City of Bellevue Neighborhood Congestion Reduction Program
140th Avenue NE and NE 8th Street Transportation Analysis Report
Contract Number 1850211.000
August 2019

The engineering material and data contained in this report were prepared under the supervision and direction of the undersigned, whose seal as registered professional engineer is affixed below.

8/13/19

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Date:	August 13, 2019
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Subject:	140th Avenue NE and NE 8th Street Intersection

1. Introduction

In November 2016, voters passed the Neighborhood Safety, Connectivity and Congestion Levy, which is aimed at helping the city address a backlog of important projects. The 2016 levy supplements existing safety, sidewalk, maintenance, intelligent transportation systems, and bicycle facilities programs as well as supporting a new program aimed at easing motor vehicle congestion in neighborhoods, the Neighborhood Congestion Reduction program. Levy funding pays for the planning, design, construction and public outreach associated with selected projects. At the conclusion of this study the City will use predefined metrics, which consider the costs and benefits of the recommended study area improvements, to determine if the project will move forward to design and construction.

The existing channelization of the study intersection is shown below in

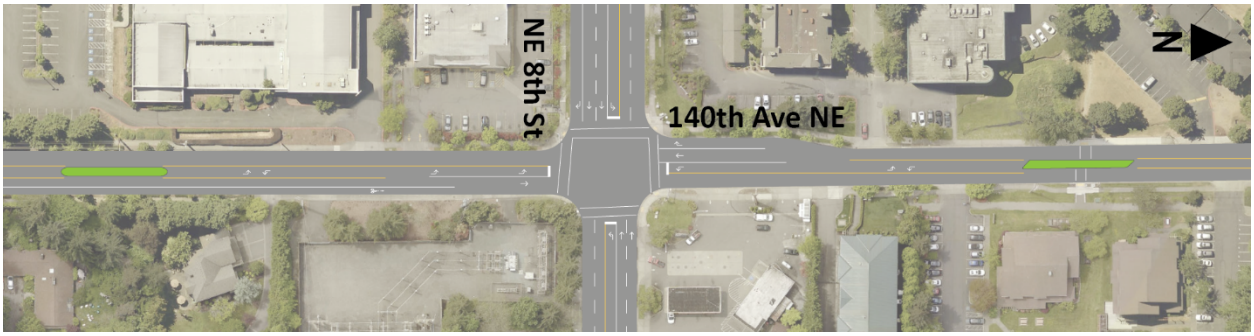


Figure 1. Southbound traffic along 140th Avenue NE currently experiences significant congestion and delays during the PM peak hour. In addition, long southbound through traffic queues were observed in the field, which would block the southbound right turning vehicles from entering the right turn pocket. Existing traffic operations observation suggests that this southbound traffic movement is operating with insufficient capacity.

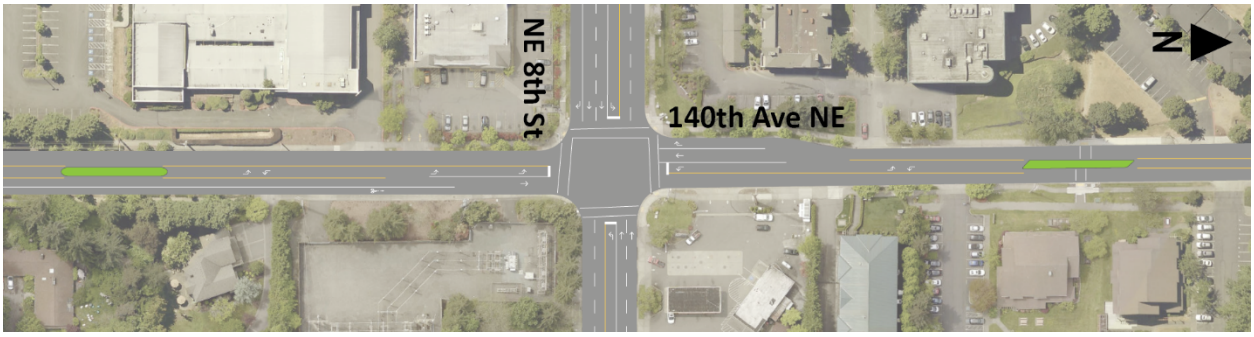


Figure 1. Existing Intersection Channelization

The intent of this study is to evaluate existing traffic operations and safety conditions as well as propose alternatives to mitigate traffic congestion, delay, and queueing issues. This transportation analysis report provides project background information, traffic analysis methods and assumptions, a summary of existing conditions including both traffic operations and safety, alternatives analysis, and a final recommendation.

Additionally, the City initiated public outreach for the spot improvement study by circulating a flyer to the local community in April 2019. The City also published a post on a social networking platform, targeted at the neighborhood to provide information on the City preferred alternatives. A summary of the public comments and general City responses are provided in the appendices of this report.

2. Methods and Assumptions

2.1 Analysis Yeas and Periods

The existing conditions analysis year is 2018 and the future analysis year is 2035. The analysis periods were determined based on the intersection turning movement counts data collected in October 2018. The weekday AM peak hour is from 7:45 AM to 8:45 AM and the PM peak hour is from 5:00 PM to 6:00 PM.

2.2 Traffic Volume

Traffic volumes for the existing conditions were collected on October 16, 2018 for both the AM and PM peak periods. Traffic volumes for the future year 2035 baseline were developed by the City of Bellevue using the Bellevue-Kirkland-Redmond (BKR) travel demand model and post-processed. The AM and PM peak hour turning movement volumes for both existing 2018 conditions and future 2035 baseline are shown in Figure 2. The complete two-hour traffic counts can be found in Appendix A.

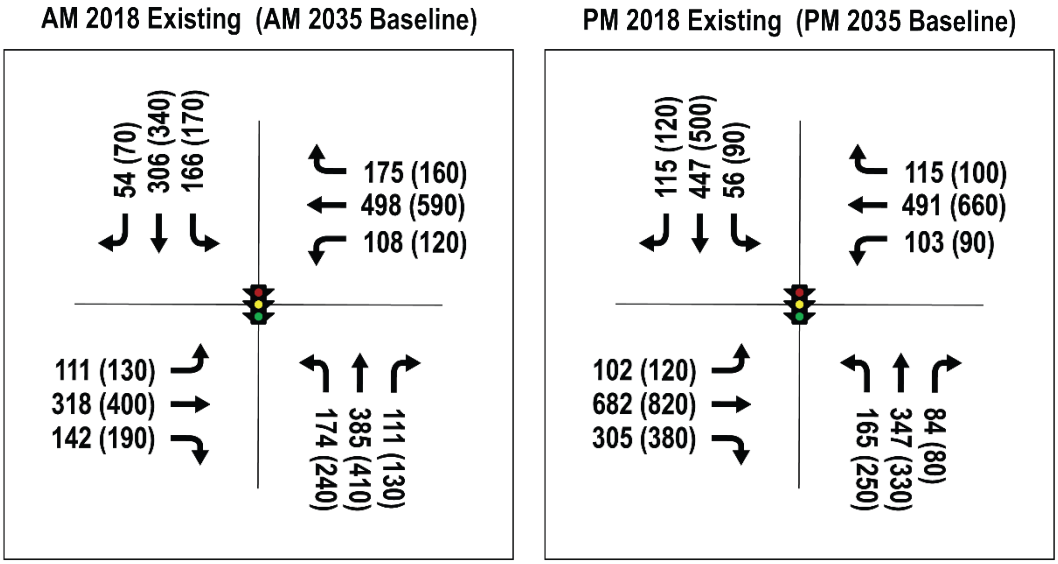


Figure 2. AM & PM Peak Hour Turning Movement Counts

2.3 Modeling Tools

Synchro 10 was used to perform the traffic operations analysis for both the existing 2018 and future 2035 conditions.

2.4 Signal Timing

For modeling purposes, historical averages of the splits from the SCATS system was used because the cycle length and splits vary dynamically throughout the peak hours under the adaptive signal system. In this study, the historical SCATS average data was collected on October 16th, 2018 and the detailed signal timing information is included in Appendix B.

2.5 Measures of Effectiveness (MOE)

The following MOEs were compared between the existing, future baseline and alternative models to evaluate the benefits and impacts of the alternatives:

- Average intersection delay and southbound through movement delay and Level of Service (LOS)
- Southbound through movement 95th percentile queue length

2.6 Design Standards & Considerations

Design of recommended improvements will adhere to City, State, AASHTO, and other local applicable design standards and guidelines. Level of design for concepts will be suitable for inclusion in the City's Transportation Improvement Program or Transportation Facilities Plan with planning level cost estimates, which capture inflation, other cost variability, and contingencies. The key design criteria can be found in Appendix C.

3. Existing Conditions Analysis

3.1 Traffic Operations Analysis

The existing AM and PM peak hour intersection delay and LOS as well as southbound through movement delay, LOS, and 95th percentile queue lengths are shown

Table 1. During the AM peak hour, the intersection operates at LOS D with an average control delay of 35 seconds, and the southbound through movement operates at LOS D with 37 seconds of control delay and a 95th percentile queue length of 300 feet. The PM LOS and average control delay is the same as during the AM peak, but the southbound through movement operates at LOS E with a 55 seconds control delay and a 95th percentile queue length of 490 feet during the PM Peak. The PM peak queue length for the southbound through movement extends beyond the midblock crossing north of the intersection.

The study intersection (140th Avenue NE & NE 8th Street) is within the City of Bellevue Mobility Management Area (MMA) 9: East Bellevue. The MMA threshold for this area is 0.85 volume-to-capacity (V/C) ratio and a congestion allowance of 5. The congestion allowance is the maximum number of intersections within the MMA that are allowed to exceed the V/C ratio. The study intersection currently operates with V/C ratios of 0.70 and 0.59 in the AM and PM peak hours, respectively; therefore, the intersection currently performs within the MMA threshold.

