

# Safe Routes to School: Calculating & Mapping Walkability in Central Arkansas

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## INTRODUCTION

*Safe Routes to School (SRTS)* is a national program used to both educate the public on the value of walkable communities and fund bike/pedestrian infrastructure projects surrounding local schools.

- In Arkansas the program is operated by the Arkansas Department of Transportation
- WalkScore is comparable but focuses on proximity to community amenities and utilizes a larger radius
- Our study focuses on utilizing road inventory data and population data within a smaller radius as walkability metrics for determining potential for *SRTS* success
- Forest Park Elementary is used as a comparative model in our study due to the school's successful implementation of the *SRTS* program
- Ida Burns was hypothesized as a good candidate for *SRTS* due to observations of pre-existing infrastructure and high volume of children residing in the one-third mile radius surrounding the school



Figure 1 & 2. Signs installed around Forest Park Elementary through the *SRTS* program



- Study goals:**
  - Compare and analyze the infrastructure features installed around a school with *SRTS* to infrastructure features surrounding a school without *SRTS*
  - Provide a visual and spatial reference for local schools to utilize when applying for *SRTS* funds
  - Develop a walkability algorithm for determining ideal *SRTS* candidates based on infrastructure and population data

## METHODOLOGY

### PHASE 1:

- Esri ArcGIS Collector* iPhone application (v.10.4.0) was used to collect location data points for infrastructure features within a one-third mile radius around Forest Park and Ida Burns

- One-third of a mile is considered a safe, walkable, and bicycle-friendly distance for children

- Infrastructure features were categorized by crosswalk condition, presence of sidewalks, and street sign type

- ArcGIS Online* was used to compare the mapped infrastructure features

### PHASE 2:

- Census data and road inventory data were utilized to evaluate four additional walkability and population variables within a 0.33 mile radius around the other elementary schools in Pulaski and Faulkner County

- 85 elementary schools in Pulaski and Faulkner County (Figure 4) were evaluated in the study

- The 78 schools without *SRTS* funding were ranked based on four variables:

- Road density
- Total population
- Traffic density
- Percent of population that is school age

- Traffic density rankings were determined using a range:

- Range was 5,444-10,860 average daily number of automobiles/km<sup>2</sup>
- Calculated by adding a half standard deviation and subtracting a half standard deviation from the average traffic density of the 7 Pulaski and Faulkner County schools with *SRTS* programs

- Schools with the highest road density, total population, percent school age, and lowest traffic density were allotted scores of 1 in each category where they ranked in the top 10

- The remaining 68 schools were ranked successively depending upon their numeric values for each variable

- Walkability scores for all four variables were tallied so that the ten highest ranked schools were those which have the lowest number

