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August 29, 2012

Mayor Fred McConkey
Town of Hunts Point
3000 Hunts Point Road
Hunts Point, WA 98004

Subject: Local Traffic Circulation and Access Review

Dear Fred:

This letter is in reference to your request to review local traffic circulation and access concerns in the vicinity of the 84th Avenue NE and 92nd Avenue NE interchanges if vehicle queuing and congestion is observed after completion of the SR 520 Eastside Transit and HOV Project. We have summarized our understanding of the concerns, and have prepared some responses and potential options for consideration if the concerns were to materialize in the future.

Summary of Concerns

There were three primary concerns related to local circulation and access that we focused on. Our understanding of the concerns are as follows:

1. **Points Drive Channelization and Access:** Once the SR 520 project is complete, including the completion of a new roundabout at the 84th Avenue NE interchange, there is a concern that access to adjoining properties and side streets along Points Drive, such as Hawthorne Court (85th Place NE) and 86th Avenue NE, will be difficult should vehicle queues extend from SR 520 and beyond. In general, the community is concerned if such congestion along the freeway were to occur and cause back-ups on the local street system, the channelization and signage plans along Points Drive would not allow local residents to freely enter or exit the corridor under such conditions.

2. **92nd Avenue NE Interchange Operations:** The Yarrow Point Town Council adopted Resolution No. 304 that required staff to work with WSDOT and the design-build contractor to install a stop sign at the end of the SR 520 westbound off-ramp to 92nd Avenue NE. In general, the Council is concerned that WSDOT has not satisfactorily addressed or remedied their concerns related to pedestrian and bicycle safety and vehicle egress from their community. The roundabout design for the intersection requires vehicles to yield to other vehicles or bicyclists that are within the roundabout, or a pedestrian who is using the crosswalk, but not require every vehicle to stop. There is concern that pedestrian and bicycle safety will be compromised as vehicles exiting the freeway are only required to yield, and that residents trying to exit the Yarrow Point community will experience increased delays because they will need to yield to traffic exiting the off-ramp.

3. **84th Avenue NE Interchange Operations:** There is concern that if vehicle back-ups on SR 520 occur, the roundabout will become gridlocked and prevent local traffic circulation and access to and from the Town of Hunts Point.

Given those three concerns, we have summarized our understanding of how WSDOT intends to address each situation, but have also provided our independent thoughts on each subject along with some potential options that could be implemented assuming issues were to arise after completion of the SR 520 project.

WSDOT's Design Approach and/or Response

The traffic analysis completed by WSDOT and its design-build contractor has indicated that, on average, no significant back-ups onto the local street system from SR 520 are expected to occur after completion of the improvements. The operational analysis[1] supporting the local street design configuration summarized the operational characteristics of both interchanges and identified the pavement markings being implemented on the adjoining local streets. All intersections are expected to operate at LOS C or better under 2014 year of opening and future 2030 conditions indicating that local access and circulation would operate acceptable without significant queuing or back-ups based on the current design.

84th Avenue NE Interchange

Based on your conversations with WSDOT, we understand that specific measures have been integrated into the design of the 84th Avenue NE interchange to address the concerns that have been raised regarding local access. In particular, we understand that WSDOT will be providing signage and striping on Points Drive in front of Hawthorne Court, which will include 'Do Not Block' pavement cross-hatching and signage. The signage and striping improvements are intended to provide adjoining residents the ability to make northbound left-turns from Hawthorne Court onto Points Drive to access the 84th Avenue NE roundabout and SR 520.

It is also our understanding that WSDOT will designate the outside westbound lane along Points Drive as a high occupancy vehicle (HOV) and local access lane (for Hunts Point residents), and the inside lane as a general purpose lane. This understanding is based on specific conversations you had with WSDOT, however no design plans have been received that identify the specific signing and striping to be implemented along Points Drive.

In addition to the above design measures, it is our understanding the ramp meter on the westbound on-ramp to SR 520 from 84th Avenue NE will include advanced queue detection for the general purpose lane. The advanced detection will allow the ramp meter to automatically adjust the vehicle processing speed to prevent vehicles from backing into the roundabout. This is a common feature when WSDOT installs ramp meters on on-ramps.

92nd Avenue NE Interchange

We have not seen any additional material submitted by WSDOT that directly addresses or responds to the concerns raised by the Town of Yarrow Point. The existing design plans do not incorporate any stop sign control at the proposed roundabout at the westbound off-ramp intersection. We do

[1] SR 520 Eastside Transit and HOV Project Local Street Traffic Operations Report, January 17, 2012, Karl Westby.

understand from you that installing conduit throughout the roundabout for potential future signalization has been discussed and is currently being considered by WSDOT.

84th Avenue NE Interchange Improvements

It is important that WSDOT provide the striping and signing plans for the roundabout and Points Drive. The signing and striping plans must allow Hunts Point residents the use of the HOV lane as was previously agreed upon with Hunts Point. The striping and signing plan for the roundabout should be similar to the illustrations shown in the *84th Avenue NE Roundabout Concept Memorandum* dated April 2011 and prepared by Eastside Corridor Constructors. The plans will need to also include 'Do Not Block' pavement cross-hatching and signage along Points Drive in front of Hawthorne Court, along with two westbound lanes as Points Drive approaches the roundabout.

