

**TO:** Inga Note, P.E. - City of Spokane Street Department  
 Lisa Key - City of Spokane Planning and Development  
 Tirrell Black - City of Spokane Planning Department

**FROM:** Bill White  
 Kennet Bertelsen, P.E.

**DATE:** June 8, 2016

**JOB NO.:** 5594.002

**RE:** Windhaven Apartments, Draft Indian Trail Safety/Collision Analysis

**CC:** Jay Bonnet, P.E. - Bonnett Engineering  
 Del Stratton - Douglass Properties

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This memorandum summarizes the safety/collision analysis prepared for Indian Trail Road in north Spokane, WA. This has been provided the second supplement to the *Windhaven Apartments Traffic Impact Analysis* (MMI, May 2016), as prepared in response to citizen commentary/questions recorded at the Windhaven neighborhood public meeting performed on May 25, 2016 at Indian Trail Church. Source material such as project data, traffic forecasts, and comparative analyses can be reviewed with the project Traffic Impact Analysis (TIA).

## METHODOLOGY

The purposes of collision analyses is to determine whether safety issues occur as a result of operational or design issues, such as signal phase issues, sight distance limitations, channelization alignment issues, etc. A location where numerous incidents occur could indicate a high accident location (HAL). A high number of collisions occurring along a street or street section may indicate a high accident corridor (HAC).

Any collision is important to consider and is relevant in safety analyses. However, collisions are reviewed on the basis of severity rates to help determine whether some form of remediation may be needed to address persistent, reoccurring collision issues within the context of traffic densities. An intersection or corridor section may have a high number of collisions/incidents, but this is not as statistically significant if the high traffic volumes are also experienced. Collision rates are calculated to provide a statistical means for quantifying collision density.

An intersection (or driveway) collision rate (ICR) quantifies severity based on the number of average accidents occurring per year, as compared with average daily traffic (ADT) entering the intersection per the following equation:

$$\begin{array}{l} \text{Intersection Collision Rate (ICR)} \\ \text{(Collisions per million entering vehicles)} \end{array} = \frac{\text{Average Accidents per Year} * 1,000,000}{365 * \text{Total Entering Intersection ADT}}$$

Similarly, the corridor collision rate (CCR) for a street or street section is based on the number of average accidents occurring per year compared with average daily traffic AND the length of the corridor, per the following equation:

$$\begin{array}{l} \text{Corridor Collision Rate (CCR)} \\ \text{(Collisions per million miles of vehicle travel)} \end{array} = \frac{\text{Average Accidents per Year} * 1,000,000}{365 * \text{Section ADT} * \text{Section Length}}$$

Typically jurisdictions such as Spokane have no set thresholds for identifying an HAL or HAC. However, a typical industry recommendation is that further evaluation/analysis should be considered if accident rates exceed 1.0 collisions per million entering vehicles for an intersection (or driveway) or 1.0 collisions per million vehicles of travel for a street or street section.

The Washington State Department of Transportation provides collision statistics within annual summary reports. The “2014 Annual Collision Summary”, the most current report available, indicates Spokane County experiences a system/network-wide rate of 168.7 collisions per 100 million miles of travel, or 1.687 collisions per million miles of travel. Thus, by comparison, the use of a 1.0 threshold is conservative at least on the basis of corridor analyses. This at least provides some local context to safety/collision analyses.

## ANALYSIS

Collision histories were reviewed for 2.67 miles of Indian Trail Road between Navaho Avenue and Francis Avenue. Intersections, driveways, and mid-block locations were considered, as well as for the corridor section overall. Histories were reviewed for nearly a three and a half-year period extending between January 1, 2013 and May 31, 2016, the most current three-plus year timeframe available, as per standard industry practices. Collision data was provided by City of Spokane officials.

Note the histories/data reviewed reflects recorded collisions, as identified through evidentiary reports provided by City of Spokane, Spokane County, and/or State law enforcement officials. Unreported collisions do occur throughout a community on roadways such as Indian Trail Road. However, Safety studies can be performed only based on recorded data. Most typically, unreported collisions would involve minor property damage only (typically non-injury).

Total collisions, average collisions, collisions rates, and severity were determined for each intersection or driveway with summary data provided in Table 1 (next page). Also summarized in bold, final row, is the overall corridor collision data for the 2.67 mile street section. Other factors to note from this table include:

- ◆ 3.4-Year refers to total collisions collected for the 3 year and 5 months analysis timeframe.
- ◆ Average annual would then be the average year collisions, taken by dividing total collisions by 3 years and 5 months.
- ◆ ADT refers to traffic entering the intersection from Indian Trail Road. The resulting ICR rates should be considered conservative as no side-street ADT is reflected.
- ◆ The average corridor ADT (in bold) was taken from three count locations of 13,555, 16,821, and 17,299, as these were performed to support the TIA and are prevalent for the study corridor section.
- ◆ PDO is a property damage only collision without injuries. These were reviewed on the basis of each incident, as to compare with other severity incidents. Each incident may actually have two or more vehicles with property damage.
- ◆ Inj. is an injury-related incident. Property damage is likely, but the worse-severity is recorded for comparison. Note injuries were also reviewed on the basis of each incident, as to compare with other severity incidents. Each incident may actually have two or more persons with injuries.
- ◆ Fat. refers to a fatality. It is acknowledge a fatality, predating this study timeframe, may have occurred and is well-remembered by citizens of the neighborhood. However, the occurrence is not recorded as it again predates available collected from City officials between January 1, 2013 and May 31, 2016.

