Memorandum

Regional Transit Safety

This memorandum highlights the importance of incorporating and updating the region's transit plans to better align with the transportation safety priorities held by CAMPO and the Blueprint for Safety Regional Multimodal Safety Action Plan (RMSAP) in the following areas: the consideration of transportation safety, reliability, and accessibility for all users.

Plan and Resource Review

The project team reviewed a total of eight resources to report on considerations, guidance and noteworthy practices for enhancements to transit safety (See Appendix A for the Transit Safety Strategies Memorandum). The review included completed and ongoing plans and resources:

- Federal Transit Administration (FTA) Resources
- Harnett Area Rural Transit System (HARTS) Public Transportation Agency Safety Plan (2024)
- Wake County Transit Prioritization Tool: Transit Access Analysis
- Go Triangle Bus Stop Improvements Criteria
- KARTS (Granville, Franklin County) – no information available
- JCATS (Johnston County) – no information available
- Wake County Transit Plan (**Ongoing**)
- Go Triangle FAST 2.0 (BOSS, BRT design guidelines, RED / Transit priority lanes and features) (**Ongoing**)

From the review, the project team identified best practices for transit safety and the core elements of a transit safety plan in the federal standards from Federal Transit Administration (FTA) and Federal Highway Administration (FHWA).

- Federal Transit Administration (FTA) – Safety Management System Components
- FTA Public Transportation Agency Safety Plans – Final Rule (2024)
- FHWA Improving Safety for Pedestrians and Bicyclists Accessing Transit

Elements in a Transit Safety Plan

From the plan and resource review, the project team identified five elements that transit safety plans are required or strongly encouraged to include, per FTA guidance:

- Safety Performance Measures,
- Safety Management Policy,
- Safety Risk Management,
- Safety Assurance, and
- Safety Promotion.

The safety performance measures provide transit agencies with quantitative metrics to evaluate the overall safety performance of the transit network and the effects of completed transit design decisions on an annual basis. The measures include fatalities (Total, Per Vehicle Revenue Miles), injuries (Total, Per Vehicle Revenue Miles), safety events (observed incident, property damage), and system reliability (mechanical failure). Outside of the system performance measures the four additional elements focus on policies for transit operator responsibilities with sets of standards and procedures to address safety behavior of both the operators and the transit users. For example, the safety risk management elements will define policies for reporting personnel incidents or asset/vehicle deficiencies instead of addressing roadway risks or reporting crash events. Table 1 outlines the required or typical elements of a Transit Safety Plan per each of the elements:

Table 1: Transit Safety Plan Elements

Safety Performance Measures	**Safety Management Policy**	**Safety Risk Management**	**System Assurance**	**Safety Promotion**
Fatalities Injuries Safety Events System Reliability	Compliance-focused	Procedures for reporting personnel incidents or asset/vehicle deficiencies Discussion about crash event reporting and assistance procedures	General guidance for recommending route modifications May include feedback system for reporting road risks or user challenges accessing or at bus stops	Describes training opportunities and requirements for bus operators Outlines communication strategies with employees

Transit Safety Plan Goals: Recommendations

The Blueprint for Safety project team determined that the frameworks for developing a transit safety plan are lacking some elements that better address roadway safety for transit users. The team recommends that all transit safety plans (or transit system plans) include the following three goals for improving roadway safety:

1. Create a strong safety culture among transit agency employees and transit users.
2. Provide a safe and accessible transit system by designing infrastructure using feedback from transit users and safety data.
3. Establish and cultivate partnerships with local, regional, state, and private organizations to communicate the safety benefits of public transit.

Transit Safety Plan Strategies: Recommendations

Transit agencies, Metropolitan Planning Organizations (MPO), and local or State Department of Transportation (DOT) representatives are responsible for adopting and implementing strategies to incorporate the comprehensive understanding of regional transportation safety in transit safety planning. The following are example strategies that agencies can consider for transit system or transit safety plans:

1. Local and State DOTs to conduct routine safety assessments using safety data analysis and user feedback.
2. MPOs or local governments to establish and share regional guidelines with transit agencies to improve safety in the design of bus stops, routes, stops and transit hubs.
3. Transit agencies to develop driver training about interacting with other roadway users, public feedback mechanisms for transit system safety, and coordinate with transit-pedestrian advisory groups.
4. Transit agencies to create an inventory of assets, such as bus stop features and stop characteristics about the transit system; and to create a Quality Management Plan to describe safety data collection protocols and additional performance measures.