In addition, it is our understanding that WSDOT will include conduit throughout the roundabout to allow future metering or signalization. In situations where the SR 520 mainline is congested, spillbacks into the roundabout are likely to occur, which will prevent vehicle ingress and egress from the Town of Hunts Point. To address spillback conditions, the roundabout approaches would need to be metered or signalized to prevent the roundabout from becoming gridlocked. While WSDOT's traffic analysis indicates the full build-out of the SR 520 improvements are anticipated to result in no queue spillback conditions, there is the potential they could arise during the time period before improvements are completed at the west end of the SR 520 bridge. Spillbacks could also arise if a major collision where to occur on the bridge causing stop and go traffic on the mainline. Under such conditions, the metering or signalization of the roundabout would allow for continued access into and out of Hunts Point.

Updated Traffic Data on Points Drive

Additional PM peak hour traffic data was recently collected to better understand the number of vehicles accessing the Hawthorne Court and 86th Avenue NE / NE 28th Street corridors from Points Drive. The data was collected on a typical weekday from 4:00 to 6:00 PM during the month of July. The data provides an understanding of the number of vehicles that could be impacted if local congestion issues arise in the future.

Table 1. Daily and PM Peak Hour Traffic Count Data

			PM Peak Hour Trips		
Location / Year of Count	**Daily Traffic (2-way)[1]**	**% of Points Drive Traffic[2]**	**Total**	**WB**	**EB**
Points Drive NE – east of 84th Avenue NE					
Year 2007 (before project)	5,630	100%	450	300	150
Year 2012 (during construction)	4,560	100%	363	207	156
Year 2030 (forecasted)	6,630	100%	530	360	170
% Change between 2007 and 2012	*-19%*	*N/A*	*-19%*	*-31%*	*+4%*
Hawthorne Court (85th Place NE) – south of Points Drive			**Total**	**NB**	**SB**
Year 2012	140	3%	11	6	5
86th Avenue NE / NE 28th Street – south of Points Drive			**Total**	**NB/WB**	**SB/EB**
Year 2012	710	16%	57	27	30

1. Daily traffic has been estimated by using a PM peak hour to daily traffic volume conversion ratio of 8% based on data collected along 84th Avenue NE.
2. The percentage of traffic along Points Drive originating or destined for the specified corridor.

The traffic data is summarized in Table 1 and has been compared to previous data collected or developed as part of the SR 520 Eastside Transit and HOV project. The updated data shows that westbound traffic volumes along Points Drive have declined by almost 20 percent compared to previous data collected in 2007. The decline of traffic could be due to several reasons such as current construction activity that is diverting or reducing trips, the implementation of SR 520 tolling that has altered travel behavior, or that the data was collected during the summer season when school is not in session.

The traffic data for Hawthorne Court shows approximately 11 vehicle trips (5 inbound/6 outbound) using the local street during the PM peak hour. All five inbound trips are from the west, with no traffic turning left from Points Drive into Hawthorne Court. Of the six outbound vehicle trips, four vehicles turned right onto Points Drive, while the other two vehicles turned left. Based on this data, there are few vehicle trips to/from Hawthorne Court during the PM peak hour that would be impacted if back-ups were to arise along Points Drive. While only the PM peak hour traffic data has been summarized, two hours of data were collected for the hours between 4:00 and 6:00 PM. Of significance is the fact that no vehicles turned left from Points Drive into Hawthorne Court during that period.

Looking north from 86th Avenue NE to NE 28th Street and Points Drive.

The traffic data for 86th Avenue NE intersection showed approximately 57 vehicles using the 86th Avenue NE and NE 28th Street approaches, combined. This is a unique location as it actually consists of two separate, closely spaced intersections. However, the traffic data has been combined so it appears as one intersection for discussion purposes. Of the 27 vehicles turning onto Points Drive from either 86th Avenue NE or NE 28th Street, approximately six are turning left, while the remaining 21 vehicles are turning right towards Tully's. Of the 30 vehicles turning from Points Drive onto 86th Avenue NE or NE 28th Street, ten are turning left from Points Drive. The remaining 20 vehicles are making an eastbound right-turn. It should be noted that left-turns are not allowed onto Points Drive between 4:00 and 7:00 PM on weekdays therefore that could be one reason for only 10 vehicles observed making that movement. Nonetheless, similar to the Hawthorne Court traffic data, a low proportion of the existing traffic using the 86th Avenue or NE 28th Street corridors would be impacted by back-ups along Points Drive, if they were to extend this far.

Options for Addressing Access Concerns along Points Drive

In general, the existing traffic data indicates that there are likely to be few vehicles impacted if back-ups were to arise during the PM peak hour along Points Drive due to possible congestion along SR 520. Based on the existing data, which is shown in Figure 1, approximately 2 vehicles at Hawthorne Court and 16 vehicles at 86th Avenue NE / NE 28th Street would likely be impacted. This represents approximately 5 percent of the PM peak hour traffic along Points Drive today.