## RESULTS & DISCUSSION

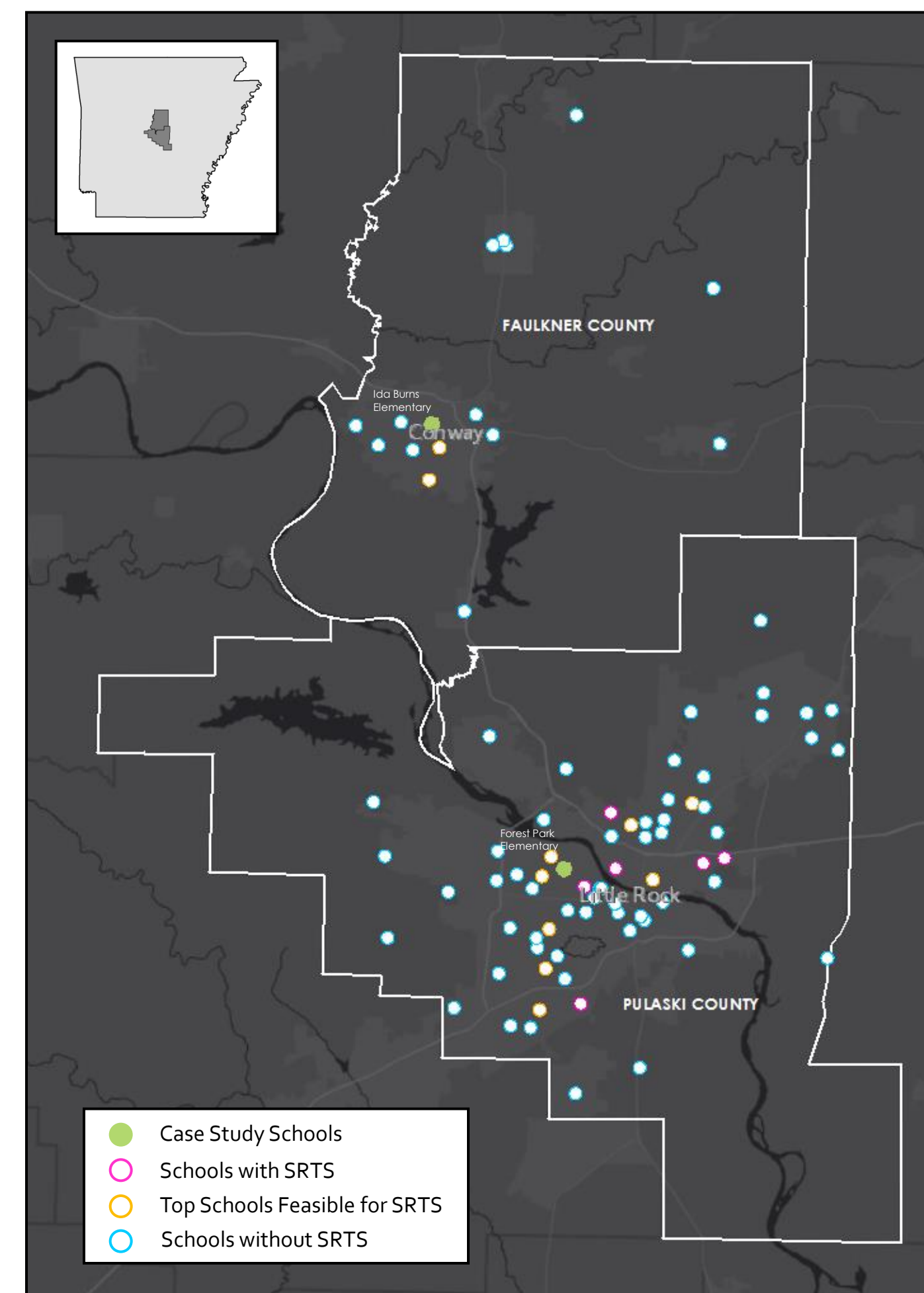


Figure 3. Study area overview

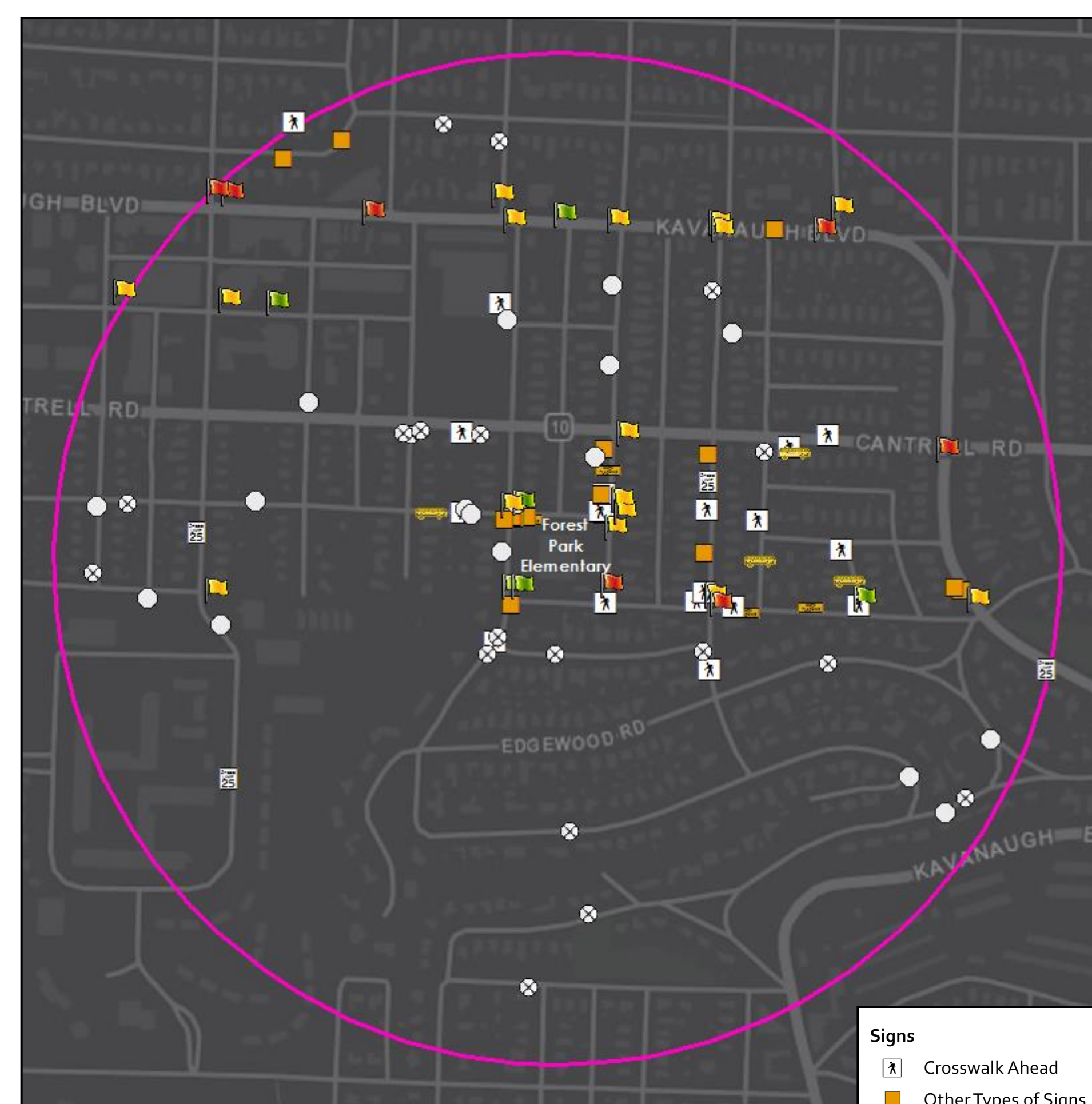


Figure 5. Safety infrastructure features surrounding Forest Park

- Limitations of the study:
  - Interstates skewed some traffic density data
  - Traffic density was the only variable that used a range
  - Because a range was used, 5 more schools qualified for receiving a rank of 1

The 10 best ranked schools match our expectation for schools we anticipated as being good matches for *SRTS* because these schools are set in similar urbanized environments. However, the 7 schools in Pulaski and Faulkner County that already have funds from the *SRTS* program do not share values consistent with the top 10 ranked schools.

### \*Important notes:

The implementation of *SRTS* in a community is dependent upon schools applying for the funds. Applying for these funds requires personnel to allot time for the application process. In some cases, the schools listed in the study reside in poverty-stricken areas where funds could be better served by improving classroom resources or renovating dilapidated school buildings. It can be argued, though, that these communities would benefit most from *SRTS* because low income families typically have less access to private transportation for commuting to school.

- Future amendments:
  - Expand the number of case study elementary schools evaluated
  - Increase the radius of the buffer to 0.5 mi to include more of the population within walking distance of the school
  - Variables could be weighted
  - Traffic density variable could be adjusted so that it remains consistent with the ranking method of the other three infrastructure and population variables

