FINAL REPORT

MILITARY ROAD SOUTH FIVE-WAY INTERSECTION STUDY

SEPTEMBER 2021

Military Road South / South 164th Street / 42nd Avenue South

City of SeaTac

DKS

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INTRODUCTION

The City of SeaTac is studying the intersection of Military Rd S, S 164th St, and 42nd Ave S to determine the best future intersection geometry and traffic control. The five-leg intersection is located in the northeast area of SeaTac, WA, as shown in **Figure 1**. The purpose of this study is to determine a configuration that will improve mobility and safety for people driving, walking, or biking through the intersection, while also serving as a potential community hub.

The intersection is heavily used as it connects several important destinations and access routes between SeaTac and Tukwila. The current configuration of the five-leg intersection can be complex to navigate and has a history of safety issues.

This study is identified in the City of SeaTac's 2021-2026 Transportation Improvement Plan. Funding for the study is made possible through the City's Transportation Capital Improvement (CIP) fund. This intersection is part of Public Works capital improvement project ST-116 that reconstructs Military Rd S from S 166th St to the intersection of S 160th St and International Blvd. Design is currently scheduled to begin in 2026.

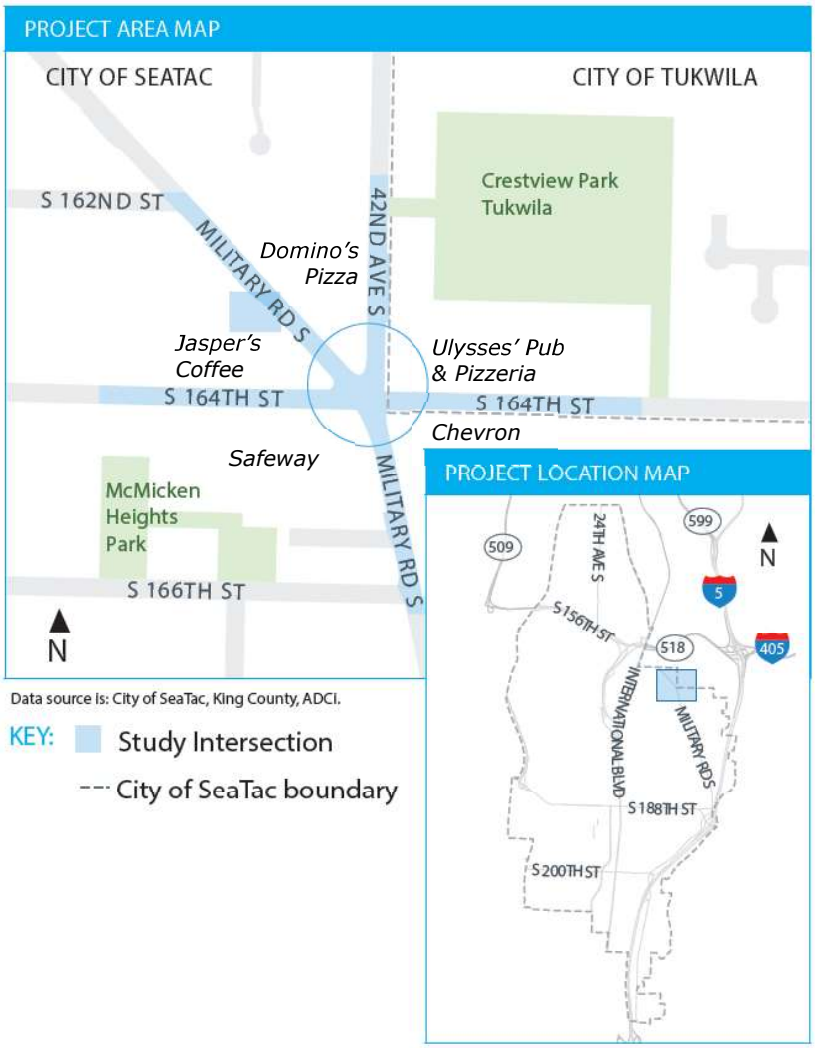


FIGURE 1: SITE AREA MAP

The purpose of this report is to serve as a summary memorandum that documents the findings and conclusions of the intersection evaluation. The intended audience includes City staff, elected officials, and the public. The report will present three alternatives and evaluation criteria to establish a recommended alternative. The recommendation will be based on identified evaluation criteria including safety and operations analysis, as well as public feedback through the open house.

EXISTING CONDITIONS

ROADWAY CHARACTERISTICS AND OPERATIONS

This section provides existing roadway characteristics, volumes, and operations for the study intersection. **Table 1** below lists the roadway's classification[1], posted speed limits, and the lane configuration. **Figure 2** shows the existing intersection configuration.

TABLE 1: ROADWAY CLASSIFICATION, SPEED LIMIT (MPH) AND LANE CONFIGURATION

ROADWAY	FUNCTIONAL CLASSIFICATION	SPEED LIMIT (MPH)	LANE CONFIGURATION
MILITARY RD S	Minor Arterial	35	Southbound has a channelized right-turn, a through lane and a left turn pocket. Northbound has a right-turn pocket, one through lane and a left-turn pocket.
42ND AVE S	Major Collector	30	Southbound has a channelized right-turn and a shared through/left lane.
S 164TH ST	Major Collector (East of intersection) Local Street (West of intersection)	25	Both eastbound and westbound approaches have one shared left/through/right lane.

Figure 3 and **Figure 4** below provide the Existing 2019 AM and PM peak hour volumes for vehicles, pedestrians and bicycles entering the study intersection. 2019 vehicle turning movement counts were obtained from the StreetLight Insight platform to represent the pre-COVID traffic condition. AM (7-8 AM) and PM (4-5 PM) peak hours data during the month of October in 2019 were aggregated to create the representative traffic volumes. Bicycle and pedestrian counts were obtained from a PM field data collection from May 2019. The AM bicycle and pedestrian volumes are conservatively assumed to be the same as PM due to the lack of AM data. The vehicle counts in this field data collection was not used due to a known nearby roadway closure.

FIGURE 2: EXISTING INTERSECTION CONFIGURATION

[1] WSDOT Functional Classification Map: https://www.wsdot.wa.gov/data/tools/geoportal/?config=FunctionalClass

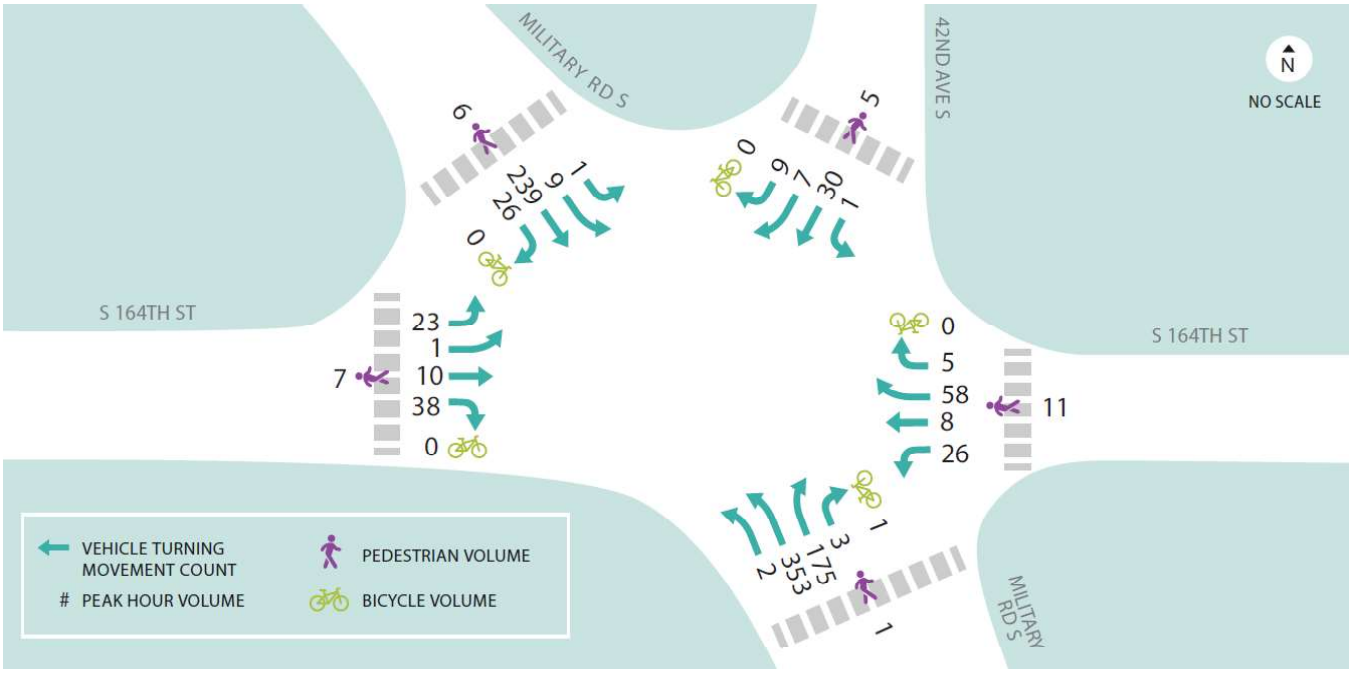


FIGURE 3: AM PEAK EXISTING 2019 VOLUMES FOR VEHICLES, PEDESTRIANS AND BICYCLISTS AT STUDY INTERSECTION.

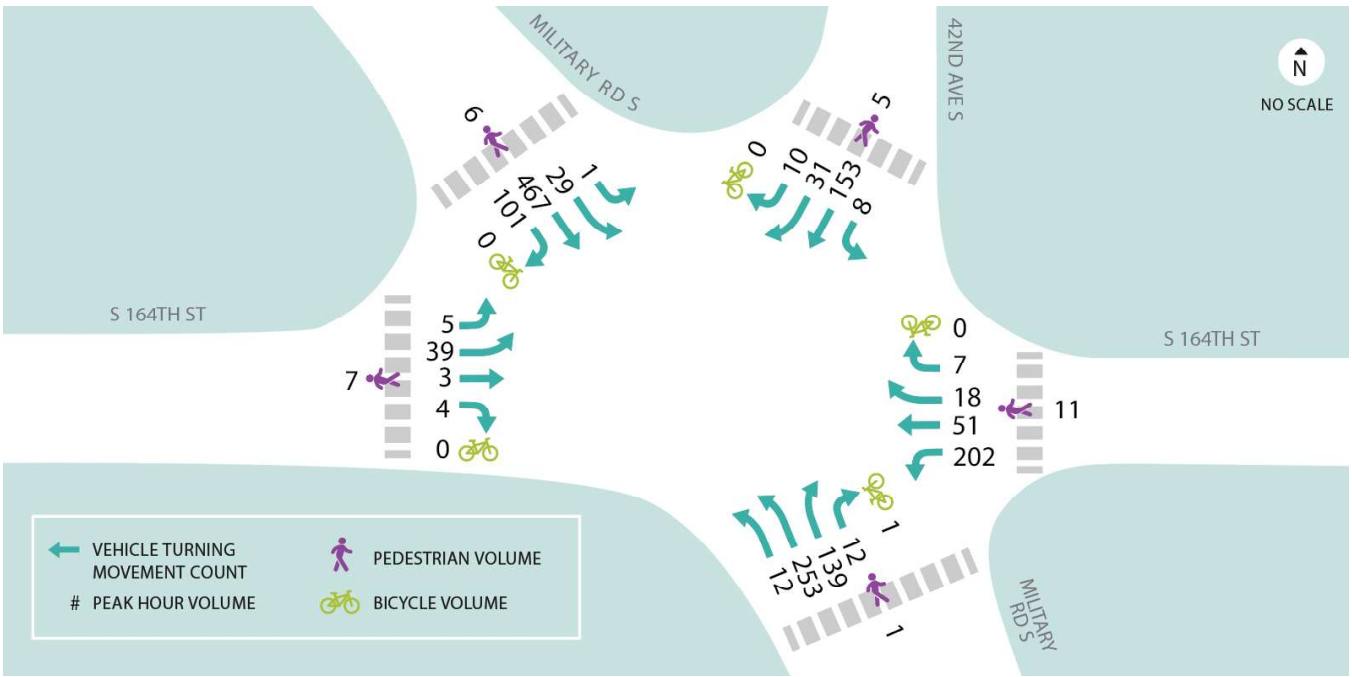


FIGURE 4: PM PEAK EXISTING 2019 VOLUMES FOR VEHICLES, PEDESTRIANS AND BICYCLISTS AT STUDY INTERSECTION.

To determine how well the intersection traffic is flowing, the existing turning movement counts, signal timing and other site-specific parameters were input into transportation software to determine several performance measures used to inform the intersection operations, including volume to capacity ratio, delay, and level of service.

Volume to capacity ratio, often shortened to v/c, is a measurement of the volume demand at an intersection in comparison to the theoretical maximum capacity. V/c can be calculated for each lane, each approach, or for the entire intersection. Since both volume and capacity are measured in vehicles per hour (vph), v/c has no units and is typically shown as a decimal (e.g., 0.50 means that volume uses half of the intersection's capacity). When v/c is greater than 0.90, vehicle flow is heavy in relation to the available capacity, resulting in observed traffic congestion. V/c above 1.00 is likely to experience extreme congestion, high delay, and stop-and-go traffic.

Intersection delay, or simply delay, is a measurement of the amount of delay (measured in seconds per vehicle) incurred by the presence of an intersection in comparison to the absence of any intersection. Delay includes: slowing down as you approach the intersection (for example, slowing down for a red light), waiting for a red light to turn green, accelerating to your desired speed, merging with traffic, and waiting for a gap in traffic. Like v/c, delay can be calculated for each lane, each approach, or for the entire intersection. Delay is typically shown as an average based on each vehicle's delay experience. Delay often correlates closely with v/c.

The level of service (LOS) is an intersection performance measure commonly used to provide an overview of how each movement and the overall intersection is operating. The LOS provides a "report card" rating of letters A through F based on average vehicle delay through the intersection which is meant to provide a more intuitive understanding of intersection operations rather than just delay and v/c numbers. LOS A indicates free flow conditions with minimal delay traveling through an intersection while LOS F indicates excessive vehicle delay and/or demand greater than the intersection's capacity. The standard document for this analysis, the Highway Capacity Manual (HCM), provides LOS criteria for unsignalized and signalized intersections and can be found below in **Table 2** and **Table 3**. Unsignalized intersections include roundabouts.

TABLE 2: LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS.

LEVEL OF SERVICE	AVERAGE INTERSECTION DELAY (SECONDS/VEHICLE)
A	0-10
B	10-15
C	15-25
D	25-35
E	35-50
F	>50

TABLE 3: LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS.

LEVEL OF SERVICE	AVERAGE INTERSECTION DELAY (SECONDS/VEHICLE)
A	0-10
B	10-20
C	20-35
D	35-55
E	55-80
F	>80

Queuing is the measure of vehicle queues (lines) at intersections, typically measured in feet. Since a queue of vehicles is constantly changing as vehicles arrive and depart the intersection, the 95th percentile queue is typically reported (queue is shorter than the 95th percentile queue 95% of the time).

Table 4 below provides the existing intersection performance measures, such as intersection volume to capacity ratio (v/c), intersection delay, and level of service (LOS). Based on the City of SeaTac Transportation Master Plan, the acceptable LOS standard for Military Rd S (arterial) is LOS E and for 42nd Ave S (collector) is LOS D. [2]

Based on the existing conditions, all movements and the overall intersection operations meet the City of SeaTac acceptable LOS standards for both AM and PM peak periods.

TABLE 4: EXISTING OPERATIONS (2019).

ROADWAY	AM	PM
INTERSECTION V/C	0.34	0.60
INTERSECTION DELAY (SEC) / LOS	10.8 / B	20.8 / C
WORST MOVEMENT DELAY (SEC) /LOS	SB (42ND), 16.6 / B	SB (42ND), 26.8 / C
WORST MOVEMENT 95TH PERCENTILE QUEUE (FEET)	NBT, 88	SBT (MILITARY), 251

For additional detailed analysis results, please see **Appendix A.**

[2] Source: City of SeaTac Transportation Master Plan, page 23

SAFETY CONCERNS

From January 2010 to June 2020, there were 63 reported collisions at the intersection, including three (3) suspected minor injuries, 19 possible injuries and 41 collisions with no apparent injuries (also called "property damage only" crash events). **Figure 5** below presents the collision severity by year. There were no collisions resulting in fatalities recorded in the past 10 years at this intersection.

