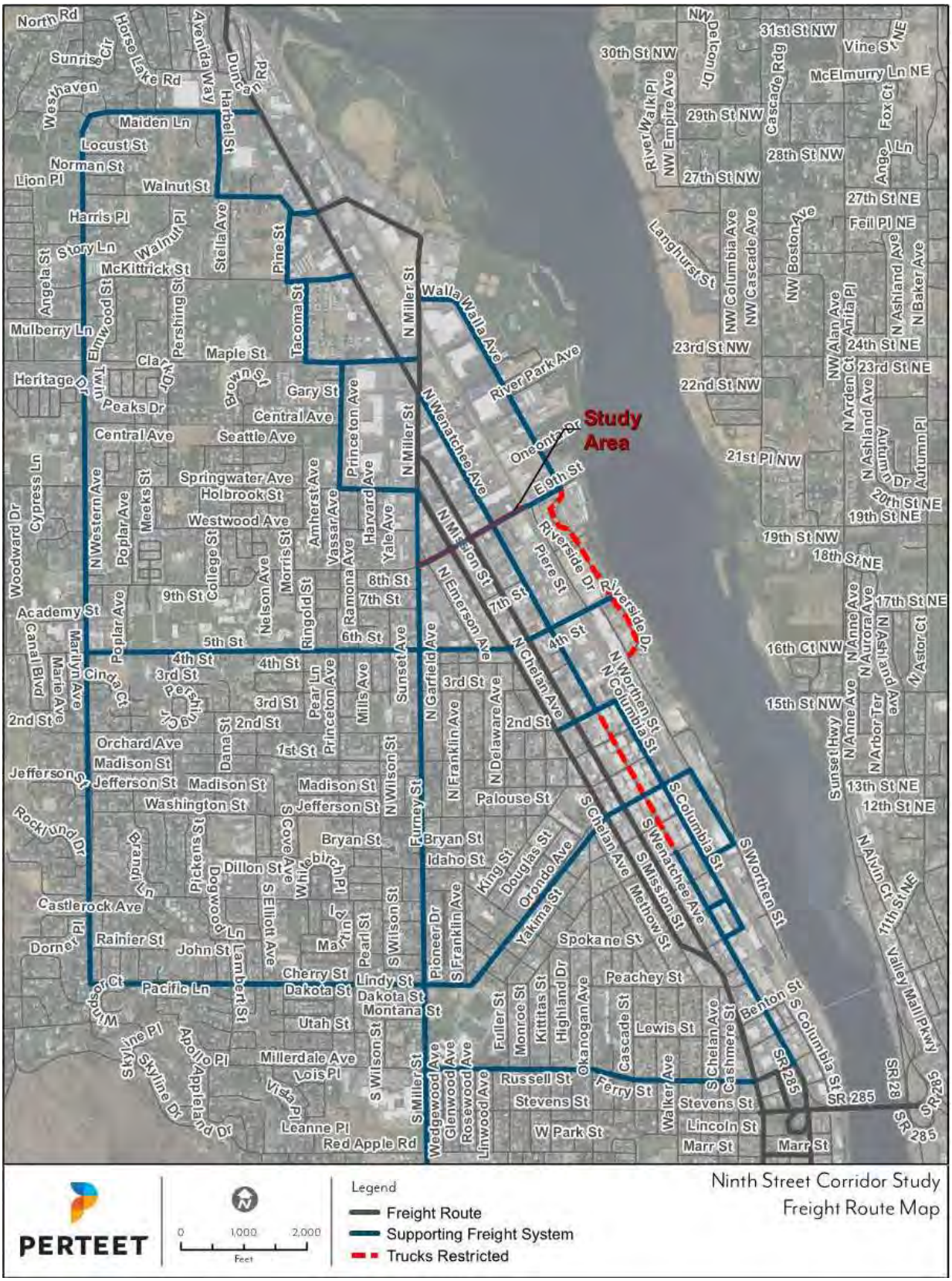


Figure 1-6. Freight route network.

1.2.3 Grades

Roadway grades within the project limits are shallow, nearly level. 9th Street throughout the study area slopes to the east at approximately 2% grade. The five cross streets all have grades less than 2%, generally sloping to the south across 9th Street.

1.2.4 Speed Data

We collected travel speed data on 9th Street between N Emerson Avenue and N Chelan Avenue on February 20, 2020. Weather conditions on February 20 were clear and dry. Key metrics from that data are shown in Table 1-1. The full data is provided in Appendix E.

Table 1-1. Existing speed data summary.

Metric	Eastbound (mph)	Westbound (mph)
Average travel speed	22	24
85th percentile travel speed	27	28
95th percentile travel speed	30	32

1.2.5 Traffic Signal Details

The existing four traffic signals have signal heads mounted on mast arms. 9th Street left-turn movements have permissive signal indications at all intersections within the study area. Cross-street left-turn movements have protected-permissive phasing at N Miller Street and protected phasing at N Wenatchee Avenue. Cross-street left-turn movements at N Chelan Avenue and at N Mission Street are permissive, as they are concurrent with pedestrian walk indications on either side.

The N Chelan Avenue and N Mission Street corridors are both coordinated signal systems through the Wenatchee core. 9th Street is the north boundary intersection for the coordinated systems.

The eastbound right-turn movement at N Chelan Avenue is signed with a "NO TURN ON RED" sign, which was installed in the summer of 2019.

Pedestrian pushbuttons are in place for all signalized crosswalks. Loop detection for vehicles is installed at the intersections of 9th Street at N Miller Street, at N Chelan Avenue, and at N Mission Street. Video detection is in place for all approaches at the intersection of 9th Street and N Wenatchee Avenue.

1.3 Study Alternatives

We evaluated four different alternative configurations for the 9th Street corridor within our study limits:

A. Three-Lane, Permissive Left-Turn Phasing: Reduce the number of travel lanes from four to three, with the center lane operating as a left-turn lane at intersections and a two-way left-turn lane (TWLTL) at select segment locations. Maintain existing curb lines and sidewalks. Use available pavement from the vehicle lane reduction to install directional bike lanes on either side of 9th Street. Maintain permissive left-turn phasing for the 9th Street left-turn movements.

B. Three-Lane, Protected-Permissive Left-Turn Phasing: Same lane configuration as Alternative A with protected-permissive left-turn phasing instead of permissive left-turn phasing for 9th Street left-turn movements.
C. Four-Lane, Protected-Permissive Left-Turn Phasing: Maintain existing lane configurations in the corridor. Maintain existing curb lines and sidewalks. Modify signal phasing to provide protected-permissive left-turn phasing for the 9th Street left-turn movements at N Chelan Avenue and at N Miller Street (other locations must have permissive phasing to avoid a left-turn trap[2]).
D. Four-Lane, Split Phasing: Same lane configuration as Alternative C with split phasing for the eastbound and westbound 9th Street approaches.

Under each alternative, the road retains the transition to two lanes prior to the BNSF railroad. Alternatives A and B include a revision to the lane configuration on 9th Street west of N Miller Street. Currently, the westbound outside departure lane merges into the inside through lane. Under Alternatives A and B, the outside lane merge is not required because of the single westbound through lane at the intersection.

1.4 Methodology Overview

Perteet analyzed multiple aspects of each alternative. The following paragraphs summarize the processes that we used for the study. The applicable chapters in this report expand on the analysis that we performed.

1.4.1 Safety Analysis

We reviewed crash records compiled by Washington State Department of Transportation (WSDOT) for the project area. For crashes along 9th Street at N Miller Street, N Emerson Street, and N Wenatchee Avenue, we worked with data spanning January 2015 through November 2019. At the intersections of 9th Street at N Chelan Avenue and at N Mission Street, we relied on data from January 2014 through December 2018.We used these records, in combination with traffic volumes data, to calculate historical crash rates for each of the five intersections within our project area in terms of crashes per million entering vehicles. That data helped us to identify which intersections had higher and lower performance records.

Additionally, we studied the datasets to understand and identify crash patterns at each site. Then, we evaluated potential countermeasures to reduce the risk of future crashes and researched data on the safety enhancements associated with our design alternatives.

