



Appendix A



RESOLUTION 26-R-24 adopting the City of Murfreesboro Safety Action Plan and its Safety Targets.

WHEREAS, there were 26,023 crashes reported within the Murfreesboro City limits from 2020 to 2024; and

WHEREAS, 38 people lost their lives in crash-related deaths on Murfreesboro roadways in the five-year period; and

WHEREAS, there were 331 people with suspected serious injuries caused from crashes on Murfreesboro roadways in the five-year period; and

WHEREAS, the City of Murfreesboro is committed to the goal of significantly reducing and ultimately eliminating roadway fatalities and serious injuries on roadways within the City's police jurisdiction.

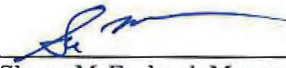
NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF MURFREESBORO, TENNESSEE, AS FOLLOWS:

SECTION 1. The City adopts an interim target of reducing fatal and serious injury crash rates expressed in crashes per 100 million vehicle miles travel by twenty-five (25) percent by the year 2040.

SECTION 2. The City adopts this Safety Action Plan of the Safe Streets and Roads for All initiative, to serve as a guiding document for the City as it works toward achieving its safety performance goals

SECTION 3. This Resolution shall be effective immediately, the public welfare and the welfare of the City requiring it.

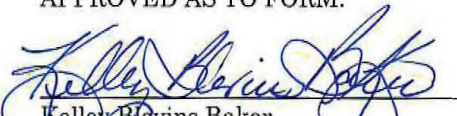
Passed: May 14, 2026


Shane McFarland, Mayor

ATTEST:

APPROVED AS TO FORM:


Erin E. Tucker
City Recorder


Kelley Blevins Baker
Interim City Attorney



Appendix B



Variable Weightings							10%	30%	10%	20%	10%	10%	5%	5%	100%	-
ID	Road Name	From	To	Length, mi	AADT	Crashes	Crash Rate	KA Crashes	Risk Index	VRU Crashes	Schools (.5 mile)	Transit (0.5 mile)	SC Inputs	Public Comments	Total Score	Rank
A	OLD FORT PKWY.	Veterans Pkwy	Broad St	5.41	38,000	2,787	7	55	99	29	1,161	2,483	7	9	90	1
B	MEMORIAL BLVD.	Broad St	Dejarnette Ln	6.86	39,254	2,475	5	28	99	18	1,359	2,437	7	32	70	4
C	NW BROAD ST.	Florence Rd	Old Fort Pkwy	6.70	28,784	1,702	5	39	95	9	378	1,209	7	15	56	8
D	SE BROAD ST.	Old Fort Pkwy	Elam Rd	6.44	29,301	1,496	4	20	95	18	1,464	1,014	7	31	60	6
E	SHELBYVILLE PK.	SE Broad St	City Limits	5.50	35,000	2,628	7	42	100	24	1,527	2,410	5	27	83	2
F	NORTHFIELD BLVD. / RUTHERFORD BLVD.	NW Broad St	S Church St	10.60	20,000	2,865	7	47	97	18	1,463	2,324	2	15	76	3
G	FORTRESS BLVD.	Old Fort Pkwy	NW Broad St	5.88	20,000	2,663	12	34	98	10	451	2,039	5	15	62	5
H	MIDDLE TENNESSEE BLVD.	NW Broad St	New Salem Hwy	6.45	20,000	2,044	9	26	97	15	1,100	1,779	2	14	59	7
I	JOHN R. RICE BLVD.	Veterans Pkwy	New Salem Hwy	7.36	8,000	1,349	13	15	99	3	691	689	-	8	39	9
J	NEW SALEM HWY	City Limits	Old Fort Pkwy	7.89	25,000	1,539	4	16	99	9	305	348	-	12	34	11
K	THOMPSON LN. / COMPTON RD.	Old Fort Pkwy	City Limits	8.72	20,000	1,708	5	17	98	4	182	1,430	3	12	37	10
L	LASCASSAS PK.	E Clark Blvd	City Limits	2.73	15,000	555	7	13	99	7	433	452	-	6	33	12
M	VETERANS PKWY.	Burnt Knob Rd	S Church St	10.51	14,000	951	4	22	95	3	177	192	-	20	31	13
N	DR. MARTIN LUTHER KING JR. BLVD	NE Broad St	City Limits	2.92	17,000	662	7	11	95	3	339	599	1	4	29	14
O	SAINT ANDREWS DR.	Old Fort Pkwy	New Salem Hwy	2.82	9,000	508	11	6	96	3	83	264	1	4	27	15
P	JOE B. JACKSON PKWY.	S Church St	SE Broad St	3.54	12,500	484	6	14	98	2	-	-	2	5	26	16

best	<	-	>	worst
------	---	---	---	-------



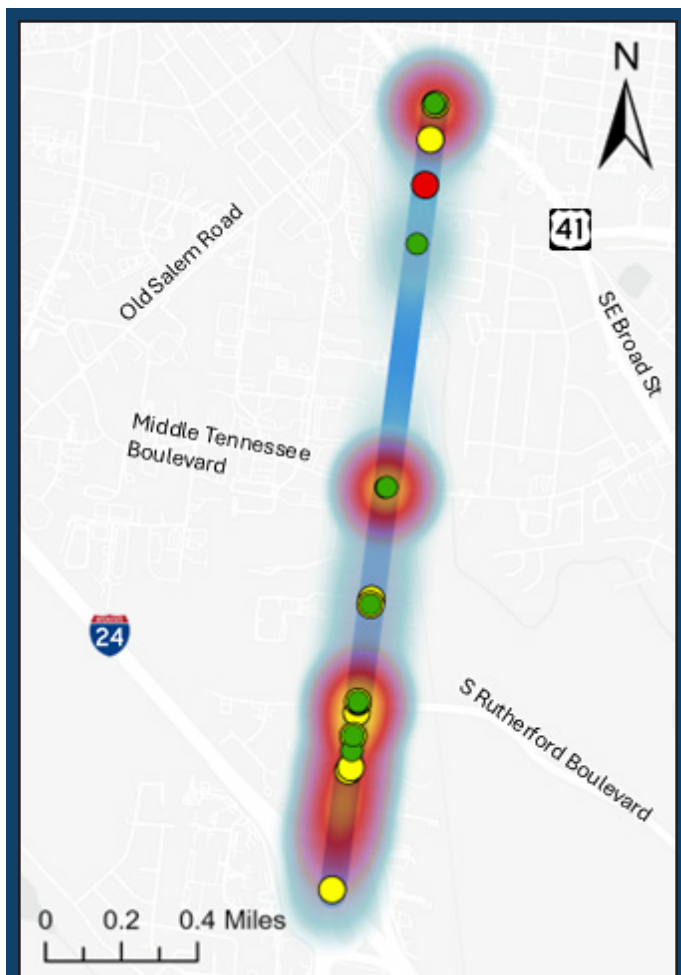
Appendix C





Shelbyville Pike (US-231)

from Broad Street to I-24



● VRU (10) ● Serious Injury (12) ● Fatal (1)

Other Principal Arterial (TDOT)

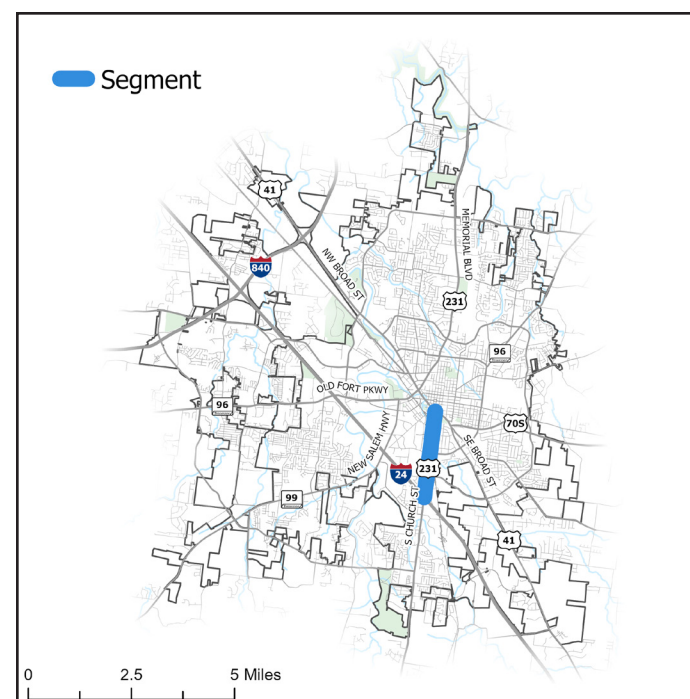
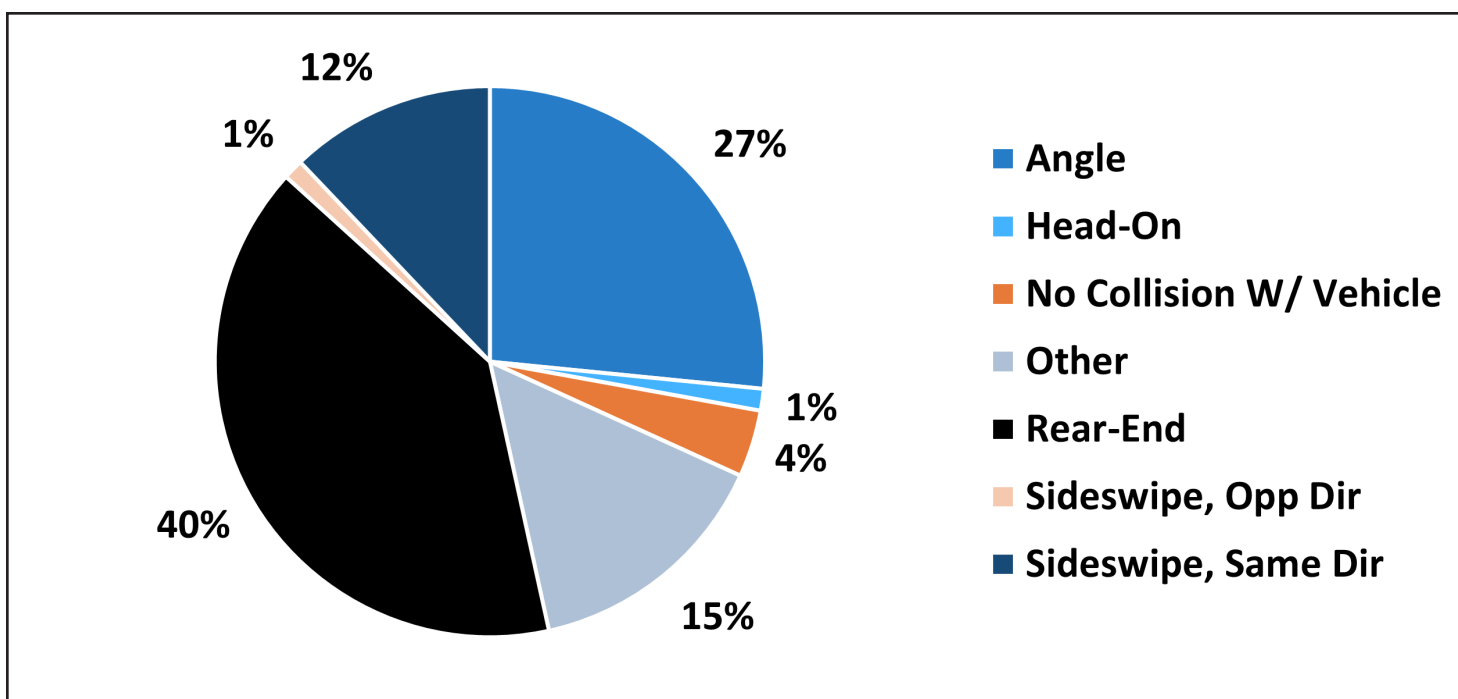
Speed Limit	45 mph
Lanes	4
Vehicles/Day	35,000
Total Crashes	1,016
HIN Intersections	-

Characteristics

This section of Shelbyville Pike (US-231) is a four-lane roadway through south Murfreesboro, divided by a bi-directional turn lane. This segment follows a straight alignment over generally rolling terrain. Multi-modal infrastructure, including sidewalks and transit stop locations, can be found throughout this segment.

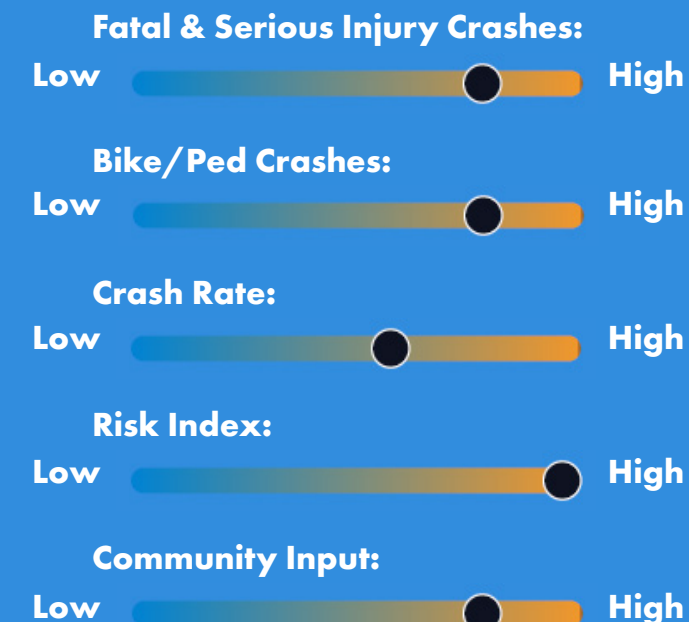


Along Shelbyville Pike (US-231), Facing North, Just North of Middle Tennessee Boulevard



OVERALL RANKING: 1

Ranking Index



Community Input

“The city needs to look at the bushes and shrubs around businesses blocking views when pulling out.”

“Poorly designed intersections and signals.”

“The new builds on S Church St need to be connected to a light.”

“Crossing broad Street on church St is very dangerous and drivers frequently run red lights.”

“Pedestrians frequently cross the road at the intersection with Broad St and refuse to use the crosswalk. It is dangerous for both pedestrians and vehicles alike, and it severely infringes upon the flow of traffic. Not only is it unsafe for pedestrians to cross, it is also unsafe for the vehicles who have to frequently try to avoid them on an already crowded street.”

Shelbyville Pike (US-231)

from Broad Street to I-24



Shelbyville Pike (US-231) from Broad Street to I-24

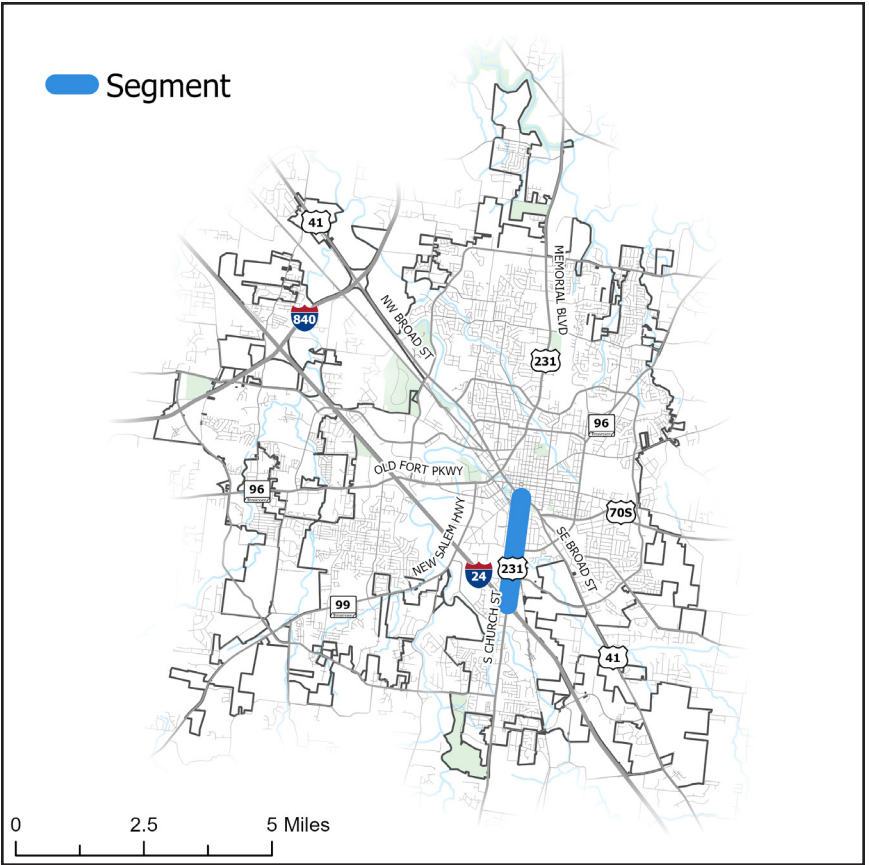
ID				Countermeasure	Cost	Schedule	Project Readiness
			1	Conduct Intersection Control & Alignment Evaluation (Broad St)	\$	Short-Term	Ready
	●		2	Flashing Yellow Arrows (FYA) (Broad St, Middle Tennessee Blvd, S Rutherford Blvd)	\$\$	Mid-Term	Ready
●	●	●	3	Retroreflective Backplates (Broad St, Middle Tennessee Blvd, S Rutherford Blvd)	\$	Short-Term	Ready
●	●	●	4	Crosswalk Visibility and Accessibility Enhancements (Broad St, Middle Tennessee Blvd, S Rutherford Blvd)	\$\$	Short-Term	Ready
●	●	●	5	Targeted Lighting	\$\$	Mid-Term	●
			6	Transit Stop Addition/Enhancement	\$\$	Mid-Term	Ready
	●		7	Retroreflective Pavement Markers	\$	Short-Term	Ready
●	●	●	8	Corridor Access Management	\$\$\$\$	Long-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

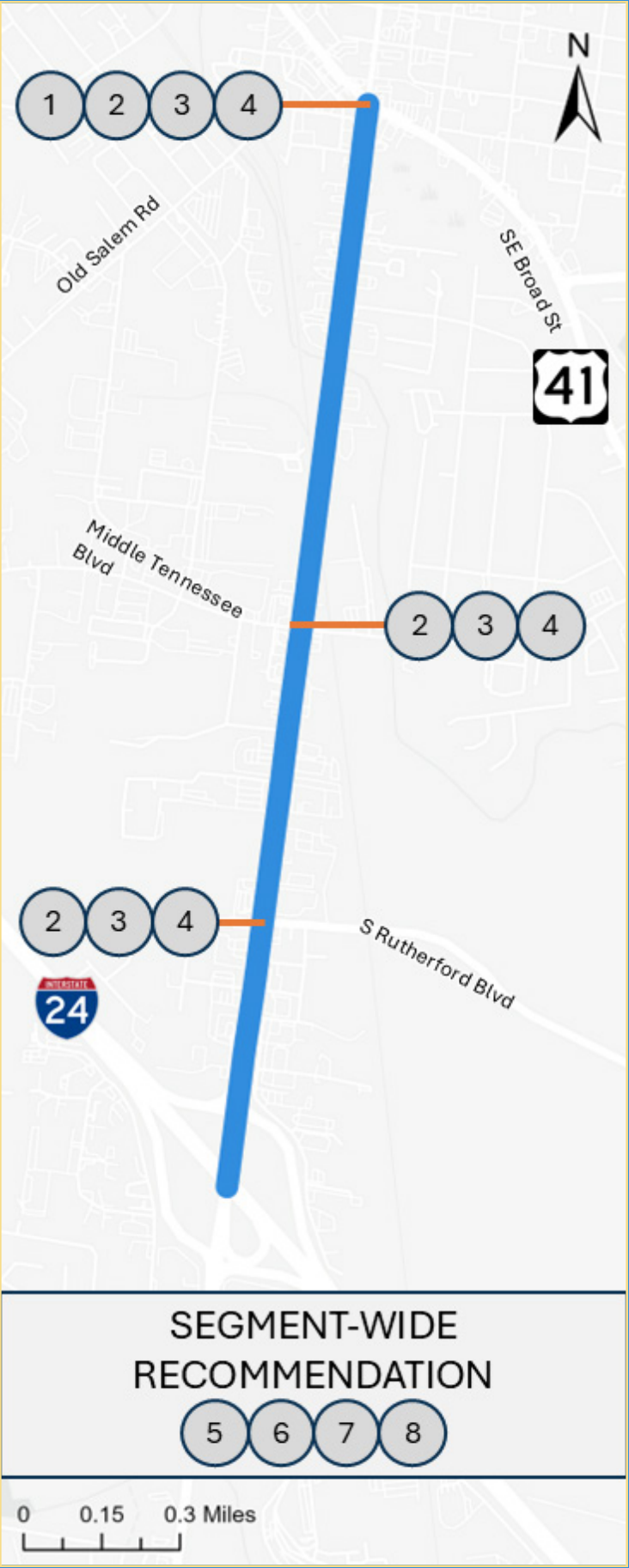
- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- **FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.**
- **Evaluating alternate intersection control or geometry ensures safer, more efficient designs by reducing severe crashes, improving pedestrian safety, and calming traffic.**
- **Proper access management at medians can prevent left-turn and head-on crashes by separating opposing traffic flows. Consolidating driveways can also facilitate better access management by controlling where vehicles can turn, thereby reducing unpredictable movements that can lead to crashes.**
- **Adding or enhancing transit stop locations provides a safer path for transit user to reach their intended destinations, including accessible sidewalks, curb ramps, detectable warning surfaces, and stop shelters and benches.**



RECOMMENDED COUNTERMEASURES

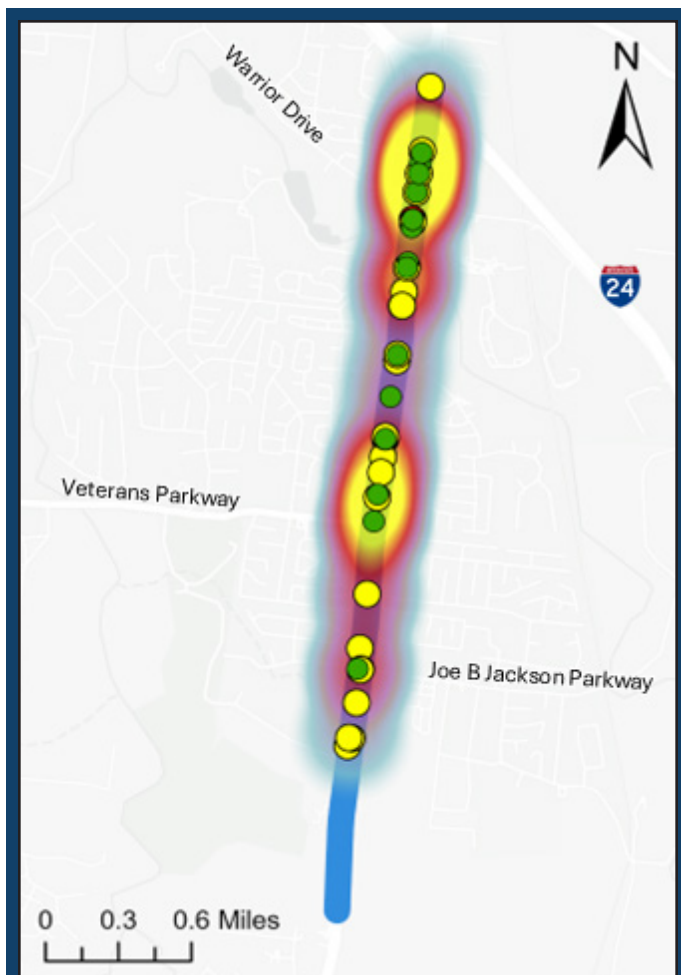


Shelbyville Pike (US-231)
from Broad Street to I-24



Shelbyville Pike (US-231)

from I-24 to City Limits



Other Principal Arterial (TDOT)

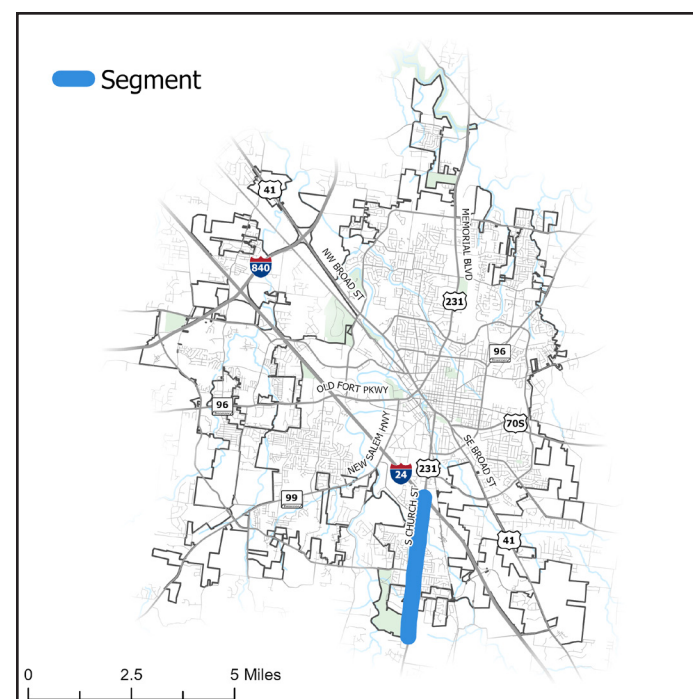
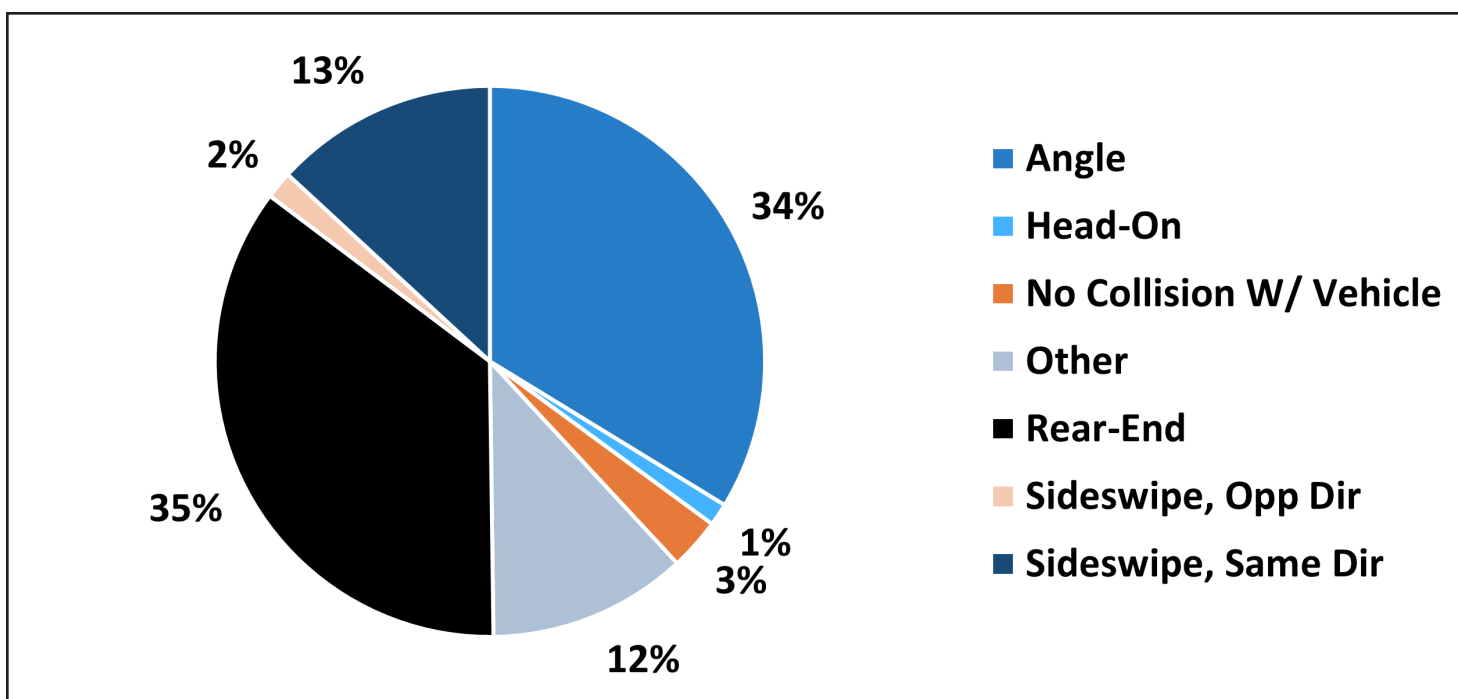
Speed Limit	45 mph
Lanes	6
Vehicles/Day	35,000
Total Crashes	1,675
HIN Intersections	-

Characteristics

This section of Shelbyville Pike (US-231) is a four-lane roadway through south Murfreesboro, divided by a bi-directional turn lane. This segment follows a straight alignment over generally rolling terrain. Multi-modal infrastructure, including sidewalks and transit stop locations, can be found throughout this segment.

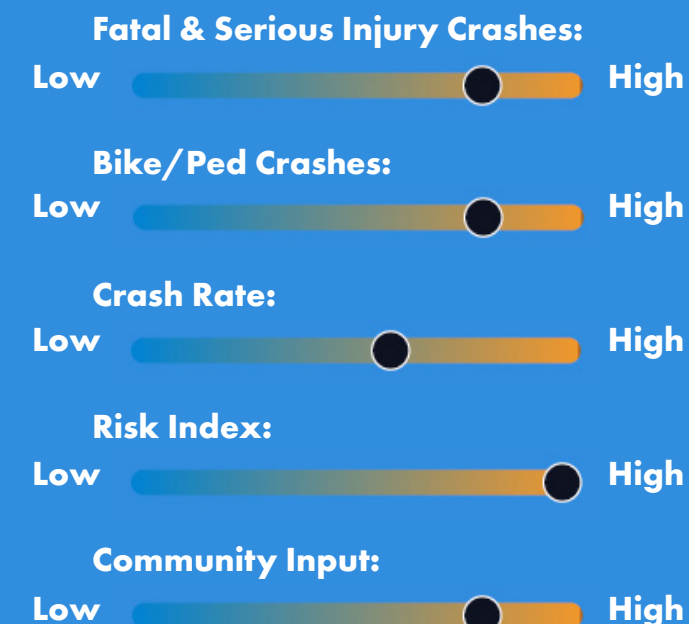


Along Shelbyville Pike (US-231), Facing North, Just South of I-24



OVERALL RANKING: 1

Ranking Index



Community Input



Shelbyville Pike (US-231)

from I-24 to City Limits



Shelbyville Pike (US-231) from I-24 to City Limits

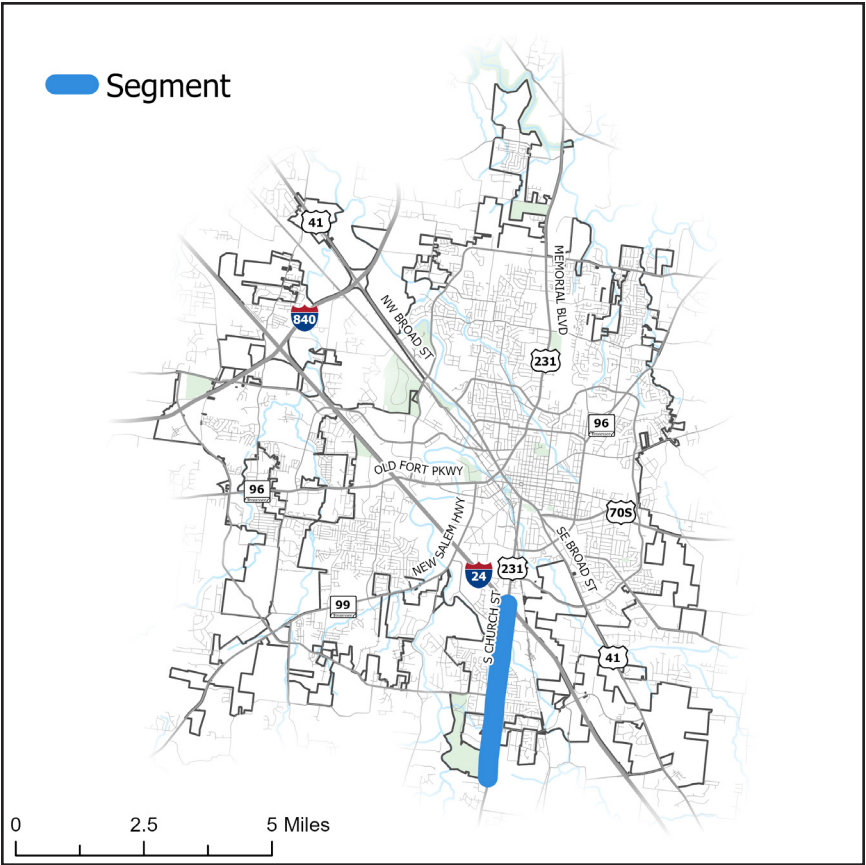
ID				Countermeasure	Cost	Schedule	Project Readiness
	●		1	Flashing Yellow Arrows (FYA) (Warrior Dr, Indian Park Dr, Calumet Trace, Innsbrooke Blvd, Veterans Pkwy, Lansdan Dr, Joe B Jackson Pkwy, Tiger Hill)	\$\$	Mid-Term	Ready
●	●	●	2	Retroreflective Backplates (Warrior Dr, Indian Park Dr, Calumet Trace, Innsbrooke Blvd, Veterans Pkwy, Lansdan Dr, Joe B Jackson Pkwy, Tiger Hill)	\$	Short-Term	Ready
●	●	●	3	Crosswalk Visibility and Accessibility Enhancements (Warrior Dr, Indian Park Dr, Calumet Trace, Innsbrooke Blvd, Veterans Pkwy, Lansdan Dr, Joe B Jackson Pkwy, Tiger Hill)	\$\$	Short-Term	Ready
●	●	●	4	Targeted Lighting	\$\$	Mid-Term	●
●	●	●	5	Sidewalks and Multi-use Paths	\$\$	Mid-Term	●
			6	Transit Stop Addition/Enhancement	\$\$	Mid-Term	●
●	●	●	7	Corridor Access Management	\$\$\$\$	Long-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

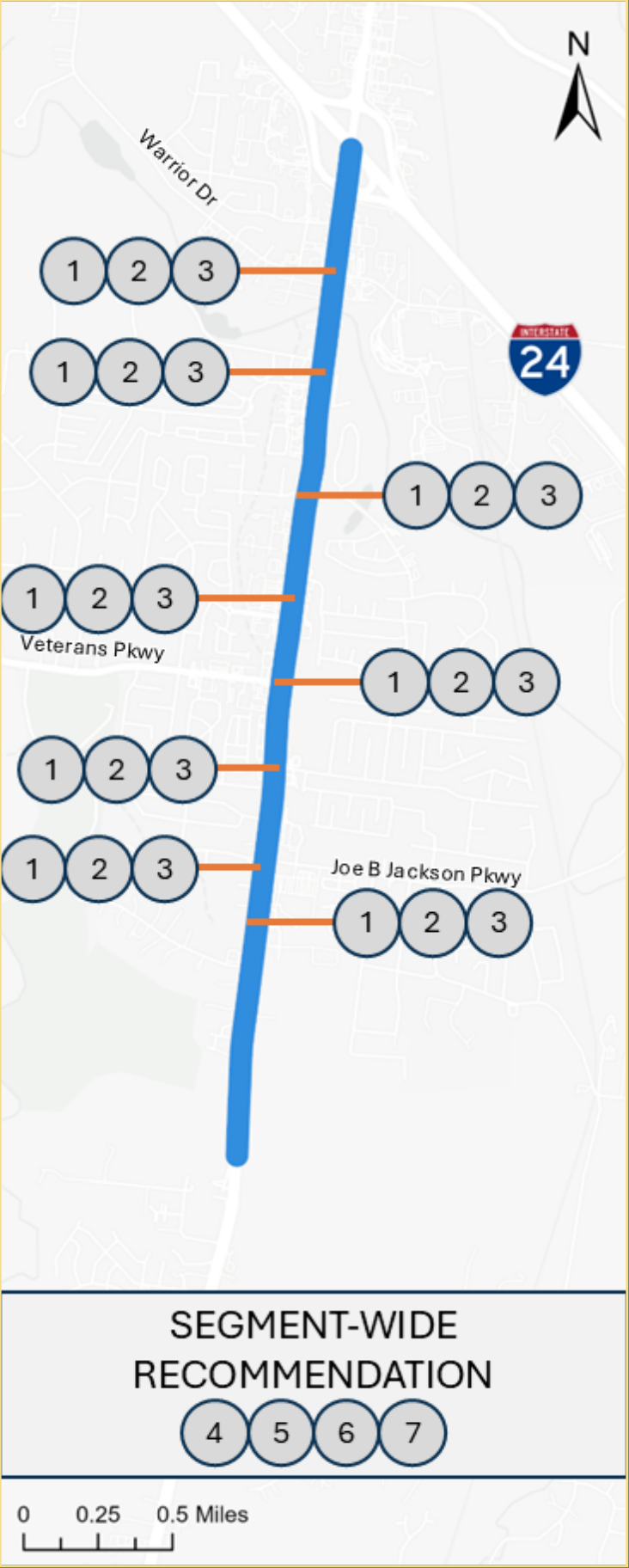
- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- Roadway lighting helps drivers, cyclists, and pedestrians see each other more clearly, especially during nighttime and low-visibility conditions, reducing the likelihood of crashes.
- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.
- Evaluating alternate intersection control or geometry ensures safer, more efficient designs by reducing severe crashes, improving pedestrian safety, and calming traffic.
- Installing sidewalks and pedestrian infrastructure dramatically improves safety by reducing pedestrian crashes up to 88%, separating vulnerable users from traffic, and enhancing visibility and accessibility. These improvements also calm traffic, promote active transportation, and create safer, more livable communities.
- Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter.



