State Route 162/410 Interchange Congestion Study

Study Limits MP 0.00 to 0.17

Final Report
December 2018

Washington State Department of Transportation

Olympic Region Multimodal Planning
P.O. Box 47440
Olympia, WA 98504

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State Route 162/State Route 410 Interchange Congestion Study
December 2018

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Approved by:

[signature]

12-18-18

John Wynands
WSDOT Olympic Region Administrator

Date

Concurrence:

Kerri Woehler

12-17-2018

Kerri Woelher
Director, Multimodal Planning

Date

SR 162/SR 410 Interchange Congestion Study

Executive Summary

The Washington State Legislature in 2018 directed the Washington State Department of Transportation (WSDOT) to recommend improvements to the highway interchange at State Route (SR) 162 and SR 410. The goal of the study was to affirm recommendations of the 2017 *SR 162 Sumner to Orting Congestion Study*, resulting in formalized solutions to relieve congestion. To meet this goal, WSDOT compiled information from the 2017 study pertaining to this study area, and generated additional data needed to validate near-, mid- and long-term intersection improvements.

Study Area

The SR 162/410 interchange is located in Sumner near the Puyallup River. Limits of the study are SR162 milepost 0.00 to 0.17. Exhibit ES1 shows a map of the study area.

Exhibit ES1: Study Area

WSDOT staff conducted this study using WSDOT's Practical Solutions approach. This approach encourages system performance management through cost-effective operational improvements first, by considering demand management opportunities and second, after exhausting other options, by considering capacity expansion. Using Practical Solutions approach, community input, policy change and local network improvements were considered before capacity investments strategies. The 2017 *SR 162 Sumner to Orting Congestion Study* (2017 study), which was the basis of this study, also used the Practical Solutions approach.

Alternatives considered

The 2017 study evaluated near-term (5 years), mid-term (10 Years), and long-term (20 Years) improvement alternatives over an eight mile corridor including at the eastbound and westbound interchange ramps on SR 410 at SR 162. The identified strategies were found to be valid and were carried forward in 2018.

Strategies

The 2017 *SR 162 Sumner to Orting Congestion Study* identified the five strategies as:

1. Transportation Demand Management
2. Operational Improvements/Intelligent Transportation Systems/Incident Management
3. Public Transportation Services
4. Park and Ride lots, Bicycle and Pedestrian Facility Improvements, Minor Access Management measures
5. Intersection Control/Corridor Improvements

Near-term strategies, shown as one through four in the above list, remain unchanged from the 2017 study; continued pursuit of strategies one through four by WSDOT and other partners is recommended. The mid- and long-term solutions were refined in this study.

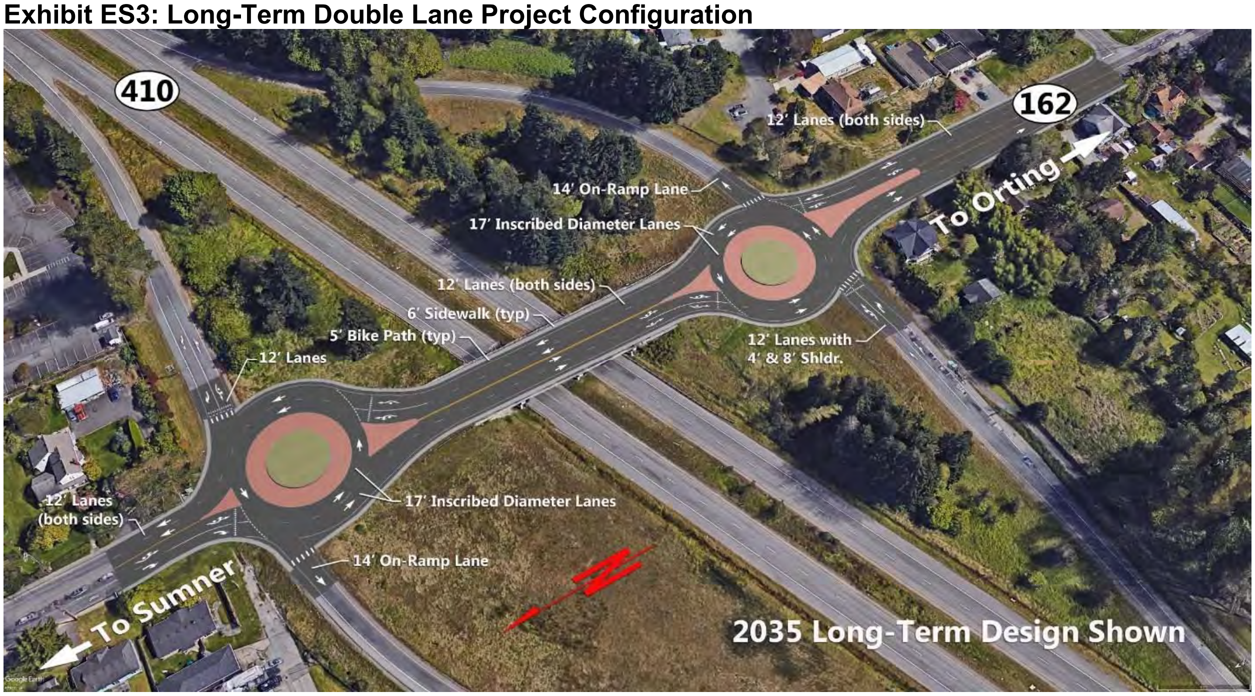
The mid-term strategy includes a one-lane roundabout configuration at each of the interchange ramps. Exhibit ES 2 shows details of this project. The cost range for construction was estimated between $6,649,165 for the design-bid-build option, to $7,724,563 for the design-build option. The work would construct roundabouts at the two intersections with an additional northbound lane across the exisiting bridge structure. The additional lane on the bridge would be accomplished by restriping the existing lanes, not by widening the bridge structure.

The long-term strategy widens the bridge between the two roundabouts and completes the roundabouts to be two-lane throughout. Exhibit ES 3 shows details of this project. The long-term cost range for construction was estimated between $18,078,192 for the design-bid-build option, to $19,969,986 for the design-build option. The resulting work would expand the roundabouts to a double lane configuation and add a southbound lane across the widened bridge structure.

The key benefits of the recommended alternatives for the mid, and long-term, would improve continuous traffic flow, reduce conflicting turning movements and thus reduce the potential for crashes, and accommodate all travel modes including cyclists, pedestrians, trucks, and buses.

Exhibit ES2: Mid-Term Recommended Project

Exhibit ES3: Long-Term Double Lane Project Configuration



Next steps

WSDOT will continue to work with interested partners on the strategies considered pertinent and viable over the near-, mid-, and long-term operation of the interchange. Highway corridor improvements could be pursued by local jurisdictions in coordination and partnership with WSDOT.

Chapter 1: Introduction

The Washington State Legislature in 2018 directed the Washington State Department of Transportation (WSDOT) to recommend improvements to the highway interchange at State Route (SR) 162 and SR 410. The goal of the study was to affirm recommendations of the 2017 *SR 162 Sumner to Orting Congestion Study* (2017 study), resulting in formalized solutions to relieve congestion. To meet this goal, WSDOT compiled information from the 2017 study pertaining to this study area, and generated additional data needed to validate near-, mid- and long-term intersection improvements.

