

ROADWAY ALTERNATIVES

Two alternatives were identified for evaluation in this study for the NE 132nd Street corridor:

- Three-lane Roadway with spot improvements at key intersections (Enhanced Three-Lane)
- Five-lane Roadway

Both alternatives incorporate the planned half-interchange at I-405. The three-lane roadway alternative reflects how the existing roadway could be modified for improved operation by adding lanes at key congested intersections. The five-lane roadway alternative examines traffic demand, which would increase with the added capacity, and identifies what is needed to make the five-lane facility work.

Enhanced Three-Lane Roadway Alternative

Based on the congestion and queue lengths in the Synchro analysis for the 2030 Baseline condition, several modifications for the signalized intersections in the NE 132nd Street Corridor were analyzed as part of a three-lane enhanced corridor alternative. This alternative consists of lane additions and modifications at key intersections where congestion and queuing are at issue. Below is a list of the intersection projects that make up the enhanced three-lane alternative.

- Lengthen the westbound, right-turn pocket approaching the 100th Avenue NE intersection. Revise striping to lengthen the westbound left-turn pocket.
- Add a right-turn pocket for the eastbound approach to Juanita High School intersection.
- Add a westbound, right-turn pocket at 108th Avenue NE.
- I-405 Half-Interchange at NE 132nd Street: Reconfigure the southbound off-ramp to have one left-turn lane, one shared through + left turn lane and one shared through + right turn lane. Reconfigure the northbound approach for one left-turn lane and one shared right, left-turn lane.
- 124th Avenue NE: Add a second left-turn lane for the westbound traffic at 124th Avenue NE and add a second northbound exit lane on the north leg. Convert the northbound right-turn lane to be a shared through + right-turn lane at 124th Avenue NE.
- Add a westbound right-turn pocket at 132nd Avenue NE.

The results of the analysis for the enhanced three-lane alternative are presented in **Figure 23**. Congestion would be improved with reduced overall delay and shortened queues in the corridor. Additional analyses tested the value of the westbound right-turn pockets at 108th and 132nd Avenue NE. The analysis confirms that that the proposed westbound right-turn pockets have a dramatic beneficial effect on traffic. **Figure 24** illustrates the operation without the two right turn project elements. Results for the enhanced three-lane alternative with the interim year 2014 traffic volumes are also provided to check for concurrency, see **Figure 25**.