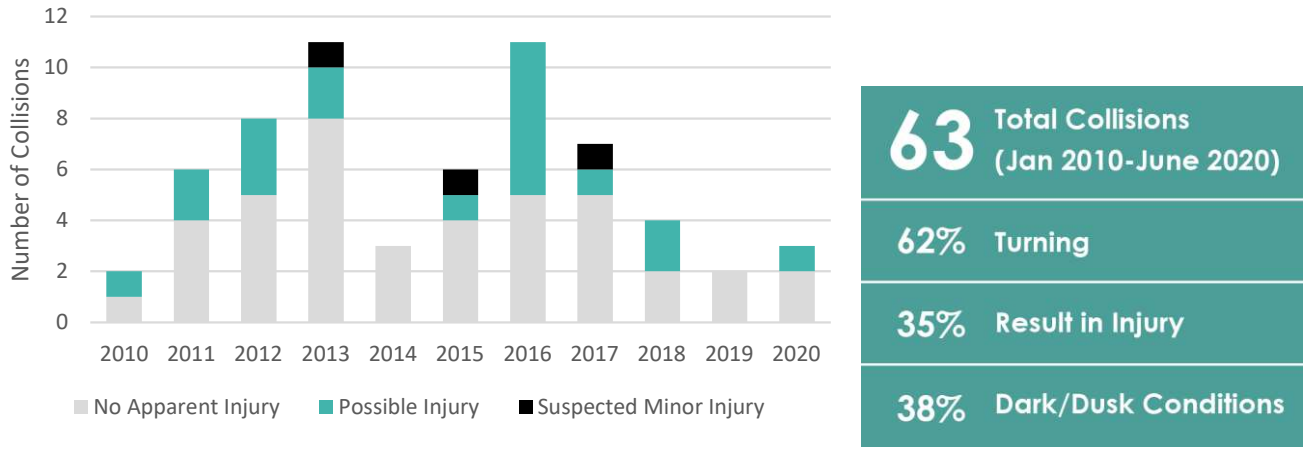


FIGURE 5: CRASH SEVERITY PER YEAR BETWEEN 2010 AND 2020.

A near-miss and causal factors analysis was conducted at the intersection using video analytics software. Video data were collected on November 24-25, 2020, to capture all road users (vehicles, bicyclists, pedestrians) navigating the location. The video analytics and interpretation identified these conflicts associated with safety risks:

- Rear-end conflicts
- Permissive left turns, especially for southbound movements
- Pedestrian and bicyclist compliance across S 164th St
- Red light running

Based on these safety risks, the team suggested the following treatments to consider:

- Install retroreflective backplates on all signal heads.
- Add protected left-turn phasing for all left-turn movements.
- Add clearance time (all-red) in general. Specifically consider more all-red time between the S 164th St westbound left turn phase and the 42nd Ave S southbound through phase.
- Conduct a lighting assessment, and if needed, improve illumination.
- Review and adjust pedestrian signal timing to improve compliance.

Findings from the video analytics study were incorporated into the study team's design alternatives and final recommendations.

On January 21, 2021, an extensive field visit was conducted at the site location. Two main concerns were identified:

1. At the driveway into the Safeway parking lot, the curvature of the roadway limits the sight visibility for southbound drivers (**Figure 6**).
2. At night, there were two streetlights that were not illuminated at the intersection at the time of the review (**Figure 7**).

FIGURE 6: FACING SOUTHBOUND ON MILITARY RD S.

FIGURE 7: FACING NORTHBOUND ON MILITARY RD S AT NIGHT.

Figure 8 is a collision diagram, which is used to display the types of crashes that occurred at the site.

This collision diagram reveals a common crash pattern near the Safeway entrance/exit along Military Rd S, where exiting vehicles making a left turn conflict with the southbound vehicles. The City intends to address this safety concern more immediately through near term projects in the area rather than waiting for the intersection redesign.

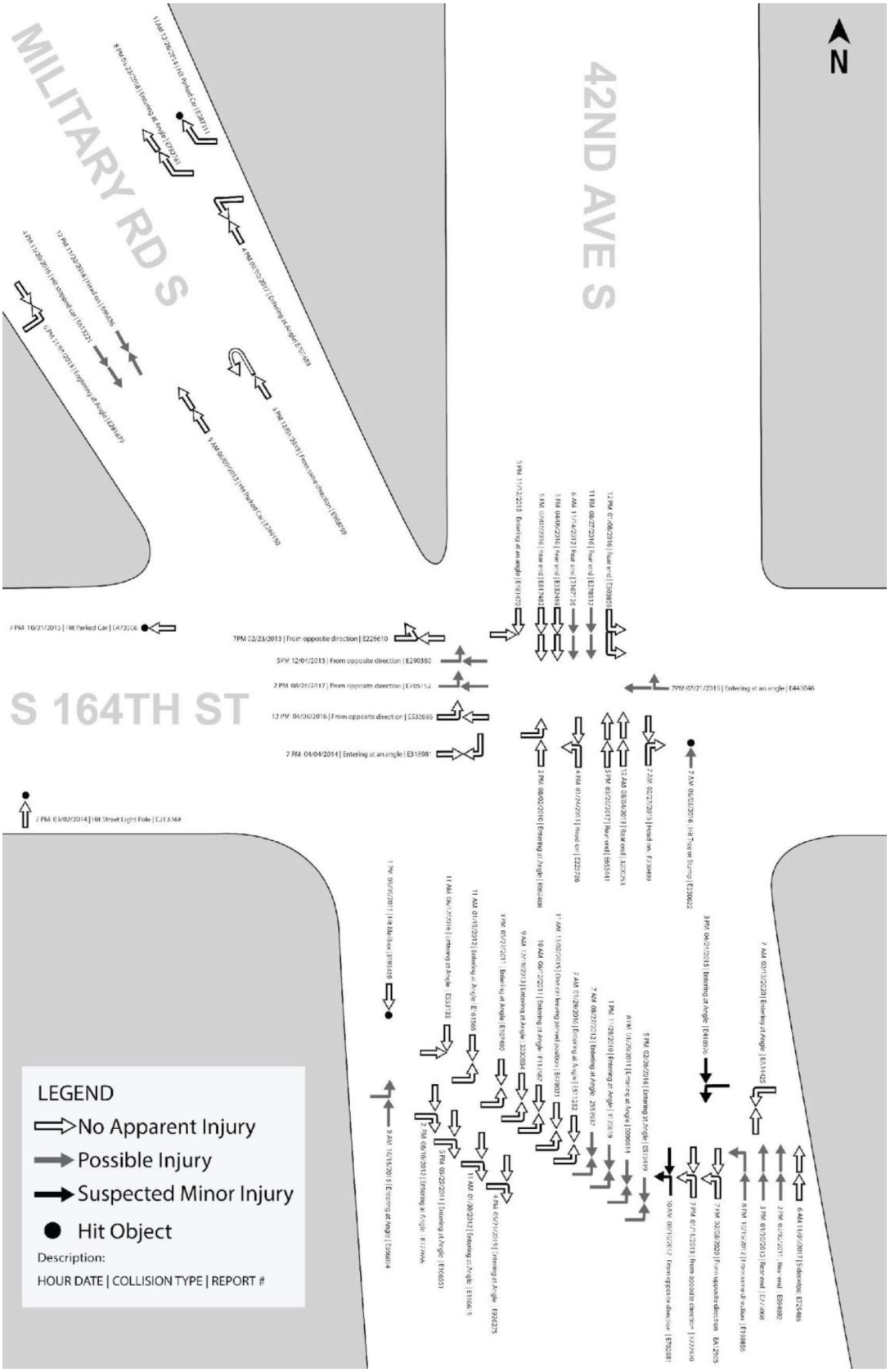


FIGURE 8: INTERSECTION COLLISION HISTORY DIAGRAM.

DEVELOPMENT OF DESIGN ALTERNATIVES

EVALUATION CRITERIA

To determine the appropriate design alternatives, multiple criteria were developed to evaluate the effectiveness of each alternative. **Table 5** below provides the list of criteria and questions that were considered during the evaluation process.

TABLE 5: EVALUATION CRITERIA FOR ALTERNATIVES

Evaluation Criteria	Questions to Consider:	How to Compare:
Safety	Does this design improve safety for motor vehicle drivers and passengers? Does this design improve safety for pedestrians and bicyclists?	Review expected crash frequency, potential for intersection collisions, and frequency of vehicle-vehicle conflicts.
Operations/ Mobility	Does this design maintain acceptable traffic operations?	Measure peak hour delay, LOS and queue lengths based on HCM 6th Edition method.
Access	Does this design negatively impact access for passenger vehicles or freight? Does this design improve access for pedestrians and bicyclists?	Does the alternative improve, retain or impact vehicle, pedestrian or freight accessibility?
Creating a Community Hub	Does this design create a place where residents, businesses, and visitors can enjoy the space and thrive?	Is the alternative compatible with the intention of creating a community hub (including place-making and consideration of future development)?
Property Impact	Does this design impact existing business operations, property lines, and/or parking?	Is the alternative a desired or a challenging design for adjacent business?
Cost	What is the cost implication to build and maintain this design?	Compare cost estimates and maintenance costs.

The evaluation criteria in **Table 5** were identified as the most critical and relevant for the selection of the preferred design alternative for the study intersection. They are consistent with engineering practices while balanced with the vision of creating a community hub at this unique location.

DESIGN ALTERNATIVES DESCRIPTIONS

This section provides a brief overview of the alternatives evaluated at the study intersection. All alternatives assume sidewalk improvements, bike lanes and three-lane Military Rd S cross-section associated with Transportation Master Plan project ST-116. Signalized alternatives will also provide bike signals and a leading bicycle interval in the signal timing to provide bicyclists a "head start" before motor vehicle traffic.

Alternative A – Maintains Signal

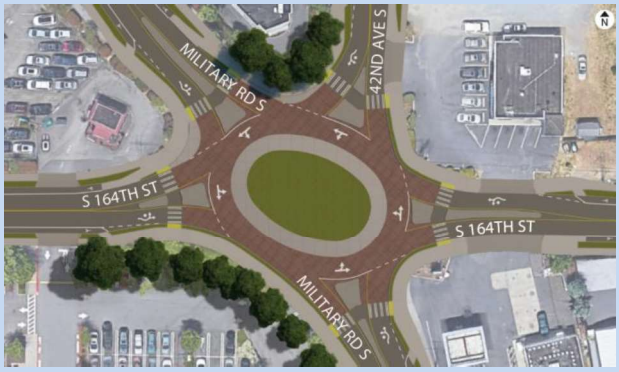
Alternative A would reconfigure the northbound Military Rd S approach, removing one lane and shortening the pedestrian crossing distance for the south leg. This alternative also:

- Removes the northeast porkchop island and extends the curb to create a more direct pedestrian crossing for the north leg;
- Restricts trucks from making southbound hard right turns from 42nd Ave S to Military Rd S and improves alignment of 42nd Ave S with southbound Military Rd S;
- Adds pavement treatment to accentuate intersection;
- Improves roadway and intersection lighting; and
- Updates signal timing to improve traffic flow. Adds bike signals with leading bike intervals.

Alternative B – Maintains Signal and adds Plaza

Alternative B also reconfigures the northbound Military Rd S approach, removing a lane and shortening the pedestrian crossing distance for the south leg. This alternative also:

- Restricts all traffic from making southbound hard right turns from 42nd Ave S to Military Rd S and extends the curb to provide plaza space for gathering;
- Removes the northwest porkchop island and protects all pedestrian movements with a signal phase;
- Restricts right turn on red for eastbound S 164th St due to placement of stop bar and crosswalk;
- Adds pavement treatment to accentuate intersection;
- Improves roadway and intersection lighting; and
- Updates signal timing to improve traffic flow. Adds bike signals with leading bike intervals.



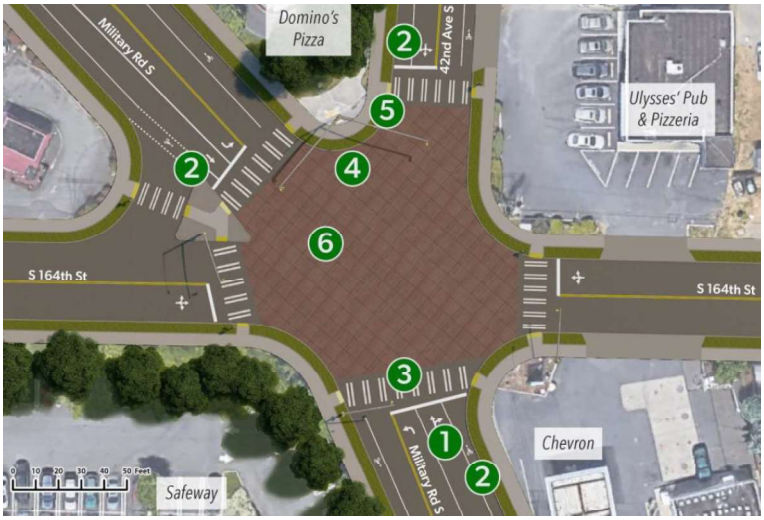
Alternative C – Convert Signal to Roundabout

Alternative C replaces the existing traffic signal with a one-lane roundabout. This alternative also:

- Provides pedestrian refuges for each crossing;
- Allows bicyclists to enter the sidewalk from bike lane approaches and use marked crosswalks to traverse roundabout, or bicyclists can traverse the roundabout with vehicles; and
- Provides space in the center of the roundabout for fountain/sculpture/art feature. (Note: center island **not available** as a gathering space).

Figures 9 through **14** below illustrates the intersection layouts and renderings approaching the intersection under each alternative.

ALTERNATIVE A: MAINTAINS TRAFFIC SIGNAL



1. Removes right-turn lane on the northbound approach on Military Road S.
2. Provides bike lanes, bike specific signals, and an exclusive bike signal phase to offer bicyclists a "head start" before motor vehicle traffic proceeds.
3. Shortens distance to cross the south leg to reduce pedestrian crossing times.
4. Removes northwest "pork chop" pedestrian refuge island and extends curb to create more direct pedestrian crossing for the north leg.
5. Restricts trucks from making southbound hard right turns from 42nd Avenue S to Military Road S and improves alignment of southbound 42nd Avenue S to southbound Military Road S.
6. Adds pavement treatment to accentuate intersection.

FIGURE 9: ALTERNATIVE A OVERHEAD VIEW

FIGURE 10: ALTERNATIVE A RENDERING LOOKING NORTHWEST TOWARDS MILITARY RD S FROM THE SOUTHEAST CORNER.