Transit Safety in the CAMPO Region

The project team reviewed the Wake Transit Access Analysis (2017-2022) to prioritize bus stop safety and access projects reviews throughout Wake County. The Wake County transit prioritization tool is based on four key measures: Connectivity, Safety, Equity and Demand. The following is a summary of enhancements to the tool that Wake County should consider for these four metrics, plus an additional fifth metric (Ridership):

Connectivity	Given the dramatic growth of the region, regular review and updates to the transit system data will improve the recommendations from the tool.
Safety	To address the safety of those accessing transit, the prioritization tool can include the latest 5 years of bicycle and pedestrian crashes within 150-ft radius of transit stops.
Equity	Given the dramatic growth of the region, regular review and updates to the equity data will improve the recommendations from the tool.
Demand	Given the dramatic growth of the region, regular review and updates to the transit user data will improve the recommendations from the tool.
Ridership (Additional)	To identify stops with the highest frequency, add a ridership total to the tool and regularly update the data with the daily averages.

GoTriangle outlines a set of criteria for reviewing bus stop improvements. These criteria are sufficient for identifying bus stops to prioritize for potential improvements.

Conclusion

Enhancing and aligning transit safety language and priorities with the overarching transportation safety goals of the CAMPO region is critical for integrating safety for all types of road users on CAMPO's roadways. By leveraging the identified best practices and updating the existing tools with the latest data, CAMPO can be proactive with creating a safer and more accessible transit system for all road users to support the State objective of pursuing zero traffic-related fatalities and serious injuries.

Appendix A. Considerations, Guidance, and Noteworthy Practices for Transit Safety

Fundamentals of Pedestrian and Bicyclist Safety in Transit Access

When considering transit access, and how to improve its efficiency, reliability, safety, and quality, conversations start with pedestrian and bicyclist access to transit. When designing transit stops or discussing transit improvements, it is important to consider pedestrians and bicyclists needs because they are the predominant users. Pedestrians and bicyclists have unique considerations to consider when improving access to transit; however, they also have similar considerations, which include:

- Connected facilities between pedestrians and bicyclists and the transit facility
- Clear signage
- Direct routes to transit stops and stations
- Ease of traffic flow and travel patterns
- Fully accessible routes
- Safe crossing to transit stops and stations

Crash factors, and how they elevate the risk of a crash occurring, should also be considered when improving safety for pedestrians and bicyclists using transit. Crash factors to consider include:

- Presence of transit stops
- Number of stops
- Bus operations frequency and headways
- Number of boarding/alighting passengers

Roadway and traffic factors can also increase the risk of a pedestrian or bicyclist crash occurring at a transit stop. Factors include:

- Horizontal curves
- Number of driveways
- Presence of medians
- Traffic volume
- Number of lanes
- Vehicle speed
- Percentage of heavy vehicles
- Lighting conditions
- Lane width

<u>Fundamentals Specific to Bicyclist Access</u>

Specific to improving safety for bicyclists using transit, consider that bicyclists may need assistance, additional time, and/or extra space to load their bicycles or to access adequate storage to lock and keep their bicycle when using transit.

Fundamentals Specific to Pedestrian Access

Specific to improving safety for pedestrians using transit, consider the connected pedestrian facilities to safely access transit facilities, and accommodations to rest at facilities or store larger items.

Noteworthy Practice: Transit Station Evaluation Tool

Accessibility to transit stops and stations is critical to increasing transit ridership and safety. To evaluate transit safety and accessibility in the Greater Philadelphia Metropolitan Area, the Delaware Valley Regional Planning Commission (DVRPC) developed a web-based Transit Station Evaluation Tool for commuter stations outside of the city's core. This tool is primarily used to identify bicycle facility improvement needs and calculated a value for each station based on the available on-road facilities for bicycles, the nearby shared-use paths and trails, the population within a 1-mile radius, the intersection density, and the typical walking and bicycling distances to transit stop locations. Once the tool calculates a value, DVRPC can use this information to improve coordination between transit and bicycle facility improvements to make transit ridership connected and accessible.