Figure 23. 2030 PM Peak Hour Operations – Enhanced Three-Lane Roadway

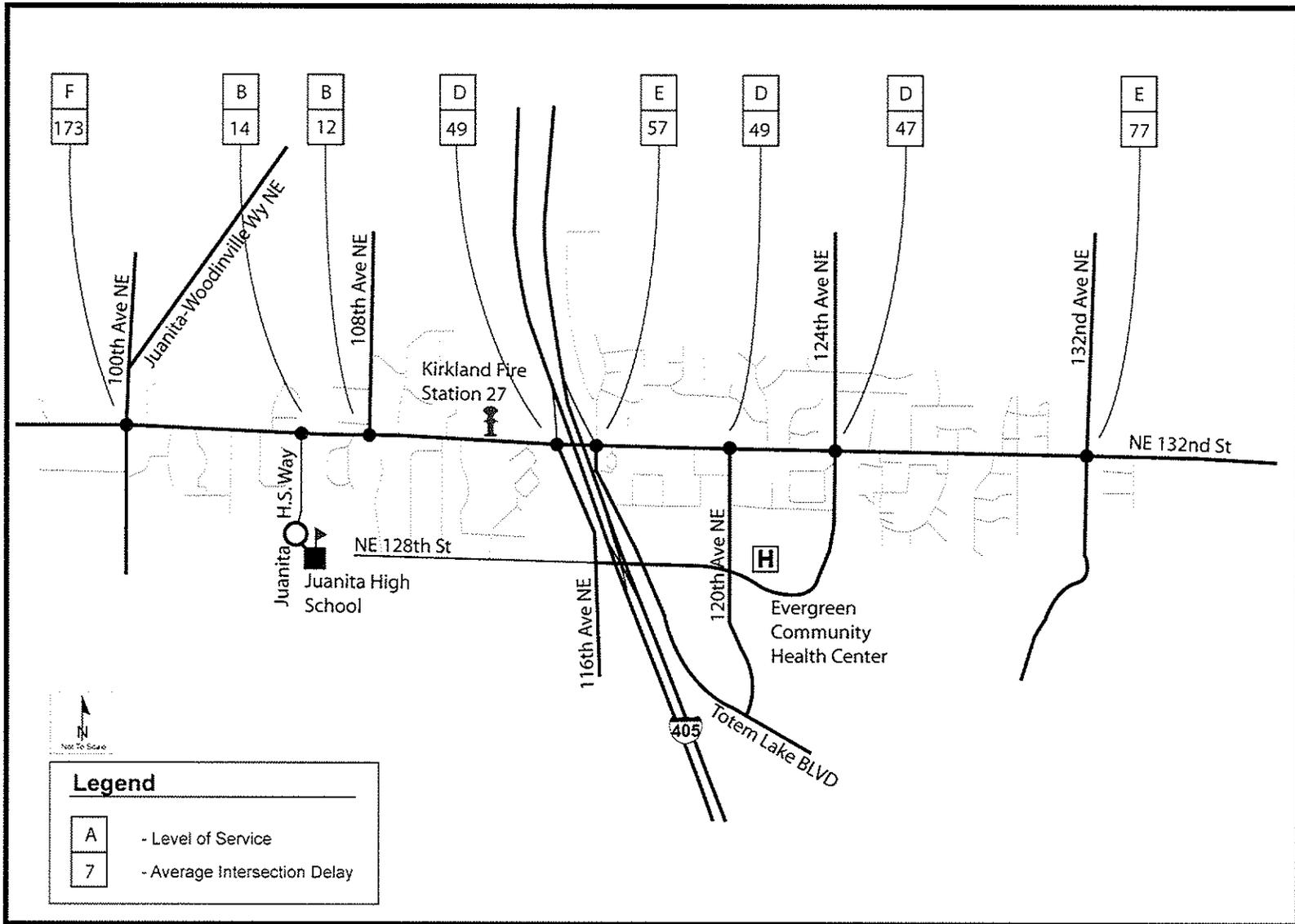


Figure 24. 2030 PM Peak Hour Operations – Enhanced Three-Lane Roadway, Without Right-turn Pockets at 108th Avenue NE and 132nd Avenue NE

