

NORTH FALLS LAKE AREA STUDY

Road Safety Audit

A road safety audit was conducted at Butner-Stem Elementary School. The audit focused on school-related traffic operations and safety impacts to the surrounding area.

Introduction

The Capital Area Metropolitan Planning Organization (CAMPO), in coordination with Granville County Schools and with review by the NFLAS Technical Team, selected the roadway network surrounding Butner-Stem Elementary School for assessment due to observed site conditions.

The RSA was performed by a multidisciplinary team with experience in transportation planning and engineering, school operations, and local roadway conditions. Team members included representatives from the North Carolina Department of Transportation (NCDOT), CAMPO, Granville County Schools, local planning staff, and school administration. Each participant contributed perspectives related to roadway operations, safety analysis, school pick up and drop off procedures, and site specific operational constraints.

Figure A illustrates the RSA study limits, the intersections evaluated as part of this assessment, and the pedestrian route observed by the RSA team during field review.

Figure A. Map of East D Street Corridor



Background

Pre-Audit Meeting

A pre audit meeting was held on Friday, March 27, 2026, at Butner-Stem Elementary School (501 East D Street, Butner, NC) to discuss background information, known concerns, and the scope of the on site assessment.

Participants of the pre-audit meeting included:

- Matthew M. Albee – NCDOT
- Kevin Ferrell – Granville County School District
- Kenneth Withrow – CAMPO
- Jennifer Ganser – Local Planning Representative
- Dr. Charmain L. Day Heggie – Butner-Stem Elementary School
- Andrew Babb – Local Transportation Planning and Engineering Consultant
- Julia Hart – Local Transportation Engineering Consultant

During the pre audit meeting, an overview of the NFLAS was provided, including a discussion of how Butner-Stem Elementary School was selected as the study's RSA location. Nearby crash history and safety concerns with existing transportation conditions were discussed. The audit process and expectations were reviewed, including the qualitative nature of RSA findings and the focus on identifying safety issues and opportunities rather than developing formal design recommendations.

As part of the pre audit discussion, the RSA team reviewed the general roadway context and school access configuration. East D Street, which is oriented northeast-southwest, serves as the primary roadway to Butner-Stem Elementary School. The road is two-lane, two-way, and has a sidewalk along its northwest side. Intersections within the study area are predominantly four leg, right angle intersections. School car access during afternoon dismissal is provided via the 22nd Street driveway, which functions as the main entrance, and the 21st Street driveway, which is typically used as the primary exit. The driveway at 23rd Street provides car access to the school during morning drop-off and is designated for school bus access during afternoon dismissal.

School staff described daily arrival and dismissal operations in detail. Morning arrival begins shortly before 7:00 a.m., with campus access beginning around 7:20 a.m. During afternoon dismissal, parents form two pick up lines under the direction of school staff, beginning as early as 2:15p.m. Students are dismissed around 2:55p.m., with the process generally being completed by 3:10 p.m. Approximately 150 students ride cars, only one student was reported to regularly walk to school, and no bicycle activity was reported.

Field Reviews

Immediately following the pre audit meeting, the full RSA team performed a joint on site review of the study area, starting at approximately 12:50 p.m. The on-site review involved a walking audit starting at the school, heading down the 22nd Street driveway, following the sidewalk along East D Street, then returning to the school using the 23rd Street driveway, as shown in Figure A. The team observed roadway geometry, pedestrian facilities, school access points, and the overall condition of facilities. Sunny, dry conditions and low traffic volumes at the time of the review allowed reviewers to clearly observe site characteristics and pedestrian facilities.

After the joint walking audit of the site, the local transportation consultants returned to the site later in the afternoon of Friday, March 27, to perform a field review of school dismissal operations. This second field review was performed between 2:30 p.m. and 3:15 p.m. along East D Street, with consultants stationed at 21st Street and 22nd Street to independently document conditions. At the time of the review, conditions along East D Street were sunny and dry, with a relatively high amount of traffic utilizing the corridor. This allowed for observation of vehicle queuing patterns and interactions between school-related traffic and through vehicle traffic along East D Street.

Current Site Conditions, Observations, and Discussion

Butner Stem Elementary School is located along East D Street within an established residential area of Butner and occupies the former Butner Stem Middle School site. Surrounding land use is primarily residential, with a few nearby daycare facilities, a police station approximately 0.5 miles west, and restaurants, small businesses, and churches southwest of the school. The school is located approximately 0.9 miles southwest of the Murdoch Developmental Center, a Comprehensive Mental Health Services facility that serves individuals with significant behavioral and psychiatric needs. While the facility is not immediately adjacent to the school and no direct conflicts were observed during the RSA, its presence within walking distance may influence parental perceptions of safety and comfort.

