TO: Mayor John Marchione and City Council

FROM: Ron Grant, Interim Public Works Director, 425-556-2742
Mike Paul, Construction Division Manager, 425-556-2721
Rob Crittenden, Traffic Operations, Safety/Engineering Div. Manager, 425-556-2838
Don Cairns, Transportation Planning/Engineering Div. Manager, 425-556-2834
Lei Wu, Senior Engineer, 425-556-2749
Tricia Thomson, Transportation Safety Improvement Program Manager, 425-556-2776
Susan Byszeski, Traffic Safety Specialist, 425-556-2882

SUBJECT: 166th Avenue NE Rechannelization – Project Implementation

DATE: December 10, 2013

The purpose of the study session is to seek Council's direction on project implementation for the 166th Avenue NE Rechannelization project.

To support Council's decision making, staff will present the recommended implementation plan including specific improvements, timing, conceptual cost estimates, and expected outcomes. During the presentation, staff will go over graphics illustrating design details of improvements as summarized in Attachment 5.

The recommended implementation plan is the result of data analysis, engineering design, and incorporation of public comments, whose primary elements are included in this Council study session packet. Staff will also discuss these elements briefly during the presentation.

A complete summary of public comments is on the project site www.redmond.gov/PlansProjects/Transportation/166thAveNERechannelization/october282013publicmeeting/

For any question or comment prior to the Council study session, please contact Lei Wu at lwu@redmond.gov or 425-556-2749.

Attachments:

1. Proposed Council study session agenda
2. Similar projects and analysis data (collision history, speed, and side street vehicle delay)
3. Public meeting executive summary and letter of support from Redmond Pedestrian and Bicycle Advisory Committee
   www.redmond.gov/PlansProjects/Transportation/166thAveNERechannelization/october282013publicmeeting/
4. Frequently asked questions
5. Recommended implementation plan (text summary only, graphics available during Council study session)

ATTACHMENT 1

Proposed Agenda for 166th Avenue NE Rechannelization

Council Study Session – December 10, 2013

Purpose: seek Council direction on recommended implementation

- Do you want the City to deliver the baseline project in 2014 within existing budget and staff resource?
- Would you like the City to further develop potential enhancements into a project for a future Budgeting by Priorities process?

Agenda Items

1. Background
    a. Project goal
    b. Other similar projects and results

2. Issues along the corridor
    a. Collisions
    b. Speed & climbing lane
    c. Side street vehicle delays
3. Public meeting comments and FAQs
    a. Main themes of comments
    b. Response via FAQs
4. Recommended project implementation
    a. Improvement elements along the corridor
    b. Implementation plan
        i. Baseline: improvement elements, cost, and expected outcomes
        ii. Potential future enhancements: improvement elements, cost, and expected outcomes
        iii. Complete street improvement as opportunities arise
5. Confirm Council's direction and next steps
    a. Baseline
    b. Potential future enhancements