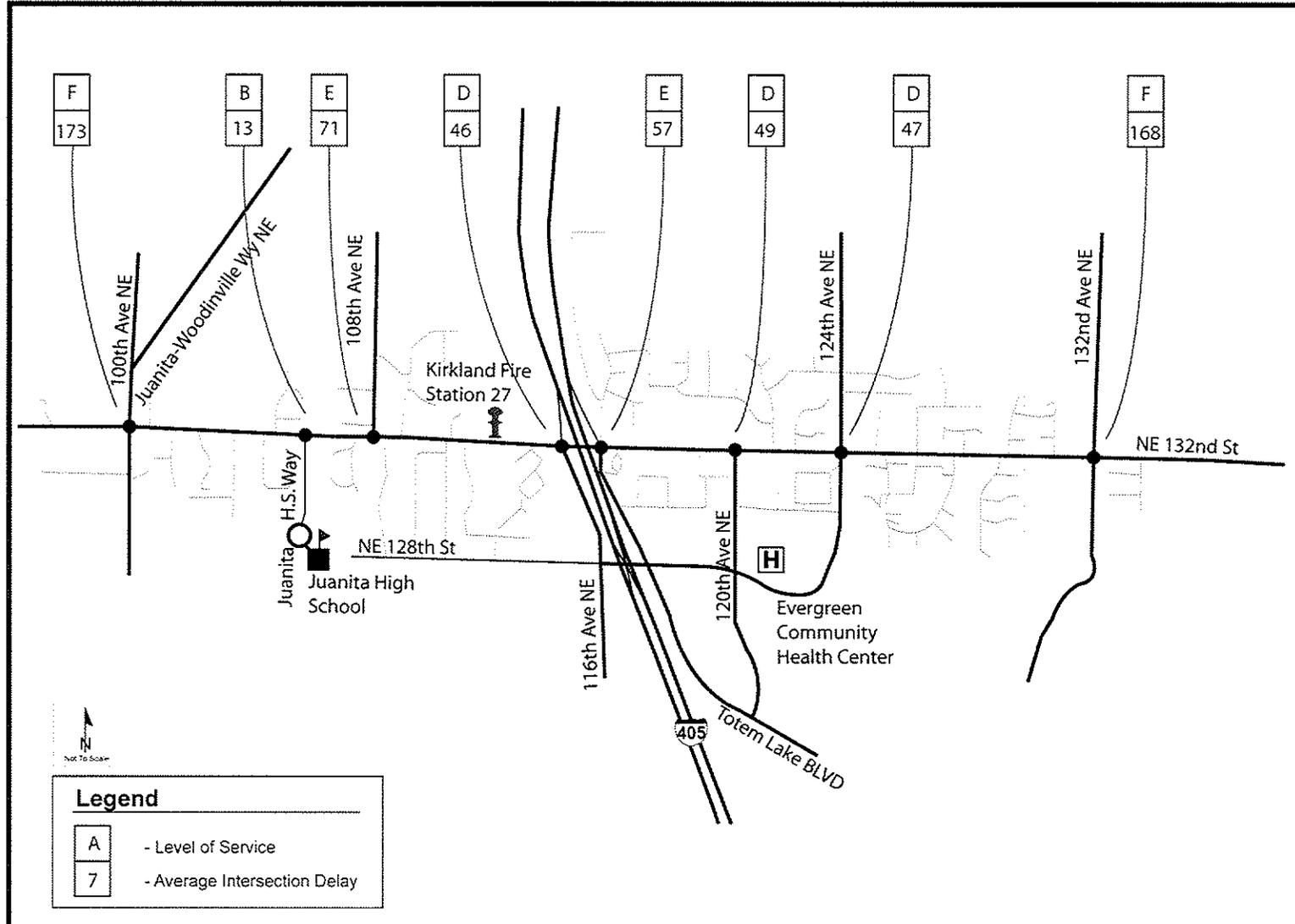
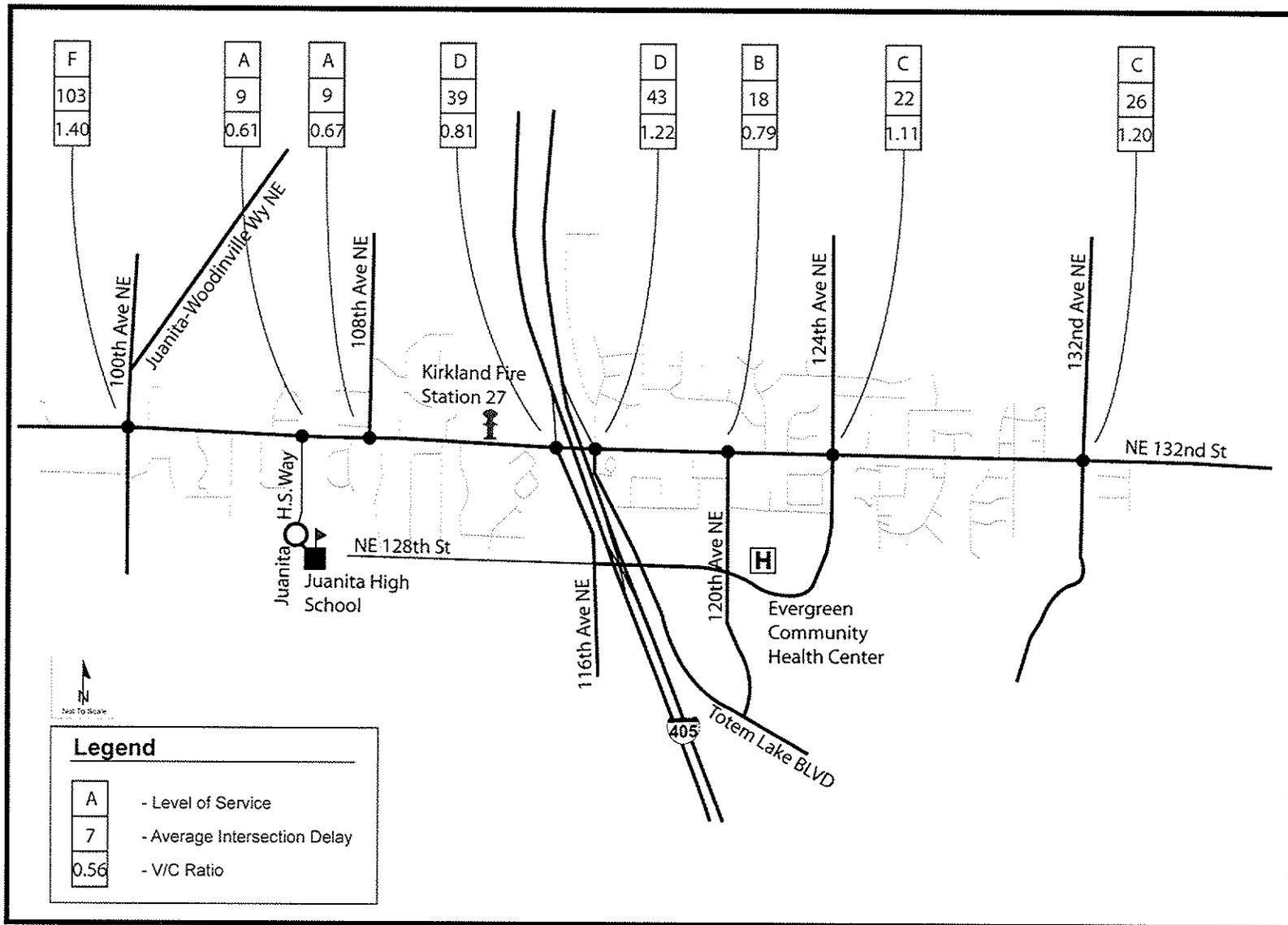