Several existing conditions observed throughout the study area may reduce safety for users, with specific safety concerns further discussed in later sections of this memorandum. First, open drainage ditches along much of the corridor reduce pedestrian comfort and recovery space for vehicles. More notably, vehicle operating speeds along East D Street were observed to be greater than the posted 25 mile per hour (mph) school-zone speed limit. This is exacerbated by the inconsistent, and in some cases, counter-intuitively placed, reduced-speed signs for the school-zone. Signs along East D Street appear to have been initially installed for the previous elementary school campus, with their current position

encouraging vehicles heading northeast to accelerate as they approach key school access points. Additionally, reduced-speed signage occurs downstream of key pedestrian crossings, and some is partially obscured by vegetation, further reducing the effectiveness of the signage.

There are some safety related features already present within the study area, which provide a baseline level of protection for pedestrians and motorists. Along the sidewalk on the northwest side of East D Street, a fence is installed at a drainage crossing, helping to separate pedestrians from a steep drop off. Intersections along East D Street use dashed edge-of-travel (EOT) lines to discourage side street vehicle encroachment on through lanes. Pedestrian crossings are painted and associated warning signs are present. While these measures contribute positively to safety, their effectiveness is influenced by surrounding geometric, operational, and maintenance conditions, which are discussed in later sections of the RSA.

East D Street at 21st Street (School Dismissal Exit)

This is a four-legged intersection, with 21st Street running northwest-southeast and East D Street running southwest-northeast, as shown in Figure B. East D Street has two lanes, no turn lanes, and a posted speed of 35 mph, with nearby 25 mph school-zone reduced-speed signage. Both 21st Street approaches are stop-controlled. The southeastern leg of 21st Street supports two-way operations but does not have any pavement markings to delineate separate lanes. The northeastern leg of 21st Street, which functions as the primary school exit, has a one-way lane heading southeast (towards East D Street). All approaches are asphalt pavement in fair or better condition with paved shoulders along both legs of East D Street and the southeastern leg of 21st Street, which approaches the intersection on an upgrade. The northwestern leg of 21st Street has curb and gutter, and approaches the intersection on a downgrade, contributing to stormwater drainage issues at the bottom of the driveway, as shown in Figure C.

A sidewalk along the northwest side of East D Street crosses 21st Street using a marked crosswalk. Curb ramps that comply with the Accessible Design standards required by the Americans with Disabilities Act (ADA curb ramps) are installed. However, the ramps are skewed relative to the painted crossing. A steep ditch separates portions of the sidewalk from the roadway.

This is a partially stop-controlled intersection, with both approaches to 21st Street being stop-controlled. There are overhead electric poles on both eastern corners of the intersection, with a streetlight attached to the pole in the southeast corner. As indicated earlier, the northwestern leg approaches the intersection on a downgrade, contributing to flooding at the bottom of the driveway. Furthermore, the downhill approach combined with vegetation along both sides of 21st Street reduces sight distance for drivers turning onto East D Street. Stop compliance on 21st Street was observed to be good during the field review, although it was noted that vehicles frequently pulled up past the painted crossing to check for oncoming traffic along East D Street, effectively blocking the crosswalk from being used. One vehicle turning left onto East D Street was observed pulling up next to a vehicle turning right onto East D Street, restricting visibility for the vehicle turning right. The southeastern leg approaches the intersection on a slight upgrade, which may hinder vehicle acceleration from a stopped position as well as reduce the sight distance for stopped vehicles.

Figure B. East D Street and 21st Street Intersection



Figure C. NW View of 21st Street at East D Street



East D Street at 22nd Street (School Dismissal Entrance)

This is a four-legged intersection, with 22nd Street running northwest-southeast and East D Street running southwest-northeast, as shown in Figure D. East D Street has two lanes, no turn lanes, and a posted speed of 35 mph, with nearby 25 mph school-zone reduced-speed signage. The southeastern leg of 21st Street is stop-controlled and supports two-way operations but does not have any pavement markings to delineate separate lanes. The northwestern leg of 21st Street is a one-way, northwest bound, lane. All approaches are asphalt pavement in fair or better condition with paved shoulders along East D Street and the southeastern leg of 22nd Street. The northwestern leg of 22nd street, which functions as the primary passenger car entrance to the school campus, has curb and gutter.