Analysis Tools for Pedestrian and Bicyclist Safety in Transit Access

To enhance pedestrian and bicyclist safety in transit access and facilities, there are qualitative and quantitative methods to collect information to make informed decisions.
Qualitative approaches include collecting feedback and observing users behaviors. These can include:

- **Soliciting direct feedback from diverse transit user groups**, including the disability community, school children, older adults, and other unique user groups, can provide valuable insights for those most vulnerable to safety risks in transit access. Feedback can be collected through:
    - Surveys
    - Questionnaires
    - Listening sessions
- **Crowd-sourced data collection**, like safety issue mapping and witness accounts, allows transit agencies to understand risks beyond what emergency responder reports alone can offer.
- **Operator safety assessment reviews** can help identify areas to invest in safety training and enhance safety culture.

Quantitative approaches require comprehensive analyses and tools. These can include:

- **Transit stop assessment tools** evaluate the path of access between facilities and boarding areas, and review roadway crossing treatments and potential obstructions.
- **Road Safety Audits (RSAs)**, conducted at various stages of a roadway project can highlight safety concerns and measures within the project's timeline and budget.
- **Modeling tools** can estimate first-mile/last-mile access considerations, considering transit boardings, network connectivity, parking availability, population, and surrounding land use development.
- **Safety data analysis focused on crash data, roadway conditions, and traffic volumes** helps identify high-risk locations and systemic issues, allowing for targeted interventions based on both reactive and proactive approaches. Integrating emerging data sources like collision avoidance warning systems and transit vehicle location data can provide deeper insights into crash patterns and safety improvements.

Noteworthy Practice: First/Last Mile Coordination

The Los Angeles County Metropolitan Transit Authority partnered with the Southern California Association of Governments to introduce Pathway; Pathway is a program to identify the county-wide transit access network to reduce the time and distance required to travel to/from origin points and ultimate destinations to/from transit stops and stations with active transportation improvements along transit routes. Improvements include crosswalks, bulb-outs, signal timing, bicycle lanes and share stations, wayfinding signage, and real time transit info signs. The active transportation improvements connect and improve safety for pedestrians and bicyclists accessing transit.

Enhancements for Pedestrian and Bicyclist Safety in Transit Access

Safe access to transit for pedestrians and bicyclists requires a comprehensive strategy integrating internal actions, community partnerships, and technological advancements. This involves promoting open communication and demonstrating a commitment to safety in all organizational aspects. Improving the culture of safety related to transit through internal actions and community partnerships can include:

- Institutionalizing safety culture in internal policies such as asset inventories
- Incorporating pedestrian and bicyclist features into standard plans
- Conducting safety audits
- Establishing performance metrics
- Creating and maintaining partnerships with local, regional, and state organizations, both public and private, are essential for improving safety and efficiency.
- Incorporating incentives for improvements and developing a Complete Streets policy document that will further reinforce policies.
- Outline the Transit Asset Management (TAM) plan on how people, processes, and tools are interconnected, to emphasize that the responsibility of safety is shared and beyond the transit trip itself.

Making improvements to the service or facility, or technological enhancements may increase transit safety for pedestrians and bicyclists. These could include:

- **Service improvements:** May include changing transit stop locations and better schedule coordination.
- **Facility modifications**: This could include moving bus stops for safer access, enhancing street crossing safety, improving signage, and increasing maintenance frequency.
- **Advanced vehicle safety features**: Transit vehicles can be equipped with safety features such as bus warning lighting, bus turning announcements, collision avoidance technologies, and blind-spot detection systems.

The collective actions—innovative safety technologies, strengthening internal policies, and robust community partnerships—pave the way for creating safer access to transit for pedestrians and bicyclists.

Noteworthy Practice: Bus Stop and Transit Center Access and Crossing Safety Improvements

The City of Denver launched their first citywide transit plan *Denver Moves: Transit Plan* to institute a local transit vision and framework for the quality, reliability, frequency, and convenience of the city's transit options. The plan arose from the current transportation system not meeting the City's needs and the projected needs as population growth and trends suggest the need for safe and efficient transportation options. Additionally, the city's bicycle and pedestrian access to transit stops and stations needed improvements to better connect bicyclists and pedestrians to transit. Denver is investing in a high quality and reliable transit network with improvements to pedestrian and bicycle infrastructure and amenities, supportive land use, and continued support for accessible fare programs.