Figure 25. 2014 PM Peak Hour Operations – Enhanced Three-Lane Roadway



Five-Lane Roadway Alternative

Traffic volumes for the five-lane roadway configuration of NE 132nd Street were post-processed from the BKR model output. The volumes are higher than for the three-lane baseline and enhanced alternatives. **Figure 26** summarizes PM peak hour turning volumes with a five-lane configuration. The traffic operation results for the five-lane configuration are shown in **Figure 27**. Congestion is better managed with the five lanes, but intersection operation would still fail at 100th Avenue NE and 132nd Avenue NE, since this alternative has a higher travel demand. Additional right of way is required throughout the length of the corridor in order to construct the five-lane roadway. The net return in traffic operations to reduce congestion and queues may not justify this degree of disruption to the community along the whole corridor.

Refinements to the five-lane configuration would include some of the same modifications as for the three-lane alternative including:

- Retain the westbound, right-turn pocket with the five-lane configuration approaching 100th Avenue NE intersection, and add a receiving lane on the west leg.
- I-405 Half Interchange at NE 132nd Street: Reconfigure the northbound approach at 116th Way NE to have one left-turn lane and one shared right + left-turn lane. Reconfigure WSDOT's I-405 southbound off-ramp lane configuration to be one exclusive right-turn pocket without channelization, one exclusive through lane, one shared through + left-turn lane and one exclusive left-turn pocket.
- Separate out the northbound through and right-turn movement at Totem Lake Boulevard by adding a right-turn pocket
- 124th Avenue NE: Add a second left-turn lane for the eastbound traffic at 124th Avenue NE and add a second northbound, exiting lane on the north leg. Convert the northbound right-turn lane to be a shared through + right-turn lane at 124th Avenue NE.
- Add a westbound shared through, right-turn pocket at 132nd Avenue NE.