Study Area

The SR 162/410 interchange is located in Sumner near the Puyallup River. Limits of the study are SR162 milepost 0.00 to 0.17. Exhibit 1 shows a map of the study area.

Exhibit 1: Study Area

Study Development

For the 2017 study, a Study Management Plan was developed to manage overall study scope and milestones, including schedule, budget and deliverables. In 2018, the study team compiled information from the 2017 *SR 162 Sumner to Orting Congestion Study* pertaining to the study area at SR 162/SR 410 interchange to generate additional data as needed to validate the current and future system performance and needs. WSDOT technical staff reviewed the draft study, which included a multidiscipline, multimodal perspective.

Stakeholder Outreach

During the 2017 study, five stakeholder meetings were held between June 30 and November 9, 2016. Stakeholders participated in the following:

- Developing goals and objectives
- Developing a needs statement
- Administering an online survey
- Brainstorming of ideas for reducing congestion
- Modeling of the results
- Screening and ranking final strategies
- Reviewing the final study document

The stakeholders were kept informed on the progress of all of the study work such as the public outreach and elected briefings. At the final stakeholder meeting, the final strategies were determined using a ranking methodology concurred by the stakeholders. In December 2018, WSDOT met with local jurisdictions to provide results of the new analysis, and updating the strategies agreed to in the 2017 study.

In addition to the five Stakeholder meetings, WSDOT met with the City Councils of Sumner, Orting, and Bonney Lake, and with elected officials. Stakeholders invited/participated included: representatives from Pierce County, Sumner, Orting, Bonney Lake, Pierce Transit, Sound Transit, Muckleshoot Tribe, Puyallup Tribe, Nisqually Tribe, Squaxin Island Tribe, Yakama Nation, Puget Sound Regional Council, and Tehaleh/Newland development group.

Community Outreach

A public outreach process was conducted along the corridor to gather public input. The 2017 study outreach process involved an online survey and two public informational open house meetings. The survey generated 2,214 responses; results showed approximately 75 percent of the respondents drive alone. The open house meetings were attended by 35 people.

Proviso Requirements

This planning study was conducted to meet the requirements identified by the Washington State Legislature. ESSB 6106, Section 218 (4)[1] states: "$200,000 of the motor vehicle account – state appropriation is provided solely for implementation of a practical solutions study for the state route number 162 and state route number 410 interchange, based on the recommendations of the SR-162 Study/Design project (L2000107). The study must include short, medium, and long-

[1] State of Washington. ENGROSSED SUBSTITUTE SENATE BILL 6106. 65th Legislature 2018 Regular Session. http://leap.leg.wa.gov/leap/Budget/Detail/2018/2018tr6106-S.PL.pdf

term phase recommendations and must be submitted to the transportation committees of the legislature by January 1, 2019."

Guiding Document

This planning study was informed by the SR 162 Sumner to Orting Congestion Study[2], published in June 2017.

[2] WSDOT. SR 162 Sumner to Orting Corridor Planning Study. https://www.wsdot.wa.gov/planning/Studies/SR162Corridor.htm

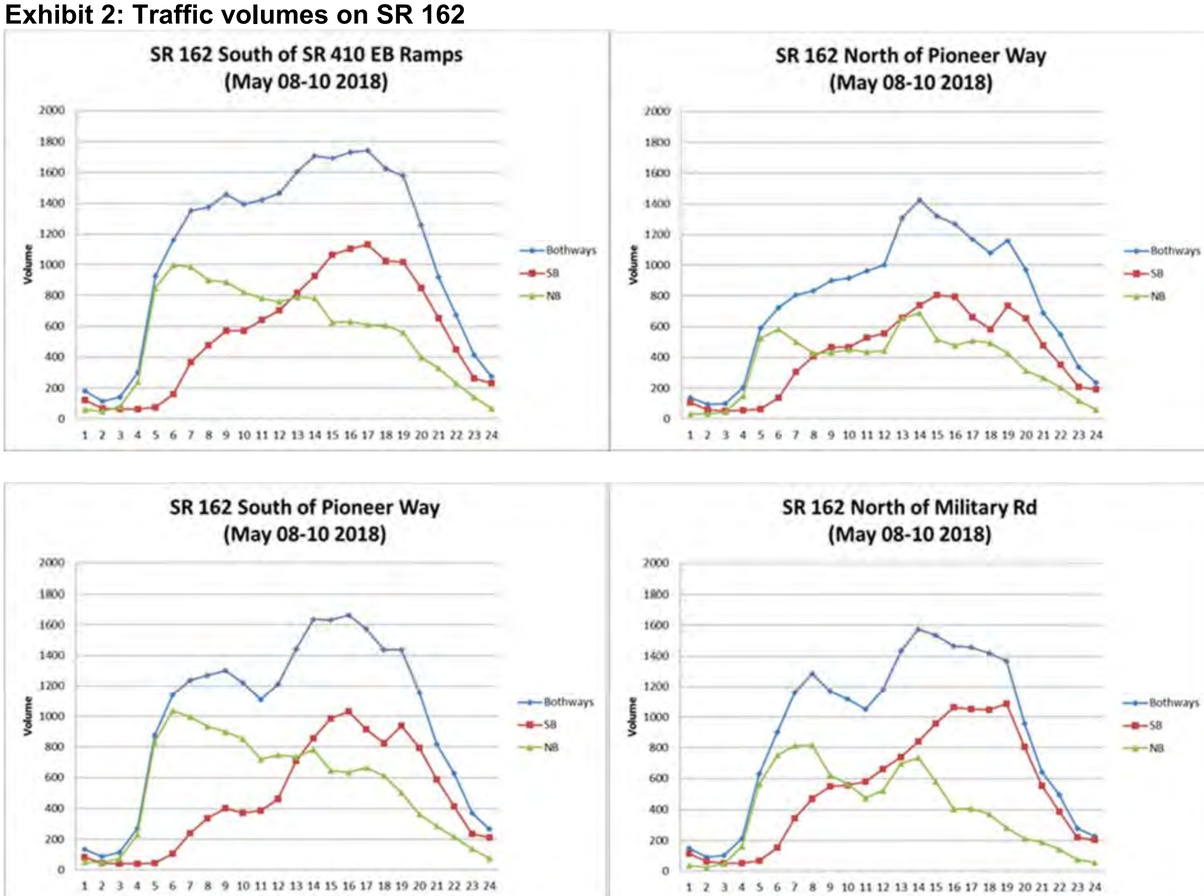
Chapter 2: Traffic Analysis

To update the traffic analysis from the 2017 study to current conditions and to ensure we are on track with our previous work and recommendations, new traffic counts were collected within the study limits. This data used snapshots of traffic conditions during May 2018. It supports the Synchro model, and results are compared with the data collected in 2016 that were used in the 2017 study.