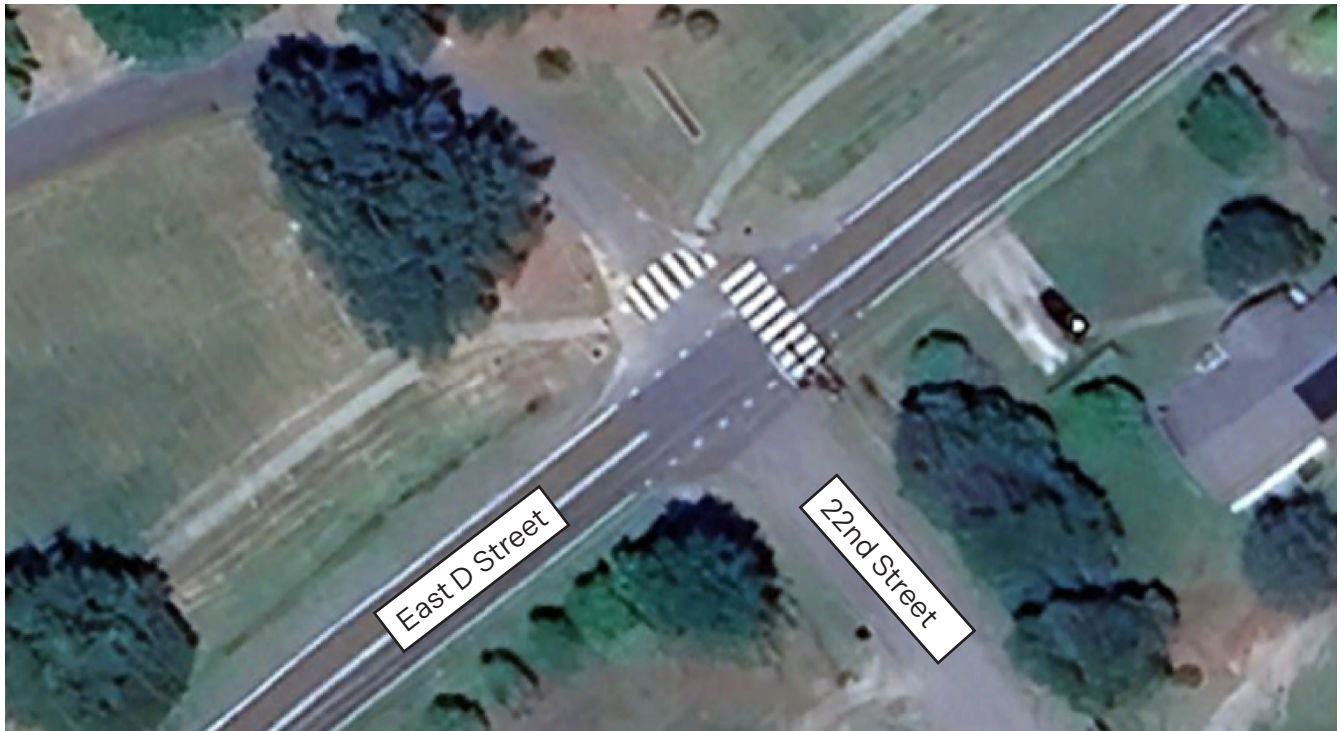
A sidewalk present along the northwest side of East D Street is separated from the roadway with a steep ditch. The sidewalk crosses 22nd Street using a painted crosswalk; however, the installed ADA curb ramps are misaligned with the marked crosswalk. Another marked crosswalk is present across the northeast leg of East D Street (see Figure E), but it does not connect to a sidewalk on the southeastern side, instead leading pedestrians toward a roadside ditch.

This is a partially stop-controlled intersection, with the northwest bound approach at 22nd Street being stop-controlled. The southeast corner of the intersection has two overhead electric poles, one of which has an attached streetlight, as well as two signposts (for the pedestrian crossing warning sign and stop sign). This cluster of signage and poles creates a blind spot for northwest bound vehicles on 22nd Street approaching the intersection. Pedestrians are directed toward this same constrained visibility zone via a marked pedestrian crossing from the northeast to the southeast corner of the intersection, further exacerbating the safety concerns associated with this reduced visibility.

