The City of Longview Washington

Memorandum

Date January 15, 2019

To: Jeff D. Cameron, PE – Public Works Director
From: Manuel Abarca, PE – Traffic Engineer

RE: Staff Report for 7th Avenue Citizen Request to Lower Posted Speed and Install RRFBs.

Background

The City has received complaints on 7th Avenue between Tennant Way and Hudson Street. The complaints assert the speed on 7th Avenue is too high for conditions and that drivers do not yield to pedestrians attempting to cross 7th Avenue. The speed limit on 7th Avenue is currently posted at 35 mph. The street is striped for two travel lanes and on street parking is permitted on both sides of the street. 7th Avenue is fronted on the west side by single family residential and multi-family residential from Douglas to Hudson, and on the east side by an auto dealership, parks, and medical facilities. 7th Avenue is classified as a major collector. The most current traffic count showed a daily volume of 7,100 vehicles per day in November of 2018.

A citizen request was submitted to consider lowering the posted speed and install pedestrian flashers at the pedestrian crossing at Florida. As a result of the citizen request, staff looked at the potential to lower the speed limit, and the feasibility and cost of pedestrian activated flashers.

Evaluation

A review of recent crash data from 2012 to 2016 was completed. This period was used because it was the period used for the most recent grant applications and staff had previously prepared crash rates for streets in Longview based on that data. A comparison of crash rates can provide prospective on 7th Avenue compares with other streets in the city.

The data shows that during the four year period between 2012 and 2016, there were 39 crashes on 7th Avenue between Tennant Way and Hudson Street. Of the 39 crashes, 3 resulted in evident injuries, 9 resulted in possible injuries, and there were no fatalities. There was a recent fatality involving a pedestrian and an impaired driver in 2017. This crash will be evaluated in 2019 when we prepare for the next round of safety grants.

Staff collected speed data using our radar speed measuring device, Speed Sentry. The Speed Sentry was placed on 7th Avenue for two complete days in each direction. The reporting software was used to report statistical measures of the speed data. The most common statistical measures used for setting speed limits are the 85th Percentile Speed, the 50th Percentile Speed and the 10 mile pace. The 85th Percentile Speed is the speed that 85% of the drivers are driving at or below. The 85th Percentile Speed for the northbound direction was measured at 33.9 mph and the southbound direction was measured at 34.9 mph. Based on the 85th percentile speed, the posted speed of 35 mph appears to be appropriate.

The 50th Percentile Speed is the speed 50% of the drivers are driving at or below. Many jurisdictions choose to set speeds on local roads using the 50th Percentile and will only use the 85th Percentile on rural roads or roads with limited access points. The 50th Percentile Speed for the northbound direction was measured at 30.4 mph and for southbound was measured at 31.5 mph. Based on using the 50th Percentile Speed, a speed limit of 30 mph would be appropriate. However, if the posted speed was 30 mph today, it is likely that drivers would still drive at the speed they feel comfortable. Lowering the speed may result in about 50 percent of the drivers exceeding the speed limit.

The 10 mile pace is the 10 mile per hour range that contains the most data points, or the 10 mile per hour range within which most of the drivers are driving. The 10 mile pace for northbound is 25 to 35 mph and for southbound is 27 to 37 mph. The 10 mile pace suggests that southbound traffic travels slightly higher than northbound, or that drivers choose to use more caution driving north than they do driving south. The 10 mile pace suggests that 30 mph may be too low and affirms 35 mph is the appropriate speed based on statistical measures only.

Setting Speed Limits and the Impacts of Speed Limit Changes

Speed limits in Washington State are set by state statutes or by ordinance based on an engineering study to recommend a speed other than the state statutes. The current state statutes are:

- 25 mph on city streets
- 50 mph on county roads
- 60 mph on state highways

There is currently no widely accepted format for an engineering study and engineers are often required to use professional judgement to determine what should be included in an engineering study. The most widely used practice is to collect speed data and use the 85th percentile speed rounded to the nearest 5 mile increment. There are other factors that may be considered such as:

- 50th Percentile Speed
- Road characteristics
- The 10 mile pace speed
- Roadside development
- Parking practice
- Presents of pedestrian activity.

There are direct impacts if the speed limit is set too high or too low. If the speed it too high, it has an adverse impact on pedestrians and bicyclists. Studies on interstates have shown there is direct relationship between higher speeds and the severity of and frequency of crashes. Following speed increases in 1987 and 1995, the frequency and severity of crashes increased. While there are few studies that look at city streets, we can reasonably assume that artificially high speed limits will contribute to an increase in crashes.

Artificially low speed limits also have consequences. Poor compliance and wide variations in speed within the traffic stream lead to riskier driving behavior. Ultimately, we can accept that a rational speed limit is one that is reasonably safe, considered appropriate by the widest cross section of drivers, is enforceable, and considers the context of the location. The question is, what are the best practices that will lead to selecting the best rational speed limit for a street segment within our city limits? We want a speed limit that is enforceable by police and defensible in court, and we want a speed that most drivers will comply with because it is not set artificially low.