Table 1. Existing AM and PM Peak Hour Delay & LOS (140th Ave NE & NE 8th St)

Scenario		Intersection	Eastbound			Westbound			Northbound			Southbound		
			L	T	R	L	T	R	L	T	R	L	T	R
2018 Ex AM	Delay*	35	28	33	4	23	38		23	53		36	37	5
	LOS	D	C	C	A	C	D		C	D		D	D	A
2018 Ex PM	Delay*	35	21	32	6	22	31		42	51		29	55	6
	LOS	D	C	C	A	C	C		D	D		C	E	A

*The unit for Vehicle Delay is second/vehicle.

3.2 Collision Analysis

This study includes a collision analysis based on five years of historical collision data collected from January 2014 to December 2018 within the study intersection. A total of 45 collisions were reported during the five-years period. Table 2 and Figure 3 provide a summary of collision types. As noted, the two most frequent types of collisions reported were rear-ends (38%) and approach turns (18%). There were two reported collisions involving pedestrians. One occurred in the north leg crosswalk and was the result of a collision with an eastbound left turning vehicle and the other occurred in the south leg crosswalk and was a result of a collision with an eastbound right turning vehicle.

Table 3 and Figure 4 provide a summary of the five-years of collision history by severity. A majority of collisions resulted in no injury (71%), 24% of collision resulted in possible injury, and 5% of collisions resulted in minor injuries.

Table 2. Summary by Collision Type

Collision Type	2014	2015	2016	2017	2018	Total
Right Angle		2	1	2		**5**
Sideswipe/Lane Change	1		3	1	1	**6**
Rear End	2	4	5	5	1	**17**
Parked Vehicle/Fixed Object		1	2		1	**4**
Approach Turn	1	3	1		3	**8**
Pedestrian	1	1				**2**
Other		2		1		**3**
Total	**5**	**13**	**12**	**9**	**6**	**45**

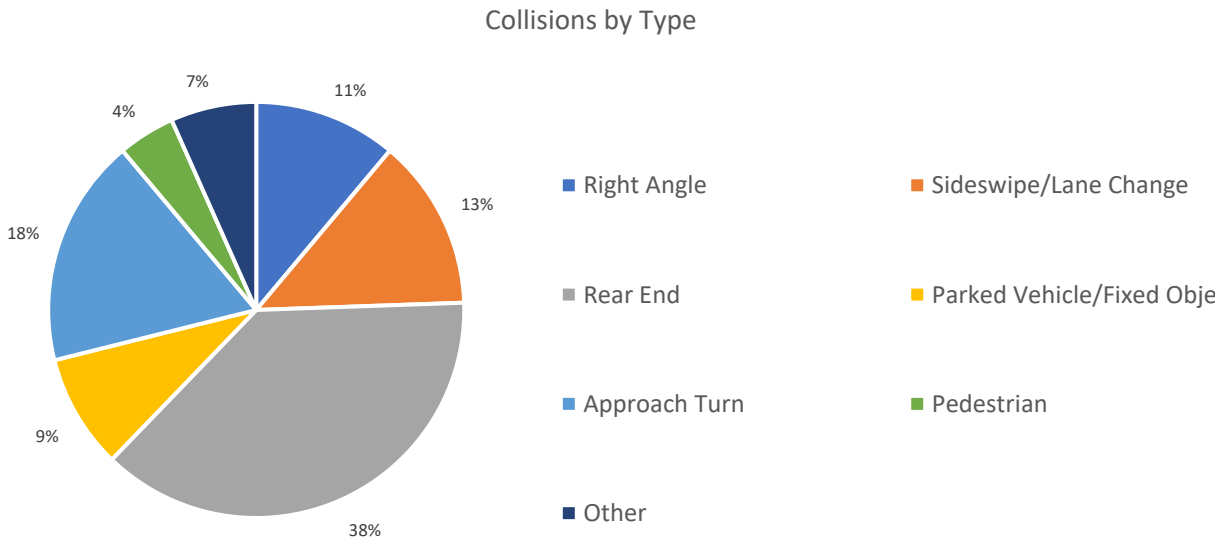


Figure 3. Summary by Collision Type

Table 3. Collision Severity

Collision Severity	2014	2015	2016	2017	2018	Total
No Injury	4	10	9	5	4	32
Non-Disabling Injury		1		1		2
Possible Injury	1	2	3	3	2	11
Total	**5**	**13**	**12**	**9**	**6**	**45**

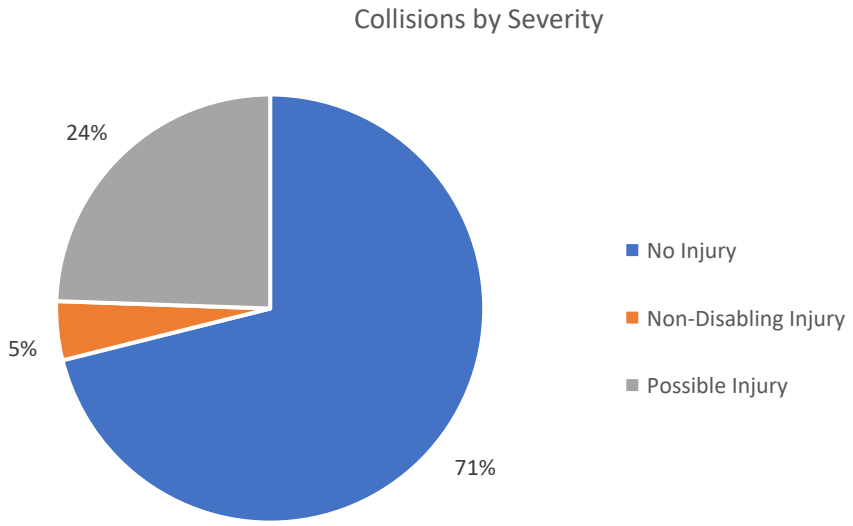


Figure 4. Collision Severity

Table 4 provides a summary of the collisions by movement of vehicle. The number of collisions were fairly evenly distributed between vehicles travelling in the eastbound, westbound, and southbound directions. Northbound travelling vehicles had the fewest with five. The majority of the southbound collisions (11 of 13, or 85%) were rear-ends.

Table 4. Collision by Movement of Vehicle

Direction	Left Turn	Through	Right Turn	Subtotal
Eastbound	2	9	4	**15**
Westbound	4	7	1	**12**
Northbound	2	3	0	**5**
Southbound	3	10	0	**13**
Total	**11**	**29**	**5**	**45**

In terms of environmental conditions associated with collisions, the data includes lighting condition (daylight, dusk, and dark) and roadway surface condition (dry or wet) when the collision occurred. A majority (69%) of collisions occurred during daylight, and a majority (76%) of collisions occurred when the roadway surface was dry.

Figure 5 provides a summary of the collisions by time of day. Most of the collisions occurred between the hours of 7:00 AM and 8:00 PM. However, the 9-AM hour, 2-PM hour, and 4-PM hour are the peak hours in which collisions occurred with 5 collisions during 9-AM hour and 6 collisions during both the 2-PM and 4-PM hours.

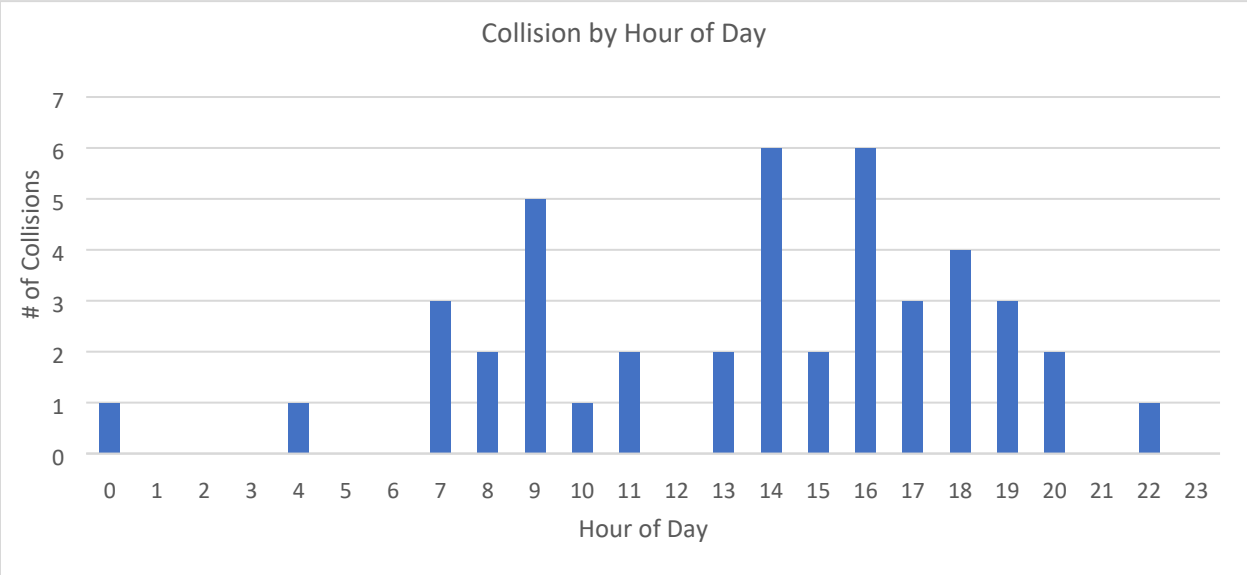


Figure 5. Collision by Hour

The trends that may be revealed from the collision analysis are that the majority of the collisions at the intersection are rear-ends and approach turns. Due to the congested nature of the intersection, spill-back queues from turn lanes, which block through lanes may contribute to rear-end collisions. Also, turning vehicles failing to properly yield, or miscalculating the gap from approaching vehicles, may contribute to the approach turn collisions.

