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We Are Nolensville Pike

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OVERVIEW

Save lives. The Nashville Department of Transportation and Multimodal Infrastructure (NDOT) and its partners are committed to achieving zero traffic deaths along Nolensville Pike in South Nashville. Nolensville Pike is a priority on the city's *Vision Zero High Injury Network (HIN)* and a focus of the Tennessee Department of Transportation's (TDOT) Pedestrian Road Safety Initiative (PRSI). See Appendix A for the PRSI report. The Vision Zero HIN was identified using a data-driven process focusing on segments with the highest concentrations of traffic injuries and deaths as reported by TDOT's crash database (ETRIMS). This database is a subset of the Tennessee Integrated Traffic Analysis Network (TITAN), which feeds into the national Fatality Analysis Reporting System (FARS). The purpose of the HIN is simple – focus investments to reduce traffic deaths to zero.

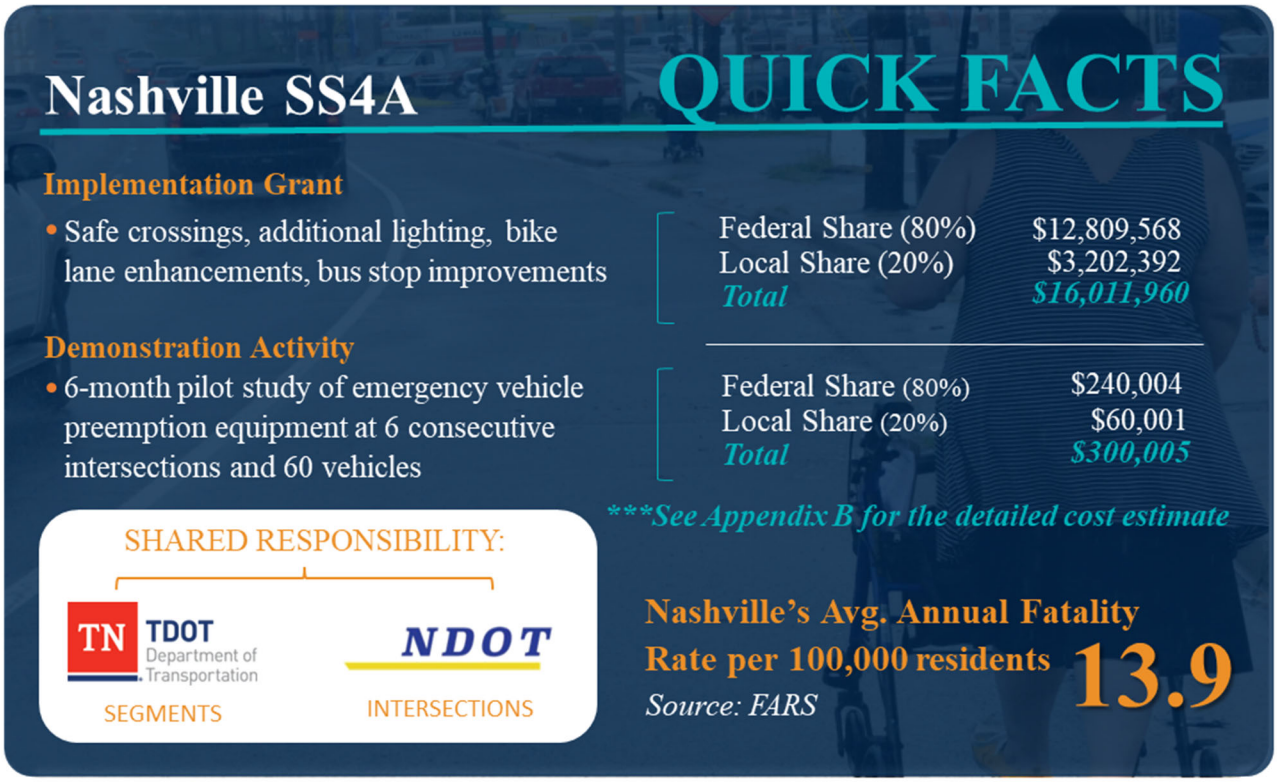
The roadway is a major north-south U.S. (US31A/US41A) and state route (SR11) connecting downtown Nashville to diverse residential neighborhoods in Davidson County. It is part of the National Highway System (NHS) and the regional truck route network. Additionally, WeGo Transit currently operates a high-frequency bus service (Route 52) along this corridor.

We are Nolensville Pike. Nolensville Pike is known as Nashville's "international corridor" given the nexus of many vibrant immigrant and refugee communities with a high concentration of family-owned international businesses lining the corridor. These minority-owned businesses are critical social spaces, economic drivers, and employment centers for the community. Individuals and families living along the corridor are more likely to be renters, people of color, Hispanic, and live below 200% of the federal poverty line.

The design of Nolensville Pike does not match the welcoming nature of the businesses and neighborhoods it connects. The corridor is auto-oriented with wide lanes, high speed limits (posted at 40 mph), and signalized intersections spaced far apart. Gaps in overhead street lighting are present with few areas lit by pedestrian-scaled lighting. Gaps in the sidewalk network also exist. These elements result in a dangerous and uncomfortable experience for the most vulnerable road users.

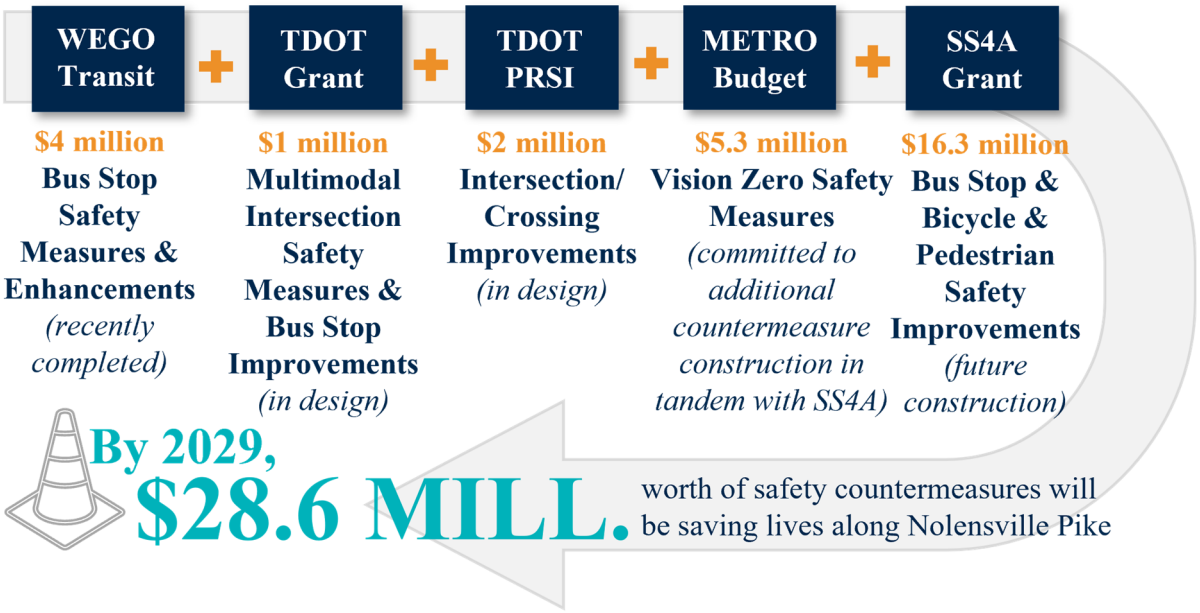
Build off the foundation. This safety project will move the Pike towards the community's vision to improve the road's design for all people. The corridor has been a focus of many planning efforts by the neighborhood, city, the region, and state. Some of these foundational plans focusing on the corridor include:

- *Healing the Pikes* (Nolensville Pike) – Nashville Civic Design Center, TDOT [2012] – envisioned a holistic corridor transformation;
- *Envision Nolensville Pike* – Conexión Américas, WeGo Transit [2016] – included month-long creative labs with community members, oral histories with students from the High School, and a public art project;
- *Envision Nolensville Pike II* – Conexión Américas, WeGo Transit, Metropolitan Government of Nashville Davidson County (Metro), Greater Nashville Regional Council (GNRC) [2017] – assessed the displacement risk for residents and businesses in the context of the region's plans for transportation improvements; and
- *Nolensville Pike Equitable Development Action Plan* – Conexión Américas, National Association for Latino Community Asset Builders (NALCAB) [2020] – highlights the safety and mobility needs associated with supporting a culturally diverse community and their small businesses.



Finishing the puzzle. Nashville's *Vision Zero Action Plan (2022)* sets a goal of eliminating serious injuries and deaths on roads by 2050, while the *Vision Zero Five-Year Implementation Plan (2022)* identifies near-term engineering and programmatic strategies based on robust data analysis for improving safety along the city's HIN. As a first next step, NDOT completed the *Vision Zero: Nolensville Pike Study (2022)*, identifying where quick build strategies and countermeasures can specifically address this dangerous corridor's most pressing pedestrian safety needs.

From these plans, this project will implement identified quick-build strategies from all three categories – operational improvements including pedestrian signal heads and leading pedestrian intervals; lighting improvements in the form of overhead LED roadway and pedestrian-scale fixtures; and mobility capital projects to include curb extensions, bus pads, quick-build sidewalks, and signalized mid-block pedestrian crossings with pedestrian refuge islands and pedestrian hybrid beacons (PHBs).



Who's Joining?

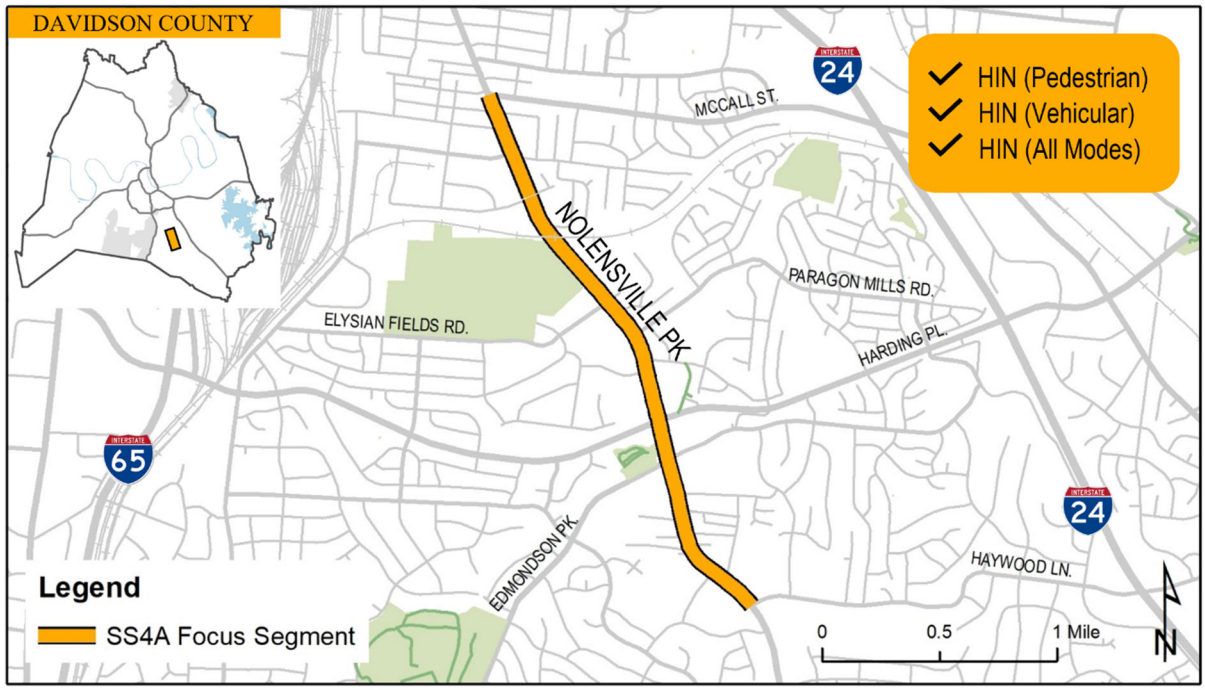
- January 2020 – *Mayor John Cooper announces Nashville's commitment to Vision Zero*
- May 2020 – WeGo begins *Nolensville Pike Shelter Project* improving 18 bus stops in partnership with TDOT, NDOT, and Metro Planning
- August 2022 – *Vision Zero Action Plan* adopted by Metro Council (Resolution 2022-1724, see Appendix C)
- August 2022 – *Vision Zero Action Plan* included in GNRC's Unified Planning Work Program (*UPWP*), which had been funded through the Congestion Mitigation and Air Quality Improvement (CMAQ) Program and awarded by the regional process.
- July 2023 – Letters of Support for SS4A grant application to improve safety along Nolensville Pike (see Letters of Support Optional Attachment)

Maximizing people's safety. NDOT, in partnership with WeGo Transit, TDOT, the Metro Council, GNRC, and local non-profits, has been focusing on safety countermeasures,

bus stop enhancements, and intersection reconstructions along Nolensville Pike over the past decade. We Are Nolensville Pike will save lives and prevent serious injuries by building upon these commitments, while supporting a vibrant community. In total, including all previous, ongoing, and planned construction projects, $16.3 million of safety countermeasures will be saving lives by the year 2029.

LOCATION

Nolensville Pike (US31A/US41A/SR11) is an urban principal arterial in Southeast Nashville. In Nashville's Vision Zero Action Plan, the corridor was identified as one of four in the city that are the most unsafe for travel. The segment of focus for the SS4A grant is between McCall Street on the northern end and Haywood Lane on the southern end, which is approximately 2.5 miles. The entirety of this segment is on Nashville's vehicular, pedestrian, and all-mode HIN. Furthermore, the intersection of Nolensville Pike and Welshwood Drive is one of the 11 most dangerous intersections for pedestrians while Nolensville Pike and Harding Place is one of the 14 most dangerous intersections for all modes in the city per the Vision Zero Action Plan. The corridor has also been identified in the Vision Zero Implementation Plan as being on the Priority HIN Project List for transit access, minor lighting improvements, state intersection improvements, and a state transformative project. The following map illustrates the SS4A focus segment of the corridor.



"We have so many visitors and clientele from surrounding areas that walk or get off at the bus stop, including elderly and children, that it puts these people at risk every time they walk to our business. We need crosswalks that are visible, sidewalks that are well-lit and consistent, and pedestrian signals at all major intersections.

-Diane Janbakhsh, Exec. Director of Hispanic Family Foundation

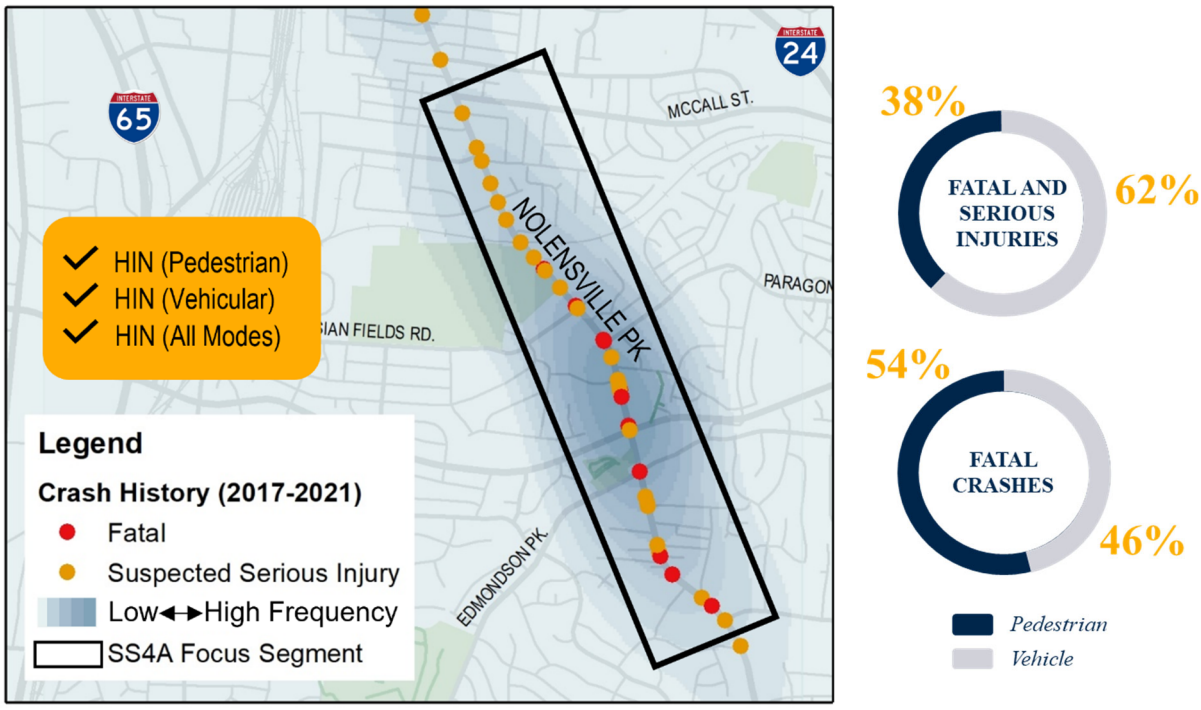
RESPONSE TO SELECTION CRITERIA

Safety

Safety Problem

As previously described, the corridor has been the focus of several planning and engineering efforts due to the lack of safety, comfort, and mobility for those walking, bicycling, using personal mobility devices, or using transit. The corridor serves as a Main Street for this area of Southeast Nashville. Community centers, places of worship, parks, non-profits supporting community development, small business incubators specifically for immigrants and refugees, schools, restaurants, bakeries, markets, the Nashville Zoo, and others call the corridor home. A lack of safe crossings and crossing infrastructure at signalized intersections, gaps in sidewalks, and incandescent overhead street lighting, prevent the community from achieving its vision to be accessible, walkable, and safe. The entirety of this segment is on Nashville's vehicular, pedestrian, and all-mode HIN.

The study corridor has an average traffic volume of more than 26,000 cars per day along the northern segment and 42,000 cars per day along the southern segment. The posted speed limit is 40 mph. Most of the corridor has five lanes: four travel lanes and one center turn lane. Between 2017 and 2021, 48 crashes resulted in serious injury or fatality (illustrated in the map below). Over thirty-seven percent of these crashes involved a pedestrian (with all occurring at night). Across Nashville, pedestrian fatal and serious injury crashes continue to rise. Sadly, 2022 was another record-breaking year for pedestrian fatalities with 49 people dying, of which most were attempting to cross a high-speed road like Nolensville Pike. Critical grant funding is needed to provide safe facilities to achieve zero traffic deaths or serious injuries. See Appendix D for additional crash characteristics, including manner of crash and location.



Crash Data Source: 2017-2021 TDOT ETRIMS

A recent survey of 580 people from along the focus segment was completed. Not only are people uncomfortable walking or bicycling, the top identified concerns included missing sidewalks and a lack of lighting on sidewalks and roads, while the top requests were for more sidewalks, speed enforcement, lighting, and traffic signals. With Metro Police already increasing enforcement on priority HIN segments, addressing the infrastructure concerns is the next step. Improving the level of comfort for pedestrians and bicyclists will serve members of this community who must walk or bike to access goods and services and encourage others to mode shift to these forms of transportation by individuals who might otherwise drive.

Safety Impact Assessment

To ensure improvements are highly effective at addressing the safety issues that exist for the most vulnerable users, the Crash Modification Factor (CMF) Clearinghouse was used to align locations with countermeasures. Locations were targeted based upon crash history, roadway and multimodal network characteristics, and the HIN. Improvements and associated CMFs are described in the table. See Appendix E for a map of anticipated improvement locations and Appendix F for cost-benefit calculations.

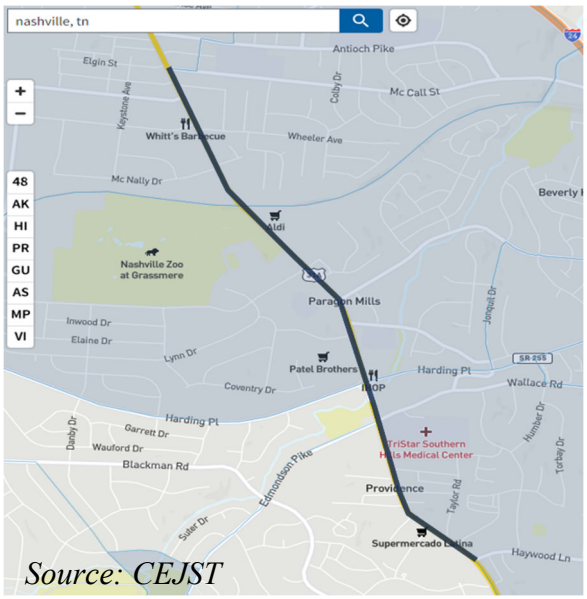
Evidence-Based Roadway Safety Countermeasures											
Nolensville Pike Termini		Fatal /Ser. Injury Crashes	Crash Modification Factors (CMFs)								Estimated Cost Benefit by Segment
			0.89	0.60	Varies	Varies	0.55	0.60	0.99	0.84	
Start	End		PHB(s)	New Sidewalks	Bus Stop Enhancements	Intersection Geometrics/ Curb Radii Reduction	Signal Timing Adjustments (Pedestrian)	High Visibility Crosswalk Striping	Pedestrian Signal Addition	Lighting	
Elgin/McCall	McNally/ Natchez	6	✓					✓		✓	0.6
McNally/ Natchez	Elysian Fields	11	✓		✓		✓	✓		✓	27.6
Elysian Fields	Harding	17		✓			✓			✓	21.9
Harding	Bass	11	✓		✓	✓	✓	✓	✓	✓	40.1
Bass	Haywood	3		✓	✓	✓		✓	✓	✓	9.4

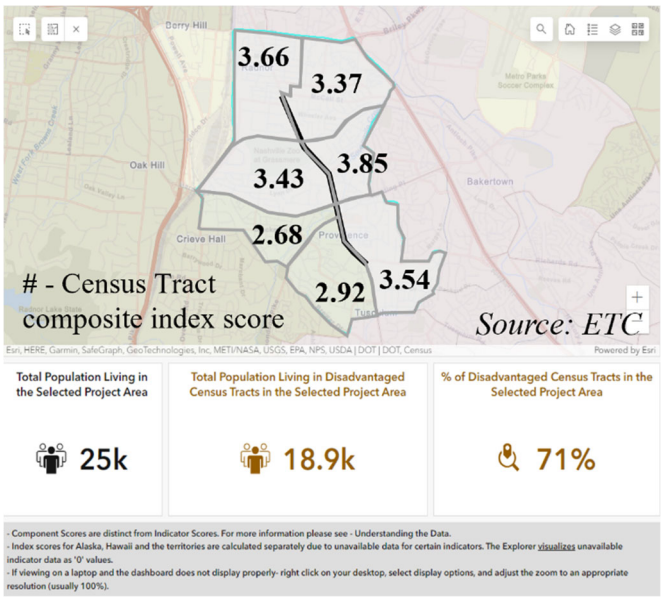
Crash Data Source: 2017-2021 TDOT ETRIMS

Equity, Engagement, & Collaboration

Equity

Individuals living in the most vulnerable areas are overrepresented in traffic deaths and severe injuries. As part of Vision Zero, *vulnerable areas* were identified through a degree of vulnerability analysis adapted from GNRC's methodology. Thirteen demographic characteristics were analyzed to identify how underserved Nashvillians are disproportionately at risk for traffic deaths and serious injuries. Nashville's *Vision Zero: Nolensville Pike Study* concluded that people who live along the Nolensville Pike corridor are more likely to be renters, people of color, Hispanic, and live below 200% of the poverty line when compared to Nashville as a whole. The two graphics below show the project corridor in relation to the Climate and Economic Justice Screening Tool (CEJST) and the DOT's Equitable Transportation Community (ETC) Explorer disadvantaged census tracts. Five out of seven census tracts are considered historically disadvantaged.





As mentioned, the corridor has been a significant focus for community engagement. Three planning and tactical urbanism projects have taken place since 2014, including a "Design Your Neighborhood" walking path and parklet in "Little Kurdistan" between Nolensville Pike and the Salahadeen Center of Nashville (a mosque and community center), four Middle Eastern food markets, and several international restaurants, among others. Eleven Metro Nashville high school students and one elementary school student designed and helped construct the pilot in partnership with the Civic Design Center and other community partners. Their journey was documented by local filmmaker Jama Mohamed in a *mini-documentary* premiering in 2020. Images from this project and other tactical urbanism projects along the corridor are provided on the following page.

This project is a continuation and realization of significant contributions and collaboration among Nashville residents that live near and along Nolensville Pike, community stakeholders, Metro, and TDOT. The safety countermeasures within this application will directly address safety concerns and support NDOT's commitment to making improvements within historically underserved communities through leveraged partnerships, stakeholder engagement, and meaningful public involvement.

Effective Practices & Strategies

Complete Streets & Design Standards & Guidelines

NDOT and Metro are dedicated to accounting for the safety of all people using roadways through both a *Green and Complete Streets Policy*, *NashvilleNext Vol. 5: Access Nashville 2040,* and the *WalknBike Plan*. *NashvilleNext* is a forward-looking plan that provides a comprehensive framework for Nashville's multimodal transportation network to support development, preservation, quality of life, and growth management through 2040. The *WalknBike Plan* outlines near-term priority sidewalk and bikeway projects. These plans and policies align with complete street elements detailed in NACTO and Nashville applies the latest design guidelines and standards relating to bicycle, pedestrian, and transit facilities whenever possible. Both TDOT and NDOT are committed to ensuring people of all ages and abilities are able to travel safely and comfortably along the corridor, meeting the standards outlined in Public Rights of Way Accessibility Guidelines (PROWAG). NDOT staff will ensure that SS4A improvements align with ADA and PROWAG standards and update the City's ADA Transition Plan and ADA asset inventories as they are constructed or implemented.

Safe Systems Approach

We Are Nolensville Pike adopts the Safe Systems Approach as the guiding paradigm to improve roadway safety on Nolensville Pike. This approach includes roadway safety interventions and countermeasures needed to achieve zero fatalities, including safety programs focused on infrastructure, human behavior, responsible oversight of the vehicle and transportation industry, and emergency response. The project will address the Safe Systems elements in the following ways to work towards achieving zero deaths on Nashville's roadways.

- **Safer People –** improvements will support safer behaviors of pedestrians, bicyclists, transit users and vehicle operators by illuminating the corridor and highlighting areas of potential conflict points (i.e., crosswalks and bike land mixing zones).
- **Safer Roads –** improvements such as new sidewalks, high-visibility crosswalks and bike lane mixing zones, PHB-signalized crossings with pedestrian refuge islands, pedestrian-scale lighting, and bike lane separation at transit stops (i.e., floating bus islands with bike lanes at the edge of curb) aim to better balance the roadway's design regardless of mode choice.
- **Safer Speeds –** the addition of PHBs (in conjunction with the new signal at the Walmart driveway and redesign of slip lanes at Harding Pike through the PRSI) will create more regular signalized pedestrian crossings, create additional gaps in traffic flow, and slow vehicular traffic. These improvements will be constructed in conjunction with Metro Police's targeted enforcement along priority segments of the HIN.
- **Post-Crash Care** – described on page 11, NDOT and its partners have been working to improve emergency response times across the city using predictive modeling and planning tools. Continuing to utilize and refine this tool is important for ensuring access to critical care for those injured in crashes nearby. Furthermore, Nolensville Pike will be a prioritized near-term corridor for the expansion of emergency vehicle preemption (EVP) following the successful demonstration project on Gallatin Pike, also described on page 11.

Other DOT Strategic Goals

Climate & Sustainability

This project aligns with Metro's 2022 *Climate Change Mitigation Action Plan*, which provides recommendations and actions for Nashville to reduce its contribution to climate change. The plan recommends an 80% reduction in annual greenhouse gas emissions from 2014 levels by 2050. In support of this goal, the plan recommends near-term safety countermeasures with multimodal transportation initiatives, advancing Vision Zero, encouraging the expansion of sidewalks, bikeways, and other non-vehicular mobility infrastructure, and supporting active transportation within neighborhoods. Providing safe environments for pedestrians, cyclists, and transit users encourages mode shifts away from automobiles and reduces greenhouse gas emissions.

The proposed lighting enhancements will be completed using low-emission LEDs (in conjunction with the ongoing effort to upgrade all existing streetlights along Nolensville to LED). This will provide a needed safety feature while reducing environmental impact.

Sustainable stormwater management practices as well as trees and scrubs will be incorporated into pedestrian refuge islands, new sidewalks, and intersection geometric improvements whenever possible to reduce impervious surfaces, aid in stormwater management, lessen the urban heat island effect, and reduce the impact of run-off into waterways. Metro Water stands ready to implement these components as part of the *Green Infrastructure Master Plan*.

Economic Competitiveness

Historically disadvantaged communities along the corridor will have improved access to economic opportunities by addressing safety and mobility concerns. At-risk local businesses were studied within the *Envision Nolensville Pike II Plan* and, although no single solution can be seen as a silver bullet, measures to increase the walkability of the corridor were frequently mentioned to improve the accessibility of local shops to their communities and prevent further gentrification and displacement. Additionally, 33 small businesses were surveyed as part of the *Nolensville Pike Equitable Development Action Plan (2020).* Of the businesses surveyed, 45.5% identified additional sidewalks and 36.4% identified additional crosswalks are needed to support their business in a manner safe to pedestrians. Due in part to this feedback, creating an accessible, walkable, and safe neighborhood is a primary goal of the action plan.

Workforce

NDOT is committed to hiring disadvantaged business enterprises (DBEs) where applicable to increase workforce participation from underserved communities. NDOT's DBE goal for this project is 20% of the total grant award. In addition to including the option for self-identification of women and minority-owned businesses, NDOT's procurement procedures also allow for the self-identification of LGBT and service-disabled veteran-owned businesses, as well as a separate process for small business owners. As previously mentioned, NDOT also utilizes partnerships with Conexión Américas and the NCDC where possible to incorporate historically disadvantaged and student populations into community development projects and internship opportunities. These partnerships help provide job training for low-income and minority groups while including middle and high school students in the planning and design process, inspiring the next generation of community leaders.

This project will also support critical access to existing community resources along the corridor, such as Conexión Américas, which provides workforce development, integration services, youth development, and even a small business incubator for Latino families and individuals. Twenty-two entrepreneurs currently operate out of their on-site culinary incubator and commercial kitchen, Mesa Komal, at the Casa Azafran Community Center. In 2019 alone, 46 jobs and 11 new businesses were created from their entrepreneurial training and opportunities provided. This is just one example of a destination that will be supported by the continued investment along Nolensville Pike.

Supplemental Planning & Demonstration Activities

Emergency Vehicle Preemption (EVP) Overview

Introduction & Project Details

NDOT requests funding to implement emergency vehicle preemption (EVP) along US31E/SR6/Gallatin Pike, a key route for emergency response in northeast Nashville. The test segment is 1.2 miles long and includes a Fire/EMS Station located nearby. EVP will be installed at six consecutive signalized intersections and 60 emergency response vehicles for the pilot project to reduce response times and intersection collisions with emergency vehicles. This section of Gallatin Pike is not only a focus of Vision Zero given the high crash volumes, but it is also a focus due to the prevalence of underserved communities. All census tracts along this segment of the corridor are historically disadvantaged according to the ETC tool. Therefore, 100% of funds will directly benefit these communities. The targeted segment is on the HIN for pedestrians, vehicles, and (partially) bicyclists, as well as the priority HIN for all modes.

