



# **US HIGHWAY 12**

## SUMMARY REPORT

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# ACKNOWLEDGMENTS



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# 1

## INTRODUCTION

The City of Walla Walla is anticipating development applications in the area north of US Highway 12 near the US Highway 12/Clinton Street intersection. The current US Highway 12/Clinton Street configuration consists of flexible “candlestick” delineators installed on the highway which prohibit through and left-turn movements from the minor street. This improvement was built in 2016 to improve safety and operations, but limits connectivity and creates a barrier for all modes of travel between

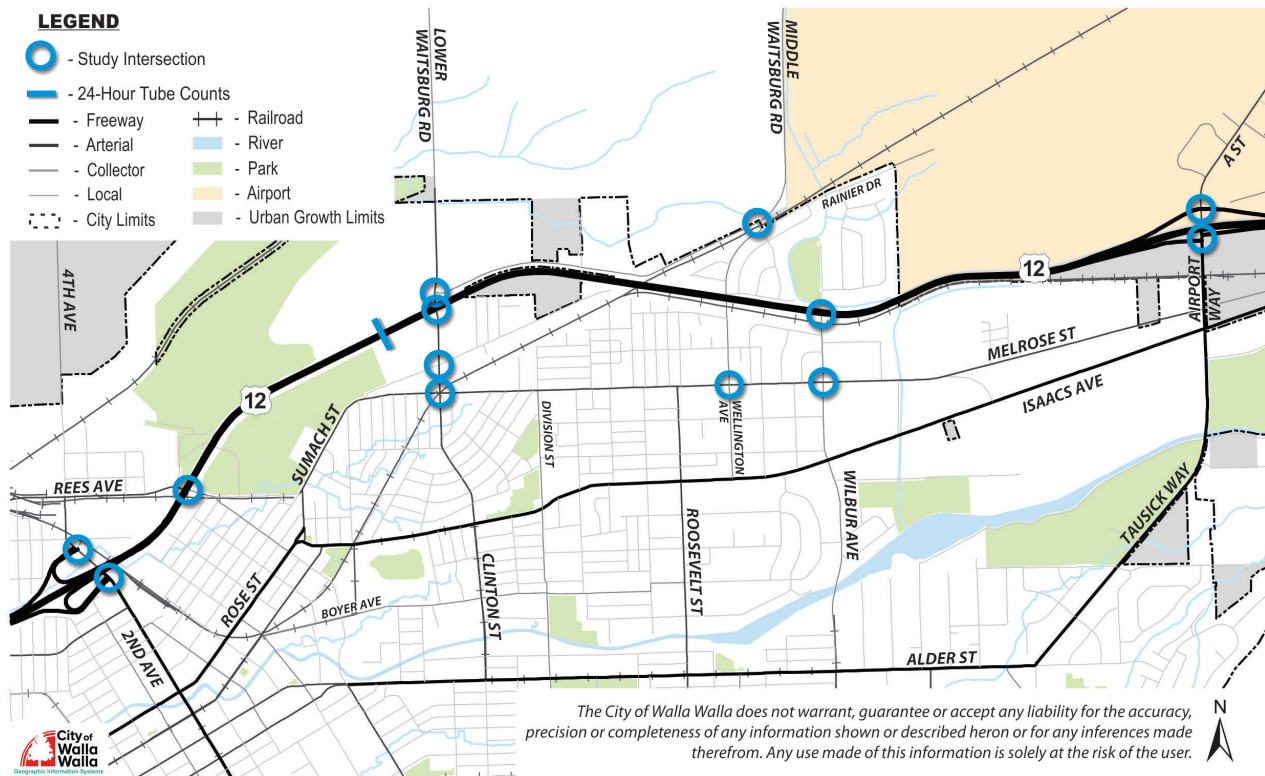
the City of Walla Walla and county lands and future developments north of US Highway 12.

In addition, development proposals for the land in the northwest quadrant of US Highway 12/Clinton Street await information regarding potential right-of-way (ROW) requirements for improvements to the interchange. A map of the study area of interest is shown on the following page in Figure 1.

### THE **PURPOSE** OF THIS PROJECT IS TO:

- Develop affordable strategies that alleviate congestion in the project study area.
- Reestablish and improve multimodal connectivity in the project area.
- Address safety concerns on the US Highway 12 corridor.
- Identify long-term multimodal solutions to support the future land use and growth north of US Highway 12.
- Identify a preferred plan for highway access for autos and freight.
- Identify major local transportation improvements and funding required to serve growth.
- Identify routes for safe and efficient emergency vehicle access and for pedestrian and bicycle crossings of the highway corridor.

FIGURE 1. STUDY AREA



IN THIS STUDY AREA, THERE IS A **NEED** FOR:

- More north-south crossings of the highway.
- Less out-of-direction travel: The Clinton Street intersection turn restrictions are a barrier for north-south travel as well as convenient access to US Highway 12 and create an increase in out-of-direction travel.
- Improved intersection safety: The US Highway 12/Wilbur Avenue intersection (and three other study intersections) have crash rates above critical crash rate.
- More improved pedestrian and bicycle facilities crossing the highway.
- Adequate multimodal infrastructure that can accommodate the future transportation needs of the north urban growth expansion area.

Throughout the evaluation process, a Technical Advisory Committee (TAC) contributed to the development and quality of this project. The TAC is composed of staff from the City of Walla

Walla, Walla Walla County, Washington State Department of Transportation (WSDOT), the Port of Walla Walla, and the Walla Walla Valley Metropolitan Organization (WWVMO).

# 2

## EXISTING CONDITIONS

### EXISTING INTERSECTION CONDITIONS

Existing intersection operations analysis was performed for all study intersections to establish baseline conditions (agencies often specify intersection performance thresholds as required operating standards).

#### INTERSECTION PERFORMANCE MEASURES

Level of service (LOS) and volume-to-capacity (V/C) ratios are two commonly used performance measures that provide a gauge of intersection operations. In addition, they are often incorporated into agency mobility standards. Descriptions are given below:

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

exceeded capacity. This condition is typically evident in long queues and delays.

**Volume-to-capacity (V/C) ratio:** A decimal representation (between 0.00 and 1.00) of the proportion of capacity that is being used (i.e., the saturation) at a turn movement, approach leg, or intersection. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases, and performance is reduced. If the ratio is greater than 1.00, the turn movement, approach leg, or intersection is oversaturated and usually results in excessive queues and lengthy delays.