4. 2035 Baseline Analysis

4.1 2035 Baseline Volumes

The forecasted 2035 baseline traffic volumes for both the AM and PM peak hours are shown in Figure 2, Section 2 of this report. The 2035 baseline volumes are shown side-by-side with the existing AM and PM traffic volumes for comparison purposes.

4.2 Baseline Traffic Operations

The 2035 baseline delay and LOS results for AM and PM peak hours are summarized in Table 5 and Table 6, respectively. With the increase in volumes, the intersection would experience increased delay during both AM and PM peak hours. During the AM peak hour, the intersection would continue to operate at LOS D, but with an additional 3 seconds of average control delay and the northbound through/right movement degrading from LOS D to E. During the PM peak hour, the intersection LOS would continue to operate at LOS D with an additional 4 seconds of average control delay and the northbound left movement would degrade from LOS D to E.

Table 5. 2035 Baseline AM Peak Delay and LOS Results

Scenario		Intersection	Eastbound			Westbound			Northbound			Southbound		
			L	T	R	L	T	R	L	T	R	L	T	R
2018 Ex	Delay*	35	28	33	4	23	38		23	53		36	37	5
	LOS	D	C	C	A	C	D		C	D		D	D	A
2035 Baseline	Delay*	38	38	37	4	26	46		26	55		41	39	7
	LOS	D	D	D	A	C	D		C	E		D	D	A

*The unit for Vehicle Delay is second/vehicle.

Table 6. 2035 Baseline PM Peak Delay and LOS Results

Scenario		Intersection	Eastbound			Westbound			Northbound			Southbound		
			L	T	R	L	T	R	L	T	R	L	T	R
2018 Ex	Delay*	35	21	32	6	22	31		42	51		29	55	6
	LOS	D	C	C	A	C	C		D	D		C	E	A
2035 Baseline	Delay*	39	27	40	9	26	41		68	41		24	58	10
	LOS	D	C	D	A	C	D		E	D		C	E	B

*The unit for Vehicle Delay is second/vehicle.

5. Alternatives Analysis

5.1 Alternative Descriptions

Two alternatives were considered at this location. Alternative 1 lengthened the existing 140th Avenue NE southbound right turn pocket at NE 8th by extending it further north. Alternative 2 added an additional southbound lane through the intersection by converting the southbound right turn pocket to a through/right lane, and providing an additional receiving lane on 140th Avenue NE south of NE 8th. Both alternatives would require additional right of way and impact adjacent properties.

For Alternative 1, the lengthening of the existing southbound right-turn pocket in front of the Bellevue Heights apartments would require additional right of way from that property, but the majority of improvements and property needs would be on the next parcel north, an office building. There would be impacts to their landscaped frontage and an existing swale (most likely a bioswale drainage facility) would be impacted. There are anticipated impacts to the head in parking along the frontage of the office building. The stalls could likely remain if a short wall is constructed between the parking and back of sidewalk, but the parking stalls at a minimum would need to be shortened to become compact stalls. The alternative 1 concept is depicted in Figure 6.

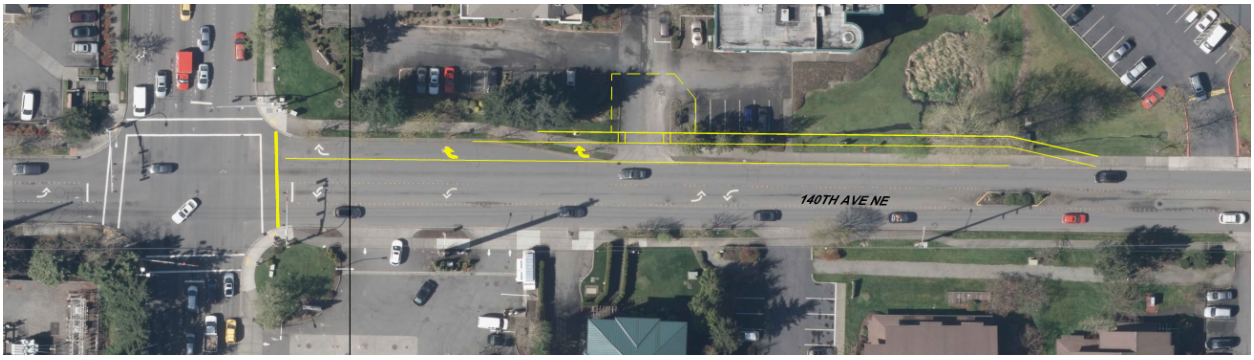


Figure 6. Alternative 1 Layout

For Alternative 2, 140th Avenue NE south of NE 8th would be widened into the existing landscape frontage of a commercial-retail property (Walgreens) as well as a church south of that parcel (Bellevue Neighborhood Church) to provide this additional receiving lane. The southbound right turn pocket would be converted into a shared through-right lane and widen south of the intersection to add a receiving lane on the south-leg of the intersection. The roadway widening needed to accommodate the additional receiving lane would involve a short retaining wall to retain the Walgreens parking lot. The stalls facing 140th Avenue NE along this retaining wall would most likely need to be shortened to be compact stalls, but the number and configuration of parking stalls should remain the same. The driveway location could also remain as-is, but would need to be reconstructed with a steeper grade. Along the church frontage, the widening would result in a decrease in landscaped area between the back of sidewalk and the drive aisle/fire lane and would also impact an existing walled bioswale that would need to be replaced with another form of stormwater quality treatment. The existing church

driveway would also need reconstruction, although the grade change will be minimal. The Alternative 2 concept is depicted in Figure 7 below.

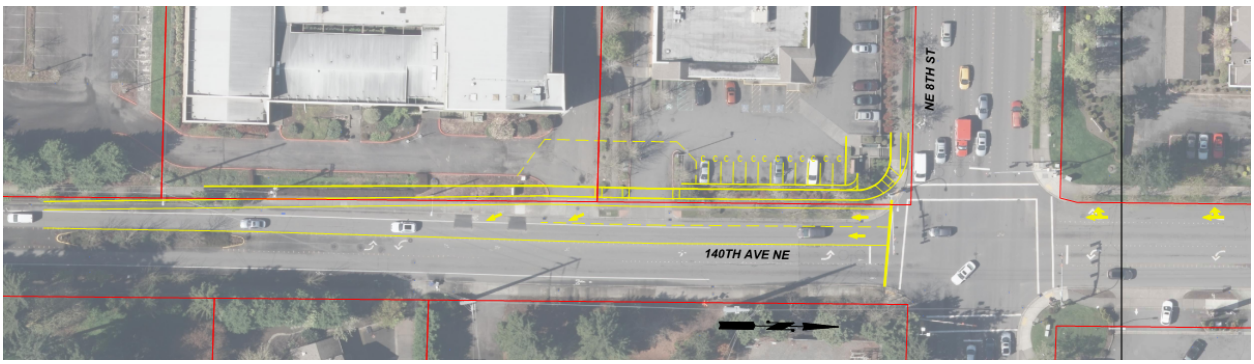


Figure 7. Alternative 2 Concept

5.2 Alternatives Analysis

5.2.1 Traffic Analysis Results

Table 7 and Table 8 provide a summary of the alternatives analysis for the overall intersection delay and LOS. For the southbound through movement, the table also includes the 95th percentile queue. The detailed alternative analysis results can be found in Appendix D.

Alternative 1 would provide a slight improvement to the 2035 baseline. During the AM peak hour, both the intersection and the southbound through movement delay would decrease by 1 second and both would remain at the same LOS as compared to existing. The southbound through 95th percentile queue would decrease slightly (approximately 25 feet). During the PM peak hour, the intersection delay would decrease by 1 second and the southbound through movement delay would decrease by 2 seconds with the LOS remaining the same. The southbound through 95th percentile queue would reduce by approximately 7 feet.

Alternative 2 would provide greater benefit to the intersection operations as compared to Alternative 1. Alternative 2 would reduce the overall intersection delay, delay for the select southbound through movement, and the 95th percentile queue length as compared to the 2035 baseline results for both AM and PM peak hours. During the AM peak hour, the intersection delay would decrease by 3 seconds with the LOS remaining the same. The southbound through movement delay would decrease by 6 seconds and improve the LOS from D to C with an approximate 165-foot reduction in the 95th percentile queue (nearly a 50% reduction). During the PM peak hour, the intersection delay would decrease by 5 seconds and the LOS would improve from D to C. The southbound through movement delay would decrease by 6 seconds and LOS would improve from E to D with an approximate 260-foot reduction in the 95th percentile queue length (nearly a 50% reduction).

Table 7. AM Alternative Analysis Results

Scenario		Intersection	Eastbound			Westbound			Northbound			Southbound		
			L	T	R	L	T	R	L	T	R	L	T	R
2018 Ex	Delay*	35	28	33	4	23	38		23	53		36	37	5
	LOS	D	C	C	A	C	D		C	D		D	D	A
	95th Queue†											146	300	22
2035 Baseline	Delay*	38	38	37	4	26	46		26	55		41	39	7
	LOS	D	D	D	A	C	D		C	E		D	D	A
	95th Queue†											166	357	33
2035 Alt 1	Delay*	37	37	33	3	26	44		27	53		44	38	6
	LOS	D	D	C	A	C	D		C	D		D	D	A
	95th Queue†											165	332	29
2035 Alt 2	Delay*	35	34	34	4	24	42		26	48		50	31	
	LOS	D	C	C	A	C	D		C	D		D	C	
	95th Queue†											166	190	

*The unit for Vehicle Delay is second/vehicle.
†The unit for 95th percentile queue is feet.