| School                            | Road Density Rank | Total Population Rank | Traffic Density Rank | Percent School Age Rank | Total Score |
|-----------------------------------|-------------------|-----------------------|----------------------|-------------------------|-------------|
| Meadowcliff Elementary School     | 23                | 12                    | 1                    | 17                      | 53          |
| Williams Magnet Elementary School | 1                 | 9                     | 1                    | 48                      | 59          |
| Jefferson Elementary School       | 21                | 5                     | 1                    | 35                      | 62          |
| Watson Elementary School          | 44                | 1                     | 17                   | 1                       | 63          |
| *Ida Burns Elementary School      | 7                 | 1                     | 26                   | 3-1                     | 65          |
| Ellen Smith Elementary School     | 8                 | 16                    | 30                   | 14                      | 68          |
| No. Heights Elementary School     | 16                | 1                     | 51                   | 1                       | 69          |
| Bale Elementary School            | 1                 | 3                     | 33                   | 33                      | 70          |
| Sherwood Elementary School        | 12                | 18                    | 1                    | 41                      | 72          |
| Seventh Street Elementary School  | 1                 | 24                    | 47                   | 1                       | 73          |

Figure 4. Rankings for the top 10 most feasible schools for *SRTS*. \*Ida Burns was one of the selected case study schools.