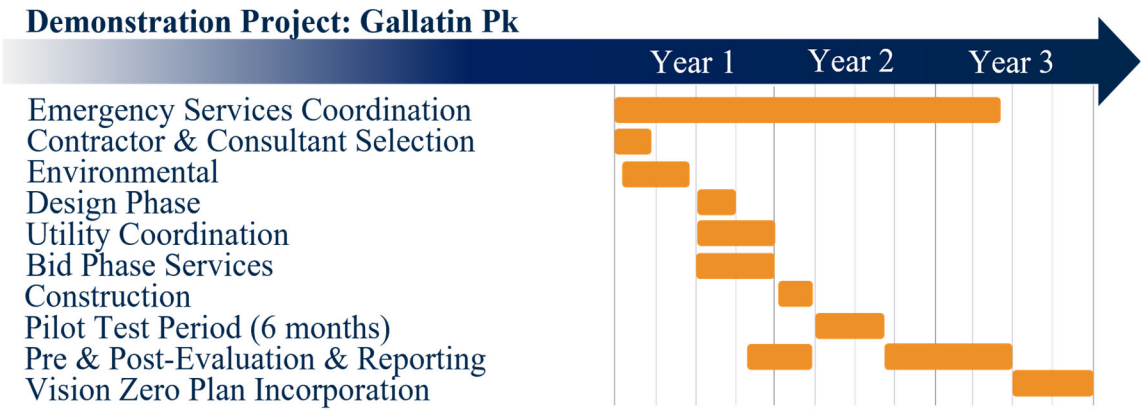
Project Need

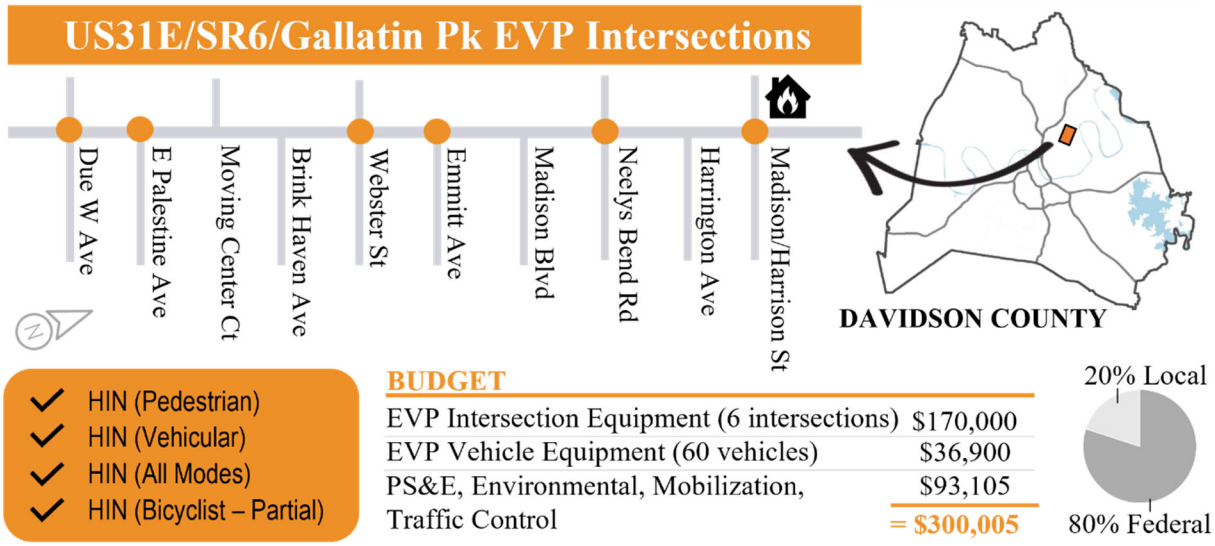
Emergency vehicle preemption has not been adopted anywhere in the city. Growth in the metropolitan region has resulted in an increase in traffic congestion. Of 1,000 cities worldwide, INRIX ranks Nashville as 131st for worst congestion. The increase in congestion coincides with increased response times for emergency response vehicles. EVP systems have been shown to improve response times (14%-50%) and reduce intersection collisions with responding vehicles (90%), according to a Federal Highway Administration (FHWA) study in St. Paul/Minneapolis. This low-cost, high-impact demonstration project will improve response times in northeast Nashville along this priority segment of the HIN. Anticipated demonstration project outcomes align with the Vision Zero Action Plan's goals of creating safer streets for everyone, prioritizing equity, increasing collaboration and transparency, improving data quality, and promoting a culture of safe traffic behaviors. It specifically addresses the post-crash care component of the Plan. This life-saving EVP demonstration also builds upon the work completed in *2019* and *2021* between the Vanderbilt Initiative for Smart Cities Operation and Research (VISOR), the Nashville Fire Department, and the City's IT Services Department. The research, funded by a National Science Foundation grant, focuses on improving emergency response times using several prediction and planning tools.

Evaluation & Vision Zero Plan Integration

While the project is in the procurement, design, and construction phases, the Fire Department will collect corridor-specific average response times for use in the pre and post-implementation evaluation. Results will be shared with partners at VISOR to continue their research surrounding emergency response and traffic congestion. Following completion and expected positive results, the Vision Zero Advisory Committee will work with NDOT staff and its partners to identify how EVP will be applied systematically at the city level with Nolensville Pike being one of the near-term priority corridors. Furthermore, given several ongoing 'next step' initiatives, the Committee will identify where incorporation into the Vision Zero Action Plan makes the most sense, whether as an additional section (leveraging technology) or under an existing strategy. The EVP equipment will remain in place to continue working towards the goal of zero roadway deaths. In addition, the equipment will pave the way for future transit signal preemption along this corridor given the presence of existing high-capacity transit service, one of the highest ridership routes for WeGo Transit.

Project Details (Schedule, Location Map, & Budget)





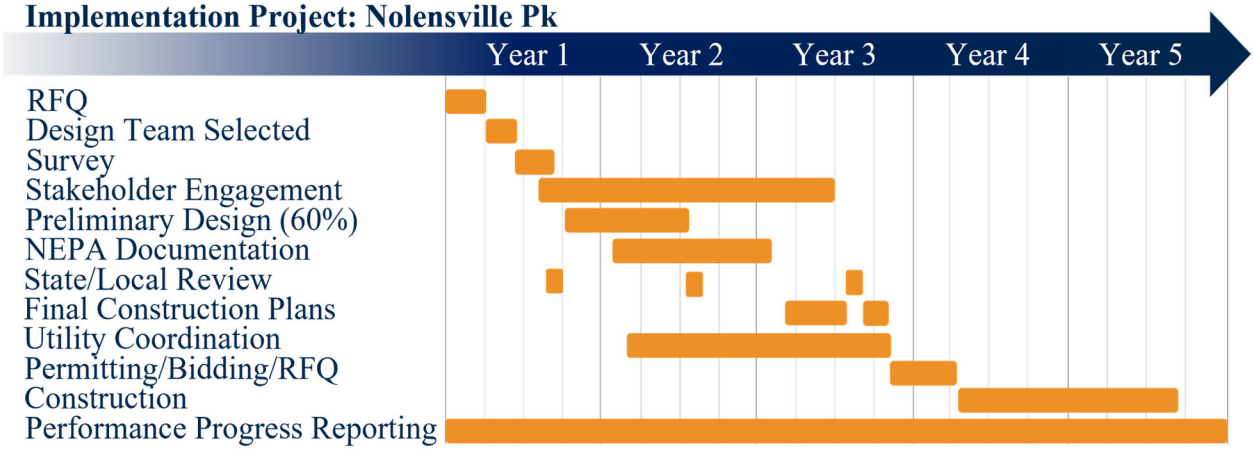
Project Readiness

NDOT and TDOT possess the necessary capabilities to coordinate and implement the federally funded project within the 5-year timeframe. The agencies coordinate on a regular basis, and both stand ready to implement this project successfully and on time. NDOT has recently been collaborating with TDOT staff to proactively plan and design the Nolensville PRSI improvements and as well as craft a more encompassing corridor strategy. Furthermore, the two partnered to recently construct the state's first PHB on a state route, which is also on the city's HIN in an equity focus area. Finally, NDOT recently completed a complete and green street project on a similar corridor with a similar scope. This prepared staff with managing large projects and being able to quickly respond to construction challenges should they arise.

Schedule

The table below illustrates the envisioned progression of the 5-year We Are Nolensville Pike safety project. Activities include planning, engagement, and design activities as well as the construction of identified improvements along the HIN priority segment. Should potential timeline-altering constructability challenges arise following the survey of the corridor, NDOT will adjust the design measures accordingly. See Appendix G for documentation relating to relevant corridor-supportive projects that are included in GNRC's 2023-2026 Transportation Improvement Program (TIP) and Nashville's 2022-2024 *WalknBike Plan* Work Program.

Implementation Project: Nolensville Pk



APPENDIX A: TDOT PRSI

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION
SUITE 1000, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-0334

Joe Galbato, III
INTERIM COMMISSIONER

Bill Lee
GOVERNOR

MEMORANDUM

To: Mr. Paul Degges
Chief Engineer and Deputy Commissioner

From: Dan Pallme
Multimodal Transportation Resources Division Interim Director

Date: March 4, 2022

Subject: Pedestrian Road Safety Initiative (PRSI)
State Route 11 (Nolensville Pike), From Haywood Lane (L.M. 6.09) to McNally Drive (L.M. 8.15)
Davidson County, PIN 125526.15

This project was requested by the TDOT Multimodal Transportation Resources Division as a candidate project to reduce pedestrian crashes along corridors and intersections throughout the State of Tennessee. This section of State Route 11 (Nolensville Pike) from log mile 6.09 to log mile 8.15 is a five (5) lane urban principal arterial. Lane widths are eleven (11) and twelve (12) feet with shoulder widths between (2) feet and twelve (12) feet. After a complete review of the project, State Route 11 (Nolensville Pike) was added to the Highway Safety Improvement Program (HSIP) list.

The total estimated cost of the identified short-term and mid-term improvements listed in this PRSI report is $2,866,200. A detailed cost breakdown by location and measure is provided in the appendix. Right-of-way acquisition is not anticipated. General maintenance and signal maintenance agreements with the Metropolitan Government of Nashville and Davidson County are required. A local match is not required. These improvements will be part of a design project and will be let to contract.

If you should need any further information, please contact me at (615) 741-4031 or email me at Daniel.pallme@tn.gov.

Attached

CC: Mr. Preston Elliott
Mr. Will Reid
Mr. Jeff Jones
Mr. Ben Price
Ms. Susannah Kniazewycz
Mr. Matt Meservy
Mr. Ronnie Porter
Mr. Steve Allen
Mr. Lee J. Smith
Mr. David Layhew
Mr. Stacy Morrison
Mr. Jonathan Russell
Mr. Brian Hurst
Mr. Jim Waters
Mr. Mike Gilbert
Mr. Shaun Armstrong
Mr. Brandon Darks
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Ms. Jessica Rich, FHWA
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File

TENNESSEE
DEPARTMENT OF TRANSPORTATION

PEDESTRIAN ROAD SAFETY INITIATIVE

***STATE ROUTE 11* (NOLENSVILLE PIKE)**
From HAYWOOD LANE to MCNALLY DRIVE
LM 6.09 to LM 8.15
DAVIDSON COUNTY
PIN 125526.15

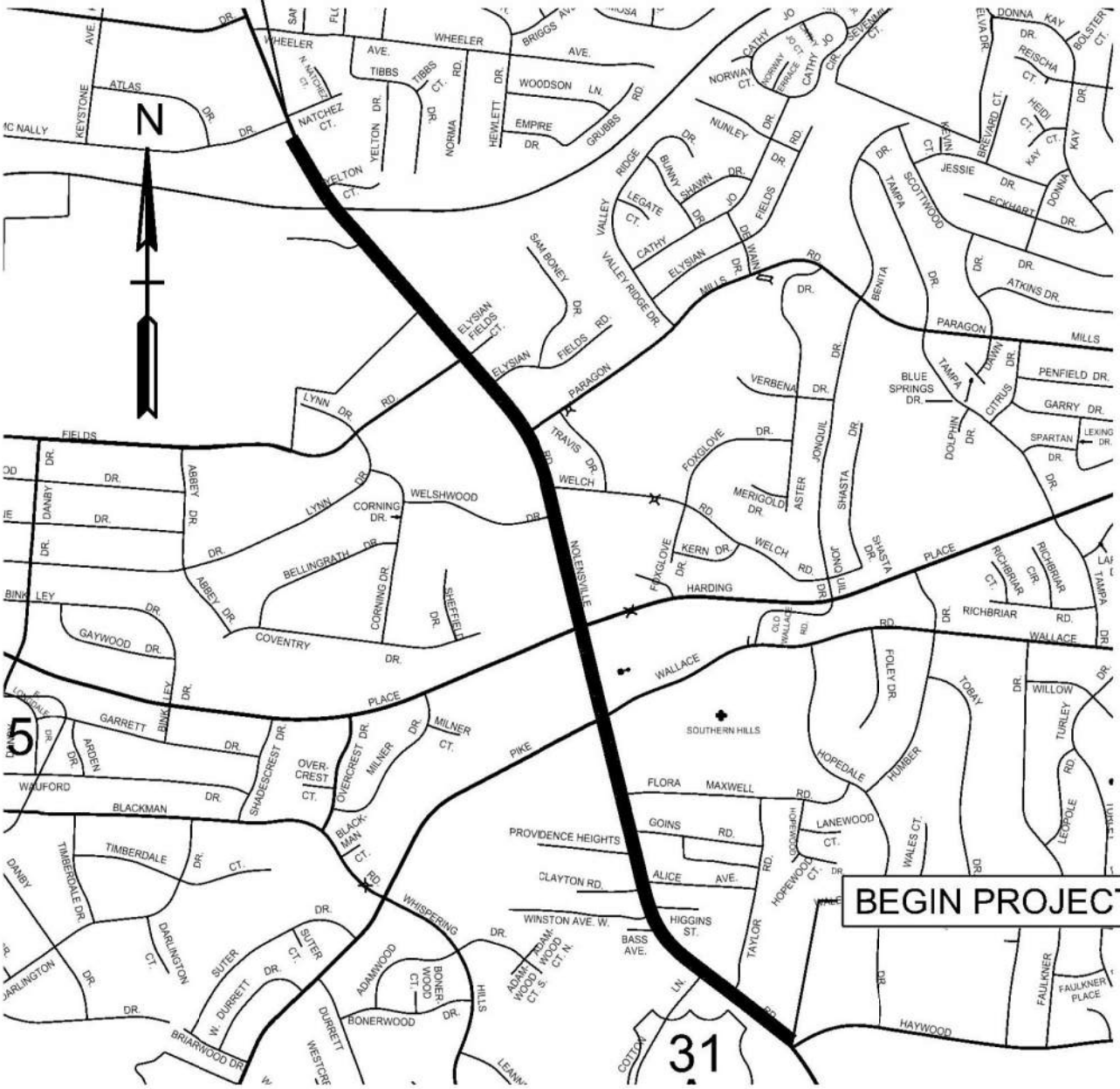
PREPARED BY
KCI Technologies Inc.
for the
Multimodal Transportation Resources Division

Approved by:	Signature	DATE
Director **Multimodal Transportation** **Resources Division**		

DAVIDSON COUNTY

END PROJECT

PROJ. NO. 125526.15



PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11 (NOLENSVILLE PIKE)

GENERAL LOCATION MAP

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was State Plane Tennessee FIPS 4100. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the Metropolitan Government of Nashville and Davidson County. This information was photogrammetrically compiled from aerial photography dated March 2006.

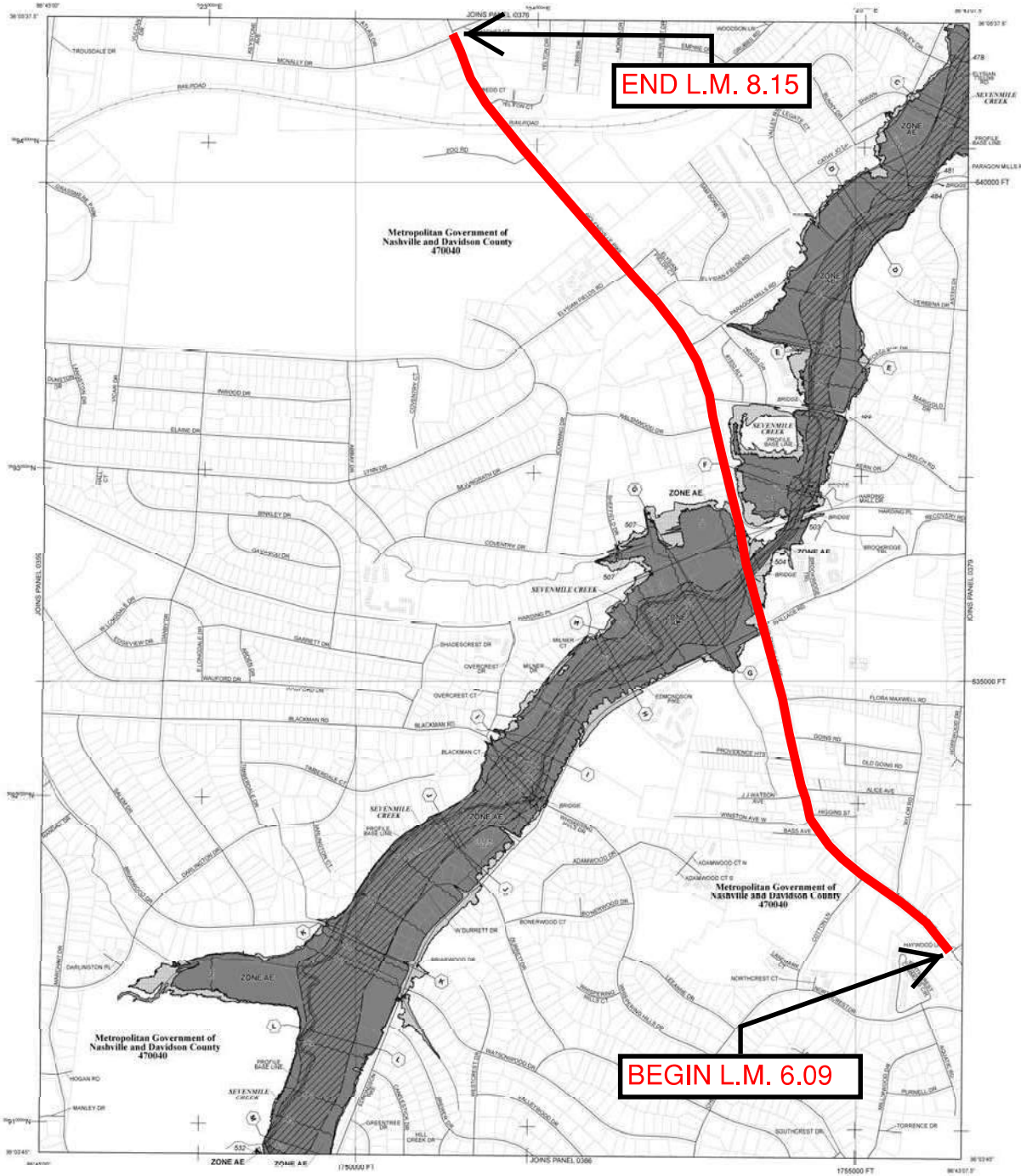
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and **questions about this map**, available products associated with this FIRM, including Digital versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange** at 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov/. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

The "profile base lines" depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A — Cross section line

23 — 23 — Transect line

87°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

4275000mE — 1000-meter Universal Transverse Mercator grid ticks, zone 16

6000000 FT — 5000-foot grid values: Tennessee State Plane coordinate system (FIPSZONE = 4100), Lambert projection

DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
APRIL 20, 2001

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
April 5, 2017 – to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to add floodway, to add roads and road names, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0378H

FIRM

FLOOD INSURANCE RATE MAP

METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY, TENNESSEE
AND INCORPORATED AREAS

PANEL 378 OF 478

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY	470040	0378	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
47037C0378H

MAP REVISED
APRIL 5, 2017

Federal Emergency Management Agency

SHEET 1 OF 1

TABLE OF CONTENTS

Davidson County
State Route 11 (Nolensville Pike)
From Haywood Lane (L.M. 6.09) to McNally Drive (L.M. 8.15)
PIN 125526.15

PEDESTRIAN ROAD SAFETY INITIATIVE

Program Overview

This project is funded through the Pedestrian Road Safety Initiative (PRSI) Program. The goal of the PRSI program is to create safer roadways for pedestrians. To achieve this, the objectives of the PRSI program are to reduce the number of fatal and severe pedestrian crashes by identifying safety concerns and implementing counter measures consistent with FHWA's Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE) and FHWA's Safe Transportation for Every Pedestrian (STEP) Initiative. Projects qualify for the PRSI program based on its score and ranking by the TDOT Pedestrian Safety Prioritization Tool. The TDOT Pedestrian Safety Prioritization Tool scores and ranks both high-risk intersections and high-risk corridors based on the following criteria: Safety, Infrastructure, Equity, and Pedestrian Demand.

Project Selection

This project was requested by the TDOT Multimodal Transportation Resources Division as a candidate project to reduce pedestrian crashes along corridors and intersections throughout the State of Tennessee. This section of State Route 11 (Nolensville Pike) from log mile 6.09 to log mile 8.15 is a five (5) lane urban principal arterial with lane widths of eleven (11) feet and twelve (12) feet and shoulder widths between two (2) feet and twelve (12) feet.

State Route 11 (Nolensville Pike) was chosen for the PRSI Program based on pedestrian crash data from 2013 through 2015 with a total of twenty-five (25) pedestrian crashes, two (2) resulting in fatalities and three (3) resulting in incapacitating injuries. The TDOT Pedestrian Safety Prioritization Tool was refined in 2020 to account for a larger range of factors contributing to pedestrian crashes. The updated methodology places State Route 11 (Nolensville Pike) in the top 1.5% of unsafe urban principal arterials for pedestrians statewide. From January 1st, 2016 through June 22nd, 2021 a total of forty-two (42) pedestrian crashes were reported within the project limits including eight (8) crashes resulting in fatalities and ten (10) crashes resulting in incapacitating injuries. A pedestrian crash diagram from January 1st, 2016 through June 22nd, 2021 is provided in the appendix.

Stakeholder Engagement

Primary stakeholders for the project were identified by the TDOT Multimodal Transportation Resources Division and invited to an onsite field review held on Thursday, August 12th, 2021. Detailed observations, site photos, and input from the field review are provided in the appendix. General observations along the project limits include non-compliant pedestrian signals, non-compliant or lack of pedestrian curb ramps, deficient driveway surfaces and sidewalk connections, and a need for additional pedestrian crossings. The lack of sufficient warning devices and pavement markings, such as flashing beacons and crosswalk pavement markings, were also observed at pedestrian crossing locations.

The purpose of the field review was to confirm the improvements detailed in the No Plans document dated August 31, 2018 and to determine if additional recommendations were needed to improve pedestrian safety.

At the initial field review, stakeholders walked the length of the project limits to identify pedestrian safety deficiencies and potential improvements. KCI Technologies staff members collected and compiled notes which were shared with the entire team for revisions. Once the notes were finalized with comments from TDOT, Metro Nashville, WeGo, the GNRC, and Walk Bike Nashville they served as the basis of a detailed list of improvements considered for inclusion into the project.

Information Used in Review

- County highway map
- United States Geological Survey (USGS) Maps
- FEMA FIRM Map
- Aerial Photographs
- TRIMS Route Feature Descriptions Listings and Geometric Reports
- Annual Average Daily Traffic (AADT) collected by TDOT
- No Plans Document obtained from PRSI report dated August 31, 2018
- On-Site Visit on August 12, 2021.

Davidson County
State Route 11 (Nolensville Pike)
From Haywood Lane (L.M. 6.09) to McNally Drive (L.M. 8.15)
PIN 125526.15

PRSI Team Members

NAME	TITLE	ORGANIZATION	EMAIL
TDOT Office of Multimodal Planning Team Members			
Veda Nguyen	Civil Engineering Manager 2	TDOT	veda.nguyen@tn.gov
Field Review Team Members			
Jeremy Bowlan	Project Manager	TDOT	jeremy.bowlan@tn.gov
Cam Morris	Transportation Project Specialist Sr.	TDOT	cam.morris@tn.gov
Brandon Darks	Transportation Manager 2	TDOT	brandon.darks@tn.gov
Jonathan Wellemeyer	Community Transportation Planner	TDOT	jonathan.wellemeyer@tn.gov
Devin Doyle	Senior Engineer	Metro Nashville	devin.doyle@nashville.gov
Justin Cole	Senior Transit Planner	WeGo	justin.cole@nashville.gov
Daniel Capparella	Associate Planner	GNRC	dcapparella@gnrc.org
Carson Cooper	Senior Planner	GNRC	ccooper@gnrc.org
Brenda Perez	Bilingual Community Engagement Manager	Walk Bike Nashville	brenda@walkbikenashville.org
Brandon Taylor	Project Manager, Consultant	KCI Technologies	Brandon.taylor@kci.com
Jonathan Cleghon	Project Engineer, Consultant	KCI Technologies	Jonathan.cleghon@kci.com
Josh Green	Project Engineer, Consultant	KCI Technologies	Josh.green@kci.com

Scope of Work

The scope of additional improvements identified include a new signal, curb ramp installation, additional street lighting, pedestrian signal improvements, PHB/HAWK (Pedestrian Hybrid Beacon/High Intensity Activated Crosswalk) improvements, and curb extensions. All improvements shall comply with the state and local accessibility guidelines as well as the requirements set forth in the 2010 Americans with Disabilities Act (ADA) and the Public Rights-of-Way Accessibility Guidelines (PROWAG).

Recommended improvements have been categorized as either short-term or mid-term based on the expected time frame required for implementation and the level of complexity. Improvements have been prioritized by expected reduction to pedestrian/vehicle type crashes in order to enable a cost-benefit analysis to guide construction. Long-term improvement recommendations have been identified but will not be implemented under PRSI construction due to the significant environmental, ROW, and utility impacts. These long-term recommendations may serve as the foundation for future TDOT or local government projects. Mid-term improvements may also not be implemented if survey and initial design studies determine significant environmental, ROW, or utility impacts.

The total estimated cost of improvements listed in this PRSI report is $2,866,200. A detailed cost breakdown by location and measure is provided in the appendix. Right-of-way acquisition is not anticipated. Pending survey results, some mid-term improvements may not be implemented due to right-of-way impacts. General maintenance and signal maintenance agreements with the Metropolitan Government of Nashville and Davidson County are required. These improvements will be part of a design project and will be let to contract.

Concept Figures

TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2022	DAVIDSON	1

ABBREVIATIONS

B = EXISTING BUS STOP

BEGIN PROJECT
L.M. 6.09

NO RECOMMENDED IMPROVEMENTS UNDER THE CURRENT PRSI PROJECT

COTTON LANE
BASS AVENUE
WINSTON AVENUE W.
JJ WATSON AVENUE
S.R. 11
TAYLOR ROAD
HAYWOOD LANE
HIGGINS AVENUE
ALICE AVENUE

LM 6.09
LM 6.262
LM 6.327
LM 6.414
LM 6.472
LM 6.488
LM 6.524
LM 6.535

MATCH LINE L.M. 6.54
SEE FIGURE 2

0 200' 400' 600'

N

PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
MULTIMODAL

FIGURE 1
STATE ROUTE 11
LOG MILE 6.09
TO
LOG MILE 6.54

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TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2022	DAVIDSON	2

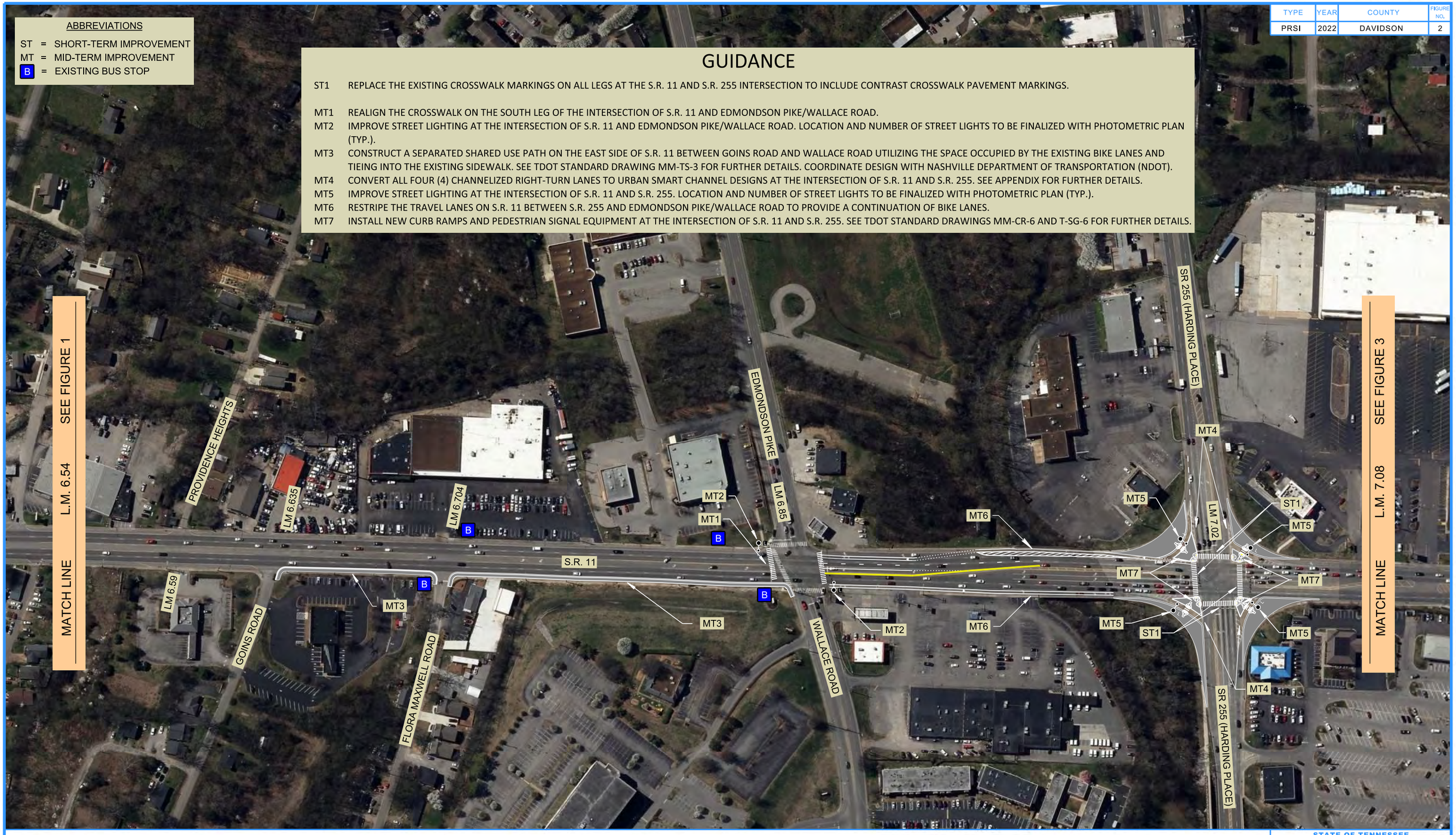
ABBREVIATIONS

ST = SHORT-TERM IMPROVEMENT
MT = MID-TERM IMPROVEMENT
B = EXISTING BUS STOP

GUIDANCE

ST1 REPLACE THE EXISTING CROSSWALK MARKINGS ON ALL LEGS AT THE S.R. 11 AND S.R. 255 INTERSECTION TO INCLUDE CONTRAST CROSSWALK PAVEMENT MARKINGS.