Traffic Counts

Traffic count data was collected at five locations on the week of May 7, 2018. Exhibit 2 shows the 24-hour traffic volume distributions at these six locations along the study corridor by direction and combined. In the 24 hour count distributions at five locations along the study corridor, the highest directional counts were 1,219 vehicles per hour on the southbound direction south of 128th Street E at 5:00 p.m. Similar volumes were found at the SR 410 interchange.

Exhibit 2: Traffic volumes on SR 162



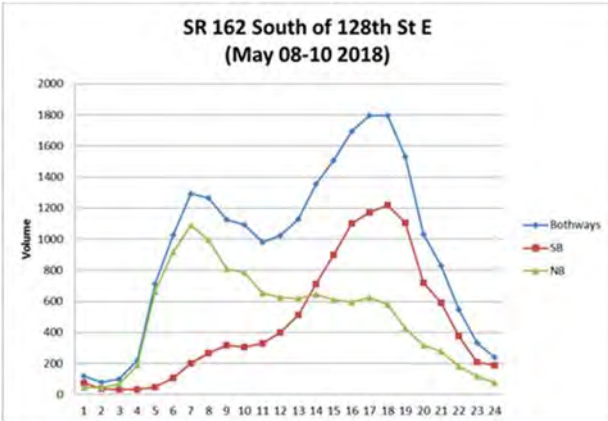
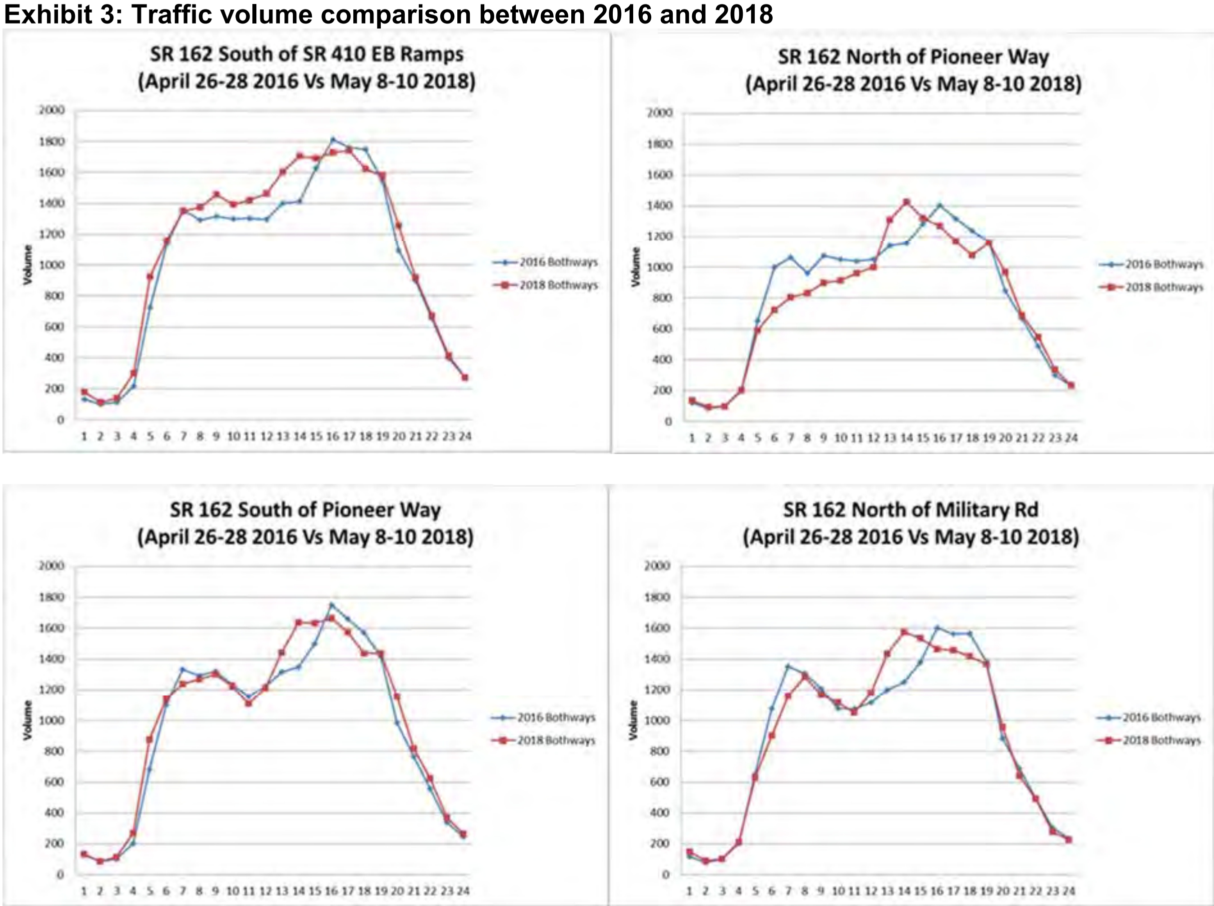
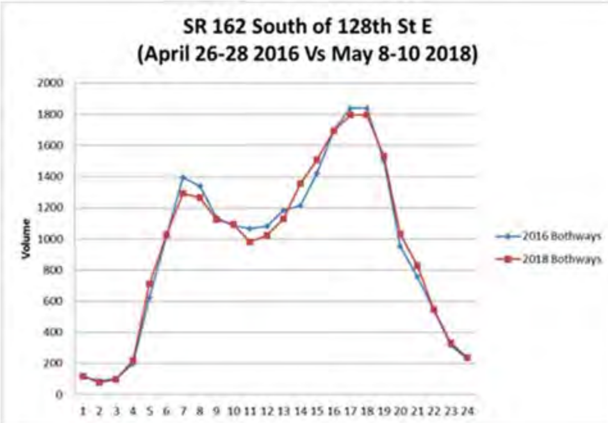


Exhibit 3 shows comparisons of the combined traffic counts for 2016 and 2018. Overall the daily traffic volumes observed in 2018 are similar to volumes observed in 2016. However, traffic volume on the SR 410 bridge during the a.m. peak period was less than traffic volume observed in 2018; the difference primarily was on the northbound direction. The p.m. peak at Pioneer Way and Military Road also shifted about two hours earlier. The potential reason for this is discussed below in Travel Time.

Exhibit 3: Traffic volume comparison between 2016 and 2018





Turning Movement Counts

The intersection turning movement counts were collected for nine intersections along SR 162 during May 2018, and compared against results from 2016. The changes in a.m. peak hour intersection volumes range from -3 percent to 11 percent, with the highest change at Military Road E. The changes in p.m. peak hour intersection volumes range from -9 percent to 5 percent with the highest change at Rivergrove Drive E. Turning movement data for a.m. peak hour counts is shown in Exhibit 4 by intersection; turning movement data for p.m. peak hour counts is shown in Exhibit 5 by intersection.