NCDOT recently published the Bus Stop and Pedestrian Crossing Guidance (2024). This resource is a tool for coordinating with transit agencies and local governments when assessing the safety of existing or proposed pedestrian crossings at bus stops or along bus routes. The guidelines outline a series of improvement options for pedestrian crossings connecting to transit. The document provides illustrations to show typical safety problems and risks associated with bus stop crossings and tools for mitigating those safety problems.

Design and Operation Measures Affecting Transit Access

Design and operational measures significantly impact access to transit for pedestrians and bicyclists by confirming that routes to transit facilities are safer, more convenient, and well-integrated within the urban landscape. A Complete Street approach is essential, incorporating pedestrian and bicyclist-friendly features.

For pedestrians, this includes designing facilities with sidewalks, appropriate surfaces, buffers, lighting, and clear signage along their transit routes.

Bicyclist facilities must focus on separating travel modes, using signage and pavement markings to guide cyclists safely, and maintaining optimal pavement conditions. Roadway crossings are critical junctures that require marked crossings, curb treatments, high-visibility features, and effective signage to enhance safety.

Transit stops and their location also play a vital role. Stops should be strategically placed at the near side, far side, or mid-block for accessibility and to increase safety. The design of these stops should facilitate easy movement and interactions among users, prioritizing direct and convenient access, low-delay crossings, human-scale lighting, transparent structures, weather protection, and accessible boarding. Additionally, various stop designs treatments may be necessary to cater to diverse user needs. Bus stop amenities surveys and transit shelter guidance directly incorporate public feedback to confirm stops are well-equipped and comfortable. Furthermore, mobility hubs and micromobility options, which co-locate different modes of transportation, can enhance the overall transit experience by providing seamless connections for pedestrians and bicyclists. These measures collectively confirm that transit accessibility is optimized for safety, convenience, and efficiency.

Noteworthy Practice: Floating Bus Stops

The Montgomery County DOT (MCDOT) demonstrated inclusive engagement in transit design with the installation of floating bus stops, integrated with existing pedestrian and bicyclist infrastructure for transit stops and stations. Floating bus stops are designed with the visually disabled community and include truncated domes, header curbs, and sidewalk curbing with a 45-degree angle edge, a level crossing at the front, railings along the back, high contrast color differences, and high-visibility crosswalks. The treatments are also designed to encourage bicyclists yielding to pedestrians and lower traffic speeds with flex posts to narrow lanes, bicycle signals, vertical and horizontal deflections, and thick pavement markings that act as "rumble strips".

Barriers to Transit Access

Barriers to transit access for pedestrians and bicyclists include several challenges that need meticulous planning and execution to overcome. Each of the following barriers highlight the need for a **holistic approach** to create a safer and more efficient transit environment for pedestrians and bicyclists:

- **Changing driver behavior near transit stops**: This includes enforcing rules to encourage yielding to pedestrians and bicyclists and penalizing failure to do so. Co-locating mobility options, such as bike-share stations and micromobility hubs, can provide seamless transitions between different modes of transportation, but this requires substantial coordination and investment.
- **Advanced infrastructure and user familiarity needed**: Technological solutions like Automatic Vehicle Location (AVL) systems, Automatic Passenger Counters (APCs), and demand response transit can improve route planning and outreach.
- **Limited funding**: Addressing sidewalk maintenance through cost-sharing or grant programs is crucial but can be hindered by limited funding.
  Resource-intensive updates: Resilience planning for emergency responses confirms that transit systems remain functional during crises, but this requires consistent updating and practice, which are resource intensive.

Noteworthy Practice: Bus Stop Design Principles

The Washington Metropolitan Area Transit Authority developed the Bus Stop Amenity Reference Guide for the transit authority, transit partners, and jurisdictions to improve transit access through steps like an asset inventory, a bus stop guide, wayfinding strategies, and thresholds for when to make these improvements. The guide outlines objectives for improving the user experience at bus stops and recognizes the limitations of bus stops'-built environment by providing two principles to inform all bus stops: Flat and Clear. All grades, crosswalks, and curbs should be flat to facilitate wheelchair movement around the bus stop area. All crosswalks, sidewalks, and paths used to access the stop or station should be clear. The guidance, objectives, and drawings of the WMATA resource encourage and inform conversations around transit access.