Attachment 2

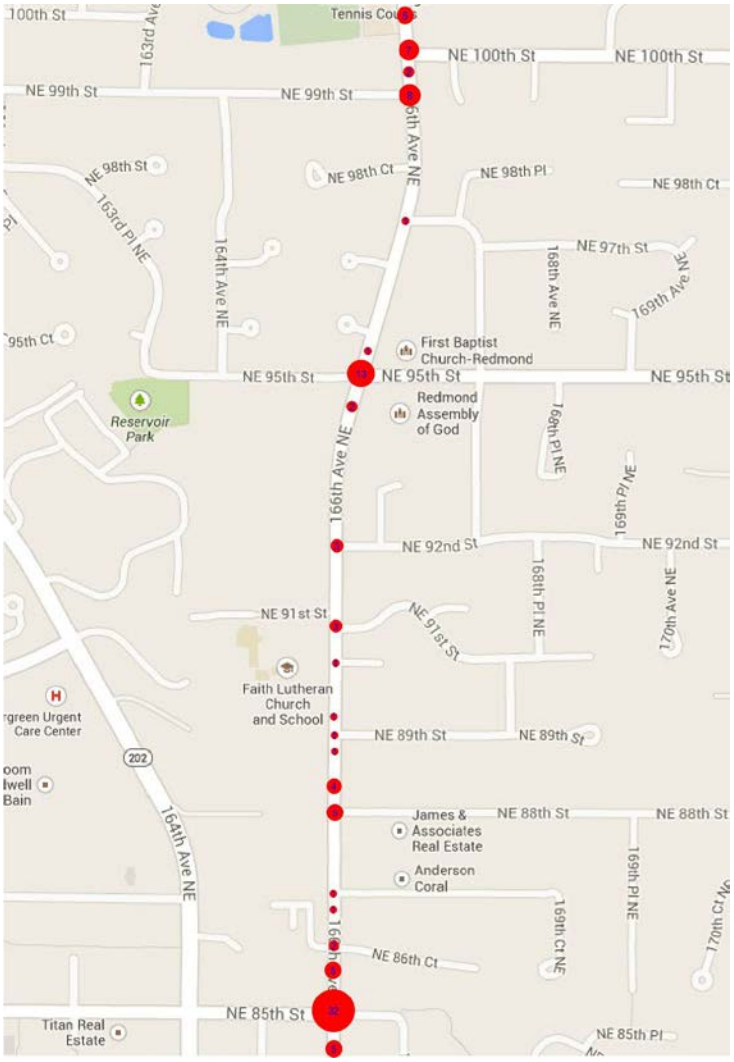
Project Corridor

Along the project corridor:

- 16 cross streets
- 14 T-intersections
- Education Hill Neighborhood
- Schools
    - Redmond Middle School
    - Faith Lutheran Elementary
- 4 churches
- Key Intersections
    - 166th Avenue NE & NE 85th Street
    - 166th Avenue NE & NE 95th Street
    - 166th Avenue NE & NE 100th Street

History of Lane Rechannelization in Redmond

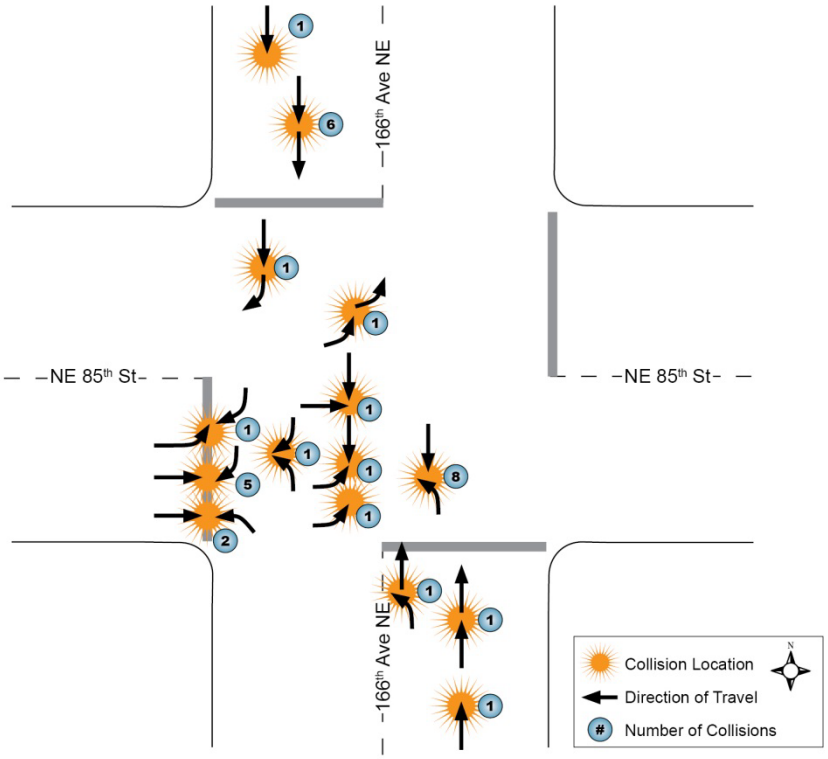
166th Avenue NE 10-Year Collision History



