I-55/75/26
Multimodal Corridor Study
▶Technical Memorandum 4: Project Priorities

Prepared by:
AECOM
1000 Corporate Centre Drive, Suite 250
Franklin, TN 37067, USA
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TDOT
Department of Transportation

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I-55/75/26 Multimodal Corridor Study

Technical Memorandum 4: Project Priorities

Introduction

Safe, efficient, and equitable multimodal surface transportation infrastructure is critical to promoting the wellbeing and economic vitality of the people of Tennessee. The state's interstate facilities form the backbone of that transportation system, complemented by state highways, local roads, airports, railroads, transit systems, bicycle and pedestrian facilities, and waterborne navigation facilities. Tennessee's interstates carry about 30% of all vehicle miles traveled in the state, and 80% of all truck miles, making them the key component of the roadway system, facilitating the movement of people and goods across the state and across the country. Developing a multimodal transportation system that meets the changing needs of Tennessee's residents, businesses, and visitors will support the state's growth and provide a range of safe transportation options.

The purpose of the I-55/75/26 Multimodal Corridor Study is to evaluate potential transportation improvements to address existing and emerging issues in the system. The analysis is centered on study areas surrounding four Interstate corridors: I-55 in southwestern Tennessee, I-155 in northwestern Tennessee, I-75 in the east-central part of the state, and I-26 in eastern Tennessee. Together, these corridors represent more than 200 miles of freeway traveling through urban and rural counties, supported by a robust network of state and local roadways, rail, air, transit, and non-motorized transportation facilities.

The study considers innovative, long-range solutions to multimodal issues and opportunities in these corridors. Solutions address traffic and congestion, operations and safety, expanded transportation choices, and the ways in which the transportation system supports economic growth, freight movement, and access to employment.

The study involves four core activities:

- Gathering and evaluating transportation, demographic, economic, and other data.
- Assessing existing and expected future system deficiencies to develop goals and performance measures for each corridor.
- Developing and evaluating feasible multimodal solutions to meet those goals.
- Prioritizing actions to implement those solutions.

This report documents the screening and prioritization of potential solutions identified in the Universe of Alternatives, which was established in Technical Memorandum 3: Development of Feasible Multimodal Solutions. For each corridor, the potential multimodal transportation solutions are evaluated for effectiveness through a two-step screening process, then prioritized for potential implementation using the following metrics:

- Mobility
- Safety
- Economic Development
- System Maintenance
- Implementation
- Cost/Cost Efficiency

Figure 1. Study Corridors

Four interstate corridors - I-55, I-155, I-75 and I-26 - are included in the study.

I-55 Corridor

▶ Project Priorities

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I-55 Corridor

1. Introduction

The I-55 corridor serves as a backbone for economic development and growth in the Memphis region. As population and employment continue to grow and redevelopment changes the face of the region, new travel demands place pressure on the Interstate as well as parallel and intersecting highways. This results in increased traffic congestion, travel times, and conflicts, which threaten the corridor's ability to sustain future growth.

A previous technical memorandum (Technical Memorandum 1) provided a data and information inventory for the corridor. Technical Memorandum 2 assessed existing and future deficiencies and needs along the I-55 corridor, focusing on traffic operations, safety, and multimodal conditions. In Technical Memorandum 3, goals and performance measures were used to assess the effectiveness of various solutions to the problems – resulting in a universe of alternatives for the I-55 corridor. Technical Memorandum 4 filters the I-55 universe of alternatives through a solutions screening and prioritization process (see Figure 1-1). This process evaluates solutions based on their impact on mobility and safety, potential environmental impacts, cost, and potential economic impacts. Ultimately, the prioritized solutions both resolve the identified deficiencies and have a high benefit/cost ratio.

2. Solutions Screening, Phase 1

The Phase 1 solutions screening process was intended to eliminate solutions with evident fatal flaws. To do so, each possible solution was evaluated against the following questions:

1. Does the proposed solution make sense given the identified deficiency?
2. Does the proposed solution align with other planned or programmed projects in the area?
3. Is the proposed solution supported by stakeholders and the public?
4. Does the proposed solution negatively impact environmental features such as wetlands, rare or protected species, or superfund sites?
5. Does the proposed solution negatively impact cultural features such as sensitive community populations, historic sites, public lands, or community institutions?