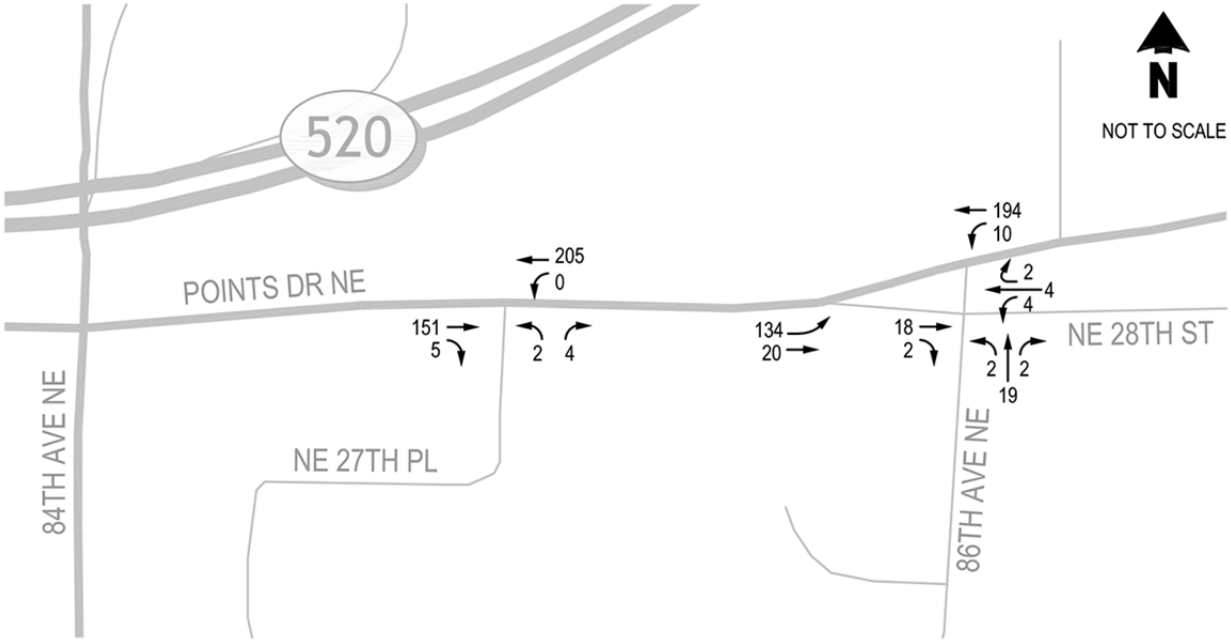

Figure 1: Existing 2012 PM Peak Hour Traffic Volumes along Points Drive

While we feel the proposed signing and striping improvements will likely address the limited number of residents that could be impacted, we also understand the improvements may not fully satisfy or provide enough confidence that access will be maintained during those unusual time periods where back-ups may occur. As a result, we have identified a few options both Clyde Hill and Hunts Point could consider if problems were to arise in the future. It is important to note that the following options could be implemented over time, after the SR 520 project is complete, and if the signing and striping improvements do not fully mitigate access issues along Points Drive.

Left-turn restrictions at 86th Avenue NE.

Option 1: Update Turn Restriction Signage and Add 'Do Not Block' Striping at the Hawthorne Court and 86th Avenue NE Intersections with Points Drive.
If back-ups along Points Drive were to occur, it is likely they would not extend to 86th Avenue NE on a frequent basis. However, to prevent blocking the intersection during time periods of extreme congestion and to allow improved local access, the intersection could be striped with 'Do Not Block' cross-hatch pavement marking similar to that being proposed at the Hawthorne Court intersection as shown in Figure 2. Currently signage is in place at the intersection that prevents left-turns between 4:00 and 7:00 PM on weekdays to avoid cut-through traffic in the neighborhoods. Additional signage would need to be added that would say 'Except Local Access' and be placed directly underneath the current turn restriction signage. This would allow local residents the opportunity to make a

left-turn onto Points Drive. While such a restriction would be difficult to enforce to identify those that want to bypass potential back-ups on Points Drive, it is assumed that the frequent back-ups of the past will only occur in rare situations once the SR 520 improvements are complete. These signing and striping improvements would work hand-in-hand with Option 2 described next.

Figure 2: Add Do Not Block Signing and Striping for Hawthorne Ct and 86th Ave NE

Option 2: Utilize 86th Avenue NE Diamond for a Turnaround for Outbound Access from Hawthorne Court