Figure 26. 2030 PM Peak Hour Turning Movement Volumes – Five-Lane Roadway

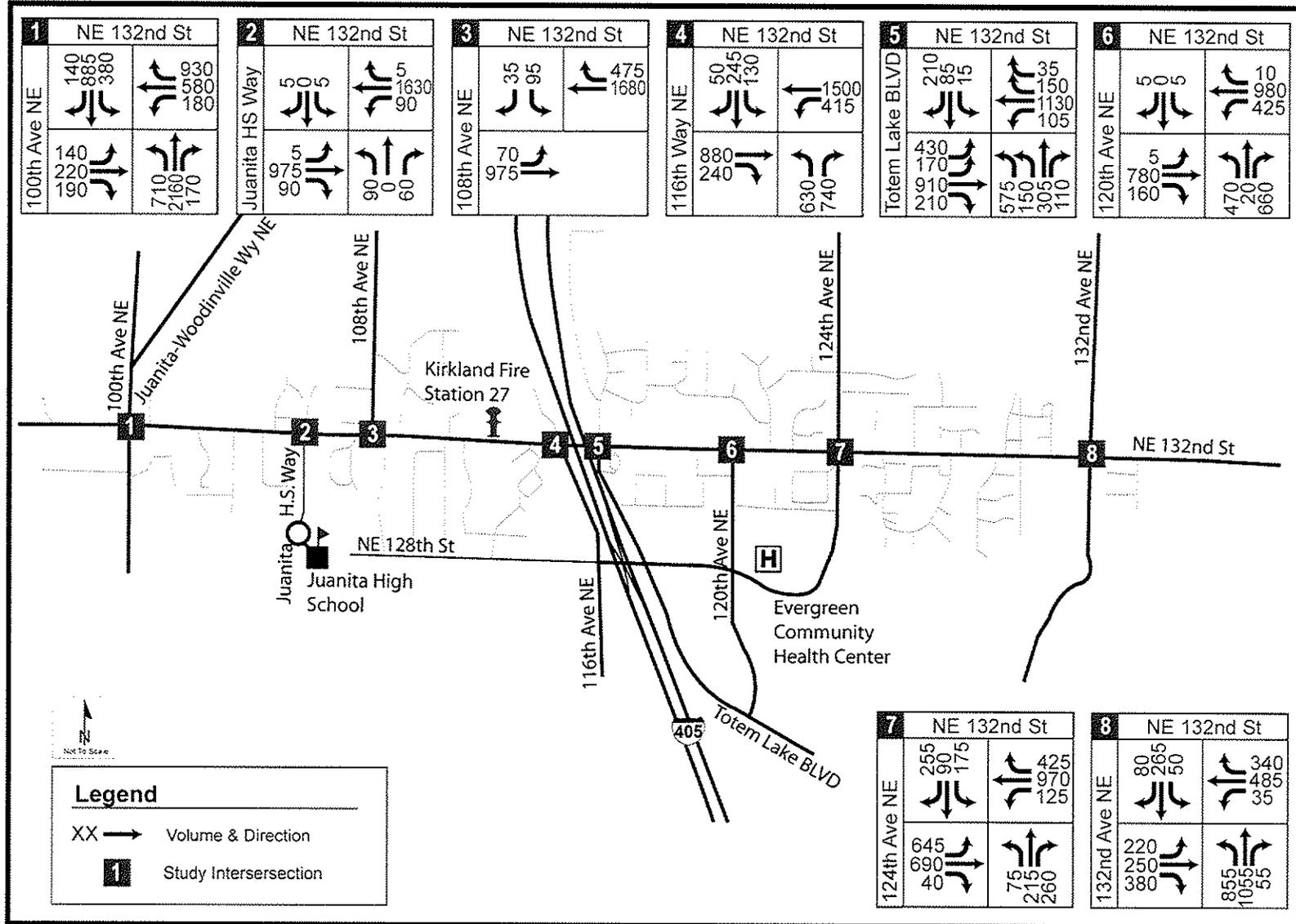
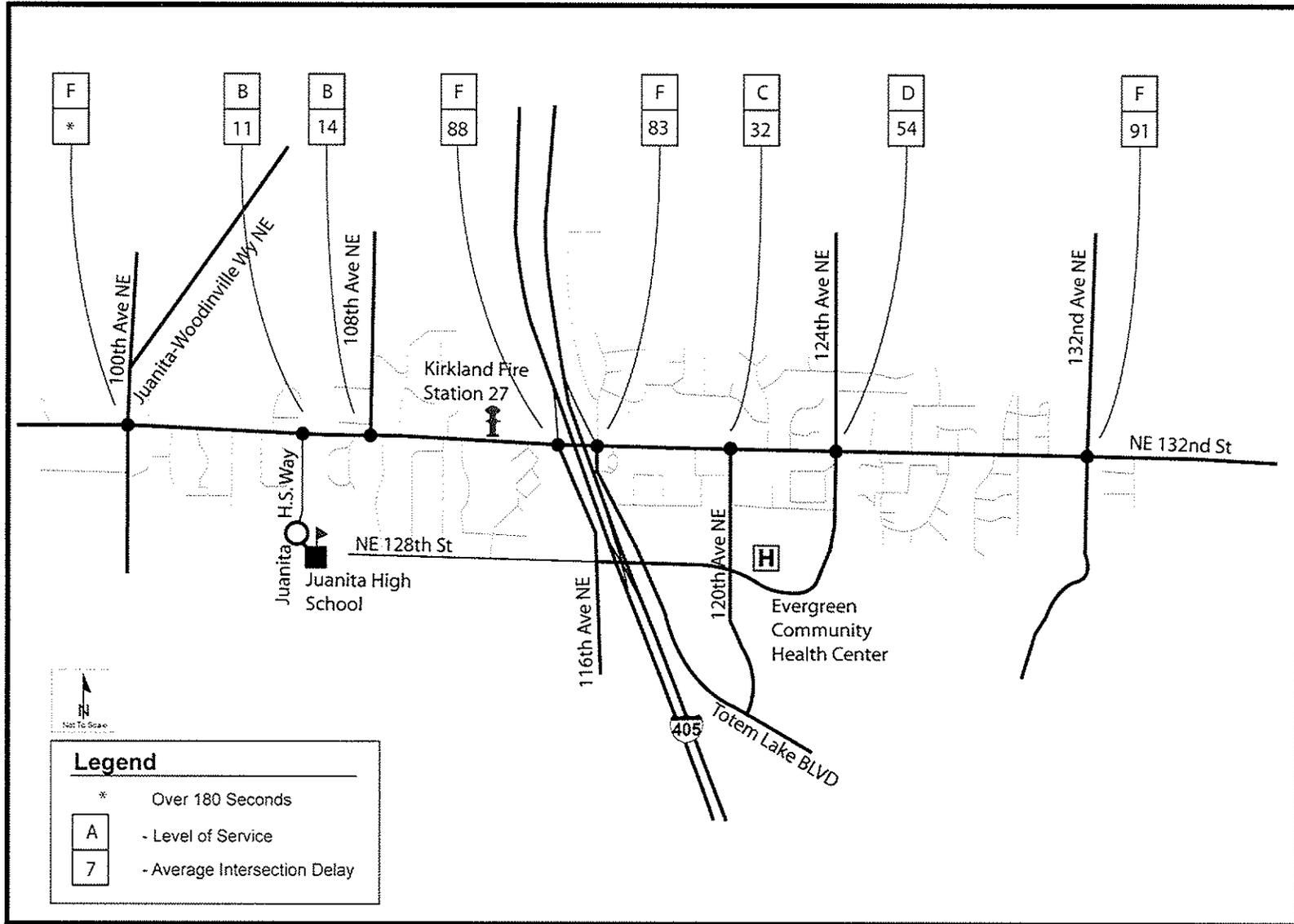