Exhibit 4: A.M. Peak Hour Turning Volumes

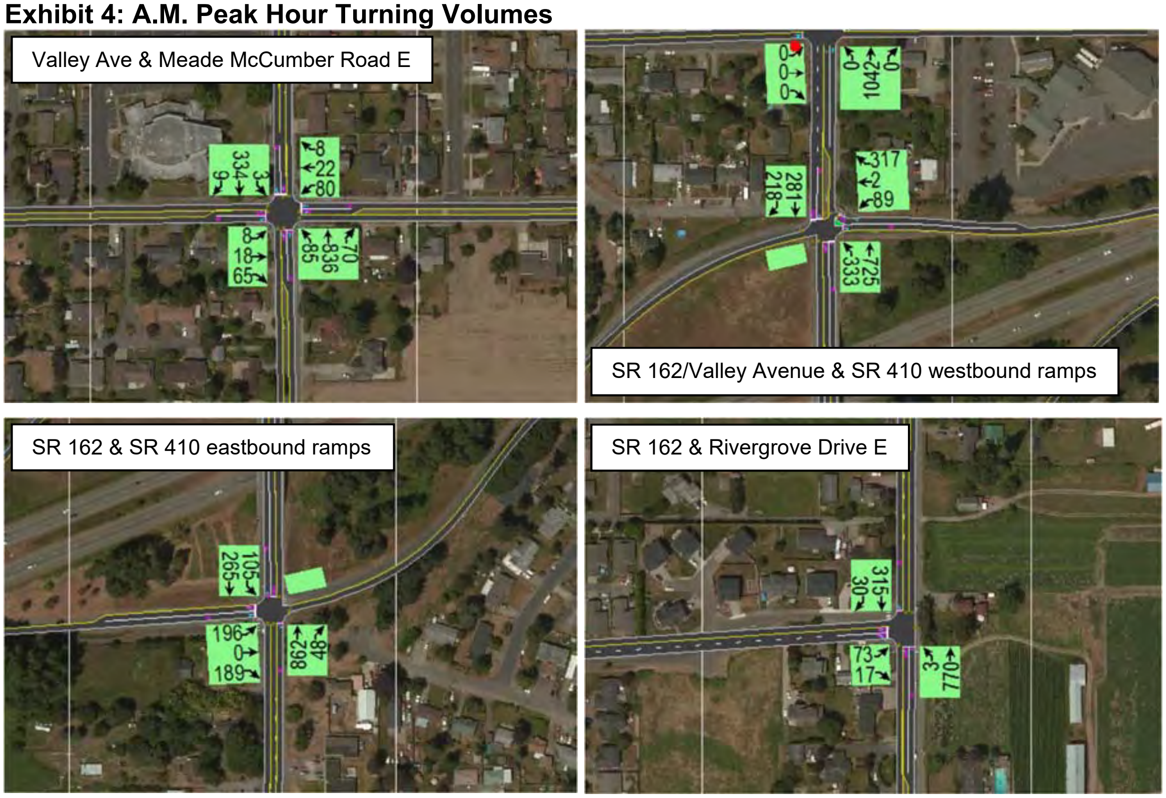
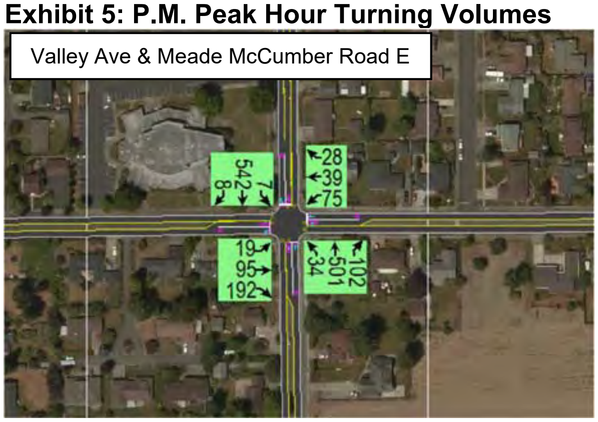
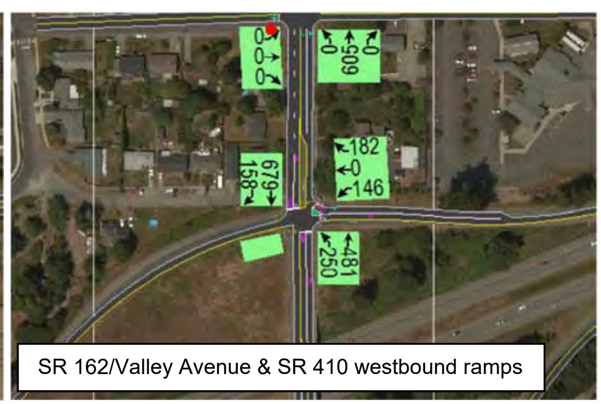


Exhibit 5: P.M. Peak Hour Turning Volumes

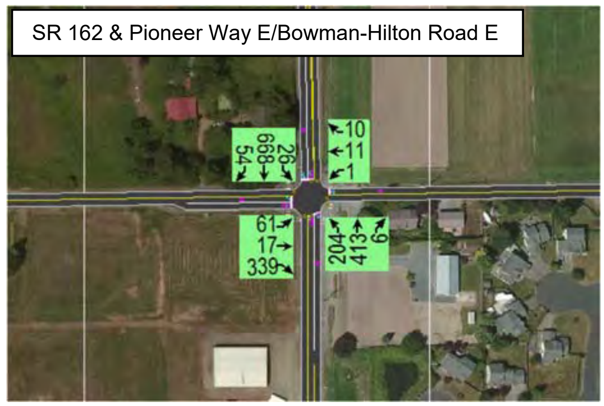





SR 162 & SR 410 eastbound ramps
126
669
235
2
458
496
97


SR 162 & Rivergrove Drive E
898
102
35
29
18
478


SR 162 & 80th Street E
741
184
21
7
6
475


SR 162 & Pioneer Way E/Bowman-Hilton Road E
54
668
26
10
11
1
61
17
339
204
413
6


SR 162 & 96th Street E
7
844
84
131
3
247
9
4
7
4
494
93


SR 162 & Military Road E
370
685
204
413
351
362


SR 162 & 128th Street E
10
964
119
106
5
262
11
1
4
3
594
79

There are some significant volume changes on SR 162 coming from side streets. In the a.m. peak hour, the traffic coming from Military Road E (eastbound approach) increased by 230 vehicles (62 percent) compared to 2016 volumes. Similarly in p.m. peak hour the traffic increased by 110 vehicles (21 percent). The traffic coming from westbound 96th Street E in p.m. peak hour increased by 140 vehicles (59 percent). These volume changes coming from side streets significantly affect the traffic flows along SR 162. As described above, more signal green time would need to be given to side streets and the north-south direction signal green time on SR 162 would be less. This is why the travel time along SR 162 significantly increased.

Exhibit 6 shows the 2018 intersection average delay and level of service based on Highway Capacity Manual 2010 methodology in Synchro for a.m. and p.m. peak hours. Highlighted cells indicate lower performance. For comparison purposes, the signal timings and cycle lengths at these nine intersections were not changed from 2016 conditions. This allows for observed changes in volume over time.