1.4.2 Traffic Operations Analysis

We collected traffic volume data at our four signalized study intersections in February 2020 in the AM and PM peak hours. We used that data to model intersection operations, including control delays, levels of service, and queue lengths under existing conditions. We used the procedures in the *Highway Capacity Manual 6* for our analyses.

We then tested the traffic operations of our four design alternatives using the same model. This analysis revealed the operational effects of our candidate lane and signal phasing configurations for 2020 traffic demands. To

[2] A left-turn trap (or "yellow trap") occurs when one left-turn lane with permissive turns changes to a yellow indication while the opposing through traffic remains under a green indication. In this situation, the left-turning vehicle may assume that the opposing direction has also received a yellow indication and proceed through the intersection, resulting in a crash.

understand if future traffic growth would impact the recommendations, we evaluated operations in 2040 as well using an estimated traffic growth rate for the study area.

We also examined the bicycle and pedestrian facilities in the corridor using a concept called level of traffic stress, which provides insight into how comfortable the facilities are for different users.

1.4.3 Preferred-Alternative Concept Development

Using the safety and traffic operations analysis results, Perteet collaborated with City staff to develop the preferred concept detailed in this report. After that discussion, we produced a planning-level concept design for the Preferred Alternative. Our design layout is based off aerial imagery and GIS edge-of-pavement data; the study area was not surveyed for this concept-development effort.

Appendix A shows our preferred concept design.

1.4.4 Preferred-Alternative Opinion of Cost Development

We developed a planning-level opinion of cost for the Preferred Alternative based on the preliminary layout we produced.

The opinion of cost includes construction costs for roadway delineation, signing, and traffic signal modification as well as environmental, design engineering, and construction management costs. Perteet applied a 20% contingency the opinion of cost to reflect uncertainties in the scope of the projects. Additionally, we used a 5% annual inflation rate to reflect costs in a potential 2023 construction start year.

Appendix B shows our planning-level opinion of cost for the Preferred Alternative.

2.0 SAFETY ANALYSIS

Perteet reviewed crash records compiled by WSDOT for the project area spanning January 2015 through December 2019. We used these records, in combination with traffic volumes data, to calculate historical crash rates for each of the five intersections within our project area in terms of crashes per million entering vehicles. That data helped us to identify which intersections had higher and lower performance records.

Additionally, we studied the datasets to understand and identify crash patterns at each site. Then, we evaluated potential countermeasures to reduce the risk of future crashes and researched data on the safety enhancements associated with our design alternatives.

2.1 Existing Crash Data Review

Table 2-1 summarizes our evaluations of the existing intersection crash data in terms of number of overall crashes, number of injury and fatal crashes, overall crash rate (presented in terms of crashes per million entering vehicles at the intersection), and the predominant crash pattern at each location.

Table 2-1. Existing intersection crash data summary.

Intersection	Number of Crashes	Number of Injury Crashes / Total Injuries [1]	Overall Crash Rate [2]	Significant Crash-type Pattern
N Miller Street	25	8 / 12	0.63	Left-turn
N Emerson Avenue	9	2 / 3	1.41	Angle
N Chelan Avenue	19	9 / 18	0.49	Angle
N Mission Street	26	6 / 9	0.62	Angle
N Wenatchee Avenue	22	8 / 12	0.67	Angle

Notes: [1] Includes "suspected" and "possible" injury classifications.
[2] Per million entering vehicles.

Additional details on the data in Table 2-1 are provided in the following sections.

2.1.1 Intersection Number of Crashes

The number of crashes listed for each intersection includes all reported crash events at the intersection that were reported to police or sheriffs. All the crashes listed within the crash history and within the study area involved at least one vehicle; there were no pedestrian-bicycle or bicycle-bicycle crashes in the records.

Each record lists the maximum injury documented, ranging from no injury to fatality. There were no fatalities within the study limits during the time periods we studied.

2.1.2 Intersection Crash Rate

The crash rate provides the crash frequency at a location, normalized based on traffic volumes. To perform this calculation, we used the following data at each intersection:

- Number of crashes in the dataset
- Duration of the dataset (in years)

- Annual traffic volumes, all intersection approaches combined

We estimated annual traffic volumes by totaling the counted intersection PM peak hour volumes, dividing by 8.9%, and then multiplying by 365. We used an 8.9% conversion factor because the daily traffic counts that we collected had approximately 8.9% of the total daily traffic occur during the PM peak hour. (See Appendix E.)

As Table 2-1 shows, the maximum crash rate we found was at the intersection of N Emerson Avenue and 9th Street; this rate was more than double the next highest rate at N Wenatchee Avenue and 9th Street. The couplet intersections at N Chelan Avenue and at N Mission Street had the lowest crash rates of the study intersections.

2.1.3 Intersection Crash Patterns

The crash patterns noted in Table 2-1 stood out to us during our review as crash types that deserved further analysis (see Section 2.2). Additional crash types were observed at each intersection, however, they were not as frequent as the type that is noted in the table. See Appendix C for details on all crash types at each location.

N Miller Street and 9th Street

The intersection of N Miller Street and 9th Street had the highest number of left-turn collisions (12) in the corridor. The majority (8) of the left-turn collisions occurred between vehicles traveling in opposite directions on 9th Street with one turning left. 9th Street does not have a protected left-turn movement on either approach. The eastbound approach has a dedicated left-turn lane, while the westbound approach is a shared through and left-turn lane. Of the 12 collisions, "failure to grant right of way" was a contributing factor in 8 of them.

N Emerson Avenue and 9th Street

The intersection of N Emerson Avenue and 9th Street had 4 crashes in 2019 and had the fourth-most angle collisions (6) in the corridor over the duration of the dataset. All the angle collisions involved northbound vehicles on N Emerson Avenue crossing the intersection and the majority (5) collided with westbound vehicles on 9th Street. In order to cross the intersection, northbound vehicles must cross three lanes of travel. The main contributing circumstances in the angle collisions were inattention and failure to grant right of way.

N Chelan Avenue and 9th Street

The intersection of N Chelan Avenue and 9th Street had 7 crashes in both 2018 and 2019 and the third-most angle collisions (7) in the corridor. The majority (5) of the angle collisions had "disregard stop and go light" as a contributing circumstance. These crashes did not have an apparent direction or time-of-day pattern. We also found that there were 6 crash records involving drivers traveling in the same direction, either in a sideswipe or rear-end event, however, only two of these crashes involved vehicles on 9th Street.

There were two separate crashes between an eastbound right-turning vehicle and a pedestrian in the south crosswalk at the N Chelan Avenue and 9th Street intersection in 2019.

N Mission Street and 9th Street

The intersection of N Mission St and 9th Street had 8 crashes in 2019, 6 crashes in both 2016 and 2017, and the most angle collisions (17) in the corridor in the duration of the data set. The majority (12) of the angle collisions involved westbound vehicles being struck by northbound vehicles, though there was not a clear time-of-day pattern among these records. Also, a majority (8) of the angle collisions had "disregard stop and go light" as a contributing circumstance in addition to four records listing "inattention."

There were two separate crashes between a northbound left-turning vehicle and a pedestrian in the west crosswalk at the N Mission Street and 9th Street intersection between 2016 and 2017.

N Wenatchee Avenue and 9th Street

The intersection of N Wenatchee Avenue and 9th Street had the second-most angle collisions (8) in the corridor. The majority (7) of the angle collisions had either "disregard stop and go light" or "inattention" as a contributing circumstance, the other angle collision had "none" listed. The majority involved a westbound vehicle, and a majority of those were within a typical potential sunset timeframe.

There were two separate crashes involving a pedestrian at this intersection in 2019. One crash involved an eastbound left-turn movement with a pedestrian in the north crosswalk. The other involved a southbound right-turn movement and a pedestrian in the west crosswalk.

2.1.4 Segment Crashes

The majority of the crashes in the study limits occurred at intersections or were intersection-related. However, there were some segment crashes that we found. These crashes are summarized in Table 2-2.

Table 2-2. Existing segment crash data summary.