Figure 27. 2030 PM Peak Hour Operations – Five-Lane Roadway



Corridor Analysis Comparisons

Travel Time

Mirai used SimTraffic to calculate the travel time and queue length values for the NE 132nd Street corridor under the 2030 conditions. Travel times were calculated for both eastbound and westbound traffic during the PM peak hour between 100th and 132nd Avenue NE. Congestion in 2030 is expected to be substantially worse than current conditions with slower travel time through the corridor. **Figure 28** summarizes these travel times. Westbound travel time is consistently greater than eastbound travel time. Both the enhanced three-lane and five-lane alternatives show significantly improved travel time when compared to the future baseline, with greater decreases in travel time for the westbound traffic than for eastbound. The future baseline westbound travel time for this corridor is estimated at 62 minutes, based on the forecasted traffic in the peak hour.

The enhanced three-lane alternative would have a travel time of 23 minutes with comparable traffic volumes and the five-lane alternative travel time would be 12 minutes with slightly higher traffic. This would be a decrease of 39 minutes with enhanced three-lanes and 50 minutes with five-lanes on NE 132nd Street. The enhanced three-lane alternative without the right-turn pockets at 108th Avenue NE and 132nd Avenue NE would result in some travel time savings when compared with the baseline, but not as substantial an improvement as the enhanced three-lane configuration. In other words, the proposed right-turn pockets at 108th and 132nd Avenues NE could make a very significant decrease in westbound travel time.

Queue Lengths

Queue lengths along this corridor were also reviewed for each alternative. PM peak hour queue lengths are shown in **Figure 29** in bar chart format. Consistent with greater travel time for westbound traffic, queue lengths are greater for westbound traffic than for eastbound traffic during the PM peak hour. In general the queue lengths are longest for the future baseline condition. The queues for the enhanced three-lane are generally shorter than the baseline queues, and the queues for five-lane roadway are generally shorter than enhanced three-lane queues. One exception is where the westbound queues for the enhanced three-lane layout at Totem Lake Boulevard NE and at 120th Avenue NE are slightly longer than the baseline queues.

Concurrency Analysis

Kirkland's V/C ratio concurrency standard is 1.40 for an individual intersection. Using concurrency as a criterion for comparison, the existing 2007 PM peak hour conditions show that all eight signalized intersections meet or exceed the standard. Under year 2014 baseline conditions, the intersection at 100th Avenue NE would not meet concurrency. However, under the 2014 enhanced three-lane alternative, all intersections would meet concurrency.