MT1 REALIGN THE CROSSWALK ON THE SOUTH LEG OF THE INTERSECTION OF S.R. 11 AND EDMONDSON PIKE/WALLACE ROAD.
MT2 IMPROVE STREET LIGHTING AT THE INTERSECTION OF S.R. 11 AND EDMONDSON PIKE/WALLACE ROAD. LOCATION AND NUMBER OF STREET LIGHTS TO BE FINALIZED WITH PHOTOMETRIC PLAN (TYP.).
MT3 CONSTRUCT A SEPARATED SHARED USE PATH ON THE EAST SIDE OF S.R. 11 BETWEEN GOINS ROAD AND WALLACE ROAD UTILIZING THE SPACE OCCUPIED BY THE EXISTING BIKE LANES AND TIEING INTO THE EXISTING SIDEWALK. SEE TDOT STANDARD DRAWING MM-TS-3 FOR FURTHER DETAILS. COORDINATE DESIGN WITH NASHVILLE DEPARTMENT OF TRANSPORTATION (NDOT).
MT4 CONVERT ALL FOUR (4) CHANNELIZED RIGHT-TURN LANES TO URBAN SMART CHANNEL DESIGNS AT THE INTERSECTION OF S.R. 11 AND S.R. 255. SEE APPENDIX FOR FURTHER DETAILS.
MT5 IMPROVE STREET LIGHTING AT THE INTERSECTION OF S.R. 11 AND S.R. 255. LOCATION AND NUMBER OF STREET LIGHTS TO BE FINALIZED WITH PHOTOMETRIC PLAN (TYP.).
MT6 RESTRIPE THE TRAVEL LANES ON S.R. 11 BETWEEN S.R. 255 AND EDMONDSON PIKE/WALLACE ROAD TO PROVIDE A CONTINUATION OF BIKE LANES.
MT7 INSTALL NEW CURB RAMPS AND PEDESTRIAN SIGNAL EQUIPMENT AT THE INTERSECTION OF S.R. 11 AND S.R. 255. SEE TDOT STANDARD DRAWINGS MM-CR-6 AND T-SG-6 FOR FURTHER DETAILS.



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PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
MULTIMODAL

FIGURE 2
STATE ROUTE 11
LOG MILE 6.54
TO
LOG MILE 7.08

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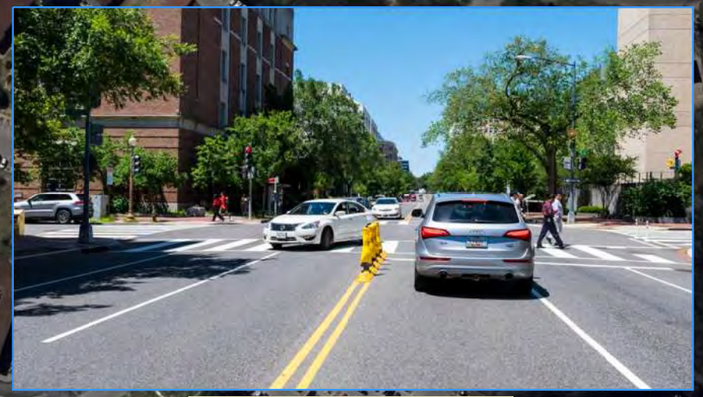
TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2022	DAVIDSON	3

ABBREVIATIONS

ST = SHORT-TERM IMPROVEMENT
MT = MID-TERM IMPROVEMENT
B = EXISTING BUS STOP



EXAMPLE OF CENTERLINE HARDENING

CROSSWALK REMOVED DURING WELSHWOOD SIGNAL CONSTRUCTION

SEE FIGURE 2

MATCH LINE

L.M. 7.08

WELSHWOOD DRIVE

LM 7.239

LM 7.296

LM 7.40

LM 7.524

LM 7.59

WELCH ROAD

PARAGON MILLS ROAD

S.R. 11

ELYSIAN FIELDS ROAD

ELYSIAN FIELDS COURT

SEE FIGURE 4

MATCH LINE

L.M. 7.65

ST1 ST2 ST3 ST4 ST5 ST6

MT1 MT2 MT3 MT4 MT5 MT6 MT7 MT8 MT9 MT10 MT11 MT12 MT13 MT14 MT15

0 200' 400' 600'

N

PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
MULTIMODAL

FIGURE 3
STATE ROUTE 11
LOG MILE 7.08
TO
LOG MILE 7.65

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ABBREVIATIONS

ST = SHORT-TERM IMPROVEMENT
MT = MID-TERM IMPROVEMENT

TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2022	DAVIDSON	3A

GUIDANCE

ST1. INSTALL A DETECTABLE WARNING SURFACE ON THE EXISTING SOUTHWEST CORNER CURB RAMP AT THE S.R. 11 AND WALMART DRIVEWAY INTERSECTION. SEE TDOT STANDARD DRAWING MM-CR-1 FOR FURTHER DETAILS.
ST2. REPAIR THE BROKEN DRIVEWAY SURFACES ON THE WEST SIDE OF S.R. 11 BETWEEN THE WALMART DRIVEWAY AND WELSHWOOD AVENUE FOR ADA COMPLIANCE.
ST3 INSTALL CENTERLINE HARDENING DEVICES FOR THE SOUTHBOUND APPROACH AT THE S.R. 11 AND WELSHWOOD DRIVE INTERSECTION. SEE DETAIL ON SHEET 3 FOR FURTHER DETAILS.
ST4 REPLACE THE NORTHBOUND STOP LINE AT THE INTERSECTION OF S.R. 11 AND WELSHWOOD DRIVE TO CONFORM TO TDOT STANDARD DRAWING T-M-2.
ST5 TRIM THE EXISTING LANDSCAPING IN THE NORTHEAST CORNER OF THE S.R. 11 AND WELCH ROAD INTERSECTION.
ST6 INSTALL BACKPLATES WITH YELLOW REFLECTIVE BORDERS ON ALL EXISTING SIGNAL HEADS AT THE S.R. 11 AND PARAGON MILLS RD INTERSECTION. SEE TDOT STANDARD DRAWING T-SG-9A FOR FURTHER DETAILS.

MT1. PENDING WARRANT ANALYSIS, INSTALL A NEW TRAFFIC SIGNAL AT THE S.R. 11 AND WALMART DRIVEWAY INTERSECTION.
MT2. IMPROVE STREET LIGHTING AT THE S.R. 11 AND WALMART DRIVEWAY INTERSECTION. LOCATION AND NUMBER OF STREET LIGHTS TO BE FINALIZED WITH PHOTOMETRIC PLAN (TYP.).
MT3. INSTALL A PEDESTRIAN REFUGE IN CONJUNCTION WITH THE SIGNAL ALONG THE NORTH LEG OF THE S.R. 11 AND WALMART DRIVEWAY INTERSECTION. SEE TDOT STANDARD DRAWING MM-CR-4 FOR FURTHER DETAILS.
MT4 REDUCE THE WIDTH OF THE NORTHBOUND RIGHT-TURN LANE AT THE S.R. 11 AND WALMART DRIVEWAY INTERSECTION.
MT5 IMPROVE STREET LIGHTING AT THE S.R. 11 AND WELSHWOOD DRIVE INTERSECTION. LOCATION AND NUMBER OF STREET LIGHTS TO BE FINALIZED WITH PHOTOMETRIC PLAN (TYP.).
MT6 INSTALL A SHARED USE PATH WITHIN THE EXISTING RIGHT-OF-WAY ON THE EAST SIDE OF S.R. 11 BETWEEN WELSHWOOD DRIVE AND WELCH ROAD. SEE TDOT STANDARD DRAWING MM-TS-3 FOR FURTHER DETAILS.
MT7 IMPROVE STREET LIGHTING AT THE S.R. 11 AND WELCH ROAD INTERSECTION. LOCATION AND NUMBER OF STREET LIGHTS TO BE FINALIZED WITH PHOTOMETRIC PLAN (TYP.).
MT8 REDUCE THE CURB RADII IN THE NORTHEAST AND SOUTHEAST CORNERS OF THE S.R. 11 AND WELCH ROAD INTERSECTION..
MT9 INSTALL PEDESTRIAN CROSSINGS WITH ADA COMPLIANT CURB RAMPS, PEDESTRIAN SIGNALS, PUSHBUTTONS, AND HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS FOR ALL LEGS OF THE S.R. 11 AND PARAGON MILLS ROAD INTERSECTION. SEE TDOT STANDARD DRAWINGS MM-CR-5, MM-CR-6, T-SG-6, AND T-M-4 FOR FURTHER DETAILS.
MT10 PENDING ANALYSIS, REMOVE THE NORTHBOUND RIGHT-TURN LANE AND REDUCE THE SOUTHEAST CURB RADIUS AT THE S.R. 11 AND PARAGON MILLS ROAD INTERSECTION.
MT11 INSTALL A PEDESTRIAN CROSSING CONTROLLED BY A PEDESTRIAN HYBRID BEACON ON S.R. 11 AT THE SOUTH LEG OF THE S.R. 11 AND ELYSIAN FIELDS ROAD INTERSECTION. SEE TDOT STANDARD DRAWING T-M-4B FOR FURTHER DETAILS. COORDINATION WITH WEGO IS REQUIRED.
MT12 INSTALL PEDESTRIAN CROSSINGS WITH ADA COMPLIANT CURB RAMPS, HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS, AND REDUCED CURB RADII IN THE NORTHEAST AND SOUTHEAST CORNERS OF THE S.R. 11 AND ELYSIAN FIELDS ROAD INTERSECTION. SEE TDOT STANDARD DRAWINGS MM-CR-5 AND T-M-4 FOR FURTHER DETAILS.
MT13 INSTALL A PEDESTRIAN REFUGE IN CONJUNCTION WITH THE PEDESTRIAN HYBRID BEACON ALONG THE SOUTH LEG OF THE S.R. 11 AND ELYSIAN FIELDS ROAD INTERSECTION. SEE TDOT STANDARD DRAWING MM-CR-4 FOR FURTHER DETAILS.
MT14 INSTALL ADA COMPLIANT CURB RAMPS IN ALL CORNERS OF THE S.R. 11 AND ELYSIAN FIELDS ROAD/ELYSIAN FIELDS COURT INTERSECTION. SEE TDOT STANDARD DRAWINGS MM-CR-5 AND MM-CR-6 FOR FURTHER DETAILS.
MT15 REALIGN THE CROSSWALK ON THE SOUTH LEG OF THE S.R. 11 AND ELYSIAN FIELDS ROAD/ELYSIAN FIELDS COURT INTERSECTION.

0 200' 400' 600'

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PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
MULTIMODAL

FIGURE 3A
STATE ROUTE 11
LOG MILE 7.08
TO
LOG MILE 7.65

TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2022	DAVIDSON	4

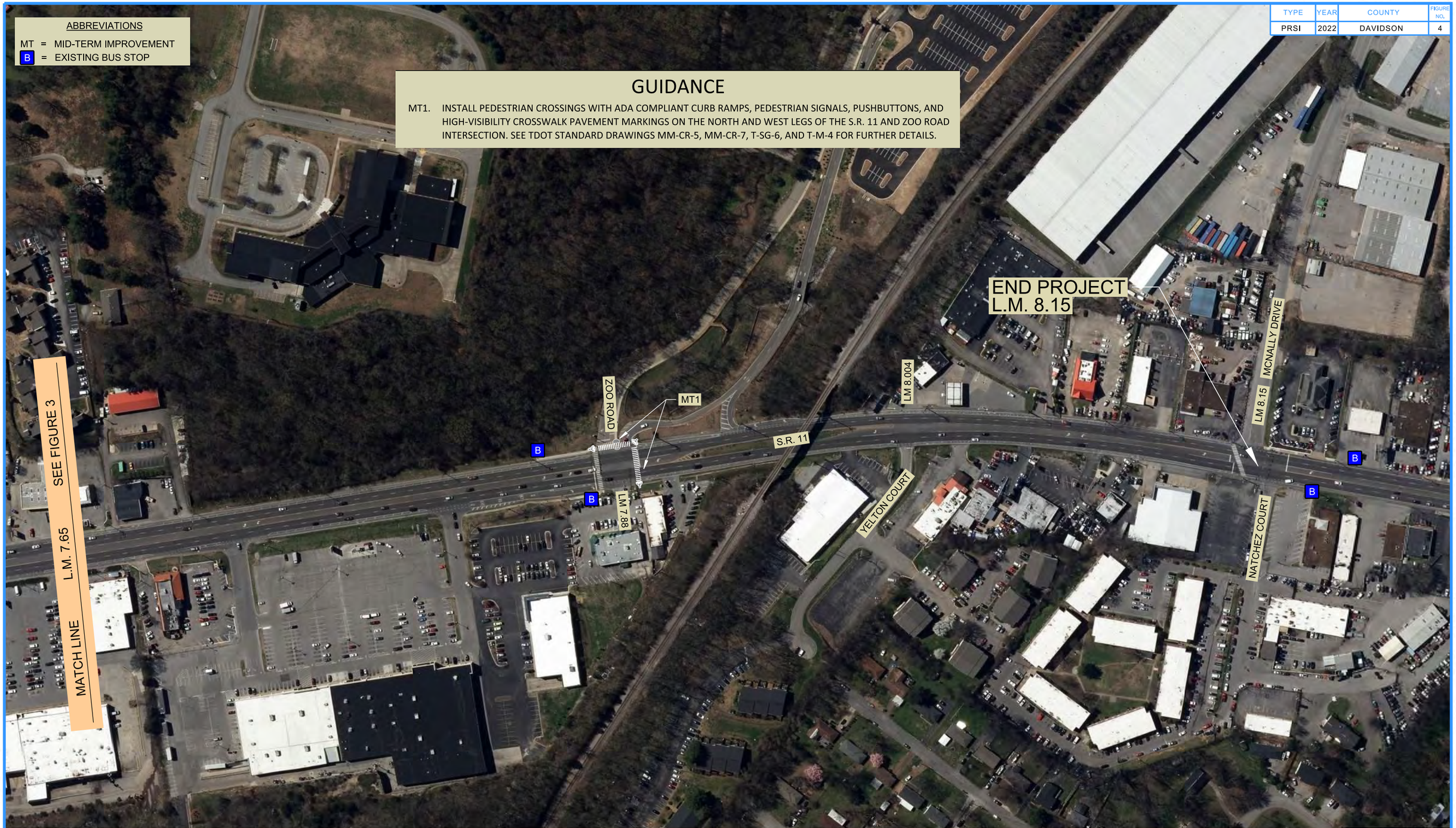
ABBREVIATIONS

MT = MID-TERM IMPROVEMENT

B = EXISTING BUS STOP

GUIDANCE

MT1. INSTALL PEDESTRIAN CROSSINGS WITH ADA COMPLIANT CURB RAMPS, PEDESTRIAN SIGNALS, PUSHBUTTONS, AND HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS ON THE NORTH AND WEST LEGS OF THE S.R. 11 AND ZOO ROAD INTERSECTION. SEE TDOT STANDARD DRAWINGS MM-CR-5, MM-CR-7, T-SG-6, AND T-M-4 FOR FURTHER DETAILS.



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PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
MULTIMODAL

FIGURE 4
STATE ROUTE 11
LOG MILE 7.65
TO
LOG MILE 8.15

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APPENDIX

1. LOCATION SPECIFIC INTERSECTION AND SEGMENT IMPROVEMENT REVIEW

KCI, TDOT, and the project team field evaluated all signalized and unsignalized minor street intersections along State Route 11 (Nolensville Pike) between Haywood Lane and McNally Drive. One (1) uncontrolled midblock location was also assessed, in the vicinity of existing bus stops and high pedestrian crash locations where pedestrian crossings occur. The team reviewed the recommendations detailed in the no plans document, determined if additional recommendations were needed in order to comply with Chapter 3 – Multimodal Design of TDOT's Roadway Design Guidelines, and identified additional infrastructure improvements that could improve pedestrian safety throughout the corridor. Prior to conducting the field review, KCI produced pedestrian and bicycle crash diagrams with data between January 1, 2016 and June 22, 2021. Having this crash data available during the field review allowed the team to focus attention on locations along the corridor with the highest concentration of crashes and provided specific details as to the cause of crashes occurring in the area. Field review items are detailed in the following tables for each intersection and additional comments are provided as discussed. Additional notes are provided with site pictures located in the Appendix where a visual clarification may be helpful. The table below lists each location considered for improvements.

SIGNALIZED INTERSECTION, UN-SIGNALIZED INTERSECTION, AND MID-BLOCK IMPROVEMENT LOCATIONS

ID	Log Mile*	Location	Control Type
1	6.11	SR-11 AT HAYWOOD LANE	Signalized
2	6.262	SR-11 AT TAYLOR ROAD	Un-signalized
3	6.327	SR-11 AT COTTON LANE	Un-signalized
4	6.44	SR-11 AT BASS AVENUE	Signalized
5	6.472	SR-11 AT WINSTON AVENUE WEST	Un-signalized
6	6.488	SR-11 AT HIGGINS STREET	Un-signalized
7	6.524	SR-11 AT J.J. WATSONS AVENUE	Un-signalized
8	6.535	SR-11 AT ALICE AVENUE	Un-signalized
9	6.59	SR-11 AT PROVIDENCE HEIGHTS	Un-signalized
10	6.635	SR-11 AT GOINS ROAD	Un-signalized
11	6.704	SR-11 AT FLORA MAXWELL RAOD	Un-signalized
12	6.85	SR-11 AT EDMONDSON PIKE/WALLACE ROAD	Signalized
13	7.02	SR-11 AT SR-255 (HARDING PLACE)	Signalized
14	7.05-7.239	SR-11 AT MIDBLOCK CROSSING NEAR WALMART DRIVEWAY	Midblock
15	7.239	SR-11 AT WELSHWOOD DRIVE	Signalized
16	7.296	SR-11 AT WELCH ROAD	Un-signalized
17	7.40	SR-11 AT PARAGON MILLS ROAD	Signalized
18	7.524	SR-11 AT ELYSIAN FIELDS ROAD	Un-signalized
19	7.59	SR-11 AT ELYSIAN FIELDS ROAD/ELYSIAN FIELDS COURT	Signalized
20	7.88	SR-11 AT ZOO ROAD	Signalized
21	8.004	SR-11 AT YELTON COURT	Un-signalized
22	8.144	SR-11 AT MCNALLY DRIVE/NATCHEZ COURT	Signalized
*Log Miles for mid-block segments indicate the beginning and end of the segment.			

Improvements have been categorized as either short-term or mid-term based on the expected time frame required for implementation and the level of complexity. Descriptions for each category are provided below. Cost was not considered as a factor when categorizing projects as short-term or mid-term.

Short-Term: Recommended improvements considered eligible for short-term implementation could be constructed immediately. Typically, these improvements include signage, pavement markings, and installation of truncated dome warning mats on existing ADA compliant curb ramps. Field verification is recommended for retrofit curb ramp installations. Short-term improvements typically require minimal engineering design, are constructed within the existing right-of-way, and do not require survey or subsurface excavation during construction.

Mid-Term: Mid-term PRSI improvements may require field run topographical survey in order to verify items such as ADA compliance for sidewalk or curb ramps, potential ROW constraints, or utility conflicts. Mid-term improvements generally include installation of new ADA compliant curb ramps with truncated dome warning mats, modifications to existing traffic signals to include upgraded pedestrian features, installation of PHB/HAWK controlled pedestrian crossings, and changes to lane configurations that require traffic data collection and analysis. Mid-term improvements may require survey, engineering design, and subsurface excavation during construction. In most cases it is expected that they can be constructed without right-of-way acquisition or utility relocation.

Long-Term: Long-term pedestrian improvements were identified during the field visit but will not be implemented under PRSI construction due to the significant environmental, ROW, and utility impacts. These long-term recommendations may serve as the foundation for future TDOT or local government projects and can be found in the **Additional Improvement Appendices**.

The short-term and mid-term improvements determined by KCI, TDOT, and the project team in the field can be prioritized based on their respective expected crash reductions. The procedures used to prioritize these improvements are based on methodologies provided in the American Association of State Highway Transportation Officials' (AASHTO) *Highway Safety Manual* and are further discussed in the Crash Modification Factors (CMF) and Improvement Prioritization appendices.

1. BEGIN PROJECT – STATE ROUTE 11 (NOLENSVILLE PIKE) AT HAYWOOD LANE (L.M. 6.11)

   No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

2. STATE ROUTE 11 (NOLENSVILLE PIKE) AT TAYLOR ROAD (L.M. 6.262)

   No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

3. STATE ROUTE 11 (NOLENSVILLE PIKE) AT COTTON LANE (L.M. 6.327)

   No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

4. STATE ROUTE 11 (NOLENSVILLE PIKE) AT BASS AVENUE (L.M. 6.44)

   No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

5. STATE ROUTE 11 (NOLENSVILLE PIKE) AT WINSTON AVENUE WEST (L.M. 6.472)

   No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

6. STATE ROUTE 11 (NOLENSVILLE PIKE) AT HIGGINS STREET (L.M. 6.488)

   No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

7. STATE ROUTE 11 (NOLENSVILLE PIKE) AT J.J. WATSON AVENUE (L.M. 6.524)

   No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

8. STATE ROUTE 11 (NOLENSVILLE PIKE) AT ALICE AVENUE (L.M. 6.535)

   No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

9. STATE ROUTE 11 (NOLENSVILLE PIKE) AT PROVIDENCE HEIGHTS (L.M. 6.59)

   No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

10. STATE ROUTE 11 (NOLENSVILLE PIKE) AT GOINS ROAD (L.M. 6.635)

    No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

11. STATE ROUTE 11 (NOLENSVILLE PIKE) AT FLORA MAXWELL ROAD (L.M. 6.704)

No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

12. STATE ROUTE 11 (NOLENSVILLE PIKE) AT EDMONDSON PIKE / WALLACE ROAD (L.M. 6.85)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Signalized	Mid-Term	
	• Realign the crosswalk for the south leg of the intersection to create a shorter crossing distance.	$36,500
	• Improve street lighting at the intersection.	$40,000
	• The east side of SR-11 (Nolensville Pike) between Edmondson Pike/Wallace Road and Goins Road is limited in functionality by the presence of utility poles and other obstructions. Utilize the adjacent buffered bike lanes to construct a new shared use path within the existing right-of-way. This may require significant modification to the existing stormwater infrastructure and curb inlets.	$580,000
	Mid-Term Cost	*$656,500*
	Total Cost of Improvements	***$656,500***

The traffic signal is being upgraded with new pedestrian crossing for all legs of the intersection. Construction was taking place at the time of the preliminary field review.

13. STATE ROUTE 11 (NOLENSVILLE PIKE) AT STATE ROUTE 255 (HARDING PLACE) (L.M. 7.02)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Signalized	Short-Term	
	• Restripe longitudinal style crosswalk pavement markings with contrast markings to increase visibility on the existing light-colored concrete pavement. TDOT uses a similar treatment to vehicular lane lines applied to concrete pavements.	$10,000
	Short-Term Cost	*$10,000*
	Mid-Term	
	• Convert all four (4) channelized right-turn lanes to Urban Smart Channel designs to improve pedestrian safety.	$32,000
	• Improve street lighting at the intersection.	$80,000
	• Remove the continuous southbound lane between the eastbound right-turn lane from SR-255 (Harding Place) and Edmondson Pike. Restripe the travel lanes on SR-11 (Nolensville Pike) between the SR-255 (Harding Place) and Edmondson Pike/Wallace Road intersections to provide a continuation of the bike lanes north and south of these intersections, respectively.	$20,000
	• Install new ADA compliant curb ramps and pedestrian signal equipment at each corner.	$88,000
	Mid-Term Cost	*$220,000*
	Total Cost of Improvements	***$230,000***

Remove the continuous southbound lane between the eastbound right-turn lane from SR-255 (Harding Place) and Edmondson Pike. This existing section creates a weaving situation for motorists and is particularly difficult for cyclists to navigate. This could provide additional space for continuation of the bike lane. Redesign of the four (4) channelized right turn lanes may allow for additional space to be provided for the bike lane connection. The southbound approach of SR-11 (Nolensville Pike) at Edmonson Pike may be restriped to shift the through lanes and left-turn lane into the available hatched space along the centerline. This would provide space for the bike lane to transition to the left of the southbound right-turn lane at Edmonson Pike. It should be noted that improvements to bicyclist safety are not fully captured in the prioritization analyses in this report. Therefore, additional benefits may be observed at this location.

14. STATE ROUTE 11 (NOLENSVILLE PIKE) AT MIDBLOCK CROSSING NEAR WALMART DRIVEWAY (BETWEEN L.M. 7.05 – L.M. 7.239)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
	Short-Term	
	• Install a truncated dome warning mat on the southwest corner curb ramp for the driveway opposite the Walmart.	$2,000
	• Repair the broken driveway surfaces on the west side of SR-11 (Nolensville Pike) between Welshwood Drive and Walmart driveway for ADA compliance.	$10,000
	Short-Term Cost	*$12,000*
New Signal	Mid-Term	
	• Pending warrant analysis, install a new traffic signal at the Walmart driveway.	$350,000
	• Improve street lighting along the segment.	$80,000
	• Install a median pedestrian refuge island in conjunction with the crossing for centerline hardening.	$10,000
	• Reduce the width of the northbound right-turn lane at driveway and install a curb extension in the northeast corner.	$80,000
	Mid-Term Cost	*$520,000*
	Total Cost of Improvements	***$532,000***

Additional long-term improvements were identified and can be found in the Additional Improvements appendices.

15. STATE ROUTE 11 (NOLENSVILLE PIKE) AT WELSHWOOD DRIVE (L.M. 7.239)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Signalized	Short-Term	
	• Harden the centerline on the north leg of the intersection.	$8,000
	• The northbound stop line is painted too close to the crosswalk. This approach should be restriped to meet TDOT standards.	$1,000
	Short-Term Cost	*$9,000*
	Mid-Term	
	• Improve street lighting along the segment.	Included with intersection at Walmart Driveway
	• Construct a new shared use path in the unused shoulder space north of the intersection to separate non-motorized travel from vehicles and improve comfort and safety.	$55,000
	Mid-Term Cost	*$55,000*
	Total Cost of Improvements	***$64,000***

16. STATE ROUTE 11 (NOLENSVILLE PIKE) AT WELCH ROAD (L.M. 7.296)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Short-Term	
	• Trim the existing landscaping to improve intersection sight distance. Vegetation in or over the ROW can be trimmed by TDOT personnel. Trimming of vegetation outside the ROW must be coordinated with property owner.	$1,000
	Short-Term Cost	*$1,000*
	Mid-Term	
	• Improve street lighting at the intersection.	Included with intersection at Walmart Driveway
	• Reduce curb radii in the northeast and southeast corners to slow turning traffic movements and reduce pedestrian crossing distances.	$50,000
	Mid-Term Cost	*$50,000*
	Total Cost of Improvements	***$51,000***

17. STATE ROUTE 11 (NOLENSVILLE PIKE) AT PARAGON MILLS ROAD (L.M. 7.40)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Signalized	Short-Term • Install backplates with a yellow reflective border to all existing traffic signal heads.	$8,000
	Short-Term Cost	*$8,000*
	Mid-Term • Add pedestrian crossings with ADA compliant curb ramps, pedestrian signals, pushbuttons, and high-visibility crosswalk pavement markings for the north, south, east, and west legs of the intersection. No sidewalk currently exists on the west side of the street in the vicinity of this intersection. Substantial sidewalk improvements may be required prior to incorporating signalized pedestrian equipment.	$95,600
	• Pending analysis, remove the northbound right-turn lane and reduce the curb radius to slow traffic. This improvement will help provide additional space for the installation of curb ramps and pedestrian signal poles where right-of-way is limited.	$25,000
	Mid-Term Cost	*$120,600*
	Total Cost of Improvements	***$128,600***

Unused shoulder space and/or removal of the northbound right-turn lane on the east side of SR-11 (Nolensville Pike) between Welshwood Drive and Paragon Mills Road could be used to separate non-motorized travel from vehicles and improve comfort and safety. This space could be very advantageous for constructing new sidewalks or a shared use path within the existing right-of-way in order to address the gap in sidewalk facilities.

18. STATE ROUTE 11 (NOLENSVILLE PIKE) AT ELYSIAN FIELDS ROAD (L.M. 7.524)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Mid-Term	
	• Install a new pedestrian crossing controlled by a PHB/HAWK at the southern intersection of Elysian Fields Road.	$94,500
	• Install new ADA compliant curb ramps with detectable warning mats, high-visibility crosswalk pavement markings, and reduce curb radii in the northeast and southeast corners to slow turning traffic movements and reduce pedestrian crossing distances.	$61,300
	• Construct a raised concrete/landscaped center median in the vicinity of this intersection.	$10,000
	Mid-Term Cost	*$165,800*
	Total Cost of Improvements	***$165,800***

19. STATE ROUTE 11 (NOLENSVILLE PIKE) AT ELYSIAN FIELDS ROAD/ELYSIAN FIELDS COURT (L.M. 7.59)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Signalized	Mid-Term	
	• Install new ADA compliant curb ramps with detectable warning mats in the northeast, southeast, northwest, and southwest corners.	$40,000
	• Realign the crosswalk on the south leg of the intersection to shorten the crossing distance.	$2,500
	Mid-Term Cost	*$42,500*
	Total Cost of Improvements	***$42,500***

Additional long-term improvements were identified and can be found in the Additional Improvements appendices.

20. STATE ROUTE 11 (NOLENSVILLE PIKE) AT ZOO ROAD (L.M. 7.88)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Signalized	Mid-Term • Add pedestrian crossings with ADA compliant curb ramps, pedestrian signals, pushbuttons, and high-visibility crosswalk pavement markings for the north and west legs of the intersection.	$57,800
	Mid-Term Cost	*$57,800*
	Total Cost of Improvements	***$57,800***

Additional long-term improvements were identified and can be found in the Additional Improvements appendices.

21. STATE ROUTE 11 (NOLENSVILLE PIKE) AT YELTON COURT (L.M. 8.004)

No improvements at this location are recommended under the current PRSI project. See the Additional Improvements appendices for recommendations for future projects.

22. END PROJECT - STATE ROUTE 11 (NOLENSVILLE PIKE) AT MCNALLY DRIVE/NATCHEZ COURT (L.M. 8.144)

It was determined by TDOT and the project team that improvements at this intersection are not required under the PRSI project as a NDOT project funded through a 2018 TDOT Multimodal Access Grant will improve all pedestrian crossings with ADA compliant curb ramps, pedestrian signals, pushbuttons, and high-visibility crosswalk pavement markings. In addition, street lighting will be improved and transit access will be incorporated. TDOT provided a copy of the grant application following the field review meeting.