#### JURISDICTIONAL OPERATING STANDARDS

Intersection performance measures vary by jurisdiction of the roadways. The study intersections under WSDOT jurisdiction must comply with the LOS targets in the WSDOT System Plan, which specifies a LOS D target for the study area<sup>1</sup>. The study intersections under the jurisdiction of the City of Walla Walla will require LOS E and a maximum v/c ratio of 0.95 for the study area<sup>2</sup>.

1 Appendix G, WDOT System Plan, Washington State Department of Transportation, December 2008. Based on a ‘Highways of Statewide Significance’ designation in an urban area.

2 Exhibit 57, City of Walla Walla Comprehensive Plan, City of Walla Walla, June 2018.

## INTERSECTION OPERATIONS

The existing traffic operating conditions at the study intersections was determined for the 2018 weekday PM peak hour (shown in Table 1). During the 2018 weekday PM peak hour, all study intersections meet the operating standards.

**TABLE 1. 2018 WEEKDAY PM PEAK HOUR INTERSECTION OPERATIONS**

	INTERSECTION	JURISDICTION	OPERATING STANDARD	P.M. PEAK HOUR		
				LOS	DELAY	V/C
1	US Highway 12 WB Ramps/N 2nd Avenue	WSDOT	LOS D	A/C	15.1	0.13
2	US Highway 12 EB Ramps/N 2nd Avenue	WSDOT	LOS D	A/B	11.3	0.22
3	US Highway 12/E Rees Avenue	WSDOT	LOS D	A/B	10.7	0.10
4	N Clinton Street/Melrose Street	City	LOS E, v/c ≤ 0.95	A/A	8.5	0.16
5	N Clinton Street/E Sumach Street	City	LOS E, v/c ≤ 0.95	A/B	10.0	0.04
6	US Highway 12/N Clinton Street	WSDOT	LOS D	A/B	11.2	0.12
7	Lower Waitsburg Road/Middle Waitsburg Road	City	LOS E, v/c ≤ 0.95	A/A	9.3	0.07
8	Middle Waitsburg Road/Blue Mountain Drive	City	LOS E, v/c ≤ 0.95	A/A	9.0	0.05
9	Melrose Street/Wellington Avenue	City	LOS E, v/c ≤ 0.95	A/C	15.2	0.29
10	US Highway 12/N Wilbur Avenue	WSDOT	LOS D	A/D	32.1	0.69
11	Melrose Street/N Wilbur Avenue	City	LOS E, v/c ≤ 0.95	B/B	13.6	0.49
12	US Highway 12 WB Ramps/Airport Way	WSDOT	LOS D	A/B	13.9	0.09
13	US Highway 12 EB Ramps/Airport Way	WSDOT	LOS D	A/B	10.1	0.15

**Unsignalized intersection:**

Delay = Critical Movement Approach Delay (sec.)

LOS = Major Street LOS/Minor Street LOS

V/C = Critical Movement Volume-to-Capacity Ratio

## US HIGHWAY 12/N CLINTON STREET

The current (2018) US Highway 12/Clinton Street configuration has flexible “candlestick” delineators installed on the highway which prohibits through and left-turn movements from the minor street. This improvement was built in 2016 to improve safety and operations, but limits connectivity and creates a barrier for all modes of travel across US Highway 12. The effects on the transportation system of this improvement can be seen in a few ways.



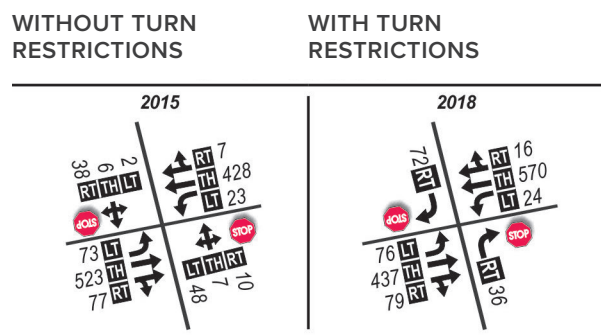
### INTERSECTION VOLUMES AND OPERATIONS

The figures to the right show the operational analysis for the intersection without and with the turn restrictions. As shown, the intersection fails to meet the operating standard (LOS D) in 2015 without the minor street turn restrictions. However, with the turn restrictions in place the intersection operates within the standard of LOS D.

### VEHICLE MILES TRAVELED (VMT)

Vehicle Miles Traveled (VMT) is a measurement of the total miles traveled by all the vehicles in a system over a period of time. With the turn restrictions in place at US Highway 12/Clinton Street intersection, the VMT would be expected to increase to reflect traffic needing to reroute to other roadways and intersections. The table to the right shows the VMT without and with the turn restrictions during the PM peak hour. As shown, there are an additional 671 VMT with the turn restrictions.

FIGURE 2. CLINTON ST. & US 12



LOS	DELAY	V/C	LOS	DELAY	V/C
A/E	39.2	0.41	A/B	11.2	0.12



SCENARIO (2014)	VMT
Without Turn Restrictions	111,256
With Turn Restrictions	111,927
<b>Difference</b>	<b>671</b>

## SAFETY ANALYSIS

An analysis of the collision history was performed at study intersections to identify collision trends. The most recent five years of available collision data (November 2013–October 2018) were obtained from the

Washington Department of Transportation (WSDOT).

Some crash statistics regarding the intersection and segment crash data are described below:

CRASH STATISTICS	
 <p><b>NO FATAL</b> COLLISIONS</p>	 <p><b>NO BICYCLE</b> COLLISIONS</p>
<p><b>1</b> <b>SEVERE INJURY</b> COLLISION (MELROSE STREET/N WILBUR AVENUE)</p>	<p>APPROXIMATELY <b>63%</b> OF ALL INTERSECTION CRASHES WERE <b>PROPERTY DAMAGE ONLY</b> (PDO)</p>
<p><b>2</b> TWO COLLISIONS <b>INVOLVING A PEDESTRIAN</b> (MELROSE STREET/ N WILBUR AVENUE)</p>	

The critical crash rate was calculated using methodology from the Highway Safety Manual. The methodology calculates a reference crash rate using local crash data, and then calculates the critical crash rate by taking the weighted average of the reference crash rate for each intersection based on the VMT.