RECOMMENDED COUNTERMEASURES

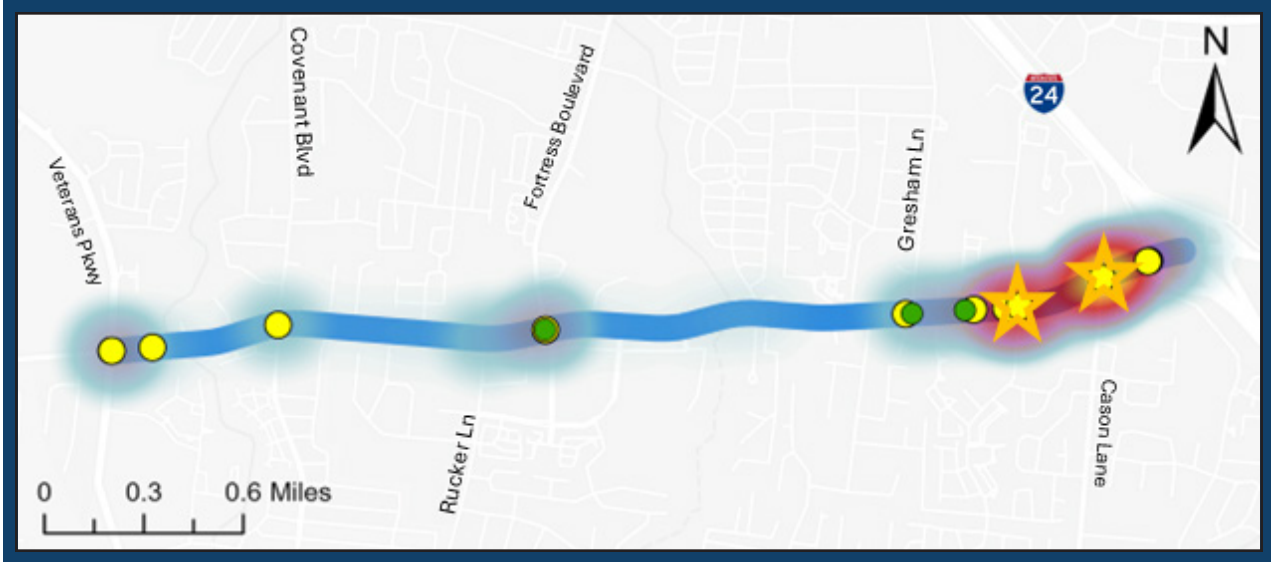


Shelbyville Pike (US-231) from I-24 to City Limits

DISCLAIMER - 23 United States Code, Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



Old Fort Parkway (TN-96) from Veterans Parkway to I-24

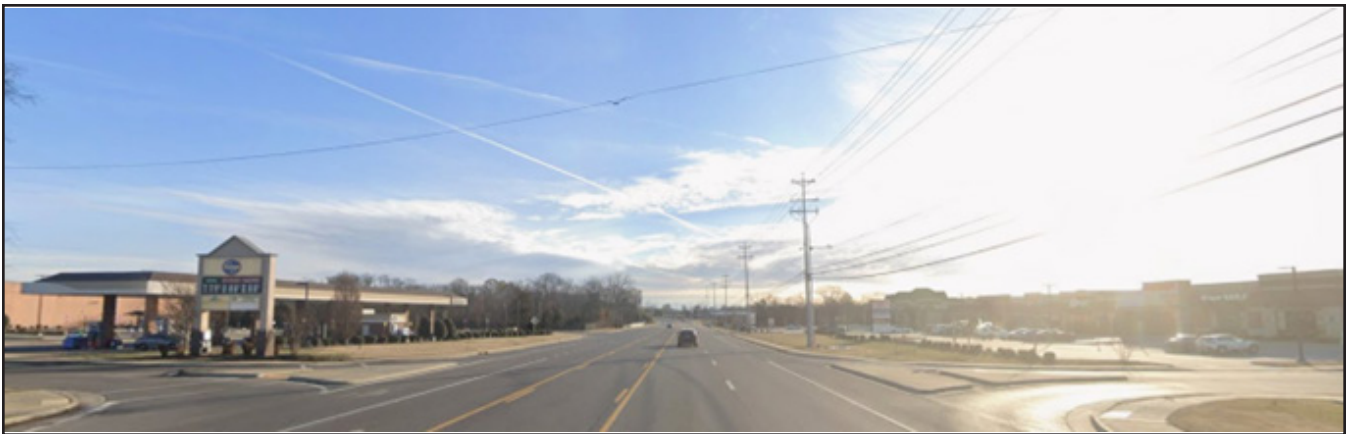


Other Principal Arterial (TDOT)

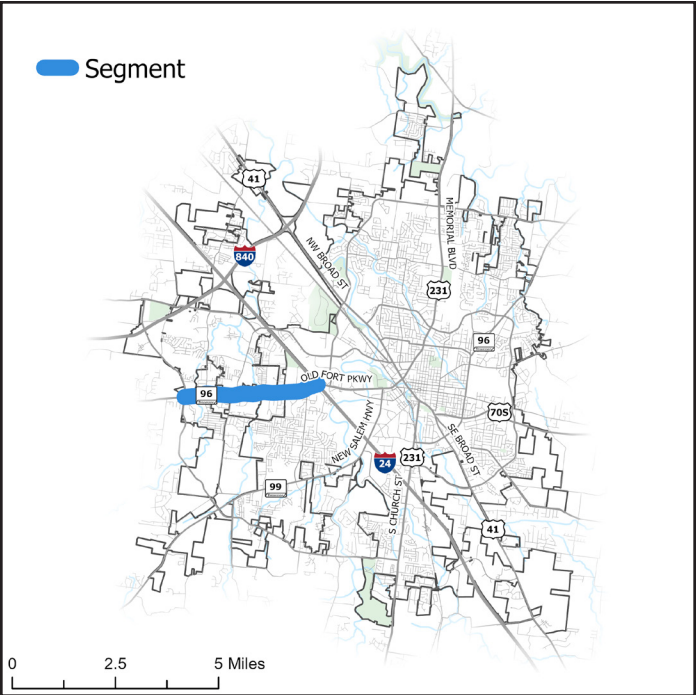
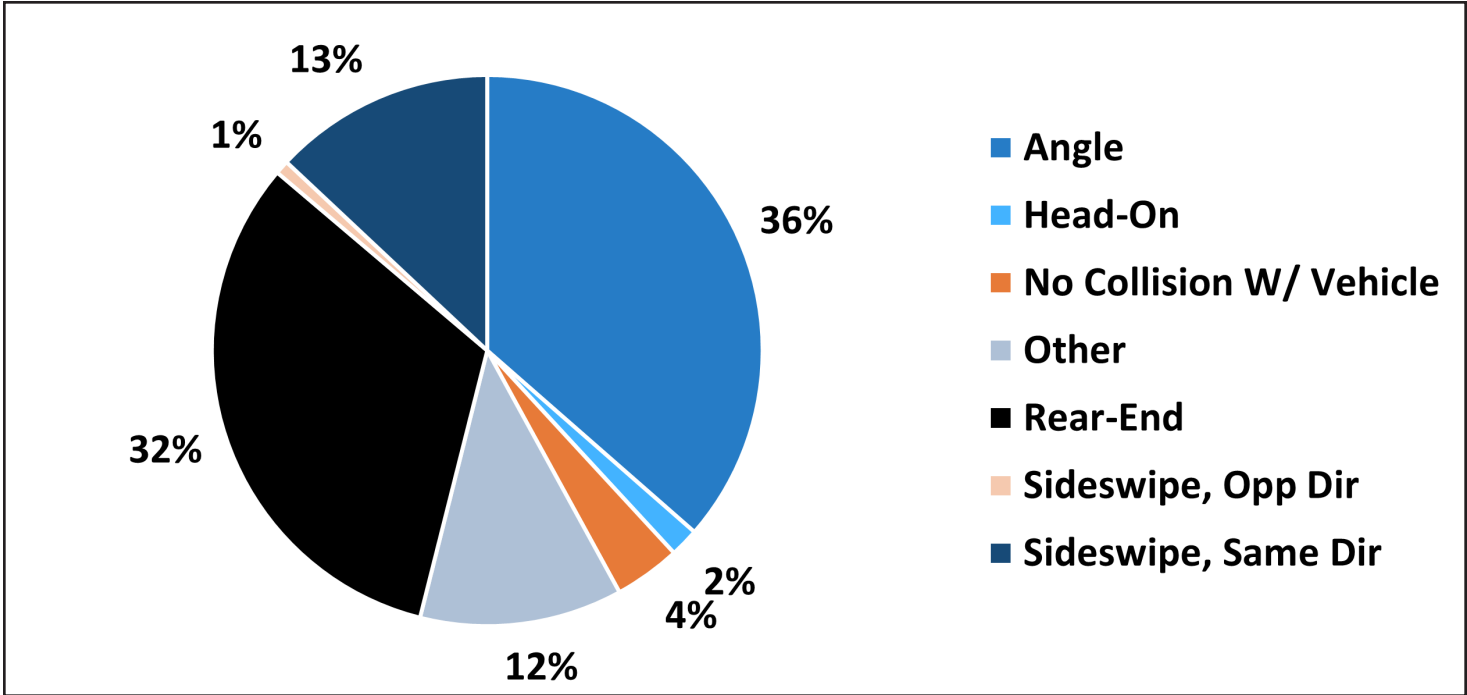
Speed Limit	45 mph
Lanes	4
Vehicles/Day	38,000
Total Crashes	1,361
HIN Intersections	2

Characteristics

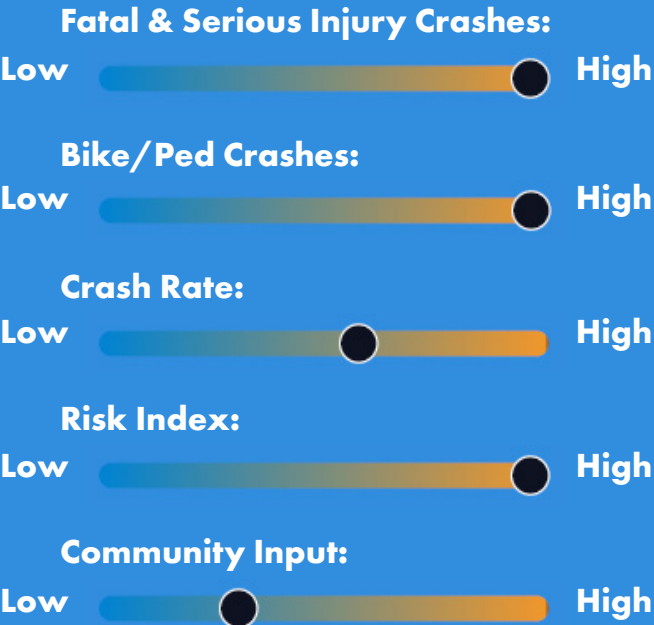
This section of Old Fort Parkway (TN-96) is a four-lane roadway through west Murfreesboro, divided by a bi-directional turn lane. This segment follows a lightly curved alignment over generally rolling terrain. The segment travels through largely residential and commercial area, and connects to I-24 at its eastern end.



Along Old Fort Parkway (TN-96), Facing East, Just East of Veterans Parkway



OVERALL RANKING: 2 Ranking Index



Community Input

- “ Cars will travel in the center lane to turn left onto I-24, but merge into the center lane going straight. No patience and drivers in center lane wait even longer to move forward. ”
- “ We have seen several accidents in the area near the I-24 interchange. ”
- “ Cason Ln is a terrible intersection. Left turn onto 96 is too short, needing to wait multiple lights. River Rock ending on Cason needs to be rerouted. No double light. ”
- “ Impossible to cross three lanes of traffic, this whole area is a disaster, no designated turning lanes just 6 lanes of straight, no crosswalks, or bike lanes! ”
- “ We need a right turn lane from southbound Veterans Blvd turning West onto Franklin Rd. Backed up traffic could be reduced with those stuck waiting to turn right onto Franklin Rd. ”

Old Fort Parkway (TN-96) from Veterans Parkway to I-24

DISCLAIMER - 23 United States Code, Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



Old Fort Parkway (TN-96) from Veterans Parkway to I-24

RECOMMENDED COUNTERMEASURES



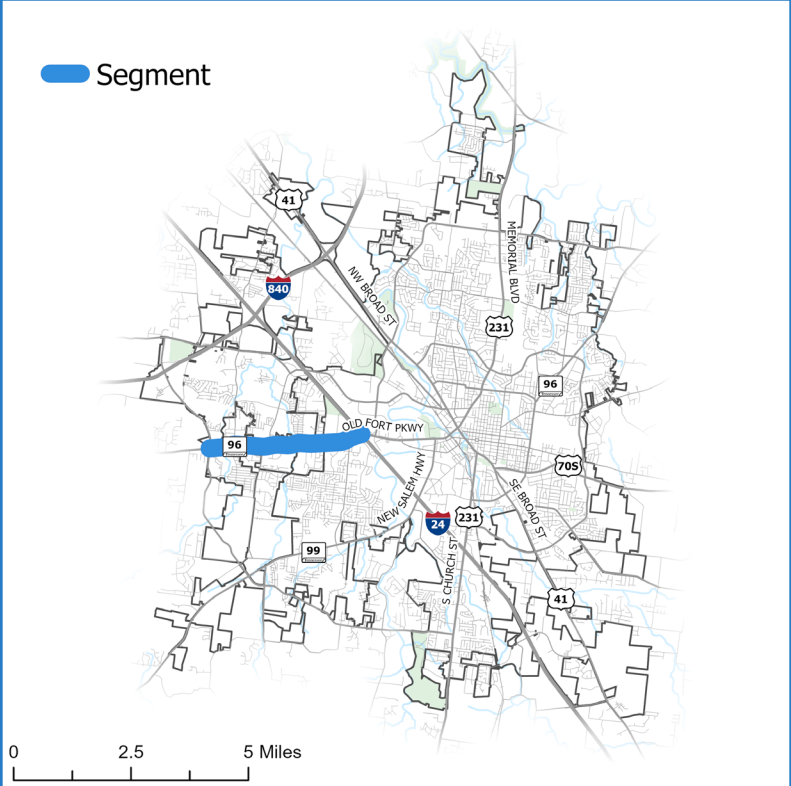
	ID	Countermeasure	Cost	Schedule	Project Readiness
	1	Improve Signal Equipment Alignment (Veterans Pkwy)	\$\$	Short-Term	Ready
●	2	Flashing Yellow Arrows (FYA) (Veterans Pkwy, Brinkley Rd, Rucker Ln, Fortress Blvd, Gresham Ln, St. Andrews Dr, Cason Ln, I-24 EB Ramps)	\$\$	Mid-Term	Ready
● ● ●	3	Retroreflective Backplates (Veterans Pkwy, Brinkley Rd, Rucker Ln, Fortress Blvd, St. Andrews Dr, Cason Ln, I-24 EB Ramps)	\$	Short-Term	Ready
● ● ●	4	Crosswalk Visibility and Accessibility Enhancements (Veterans Pkwy, Brinkley Rd, Rucker Ln, Fortress Blvd, St. Andrews Dr, Cason Ln, I-24 EB Ramps)	\$\$	Short-Term	Ready
	5	Conduct Intersection Control & Alignment Evaluation (Cason Ln)	\$	Short-Term	Ready
● ● ●	6	Sidewalks and Multi-use Paths	\$\$	Mid-Term	Ready
	7	Retroreflective Pavement Markers	\$	Short-Term	Ready
● ● ●	8	Corridor Access Management	\$\$\$\$	Long-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter. This enhanced visibility and recognition can lead to a reduction in rearend and angle crashes at signalized intersections.
- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.
- Evaluating alternate intersection control or geometry ensures safer, more efficient designs by reducing severe crashes, improving pedestrian safety, and calming traffic.
- Proper access management at medians can prevent left-turn and head-on crashes by separating opposing traffic flows. Consolidating driveways can also facilitate better access management by controlling where vehicles can turn, thereby reducing unpredictable movements that can lead to crashes.



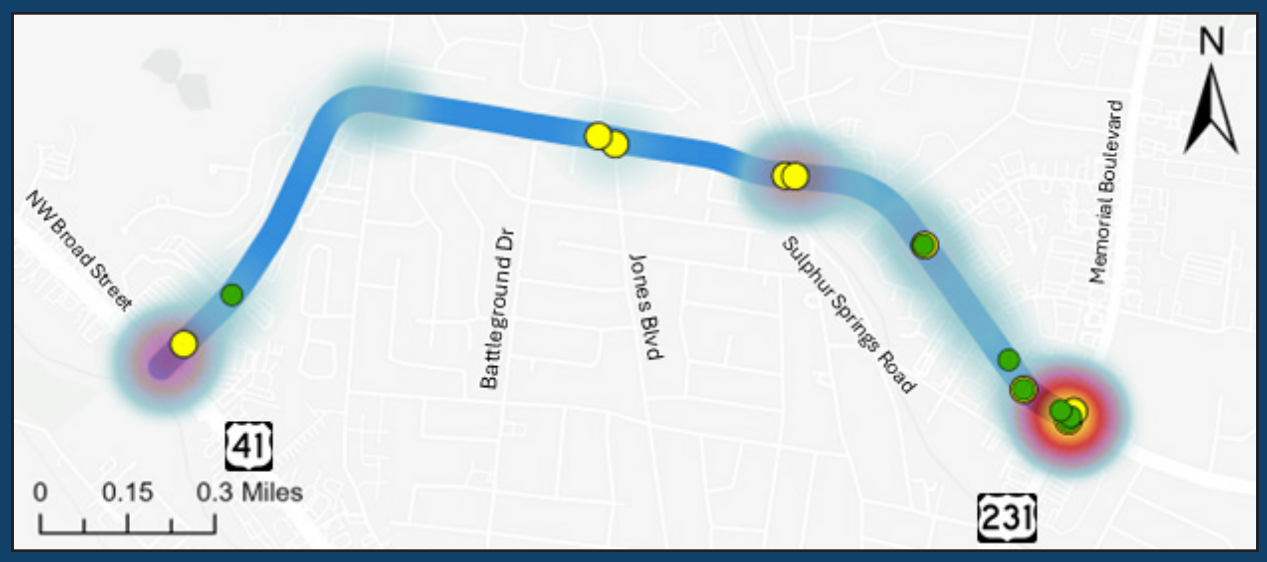
Old Fort Parkway (TN-96) from Veterans Parkway to I-24

DISCLAIMER - 23 United States Code, Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



Northfield Boulevard

from Broad Street to Memorial Boulevard



Minor Arterial (Murfreesboro, TN)

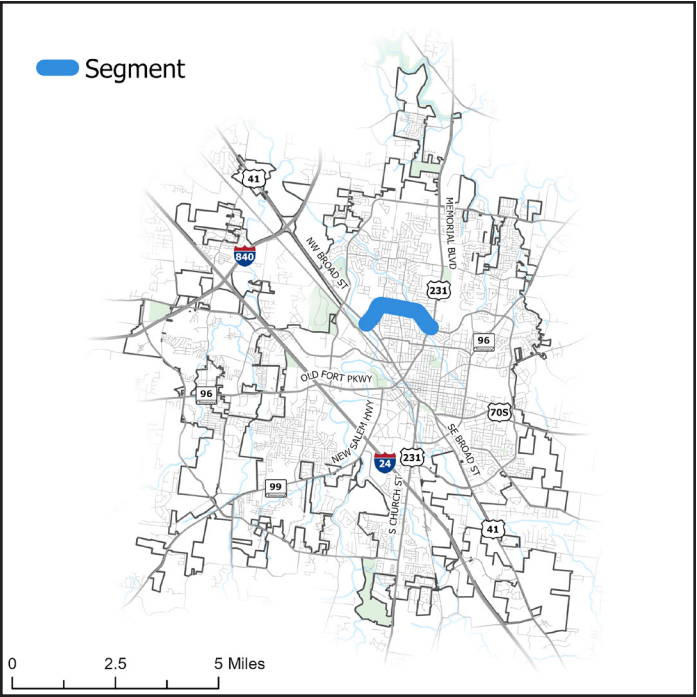
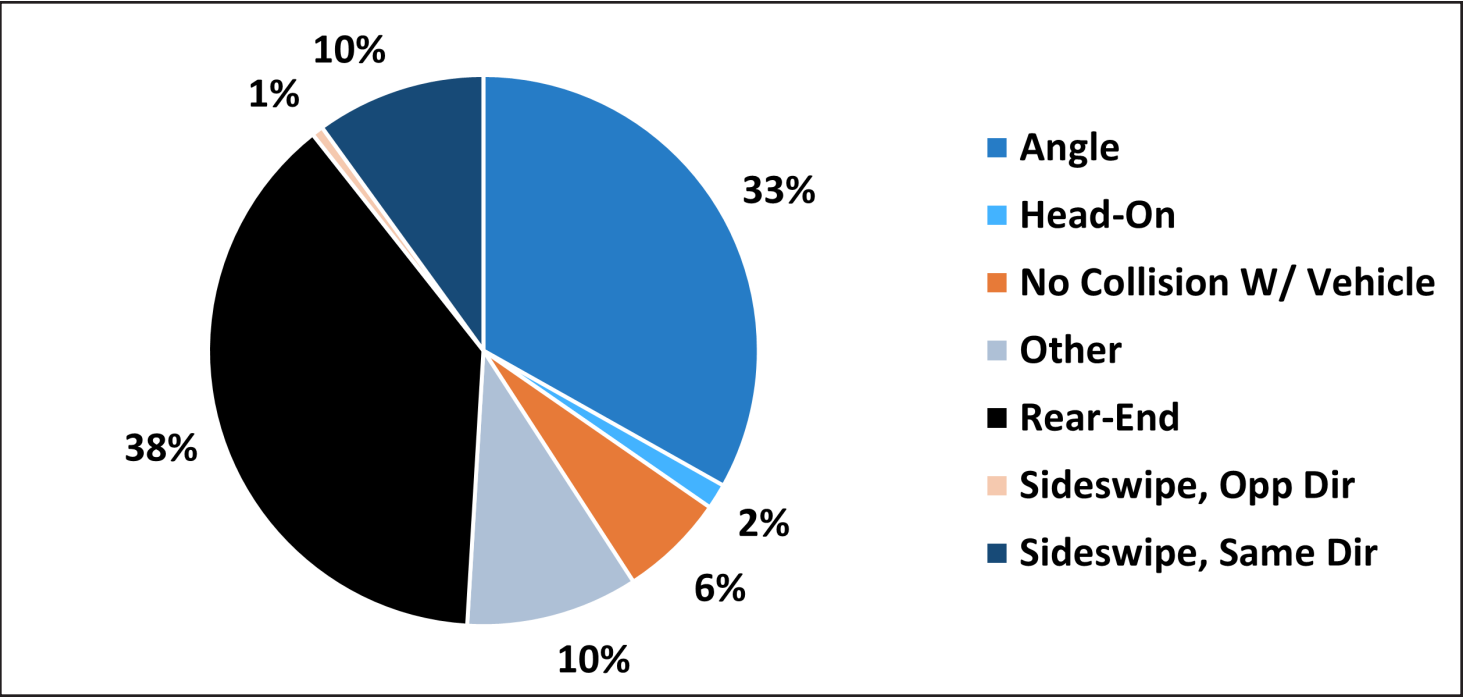
Speed Limit	40 mph
Lanes	4
Vehicles/Day	20,000
Total Crashes	742
HIN Intersections	-

Characteristics

This section of Northfield Boulevard is a four-lane roadway through south Murfreesboro, divided by medians and bi-directional turn lanes. This segment follows a curved alignment over generally rolling terrain. Sidewalks and pedestrian infrastructure can be found throughout this segment, including several mid-block crossings.

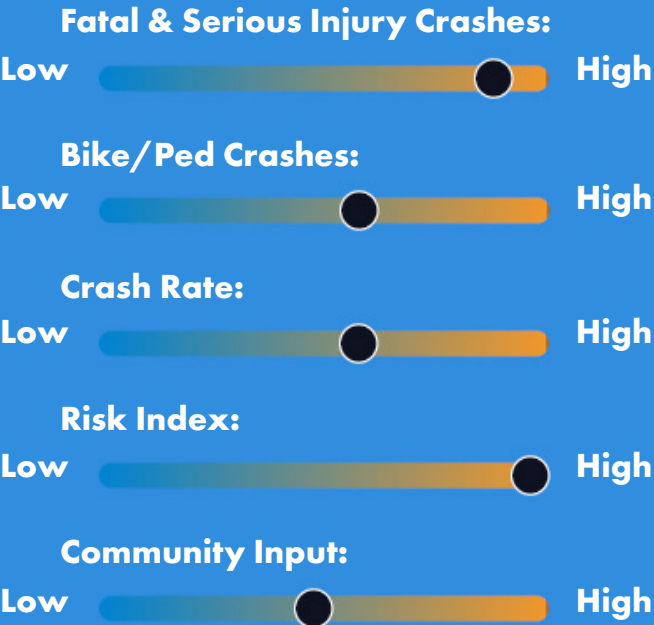


Along Northfield Boulevard, Facing West, Just West of Memorial Boulevard



OVERALL RANKING: 3

Ranking Index



Community Input

“Speed lowering measures are needed to slow drivers on Northfield Blvd. near Georgetown Lane that exceed the speed limit in an effort to get in the far right lane at the intersection with Broad St. to turn right onto Broad.”

“Crosswalks and pedestrian signals needed at Broad Street”

“Cars routinely speed through this stretch, travelling perhaps 15-20 miles per hour over the posted limit, at all hours of the day.”

“There should be more pedestrian facilities here. A protected bike lane perhaps? Speed cushions? Something to ease traffic.”

Northfield Boulevard

from Broad Street to Memorial Boulevard

DISCLAIMER - 23 United States Code, Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



Northfield Boulevard

from Broad Street to Memorial Boulevard

RECOMMENDED COUNTERMEASURES



- ### Benefit Summary
- Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter. This enhanced visibility and recognition can lead to a reduction in rearend and angle crashes at signalized intersections.
 - FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.
 - By promoting slower turning speeds and better visibility, “smart channel” right turns help reduce the likelihood of collisions at intersections.
 - RPMs provide continuous lane guidance, which is particularly useful in navigating curves and complex intersections. The reflective properties of RPMs make them highly visible at night, reducing the risk of accidents by guiding drivers safely along the road.

	ID	Countermeasure	Cost	Schedule	Project Readiness
	1	Flashing Yellow Arrows (FYA) (Battleground Dr, Sulphur Springs Rd, Memorial Blvd)	\$\$	Mid-Term	Ready
	2	Retroreflective Backplates (Broad St, Battleground Dr, Sulphur Springs Rd, Memorial Blvd)	\$	Short-Term	Ready
	3	Crosswalk Visibility and Accessibility Enhancements (Broad St, Battleground Dr, Sulphur Springs Rd, Memorial Blvd)	\$\$	Short-Term	Ready
	4	Smart Channel Right-Turn Lane (Memorial Blvd)	\$\$\$	Long-Term	Ready
	5	Eliminate Negative Off-sets at Intersections (MTSC Rd and Sulphur Springs Rd)	\$\$\$	Mid-Term	Ready
	6	Rectangular Rapid Flashing Beacons (RRFB) (Saddlebrook Dr)	\$\$	Mid-Term	
	7	Retroreflective Pavement Markers	\$	Short-Term	Ready
	8	Corridor Access Management	\$\$\$\$	Long-Term	Ready
	9	Traffic Calming (Corridor-Wide Speed Management)	\$\$	Mid-Term	Ready

FHWA Proven Safety Countermeasure

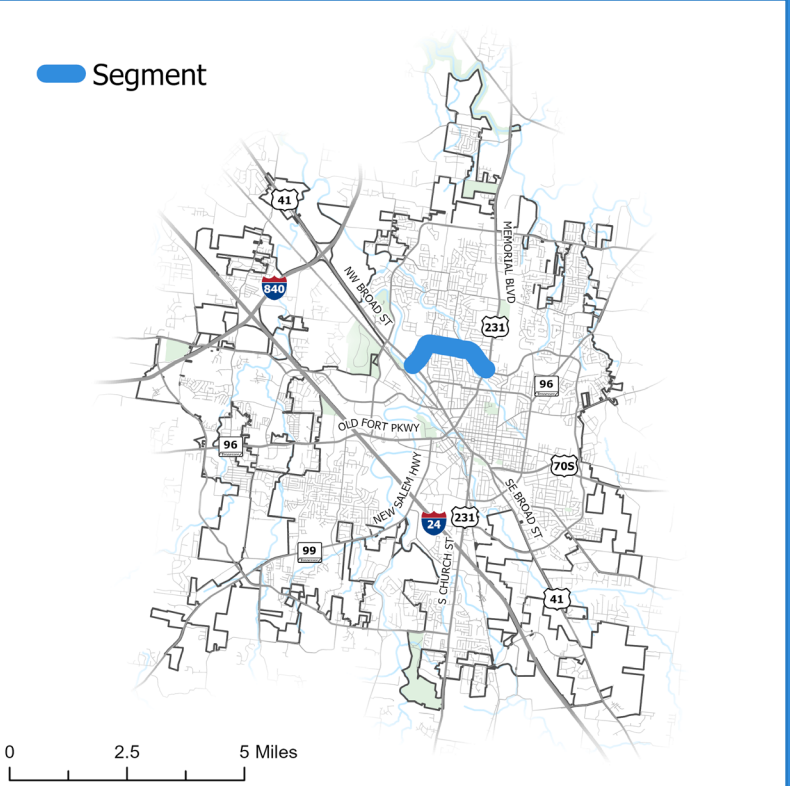
Crash Modification Factors Countermeasure

Vulnerable Road User Related Countermeasure

Requires ROW Acquisition

Requires Utility Relocation

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000



Northfield Boulevard

from Broad Street to Memorial Boulevard

DISCLAIMER - 23 United States Code, Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



Memorial Boulevard (US-231)

from Broad Street to DeJarnette Lane

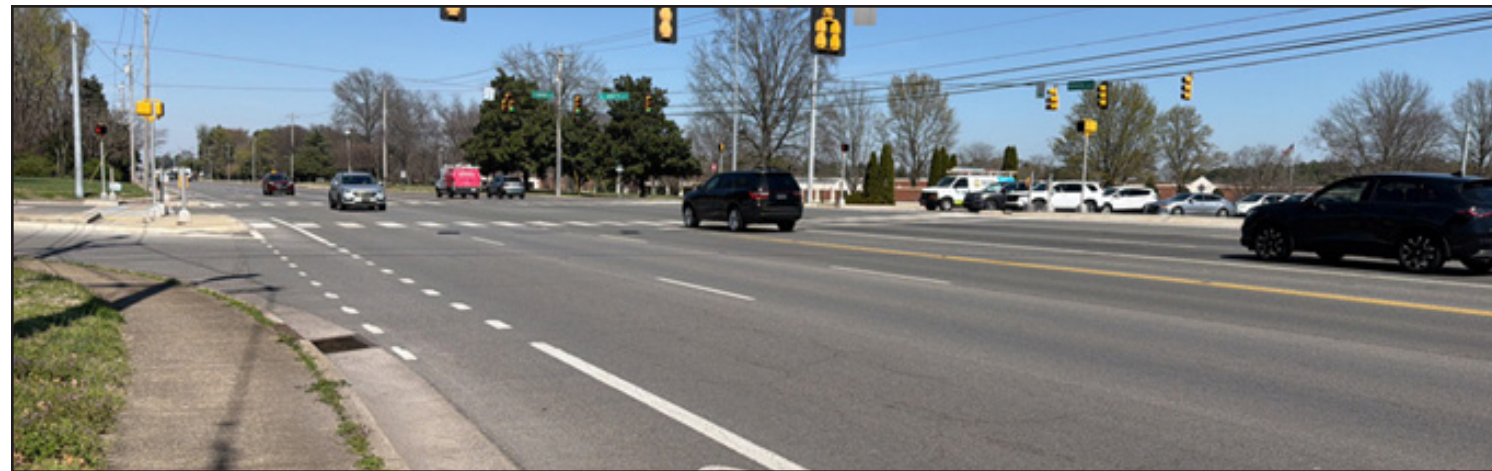


Other Principal Arterial (TDOT)

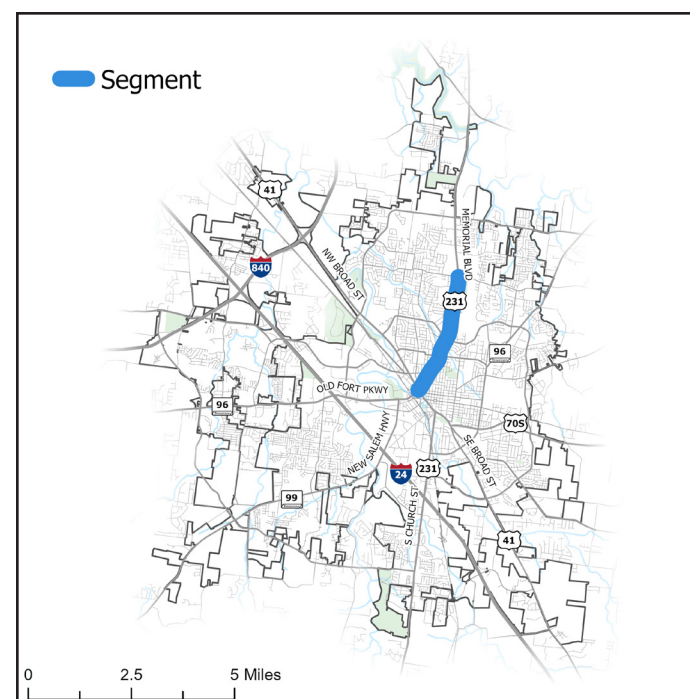
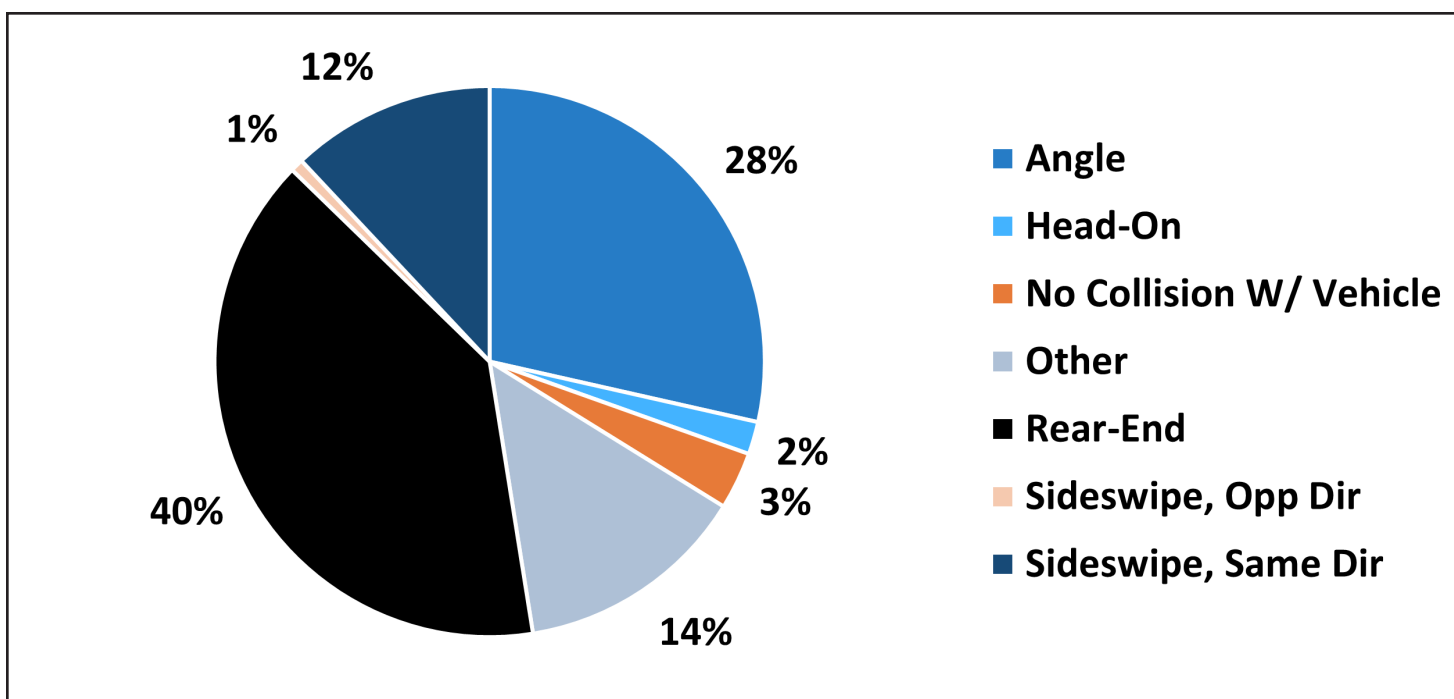
Speed Limit	45 mph
Lanes	4
Vehicles/Day	39,254
Total Crashes	1,984
HIN Intersections	3

