



## Bell Road Speed Study Executive Summary

### *Bell Road from Smith Springs Road to Woodland Pointe Drive*

The rural arterial portion of Bell Rd has a higher crash rate compared to similar roadways in Tennessee. One stretch of particular interest is from Smith Spring Rd to Woodland Pointe Dr. This section is approximately 2.35 miles long and has a 35 MPH zone to the South and 40 MPH to the North. The speed limit on this section of Bell Rd is 50 mph and multimodal infrastructure includes painted bike lanes in both directions. Reducing speeds would reduce the severity of crashes and may reduce the overall crash rate. For example, a pedestrian has a 68% chance of survival in a pedestrian crash if the vehicle is traveling 35 MPH, compared to 35% if the vehicle is traveling 45 MPH. Pedestrian survivability increases to 89% if the vehicle is traveling 25 MPH. To determine if a speed limit reduction is warranted, NDOT conducted a speed study on Bell Rd from Smith Spring Rd to Woodland Pointe Dr. The following three methods were used to guide the analysis:

- NCHRP 966, Posted Speed Limit Setting Tool
- Free Flow Speed (FFS) Calculation of a Multilane Highway in Chapter 12 of the Highway Capacity Manual 6<sup>th</sup> edition (HCM)
- Nashville Next Volume V: Access Nashville 2040.

Based off a rural roadway type and a Principal Arterial classification, the following variables were considered:

- 85<sup>th</sup> percentile speed
- 50<sup>th</sup> percentile speed
- Speed limit
- Average Annual Daily Traffic
- Number of Lanes
- Median type
- Presence of an Adverse Alignment
- Access Point Density
- Lane Width
- Shoulder Width
- Crash Rate

All crash rate calculations were conducted using TDOT's crash rate calculation form, DL 2012. From the results, NDOT determined that the crash is higher compared to similar segments in Tennessee. Of particular concern is the fatal crash rate, which is two times higher than the state average.

After the suggested speed limit was calculated, the Free Flow Speed (FFS) was calculated to better understand the speeds the roadway is designed for. Based on the HCM 6<sup>th</sup> edition the FFS for a multilane highway is based on the following variables:



- Base Free Flow Speed (posted speed limit plus 5 mph)
- Lane width
- Total Lateral Clearance
- Median Type
- Access Point Density

Finally, the results of FFS and NCHRP 966 calculation were compared to *Nashville Next Volume V: Access Nashville 2040* which is a document that provides guidance on suggested speeds limits for various roadway classifications. Results from the NCHRP 966 calculation recommend a speed limit of 40 mph on Bell Rd from Smith Spring Rd to Woodland Pointe Dr. Based on the HCM, the appropriate FFS for this portion of Bell Rd is 49 mph. It is important to note that the FFS and the speed limit are expected to differ. The FFS speed is the expected speed of drivers under ideal conditions based on roadway characteristics. When setting the speed limit, engineering judgment must be applied. Which is why both results were compared to *Nashville Next Volume V: Access Nashville 2040*. According to this documents, rural arterials should have speed limits between 45 mph and 55 mph. The document also assumes typical rural arterial lengths to be 10 miles or higher. Although this segment should have a minimum speed limit of 45 MPH based on *Nashville Next Volume V: Access Nashville 2040*, NDOT is acknowledging that drivers need to reduce their speeds between 10 to 15 mph over s short distance. This is why NDOT recommends reducing the speed limit on Bell Rd from Smith Spring Rd to Woodland Pointe Dr from the existing 50 mph to 40 mph.