Figure 28. PM Peak Hour Travel Time Comparison for NE 132nd Street (100th Ave – 132nd Ave NE)

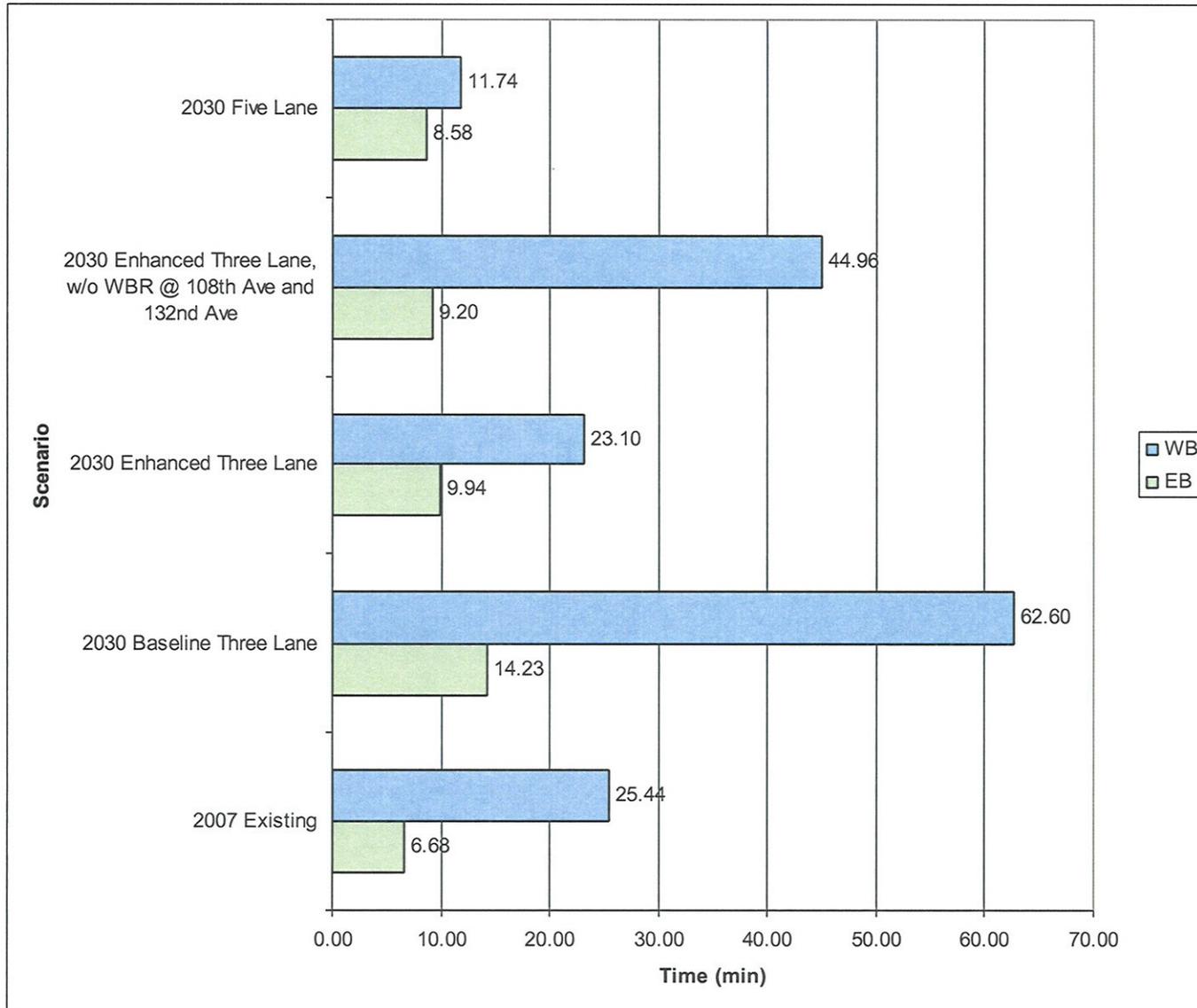
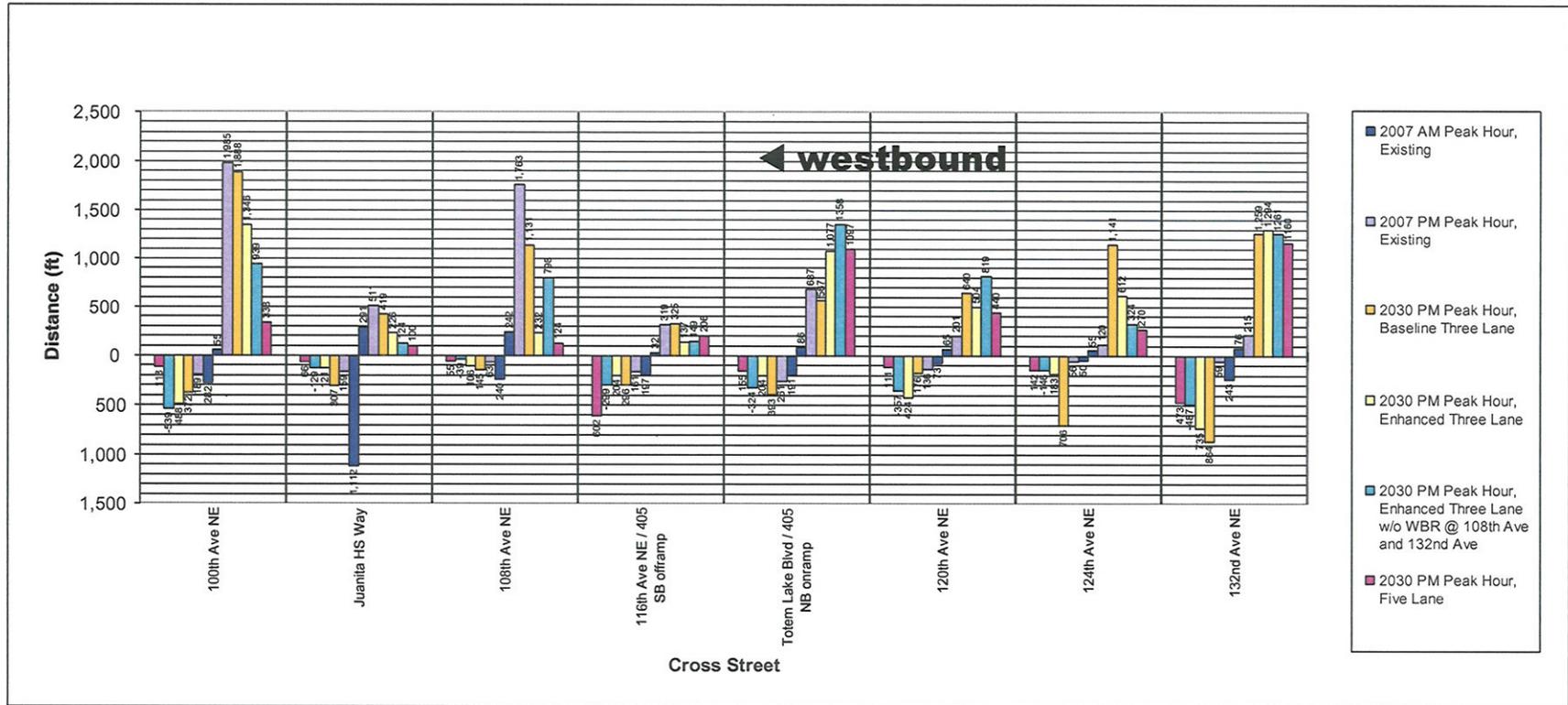