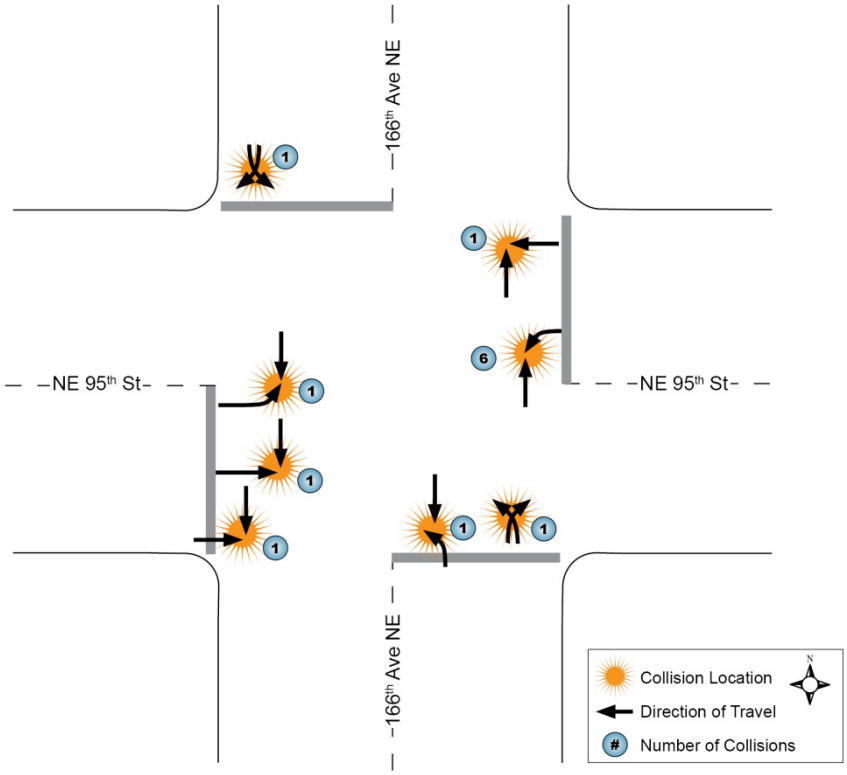
- Collision data between 2003 and 2012
- Highest Collision Intersections:
  - NE 85th Street = 32
  - NE 95th Street = 13
  - NE 99th Street = 8

NE 85th & 95th Street Crash Diagrams

NE 85th Street: 32 Collisions (2003-2012)



NE 95th Street 13 Collisions (2003-2012)



Speed Analysis along 166th Avenue NE

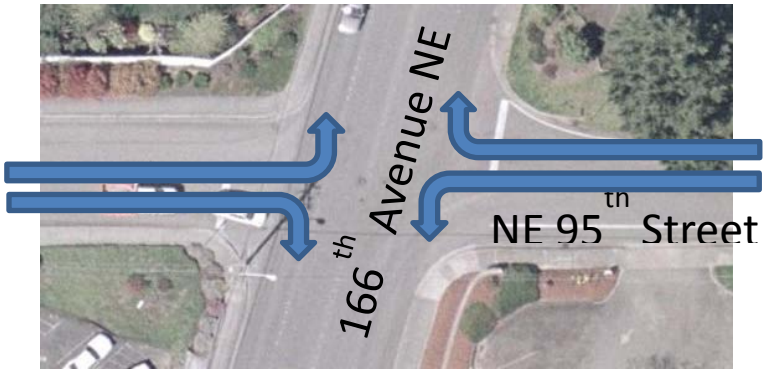
- Posted Speed = 30 mph
- Average speeds near speed limit
- 85th percentile speeds range from 5 to 9 mph greater than the speed limit
- Downhill speeding between NE 95th Street and NE 88th Street
- Uphill speeding between NE 95th Street and NE 98th Street
- Speed differential makes turning from side streets more difficult
- Higher speeds result in more collisions

Side Street Delay at NE 95th Street (Field Data)

Observed Morning Delays (in seconds): 8:35 – 8:50 am

No left turning vehicles

21.1 second average
2.0 second minimum
139.0 second maximum



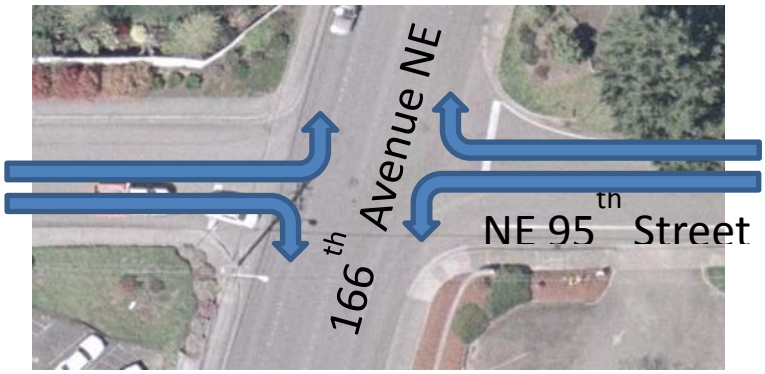
36.4 second average
5.0 second minimum
54.0 second maximum

