

Highway-Rail Crossing Safety in the CAMPO Region

All at-grade rail crossings in North Carolina are candidates for review by the NCDOT Rail Division Crossing Hazard Elimination Program. The Crossing Hazard Elimination Program reviews active, public rail crossings for potential improvements, closures or consolidations, and grade separation where feasible. The Rail Division within the North Carolina Department of Transportation (NCDOT) follows three general steps to establish safety improvement projects at highway-rail grade crossings: identify safety needs, develop safety infrastructure, and collaborate with local agencies to implement safety solutions. This memorandum summarizes how the NCDOT Rail Division identifies, prioritizes, develops and justifies rail crossing safety projects. This memo also highlights opportunities for the Capital Area Metropolitan Planning Organization (CAMPO) to collaborate with the Rail Division to address rail crossing safety concerns within their region.

Project Identification

The Rail Division maintains the State Authoritative Rail and Highway database (SARAH) to store information on rail crossings and vehicle-train crash data that is then used to identify safety needs and projects along a transportation corridor or at a specific site. Projects can include NCDOT permanent crossing closures, grade separations, and signalization. To identify safety needs and prioritize highway-rail crossing improvement projects, the Rail Division applies SARAH data in two modeling methodologies: risk modeling and benefit-cost analysis.

Risk modeling software such as the USDOT Accident Prediction Model (APM) and the FHWA-approved Investigative Index use crash history and site characteristic data to rank public grade crossings based on their expected future crashes or safety-related incident. Results of exposure models are supplemented with field investigations and local knowledge for project identification. Factors such as train volume, average annual daily traffic (AADT), crash history and existing warning devices are considered when ranking locations in the Investigative Index.

Benefit-cost (B/C) analyses like the Federal Rail Administration's (FRA) Grade Dec and the NCDOT Transportation Strategic Investment B/C Model are standards for prioritizing highway-rail crossing safety projects. Unlike risk modeling, B/C analyses apply the greatest weight on the economic benefits and require practitioners to select proposed improvements prior to the analysis.

Project Development and Implementation

The Rail Division develops solutions aligned with the agency's goals to address the identified safety needs. To incorporate the safety improvements, the Rail Division utilizes three funding programs:

FHWA Section 130 Funding

The program commonly referred to as the [Rail Highway Crossing Program](#) requires States to conduct and maintain a survey of highways to identify highway-rail grade crossings that may need separation, relocation, or other safety countermeasures. The Rail Division is responsible for disbursing FHWA Section 130 funds at any public rail crossing for the purpose of eliminating hazards and is most often used for signalization efforts. The projects within this funding pool are prioritized statewide using a risk assessment model.

Freight Rail and Rail Crossing Funding

The [Freight Rail and Rail Crossing Safety Improvement Program](#) is used for projects brought to the attention of the Rail Division by members of the public or local agencies. These projects are selected on a case-by-case basis and is most often used for signalization projects on shorter rail lines.

Strategic Transportation Investments

The [Strategic Transportation Investments](#) (STI) law requires funds from the State Transportation Improvement Program (STIP), Federal aid, and additional State funding to be disbursed as statewide strategic mobility projects, regional impact projects, or division need projects. Projects funded with STI are more often grade separations or consolidation projects. The prioritization process uses a set of criteria, local input, and a 100-point scale to determine the projects with the greatest safety needs. The Rail Division justifies the safety improvement project solutions by relating the project outcomes to the potential economic benefit, the predicted lives saved, and the agency mission.

Highway – Rail Crossings in CAMPO

There are 173 total at-grade highway-rail crossings in the CAMPO region. Approximately, 116 highway-rail crossings are public and 57 are private. At-grade and grade-separated highway-rail crossings in the region are identified in Figure 1.

Figure 1. Map of highway rail crossings in the CAMPO region.