FHWA Development of an Expert System

To help evaluate speed limits in the city, I recommend we use a tool developed by the Federal Highways Administration (FHWA). FHWA developed a system to recommend speed limits after studying practices from around the world and after studying and determining the best practices in the US. There are many factors that highlight the need for an expert system to recommend speed limits:

1. Consider 1/3 of all fatalities nationwide are directly related to speeding.
2. Determining the most rational speed for a street, road or highway can be time consuming and expensive and the results don't always have the credibility desired by law enforcement and the courts.
3. There is a lack of clear national guidance and procedures for engineers to rely on to consistently select the most rational speed limit.

In response, FHWA has developed the "expert" system to help decision makers and engineers determine the rational speed limit on streets in their jurisdiction. The expert system is intended to mimic the decision making skills and experience of a panel of national experts. It is like using the services of a pool of the best engineers in the country without the time and expense to advertise, select and manage their services. The expert system is called USLIMITS2. It is a web based program that compares inputs to national databases and recommends a rational speed for a street segment from a given set of factors and decision making tools. Because USLIMITS2 was developed by FHWA, the recommendations have more "clout" and the results are more likely to be accepted by the driving population, pedestrians and cyclists, supported by law enforcement, and upheld by local judges.

USLIMITS 2 Input and Results

Attached is the report from USLIMITS 2 which shows the inputs for the basic project information, roadway information, summary of crash data information, and traffic information. The recommended speed for 7th Avenue from USLIMITS 2 is 30 mph.

The results from USLIMTS 2 show that the crash rates (per 100 million vehicle miles) on 7th Ave. are 30 percent above the rates for similar roads. The recommendation from USLIMTS2 is to perform a detailed crash study and identify engineering and traffic control deficiencies and appropriate corrective actions. The speed limit should only be reduced below the current speed of 35 mph as a last measure after all other treatments have either been tried or ruled out. Following the recommendations from USLIMITS2, below is the results of a detail crash study.

As part of the 2018 grant preparation effort, staff calculated the crash rates for other streets in the city. The table below shows there are two street segments with higher crash rates:

- Ocean Beach Highway between Cowlitz Way and 15th Avenue
- Washington Way within the Civic Circle

Crash Rates from 2012 to 2016 Crash Data

Street	From	To	Rate	Rank
7th Avenue	Tennant Way	Hudson Street	502	3
Ocean Beach Highway	**Cowlitz Way**	**15th Avenue**	**627**	**2**
	15th Avenue	Olympia/Kessler	262	10
	Olympia/Kessler	Lowes	381	4
	Lowes	Nebraska	313	7
	Nebraska	38th Avenue	150	21
	38th Avenue	42nd Avenue	194	17
Washington Way	Cowlitz Way	15th Avenue	228	14
	Civic Circle		**637**	**1**
	Civic Circle	Kessler	256	11
	Kessler	33rd Avenue	183	18
Oregon Way	SR 432	Beech	224	16
	Beech	Tennant Way	238	13
15th Avenue	Tennant	Washington Way	262	9
	Washington Way	SR 4	226	15
30th Avenue	Pacific Way	SR 4	334	5
	SR 4	Washington Way	310	8
Beech	Washington Way	Oregon Way	327	6
Tennant Way	7th Avenue	15th Avenue	156	20
Nichols	Louisiana	Washington Way	163	19
	Washington Way	15th Avenue	239	12

Based on crash rates, 7th Avenue is one of our highest crash locations. The vehicle crash history was tabulated by Year, Block Number, Hour of the Day, Day of the Week, Sobriety, Injuries, Crash Type, Weather, Travel Direction and Vehicle Type to look for possible tends and to identify possible countermeasures. The most significant trend appears to be related to Crash Type, Direction, and Vehicle Type. The highest number of crash types were rear-end crashes. Rear-end crashes are generally related to driving faster than conditions permit, driver inattention, congestion, or high numbers of parking and turning maneuvers. There were 7 crashes where entering traffic was hit by traffic on 7th Avenue. This likely indicates a need to improve the sight distance for traffic existing side streets and the parking lots. There were more crashes with vehicles driving northbound on 7th Avenue than southbound. The vehicle type for the primary vehicle was almost 3 to 1 trucks to passenger cars.

Potential Countermeasures

There are possible low cost countermeasure that may help to reduce the crash history. There is a lack of channelization on 7th Avenue. The only pavement markings are a centerline stripe and crosswalks. The centerline is a single row of raised pavement markers.

Countermeasure 1

Striping a double yellow and an edge line similar to Pacific Way to make the travel lane appear narrower may work to slow down the speed of traffic.

Countermeasure 2

Striping turn lanes or a continuous two-way-left turn lane may help reduce the rear-end crashes if the pavement is wide enough to maintain travel lanes and parking.

Countermeasure 3

Removing some parking to improve sight distance for side-street and parking lot traffic may reduce angle crashes and have the added benefit of making pedestrians more visible.