The crosswalk does not connect to a sidewalk on the opposite side, instead directing pedestrians into a drainage ditch. Because this intersection is the primary school access and the northwest bound approach is the only stop-controlled movement, the blind spot created by roadside objects poses a heightened pedestrian safety concern. Drivers focused on finding gaps in East D Street traffic may not see pedestrians in the blind spot, and the missing sidewalk connection forces users to walk in the street, ditch, or along adjacent yards.

Angle crashes have occurred near this location, including a reported collision from 2025 involving a school staff member during the morning drop-off period. The blind spot created by the poles seems to be the primary factor contributing to angle crashes at this location. Because drivers must assess multiple conflicting movements under restricted visibility conditions, the likelihood of delayed reactions or misjudged gaps may increase, particularly during periods of high activity. The reduced visibility for drivers combined with the lack of sidewalk connectivity reduces safety and comfort levels for pedestrians.

Figure D. East D Street and 22nd Street Intersection



**Figure E. Painted Crosswalk
at 23rd Street and East D
Street**

East D Street at 23rd Street (Bus + School Drop-Off Entrance and Exit)

This is a four-legged intersection with 23rd Street running northwest-southeast and East D Street running southwest-northeast, as shown in Figure F. East D Street has two lanes, no turn lanes, and a posted speed of 35 mph, with nearby 25 mph school-zone reduced-speed signage. 23rd Street is stop-controlled at both approaches to the intersection and supports two-way operations, but does not have any pavement markings to delineate separate lanes. All approaches are asphalt pavement in fair or better condition with paved shoulders along East D Street and the southeastern leg of 23rd Street. The northwestern leg of 23rd street, which functions as the primary bus access to and from the school campus, has curb and gutter.

A sidewalk is present along the northwest side of East D Street, separated from the road by a steep ditch. The sidewalk crosses 23rd Street using a painted crosswalk with ADA curb ramps.

This is a partially stop-controlled intersection, with both approaches to 23rd Street being stop-controlled. There are overhead electric poles on both eastern corners of the intersection, with a streetlight attached to the pole in the southeast corner. This intersection serves as the primary access point for school buses to and from the school campus, to avoid parent vehicle traffic.

Figure F. East D Street and 23rd Street Intersection



Findings and Suggestions

Primary Safety Concerns

Excessive School Related Queuing

During the afternoon dismissal field visit on March 27th, 2026, vehicle queues generated by school pick up operations were observed along East D Street on both approaches to 22nd Street. Queues began forming at approximately 2:20 p.m., extending to the adjacent 21st Street intersection by 2:55 p.m. (see Figure G), and dissipating by 3:05 p.m. Because East D Street only has one lane in each direction, the queued vehicles restrict through traffic movement for approximately 45 minutes in the afternoon. A queued vehicle was observed partially blocking the 21st Street intersection for a portion of the field visit, indicating that school related queues may also reduce access for cross-street traffic during arrival and dismissal periods.

Drivers seeking to continue through the East D Street corridor were observed crossing the double yellow centerline to pass stopped vehicles. This behavior increases the potential for sideswipe collisions, as drivers bypassing queues must cross the double yellow line three separate times, with a particularly small available area at the second centerline crossing between opposing queues at 22nd Street. Furthermore, such maneuvers increase the risk of head on conflicts, especially given the absence of control measures that discourage simultaneous attempts by opposing vehicles.

In the absence of stop control along East D Street, acceptable operation during dismissal depends on queued vehicles stopping far enough upstream of 22nd Street to maintain a pass-through gap at the intersection. The school principal noted that traffic cones are used at the start of the school year to communicate preferred stopping locations; however, this approach requires drivers to remember and continue to follow temporary instruction year-round. This also makes the dismissal process especially confusing for first-time pick-up drivers, such as relatives. If one of these unfamiliar vehicles queues into the limited gap, through traffic may be forced to stop or make passing maneuvers near the intersection, increasing the potential for conflicts.

Because the queuing pattern relies on informal stopping behavior rather than clearly defined traffic controls, drivers must interpret conditions in real time, which was observed to cause hesitation, illegal maneuvers, or last minute route changes.

Limited Pedestrian Accessibility Near School

During the initial field review of the study area with the entire RSA team, several pedestrian accessibility challenges were identified throughout the study area, with safety concerns noted at specific intersections and along East D Street. The existing lack of use of pedestrian facilities implies that facilities are not adequately meeting the needs of pedestrians and thus may be discouraging pedestrian travel.