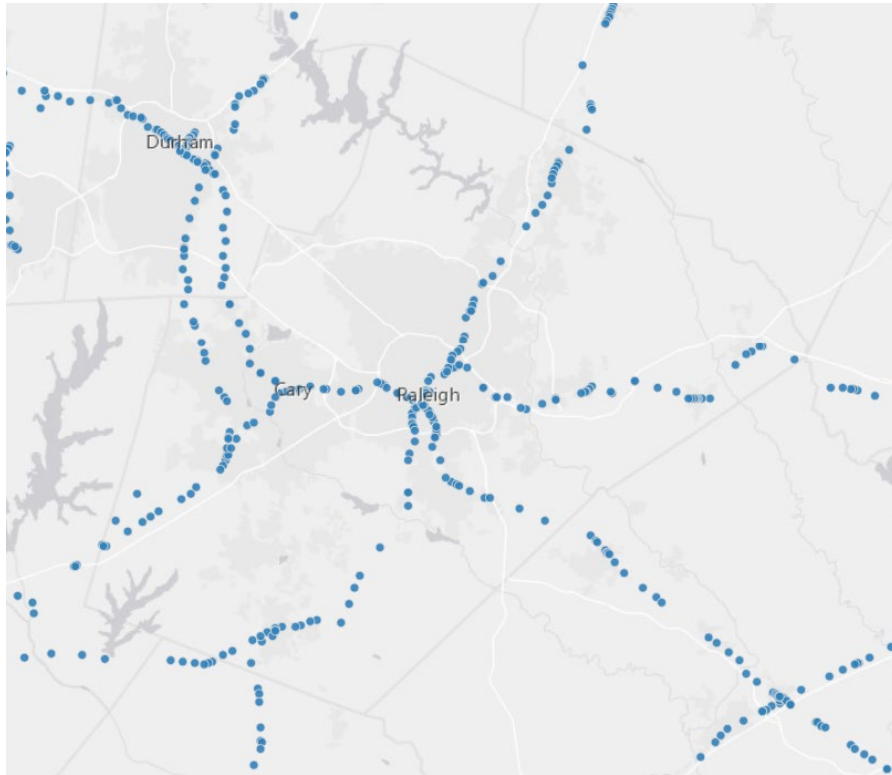
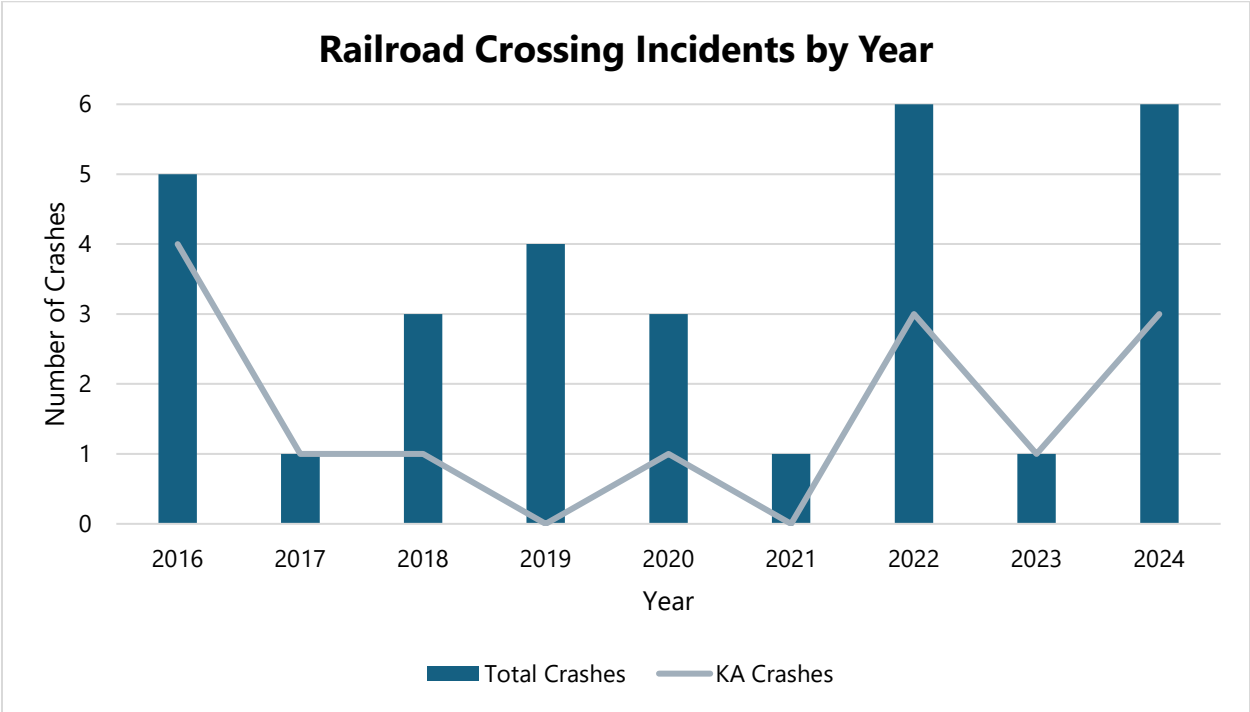