Table 1. Summary Intersection Collision							
Intersection	Traffic Control				Severity		
	3.4-Year Totals	Average Annual	ADT <sup>1</sup>	ICR <sup>2</sup> or CCR <sup>3</sup>	PDO <sup>4</sup>	Inj. <sup>5</sup>	Fat <sup>6</sup>
Navaho Avenue	3	0.9	4100	0.59	67%	33%	0%
Shawnee Avenue	2	0.6	13555	0.12	50%	50%	0%
Mid-Block S/of Shawnee	1	0.3	13555	0.06	0%	100%	0%
Selkirk Apts Drive	0	0.0	13555	0.00	0%	0%	0%
Chase Bank Drive	0	0.0	13555	0.00	0%	0%	0%
Barnes Road	8	2.3	13555	0.47	25%	75%	0%
Sundance Plaza North Drive	3	0.9	13555	0.18	33%	67%	0%
Sundance Plaza South Drive	0	0.0	13555	0.00	0%	0%	0%
STCU Drive	0	0.0	13555	0.00	0%	0%	0%
Lowell Avenue	2	0.6	16821	0.10	50%	50%	0%
Pacific Park Dr./Strong Rd	4	1.2	16821	0.19	25%	75%	0%
Christian School Drive	1	0.3	16821	0.05	0%	100%	0%
Kathleen Avenue	1	0.3	17299	0.05	100%	0%	0%
Excel Avenue	0	0.0	17299	0.00	0%	0%	0%
Fleming Street	1	0.3	17299	0.05	0%	100%	0%
Weile Avenue	0	0.0	17299	0.00	0%	0%	0%
Assumption Parish School	0	0.0	17299	0.00	0%	0%	0%
Woodside Avenue	6	1.8	17299	0.28	50%	50%	0%
Beacon Avenue	1	0.3	17299	0.05	100%	0%	0%
Holyoke Avenue	1	0.3	17299	0.05	100%	0%	0%
Yokes North Drive	0	0.0	17299	0.00	0%	0%	0%
Yokes Central Drive	0	0.0	17299	0.00	0%	0%	0%
Indian Trail Dental North Drive	0	0.0	17299	0.00	0%	0%	0%
Indian Trail Dental South Drive	0	0.0	17299	0.00	0%	0%	0%
Elmhurst Street	2	0.6	17299	0.09	0%	100%	0%
Francis Avenue	16	4.7	17299	0.74	50%	50%	0%
<b>Total Collisions</b>	<b>52</b>	<b>15.2</b>	<b>15892</b>	<b>0.98</b>	<b>42%</b>	<b>58%</b>	<b>0%</b>
1. ADT = Entering from Indian Trail for intersections, or as a count average for the corridor. 2. ICR = Intersection Collision Rate 3. CCR = Collision Corridor Rate 4. PDO = Property Damage Only 5. Inj. = Injury Incident 6. Fat. = Fatality							

As shown, 52 recorded collisions occurred along Indian Trail Road between Indian Trail Road between January 1, 2013 and May 31, 2016. Overall, 42 percent of collisions involved vehicle property damage only with 58 percent involving injuries. There were no fatalities within the study timeframe. An average of 15.2 collisions occur along Indian Trail Road each year that, when compared with an average of 15,892 ADT, results in a CCR of 0.98 collisions per million miles of vehicle travel.

Three prevailing collision types along the corridor include:

1. **35% Rear-End Collisions** - A following vehicle collides with a preceding stopped or slowing vehicle);
2. **25% Left Angle** - A left turn “tee” collisions where a permissive left-turning vehicle crosses in front of a through vehicle at an intersection or driveway.
3. **19% Right Angle** - A right-turning vehicle at an intersection or driveway enters the roadway in front of a through vehicle.

The remaining 21 percent of collision types varied between same direction side-swipe, opposite direction side-swipe, opposite direction head-on, a collision with a fixed object (tree, pole, sign, or parked car), and a collision with a pedestrian or bicyclist.

A summary of intersection collision data for the highest three intersection locations, as determined on the basis of ICR comparisons, is summarized as follow:

1. **Francis Avenue/Indian Trail Road.** Sixteen collisions occurred over three years and five months with an average of 4.7 collisions occurring per year; calculating to an ICR of 0.74 collisions per million entering vehicles. Severities were equal between injury and property damage only collisions. The prevailing intersection types include left-angle (56-percent) and rear end (31 percent).
2. **Navaho Avenue/Indian Trail Road.** Three collisions occurred over three years and five months with an average of 0.9 collisions occurring per year; calculating to an ICR of 0.59 collisions per million entering vehicles. Two collisions involved property damage only with one injury accident. All collisions were right angle.
3. **Barnes Road/Indian Trail Road.** Eight collisions occurred over three years and five months with an average of 2.3 collisions occurring per year; calculating to an ICR of 0.47 collisions per million entering vehicles. 75 percent of collisions involved injuries with 25 percent property damage only. The prevailing intersection types include left and right-angle collisions (63 percent). A pedestrian was hit crossing at the intersection.