Exhibit 6: 2018 Peak Hour Delay

Roadway Intersection	AM Delay	AM Level of Service	PM Delay	PM Level of Service
Valley Ave & Meade McCumber Road E	133.3	F	87.4	F
SR 162/Valley Avenue & SR 410 westbound ramps	66.9	E	36.7	D
SR 162 & SR 410 eastbound ramps	83.3	F	54.4	D
SR 162 & Rivergrove Drive E	9.2	A	12.8	C
SR 162 & 80th Street E	26.2	D	33.3	D
SR 162 & Pioneer Way E/Bowman-Hilton Road E	48.0	D	72.3	E
SR 162 & 96th Street E	52.4	D	56.0	E
SR 162 & Military Road E	27.1	C	127.9	F
SR 162 & 128th Street E	71.7	E	66.2	E

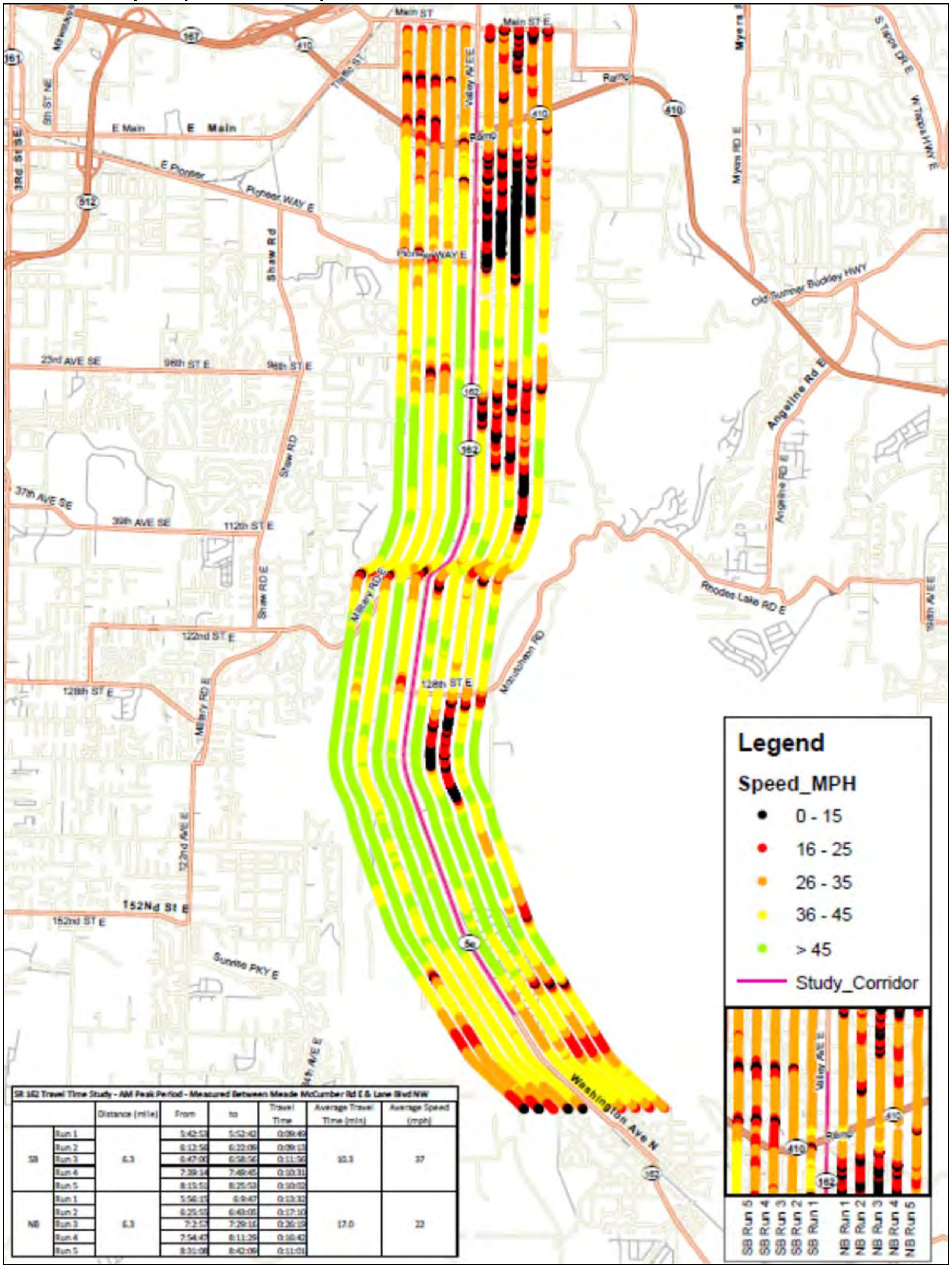
The delay at Meade McCumber Road E increased. in a.m. peak hours to 133 seconds from 73 seconds in 2016, while the delay in p.m. peak hour increased to 87 seconds from 64 seconds. The delays at intersections at 96th Street E and Military Road E also got worse compared to 2016, mainly due to the heavier side street traffic coming into SR 162.

Travel Time

WSDOT conducted a travel time survey in June 2018. The travel time route was from Meade McCumber Road E to Lane Boulevard NW which is in the same location as the 2017 study. Five runs in total were conducted for both a.m. and p.m. peak periods. To determine travel times, a GPS device which generates a point every second or two was used. Each generated point included the time stamp and the point speed. Therefore, the congested locations were identified by plotting all points on the map.