Figure 29. NE 132nd Street Intersection Peak Hour Queue Length Comparison



Congestion

The LOS and intersection delay were calculated for each of the signalized intersections along the NE 132nd Street Corridor. Under the 2007 existing conditions, the intersection at 100th Avenue NE is the only one in the PM peak hour with LOS F. All other intersections operate at LOS C or higher for the intersection as a whole (all movements) and for the peak hour as a whole. Note that the morning peak at the high school is short in duration and quite intense. Peak hour queuing does extend between intersections in the corridor with rolling queues. By 2014 under baseline conditions, 100th Avenue NE would remain at LOS F, and 132nd Avenue NE would drop to LOS D. The average intersection delay at 100th Avenue NE would increase from 123 seconds in 2007 to 158 seconds in 2014. However, under the 2014 enhanced three-lane configuration, the 100th Avenue NE intersection delay would decrease to 103 seconds.

By 2030, under the baseline conditions, the intersections at 100th, 124th and 132nd Avenue NE would operate at LOS F. The 108th Avenue and Totem Lake Boulevard intersections would operate at capacity, or LOS E. The intersections at 116th Way NE and 124th Avenue would operate at LOS D. Under the enhanced three-lane alternative, 100th Avenue NE would remain at LOS F with a slight improvement in delays. However, the improvements under the enhanced three-lane alternative would improve the LOS and delays at 108th and 132nd Avenue NE. The LOS and delays at 116th Way NE and 124th Avenue NE would be similar to those of the baseline. Only one intersection would remain at LOS F and two at LOS E. Without right turn pockets at 108th and 132nd Avenues NE, the enhanced three-lane alternative, the intersection LOS and delays at 108th and 132nd Avenue NE would be the same as with the baseline.

For the five-lane alternative, the LOS and intersection delays would be worse than the enhanced three-lane alternative at several intersections due to the increased traffic in the corridor, attracted to the wider roadway.