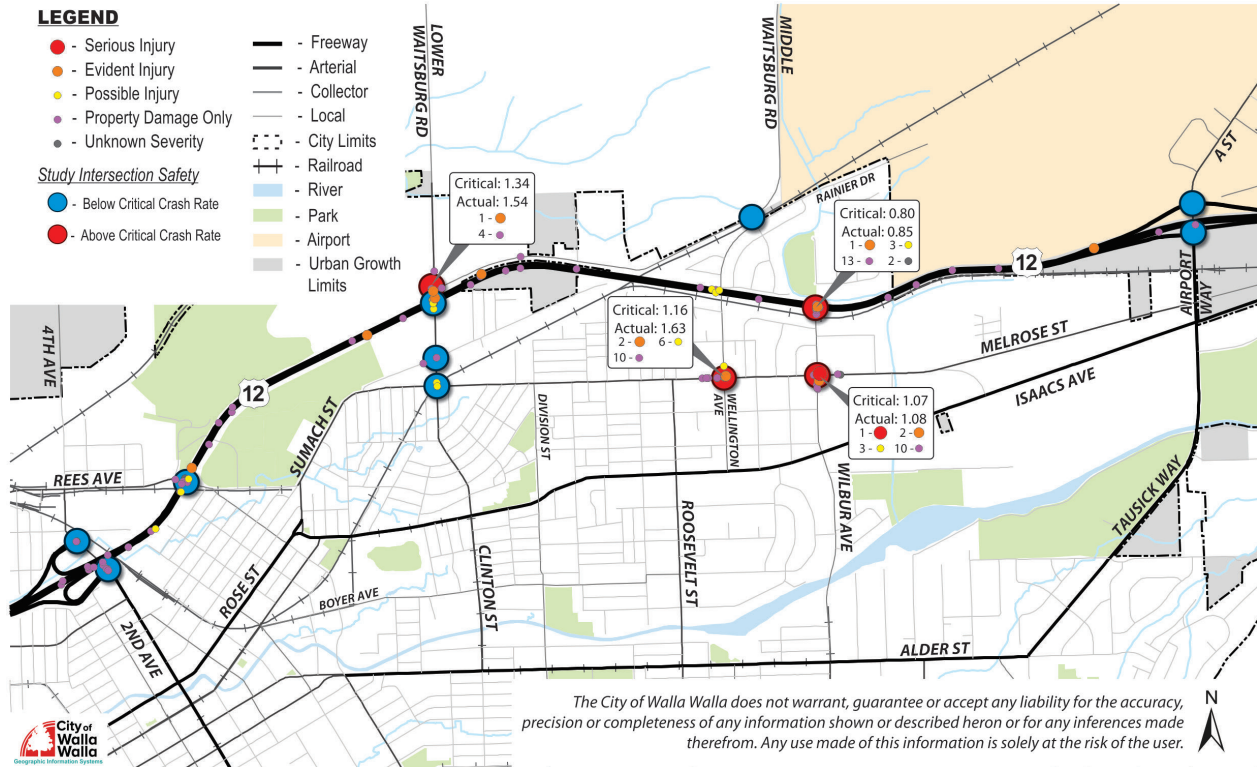
Then the actual intersection crash rate (crashes per million entering vehicles [MEV]) is calculated

and compared to the critical crash rate. The map (Figure 3) displays the locations and severity of the collisions as well as the actual crash rates and critical crash rates.

If the actual crash rate is higher than the critical crash rate, then the intersection is flagged and evaluated for potential safety improvements.



FIGURE 3. STUDY AREA



As shown, there are four intersections that have an actual crash rate higher than the critical rate. Those four intersections, indicated by red circles on Figure 3, are Lower Waitsburg Road/Middle Waitsburg Road, Melrose Street/Wellington Avenue, US Highway 12/N Wilbur Avenue, and Melrose St/N Wilbur Avenue.

It should be noted that the crash rate at US Highway 12/Clinton Street was 0.63 crashes/MEV before the turn restrictions (data from 2013-2016). After the turn restrictions were installed on the highway, the crash rate was cut in half at the intersection, 0.31 crashes/MEV (2017-2018).

# 3 FUTURE CONDITIONS

A travel demand model baseline scenario was developed for the year 2040 by the Walla Walla Valley Metropolitan Organization (WWVMPO). This model was compared against the future alternatives of the corridor study to identify capacity improvements in the study area. The travel demand modeling approach was coordinated with the WWVMPO, Washington Department of Transportation (WSDOT), and the City of Walla Walla.

## WWVMPO TRAVEL DEMAND MODEL

The WWVMPO travel demand model was utilized for the recent update of the City's Transportation Element of the Comprehensive Plan. The model includes the population and employment information assumed for the Walla Walla Valley.

The population and employment forecasts incorporated into the WWVMPO 2040 Plan were based on the existing comprehensive plan and the population growth assumed under both the City's and County's 2018 Comprehensive Plan.

## FUTURE LAND USE CONSIDERATIONS

The City will likely apply for an urban growth area (UGA) expansion to the north within the 20-year planning horizon. The expansion area would likely encompass 329 acres north of US Highway 12 between Lower Waitsburg Road and Middle Waitsburg Road. Due to the challenges of providing urban services, the City has considered removing 198 acres from the UGA to the south of the City between Cottonwood Road and Plaza Way. Three alternative traffic demand models were considered during the recent 2018 Comprehensive Plan update:

- 1 No UGA Expansion, Assumes Growth Occurs Within Current UGA
- 2 Assumes UGA Expansion, Majority of Growth Occurs in North Area
- 3 Assumes UGA Expansion, Moderate Growth Occurs in North Area and Within Current UGA

The Technical Advisory Committee (TAC) for this project agreed that Alternative 2 should be used as the future baseline model for this project as it provides the most conservative traffic growth estimate for this project's study area.

## FUTURE INTERSECTION CONDITIONS

Future intersection volumes were developed from the 2040 Future Baseline travel demand model and future intersection operations analysis was performed for all the study intersections to establish future baseline conditions.

## FUTURE INTERSECTION OPERATIONS

The future 2040 baseline traffic operating conditions at the study intersections were determined for the PM peak hour (shown in Table 4). During the 2040 weekday PM peak hour, all study intersections meet the operating standards except US Highway 12/Wilbur Avenue. The northbound left turn movement is shown to be over capacity (v/c greater than 1) causing long delays for vehicles turning left from N Wilbur Avenue onto US Highway 12.