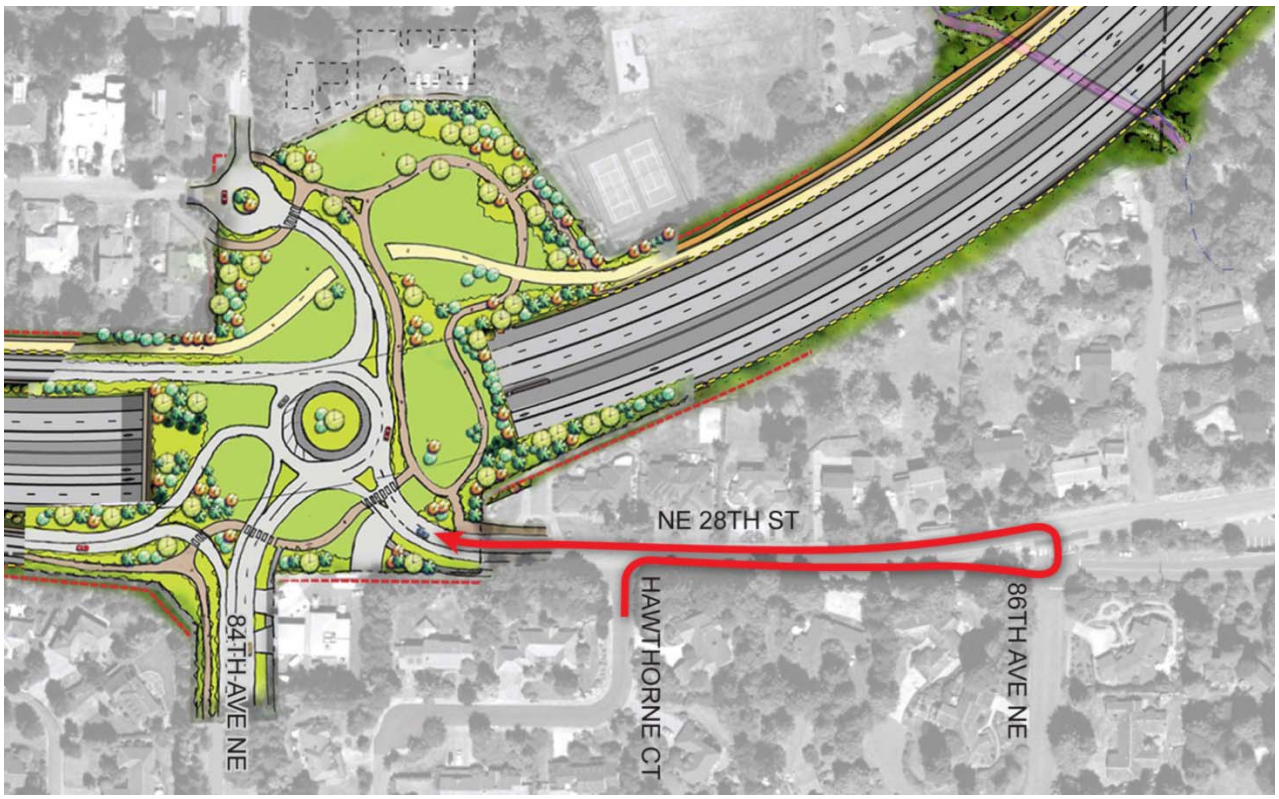

Figure 3: Utilize 86th Avenue NE Diamond for a Turnaround

If the signage and cross-hatching improvements are ineffective in allowing residents to make a northbound left-turn from Hawthorne Court onto westbound Points Drive, they could make a right onto Points Drive and utilize the diamond at 86th Avenue NE to make a left turn as shown in Figure 3. Such a maneuver is dependent on implementation of Option 1 described previously. Allowing a left turn at 86th Avenue NE would address the two vehicles that make a left-turn from Hawthorne Court to Points Drive during the PM peak hour (or the five vehicles during the two-hour PM peak). This maneuver adds a small amount of additional travel but is an easy and less impactful alternative to implement than providing a dedicated turn lane or widening the corridor.