2. COST ESTIMATE

KCI, TDOT, and the project team evaluated all signalized and unsignalized minor street intersections along State Route 11 (Nolensville Pike) between Haywood Lane and McNally Drive. The team reviewed the recommendations detailed in the no plans document, determined if additional recommendations were needed in order to comply with Chapter 3 – Multimodal Design of TDOT's Roadway Design Guidelines, and identified additional infrastructure improvements that could improve pedestrian safety throughout the corridor.

The total construction estimate for short-term improvements is approximately **$40,000**. The total construction estimate for mid-term improvements is approximately **$1,888,200**. The total construction estimate for long-term improvements is **$0.** The total construction estimate for all improvements, including mobilization, construction contingencies, and construction engineering and inspection is approximately **$2,866,200**. Estimated subtotal costs of traffic maintenance, mobilization, construction contingencies, and construction engineering and inspection have been rounded up to the next $1,000. The cost does not include engineering design.

STATE ROUTE 11 (NOLENSVILLE PIKE) - ESTIMATED CONSTRUCTION COST SUMMARY		
LOG MILE	**INTERSECTION**	**ESTIMATED COST**
6.11	HAYWOOD LANE	$0
6.262	TAYLOR ROAD	$0
6.327	COTTON LANE	$0
6.44	BASS AVENUE	$0
6.472	WINSTON AVENUE WEST	$0
6.488	HIGGINS STREET	$0
6.524	J.J. WATSON AVENUE	$0
6.535	ALICE AVENUE	$0
6.59	PROVIDENCE HEIGHTS	$0
6.635	GOINS ROAD	$0
6.704	FLORA MAXWELL ROAD	$0
6.85	EDMONDSON PIKE/WALLACE ROAD	$656,500
7.02	STATE ROUTE 255 (HARDING PLACE)	$230,000
7.05-7.239	MIDBLOCK CROSSING	$532,000
7.239	WELSHWOOD DRIVE	$64,000
7.296	WELCH ROAD	$51,000
7.40	PARAGON MILLS ROAD	$128,600
7.524	ELYSIAN FIELDS ROAD	$165,800
7.59	ELYSIAN FIELDS ROAD/ELYSIAN FIELDS COURT	$42,500
7.88	ZOO ROAD	$57,800
8.004	YELTON COURT	$0
8.144	MCNALLY DRIVE/NATCHEZ COURT	$0
SUBTOTAL INCLUDING MAINTENANCE OF TRAFFIC (10%)		**$2,121,200**
TOTAL CONSTRUCTION ESTIMATE* INCLUDING MOBILIZATION (5%), CONTINGENCY (20%) & CEI (10%)		**$2,866,200**
**Does not include engineering design cost*		

Route:	State Route 11 (Nolensville Pk) from Haywood Ln to
Description:	PIN 125526.15 Pedestrian Road Safety Initiative (PRSI) Projects
Project Type of Work:	Safety
County:	Davidson
Length:	2.06 Miles
Date:	December 14, 2021
Estimate Type:	Conceptual

DESCRIPTION CONSTRUCTION ITEMS (NOT TO INCLUDE ENGINEERING DESIGN)		FIELD REVIEW IMPROVEMENTS	TOTAL
New Traffic Signal		$350,000	$350,000
Curb Ramp Installation		$242,000	$242,000
Pedestrian Signal Improvements		$145,200	$145,200
PHB/HAWK Improvements		$93,000	$93,000
Crosswalk Pavement Markings		$31,000	$31,000
Curb Extensions		$173,000	$173,000
Sidewalk Extensions		$635,000	$635,000
Other Improvements (Signage, Signal Timing, Street Lighting, Refuge Islands, Etc.)		$258,000	$258,000
Maintenance of Traffic (rounded up to next $1,000)	10%	$194,000	$194,000
SUBTOTAL		**$2,121,200**	**$2,121,200**
LOCAL MATCH	10%		
Mobilization (rounded up to next $1,000)	5%		$107,000
Const. Contingency (rounded up to next $1,000)	20%		$425,000
Const. Eng. & Inspec. (rounded up to next $1,000)	10%		$213,000
LOCAL MATCH			$286,620
TOTAL CONSTRUCTION ESTIMATE			**$2,866,200**

3. CRASH DIAGRAMS

TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2021	DAVIDSON	1

CRASH LEGEND

- Vehicle Path (Direction of Travel)
- Backing Vehicle
- Rear End
- Head On
- Side Swipe (Same Direction)
- Side Swipe (Opposite Direction)
- Right Angle
- Left Turn
- Overturn
- Out of Control
- Pedestrian/Bicycle Pedestrian/Motorcycle (Specify Road User)
- Heavy Truck / Bus

CONDITION CODES LEGEND

X - X - X - # ← NUMBER OF VEHICLES

WEATHER	ROAD SURFACE	LIGHTING
C=Clear	D=Dry	D=Daylight
R=Rain	W=Wet	DKN=Dark Not Lighted
CLD=Cloudy	I=Icy	DKL=Dark Lighted
F=Fog	O=Other	DN=Dawn
S=Snow	U=Unknown	DS=Dusk
U=Unknown		U=Unknown

TYPE OF CRASH

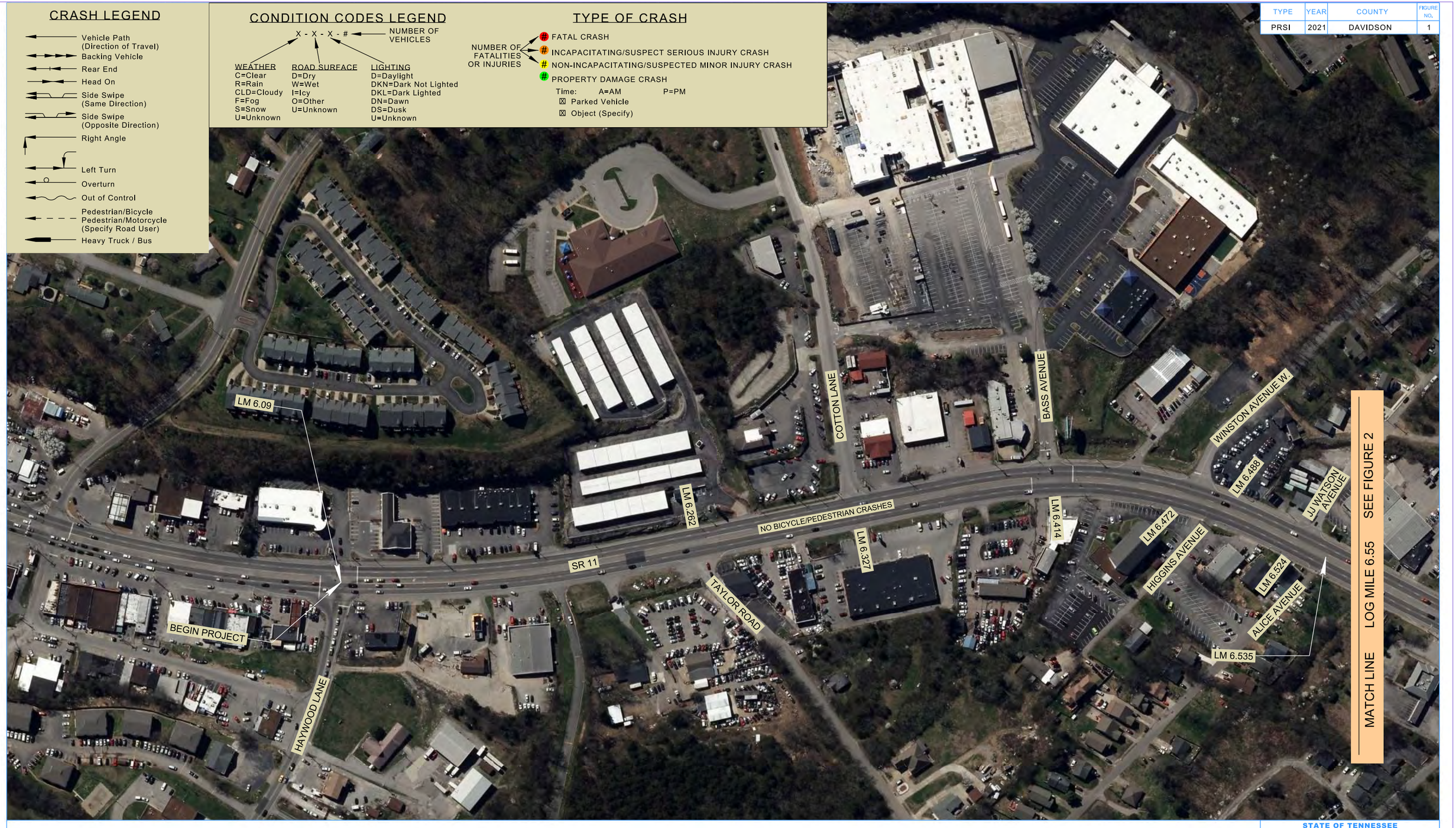
NUMBER OF FATALITIES OR INJURIES

- # FATAL CRASH
- # INCAPACITATING/SUSPECT SERIOUS INJURY CRASH
- # NON-INCAPACITATING/SUSPECTED MINOR INJURY CRASH
- # PROPERTY DAMAGE CRASH

Time: A=AM P=PM

☒ Parked Vehicle

☒ Object (Specify)



0 200' 400' 600'

PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY
BICYCLE/PEDESTRIAN CRASHES 1/1/2016-6/22/2021

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
S.T.I.D.

FIGURE 1
STATE ROUTE 11
LOG MILE 6.09
TO
LOG MILE 6.55

7/13/2021 8:33:53 AM
\\tn-nashville\projects\2020\2002060.07 (TDOT PRSI SR-11 Nolensville Pk Fr. Haywood Ln.)\Engr\Crashes\Crash Diagram\Figure 1.dgn

CRASH LEGEND

- Vehicle Path (Direction of Travel)
- Backing Vehicle
- Rear End
- Head On
- Side Swipe (Same Direction)
- Side Swipe (Opposite Direction)
- Right Angle
- Left Turn
- Overturn
- Out of Control
- Pedestrian/Bicycle Pedestrian/Motorcycle (Specify Road User)
- Heavy Truck / Bus

CONDITION CODES LEGEND

X - X - X - # (NUMBER OF VEHICLES)

WEATHER	ROAD SURFACE	LIGHTING
C=Clear	D=Dry	D=Daylight
R=Rain	W=Wet	DKN=Dark Not Lighted
CLD=Cloudy	I=Icy	DKL=Dark Lighted
F=Fog	O=Other	DN=Dawn
S=Snow	U=Unknown	DS=Dusk
U=Unknown		U=Unknown

TYPE OF CRASH

NUMBER OF FATALITIES OR INJURIES

- # FATAL CRASH
- # INCAPACITATING/SUSPECT SERIOUS INJURY CRASH
- # NON-INCAPACITATING/SUSPECTED MINOR INJURY CRASH
- # PROPERTY DAMAGE CRASH

Time: A=AM P=PM

☒ Parked Vehicle

☒ Object (Specify)

TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2021	DAVIDSON	2

MATCH LINE LOG MILE 6.55 — SEE FIGURE 1

MATCH LINE LOG MILE 7.09 — SEE FIGURE 3

PROVIDENCE HEIGHTS

LM 6.635

LM 6.704

LM 6.59

GOINS ROAD

SR 11

FLORA MAXWELL ROAD

EDMONDSON PIKE

LM 6.85

WALLACE ROAD

HARDING PLACE

LM 7.02

(PEDESTRIAN) 1 06/08/17 11:20A C - D - D - 1

(BICYCLE) 1 12/21/16 03:20P C - D - D - 1

1 06/29/20 10:25P C - D -DKL- 1 (PEDESTRIAN)

1 10/14/16 06:39P C - D -DKL- 1 (PEDESTRIAN)

(PEDESTRIAN) 1 03/22/17 06:00A CLD- D -DKL- 1

(PEDESTRIAN) 1 08/15/19 08:36P C - D -DKL- 1

(PEDESTRIAN) 1 05/11/20 08:57P C - D -DKL- 1

(PEDESTRIAN) 1 04/23/20 06:53P C - D -DS - 1

1 10/08/17 12:27A C - D -DKL- 1 (PEDESTRIAN)

1 05/30/17 03:33P C - D - D - 1 (PEDESTRIAN)

1 03/23/18 05:24A C - D -DKL- 1 (PEDESTRIAN)

1 11/07/17 05:30A R - W -DKL- 1 (PEDESTRIAN)

1 09/08/17 03:15P C - D - D - 1 (PEDESTRIAN)

0 200' 400' 600'

N

PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY
BICYCLE/PEDESTRIAN CRASHES 1/1/2016-6/22/2021

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
S.T.I.D.

FIGURE 2
STATE ROUTE 11
LOG MILE 6.55
TO
LOG MILE 7.09

7/19/2021 3:44:46 PM
\\tn-nashville\projects\2020\2002060.07 (TDOT PRSI SR-11 Nolensville Pk Fr. Haywood Ln.)\Engr\Crashes\Crash Diagram\Figure 2.dgn

TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2021	DAVIDSON	3

CRASH LEGEND

- Vehicle Path (Direction of Travel)
- Backing Vehicle
- Rear End
- Head On
- Side Swipe (Same Direction)
- Side Swipe (Opposite Direction)
- Right Angle
- Left Turn
- Overturn
- Out of Control
- Pedestrian/Bicycle Pedestrian/Motorcycle (Specify Road User)
- Heavy Truck / Bus

CONDITION CODES LEGEND

X - X - X - # ← NUMBER OF VEHICLES

WEATHER	ROAD SURFACE	LIGHTING
C=Clear	D=Dry	D=Daylight
R=Rain	W=Wet	DKN=Dark Not Lighted
CLD=Cloudy	I=Icy	DKL=Dark Lighted
F=Fog	O=Other	DN=Dawn
S=Snow	U=Unknown	DS=Dusk
U=Unknown		U=Unknown

TYPE OF CRASH

NUMBER OF FATALITIES OR INJURIES

- # FATAL CRASH
- # INCAPACITATING/SUSPECT SERIOUS INJURY CRASH
- # NON-INCAPACITATING/SUSPECTED MINOR INJURY CRASH
- # PROPERTY DAMAGE CRASH

Time: A=AM P=PM

☒ Parked Vehicle

☒ Object (Specify)

1 02/19/21 12:05P C - W - D - 1 (PEDESTRIAN)
1 08/29/17 10:15A C - D - D - 1 (PEDESTRIAN)
1 11/22/16 10:31P C - D -DKL- 1 (PEDESTRIAN)

1 07/21/17 10:08P C - D -DKL- 1 (PEDESTRIAN)
1 10/27/16 08:59P C - D -DKL- 1 (PEDESTRIAN)
1 12/10/19 06:15A R - W -DKL- 1 (PEDESTRIAN)
1 06/16/18 09:00P C - D -DKL- 1 (PEDESTRIAN)
1 11/12/17 09:45P C - D -DKL- 1 (PEDESTRIAN)
1 03/12/16 07:25P R - W -DKL- 1 (PEDESTRIAN)
1 05/20/21 10:24P C - D -DKL- 1 (PEDESTRIAN)

(PEDESTRIAN)
1 12/07/20 03:16P U - D - D - 1

(PEDESTRIAN)
1 11/07/19 08:51A R - W - D - 1

(PEDESTRIAN)
1 08/25/19 11:09P R - W -DKL- 1

(WHEELCHAIR PEDESTRIAN)
1 01/29/17 07:25P R - D -DKL- 1

(PEDESTRIAN)
1 07/31/18 04:15P C - D - D - 1

1 10/22/17 07:18P C - D -DKL- 1 (PEDESTRIAN)

1 12/18/16 03:00A R - W -DKL- 1 (PEDESTRIAN)

1 04/16/20 07:00P C - D -DS - 1 (PEDESTRIAN)

1 06/21/17 01:20A C - D -DKL- 1 (PEDESTRIAN)

1 04/06/21 06:54P C - D -DKL- 1 (BICYCLE)
1 12/11/20 09:17P C - D -DKL- 1 (PEDESTRIAN)

1 02/22/16 10:26P R - W -DKL- 1 (PEDESTRIAN)

WELSHWOOD DRIVE
WELCH ROAD
PARAGON MILLS ROAD
ELYSIAN FIELDS ROAD
ELYSIAN FIELDS COURT
SR 11
LM 7.239
LM 7.296
LM 7.40
LM 7.524
LM 7.59

MATCH LINE LOG MILE 7.09 SEE FIGURE 2

MATCH LINE LOG MILE 7.65 SEE FIGURE 4

0 200' 400' 600'

N

PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY
BICYCLE/PEDESTRIAN CRASHES 1/1/2016-6/22/2021

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
S.T.I.D.

FIGURE 3
STATE ROUTE 11
LOG MILE 7.09
TO
LOG MILE 7.65

7/19/2021 3:55:25 PM
\\tn-nashville\projects\2020\2002060.07 (TDOT PRSI SR-11 Nolensville Pk Fr. Haywood Ln.)\Engr\Crashes\Crash Diagram\Figure 3.dgn

TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2021	DAVIDSON	4

CRASH LEGEND

- Vehicle Path (Direction of Travel)
- Backing Vehicle
- Rear End
- Head On
- Side Swipe (Same Direction)
- Side Swipe (Opposite Direction)
- Right Angle
- Left Turn
- Overturn
- Out of Control
- Pedestrian/Bicycle Pedestrian/Motorcycle (Specify Road User)
- Heavy Truck / Bus

CONDITION CODES LEGEND

X - X - X - #

- # = NUMBER OF VEHICLES
- WEATHER: C=Clear, R=Rain, CLD=Cloudy, F=Fog, S=Snow, U=Unknown
- ROAD SURFACE: D=Dry, W=Wet, I=Icy, O=Other, U=Unknown
- LIGHTING: D=Daylight, DKN=Dark Not Lighted, DKL=Dark Lighted, DN=Dawn, DS=Dusk, U=Unknown

TYPE OF CRASH

NUMBER OF FATALITIES OR INJURIES

- # FATAL CRASH
- # INCAPACITATING/SUSPECT SERIOUS INJURY CRASH
- # NON-INCAPACITATING/SUSPECTED MINOR INJURY CRASH
- # PROPERTY DAMAGE CRASH

Time: A=AM P=PM

☒ Parked Vehicle

☒ Object (Specify)

MATCH LINE LOG MILE 7.65 SEE FIGURE 3

(BICYCLE) 1 09/14/18 04:26P C - D - D - 1

(PEDESTRIAN) 1 01/27/18 09:48P R - W -DKL- 1

(PEDESTRIAN) 1 11/25/19 07:10P C - D -DKL- 1

(PEDESTRIAN) 1 12/20/17 04:59P R - W -DS - 1

ZOO ROAD

SR 11

MCNALLY DRIVE

LM 8.004

LM 8.15

LM 7.88

YELTON COURT

LM 8.144

NATCHEZ COURT

END PROJECT

1 03/29/18 03:43A R - W -DKL- 1 (PEDESTRIAN)

1 09/03/19 08:23A C - D - D - 1 (BICYCLE)

1 06/18/21 10:10P C - D -DKL- 1 (PEDESTRIAN)

0 200' 400' 600'

N

PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY
BICYCLE/PEDESTRIAN CRASHES 1/1/2016-6/22/2021

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
S.T.I.D.

FIGURE 4
STATE ROUTE 11
LOG MILE 7.65
TO
LOG MILE 8.15

7/19/2021 4:01:27 PM
\\tn-nashville\projects\2020\2002060.07 (TDOT PRSI SR-11 Nolensville Pk Fr. Haywood Ln.)\Engr\Crashes\Crash Diagram\Figure 4.dgn

4. CRASH MODIFICATION FACTOR (CMF) RESOURCES

U.S. Department of Transportation
Federal Highway Administration
1200 New Jersey Avenue, SE
Washington, DC 20590
202-366-4000

Safety

Toolbox of Countermeasures and Their Potential Effectiveness

Downloadable Version
PDF [552 KB]

FHWA-SA-018-41
September 2018

Introduction

A CMF is the proportion of crashes that are expected to remain after the countermeasure is implemented. For example, an expected 20 percent reduction in crashes would correspond to a CMF of (1.00 – 0.20) = 0.80. In some cases, the CMF is negative, i.e. the implementation of a countermeasure is expected to lead to a percentage increase in crashes.

One CMF estimate is provided for each countermeasure. Where multiple CMF estimates were available from the literature, selection criteria were used to choose which CMFs to include in the issue brief:

Crash Reduction Factors

A CRF is the percentage crash reduction that might be expected after implementing a given countermeasure. In some cases, the CRF is negative, i.e. the implementation of a countermeasure is expected to lead to a percentage increase in crashes.

One CRF estimate is provided for each countermeasure. Where multiple CRF estimates were available from the literature, selection criteria were used to choose which CRFs to include in the issue brief:

- First, CMFs from studies that took into account regression to the mean and changes in traffic volume were preferred over studies that did not.
- Second, CMFs from studies that provided additional information about the conditions under which the countermeasures was applied (e.g. road type, area type) were preferred over studies that did not.

Where these criteria could not be met, a CMF may still be provided. In these cases, it is recognized that the estimate of the CMF may not be as reliable, but is the best available at this time. The CMFs in this issue brief may be periodically updated as new information becomes available.

The Desktop Reference for Countermeasures includes most of the CMFs included in this issue brief, and adds many other CMFs available in the literature. A few CMFs found in the literature were not included in the Desktop

Reference. Those excluded CMFs were considered to have smaller sample sizes or too large a standard error to be meaningful, or the original research did not provide sufficient detail for the CMF to be useful.

A CMF should be regarded as a generic estimate of the effectiveness of a countermeasure. The estimate is a useful guide, but it remains necessary to apply engineering judgment and to consider site-specific environmental, traffic volume, traffic mix, geometric, and operational conditions which will affect the safety impact of a countermeasure. Actual effectiveness will vary from site to site. The user must ensure that a countermeasure applies to the particular conditions being considered. The reader is also encouraged to obtain and review the original source documents for more detailed information, and to search databases such as the National Transportation Library (ntlsearch.bts.gov) for information that becomes available after the publication of this issue brief.

Return to top

Using the Tables

The CRFs for pedestrian crashes are presented in three tables which summarize the available information. The Tables are:

Table 1: Signalization Countermeasures
Table 2: Geometric Countermeasures
Table 3: Signs, Markings, Operational Countermeasures

Each table has the following columns:

- Countermeasure = the countermeasure name.
- Crash Severity = the crash severity used in the analysis. Where available, separate CMFs are provided for different crash severities. The crash severities are: all, fatal/injury, fatal, or injury. The categories depend on the approach taken by the original study. For example, some studies referred to fatal/injury (fatal and injury crashes combined). Some distinguished fatal from injury. "All" is used for CMFs from studies which did not specify
  the severity.
- CMF for Crash Type (SE) = the CMF value selected from the literature, listed under the column(s) for the appropriate crash type (All, Left-Turn, or Pedestrian). CMFs listed under the Pedestrian column refer to the reduction in crashes involving pedestrians crossing the street, unless otherwise specified. Standard error (SE) for the CMF is provided in parenthesis where available. The standard error is the standard deviation of the error in the estimate of the CMF. The true value of the CMF is unknown for a given treatment type. The standard error provides a measure of the precision of the estimate of the true
  value of the CMF. A relatively small standard error indicates that a CMF is more precisely known. A relatively large standard error indicates that a CMF is less precisely known.
- Reference Number = the reference number for the source information, as given in the reference list in this document.
- CMF ID = ID number of the CMF in the CMF Clearinghouse.
- Star Rating – an indicator of the quality or confidence of the CMF and is based on the following factors: study design, sample size, standard error, potential bias, and data source. The ratings range from 1 to 5 where 5 indicates the highest or most reliable rating.

Cells with "—" indicate that no information is reported in the source document. For additional information, visit the FHWA Office of Safety website (safety.fhwa.dot.gov).

Example

COUNTERMEASURE	CRASH SEVERITY	CMF FOR CRASH TYPE (SE)			REFERENCE NUMBER	CMF ID	STAR RATING
		ALL	LEFT	PEDESTRIAN			

			TURN				
Exclusive Pedestrian Phase	All	—	—	0.49 (0.16)	2	4117	2

Using the first countermeasure from Table 1 as an example, the following information can be gained from the table:

1. The countermeasure name is "Exclusive Pedestrian Phase."
2. The crash severity is "All," meaning that the original study calculated the CMF for all crash severities combined or did not specify a crash severity.
3. A CMF of 0.49 is listed under the "Pedestrian" column, meaning that a (1.00 - 0.49) = 51% reduction in pedestrian crashes is expected for this countermeasure.
4. The "—" in the "All" and "Left-Turn" columns indicates that CMFs for these crash types were not provided in the original study.
5. The standard error for this CMF is 0.16.
6. The reference number is 2, which refers to the 2012 study by Chen, Chen, Ewing, McKnight, Srinivasan, and Roe in the references list.
7. The CMF ID is 4117 in the CMF Clearinghouse.
8. This study has a 2 star rating.

Other Useful Resources

- www.cmfclearinghouse.org
- www.walkinginfo.org
- www.walkinginfo.org/pedsafe/
- safety.fhwa.dot.gov/provencountermeasures

TABLE 1. SIGNALIZED COUNTERMEASURES

COUNTERMEASURE	CRASH SEVERITY	CMF FOR CRASH TYPE (SE)			REFERENCE NUMBER	CMF ID	STAR RATING
		ALL	LEFT TURN	PEDESTRIAN			
Exclusive Pedestrian Phase	All	—	—	0.49 (0.16)	2	4117	2
Improved Signal Timing (ITE)	Fatal/Injury	—	—	0.63	14	383	2
Replace Existing "Walk/ Don't Walk" Signals with Pedestrian Countdown Signal Head	All	—	—	0.75	9	—	—
Replace Existing "Walk/ Don't Walk" Signals with Pedestrian Countdown Signal Head	All	—	—	0.3	15	5272	4
Implement Leading Pedestrian Interval (LPI)	All	—	—	0.413 (0.064)	4	1993	3
Remove Unwarranted Signals (One-Way	All	—	—	0.83	12	331	3

Street)							
Pedestrian Hybrid Beacon (PHB)	All	—	—	0.45 (0.167)	17	9020	4
PHB and Advanced Yield/Stop Markings/ Signs	All	—	—	0.43 (0.134)	17	9021	4
Increase Pedestrian Crossing Time	All	—	—	0.49 (0.10)	2	4658	3
Add New Traffc Signals, when Warranted	All	0.75 (0.07)	—	—	2	4658	3

TABLE 2. GEOMETRIC COUNTERMEASURES

COUNTERMEASURE	CRASH SEVERITY	CMF FOR CRASH TYPE (SE)			REFERENCE NUMBER	CMF ID	STAR RATING
		ALL	LEFT TURN	PEDESTRIAN			
Install Pedestrian Overpass/Underpass	Fatal/Injury	—	—	0.1	6	—	—
Install Pedestrian Overpass/Underpass	All	—	—	0.14	6	—	—
Install Pedestrian Overpass/Underpass (Unsignalized Intersection)	All	—	—	0.87	8	—	—
Install Raised Median	All	—	—	0.75	6	—	—
Install Raised Median at Unsignalized Crossing	All	—	—	0.69 (0.183)	17	8799	3
Install Raised Pedestrian Crossing	All	0.7	—	—	1	—	—
Install Raised Pedestrian Crossing	Fatal/Injury	0.64	—	—	1	—	—
Install Sidewalk	All	—	—	0.12	10	—	—
Provide Paved Shoulder	All	—	—	0.29	6	—	—
Narrow Roadway from Four Lanes to Three Lanes (Two Through Lanes with Center Turn Lane)	All	0.71	—	—	7	199	5
Road Diet–Urban Area	All	—	—	0.81	11	5554	4

				(0.005)			
Road Diet–Suburban Area	All	—	—	0.53 (0.02)	12	2841	4

TABLE 3. SIGNS, MARKINGS, AND OPERATIONAL COUNTERMEASURES

COUNTERMEASURE	CRASH SEVERITY	CMF FOR CRASH TYPE (SE)			REFERENCE NUMBER	CMF ID	STAR RATING
		ALL	LEFT TURN	PEDESTRIAN			
Add Overhead Lighting	Injury Crashes	—	—	0.77	7	199	5
Improve Pavement Friction (Skid Treatment with Overlay)	Fatal/Injury	—	—	0.97	6	—	—
Increase Enforcement	All	—	—	0.77	16	—	—
Prohibit Right-Turn-on-Red	All	0.97	—	—	7	199	5
Prohibit Left Turns	All	—	—	0.9	6	—	—
Restrict Parking Near Intersections (to Off-Street)	All	—	—	0.7	6	—	—
High-Visibility Crosswalk	All	—	—	0.52 (0.17)	2	4658	3
Convert Parallel Lane to High-Visibility Crosswalk (School Zone)	All	—	—	0.63	5	2697	3
Advanced Stop/Yield	All	—	—	0.75 (0.230)	17	9017	3
Rectangular Rapid-Flashing Beacon (RRFB)	All	—	—	0.53 (0.377)	17	9024	2

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3. De Brabander, B. and Vereeck, L., "Safety Effects of Roundabouts in Flanders: Signal type, speed limits and vulnerable road users." AAP-1407, Elsevier Science, (2006).
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5. Feldman, M., J. Manzi, and M. Mitman. "An Empiracal Bayesian Evaluation of the Safety Effects of High-Visibility School (Yellow) Crosswalks in San Francisco, California." Transportation Research Record: Journal of the Transportation Research Board, No. 2198, Transportation Research Board, Washington, D.C., 2010, pp. 8-14.
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9. Markowitz, F., Sciortino, S., Fleck, J. L., and Yee, B. M., "Pedestrian Countdown Signals: Experience with an Extensive Pilot Installation." Institute of Transportation Engineers Journal, Vol. January 2006, ITE, (1-1-2006) pp. 43-48. Updated by Memorandum, Olea, R., "Collision changes 2002-2004 and countdown signals," (February 7th, 2006).
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Page last modified on October 16, 2018

CRASH MODIFICATION FACTORS CLEARINGHOUSE

CMF / CRF DETAILS

CMF ID: 8481

INSTALL PEDESTRIAN SIGNALS

DESCRIPTION:

PRIOR CONDITION: INTERSECTIONS WITHOUT PEDESTRIAN SIGNALS

CATEGORY: PEDESTRIANS

STUDY: *DEVELOPING CRASH MODIFICATION FUNCTIONS FOR PEDESTRIAN SIGNAL IMPROVEMENT*, SACCHI ET AL., 2015

Star Quality Rating:	★★★★☆ [VIEW SCORE DETAILS]
Rating Points Total:	115

Crash Modification Factor (CMF)

Value:

$$CMF_{FI} = 0.552 \times (V^*_{M,1} \times V^*_{m,1})^{0.076} \times \exp(0.090 \times Area + 0.189[1 - (0.621)^s]/s)$$

Where:

V_M = Major Road AADT (in thousands of vehicles)

V_m = Minor Road AADT (in thousands of vehicles)

Area = Area Type Indicator (Residential = 0, Commercial = 1)

S = Number of years since treatment installation

Adjusted Standard Error:	
Unadjusted Standard Error:	

Crash Reduction Factor (CRF)

Value:	
Adjusted Standard Error:	
Unadjusted Standard Error:	

Applicability

Crash Type:	All
Crash Severity:	K (fatal),A (serious injury),B (minor injury),C (possible injury)
Roadway Types:	Not specified
Number of Lanes:	