ALTERNATIVE B: MAINTAINS SIGNAL AND ADDS PLAZA

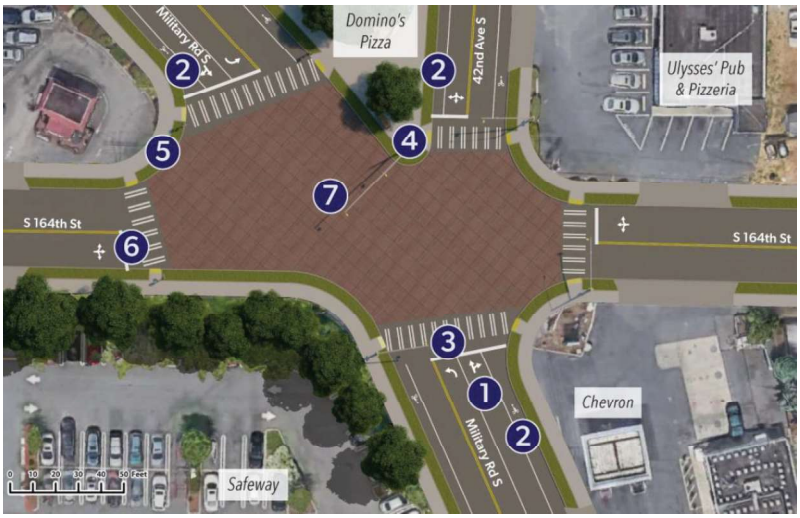
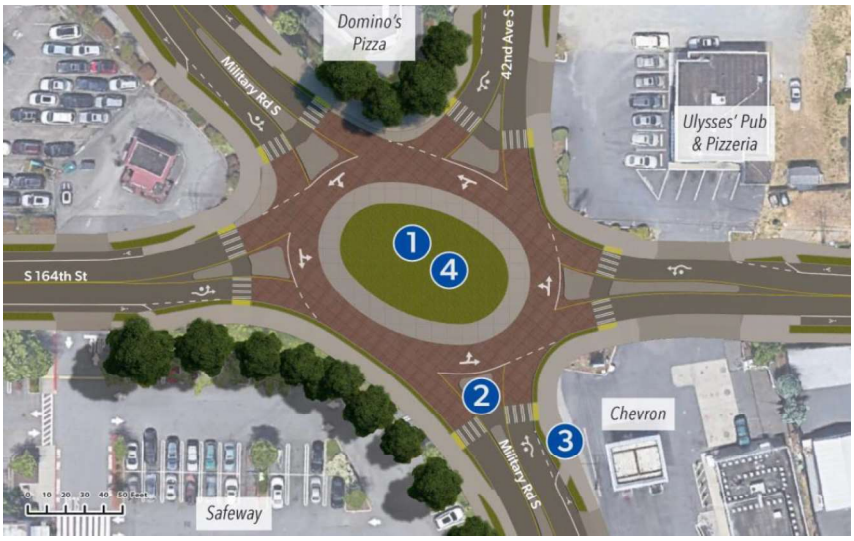


FIGURE 11: ALTERNATIVE B OVERHEAD VIEW

1. Removes right-turn lane on the northbound approach on Military Road S.
2. Provides bike lanes, bike specific signals, and an exclusive bike signal phase to offer bicyclists a "head start" before motor vehicle traffic proceeds.
3. Shortens distance to cross the south leg to reduce pedestrian crossing times.
4. Restricts all traffic from making southbound hard right turns from 42nd Avenue S to Military Road S, removes northeast "pork chop" pedestrian refuge island, and extends curb to provide plaza space for gathering.
5. Removes northwest "pork chop" pedestrian refuge island and extends curb to provide additional space for pedestrians and offers a pedestrian-specific signal for safer crossings.
6. Restricts right turn on red for eastbound S 164th Street due to limited sight distance.
7. Adds pavement treatment to accentuate intersection.

FIGURE 12: ALTERNATIVE B RENDERING LOOKING NORTH TOWARDS MILITARY RD S/ 42ND AVE S FROM THE SOUTHEAST CORNER.

ALTERNATIVE C: CONVERT SIGNAL TO ROUNDABOUT



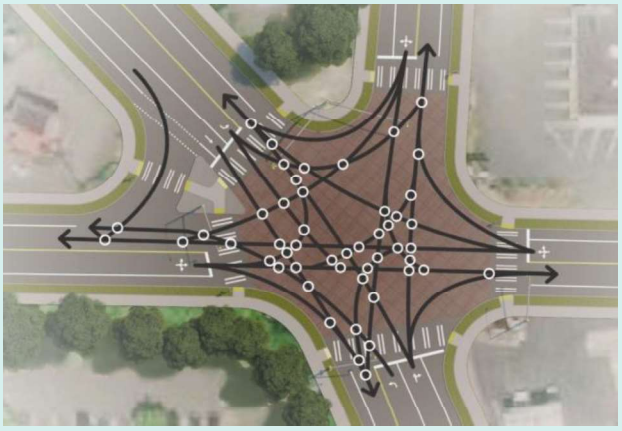
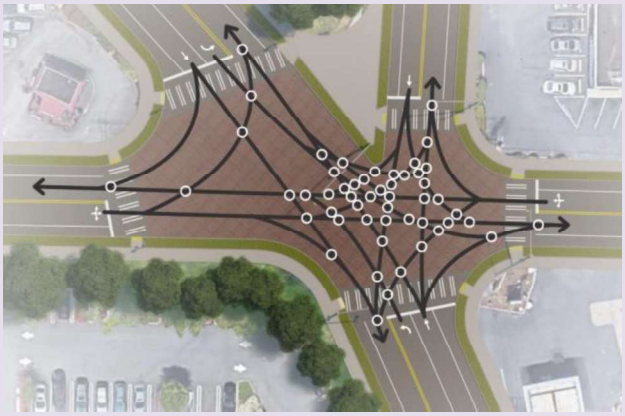
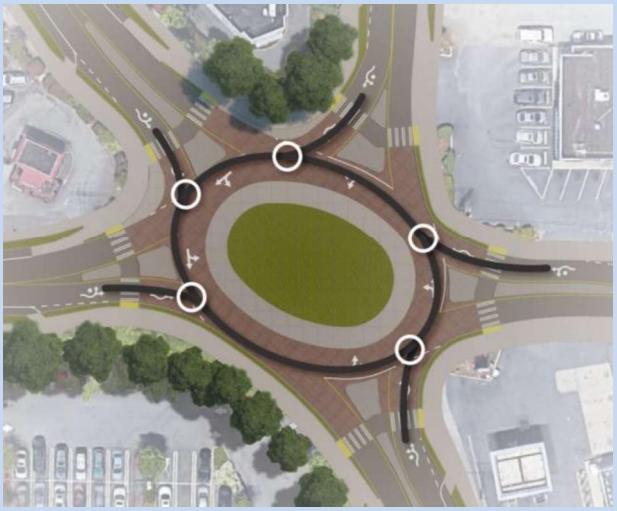
1. Removes traffic signal and constructs a one-lane roundabout.
2. Provides pedestrian refuges for each crossing.
3. Allows bicyclists to enter sidewalk from bike lane approaches and use marked crosswalks for safer travel through the intersection.
4. Provides space in center of roundabout for placemaking: fountain/ sculpture/ art feature, etc.

FIGURE 13: ALTERNATIVE C OVERHEAD VIEW

FIGURE 14: ALTERNATIVE C RENDERING LOOKING NORTHEAST TOWARDS MILITARY RD S/ 42ND AVE S FROM THE SOUTHEAST CORNER.

SAFETY ASSESSMENT

The following section provides an assessment of the safety evaluation criterion, including conflict diagrams for each of the alternatives. A conflict diagram illustrates potential conflicting paths between motor vehicle drivers for comparison purposes. Each alternative is rated one to five, with five being the most favorable.

	**Alternative A – Maintains Signal** • Approximately 40 crossing conflicts • Leading pedestrian intervals can reduce 19% of all pedestrian crashes • One pedestrian crossing not controlled by pedestrian signal	**Rating** ★★★★
	**Alternative B – Maintains Signal and adds Plaza** • Approximately 40 crossing conflicts • Leading pedestrian intervals can reduce 19% of all pedestrian crashes • Northwest crossing is longer than Alternative A	★★★★
	**Alternative C – Convert Signal to roundabout** • Zero Crossing conflicts • 5 Merging conflicts • Estimated 45% reduction of all crashes • Estimated 77% reduction in fatal and injury collisions • Median refuge island for each crossing • Pedestrians only need to cross one direction and one lane at a time • No pedestrian crossings controlled by pedestrian signals	★★★★★

OPERATIONS ANALYSIS

METHODS AND ASSUMPTIONS

The Military Rd S, S 164th St, and 42nd Ave S intersection was modeled using both Vistro (version 2021) and SIDRA (version 8). Vistro was used to evaluate intersection traffic performance at signalized intersections; it captures and provides results for pedestrian and bicycle movements. SIDRA was used for roundabout performance evaluation; it provides an estimate of capacity based on vehicle paths.

Vistro was used for the 2019 Existing Conditions, 2050 No Build, 2050 Alternative A, and 2050 Alternative B models and SIDRA was used for the 2050 Alternative C model. The traffic operations analysis for the project includes two analyses years - existing condition year 2019 and future year 2050. The analysis focuses on both the AM and PM peak hours. Each model provides the following performance metrics – volume-to-capacity ratio, intersection delay, intersection LOS, and 95th percentile queue length by approach.

The Existing, Future No Build, and three Future Alternative models include the geometric input, analysis years, traffic growth rates, signal timings to optimize traffic operations, and other parameters required for model input. A site visit was conducted to verify key model inputs.

FUTURE VOLUME DEVELOPMENT

To estimate the future traffic volumes at the intersection of Military Rd S, S 164th St, and 42nd Ave S, growth rates were calculated and applied to determine the most likely future scenario.

Initially, the Puget Sound Regional Council (PSRC) travel demand model was used to determine the annual growth rate between the 2014 base year model and the 2040 future model year. This approach has drawbacks due to the low resolution of the roadway network and large travel analysis zone (TAZ) size, which limit the accuracy of individual turning movement estimates. However, the model can accurately predict regional movements, so the regional model's growth rates were used for the AM southbound direction (1.11%) on both Military Rd S and 42nd Ave S, and PM northbound (1.32%) for Military Rd S. These growth rates are within the expected range for a major roadway. These growth rates were also used for pedestrian and bicyclist growth for operational analysis purposes. For the other approaches, a general growth rate was needed that could more accurately reflect expected local traffic patterns and the potential for redevelopment.

Within 0.25 miles from the study intersection, three possible development scenarios were developed with the planning staff at the City of SeaTac based on Buildable Lands reports:

1. 90% Residential
    a. Single-family homes would account for 30% of 276 new housing units, with multifamily mid-rise as the remaining 70%. Approximately 13,500 square feet of shopping/retail space would be built.

2. 50% Residential
    a. Single-family housing would account for 35% of 254 new housing units, again with multifamily mid-rise as the remaining 65%. Approximately 24,000 square feet of office space would be built plus almost 36,000 square feet of shopping/retail space.
3. Double Density
    a. Housing density would target twice the current amount. Density is measured as the number of people or housing units per acre.
    b. Single-family housing would account for only 20% of 447 new housing units, with multifamily mid-rise as the remaining 80%. Similar to Scenario 1, approximately 13,500 square feet of shopping/retail space would be built.

Scenario 2 was selected as the most realistic development outcome. Trip generation rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, were applied to both the Scenario 2 development land uses, as well as the existing land uses within 0.25 miles from the study intersection, to determine the annual growth rate for local traffic. It was determined that AM local traffic would increase 0.37% per year and PM would increase 0.57% per year. These rates are within the expected range for local roadways with a moderate amount of future development.

On the next page, **Figure 15** and **Figure 16** provide the Future 2050 AM and PM peak hour volumes for vehicles, pedestrians and bicycles entering the study intersection.

FUTURE NO BUILD

The Future No Build scenario in analysis year 2050 is intended to provide a baseline condition for comparison with the alternatives so that each alternative's operational benefits and trade-offs can be identified.

Additionally, the traffic models and evaluation for the Future No Build scenario consider the planned bike lane facilities on Military Rd S (bike lanes; both directions) and 42nd Ave S (northbound bike sharrow; southbound bike lane).

The following section provides the summary of v/c, LOS, delay, and queuing performance for both AM and PM peak hours for the Future No Build in analysis year 2050. For additional detailed analysis results, please see **Appendix A**.

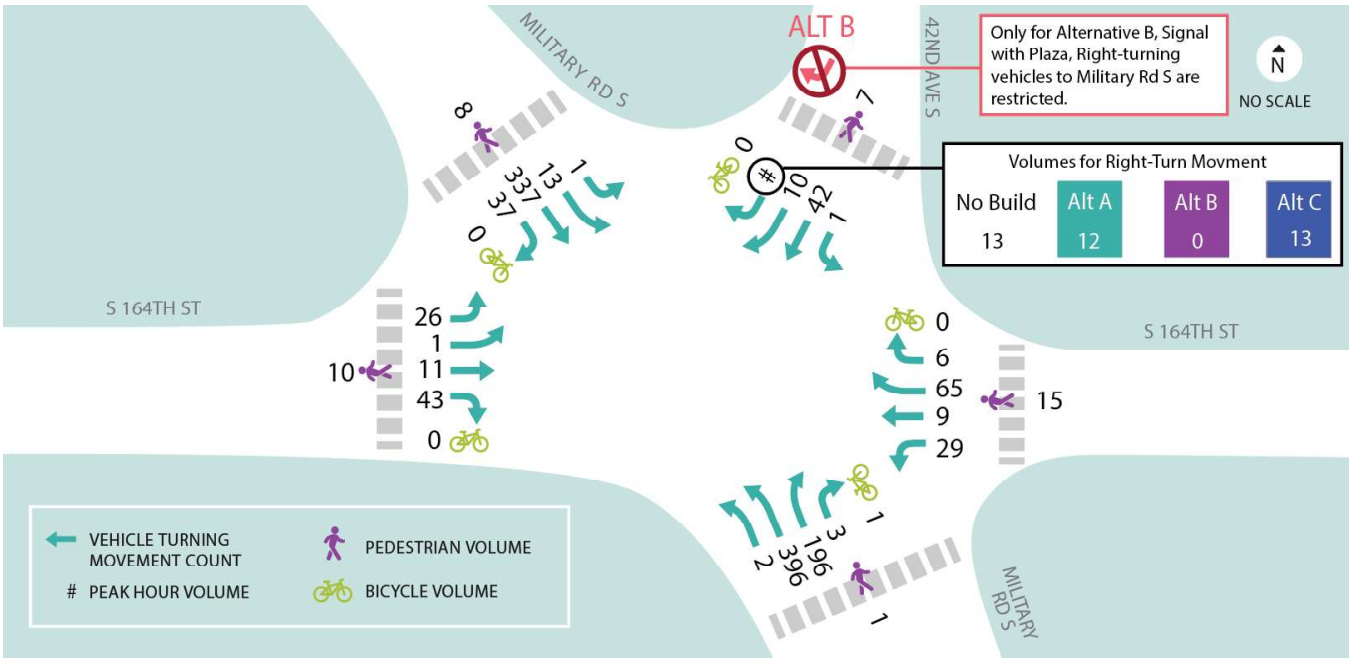


FIGURE 15: AM PEAK FUTURE 2050 VOLUMES FOR VEHICLES, PEDESTRIANS AND BICYCLISTS AT STUDY INTERSECTION.

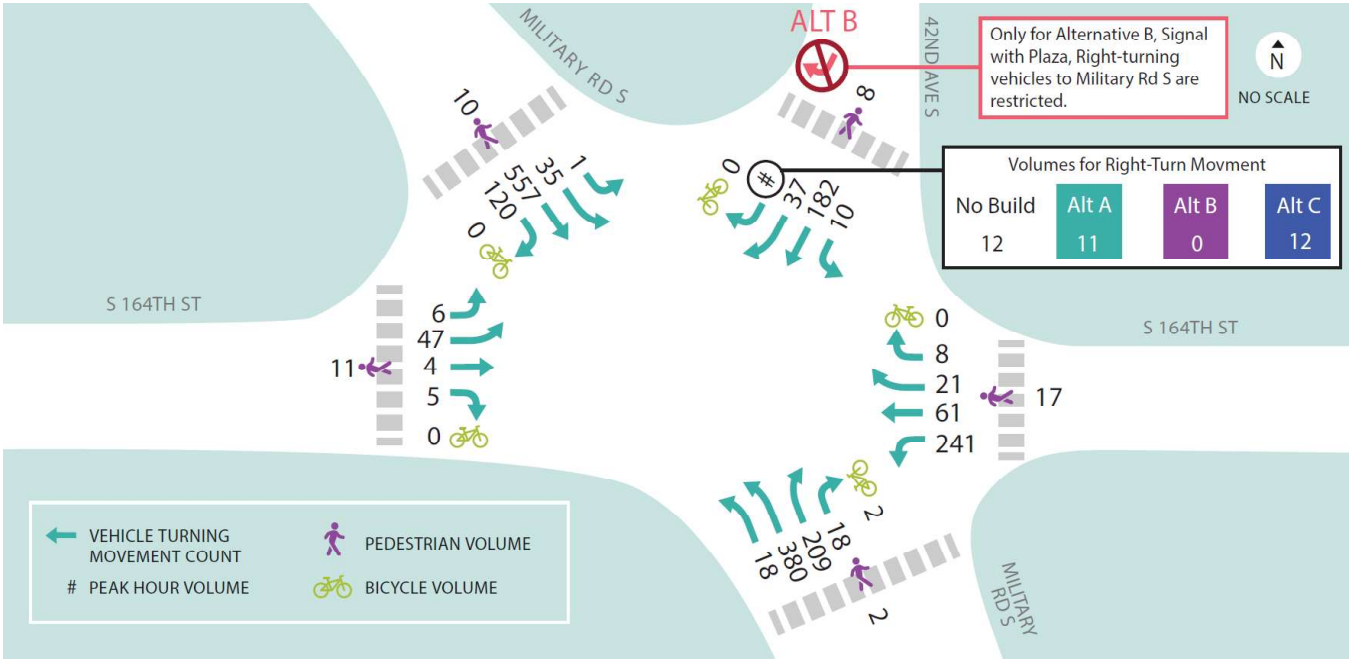


FIGURE 16: PM PEAK FUTURE 2050 VOLUMES FOR VEHICLES, PEDESTRIANS AND BICYCLISTS AT STUDY INTERSECTION.