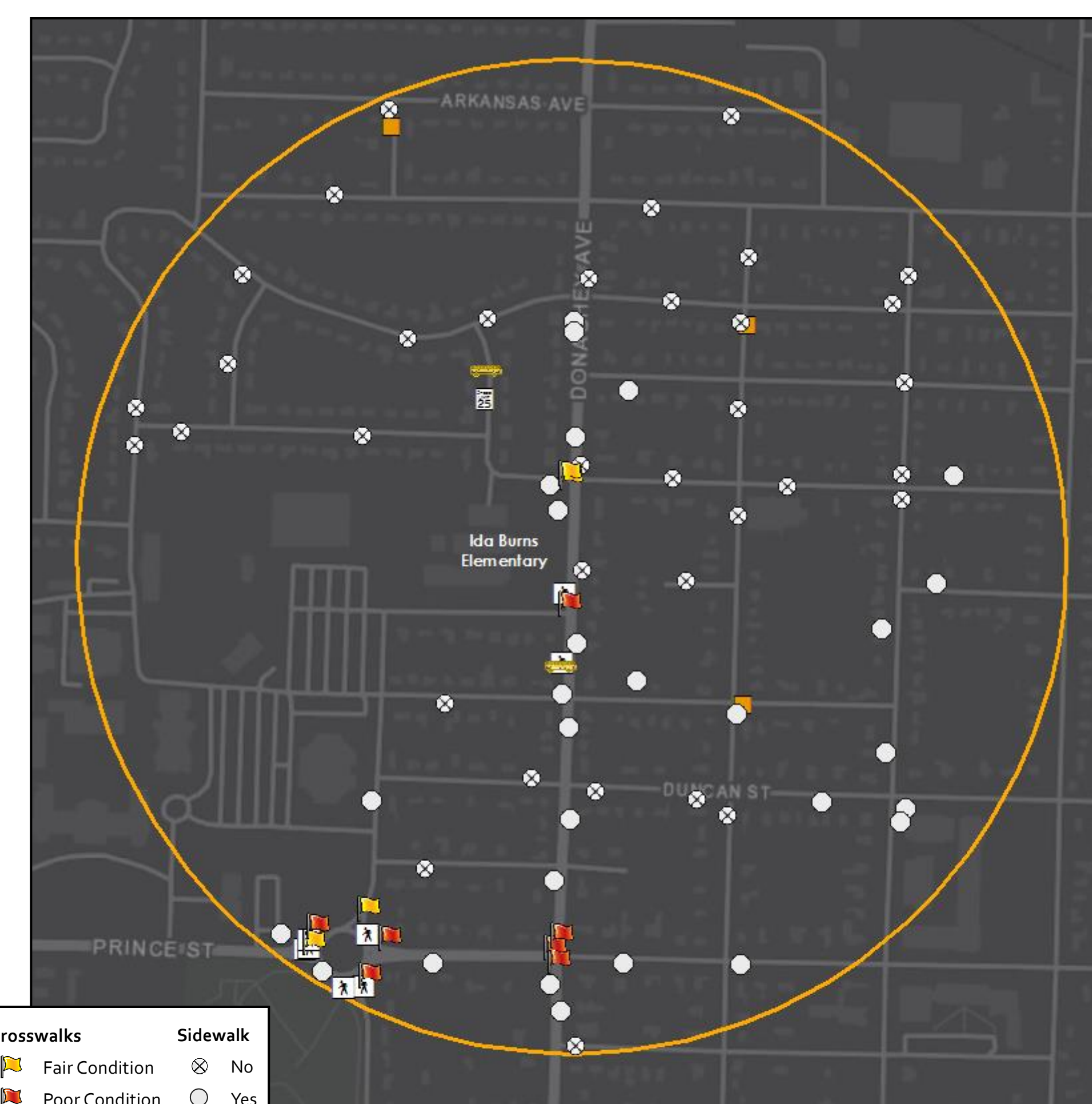


Figure 6. Safety infrastructure features surrounding Ida Burns



Figure 7. Signs installed around Forest Park Elementary

With the exception of the amount of sidewalks, Forest Park has a much higher infrastructure feature count than Ida Burns (Figures 5 and 6). The majority of Forest Park's data points mapped in Figure 5 are signs implemented upon the school receiving *SRTS* funding. Both Forest Park and Ida Burns have a major thoroughfare bisecting them, Cantrell Road within the Forest Park buffer and Donaghey Avenue within the Ida Burns buffer. We expected Ida Burns to be a good candidate for *SRTS* due to the presence of Donaghey and its number of cross streets, the apparent home density, and the number of schools in close proximity to the buffer, which we hypothesized would indicate a higher percentage of school aged children. Ida Burns ranked 6<sup>th</sup> for its infrastructure and population rating, indicating it could be a good candidate for *SRTS*.