**TABLE 2. 2040 FUTURE BASELINE WEEKDAY PM PEAK HOUR INTERSECTION OPERATIONS**

	INTERSECTION	JURISDICTION	OPERATING STANDARD	P.M. PEAK HOUR		
				LOS	DELAY	V/C
1	US Highway 12 WB Ramps/N 2nd Avenue	WSDOT	LOS D	A/D	26.1	0.29
2	US Highway 12 EB Ramps/N 2nd Avenue	WSDOT	LOS D	A/B	13.9	0.32
3	US Highway 12/E Rees Avenue	WSDOT	LOS D	A/B	12.8	0.19
4	N Clinton Street/Melrose Street	City	LOS E, v/c ≤ 0.95	A/A	8.6	0.16
5	N Clinton Street/E Sumach Street	City	LOS E, v/c ≤ 0.95	A/B	10.0	0.05
6	US Highway 12/N Clinton Street	WSDOT	LOS D	A/C	15.8	0.44
7	Lower Waitsburg Road/Middle Waitsburg Road	City	LOS E, v/c ≤ 0.95	A/B	13.1	0.16
8	Middle Waitsburg Road/Blue Mountain Drive	City	LOS E, v/c ≤ 0.95	A/A	9.3	0.06
9	Melrose Street/Wellington Avenue	City	LOS E, v/c ≤ 0.95	A/C	18.1	0.43
10	US Highway 12/N Wilbur Avenue	WSDOT	LOS D	A/F	98.9	1.05
11	Melrose Street/N Wilbur Avenue	City	LOS E, v/c ≤ 0.95	B/C	18.4	0.63
12	US Highway 12 WB Ramps/Airport Way	WSDOT	LOS D	A/B	14.1	0.10
13	US Highway 12 EB Ramps/Airport Way	WSDOT	LOS D	A/B	10.3	0.17

**Unsignalized intersection:**

Delay = Critical Movement Approach Delay (sec.)

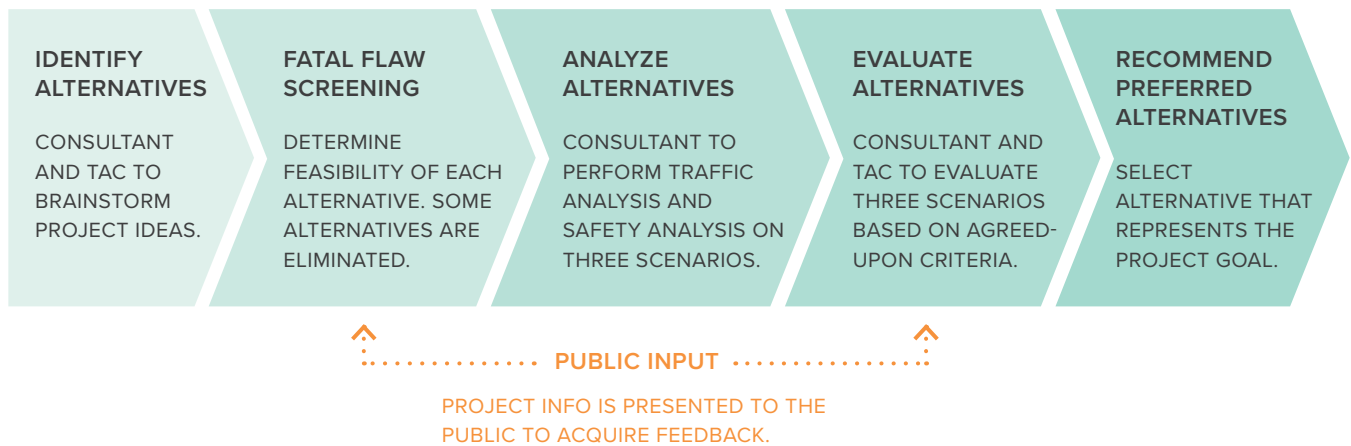
LOS = Major Street LOS/Minor Street LOS

V/C = Critical Movement Volume-to-Capacity Ratio

# 4 ALTERNATIVES EVALUATION PROCESS

The flowchart below shows the process that was followed to evaluate the project alternatives. As shown, the project consultants, Technical Advisory Committee (TAC) members, and public

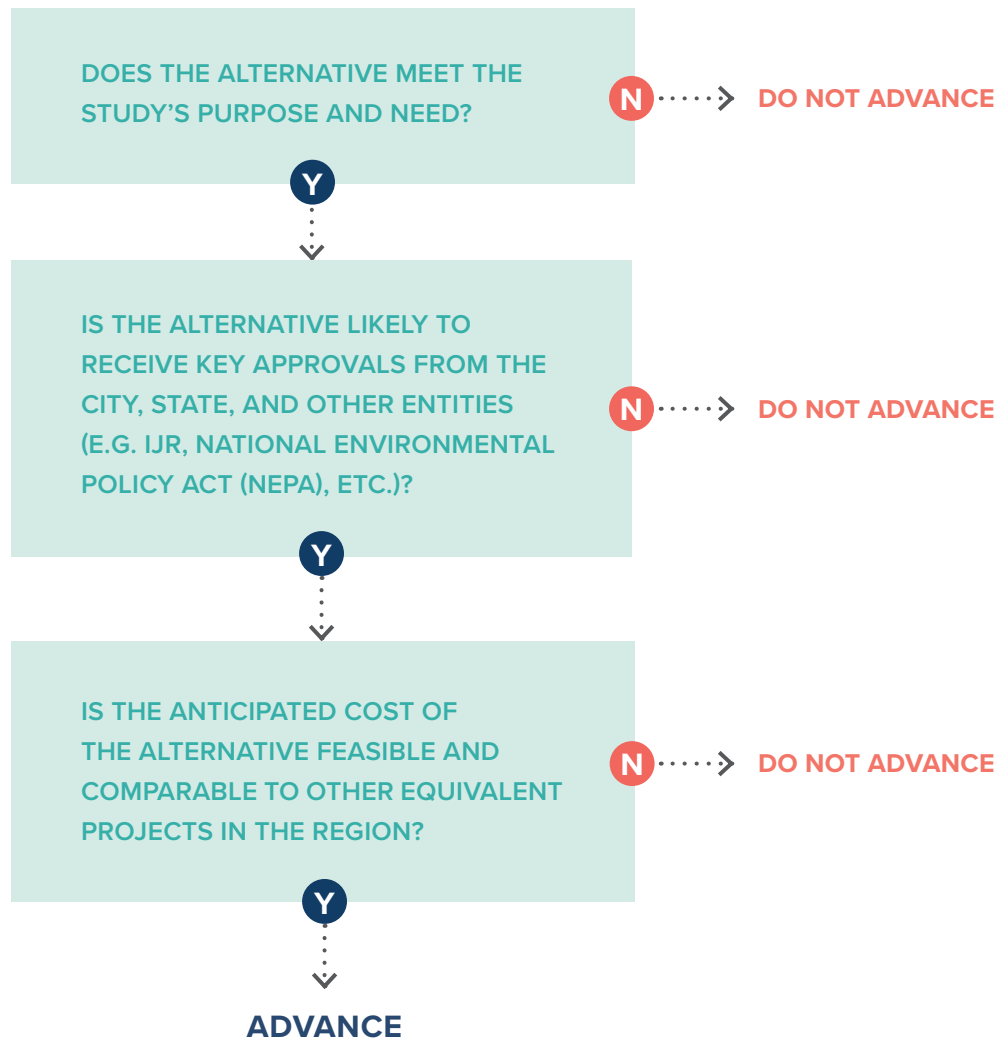
all contributed to the process. The following sections discuss the details of each step of the alternative evaluation process.