Segment [1]	Number of Crashes	Number of Injury Crashes / Total Injuries [2]	Significant Crash-type Pattern
N Miller Street to N Emerson Avenue	0	0 / 0	n/a
N Emerson Avenue to N Chelan Avenue	0	0 / 0	n/a
N Chelan Avenue to N Mission Street	4	0 / 0	n/a
N Mission Street to N Wenatchee Avenue	0	0 / 0	n/a
N Wenatchee Avenue to BNSF Railroad	2	0 / 0	n/a

Notes: [1] Based on records between January 2015 and December 2019.
[2] Includes "suspected" and "possible" injury classifications.

We did not identify any significant crash patterns on any of the segments. Most of the project segments did not have any crash records in the dataset we reviewed. Across all segments, there were zero injury or fatal crashes.

2.2 Countermeasures and Anticipated Safety Performance

2.2.1 Review of Countermeasures

We identified potential countermeasure strategies to address the crash patterns detailed in Table 2-1 and Section 2.1.3. These strategies are listed per intersection in Table 2-3.

See Section 4.2 for our recommended countermeasures with the Preferred Alternative concept.

Table 2-3. Potential countermeasures by location.

Intersection	Countermeasures
N Miller Street	• Channelize east intersection leg with a left-turn only lane. • Add left-turn signal phasing.
N Emerson Avenue	• Vegetation trimming/clearing to improve sight distance. • Parking zone removal/enforcement to improve sight distance. • Install a median on 9th Street at N Emerson Avenue to prohibit the northbound through movement and eastbound left-turn movement. (The intersection would operate as right-in/right-out.) (This action would have significant access implications.)
N Chelan Avenue	• Add supplemental signal heads to mitigate glare issues. (Most critical for westbound signal heads.) • Retroreflective backing to increase visibility of signal heads. • Leading pedestrian intervals or protected left-turn signalization.
N Mission Street	• Add supplemental signal heads to mitigate glare issues. (Most critical for westbound signal heads.) • Retroreflective backing to increase visibility of signal heads • Leading pedestrian intervals or protected left-turn signalization.
N Wenatchee Avenue	• Add supplemental signal heads to mitigate glare issues. (Most critical for westbound signal heads.) • Retroreflective backing to increase visibility of signal heads. • Leading pedestrian intervals or protected left-turn signalization.

2.2.2 Safety Performance for Design Alternatives

Each of the proposed roadway design alternatives would affect safety performance in the corridor. To generally quantify the impacts associated with each alternative, we used available crash reduction factor data available on the Crash Modification Factor Clearinghouse online. Data from that site is reputable and used by publications such as the *Highway Safety Manual*.

Crash reduction factors are expressed as a percentage of change from a baseline condition for a proposed roadway modification. Modifications can include geometric, control, traffic volume, or other types of changes. In this case, we reviewed crash reduction factors for the lane configurations and left-turn signal phasing components of our four corridor alternatives; we did not assess factors related to the countermeasures we documented in Table 2-3. Our crash reduction factor research is summarized in Table 2-4. The online clearinghouse did not contain any results for crash reduction factors associated with installing protected-permissive phasing on the inside lanes of a four-lane roadway section.

Table 2-4. Crash reduction factors for each corridor alternative.

Alternative	Crash Reduction Factor
A. Three-Lane, Permissive Left-Turn Phasing	37-47%
B. Three-Lane, Protected-Permissive Left-Turn Phasing	41-50%
C. Four-Lane, Protected-Permissive Left-Turn Phasing	*No studies available*
D. Four-Lane, Split Phasing	39-56%

3.0 TRAFFIC ANALYSIS

The goals for our traffic analysis were to understand how well the existing intersections on 9th Street operate and to quantify the impacts of the proposed alternatives on each study intersection in 2020 and 2040.

3.1 Performance Metrics

We focused on automobile, pedestrian, and bicycle metrics during our analysis. These are described below.

3.1.1 Automobile Metrics

Control Delay and Level of Service

Level of service (LOS) is the primary way to define operations for intersections. The computational methods for calculating LOS are included in the *Highway Capacity Manual* (HCM), published by the Transportation Research Board. The HCM defines LOS for various intersection types. For this corridor, we relied only on signalized intersection LOS.

Perteet evaluated the study intersections through a traffic model developed in Synchro 10, which applies HCM methodology for intersection operations. In the HCM, level of service is a function of average control delay experienced by vehicles at the intersection. Table 3-1 summarizes the LOS criteria at traffic signals.

Table 3-1. Signalized intersection level of service criteria.

Level of Service	Average Control Delay (seconds/vehicle)
A	≤ 10
B	10-20
C	20-35
D	35-55
E	55-80
F	> 80

The City of Wenatchee performance metric target for intersection level of service is established in Table 2-2 of the Chelan-Douglas Transportation Council (CDTC) Regional Transportation Plan, *Transportation 2040*, which is LOS E or better for urban corridors such as 9th Street.

Queue Length

The Synchro model we developed returns queue results per lane group on each approach. Queue lengths are also calculated based on the HCM procedures, and the outputs from the HCM are reported in terms of number of vehicles per lane. We translated this data using a conversion factor of 25 feet per average vehicle, which accounts for the separation between queued vehicles in addition to vehicle lengths.

We focused on 95th percentile queue lengths when we evaluated turn lane lengths. These are near-maximum queues that we anticipate will form based on the traffic volumes and signal phasing, and this is the standard metric for turn lane sizing.

Unless otherwise noted, the calculations in this section were done according to the HCM 6 methodology. Alternative C cannot be processed by the HCM 6 because it includes a protected left-turn phase from a shared

lane. For Alternative C control delay and LOS calculations, we used HCM 2000 to evaluate this alternative. For Alternative C queue calculations, we used Synchro's queue-length methodology, as the HCM 2000 reports from Synchro do not report queueing data.

3.1.2 Non-Motorized Metrics

We used the bicycle level of traffic stress (BLTS) evaluation to assess the performance of the bicycle facilities through our 9th Street study area. BLTS evaluate bicycle facilities and projects how comfortable each class of user would be on the facility. This scale divides bicycle facilities into four groups based on how comfortable a bicyclist would be using one. BLTS 1 facilities are the least stressful and range from low-speed, low-volume residential streets to separated shared-used trails, whereas BLTS 4 facilities, including multi-lane roadways with no bike lanes, are the most stressful. Other variables, such as adjacent vehicle travel speed, number of vehicle lanes, and bicycle lane width, all influence a facility's BLTS score.

The City does not have an adopted bicycle metric performance targets for 9th Street or other arterials at this time.

We used the pedestrian level of traffic stress (PLTS) evaluation to assess the performance of the pedestrian facilities through our 9th Street study area. This metric is a companion metric to BLTS, and many of the variables that impact one affect the other. Similar to BLTS, PLTS ranges from PLTS 1 to PLTS 4, with PLTS 1 facilities having the least-stressful experience and the PLTS 4 being most stressful.

The City does not have an adopted pedestrian metric performance targets for 9th Street or other arterials at this time.

3.2 Automobile Analysis

Perteet used the signal timing plans that the City provided for all four study intersections. We retained these signal timings in the existing conditions and Alternative A analyses. The remaining analysis required phasing changes for left-turn movements, so we modified the timing plans. At the intersection of 9th Street at N Miller Street and at N Wenatchee Avenue, because the cross streets are not in a coordinated signal, we added the left-turn phases for 9th Street to increase the intersection cycle lengths. However, at the coordinated signals at N Chelan Avenue and at N Mission Street, we doubled the signal cycle length and SR 285 split length to remain at a regular multiple with respect to the rest of the coordinated signals.

3.2.1 Control Delay and LOS

Tables 3-2 and 3-3 provide the control delay and LOS in tabular form for each study intersection.

Table 3-2. Study intersection delays (seconds per vehicle) and LOS in the AM peak hour.

Intersection	Existing		Alt. A		Alt. B		Alt. C		Alt. D	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
N Miller Street	11.8	B	12.9	B	17.2	B	11.8	B	21.6	C
N Chelan Avenue	12.4	B	13.3	B	25.8	C	29.2[1]	C	35.9	D
N Mission Street	8.9	A	8.9	A	15.7	B	19.4[1]	B	15.5	B
N Wenatchee Avenue	9.9	A	10.1	B	1.4	B	9.9	A	16.5	B

Notes: [1] Calculated using HCM 2000 methodology.