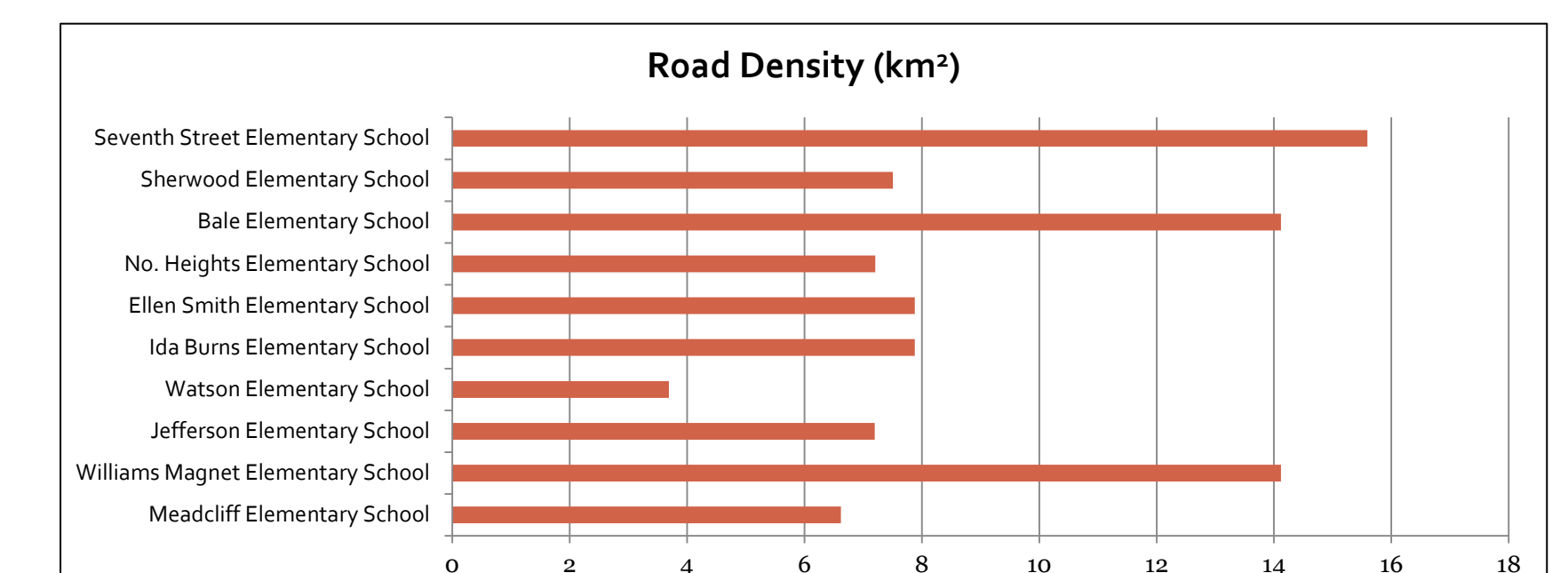


Figure 8. Road density data for the top 10 ranked schools

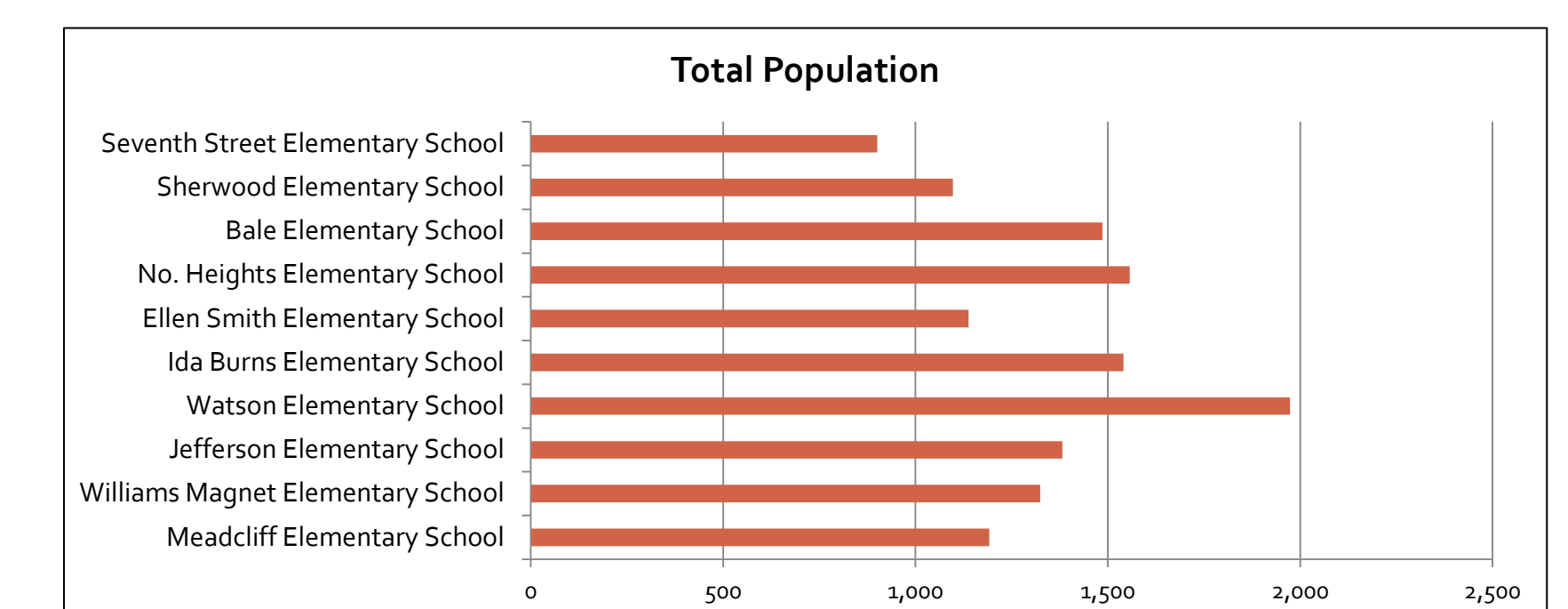


Figure 9. Total population data for the top 10 ranked schools