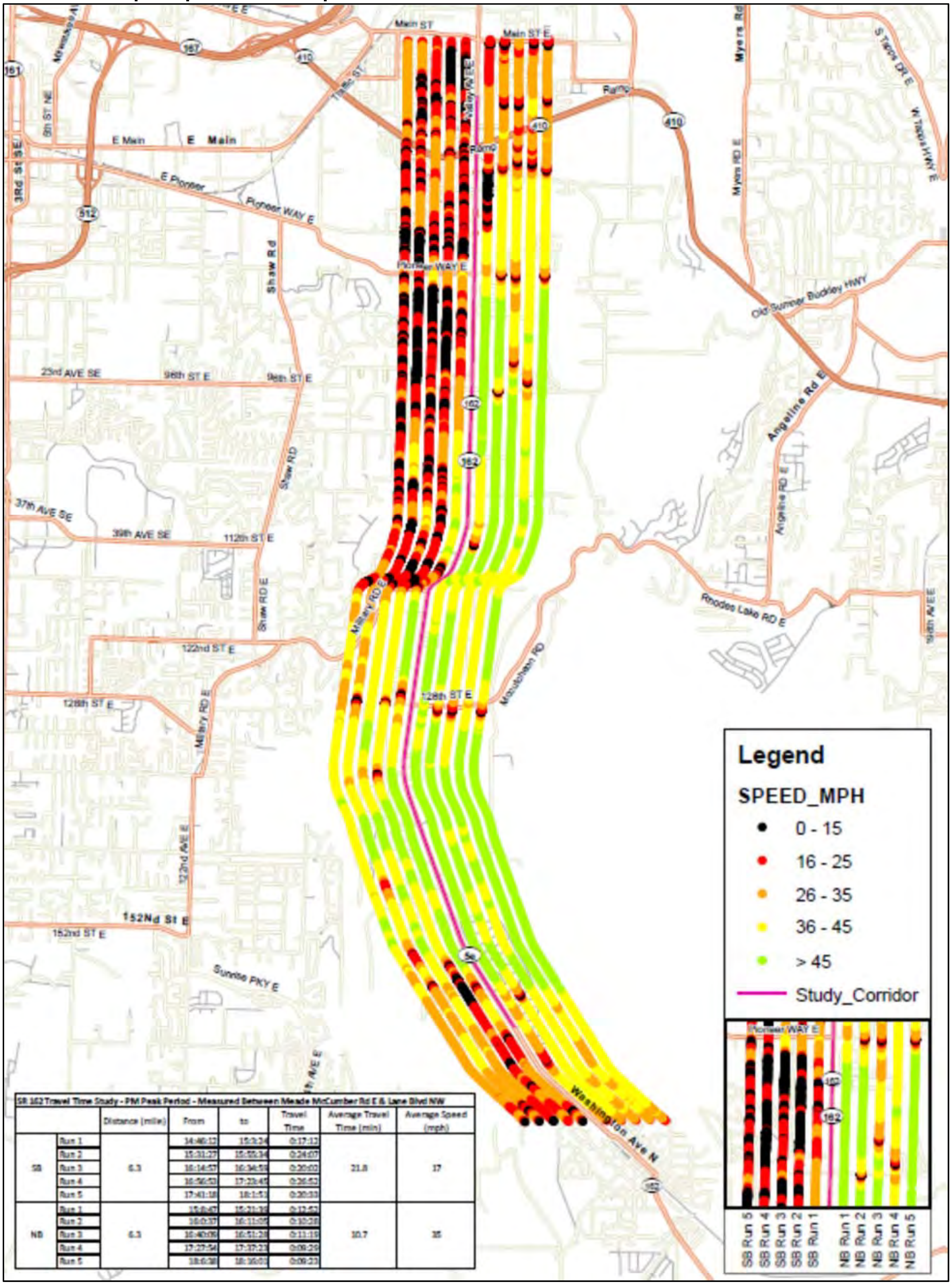
Exhibit 7 shows the variations of the travel speed along the study corridor for a.m. peak hours. The green indicates the travel speed is greater than 45 mph and black indicates the travel speed is below 15 mph. Congestion or the travel speed below 15 mph occurred in the northbound direction when approaching 128th Street E, approaching 96th Street E, and approaching the SR 410 interchange. Exhibit 8 shows p.m. peak period travel speed. During p.m. peak period, the congestion occurred on southbound mainly from Military Road E intersection backing up to the SR 410 interchange and beyond.

Exhibit 7: AM peak period travel speed



SR 162 Travel Time Study - AM Peak Period - Measured Between Meade McCumber Rd E & Lane Blvd NW							
		Distance (mile)	From	to	Travel Time	Average Travel Time (min)	Average Speed (mph)
SB	Run 1	6.3	5:42:53	5:52:42	0:09:49	10.3	37
	Run 2		6:12:56	6:22:08	0:09:12		
	Run 3		6:47:00	6:58:56	0:11:56		
	Run 4		7:39:14	7:49:45	0:10:31		
	Run 5		8:15:51	8:25:53	0:10:02		
NB	Run 1	6.3	5:56:15	6:9:47	0:13:32	17.0	22
	Run 2		6:25:55	6:43:05	0:17:10		
	Run 3		7:2:57	7:29:16	0:26:19		
	Run 4		7:54:47	8:11:29	0:16:42		
	Run 5		8:31:08	8:42:09	0:11:01		

Exhibit 8: PM peak period travel speed



SR 162 Travel Time Study - PM Peak Period - Measured Between Meade McCumber Rd E & Lane Blvd NW

		Distance (mile)	From	to	Travel Time	Average Travel Time (min)	Average Speed (mph)
SB	Run 1	6.3	14:46:12	15:3:24	0:17:12	21.8	17
	Run 2		15:31:27	15:55:34	0:24:07		
	Run 3		16:14:57	16:34:59	0:20:02		
	Run 4		16:56:53	17:23:45	0:26:52		
	Run 5		17:41:18	18:1:51	0:20:33		
NB	Run 1	6.3	15:8:47	15:21:39	0:12:52	10.7	35
	Run 2		16:0:37	16:11:05	0:10:28		
	Run 3		16:40:06	16:51:25	0:11:19		
	Run 4		17:27:54	17:37:23	0:09:29		
	Run 5		18:6:38	18:16:01	0:09:23		

Exhibit 9 shows the average travel time and speed for a.m. peak period. Measurement was made between Meade McCumber Road E and Lane Boulevard NW, a distance of 6.3 miles, over five runs. The southbound average travel time during the a.m. peak period was 10.3 minutes, showing no change from 2016. The northbound average travel time during the a.m. peak period was 17.0 minutes, an increase of 5.1 minutes from 11.9 minutes in 2016.

Exhibit 9: AM Average Travel Time and Average Speed

Run	From	To	Travel Time	Average Travel Time (Minutes)	Average Speed (mph)
Southbound 1	5:42:53	5:52:42	0:09:49	10.3	37
Southbound 2	6:12:56	6:22:09	0:09:13		
Southbound 3	6:47:00	6:58:56	0:11:56		
Southbound 4	7:39:14	7:49:45	0:10:31		
Southbound 5	8:18:51	8:25:53	0:10:02		
Northbound 1	5:56:15	6:09:47	0:13:32	17.0	22
Northbound 2	6:25:55	6:43:05	0:17:10		
Northbound 3	7:02:57	7:29:16	0:26:19		
Northbound 4	7:54:47	8:11:29	0:16:42		
Northbound 5	8:31:08	8:42:09	0:11:01		

Exhibit 10 shows the average travel time and speed for p.m. peak period. Measurement was made between Meade McCumber Road E and Lane Boulevard NW, a distance of 6.3 miles, over five runs. The southbound average travel time during the p.m. peak period was 21.8 minutes, showing an increase of 4.7 minutes from 17.1 minutes in 2016. The northbound average travel time during the p.m. peak period was 10.7 minutes, a reduction of 0.8 minutes from 2016.

Exhibit 10: PM Average Travel Time and Average Speed

Run	From	To	Travel Time	Average Travel Time (Minutes)	Average Speed (mph)
Southbound 1	14:46:12	15:03:24	0:17:12	21.8	17
Southbound 2	15:31:27	15:55:34	0:24:07		
Southbound 3	16:14:57	16:34:59	0:20:02		
Southbound 4	16:56:53	17:23:45	0:26:52		
Southbound 5	17:41:18	18:01:51	0:20:33		
Northbound 1	15:08:47	15:21:39	0:12:52	10.7	35
Northbound 2	16:00:37	16:11:05	0:10:28		
Northbound 3	16:40:09	16:51:28	0:11:19		
Northbound 4	17:27:54	17:37:23	0:09:29		
Northbound 5	18:06:38	18:16:01	0:09:23		

Although the daily traffic distribution was similar to data from 2016, the travel time at peak directions during a.m. and p.m. peak periods was significantly increased. The potential reason for this increase could be due to Pierce County's Shaw Road E closure between 23rd Avenue SE and Manorwood Drive. Based on the turning movement counts collected in May 2018, the traffic coming from Military Road E (eastbound approach and detour for Shaw Road E closure) increased by 230 vehicles in the a.m. peak hour compared to 2016 volumes. Therefore, the traffic signal would need to accommodate by increasing the green time for eastbound approach. The green time for the north-south directions on SR 162 would be much less than before. The travel time would increase even though volumes are similar. The queue lengths would be much longer due to inefficient platooning.