Characteristics

This section of Memorial Boulevard (US-231) is a four-lane roadway through north Murfreesboro, divided by a bi-directional turn lane. This segment follows a lightly curved alignment over generally rolling terrain. Multi-modal infrastructure, including sidewalks and bike lanes, can be found throughout



Along Memorial Boulevard (US-231), Facing North, Just South of DeJarnette Lane



OVERALL RANKING: 4

Ranking Index

Fatal & Serious Injury Crashes:
Low High

Bike/Ped Crashes:
Low High

Crash Rate:
Low High

Risk Index:
Low High

Community Input:
Low High

Community Input

“ Pedestrians are struck or almost struck here often because cars have to be aggressive just to get through the intersection, which is almost always blocked ”

“ There are several transit stops that need bus shelters and benches ”

“ The traffic from Chick-fil-a backs up onto Broad Street ”

“ It's difficult to make a left turn here at Ridgely. There's a tree here that blocks the visibility of oncoming traffic. ”

“ There is a high amount of people who exceed the speed limit of 35 going across the bridge on a daily basis. ”

“ A pedestrian crosswalk is needed at Medical Center. It is actively very confusing crossing this intersection on foot. ”

Memorial Boulevard (US-231)

from Broad Street to DeJarnette Lane



Memorial Boulevard (US-231)

from Broad Street to Dejarnette Lane

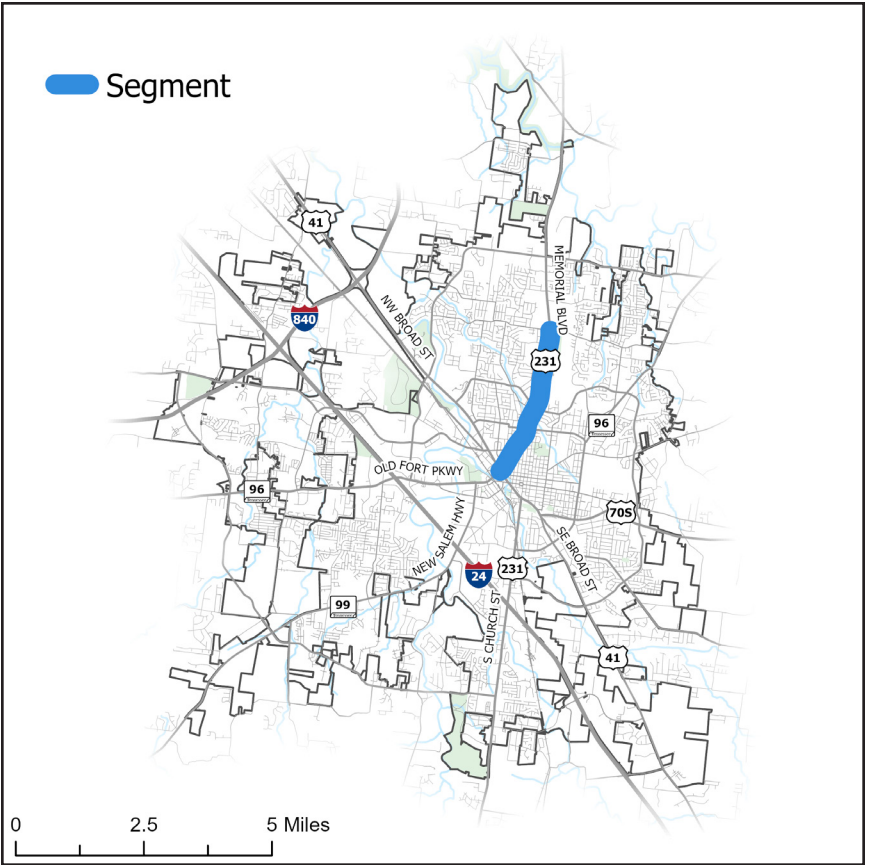
ID				Countermeasure	Cost	Schedule	Project Readiness
	●		1	Flashing Yellow Arrows (FYA) (Ridgely Rd, Medical Center Pkwy, Clark Blvd, Northfield Blvd, Heritage Park Dr, Airport Rd, Wendelwood Dr, Dejarnette Ln)	\$\$	Mid-Term	Ready
●	●	●	2	Retroreflective Backplates (Ridgely Rd, Medical Center Pkwy, Clark Blvd, Northfield Blvd, Heritage Park Dr, Airport Rd, Wendelwood Dr, Dejarnette Ln)	\$	Short-Term	Ready
●	●	●	3	Crosswalk Visibility and Accessibility Enhancements (Ridgely Rd, Medical Center Pkwy, Clark Blvd, Northfield Blvd, Heritage Park Dr, Airport Rd, Wendelwood Dr, Dejarnette Ln)	\$\$	Short-Term	Ready
	●		4	Smart Channel Right-Turn Lane (Northfield Blvd and Dejarnette)	\$\$\$	Long-Term	●
●	●	●	5	Targeted Lighting	\$\$	Mid-Term	●
	●		6	Retroreflective Pavement Markers	\$	Short-Term	Ready
●	●	●	7	Corridor Access Management	\$\$\$\$	Long-Term	Ready
			8	Transit Stop Addition/Enhancement	\$\$	Mid-Term	●
	●	●	9	Traffic Calming (Corridor-Wide Speed Management)	\$\$	Mid-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

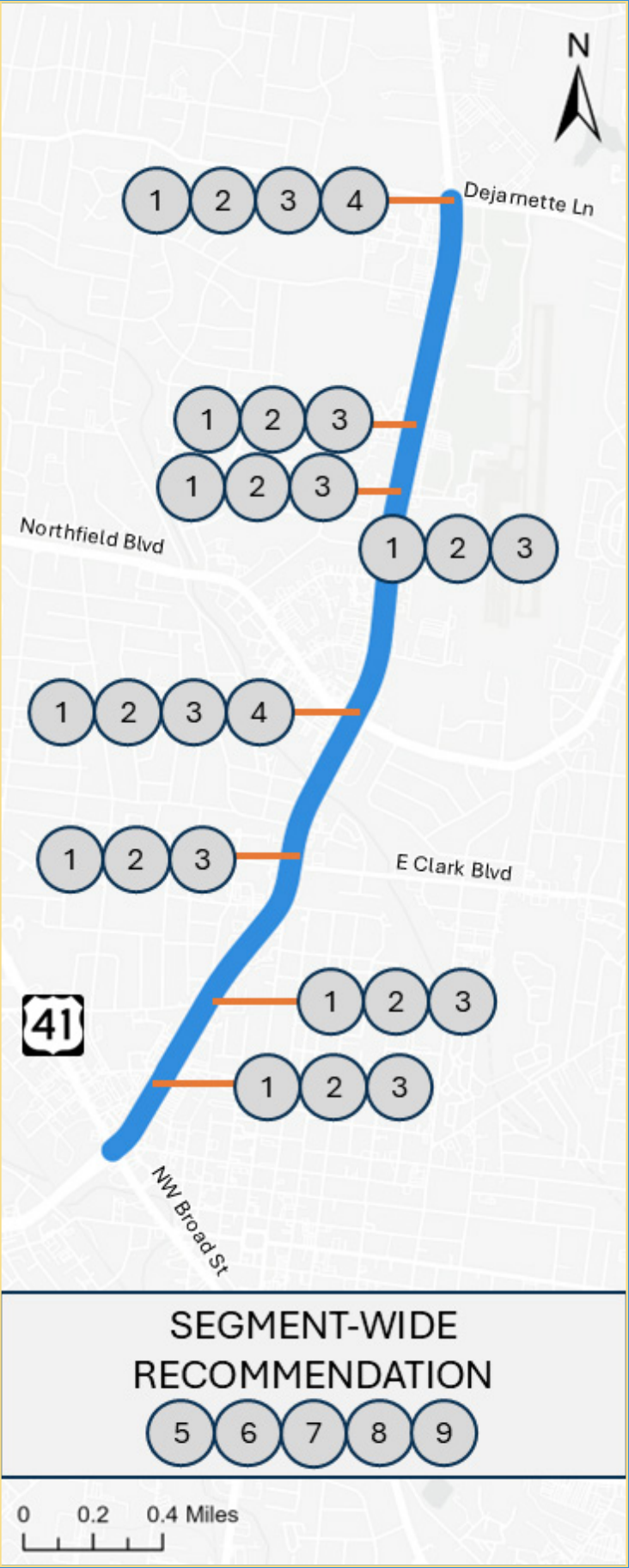
- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- **FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.**
- **Proper access management at medians can prevent left-turn and head-on crashes by separating opposing traffic flows. Consolidating driveways can also facilitate better access management by controlling where vehicles can turn, thereby reducing unpredictable movements that can lead to crashes.**
- **Adding or enhancing transit stop locations provides a safer path for transit user to reach their intended destinations, including accessible sidewalks, curb ramps, detectable warning surfaces, and stop shelters and benches.**
- **RPMs provide continuous lane guidance, which is particularly useful in navigating curves and complex intersections. The reflective properties of RPMs make them highly visible at night, reducing the risk of accidents by guiding drivers safely along the road.**



RECOMMENDED COUNTERMEASURES



Memorial Boulevard (US-231)

from Broad Street to Dejarnette Lane



SE Broad Street (US-41)

from Old Fort Parkway to Martin Luther King Boulevard

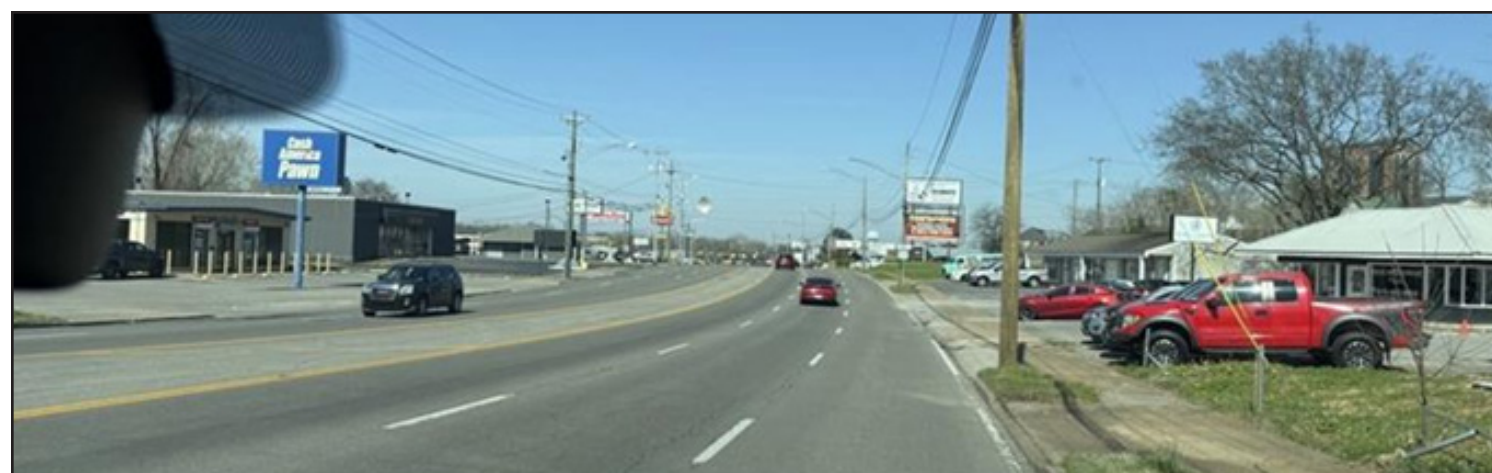


Minor Arterial (TDOT)

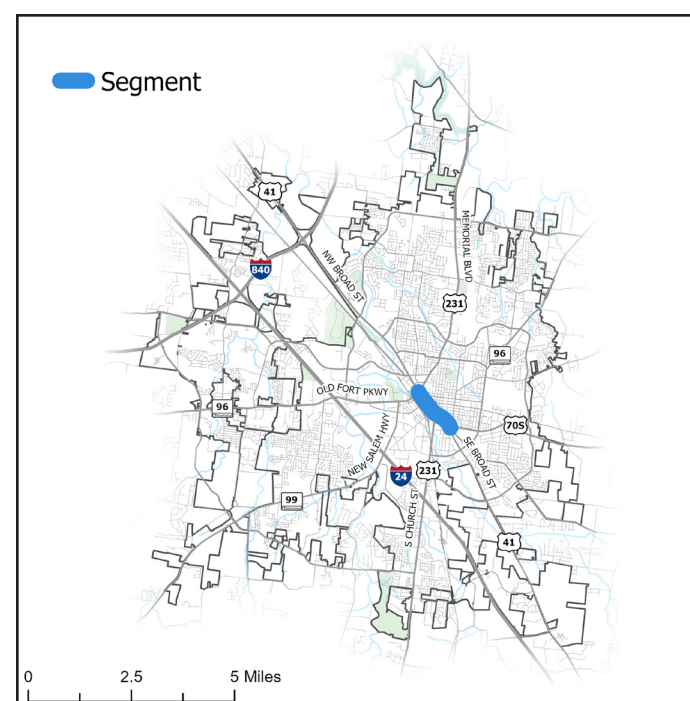
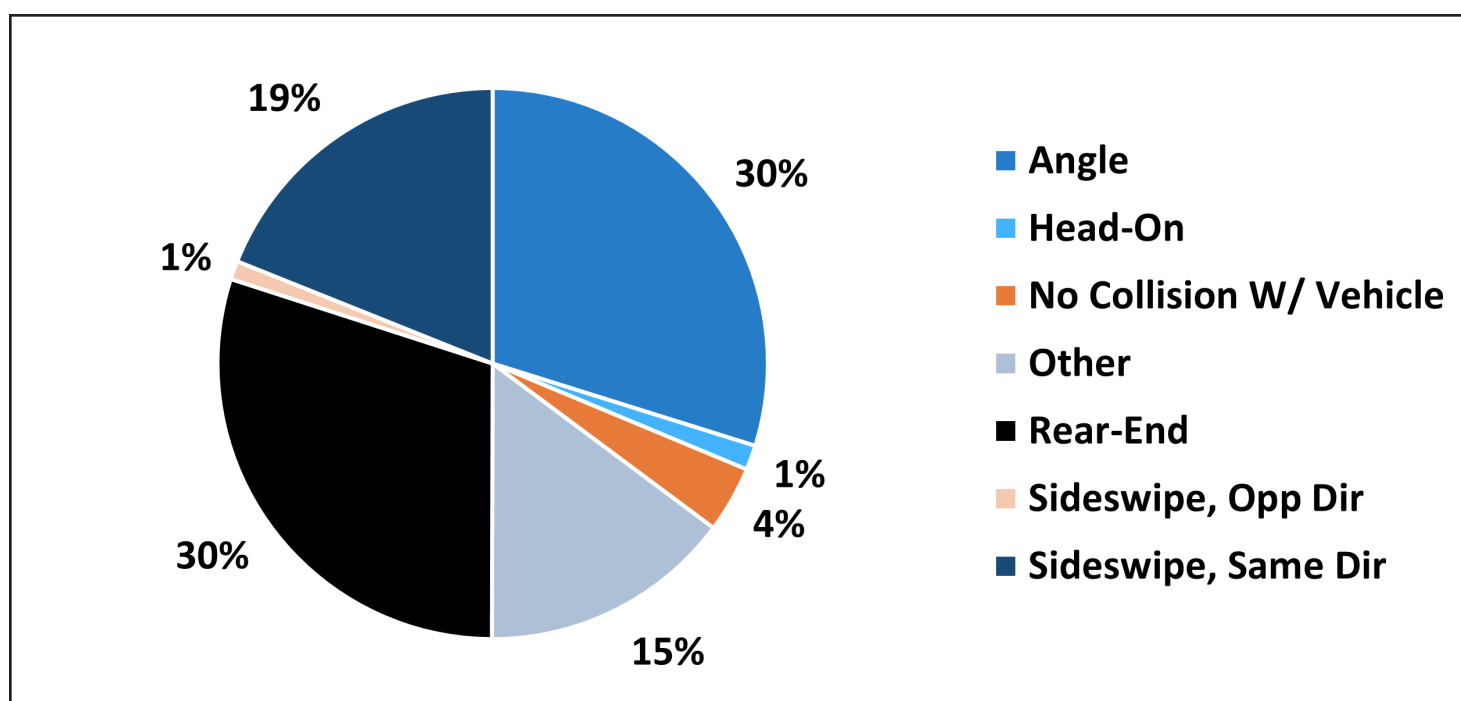
Speed Limit	40 mph
Lanes	6
Vehicles/Day	29,301
Total Crashes	1,103
HIN Intersections	-

Characteristics

This section of SE Broad Street (US-41) is a six-lane roadway through central Murfreesboro, divided by a bi-directional turn lane. This segment follows a lightly curved alignment over generally rolling terrain. This segment flows through largely commercial areas, providing essential non-motorist access throughout downtown Murfreesboro.

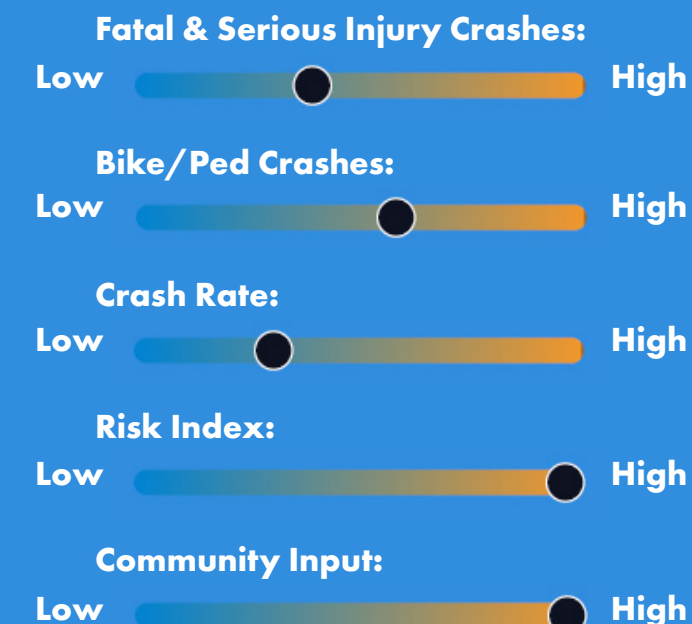


Along SE Broad Street, Facing East, Just West of S Maney Ave



OVERALL RANKING: 6

Ranking Index



Community Input



SE Broad Street (US-41)

from Old Fort Parkway to Martin Luther King Boulevard



SE Broad Street (US-41)

from Old Fort Parkway to Martin Luther King Boulevard

ID				Countermeasure	Cost	Schedule	Project Readiness
	1	Retroreflective Backplates (Old Fort Pkwy, W Lytle St, W Main St, S Church St, S Maney Ave, Dr. MLK Jr Blvd)			\$	Short-Term	Ready
	2	Flashing Yellow Arrows (FYA) (Old Fort Pkwy, W Lytle St, W Main St, S Church St, S Maney Ave, Dr. MLK Jr Blvd)			\$\$	Mid-Term	Ready
	3	Crosswalk Visibility and Accessibility Enhancements (Old Fort Pkwy, W Lytle St, W Main St, S Church St, S Maney Ave, Dr. MLK Jr Blvd)			\$\$	Short-Term	Ready
	4	Conduct Intersection Control & Alignment Evaluation (S Church St)			\$	Short-Term	Ready
	5	Corridor Access Management			\$\$\$\$	Long-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

FHWA Proven Safety Countermeasure

Crash Modification Factors Countermeasure

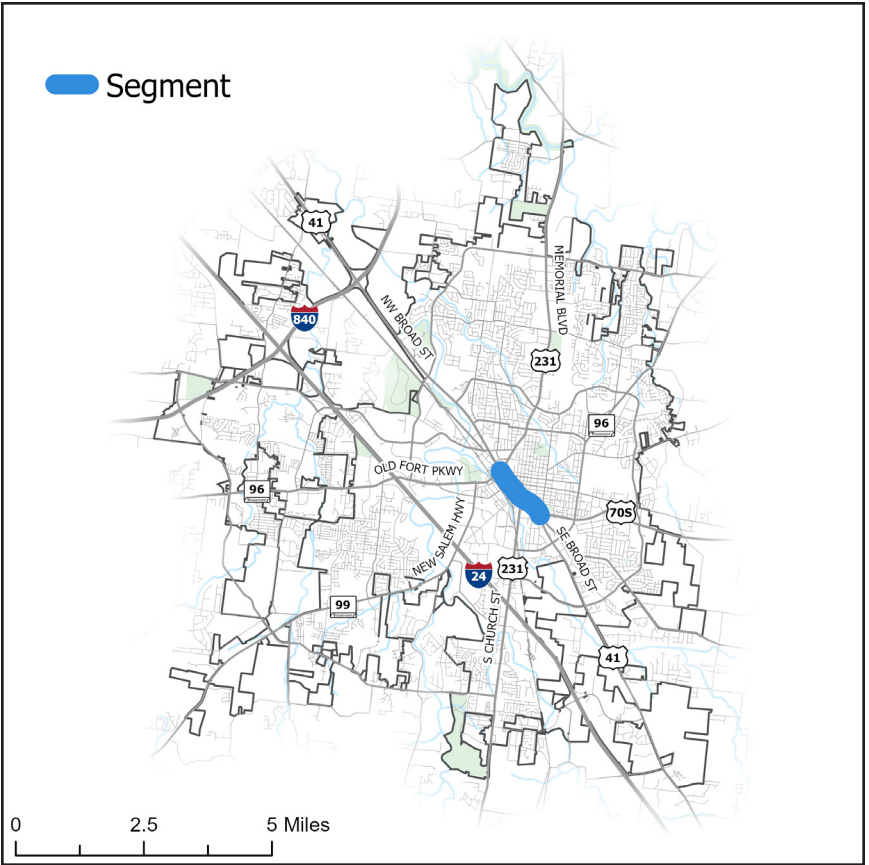
Vulnerable Road User Related Countermeasure

Requires ROW Acquisition

Requires Utility Relocation

Benefit Summary

- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.
- Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.
- Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter. This enhanced visibility and recognition can lead to a reduction in rearend and angle crashes at signalized intersections.
- Evaluating alternate intersection control or geometry ensures safer, more efficient designs by reducing severe crashes, improving pedestrian safety, and calming traffic.



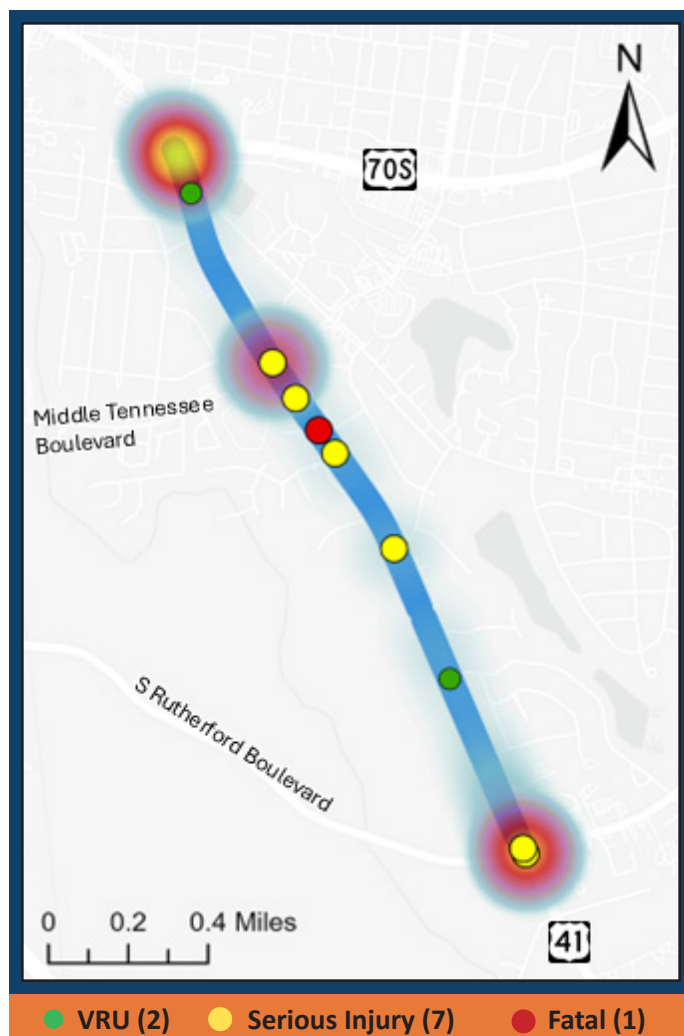
RECOMMENDED COUNTERMEASURES





SE Broad Street (US-41)

from Martin Luther King Boulevard to S Rutherford Boulevard

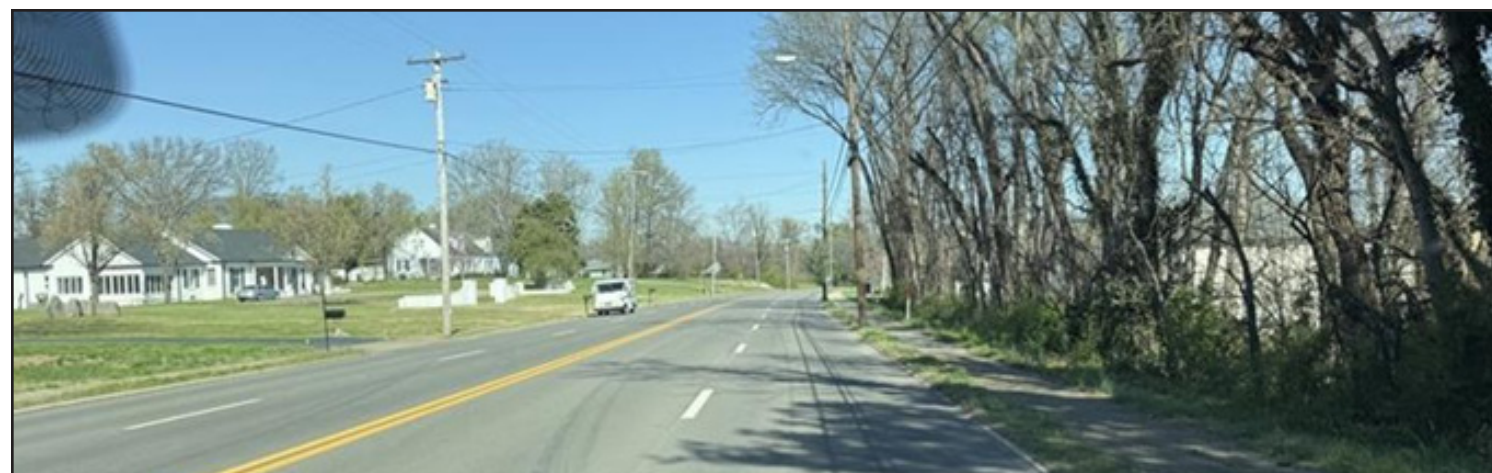


Minor Arterial (TDOT)

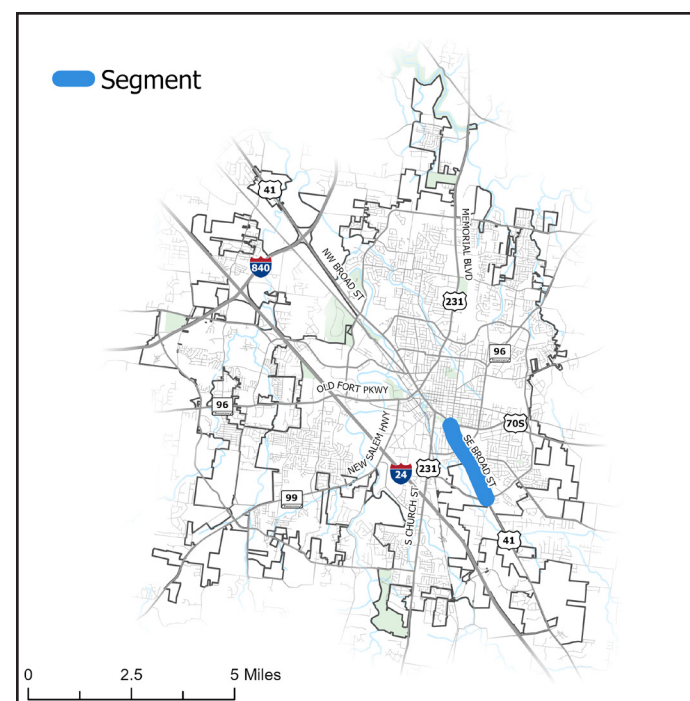
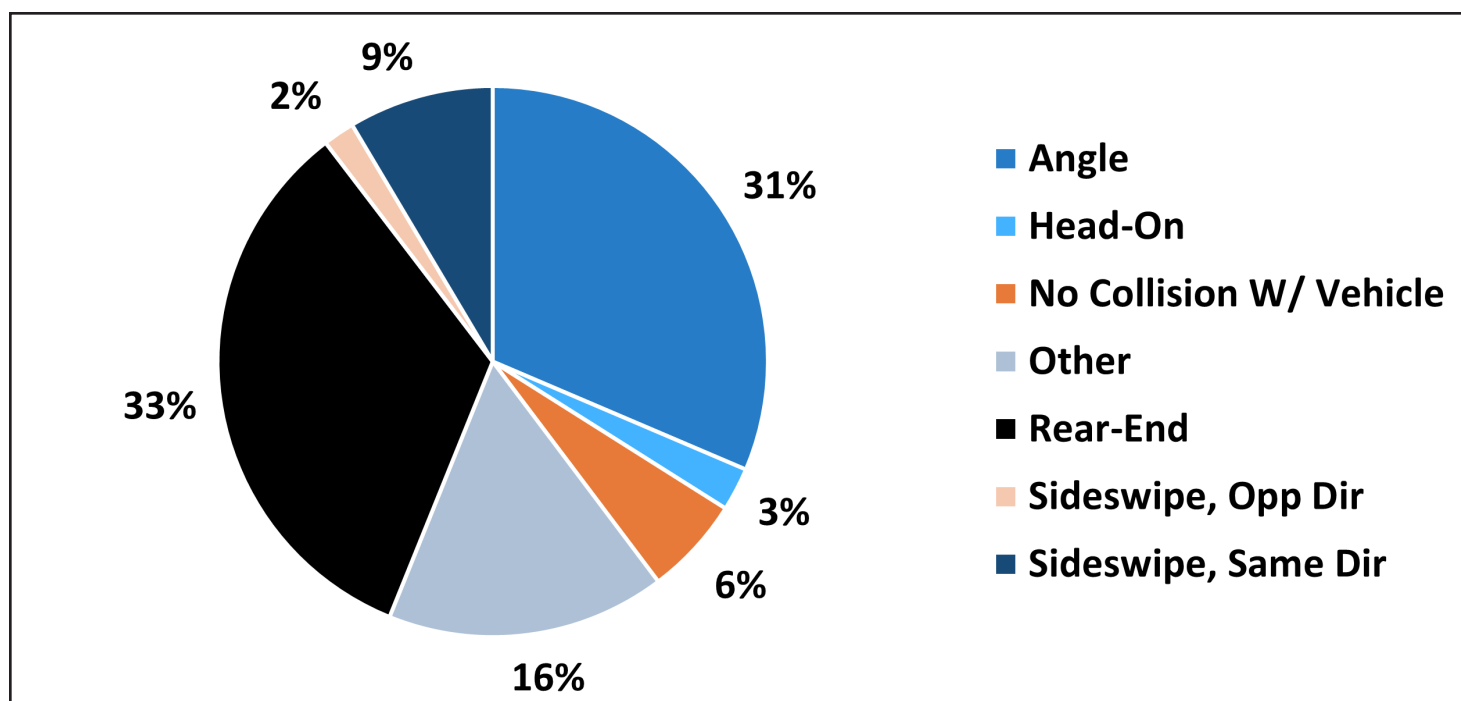
Speed Limit	40 mph
Lanes	4
Vehicles/Day	29,301
Total Crashes	433
HIN Intersections	-

Characteristics

This section of SE Broad Street (US-41) is split between two- and four-lane, undivided roadway through southeast Murfreesboro. This segment follows a straight alignment over generally rolling terrain. Sidewalks are present along the western end of the segment.