2050 Future No Build Results

Based on the Future No Build scenario, all movements and the overall intersection operations meet the City of SeaTac acceptable LOS standards for both AM and PM peak periods.

The Future No Build will have an acceptable and similar operation performance to existing conditions. Both the AM and PM intersection LOS remain the same, while the worst queue increases in both AM and PM.

PEAK HOUR	V/C	INTERSECTION DELAY (SEC/VEH) / LOS	95TH %TILE QUEUES (FEET)
AM	0.34	12.0 / B	**101 / NB** 82 / SB (Military) 26 / EB 35 / WB 19 / SWB (42nd)
PM	0.70	30.9 / C	259 / NB **447 / SB (Military)** 45 / EB 279 / WB 210 / SWB (42nd)

OPERATIONS & MOBILITY ASSESSMENT

The following section provides an assessment of the operations/mobility evaluation criterion, including a summary of v/c, LOS, delay, and queuing performance for both AM and PM peak hours for all three alternatives in analysis year 2050. Each alternative is rated one to five, with five being the most favorable. For additional detailed analysis results, please see **Appendix A**.

This alternative will have an acceptable and similar operation performance to the No Build scenario. Both the AM and PM intersection delays are higher than in the No Build due to the bike phase and the right-turn on red restrictions at Military Rd S and 42nd Ave S. In both the AM and PM, queues increase for the northbound movement due to the reduction in lanes approaching the intersection.

Alternative A – Maintains Signal

Peak Hour	V/C	Intersection Delay (sec/veh) / LOS	95th %tile Queues (feet)
AM	0.48	17.7 / B	**268 / NB** 125 / SB* 45 / EB 62 / WB 40 / SWB*
PM	0.75	47.5 / D	**655 / NB** 497 / SB* 58 / EB 354 / WB 282 / SWB*

* SB on Military Rd S and SWB on 42nd Ave S

Rating

★★★

Similar to Alternative A, this alternative will have an acceptable operational performance though worse than the No Build scenario, particularly in the PM. Both the AM and PM intersection delays are higher than in the No Build due to the bike phase and the associated right-turn on red restrictions at Military Rd S and 42nd Ave S. Intersection delays are higher than Alternative A due to the additional right-turn on red

Alternative B – Maintains Signal and Adds Plaza

Peak Hour	V/C	Intersection Delay (sec/veh) / LOS	95th %tile Queues (feet)
AM	0.47	17.4 / B	**265 / NB** 142 / SB* 46 / EB 62 / WB 32 / SWB*
PM	0.78	55.0 / E	625 / NB **789 / SB*** 62 / EB 368 / WB 273 / SWB*

* SB on Military Rd S and SWB on 42nd Ave S

★★★

restriction at eastbound S 164th St and the removal of the channelized right-turn pocket on southbound Military Rd S.

Alternative B has similar queue lengths as Alternative A for all movements in both peak periods except for SBT queues along Military Rd S which will be approximately 300' longer in the PM due to removal of the channelized right-turn pocket. This alternative has the highest intersection delay and worst LOS.

This alternative will have a noticeable operational performance improvement compared to the No Build scenario and both Alternatives A and B.

Despite a higher v/c value associated with the reduced number of lanes approaching the intersection, Alternative C has the lowest intersection delay, best LOS, and shortest queue lengths among all alternatives and the No Build scenario in both the AM and PM peak hours. The southbound queue length in the PM peak hour is similar to the queue length in Alternative A while the other movements' queue lengths are significantly shorter.

Alternative C – Convert Signal to Roundabout

Peak Hour	V/C	Intersection Delay (sec/veh) / LOS	95th %tile Queues (feet)
AM	0.45	5.1 / A	**106 / NB** 59 / SB* 13 / EB 24 / WB 10 / SWB*
PM	0.88	14.1 / B	122 / NB **490 / SB*** 26 / EB 103 / WB 55 / SWB*

* SB on Military Rd S and SWB on 42nd Ave S

ACCESS ASSESSMENT

The following section provides an assessment of the access evaluation criterion. Each alternative is rated one to five, with five being the most favorable.

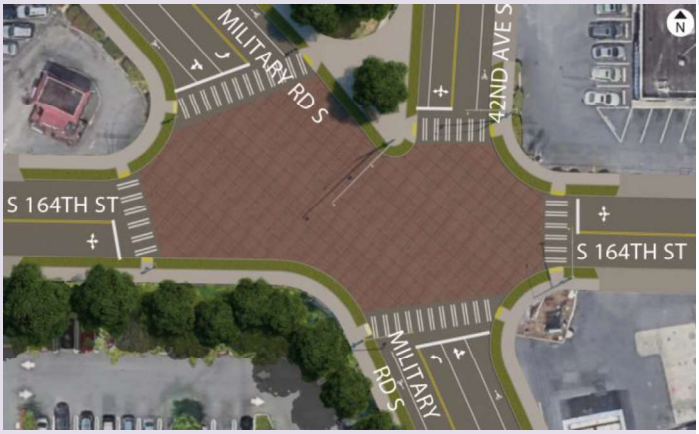
Alternative A – Maintains Signal

This alternative will have a southbound right-turn restriction for trucks from 42nd Ave S to Military Rd S, but impact to truck access is minimal due to low existing demand.

This alternative will have a reduced crossing distance on the south leg and more direct crossings on the north leg for 42nd Ave S.

Rating

★★★★

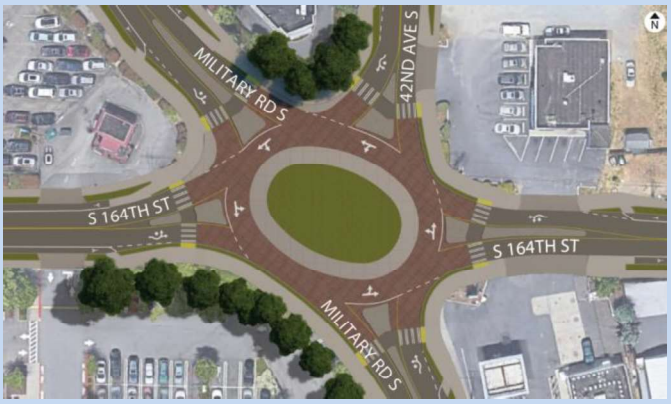


Alternative B – Maintains Signal and Adds Plaza

Similar to Alternative A, this alternative will have a southbound right-turn restriction for all vehicles from 42nd Ave S to Military Rd S, but impact to vehicle access is minimal due to low existing demand.

This alternative will also have a reduced crossing distance on the south leg and more direct crossings on the north leg, for both Military Rd S and 42nd Ave S. Additionally, it will have a reduced crossing distance on the west leg.

★★★★



Alternative C – Convert Signal to Roundabout

This alternative is not expected to have any impact on freight accessibility.

This alternative will have reduced pedestrian crossing distances on all legs. Pedestrians may have longer walking distances due to the updated crosswalk locations.

★★★★

CREATING A COMMUNITY HUB ASSESSMENT

The Safeway located at the study intersection is one of the largest grocery stores in area and it is the only grocery store within City of SeaTac limits. Since a large majority of community members likely visit this area often, it creates an opportunity to develop this area as a community hub. This section provides an assessment of the creating a community hub evaluation criterion. Each alternative is rated one to five, with five being the most favorable.

Alternative A – Maintains Signal

This alternative is compatible with the intention of creating a community hub.

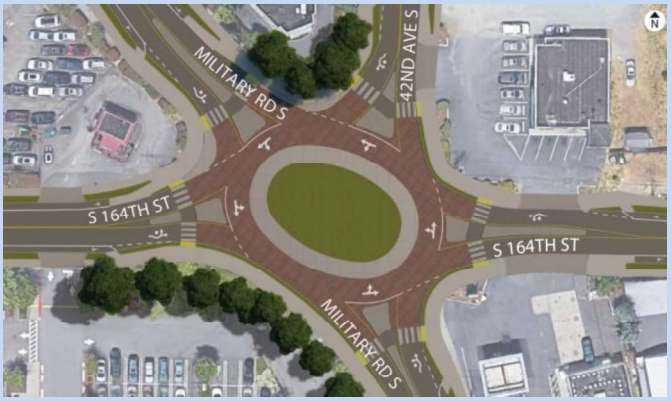
Rating

★★★

Alternative B – Maintains Signal and Adds Plaza

This alternative creates opportunities for a gathering space in the plaza on the north side of the intersection between Military Rd S and 42nd Ave S.

★★★★



Alternative C – Convert Signal to Roundabout

This alternative will have a lower travel speed that will create an appealing urban environment. It will create opportunities for placemaking elements integrated with the roundabout design.

★★★★★

PROPERTY IMPACT ASSESSMENT

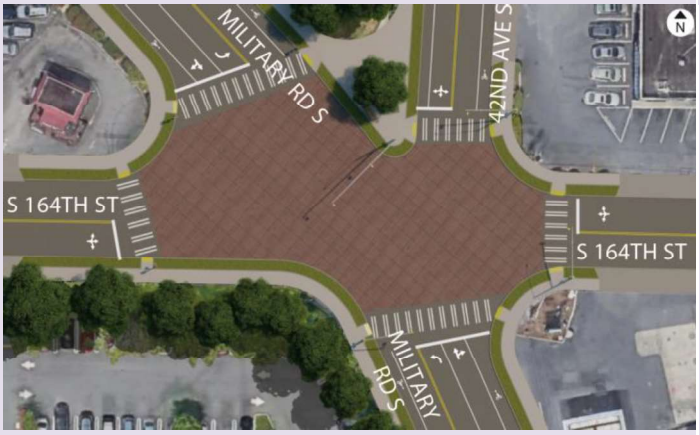
This section provides an assessment of the property impact evaluation criterion, including parking and right-of-way impacts. Each alternative is rated one to five, with five being the most favorable.

Alternative A – Maintains Signal

This alternative is not expected to have an impact on existing parking. Based on preliminary planning cost estimates, this alternative would require approximately 4,500 square feet of right-of-way acquisition from four of the five corners of the intersection.

Rating

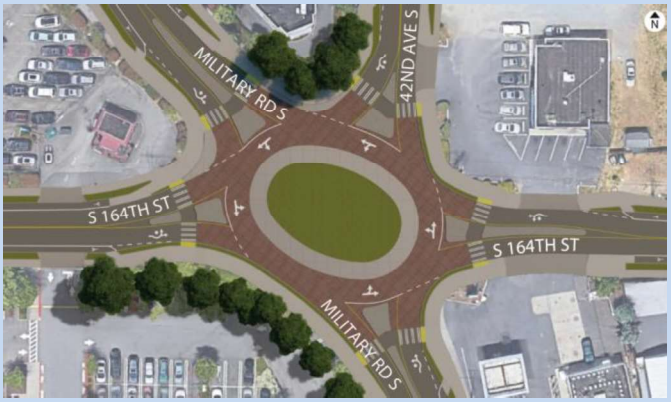
★★★



Alternative B – Maintains Signal and Adds Plaza

This alternative is not expected to have an impact on existing parking. Based on preliminary planning cost estimates, this alternative would require approximately 4,500 square feet of right-of-way acquisition from four of the five corners of the intersection.

★★★



Alternative C – Convert Signal to Roundabout

This alternative may impact six to ten parking spaces at Safeway (approximately 3-5% of total spaces). Based on preliminary planning cost estimates, this alternative would require approximately 7,500 square feet of right-of-way acquisition from all five corners of the intersection.

★★

COST ASSESSMENT

This section provides an assessment of the cost evaluation criterion based on planning level cost estimates for design and construction completed by Parametrix in July 2021 (summarized in **Appendix B)** and expected annual maintenance costs for signals versus roundabouts. Each alternative is rated one to five, with five being the most favorable.

Alternative A – Maintains Signal

This alternative is expected to have a medium design and construction cost, estimated at $2.9 million. Annual maintenance cost for a signal is higher than a roundabout.

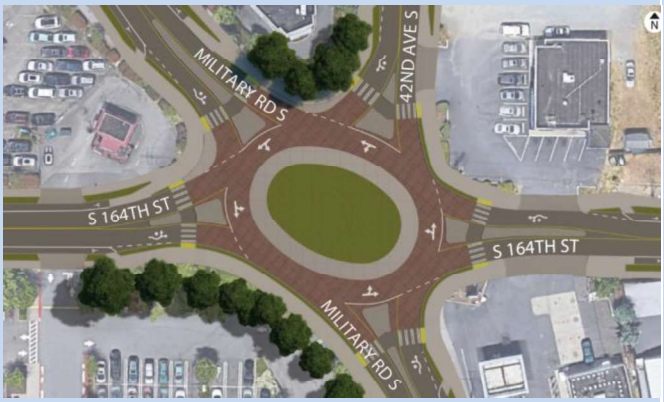
Rating

★★★

Alternative B – Maintains Signal and adds Plaza

This alternative is expected to have a medium design and construction cost, estimated at $3.1 million. Annual maintenance cost for a signal is higher than a roundabout.

★★★



Alternative C – Convert Signal to roundabout

This alternative is expected to have a medium design and construction cost, estimated at $3.4 million. Annual maintenance cost for a roundabout is lower than a signal.

★★★

EVALUATION RATING

As presented in the previous chapters, six criteria were used to evaluate the three alternatives. **Table 6** provides a summary of the evaluation criteria and the overall rating for each of the three alternatives considered in the study.

TABLE 6: EXISTING OPERATIONS (2019 OPERATIONS).

EVALUATION CRITERIA	QUESTIONS TO CONSIDER	ALT A: SIGNAL	ALT B: SIGNAL WITH PLAZA	ALT C: ROUNDABOUT
SAFETY	Does this design improve safety for motor vehicle drivers and passengers? Does this design improve safety for pedestrians and bicyclists?	★★★★	★★★★	★★★★★
OPERATIONS/ MOBILITY	Does this design maintain acceptable traffic operations?	★★★	★★★	★★★★
ACCESS	Does this design negatively impact access for passenger vehicles or freight? Does this design improve access for pedestrians and bicyclists?	★★★★	★★★★	★★★★
CREATING A COMMUNITY HUB	Does this design create a place where residents, businesses, and visitors can enjoy the space and thrive?	★★★	★★★★	★★★★★
PROPERTY IMPACT	Does this design impact existing business operations, property lines, and/or parking?	★★★	★★★	★★
COST	What is the cost implication to build and maintain the design?	★★★	★★★	★★★
TOTAL OVERALL RATING		**3.3/5**	**3.5/5**	**3.8/5**

PUBLIC OUTREACH

As part of the Military Rd S intersection study, the City of SeaTac hosted an online open house from June 9th to June 30th, 2021. The purpose of the online open house was to provide information to the public and gather feedback from the participants on which design alternative was the most preferred for a reconfigured intersection. Participants could learn about the project challenges, benefits and schedule of the design alternatives being considered. The following section provides an overview of the key findings from the online open house.