Firstly, there is an overall lack of connectivity for pedestrian facilities throughout the study area, with a continuous pedestrian route only available to students living in a few select places. There is a sidewalk available for students to use along the north side of East D Street, but the nearest cross streets with sidewalks are 24th Street and Central Avenue, which are located around 0.3 and 0.5 miles away from the school, respectively. There does not appear to be a continuous, efficient pedestrian route available for students who live southeast of the school or northeast of 24th Street.

Even for students who do have access to a continuous pedestrian route, other aspects of the site and nearby pedestrian facilities reduce the comfort level for users. To follow the sidewalk along East D Street to either of the nearby cross-street sidewalks, a pedestrian would likely need to cross either 21st or 22nd Street, which are the two primary access points to the school for vehicular traffic. During the afternoon dismissal field review, vehicles exiting the school driveway at 21st Street were observed pulling up past the crossing to check for oncoming traffic along East D Street, effectively blocking the crossing from being used. Additionally, a steep ditch combined with untrimmed vegetation lowers pedestrian comfort by reducing the usable sidewalk width and reducing visibility. Taken together, these comfort and continuity concerns likely contribute to low pedestrian activity, helping to explain the infrequent use of sidewalk facilities, despite their presence.

The pedestrian facilities are particularly lacking in terms of accessibility for users with mobility challenges or visual impairments. The sidewalk is made of precast concrete squares laid out unevenly, introducing tripping hazards. The deferred maintenance allowing vegetation to overgrow along the sidewalk and the steep side slopes adjacent to the sidewalk further reduce safety by introducing unexpected vertical barriers and providing little opportunity for pedestrians to recover from slips or missteps. The most significant barrier to sidewalk use occurs at intersections, where curb ramps are severely skewed and approach the crossings on steep downgrades. The steep approach increases the risk of uncontrolled wheelchair speeds, particularly in wet conditions, while misaligned curb ramps reduce predictability and wayfinding for users with visual impairment. Collectively, these conditions significantly limit maneuverability, reduce pedestrian confidence, and discourage sidewalk use by individuals who rely on accessible pedestrian infrastructure.

Figure G. Queues observed along East D Street (looking from the sidewalk towards the intersection with 21st Street) at 2:55 p.m. on March 27th, 2026



Suggested Improvements

The improvements listed below are intended to address maintenance, functional, and safety concerns based on the current intersection conditions observed during the field review. An effort has been made to include a range of potential improvements that vary in relative cost, complexity, and implementation timeframe. In some cases, suggested improvements could conflict with one another, in which case only one alternative should be pursued. These suggestions are not comprehensive redesigns but rather practical enhancements that could be considered individually or in combination to improve overall operations and user safety.

Corridor-Wide

- Reinforce appropriate vehicle speeds in the school-zone by relocating reduced speed signage so the school zone speed is maintained in both directions along East D Street.
 - » Extend reduced-speed zone between 21st and 23rd Streets at a minimum. Consider extending reduced-speed zone to the full block of East D Street (Central Ave to 24th Street).
 - » Consider lowering the overall posted speed in the school's vicinity.
- Install additional pedestrian facilities where it is feasible to better connect the school to adjacent neighborhoods.

To Address Primary Safety Concerns

Excessive School Related Queuing

- Construct turn lanes to contain queues entering the school driveway.
- Restrict school traffic queuing to 21st Street, which was observed to have significantly less through traffic. It would be important to ensure 21st Street is long enough to contain the number of vehicles queued.
- Instruct school-related traffic to queue in school driveway/parking lot provided there is enough room to operate dismissal safely.
- Install electronic warning signs upstream of 22nd Street and East D Street intersection to encourage non-school traffic to use a detour. Consider installing stop bars and signs along the East D Street approaches to 21st Street to ensure adequate space between opposing queues is maintained.

Limited Pedestrian Accessibility Near School

- Realign the curb ramps so connections to the crosswalks are not skewed.
- Repaint marked crosswalks.
- Paint vehicle stop bars behind crosswalks.
- Consider installing pedestrian hybrid beacons (PHBs) to signalize East D Street pedestrian crossing and the crossings at 21st, 22nd, and 23rd Street. Consider using time-of-day phasing to ensure pedestrian movements receive priority during peak school operation periods.
- Increased and/or more frequent vegetation trimming by Town staff.
- Reduce the elevation of the entire sidewalk alignment so that it is closer to the roadway. This would allow for a reduction in side slopes adjacent to the sidewalk as well as for smoother downgrades approaching intersections, but would be associated with significant landscape grading costs.