Table 8. PM Alternative Analysis Results

Scenario		Intersection	Eastbound			Westbound			Northbound			Southbound		
			L	T	R	L	T	R	L	T	R	L	T	R
2018 Ex	Delay*	35	21	32	6	22	31		42	51		29	55	6
	LOS	D	C	C	A	C	C		D	D		C	E	A
	95th Queue†											95	491	28
2035 Baseline	Delay*	39	27	40	9	26	41		68	41		24	58	10
	LOS	D	C	D	A	C	D		E	D		C	E	B
	95th Queue†											99	577	50
2035 Alt 1	Delay*	38	31	39	11	42	40		60	35		22	56	2
	LOS	D	C	D	B	D	D		E	D		C	E	A
	95th Queue†											91	570	14
2035 Alt 2	Delay*	34	21	29	7	27	31		49	47		34	52	
	LOS	C	C	C	A	C	C		D	D		C	D	
	95th Queue†											107	316	

*The unit for Vehicle Delay is second/vehicle.
†The unit for 95th percentile queue is feet.

The model results demonstrate that Alternative 2 provides greater operational benefit because it adds more capacity to the southbound through movement by converting the existing right turn lane to the through/right lane, and adding a second southbound through/merge lane along 140th Avenue NE. Although the southbound right turn pocket extension included in the Alternative 1 would allow the right

turn vehicles to enter the turn pocket earlier and bypass the southbound through traffic queue, it doesn't provide as much capacity to the southbound through movement as that of Alternative 2.

Alternative 1 and Alternative 2 improvements were combined into one model and tested during the preliminary stages of this analysis. The purpose was to determine if a third alternative would have even greater benefit than Alternative 2 alone, and be worthy of developing further. The cursory model results revealed that a combined (Alternative 1 and Alternative 2) third alternative would offer no significant operational improvements as compared to Alternative 2; therefore, the alternative was not developed further.

5.2.2 Multi Modal Level of Service (MMLOS) Evaluation

Policy TR-40 in the Bellevue Comprehensive Plan states that the City should establish multimodal level of service standards. In April 2017, the Bellevue Transportation Commission recommended multimodal metrics, standards, and guidelines to evaluate the performance of vehicle, pedestrian, bicycle, and transit modes. Table 9 provides a summary of the MMLOS impacts across the 2035 Baseline and two alternatives as compared to the 2018 existing condition.

Table 9. Project MMLOS Evaluation

Mode	No Build	Alternative 1	Alternative 2
Vehicle	Does Not Improve	Improves	Improves
Transit	Does Not Improve	Improves	Improves
Bike	Does Not Improve		
Pedestrian	Does Not Improve		

Vehicle Mode

Under MMLOS guidelines, vehicle LOS is evaluated based on the intersection volume to capacity (V/C) ratio. Table 10 provides a summary of the intersection V/C Ratio based on the Synchro model HCM report. The V/C ratio is higher in the 2035 baseline conditions, as expected, due to the increase in volumes at the intersection under future conditions. The Alternative 1 condition would yield the same V/C ratio as 2035 baseline as the alternative does not properly address the congestion at this intersection. Based on the analysis, the V/C ratio would decrease under Alternative 2.

Table 10. Intersection V/C ratio

Scenario	AM	PM
2018 Existing	0.70	0.59
2035 Baseline	0.79	0.75
2035 Alt 1	0.79	0.75
2035 Alt 2	0.77	0.65

Transit Mode

King County Metro RapidRide B Line travels eastbound/westbound through this intersection and has a pair of stops just downstream (far side) of the intersection on NE 8th Street. Route 889 also travels northbound/southbound through the intersection and has stops in the range of 900 ft to 400 ft north

and south of the intersection, respectively. This route serves Sammamish High School and the International School and runs one trip per AM and PM on weekdays.

Transit speed LOS will be negatively impacted as a result of the vehicle delay increase in the 2035 Baseline if no intersection improvements are made. Under alternative 1, transit speed LOS would remain unchanged as the delay is not properly addressed with the alternative. Under Alternative 2, transit speed LOS would improve as a result of the reduction in vehicle delay for the bus movements. The Route 889 stop location south of the intersection would need to be adjusted under Alternative 2, while the stop north of the intersection would not be impacted by the project. There would be no impact to transit stop LOS as existing transit stop amenities will be maintained or relocated under the alternatives.

Bike and Pedestrian Mode

Bike LOS will remain the same under the 2035 Baseline and both alternatives because the existing bike facilities will be maintained under each alternative. The pedestrian LOS would be reduced due to the loss of the plater between the sidewalk and the curb on the west side of 140th Avenue NE south of the intersection.

5.3 Alternatives Comparison

A summary of the alternative comparison is presented in Table 11.

Table 11. Alternatives Analysis Comparison

2035 Baseline	Alternative 1 – Lengthening Southbound Right turn pocket	Alternative 2 – Convert Right turn pocket to through/right and create receiving lane
Traffic Operations		
AM LOS: D AM V/C: 0.79 PM LOS: D PM V/C: 0.75 Significant delay and critical movements operating over capacity contributing to spillback queues	AM LOS: D AM V/C: 0.79 PM LOS: D PM V/C: 0.75 Significant delay with slightly improved operations by increasing the SB right turn storage	AM LOS: D AM V/C: 0.77 PM LOS: C PM V/C: 0.65 Improved operations by expanding the SB through capacity at the intersection
Traffic Safety		
Collision rates are anticipated to be unchanged or higher	Collision rates are anticipated to be unchanged	Collision rates may decrease as vehicle queuing is improved, reducing the frequency of spillback queues

Table 11 [Continued]. Alternatives Analysis Comparison

2035 Baseline	Alternative 1 – Lengthening Southbound Right turn pocket	Alternative 2 – Convert Right turn pocket to through/right and create receiving lane
Multi-Modal Impacts		
Lower transit speeds due to increased intersection delay Same level of transit amenities No change to existing pedestrian and bicycle conditions	Potentially higher transit speeds due to slightly decreased intersection delay Same level of transit amenities No change to existing pedestrian and bicycle conditions	Likely higher transit speeds due to decreased intersection delay Same level of transit amenities No change to existing bicycle conditions. Planter strip would be lost due to widening on the south leg, west side of 140th Avenue NE
Right-of-Way		
None	Sidewalk easement or ROW acquisition needed	Sidewalk easement or ROW acquisition needed. Could compromise some existing parking stalls.
Stormwater Impacts		
None	Existing private water quality treatment facility likely impacted and would need replacement.	Existing private water quality treatment facility (walled bioswale) impacted and would need replacement.
Utility Impacts		
None	Luminaire relocation	Luminaire relocation, water meter lowering
Environmental Impacts		
None	Minimal impacts – street tree removal	Minimal impacts – street tree removal
Construction Costs		
None	Not estimated due to lack of traffic operational benefit	$1,600,000

6. Recommendation

Based on the traffic analysis, the recommended alternative is Alternative 2, the conversion of southbound right turn pocket into through-right lane and the introduction of a second southbound receiving/merge lane along the 140th Avenue NE south of NE 8th St. Figure 8 below illustrates the preferred alternative. This alternative adds a southbound receiving lane to 140th Avenue NE south of the intersection. The proposed lane is approximately 500 feet in length including the merge taper. The existing southbound right turn pocket on 140th Avenue NE is modified to a through and right turn lane

to accommodate the additional southbound lane through the intersection. The existing traffic signal pole on the southwest corner of the intersection will be replaced in a new location to accommodate the widening. The proposed work results in widening of 140th Avenue NE approximately 7 feet to the west. The following sections provide a discussion of the challenges and risks associated with this proposed alternative.

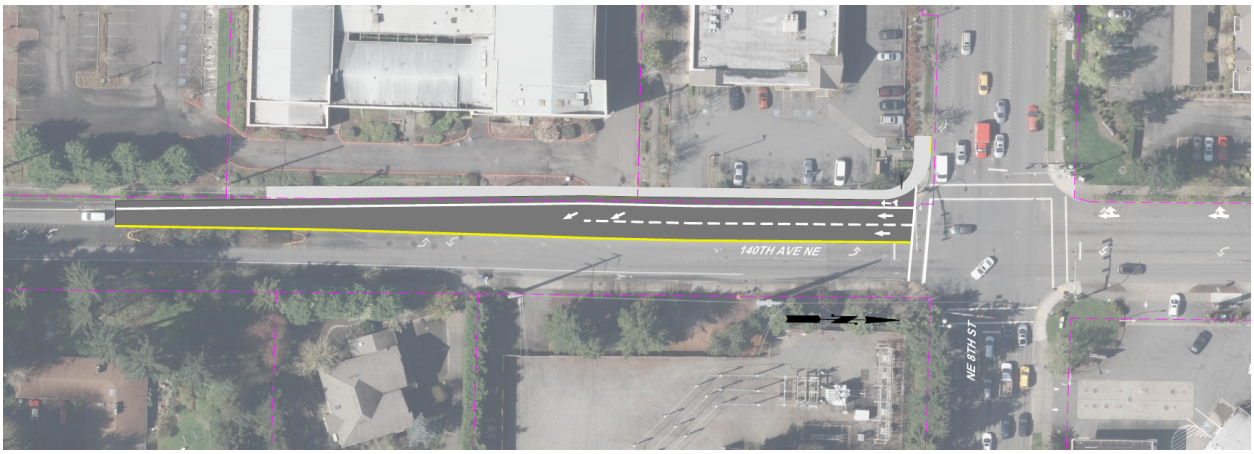


Figure 8 Preferred Alternative - Southbound Receiving and Merge Lane

7. Construction Challenges and Risks

This alternative adds a southbound receiving lane to 140th Avenue NE south of the intersection. The proposed lane is approximately 500 feet in length including the merge taper. The existing southbound right turn pocket on 140th Avenue NE is modified to a through and right turn lane to accommodate the additional southbound lane through the intersection. The existing traffic signal pole on the southwest corner of the intersection will be replaced in a new location to accommodate the widening. The proposed work results in widening of 140th Avenue NE approximately 7 feet to the west. The following sections provide a discussion of the challenges and risks associated with this proposed alternative.