138	Completed surveys
70%	Of respondants use the intersection on a daily basis
61%	Preferrences: Alternative C Roundabout
29%	Alternative A: Maintains Signal
10%	Alternative B: Maintains Signal with Plaza

OPEN HOUSE

During the online open house, 460 individuals visited the site and of those, 138 individuals completed a survey. The survey included seven questions related to the design alternatives, respondent's priorities, and demographics. All the questions were optional, and many questions allowed respondents to select more than one answer.

Respondent Characteristics

About 30% of online open house visitors completed survey questions. Eighty-four percent (84%) of respondents who provided a ZIP code listed 98188, the ZIP code that surrounds the intersection at Military Rd S, S 164th St, and 42nd Ave S.

The majority (70%) of respondents traveled through the intersection daily, and most travel through the intersection by car. Among participants who chose to identify their ethnicity/race, 69% identified as White and/or Caucasian alone. Ninety-one percent (91%) of respondents primarily speak English in their home. Most respondents were 30 years or older, with the largest represented age group being those 60 years or older (30%).

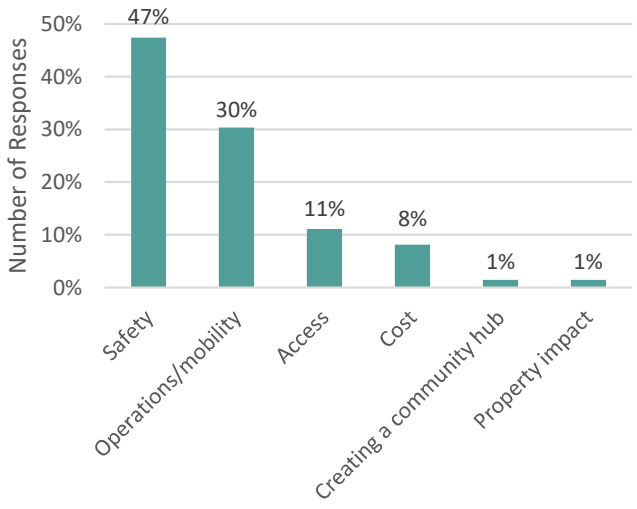
Preferences and Priorities

Of the three alternatives presented in the online open house, 61% of survey participants preferred Alternative C: Converts signal to roundabout and selected the following as their top three reasons:

1. Improves traffic flow (31%)
2. Improves safety for motor vehicle drivers and passengers (22%)
3. Improves safety for pedestrians and bicyclists (17%)

For more information regarding the public open house feedback, please see **Appendix C** for the full report.

SURVEY QUESTION: WHICH OF THESE ARE MOST IMPORTANT TO YOU?



RECOMMENDATION

This study involved evaluating six criteria and input from the public open house. Based on the analysis, Alternative C: Convert Signal to Roundabout is recommended above other options. The proposed multi-modal design will accommodate future bike lanes, shorten pedestrian crossing distances, and balance vehicle delays compared to the No Build conditions. A roundabout maintains all turning movement options at the intersection while eliminating the current intersection's difficult hard-right and -left turns. In particular, this design is the best option for pedestrian crossings as it has the shortest total crossing distance and greatest waiting space for the intersection, with lower vehicle speeds through the intersection.

WHY ARE WE RECOMMENDING A ROUNABOUT?

The roundabout alternative for Military Rd S intersection operates better than the signal alternatives, including the No Build alternative. During the PM peak period, the roundabout's 95th percentile queue length for the peak direction (Southbound Military Rd S) is similar to the No Build and Alternative A conditions and shorter than the Alternative B condition. For other approaches and for the AM peak conditions, the roundabout queues are shorter than the signal options.

Also, roundabouts are designed to improve safety for all users, include pedestrians and bicycles. The safety benefits of roundabouts include reduced driving speed (15-25 mph), reduced number of conflict points and reduced pedestrian crossing distances. Approach speeds are reduced because the entire area becomes traffic-calmed by the roundabout. Furthermore, unlike traffic signals, roundabouts do not depend on electricity to properly function, so they are not susceptible to power outages.

On average, roundabouts reduce severe crashes by 78-82%[1]

[1]Highway Safety Manual, American Association of State Highway and Transportation Officials, Washington, DC, 2010.

HOW DOES IT AFFECT EMERGENCY SERVICES?

First responders are better served by a roundabout than a traditional intersection:

- Angle crashes at signalized intersections are the most common fatal crash type involving fire trucks nationally.
- Signal preemption is needed at signalized intersections because signals do not accommodate first responders well. Roundabouts provide a natural flow that is better for first responders since they eliminate unnecessary stops and delays.

HOW WILL IT AFFECT FREIGHT MOBILITY?

Roundabouts can be designed for large trucks by using features such as:

- Wider entry and exit lanes for efficient movement of traffic.
- Mountable aprons and curbs intended to be used by vehicles with a wide and/or long wheelbase.
- Curvature and radii that allow for easy turning movements, including U-turns.

HOW IS THIS GOOD FOR PEDESTRIANS?

Pedestrians are inherently safer at a roundabout compared to a signal:

- Since the entering and exiting lanes are separated, pedestrians can cross a shorter distance of only one direction of traffic at a time. This allows pedestrians to focus their attention on one direction of crossing traffic. This is especially true at a 5-leg intersection where vehicles can be coming from many directions.
- Traffic speeds will be lowered around the roundabout, which is associated with better yielding rates, reduced vehicle stopping distance and lower risk of collision injury or fatality.

APPENDIX

DKS

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CONTENTS

APPENDIX A. DETAILED OPERATIONS ANALYSIS RESULTS

Operational Performance Comparison

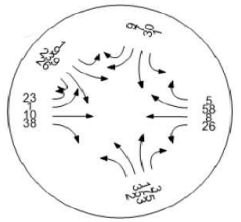
	AM					PM				
	Existing	**2050 No Build**	**Alternative A**	**Alternative B**	**Alternative C**	**Existing**	**2050 No Build**	**Alternative A**	**Alternative B**	**Alternative C**
Intersection Delay	10.8	12	17.7	17.4	5.1	20.8	30.9	47.5	55	14.1
Intersection LOS	B	B	B	B	A	C	C	D	E	B
Volume / Capacity	0.34	0.34	0.48	0.47	0.45	0.6	0.7	0.75	0.78	0.88
Worst Approach Delay*	16.6 / SWB	17.5 / SWB	27.4 / SWB	27.2 / SWB	3.3 / NB & WB	26.8/ SWB	36.8 / SWB	53.6 / SWB	65.1 / SBT	24.2 / SB
Worst movement 95th Percentile Queue Length*	88/ NBT	101 / NBT	268 / NBT	265 / NBT	106 / NB	251 / SBT	447 / SBT	655 / NBT	789 / SBT	490 / SB

* SB on Military Road S and SWB on 42nd Avenue S

Existing AM Condition

Name	Military Rd S				Military Rd S				S 164th St				S 164th St				42nd Ave S			
Approach	Northbound				Southbound				Eastbound				Westbound				Southwestbound			
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left2	Left	Thru	Right	Left	Thru	Right	Right2	Left	Thru	Right	Right2
Hourly Volume [veh/h]	2	353	175	3	1	9	239	26	23	1	10	38	26	8	58	5	1	30	7	9
95th-Percentile Queue Length [ft]	0.5	88.0	38.2		3.4		53.5		24.5				33.7				13.8			
Delay by Movement [s/veh]	12.2	10.3	8.9	8.9	14.9	14.9	9.2	9.2	14.5	14.5	14.5	14.5	14.9	14.9	14.9	14.9	16.6	16.6	16.6	16.6
LOS by Movement	B	B	A	A	B	B	A	A	B	B	B	B	B	B	B	B	B	B	B	B
Intersection Delay [s/veh]	10.8																			
Intersection LOS	B																			
Intersection V/C	0.34																			
Crosswalk LOS	B				B				A				A				B			
Bicycle LOS	E				D				D				C				A			

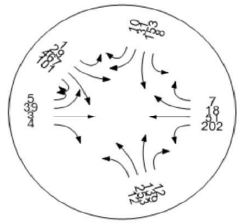
Method: HCM 6th (VISTRO)



Existing PM Condition

Name	Military Rd S				Military Rd S				S 164th St				S 164th St				42nd Ave S			
Approach	Northbound				Southbound				Eastbound				Westbound				Southwestbound			
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left2	Left	Thru	Right	Left	Thru	Right	Right2	Left	Thru	Right	Right2
Hourly Volume [veh/h]	12	253	139	12	1	29	467	101	5	39	3	4	202	51	18	7	8	153	31	10
95th-Percentile Queue Length [ft]	7.8	122.4	67.0		16.6		250.7		27.0				180.5				127.0			
Delay by Movement [s/veh]	29.0	16.4	15.5	15.5	21.3	21.3	20.1	20.1	20.3	20.3	20.3	20.3	24.5	24.5	24.5	24.5	26.8	26.8	26.8	26.8
LOS by Movement	C	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Intersection Delay [s/veh]	20.8																			
Intersection LOS	C																			
Intersection V/C	0.60																			
Crosswalk LOS	C				B				A				A				B			
Bicycle LOS	D				D				D				D				A			

Method: HCM 6th (VISTRO)



Future No Build AM Condition

Name	Military Rd S				Military Rd S				S 164th St				S 164th St				42nd Ave S			
Approach	Northbound				Southbound				Eastbound				Westbound				Southwestbound			
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left2	Left	Thru	Right	Left	Thru	Right	Right2	Left	Thru	Right	Right2
Hourly Volume [veh/h]	2	396	196	3	1	13	337	37	26	1	11	43	29	9	65	6	1	42	10	13
95th-Percentile Queue Length [ft]	0.6	100.8	44.0		4.5		81.8		25.7				35.4				18.5			
Delay by Movement [s/veh]	14.9	11.5	10.0	10.0	16.4	16.4	10.9	0.0	14.8	14.8	14.8	14.8	15.2	15.2	15.2	15.2	17.5	17.5	17.5	0.0
LOS by Movement	B	B	B	B	B	B	B	-	B	B	B	B	B	B	B	B	B	B	B	-
Intersection Delay [s/veh]	12.0																			
Intersection LOS	B																			
Intersection V/C	0.34																			
Crosswalk LOS	B				B				A				A				B			
Bicycle LOS	D				D				D				C				A			

Method: HCM 6th (VISTRO)

Future No Build PM Condition

Name	Military Rd S				Military Rd S				S 164th St				S 164th St				42nd Ave S			
Approach	Northbound				Southbound				Eastbound				Westbound				Southwestbound			
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left2	Left	Thru	Right	Left	Thru	Right	Right2	Left	Thru	Right	Right2
Hourly Volume [veh/h]	18	380	209	18	1	35	557	120	6	47	4	5	241	61	21	8	10	182	37	12
95th-Percentile Queue Length [ft]	17.6	259.3	151.1		30.0		447.4		45.1				279.0				210.3			
Delay by Movement [s/veh]	42.1	23.3	21.1	21.1	32.1	32.1	36.0	0.0	25.7	25.7	25.7	25.7	33.7	33.7	33.7	33.7	36.8	36.8	36.8	0.0
LOS by Movement	D	C	C	C	C	C	D	-	C	C	C	C	C	C	C	C	D	D	D	-
Intersection Delay [s/veh]	30.9																			
Intersection LOS	C																			
Intersection V/C	0.70																			
Crosswalk LOS	C				B				A				A				B			
Bicycle LOS	D				D				D				D				A			

Method: HCM 6th (VISTRO)

Future Build AM Condition - Alt A

Name	Military Rd S				Military Rd S				S 164th St				S 164th St				42nd Ave S			
Approach	Northbound				Southbound				Eastbound				Westbound				Southwestbound			
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left2	Left	Thru	Right	Left	Thru	Right	Right2	Left	Thru	Right	Right2
Hourly Volume [veh/h]	2	396	196	3	1	13	337	37	26	1	11	43	29	9	65	6	1	42	10	12
95th-Percentile Queue Length [ft]	0.9	268.0			8.3		125.0		45.4				62.3				39.6			
Delay by Movement [s/veh]	16.5	17.4	17.4	17.4	26.9	26.9	12.3	0.0	23.9	23.9	23.9	23.9	24.4	24.4	24.4	24.4	27.4	27.4	27.4	27.4
LOS by Movement	B	B	B	B	C	C	B	-	C	C	C	C	C	C	C	C	C	C	C	C
Intersection Delay [s/veh]	17.7																			
Intersection LOS	B																			
Intersection V/C	0.48																			
Crosswalk LOS	B				B				A				A				A			
Bicycle LOS	C				B				D				D				B			

Method: HCM 6th (VISTRO)

Future Build PM Condition - Alt A

Name	Military Rd S				Military Rd S				S 164th St				S 164th St				42nd Ave S			
Approach	Northbound				Southbound				Eastbound				Westbound				Southwestbound			
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left2	Left	Thru	Right	Left	Thru	Right	Right2	Left	Thru	Right	Right2
Hourly Volume [veh/h]	18	380	209	18	1	35	557	120	6	47	4	5	241	61	21	8	10	182	37	11
95th-Percentile Queue Length [ft]	20.7	655.1			45.8		496.8		57.9				353.6				282.2			
Delay by Movement [s/veh]	47.3	56.2	56.2	56.2	56.7	56.7	36.3	0.0	33.2	33.2	33.2	33.2	47.1	47.1	47.1	47.1	53.6	53.6	53.6	53.6
LOS by Movement	D	E	E	E	E	E	D	-	C	C	C	C	D	D	D	D	D	D	D	D
Intersection Delay [s/veh]	47.5																			
Intersection LOS	D																			
Intersection V/C	0.75																			
Crosswalk LOS	C				B				A				A				B			
Bicycle LOS	C				B				D				D				B			

Method: HCM 6th (VISTRO)

Future Build AM Condition - Alt B

Name	Military Rd S				Military Rd S				S 164th St				S 164th St				42nd Ave S			
Approach	Northbound				Southbound				Eastbound				Westbound				Southwestbound			
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left2	Left	Thru	Right	Left	Thru	Right	Right2	Left	Thru	Right	Right2
Hourly Volume [veh/h]	2	396	196	3	1	13	337	37	26	1	11	43	29	9	65	6	1	42	10	-
95th-Percentile Queue Length [ft]	0.9	265.2			8.2		142.0		46.3				61.9				32.0			
Delay by Movement [s/veh]	17.3	17.1	17.1	17.1	26.6	26.6	12.7	12.7	23.7	23.7	23.7	23.7	24.3	24.3	24.3	24.3	27.1	27.1	27.1	-
LOS by Movement	B	B	B	B	C	C	B	B	C	C	C	C	C	C	C	C	C	C	C	-
Intersection Delay [s/veh]	17.4																			
Intersection LOS	B																			
Intersection V/C	0.47																			
Crosswalk LOS	B				B				A				A				A			
Bicycle LOS	B				C				E				E				A			

Method: HCM 6th (VISTRO)

Future Build PM Condition - Alt B

Name	Military Rd S				Military Rd S				S 164th St				S 164th St				42nd Ave S			
Approach	Northbound				Southbound				Eastbound				Westbound				Southwestbound			
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left2	Left	Thru	Right	Left	Thru	Right	Right2	Left	Thru	Right	Right2
Hourly Volume [veh/h]	18	380	209	18	1	35	557	120	6	47	4	5	241	61	21	8	10	182	37	-
95th-Percentile Queue Length [ft]	23.4	624.6			46.7		788.9		62.1				367.7				273.2			
Delay by Movement [s/veh]	56.9	48.6	48.6	48.6	56.4	56.4	65.6	65.6	34.4	34.4	34.4	34.4	49.8	49.8	49.8	49.8	53.0	53.0	53.0	-
LOS by Movement	E	D	D	D	E	E	E	E	C	C	C	C	D	D	D	D	D	D	D	-
Intersection Delay [s/veh]	55.0																			
Intersection LOS	E																			
Intersection V/C	0.78																			
Crosswalk LOS	C				B				A				A				B			
Bicycle LOS	B				D				E				F				B			

Method: HCM 6th (VISTRO)