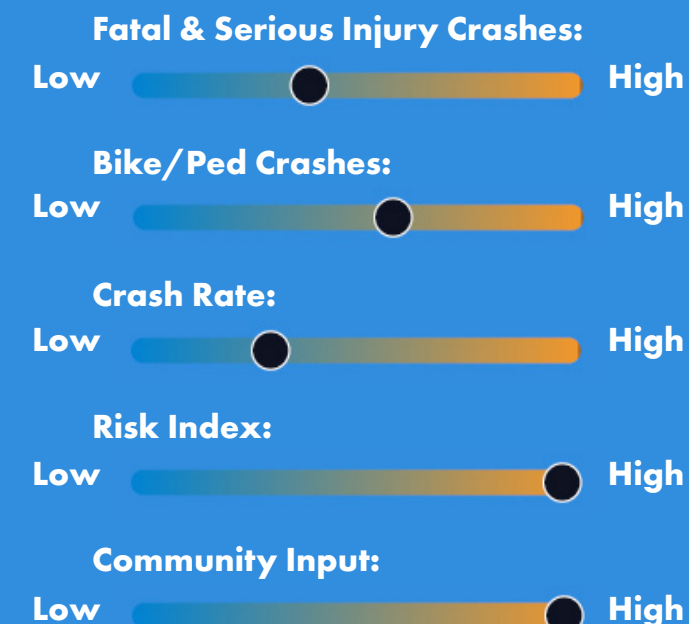


Along SE Broad Street, Facing North, Just South of Tremont Drive



OVERALL RANKING: 6

Ranking Index



Community Input



SE Broad Street (US-41)

from Martin Luther King Boulevard to S Rutherford



SE Broad Street (US-41) from Martin Luther King Boulevard to S Rutherford Boulevard

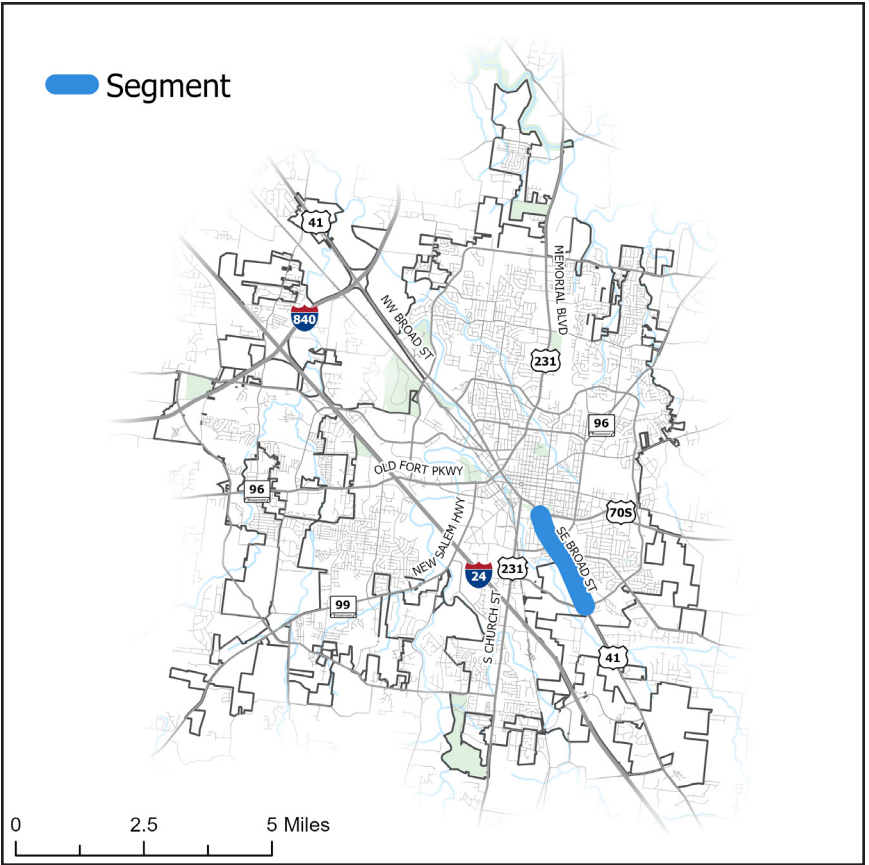
ID				Countermeasure	Cost	Schedule	Project Readiness
	1	Retroreflective Backplates (Dr MLK Jr Blvd, Middle Tennessee Blvd, S Rutherford Blvd)			\$	Short-Term	Ready
	2	Flashing Yellow Arrows (FYA) (Middle Tennessee Blvd, S Rutherford Blvd)			\$\$	Mid-Term	Ready
	3	Crosswalk Visibility and Accessibility Enhancements (Dr MLK Jr Blvd, Middle Tennessee Blvd, S Rutherford Blvd)			\$\$	Short-Term	Ready
	4	Targeted Lighting			\$\$	Mid-Term	
	5	Roadway Reconfiguration			\$\$\$\$	Long-Term	Ready
	6	Retroreflective Pavement Markers			\$	Short-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.
- Roadway lighting helps drivers, cyclists, and pedestrians see each other more clearly, especially during nighttime and low-visibility conditions, reducing the likelihood of crashes.
- Roadway reconfigurations, such as a road diet, allow for the addition of non-motorist infrastructure, such as bike lanes and shared turn lanes, while requiring little to no reduction in the capacity of the roadway.
- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.
- Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter.



RECOMMENDED COUNTERMEASURES

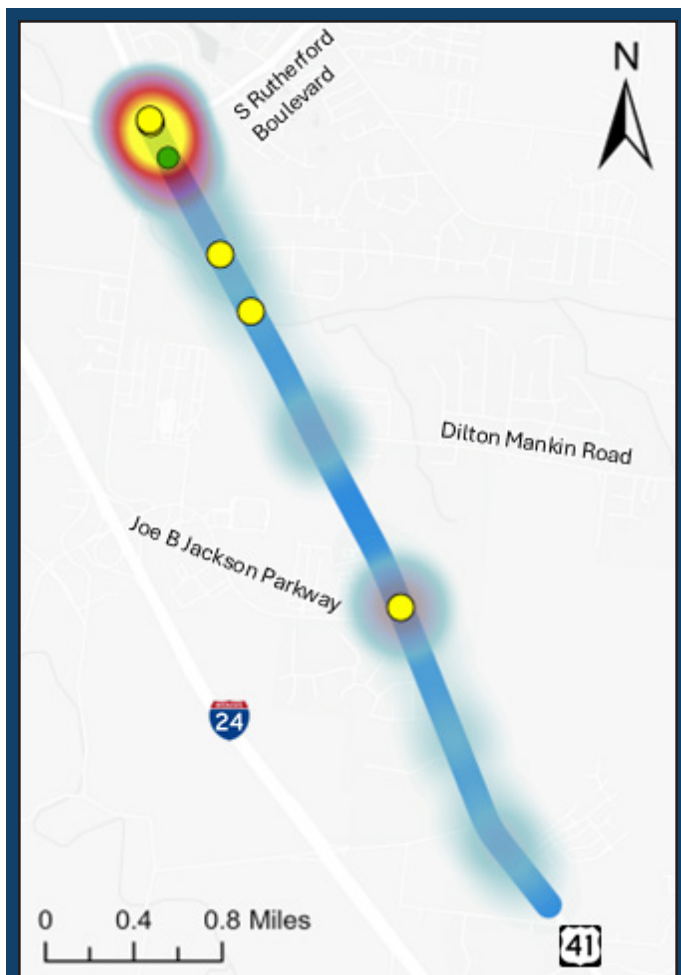


SE Broad Street (US-41) from Martin Luther King Boulevard to S Rutherford Boulevard



SE Broad Street/Manchester Pike (US-41)

from S Rutherford Boulevard to City Limits



Minor Arterial (TDOT)

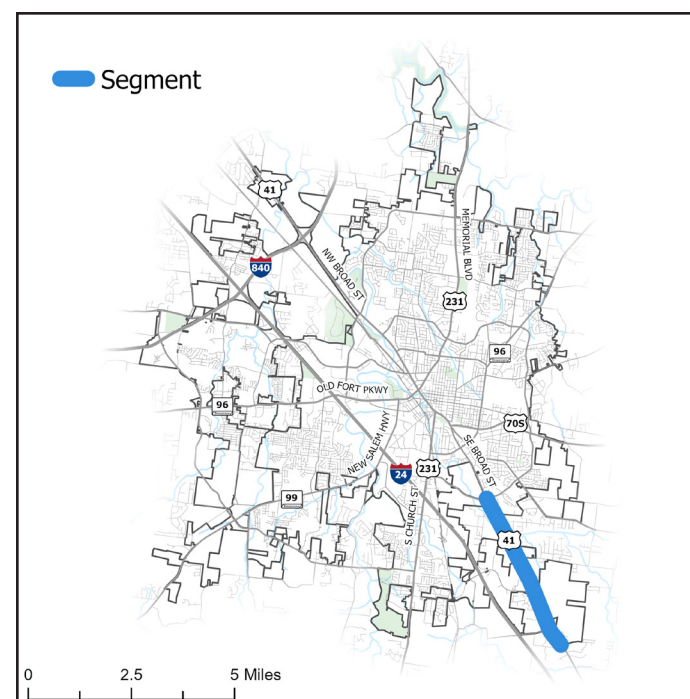
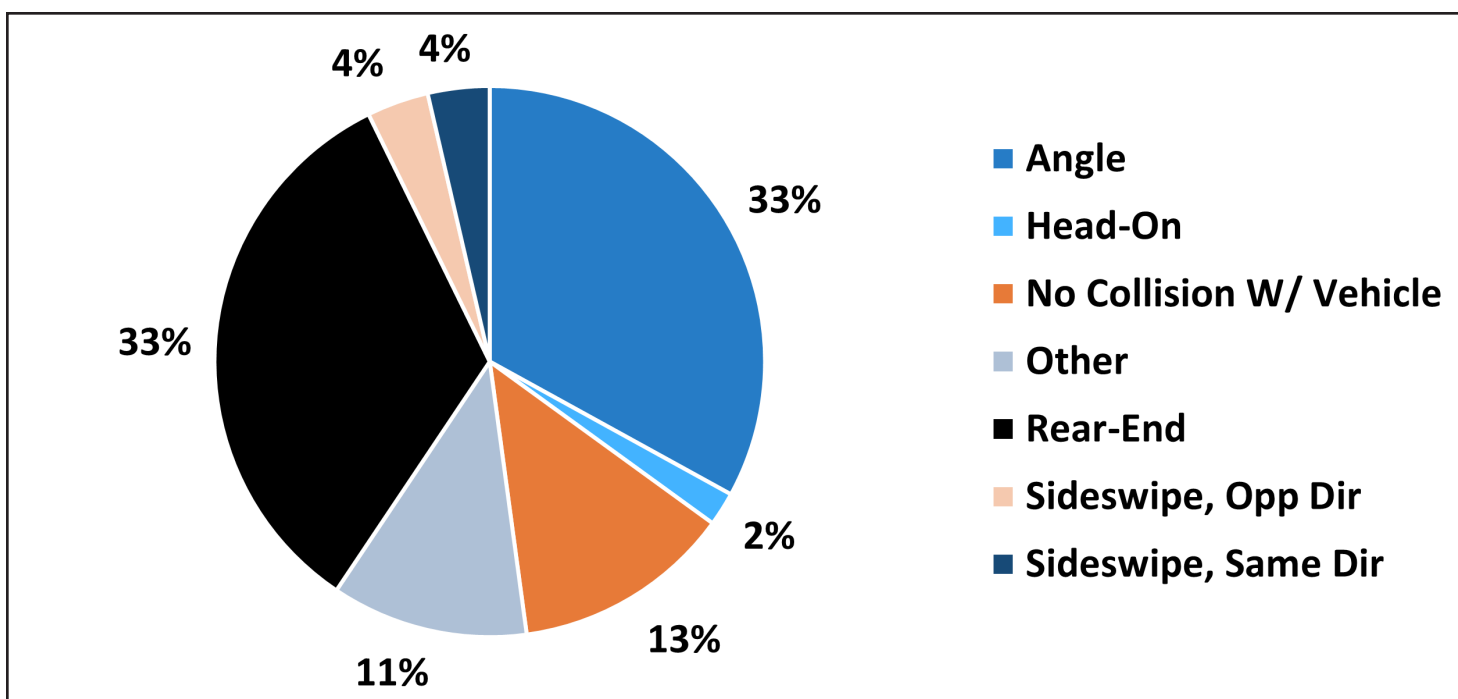
Speed Limit	40 mph
Lanes	2
Vehicles/Day	29,301
Total Crashes	303
HIN Intersections	-

Characteristics

This section of SE Broad Street (US-41) is a two-lane, undivided roadway through rural southeast Murfreesboro. This segment follows a straight alignment over generally rolling terrain. There are no sidewalks along this corridor, however, wide shoulders can be found throughout.

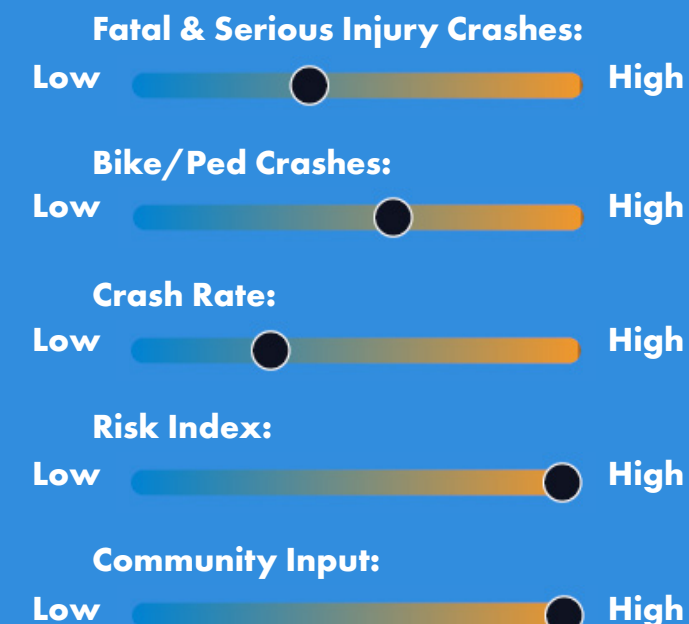


Along SE Broad Street, Facing North, Just South of S Rutherford Boulevard



OVERALL RANKING: 6

Ranking Index



Community Input



SE Broad Street/Manchester Pike (US-41)

from S Rutherford Boulevard to City Limits



SE Broad Street/Manchester Pike (US-41) from S Rutherford Boulevard to City Limits

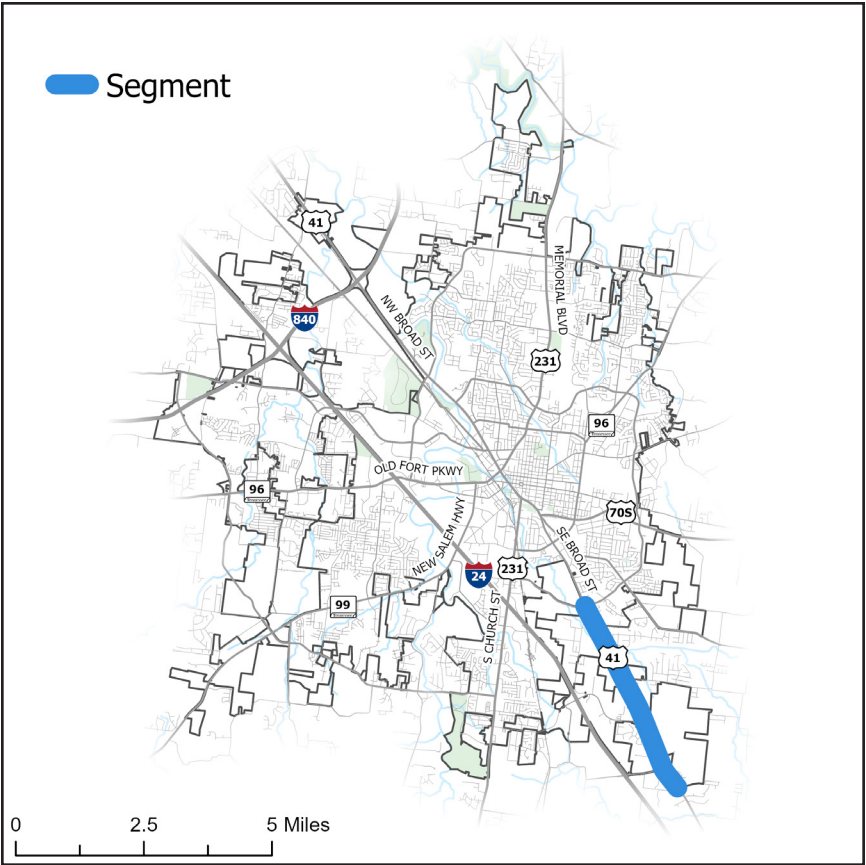
ID				Countermeasure	Cost	Schedule	Project Readiness
●	●	●	1	Retroreflective Backplates (S Rutherford Blvd, Dilton Rankin Rd, Joe B Jackson Pkwy)	\$	Short-Term	Ready
	●		2	Flashing Yellow Arrows (FYA) (S Rutherford Blvd, Dilton Rankin Rd, Joe B Jackson Pkwy)	\$\$	Mid-Term	Ready
●	●	●	3	Crosswalk Visibility and Accessibility Enhancements (S Rutherford Blvd, Dilton Rankin Rd, Joe B Jackson Pkwy)	\$\$	Short-Term	Ready
●	●	●	4	Targeted Lighting	\$\$	Mid-Term	●
	●		5	Retroreflective Pavement Markers	\$	Short-Term	Ready
			6	Conduct Intersection Control & Alignment Evaluation (Elam Rd)	\$	Short-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.
- Roadway lighting helps drivers, cyclists, and pedestrians see each other more clearly, especially during nighttime and low-visibility conditions, reducing the likelihood of crashes.
- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.
- Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter.
- Evaluating alternate intersection control or geometry ensures safer, more efficient designs by reducing severe crashes, improving pedestrian safety, and calming traffic.



RECOMMENDED COUNTERMEASURES



SE Broad Street/Manchester Pike (US-41)
from S Rutherford Boulevard to City Limits



Middle Tennessee Boulevard/Clark Blvd (TN-96)

from Broad Street to Greenland Drive



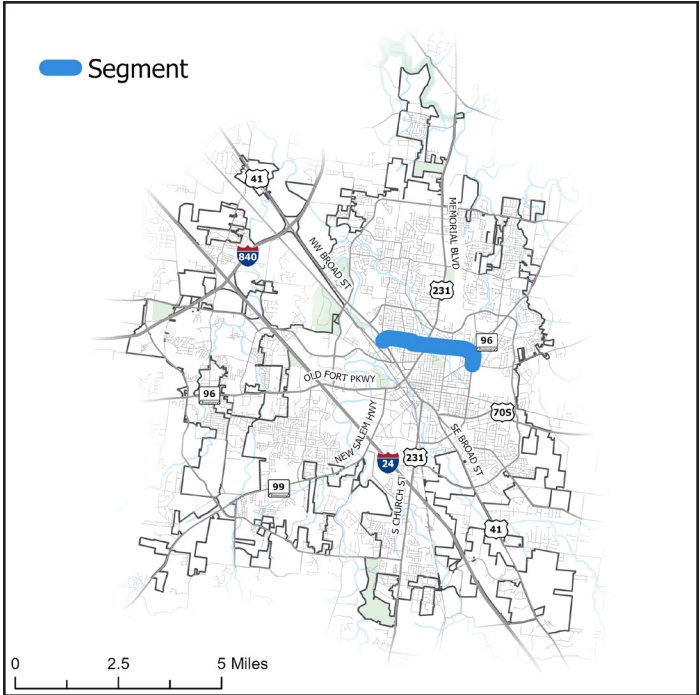
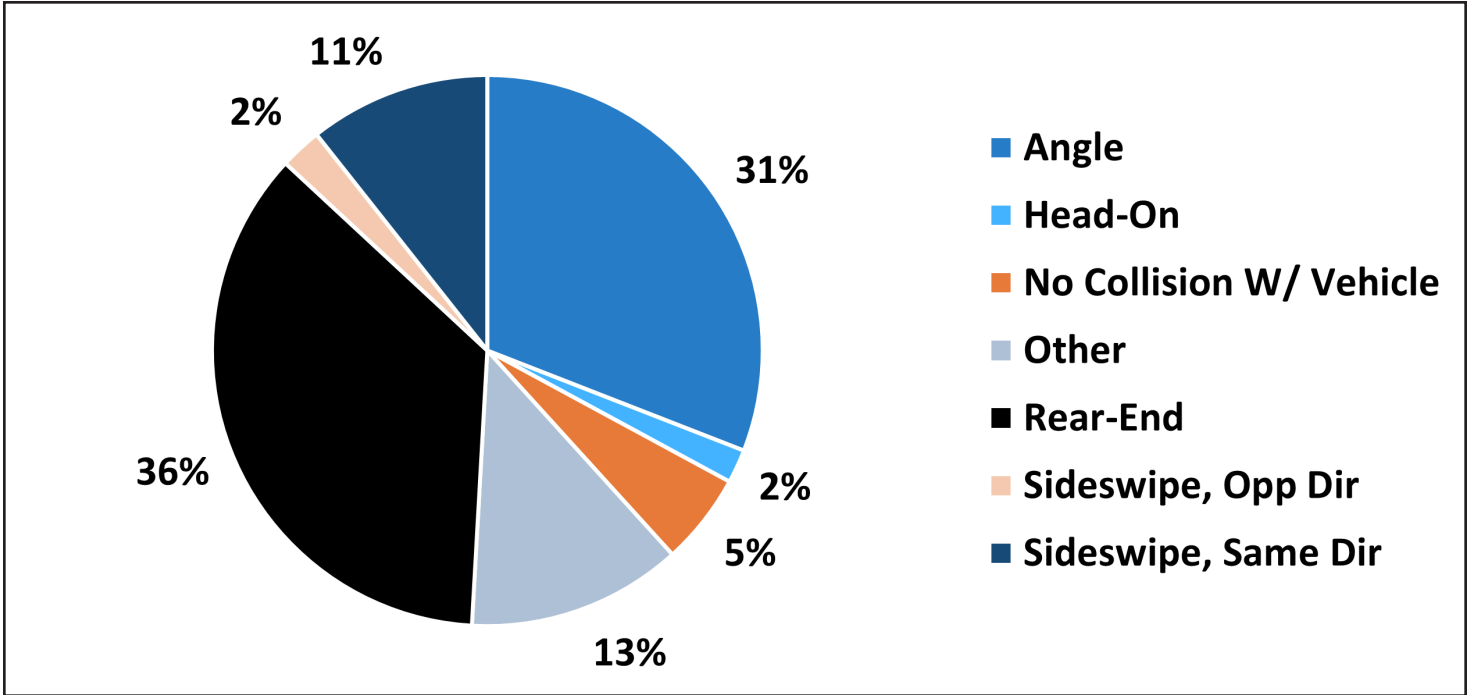
Minor Arterial (TDOT)	
Speed Limit	40 mph
Lanes	4
Vehicles/Day	20,000
Total Crashes	1,061
HIN Intersections	1

Characteristics

This section of Middle Tennessee Boulevard/Clark Boulevard (TN-96) includes a section of four-lane roadway divided by a bi-directional turn lane along the eastern end, with undivided two-lane roadway near the western end. This segment follows a curved alignment over generally rolling terrain. Sidewalks and pedestrian crossings are found throughout this segment.

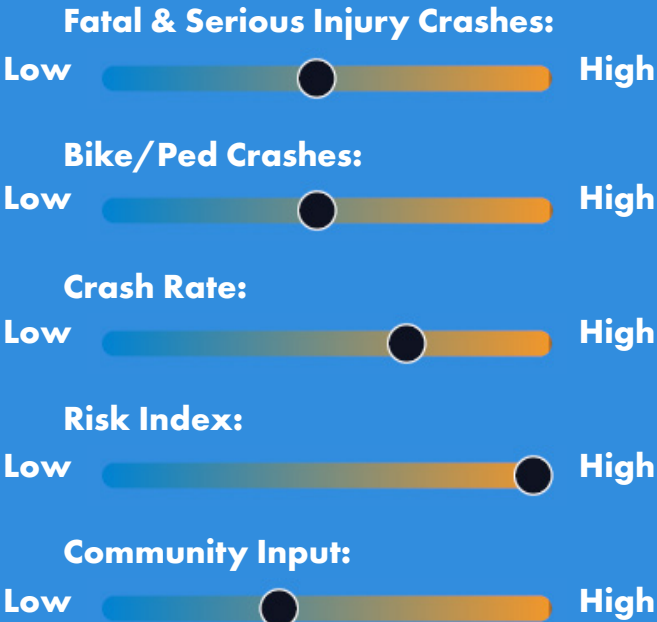


Along Middle Tennessee Boulevard/Clark Boulevard (TN-96), Facing West, Just West of Woodland St



OVERALL RANKING: 7

Ranking Index



Community Input

“ When turning left onto Clark from Memorial Blvd: the light is too short. Less than 5 cars from each turn lane can safely make it through intersection before lights turns. Many cars run the light. Some rush through from the left lane and cut too close to the drivers waiting in left turn lane coming off of Clark onto Memorial. ”

“ There are no sidewalks here, people are forced to walk in the street or yards. ”

“ Too many red light runners because you have to sit at the light for 2 to 3 cycles coming off E Clark ”

“ Opportunity to improve pedestrian and vehicle safety. Significant number of vehicle crashes due to confusing traffic signals and driver behavior. Improved signaling, crosswalks, or potential traffic circle could enhance safety and accessibility for the significant number of pedestrians, cyclists and motorists using this intersection. ”

DISCLAIMER - 23 United States Code, Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



Middle Tennessee Boulevard/Clark Blvd (TN-96) from Broad Street to Greenland Drive

RECOMMENDED COUNTERMEASURES



Benefit Summary

- Wider shoulders provide additional space for vehicles to maneuver, reducing the likelihood of head-on, sideswipe, and fixed-object crashes.
- Rumble striping along edge/centerlines provide tactile and auditory feedback to drivers when their vehicle strays from the lane, helping to reduce the risk for roadway departure crashes and head-on collisions.
- Installing sidewalks and pedestrian infrastructure dramatically improves safety by reducing pedestrian crashes, separating vulnerable users from traffic, and enhancing visibility and accessibility.
- Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.

	ID	Countermeasure	Cost	Schedule	Project Readiness
	1	Flashing Yellow Arrows (FYA) (Broad St, Memorial Blvd, N Highland Ave, N Tennessee Blvd, Lascassus Pk)	\$\$	Mid-Term	Ready
	2	Retroreflective Backplates (Broad St, Jones Blvd, Memorial Blvd, N Highland Ave, N Tennessee Blvd, Lascassus Pk)	\$	Short-Term	Ready
	3	Crosswalk Visibility and Accessibility Enhancements (Broad St, Jones Blvd, Memorial Blvd, N Highland Ave, N Tennessee Blvd, Lascassus Pk)	\$\$	Short-Term	Ready
	4	Rectangular Rapid Flashing Beacons (RRFB) (Woodland St)	\$\$	Mid-Term	
	5	Conduct Intersection Control & Alignment Evaluation (Grantland Ave / Woodland St)	\$	Short-Term	Ready
	6	Corridor Access Management	\$\$\$\$	Long-Term	Ready
	7	Sidewalks and Multi-use Paths	\$\$	Mid-Term	
	8	Widen Shoulders	\$\$\$	Mid-Term	
	9	Longitudinal Rumble Strips and Stripes on Two-Lane Roads	\$	Short-Term	Ready
	10	Retroreflective Pavement Markers	\$	Short-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

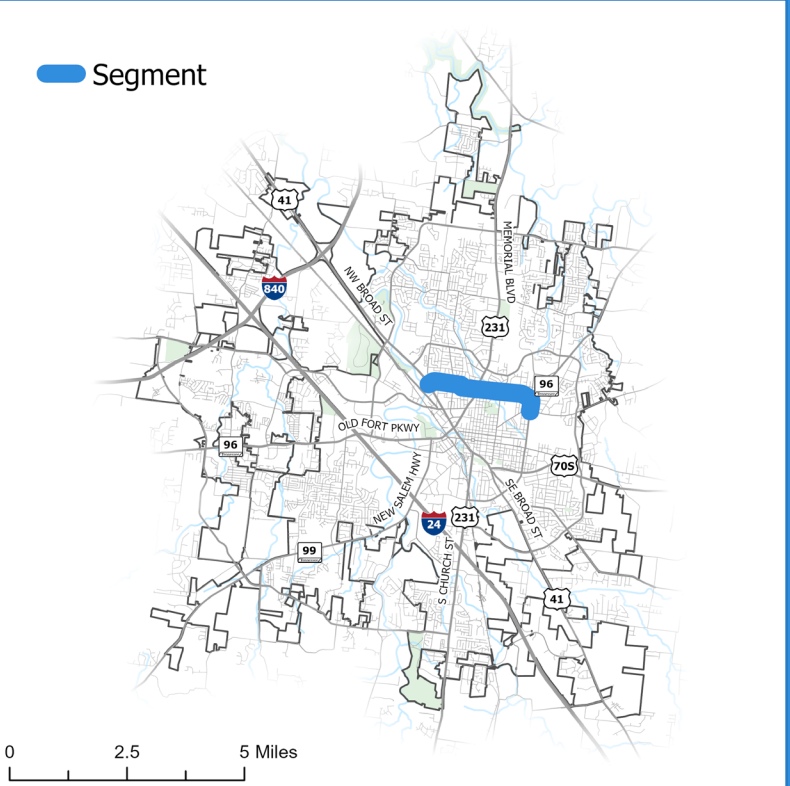
FHWA Proven Safety Countermeasure

Crash Modification Factors Countermeasure

Vulnerable Road User Related Countermeasure

Requires ROW Acquisition

Requires Utility Relocation



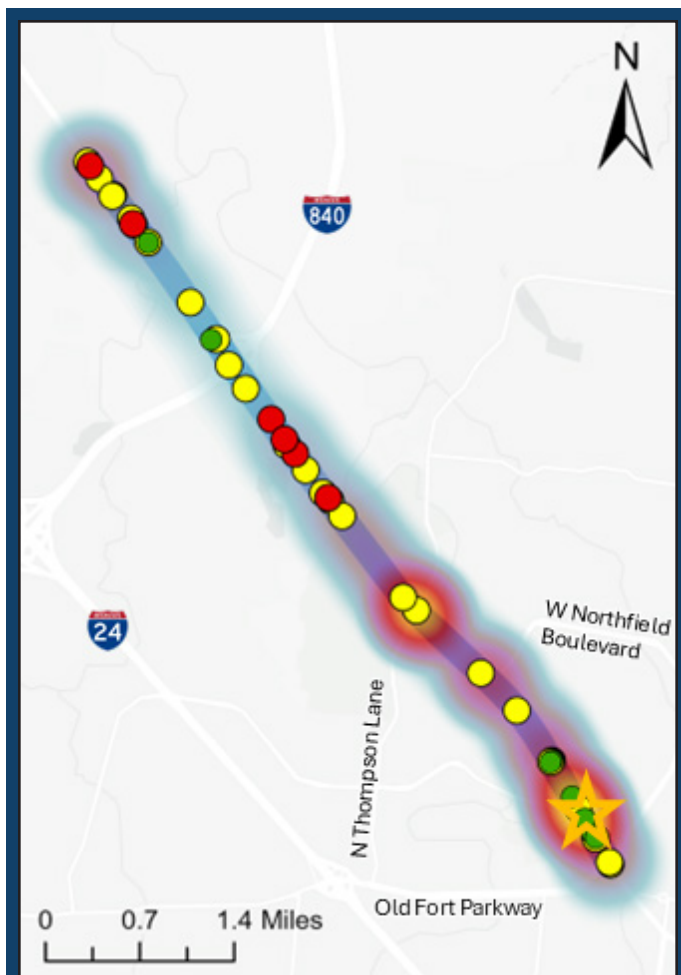
Middle Tennessee Boulevard/Clark Blvd (TN-96) from Broad Street to Greenland Drive

DISCLAIMER - 23 United States Code, Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



NW Broad Street (US-41)

from Florence Road to Old Fort Parkway



● VRU (9) ● Serious Injury (33) ● Fatal (6)

Other Principal Arterial (TDOT)

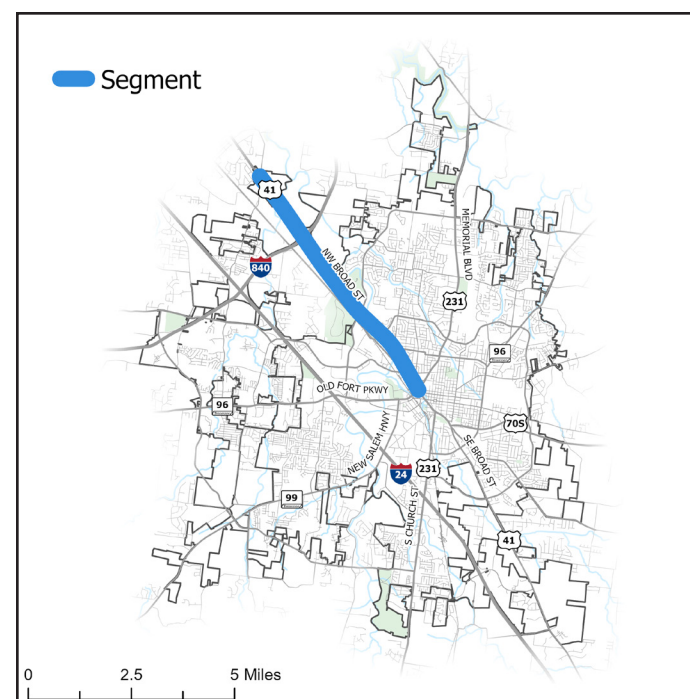
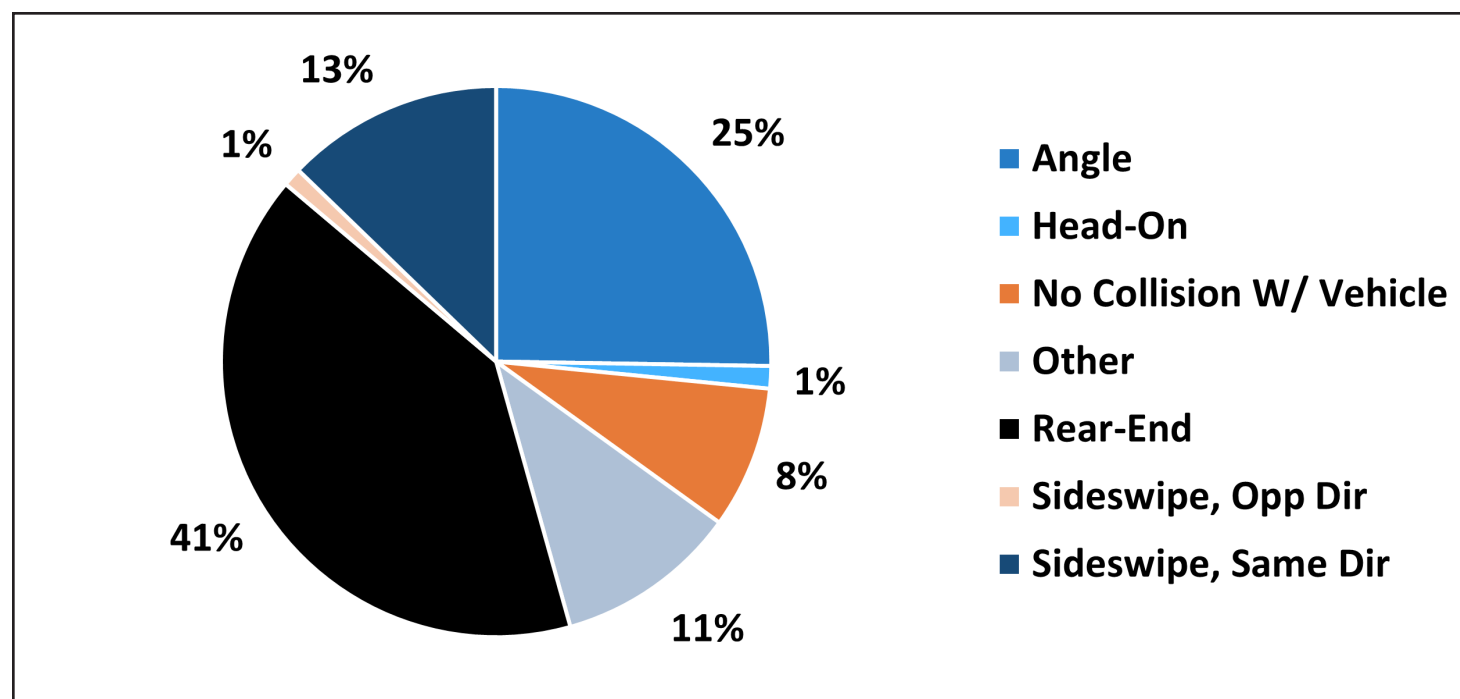
Speed Limit	45 mph
Lanes	4
Vehicles/Day	28,784
Total Crashes	1,746
HIN Intersections	1

Characteristics

This section of NW Broad Street (US-41) is a four-lane roadway through northwest Murfreesboro, divided by medians and bi-directional turn lanes. This segment follows a straight alignment over generally rolling terrain. This corridor acts as a primary thoroughfare between the Murfreesboro and Smyrna areas.