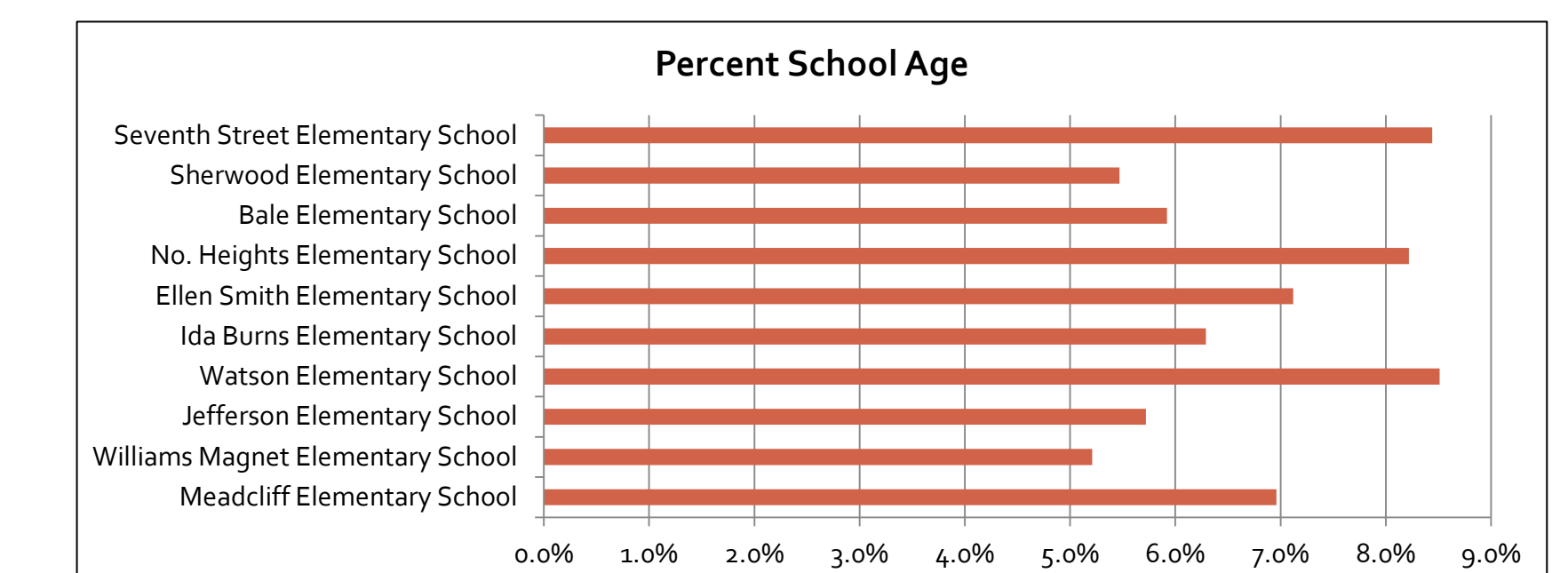


Figure 10. Percent school age data for the top 10 ranked schools

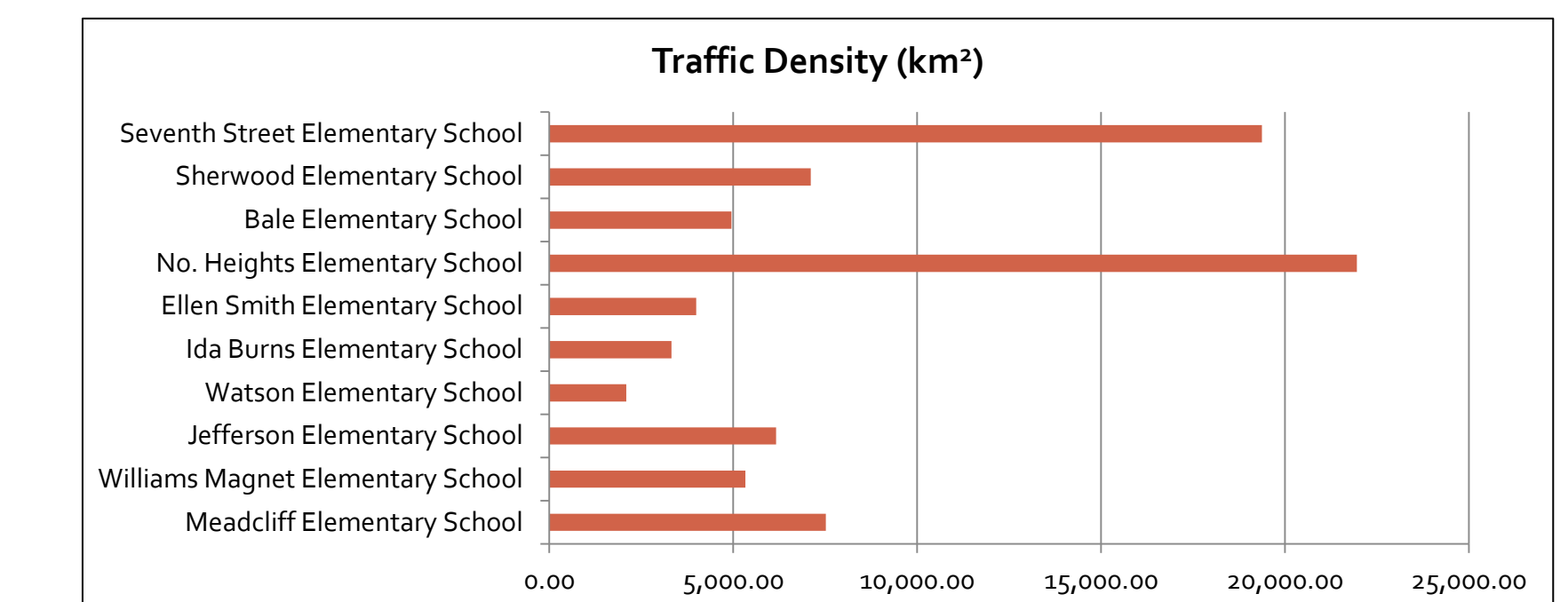


Figure 11. Traffic density data for the top 10 ranked schools



Figure 12. Sign and crosswalk installed outside Forest Park Elementary

## SOURCES & ACKNOWLEDGEMENTS

**Data sources:** Arkansas Department of Transportation and U.S. Census Bureau.

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