6.8 second average
4.0 second minimum
15.0 second maximum

Observed Evening Delays (in seconds): 5:35 – 5:50 pm

27.0 second average
27.0 second minimum
27.0 second maximum

4.3 second average
3.0 second minimum
8.0 second maximum



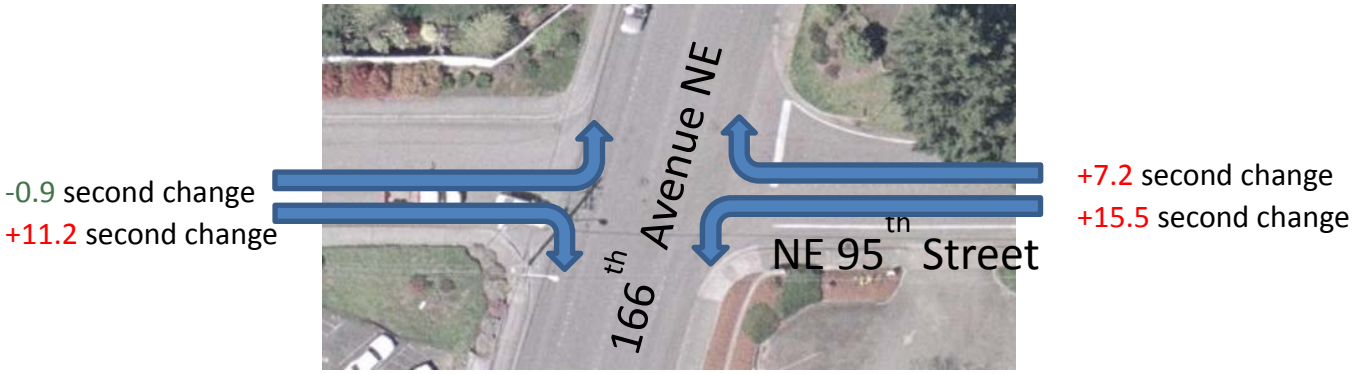
29.0 second average
14.0 second minimum
39.0 second maximum

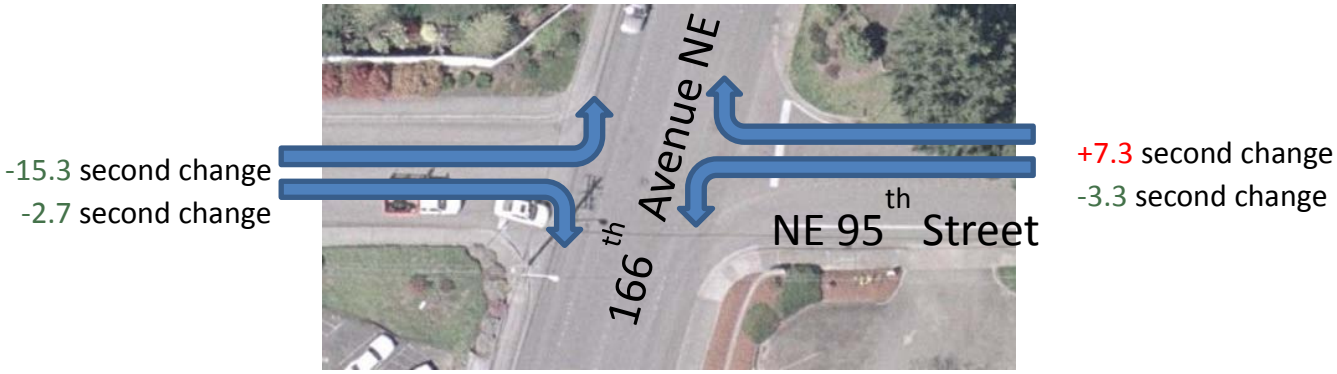
66.6 second average
11.0 second minimum
164.0 second maximum