Along NE Broad Street, Facing North, Just South of Medical Center Parkway



OVERALL RANKING: 8

Ranking Index

Fatal & Serious Injury Crashes:
Low High

Bike/Ped Crashes:
Low High

Crash Rate:
Low High

Risk Index:
Low High

Community Input:
Low High

Community Input



NW Broad Street (US-41)

from Florence Road to Old Fort Parkway



NW Broad Street (US-41)

from Florence Road to Old Fort Parkway

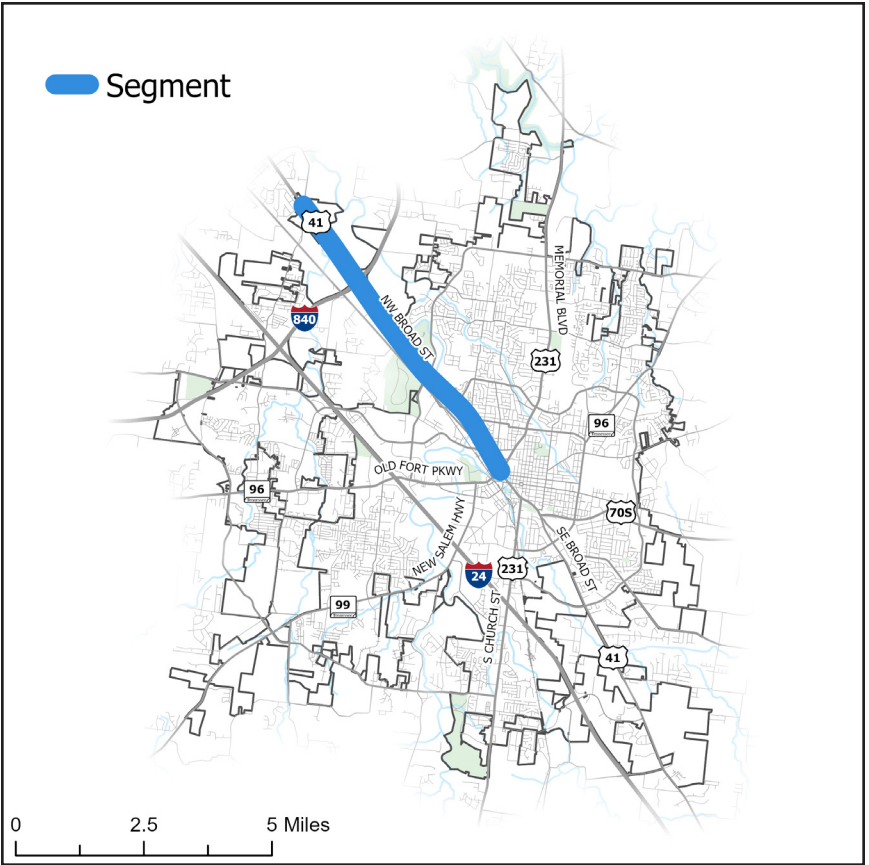
ID				Countermeasure	Cost	Schedule	Project Readiness
●	●	●	1	Retroreflective Backplates (Florence Rd, N Thompson Ln, Northfield Blvd, Clark Blvd, Medical Center Pkwy, Old Fort Pkwy)	\$	Short-Term	Ready
●	●	●	2	Crosswalk Visibility and Accessibility Enhancements (Florence Rd, Singer Rd, N Thompson Ln, Northfield Blvd, Clark Blvd, Medical Center Pkwy, Old Fort Pkwy)	\$\$	Short-Term	Ready
	●		3	Flashing Yellow Arrows (FYA) (Florence Rd, Singer Rd, Northfield Blvd, Clark Blvd, Medical Center Pkwy, Old Fort Pkwy)	\$\$	Mid-Term	Ready
			4	Railroad Crossing Enhancements (Van Cleave Ln)	\$\$\$	Mid-Term	●
●	●	●	5	Median and Pedestrian Refuge Island	\$\$	Mid-Term	Ready
	●		6	Retroreflective Pavement Markers	\$	Short-Term	Ready
●	●	●	7	Corridor Access Management	\$\$\$\$	Long-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.
- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.
- Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter.
- Properly-designed crossings—such as those with clear signage, warning lights, gates, and smooth road surfaces—significantly reduce the risk of collisions between trains, vehicles, and pedestrians. They enhance visibility and awareness for all users, helping drivers and walkers make safer decisions.



RECOMMENDED COUNTERMEASURES



NW Broad Street (US-41)

from Florence Road to Old Fort Parkway



Veterans Parkway

from Burnt Knob Road to S Church Street

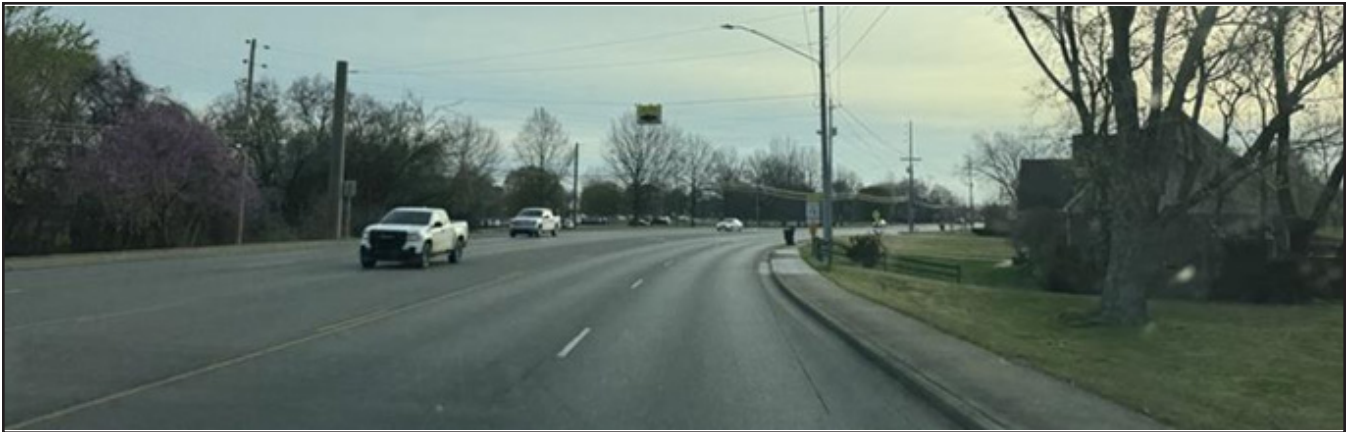


Minor Arterial (Murfreesboro, TN)

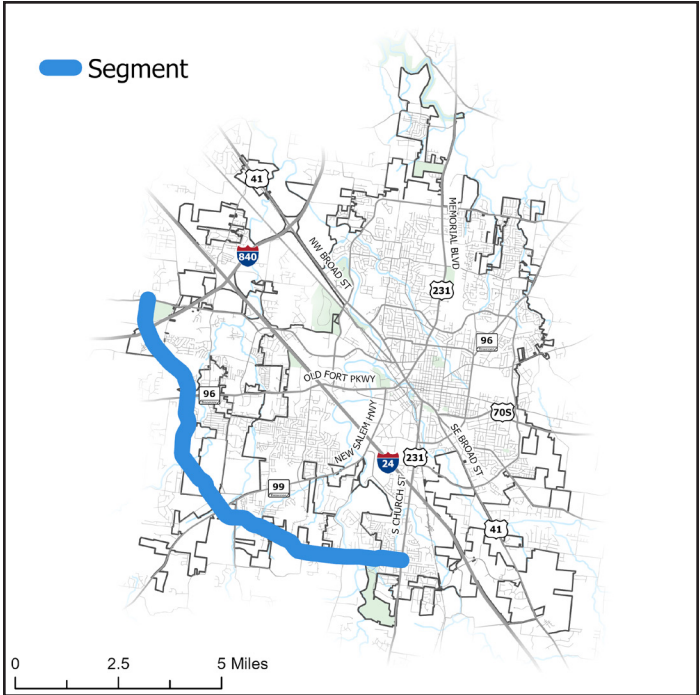
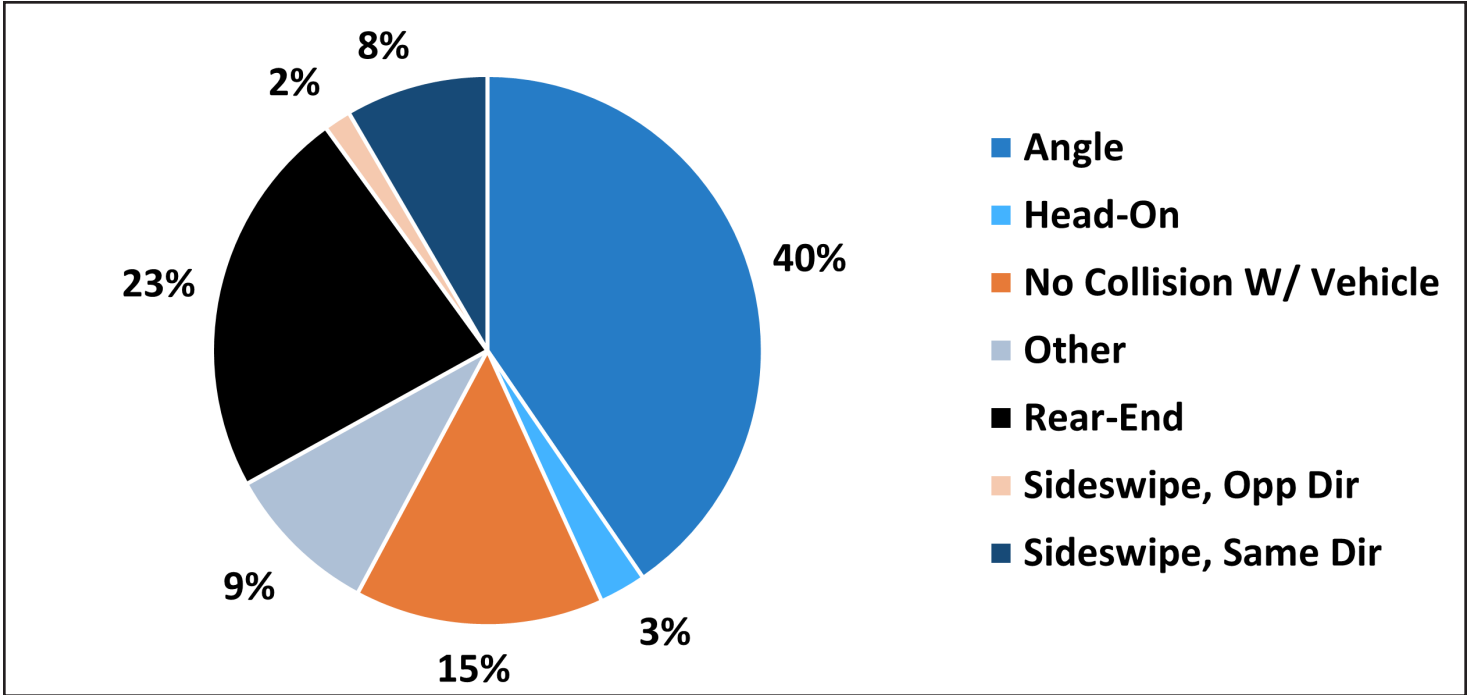
Speed Limit	45 mph
Lanes	4
Vehicles/Day	14,000
Total Crashes	690
HIN Intersections	-

Characteristics

This section of Veterans Parkway is a four-lane roadway through south Murfreesboro, divided by a bi-directional turn lane. This segment follows a curved alignment over generally rolling terrain. Sidewalks and pedestrian infrastructure can be found throughout this segment, with a high presence near Barfield Crescent Park.

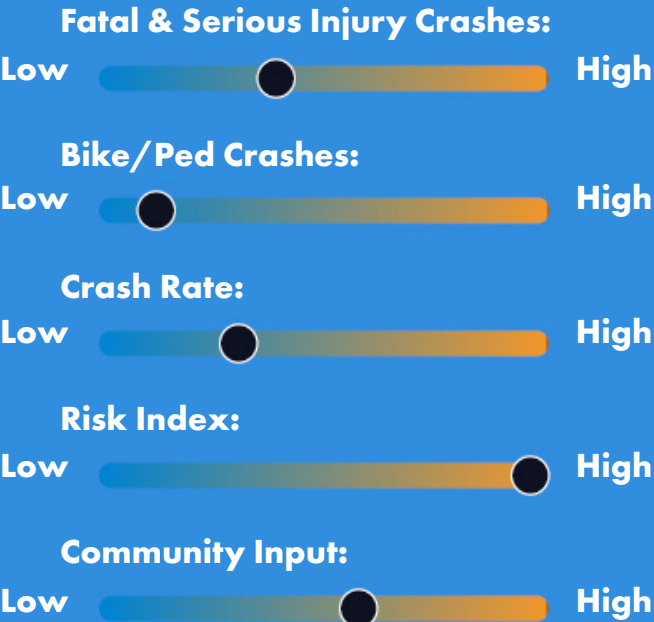


Along Veterans Parkway, Facing East, Just West of Jenkins Drive



OVERALL RANKING: 10

Ranking Index



Community Input



Veterans Parkway

from Burnt Knob Road to S Church Street



Veterans Parkway

from Burnt Knob Road to S Church Street

RECOMMENDED COUNTERMEASURES



			ID	Countermeasure	Cost	Schedule	Project Readiness
●	●	●	1	Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections (Burnt Knob Rd)	\$	Short-Term	Ready
●	●	●	2	Retroreflective Backplates (Kroger, Old Fort Pkwy, Rucker Ln, New Salem Hwy, Barfield Rd, S Church St)	\$	Short-Term	Ready
	●		3	Flashing Yellow Arrows (FYA) (Westlawn Blvd, Kroger, Old Fort Pkwy, Rucker Ln, New Salem Hwy, Barfield Rd, S Church St)	\$\$	Mid-Term	Ready
●	●	●	4	Crosswalk Visibility and Accessibility Enhancements (Westlawn Blvd, Kroger, Old Fort Pkwy, Rucker Ln, New Salem Hwy, Barfield Rd, S Church St)	\$\$	Short-Term	Ready
●	●	●	5	Pedestrian Hybrid Beacons (Barfield Crescent Park)	\$\$\$	Mid-Term	● ●
●	●	●	6	Corridor Access Management	\$\$\$\$	Long-Term	Ready
●	●	●	7	Targeted Lighting	\$\$	Mid-Term	● ●
	●		8	Retroreflective Pavement Markers	\$	Short-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

● FHWA Proven Safety Countermeasure

● Crash Modification Factors Countermeasure

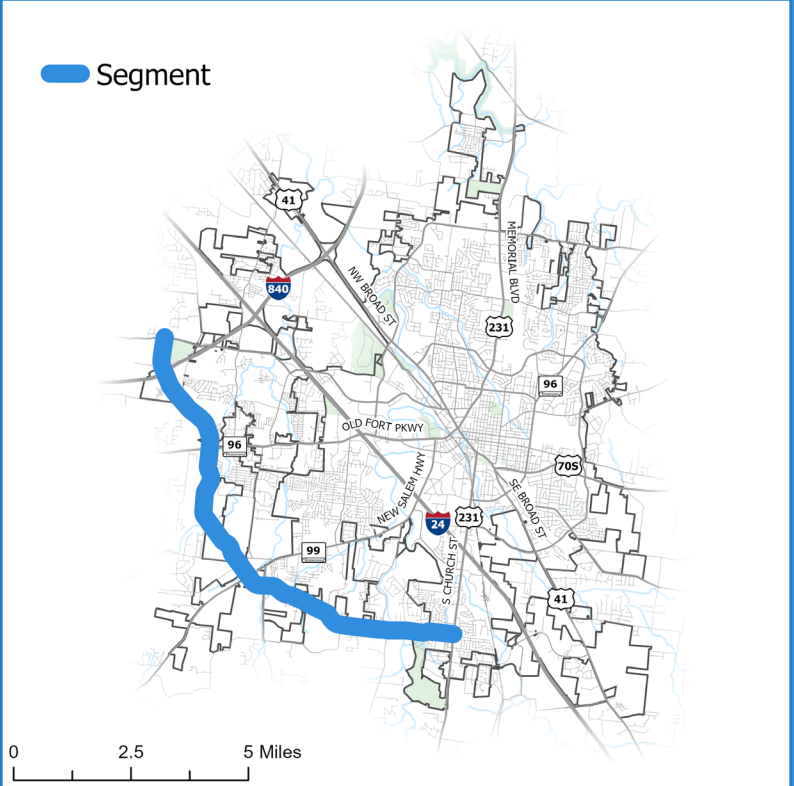
● Vulnerable Road User Related Countermeasure

● Requires ROW Acquisition

● Requires Utility Relocation

Benefit Summary

- Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.
- RPMs provide continuous lane guidance, which is particularly useful in navigating curves and complex intersections. The reflective properties of RPMs make them highly visible at night, reducing the risk of accidents by guiding drivers safely along the road.
- Roadway lighting helps drivers, cyclists, and pedestrians see each other more clearly, especially during nighttime and low-visibility conditions, reducing the likelihood of crashes.
- Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter.



Veterans Parkway

from Burnt Knob Road to S Church Street

DISCLAIMER - 23 United States Code, Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



Thompson Lane (TN-268)

from Broad Street to Old Fort Parkway

Minor Arterial (TDOT)

Speed Limit	40 mph
Lanes	4
Vehicles/Day	20,000
Total Crashes	698
HIN Intersections	-

Characteristics

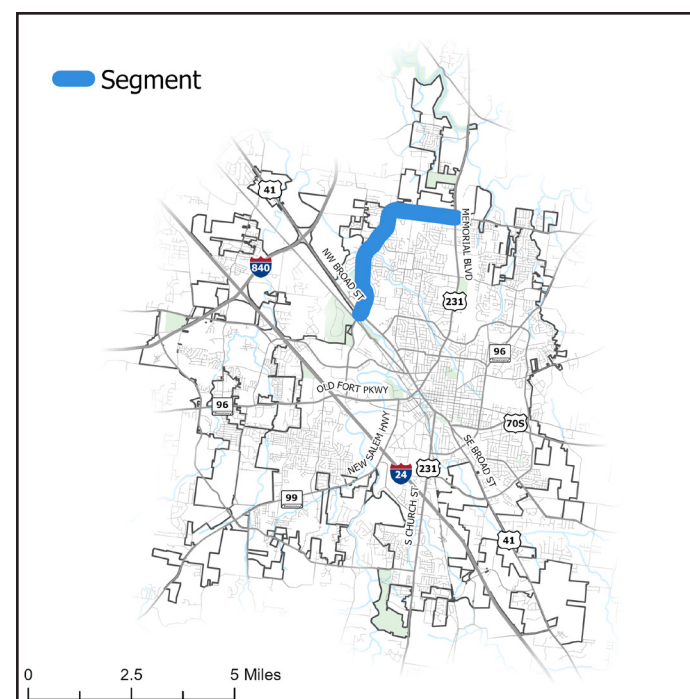
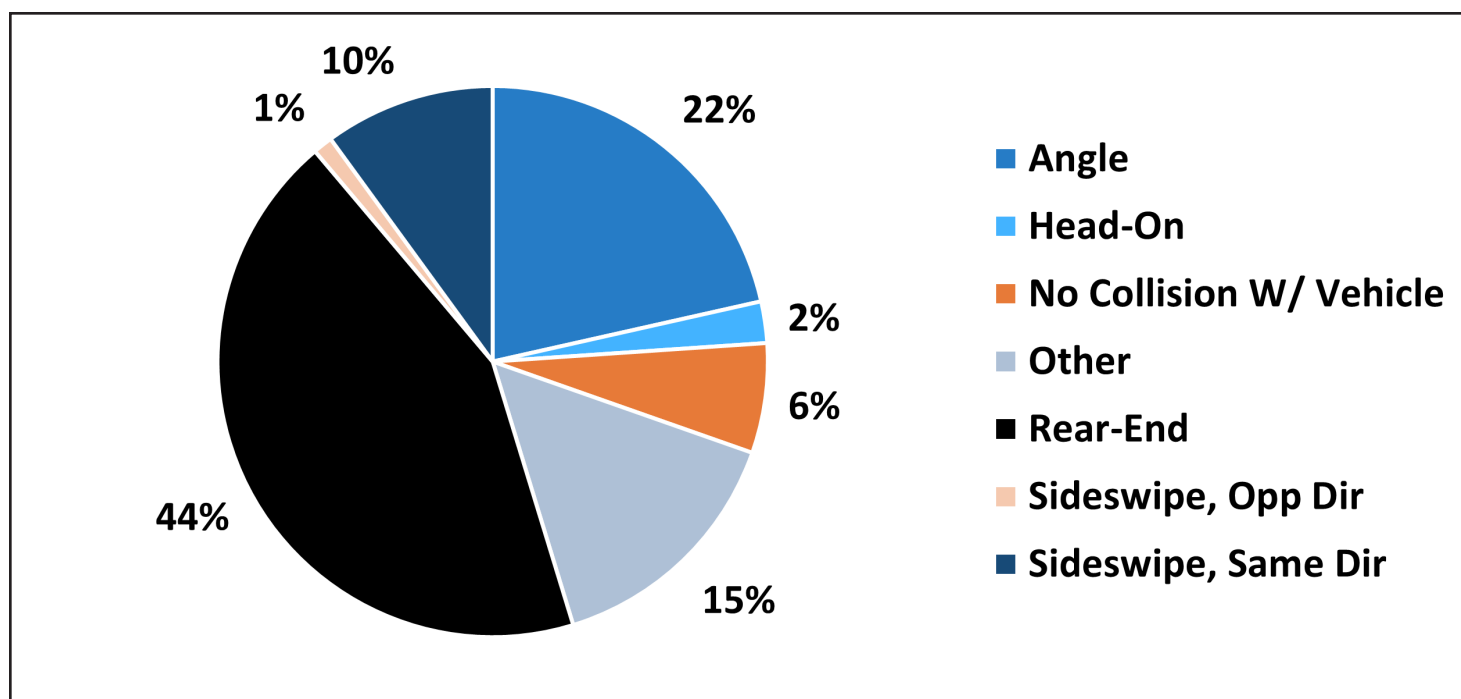
This section of Thompson Lane (TN-268) is a two-lane, divided roadway through northwest Murfreesboro. This segment follows a curved alignment over generally rolling terrain. Bike lanes can be found throughout a majority of this segment.



Along Thompson Lane, Facing East, Just West of Regency Park Drive



● VRU (0) ● Serious Injury (4) ● Fatal (2)



OVERALL RANKING: 11

Ranking Index

Fatal & Serious Injury Crashes:
Low High

Bike/Ped Crashes:
Low High

Crash Rate:
Low High

Risk Index:
Low High

Community Input:
Low High

Community Input

“ The intersection at Leanna has become extremely dangerous ”

“ Cyclists need a safe way to get onto the Greenway from Thompson ”

“ I've seen multiple crashed and near crashed at Leanna Road over the years. A stop light is needed. ”

“ BUS SHELTER & BENCH NEEDED in the Area to Protect Citizens from the Elements / Rain and Sun ”

“ Turning onto Thompson from Leanna is a nightmare. Doesn't matter if you are going left or right onto Thompson Lane, it's dangerous!!! This also backs up quite a bit! ”

Thompson Lane (TN-268)

from Broad Street to Old Fort Parkway



Thompson Lane (TN-268)

from Broad Street to Old Fort Parkway

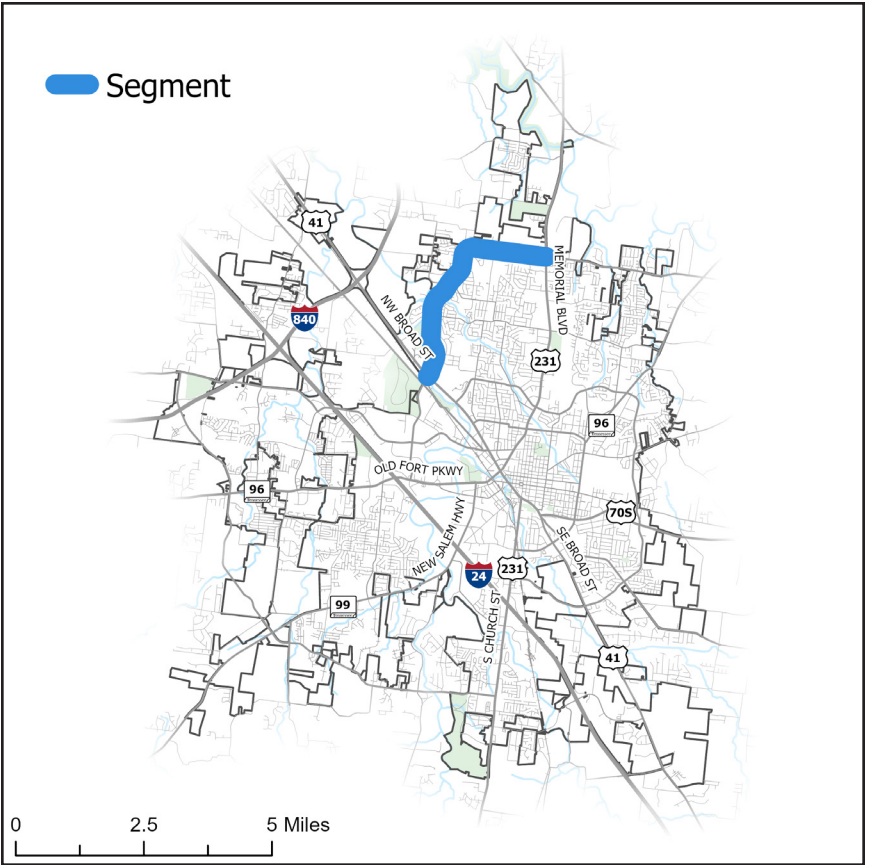
ID				Countermeasure	Cost	Schedule	Project Readiness
●	●	●	1	Retroreflective Backplates (Broad St, Sulphur Springs Rd, Memorial Blvd)	\$	Short-Term	Ready
●	●	●	2	Crosswalk Visibility and Accessibility Enhancements (Broad St, Sulphur Springs Rd, Memorial Blvd)	\$\$	Short-Term	Ready
	●		3	Flashing Yellow Arrows (FYA) (Haynes Dr, Sulphur Springs Rd, Memorial Blvd)	\$\$	Mid-Term	Ready
			4	Conduct Intersection Control & Alignment Evaluation (Leanna Rd and Siegel Rd)	\$	Short-Term	Ready
●	●	●	5	Enhanced Delineation for Horizontal Curves	\$	Short-Term	Ready
●	●	●	6	Appropriate Speed Limits	\$	Short-Term	Ready
●	●	●	7	Sidewalks and Multi-use Paths	\$\$	Mid-Term	●
●	●	●	8	Corridor Access Management	\$\$\$\$	Long-Term	Ready
●	●		9	Longitudinal Rumble Strips and Stripes on Two-Lane Roads	\$	Short-Term	Ready
	●		10	Retroreflective Pavement Markers	\$	Short-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

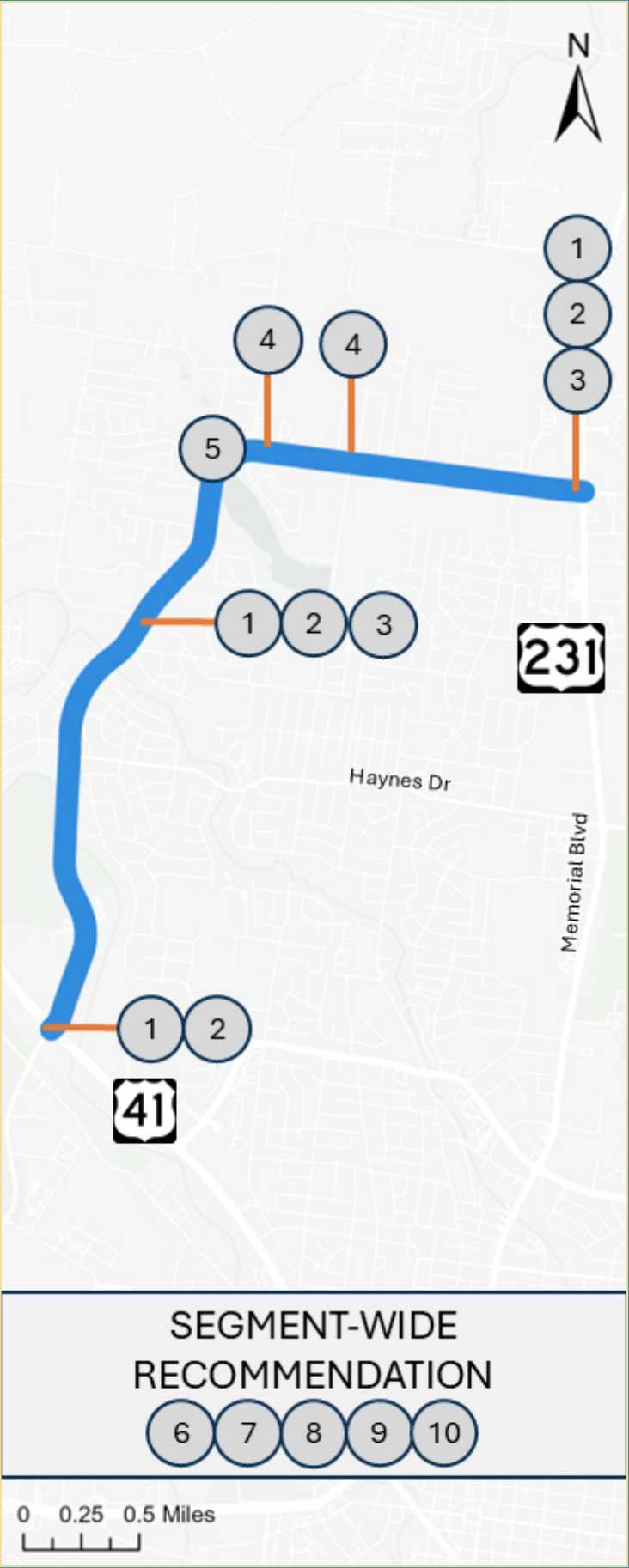
- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- Rumble striping along edge/centerlines provide tactile and auditory feedback to drivers when their vehicle strays from the lane, helping to reduce the risk for roadway departure crashes and head-on collisions.
- RPMs provide continuous lane guidance, which is particularly useful in navigating curves and complex intersections. The reflective properties of RPMs make them highly visible at night, reducing the risk of accidents by guiding drivers safely along the road.
- Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.
- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.
- Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter.



RECOMMENDED COUNTERMEASURES



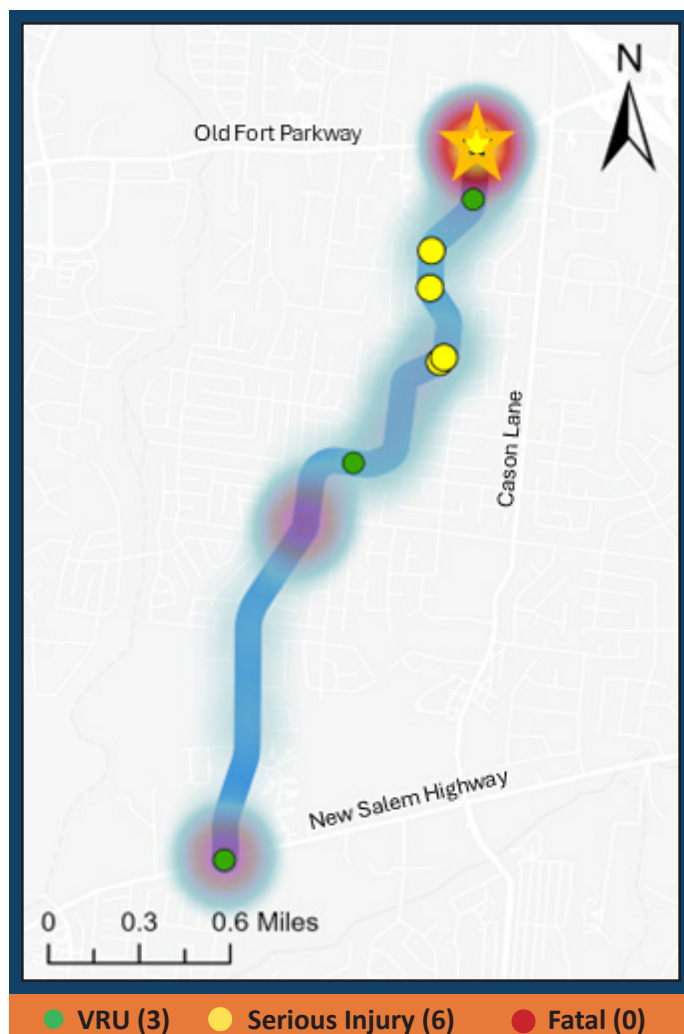
Thompson Lane (TN-268)

from Broad Street to Old Fort Parkway



Saint Andrews Drive

from Old Fort Parkway to New Salem Highway



Local (Murfreesboro, TN)

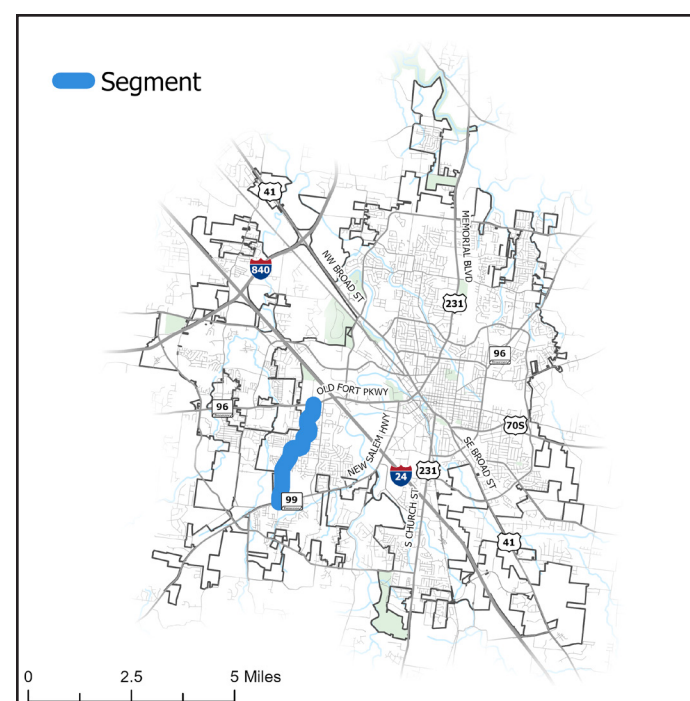
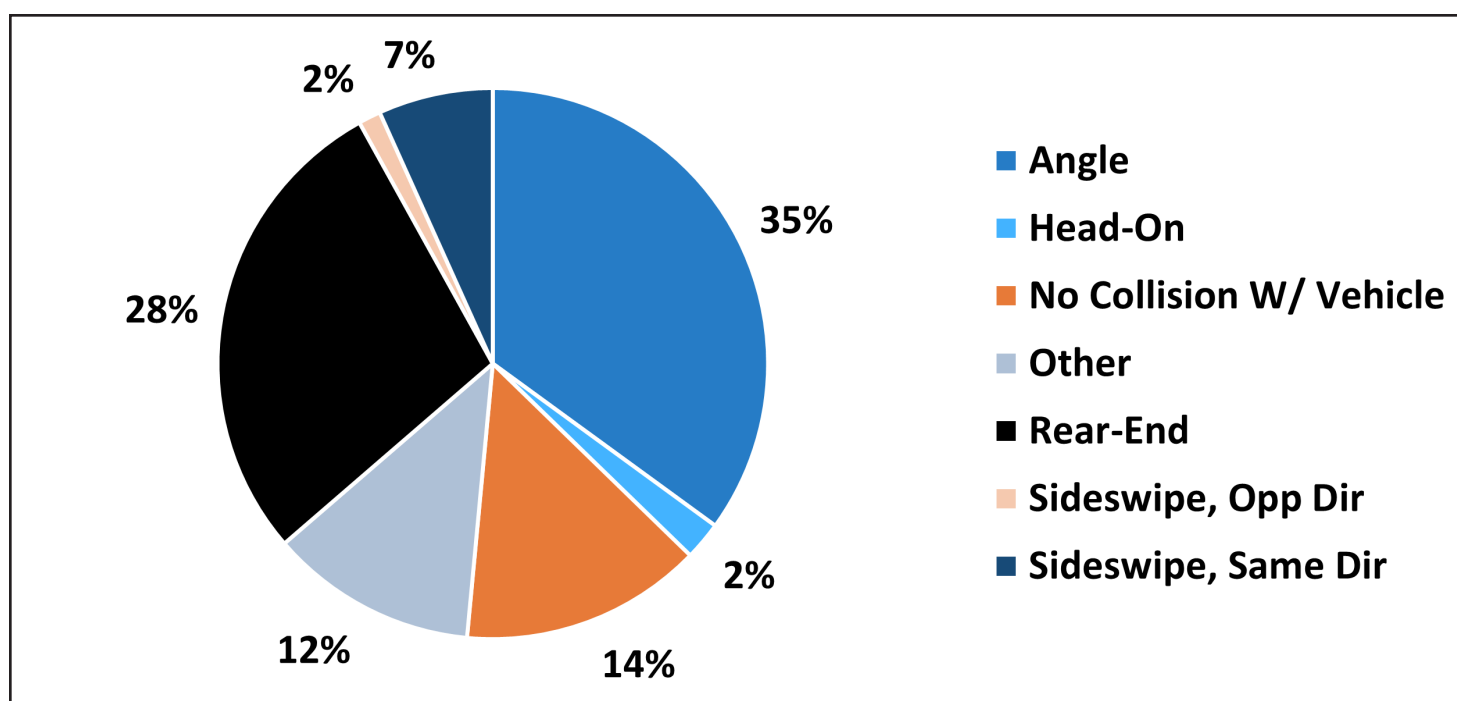
Speed Limit	30 mph
Lanes	2
Vehicles/Day	9,000
Total Crashes	534
HIN Intersections	1

Characteristics

This section of Saint Andrews Drive is a two-lane, undivided roadway through west Murfreesboro. This segment follows a curved alignment over generally rolling terrain. Sidewalks are present throughout this corridor, providing essential access to the large residential neighborhoods along the segment.