Future Build AM Condition - Alt C

Name	Military Rd S				Military Rd S				S 164th St				S 164th St				42nd Ave S			
Approach	Northbound				Southbound				Eastbound				Westbound				Southwestbound			
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left2	Left	Thru	Right	Left	Thru	Right	Right2	Left	Thru	Right	Right2
Hourly Volume [veh/h]	2	396	196	3	1	13	337	37	26	1	11	43	29	9	65	6	1	42	10	13
95th-Percentile Queue Length [ft]	106.0				59.0				13.0				24.0				10.0			
Delay by Movement [s/veh]	9.0	7.9	2.9	3.6	10.4	8.2	2.7	3.9	8.7	7.9	2.6	3.5	10.1	4.8	4.8	5.6	11.2	5.0	5.7	6.1
LOS by Movement	A	A	A	A	B	A	A	A	A	A	A	A	B	A	A	A	B	A	A	A
Intersection Delay [s/veh]	5.1																			
Intersection LOS	A																			
Intersection V/C	0.45																			
Crosswalk LOS	-				-				-				-				-			
Bicycle LOS	-				-				-				-				-			

Method: HCM 6th (VISTRO)

Future Build PM Condition - Alt C

Name	Military Rd S				Military Rd S				S 164th St				S 164th St				42nd Ave S			
Approach	Northbound				Southbound				Eastbound				Westbound				Southwestbound			
Turning Movement	Left	Thru	Right	Right2	Left2	Left	Thru	Right	Left2	Left	Thru	Right	Left	Thru	Right	Right2	Left	Thru	Right	Right2
Hourly Volume [veh/h]	18	380	209	18	1	35	557	120	6	47	4	5	241	61	21	8	10	182	37	12
95th-Percentile Queue Length [ft]	122.0				490.0				26.0				103.0				55.0			
Delay by Movement [s/veh]	9.5	8.4	3.5	4.1	31.4	29.1	23.7	24.8	16.1	15.3	10.0	10.8	12.6	7.3	7.3	8.2	13.5	7.4	8.0	8.5
LOS by Movement	A	A	A	A	D	D	D	D	B	B	A	B	B	A	A	A	B	A	A	A
Intersection Delay [s/veh]	14.1																			
Intersection LOS	B																			
Intersection V/C	0.88																			
Crosswalk LOS	-				-				-				-				-			
Bicycle LOS	-				-				-				-				-			

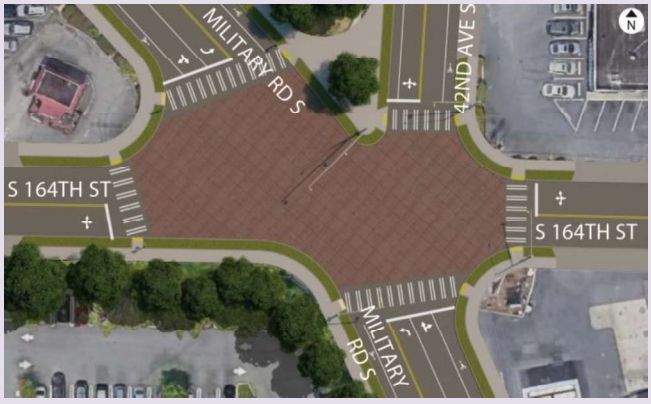
Method: HCM 6th (VISTRO)

APPENDIX B. PLANNING LEVEL COST ESTIMATES

COST ESTIMATE (2021)

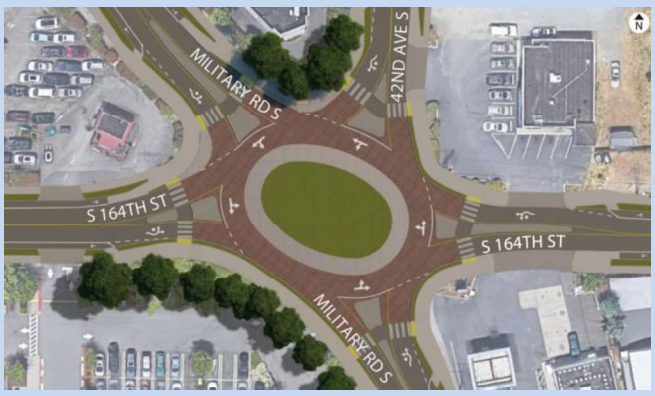
Alternative A – Maintains Signal

Subtotal Construction Cost	$1,600,000
Contingency (30%)	$480,000
Construction Management at 12%	$250,000
ROW Acquisition	$240,000
Design Engineering @18%	$370,000
TOTAL COST	**$2,940,000**



Alternative B – Maintains Signal and Adds Plaza

Subtotal Construction Cost	$1,680,000
Contingency (30%)	$504,000
Construction Management at 12%	$260,000
ROW Acquisition	$240,000
Design Engineering @18%	$390,000
TOTAL COST	**$3,070,000**



Alternative C – Convert Signal to Roundabout

Subtotal Construction Cost	**$1,760,000**
Contingency (30%)	**$530,000**
Construction Management at 12%	**$270,000**
ROW Acquisition	**$390,000**
Design Engineering @18%	**$410,000**
TOTAL COST	**$3,360,000**

APPENDIX C. ONLINE OPEN HOUSE FINAL REPORT 2021

Military Road South
5-Way Intersection Study

ONLINE OPEN HOUSE FINAL REPORT

JUNE 9 – 30, 2021

Table of Contents

SUMMARY

The intersection at Military Road South, South 164th Street, and 42nd Avenue South connects several important destinations between SeaTac and Tukwila. Its configuration is complex due to five approaches to the intersection and there are observed safety issues. The intersection accommodates high traffic volumes during peak morning and evening hours, and future development in the area is expected to increase the demands for mobility through the intersection.

As part of the Military Road South 5-Way Intersection Study, the City of SeaTac hosted an online open house between June 9 and June 30, 2021 to gather feedback on which design alternatives participants like best for a reconfigured intersection.

When visiting the online open house, participants could:

- Learn more about the project need, benefits, and schedule.
- Learn more about the benefits and challenges of the design alternatives being considered.
- Give feedback on preferred design alternatives under consideration.
- Share demographic information to help determine the effectiveness of the City's outreach.
- Sign up for project email updates.

Promotions

The City used multiple methods to reach audiences and promote the online open house. The City sent a postcard advertising the online open house to 1,150 addresses within a quarter mile of the project area. The City also posted information about the online open house on the project webpage, social media, and via email to the City's listserv.

The following report captures data from survey respondents who visited the online open house.

METHODS

The online open house included seven questions related to design alternatives and respondent priorities, and four questions related to respondent demographics. All questions were optional. Not all respondents answered every question. Many questions allowed respondents to select more than one answer. Questions with more than one answer do not use percentage to calculate any total value or representation.

Use and Activity

460 individuals visited the online open house; of those, 138 individuals completed the survey. A complete report of web activity can be viewed on page 17.

KEY FINDINGS

Respondent Characteristics

About 30% of online open house visitors completed survey questions. Eighty-four percent (84%) of respondents who provided a ZIP code listed 98188, the ZIP code that surrounds the intersection at Military Road South, South 164th Street, and 42nd Avenue South.

The majority (70%) of respondents traveled through the intersection on a daily basis, and most travel through the intersection by car. Among participants who chose to identify their ethnicity/race, 69% identified as White and/or Caucasian alone. Ninety-one percent (91%) of respondents primarily speak English in their home. Most respondents were 30 years or older, with the largest represented age group being those 60 years or older (30%).

Preferences and Priorities

Of the three alternatives presented in the online open house, 61% of survey participants preferred *Alternative C: Converts signal to roundabout* and selected the following as their top three reasons:

1. Improves traffic flow (85%)
2. Improves safety for motor vehicle drivers and passengers (59%)
3. Improves safety for pedestrians and bicyclists (45%)

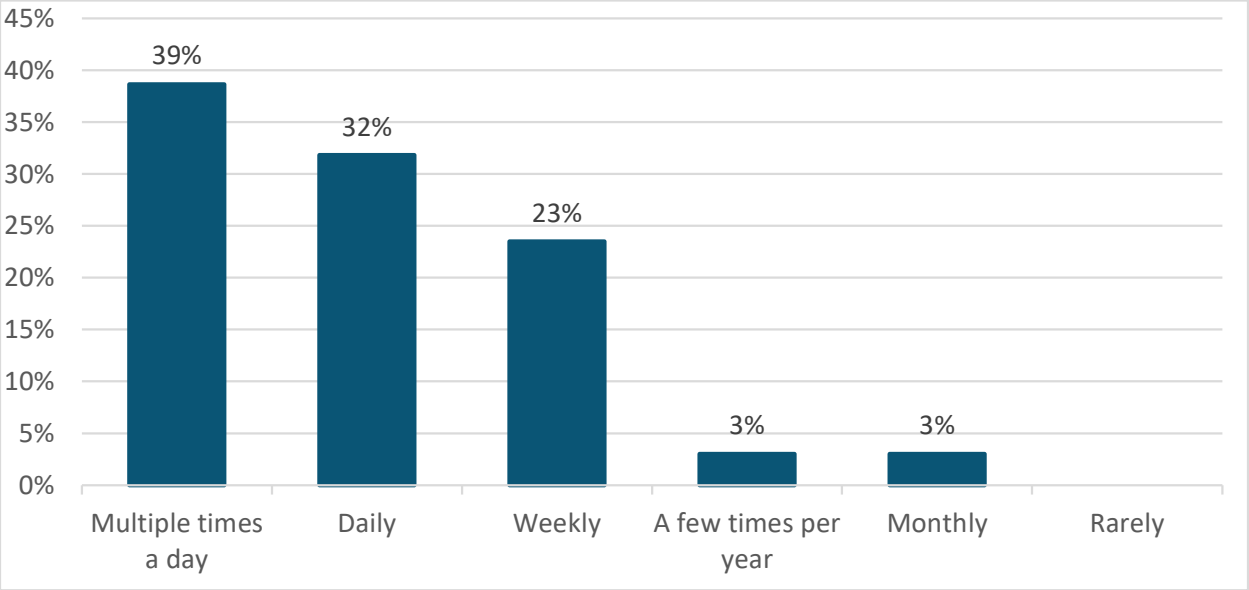
NEXT STEPS

Along with technical evaluations such as traffic, collision and signal timing data, the public input received from the online open house will assist the project team in narrowing the design options. The City of SeaTac is expected to begin design of the selected alternative in 2024.d

SURVEY RESPONSES

Reporting note: Many questions allowed respondents to select more than one answer. This is reflected in the "Tally" for answers to these questions.

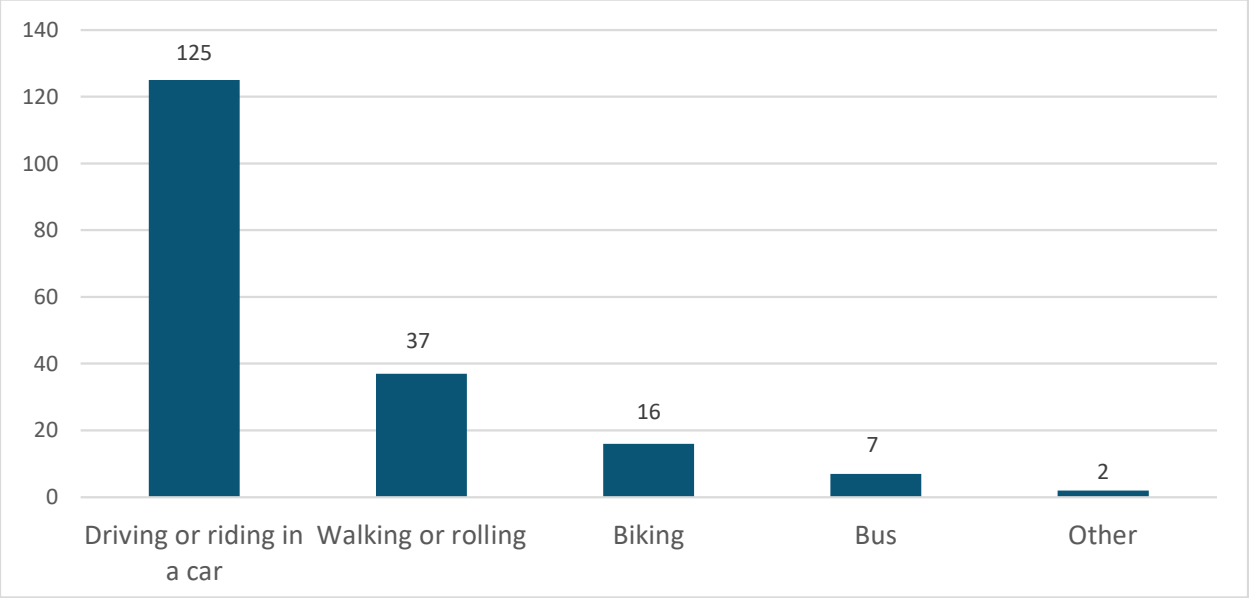
Question 1 | How frequently do you travel through the intersection at Military Road South, South 164th Street, and 42nd Avenue South?



Answer	Percentage	Responses
Multiple times a day	39%	51
Daily	32%	42
Weekly	23%	31
A few times per year	3%	4
Monthly	3%	4
Rarely	0%	0

Total respondents | 132

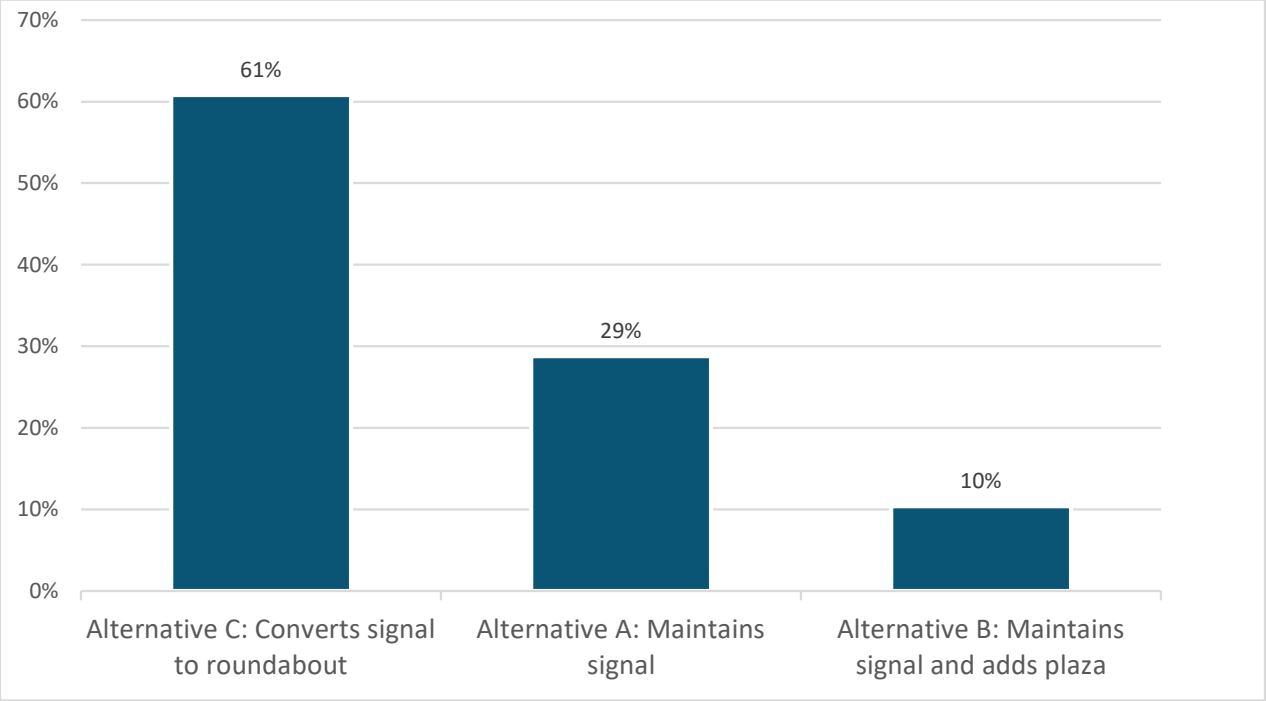
Question 2 | How do you travel through the intersection? (Select all that apply)



Answer	Tally
Driving or riding in a car	125
Walking or rolling	37
Biking	16
Bus	7
Other	2

Total respondents | 130

Question 3 | Which of the three design alternatives do you *most* prefer?