Travel Demand Modeling

Travel demand forecast modeling for this study remains the same as the 2017 study. For this study, WSDOT compared and validated the most current counts and travel time in 2018 with the previous data generated in 2016 and ensured the strategies and recommendations remained valid.

Chapter 3: Safety Analysis

Crash data for the most recent five years was analyzed at the westbound and eastbound ramps in the study area. Crash data for the 5-year time period January 1, 2013 through December 31, 2017 at the westbound ramp reveal the following:

- Seven crashes have occurred at this intersection.
- No fatal or serious injury crashes occurred.
- Two of the seven crashes resulted in possible injuries, while the remaining crashes were non-injury crashes.
- Six of the seven crashes (86 percent) were rear end type crashes, the primary crash type at this intersection.

Crash data for the 5-year time period January 1, 2013 through December 31, 2017 at the eastbound ramp reveal the following:

- 24 crashes occurred at this intersection.
- No fatal or serious injury crashes occurred.
- Seven of the 24 crashes resulted in possible injuries, while the remaining 17 crashes were non-injury crashes.
- 17 of the 24 crashes (71 percent) were rear end type crashes, the primary crash type at this intersection.

Changes in Crash History

Results from this analysis are similar to the analysis completed in 2017. The 2017 study analyzed data from 2011 to 2015 over the corridor. Results of that analysis revealed the following:

- 409 crashes occurred on the SR 162 corridor.
- No fatal crashes occurred.
- 4 serious injury crashes occurred.
- 282 of the 409 crashes (73 percent) were rear end type crashes, the primary crash type at this intersection.

Chapter 4: Environmental Analysis

The 2017 study identifies key environmental features. These features include climate risk assessment, fish passage barriers, and wildlife habitat and connectivity. There are no key environmental issues identified in this study area.

Chapter 5: Improvement Strategies

The 2017 study identified a significant number of strategies, based on the practical solutions approach. The strategies encourage system performance management through cost-effective operational improvements first, followed by demand management opportunities. Community input, policy changes, and local network improvements were also considered before lastly considering capacity expansion. This study used the 2017 study framework and updated the solutions based on new traffic and safety data analysis. Solutions are provided for near-term (5 years), mid-term (10 Years), and long-term (20 Years) time frame.

Near-Term Solutions (2020)

Near-term solutions were not further analyzed as part of this study. The 2017 study recommendations include the following strategies which were identified to have continued value at a corridor level in the near term and through the 20 year study period:

Transportation Demand Management

Transportation Demand Management strategies are aimed at travel behavior rather than expanding the transportation network to meet travel demand. Such strategies may include:

- The promotion of work hour changes
- Rideshare options (carpool, vanpool, etc.)
- Worksite parking policies
- Telecommuting

Operations/Intelligent Transportation Systems/Incident Management

Operational improvement strategies are aimed at system efficiency. Operational strategies may include:

- Active Traffic Management
- Traffic signal timing/optimization
- Signal interconnect actions

Intelligent Transportation Systems (ITS) improve transportation safety and mobility through the use of advanced wireline and wireless communications technologies. ITS strategies proposed include:

- Electronic traveler information
- Highway Advisory Radio (HAR)
- Road & weather information systems

The SR 162 corridor is not presently included in WSDOT's ITS Plan.

WSDOT Incident Response resources clear traffic incidents safely and quickly, minimizing congestion and the risk of secondary incidents. Incident management strategies include:

- Multiple shoulder pullout areas
- Incident response resources during peak travel times

Public Transportation Services

Public Transportation strategies include multiple elements of transit and rail service.

Park and Ride lots, Bicycle & Pedestrian Facility Improvements, Minor Access Management

These types of strategies include:

- Small to medium-sized public park and ride lots both publicly and privately-owned, which may or may not be served by transit.
- Shoulder widening
- Improved bicycle and pedestrian accessibility and mobility
- Minor access management treatments, including improved delineation of highway access to SR 162.

Mid-Term Solutions (2025)

A scoping-level estimate was completed with more detail than the planning-level estimate in 2017. Major cost items such as bridge widening, roundabout configuration, right-of-way acquisition, and utility relocation were reviewed, including meeting with subject experts as needed. The estimate was also reviewed to consider engineering costs and sales tax, the costs of design-bid-build compared to design-build, and to determine important considerations which need to be taken forward with the mid-term solution. This section includes strategies from the 2017 study that are identified to have continued value at a corridor level in the mid-term. In addition, a mid-term project is recommended.

Intersection Channelization

Intersection channelization is a strategy that increases mobility and capacity at highway intersections using turn lanes and striping.

Roundabouts

Modern roundabouts create continuous, one-way traffic flow, reduce crashes and cost less to maintain than traditional signalized intersections. Converting signalized intersections in a suburban environment into single lane roundabouts may reduce fatal and all injury crashes.

Corridor Segment Widening

Capital investments that significantly widen the existing roadway are used sparingly.

Recommended mid-term project

The recommended mid-term project details are shown in Exhibit 11. The project recommendations are based on 2018 traffic volumes. The project includes intersection channelization, roundabouts, and widening. Specific strategies include:

- Restripe SR 162 between the ramp intersections to provide one southbound and two northbound lanes.
- Replace the existing signalized ramp intersections with roundabouts.
- Add a second lane to the northbound SR 162 approach to the eastbound ramp intersection.

The roundabout design will address pedestrian and bicycle needs. The project anticipates the relocation of Puget Sound Energy's two high-voltage lines to locations compatible with both the mid-term and long-term projects. Property acquisition from the Puget Sound Energy parcel east of SR 162, between 74th Street and the interchange, is included in the mid-term project.

Roundabouts have the potential to reduce the total number of crashes and the crash severity compared to signalized intersections because roundabouts slow traffic down by using splitter-island, channelized approaches and a raised central island. These features result in lower vehicle speeds and fewer conflict points.

In order to determine safety benefits of a roundabout, WSDOT used crash modification factors to estimate a change in the annual number of crashes, or the severity of crashes. The factors are created based on studies that use locations where the particular change in question was made and the effects were monitored. Each factor is for a specific situation, for example changing a signalized intersection to a single lane roundabout. In this case, a factor of 0.45 was used, and was applied to the historical annual crash history. As a result, WSDOT expects the number of crashes to drop to 45 percent of the historical amount.