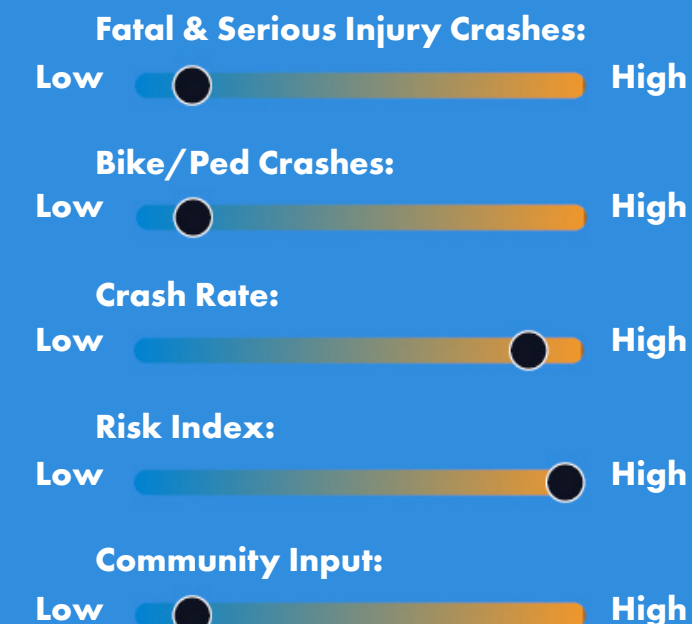


Along Saint Andrews Drive, Facing South, Just North of Risen Star Drive



OVERALL RANKING: 12

Ranking Index



Community Input

“ Cyclists are nervous riding in this area due to the number of vehicles that drive too fast. Cars hit mailboxes, and speed at night. ”

“ Wrecks at this intersection ALL the time. Very unsafe for drivers and pedestrians. ”

“ Trying to cross in the morning or night at the intersection of Cason and Saint Andrews is impossible. People drive fast. There is no crosswalks, or light to let people know people are crossing. ”

Saint Andrews Drive

from Old Fort Parkway to New Salem Highway



Saint Andrews Drive

from Old Fort Parkway to New Salem Highway

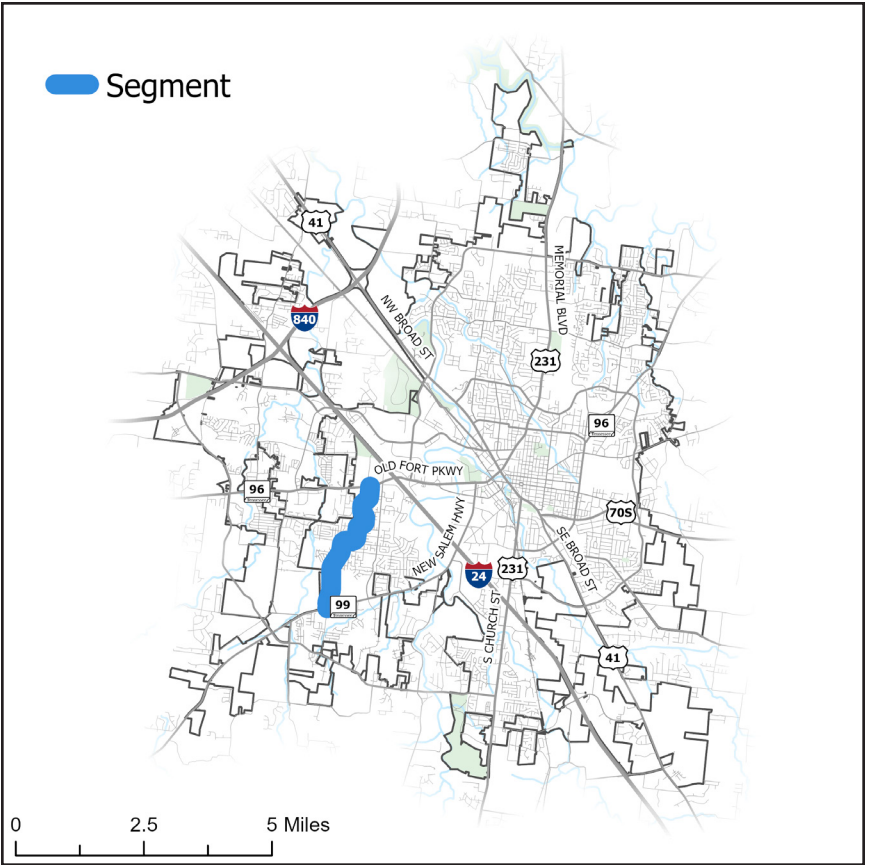
ID				Countermeasure	Cost	Schedule	Project Readiness
	●		1	Flashing Yellow Arrows (FYA) (New Salem Hwy and Old Fort Pkwy)	\$\$	Mid-Term	Ready
●	●	●	2	Retroreflective Backplates (New Salem Hwy and Old Fort Pkwy)	\$	Short-Term	Ready
●	●	●	3	Crosswalk Visibility and Accessibility Enhancements (New Salem Hwy and Old Fort Pkwy)	\$\$	Short-Term	Ready
			4	Conduct Intersection Control & Alignment Evaluation (Cason Trl and Wellington Pl)	\$	Short-Term	Ready
	●		5	Retroreflective Pavement Markers	\$	Short-Term	Ready
			6	Complete Multi-Modal Corridor Evaluation	\$\$\$	Mid-Term	Ready
	●	●	7	Traffic Calming (Corridor-Wide Speed Management)	\$\$	Mid-Term	Ready
●	●	●	8	Targeted Lighting	\$\$	Mid-Term	●

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

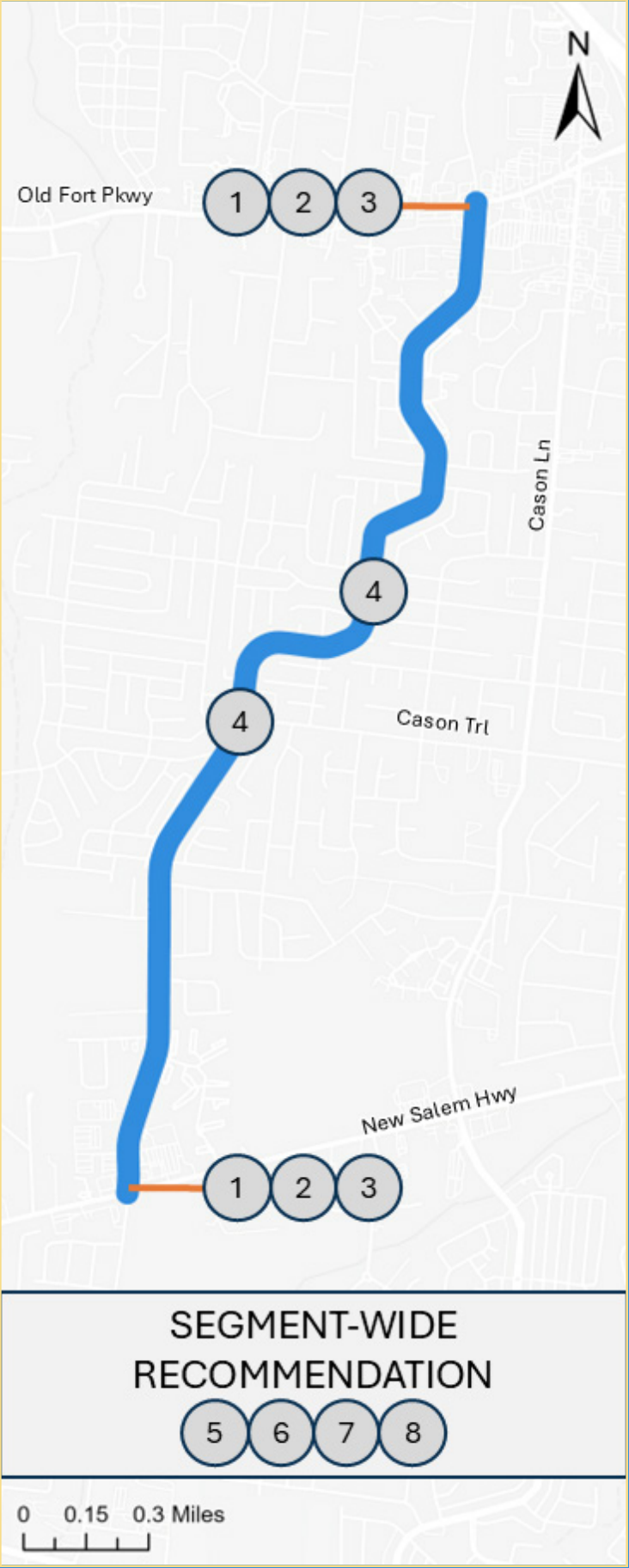
- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- **RPMs provide continuous lane guidance, which is particularly useful in navigating curves and complex intersections. The reflective properties of RPMs make them highly visible at night, reducing the risk of accidents by guiding drivers safely along the road.**
- **Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.**
- **FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.**
- **Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter.**
- **Evaluating alternate intersection control or geometry ensures safer, more efficient designs by reducing severe crashes, improving pedestrian safety, and calming traffic.**



RECOMMENDED COUNTERMEASURES



Saint Andrews Drive
from Old Fort Parkway to New Salem Highway

DISCLAIMER - 23 United States Code, Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



Lascassas Pike (TN-96)

from E Clark Boulevard to City Limits

Minor Arterial (TDOT)

Speed Limit	40 mph
Lanes	2
Vehicles/Day	15,000
Total Crashes	488
HIN Intersections	1

Characteristics

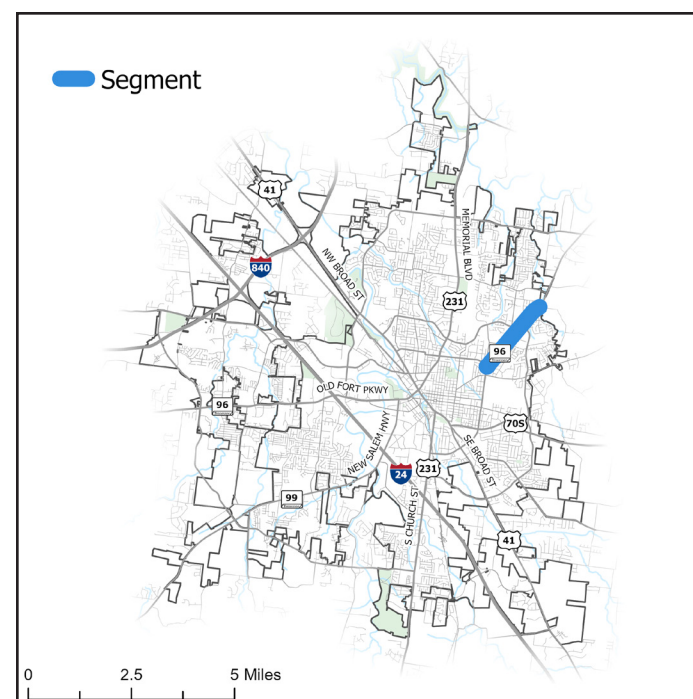
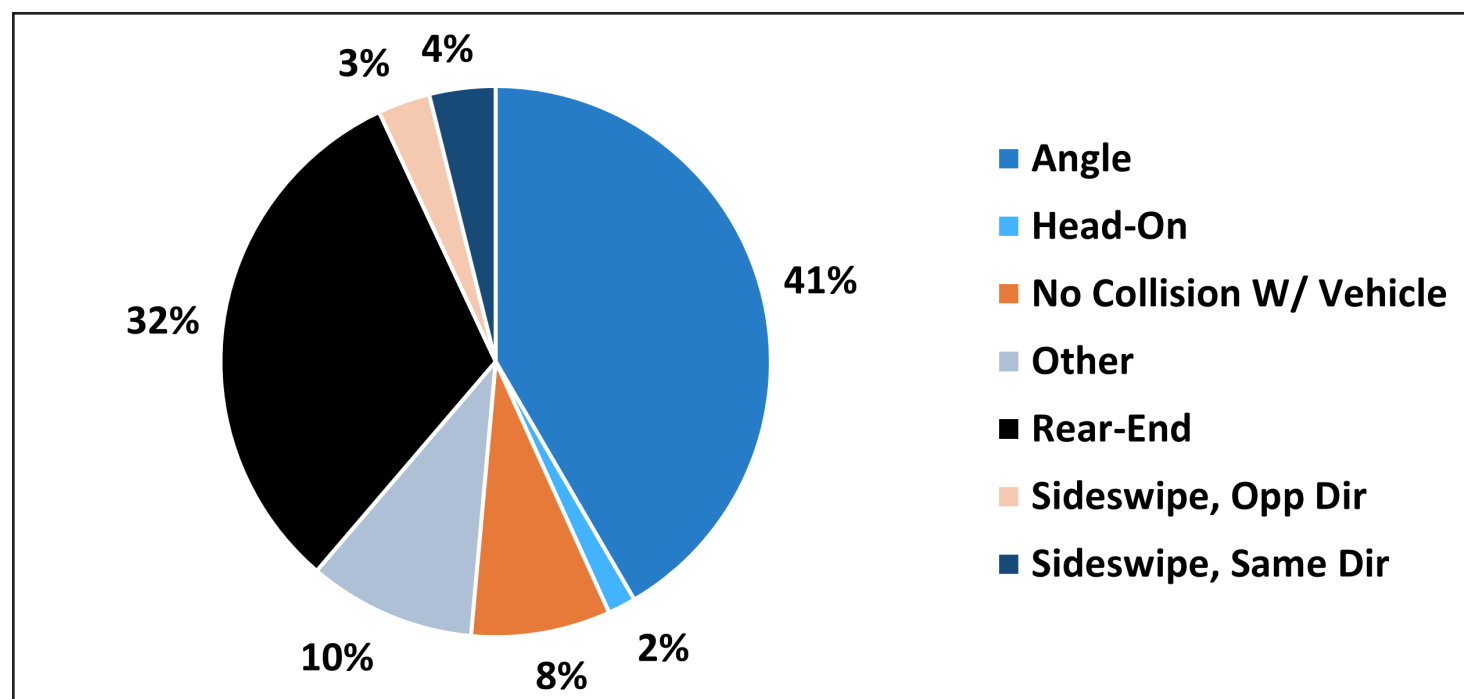
This section of Lascassas Pike (TN-96) is a two-lane, undivided roadway through northeast Murfreesboro. This segment follows a straight alignment over generally rolling terrain. This segment exhibits a high presence of student living related to Middle Tennessee State University.



Along Lascassas Pike (TN-96), Facing west, Just west of Patriot Drive

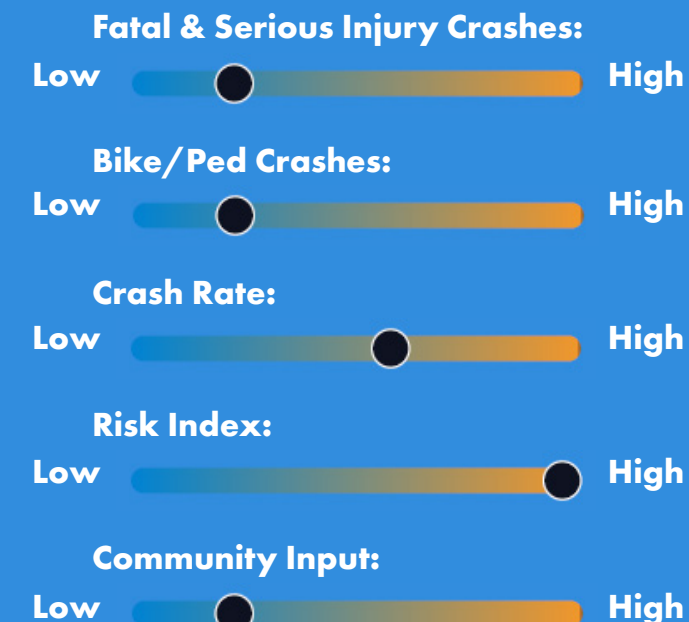


● VRU (7) ● Serious Injury (8) ● Fatal (1)



OVERALL RANKING: 14

Ranking Index



Community Input

“ There needs to be a light at Hazelwood. There are often several crashes at this intersection and it's also very unsafe for pedestrians to cross. I cross this intersection almost every day to go get groceries. ”

“ This road needs sidewalks. It's very unsafe for pedestrians. ”

“ There needs to be a light here. There are often several crashes at this intersection and it's also very unsafe for pedestrians to cross. I cross this intersection almost every day to go get groceries. ”

“ Lascassas Pike needs a bike lane and sidewalks for all the college students living on this road. I see way too many "near misses" of folks walking to and from campus on this busy road. ”

“ Opportunity to improve pedestrian and vehicle safety. Significant number of vehicle crashes due to confusing traffic signals and driver behavior. Improved signaling, crosswalks, or potential traffic circle could enhance safety and accessibility for the significant number of pedestrians, cyclists and motorists using this intersection. Several student housing and apartment complexes nearby as well as the corridor to the Lascassas community. ”

Lascassas Pike (TN-96)

from E Clark Boulevard to City Limits



Lascassas Pike (TN-96)

from E Clark Boulevard to City Limits

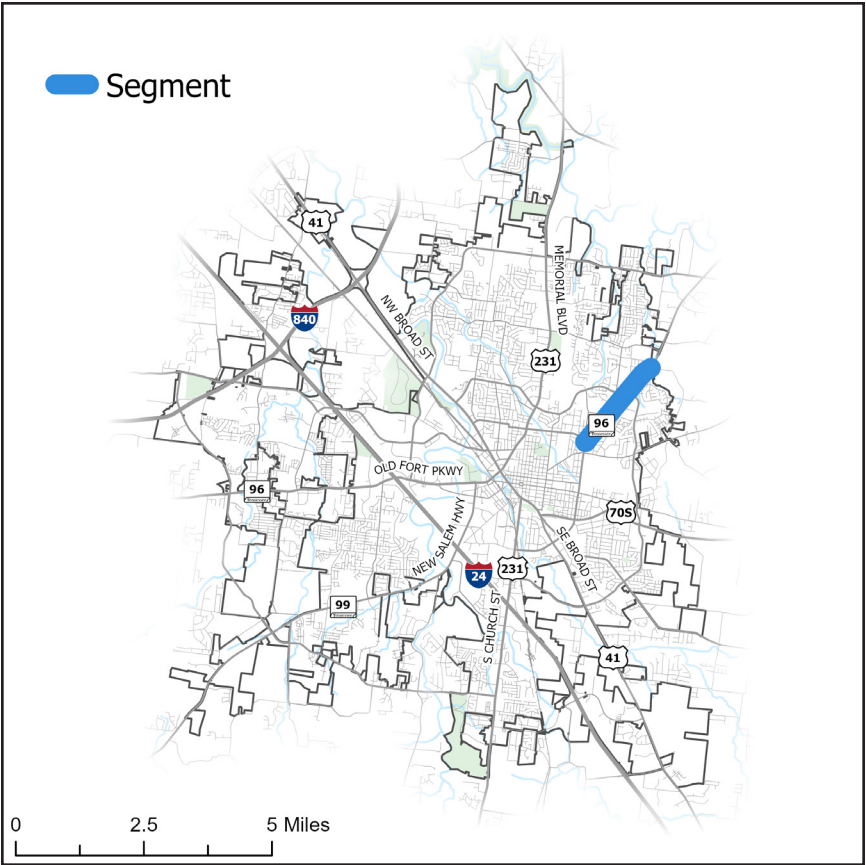
ID				Countermeasure	Cost	Schedule	Project Readiness
	●		1	Smart Channel Right-Turn Lane (E Clark Blvd)	\$\$\$	Long-Term	● ●
	●		2	Flashing Yellow Arrows (FYA) (E Clark Blvd and Rutherford Blvd)	\$\$	Mid-Term	Ready
●	●	●	3	Retroreflective Backplates (E Clark Blvd and Rutherford Blvd)	\$	Short-Term	Ready
●	●	●	4	Crosswalk Visibility and Accessibility Enhancements (E Clark Blvd and Rutherford Blvd)	\$\$	Short-Term	Ready
●	●	●	5	Targeted Lighting	\$\$	Mid-Term	Ready
	●		6	Retroreflective Pavement Markers	\$	Short-Term	Ready
●	●	●	7	Corridor Access Management	\$\$\$\$	Long-Term	Ready
			8	Conduct Intersection Control & Alignment Evaluation (Hazelwood St)	\$	Short-Term	Ready
●	●	●	9	Sidewalks and Multi-use Paths	\$\$	Mid-Term	●

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

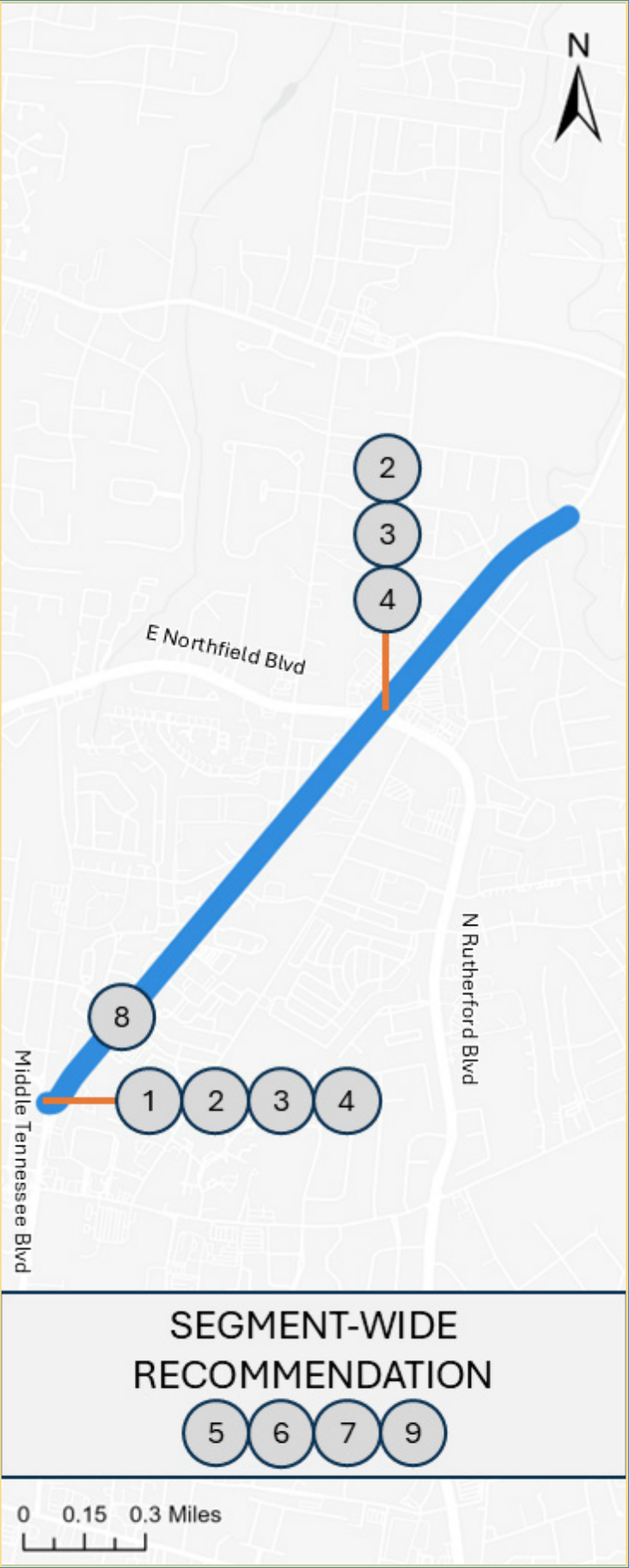
- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.
- By promoting slower turning speeds and better visibility, “smart channel” right turns help reduce the likelihood of collisions at intersections.
- Installing sidewalks and pedestrian infrastructure dramatically improves safety by reducing pedestrian crashes up to 88%, separating vulnerable users from traffic, and enhancing visibility and accessibility. These improvements also calm traffic, promote active transportation, and create safer, more livable communities.
- Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter. This enhanced visibility and recognition can lead to a reduction in rearend and angle crashes at signalized intersections.
- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.



RECOMMENDED COUNTERMEASURES

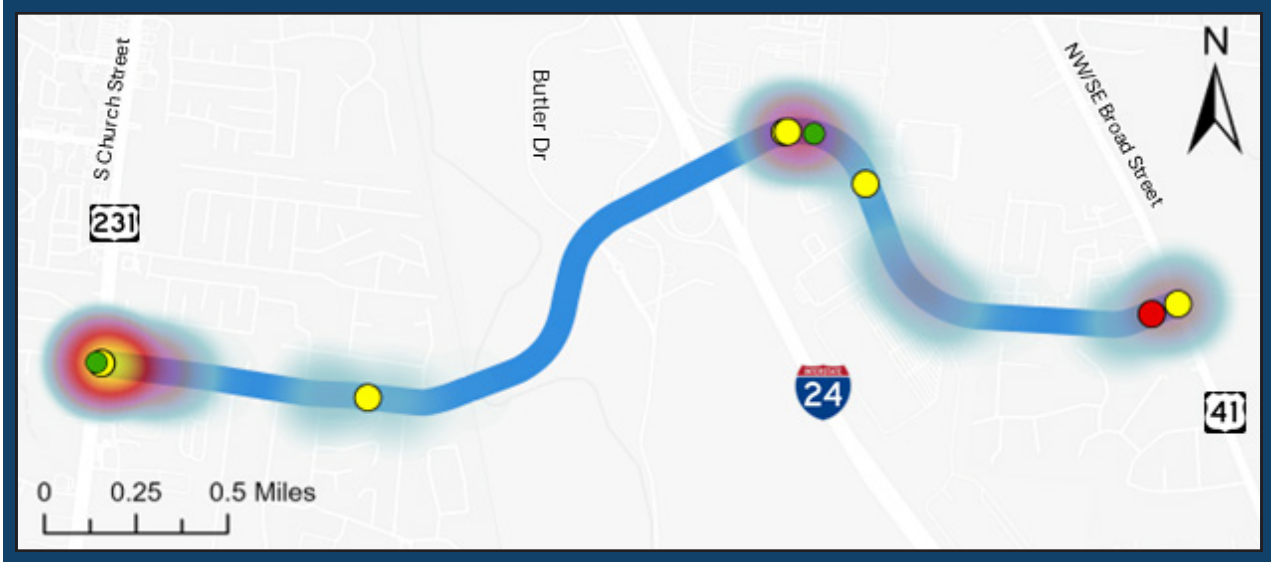


Lascassas Pike (TN-96)
from E Clark Boulevard to City Limits



Joe B Jackson Parkway

from S Church Street to Broad Street



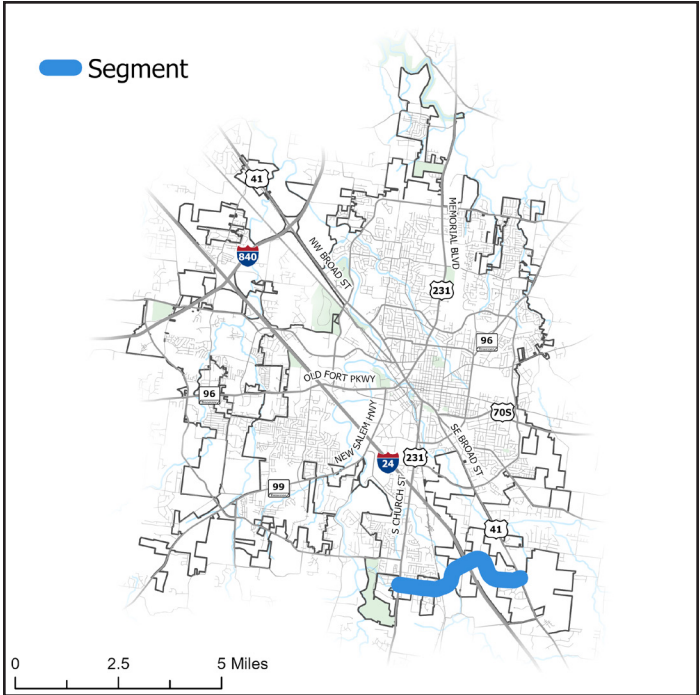
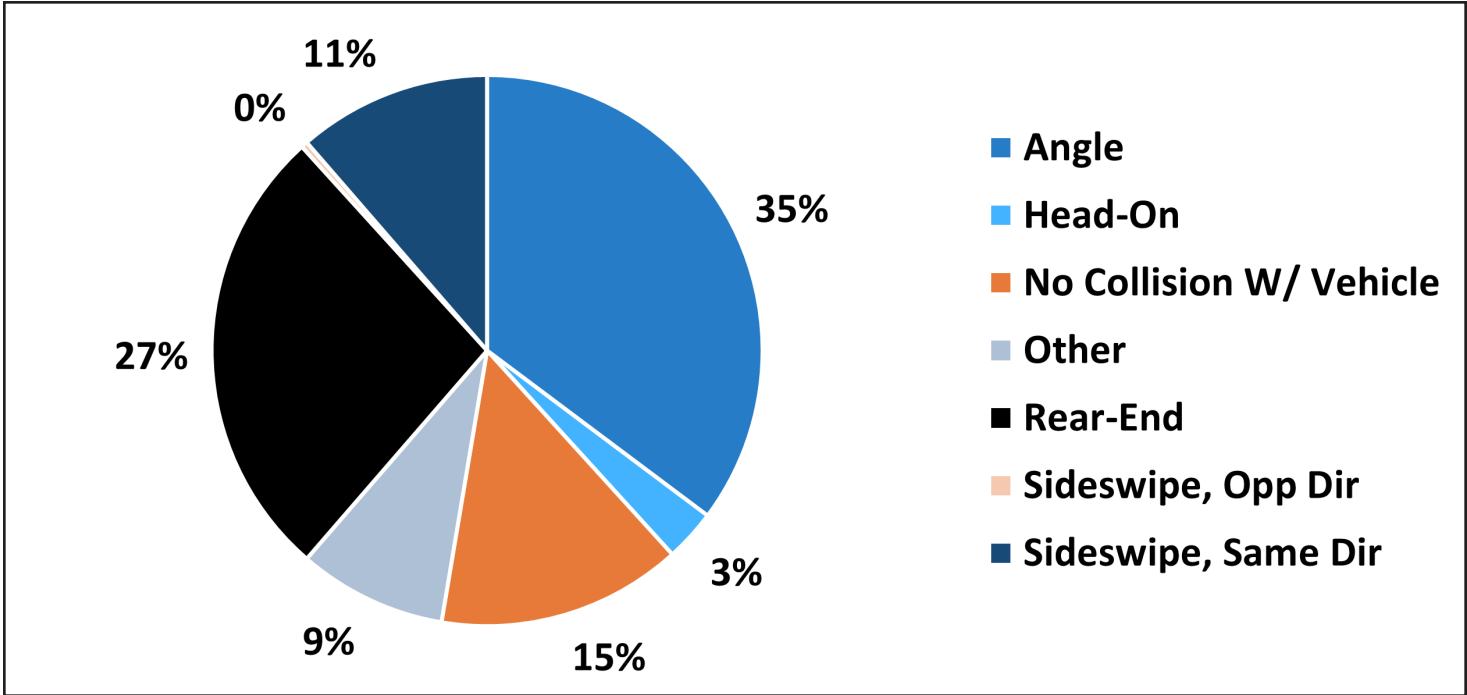
Local (Murfreesboro, TN)	
Speed Limit	45 mph
Lanes	4
Vehicles/Day	12,500
Total Crashes	264
HIN Intersections	-

Characteristics

This section of Joe B Jackson Parkway is a four-lane roadway in south Murfreesboro, divided by a bi-directional turn lane. This segment follows a curved alignment over generally rolling terrain. There are no sidewalks or pedestrian infrastructure found along this segment.

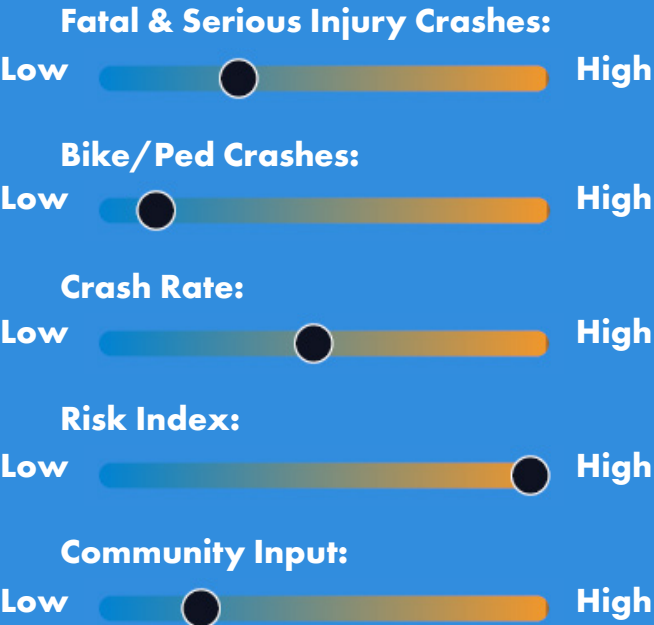


Along Joe B Jackson Parkway, Facing East, Just East of Doral Drive



OVERALL RANKING: 15

Ranking Index



Community Input

“ People make a turnaround here to avoid long turning line to get on 24W. ”

“ Joe B needs red lights at Butler , both I24 interchanges, and Elam rd. There are a number of crash that happen in the area that could be avoided with red lights. With Buc-ees coming traffic will get worse and more accidents will happen with out traffic lights. ”

“ Crossing this highway intersection is really difficult and dangerous for pedestrians and micro-mobility. ”

“ The barrels and signage around the road changes for Buc-ees are rough. Cars coming from interstate are expecting a merge lane, and push into traffic. I see/experience near-miss crashes here a lot. ”

Joe B Jackson Parkway

from S Church Street to Broad Street

DISCLAIMER - 23 United States Code, Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



Joe B Jackson Parkway

from S Church Street to Broad Street

RECOMMENDED COUNTERMEASURES



			ID	Countermeasure	Cost	Schedule	Project Readiness
	●		1	Flashing Yellow Arrows (FYA) (S Church St, Bob Baskin Dr, Elam Rd, Elam Farms Pkwy, Hollis Westbooks Ln, Richard Reeves Dr, S Broad St)	\$\$	Mid-Term	Ready
●	●	●	2	Retroreflective Backplates (S Church St, Bob Baskin Dr, Elam Rd, Elam Farms Pkwy, Hollis Westbooks Ln, Richard Reeves Dr, S Broad St)	\$	Short-Term	Ready
●	●	●	3	Crosswalk Visibility and Accessibility Enhancements (S Church St, Bob Baskin Dr, Elam Rd, Elam Farms Pkwy, Hollis Westbooks Ln, Richard Reeves Dr, S Broad St)	\$\$	Short-Term	Ready
●	●	●	4	Median and Pedestrian Refuge Island (S Broad St and Butler Dr)	\$\$	Mid-Term	Ready
●	●	●	5	Sidewalks and Multi-use Paths	\$\$	Mid-Term	Ready
	●		6	Retroreflective Pavement Markers	\$	Short-Term	Ready
●	●	●	7	Corridor Access Management	\$\$\$\$	Long-Term	Ready

\$ - 0 to 50,000; \$\$ - 50,001 to 100,000; \$\$\$ 100,001 to 500,000; \$\$\$\$ Over 500,000

● FHWA Proven Safety Countermeasure

● Crash Modification Factors Countermeasure

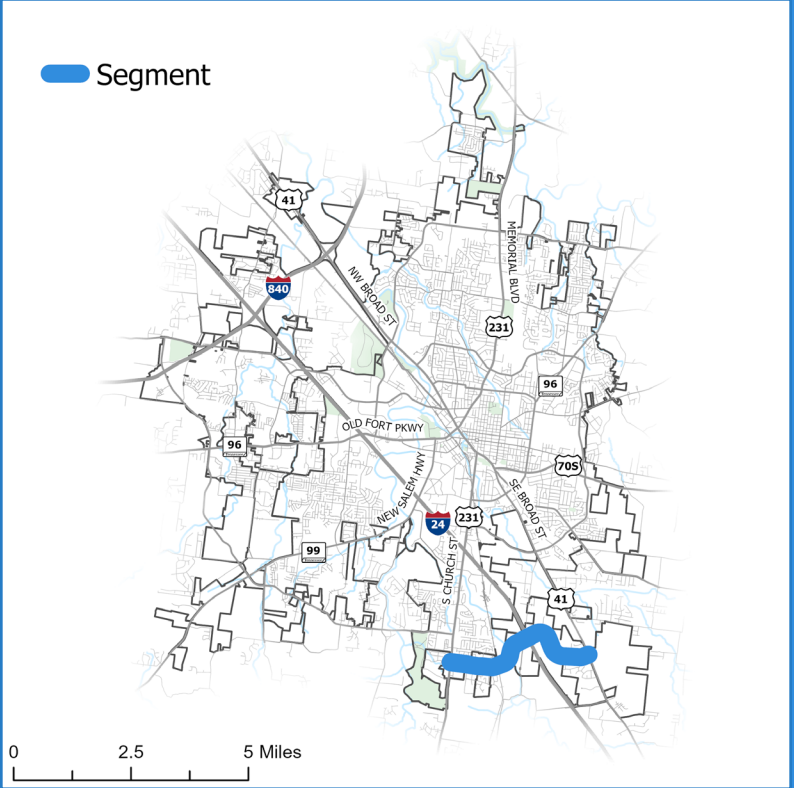
● Vulnerable Road User Related Countermeasure

● Requires ROW Acquisition

● Requires Utility Relocation

Benefit Summary

- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.
- Proper access management at medians can prevent left-turn and head-on crashes by separating opposing traffic flows. Consolidating driveways can also facilitate better access management by controlling where vehicles can turn, thereby reducing unpredictable movements that can lead to crashes.
- RPMs provide continuous lane guidance, which is particularly useful in navigating curves and complex intersections. The reflective properties of RPMs make them highly visible at night, reducing the risk of accidents by guiding drivers safely along the road.
- Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter.