Option 3: Utilize the 84th Avenue NE Roundabout for U-Turns

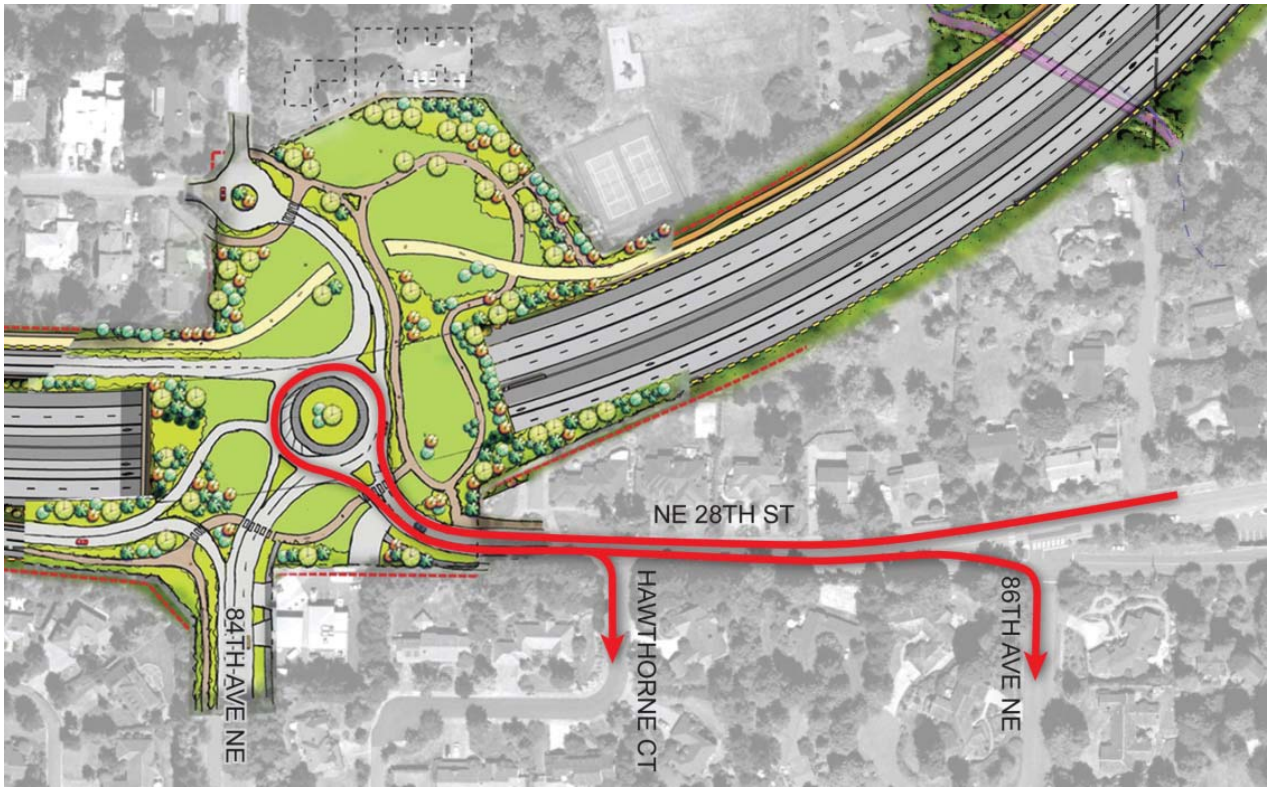

Figure 4: Utilize the 84th Avenue NE Roundabout for U-turns

If left-turn access into Hawthorne Court or 86th Avenue NE was to be blocked, the roundabout at 84th Avenue NE could be used as a U-turn as shown in Figure 4. Depending on how back-ups through the roundabout are addressed, there is a potential to allow the outside lane designated for local and high occupancy vehicle (HOV) traffic to be utilized for local U-turn traffic. This would require a merging activity within the roundabout between SOV drivers accessing westbound SR 520 in the inside lane and local residents as they attempt to make a U-turn movement from the outside lane. This merging activity could occur if the approaches to the roundabout were signalized or metered or potentially if cross-hatching or other striping and signing is implemented to safely allow vehicles to merge from the outside

lane to the inside lane within the roundabout. The specific channelization design needs to be evaluated further if such improvements were to be implemented by WSDOT.

Other options to improve access to Hawthorne Court and 84th Avenue NE, such as advanced warning signs or widening Points Drive, were considered, but were ultimately not included as a recommended option. A summary of these other options and the reasons they were not recommended are summarized below:

- **Advanced Warning Signs at 92nd Avenue NE:**

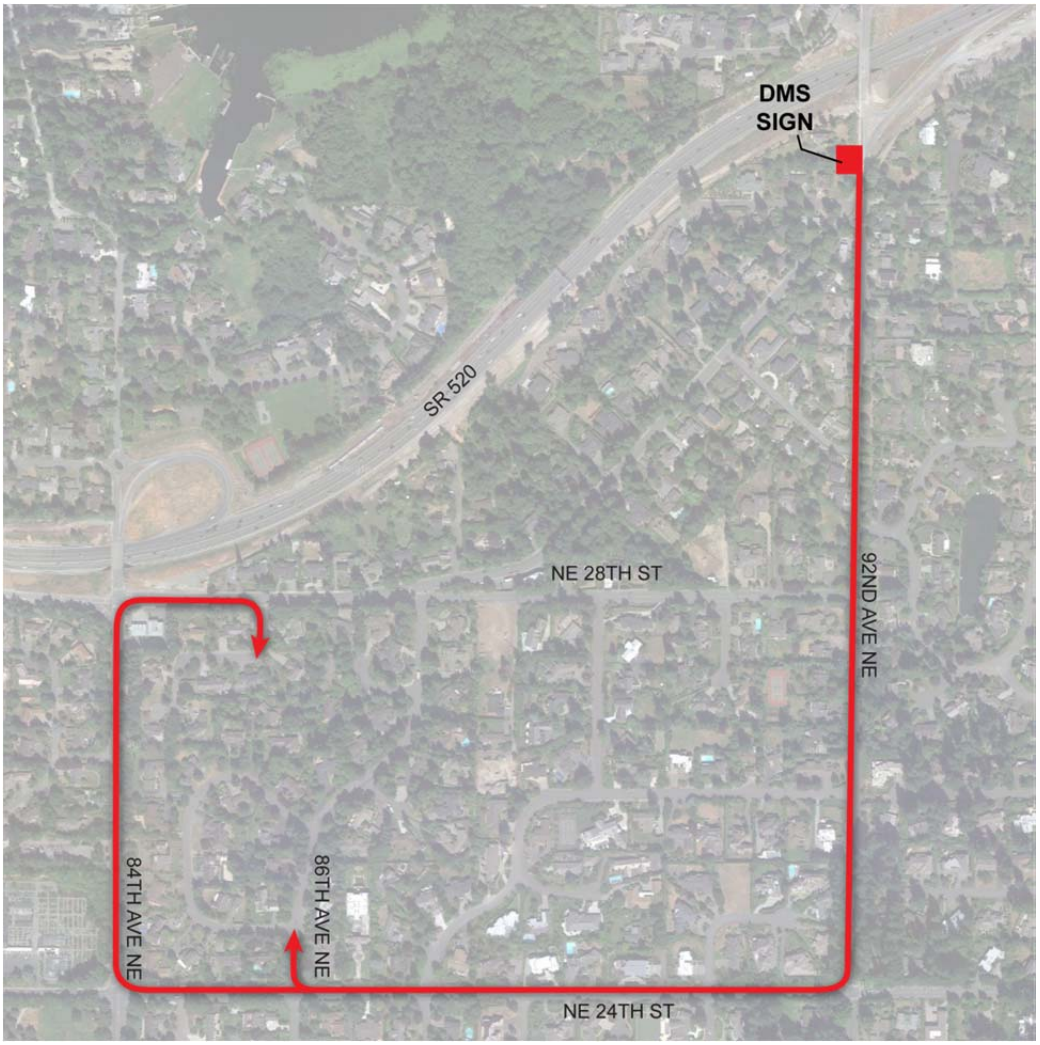

Figure 5: Provide advanced warning signs at 92nd Avenue NE

This option was considered in order to provide advanced warning to local residents to direct them to utilize an alternative route if vehicle queues were to extend onto westbound Points Drive. As shown in Figure 5, this could be accomplished through the use of advanced electronic warning signs installed at key locations, such as the 92nd Avenue NE interchange.