The widening results in the relocation and replacement of the existing gravity block wall between the elevated parking lot of Walgreens and the sidewalk along the 140th Avenue NE. The existing staircase from Walgreens to the existing 140th Avenue NE sidewalk will be impacted and should likely eliminated for safety reasons due to the close proximity of stair landing and roadway. The recommendation is to eliminate this staircase and preserve the existing staircase to NE 8th St. The Walgreens parking stall length nearest to 140th Avenue NE will be reduced by approximately 2 feet. In order to accommodate the reduction in length, the parking lot stalls along the 140th Avenue NE frontage could be modified to be compact stalls and still appear to meet parking aisle and stall dimensions required by the Bellevue Land Use Code. The ADA parking stalls near the Walgreens entrance will not be impacted. The driveway accesses on 140th Avenue NE will be reconstructed at a steeper grade, but it appears that it would be within maximum allowable driveway grades.

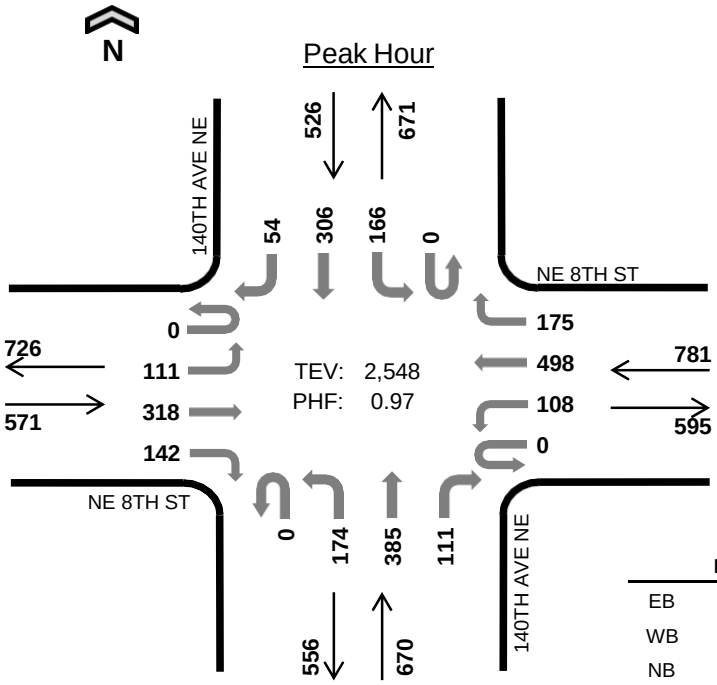
With the proposed widening and shifting of curb and gutter, new storm drainage concrete inlets/catch basins will be needed along the proposed curb line, these will be connected into the existing storm main

in the southbound lane of 140th Avenue NE. There is an existing type II catch basin partially exposed along the Walgreens parking lot, this is a potential control structure and connection point between the on-site drainage system and the public storm drain. This structure would need to be replaced or significantly lowered as part of the roadway widening. This is a potential risk if it is not feasible to adjust; a survey will be required to confirm. Worst case, the elevations could be maintained but it could be relocated further west into the private property which would involve impacts to a private drainage system. A survey would be needed of the public and private storm drains along this frontage to complete the assessment of this potential risk. Another smaller project cost risk would be the lowering of the water meter vault to match the proposed grades at the replaced Walgreens driveway access on 140th Avenue NE. The water meter inside the vault may not be deep enough to allow the extent of lowering expected and the water line and meter itself may need to be lowered. The largest project risk is further south along the church property. There is an existing walled bioswale facility, most likely for water quality purpose, just behind the 140th Avenue NE sidewalk along the church frontage. The runoff from the Cedar Park Christian International School parking lot is collected into an underground detention facility and is discharged into the public storm drain system after receiving treatment at this walled bioswale facility. The roadway widening will conflict with this water quality facility, thus it will need to be replaced. The recommendation is to replace the walled bioswale with an underground stormwater treatment vault like a Filterra unit or Modular Wetland System which contains a biofiltration media as approved by DOE for enhanced treatment. The drainage report for the church development project would be needed to determine the water quality flow rate downstream of the detention to further size the stormwater treatment vault and a survey would be needed of the private storm drains along this frontage to design the inlet and outlet pipe connections to the vault, which would help determine the depth and configuration of the vault. Costs were included for this water quality system replacement.

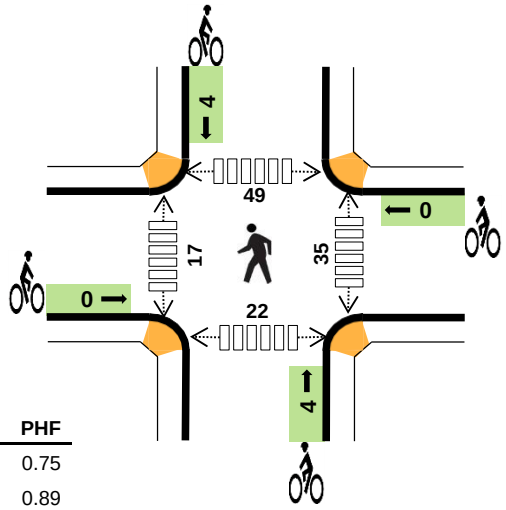
See Appendix E for the proposed concept plan and Appendix F for the planning level cost estimate.

Appendix A – Two Hour AM & PM Peak Turning Movement Counts

140TH AVE NE
NE 8TH ST



Date: Tue, Oct 16, 2018
Count Period: 7:30 AM to 9:30 AM
Peak Hour: 7:45 AM to 8:45 AM



	HV %:	PHF
EB	3.7%	0.75
WB	4.4%	0.89
NB	0.9%	0.96
SB	2.1%	0.85
TOTAL	2.8%	0.97

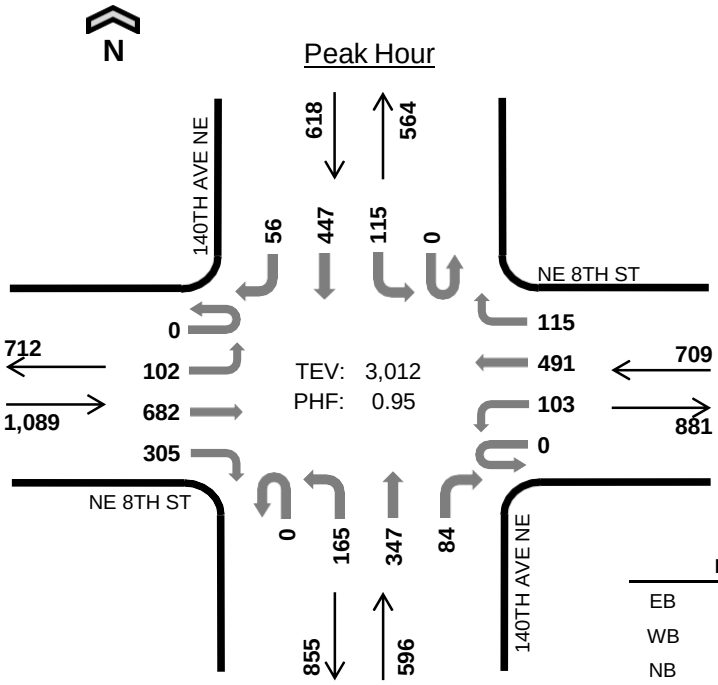
Two-Hour Count Summaries

Interval Start	NE 8TH ST Eastbound				NE 8TH ST Westbound				140TH AVE NE Northbound				140TH AVE NE Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:30 AM	0	15	46	26	0	23	86	31	0	41	82	16	0	28	57	5	456	0
7:45 AM	**0**	**24**	**75**	**46**	**0**	**24**	**125**	**39**	**0**	**45**	**99**	**19**	**0**	**61**	**74**	**20**	**651**	0
8:00 AM	**0**	**18**	**60**	**25**	**0**	**28**	**125**	**66**	**0**	**38**	**93**	**39**	**0**	**52**	**71**	**8**	**623**	0
8:15 AM	**0**	**43**	**114**	**33**	**0**	**38**	**114**	**31**	**0**	**44**	**84**	**34**	**0**	**37**	**79**	**7**	**658**	2,388
8:30 AM	**0**	**26**	**69**	**38**	**0**	**18**	**134**	**39**	**0**	**47**	**109**	**19**	**0**	**16**	**82**	**19**	**616**	**2,548**
8:45 AM	0	49	93	34	0	9	134	14	0	50	130	14	0	19	76	18	640	2,537
9:00 AM	0	16	70	30	0	8	104	17	0	51	120	8	0	18	79	18	539	2,453
9:15 AM	0	26	80	34	0	9	132	18	0	33	99	10	0	20	71	17	549	2,344
Count Total	0	217	607	266	0	157	954	255	0	349	816	159	0	251	589	112	4,732	0
Peak Hour	**0**	**111**	**318**	**142**	**0**	**108**	**498**	**175**	**0**	**174**	**385**	**111**	**0**	**166**	**306**	**54**	**2,548**	**0**