Joe B Jackson Parkway

from S Church Street to Broad Street

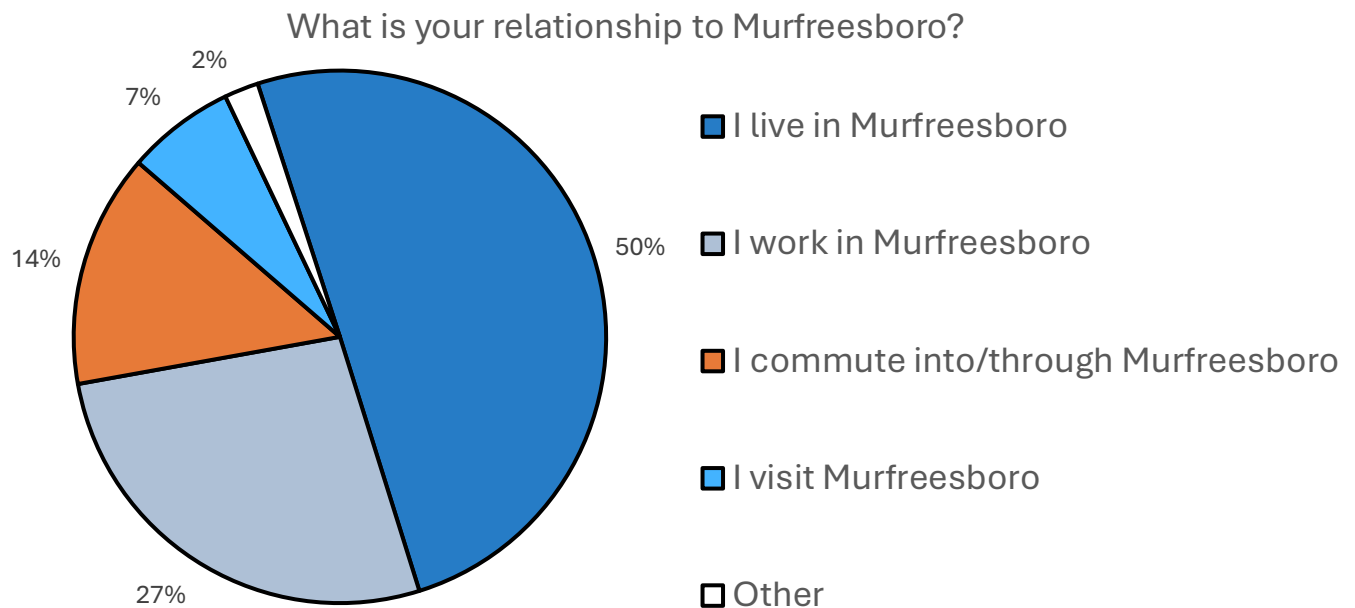
DISCLAIMER - 23 United States Code, Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.



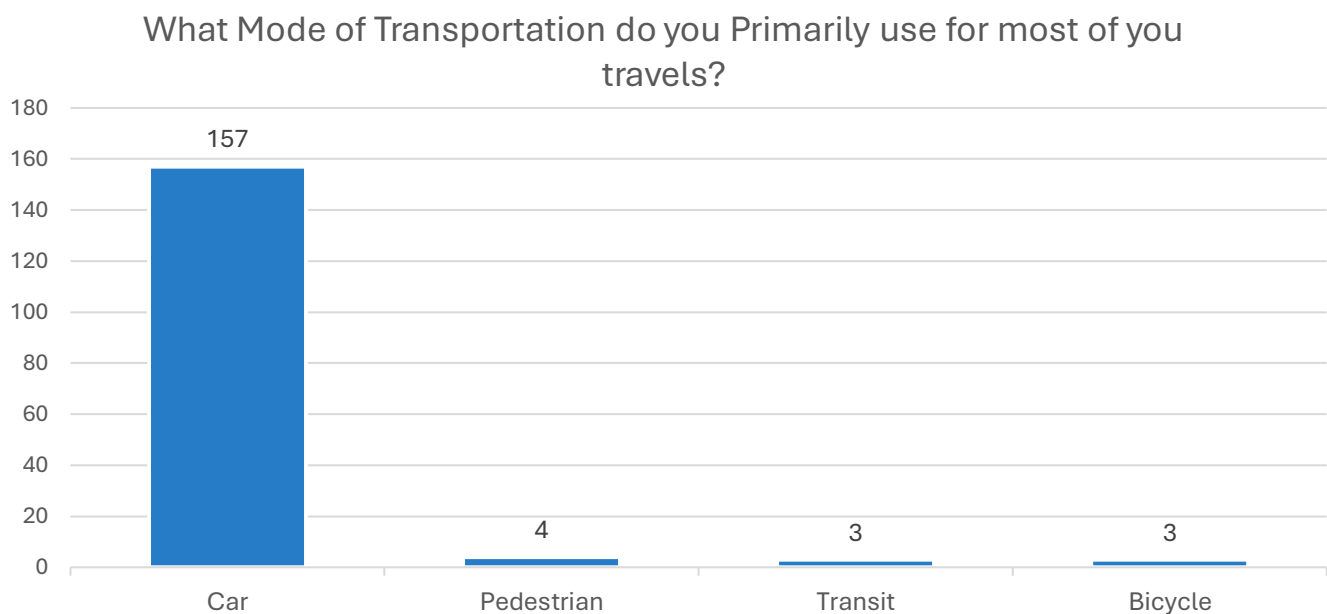
Appendix D



At the beginning of the survey, members were asked what their relationship to Murfreesboro was and whether they live or work in the area. Roughly 78 percent of respondents live or work within the Murfreesboro city limits, further validating that their experiences are focused on areas within the City.

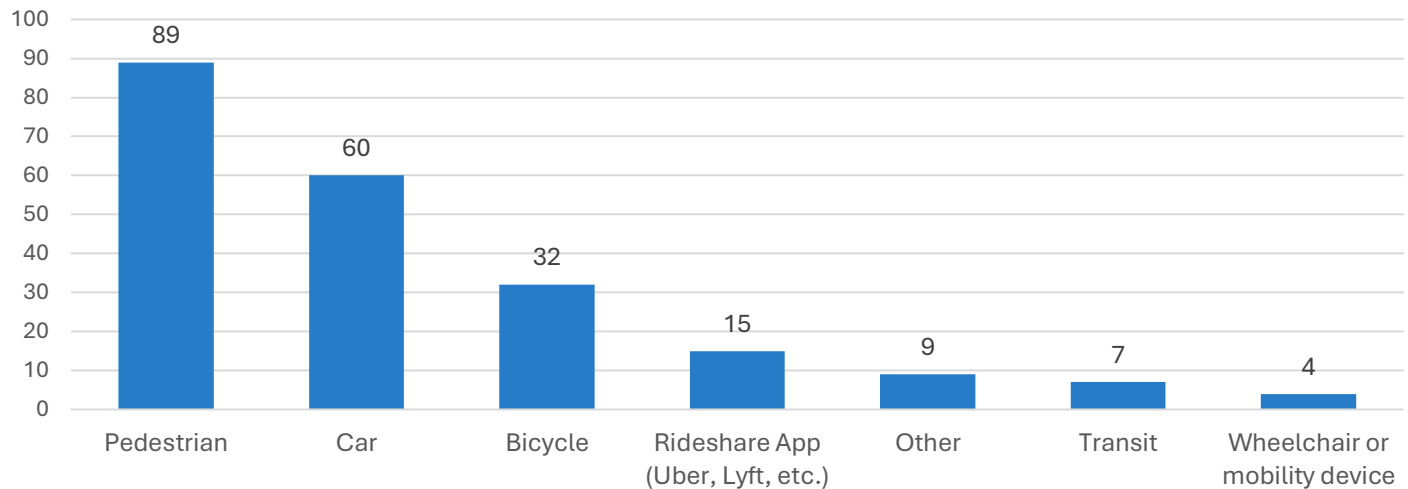


Respondents were asked to provide information on how they travel to Murfreesboro. It is inferred that while a large majority of the population travels by car, respondents have a healthy selection of travel choices. Travelling alone by car (157 responses) was the most popular response, followed by walking (4 responses), bicycle (3 responses), and transit (3 responses).



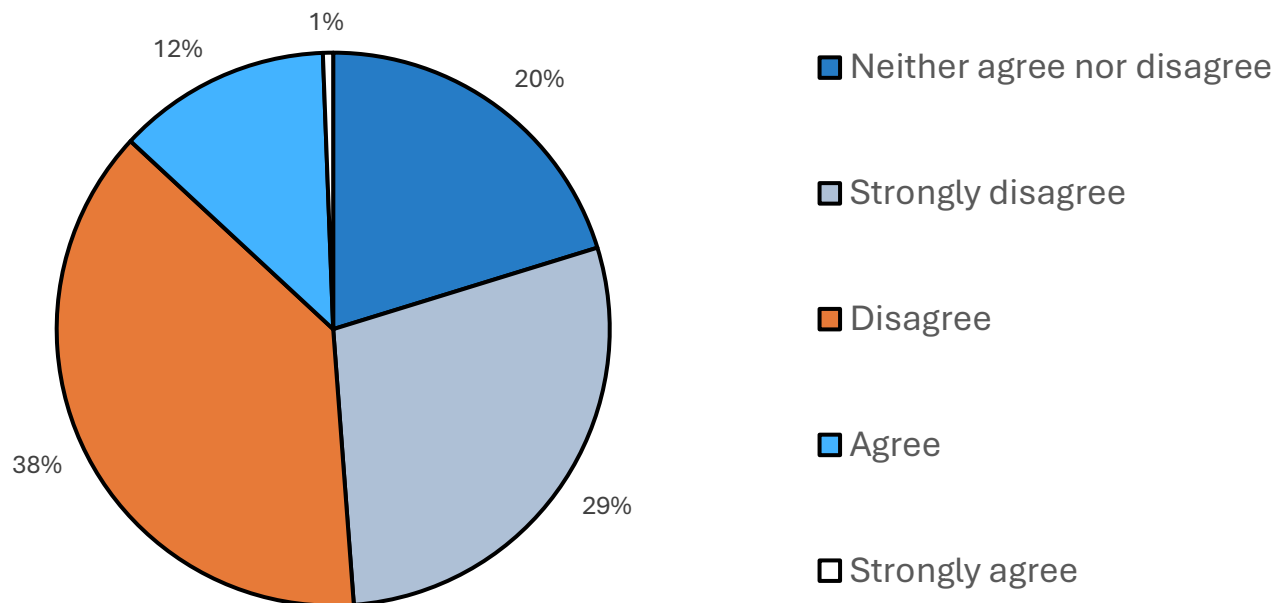
The following questions were to gather information about which alternative mode of transportation community members use. It is assumed that weekday/work transportation modes are not always the same case for things like leisure activities, exercise, weekend travel, etc.

Which of the following alternative modes of transportation do you commonly use?



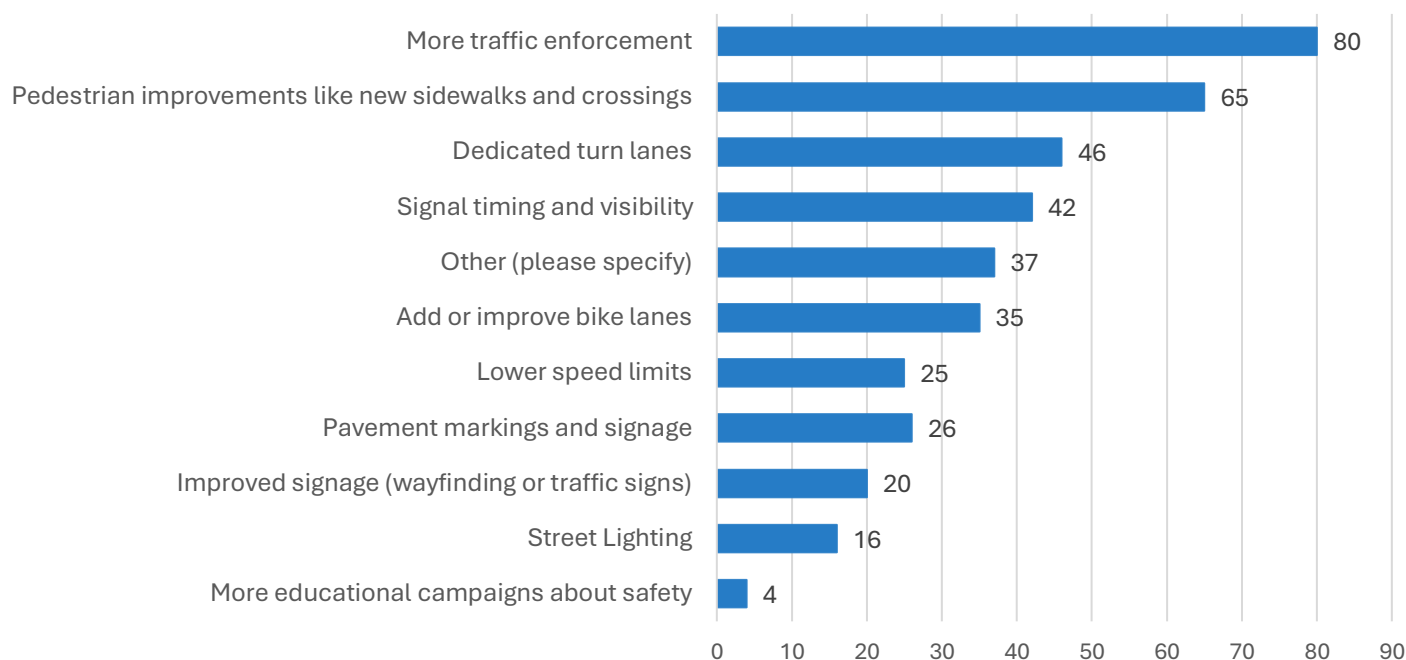
Respondents were also asked how strongly they agree that Murfreesboro streets are safe. About 13 percent of respondents felt that Murfreesboro streets were safe. Around 66 percent of respondents disagree however, indicating that they feel unsafe on the streets in Murfreesboro.

How strongly do you agree that Murfreesboro streets are safe?



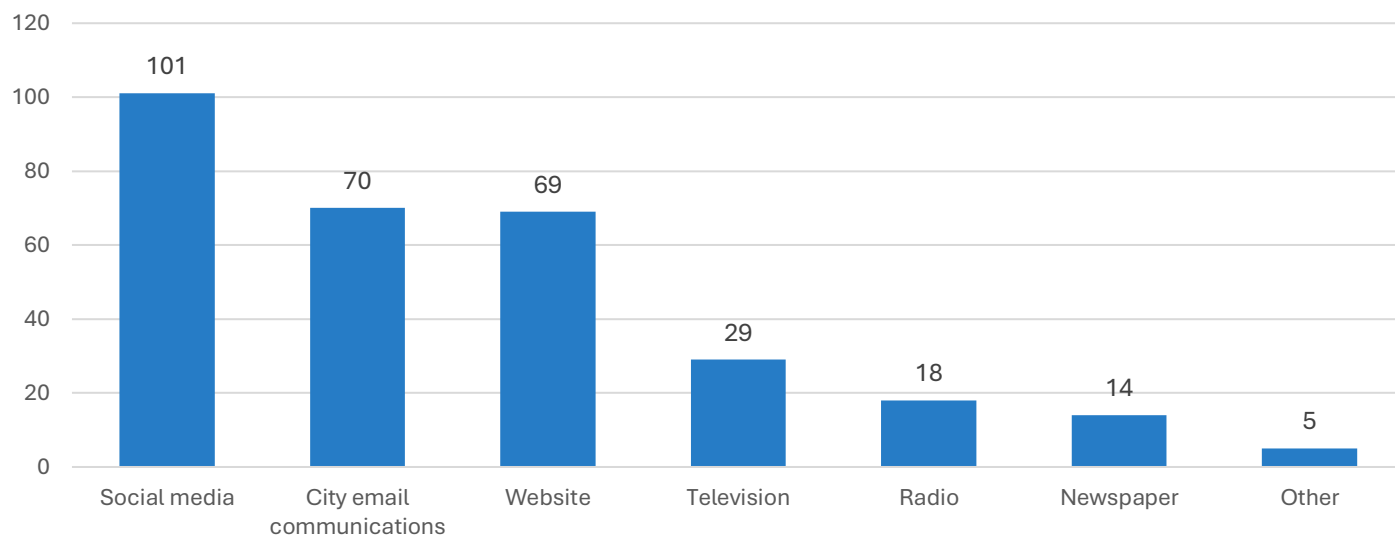
Respondents were asked to select up to three improvements that would make driving in Murfreesboro feel safer. The top three responses were more traffic enforcement, pedestrian improvements, and dedicated turn lanes.

Improvements to make driving safer



Respondents selected how they would like to hear about updates from the City regarding the Safety Action Plan. The most requested mode of communication was social media and city email communications.

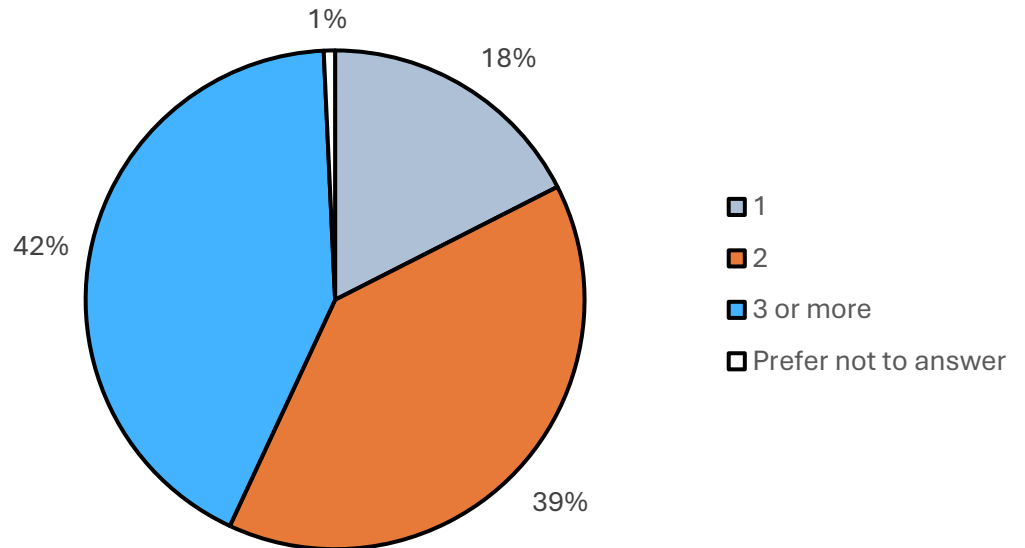
How would you prefer to learn about updates from the City?



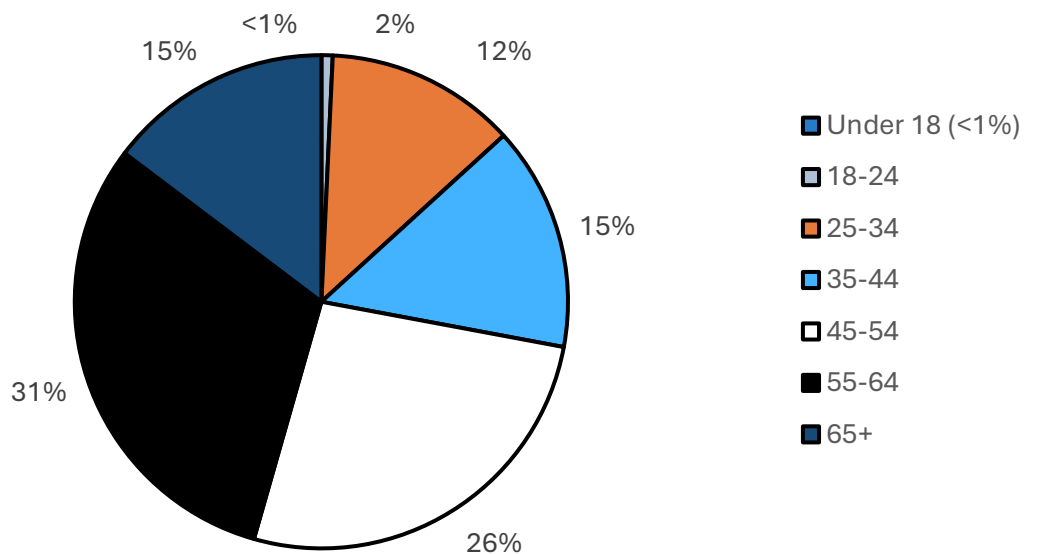
Key Demographics

The survey concluded with demographic questions that respondents could choose to answer. Responses were representative of the community makeup.

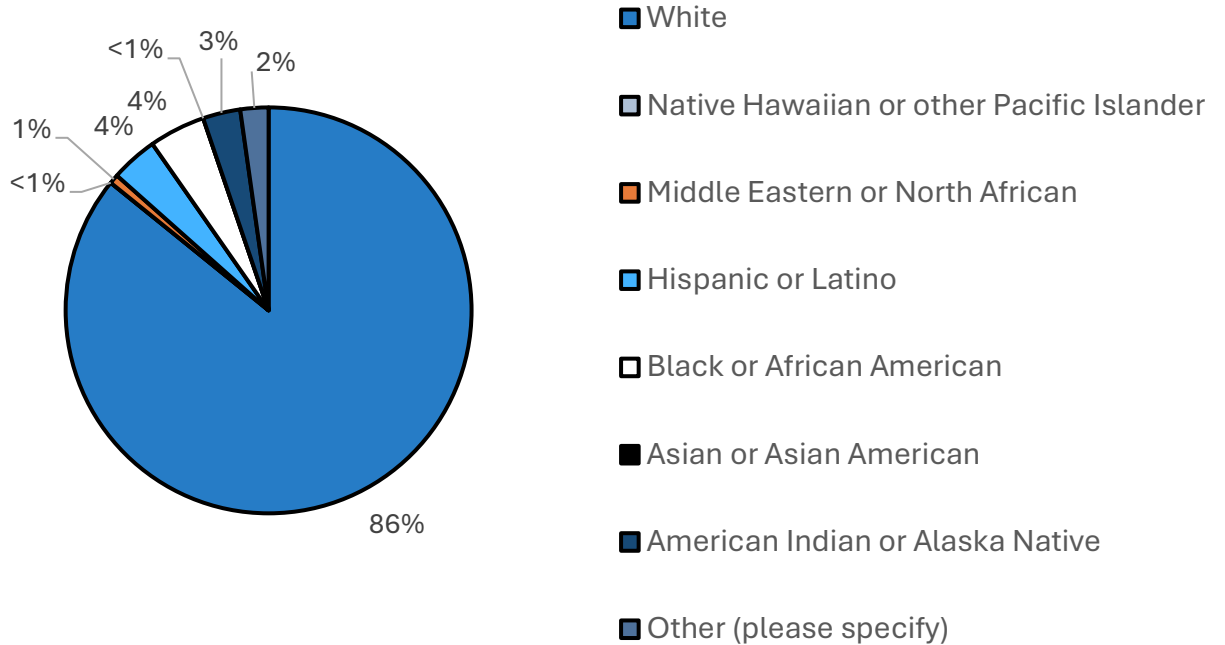
Number of Vehicles in Household



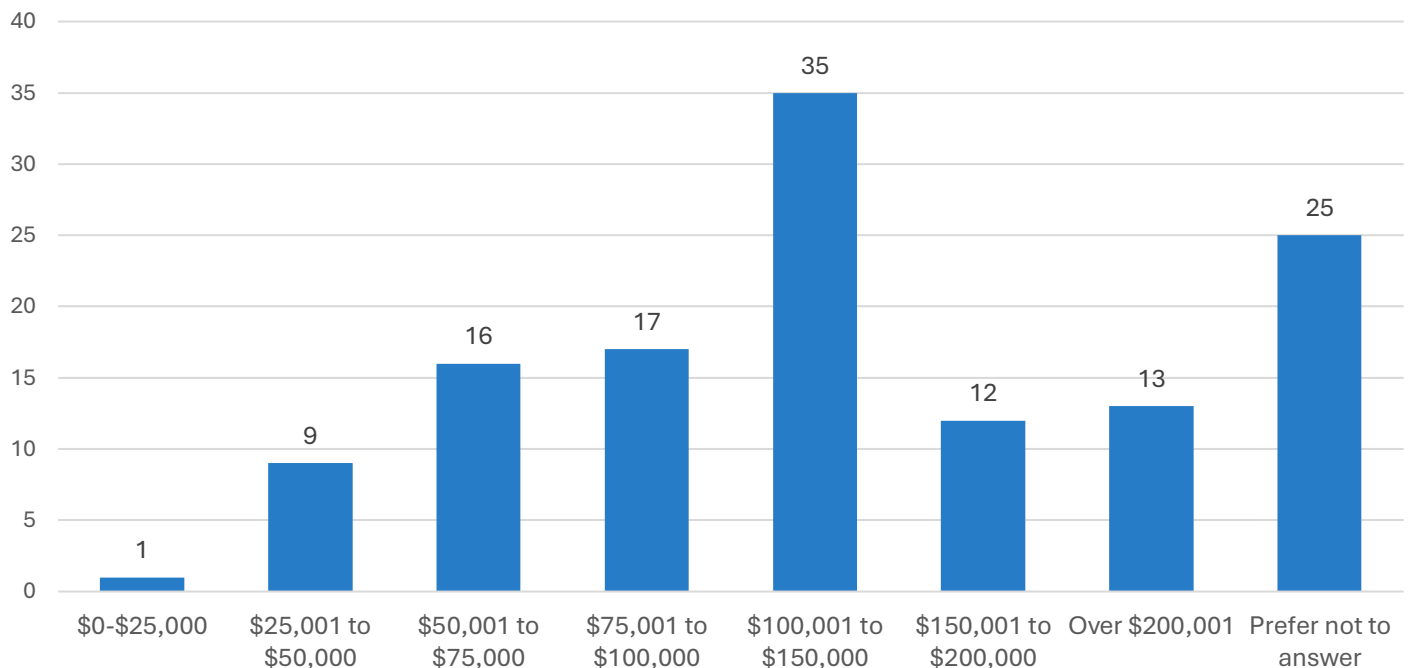
Age



Race



Annual Income Range





Appendix E



COUNTERMEASURE TOOLKIT

This section of the Murfreesboro SAP presents countermeasures that can be implemented in all Agencies within the region to improve safety. Priority should be given to roads along the HIN to lessen severity among crashes.

A countermeasure toolkit is a comprehensive collection of strategies and countermeasures designed to address specific traffic safety concerns. This toolkit provides agencies in the Murfreesboro SAP area with a range of options and resources to effectively improve safety and enhance the overall performance of roadways and transportation systems. As the countermeasure toolkit is implemented, educational campaigns will be needed to inform the public on proper and safe use of certain countermeasures.

For more information on Crash Modification Factors (CMF), please view the [CMF Clearinghouse](#).

Table 1. Countermeasure Toolkit

SOURCE	COUNTERMEASURE	CMF	CONTEXT (URBAN/ RURAL)	TIMEFRAME	COST
	APPROPRIATE SPEED LIMITS	0.86	BOTH	SHORT	\$
	CONDUCT INTERSECTION CONTROL & ALIGNMENT EVALUATION	N/A	BOTH	SHORT	\$
	ENHANCED DELINEATION FOR HORIZONTAL CURVES	0.82	RURAL	SHORT	\$
	EVALUATE PROPER APPROACH LANEAGE	0.40-0.52	BOTH	SHORT	\$
	IMPROVE SIGNAGE	0.65-.84	BOTH	SHORT	\$
	LEADING PEDESTRIAN INTERVAL	0.90	URBAN	SHORT	\$
	LONGITUDINAL RUMBLE STRIPS AND STRIPES ON TWO-LANE ROADS	0.74	RURAL	SHORT	\$
	RETROREFLECTIVE BACKPLATES	0.85	BOTH	SHORT	\$
	RETROREFLECTIVE PAVEMENT MARKERS	0.54-0.89	BOTH	SHORT	\$
	SIGHT DISTANCE EVALUATION	N/A	BOTH	SHORT	\$
	SYSTEMIC APPLICATION OF MULTIPLE LOW-COST COUNTERMEASURES AT STOP-CONTROLLED INTERSECTIONS	0.73	BOTH	SHORT	\$
	WIDER EDGE LINES	0.97	BOTH	SHORT	\$
	YELLOW CHANGE INTERVALS	0.99	BOTH	SHORT	\$
	BIKE LANES	0.43	BOTH	SHORT	\$\$
	CROSSWALK VISIBILITY ENHANCEMENTS	0.60	BOTH	SHORT	\$\$
	IMPROVE SIGNAL EQUIPMENT ALIGNMENT	N/A	BOTH	SHORT	\$\$
	UPDATE SPECIAL EVENT TRANSPORTATION MANAGEMENT	N/A	URBAN	SHORT	\$\$
	FLASHING YELLOW ARROWS (FYA)	0.52-0.82	BOTH	MID	\$\$
	MEDIAN AND PEDESTRIAN REFUGE ISLAND	0.29	URBAN	MID	\$\$
	MEDIAN BARRIERS	0.29	BOTH	MID	\$\$

SOURCE	COUNTERMEASURE	CMF	CONTEXT (URBAN/ RURAL)	TIMEFRAME	COST
  	RECTANGULAR RAPID FLASHING BEACONS (RRFB)	0.31	BOTH	MID	\$\$
  	SIDEWALKS AND MULTI-USE PATHS	0.60	BOTH	MID	\$\$
  	TARGETED LIGHTING	0.68	BOTH	MID	\$\$
 	TRAFFIC CALMING (CORRIDOR-WIDE SPEED MANAGEMENT)	0.60	BOTH	MID	\$\$
	TRANSIT STOP ADDITION/ENHANCEMENT	N/A	BOTH	MID	\$\$
	COMPLETE MULTI-MODAL CORRIDOR EVALUATION	N/A	URBAN	MID	\$\$\$
 	DEDICATED LEFT AND RIGHT-TURN LANES AT INTERSECTIONS	0.52-0.86	BOTH	MID	\$\$\$
 	ELIMINATE NEGATIVE OFF-SETS AT INTERSECTIONS	0.60	BOTH	MID	\$\$\$
	FLATTEN MINOR STREET APPROACH	N/A	BOTH	MID	\$\$\$
  	PEDESTRIAN HYBRID BEACONS	0.88	URBAN	MID	\$\$\$
	RAILROAD CROSSING ENHANCEMENTS	N/A	BOTH	MID	\$\$\$
	REDUCED LEFT-TURN CONFLICT INTERSECTIONS	0.71	BOTH	MID	\$\$\$
	WIDEN SHOULDERS	N/A	BOTH	MID	\$\$\$
	SMART CHANNEL RIGHT-TURN LANE	0.40	BOTH	LONG	\$\$\$
  	CORRIDOR ACCESS MANAGEMENT	0.93	BOTH	LONG	\$\$\$\$
  	ROADWAY RECONFIGURATION	0.53	URBAN	LONG	\$\$\$\$
  	ROUNDBABOUTS	0.59	BOTH	LONG	\$\$\$\$

CMF Crash Modification Factor

-  FHWA Proven Safety Counter Measure
-  Crash Modification Factors Countermeasure
-  Vulnerable Road User Related Countermeasures

- \$ \$0 – \$50,000
- \$\$ \$50,001 – \$100,000
- \$\$\$ \$100,001 – \$500,000
- \$\$\$\$ > \$500,000

1. APPROPRIATE SPEED LIMITS

Posted speed limits are often the same as the legislative statutory speed limit. Agencies with the authority to set speed limits can establish non-statutory speed limits or designate reduced speed zones, and an increasing number are doing so. Roadway safety experts agree that speed control is one of the most important methods for reducing fatal and serious injury crashes.

A driver may not see or be aware of the conditions along a corridor and may drive at a speed that feels reasonable for themselves but may not be for all system users, especially vulnerable road users, such as children and seniors. A driver traveling at 30 miles per hour who hits a pedestrian has a 45 percent chance of killing or seriously injuring them. At 20 miles per hour, that percentage drops to 5 percent.

Figure 1. Speed Limit Sign



Source: Adobe Stock

CMF: 0.86

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Unrestrained Occupant, Impaired Driving, Younger Drivers, Roadway Departure, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle, Animal

Cost: \$ | Timeframe: SHORT

2. CONDUCT INTERSECTION CONTROL & ALIGNMENT EVALUATION

This strategy applies FHWA's Intersection Control Evaluation (ICE) framework to objectively screen and compare intersection control and geometric alternatives (e.g., stop control, signalization, roundabout, RCUT/MUT), and integrates a targeted alignment review (approach skew, grades, and turning geometry). Using FHWA tools—SPICE for planning level safety performance and CAP X for operations—alternatives are evaluated on predicted crashes, multimodal performance, operations, costs, and lifecycle impacts. The process yields a transparent, defensible selection of intersection control and an aligned geometric concept that improves safety and consistency for all users.

Figure 2. Example Signalized Intersection



Source: Adobe Stock

CMF: N/A

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Unrestrained Occupant, Impaired Driving, Younger Drivers, Intersections, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$ | Timeframe: SHORT

3. ENHANCED DELINEATION FOR HORIZONTAL CURVES

Enhanced delineation for horizontal curves includes various strategies implemented in advance or within curves. Pavement markings, center, and edge lines help drivers establish their position on the road. In-lane curve warning pavement markings are solid center lines on two-lane roads that warn drivers that a curve is approaching. Retroreflective strips are material on signposts that reflect light back to the driver to help draw attention to the sign during the night. A delineator is a retroreflective device placed on a post or roadside barrier along the side of the road that lets a driver align themselves on the road. Chevron signs placed on the outside of the curve or on the edge of the road inform the driver of the direction of the road. Enhanced visibility at horizontal curves can be improved by adding or upgrading to larger, retroreflective signs. Dynamic curve warnings detect vehicle speeds approaching a curve and alert drivers if the vehicular speed exceeds the speed limit. Sequential Dynamic Chevrons, a type of enhanced delineation, can lead to a 60 percent reduction in fatal and injury crashes.