## ALTERNATIVES CONSIDERED

After the alternatives list was compiled, a first level of screening was conducted to determine the viability of each alternative and to narrow down the alternatives list. This first-level screening process was qualitative in nature and was geared at eliminating alternatives that are deemed to be fatally flawed. The following three questions were asked of each alternative to determine their viability. If any of the alternatives answered “no” to any of the three questions, the alternative was not advanced.

The project consultant facilitated the TAC through this step in the evaluation process. The results of the fatal flaw screening are shown in the rightmost column of Table 3 on the following page.



**TABLE 3. DESIGN ALTERNATIVES AND FATAL FLAW SCREENING RESULTS**

<b>ALTERNATIVES</b>	<b>DESCRIPTION</b>	<b>ALTERNATIVE ADVANCED?</b>
<b>US HIGHWAY 12/CLINTON STREET INTERSECTION</b>		
Alternative 1	Partial Cloverleaf On/Off Ramps	Yes; Strong potential for right-of-way acquisition costs, especially if property west of intersection is developed
Alternative 2	J-Turns off Highway	No; signal on high-speed facility will not receive local or WSDOT approval.
Alternative 3	Diamond Interchange	Yes; strong potential for high right-of-way acquisition costs, especially if property west of intersection is developed
Alternative 4	Roundabout	Yes; safety may be an issue for pedestrian crossings of highway at roundabout
Alternative 5	Grade-Separated Crossing (No Highway Access)	No; does not meet purpose and need statement as the lack of highway access would degrade mobility
<b>US HIGHWAY 12/WILBUR AVENUE INTERSECTION</b>		
Alternative 6	Extend Wilbur over US Highway 12 (No Highway Access)	No; does not meet purpose and need statement as the lack of highway access would degrade mobility
Alternative 7	Half-Diamond Interchange	No; does not meet purpose and need statement as the limited highway access would degrade mobility
Alternative 8	Full-Diamond Interchange (three-leg with no north access)	Yes; As long as Wilbur Avenue remains at-grade and the highway is raised over Wilbur Ave in order to maintain business access on Wilbur Ave
Alternative 9	Full-Diamond Interchange with Connection to Cookerly Drive or Mountain Park Drive (four-leg)	No; does not provide the access for the desired trips and impacts the neighborhood and Vista Terrace Park.
Alternative 10	Raise US Highway 12 Up, Dog-bone Roundabouts Underneath	No; does not provide the access for the desired trips and impacts the neighborhood and Vista Terrace Park.
Alternative 11	At-Grade Roundabout	Yes
Alternative 12	Acceleration and Deceleration Lanes on US Highway 12	Yes
<b>OTHER INTERSECTIONS/SEGMENTS</b>		
Alternative 13	Improve Wellington Street, Install Roundabout at Middle Waitsburg Road/Blue Mountain Drive	No; does not meet purpose and need statement.
Alternative 14	Signal or Roundabout at Melrose Street/Wellington Avenue	No; does not meet purpose and need statement.
Alternative 15	Improve Melrose Street East-West Capacity, Turn US Highway 12/ Wilbur Avenue into Right-in, Right-out	No; does not meet purpose and need statement.
Alternative 16	Realign Middle Waitsburg Road Further to the North on Lower Waitsburg Road	No; does not meet purpose and need statement.

## SCENARIOS DEVELOPED

After conducting the fatal flaw screening, the following four scenarios were developed by combining the remaining alternatives. The descriptions are below.

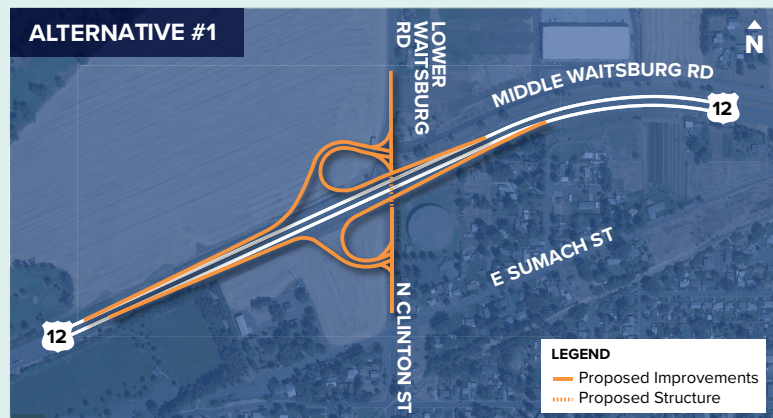
### SCENARIO #1

- **Alternative 1:** Partial Cloverleaf Interchange at Highway 12/Clinton Street intersection
- **Alternative 12:** Acceleration and Deceleration Lanes on US Highway 12 at Wilbur Avenue

Scenario #1 provides a partial cloverleaf interchange at the Clinton Street intersection, with both ramps located on the west side of the interchange. Clinton Street would be a raised, grade-separated north-south crossing for pedestrians, cyclists, and traffic on Clinton Street with left turn pockets at the on-ramp intersections. This scenario would also realign the Middle Waitsburg Road/Lower Waitsburg Road

intersection with the US Highway 12 westbound ramp intersection. The existing east-west pedestrian trail that runs along the north side of US Highway 12 at Clinton Street would also be realigned to the north and remain on the south side of Middle Waitsburg Road.

At the US Highway 12/Wilbur Avenue intersection, an acceleration lane for northbound right turns and a median acceleration lane for northbound left-turns would be installed on US Highway 12 to allow vehicles safe and adequate distance to accelerate to the posted speed on US Highway 12. The eastbound right turn lane and westbound left turn lane on US Highway 12 would be increased to WSDOT standards to provide adequate deceleration for vehicles turning onto Wilbur Avenue.



## SCENARIO #2

- **Alternative 3:** Diamond Interchange at US Highway 12/ Clinton Street intersection
- **Alternative 12:** Acceleration and Deceleration Lanes on US Highway 12 at Wilbur Avenue

Scenario #2 provides a tight, diamond interchange at the Clinton Street intersection, with Clinton Street raised over the highway.