The alternative route would be less direct, but likely result in less overall travel time for residents of Hawthorne Court or Medina. As an example, a Dynamic Message Sign (DMS) could be located in the vicinity of the 92nd Avenue interchange and direct residents south on 92nd Avenue NE, west NE 24th Street, and north on 84th Avenue NE to access Points Drive. The option is not recommended because no traffic was observed making a left-turn from Points Drive to Hawthorne Court between 4:00 and 6:00 PM, and only about 30 vehicles turn left at the 84th Avenue NE intersection today. In addition, most residents that use Points Drive when exiting the 92nd Avenue NE interchange would, over time, change their route if queuing issues were to frequently occur along Points Drive.

- **Left-turn Refuge Lane:**

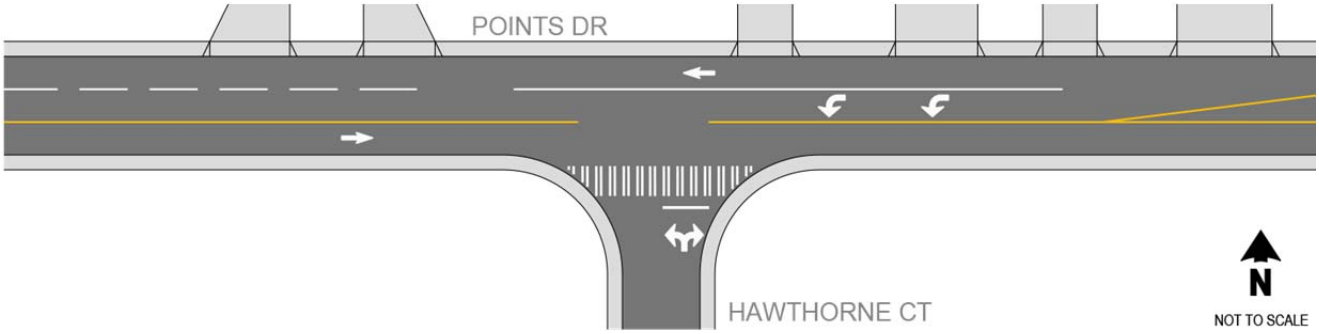

Figure 6: Restriping Points Drive to add Left-turn Refuge Lane

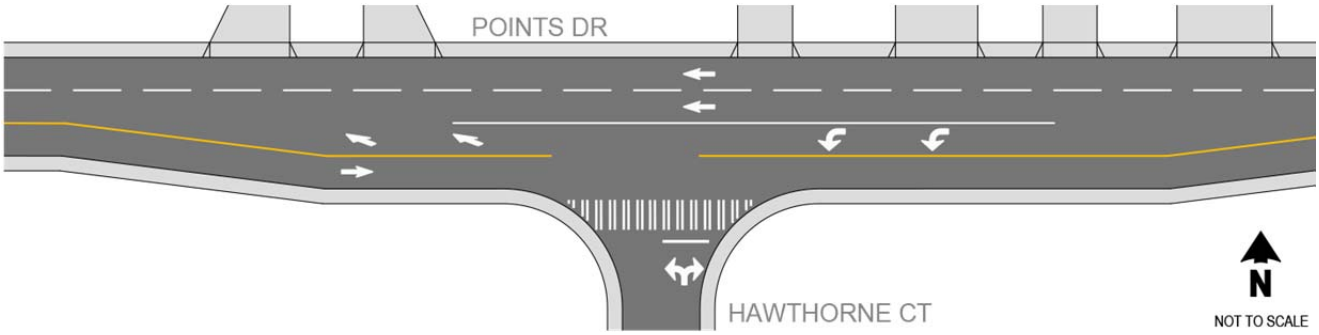

Figure 7: Widen Points Drive to add Left-turn Refuge Lane

Restriping one of the westbound lanes or widening Points Drive to provide a dedicated left-turn refuge lane were considered to provide exclusive left-turn access for Hawthorne Court (similar to that proposed for Medina Circle). However, the options illustrated in Figures 6 and 7 do not appear to be warranted based on the data collected, which observed no left-turns into Hawthorne Court during the 4:00 to 6:00 PM time period. In addition, c-curbing and striping would be required that would permanently restrict left-turn access to the residents on the north side of Points Drive. Such a concept works at Medina Circle because there are no access points on the opposite side of the road; however, along Points Drive, there are homes along the north side that would have their access partially blocked or restricted.