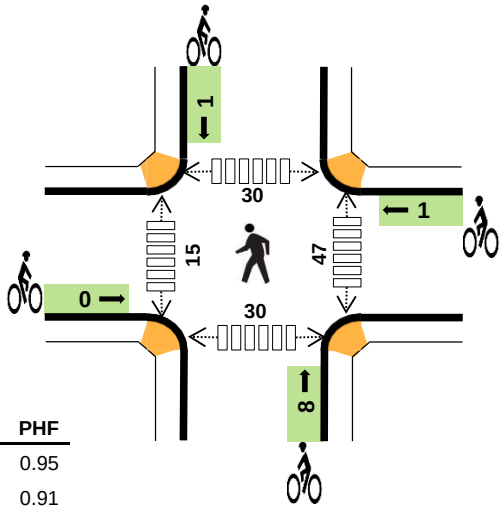
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:30 AM	4	2	5	5	*16*	0	0	1	2	*3*	6	3	9	1	*19*
7:45 AM	**4**	**7**	**1**	**3**	***15***	**0**	**0**	**1**	**1**	***2***	**9**	**6**	**21**	**8**	*44*
8:00 AM	**2**	**5**	**1**	**2**	***10***	**0**	**0**	**0**	**0**	***0***	**12**	**4**	**16**	**2**	*34*
8:15 AM	**6**	**8**	**2**	**5**	***21***	**0**	**0**	**2**	**1**	***3***	**9**	**3**	**9**	**11**	*32*
8:30 AM	**9**	**14**	**2**	**1**	***26***	**0**	**0**	**1**	**2**	***3***	**5**	**4**	**3**	**1**	***13***
8:45 AM	4	8	3	2	*17*	0	0	2	0	*2*	2	7	8	1	*18*
9:00 AM	3	4	4	2	*13*	0	0	1	2	*3*	0	4	2	1	*7*
9:15 AM	1	9	2	3	*15*	0	1	0	1	*2*	6	8	4	2	*20*
Count Total	33	57	20	23	*133*	0	1	8	9	*18*	49	39	72	27	*187*
Peak Hour	**21**	**34**	**6**	**11**	***72***	**0**	**0**	**4**	**4**	***8***	**35**	**17**	**49**	**22**	***123***

140TH AVE NE
NE 8TH ST



Date: Tue, Oct 16, 2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 5:00 PM to 6:00 PM



	HV %:	PHF
EB	0.6%	0.95
WB	1.8%	0.91
NB	0.7%	0.95
SB	0.8%	0.94
TOTAL	1.0%	0.95

Two-Hour Count Summaries

Interval Start	NE 8TH ST Eastbound				NE 8TH ST Westbound				140TH AVE NE Northbound				140TH AVE NE Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	20	144	72	0	26	126	32	0	33	77	25	0	21	115	11	702	0
4:15 PM	0	22	130	69	0	36	115	31	0	31	73	18	0	27	140	11	703	0
4:30 PM	0	25	155	76	0	24	99	28	0	29	86	24	0	31	139	16	732	0
4:45 PM	0	20	131	85	0	20	115	41	0	42	96	24	0	30	118	14	736	2,873
5:00 PM	**0**	**20**	**160**	**84**	**0**	**30**	**98**	**31**	**0**	**39**	**74**	**22**	**0**	**29**	**112**	**14**	**713**	2,884
5:15 PM	**0**	**32**	**157**	**85**	**0**	**38**	**114**	**25**	**0**	**36**	**99**	**18**	**0**	**25**	**106**	**16**	**751**	2,932
5:30 PM	**0**	**29**	**167**	**69**	**0**	**15**	**135**	**28**	**0**	**43**	**91**	**17**	**0**	**32**	**116**	**17**	**759**	2,959
5:45 PM	**0**	**21**	**198**	**67**	**0**	**20**	**144**	**31**	**0**	**47**	**83**	**27**	**0**	**29**	**113**	**9**	**789**	**3,012**
Count Total	0	189	1,242	607	0	209	946	247	0	300	679	175	0	224	959	108	5,885	0
Peak Hour	**0**	**102**	**682**	**305**	**0**	**103**	**491**	**115**	**0**	**165**	**347**	**84**	**0**	**115**	**447**	**56**	**3,012**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	4	5	3	0	*12*	0	0	1	4	*5*	9	11	8	7	*35*
4:15 PM	3	10	3	0	*16*	0	0	0	1	*1*	1	3	2	3	*9*
4:30 PM	6	2	0	5	*13*	0	0	1	2	*3*	6	12	7	3	*28*
4:45 PM	4	3	0	2	*9*	0	0	1	1	*2*	11	10	7	5	*33*
5:00 PM	**1**	**3**	**1**	**2**	***7***	**0**	**0**	**0**	**0**	***0***	**10**	**5**	**5**	**6**	*26*
5:15 PM	**2**	**3**	**0**	**0**	***5***	**0**	**0**	**0**	**0**	***0***	**14**	**1**	**4**	**9**	*28*
5:30 PM	**2**	**2**	**1**	**3**	***8***	**0**	**1**	**6**	**0**	***7***	**8**	**7**	**9**	**6**	*30*
5:45 PM	**2**	**5**	**2**	**0**	***9***	**0**	**0**	**2**	**1**	***3***	**15**	**2**	**12**	**9**	***38***
Count Total	24	33	10	12	*79*	0	1	11	9	*21*	74	51	54	48	*227*
Peak Hour	**7**	**13**	**4**	**5**	***29***	**0**	**1**	**8**	**1**	***10***	**47**	**15**	**30**	**30**	***122***

Appendix B – SCATS Historical Average Signal Timing Card

140th Ave NE and NE 8th St

HISTORICAL SCATS AVERAGE - Oct 16th, 2018

Stage	Phases	AM	PM
A	2 & 6	40	41
B	TSP		
C	3 & 7	25	23
D	4 & 8	47	51
E	TSP		
F	1 & 5	18	25

Cycle Length 130 140

Offsets
Reference point is from End of A
It is the master intersection for this area, no offset plans

Notes
Ignore TSP stage (early green and green extension)

Walk times

	1	2	3	4	5	6	7	8
Delay	0	0	0	0	0	0	0	0
Walk time	0	5.0	0	5.0	0	5.0	0	5.0
Clearance 1	0	12	0	12	0	11	0	17
Clearance 2	0	0	0	0	0	0	0	0

Appendix C – Key Design Criteria

City of Bellevue Design Documentation

Created Date: 04-20-2019

CIP No.

Approval Date:

Project Name and Description

Last Revised Date:

Bellevue Spot Improvements-Study Area-1, 140th AVE NE & NE 8th ST - Key Design Criteria

COB ID	Design Element	Standard	Source	Existing/Proposed Condition	Design Exception?	LAG Design Deviation?	LAG Criteria (NALE = Not a LAG Element)	Comments, also refer to WSDOT Design Manual Chapter 1100
1	LANE WIDTH	11 FT Urban areas	AASHTO Geometric Design 4.3	11' lanes			NALE	WSDOT Chapter 1231.
2	No. of Lanes			3 lanes in Existing condition and a southbound merge lane is added in the Proposed condition.			NALE	
3	Bike Lane Width (ft)	Min 5' wide	COB TDM 14	5 feet Proposed bike lane matching the width of the Existing bike lane			NALE	
4	Parking Bay Width (ft)	Meet table 1	COB TDM 3D	N/A			NALE	
5	Drainage Type: Vertical Curb, Curb& Gutter (ft), other	Curb and Gutter use on all public streets	COB TDM 11	Curb and Gutter			NALE	
6	Planting Strip (ft)	4 FT Min	COB TDM 3B	The project requires widening of the existing roadway. The existing planting strip and sidewalk is removed and 6FT sidewalk without planting strip is proposed to minimize property impacts.			1	
7	Sidewalk Width (ft)	6 FT Min	COB TDM 14	The project requires widening of the existing roadway. The existing sidewalk is removed and relocated to accommodate the additional merge lane.			NALE	
8	Medians		COB TDM 8	N/A				
9	Pavement Type	10 IN HMA	COB TDM RC-100-1	10 IN HMA			NALE	Check Geotechnical Report for additional requirements.
10	Bus Route, stops, shelters,pads	N/A		N/A			NALE	
11	DESIGN SPEED						NALE	
12	Posted speed	Existing Ordinance is 30 MPH on 140th Avenue SE and NE from SE 10th Street to NE 24th Street.		Proposed: 30 MPH at the design location on 140th AVENUE NE to match the Existing.			NALE	
13	CROSS SLOPE	2% Lane	WSDOT DM 1250.02	2% Lane			NALE	
14	Design Vehicle	AASHTO SU-30	COB TDM 9	Meets standard			NALE	Check Truck and Bus Routes
15	Thru Lane Alignments Across Intersection	6 FT	WSDOT DM 1310.02(3)	3.9 FT offset between the additional southbound merge lane and the existing right turn pocket modified to through and right lane.			NALE	
16	Left turn lane offset across intersection	6 FT	WSDOT DM 1310.02(3)	0 FT alignment is on a curve			NALE	
17	Intersection Skew Angle	85 to 95 degrees	COB TDM 9C	Existing intersection alignment is not modified.			NALE	AASHTO, city design manual.
18	Corner Radii	Meet design vehicle turn movements	COB TDM 9	Meets standard			NALE	
19	Minimum Curb Return (ft)	30 FT	COB TDM 9C	Proposed curb radius at the southwest corner of the intersectioin is 30 FT and meets standard.			NALE	
20	Taper	300 FT Min	WSDOT DM 1310.03(4)	Meets standard			NALE	
21	Spacing	150 FT to nearest intersection 100 FT from other driveways	COB TDM 5I COB TDM 5H	Driveways to Walgreens and the Neighborhood Church: 1. Proposed driveway separation is 20.5 feet and matches existing. 2. The Proposed driveway is 130 feet from the intersection and is located at the same location as the existing.			NALE	city design manual & AASHTO

Appendix D – Alternative Analysis Result

Bellevue On-Call Levy Task #3 - Alternative Draft Synchro Results - AM Peak - 140th Ave NE & NE 8th St