As shown on Table 1, respective intersection and driveway ICR do not exceed 1.0 collisions per million entering vehicles. Thus, it does not appear an HAL is prevalent on the basis of collision densities. Similarly, the CCR is just below 1.0 collisions per million entering vehicles, suggesting a HAC does not exist along Indian Trail Road. The rate is well below the average for roadways throughout Spokane County.

Other highlights and pertinent information from the safety analysis includes:

- ◆ No fatalities were noted within the three year and five month study timeframe.
- ◆ A pedestrian incident was noted at the Barnes Road intersections.
- ◆ A pedestrian incident was noted mid-block between Shawnee Avenue and Barnes Road.
- ◆ Nine collisions were attributed to “wet” roadway conditions, with four during rain, outside of snow/ice.
- ◆ Two additional collisions were attributed to snow/ice.
- ◆ Twelve collisions occurred at night (dark)

## SUMMARY

The collision analysis does not highlight a potential HAL or HAC for Indian Trail Road; thus, no improvement considerations are recommended. With that said, the CCR is nearly at 1.0. Thus, it is recommended the City, via any staff study or through request of future private development

studies, continue to review collision rates to confirm that an HAL or HAC does not evolve for Indian Trail Road.

Note additional summary data on the intersection basis is provided on the next page for more detailed review, if/as needed.

### Further Collision Summary Data

Location	Total Collisions	Average Annual	Mainline ADT	Corridor Intersection Rate	Property Damage Only	Injury Accident	Fatality	Rear End	Same Direction Sideswipe	Opposite Direction Left-Turn "Tee"	Drive/Intersect. Enter. Right Angle "Tee"	Opposite Direction Sideswipe	Opposite Direction Head On	Overturn Vehicle	Fixed Object or Parked Car	Pedestrian or Bicycle
Navaho Avenue	3	0.9	4100	0.59	2	1					3					
Shawnee Avenue	2	0.6	13555	0.12	1	1		1			1					
Mid-Block S/of Shawnee	1	0.3	13555	0.06		1										1
Selkirk Apts Drive	0	0.0	13555	0.00												
Chase Bank Drive	0	0.0	13555	0.00												
Barnes Road	8	2.3	13555	0.47	2	6				2	3		1		1	1
Sundance Plaza North Drive	3	0.9	13555	0.18	1	2		1							2	
Sundance Plaza South Drive	0	0.0	13555	0.00												
STCU Drive	0	0.0	13555	0.00												
Lowell Avenue	2	0.6	16821	0.10	1	1		1					1			
Pacific Park Dr/Strong Rd	4	1.2	16821	0.19	1	3		3	1							
Christian School Drive	1	0.3	16821	0.05		1		1								
Kathleen Avenue	1	0.3	17299	0.05	1			1								
Excel Avenue	0	0.0	17299	0.00												
Fleming Street	1	0.3	17299	0.05		1		1								
Weile Avenue	0	0.0	17299	0.00												
Assumption Parish School	0	0.0	17299	0.00												
Woodside Avenue	6	1.8	17299	0.28	3	3		3		2	1					
Beacon Avenue	1	0.3	17299	0.05	1										1	
Holyoke Avenue	1	0.3	17299	0.05	1						1					
Yokes North Drive	0	0.0	17299	0.00												
Yokes Central Drive	0	0.0	17299	0.00												
Indian Trail Dental North Drive	0	0.0	17299	0.00												
Indian Trail Dental South Drive	0	0.0	17299	0.00												
Elmhurst Street	2	0.6	17299	0.09		2		1							1	
Francis Avenue	16	4.7	17299	0.74	8	8		5	1	9	1					
<b>Total Collisions</b>	<b>52</b>	<b>15.2</b>	<b>15892</b>	<b>0.98</b>	<b>22</b>	<b>30</b>	<b>0</b>	<b>18</b>	<b>2</b>	<b>13</b>	<b>10</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>5</b>	<b>2</b>
<b>- Percent Collisions</b>					<b>42%</b>	<b>58%</b>	<b>0%</b>	<b>35%</b>	<b>4%</b>	<b>25%</b>	<b>19%</b>	<b>0%</b>	<b>4%</b>	<b>0%</b>	<b>10%</b>	<b>4%</b>
Location	Total Collisions	Average Annual	Mainline ADT	Corridor Intersection Rate	Property Damage Only	Injury Accident	Fatality	Rear End	Same Direction Sideswipe	Opposite Direction Left-Turn "Tee"	Drive/Intersect. Enter. Right Angle "Tee"	Opposite Direction Sideswipe	Opposite Direction Head On	Overturn Vehicle	Fixed Object or Parked Car	Pedestrian or Bicycle