Exhibit 11: Mid-Term Project Configuration

The cost estimate for the mid-term project is shown in Exhibit 12. The 2018 costs were calculated on a design-build and a design-bid-build deliverable factor.

Exhibit 12: Mid-Term Project Cost Estimation

Construction	
Preparation	$345,154
Grading	$336,725
Storm sewer	$256,100
Bridge widening	$0
Surfacing and paving	$280,280
Erosion control and planting	$102,629
Traffic	$1,093,596
Other items	$594,705
Construction work subtotal	$3,009,189
Uncertainties (25%)	$752,297
Sales Tax (9.3%)	$349,818
Subtotal	$4,111,304

Design-Bid-Build Option	
WSDOT construction engineering (14%)	$575,583
Utilities and other agreements	$0
Change order contingency (4%)	$164,452
Project construction total	$4,851,339
Right of way estimated	$20,000
WSDOT utilities	$750,000
WSDOT preliminary engineering (25%)	$1,027,826
Pre total	$1,797,826
Project total	$6,649,165

Design-Build Option	
Construction work subtotal	$3,009,189
Uncertainties (25%)	$752,297
Consultant design estimated (15%)	$451,378
Design/builder construction engineering (8%)	$240,735
Subtotal	$4,453,599
Sales tax (9.3%)	$414,185
Subtotal	$4,867,784
Contingencies (2%)	$97,356
WSDOT design and constriction oversight	$389,423
Incentives/disincentives	$200,000
Bidder stipend	$600,000
WSDOT preliminary engineering	$1,000,000
Utility relocation estimated	$750,000
Right of way estimated	$20,000
Project total	$5,354,563
Project total with non-construction estimated work	$7,724,563

Long-Term Solutions (2035)

A scoping-level estimate described for the mid-term project was also completed for the long term. Major cost items such as bridge widening, roundabout configuration, right-of-way acquisition, and utility relocation were reviewed, including meeting with subject experts as needed. This estimate was also reviewed to consider engineering costs and sales tax, the costs of design-bid-build compared to design-build, and to determine important considerations which need to be taken forward beyond the mid-term solutions. This section includes a recommended long-term project and a potential long-term project, based on 2035 traffic volumes.

Recommended long-term project

The long-term project details are shown in Exhibit 13. The long-term project includes the following specific strategies:

- Add a second southbound lane through the roundabouts and between the ramp intersections, merging into the existing lane between the interchange and 74th Street.
- Widen the existing bridge over SR 410 to accommodate the widths needed for the second southbound lane, and to accommodate bike lanes instead of shoulders.
- Extend southward the second northbound through lane south of the eastbound ramp intersection, added in the mid-term project, to 74th Street.

The long-term project is designed to better address non-motorized mobility and increased traffic volumes. The project includes total acquisition of five residential parcels west of SR 162, between 74th Street and the interchange, and associated relocations. It should be noted that the existing SR 162 corridor does not have the capacity for the projected 2035 traffic volumes.

Exhibit 13: Long-Term Project Configuration

The cost estimate for the long-term project is shown in Exhibit 14. The 2018 costs were calculated on a design-build and a design-bid-build deliverable factor.

Exhibit 14: Long-Term Project Cost Estimation

Construction	
Preparation	$1,135,126
Grading	$338,100
Storm sewer	$635,400
Bridge widening	$3,500,000
Surfacing and paving	$167,125
Erosion control and planting	$152,250
Traffic	$2,013,760
Other items	$482,175
Construction work subtotal	$8,423,936
Uncertainties (25%)	$2,105,984
Sales Tax (9.3%)	$979,283
Subtotal	$11,509,203

Bid-Build Option	
WSDOT construction engineering (10%)	$1,150,920
Utilities and other agreements	$0
Change order contingency (4%)	$460,368
Project construction total	$13,120,491
Right of way estimated	$2,080,400
WSDOT utilities	$0
WSDOT preliminary engineering (25%)	$2,877,301
Pre total	$4,957,701
Project total	$18,078,192

Design-Build Option	
Construction work subtotal	$8,423,936
Uncertainties (25%)	$2,105,984
Consultant design estimated (15%)	$1,263,590
Design/builder construction engineering (8%)	$673,915
Subtotal	$12,467,425
Sales tax (9.3%)	$1,159,471
Subtotal	$13,626,896
Contingencies (2%)	$272,538
WSDOT design and constriction oversight	$1,090,152
Incentives/disincentives	$200,000
Bidder stipend	$600,000
WSDOT preliminary engineering	$2,300,000
Utility relocation estimated	$0
Right of way estimated	$2,080,400
Project total	$14,989,586
Project total with non-construction estimated work	$19,969,986

The long-term project is designed to minimize re-work completed as part of the mid-term project. However, some cost savings would result if both projects were completed simultaneously. A simultaneously-completed project that includes the mid-term project and the long-term project is roughly estimated between $24 million for the design-bid-build option, to $27 million for the design-build option.

Potential Long-Term Project: Puyallup River Bridge

Improvements made to the SR 162/SR410 interchange may shift the congestion to another point on the corridor. Corridor-level traffic forecasting suggests access control, further improvements at selected intersections, some level of roadway widening and addressing the Puyallup River Bridge will be needed to address 2035 traffic volumes. This widening would include an additional two-lane bridge over the Puyallup River, as widening the existing structure is not likely to be economical.

The existing SR 162 Puyallup River Bridge (No. 162/4), approximately one-half mile south of the interchange, was constructed by Pierce County in 1972. It is a pre-stressed concrete girder bridge with two 11-foot wide lanes with 4-foot wide shoulders and curbs supporting steel post thrie beam railing. The bridge was designed for 1972 seismic loads and is not adequate for current seismic design codes. Widening may not be practical, as the widened portion would have to accommodate the seismic load for both the existing bridge and widening. Also, widening would need to address scour and stream flow concerns, as there is a mid-river pier. The combined additional costs due to permitting, seismic and scour concerns could increase the widening cost to a level where replacement is more practical, which occurs when widening/rehabilitation costs meet or exceed 60 percent of replacement cost. As an interim measure, a two-lane parallel bridge could be constructed to address immediate capacity needs, with the option in the future of replacing the existing two-lane structure or widening the newer bridge.

Chapter 6: Next Steps

With the completion of this planning study, the strategies identified will assist WSDOT and partners to make decisions on improving highway efficiencies and reducing congestion at the SR 162/SR 410 interchange. The study affirmed the next steps identified in the 2017 study are still relevant to this interchange area.

WSDOT will work with transportation partners on the following topics:

- Seek out low-cost technological improvements that improve reliability of operations.
- Implement commute trip reduction programs.
- Explore and encourage the use of public transportation.
- Evaluate opportunities to develop park and ride facilities.
- Identify grant funding opportunities that would deliver transportation improvements.
- Accommodate pedestrians and cyclists at the time of scoping solutions.
- Promote education and public outreach to better inform and educate the traveling public.

WSDOT will continue to work with interested partners on the strategies considered pertinent and viable over the near-, mid-, and long-term operation of the interchange. Highway corridor improvements could be pursued by local jurisdictions in coordination and partnership with WSDOT.