4/23/2019

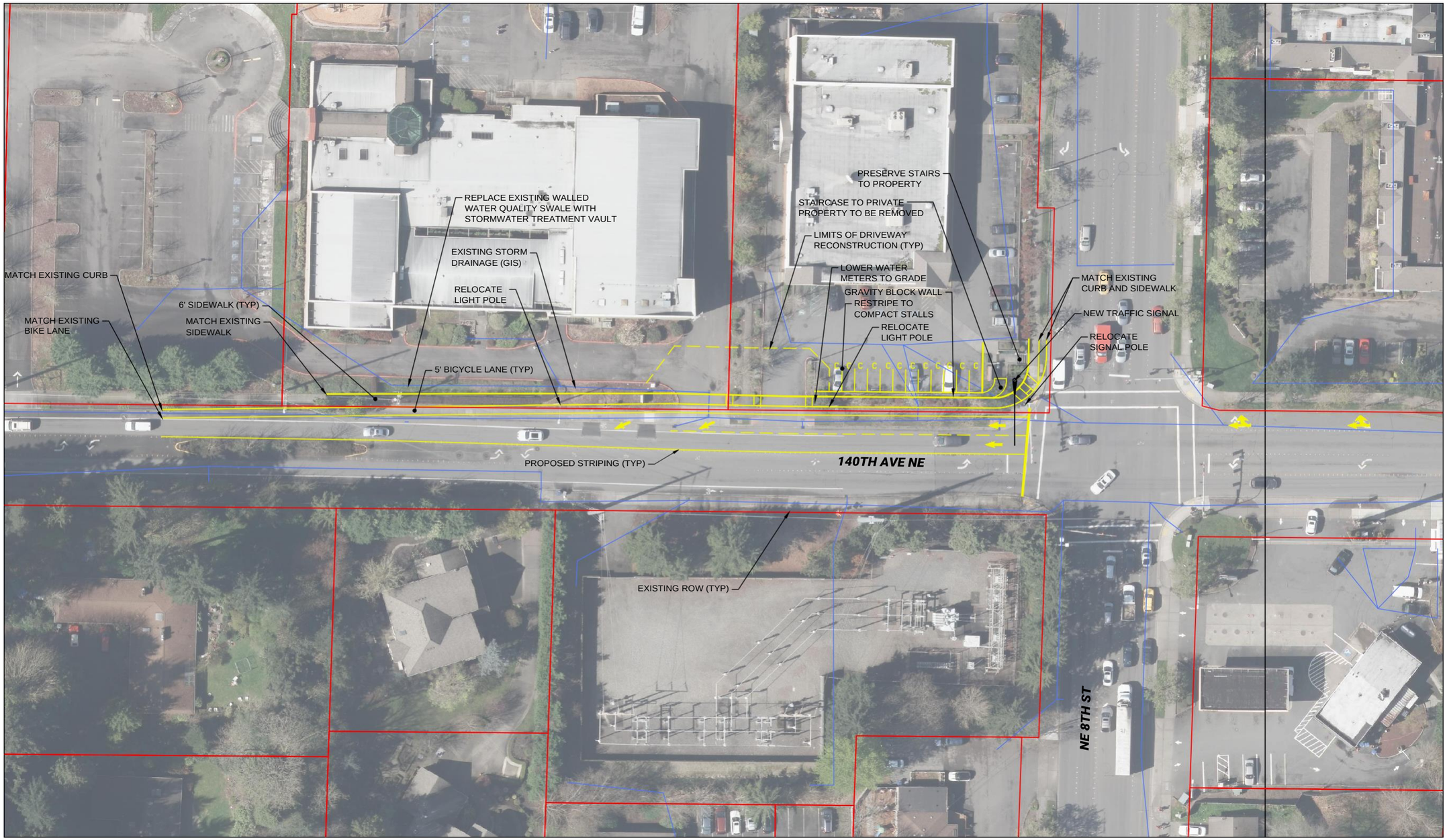
			Existing 2018				No Build 2035				Alt 1 - 2035 - Extend SBR pocket length to 600'				Alt 2 - 2035 - Change SB approach from R,T,L to TR,T,L; - Add a second 300' SB receiving merge lane			
ID	**Intersection**	**Movement**	**Volume**	**Delay (s/veh)**	**LOS**	**95th% Queue Length(ft)**	**Volume**	**Delay (s/veh)**	**LOS**	**95th% Queue Length(ft)**	**Volume**	**Delay (s/veh)**	**LOS**	**95th% Queue Length(ft)**	**Volume**	**Delay (s/veh)**	**LOS**	**95th% Queue Length(ft)**
41	**140th & NE 8th**	EBL	111	28	C	103	130	38	D	118	130	37	D	118	130	34	C	118
		EBT	318	33	C	165	400	37	D	208	400	33	C	194	400	34	C	208
		EBR	142	4	A	20	190	4	A	18	190	3	A	18	190	4	A	18
		WBL	108	23	C	104	120	26	C	115	120	26	C	115	120	24	C	115
		WBT	498	38	D	375	590	46	D	#464	590	44	D	#425	590	42	D	#464
		WBR	175				160				160				160			
		NBL	174	23	C	120	240	26	C	165	240	27	C	165	240	26	C	165
		NBT	385	53	D	532	410	55	E	#652	410	53	D	#579	410	48	D	#652
		NBR	111				130				130				130			
		SBL	166	36	D	146	170	41	D	166	170	44	D	165	170	50	D	166
		SBT	306	37	D	300	340	39	D	357	340	38	D	332	340	31	C	190
		SBR	54	5	A	22	70	7	A	33	70	6	A	29	70			
		Intersection	2548	35	D	-	2950	38	D	-	2950	37	D	-	2950	35	D	-

Bellevue On-Call Levy Task #3 - Alternative Draft Synchro Results - PM Peak - 140th Ave NE & NE 8th St

4/23/2019

			Existing 2018				No Build 2035				Alt 1 - 2035 - Extend SBR pocket length to 600'				Alt 2 - 2035 - Change SB approach from R,T,L to TR,T,L; - Add a second 300' SB receiving merge lane			
ID	Intersection	Movement	Volume	Delay (s/veh)	LOS	95th% Queue Length(ft)	Volume	Delay (s/veh)	LOS	95th% Queue Length(ft)	Volume	Delay (s/veh)	LOS	95th% Queue Length(ft)	Volume	Delay (s/veh)	LOS	95th% Queue Length(ft)
41	140th & NE 8th	EBL	102	21	C	95	120	27	C	110	120	31	C	118	120	21	C	102
		EBT	682	32	C	365	820	40	D	455	820	39	D	446	820	29	C	393
		EBR	305	6	A	91	380	9	A	153	380	11	B	166	380	7	A	143
		WBL	103	22	C	100	90	26	C	89	90	42	D	96	90	27	C	82
		WBT	491	31	C	330	660	41	D	452	660	40	D	435	660	31	C	401
		WBR	115				100				100				100			
		NBL	165	42	D	157	250	68	E	#324	250	60	E	270	250	49	D	248
		NBT	347	51	D	454	330	41	D	428	330	35	D	367	330	47	D	424
		NBR	84				80				80				80			
		SBL	115	29	C	95	120	24	C	99	120	22	C	91	120	34	C	107
		SBT	447	55	E	491	500	58	E	577	500	56	E	570	500	52	D	316
		SBR	56	6	A	28	90	10	B	50	90	2	A	14	90			
		Intersection	3012	35	D	-	3540	39	D	-	3540	38	D	-	3540	34	C	-

Appendix E – Preferred Alternative Concept Plan



NOTES:

1. ALL PROPOSED LANE WIDTHS 11' UNLESS NOTED OTHERWISE.

0 15 30 60
1 inch = 30 feet

10% DESIGN - NOT FOR CONSTRUCTION

NO.	DATE	BY	APPR.	REVISIONS

Approved By

TRANSPORTATION DESIGN MANAGER — DATE

PROJECT MANAGER — DATE

S. RAJAN	3/20/19
DESIGNED BY :	DATE
S. BULL	3/20/19
DRAWN BY :	DATE
J. MATTHEWS	3/20/19
CHECKED BY	DATE

City of Bellevue
Transportation Department

kpff

BELLEVUE SPOT IMPROVEMENTS

STUDY AREA 1
140TH AVE NE & NE 8TH ST
ALTERNATIVE 1

SHT 1 OF 2

Jun 20, 2019 - 3:25pm sbull Z:\1800001-1802999\1800675 COB T03-148th Spot Improvements\CADD\Design\Study Area 1\Study Area 1 - 140th Ave NE and NE 8th St intersection.dwg

Appendix F – Opinion of Probably Cost Summary

OPINION OF PROBABLE COST - SUMMARY
PROJECT: 140TH AND 148TH SPOT IMPROVEMENTS
Study Area 1- 140th AVE NE & NE 8th ST, PREFERRED ALTERNATIVE 1- ADDING A SB MERGE LANE
CIP NO.
DATE: 08/15/19

I. RIGHT OF WAY ACQUISITION & EASEMENT AND REIMBURSEMENT COSTS				**$ 40,000.00**
II. CONSTRUCTION				
1. Grading/Drainage				
2. Structures				
3. Surfacing/Paving				
4. Roadside Development				
5. Traffic Services & Safety				
	$ 519,700			
6. Miscellaneous Items Not Yet Estimated				
20.0% of (Lines 1 through 5) @ 5% Level	*$103,940*		**$ 623,640**	
7. Allowance for 5%-Level Accuracy				
30.0% of (Lines 1 through 6)	*$ 187,092.00*			
8. Mobilization, Survey, Potholing				
15% of (Line 1 through 6)	*$ 93,546.00*			
9. Maintenance of Traffic				
15% of (Line 1 through 6)	*$ 93,546.00*		**$ 997,824**	
10. Construction Engineering				
15.0% of (Lines 1 through 9)	*$ 149,673.60*			
11. Construction Contingency				
10.0% of (Lines 1 through 9)	*$ 99,782.40*			**$ 1,247,280.00**
III. DESIGN ENGINEERING AND CITY COSTS				
1. Design Engineering (Consultant Contract)				
15.0% of (CONSTRUCTION cost not incl contingency)	*$ 172,124.64*			
2. Agency Administration				
10.0% of (CONSTRUCTION cost not incl contingency)	*$ 114,749.76*			
3. Alignment Survey				
2.0% of (CONSTRUCTION cost not incl contingency)	*$ 22,949.95*			
4. Uniformed Police Officers				
	$ -			
TOTAL ESTIMATED COST				**$ 1,597,200.00**