Projects which received a "NO" response for questions 1, 2, or 3, or a "YES" response for questions 4 or 5 were eliminated and did not move forward to the Phase 2 solutions screening. Exceptions include projects where the potential is high for environmental/cultural impact mitigation. As shown in Table 2-1, no I-55 solutions were eliminated in the Phase I solutions screening process.

Figure 1-1. Solutions Screening and Prioritization Process

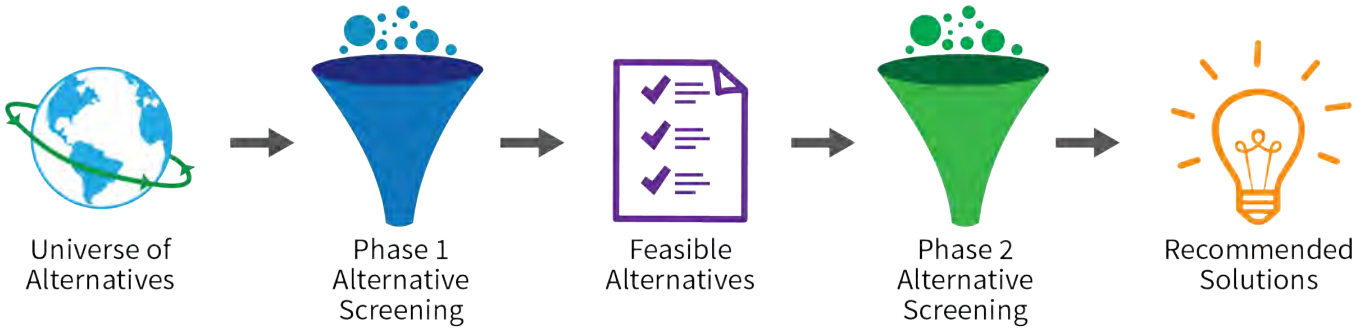

Table 2-1. Phase 1 Alternative Screening Matrix — I-55

	ID	Logical?	Align with Planned/ Programmed Projects?	Supported by Stakeholders/ Public?	Potential Environmental or Cultural Impact?	Advance to Phase 2 Screening?
Safety	S1*: Close Exit 12C; Convert enter/exit lanes to merge/exit lanes for I-55 (Metal Museum Drive) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S2*: Install additional jersey barrier (Metal Museum Drive) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S3*: Add pavement markings; add additional overhead signage (Metal Museum Drive) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S4*: Add pavement markings (Metal Museum Drive) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S5*: Interchange improvement (Crump Boulevard Interchange) - Source: Public/Stakeholder, TN Freight Plan (2018), Regional Freight Plan	Yes	Yes	Yes	No	YES
	S6: Resurface pavement (Mississippi River Bridge to Mississippi State Line) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES[1]
	S7: Realign ramps (South 3rd Street (US-61) Interchange) - Source: Data Analysis	Yes	Yes	Yes	No	YES[2]
	S8*: Add advanced signage and pavement markings; Extend SB deceleration lane (I-240) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	S9*: Extend WB deceleration lane (I-240 interchange) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	S10: Evaluate the need for additional drainage (Brooks Road) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
Freight	F1: Study interchange design to ensure safe efficient truck movement (I-240 Interchange) - Source: Data Analysis	Yes	Yes	Yes	No	YES[3]
	F2: Add auxiliary lane between off-ramps and on-ramps at McLemore Avenue - Source: TN Freight Plan (2018), Regional Freight Plan	Yes	Yes	Yes	No	YES
	F3: Resurface so that at least 90% of corridor has good ride quality (Horn Lake Road to Mississippi River) - Source: Data Analysis	Yes	Yes	Yes	No	YES[1]
	F4: Add overnight truck parking capacity (~100 spaces) (Arkansas State Line to Mississippi State Line) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	F5: Apply signal coordination on adjacent arterial streets (Crump, McLemore, US-61, Brooks) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	F6: New interchange at Holmes Road - Source: TN Freight Plan (2018), Regional Freight Plan, Livability 2040 RTP, Public/Stakeholder	Yes	Yes	Yes	No	YES[4]