Side Street Delay at NE 95th Street

Expected Difference Between Before and After Rechannelization

Change to Average Delay in Morning Delays (in seconds): 8:35 – 8:50 am





Change to Average Delay in Evening Delays (in seconds): 5:35 – 5:50 pm

Attachment 4

166th Avenue NE Rechannelization Project
Frequently Asked Questions

Question: Why is the City of Redmond restriping 166th Avenue NE from four to three lanes plus two bike lanes?

Answer: The 166th Avenue NE corridor has a safety problem. There have been 104 collisions on the four lane section of 166th from just south of NE 85th Street to just north of NE 100th Street in the past ten years, including one pedestrian fatality at NE 95th Street. Previous conversions from four to three lanes within the City have resulted in a measureable decrease in collisions and improved sense of safety for both cyclists and pedestrians.

Question: Is there a particular reason for the collisions and side street delay on 166th Avenue NE?

Answer: Many of the side street intersections do not meet current intersection sight distance standards. The reduced sight distance makes it difficult to see traffic when entering 166th Avenue NE. Cars are speeding uphill between NE 95th and NE 97th Street, and downhill between NE 85th and NE 87th Street. Higher speeds require longer sight distances. The restriping will help reduce speeding and create more consistent speeds along the corridor. Several collisions were a result of drivers creeping into the travel lane to see conflicting traffic. Some drivers weren't able to make right or left turns because they could not see the available gaps. The restriping will move vehicles farther away from the curb (with the addition of 5.5-foot bike lanes on both sides) improving visibility for side street traffic trying to cross or enter onto 166th Avenue NE.

Question: How will the restriping help pedestrians?

Answer: The three lane section allows for safer pedestrian crossings because there are fewer lanes for a pedestrian to cross - only one lane of through traffic in each direction and a center turn lane area that can provide additional pedestrian refuge. The proposed project includes the addition of two flashing beacon crossings for pedestrians. These beacons cannot be installed on a four lane roadway. Additionally, bike lanes separate pedestrians from vehicles, improving pedestrian safety along the entire corridor.

Question: The City keeps talking about complete streets. What is a complete street?

Answer: A complete street provides space for all roadway users including motor vehicles, bicycles, pedestrians, and transit. Providing separate travel lanes dedicated for each mode of travel improves safety and efficiency. Complete streets safely move more people. The City's current street standards are based upon Redmond's Complete Streets Ordinance (Ordinance 2359 adopted on Sept 4, 2007). All new roadways are built to a complete streets standard.

Question: Why doesn't the four to three lane rechannelization include bus pull-outs along the corridor?

Answer: Bus pull-outs would require the City to purchase right-of-way along the corridor, which would dramatically increase the cost of this project. During peak hours of the day, there are a total of four buses per hour using the 166th Avenue NE corridor, northbound and southbound. Given the low frequency of buses and limited ridership it was determined that bus pull-outs are not necessary for this section of 166th Avenue NE. The City will work with Metro Transit to consolidate existing stops to improve the overall operation of the corridor.

Question: Will the City of Redmond make 166th Avenue NE a snow-plow/de-icing route to reduce issues with a three lane roadway?

Answer: 166th Avenue NE is already a "first priority" roadway for plowing and de-icing. Converting 166th Avenue NE from a four to three lane roadway will not impact the prioritization of 166th during snow events. Refer to www.redmond.gov/Transportation/StreetOperations/SnowandIceRemoval/ to see the City of Redmond's Snow and Ice Removal protocol and mapping.