Table 3-3. Study intersection performance in the PM peak hour.

Intersection	Existing		Alt. A		Alt. B		Alt. C		Alt. D	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
N Miller Street	13.0	B	13.9	B	17.9	B	13.0	B	21.7	C
N Chelan Avenue	12.8	B	13.9	B	26.6	C	30.1[1]	C	42.1	D
N Mission Street	12.6	B	15.4	B	27.3	C	20.8[1]	C	27.8	C
N Wenatchee Avenue	12.3	B	13.5	B	17.6	B	12.3	B	24.2	C

Notes: [1] Calculated using HCM 2000 methodology.

All four intersections operate with LOS A or LOS B performance in the AM and PM peak hours under the current corridor configuration. Of the design alternatives, Alternative A most closely matches that performance, with only N Wenatchee Avenue degrading to LOS B in the AM peak hour. The remaining alternatives result in at least one LOS C or lower grade during either peak hour at certain intersections.

All alternatives satisfy the Wenatchee level of service requirements of LOS E or better. The Synchro outputs are provided in Appendix G.

3.2.2 Queues

Tables 3-4 and 3-5 present the queue lengths for each movement. Highlighted cells indicate which movements/alternatives would cause backups into adjacent intersections.

Table 3-4. Study intersection 95th percentile queue lengths (feet per lane) in the AM peak hour.

Intersection	Existing	Alt. A	Alt. B	Alt. C	Alt. D
N Miller Street					
Eastbound left	18	20	20	18	35
Eastbound through	65	63	85	65	143
Westbound left	55	13	13	55	118
Westbound through	48	100	140	48	103
N Chelan Avenue					
Eastbound through	95	180	430	104[1]	253
Westbound left	83	48	125	207[1]	350
Westbound through	83	110	238	207[1]	303
N Mission Street					
Eastbound left	55	18	38	42[1]	93
Eastbound through	45	63	120	42[1]	80
Westbound through	53	100	218	77[1]	88
N Wenatchee Avenue					
Eastbound left	18	5	8	18	50
Eastbound through	15	28	40	15	45
Westbound left	13	5	5	13	35
Westbound through	10	18	28	10	33

Notes: [1] Calculated using Synchro's 95th percentile queue calculation methodology.

Table 3-5. Study intersection 95th percentile queue lengths (feet per lane) in the PM peak hour.

Intersection	Existing	Alt. A	Alt. B	Alt. C	Alt. D
N Miller Street					
Eastbound left	10	13	13	10	23
Eastbound through	35	35	50	35	90
Westbound left	85	43	48	85	175
Westbound through	75	133	178	75	150
N Chelan Avenue					
Eastbound through	90	190	453	91[1]	240
Westbound left	103	55	120	172[1]	473
Westbound through	95	150	270	172[1]	393
N Mission Street					
Eastbound left	68	38	78	161[1]	205
Eastbound through	65	58	113	161[1]	180
Westbound through	143	260	568	208[1]	278
N Wenatchee Avenue					
Eastbound left	38	18	18	38	110
Eastbound through	33	63	100	33	95
Westbound left	50	28	30	50	140
Westbound through	45	80	120	45	123

Notes: [1] Calculated using Synchro's 95th percentile queue calculation methodology.

Note that the values under the four-lane roadway sections in Tables 3-4 and 3-5 show the inside-lane queue lengths under the "left" rows and the outside-lane queue lengths under the "through" rows where the intersection street supports two-way traffic.

Queue lengths are generally minimized in the existing conditions compared to the alternatives, since the existing configuration provides four travel lanes with shorter cycle lengths. Alternative A, which retains the existing cycle lengths, generally has shorter left-turn queue lengths than the existing condition because movements are isolated into dedicated turn lanes.

The shortest segment between intersections in the study limits is between N Miller Street and N Emerson Avenue. The distance between these intersections is approximately 70 feet. The westbound through-movement queue lengths at N Miller Street under all alternatives exceed the available storage space between intersections, so traffic will be required to keep queue east of N Emerson Avenue. Under Alternatives A and B, the 95th percentile westbound left-turn queue length fits within the available storage space without spilling into N Emerson Avenue.

The only other movements that have 95th percentile queue lengths that exceed available storage space between intersections are the westbound movements at N Chelan Avenue and at N Wenatchee Avenue. The distance between N Chelan Avenue and N Mission Street is approximately 260 feet. Under Alternative B, the PM peak hour westbound through movement here would have a 95th percentile queue length of 270 feet. And under Alternative D, the queue lengths in both westbound lanes would exceed 300 feet in the AM peak hour and 390 feet in the PM peak hour. The westbound through movement between N Mission Street and N Wenatchee Avenue exceeds available storage space only in the Alternative B PM peak hour analysis.

All other lanes and movements have sufficient queue storage space without reaching adjacent intersections based on 2020 traffic demands.

2040 queueing for Preferred Alternative

While Tables 3-2 and 3-3 depict that Alternative A and B (which combine to form the Preferred Alternative; see Chapter 4) generally provide sufficiently short queue lengths in 2020, the proposed action to reduce the number of through travel lanes could result in different operations under future traffic conditions. Based on other work within the region, we assume that traffic volumes will generally grow at a rate of 1.5% per year.

The analysis of 2040 conditions showed that signal timing modifications will be required with the Preferred Alternative to limit queuing on 9th Street between intersections. Table 3-6 presents the 2040 queues for the Preferred Alternative in each peak hour under two signal timing schemes: existing and modified. As with the prior tables, values exceeding available storage length are highlighted.

Table 3-6. Study intersection 95th percentile 2040 Preferred Alternative queue lengths (feet per lane).

Intersection	2040 AM Ex. Timings	2040 PM Ex. Timings	2040 AM Mod. Timings	2040 PM Mod. Timings
N Miller Street				
Eastbound left	33	20	33	20
Eastbound through	143	83	143	83
Westbound left	23	75	23	75
Westbound through	228	288	228	288
N Chelan Avenue				
Eastbound through	233	248	188	175
Westbound left	80	93	88	88
Westbound through	133	168	215	258
N Mission Street				
Eastbound left	20	63	13	55
Eastbound through	75	55	43	95
Westbound through	130	333	60	258
N Wenatchee Avenue				
Eastbound left	10	30	10	30
Eastbound through	43	108	43	108
Westbound left	8	50	8	50
Westbound through	28	138	28	138

The modified signal timing scheme removes the 9th Street intersections at N Chelan Avenue and at N Mission Street from coordination. This allows more time to go to the 9th Street movements, which limits queues on the short blocks. Level of service for each intersection still meets standards under this modified signal timing scheme. (Note that the removal of 9th Street from the N Chelan Avenue coordination is optional; queues will not exceed available storage space.)

This modified signal timing plan does not need to implemented immediately. We recommend the City monitor queueing and traffic volume growth over time and implement the timing change only when required.

3.3 Non-Motorized Analysis

Table 3-7 documents the BLTS and PLTS for each alternative for the overall corridor, with one excluded area: the currently missing sidewalk zone on the south side of 9th Street west of the BNSF railroad. Without sidewalk, this zone automatically rates as PLTS 4 under all scenarios. We assume that corridor users are familiar with this missing sidewalk segment and route their trips to the north side of 9th Street if it is necessary to cross the railroad tracks. As noted previously, a separate City project will install sidewalks in this missing zone.

Table 3-7. Non-motorized level of traffic stress corridor evaluations.

Alternative	BLTS	PLTS
Existing	3	4
A. Three-Lane, Permissive Left-Turn Phasing	2	2
B. Three-Lane, Protected-Permissive Left-Turn Phasing	2	2
C. Four-Lane, Protected-Permissive Left-Turn Phasing	3	4
D. Four-Lane, Split Phasing	3	4

The BLTS score was primarily based on the lane geometrics. The signal phasing alternatives do not impact the BLTS since it is not considered a factor in the development of the BLTS score. The primary difference, which resulted in the decrease of stress to a BLTS 2, was due to the presence of a bike lane in Alternatives A and B.