Countermeasure 4

Installing pedestrian activated flashers like rapid rectangular flashing beacons (RRFB) we've installed elsewhere will help improve driver compliance yielding to pedestrians, if the RRFBs are actuated by pedestrians – not all pedestrians chose to activate them. The city has had success with RRFBs at other locations. The width of 7th Avenue is about 50-feet. Curb extensions or bulb outs could be considered to shorten the crossing distance. The most recent cost estimate to install a RRFBs and curb extensions at a crosswalk is $150,000. The citizen request asked for RRFBs at Florida Street; however, based on crash data, staff would recommend installing RRFBs at Delaware Street rather than at Florida Street. The Delaware Street crossing has been the location of two pedestrian crashes and provides a connection to the park.

As an alternative, council may consider installing the RRFBs without curb extensions and use city staff for the installation. Staff estimates it will cost about $40,000 to install RRFBs using maintenance crews.

Final Recommendation

Staff does not recommend lowing the speed limit on 7th Avenue as the first course of action until countermeasures to address the crash history have been put in place and evaluated. Lowering the speed limit will increase the number of drivers that will disregard the posted speed if countermeasures are not put into place. Staff recommends that council consider pavement marking and parking removal countermeasures, and the installation of RRFBs at Delaware Street, with staff evaluating the success of the countermeasures. The pavement markings maybe completed using existing budget and materials, and if the pavement markings help lower the speed, then council should consider funding a more permanent pavement marking using thermoplastic rather than paint. Staff would recommend hiring a contractor to install the thermoplastic with reflectorized raised pavement markers. If the countermeasures do not reduce the crash rate and improving the safety of pedestrians crossing 7th Avenue, then council should move forward to direct staff to prepare an ordinance to reduce the speed on 7th Avenue from 35 mph to 30 mph. The speed change can be justified using the results of USLIMTS2. It should be noted that any change in speed limit will require police enforcement to be effective.

USLIMITS2 Speed Zoning Report

Project Name: 7th Avenue

Analyst: Manuel Abarca

Date: 11-21-2018

Basic Project Information

Project Number: 1801

Route Name: 7th Avenue

From: Frontage Road

To: Hudson

State: Washington

County: Cowlitz County

City: Longview city

Route Type: Road Section in Developed Area

Route Status: Existing

Crash Data Information

Crash Data Years: 4.00

Crash AADT: 7100 veh/day

Total Number of Crashes: 22

Total Number of Injury Crashes: 0

Section Crash Rate: 283 per 100 MVM

Section Injury Crash Rate: 0 per 100 MVM

Crash Rate Average for Similar Roads: 205

Injury Rate Average for Similar Roads: 64

Roadway Information

Section Length: 0.75 mile(s)

Statutory Speed Limit: 35 mph

Existing Speed Limit: 35 mph

Adverse Alignment: No

One-Way Street: No

Traffic Information

85th Percentile Speed: 35 mph

50th Percentile Speed: 31 mph

AADT: 7100 veh/day

On Street Parking and Usage: High

Pedestrian / Bicyclist Activity: Not High

Divided/Undivided: Undivided

Number of Through Lanes: 2

Area Type: Residential-Collector/Arterial

Number of Driveways: 28

Number of Signals: 1

Project Description: Check existing speed limit.

Recommended Speed Limit: 30

Note: The section crash rate of 283 per 100 MVM is more than 30 percent above the average for similar roads (205) but below the critical rate (296). A comprehensive crash study should be undertaken to identify engineering and traffic control deficiencies and appropriate corrective actions. The speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out.

Equations Used in Crash Data Calculations

Exposure (M)
M = (Section AADT * 365 * Section Length * Duration of Crash Data) / (100000000)
M = (7100 * 365 * 0.75 * 4.00) / (100000000)
M = 0.0777

Crash Rate (Rc)
Rc = (Section Crash Average * 100000000) / (Section AADT * 365 * Section Length)
Rc = (5.50 * 100000000) / (7100 * 365 * 0.75)
Rc = 282.98 crashes per 100 MVM

Injury Rate (Ri)
Ri = (Section Injury Crash Average * 100000000) / (Section AADT * 365 * Section Length)
Ri = (0.00 * 100000000) / (7100 * 365 * 0.75)
Ri = 0.00 injuries per 100 MVM

Critical Crash Rate (Cc)
Cc = Crash Average of Similar Sections + 1.645 * (Crash Average of Similar Sections / Exposure) ^ (1/2) + (1 / (2 * Exposure))
Cc = 205.37 + 1.645 * (205.37 / 0.0777) ^ (1/2) + (1 / (2 * 0.0777))
Cc = 296.35 crashes per 100 MVM

Critical Injury Rate (Ic)
Ic = Injury Crash Average of Similar Sections + 1.645 * (Injury Crash Average of Similar Sections / Exposure) ^ (1/2) + (1 / (2 * Exposure))
Ic = 63.75 + 1.645 * (63.75 / 0.0777) ^ (1/2) + (1 / (2 * 0.0777))
Ic = 117.29 injuries per 100 MVM