At Key Intersections

East D Street at 21st Street (School Dismissal Exit)

- Paint vehicle stop bars at the approaches to East D Street along 21st Street.
- Repaint the crosswalk.
- Consider installing PHB at crosswalk.
- Reduce the lane width for the school driveway at 21st Street using:
 - » Painted gore lines (hatching) to discourage cars from pulling up next to each other while preserving space for buses and emergency vehicles.
 - » (Alternatively) install concrete bump-outs to physically restrict vehicles from pulling up next to each other.
- Install "Cross Traffic Does Not Stop" (MUTCD W4-4P) warning plaques to the approaches of 21st Street.
- Realign the sidewalk approaches to the pedestrian crossing to provide a more direct crossing of 21st Street.
- Reconstruct the southeast bound approach to East D Street to improve stormwater drainage. This would improve safety and lengthen the pavement lifespan but would be costly and difficult to implement considering it would require temporary closure of the main school exit route.

East D Street at 22nd Street (School Dismissal Entrance)

- Paint vehicle stop bars at the northwest bound approach along 22nd Street.
- Repaint the crosswalk.
- Consider installing PHB at crosswalk.
- Install "Cross Traffic Does Not Stop" (MUTCD W4-4P) warning plaques to the approaches of 22nd Street.
- Realign the sidewalk approaches to the pedestrian crossing to provide a more direct crossing of 22nd Street.
- Reconstruct the southeast bound approach to East D Street to improve stormwater drainage. Again, this would improve safety and lengthen the pavement lifespan but would be costly and difficult to implement considering it would require temporary closure of the main school exit route.
- Relocate the pedestrian crossing placement.
- Relocate the poles in the SE quadrant of the intersection. This would require working with the local utility they are managed by.
- Explore operational adjustments that simplify movements at this access point.

East D Street at 23rd Street (Bus + School Drop-Off Entrance and Exit)

- Install a traffic signal at the intersection to guide vehicle movements, paired with pedestrian signals for each crossing.
- Consider installing PHB for East D Street crossing.
- Paint vehicle stop bars at both 23rd Street approaches.
- Repaint the crosswalks.
- Install "Cross Traffic Does Not Stop" (MUTCD W4-4P) warning plaques to the approaches of 23rd Street.
- Install "Buses Only" (MUTCD AR-162) sign at entrance to northwestern leg of intersection to help preserve the separation from passenger car traffic that allows this intersection to function with fewer conflicts.

Summary of Recommendations

Recommendations for the East D Street corridor focus on improving safety and operations during school arrival and dismissal while making pedestrian travel more accessible and comfortable. The suggested improvements below summarize the key actions identified during the RSA and are intended to be considered individually or in combination, depending on feasibility, cost, and implementation timeframe.

- Relocate school-zone reduced-speed signage to maintain the speed reduction along the frontage of the school.
- Modify dismissal operations to reduce queues.
- Install vehicle stop bars.
- Improve signage locations to optimize driver visibility.
- Install additional signage while maintaining vehicle visibility.
- Consider installing a signal at 23rd Street and East D Street Intersection.
- Improve roadway approach grades where feasible.
- Realign curb ramps.
- Repaint crosswalks. Consider relocating East D Street pedestrian crossing.
- Increase vegetation trimming.
- Address sidewalk grade/side-slope issues where feasible.
- Install additional pedestrian facilities where feasible.
- Consider installing PHBs at roadway crossings.

Conclusions

Funding programs administered by the North Carolina Department of Transportation may be available to support the implementation of some of the safety improvements identified above. The [Governor Highway Safety Program \(GHSP\)](#), and the [North Carolina Highway Safety Improvement Program \(HSIP\)](#) could be potential sources for funding safety improvements.

This Roadway Safety Audit for Butner-Stem Elementary School identifies safety concerns primarily associated with pedestrian accommodations and school related traffic operations during dismissal. The observations documented in this memorandum are intended to inform future evaluation and decision making by Granville County and partner agencies. The suggested improvements are not intended to be exhaustive, but rather to offer potential strategies for the County's consideration and possible further evaluation. The RSA team recognizes that multiple approaches may be available to address the identified issues and that the selection, timing, and implementation of improvements are at the discretion of the County.