- **Two-way Center Left-turn Lane:**

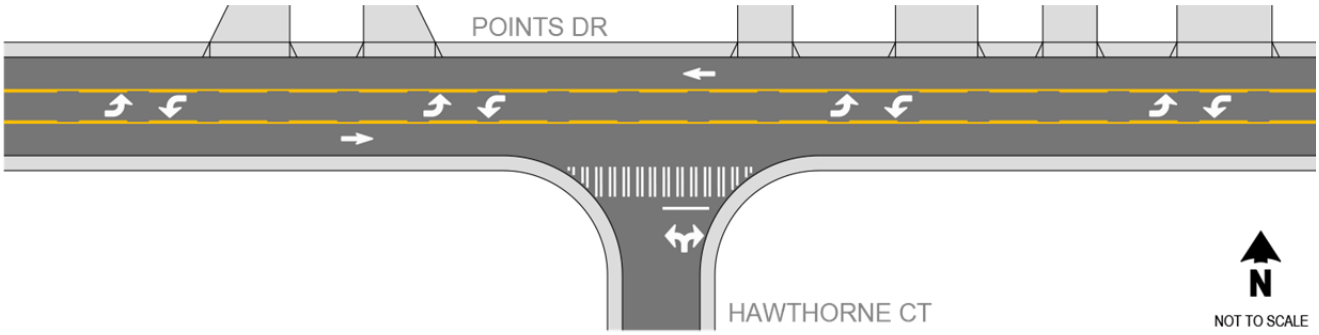

Figure 8: Restripe Points Drive to add a Two-way Center Left-turn Lane

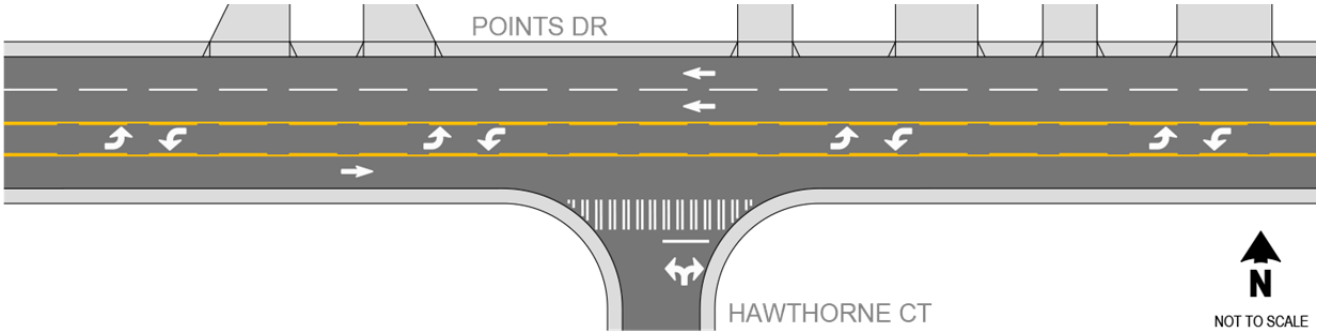

Figure 9: Widen Points Drive to add a Two-way Center Left-turn Lane

Similar to the previous options, restriping one of the westbound lanes or widening the corridor was considered to provide a two-way center left-turn lane (instead of the dedicated left-turn lane) to serve Hawthorne Court and residents on the north side of Points Drive. However, the options shown in Figures 8 and 9 do not appear to be warranted based on the data collected, which observed no left-turns into Hawthorne Court and only five left-turns out during the 4:00 to 6:00 PM time period. In addition, for the lane to be of value, vehicles would need to use it as a travel lane to bypass any vehicle queuing along Points Drive. Using the lane in this manner is not only discouraged, but not allowed under Washington State RCW because it compromises safety. The purpose of a two-way center left-turn lane is to remove left turning traffic from a free flowing roadway to reduce the number of rear-end collisions due to left-turning vehicles stopping in the travel lane. Washington State RCW 46.61.290 Section 3C outlines that this type of turn lane should not be used for overtaking or passing vehicles in the same direction or to use the lane for more than 300 feet. A majority of vehicle collisions in a two-way center left-turn lane occur in queued conditions, either in the same direction from people entering the turn lane at different times or from opposing traffic trying to access the lane in the opposite direction. In queued conditions, the speed differential is often great and visibility is impaired for seeing vehicles access it from both sides.

Traffic Control Options at 92nd Avenue NE

We understand that the Yarrow Point Town Council passed Resolution No. 504 that requires staff to work with WSDOT and the design-builder to install a stop sign at the end of the 92nd Avenue NE interchange off-ramp from SR 520. The existing WSDOT design plans for the intersection identify a five-leg roundabout with each approach yield-controlled. Yield control is a standard form of traffic control at roundabouts and requires vehicles entering the roundabout to yield to those vehicles within the roundabout or approaching from the left. Generally, it appears that Yarrow Point is concerned about vehicle egress from their community because residents will need to yield to traffic exiting the off-ramp, when under existing conditions they had unimpeded access.

We have summarized roundabout design standards and guidelines to provide a basis for the designated yield-control. We have also reviewed the work to-date by WSDOT to understand if safety or operational conditions would support a deviation from the traffic control standards to warrant a stop sign.

Statewide and National Standards and Guidelines

State law (RCW 47.36) requires WSDOT to adopt uniform standards for traffic control devices. The benefit of having a uniform standard for traffic control and signage is to provide consistency from one community to the next. Such standards improve safety by reducing the chances that drivers will encounter unfamiliar forms of traffic control or signage. WSDOT formally adopted the *2009 Manual on Uniform Traffic Control Devices (MUTCD)* on November 17, 2011; therefore, the MUTCD is, by reference, state law.