Clinton Street would provide a north-south crossing for pedestrians, cyclists, and traffic on with left turn pockets at the on-ramp intersections. This scenario would also realign the Middle Waitsburg Road/Lower Waitsburg Road intersection 350 feet north of its existing location. The existing east-west pedestrian trail that runs along the northside of US Highway 12 at Clinton Street would also be realigned to the north and remain on the south side of Middle Waitsburg Road.

Similar to Scenario #1, at the US Highway 12/Wilbur Avenue intersection, an acceleration lane for northbound right turns and a median acceleration lane for northbound left-turns would be installed on US Highway 12 to allow vehicles safe and adequate distance to accelerate to the posted speed on US Highway 12. The eastbound right turn lane and westbound left turn lane on US Highway 12 would be increased to WSDOT standards to provide adequate deceleration for vehicles turning onto Wilbur Avenue.



## SCENARIO #3

- **Alternative 4:** At-Grade, Dual-Lane Roundabout at US Highway 12/Clinton Street
- **Alternative 11:** At-Grade, Dual-Lane Roundabout at US Highway 12/Wilbur Avenue

Scenario #3 proposes at-grade, dual lane roundabouts at the Clinton Street and Wilbur Avenue intersections along US Highway 12.

Both roundabouts would provide two-through lanes for the east-west highway movements. This scenario would also realign the Middle Waitsburg Road/Lower Waitsburg Road intersection 350 feet





north of its existing location. The existing east-west pedestrian trail that runs along the northside of US Highway 12 at Clinton Street would also be realigned to the north and remain on the south side of Middle Waitsburg Road. Both roundabouts would provide pedestrian refuge islands on each approach leg. Vehicles would enter and exit the roundabout at approximately 20-25 mph.



#### SCENARIO #4

- **Alternative 8:** Full-Diamond Interchange (three-leg) at Highway 12/Wilbur Avenue intersection

Scenario #4 proposes a three-leg, diamond interchange at the US Highway 12/Wilbur Avenue intersection. This scenario would raise US Highway 12 over Wilbur Avenue in order to maintain access



to the businesses near the interchange. Two ramp intersections on Wilbur Avenue would provide the same movements onto and off the highway that exist today.

#### US HIGHWAY 12 ROUNDABOUT CONCERNS

During the public input process, concerns were raised about installing a roundabout on a high-speed facility as proposed in Scenario

#3. The following page shows some locations where dual-lane, at-grade roundabouts have successfully been implemented on other high-speed WSDOT facilities.

## SIMILAR ROUNDABOUTS ON OTHER HIGH-SPEED WSDOT FACILITIES:

1

DUAL-LANE ROUNDABOUT  
IN LYNDEN, WA AT THE  
INTERSECTION OF WA-539 (50 MPH)  
AND WISER LAKE ROAD.



2

DUAL-LANE ROUNDABOUT IN  
MARYSVILLE, WA AT THE  
INTERSECTION OF WA-9 (55 MPH)  
AND 84TH STREET.



3

SINGLE-LANE ROUNDABOUT  
IN MATTAWA, WA AT THE  
INTERSECTION OF WA-243 (60 MPH)  
AND ROAD 24 SW.



## FUTURE TRAFFIC ANALYSIS

After the first public meeting, Scenario #4 was eliminated due to the impacts to nearby right-of-way. The first three scenarios were advanced for future traffic analysis. The intersection

operations and corridor travel times for the three advanced scenarios were analyzed under 2040 traffic conditions and are presented on the following page.

## 2040 INTERSECTION OPERATIONS

The future 2040 traffic operations at the study intersections were determined for the PM peak hour based on the 2010 Highway Capacity Manual methodology for unsignalized intersections<sup>1</sup>. The Highway Capacity Manual, 6th Edition methodology was used to evaluate the roundabout intersections.<sup>2</sup>

Table 4 lists the 2040 intersection performance for the impacted intersections during PM peak hour for the Baseline conditions and Scenarios #1, #2, and #3. The complete table showing the intersection operations for all the study

ALL **THREE** SCENARIOS PROVIDE LONG-TERM CAPACITY AND MEET THE MOBILITY STANDARD AT BOTH CLINTON STREET AND WILBUR AVENUE INTERSECTIONS

intersections can be found in the Appendix. The 2040 future volume development and baseline intersection operations, and #3, can be found in the Existing and Future Baseline Conditions Report.<sup>3</sup>

- 1 Highway Capacity Manual, Transportation Research Board, 2010.
- 2 Highway Capacity Manual, 6th Edition, Transportation Research Board, 2017.
- 3 Existing and Future Baseline Conditions Report, DKS Associates, 2019.

**TABLE 4. 2040 PM PEAK HOUR - STUDY INTERSECTION OPERATIONS FOR SCENARIOS #1, #2, AND #3**

INTERSECTION	OPERATING STANDARD	BASELINE			SCENARIO #1			SCENARIO #2			SCENARIO #3		
		LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C
<b>TWO-WAY STOP CONTROLLED OR ROUNDABOUT</b>													
N Clinton St & US Hwy 12 (WB Ramps*)	LOS D				A/C	15.1	0.18	A/B	12.6	0.14			
N Clinton St & US Hwy 12 (EB Ramps)	LOS D	A/C	15.8	0.44	A/C	15.1	0.49	A/C	15.9	0.52	A/A	9.1	0.39
Lower Waitsburg & Middle Waitsburg*	LOS E,	A/B	13.1	0.16	-	-	-	A/B	14.5	0.19	A/B	14.1	0.17
N Wilbur St & US Hwy 12	v/c ≤ 0.95	<b>A/F</b>	<b>98.9</b>	<b>1.05</b>	A/C	24.2	0.66	A/C	23.8	0.64	A/A	8.0	0.38

**Unsignalized intersection:**

Delay = Average Stopped Delay per Vehicle (sec) at Worst Movement

LOS = Level of Service of Major Street/Minor Street

v/c = Volume-to-Capacity Ratio of Worst Movement

\*N Clinton St, Hwy 12 WB Ramps, and Middle Waitsburg Road are all the same intersection in Scenario 1

**Bold/Highlighted** = Intersection does not meet operating standard.

As shown, all of the study intersections meet the required operating standards for Scenarios #1, #2, and #3 and do not significantly vary from one scenario to another. There are no significant delays or v/c ratios at any of the study intersections. All scenarios provide improved operations for the US Highway 12/Wilbur Avenue intersection compared to the 2040 Baseline scenario as well as long-term capacity at the impacted intersections.