Figure 3. Enhanced Delineation for Horizontal Curves



Source: Adobe Stock

CMF: 0.82

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Unrestrained Occupant, Impaired Driving, Younger Drivers, Roadway Departure, Motorcycle, Large Trucks, Bicycle

Cost: \$ | Timeframe: SHORT

4. EVALUATE PROPER APPROACH LANEAGE

This strategy involves assessing and improving intersection approach lane configurations—including adding or extending left or right turn lanes, modifying turn lane geometry, or revising lane alignment—to reduce vehicle conflict points and improve operational efficiency. **Adding left turn lanes on major approaches is a proven safety countermeasure associated with an estimated 48 percent reduction in crashes (CMF = 0.52). Improvements to channelized right turn lanes, such as sharpening approach angles and improving sight distance, can reduce right turn crashes by approximately 60 percent (CMF = 0.397). These laneage modifications reduce rear end, angle, and turning collisions while improving visibility and predictability for all users.**

Figure 4. Lane Alignment Example



Source: Adobe Stock

CMF: – 0.4 to 0.52

Safety Emphasis Area Addressed:

Older Driver (65+), Unrestrained Occupant, Impaired Driving, Younger Drivers, Intersections, Local Roads, , Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$ | Timeframe: SHORT

5. IMPROVE SIGNAGE

This strategy enhances driver awareness and decision making by installing or upgrading critical warning and regulatory signs. Improvements may include adding advance warning signs (e.g., SIGNAL AHEAD, STOP AHEAD) and improving retroreflectivity for nighttime visibility. **Crash based evaluations show that installing advance warning signs can reduce angle crashes by 35 percent (CMF = 0.65), and non intersection injury crashes by 16 percent. These low cost signing treatments provide substantial safety benefits by improving driver recognition of upcoming conditions.**

Figure 5. Signal Ahead Signage



Source: Adobe Stock

CMF: 0.65 to 0.84

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Unrestrained Occupant, Impaired Driving, Younger Drivers, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle, Animal

Cost: \$ | Timeframe: SHORT

6. LEADING PEDESTRIAN INTERVAL

A leading pedestrian interval (LPI) allows pedestrians to enter the crosswalk at an intersection 3–7 seconds before vehicles receive a green indication. An LPI increases pedestrian visibility, aiming to reduce conflict with vehicles. LPI also helps pedestrians who may require more time to cross the street. Installing an LPI can lead to a 13 percent reduction in pedestrian–vehicle crashes at intersections.

Figure 6. Leading Pedestrian Interval



Source: Adobe Stock

CMF: 0.9

Safety Emphasis Area Addressed:

Intersections, Pedestrians, Bicycles

Cost: \$ | Timeframe: SHORT

7. LONGITUDINAL RUMBLE STRIPS AND STRIPES ON TWO-LANE ROADS

Longitudinal rumble strips are milled or painted installations on the ground that alert a driver through vibration and sound. A longitudinal rumble strip is on the shoulder, edge, or near or at the center line of an undivided roadway. These are intended to warn drivers whose vehicles are crossing centerlines through the creation of noise and vehicular vibration. Rumble strips should be implemented meeting AASHTO and other safety guidelines for VRU safety. Longitudinal rumble strips can result in a 44–64 percent reduction in head-on fatal and injury crashes on two-lane rural roads.

Figure 7. Rumble Strips



Source: Adobe Stock

CMF: 0.74

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Roadway Departure

Cost: \$ | Timeframe: SHORT

8. RETROREFLECTIVE BACKPLATES

A retroreflective backplate is a backplate made by framing traffic signals with a 1-to-3-inch yellow retroreflective border. They improve the visibility of the signal by creating an illuminated border to provide greater contrast from the area around the signal. The backplates lead to improvements in both daytime and nighttime conditions. Safety benefits for retroreflective backplates include a 15 percent reduction in total crashes.

Figure 8. Retroreflective Backplates



Source: Adobe Stock

CMF: 0.85

Safety Emphasis Area Addressed:

Older Driver (65+), Impaired Driving, Younger Drivers, Intersections, Local Roads

Cost: \$ | Timeframe: SHORT

9. RETROREFLECTIVE PAVEMENT MARKERS

This treatment enhances lane visibility, particularly during nighttime and wet weather conditions, by providing continuous retroreflective guidance along the roadway. Improved delineation helps drivers maintain lane discipline and reduces the likelihood of run off road, nighttime, and wet weather crashes. **Based on CMF Clearinghouse studies evaluating wet reflective pavement markings—an analogous visibility enhancement—this countermeasure is associated with approximately an 11 percent reduction in total crashes (CMF = 0.887), with larger reductions on multilane roads (total crashes CMF = 0.825) and significant decreases in nighttime (CMF = 0.696) and run off road crashes (CMF = 0.538).**

Figure 9. Wet Reflective Pavement Markings



Source: Adobe Stock

CMF: 0.54 to 0.89

Safety Emphasis Area Addressed:

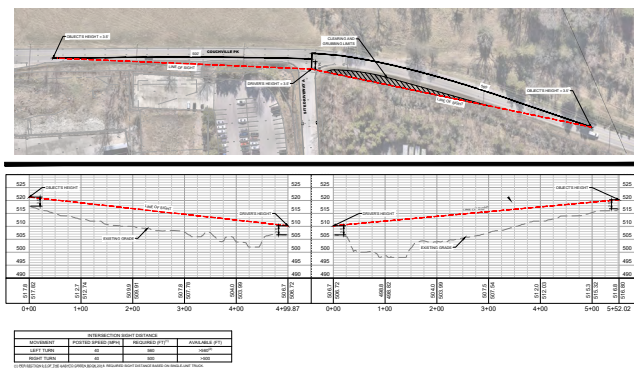
Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Roadway Departure, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$ | Timeframe: SHORT

10. SIGHT DISTANCE EVALUATION

Conduct a thorough evaluation of available sight distance at intersections, driveways, and roadway segments to ensure compliance with AASHTO, MUTCD, and state design requirements. This includes verifying stopping sight distance, intersection sight distance, and decision sight distance, and identifying sight obstructions caused by vegetation, roadside features, horizontal/vertical geometry, or driveway placement. While no crash modification factor (CMF) is published for sight distance evaluation or correction, geometric design manuals emphasize that adequate sight distance is essential for safe operations. Evaluations should identify deficiencies and recommend corrective actions such as clearing vegetation, regrading approaches, modifying intersection geometry, adjusting corner radii, or applying traffic control to mitigate insufficient visibility.

Figure 10. Sight Distance Evaluation



11. SYSTEMIC APPLICATION OF MULTIPLE LOW-COST COUNTERMEASURES AT STOP-CONTROLLED INTERSECTIONS

This systemic approach to stop-controlled intersection safety involves deploying a package of multiple low-cost countermeasures, including enhanced signing and pavement markings, at intersections. These countermeasures increase driver awareness and recognition of the intersections and potential conflicts. This application is associated with a 10 percent reduction of fatal and injury crashes at all locations/types/areas.

Figure 11. Stop-Controlled Intersections



CMF: 0.73

Safety Emphasis Area Addressed:

Older Driver (65+), Impaired Driving,
Younger Drivers, Intersections, Local Roads,
Motorcycle, Pedestrian, Bicycle,

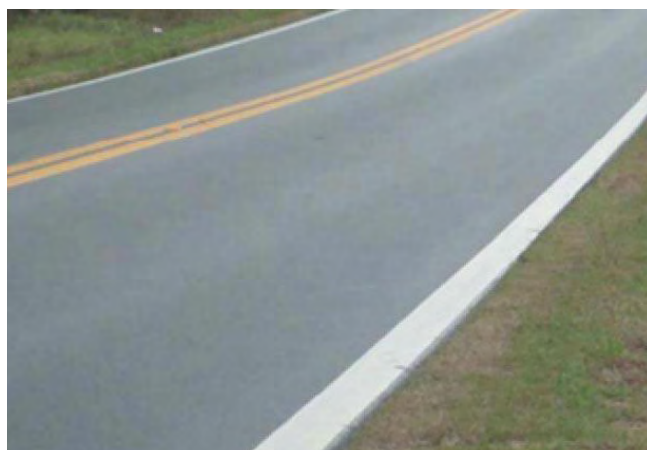
Cost: \$ | Timeframe: SHORT

Source: FHWA

12. WIDER EDGE LINES

Edge lines are the pavement markings at the edge of travel lanes and are designed to help drivers clearly identify the road alignment ahead. To improve safety, designers increase edge lines from the minimum normal line width of 4 inches to the maximum normal width of 6 inches. Wider edge lines enhance the visibility of travel lane boundaries compared to traditional edge lines. Wider edge lines can reduce crashes by up to 22 percent for fatal and injury crashes on rural freeways.

Figure 12. Wider Edge Lines



CMF: 0.97

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related,
Impaired Driving, Younger Drivers,
Roadway Departure

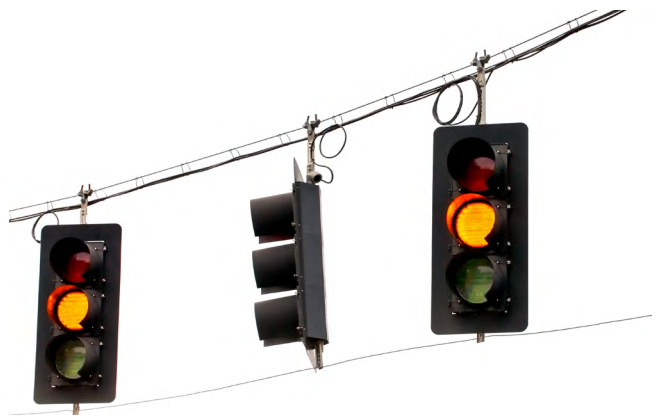
Cost: \$ | Timeframe: SHORT

Source: Adobe Stock

13. YELLOW CLEARANCE INTERVALS

The yellow clearance interval is the time the yellow signal indication is displayed following a green light signal indication. Red light running is a leading cause of crashes and fatalities at intersections, so timing the signal allows drivers to both stop safely without inviting accelerating through a yellow to red light transition. A well-timed yellow clearance interval helps reduce crashes, indicating green has passed and red is following next. This leads to appropriate speeds and speed management at signalized intersections. Safety benefits include a 36–50 percent reduction in red light running when timed appropriately.

Figure 13. Yellow Light at a Signal



CMF: 0.99

Safety Emphasis Area Addressed:

Older Driver (65+), Younger Drivers, Intersections, Local Roads, Pedestrian, Bicycle

Cost: \$ | Timeframe: SHORT

Source: Adobe Stock

14. BIKE LANES

A bike lane is a designated area of a roadway that is reserved for bicycles, typically marked with pavement markings and signage. Bike lanes provide bicyclists with a dedicated space to ride, improving safety by reducing conflicts with motor vehicles, and encouraging more people to choose bicycling as a mode of transportation. Bike Lane Additions can reduce crashes by up to 49 percent for total crashes on urban 4-lane undivided collectors and local roads and 30 percent for total crashes on urban 2-lane undivided collectors and local roads.

Figure 14. Bike Lane



Source: Adobe Stock

CMF: 0.43

Safety Emphasis Area Addressed:

Impaired Driving, Distracted Driving, Occupant Protection, Unsafe Speed, Vulnerable Road Users

15. CROSSWALK VISIBILITY AND ACCESSIBILITY ENHANCEMENTS

Crosswalk visibility enhancements encompass multiple strategies that can be used alone or in combination. High-visibility crosswalks use an inlay or thermoplastic tape patterns that are visible to the driver and pedestrians from far away. Improved lighting illuminates with a positive contrast that makes the pedestrian more visible by placing luminaires in forward locations. Enhanced signage and pavement markings alert the driver in advance that a pedestrian crosswalk is approaching, using either signage, pavement markings, or curb extensions. **High-visibility crosswalks can reduce pedestrian injury crashes up to 40 percent.**

Figure 15. High-Visibility Crosswalk



Source: Adobe Stock

CMF: 0.60

Safety Emphasis Area Addressed:

Distracted Driving, Intersections,
Pedestrians, Bicycles

Cost: \$\$ | Timeframe: SHORT

16. IMPROVE SIGNAL EQUIPMENT ALIGNMENT

This countermeasure improves the visibility and conspicuity of traffic signals by adjusting signal head orientation, repositioning equipment to meet MUTCD visibility requirements, and removing objects or geometric conditions that obstruct a driver's view of the signal. Proper alignment ensures that signal indications are clearly visible to approaching drivers, reducing the risk of red light running, sudden braking, and angle collisions. Although the CMF Clearinghouse does not publish a crash modification factor for signal alignment improvements, the Highway Safety Manual notes that inadequate visibility of traffic control devices contributes to intersection crashes, and correcting alignment issues is considered a critical safety maintenance activity.

Figure 16. Signal Head on Mast Arm



Source: Adobe Stock

CMF: N/A

Safety Emphasis Area Addressed:

Older Driver (65+), Unrestrained Occupant,
Impaired Driving, Younger Drivers, Intersections,
Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$ | Timeframe: SHORT

17. UPDATE SPECIAL EVENT TRANSPORTATION MANAGEMENT

This strategy involves enhancing the planning, coordination, and operational procedures used to manage traffic and pedestrian activity during large planned special events. Special events—such as sports games, concerts, festivals, and parades—create temporary but significant increases in traffic demand, which can lead to congestion, increased crash risk, pedestrian–vehicle conflicts, and delays for emergency response. Updating special event transportation management includes revising traffic control plans, improving interagency coordination, expanding multimodal travel options, optimizing signal timing, enhancing traveler information through dynamic message signs and digital platforms, and improving pedestrian circulation around event venues. FHWA identifies strong special event planning and coordinated operations as essential elements for maintaining safe and efficient travel during these high impact periods.

Figure 17. Special Event Management



Source: Adobe Stock

CMF: N/A

Safety Emphasis Area Addressed:

Older Driver (65+), Younger Drivers, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$ | Timeframe: MID

18. FLASHING YELLOW ARROWS (FYA)

Flashing Yellow Arrows improve left turn safety by providing a clearer indication of permissive left turn operations and reducing driver confusion compared to the traditional circular green. FYA treatments allow agencies to fine tune left turn control, including time of day operations that reduce conflict risk during off peak conditions. **Crash Modification Factor (CMF) studies show that FYA installation can reduce angle or left turn crashes by 18 percent at dual left turn lane intersections (CMF = 0.82) and by up to 48 percent where time of day FYA operation is used with a single left turn lane (CMF = 0.52).**

Figure 18. Flashing Arrow Signal



Source: Adobe Stock

CMF: – 0.52 to 0.82

Safety Emphasis Area Addressed:

Older Driver (65+), Younger Drivers, Intersections

Cost: \$\$ | Timeframe: MID

19. MEDIANS AND PEDESTRIAN REFUGE ISLANDS

Medians in urban and suburban areas can be defined by pavement markings, raised areas, or islands to separate motorized and non-motorized road users. Medians may also serve as a refuge for pedestrians. A median with marked crosswalks can lead to a 46 percent reduction in pedestrian crashes, while also making walking a more comfortable experience.

A pedestrian refuge island is a median with a refuge area that is intended to help protect pedestrians who are crossing a road, while also making walking a more comfortable experience. Pedestrian refuges can also help when crossing large multi-lane roads. Pedestrian Refuge Islands contribute to a 56 percent reduction in pedestrian crashes.

Figure 19. Median and Pedestrian Refuge Island



Source: Adobe Stock

CMF: 0.29

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Unrestrained Occupant, Impaired Driving, Younger Drivers, Roadway Departure, Intersections, Local Roads, Work Zone, Motorcycle, Pedestrian, Bicycle

Cost: \$\$ | Timeframe: MID

20. MEDIAN BARRIERS

Median barriers are longitudinal barriers that separate opposing traffic on a divided highway and are designed to redirect vehicles striking either side of the barrier. These barriers can take the form of cable barriers, concrete barriers, or metal-beam guardrails. Median barriers significantly reduce the number of cross-median crashes. These barriers significantly reduce head-on crashes and fatalities by physically separating the two sides of the road. Median Barriers Installed on Rural Four-Lane Freeways lead to a 97 percent reduction in cross-median crashes.

Figure 20. Median Barrier



Source: Adobe Stock

CMF: 0.29

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Roadway Departure

Cost: \$\$ | Timeframe: MID

21. RECTANGULAR RAPID FLASHING BEACONS (RRFB)

A rectangular rapid flashing beacon (RRFB) is a pedestrian-activated traffic control device installed at crosswalks to enhance visibility and alert drivers to the presence of pedestrians. When activated, the RRFB emits a rapid, alternating pattern of flashing lights to alert oncoming drivers to yield to pedestrians crossing the street. According to FHWA, RRFBs can result in motorist yielding rates as high as 98 percent at marked crosswalks with varied speed limits, crossing distances, and number of travel lanes.

Figure 21. Rectangular Rapid Flashing Beacon (RRFB)



Source: Kimley-Horn

CMF: 0.31

Safety Emphasis Area Addressed:

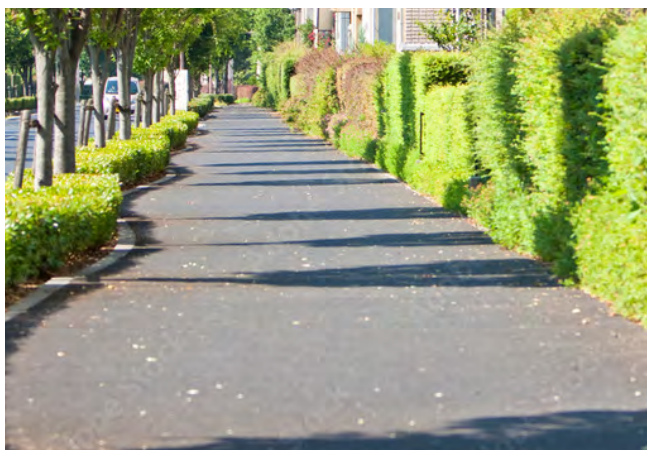
Pedestrian, Bicycle

Cost: \$\$ | Timeframe: MID

22. SIDEWALKS AND MULTI-USE PATHS

A sidewalk is a designated pathway alongside a road or street intended for pedestrian use. It provides a safe and separate space for pedestrians to walk or roll, separated from vehicular traffic. Sidewalks enhance pedestrian safety by reducing the risk of collisions with vehicles, promoting walking as a mode of transportation, and providing accessible routes for people of all ages and abilities. Sidewalks can contribute up to a 89 percent reduction in crashes involving pedestrians walking along roadways.

Figure 22. Sidewalk



Source: Adobe Stock

CMF: 0.60

Safety Emphasis Area Addressed:

Pedestrian, Bicycle

Cost: \$\$ | Timeframe: MID

23. TARGETED LIGHTING

The number of fatal crashes occurring in daylight is about the same as those in darkness. However, the nighttime fatality rate is three times the daytime rate despite only 25 percent of vehicle miles traveled (VMT) occurring at night. At nighttime, vehicles traveling at higher speeds may not be able to stop once a hazard or change in the road ahead becomes visible by the headlights. Therefore, improvements to the lighting infrastructure of a roadway lead to a highly visible, safer roadway.

Adequate lighting (i.e., at or above minimum acceptable standards) is based on research recommending horizontal and vertical illuminance levels to provide safety benefits to all users of the roadway environment. Adequate lighting can also provide personal security benefits for people walking or rolling as they travel along and across roadways. Increased lighting can come in the form of intersection or corridor lighting depending on the needs of the community. Lighting can reduce pedestrian nighttime crashes by up to 42 percent.

Figure 23. Corridor Lighting



Source: Adobe Stock

CMF: 0.68

Safety Emphasis Area Addressed:

Older Driver (65+), Impaired Driving, Younger Drivers, Roadway Departure, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle, Animal

Cost: \$\$ | Timeframe: MID

24. TRAFFIC CALMING (CORRIDOR WIDE SPEED MANAGEMENT)

This strategy involves applying a combination of physical and self-enforcing design treatments—such as horizontal deflection, roadway narrowing, or vertical elements—to reduce vehicle speeds and discourage cut through traffic. Traffic calming enhances the safety, comfort, and mobility of pedestrians, bicyclists, and other non-motorized users by creating a slower and more predictable operating environment. **These measures support community livability and are widely recognized by FHWA and ITE as effective tools for reducing the negative impacts of motor vehicle traffic by up to 42 percent.**

Figure 24. Traffic Calming Devices



Source: Adobe Stock

CMF: – 0.60

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Roadway Departure, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$ | Timeframe: MID

25. TRANSIT STOP ADDITION/ENHANCEMENT

Enhance or add transit stops to improve transit user safety, comfort, and accessibility. Improvements include constructing ADA compliant landing pads, providing connected sidewalks, adding safe pedestrian crossings, installing shelters and lighting, improving transit signage, and enhancing bicycle/micromobility access. According to FHWA, transit stops are major pedestrian and bicyclist generators, and agencies must ensure riders feel safe and welcome accessing these facilities. Safety improvements such as connected sidewalks, enhanced crossings, clear sightlines, and well designed waiting areas reduce pedestrian risk at and near transit stops. FHWA's Improving Safety for Pedestrians and Bicyclists Accessing Transit and the Pedestrian Safety Guide for Transit Agencies provide engineering and operational strategies for safer transit access.

Figure 25. Bus Shelter



Source: Kimley-Horn Hennepin Ave Project

CMF: N/A

Safety Emphasis Area Addressed:

Pedestrian, Bicycle

Cost: \$\$ | Timeframe: MID

26. COMPLETE MULTI MODAL CORRIDOR EVALUATION

Conduct a corridor scale, Complete Streets evaluation that integrates community engagement, multimodal network connectivity analysis, person based performance measures, and Safe System safety diagnostics for all users. The process compiles safety, demand, reliability, access, equity, and curb/freight data; identifies network gaps; develops context sensitive alternatives (projects + operations); and applies FHWA multimodal performance methods to select a preferred program with transparent, lifecycle based criteria. Deliverables include an existing conditions atlas, a connectivity and gap analysis, an alternatives toolbox, a performance evaluation summary, and a phased implementation and monitoring plan.

Figure 26. Multimodal Intersection



Source: Adobe Stock

CMF: N/A

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Younger Drivers, Intersections, Local Roads, Motorcycle, Pedestrian, Bicycle

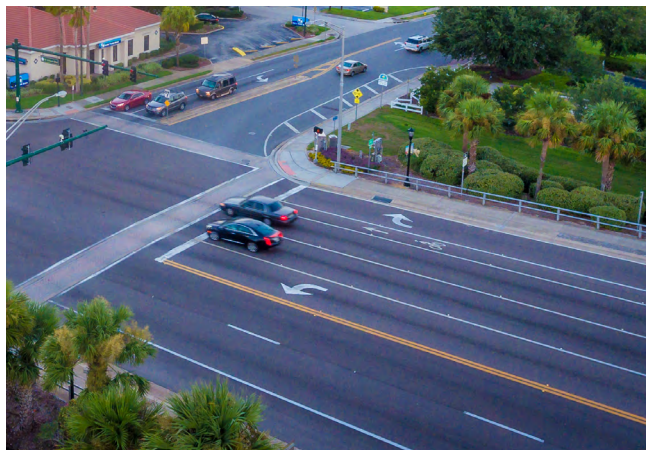
Cost: \$\$\$ | Timeframe: MID

27. DEDICATED LEFT- AND RIGHT-TURN LANES AT INTERSECTIONS

Auxiliary turn lanes—either for left-turns or right-turns—provide physical separation between turning traffic that is slowing or stopped and adjacent through traffic at approaches to intersections. Turn lanes can be designed to provide for deceleration prior to a turn, as well as for storage of vehicles that are stopped and waiting for the opportunity to complete a turn.

While turn lanes provide measurable safety and operational benefits at many types of intersections, they are particularly helpful at two-way stop-controlled intersections. It is important to also mention that additional lanes could cause VRUs to be in the roadway longer, and proper signage and safety considerations should be used. A dedicated turn lane can lead to a 28–48 percent reduction in total crashes.

Figure 27. Dedicated Left- and Right-Turn Lanes



Source: Adobe Stock

CMF: 0.52 – 0.86

Safety Emphasis Area Addressed:

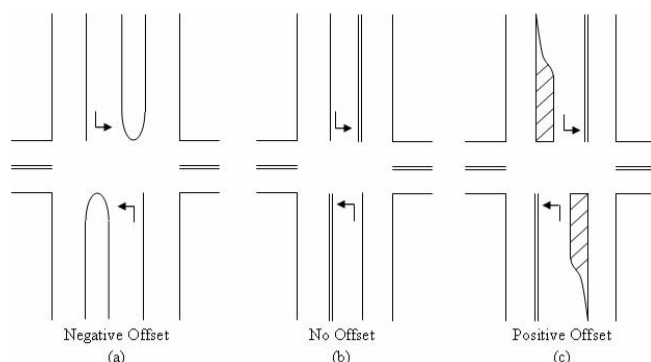
Older Driver (65+), Younger Drivers, Intersections, Large Trucks, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

28. ELIMINATE NEGATIVE OFFSETS AT INTERSECTIONS

This countermeasure improves safety by correcting intersection geometry where opposing left turn lanes are laterally aligned in a way that restricts drivers' view of oncoming through traffic. A negative offset limits sight distance, increasing the risk of left turn and angle crashes. By realigning the left turn lanes to achieve a zero or positive offset, driver visibility and judgment of acceptable gaps are significantly improved. **CMF Clearinghouse studies show that improving left turn lane offset can reduce total crashes by approximately 34 percent (CMF = 0.662) and left turn crashes by up to 38 percent (CMF = 0.62). This treatment enhances intersection transparency, reduces conflicts, and improves overall operational safety.**

Figure 28. Negative, No, and Positive Offset Left-Turn Lanes



CMF: 0.60

Safety Emphasis Area Addressed:

Older Driver (65+), Impaired Driving, Younger Drivers, Intersections, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

Source: FHWA

29. FLATTEN MINOR STREET APPROACH

This countermeasure improves safety by reducing steep grades and vertical curvature on the minor street approach to an intersection. Steep approach grades impair stopping ability, reduce sight distance, increase driver workload, and worsen vehicle acceleration from a stopped condition. Geometric design guidance from AASHTO recommends limiting intersection approach grades to 3 percent or less, with smoother transitions (“warping”) into the major roadway profile to maintain visibility and driver comfort. Although no Crash Modification Factor (CMF) exists in the CMF Clearinghouse for this treatment, flattening approach grades is widely recognized as an important measure to improve sight distance, reduce stopping distance, and reduce the likelihood of rear end, run off road, and angle conflicts.

Figure 29. Steep Intersection



Source: Adobe Stock

CMF:N/A

Safety Emphasis Area Addressed:

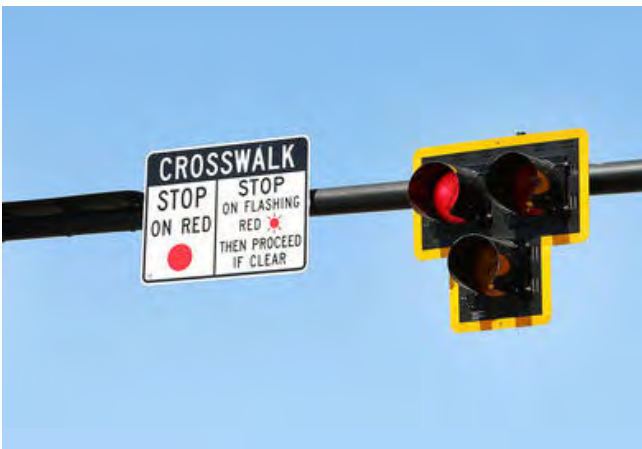
Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

30. PEDESTRIAN HYBRID BEACONS

The pedestrian hybrid beacon (PHB) is a traffic control device designed to help pedestrians safely cross higher-speed roadways at midblock crossings and uncontrolled intersections. PHBs are typically effective at locations where three or more lanes will be crossed or in areas with high traffic volume. If PHBs are not familiar to a community, agencies and other governmental departments may need to provide education campaigns to ensure proper utilization. PHBs can lead to a 55 percent reduction in pedestrian crashes.

Figure 30. Pedestrian Hybrid Beacon



Source: Adobe Stock

CMF: 0.88

Safety Emphasis Area Addressed:

Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

31. RAILROAD CROSSING ENHANCEMENTS

This strategy improves safety at highway–rail grade crossings through upgrades such as installing active warning devices (flashing lights, gates, cantilevered signals), enhancing signage, adding illumination, improving approach geometry, and incorporating pedestrian trespass deterrent measures. These improvements enhance driver and pedestrian awareness, increase conspicuity of the crossing, and reduce the likelihood of collisions with trains.

Figure 31. Active Railroad Warning Devices



Source: Adobe Stock

CMF: N/A

Safety Emphasis Area Addressed:

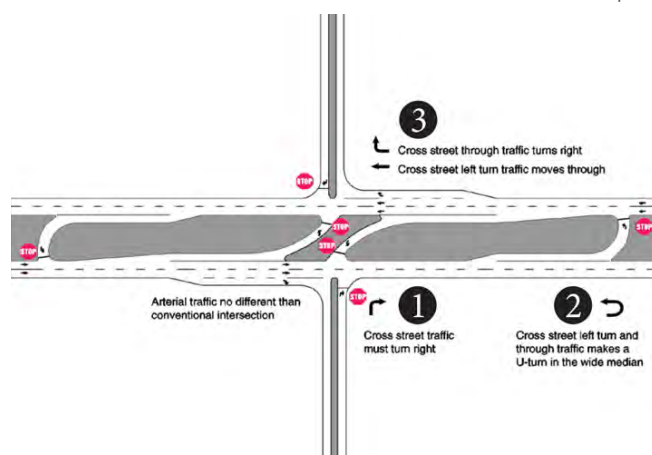
Older Driver (65+), Impaired Driving, Younger Drivers, Intersections, Local Roads, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

32. REDUCED LEFT-TURN CONFLICT INTERSECTIONS

Reduced left-turn conflict intersections (RCUT) are geometric designs that alter how left-turn movements occur. These intersections simplify drivers' decision-making and minimize the potential for higher-severity crash types, such as head-on and angle. Variations on the U-Turn are typical of these intersections. One type of these intersections, the RCUT intersection, has been shown to lead to a 54 percent reduction in fatal and injury crashes.

Figure 32. Reduced Left-Turn Conflict Intersection Example



Source: FHWA

CMF: 0.71

Safety Emphasis Area Addressed:

Older Driver (65+), Younger Drivers, Intersections, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

33. WIDEN SHOULDERS

Widening paved shoulders can improve vehicle recovery areas, provide space for disabled vehicles and bicyclists, and enhance roadway operations. Shoulder widening is most effective when paired with complementary safety improvements such as rumble strips, slope flattening, clear zone improvements, and access management. Shoulder improvements support multimodal needs and help create a safer, more forgiving roadside environment.

Figure 33. Wide Shoulder



Source: Adobe Stock

CMF: N/A

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Roadway Departure, Motorcycle, Large Trucks, Bicycle

Cost: \$\$\$ | Timeframe: MID

34. SMART CHANNEL RIGHT TURN LANE

This countermeasure redesigns a traditional, high speed channelized right turn lane into a pedestrian oriented smart channel. Improvements include tightening the turning radius, sharpening the entry angle, repositioning the stop bar, and reshaping the channelizing island to enhance sight distance and reduce vehicular turning speed. These changes reduce conflicts between right turning vehicles and both pedestrians and through traffic.

Figure 34. Smart Channel Right-Turn Lane



Source: Kimley-Horn

CMF: 0.40

Safety Emphasis Area Addressed:

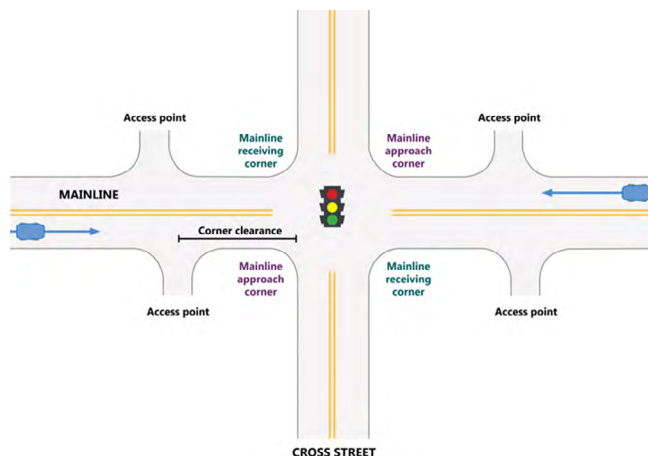
Older Driver (65+), Aggressive/Speed Related, Younger Drivers, Intersections, Local Roads, Motorcycle, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: LONG

35. CORRIDOR ACCESS MANAGEMENT

Access management refers to the design, application, and control of entry and exit points along a roadway. This includes intersections with other roads and driveways that serve adjacent properties. Thoughtful access management along a corridor can simultaneously enhance safety for all modes, facilitate walking and biking, and reduce trip delay and congestion. While access management is a broad topic, strategies can include the intentional spacing of intersections, utilizing protected turn lanes, and generally minimizing conflict points on a corridor. Access management should also depend on the built environment context. Safety benefits include a 25 to 31 percent reduction in fatal and injury crashes along urban/suburban arterials.

Figure 35. Access Management



CMF: 0.93

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Younger Drivers, Intersections, Pedestrian, Bicycle

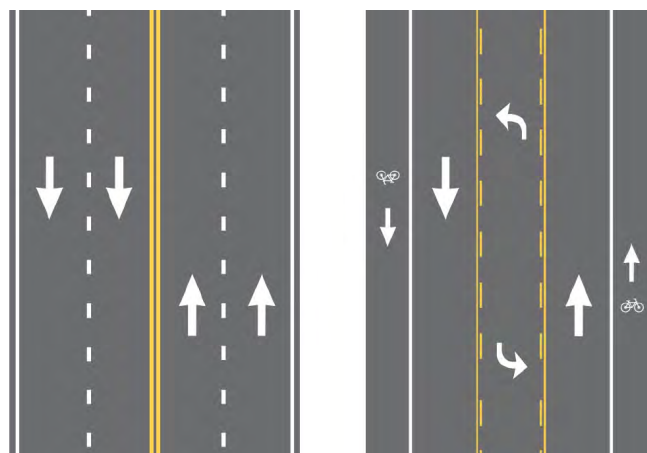
Cost: \$\$\$\$ | Timeframe: LONG

Source: FHWA

36. ROADWAY RECONFIGURATION

A roadway reconfiguration usually involves converting an existing four-lane roadway into a three-lane roadway. Implementing a roadway reconfiguration can improve safety, calm traffic, provide better mobility and access for all users, and enhance the quality of life in a community. Roadway reconfigurations make a roadway more “complete” by adding bike lanes or areas for pedestrians. Sometimes, roadway reconfigurations are called road diets and are typically a low cost countermeasure. In the context of a 4-lane to 3-lane reconfiguration, a road segment can experience up to a 47 percent reduction in total crashes.

Figure 36. Roadway Reconfiguration



CMF: 0.53

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Unrestrained Occupant, Impaired Driving, Younger Drivers, Local Roads, Motorcycle, Pedestrian, Bicycle

Cost: \$\$\$\$ | Timeframe: LONG

Source: FHWA

37. ROUNDABOUTS

A roundabout is a type of circular intersection where traffic flows continuously around a central island. Vehicles entering a roundabout must yield to traffic already circulating within it, promoting a smooth and efficient flow of traffic with reduced conflict points compared to traditional intersections. Roundabouts are designed to improve safety, reduce congestion, and enhance traffic flow. Roundabouts lead to a 78–82 percent reduction in fatal and injury crashes.

Figure 37. Roundabout



Source: Adobe Stock

CMF: 0.59

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed
Related, Younger Drivers Intersections, Local
Roads, Motorcycle, Pedestrian, Bicycle

Cost: \$\$\$\$ | Timeframe: LONG