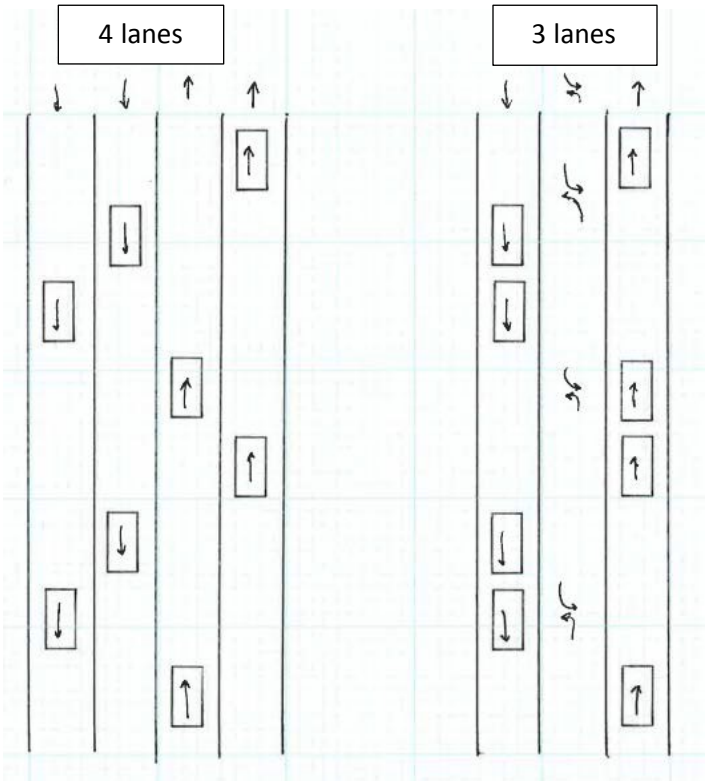
Question: If there is an accident, how does an emergency vehicle respond on a three lane roadway?

Answer: During an emergency, the traveling public is required to pull over and stop, allowing emergency vehicles to pass. Police, Fire, and/or EMT vehicles are allowed to travel in any lane necessary to reach an accident including the two-way left turn lane or opposing lanes, if necessary.

Question: How will three lanes make it easier to turn onto 166th Avenue NE, compared to the existing four lane roadway?

Answer: Although all the traffic will be consolidated to one lane in each direction (minus those in the two-way turn lane), vehicles on side streets will find it easier to turn onto 166th Avenue NE because there will be a clearer line of sight to oncoming traffic. By improving the sight distance, the turning vehicle can better judge speeds of oncoming traffic. Additionally, the two-way left turn lane can be used as a refuge location, allowing vehicles to cross one conflicting flow of traffic at a time.

Below is an example of how gaps remain in the traffic flow after a conversion:



Question: How will community comments from the public meeting get incorporated into the project?

Answer: The public provided a variety of comments and suggestions, many of which will be incorporated into the project:

- High friction pavement markings will be investigated to address the sliding that occurs on the plastic arrows and crosswalk markings, particularly at NE 85th Street.
- Sight distance corrections will be investigated at all intersections and may include vegetation management, fence relocations, or minor grading.
- Strong neighborhood support for a roundabout or traffic signal at NE 95th Street will be shared with the City Council.
- The City will work with Metro Transit to reduce the impact of bus operations and improve pedestrian safety on 166th Avenue NE by re-evaluating the location and number of bus stops on the corridor.
- The operation of the existing signals at NE 85th, NE 100th and NE 104th Street will be re-evaluated to improve efficiency and safety.

Question: I'm concerned about being stuck behind slower moving vehicles going up 166th Avenue NE. Did the City consider a passing lane?

Answer: In general, less than 10 % of the traffic on 166th Avenue NE is going slower than 25 MPH. The number of vehicles exceeding the 30 MPH speed limit by more than 5 MPH is close to 50%. What appears to be a slow moving vehicle is often a vehicle going the speed limit. For this reason a passing lane has not been recommended. Trucks with more than three axles comprise only 0.3% of the traffic on 166th Avenue NE, which averages to about 2 trucks an hour. This low volume of trucks does not support a climbing lane.

Question: I'm concerned about being trapped behind buses going up 166th Avenue NE. Did the City consider the impacts of buses on traffic congestion?

Answer: Buses account for less than 1% of the traffic volume on 166th Avenue NE. Data does show that bus speeds are low near the stops. This is not a high enough proportion of traffic to recommend a passing lane. The City will work with Metro Transit to re-evaluate the number of bus stops on 166th Avenue NE to reduce the impact of accelerating buses on uphill traffic.

Question: Won't reducing 166th Avenue NE from two lanes to one lane in each direction cause more congestion?