Road Division Type:	
Speed Limit:	
Area Type:	Urban and suburban
Traffic Volume:	
Average Traffic Volume:	
Time of Day:	Not specified

If countermeasure is intersection-based

Intersection Type:	
Intersection Geometry:	4-leg
Traffic Control:	Signalized
Major Road Traffic Volume:	Minimum of 5120 to Maximum of 44800 Annual Average Daily Traffic (AADT)
Minor Road Traffic Volume:	Minimum of 650 to Maximum of 9530 Annual Average Daily Traffic (AADT)
Average Major Road Volume :	23326 Annual Average Daily Traffic (AADT)
Average Minor Road Volume :	2130 Annual Average Daily Traffic (AADT)

Development Details

Date Range of Data Used:	2005 to 2013
Municipality:	Metro Vancouver
State:	
Country:	Canada
Type of Methodology Used:	10
Sample Size (crashes):	36 crashes
Sample Size (sites):	13 sites
Sample Size (site-years):	53 site-years

Other Details

Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	Mar-13-2017
Comments:	

VIEW THE FULL STUDY DETA

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CRASH MODIFICATION FACTORS CLEARINGHOUSE

CMF / CRF DETAILS

CMF ID: 2089

RESTRICT LEFT OR RIGHT TURN (TRANSIT-SERVICED LOCATIONS)

DESCRIPTION:

PRIOR CONDITION: SIGNALIZED INTERSECTION

CATEGORY: ACCESS MANAGEMENT

STUDY: *ANALYSIS OF TRANSIT SAFETY AT SIGNALIZED INTERSECTIONS IN TORONTO*, SHALAH ET AL., 2009

Star Quality Rating:	[VIEW SCORE DETAILS]
Rating Points Total:	115

Crash Modification Factor (CMF)

Value:	0.87
Adjusted Standard Error:	
Unadjusted Standard Error:	0.02

Crash Reduction Factor (CRF)

Value:	13.4 *(This value indicates a **decrease** in crashes)*
Adjusted Standard Error:	
Unadjusted Standard Error:	2

Applicability

Crash Type:	All
Crash Severity:	All
Roadway Types:	Not Specified
Number of Lanes:	
Road Division Type:	
Speed Limit:	
Area Type:	Urban
Traffic Volume:	
Average Traffic Volume:	
Time of Day:	All

If countermeasure is intersection-based

Intersection Type:	Roadway/roadway (not interchange related)
Intersection Geometry:	
Traffic Control:	Signalized
Major Road Traffic Volume:	Minimum of 3556 to Maximum of 50877 Annual Average Daily Traffic (AADT)
Minor Road Traffic Volume:	
Average Major Road Volume :	
Average Minor Road Volume :	

Development Details

Date Range of Data Used:	1999 to 2003
Municipality:	City of Toronto, Canada
State:	
Country:	
Type of Methodology Used:	7
Sample Size (sites):	1655 sites

Other Details

Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	Dec-01-2009
Comments:	

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CRASH MODIFICATION FACTORS CLEARINGHOUSE

CMF / CRF DETAILS

CMF ID: 9738

PRESENCE OF DRIVEWAY ON AN INTERSECTION APPROACH CORNER

DESCRIPTION:

PRIOR CONDITION: NO DRIVEWAYS WITHIN 50 FEET OF ANY APPROACH CORNER AT A SIGNALIZED INTERSECTION

CATEGORY: ACCESS MANAGEMENT

STUDY: *SAFETY EVALUATION OF CORNER CLEARANCE AT SIGNALIZED INTERSECTIONS*, LE ET AL., 2018

Star Quality Rating:	★★★★★ [VIEW SCORE DETAILS]
Rating Points Total:	150

Crash Modification Factor (CMF)

Value:	0.79
Adjusted Standard Error:	
Unadjusted Standard Error:	0.08

Crash Reduction Factor (CRF)

Value:	21 *(This value indicates a **decrease** in crashes)*
Adjusted Standard Error:	
Unadjusted Standard Error:	8

Applicability

Crash Type:	All
Crash Severity:	K (fatal),A (serious injury),B (minor injury),C (possible injury)
Roadway Types:	Not specified
Number of Lanes:	
Road Division Type:	
Speed Limit:	
Area Type:	Not specified
Traffic Volume:	
Average Traffic Volume:	
Time of Day:	All

If countermeasure is intersection-based

Intersection Type:	Roadway/roadway (not interchange related)
Intersection Geometry:	4-leg
Traffic Control:	Signalized
Major Road Traffic Volume:	Minimum of 10406 to Maximum of 93000 Annual Average Daily Traffic (AADT)
Minor Road Traffic Volume:	Minimum of 500 to Maximum of 48000 Annual Average Daily Traffic (AADT)
Average Major Road Volume :	37945 Annual Average Daily Traffic (AADT)
Average Minor Road Volume :	8598 Annual Average Daily Traffic (AADT)

Development Details

Date Range of Data Used:	2009 to 2011
Municipality:	
State:	CA, NC
Country:	United States
Type of Methodology Used:	7
Sample Size (crashes):	1568 crashes
Sample Size (sites):	275 sites
Sample Size (site-years):	825 site-years

Other Details

Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	Oct-27-2018
Comments:	This CMF is for the presence of a driveway on 1 approach corner within 50 feet of a signalized intersection compare driveways present.

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5. IMPROVEMENT PRIORITIZATION

The short-term, mid-term, and long-term improvements identified by KCI, TDOT, and the project team were prioritized based on their respective expected crash reductions to pedestrian/vehicle type crashes. Careful consideration was taken by KCI and the project team to select and prioritize improvements that align with the goals of TDOT and the needs of the impacted community along State Route 11 (Nolensville Pike). The procedures used to prioritize these improvements are based on methodologies provided in the FHWA manual, *Crash Modification Factors in Practice: Using CMFS to Quantify the Safety in the Value Engineering Process* which describes typical practices from the American Association of State Highway Transportation Officials' (AASHTO) *Highway Safety Manual*. More specifically, KCI implemented the "observed crash frequency with crash modification factor (CMF)" method. This methodology is particularly effective when sufficient crash data is available for the study location. In addition to requiring historical crash data, the methodology utilizes industry standard crash modification factors. Per the FHWA, "a CMF estimates a safety countermeasure's ability to reduce crashes and crash severity. Transportation professional frequently use CMF values to identify countermeasures with the greatest safety benefit for a particular crash type or location."

To select CMF's for the study locations, a list of countermeasures were identified, relevant CMFs were obtained, and CMF applicability was verified for pedestrian/vehicle type crashes in urban/suburban areas. To obtain applicable CMFs, the analyst first consulted Appendix B of the *FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations*. These are listed in the Table below:

Appendix B: CRF and CMF Summary Table

Table 3. CRFs and CMFs by countermeasure.

Countermeasure	CRF	CMF	Basis	Reference
Crosswalk visibility enhancement[1]	—	—	—	—
Advance STOP/YIELD signs and markings	25%	0.75	Pedestrian crashes[2]	Zegeer, et. al. 2017
Add overhead lighting	23%	0.77	Total injury crashes	Harkey, et. al. 2008
High-visibility marking[3]	48%	0.52	Pedestrian crashes	Chen, et. al., 2012
High-visibility markings (school zone)[3]	37%	0.63	Pedestrian crashes	Feldman, et. al. 2010
Parking restriction on crosswalk approach	30%	0.70	Pedestrian crashes	Gan, et. al., 2005
In-street Pedestrian Crossing sign	UNK	UNK	N/A	N/A
Curb extension	UNK	UNK	N/A	N/A
Raised crosswalk (speed tables)	45%	0.55	Pedestrian crashes	Elvik, et. al., 2004
	30%	0.70	Vehicle crashes	
Pedestrian refuge island	32%	0.68	Pedestrian crashes	Zegeer, et. al., 2017
PHB	55%	0.45	Pedestrian crashes	Zegeer, et. al., 2017
Road Diet – Urban area	19%	0.81	Total crashes	Pawlovich, et. al., 2006
Road Diet – Suburban area	47%	0.53	Total crashes	Persaud, et. al., 2010
RRFB	47%	0.53	Pedestrian crashes	Zegeer, et. al. 2017

[1]This category of countermeasure includes treatments which may improve the visibility between the motorist and the crossing pedestrian.
[2]Refers to pedestrian street crossing crashes, and does not include pedestrians walking along the road crashes or "unusual" crash types.
[3]The effects of high-visibility pavement markings (e.g., ladder, continental crosswalk markings) in the "after" period is compared to pedestrian crashes with parallel line markings in the "before" period.

For countermeasures not considered in the FHWA manual, additional transportation resources were consulted, including the AASHTO *Highway Safety Manual*, the FHWA *Toolbox of Countermeasures and Their Potential Effectiveness,* and the CMF Clearinghouse database, which is a database that allows users to search CMFs from carefully vetted transportation research studies. Relevant CMF resources utilized in this study are contained in the Appendix.

To apply CMFs to the observed crashes in the study area, historical non-motorized crash data was obtained from Enhanced Tennessee Roadway Information Management System (ETRIMS) for the time period between January 1, 2016 and June 22, 2021. This data was further filtered to only include crashes occurring between June 22, 2016 and June 22, 2021 to account for a 5-year analysis period. In total, forty-two (42) non-motorized crashes were recorded in the study area during the sixty-four (64) month (5.3 year) period. The State Route 11 (Nolensville Pike) corridor was divided into the nine (9) signalized intersections, twelve (12) unsignalized intersections, and one (1) mid-block crossing as listed in the previous section. Observed Crashes were assigned to each of these twenty-two (22) locations using engineering judgement based on information in the crash diagrams produced by KCI.

The selected CMFs were applied as a multiplicative factor to the number of observed crashes at each location to estimate a reduced number of anticipated crashes after the countermeasure has been implemented. The following equation was applied at each location:

$$N_{exp} = N_{obs} * (CMF_1 * CMF_2 * CMF_{3\ldots})$$

Where,

N_{obs} is the number of observed crashes at a given location within a specific period

N_{exp} is the number of expected crashes to occur at a specific location within a specific period

CMF_1, CMF_2, CMF_3… are the applicable crash modification factors at a specific location.

The anticipated 5-year crash total was calculated separately for each location following short-term, mid-term, and long-term improvements to develop a method of prioritization for each improvement type. The 5-year crash totals observed and the anticipated 5-year crash totals determined at each location were analyzed as a historic yearly crash rates ($\frac{5-year\ N_{obs}}{5\ years}$ and $\frac{5-year\ N_{exp}}{5\ years}$). To determine the effectiveness of short-term, mid-term, and long-term improvements the difference in anticipated and observed yearly crash rates were calculated for each improvement category at each location. Locations (including signalized intersections, un-signalized intersections, and roadway segments) were ranked based on the anticipated improvement in yearly crash rates for each improvement category. The tables provided in the Appendix show location prioritization for short-term, mid-term, and long-term improvements, respectively.

The summary table shown below is compiled to provide TDOT additional assistance in the improvement prioritization process. Included for each location, are the number of non-motorized crashes observed during the five-year period, the yearly observed crash rate, the expected yearly crash rate following short term (st), mid-term (mt), and long-term (lt) improvements, and the difference in observed and expected crash rates. Also listed to assist with the decision process are the expected rates if short-term and mid-term improvements both were to be implemented (st & mt), and the expected rates if all improvements were to be implemented (total). The locations in the table are listed in descending order based on the anticipated improvement in yearly crash rates for the improvement category that provides the most significant benefit (max: st, mt, lt). Additionally, KCI has provided a column listing the most cost-effective solution to prioritize for each location based on anticipated crash reduction and type of improvement (prioritized recommendation). Location IDs are provided in the summary table that directly correlate to the improvement tables shown previously. These tables may be referenced for specific improvements at each location. Supplemental improvement concept layouts have also been provided in the Appendix by KCI.

Special consideration should be given when improvement locations are dependent on another improvement. For example, new curb ramps and pedestrian signals may be recommended on the same intersection approach where reduced curb radii are recommended. Therefore, the installation of pedestrian equipment and new curb ramps should consider the revised curb radii. Another example to be considered is a location where detectable warning mats are recommended as a short-term improvement, but a revised curb is recommended for mid-term improvements. In this scenario, it may be intuitive to install the warning mat during construction of the revised curb and pedestrian curb ramps.

Davidson County
State Route 11 (Nolensville Pike)
From Haywood Lane (L.M. 6.09) to McNally Drive (L.M. 8.15)
PIN 125526.15

LOCATION BASED CRASH ANALYSES RESULTS - IMPROVEMENT PRIORITIZATION RANKINGS AND RECOMMENDATIONS ALONG SR-11 (NOLENSVILLE PIKE)

Rank	ID	LOCATION	Nobs	Years	Obs/yr	Nexp/yr (st)	**(Obs-Exp)/yr (st)**	Nexp/yr (mt)	**(Obs-Exp)/yr (mt)**	Nexp/yr (Tot)	**(Obs-Exp)/yr (Total)**
1	14	STATE ROUTE 11 (NOLENSVILLE PIKE) AND WALMART DRIVEWAY	10	5.33	1.88	1.78	**0.09**	0.42	**1.46**	0.40	**1.48**
2	13	STATE ROUTE 11 (NOLENSVILLE PIKE) AND STATE ROUTE 255 (HARDING PLACE)	7	5.33	1.31	0.55	**0.76**	0.62	**0.69**	0.26	**1.05**
3	12	STATE ROUTE 11 (NOLENSVILLE PIKE) AND EDMOND PIKE / WALLACE ROAD	5	5.33	0.94	0.76	**0.18**	0.44	**0.50**	0.36	**0.58**
4	22	STATE ROUTE 11 (NOLENSVILLE PIKE) AND MCNALLY DRIVE / NATCHEZ COURT*	3	5.33	0.56	0.11	**0.45**	0.56	**0.00**	0.11	**0.45**
5	20	STATE ROUTE 11 (NOLENSVILLE PIKE) AND ZOO ROAD	3	5.33	0.56	0.46	**0.11**	0.16	**0.41**	0.13	**0.44**
6	15	STATE ROUTE 11 (NOLENSVILLE PIKE) AND WELSHWOOD DRIVE	4	5.33	0.75	0.49	**0.26**	0.49	**0.26**	0.32	**0.43**
7	18	STATE ROUTE 11 (NOLENSVILLE PIKE) AND ELYSIAN FIELDS ROAD	2	5.33	0.38	0.38	**0.00**	0.04	**0.34**	0.04	**0.34**
8	16	STATE ROUTE 11 (NOLENSVILLE PIKE) AND WELCH ROAD	3	5.33	0.56	0.51	**0.06**	0.28	**0.28**	0.25	**0.31**
9	19	STATE ROUTE 11 (NOLENSVILLE PIKE) AND ELYSIAN FIELDS ROAD / ELYSIAN FIELDS COURT	3	5.33	0.56	0.46	**0.11**	0.36	**0.20**	0.29	**0.27**
10	17	STATE ROUTE 11 (NOLENSVILLE PIKE) AND PARAGON MILLS ROAD	1	5.33	0.19	0.15	**0.04**	0.05	**0.14**	0.04	**0.15**
11	11	STATE ROUTE 11 (NOLENSVILLE PIKE) AND FLORA MAXWELL ROAD	1	5.33	0.19	0.17	**0.02**	0.03	**0.16**	0.03	**0.15**
12	1	STATE ROUTE 11 (NOLENSVILLE PIKE) AND HAYWOOD LANE	0	5.33	0.00	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**
13	4	STATE ROUTE 11 (NOLENSVILLE PIKE) AND BASS AVENUE	0	5.33	0.00	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**
14	2	STATE ROUTE 11 (NOLENSVILLE PIKE) AND TAYLOR ROAD	0	5.33	0.00	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**
15	3	STATE ROUTE 11 (NOLENSVILLE PIKE) AND COTTON LANE	0	5.33	0.00	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**
16	5	STATE ROUTE 11 (NOLENSVILLE PIKE) AND WINSTON AVENUE WEST	0	5.33	0.00	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**
17	6	STATE ROUTE 11 (NOLENSVILLE PIKE) AND HIGGINS STREET	0	5.33	0.00	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**
18	7	STATE ROUTE 11 (NOLENSVILLE PIKE) AND J.J. WATSON AVENUE	0	5.33	0.00	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**
19	8	STATE ROUTE 11 (NOLENSVILLE PIKE) AND ALICE AVENUE	0	5.33	0.00	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**
20	9	STATE ROUTE 11 (NOLENSVILLE PIKE) AND PROVIDENCE HEIGHTS	0	5.33	0.00	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**
21	10	STATE ROUTE 11 (NOLENSVILLE PIKE) AND GOINGS ROAD	0	5.33	0.00	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**
22	21	STATE ROUTE 11 (NOLENSVILLE PIKE) AND YELTON COURT	0	5.33	0.00	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**

*Improvements to the intersection of State Route 11 (Nolensville Pike) and McNally Drive/Natchez Court are being made under a separate project and are not reflected in the PRSI recommendations.

NOTE: Locations above the red line represent priority recommendations for the PRSI project based on expected crash reduction and budget. Locations below the red line represent opportunities for additional improvements. Location IDs provided in the summary table directly correlate to the improvement tables shown in the report. These tables may be referenced for specific improvements at each location. It should be noted that improvements to bicyclist safety are not fully captured in the prioritization analyses in this report. Therefore, additional benefits may be observed at select locations where improvements to bicycle infrastructure are provided such as State Route 11 (Nolensville Pike) at Haywood Lane, State Route 11 (Nolensville Pike) at Edmondson Pike / Wallace Road, State Route 11 (Nolensville Pike) at State Route 255 (Harding Place), and State Route 11 (Nolensville Pike) at Welshwood Drive.

STATE ROUTE 11 (NOLENSVILLE PIKE) - ESTIMATED PEDESTRIAN CRASH REDUCTION RATE AND COST SUMMARY FOR SHORT AND MID-TERM IMPROVEMENTS ONLY			
PRIORITY	**EXPECTED PEDESTRIAN CRASH REDUCTION PER YEAR**	**INTERSECTION**	**ESTIMATED COST**
1	1.48	WALMART DRIVEWAY	$532,000
2	1.05	STATE ROUTE 255 (HARDING PL)	$230,000
3	0.58	EDMONDSON PK/WALLACE RD	$656,500
4	0.44	ZOO RD	$57,800
5	0.43	WELSHWOOD DR	$64,000
6	0.34	ELYSIAN FIELDS RD	$165,800
7	0.31	WELCH RD	$51,000
8	0.27	ELYSIAN FIELDS RD/ELYSIAN FIELDS CT	$42,500
9	0.15	PARAGON MILLS RD	$128,600
10	0.15	FLORA MAXWELL RD	$161,800
11	0.00	HAYWOOD LN	$142,600
12	0.00	BASS AVE	$92,500
13	0.00	TAYLOR RD	$56,300
14	0.00	COTTON LN	$51,300
15	0.00	WINSTON AVE WEST	$51,300
16	0.00	HIGGINS ST	$1,300
17	0.00	J.J. WATSON AVE	$51,300
18	0.00	ALICE AVE	$16,300
19	0.00	PROVIDENCE HEIGHTS	$1,300
20	0.00	GOINS RD	$51,300
21	0.00	YELTON CT	$1,300
PRIORITY 1-10 SUBTOTAL INCLUDING MAINTENANCE OF TRAFFIC (10%)			**$2,121,200**
PRIORITY 1-10 TOTAL CONSTRUCTION ESTIMATE* INCLUDING MOBILIZATION (5%), CONTINGENCY (20%) & CEI (10%)			**$2,866,200**
**Does not include engineering design cost*			

NOTE: Locations above the red line represent priority recommendations for the PRSI project based on expected crash reduction and budget. Locations below the red line represent opportunities for additional improvements and details can be found in the **Additional Improvement Appendices.**

6. FIELD REVIEW SIGN IN SHEET

TDOT PRSI SR-11 (NOLENSVILLE PIKE)
FIELD REVIEW MEETING
SIGN-IN
AUGUST 12, 2021

NAME	ORGANIZATION	PHONE	EMAIL
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7. GENERAL NOTES

KCI discussed various project details along the corridor with TDOT, NDOT, WeGo, GNRC, and Walk Bike Nashville staff. Among them were the lack of safe access and overall comfort level for pedestrians along the SR-11 (Nolensville Pike) corridor. While bike lanes are present along the majority of the study area, improvements could still be implemented by filling gaps where shared lanes are designated and by providing physical separation in the buffered sections. However, many significant improvements to the sidewalk network and non-motorized facilities are recommended to create a safe and attractive environment for all non-motorized users. During the field review, pedestrians were observed regularly walking in the bike lanes along the corridor due to the absence of continuous sidewalk.

New sidewalks filling existing sidewalk gaps should be installed on both the east and west sides of SR-11 (Nolensville Pike) throughout the project limits to eliminate sidewalk gaps along the corridor. While sidewalk gaps throughout the corridor need to be addressed, many locations are expected to impact utilities and existing commercial developments. Additional right-of-way and survey data would be needed to determine the feasibility of sidewalk installation at these locations. However, two (2) specific sections were identified by the project team during the field review meeting for potential installation with limited impacts. The sections identified will provide needed connections to nearby bus stops, schools, and high-frequency pedestrian destinations and tie into crosswalk locations. In addition, several long sections of SR-11 (Nolensville Pike) have a wide outside shoulder adjacent to buffered bike lanes. This space could be very advantageous for constructing new sidewalks or a shared use path within the existing right-of-way. The specific sidewalk gaps to be addressed are displayed in the aerial figures below and include:

- The east side of SR-11 (Nolensville Pike) from Haywood Lane south to the existing bus stop.

- The east side of SR-11 (Nolensville Pike) between Elysian Fields Road and Zoo Road, which includes removal of the right-turn lane at the Windlands Center driveway, as well as both sides of SR-11 (Nolensville Pike) between Zoo Road and McNally Drive.

In addition to new sidewalk connections, significant improvements could be made to improve the safety and overall comfort level of existing sidewalks for pedestrians. Low cost, short-term solutions could include the retrofitting of existing pedestrian infrastructure to reach a required level of ADA compliance. Additionally, regulatory and maintenance improvements could be considered, such as enforcing the speed limit to 40 mph as well as more frequent street cleaning and vegetation clearing by the TDOT Highway Beautification Office. High vehicle speeds were observed throughout the entire project limits and roadway debris was observed as an obstruction to pedestrian travel. Higher cost, longer-term solutions could include widened sidewalks to improve walkability and removal of utility pole obstructions. Obstructions within sidewalks commonly reducing the effective widths to less than five (5) feet along the entire project limits in combination with heavy vehicles and high speeds in the adjacent travel lanes creates a stressful environment for non-motorized travel.

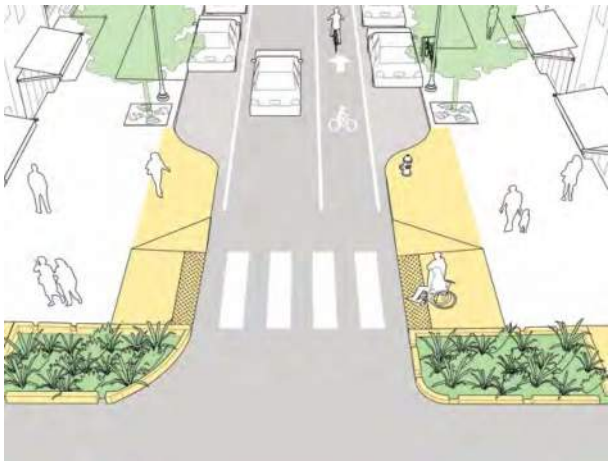
Street lighting should be improved on SR-11 (Nolensville Pike) throughout the entire project limits. Pedestrian and bicycle crash data assembled between January 1, 2016 and June 22, 2021 reveals a total of 42 crashes with non-motorized roadway users occurred during that time. Of the 42 total crashes, 31 (or 74%) occurred during dark or dusk lighting conditions. A high rate of crashes in dark conditions could correlate to a higher rate of severe crashes. According to the United States Department of Transportation National Highway Safety Administration (NHTSA), 76% of all pedestrian fatalities occurred in dark conditions. The Federal Highway Administration's (FHWA) Safe Transportation for Every Pedestrian (STEP) program identifies street lighting as an effective countermeasure to improving pedestrian safety. Information from FHWA states that:

> "Studies have identified a strong relationship between darker conditions and more severe injury pedestrian crashes. Appropriate lighting should increase visibility of pedestrian crosswalks and reduce glare for motorists. Illumination may also encourage more pedestrians to use crosswalks. Generally, overhead lights should be placed in advance of crosswalks and intersections, on both approaches, illuminating pedestrians from the sides and not creating overhead shadows on people crossing the road. At intersections, overhead lighting is estimated

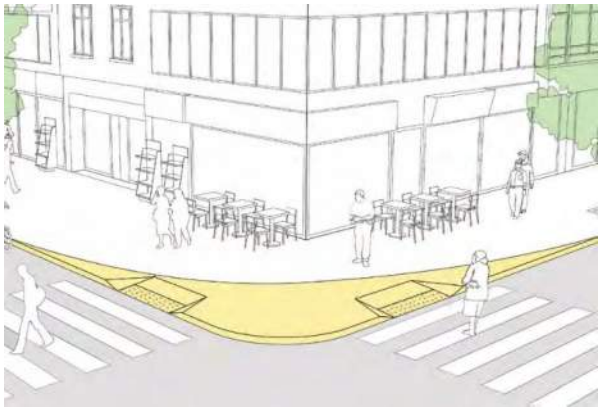
to reduce all types of injury crashes by 27%. Outside of intersections, overhead lighting improvements are estimated to reduce all types of injury crashes by 23%."

Corridor-wide improvements to street lighting on SR-11 (Nolensville Pike) should be implemented to improve the safety of non-motorized users. In addition to increases in the coverage of corridor lighting, light-emitting diode (LED) streetlights should be considered. Brighter LED streetlights will not only provide better visibility than the existing conditions, but they are also more environmentally friendly by reducing energy consumption and typically require less maintenance. Supplemental countermeasures, such as reflective signage, LED signs, crosswalk illumination, pedestrian hybrid beacons, and leading pedestrian intervals (LPI) can provide additional improvements to pedestrian safety in dark conditions.

Multiple locations were identified along the SR-11 (Nolensville Pike) corridor, particularly at stop controlled minor side streets, where the installation of curb extensions or pedestrian bulb-outs could improve pedestrian safety by reducing pedestrian crossing distances and exposure time. The curb extension, or pedestrian bulb-out, would utilize roadway width that is not needed for turning or moving vehicles to allow more space for pedestrians. NDOT requires a minimum roadway width of 27 feet, including the gutter pan, between curb extensions on Residential Low-Density Minor and Local Streets. Additional survey may be required in certain areas with drainage or underground utility concerns. In conjunction with or where curb extensions are not feasible, reducing intersection curb radii to slow turning vehicles should be considered. Curb radii between 10 feet and 15 feet could be applied depending on the specific location and design vehicle. Appropriate guidelines from TDOT, the National Association of City Transportation Officials (NACTO), and specific details adopted by NDOT should be adhered to during design.



Example of Curb Extensions (Source: NACTO)



Example of Reduced Curb Radius (Source: NACTO)

Two (2) unsignalized intersections on SR-11 (Nolensville Pike) were identified through the analysis of crash data and during field review observations where the need for actuated control would improve pedestrian safety, particularly in the area surrounding existing bus stops. Pedestrian hybrid beacons (PHB), commonly

referred to as a high intensity activated crosswalk (HAWK) beacons were preferred by the field review team for mid-block crossing control on this corridor. Prior to implementation, pedestrian traffic counts should be conducted, and the minimum threshold of 20 hourly pedestrian crossings specified by the *Manual of Uniform Traffic Control Devices* (MUTCD) should be considered. Proposed locations for new PHB/HAWK installations are near heavily used transit stops and adjacent to commercial and civic destinations frequented by pedestrians. Therefore, it is expected that the minimum threshold of 20 hourly pedestrian crossings will be achieved. Locations identified for installation of a PHB/HAWK include:

- At or near the intersection of Flora Maxwell Road. This location was identified due to a heavily used bus stop and a heavily trafficked grocery store.
- At or near the intersection of Elysian Fields Rd. This location was identified due to a history of pedestrian crashes, a community center, and a nearby bus stop.

Example of PHB/HAWK (Source: FHWA Safety Program)

The current 2009 Edition of MUTCD states "The pedestrian hybrid beacon should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs". Some of the locations identified above would not meet this guidance. However, a new edition of the MUTCD is expected in the near future and draft versions have removed the 100 foot separation guidance, which would allow a PHB/HAWK to be placed at an intersection controlled by stop or yield signs.

In the event that the new MUTCD does not remove the 100-foot separation guidance or if PHB/HAWK installation is found to be not feasible, then rectangular rapid flashing beacons (RRFB) should be considered as an alternative. If RRFBs are installed on SR-11 (Nolensville Pike), which carries a 5-lane section through the majority of the project limits, then they should be overhead mounted for added visibility. The preferred design would include one (1) overhead mast arm mounted RRFBs (dual sided) in addition to two (2) post mounted RRFB on both sides of the roadway. Solar power and wireless communication could be used to simplify construction. MUTCD Interim Approval (IA-21) provides guidelines for overhead RRFBs under the current edition of the (MUTCD).

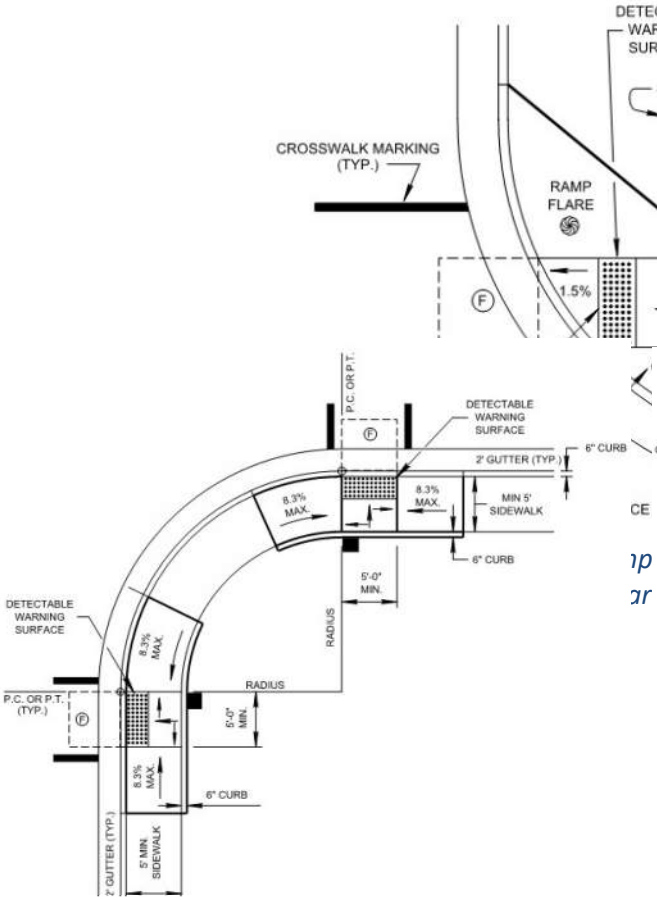
Example of Overhead & Pole Mounted RRFB Devices (Source: TAPCO)

Crosswalk pavement markings shall be longitudinal bar style, which are used on all TDOT routes and are preferred for all midblock crossing locations. Pavement markings at intersections with a concrete roadway surface at SR-11 (Nolensville Pike) / SR-255 (Harding Place) were observed to be worn and noted by TDOT and NDOT as being difficult to maintain due to the lack of adhesion between concrete and thermoplastic pavement markings. Application of an epoxy primer prior to thermoplastic installation on concrete is recommended to improve adhesion and durability. As crosswalks are applied on concrete roadway surfaces, they should be installed with longitudinal style white bars framed by black bands to increase visibility on the existing light-colored concrete pavement.