Assumptions:
1. Estimate calculated in 2019 dollars.
2. Estimate is based on 10% Design

*Items not estimated at 10% level assumed cost for these included in items 6 and 7.

kpff
1601 Fifth Avenue, Suite 1600
Seattle, WA 98101
206.622.5822

Preliminary Engineer's Estimate of Probable Cost

Client: City of Bellevue
Project: 140th and 148th Spot Improvements
Title: Study Area 1 - 140th AVE NE & NE 8th ST
Alternative 1 Preferred -SB Merge Lane
By: SGR
Date: 8/15/2019

Study Area 1

ITEM NO.	STD ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	TOTAL COST	% OF CONST
		ROADWAY					
	25	CLEARING AND GRUBBING	0.3	Acre	$40,000	$12,000.00	2.3%
	310	ROADWAY EXCAVATION INCL. HAUL	480	CY	$40.00	$19,200.00	3.7%
	5120	CRUSHED SURFACING TOP COURSE	260	TON	$50.00	$13,000.00	2.5%
	5767	HMA CL 1/2" PG 64-22	520	TON	$200.00	$104,000.00	20.0%
	6700	CEMENT CONC. TRAFFIC CURB AND GUTTER	560	LF	$35.00	$19,600.00	3.8%
	7055	CEMENT CONC. SIDEWALK	330	SY	$70.00	$23,100.00	4.4%
	7058	CEMENT CONC. CURB RAMP TYPE	1	EA	$2,000.00	$2,000.00	0.4%
	SP	FENCING	120	LF	$50.00	$6,000.00	1.2%
		DRAINAGE/UTILITIES					
	3541	SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	200	LF	$50.00	$10,000.00	1.9%
	3091	CATCH BASIN TYPE 1	7	EA	$2,000.00	$14,000.00	2.7%
		CONCRETE INLET	2	EA	$1,000.00	$2,000.00	0.4%
	3105	ADJUST TO GRADE, CATCH BASIN TYPE 2 48 IN. DIAM.	2	EA	$500.00	$1,000.00	0.2%
	SP	RESET WATER METER	1	EA	$5,000.00	$5,000.00	1.0%
	SP	REPLACEMENT OF WATER QUALITY SWALE WITH FILTERRA OR SIMILAR	1	LS	$55,000.00	$55,000.00	10.6%
		STRUCTURE				$0.00	0.0%
	SP	GRAVITY BLOCK WALL	340	SF	$120.00	$40,800.00	7.9%
	SP	CONCRETE STAIRWAY	1	LS	$5,000.00	$5,000.00	1.0%
		ENVIRONMENT					
		EROSION/WATER POLLUTION CONTROL	1	LS	$10,000.00	$10,000.00	1.9%
		SWPPP PREPARATION AND MAINTENANCE	1	LS	$2,000.00	$2,000.00	0.4%
		SPCC PLAN	1	LS	$1,000.00	$1,000.00	0.2%
		TRAFFIC AND ILLUMINATION					0.0%
		PERMANENT SIGNING AND STRIPING	1	LS	$5,000.00	$5,000.00	1.0%
		TRAFFIC SIGNAL	1	LS	$150,000.00	$150,000.00	28.9%
		ILLUMINATION	1	LS	$10,000.00	$10,000.00	1.9%
		LANDSCAPING					
		LANDSCAPE RESTORATION	1	LS	$10,000.00	$10,000.00	1.9%
				Subtotal		**$519,700.00**	

Appendix G– Public Comments and Responses

Question/Comment: I do not see this making any difference in the flow of traffic.

> ***Response:*** *Two alternatives were considered at this location. Alternative 1 lengthened the existing 140th Ave NE southbound right turn pocket at NE 8th St by extending it further north. Alternative 2 (preferred option) converted the southbound right turn pocket into a shared through-right lane and widened south of the intersection to add a receiving lane. Based on the analysis results of these two alternatives, Alternative 2 would provide greater benefit than Alternative 1 by reducing overall intersection delay by allowing more through movement to cross the intersection. Currently, during the afternoon traffic, queue length for the southbound through movement extends beyond the midblock crossing north of the intersection, not allowing the southbound to westbound right-turn vehicle to enter onto the existing right-turn pocket. When there is congestion, having a second lane through the intersection helps push more vehicles through the intersection. We see this at locations such as southbound at the 140th Ave NE / Bel-Red Rd intersection, and northbound at the i112th Ave NE / NE 12th St intersection where people must merge soon after the intersection. During the peak hours, we've observed using city's cameras at the intersections, roughly a third of people use the curb lane and merge.*

Question/Comment: I'm not certain how many cars, based on today's behavior, would actually use the expanded lane.

> ***Response:*** *We have recently observed two similar intersections where people must merge soon after the intersection: 1) southbound at the 140th Ave NE / Bel-Red Rd intersection; and 2) northbound at the 112th Ave NE / NE 12th St intersection. During the peak hours, we've observed using city's cameras at the intersections, roughly a third of people use the curb lane and merge.*

Question/Comment: *With a receiving lane there, I would worry about cars suddenly slowing down/stopping in order to make the right turn (often times signaling late or not at all) while the cars behind are focused on the upcoming merge.*

> ***Response:*** *The layout of the proposed option is similar to the intersections mentioned above. In both cases, there are driveways just past the intersection or in the merge area. When we reviewed the collision history at these locations, there were not rear end collisions related to the driveways. Additionally, our proposal actually has two full lanes across Walgreens and Bellevue Neighborhood Church, then the merge taper begins.*

Question/Comment: I wonder if you would get good benefit from deepening the right and left-turn pockets on the north side of NE 8th.

Response: *Two alternatives were considered at this location. Alternative 1 lengthened the existing 140th Ave NE southbound right turn pocket at NE 8th St by extending it further north. Alternative 2 (preferred option) converted the southbound right turn pocket into a shared through-right lane and widened south of the intersection to add a receiving lane. Based on the analysis results of these two alternatives, Alternative 2 would provide greater benefit than Alternative 1 by reducing overall intersection delay by allowing more through movement to cross the intersection. Currently, during the afternoon traffic, queue length for the southbound through movement extends beyond the midblock crossing north of the intersection, not allowing the southbound to westbound right-turn vehicle to enter onto the existing right-turn pocket. When there is congestion, having a second lane through the intersection helps push more vehicles through the intersection.*

Question/Comment: This looks like a good idea, except the two southbound lanes will have to merge back into one lane, and traffic and could still back up across the intersection. You need to add the second southbound lane until at least Main Street, where many of the cars will turn left. (Maybe make the left lane be a left turn only lane at Main and the new lane continues straight on the existing lane.) Otherwise there will be new problems and possible accidents caused by merging back into one lane. It is a bad idea to allow one lane to split to two, and then make the cars squeeze back into one lane. It just moves the problem down the road!

Response: *In regard to extending the new southbound lane to Main St or beyond – Yes, this would definitely increase the capacity of 140th Ave but was not considered within the scope of this congestion reduction study, particularly since it would significantly impact adjacent properties (lots of right of way acquisition).*

Question/Comment: This intersection could be more efficient if the left turns were synchronized – north south already is, largely, but east-west are often cycled in opposition which makes no sense and needlessly delays all east-west traffic. Having opposing left turn lanes go green simultaneously allows more vehicles through the intersection and clears the left turn lanes most effectively. This odd signalization is rather common in Bellevue though I see it almost nowhere else. No one else signalizes one left turn at a time, leaving the large majority of traffic sitting quite still. Improving southbound congestion at this intersection could be helped by removing the southernmost median island and extending the left turn lane. Odds are that a significant portion of the traffic on this segment of 140th (NE 8th to Bel-Red), is also avoiding the chaos of Spring District and other nearby construction and detours.

Response: *Unsynchronized left turns – I understand what you are referring to, which is that at some locations, the left turn phases both come at the same time before the through movements whereas at other locations, one left turn direction comes up before and the other direction comes up after (we call this leading and lagging left turns). We do this to coordinate the traffic signals along a corridor and to have progression in both directions. This is something that is difficult to explain with just words; thus, I have attached a document that pulls some information and diagrams from the Federal Highway Administration's Traffic Signal Timing Manual. Leading and lagging the left turns increases the bandwidth in the two different directions on a road so we may fully*

utilize the green time. Additionally, it doesn't necessarily impact the amount of green time allotted to the left turn movement, just when the movement is served.

Question/Comment: Please do not sacrifice the middle turn lane space on 140th Avenue.

Response: *The proposed alternative and other alternatives considered will maintain a two-way left-turn lane (middle turn lane) on 140th Avenue.*

Question/Comment: Must keep right turn (south) green light or crosswalk traffic may conflict with efficient and safe car movement.

Response: *Signal phasing will be adjusted/modified to ensure the pedestrians can safely cross the intersections.*

Question/Comment: Getting into Walgreens from 140th northbound will most likely become impossible.

Response: *A two-way left-turn lane and northbound left-turn lane will remain as-is. Therefore, just like you would find a gap to cross two lanes on 140th Ave NE to NE 15th Ct (AVID Apartments/Condominium) located just south of Bel-Rd Rd, you would do the same to enter Walgreens from 140th Ave northbound.*