Section 2B.09 of the MUTCD states that a "YIELD (R1-2) sign shall be used to assign right-of-way at the entrance to a roundabout." This is a standard, using the word "shall" which the MUTCD uses to denote a statement that is mandatory or required. Further, there are no guidance statements, which the MUTCD uses to document exceptions to the rules. It is possible to deviate from a standard, but it requires an engineering study that must show cause for the deviation.

Section 7.4.1.1 of *NCHRP Report 672, Roundabouts: An Informational Guide* states that "a yield sign (R1-2) is required on the right side of each entry into the roundabout." The document is not a standard, but is used as a guide of prevailing practice by roundabout designers.

Traffic Operations

As shown in Figure 10, approximately 86 vehicles will be exiting from SR 520 during the PM peak hour. Of those vehicles, 63 will be in direct conflict with those vehicles heading southbound on 92nd Avenue NE from Yarrow Point. This results in residents of Yarrow Point experiencing approximately 3 seconds of additional delay, on average, during the PM peak hour as documented in WSDOT's traffic analysis. The yield control is expected to result in little delay and good level of service for all users of the roundabout. In addition, the forecasted traffic volumes are considered low and represent less than a third of the capacity of the roundabout.

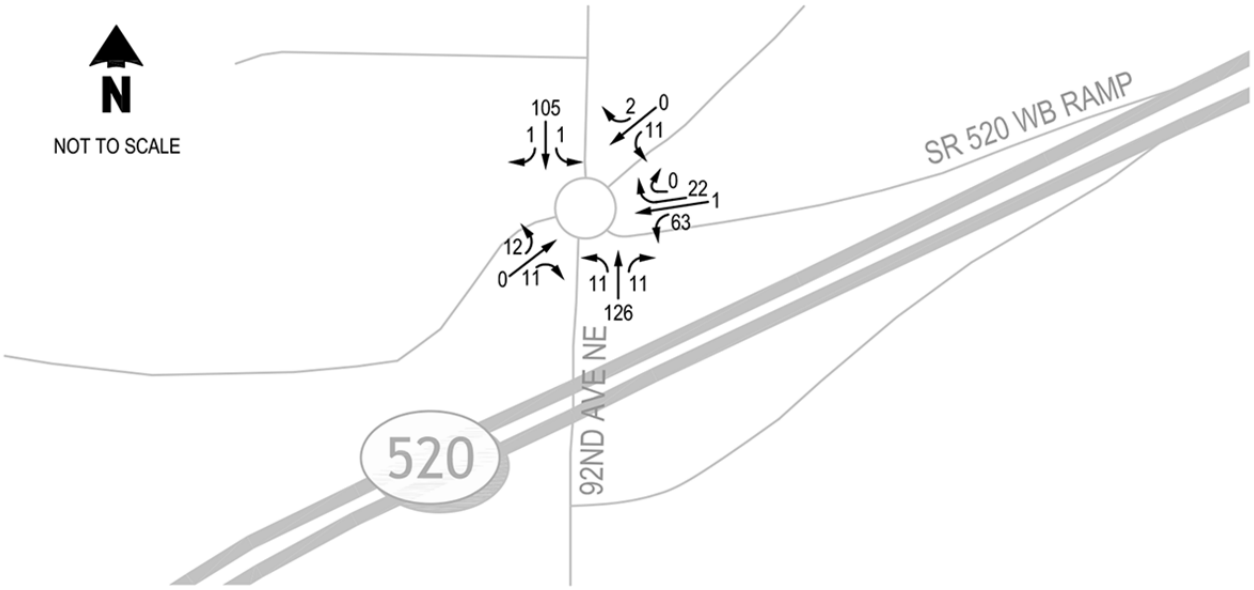

Figure 10: Future 2014 PM Peak Hour Traffic Volumes with the Roundabout

Safety

We would caution the use of a stop sign as it could actually result in unintended safety issues. For example, providing a stop sign on one approach, but not others, creates a confusing situation for drivers that are not accustomed to the intersection. Non-standard traffic control could result in a higher occurrence of collisions at the intersection.

Based on the above information, no specific data has been provided or obtained that would support a deviation in traffic control at the intersection. Typically there is an adjustment period for drivers to adapt to a new roundabout, and in some cases additional lower speed sideswipe collisions may occur; however, roundabouts also typically process traffic in a safer and more efficient way for all users of the intersection. We recommend that the Town continue to monitor the safety and operations at the intersection once the roundabout has been completed to understand if any trends occur that might provide a basis for a deviation.

Installation of Conduit

We understand that Yarrow Point would like WSDOT to install conduit in the roundabout to accommodate future signalization. This is similar to the request Hunts Point has made for the 84th Avenue NE roundabout given the potential for SR 520 back-ups to extend into the roundabout. However, the situation at 92nd Avenue NE is different because the roundabout is at the terminus of the westbound off-ramp, whereby SR 520 congestion will not cause back-ups to extend into the roundabout. In any case, the conduit could be installed at the 92nd Avenue NE roundabout as a precautionary measure, but we do not feel it is necessary.

We appreciate the opportunity to review the circulation and access concerns you have raised, and provide some ideas on ways to address them. Please do not hesitate to contact us should you have any questions about our recommendations and options we have presented. We may be reached at (425) 821-3665.

Mayor Fred McConkey
August 29, 2012

Sincerely,
Transpo Group, Inc.

Dan McKinney, Jr.
Associate Principal

Jon Pascal, PE, PTOE
Associate Principal

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