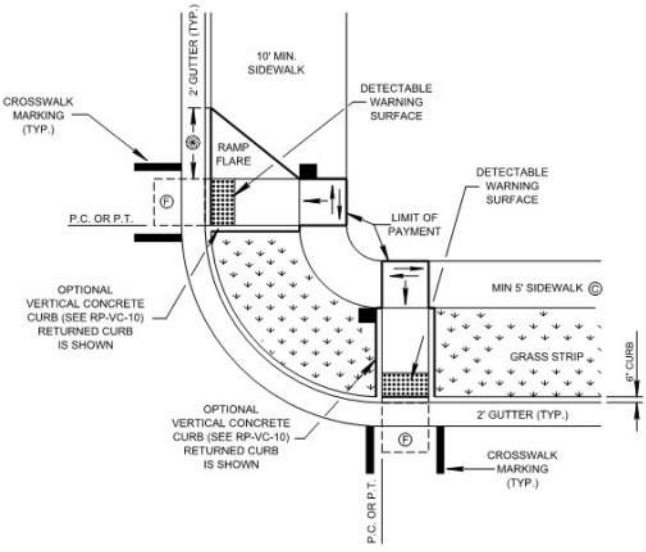
Pedestrian signal accommodations are generally provided along the SR-11 (Nolensville Pike) corridor. However, multiple locations were identified for improvements during the field review meeting that would improve accessibility. In many locations accessible pedestrian signals (APS) are required to ensure ADA compliance, including the installation of pedestal poles and/or pedestrian pushbutton posts. Specific

pedestrian signal improvements for each intersection are detailed in the Intersection Improvement Review section below.

Various curb ramp design elements within the limits of the SR-11 (Nolensville Pike) project are generally non-compliant or do not meet current preferred standards, particularly at minor street crossings, including the orientation of curb ramps for dual crossings and single crossings. The orientation of the curb ramps should direct pedestrian travel into the crosswalk compared to the travel lanes within the intersection. Multiple locations were deemed to have a non-standard orientation based on TDOT's multimodal standard drawings (MM-CR-1 through MM-CR-9). TDOT and NDOT require truncated dome surfaces to be yellow in color.



Example of Parallel Curb Ramp Outside Radius (Source: TDOT Standard Drawing MM-CR-6)



Example of Perpendicular Curb Ramp Outside Radius (Source: TDOT Standard Drawing MM-CR-6)

Heavy pedestrian traffic at signalized intersections, particularly in the area surrounding bus stops, and aggressive motorist behavior were observed at multiple locations during the field review meeting. The

project team would like to consider providing the following traffic signal associated countermeasures to improve pedestrian safety throughout the SR-11 (Nolensville Pike) corridor project limits.

- Leading Pedestrian Intervals (LPIs) for pedestrian crossings at all signalized intersections to help improve pedestrian safety. In addition, it is recommended that each intersection be examined for walk/flashing don't walk pedestrian signal timing adjustments, as needed, for compliance with the MUTCD and ADA.
- Flashing yellow arrow (FYA) traffic signal operations to replace all protected/permissive left turn signal operations. At this time, KCI is not recommending the installation of FYA due to the lack of available research correlating FYA to improvements in pedestrian safety. NDOT does not typically install FYA signal operations in Davidson County.
- Implementation of a "hot response" from pedestrian signals at high volume pedestrian locations and near bus stops. A "hot response" provides a pedestrian phase quickly after activation, which can improve compliance and reduce overall delay for pedestrians at a signalized intersection. A "hot response" may be particularly effective at midblock crossing locations controlled by PHBs where the distance to other signalized crossings is significant and may encourage use of the protected crossing.

The following safety needs and countermeasures refer to the improvements of bike lanes along the State Route 11 (Nolensville Pike) corridor. Raised concrete/landscaped center median along the corridor to visually reduce the overall width of the roadway and to effectively implement access management techniques may enhance the safety and functionality of the roadway system for all users. Preferred locations for installation may be determined based on the presence of transit facilities, grocery stores, schools, parks, or other community destinations. Red colored pavement markings in dedicated transit lanes or in combined bus/bicycle lanes have been shown to enhance the conspicuity of the bus stop. Vertical protection elements such as flexible delineators, bollards, or other vertical features consistent with TDOT Multimodal standards, within the existing bike lane buffer where adequate width exists and does not conflict with roadways or driveways may improve cyclist comfort level and bike lane usability. Green colored pavement markings in bike lanes where conflicts may be more pronounced and through intersections should be used to visually enhance the extension of the bike lane.

Example of Center Median (Source: FHWA)

Example of Green Bike Lanes (Source: NACTO)

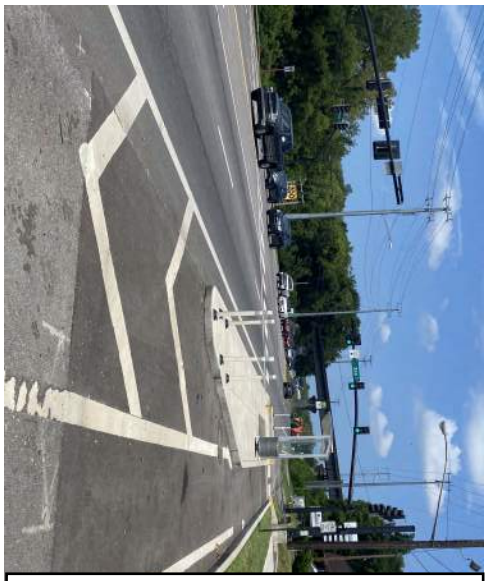
8. FIELD REVIEW PHOTOS

Nolensville at Zoo - North

Nolensville at Zoo - Southeast

Nolensville at Zoo - Southeast

Nolensville at Zoo - Southeast



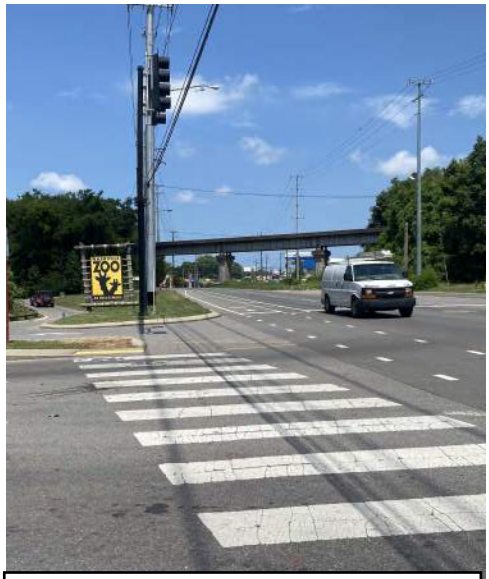
Nolensville at Zoo - Southeast

Nolensville at Zoo - Southeast

Nolensville at Zoo - Southwest

Nolensville at Zoo - Northwest

Nolensville at Zoo - Northwest



Nolensville at Zoo - Northwest

Nolensville at Zoo - Southeast

Nolensville at Zoo - Southwest

Nolensville at Zoo - Southwest

Nolensville at Zoo - Southwest

Nolensville at Zoo - Northwest

Nolensville at Zoo - Northwest

Nolensville at Zoo - Northwest

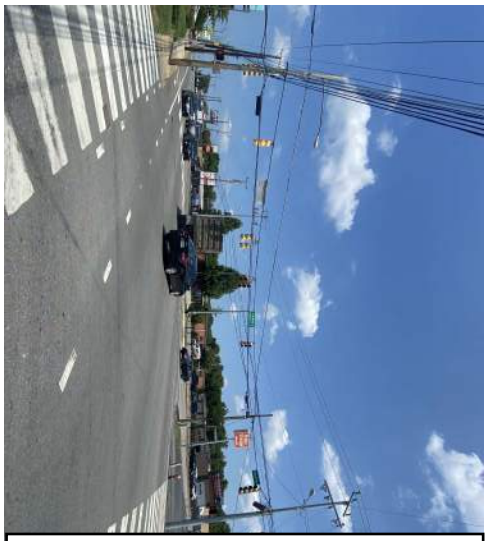
Nolensville at Zoo - Northwest

Nolensville at McNally - South

Nolensville at McNally - Northwest

Nolensville at McNally - Northwest

Nolensville at McNally - Northeast



Nolensville at McNally - Northeast

Nolensville at Paragon Mills - Southwest

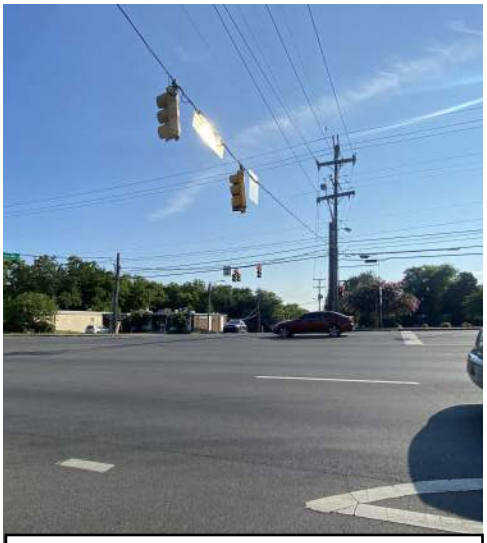
Nolensville at Paragon Mills - East

Nolensville at Paragon Mills - East

Nolensville at Paragon Mills - Southwest

Nolensville at Paragon Mills - Northwest

Nolensville at Paragon Mills - Southwest



Nolensville at Paragon Mills - Northeast

Nolensville at Paragon Mills - Northeast

Nolensville at Paragon Mills - Southeast

Nolensville at Paragon Mills - West

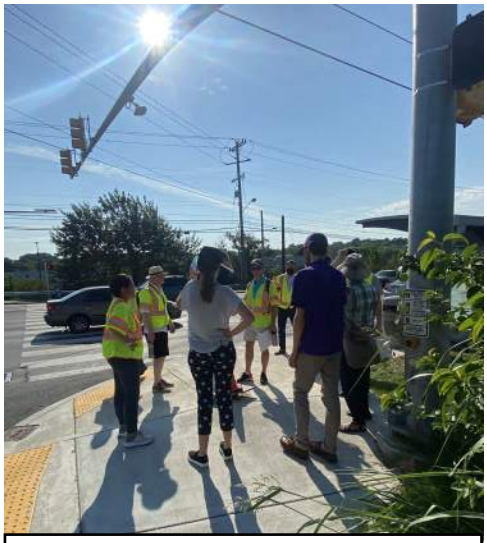
Nolensville at Paragon Mills - East

Nolensville at Paragon Mills - Southeast

Nolensville at Paragon Mills - Northwest

Nolensville at Welshwood - Northwest

Nolensville at Welshwood - Southwest



Nolensville at Welshwood - Southwest

Nolensville at Welshwood - Northeast

Nolensville at Welshwood - South

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Nolensville at Welshwood - Southeast

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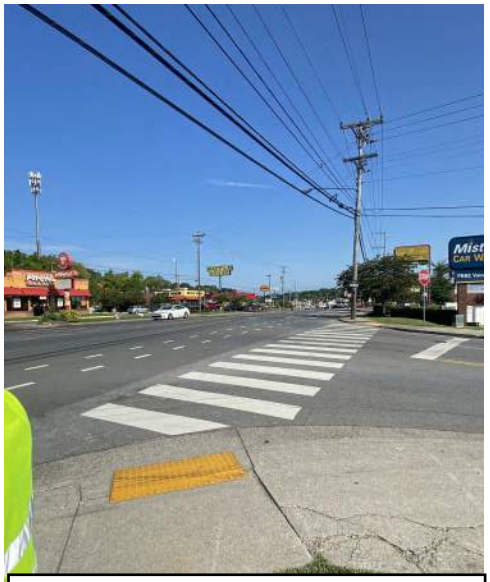
Nolensville at Welshwood - Northeast

Nolensville at Welshwood - Northwest



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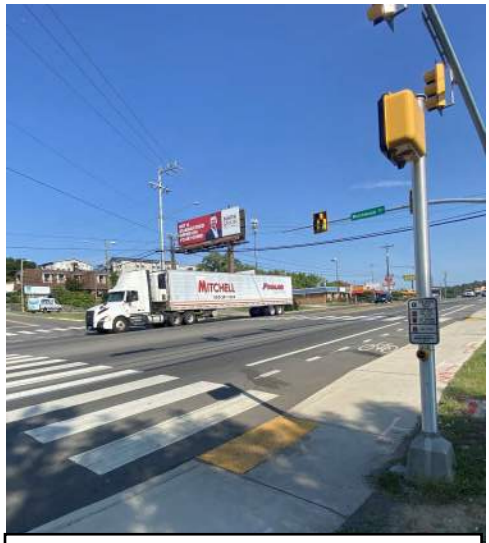

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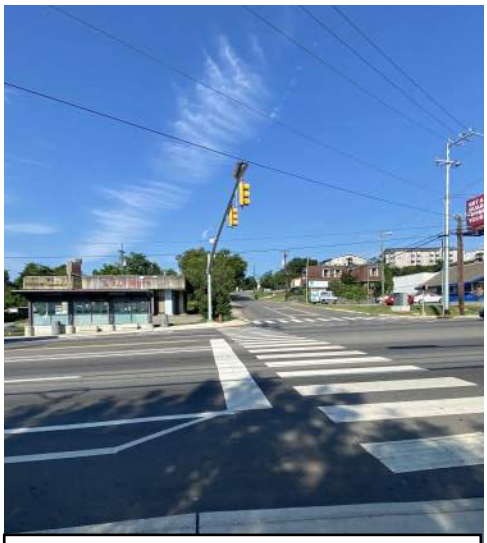


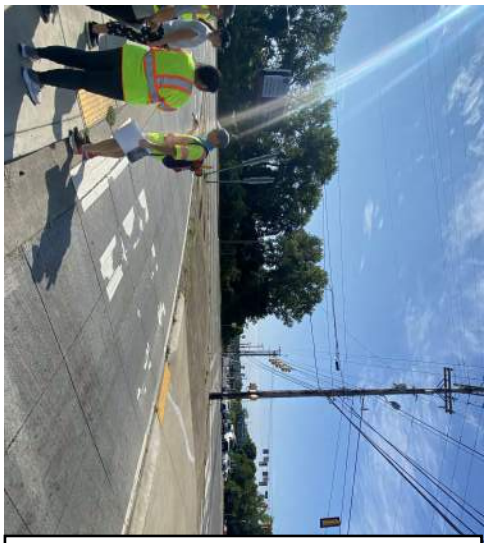
Nolensville at Welshwood - Southwest

Nolensville at Welshwood - North

Nolensville at Welshwood - South

Nolensville at Welshwood - South

Nolensville at Harding - North



Nolensville at Harding - Northeast

Nolensville at Harding - Northeast

Nolensville at Harding - Northeast

Nolensville at Harding - Southwest

Nolensville at Harding - Southeast

Nolensville at Harding - Southeast

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Nolensville at Harding - East

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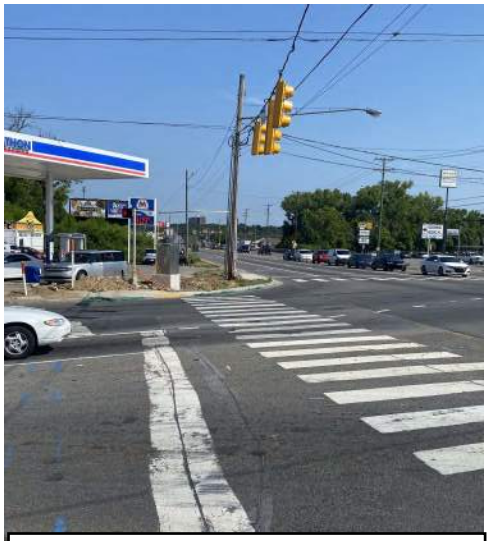
Nolensville at Harding - Southwest

Nolensville at Harding - Northwest



Nolensville at Edmondson - Northwest

Nolensville at Edmondson - Southeast

Nolensville at Edmondson - Southeast

Nolensville at Edmondson - Northeast

Nolensville at Edmondson - Northwest

Nolensville at Edmondson - West

Nolensville at Edmondson - Northwest

Nolensville at Edmondson - Northeast

Nolensville at Edmondson - Northwest

Nolensville at Edmondson - Northeast

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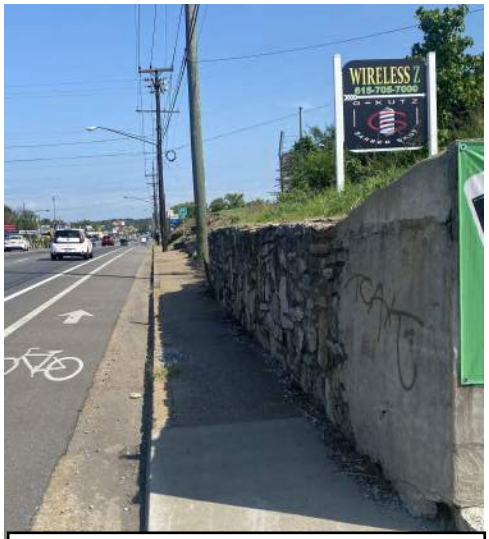

Nolensville at Flora Maxwell - North

Nolensville at Flora Maxwell - North

Nolensville at Flora Maxwell - Northeast

Nolensville at Flora Maxwell - Southeast

Nolensville at Flora Maxwell - East

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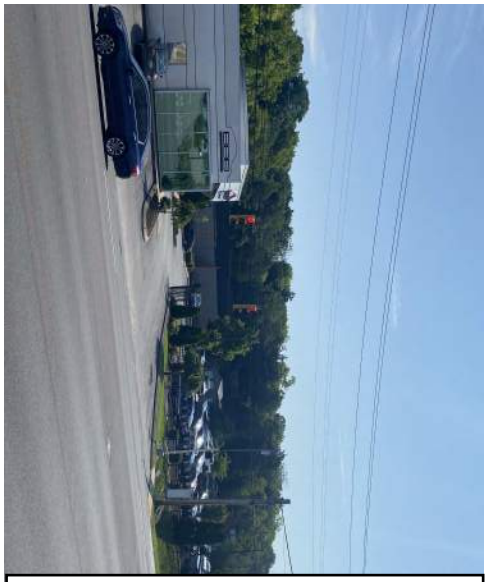
Nolensville at Flora Maxwell - Southeast

Nolensville at Bass - Southwest

Nolensville at Bass - Northwest

Nolensville at Bass - Northwest



Nolensville at Bass - East

Nolensville at Bass - East

Nolensville at Bass - West

Nolensville at Bass - Southwest

Nolensville at Bass - Southwest

Nolensville at Bass - Southwest

Nolensville at Bass - Southeast

Nolensville at Bass - North

Nolensville at Bass - South

Nolensville at Cotton - North

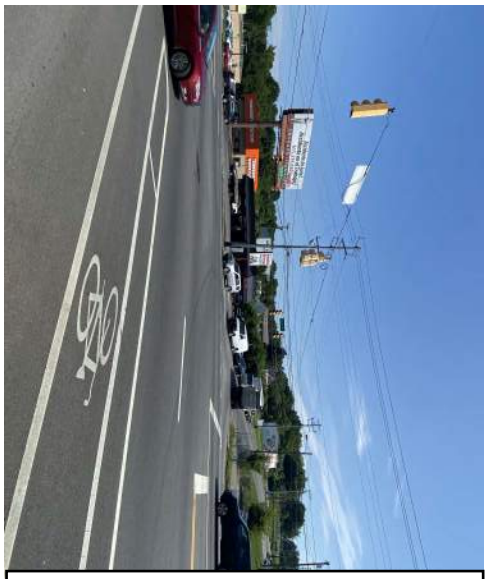
Nolensville at Cotton - North

Nolensville at Cotton - North

Nolensville at Cotton - South

Nolensville at Haywood - Northwest

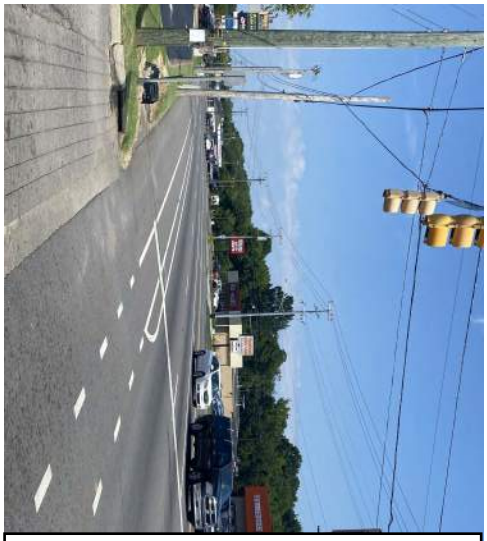
Nolensville at Haywood - North



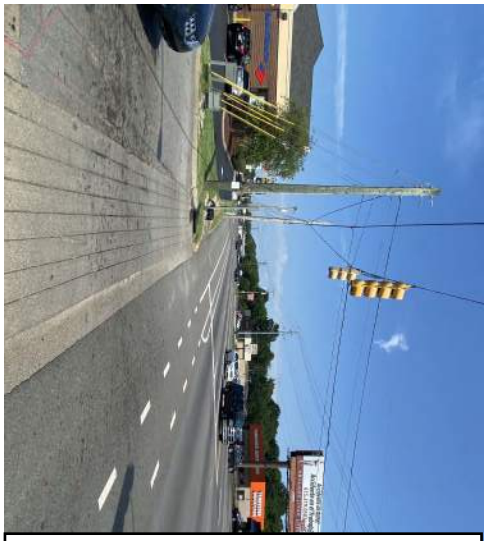
Nolensville at Haywood - East

Nolensville at Haywood - Northwest

Nolensville at Haywood - Southeast



Nolensville at Haywood - Northwest

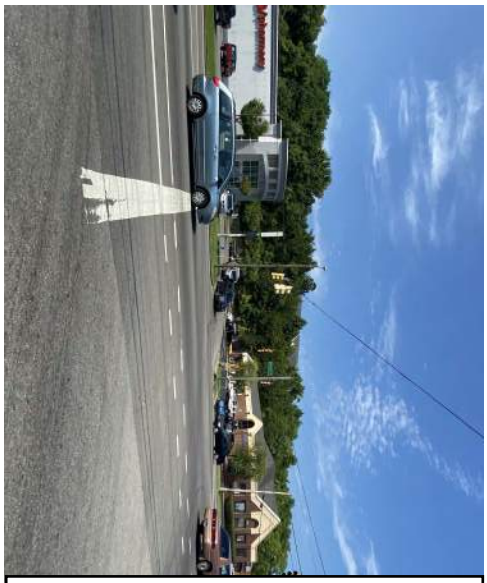


Nolensville at Haywood - Northwest

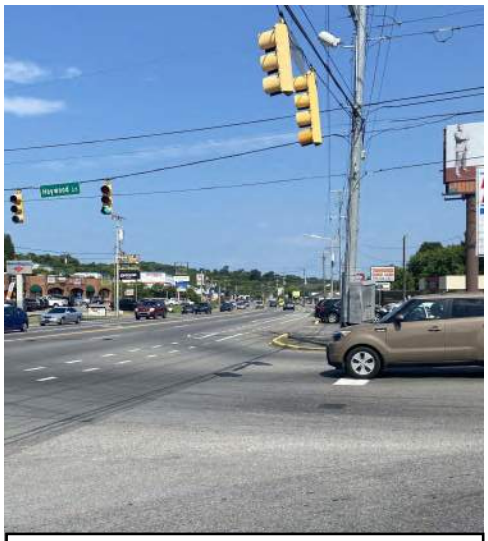
Nolensville at Haywood - Southeast

Nolensville at Haywood - Northeast

Nolensville at Haywood - Southeast



Nolensville at Haywood - West



Nolensville at Haywood - Northeast

Nolensville at Goins - Southeast

Nolensville at Goins - Northeast

Nolensville at Goins - South

Nolensville at Goins - South

Nolensville at Elysian Fields (Signalized) - South

Nolensville at Elysian Fields (Signalized) - South

Nolensville at Elysian Fields (Signalized) - North

Nolensville at Elysian Fields (Signalized) - South

Nolensville at Elysian Fields (Signalized) - South

Nolensville at Elysian Fields (Signalized) - North

Nolensville at Elysian Fields (Signalized) - North

Nolensville at Elysian Fields (Signalized) - North

Nolensville at Elysian Fields (Unsignalized) - Northeast

Nolensville at Elysian Fields (Unsignalized) - Southeast

Elysian Fields Rd at Elysian Fields Ct - North

Elysian Fields Rd at Elysian Fields Ct - Northwest

Elysian Fields Rd at Elysian Fields Ct - Northwest

Elysian Fields Rd at Elysian Fields Ct - Northeast

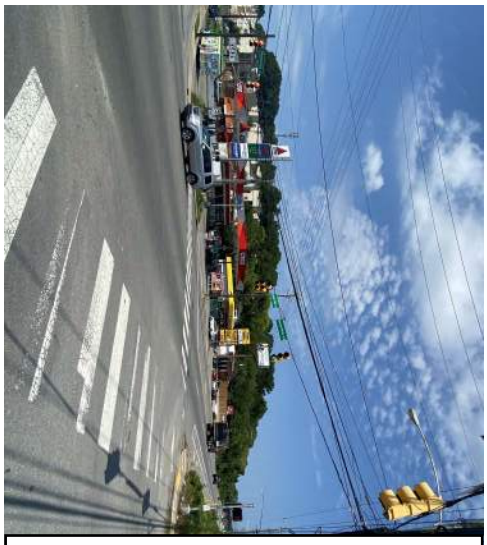
Nolensville at Elysian Fields (Unsignalized) - North

Nolensville at Elysian Fields (Unsignalized) - North

Nolensville at Elysian Fields (Unsignalized) - North

Nolensville at Elysian Fields (Signalized) - Southeast

Nolensville at Elysian Fields (Signalized) - West



Nolensville at Elysian Fields (Signalized) - Northwest

Nolensville at Elysian Fields (Signalized) - East

Nolensville at Elysian Fields (Signalized) - Northeast

Nolensville at Elysian Fields (Signalized) - Northeast

Nolensville at Elysian Fields (Signalized) - Northeast

Nolensville at Elysian Fields (Signalized) - South

Nolensville at Elysian Fields (Signalized) - South

Nolensville at Music City Thrift - South

Nolensville at Music City Thrift - South

Nolensville at Music City Thrift - Northeast

Nolensville at Music City Thrift - South

Nolensville at Music City Thrift - North

9. URBAN SMART CHANNEL OVERVIEW

1. BACKGROUND

The geometry of the channelized right turn lanes do not prioritize pedestrian crossing safety at the intersection of Nolensville Pike (SR-11) and Harding Place (SR-255). This conventional style of right turn lane, often referred to as a "slip lane", is designed in a way to increase capacity and to reduce delay to right turning vehicles at intersections. Common engineering principles for right turn slip lanes allow right turn movements to traverse at a high rate of speed without a signalized traffic control device. While the intersection being considered for improvements is controlled by an existing traffic signal, the right turn slip lane movements for each approach are not.

Right turn slip lanes can be challenging for pedestrians traversing through an intersection that facilitates this type of turning movement and as a result, pedestrian safety is decreased by several design elements, including the following:

- Acceleration Lanes – slip lanes that provide acceleration lanes to the intersecting roadway don't require turning traffic to yield to traffic on the intersecting roadway. This may result in higher turning speeds through the approach and may decrease yielding behavior to pedestrians by motorists.
- Flat Entry Angles – flatter angles of entry to the intersecting roadway can be detrimental for the sight lines approaching the pedestrian crosswalk prior to the intersecting roadway and may result in higher turning speeds.
- Large corner Radii – large corner radii can accommodate large turning vehicles but may also encourage higher turning speeds resulting in insufficient distance to perceive and yield to pedestrians given the greater distance covered during reaction time and braking.
- Lane Width – wider lane widths increase pedestrian crossing distance and exposure time in the slip lane and may result in higher turning speeds.

A crash analysis between 2016 – 2020 at the intersection of Nolensville Pike (SR-11) and Harding Place (SR-255), indicated that there were four (4) pedestrian-related crashes at this intersection and one (1) crash was attributed to a potential pedestrian crossing in the right turn slip lane. One (1) pedestrian-related crash, not occurring in the right turn slip lane, resulted in one (1) pedestrian fatality.

2. EXISTING CONDITIONS

The existing right turn slip lanes at this intersection are presented in Figure 1 and are detailed Table 1 below.

Intersecting Roadway	Approx. Approach Angle	Right Turn Slip Lane Movement	Approx. Slip Lane Entry Angle	Intersecting Condition	Approx. Slip Lane Width
EB Harding Place	85°	NB Nolensville Pike	33°	Merge	16’
WB Harding Place	82°	SB Nolensville Pike	32°	Merge	16’
NB Nolensville Pike	95°	WB Harding Place	35°	Merge	16’
SB Nolensville Pike	98°	EB Harding Place	21°	Accel	16’

TABLE 1 – EXISTING SLIP LANE GEOMETRY AT NOLENSVILLE PIKE (SR-11) & HARDING PLACE (SR-255)

The flat-angle entry, shown in Table 1 and Figure 1, is typically appropriate for right turn slip lanes with either yield control or no control for vehicles at the entry to the cross street as the reduction in right turn delay is reduced with the increase in speed. Figure 2 shows the negative impacts of a flat angle of entry for the slip lane movements at this intersection.

FIGURE 1 – EXISTING SLIP LANE GEOMETRY AT NOLENSVILLE PIKE (SR-11) & HARDING PLACE (SR-255)

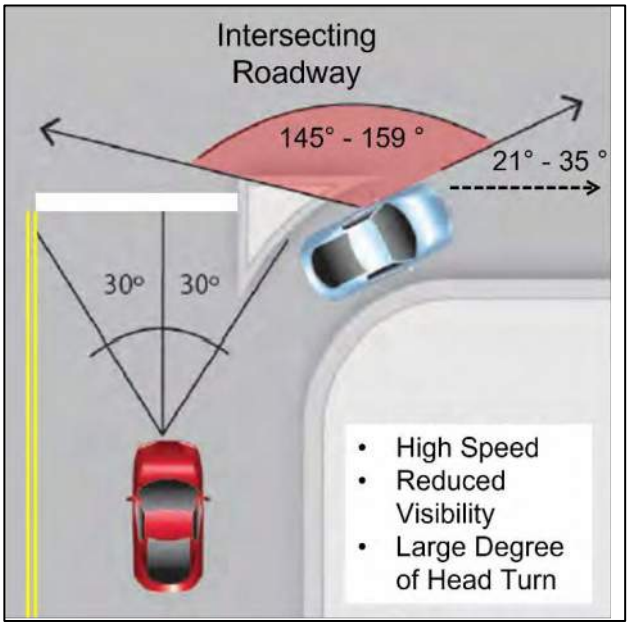


FIGURE 2 – EXISTING SLIP LANE ENTRY ANGLE GEOMETRY

3. PROPOSED CONDITIONS

While right turn slip lanes with flat-angle entries are advantageous for motorists in areas with infrequent or no pedestrian activity, they can be detrimental to nonmotorized safety in locations that support walkable, bikeable, and transit dependent areas by encouraging higher turning speeds. Conversely, improvements proposed in the Nolensville Pike (SR-11) Pedestrian Road Safety Initiative (PRSI) project support a modified right turn slip lane design that may improve pedestrian safety by prioritizing the following outcomes:

- Slower turning speeds
- Increased visibility of pedestrians crossing the slip lane and the intersecting roadway
- Reduced pedestrian exposure in the roadway

To achieve these PRSI goals at the study intersection, the reconstruction of the right turn channelizing islands can influence the speed at which right turn movements are made as well as the angle at which right turning vehicles approach the intersecting roadway. Commonly referred to as “pork chop” islands, these refuges for pedestrians can be redesigned to accommodate the safety goals mentioned previously.