The existing PLTS was rated as a PLTS 4 due to the lack of any buffer space between moving traffic and pedestrians on a sidewalk. Once a bike lane or striped shoulder is added, the pedestrian stress level is reduced to PLTS 2. The phasing at the signals under the different alternatives does not impact these results. Though signal elements can have an impact on PTLS, in this case the section parameters dictate the rating.

4.0 ALTERNATIVE DESIGNS

4.1 Comparison of Alternatives

While the existing four-lane roadway configuration on 9th Street provides low control delays for traffic, the configuration introduces traffic stress on bicycles and pedestrians, which could be restricting access to the corridor for some users. Alternatives C and D, which retain the existing cross section, do not improve the corridor significantly for non-motorized users. While some safety improvements would likely result at the crosswalks along 9th Street, the experiences for pedestrians and bicyclists between intersections would be unchanged under these alternatives.

The installation of a bike lane, providing a space for bicycle trips and a buffer between pedestrians and vehicle traffic, would improve the level of traffic stress for both modes under Alternative A or B. Of the two, Alternative A would have more efficient traffic operations with shorter queues, though the anticipated safety benefits of Alternative B are slightly stronger. Still, many of the proposed countermeasures outlined in Table 2-3 are compatible with either alternative to improve safety beyond the lane configuration changes.

The alternatives do not vary in terms of pedestrian facilities, as all four options would retain the existing sidewalks.

4.2 Preferred Alternative

We developed our Preferred Alternative design concept based on the safety and traffic analysis results. We opted to combine elements of Alternative A and B throughout the project limits to provide a consistent roadway configuration with three travel lanes and direction bike lanes, with varying signal treatments at each intersection.

Specifically, the Preferred Alternative includes protected-permitted left-turn phasing at the intersections of 9th Street at N Miller Street and at N Wenatchee Avenue and permissive phasing at the couplet intersections of 9th Street at N Chelan Avenue and at N Mission Street.

We have identified other design elements to include within the project limits to address various elements of the analysis. These items are listed in Section 4.2.2.

4.2.1 Typical Configuration

The typical roadway configuration for the Preferred Alternative has one travel lane per direction with a center left-turn or two-way left-turn lane. The space between the travel lanes and the existing curb line, which will not be shifted with the project, will be used for a directional bike lane on each side of 9th Street.

As discussed in Chapter 1, the existing roadway width varies between 40 feet, 44 feet, and 46 feet through the study limits. Figure 4-1 shows how that space will be reallocated under the Preferred Alternative.

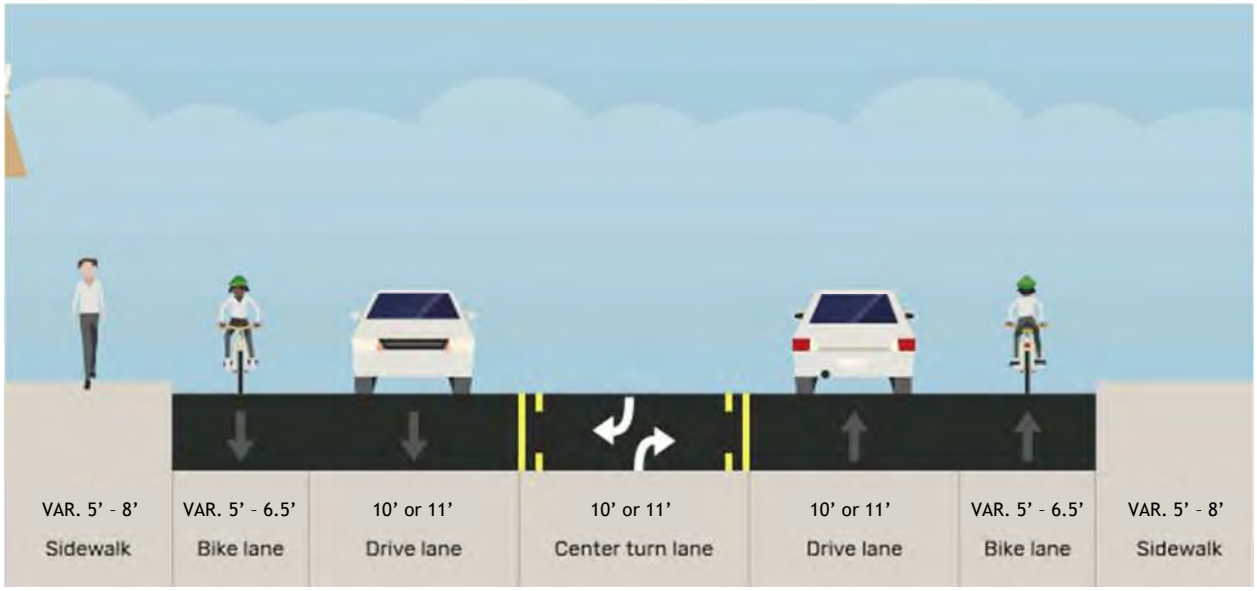


Figure 4-1. Preferred Alternative typical section.

Figure 4-1 does not show the gutter width, which is 1 foot and will extend into each bike lane. The material and grade differences at the gutter are not desirable for bicycle use. In a curbed roadway condition, 5-foot or wider lanes—including gutter width—provide sufficient width per the American Association of State Highway and Transportation Officials *Bike Guide*.

We recommend 11-foot wide travel lanes where possible in this urban corridor to accommodate freight vehicles on the route. However, where the road narrows between N Mission Street and N Wenatchee Avenue, we propose to retain the existing 10-foot wide lanes and install 5-foot wide bike lanes. Where the corridor is widest between N Wenatchee Avenue and the taper prior to the railroad tracks, the bike lanes can expand to fill the additional space. Table 4-1 summaries the proposed widths for the Preferred Alternative.

Table 4-1. Typical lane widths by corridor segment.

Segment	Through Lane Width (feet)	Center Lane Width (feet)	Bike Lane Width (feet)	Total Width (feet)
N Miller Street to N Emerson Avenue	11	11	5.5	44
N Emerson Avenue to N Chelan Avenue	11	11	5.5	44
N Chelan Avenue to N Mission Street	11	11	5.5	44
N Mission Street to N Wenatchee Avenue	10	10	5	40
N Wenatchee Avenue to BNSF Railroad	11	11	6.5	46

This proposed configuration will retain sufficient space for emergency vehicles to use the corridor. Vehicles blocking the path of an emergency vehicle can temporarily park in the bicycle lanes to open up a clear lane.

4.2.2 Additional Design Features

The Preferred Alternative requires additional items to fully function, which generally relate to the traffic signals and roadway channelization. We have also identified items that we recommend to enhance the corridor and improve safety.

Required Elements

The proposed three-lane configuration shown in Figure 4-1 must taper down to the existing roadway configurations beyond the project limits. This reconfiguration will require removal of existing and installation of new channelization markings. Our proposed transition treatments are shown in our concept exhibit, which is Appendix A to this report.

At the four traffic signals within the study limits, the existing signal heads will need to be shifted to the right in order to avoid a red/yellow/green ball indication over the proposed left-turn lane. This is consistent with the *Manual on Uniform Traffic Control Devices* (MUTCD) and design best practices. At the intersections of 9th Street at N Miller Street and at N Wenatchee Avenue, additional signal heads will be required for the protected-permissive left-turn phasing for 9th Street.

Though some of the east and west mast arms at N Miller Street and at N Wenatchee Avenue appear to be sufficiently long for these changes, we did not evaluate the structural capacity of the existing mast arms, pole, or foundations. We assume that adding these signal heads will trigger pole replacements to provide sufficient structural support for the added wind load. Replacing these poles will trigger ADA pushbutton upgrades at the intersections, which will then require sidewalk and curb ramp replacements to facilitate installation of the new pushbutton posts.

We do not anticipate any need to replace signal poles at the intersections of 9th Street at N Chelan Avenue or at N Mission Street, since the signal head shifts at those locations will decrease wind loads on the poles. Figure 4-2 shows how the existing mast arm lengths at N Chelan Avenue will satisfy the Preferred Alternative lane locations.