### US HIGHWAY 12 CORRIDOR TRAVEL TIMES

The average existing eastbound and westbound travel times on US Highway 12, from the 2nd Avenue interchange to the Airport Way interchange (3.2 miles in length), is approximately 3:30 minutes (210 seconds). Under Scenario #1 and Scenario #2 conditions, the approximate eastbound and westbound travel times would remain unchanged from existing conditions as the through movements on the highway would remain unimpeded. However, under Scenario #3 conditions, the travel times would be expected to increase due to the roundabouts at Clinton Street and Wilbur Avenue. The additional delay would be attributed to vehicles decelerating to enter the roundabout and accelerating after exiting the roundabout and would be approximately 24 seconds per roundabout in either direction.<sup>1</sup> Additionally, the eastbound and westbound delay at each roundabout is approximately 14 seconds per the intersection analysis. In total, a 76-second (36%) increase in travel time would be expected along the highway corridor under Scenario #3 conditions.

<sup>1</sup> This delay was calculated using acceleration and deceleration rates identified in the AASHTO Green Book and the assumption that the posted highway speed is 60 mph and the entry and exit speed of the roundabouts is 25 mph.

### SCENARIO #1 AND SCENARIO #2:

TRAVEL TIMES ARE  
**UNCHANGED**  
FROM EXISTING  
CONDITIONS

### SCENARIO #3:

TRAVEL TIMES  
INCREASE BY  
**+76 SECS**

### PEDESTRIAN AND BICYCLE FACILITIES

This section contains a discussion on pedestrian and bicycle safety for each of the three advanced scenarios.

#### SCENARIO #1

Scenario #1 will feature a grade-separated crossing of US Highway 12 via N Clinton Street. This will provide north-south connectivity for pedestrians and bicyclists over US Highway 12 to provide access to the future northern urban growth area without conflicting with through motor vehicle traffic on US Highway 12. Additionally, the existing pedestrian trail along the north side of US Highway 12 will be maintained by being realigned north of the interchange ramps. At US Highway 12 and Wilbur Avenue, an east-west crosswalk will be added to south leg across Wilbur Avenue.

### SCENARIO #2

Scenario 2 will also feature the same motor vehicle, pedestrian and bicycle safety improvements as discussed in Scenario 1.

### SCENARIO #3

Scenario 3 will provide at-grade pedestrian and bicyclists crossings with refuge islands on all approach legs of the roundabouts. Although motor vehicles will need to yield to pedestrians and bicyclists, the speed of vehicles entering and existing the roundabout will be approximately 25 mph. These at-grade crossings will provide access to and from the northern urban growth area. Additionally, the existing pedestrian trail along the north side of US Highway 12 will be maintained by being realigned north of the interchange ramps.

## BENEFIT-COST ANALYSIS

### CRASH MODIFICATION FACTORS (CMF)

A crash modification factor (CMF) is used to estimate the expected number of crashes after implementing a safety countermeasure. The CMF is multiplied by the existing number of crashes, producing the number of expected crashes after the countermeasure has been installed. The following crash modification factors (CMFs) were found on the Crash Modification Factors Clearinghouse website<sup>1</sup>.

### SCENARIO #1

The Clinton Street intersection would be converted from an at-grade intersection to grade-separated interchange. The expected CMF is 0.58 for all crash severities.

The Wilbur Avenue intersection safety improvements would include installing a standard acceleration lane for left turns onto US Highway 12. The expected CMF is 0.90 for all crashes.<sup>2</sup>

### SCENARIO #2

Scenario 2 will also feature the same CMFS as discussed for Scenario 1.

### SCENARIO #3

The Clinton Street and Wilbur Avenue intersections would be converted from a stop-controlled intersection to multilane roundabouts. The expected CMF is 0.75 for all crash severities.

### COST ESTIMATES

Planning-level cost estimates were developed for the scenarios and are shown in Table 5. The planning-level cost estimates are shown in 2019 dollars, have significant contingency assumed, and are subject to change. Cost estimate backup information is provided in the appendix.

The main cost differences between the scenarios are related to the right-of-way acquisition costs and structure costs. Scenarios #1 and #2 had significantly higher costs in these categories than Scenario #3.

1 <http://www.cmfclearinghouse.org/index.cfm>

2 The reported CMF for installing a standard acceleration lane is 0.80 per the Clearinghouse website. Because the Wilbur Avenue intersection already has an existing acceleration lane for left-turns onto US Highway 12, the improvements would simply include bringing the existing acceleration lane up to standards. Therefore, we have assumed that only half of the crashes would be reduced with the improvement.

The safety benefits are estimated by determining the societal costs in dollars associated with the annual reduction in crashes due to the proposed improvements. The societal crash costs are determined by the State of Washington and can be found in the WSDOT Safety Analysis Guide.<sup>1</sup> The project costs are based on the mid-value cost from the cost estimate ranges as discussed above.

Table 6 shows the estimated benefit-cost ratios for the three scenarios. Benefit-cost analysis calculations can be found in the appendix.

Due to the higher cost estimate and the low benefits at the Wilbur Avenue intersection, the benefit-cost ratio for Scenarios #1 and #2 was approximately 5.5x smaller than the benefit-cost ratio for Scenario #3.

**TABLE 5. PLANNING-LEVEL COST ESTIMATES (2019 DOLLARS)**

ALTERNATIVE	TOTAL
<b>Scenario #1:</b> Partial Cloverleaf Interchange at US Hwy 12/Clinton St and Acceleration/Deceleration Lane Improvements at US Hwy 12/Wilbur Ave	\$35 - \$45 Million
<b>Scenario #2:</b> Diamond Interchange at US Hwy 12/Clinton St and Acceleration/Deceleration Lane Improvements at US Hwy 12/Wilbur Ave	\$35 - \$45 Million
<b>Scenario #3:</b> At-Grade, Dual Lane Roundabout Interchanges at US Hwy 12/Clinton St and US Hwy 12/Wilbur Ave	\$10 - \$20 Million



**TABLE 6. BENEFIT-COST ANALYSIS SUMMARY**

	SCENARIOS #1 AND #2	SCENARIO #3
Safety Benefit – Clinton Street Intersection	\$7,600,000	\$7,200,000
Safety Benefit – Wilbur Avenue Intersection	\$1,400,000	\$11,400,000
Project Cost Estimate (total cost)*	\$40,000,000	\$15,000,000
<b>Benefit-Cost Ratio</b>	<b>0.23</b>	<b>1.24</b>

\*Mid-value of cost estimate range

<sup>1</sup> Table 3, Safety Analysis Guide, WSDOT, September 2017.