New construction guidance by the City of Ottawa, Ontario details an improved channelizing island at slip lane locations and is referred to as an “urban smart channel”. This modification to the conventional pork chop island incorporates several improved design features, including:

- A sharper angle of entry into the cross street of approximately 70 degrees, encouraging slower turning speeds while still maintaining yielding movements for vehicular traffic
- The improved approach angle does not require a large degree of head rotation from drivers in order to identify a safe gap in the conflicting traffic stream
- Delineates a narrower turning path for motorists using pavement markings or other corner treatments while allowing a curbed radius to accommodate larger vehicle turning movement, as necessary
- The crosswalk is installed in unobstructed view of the motorist approaching the slip lane, not while reaching a higher speed prior to merging into the conflicting traffic stream

Initial studies indicate that the design promotes slower entry speeds compared to the conventional design without compromising vehicular traffic flow, in addition to improved pedestrian comfort. Beginning in 2009, the City of Ottawa, Ontario has also found that the urban smart channel may have a smaller footprint than the conventional design and may require less right-of-way for new installations and the ability to repurpose space for pedestrians for retrofit installations. Additionally, the Texas Department of Transportation (TxDOT) conducted a research project in 2014 aimed to address pedestrian related crashes involving right turning vehicles at slip lanes. The culmination of the research project identified the “urban smart channel” as inspiration for new design guidelines to better accommodate motorists, pedestrians, and bicyclists throughout the state.

A conceptual design of the urban smart channel with a right turn deceleration lane is presented in Figure 3 and is more appropriate for balancing speed and pedestrian safety. Figure 4 shows the positive impacts of a sharper angle of entry for the slip lane movements at this intersection. This design concept would be similar to what the PRSI project is proposing for all approaches of the study intersection.

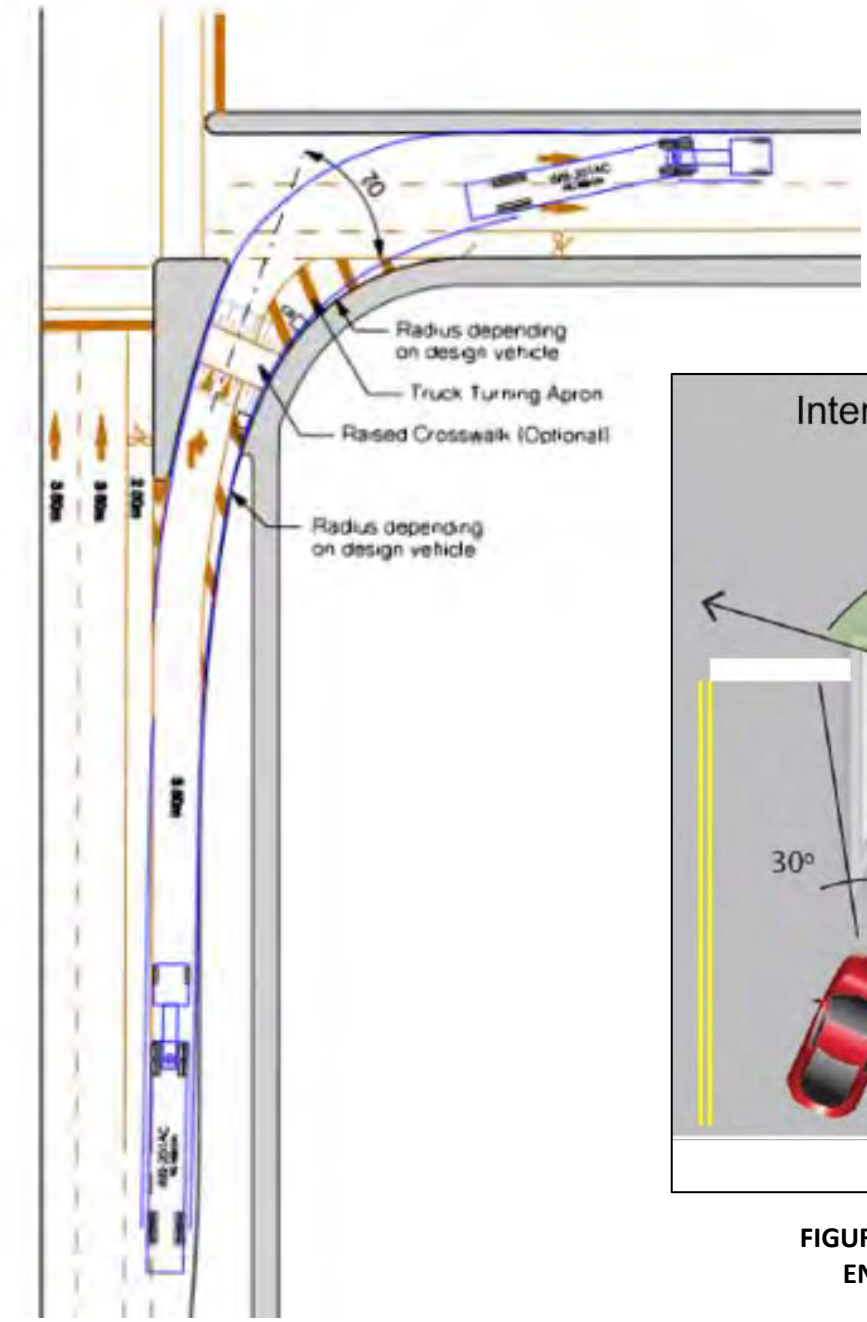


FIGURE 3 – URBAN SMART CHANNEL CONCEPTUAL DESIGN: RIGHT TURN STORAGE LANE

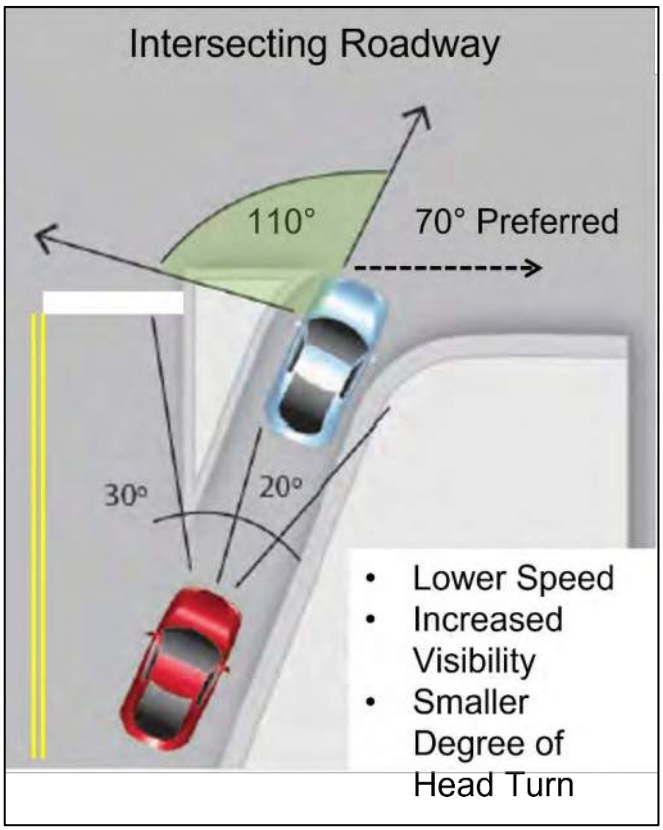


FIGURE 4 – PROPOSED SLIP LANE ENTRY ANGLE GEOMETRY

4. DESIGN CONSIDERATIONS

Pedestrian safety at the study intersection can be improved by modifying the right turn slip lanes to be consistent with the design goals and principles stated in Section 3. However, improvements to the existing intersection should accommodate larger design vehicles to and from each arterial corridor while limiting right turning speeds for passenger vehicles. This can be achieved by providing the appropriate turning radii for the most frequent 'managed vehicle' (passenger car), but also by selecting an appropriate corner treatment to facilitate turning movements for larger 'control vehicles', including transit vehicles and emergency vehicles.

The National Association of City Transportation Officials (NATCO) provides a useful framework that identifies corner design treatments for urban intersections using a design vehicle approach that balances both pedestrian crossing safety and vehicle throughput. Using this method, specific treatments may include a dual radius with a defined truck apron as shown in Figure 5. As depicted, the truck apron is provided to slow the 'managed vehicle' on the left side of the diagram while accommodating the 'control vehicle' on the right side of the diagram. This typical application of corner design can be included as part of the urban smart channel design for the right turn slip lanes at the intersection of Nolensville Pike (SR-11) and Harding Place (SR-255).

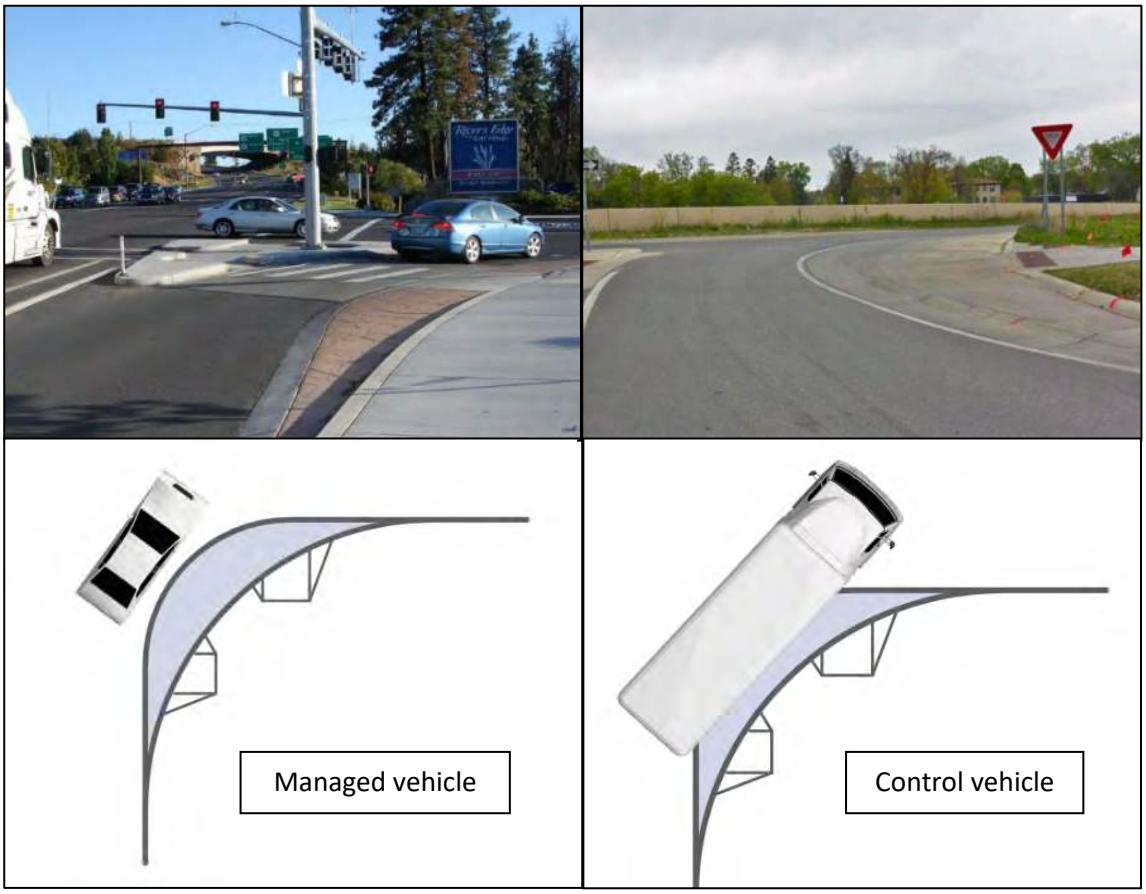


FIGURE 5 – DUAL RADIUS WITH DEFINED TRUCK APRON

Source: Don't Give Up At the Intersection, NACTO

10. ADDITIONAL LOCATION SPECIFIC INTERSECTION AND SEGMENT IMPROVEMENTS

1. BEGIN PROJECT – STATE ROUTE 11 (NOLENSVILLE PIKE) AT HAYWOOD LANE (L.M. 6.11)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Signalized	Mid-Term • Add pedestrian crossings with ADA compliant curb ramps, pedestrian signals, pushbuttons, and high-visibility crosswalk pavement markings for the north, south, east, and west legs of the intersection. No sidewalk currently exists in the vicinity of this intersection. Substantial sidewalk improvements may be required prior to incorporating signalized pedestrian equipment.	$127,600
	• Convert the unused shoulder space on the west side of the intersection into a bus boarding island and incorporate the bike lane as either a shared cycle lane bus stop or separately to create a "floating" bus boarding island as space allows. WeGo standard shelter designs and guidelines should be applied.	$10,000
	• Pending analysis, remove the northbound right-turn lane and reduce the curb radius to slow turning traffic. The presence of heavy vehicles should be considered since there is not a truck restriction on Haywood Lane.	$5,000
	Mid-Term Cost	*$142,600*
	Long-Term • install a sidewalk or shared use path on the east side of SR-11 (Nolensville Pike) from Haywood Lane south to the existing bus stop. ROW constraints will inform decision.	$75,000
	Long-Term Cost	*$75,000*
	Total Cost of Improvements	***$217,600***

The split phase signal operation was observed to create long delays for the minor street. Adjustments to signal phasing were discussed by KCI, however, it was determined that the current phasing plan provides the most safety benefit to pedestrians. Therefore, adjustments should not be considered as part of this report.

2. STATE ROUTE 11 (NOLENSVILLE PIKE) AT TAYLOR ROAD (L.M. 6.262)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Short-Term	
	• Replace the damaged pedestrian safety rail on the north side of the storage center driveway opposite Taylor Road. Some curbing at the existing rail location is needed.	$5,000
	Short-Term Cost	*$5,000*
	Mid-Term	
	• Add ADA compliant directional curb ramps and high-visibility crosswalk pavement markings for the east leg of the intersection.	$11,300
	• Reduce curb radii in the northeast and southeast corners to slow turning traffic movements and reduce pedestrian crossing distances.	$40,000
	Mid-Term Cost	*$51,300*
	Total Cost of Improvements	***$56,300***

3. STATE ROUTE 11 (NOLENSVILLE PIKE) AT COTTON LANE (L.M. 6.327)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Mid-Term	
	• Add ADA compliant directional curb ramps and high-visibility crosswalk pavement markings for the west leg of the intersection.	$11,300
	• Reduce curb radii in the northwest and southwest corners to slow turning traffic movements and reduce pedestrian crossing distances.	$40,000
	Mid-Term Cost	*$51,300*
	Total Cost of Improvements	***$51,300***

4. STATE ROUTE 11 (NOLENSVILLE PIKE) AT BASS AVENUE (L.M. 6.44)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Signalized	Mid-Term • Add a pedestrian crossing with ADA compliant curb ramps, pedestrian signals, pushbuttons, and high-visibility crosswalk pavement markings for the north leg of the intersection. An alteration to the private parking lot configuration on the east side of the street may be required.	$66,500
	• Relocate the northbound WeGo bus stop to the south side of the intersection, construct a new boarding island, and incorporate the bike lane in a shared cycle lane bus stop per WeGo standard shelter design and guidelines. This may require significant modification to the existing stormwater infrastructure. Existing drainage patterns at the intersection to be considered as significant runoff was observed from the adjacent parking lot in the southwest corner.	$26,000
	Mid-Term Cost	*$92,500*
	Total Cost of Improvements	***$92,500***

5. STATE ROUTE 11 (NOLENSVILLE PIKE) AT WINSTON AVENUE WEST (L.M. 6.472)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Mid-Term • Add ADA compliant directional curb ramps and high-visibility crosswalk pavement markings for the west leg of the intersection.	$11,300
	• Reduce curb radii in the northwest and southwest corners to slow turning traffic movements and reduce pedestrian crossing distances.	$40,000
	Mid-Term Cost	*$51,300*
	Total Cost of Improvements	***$51,300***

6. STATE ROUTE 11 (NOLENSVILLE PIKE) AT HIGGINS STREET (L.M. 6.488)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Short-Term • Add high-visibility crosswalk pavement markings for the east leg of the intersection.	$1,300
	Short-Term Cost	*$1,300*
	Total Cost of Improvements	***$1,300***

7. STATE ROUTE 11 (NOLENSVILLE PIKE) AT J.J. WATSON AVENUE (L.M. 6.524)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Mid-Term • Add ADA compliant curb ramps and high-visibility crosswalk pavement markings for the west leg of the intersection.	$11,300
	• Reduce curb radii in the northwest and southwest corners to slow turning traffic movements and reduce pedestrian crossing distances.	$40,000
	Mid-Term Cost	*$51,300*
	Total Cost of Improvements	***$51,300***

8. STATE ROUTE 11 (NOLENSVILLE PIKE) AT ALICE AVENUE (L.M. 6.535)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Short-Term • Add high-visibility crosswalk pavement markings for the east leg of the intersection.	$1,300
	Short-Term Cost	*$1,300*
	Mid-Term • Remove the existing driveway apron at the intersection and modify corner radii, sidewalk, and ADA compliant curb ramps as needed per TDOT standards for minor street intersections.	$15,000
	Mid-Term Cost	*$15,000*
	Total Cost of Improvements	***$16,300***

9. STATE ROUTE 11 (NOLENSVILLE PIKE) AT PROVIDENCE HEIGHTS (L.M. 6.59)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Short-Term • Add high-visibility crosswalk pavement markings for the west leg of the intersection.	$1,300
	Short-Term Cost	*$1,300*
	Total Cost of Improvements	***$1,300***

10. STATE ROUTE 11 (NOLENSVILLE PIKE) AT GOINS ROAD (L.M. 6.635)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Mid-Term • Add ADA compliant curb ramps and high-visibility crosswalk pavement markings for the east leg of the intersection.	$11,300
	• Reduce curb radii in the northeast and southeast corners to slow turning traffic movements and reduce pedestrian crossing distances.	$40,000
	Mid-Term Cost	*$51,300*
	Total Cost of Improvements	***$51,300***

11. STATE ROUTE 11 (NOLENSVILLE PIKE) AT FLORA MAXWELL ROAD (L.M. 6.704)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Short-Term	
	• Remove the existing landscaping that impedes the intersection sight distance.	$1,000
	Short-Term Cost	*$1,000*
	Mid-Term	
	• Install a new pedestrian crossing controlled by a PHB/HAWK at or near the Flora Maxwell Road intersection.	$94,500
	• Add ADA compliant curb ramps and high-visibility crosswalk pavement markings for the east leg of the intersection.	$11,300
	• Replace the existing driveway apron for the west leg of the intersection to comply with current TDOT or NDOT standards and to allow an ADA compliant pedestrian crossing surface.	$15,000
	• Reduce curb radii in the northeast and southeast corners to slow turning traffic movements and reduce pedestrian crossing distances.	$40,000
	Mid-Term Cost	*$160,800*
	Total Cost of Improvements	***$161,800***

The new crossing should be designed so that pedestrians cross behind WeGo buses and are visible to passing motorists. Coordination with WeGo is required.

12. STATE ROUTE 11 (NOLENSVILLE PIKE) AT EDMONDSON PIKE / WALLACE ROAD (L.M. 6.85)

All identified improvements at this location are included in the current PRSI project.

13. STATE ROUTE 11 (NOLENSVILLE PIKE) AT STATE ROUTE 255 (HARDING PLACE) (L.M. 7.02)

All identified improvements at this location are included in the current PRSI project.

14. STATE ROUTE 11 (NOLENSVILLE PIKE) AT MIDBLOCK CROSSING NEAR WALMART DRIVEWAY (BETWEEN L.M. 7.05 – L.M. 7.239)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
New Signal	Long-Term • Incorporate the bike lane within the WeGo shelter and/or bus lane to include applying red-colored pavement within the dedicated bus lane to enhance the conspicuity of the bus stop. Requires a written request to the FHWA for interim approval.	*$10,000*
	Long-Term Cost	*$10,000*
	Total Cost of Improvements	***$542,000***

15. STATE ROUTE 11 (NOLENSVILLE PIKE) AT WELSHWOOD DRIVE (L.M. 7.239)

All identified improvements at this location are included in the current PRSI project.

16. STATE ROUTE 11 (NOLENSVILLE PIKE) AT WELCH ROAD (L.M. 7.296)

All identified improvements at this location are included in the current PRSI project.

17. STATE ROUTE 11 (NOLENSVILLE PIKE) AT PARAGON MILLS ROAD (L.M. 7.40)

All identified improvements at this location are included in the current PRSI project.

18. STATE ROUTE 11 (NOLENSVILLE PIKE) AT ELYSIAN FIELDS ROAD (L.M. 7.524)

All identified improvements at this location are included in the current PRSI project.

19. STATE ROUTE 11 (NOLENSVILLE PIKE) AT ELYSIAN FIELDS ROAD/ELYSIAN FIELDS COURT (L.M. 7.59)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Signalized	Long-Term • Install a new sidewalk or shared use path and incorporate unused shoulder space on east side of SR-11 (Nolensville Pike) between Elysian Fields Road and McNally Drive as well as the west side of SR-11 (Nolensville Pike between Zoo Road and McNally Drive. Include removal of the right-turn lane at the Windlands Center driveway. This section was identified by the site review team as the top new sidewalk priority along the corridor. Consideration will be given to eliminate excessive driveway access points.	$1,700,000
	Long-Term Cost	*$1,700,000*
	Total Cost of Improvements	***$1,700,000***

20. STATE ROUTE 11 (NOLENSVILLE PIKE) AT ZOO ROAD (L.M. 7.88)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Signalized	Long-Term • Gaps in the sidewalk due to the existing railroad overpass structure create unsafe conditions for pedestrian travel in the vicinity of this intersection and continuing north to the McNally Drive intersection. Existing right-of-way limits will be evaluated and increased separation for non-motorized travel will be considered. In lieu of the existing bike lane, this space could be very advantageous for constructing new sidewalks or a shared use path within the existing right-of-way in order to address the gap in sidewalk facilities.	Included with intersection at Elysian Fields
	Long-Term Cost	*N/A*
	Total Cost of Improvements	***$0***

The pedestrian crossing of SR-11 (Nolensville Pike) runs on an exclusive pedestrian phase. Addition of the new crosswalk on the north side of the intersection will be included as part of the exclusive phase.

21. STATE ROUTE 11 (NOLENSVILLE PIKE) AT YELTON COURT (L.M. 8.004)

INTERSECTION TYPE	RECOMMENDED IMPROVEMENTS	COST
Minor Street Stop-Control	Short-Term • Add high-visibility crosswalk pavement markings for the east leg of the intersection.	$1,300
	Short-Term Cost	*$1,300*
	Total Cost of Improvements	***$1,300***

22. END PROJECT - STATE ROUTE 11 (NOLENSVILLE PIKE) AT MCNALLY DRIVE/NATCHEZ COURT (L.M. 8.144)

It was determined by TDOT and the project team that improvements at this intersection are not required under the PRSI project as a NDOT project funded through a 2018 TDOT Multimodal Access Grant will improve all pedestrian crossings with ADA compliant curb ramps, pedestrian signals, pushbuttons, and high-visibility crosswalk pavement markings. In addition, street lighting will be improved and transit access will be incorporated. TDOT provided a copy of the grant application following the field review meeting. Project design is kicked off the week of August 16th.

11. ADDITIONAL IMPROVEMENTS CONCEPT FIGURES

TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2022	DAVIDSON	5

ABBREVIATIONS

ST = SHORT-TERM IMPROVEMENT
MT = MID-TERM IMPROVEMENT
LT = LONG-TERM IMPROVEMENT
B = EXISTING BUS STOP

BEGIN PROJECT
L.M. 6.09

SEE FIGURE 6
L.M. 6.54
MATCH LINE

SR 11
COTTON LANE
BASS AVENUE
WINSTON AVENUE W.
JJ WATSON AVENUE
HAYWOOD LANE
TAYLOR ROAD
HIGGINS AVENUE
ALICE AVENUE

LM 6.09
LM 6.262
LM 6.327
LM 6.414
LM 6.472
LM 6.488
LM 6.524
LM 6.535

MT1
MT2
MT3
MT4
MT5
MT6
MT7
MT8
MT9
MT10
MT11
MT12
MT13
MT14
LT1
ST1
ST2
ST3

0 200' 400' 600'

N

PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
MULTIMODAL

FIGURE 5
STATE ROUTE 11
LOG MILE 6.09
TO
LOG MILE 6.54

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TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2022	DAVIDSON	5A

ABBREVIATIONS

ST = SHORT-TERM IMPROVEMENT
MT = MID-TERM IMPROVEMENT
LT = LONG-TERM IMPROVEMENT

GUIDANCE

ST1. REPLACE THE DAMAGED PEDESTRIAN SAFETY RAIL ON THE WEST SIDE OF S.R. 11 OPPOSITE TAYLOR ROAD.
ST2. INSTALL HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS FOR THE EAST LEG OF THE INTERSECTION OF S.R. 11 AND HIGGINS AVE.
ST3. INSTALL HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS FOR THE EAST LEG OF THE INTERSECTION OF S.R. 11 AND ALICE AVENUE.

MT1. INSTALL PEDESTRIAN CROSSINGS WITH ADA COMPLIANT CURB RAMPS, PEDESTRIAN SIGNALS, PUSHBUTTONS, AND HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS ON ALL LEGS OF THE S.R. 11 AND HAYWOOD LN INTERSECTION. SEE TDOT STANDARD DRAWINGS MM-CR-6, T-M-4, AND T-SG-6 FOR FURTHER DETAILS.
MT2. INSTALL A SOUTHBOUND BUS BOARDING ISLAND INCORPORATING THE BIKE LANE AS A SHARED CYCLE LANE BUS STOP SOUTH OF THE S.R. 11 AND HAYWOOD LN INTERSECTION. WEGO STANDARD DESIGNS AND GUIDELINES SHOULD BE APPLIED.
MT3. PENDING ANALYSIS, REMOVE THE NORTHBOUND RIGHT-TURN LANE AND REDUCE THE CURB RADIUS IN THE SOUTHEAST CORNER AT THE S.R. 11 AND HAYWOOD LN INTERSECTION.
MT4. INSTALL PEDESTRIAN CROSSINGS WITH ADA COMPLIANT CURB RAMPS AND HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS ON THE EAST LEG OF THE S.R. 11 AND TAYLOR RD INTERSECTION. SEE TDOT STANDARD DRAWINGS MM-CR-5 AND T-M-4 FOR FURTHER DETAILS.
MT5. REDUCE THE CURB RADII IN THE NORTHEAST AND SOUTHEAST CORNERS AT THE S.R. 11 AND TAYLOR RD INTERSECTION.
MT6. INSTALL PEDESTRIAN CROSSINGS WITH ADA COMPLIANT CURB RAMPS AND HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS ON THE WEST LEG OF THE S.R. 11 AND COTTON LN INTERSECTION. SEE TDOT STANDARD DRAWINGS MM-CR-5 AND T-M-4 FOR FURTHER DETAILS.
MT7. REDUCE THE CURB RADII IN THE NORTHWEST AND SOUTHWEST CORNERS AT THE S.R. 11 AND COTTON LN INTERSECTION.
MT8. INSTALL PEDESTRIAN CROSSINGS WITH ADA COMPLIANT CURB RAMPS, PEDESTRIAN SIGNALS, PUSHBUTTONS, AND HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS ON THE NORTH LEG OF THE S.R. 11 AND BASS AVE INTERSECTION. SEE TDOT STANDARD DRAWINGS MM-CR-5, MM-CR-6, T-M-4, AND T-SG-6 FOR FURTHER DETAILS.
MT9. INSTALL A NORTHBOUND BUS BOARDING ISLAND INCORPORATING THE BIKE LANE AS A SHARED CYCLE LANE BUS STOP SOUTH OF THE S.R. 11 AND BASS AVE INTERSECTION. WEGO STANDARD DESIGNS AND GUIDELINES SHOULD BE APPLIED.
MT10. INSTALL PEDESTRIAN CROSSINGS WITH ADA COMPLIANT CURB RAMPS AND HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS ON THE WEST LEG OF THE S.R. 11 AND WINTSON AVE W. INTERSECTION. SEE TDOT STANDARD DRAWINGS MM-CR-5 AND T-M-4 FOR FURTHER DETAILS.
MT11. REDUCE THE CURB RADII IN THE NORTHWEST AND SOUTHWEST CORNERS AT THE S.R. 11 AND WINSTON AVE W. INTERSECTION.
MT12. INSTALL PEDESTRIAN CROSSINGS WITH ADA COMPLIANT CURB RAMPS AND HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS ON THE WEST LEG OF THE S.R. 11 AND JJ WATSON AVE INTERSECTION. SEE TDOT STANDARD DRAWINGS MM-CR-5 AND T-M-4 FOR FURTHER DETAILS.
MT13. REDUCE THE CURB RADII IN THE NORTHWEST AND SOUTHWEST CORNERS AT THE S.R. 11 AND JJ WATSON AVE INTERSECTION.
MT14. REMOVE THE EXISTING DRIVEWAY APRON AT THE S.R. 11 AND ALICE AVE INTERSECTION AND MODIFY CORNER RADII, SIDEWALK, AND COMPLIANT CURB RAMPS TO PROVIDE A PEDESTRIAN CROSSING. SEE TDOT STANDARD DRAWINGS MM-CR-5 FOR FURTHER DETAILS.

LT1. INSTALL A SIDEWALK ON THE EAST SIDE OF S.R. 11 FROM HAYWOOD LANE SOUTH TO THE EXISTING BUS STOP.

0 200' 400' 600'

N

PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
MULTIMODAL

FIGURE 5A
STATE ROUTE 11
LOG MILE 6.09
TO
LOG MILE 6.54

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TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2022	DAVIDSON	6

ABBREVIATIONS

ST = SHORT-TERM IMPROVEMENT
MT = MID-TERM IMPROVEMENT
B = EXISTING BUS STOP

GUIDANCE

ST1. INSTALL HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS FOR THE WEST LEG OF THE INTERSECTION OF S.R. 11 AND PROVIDENCE HEIGHTS.
ST2. REMOVE THE LANDSCAPING IMPEDING THE INTERSECTION SIGHT DISTANCE AT THE NORTHEAST CORNER OF S.R. 11 AND FLORA MAXWELL RD.