Answer: Significant PM peak queuing was observed northbound at NE 104th Street. This queuing is a result of through traffic turning right at the signal and is controlled by signal timing. The queuing is of relatively short duration, peaking for about 20 minutes. Signal timing changes could be made to favor that movement and reduce the queuing, but improved conditions could attract more cut-through
traffic caused by drivers who want to avoid other more congested routes. The changes proposed at NE
85th Street will continue to provide a southbound through lane and a northbound right turn lane so the
southbound capacity at the intersection will not be changed. No changes are proposed at NE 104th
Street as part of this project and the queues that extend south from the signal will not be impacted by the lane conversion project.

Question: Why are bike lanes being added to 166th Avenue NE?

Answer: The primary purpose of the 166th Avenue NE rechannelization project is to improve safety for vehicles, bicycles, and pedestrians. Providing three vehicle lanes, one in each direction and a two-way left turn lane separates through vehicles from turning vehicles, which

significantly improves vehicle safety. The remaining pavement is being used for bike lanes. Marking bike lanes has multiple benefits, including separating pedestrians from traffic, providing significant sight distance improvements for vehicles entering 166th Avenue NE from side streets and providing emergency parking for stalled vehicles or during snow conditions. Bike lanes also keep slower moving bikes out of traffic and faster moving bikes off of the sidewalks.

Attachment 5 - Proposed Implementation of 166th Avenue NE Rechannelization *(last updated December 5, 2013)*

Implementation Options /Timeline/Cost Estimate/Outcomes	85th	91st	95th	100th	Road Section	Lighting /Utilities
1. Baseline (2014 construction) **$750,000 - $ 850,000** **Addresses important safety concerns, e.g., sight line deficiencies and speeding.**	• Keep SB right turn lane for capacity • Construct narrow median on north leg of intersection for speed control • Merge SB bike lane into through lane to improve safety • Use high friction markings to improve skid resistance • Modify signal to match striping • Include protected NB left-turn arrow	• Construct Rectangular Rapid Flash Beacon School Crossing (RRFB) south of 91st for pedestrian safety • Part of School zone project • Cannot move ahead without rechannelization	• Construct Rectangular Rapid Flash Beacon (RRFB) south of 91st for pedestrian safety	• No change	• Restripe existing roadway to three lanes with bike lanes to improve safety	• Add light fixtures to existing utility poles to improve visiblity • Add wood poles and fixtures at dark spots to improve visibilty
2a. Potential future enhancements- signal option at 95th (future BP process item) **$1,500,000 - $2,000,000** **On top of baseline improvements, further addresses traffic operations and safety issues. For example, at NE 95th, this option allows dedicated green time for side street vehicles. ROW impacts.**	• Same as above	• Same as above	• Construct traffic signal to reduce side street delay, create gaps for adjacent streets, and enhance pedestrian safety	• Construct Rapid Flash Rectangular Beacon (RRFB) south of 100th for pedestrian safety, provide consistency with other crossings and encourage use of improvements at NE 95th Street	• Overlay roadway and improve curb ramps to current ADA Standards, which is under a separate budget	• Same as above
2b. Potential future enhancements- Roundabout option at 95th (future BP process item) **$2,500,000- $3,000,000** **On top of baseline improvements, further addresses traffic operations and safety issues. For example, at NE 95th, this option further calms traffic. ROW impacts greater than that of Option 2a (a signal).**	• Same as above	• Same as above	• Construct roundabout to reduce side street delay, reduce speeds on 166th Avenue NE, and enhance pedestrian safety	• Construct Rapid Flash Rectangular Beacon (RRFB) south of 100th for pedestrian safety, provide consistency with other crossings and encourage use of improvements at NE 95th Street	• Overlay roadway and improve curb ramps to current ADA Standards, which is under a separate budget	• Same as above
3. Additional Complete Streets Elements (as development occurs) **Not Estimated** **Creates the standard City of Redmond complete street cross section as development happens. Includes a landscape buffer and wider sidewalks.**	• Widen roadway to east to provide continuous bike lane northbound and eliminate offset for northbound through lane	• Same as above	• Can include traffic signal or roundabout • Extend sidewalk improvements east and west into neighborhoods	• Same as above	• Add planter strips and widen sidewalks where feasible	• Underground utilities • Construct new illumination system entire corridor