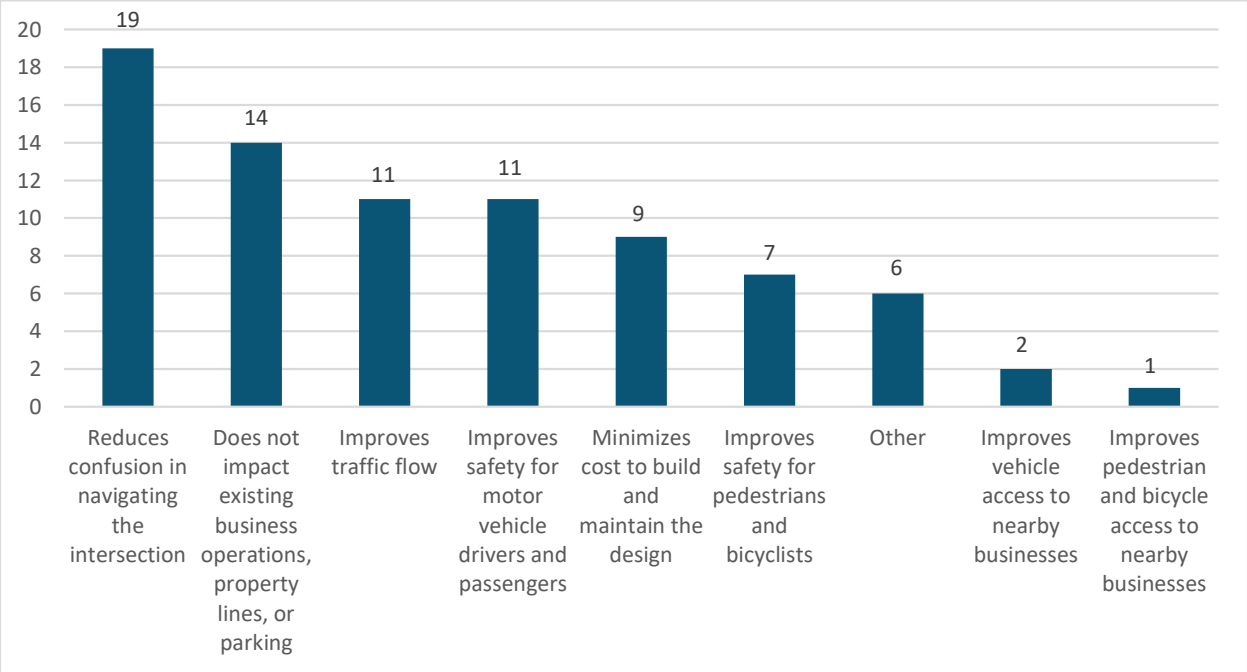


Answer	Percentage	Responses
Alternative C: Converts signal to roundabout	61%	76
Alternative A: Maintains signal	29%	36
Alternative B: Maintains signal and adds plaza	10%	13

Total respondents | 125

Question 4 | I prefer this alternative because it… (SELECT TOP 3)

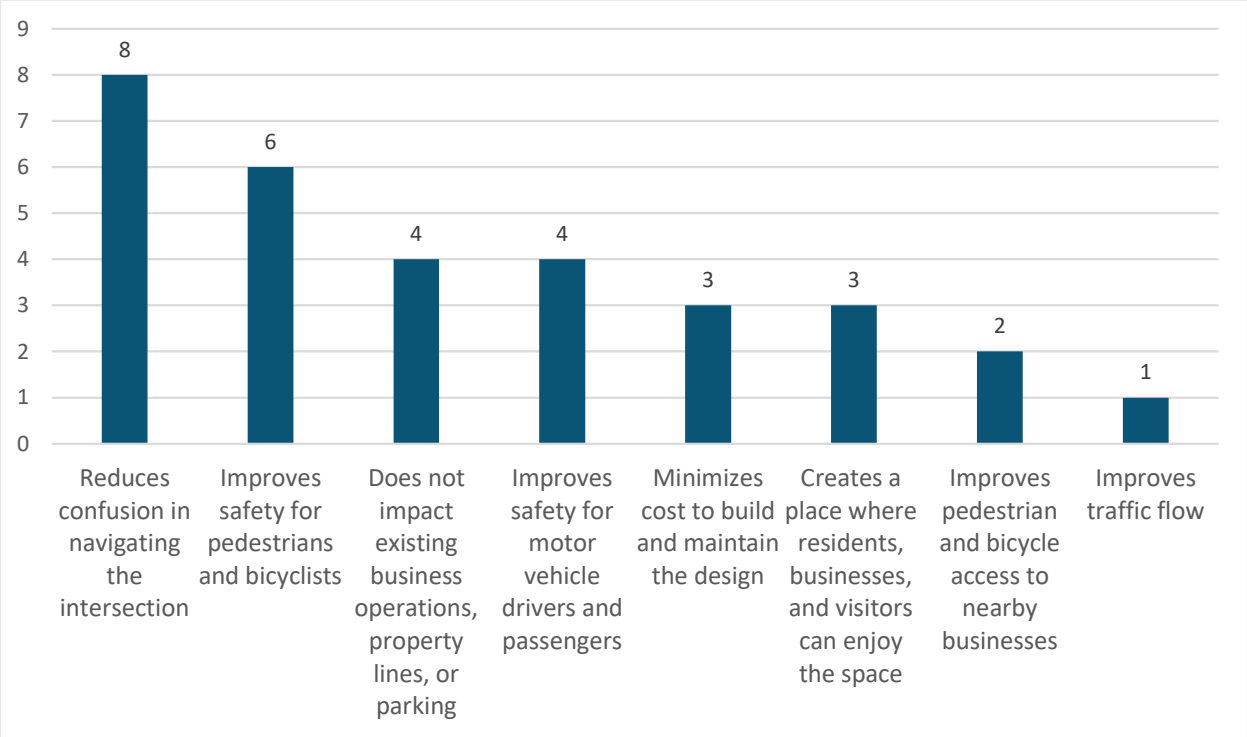
Alternative A



Answers	Tally
Reduces confusion in navigating the intersection	19
Does not impact existing business operations, property lines, or parking	14
Improves traffic flow	11
Improves safety for motor vehicle drivers and passengers	11
Minimizes cost to build and maintain the design	9
Improves safety for pedestrians and bicyclists	7
Other	6
Improves vehicle access to nearby businesses	2
Improves pedestrian and bicycle access to nearby businesses	1
Creates a space for fountain/sculpture/art feature	0
Creates a place where residents, businesses, and visitors can enjoy the space	0

Total respondents | 34

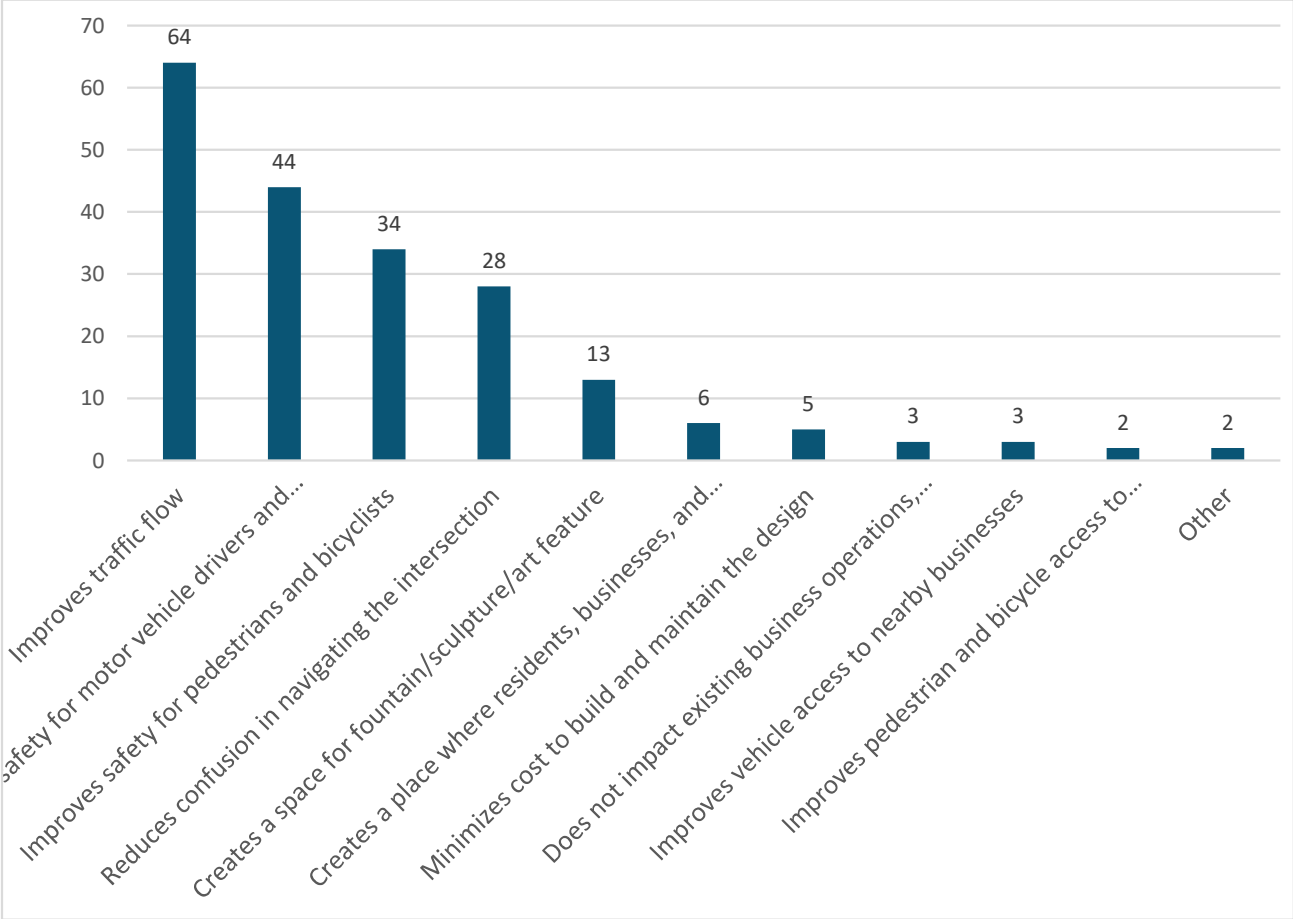
Alternative B



Answers	Tally
Reduces confusion in navigating the intersection	8
Improves safety for pedestrians and bicyclists	6
Does not impact existing business operations, property lines, or parking	4
Improves safety for motor vehicle drivers and passengers	4
Minimizes cost to build and maintain the design	3
Creates a place where residents, businesses, and visitors can enjoy the space	3
Improves pedestrian and bicycle access to nearby businesses	2
Improves traffic flow	1
Improves vehicle access to nearby businesses	0
Creates a space for fountain/sculpture/art feature	0
Other	0

Total respondents | 13

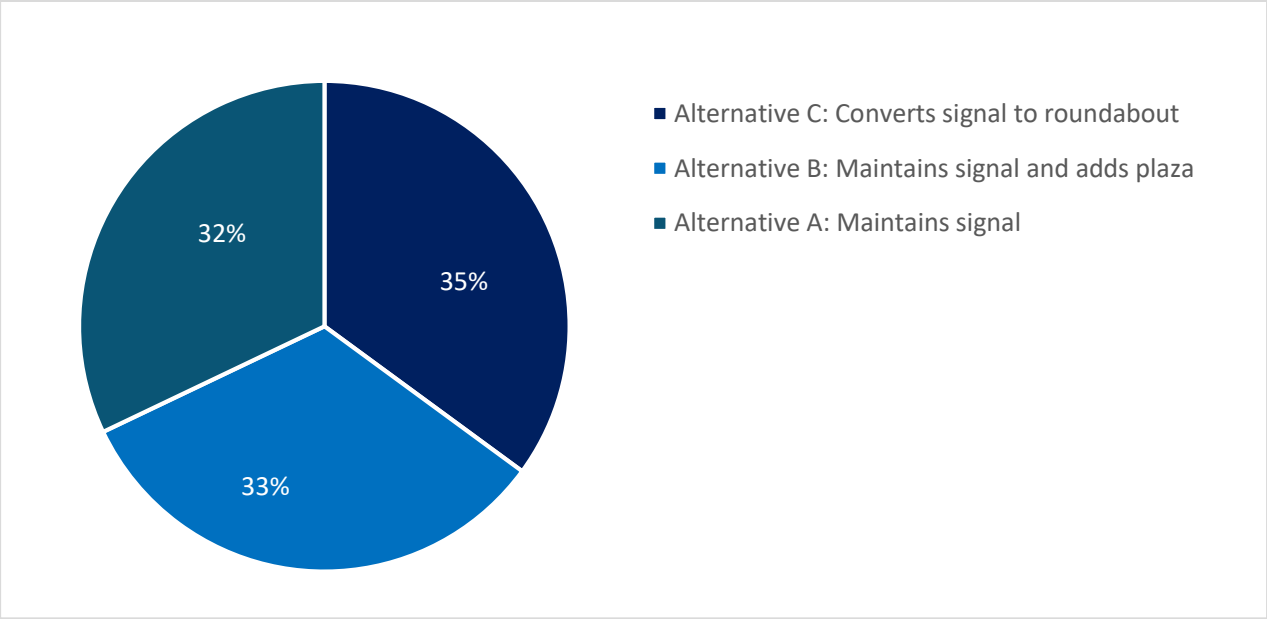
Alternative C



Answers	Tally
Improves traffic flow	64
Improves safety for motor vehicle drivers and passengers	44
Improves safety for pedestrians and bicyclists	34
Reduces confusion in navigating the intersection	28
Creates a space for fountain/sculpture/art feature	13
Creates a place where residents, businesses, and visitors can enjoy the space	6
Minimizes cost to build and maintain the design	5
Does not impact existing business operations, property lines, or parking	3
Improves vehicle access to nearby businesses	3
Improves pedestrian and bicycle access to nearby businesses	2
Other	2

Total respondents | 75

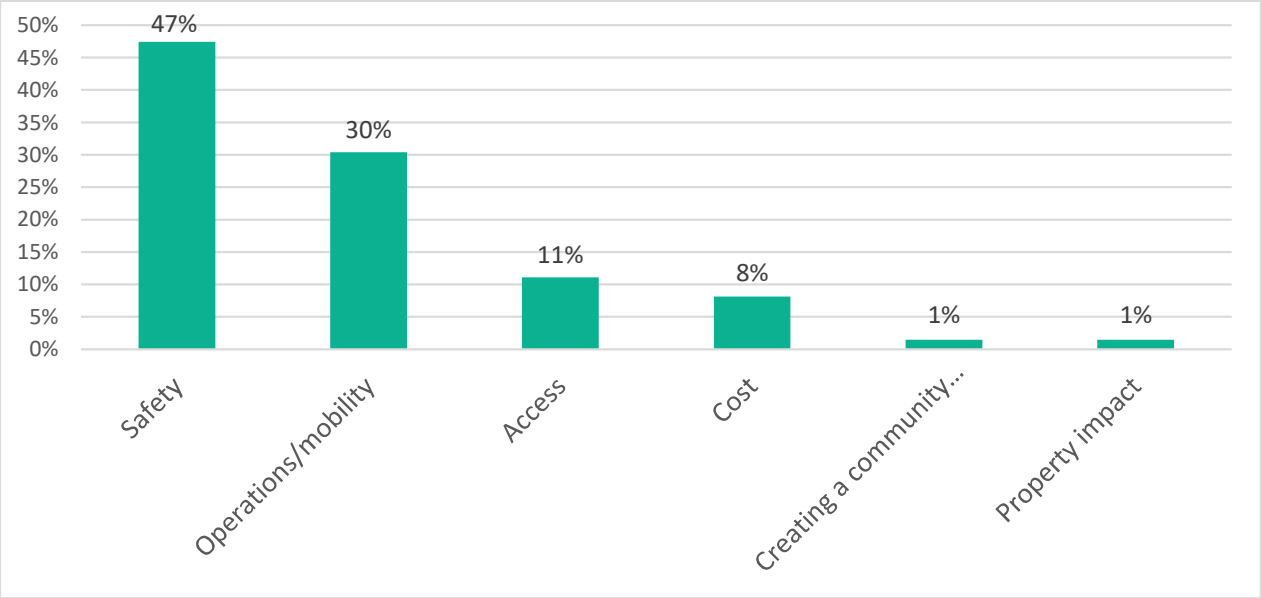
Question 5 | Which of the three design alternatives do you *least* prefer?