MT1. INSTALL A PEDESTRIAN CROSSING WITH ADA COMPLIANT CURB RAMPS AND HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS ON THE EAST LEG OF THE S.R. 11 AND GOINS ROAD INTERSECTION. SEE TDOT STANDARD DRAWING MM-CR-5 AND T-M-4 FOR FURTHER DETAILS.
MT2. REDUCE THE CURB RADII IN THE NORTHEAST AND SOUTHEAST CORNERS AT THE S.R. 11 AND GOINS ROAD INTERSECTION.
MT3. INSTALL A MIDBLOCK PEDESTRIAN CROSSING CONTROLLED BY A PEDESTRIAN HYBRID BEACON LOCATED AT THE NORTH LEG OF THE S.R. 11 AND FLORA MAXWELL ROAD INTERSECTION. COORDINATION WITH WEGO IS REQUIRED.
MT4. INSTALL A PEDESTRIAN CROSSING WITH ADA COMPLIANT CURB RAMPS AND HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS ON THE EAST LEG OF THE S.R. 11 AND FLORA MAXWELL ROAD INTERSECTION. SEE TDOT STANDARD DRAWING MM-CR-5 AND T-M-4 FOR FURTHER DETAILS.
MT5. REPLACE THE EXISTING DRIVEWAY APRON AT THE WEST LEG OF THE S.R. 11 AND FLORA MAXWELL ROAD INTERSECTION TO ALLOW AN ADA COMPLIANT PEDESTRIAN CROSSING SURFACE INCLUDING ADA COMPLIANT CURB RAMPS AND HIGH-VISILIBITY CROSSWALK PAVEMENT MARKINGS. SEE TDOT STANDARD DRAWING MM-CR-5 AND T-M-4 FOR FURTHER DETAILS.
MT6. REDUCE CURB RADII IN THE NORTHEAST AND SOUTHEAST CORNERS AT THE S.R. 11 AND FLORA MAXWELL ROAD INTERSECTION.

MATCH LINE L.M. 6.54 SEE FIGURE 5

MATCH LINE L.M. 7.08 SEE FIGURE 7

PROVIDENCE HEIGHTS
GOINS ROAD
FLORA MAXWELL ROAD
EDMONDSON PIKE
WALLACE ROAD
HARDING PLACE
SR 11
LM 6.59
LM 6.635
LM 6.704
LM 6.85
LM 7.02
ST1
ST2
MT1
MT2
MT3
MT4
MT5
MT6
B

0 200' 400' 600'

N

PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
MULTIMODAL

FIGURE 6
STATE ROUTE 11
LOG MILE 6.54
TO
LOG MILE 7.08

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TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2022	DAVIDSON	7

ABBREVIATIONS

LT = LONG-TERM IMPROVEMENT

B = EXISTING BUS STOP

GUIDANCE

LT1. INCORPORATE THE BIKE LANE WITHIN THE WEGO SHELTER AND/OR BUS LANE TO INCLUDE APPLYING RED-COLORED PAVEMENT IN THE DEDICATED BUS LANE.

LT2. INSTALL A NEW SIDEWALK/SHARED USE PATH INCORPORATING UNUSED SHOULDER SPACE ON EAST SIDE OF S.R. 11 BETWEEN ELYSIAN FIELDS ROAD AND MCNALLY DRIVE/NATCHEZ COURT. INCLUDE REMOVAL OF THE RIGHT-TURN LANE AT THE WINDLANDS CENTER DRIVEWAY.

0 200' 400' 600'

N

PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11

LOG MILE 6.09 TO LOG MILE 8.15

DAVIDSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
MULTIMODAL

FIGURE 7
STATE ROUTE 11
LOG MILE 7.08
TO
LOG MILE 7.65

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TYPE	YEAR	COUNTY	FIGURE NO.
PRSI	2022	DAVIDSON	8

ABBREVIATIONS

ST = SHORT-TERM IMPROVEMENT
LT = LONG-TERM IMPROVEMENT
B = EXISTING BUS STOP

GUIDANCE

ST1. INSTALL HIGH-VISIBILITY CROSSWALK PAVEMENT MARKINGS FOR THE EAST LEG OF THE INTERSECTION OF S.R. 11 AND YELTON COURT.

LT1. INSTALL A NEW SIDEWALK/SHARED USE PATH INCORPORATING UNUSED SHOULDER SPACE ON EAST SIDE OF S.R. 11 BETWEEN ELYSIAN FIELDS ROAD AND MCNALLY DRIVE/NATCHEZ COURT. INCLUDE REMOVAL OF THE RIGHT-TURN LANE AT THE WINDLANDS CENTER DRIVEWAY.

LT2. INSTALL A NEW SIDEWALK/SHARED USE PATH INCORPORATING UNUSED SHOULDER SPACE ON THE WEST SIDE OF S.R. 11 BETWEEN ZOO ROAD AND MCNALLY DRIVE/NATCHEZ COURT.

0 200' 400' 600'

N

PEDESTRIAN ROAD SAFETY INITIATIVE

STATE ROUTE 11
LOG MILE 6.09 TO LOG MILE 8.15
DAVIDSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
MULTIMODAL

FIGURE 8
STATE ROUTE 11
LOG MILE 7.65
TO
LOG MILE 8.15

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APPENDIX B: Detailed Cost Estimate

Table reads Nolensville Pike north to south
Includes $50,000 for floating bus island w/ bike lane bus shelters
Pedestrian hybrid beacons include high-visibility crosswalks, pedestrian refuge islands, lighting, etc.
Ped scale lighting = assumes every 100' (locations to be defined) ($10,000)

Start	End	Type	From Street To Street	X-Section Comments	$/Unit	Total Cost
Elgin Rd/McCall St	McNally Dr/Natchez Ct	**New**	McCall St intersection	High visibility crosswalk markings	$ 16.50	$ 4,950.00
		New	McCall St intersection	Mixing zone markings	$ 90.00	$ 15,030.00
		New	Veritas St intersection	Pedestrian Hybrid Beacon	$ 250,000.00	$ 250,000.00
		New	Veritas intersection	Mixing zone markings	$ 90.00	$ 12,510.00
		New	Wheeler Ave intersection	Mixing zone markings	$ 90.00	$ 7,470.00
		New	Between Wheeler Ave and Natchez Ct	Pedestrian Hybrid Beacon	$ 250,000.00	$ 250,000.00
		New	Elgin Rd/McCall St to McNally Dr/Natchez Ct	New street light (NES installation)	$ 20,000.00	$ 80,000.00
		New	Elgin Rd/McCall St to McNally Dr/Natchez Ct	New pedestrian lighting	$ 10,000.00	$ 248,200.00
McNally Dr/Natchez Ct	Elysian Fields Rd	**New**	McNally Dr intersection	Mixing zone markings	$ 90.00	$ 19,980.00
		New	McNally Dr intersection	LPI @ signal	$ 3,000.00	$ 3,000.00
		New	Yelton Ct intersection	High visibility crosswalk markings	$ 16.50	$ 2,310.00
		New	Yelton Ct intersection	Mixing zone markings	$ 90.00	$ 7,470.00
		New	Yelton Ct intersection	Pedestrian Hybrid Beacon	$ 250,000.00	$ 250,000.00
		New	Zoo Rd intersection	Supplemental signal head on Zoo Rd ahead of signal	$ 100,000.00	$ 100,000.00
		Repair	Zoo Rd intersection	High visibility crosswalk markings	$ 16.50	$ 2,970.00
		Repair	Zoo Rd intersection	Enhanced bus shelter	$ 50,000.00	$ 50,000.00
		New	McNally Dr/Natchez Ct to Elysian Fields Rd	New pedestrian lighting	$ 10,000.00	$ 296,100.00
		New	Elysian Fields Rd intersection	Mixing zone markings	$ 90.00	$ 9,990.00
		New	Elysian Fields Rd intersection	Pedestrian signage	$ 350.00	$ 2,800.00
Elysian Fields Rd	Harding Pl	**New**	Paragon Mills Rd intersection	Mixing zone markings	$ 90.00	$ 15,030.00
		New	Welshwood Dr intersection	LPI @ signal	$ 3,000.00	$ 3,000.00
		New	Welshwood Dr intersection	Mixing zone markings	$ 90.00	$ 9,990.00
		New	Walmart Driveway	Red transit lane paint		$ 23,220.00
		New	Walmart Driveway	Mixing zone markings	$ 90.00	$ 45,000.00
		New	Elysian Fields Rd to Harding Pl	New street light (NES installation)	$ 20,000.00	$ 80,000.00
		New	Elysian Fields Rd to Harding Pl	New pedestrian lighting	$ 10,000.00	$ 273,600.00
		New	Harding Pl intersection	Signalize slip lanes (if warranted following new urban channel design)	$ 125,000.00	$ 500,000.00
		New	4015 Nolensville Pk to 3923 Nolensville	10' SW, 4' FZ, Major storm upgrades	$ 2,700.00	$ 2,124,900.00
Harding Pl	Bass Ave	**Repair**	Edmonson Pike intersection	Improve pedestrian signal phasing and LPIs	$ 3,000.00	$ 3,000.00
		New	Edmonson Pike intersection	Mixing zone markings	$ 90.00	$ 25,020.00
		New	Flora Maxwell Rd intersection	Pedestrian Hybrid Beacon	$ 250,000.00	$ 250,000.00
		New	Flora Maxwell Rd intersection	Improve crosswalk visibility, reduce curb radii, driveway upgrade		$ 67,270.00
		New	Flora Maxwell Rd intersection	Mixing zone markings	$ 9.86	$ 1,110.00
		Repair	Goins Rd intersection	Improve crosswalk visibility, reduce curb radii		$ 51,300.00
		New	Goins Rd intersection	Mixing zone markings	$ 90.00	$ 9,990.00
		New	Providence Heights intersection	Mixing zone markings	$ 90.00	$ 9,990.00
		Repair	Providence Heights intersection	Improve crosswalk visibility	$ 16.50	$ 1,650.00
		New	Alice Ave/JJ Watson Ave intersection	Mixing zone markings	$ 90.00	$ 9,990.00
		Repair	Alice Ave/JJ Watson Ave intersection	Improve crosswalk visibility, curb ramps, reduce curb radii, driveway		$ 67,630.00
		New	Higgins St/Winston Ave intersection	Mixing zone markings	$ 90.00	$ 9,990.00
		Repair	Higgins St/Winston Ave intersection	Improve crosswalk visibility, reduce curb radii		$ 52,600.00
		Repair	Bass Ave intersection	Relocated NB bus stop to south side of intersection	$ 50,000.00	$ 50,000.00
		Repair/New	Bass Ave intersection	Stormwater improvement cost buffer		$ 250,000.00
		New	Bass Ave intersection	New crosswalk markings, ADA curb ramps, ped signals/pushbuttons		$ 69,500.00
		New	Bass Ave intersection	Cost buffer for potential alteration/bulb-out addition to BBB drive		$ 83,000.00
		New	Bass Ave intersection	Mixing zone markings	$ 90.00	$ 12,510.00
		New	Harding Pl to Bass Ave	New street light (NES installation)	$ 20,000.00	$ 40,000.00
		New	Harding Pl to Bass Ave	New pedestrian lighting	$ 10,000.00	$ 287,500.00
Bass Ave	Haywood Ln	**New**	Haywood Ln intersection	High visibility crosswalk, ped signals, pushbuttons, curb ramps		$ 131,600.00
		New	Haywood Ln intersection	Shared cycle lane bus stop	$ 50,000.00	$ 50,000.00
		New	Haywood Ln intersection	Reduce curb radii	$ 39.77	$ 29,112.00
		New	Bass Ave to Cotton Ln	6'-8' SW, 2'-4' FZ, Minor storm upgrades	$ 450.00	$ 189,000.00
		New	Cotton Ln intersection	Curb ramp addition (west leg), high visibility crosswalk		$ 11,300.00
		New	Cotton Ln intersection	Reduce curb radii		$ 40,168.00
		New	Bass Ave to Haywood Ln	New street light (NES installation)	$ 20,000.00	$ 60,000.00
		New	Bass Ave to Haywood Ln	New pedestrian lighting	$ 10,000.00	$ 161,200.00
		New	4611 Nolensville Pike to Haywood Ln	6'-8' SW, 2'-4' FZ, Moderate storm upgrades, Some retaining wall	$ 750.00	$ 772,500.00
		New	Haywood Ln to 4506 Nolensville Pike	6'-8' SW, 2'-4' FZ, Minor storm upgrades	$ 450.00	$ 738,450.00
Gallatin Pk - Madison St/Harris St to Due West Ave		**New**	Vehicle preemption equipment	60 vehicles	$ 169,980.00	$ 170,000.00
		New	Emergency signal preemption	6 intersections	$ 36,900.00	$ 36,900.00

APPENDIX C: Resolution

Resolution No. RS2022- 1724

A resolution adopting the Nashville Department of Transportation and Multimodal Infrastructure's Vision Zero Action Plan and Vision Zero Five-Year Implementation Plan and pledging to support the Metropolitan Government's efforts to achieve zero traffic deaths and serious injuries on Nashville's roadways.

WHEREAS, Vision Zero provides a comprehensive strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility options for all; and,

WHEREAS, the Metro Nashville WalknBike Strategic Plan of 2017 recommended the completion of a Vision Zero plan. On January 18, 2020, Mayor John Cooper announced his administration's commitment to Vision Zero and thereafter requested completion of a plan of action. Additionally, the Metro Nashville Transportation Plan, adopted by the Metro Council December 15, 2020 per RS2020-656, includes a commitment to the Vision Zero Action Plan; and,

WHEREAS, the Nashville Department of Transportation & Multimodal Infrastructure ("NDOT") has completed work on a Vision Zero Action Plan and a Five-Year Implementation Plan with participation and input from a steering committee that included representation from Metro Council, the Tennessee Department of Transportation, the Greater Nashville Regional Council, Walk Bike Nashville, and other key community partners; and,

WHEREAS, the Vision Zero Action Plan serves as a framework document for meeting program goals and it establishes strategies based upon the five E's of transportation safety: Engineering, Education, Encouragement, Evaluation & Enforcement; and,

WHEREAS, the Vision Zero Action Plan also identifies a High Injury Network of the most dangerous roads and intersections across Davidson County for people walking, biking and driving, and the plan was developed based upon extensive data analysis as well as community input; and,

WHEREAS, the Vision Zero Five-Year Implementation Plan makes specific commitments to projects, policies, and programs over the next five years to meet the goal of zero deaths and serious injuries based upon the five E's framework, and with a specific focus on locations identified in the High Injury Network; and,

WHEREAS, the Vision Zero Five-Year Implementation Plan determines annual funding needs for NDOT to successfully meet the goals outlined in the document; and,

WHEREAS, one death on Nashville's roadways is too many, and the Metropolitan Government will work to ensure rapid deployment of Vision Zero across all of Davidson County, including quick-build projects in addition to more time and cost-intensive capital projects, as well as enhanced community education and enforcement; and,

WHEREAS, both referenced plans have the support and endorsement of Mayor John Cooper and the Nashville Department of Transportation & Multimodal Infrastructure

NOW, THEREFORE BE IT RESOLVED BY THE COUNCIL OF THE METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY:

Section 1. That the Nashville Department of Transportation and Multimodal Infrastructure's Vision Zero Action Plan and Vision Zero Five-Year Implementation Plan, attached hereto as Exhibit A, is hereby approved.

Section 2. That the Metropolitan Council does hereby offer its pledge of support to the implementation of Vision Zero in Nashville and Davidson County in an effort to reduce the number of traffic-related deaths and serious injuries to zero.

Section 3. That this resolution shall take effect from and after its adoption, the welfare of The Metropolitan Government of Nashville and Davidson County requiring it.

RECOMMENDED BY

Diana Alarcon, Director
Nashville Department of Transportation
and Multimodal Infrastructure

APPROVED AS TO FORM AND
LEGALITY:

Assistant Metropolitan Attorney

INTRODUCED BY:

Member(s) of Council

ORIGINAL

METROPOLITAN COUNTY COUNCIL

Resolution No. RS2022-1724

A resolution adopting the Nashville Department of Transportation and Multimodal Infrastructure's Vision Zero Action Plan and Vision Zero Five-Year Implementation Plan and pledging to support the Metropolitan Government's efforts to achieve zero traffic deaths and serious injuries on Nashville's roadways.

Introduced AUG 16 2022

Amended _____

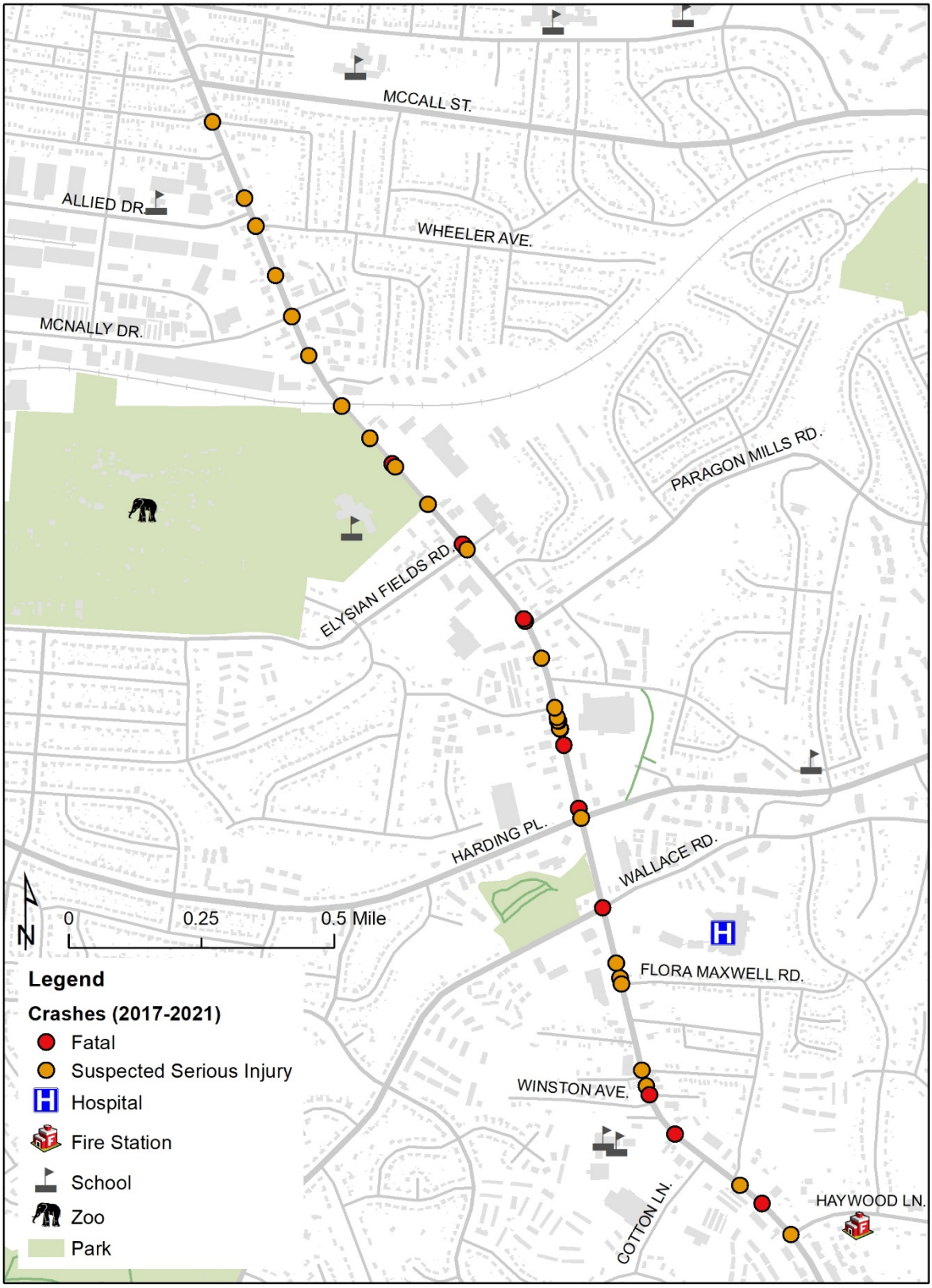
Adopted AUG 16 2022

Approved John Cooper

By AUG 17 2022

Metropolitan Mayor

APPENDIX D: Crash Characteristics


MCCALL ST.
ALLIED DR.
WHEELER AVE.
MCNALLY DR.
PARAGON MILLS RD.
ELYSIAN FIELDS RD.
HARDING PL.
WALLACE RD.
FLORA MAXWELL RD.
WINSTON AVE.
COTTON LN.
HAYWOOD LN.
N
0
0.25
0.5 Mile
Legend
Crashes (2017-2021)
Fatal
Suspected Serious Injury
Hospital
Fire Station
School
Zoo
Park

Nolensville Pike Crashes

Fatal and Serious Injury Crashes (2017-2021)

	Fatalities	Serious Injuries	TOTAL
Pedestrians	7	24	30
Motorists	6	11	18
TOTAL	13	35	48

Fatal and Serious Injury Crashes – Time of Day Crash Characteristics (2017-2021)

	Daytime	%	Nighttime	%	TOTAL
Pedestrians	0	0%	18	100%	18
Motorists	12	40%	18	60%	30
TOTAL	12	25%	36	75%	48

Fatal and Serious Injury Crashes – Location Crash Characteristics (2017-2021)

	Intersection	%	Segment	%	TOTAL
Pedestrians	7	39%	11	61%	18
Motorists	15	50%	15	50%	30
TOTAL	22	46%	26	54%	48

Fatal and Serious Injury Crashes – Manner of Collision (2017-2021)

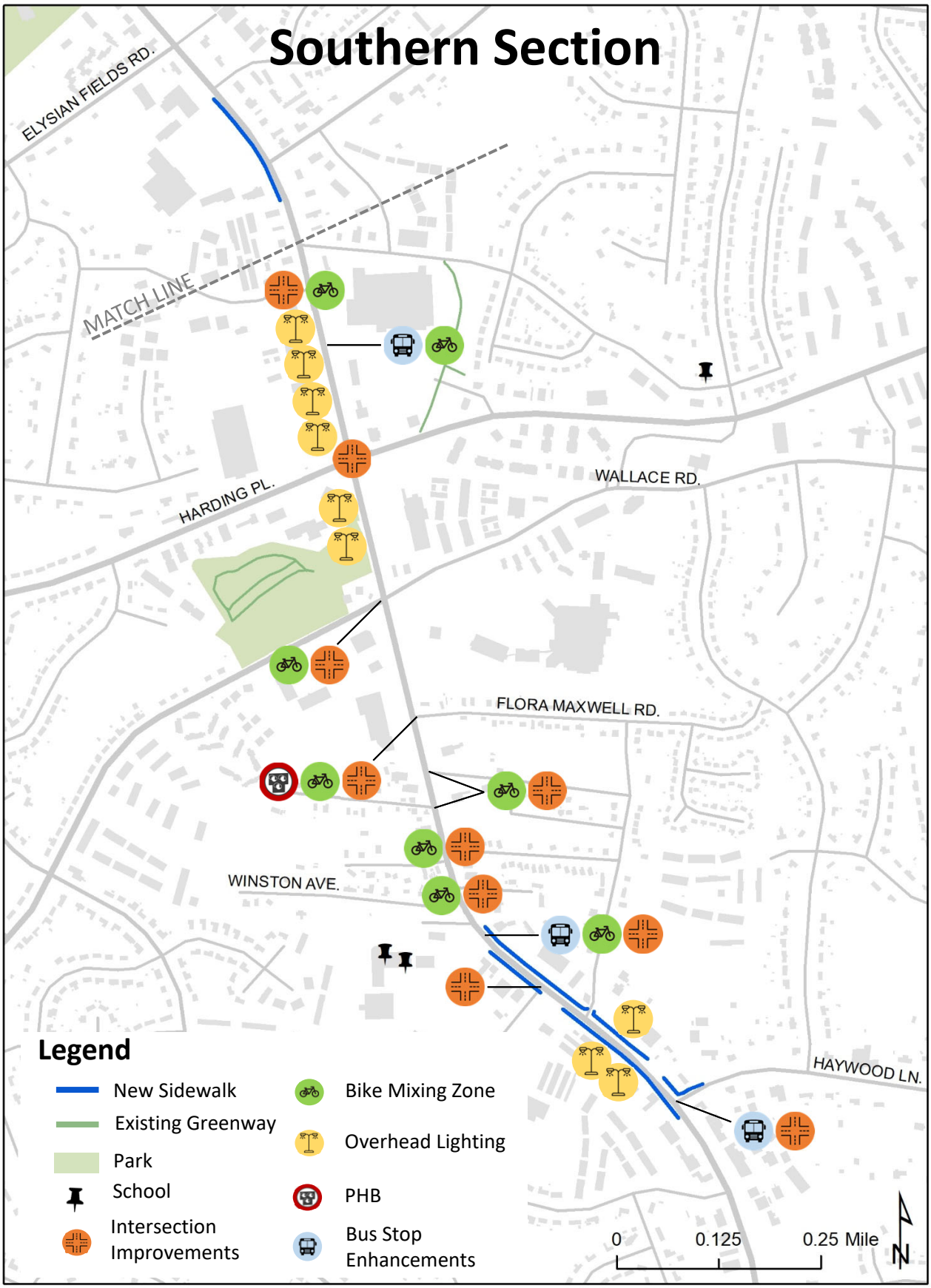
	Fatalities	Serious Injuries	TOTAL
No Collision with Vehicle	8	16	24
Angle	5	13	18
Head-On	0	4	4
Rear-End	0	1	1
Unknown	0	1	1
TOTAL	13	35	48

Manner of Collision – All Crashes (2017-2021)

	Fatalities	Serious Injuries	Minor Injury	Possible Injury	Property Damage	TOTAL
Rear-End	0	1	159	46	450	656
Angle	5	13	128	42	340	528
No Collision with Vehicle	8	16	37	7	44	112
Sideswipe	0	0	25	15	169	209
Head-On	0	4	22	7	34	67
Rear to Side	0	0	0	1	2	3
Unknown	0	1	0	0	85	86
Other	0	0	3	1	7	11
TOTAL	13	35	374	119	1,131	1,672

APPENDIX E: Implementation Improvement Locations

**Pedestrian-scale lighting will be added along each segment; Locations to be identified during the planning and design phases.*



**Pedestrian-scale lighting will be added along each segment; Locations to be identified during the planning and design phases.*

APPENDIX F: Cost-Benefit Calculations

Location	Project	CMF	CMF ID	Fatal Crashes	Serious Injury Crashes	Fatalities Avoided Per Year	Serious Injuries Avoided Per Year	Value of Fatalities Avoided Per Year	Value of Serious Injuries Avoided Per Year	Segment Totals - Fatality Values	Segment Totals - Serious Injury Values	Total Segment Improvement Costs (w/ contingencies, fees, etc.; no inflation)	Estimated Benefit-Cost
McCall to McNally	PHB(s)	0.89	10585	0	6	0	0.66	$ -	$ 203,148	$ -	$ 1,237,356	$ 2,154,222	0.57
	High Visibility Crosswalk Striping	0.6	4123			0	2.4	$ -	$ 738,720				
	Lighting	0.84	579			0	0.96	$ -	$ 295,488				
McNally to Elysian Fields	PHB(s)	0.89	10585	2	9	0.22	0.99	$ 2,870,296	$ 304,722	$ 50,621,584	$ 5,374,188	$ 2,030,682	27.57
	Bus Stop Enhancements	0.18	2195			1.64	7.38	$ 21,396,752	$ 2,271,564				
	Signal Timing Adjustments (Pedestrian)	0.55	4116			0.9	4.05	$ 11,742,120	$ 1,246,590				
	High Visibility Crosswalk Striping	0.6	4123			0.8	3.6	$ 10,437,440	$ 1,108,080				
	Lighting	0.84	579			0.32	1.44	$ 4,174,976	$ 443,232				
Elysian Fields to Harding	New Sidewalks	0.598	11246	7	10	2.814	4.02	$ 36,713,695	$ 1,237,356	$ 92,423,531	$ 3,114,936	$ 4,360,802	21.91
	Signal Timing Adjustments (Pedestrian)	0.55	4116			3.15	4.5	$ 41,097,420	$ 1,385,100				
	Lighting	0.84	579			1.12	1.6	$ 14,612,416	$ 492,480				
Harding to Bass	PHB(s)	0.89	10585	3	8	0.33	0.88	$ 4,305,444	$ 270,864	$ 99,416,616	$ 6,254,496	$ 2,638,112	40.06
	Bus Stop Enhancements	0.18	2195			2.46	6.56	$ 32,095,128	$ 2,019,168				
	Intersection Geometrics/ Curb Radii Reduction	0.41	8498			1.77	4.72	$ 23,092,836	$ 1,452,816				
	Signal Timing Adjustments (Pedestrian)	0.55	4116			1.35	3.6	$ 17,613,180	$ 1,108,080				
	High Visibility Crosswalk Striping	0.6	4123			1.2	3.2	$ 15,656,160	$ 984,960				
	Pedestrian Signal Addition	0.99	10363			0.03	0.08	$ 391,404	$ 24,624				
	Lighting	0.84	579			0.48	1.28	$ 6,262,464	$ 393,984				
Bass to Haywood	New Sidewalks	0.598	11246	1	2	0.402	0.804	$ 5,244,814	$ 247,471	$ 31,077,478	$ 1,466,359	$ 3,469,392	9.38
	Bus Stop Enhancements	0.18	2195			0.82	1.64	$ 10,698,376	$ 504,792				
	Intersection Geometrics/ Curb Radii Reduction	0.41	8498			0.59	1.18	$ 7,697,612	$ 363,204				
	High Visibility Crosswalk Striping	0.6	4123			0.4	0.8	$ 5,218,720	$ 246,240				
	Pedestrian Signal Addition	0.99	10363			0.01	0.02	$ 130,468	$ 6,156				
	Lighting	0.84	579			0.16	0.32	$ 2,087,488	$ 98,496				

	Fatalities	Serious Injuries	Total Fatalities Avoided	Total Serious Injuries Avoided	Total Value of Fatalities Avoided	Total Value of Serious Injuries Avoided
Totals	**13**	**35**	**21**	**56.684**	**$ 273,539,208.80**	**$ 17,447,335.20**

Grand Total **$ 290,986,544.00**

APPENDIX G: Additional Project Readiness Documentation

GNRC has demonstrated a willingness to invest in the Nolensville Pike corridor and has funded three projects as part of the Fiscal Year 2023-2026 TIP: Expansion of Rapid Bus Service Infrastructure (Project #2014-15-005) – implementation phase; Pedestrian Signal Priorities (Project #2018-111-075) – construction phase; Nolensville Pike/McNally Drive Intersection Improvement Grant Local Match (Project #2019-14-086) – construction phase

Metro Nashville's *WalknBike Plan* 2022-2024 Work Plan on pages 45-50 includes several sidewalk projects for near-term implementation leading to the Nolensville Pike corridor. These include the following.

On Street	From Street	To Street	Phase	2022	2023	2024
Funded Priority Sidewalk Segments						
Welshwood	Corning	Nolensville	DES	DES	CON	
Nolensville	Welch	Paragon Mills	PLANNED		DES	ROW
Unfunded Priority Sidewalk Segments						
Nolensville	Edmonson	Elysian Fields	PLANNED			
Edmonson	Suter	Nolensville	PLANNED			
Nolensville	Elysian Fields	Natchez	PLANNED			
Nolensville	Fairlane	Haywood	PLANNED			