## SCENARIO EVALUATION

The following section discusses the criteria evaluation of the three scenarios. The criteria are based on goals and objectives found in the City of Walla Walla’s Comprehensive Plan<sup>1</sup>, Walla Walla County’s Comprehensive Plan<sup>2</sup>, Walla Walla Valley Metropolitan and Regional Transportation Plan<sup>3</sup>, and Washington State Department of Transportation’s (WSDOT) Transportation Plan<sup>4</sup>. The nine evaluation criteria are listed to the right. The intent of this evaluation is to provide guidance as to how well the scenarios meet the needs of the community. This tool should only be used to help guide the selection of the recommended improvement as input from key stakeholders and the public will also influence the selection of the recommended improvement.

Each criterion was scored over a range of -2 to +2, with -2 meaning the scenario deteriorates performance and +2 meaning the scenario provides optimal performance. The scenarios

### EVALUATION CRITERIA:

- Safety
- Connectivity
- Transportation choices
- Travel times and operations
- Planning level cost estimates
- Right of way/property impacts
- Economic vitality
- Fundability
- Freight mobility

were scored relative to each other. The weight of each criteria was equal. The criteria evaluation matrix can be found in the appendix. The resulting scores of the scenarios are shown in Table 7. As shown, Scenario #2 had the highest score. However, the range of scores is small, showing that all three alternatives are viable options.

**TABLE 7. EVALUATION CRITERIA RESULTS**

ALTERNATIVE	SCORE
<b>Scenario #1:</b> Partial Cloverleaf Interchange at US Hwy 12/Clinton St and Acceleration/Deceleration Lane Improvements at US Hwy 12/Wilbur Ave	9.0
<b>Scenario #2:</b> Diamond Interchange at US Hwy 12/Clinton St and Acceleration/Deceleration Lane Improvements at US Hwy 12/Wilbur Ave	10.0
<b>Scenario #3:</b> At-Grade, Dual Lane Roundabout Interchanges at US Hwy 12/Clinton St and US Hwy 12/Wilbur Ave	8.5

1 Walla Walla Comprehensive Plan, City of Walla Walla, 2018.

2 Walla Walla County Comprehensive Plan, Walla Walla County, December 2007.

3 Metropolitan and Regional Transportation 2040 Plan, Walla Walla Valley Metropolitan and Sub-Regional Transportation Planning Organization, Modified December 5, 2018.

4 Washington Transportation Plan 2035, WSDOT, January 2015.

# 5

## CONSULTANT RECOMMENDATION

Based on the information presented in this memorandum, the roundabout at both Wilbur Avenue and Clinton Street intersections (Scenario #3) provides similar operational and safety benefits as the interchange options (Scenarios #1 and #2) but for a significantly lower cost. Therefore, the consultant recommends the installation of the multi-lane, at-grade roundabouts (Scenario #3) as the near-term solution.

However, based on the criteria evaluation results and the input from the community, Scenario #2 was found to adhere most closely to the goals and objectives of the local community. Therefore, the consultant recommends Scenario #2 as the long-term solution beyond the 20-year planning horizon with the assumption that the near-term solution at Wilbur Avenue (dual-lane roundabout) would not be reverted back to acceleration/ deceleration lanes in the long-term.

Further evaluation and discussion regarding the Wilbur Avenue intersection would be needed at that time to determine a reasonable long-term improvement besides the acceleration/ deceleration lanes.

### RECOMMENDATION:

#### NEAR-TERM:

INSTALLATION OF MULTI-LANE, AT-GRADE ROUNDABOUTS AT BOTH WILBUR AVENUE AND CLINTON STREET INTERSECTIONS (SCENARIO #3)

#### LONG-TERM:

INSTALLATION OF A DIAMOND INTERCHANGE AT THE CLINTON STREET INTERSECTION

REEVALUATE LAND USE NEEDS AND PERFORMANCE OF DUAL-LANE ROUNDABOUT AT THE WILBUR AVENUE INTERSECTION TO DETERMINE DESIRED LONG-TERM SOLUTION THERE

As provided in the technical analysis, both roundabouts will provide long-term capacity through the current planning horizon (2040) based on current growth assumptions in the north urban growth expansion area. However, as additional land use and growth assumptions are determined for the north UGA, the need for a different long-term solution beyond what was evaluated in this report may arise and should be considered if needed.



# 6 TECHNICAL ADVISORY COMMITTEE (TAC) DELIBERATION

On October 31st, the project consultant met with the Technical Advisory Committee (TAC) and discussed the consultant recommendation as stated above. At this meeting, each representative had an opportunity to voice their preferred recommendation and bring to light any concerns regarding any of the scenarios. Some agencies preferred the

diamond interchange option (Scenario #2) while others preferred the roundabouts (Scenario #3). In general, the disagreement about the preferred recommendation centered around project funding and how much emphasis should be placed on the B/C analysis. Below are summaries of each agency's stance on the project recommendation:

## WSDOT

WSDOT employs the Practical Solutions framework in order to make decisions based on performance and safety. Based on the analysis found in this memorandum (specifically the benefit-cost ratio evaluation), they **support a recommendation for the dual-lane roundabouts as the near-term solution and the diamond interchange at Clinton Street as a potential long-term solution**, viewing this project as a phased project.

## PORT OF WALLA WALLA

The Port of Walla Walla **supports the Clinton Street diamond interchange and acceleration/deceleration lane improvements at Wilbur Avenue as the only recommended solution** since it is the consultant's recommended long-term solution. The agency does not support roundabouts due to the lack of current available funding (for either an interchange or a roundabout) and wants the long-term improvement to be the community's sole focus of funding efforts.

## THE COUNTY

The County is **not supportive of the roundabouts scenario**. However, as long as the implementation of the roundabout scenario does not suppress the opportunity to secure federal funds for the interchange option in the future, the County **would be supportive of the near-term/long-term approach** as outlined in the consultant recommendation.

## THE MPO

The MPO decisions are driven by performance-based measures. Therefore, based on the analysis results of this project, the **dual-lane roundabouts (Scenario #3) is the supported solution** by the MPO. The MPO agrees with the City in supporting Scenario #3 as it greatly improves safety at both the Clinton Street and Wilbur Street intersections. Scenarios #1 and #2 do not provide as great of a safety benefit as Scenario #3. The MPO sees a definite need for reevaluation of the study area as development and growth in the northern UGA occurs.

## THE CITY

The City is most concerned with improving access and connectivity while also improving safety. If the **dual-lane roundabouts (Scenario #3) are the solution that can be implemented the soonest (due to ability to gather funds), then that is the supported scenario by the City**. Additionally, the City supports Scenario #3, as it greatly improves safety at both the Clinton Street and Wilbur Street intersections. Scenarios #1 and #2 do not provide as great of a safety benefit as Scenario #3. The City supports the idea of installing an interchange at the Clinton Street intersection in the future as funds become available and the need for it arises.