Answers	Percentage	Tally
Alternative C: Converts signal to roundabout	35%	47
Alternative B: Maintains signal and adds plaza	33%	44
Alternative A: Maintains signal	32%	43

Total respondents | 134

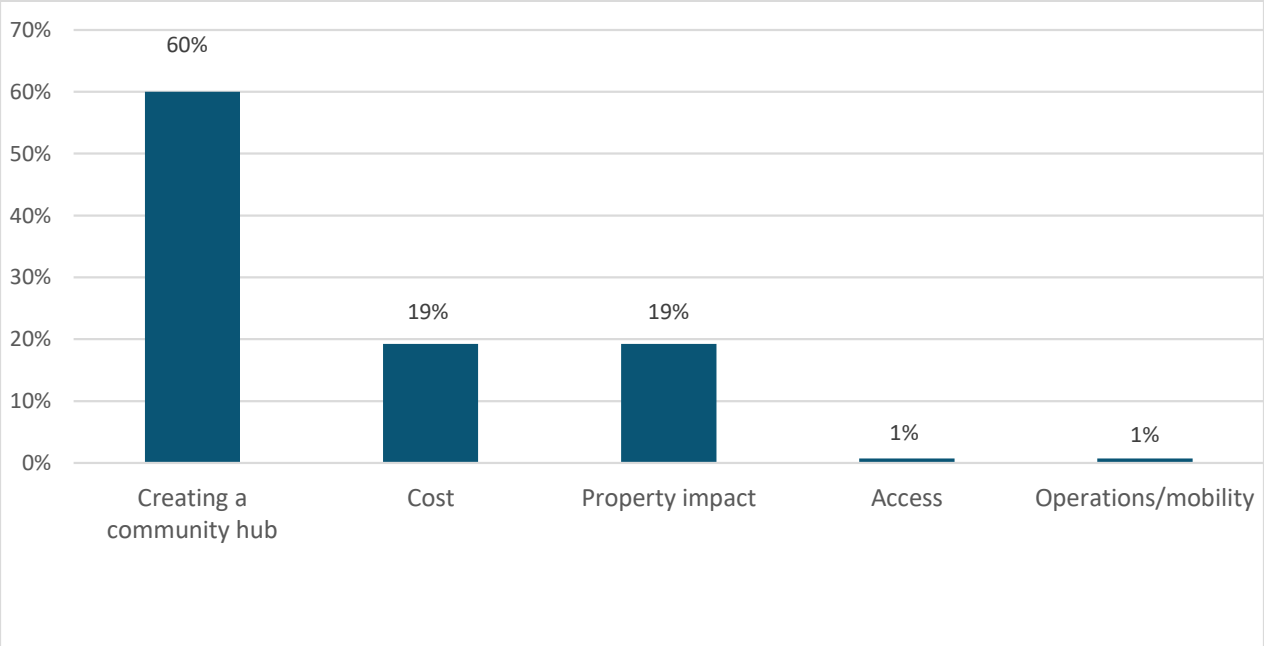
Question 6 | Which of these is *most* important to you?



Answers	Percentage	Tally
Safety	47%	64
Operations/mobility	30%	41
Access	11%	15
Cost	8%	11
Creating a community hub	1%	2
Property impact	1%	2

Total respondents | 135

Question 7 | Which of these is *least* important to you?

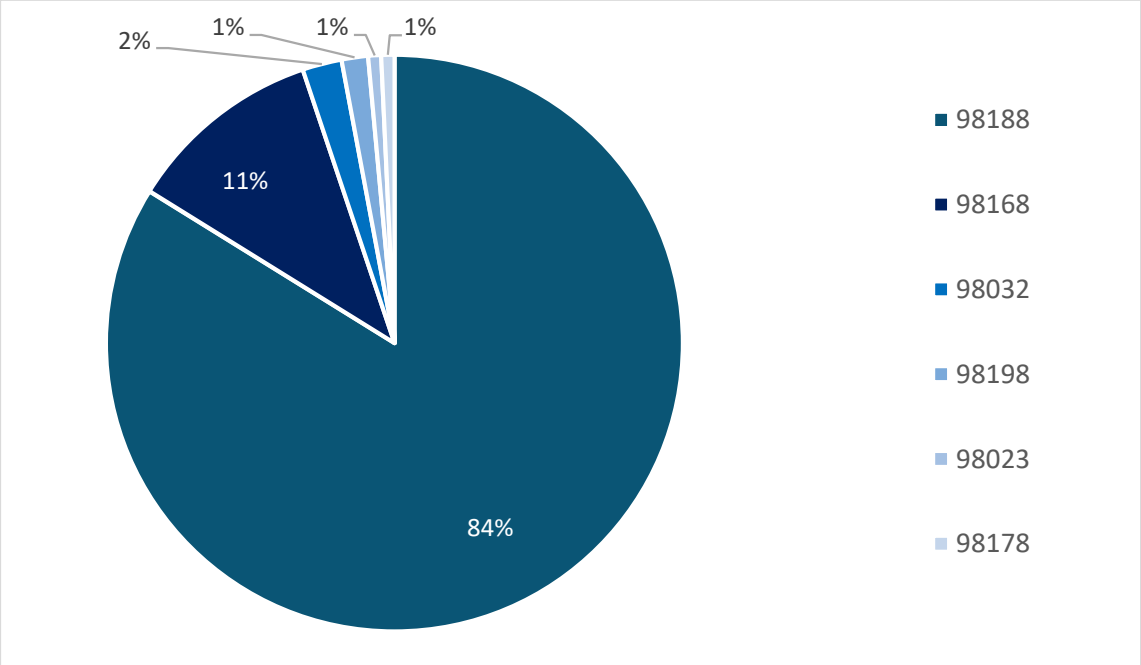


Answers	Percentage	Tally
Creating a community hub	60%	81
Cost	19%	26
Property impact	19%	26
Access	1%	1
Operations/mobility	1%	1
Safety	0%	0

Total respondents | 135

DEMOGRAPHIC QUESTIONS

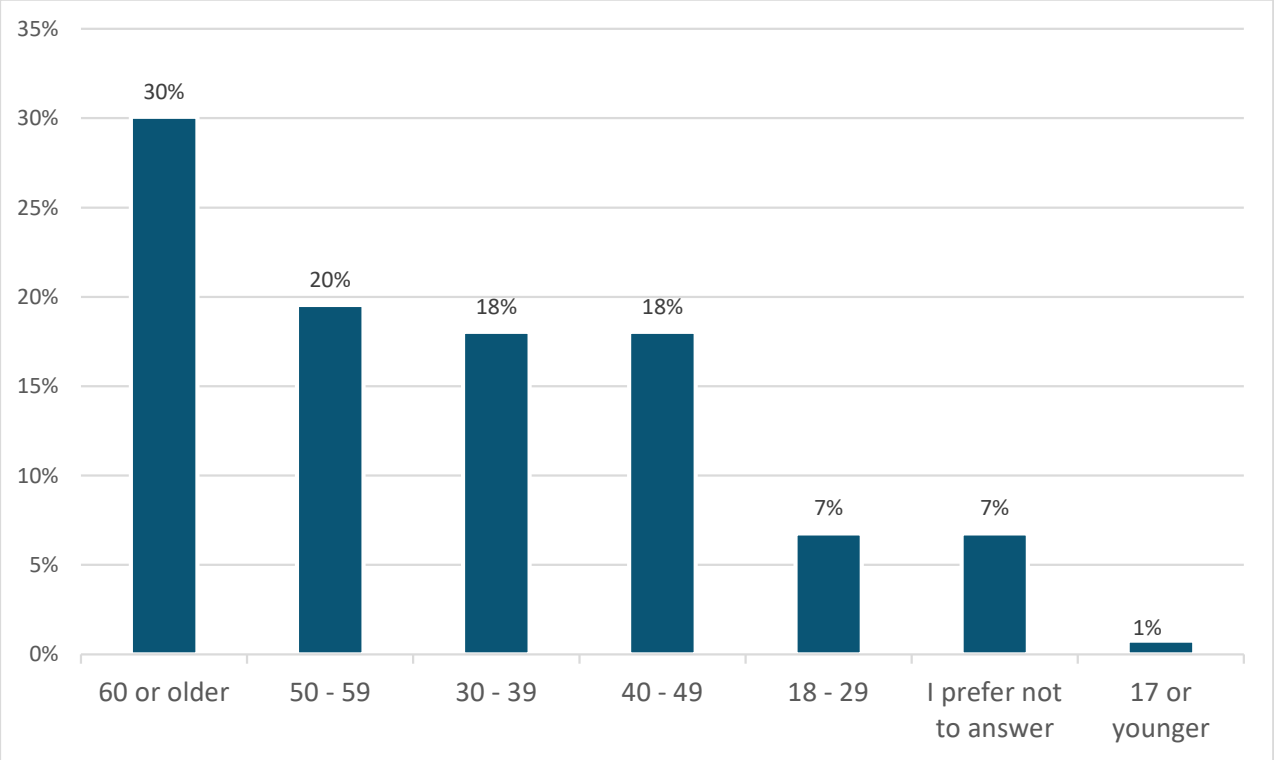
Question 1 | What ZIP code do you live in?



Answers	Percentage	Tally
98188	84%	114
98168	11%	15
98032	2%	3
98198	1%	2
98023	1%	1
98178	1%	1

Total respondents | 136

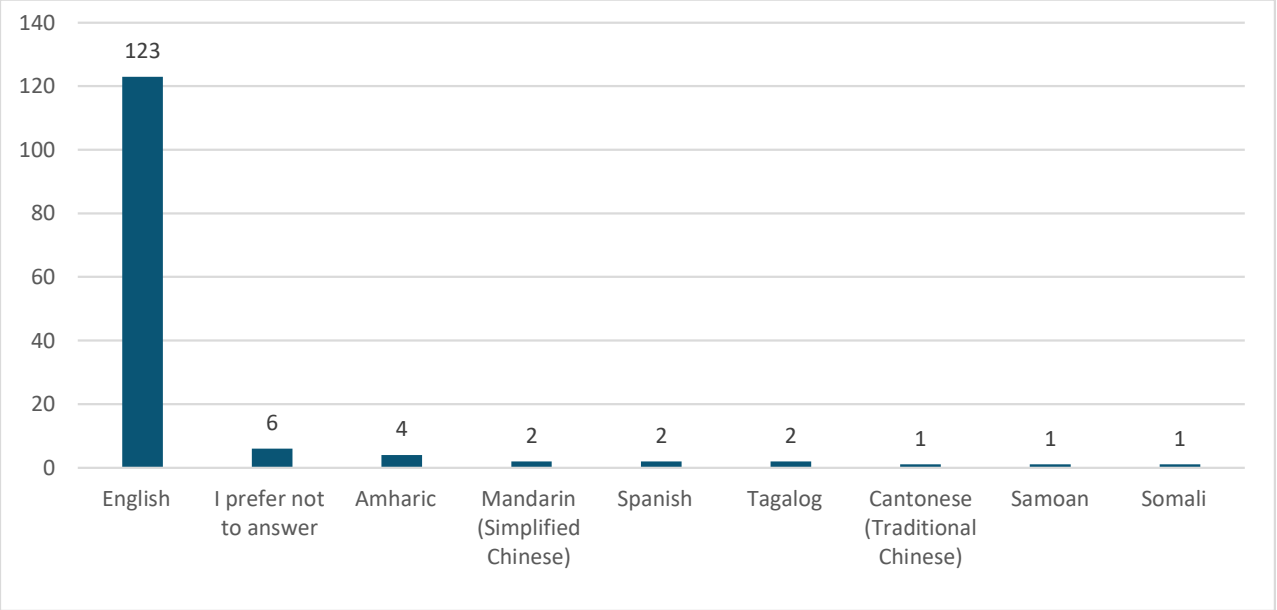
Question 2 | What is your age?



Answers	Percentage	Tally
60 or older	30%	40
50 - 59	20%	26
30 - 39	18%	24
40 - 49	18%	24
18 - 29	7%	9
I prefer not to answer	7%	9
17 or younger	1%	1

Total respondents | 133

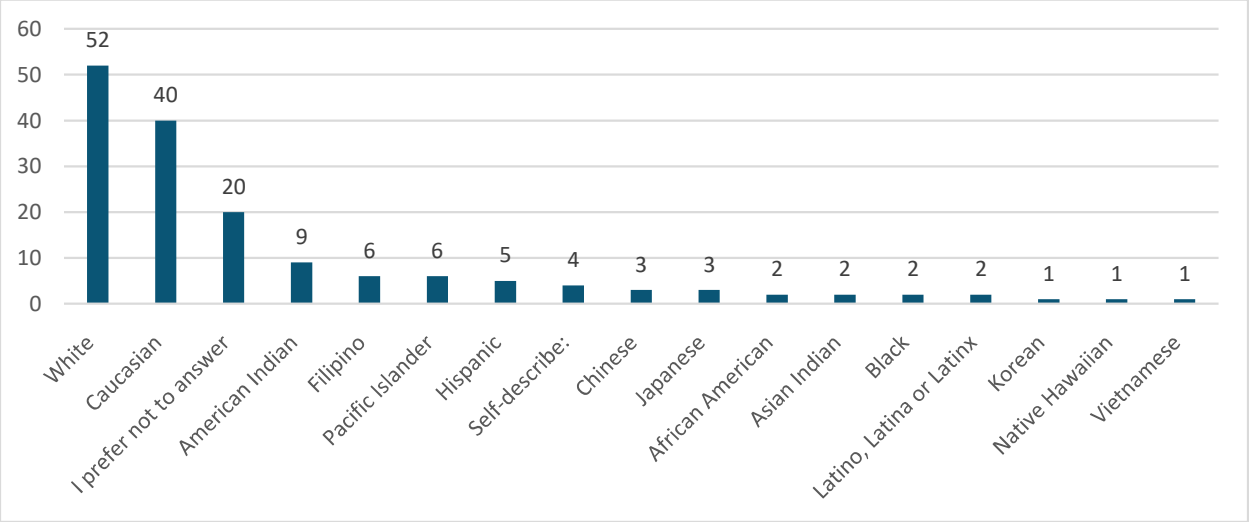
Question 3 | What is the primary language spoken in your home? (Select all that apply)



Answers	Tally
English	123
I prefer not to answer	6
Amharic	4
Mandarin (Simplified Chinese)	2
Spanish	2
Tagalog	2
Cantonese (Traditional Chinese)	1
Samoan	1
Somali	1
Korean	0
Tigrinya	0
Vietnamese	0

Total respondents | 135

Question 4 | How do you identify? (Select all that apply)



Answers	Tally
White	52
Caucasian	40
I prefer not to answer	20
American Indian	9
Filipino	6
Pacific Islander	6
Hispanic	5
Self-describe:	4
Chinese	3
Japanese	3
African American	2
Asian Indian	2
Black	2
Latino, Latina or Latinx	2
Korean	1
Native Hawaiian	1
Vietnamese	1

Total respondents | 130

WEB ACTIVITY REPORT

URL | militaryroad.infocommunity.org

Users | 460
Total number of people that visited the online open house at least once.

Sessions | 579
The number of times a user was actively engaged with the online open house.

Total pageviews | 1,658
The total number of times all pages within the online open house were viewed.

Pages visited per session | 2.86
The average number of pages a user visited during a session.

Session duration | 3 minutes, 24 seconds
The average time a user spent viewing the online open house during a session.

Device use
Mobile | 57%
Desktop | 40%
Tablet | 3%

Top 5 traffic sources
Direct entry of URL | 52%
Facebook | 29%
Seatacblog.com | 10%
Cityofseatac.wordpress.com | 4%
Nextdoor.com | 3%