Figure 4-2. Conceptual view of 9th Street channelization near N Chelan Avenue (facing west).

Vehicle detection changes and modifications will be required at three of the four signalized intersections. At all of the signals within the project limits except for at N Wenatchee Avenue, vehicles are detected by loops in the

pavement. At N Wenatchee Avenue, video detection is used on all approaches. The proposed lane shifts to the three-lane section will require either revised loop detection or a change to video detection for the eastbound and westbound approaches at N Miller Street, N Chelan Avenue, and N Mission Street.

Recommended Treatments

We recommend installing bike lane or route signing along 9th Street to provide wayfinding for riders. This will supplement required bike lane channelization markings.

We recommend incorporating the following elements in the 9th Street corridor to improve safety in the corridor:

- Supplemental signal heads on all westbound mast arm pole shafts for westbound through movements on 9th Street for increased signal visibility during sunsets;
- Retroreflective backplates on all signal heads within the study area for increased signal visibility;
- Leading pedestrian intervals for all east-west crosswalks on 9th Street at the intersections of N Chelan Avenue and N Mission Street, as these intersections do not have protected-permissive phasing for the eastbound and westbound left-turn movements under the Preferred Alternative; and
- DO NOT BLOCK INTERSECTION signing and pavement markings for westbound traffic at the intersection of N Emerson Avenue and 9th Street.

4.2.3 Opinion of Cost

We developed a planning-level opinion of cost for the Preferred Alternative. The opinion of cost includes roadway construction, environmental, engineering, and construction management costs. We made the following notes and assumptions when developing the cost estimate:

- Right-of-way acquisition and easements are not required.
- Pavement, sidewalk, and curb ramps will not be replaced with the project, except as noted below.
- Utility systems will not be impacted by the project.
- All the required and recommended features detailed in Sections 4.2.1 and 4.2.2 are included.
- Existing loop detection systems on 9th Street are replaced with video detection.
- Existing signal control cabinets do not need to be replaced to accommodate the phasing, left-turn signal heads, or detection changes associated with the project.
- East and west mast arm poles and foundations at N Miller Street and at N Wenatchee Avenue are replaced to install protected-permissive signal heads. This triggers intersection-wide pedestrian pushbutton upgrades for ADA compliance, which requires curb ramp rebuilds at all corners to install.
- Existing conduits can be used for all signal modifications; trenching across intersections is not required.
- Environmental costs, including permitting in final design, construction compliance, and temporary water pollution and erosion control.
- 10% of construction subtotal for mobilization.
- 12% of construction subtotal, including mobilization, for construction engineering.
- 20% of construction subtotal, including mobilization, for construction contingency to cover additional project costs to be identified during final design.
- 15% of construction total for final design.
- 5% annual inflation between 2020 (cost index) and an assumed construction year of 2023.

Table 4-2 summarizes the cost elements. The opinion of cost itemized breakdown is included in Appendix B.

Table 4-2. Opinion of Cost Summary.

Cost Element	Estimated Cost
Right-of-way	$ 0
Construction	$ 561,000
Construction engineering and compliance	$ 80,000
Preliminary engineering and permitting	$ 101,000
Inflation to 2023	$ 117,000
Total	**$ 859,000**

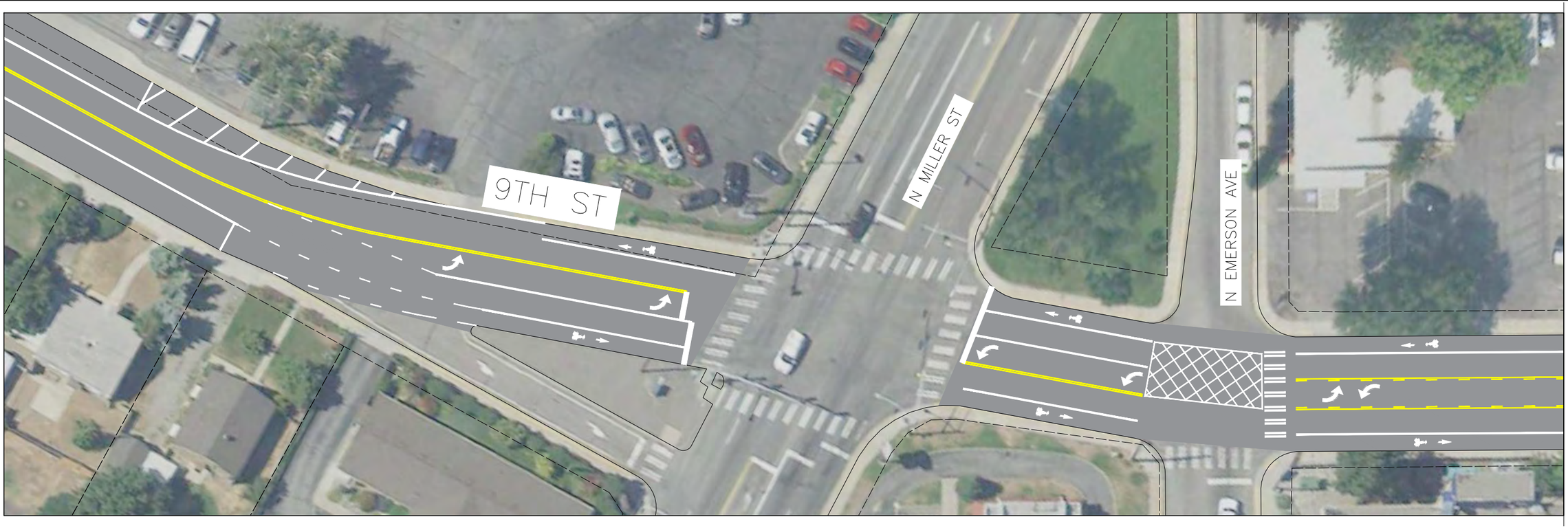
4.2.4 Phasing and Cost Considerations

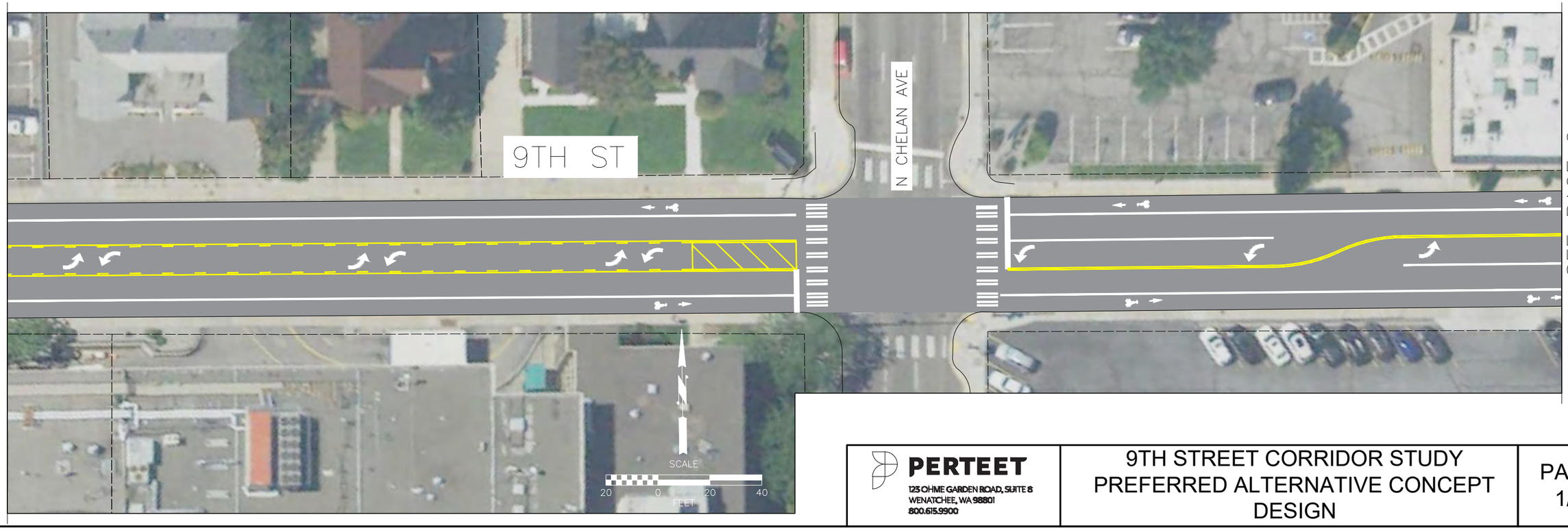
Overall project cost can be reduced if signal equipment, including traffic signal heads, video detection cameras, and mast arms have already been procured by City of Wenatchee and can be used on this project. Additionally, constructing the project earlier will reduce anticipated inflation, which we estimate will lead to 5% annual increases in total project cost.