Figure 2 depicts the total rail crossing related crashes and the fatal and serious injury crashes of the total crashes in the CAMPO region over a ten-year period. Over the past three years, 50% or more of the rail crossing crashes in the CAMPO region were fatal or serious injury crashes.

Figure 2. Rail Crossing Crashes by Year.



The highway-rail crashes in the region span the five counties with public, active at-grade railway crossings in the region and include a variety of different roadway users. Table 1 summarizes the total rail crossing related crashes in the CAMPO Region by roadway user over a ten-year period.

Table 1. Rail Crossing Crashes by Roadway User.

Year	Total Crashes	Car	Truck	Semi-Truck	Other Motor Vehicle	Pedestrian	Other
2016	5	4	0	0	0	1	0
2017	1	0	0	0	0	1	0
2018	3	0	0	0	2	0	1
2019	4	2	2	0	0	0	0
2020	3	2	0	0	1	0	0
2021	1	0	1	0	0	0	0
2022	6	0	1	1	1	3	0
2023	1	0	0	0	0	1	0
2024	6	3	1	1	0	1	0
10-Year	30	11	5	2	4	7	1

Table 2 summarizes the total rail crossing related crashes in the CAMPO region by county over a 10-year period. There are no active, public at-grade rail crossing crashes in Granville County. Motor vehicle crashes (including trucks) represent the majority of roadway users involved in crashes with trains in NC, but pedestrian crashes at rail crossings is noteworthy.

Table 2. Rail Crossing Crashes by County.

Year	Total Crashes	Chatham	Franklin	Granville	Harnett	Johnston	Wake
2016	5	0	0	0	0	2	3
2017	1	0	0	0	0	0	1
2018	3	1	0	0	0	1	1
2019	4	1	0	0	0	2	1
2020	3	0	0	0	0	0	3
2021	1	0	0	0	1	0	0
2022	6	0	1	0	0	2	3
2023	1	0	0	0	1	0	0
2024	6	1	0	0	0	2	3
10-Year	30	3	1	0	2	9	15

At-grade rail crossings in the CAMPO region and throughout North Carolina are a concern for potential crashes between trains and other roadway users. Trains move through the corridors with high speeds and are unable to stop quickly. In addition to the higher speeds, at-grade crossings may have sight line impairments issues and signal malfunctions can lead to drivers not noticing an approaching train in time.

Safety Improvements and Programs

Traffic Separation Studies

The NCDOT Rail Division collaborates with Metropolitan Planning Organizations (MPOs), Rural Planning Organization (RPOs), and local agencies to identify safety needs and improvements using Traffic Separation Studies (TSS). A TSS reviews five to fifteen rail crossings on a single line with stakeholders in the rail corridor. This includes the party who owns the rail line, the rail division, the municipalities where the crossings exist, and the MPOs.

Once projects are identified, NCDOT and the affected agencies collaborate to identify funding, scopes of service, and executive agreements. The coordinated effort to conduct a TSS can be funded jointly by CAMPO and the Rail Division. The greatest successes of the past have the projects that utilized this pool of funding. When local agencies are interested in the outcomes of the traffic separation studies, and the municipalities are engaged with the safety benefits, the projects are more widely accepted.

Rail Safety Education Programs

The NCDOT Rail Division also oversees the statewide safety initiative for educating drivers and pedestrians about the hazards at rail crossings. The [NC Be Rail Safe program](#) provides education materials and first-responder training for emergencies occurring along rail lines and at rail crossings. Other national programs, such as [Operation Lifesaver](#), provide resources on rail safety to new drivers, teachers and youth. These programs may be resources for developing rail safety education and outreach programs within the CAMPO region.