To reduce near-term project costs without compromising the core goals of the Preferred Alternative, the protected-permissive left-turn phasing at the intersections of 9th Street at N Miller Street and N Wenatchee Avenue could be deferred to a future effort. If that occurred and existing signal heads were retained and shifted on existing mast arm poles, the total project cost shown in Table 4-2 would be reduced to $381,000 (2023 $). This reduce cost still accounts for the new recommended supplemental signal heads and retroreflective backings on all signal heads to enhance signal visibility and reduce crash likelihood.

APPENDIX A

Preferred Alternative Concept Designs





PERTEET
125 OHME GARDEN ROAD, SUITE 8
WENATCHEE, WA 98801
800.615.9900

9TH STREET CORRIDOR STUDY
PREFERRED ALTERNATIVE CONCEPT DESIGN

PAGE 1/2

Apr 24, 2020 - 1:16pm james.lee X:\Wenatchee, City of\Projects\20190167 - Ninth St Corridor Study\CADD\01 - Ref\X-ROAD.dwg Layout Name: 1

SEE PAGE 1

N MISSION ST

9TH ST

N WENATCHEE AVE

SEE BELOW

SEE ABOVE

9TH ST

BNSF RAILROAD

DESIGN IS COMPATIBLE WITH PROPOSED CROSSING-IMPROVEMENTS PROJECT. MODIFY CHANNELIZATION AS NEEDED.

SCALE
20 0 20 40
FEET

PERTEET
123 OHME GARDEN ROAD, SUITE 8
WENATCHEE, WA 98801
800.615.9900

9TH STREET CORRIDOR STUDY
PREFERRED ALTERNATIVE CONCEPT DESIGN

Oct 28, 2020 - 3:15pm brent.powell X:\Wenatchee, City of\Projects\20190167 - Ninth St Corridor Study\CADD\01 - Ref\X-ROAD.dwg Layout Name: 2

APPENDIX B

Preferred Alternative Planning-Level Opinion of Cost

123 Ohme Garden Road, Suite 8, Wenatchee, WA 98801 | P 800.615.9900

PLANNING LEVEL OPINION OF COST SUMMARY

Project Description:	Ninth Street Corridor Study	Client:	City of Wenatchee
Corridor Section:	N Miller Street - BNSF Railroad	Date:	April 2020
Location:	Wenatchee, WA	Date of Cost Index:	2020
		Calculated By/Entered By:	B. Powell
		Checked By:	M. Hendrix

Preferred Alternative

		ITEM	UNIT	ESTIMATED UNIT COST	QTY	COST
I.		**RIGHT OF WAY**				
		RIGHT OF WAY (urban developed)	SF	$45	-	$0
		RIGHT OF WAY (urban undeveloped)	SF	$20	-	$0
		RELOCATIONS: BUSINESSES	EA	$150,000	-	$0
		RELOCATIONS: RESIDENCES	EA	$110,000	-	$0
		CONDEMNATION PROCEDURE	EA	$100,000	-	$0
		ADMINISTRATION (TITLES, APPRAISALS, ETC.)	EA	$15,000	-	$0
		RIGHT OF WAY TOTAL				**$0**
II.		**CONSTRUCTION**				
1		**PREPARATION/GRADING/DRAINAGE**				
	1.1	**PREPARATION**				
		CLEAR & GRUB, DEMO	ACRE	$5,000	-	$0
		REMOVING EXISTING PAVEMENT	SY	$25	-	$0
		REMOVE PAVEMENT MARKINGS	LF	$2	6,400	$12,800
	1.2	**EARTHWORK**				
		ROADWAY EXCAVATION INCL, HAUL	CY	$80	40	$3,200
		STRUCTURE EX. CL. A INCL. HAUL	CY	$25	-	$0
		BORROW INCL. HAUL	TON	$16	-	$0
		EMBANKMENT COMPACTION	CY	$2	-	$0
	1.3	**STORMWATER MITIGATION**				
		DETENTION AND TREATMENT	SF	$6	-	$0
	1.4	**STORM SEWER**				
		CATCH BASIN TYPE 1	EA	$1,000	-	$0
		CATCH BASIN TYPE 2	EA	$2,200	-	$0
		PLAIN CONC. STORM SEWER PIPE 12 IN. DIAM.	LF	$35	-	$0
		PLAIN CONC. STORM SEWER PIPE 18 IN. DIAM.	LF	$45	-	$0
		STRUCTURE EXCAVATION CL. B	CY	$15	-	$0
2		**STRUCTURE**				
		CONCRETE BRIDGES	SF	$150	-	$0
		CONCRETE BRIDGES WIDENING	SF	$200	-	$0
		PEDESTRIAN BRIDGES	SF	$250	-	$0
		STEEL BRIDGES	SF	$100	-	$0
		BRIDGE ABUTMENT RETROFIT	SF	$150	-	$0
		RETAINING WALLS (Cast in Place)	SF	$65	-	$0
		RETAINING WALLS (Soil Nail with Cast in Place Facing)	SF	$150	-	$0
		BRIDGE REMOVAL	SF	$20	-	$0
		NOISE WALLS	SF	$25	-	$0

123 Ohme Garden Road, Suite 8, Wenatchee, WA 98801 | P 800.615.9900

PLANNING LEVEL OPINION OF COST SUMMARY

Project Description:	Ninth Street Corridor Study		Client: City of Wenatchee		
Corridor Section:	N Miller Street - BNSF Railroad		Date: April 2020		
Location:	Wenatchee, WA		Date of Cost Index: 2020		
3	**SURFACING**				
	PORTLAND CEMENT CONCRETE	SF	$10	-	$0
	HOT MIX ASPHALT	TON	$150	-	$0
	CRUSHED SURFACING	TON	$75	30	$2,250
4	**ROADSIDE DEVELOPMENT**				
	FENCING	LF	$15	-	$0
	SEEDING, MULCHING & FERTILIZING	ACRE	$1,200	-	$0
	WETLAND MITIGATION	LS	$0	1	$0
	TEMP. WATER POLLUTION & EROSION CONTROL (6%)	LS	$5,000	1	$5,000
	LANDSCAPING	LS	$0	1	$0
5	**TRAFFIC**				
	GUARD RAIL	LF	$18	-	$0
	CONCRETE BARRIER	LF	$50	-	$0
	SIGNAL SYSTEMS	LS	$220,000	1	$220,000
	ILLUMINATION	LS	$0	1	$0
	SIGNING	LS	$10,000	1	$10,000
	CHANNELIZATION	LF	$4	8,500	$34,000
	CURBS	LF	$25	-	$0
	CURB RAMP	EA	$2,500	16	$40,000
	SIDEWALKS	SY	$60	110	$6,600
	TRAFFIC CONTROL (20%)	LS	$65,800	1	$65,800
5.1	**OTHER ITEMS**				
	SURVEYING (2%)	LS	$6,600	1	$6,600
	SPECIAL ITEMS	EST	$0	1	$0
	UTILITY RELOCATIONS	EST	$0	1	$0
6	**MISCELLANEOUS (20%)**	LS	$81,300	1	$81,300
7	**CONSTRUCTION SUBTOTAL (ITEMS 1 THRU 6)**				**$487,550**
8	**MOBILIZATION (15%)**				
	15% OF ITEM 7	EST	$73,200	1	$73,200
9	**SUBTOTAL (ITEMS 7 & 8)**				**$560,750**
10	**SALES TAX**				
	N/A	EST	$0	1	$0
11	**AGREEMENTS (Utilities, WSP, etc.)**				
	N/A	EST	$0	1	$0
12	**SUBTOTAL (ITEMS 9 THRU 11)**				**$560,750**
13	**CONSTRUCTION**				
	ENGINEERING (12% OF ITEM 12)	EST	$68,000	1	$68,000
	ENVIRONMENTAL COMPLIANCE (2% OF ITEM 12)	EST	$12,000	1	$12,000

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PLANNING LEVEL OPINION OF COST SUMMARY

Project Description:	Ninth Street Corridor Study		Client: City of Wenatchee		
Corridor Section:	N Miller Street - BNSF Railroad		Date: April 2020		
Location:	Wenatchee, WA		Date of Cost Index: 2020		
14	**CONSTRUCTION TOTAL (ITEMS 12 & 13)**				**$640,750**
III.	**PRELIMINARY WORK**				
	PRELIMINARY ENGINEERING (15% OF ITEM 14)	EST	$96,113	1	$96,113
	ROW PERMITS	EST	$5,000	1	$5,000
IV.	**TOTAL ESTIMATED COST**				
	(ITEMS I, 14 & III)				**$742,000**
V.	**FUTURE ESTIMATED COST**				

	Inflation	Const. Year	Cost Index	Future Cost
FUTURE COST BASED ON INFLATION RATE	5.00%	2023	2020	**$859,000**

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PLANNING LEVEL OPINION OF COST SUMMARY

Project Description:	Ninth Street Corridor Study	Client:	City of Wenatchee
Corridor Section:	N Miller Street - BNSF Railroad	Date:	April 2020
Location:	Wenatchee, WA	Date of Cost Index:	2020
		Calculated By/Entered By:	B. Powell
		Checked By:	M. Hendrix

Preferred Alternative without Protected-Permissive Phasing at N Miller Street, N Wenatchee Avenue

		ITEM	UNIT	ESTIMATED UNIT COST	QTY	COST
I.		**RIGHT OF WAY**				
		RIGHT OF WAY (urban developed)	SF	$45	-	$0
		RIGHT OF WAY (urban undeveloped)	SF	$20	-	$0
		RELOCATIONS: BUSINESSES	EA	$150,000	-	$0
		RELOCATIONS: RESIDENCES	EA	$110,000	-	$0
		CONDEMNATION PROCEDURE	EA	$100,000	-	$0
		ADMINISTRATION (TITLES, APPRAISALS, ETC.)	EA	$15,000	-	$0
		RIGHT OF WAY TOTAL				**$0**
II.		**CONSTRUCTION**				
1		**PREPARATION/GRADING/DRAINAGE**				
	1.1	**PREPARATION**				
		CLEAR & GRUB, DEMO	ACRE	$5,000	-	$0
		REMOVING EXISTING PAVEMENT	SY	$25	-	$0
		REMOVE PAVEMENT MARKINGS	LF	$2	6,400	$12,800
	1.2	**EARTHWORK**				
		ROADWAY EXCAVATION INCL, HAUL	CY	$80	-	$0
		STRUCTURE EX. CL. A INCL. HAUL	CY	$25	-	$0
		BORROW INCL. HAUL	TON	$16	-	$0
		EMBANKMENT COMPACTION	CY	$2	-	$0
	1.3	**STORMWATER MITIGATION**				
		DETENTION AND TREATMENT	SF	$6	-	$0
	1.4	**STORM SEWER**				
		CATCH BASIN TYPE 1	EA	$1,000	-	$0
		CATCH BASIN TYPE 2	EA	$2,200	-	$0
		PLAIN CONC. STORM SEWER PIPE 12 IN. DIAM.	LF	$35	-	$0
		PLAIN CONC. STORM SEWER PIPE 18 IN. DIAM.	LF	$45	-	$0
		STRUCTURE EXCAVATION CL. B	CY	$15	-	$0
2		**STRUCTURE**				
		CONCRETE BRIDGES	SF	$150	-	$0
		CONCRETE BRIDGES WIDENING	SF	$200	-	$0
		PEDESTRIAN BRIDGES	SF	$250	-	$0
		STEEL BRIDGES	SF	$100	-	$0
		BRIDGE ABUTMENT RETROFIT	SF	$150	-	$0
		RETAINING WALLS (Cast in Place)	SF	$65	-	$0
		RETAINING WALLS (Soil Nail with Cast in Place Facing)	SF	$150	-	$0
		BRIDGE REMOVAL	SF	$20	-	$0
		NOISE WALLS	SF	$25	-	$0

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PLANNING LEVEL OPINION OF COST SUMMARY

Project Description:	Ninth Street Corridor Study		Client: City of Wenatchee		
Corridor Section:	N Miller Street - BNSF Railroad		Date: April 2020		
Location:	Wenatchee, WA		Date of Cost Index: 2020		
3	**SURFACING**				
	PORTLAND CEMENT CONCRETE	SF	$10	-	$0
	HOT MIX ASPHALT	TON	$300	-	$0
	CRUSHED SURFACING	TON	$100	-	$0
4	**ROADSIDE DEVELOPMENT**				
	FENCING	LF	$15	-	$0
	SEEDING, MULCHING & FERTILIZING	ACRE	$1,200	-	$0
	WETLAND MITIGATION	LS	$0	1	$0
	TEMP. WATER POLLUTION & EROSION CONTROL (6%)	LS	$5,000	1	$5,000
	LANDSCAPING	LS	$0	1	$0
5	**TRAFFIC**				
	GUARD RAIL	LF	$18	-	$0
	CONCRETE BARRIER	LF	$50	-	$0
	SIGNAL SYSTEMS	LS	$90,000	1	$90,000
	ILLUMINATION	LS	$0	1	$0
	SIGNING	LS	$10,000	1	$10,000
	CHANNELIZATION	LF	$4	8,500	$34,000
	CURBS	LF	$25	-	$0
	CURB RAMP	EA	$2,500	-	$0
	SIDEWALKS	SY	$60	-	$0
	TRAFFIC CONTROL (20%)	LS	$29,400	1	$29,400
5.1	**OTHER ITEMS**				
	SURVEYING (N/A)	LS	$0	1	$0
	SPECIAL ITEMS	EST	$0	1	$0
	UTILITY RELOCATIONS	EST	$0	1	$0
6	**MISCELLANEOUS (20%)**	LS	$36,300	1	$36,300
7	**CONSTRUCTION SUBTOTAL (ITEMS 1 THRU 6)**				**$217,500**
8	**MOBILIZATION (15%)**				
	15% OF ITEM 7	EST	$32,700	1	$32,700
9	**SUBTOTAL (ITEMS 7 & 8)**				**$250,200**
10	**SALES TAX**				
	N/A	EST	$0	1	$0
11	**AGREEMENTS (Utilities, WSP, etc.)**				
	N/A	EST	$0	1	$0
12	**SUBTOTAL (ITEMS 9 THRU 11)**				**$250,200**
13	**CONSTRUCTION**				
	ENGINEERING (12% OF ITEM 12)	EST	$31,000	1	$31,000
	ENVIRONMENTAL COMPLIANCE (N/A)	EST	$0	1	$0

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PLANNING LEVEL OPINION OF COST SUMMARY

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Location:	Wenatchee, WA		Date of Cost Index: 2020		
14	**CONSTRUCTION TOTAL (ITEMS 12 & 13)**				**$281,200**
III.	**PRELIMINARY WORK**				
	PRELIMINARY ENGINEERING (15% OF ITEM 14)	EST	$42,180	1	$42,180
	ROW PERMITS	EST	$5,000	1	$5,000
IV.	**TOTAL ESTIMATED COST**				
	(ITEMS I, 14 & III)				**$329,000**
V.	**FUTURE ESTIMATED COST**				

	Inflation	Const. Year	Cost Index	Future Cost
FUTURE COST BASED ON INFLATION RATE	5.00%	2023	2020	**$381,000**

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APPENDIX C

Study-Area Crash History

REMAINING APPENDICES AVAILABLE UPON REQUEST