Table 2-1. Phase 1 Alternative Screening Matrix (cont.) — I-55

	ID	Logical?	Align with Planned/ Programmed Projects?	Supported by Stakeholders/ Public?	Potential Environmental or Cultural Impact?	Advance to Phase 2 Screening?
Multimodal	T2: Improve shuttle service frequency to the Memphis International Airport and major employment centers in the vicinity of the airport - Source: MATA Short-Range Transit Plan	Yes	Yes	Yes	No	YES
	T9: Express route along I-240 with select stops around the international facility (SR-64/Stage Road to BNSF Railway/Memphis International Airport) - Source: Livability 2040 Regional Transportation Plan	Yes	Yes	Yes	No	YES
	T10: Circulator shuttle allowing a more direct connection to places of employment (Memphis Intermodal Facility) - Source: Livability 2040 Regional Transportation Plan	Yes	Yes	Yes	No	YES
	T12: Study transit extension into DeSoto County, Mississippi - Source: Data Analysis, Livability 2040 Regional Transportation Plan	Yes	Yes	Yes	No	YES
	BP1: Conduct a study to identify bike/ped accommodations at U.S. and State Route interchanges - Source: Data Analysis	Yes	Yes	Yes	No	YES
Capacity	C1: Widen existing four lane section and/or improve entrance & exit ramps, including option lanes at exits (I-240 to US-61) - Source: Data Analysis, Regional Freight Plan, Livability 2040 Regional Transportation Plan	Yes	Yes	Yes	No	YES[2]
	C2: Improve interchange to maintain six lanes between ramps (McLemore Avenue interchange) - Source: Data Analysis, TN Freight Plan (2018), Regional Freight Plan	Yes	Yes	Yes	No	YES
	C3: Widen existing 4-lane bridge (Mississippi River Bridge) - Source: Data Analysis	Yes	Yes	Yes	Yes[5]	YES
TSM&O	TS1: Advance warning and pull-off OR collapsible barrier in the median for over-dimensional vehicles (Advance of Mississippi River Bridge WB approach) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	TS2: Install corridor management assets (ITS/DMS) (throughout corridor) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
Econ. Develop.	ED1: Evaluate need for additional interstate access point to accommodate economic growth (I-240 to Mississippi State Line) - Source: Public/Stakeholder, TN Freight Plan (2018), Regional Freight Plan, Livability 2040 RTP	Yes	Yes	Yes	No	YES[4]

* Interim solutions or to be implemented in concert with planned interchange modification projects at Crump Avenue and I-240.
1- Mississippi State Line to Mill Branch Road (approx. 3.5 miles) resurfacing was part of December 2018 Bid Letting.
2- Would require widening Illinois Central Rail Road (ICRR) bridges.
3- In theory this should have been done as part of I-240/I-55 interchange improvement project. Ultimately, modification to only one of the movements is included.
4- Holmes Road Interchange spacing would be approximately one mile to adjacent interchanges (Shelby Drive & Main Street).
5- Impact to Mississippi River

3. Solutions Screening, Phase 2

The Phase 2 alternatives screening process utilized performance measures identified in Section 3 of Technical Memorandum 3 to further refine the list of feasible alternatives. Potential solutions that passed the Phase 1 Screening were evaluated against the following questions:

1. Does the proposed solution improve level of service on the interstate corridor?
2. Does the proposed solution improve peak hour travel speeds on the interstate corridor?
3. Does the proposed solution improve travel times between key origin and destination (O&D) pairs along the corridor?
4. Does the proposed solution improve peak hour densities at the improved interchange?
5. Does the proposed solution reduce average and max queues at the improved interchange?
6. Does the proposed solution have the potential to reduce crashes in safety hot spots?
7. Does the proposed solution address deficiencies in bridges with a low sufficiency rating?
8. Does the proposed solution increase pavement quality?
9. Does the proposed solution provide for pedestrian/bicycle connectivity and safety at interchanges?
10. Does the proposed solution provide additional truck parking opportunities, particularly in urban areas?
11. Does the proposed solution have the potential to reduce vehicle miles traveled (VMT)?
12. Does the proposed solution improve incident management?
13. Does the proposed solution provide potential economic development opportunities?

Projects which received only "NO" responses were eliminated and did not move forward as feasible multimodal solutions. As shown in Table 2-2, with exception to Multimodal T9, all projects passed the Phase 2 screening and moved forward to project prioritization. Multimodal T9 was removed from further consideration due to its lack of impact on the I-55 corridor. The termini of the proposed express route were Stage Road (in Bartlett) and the BNSF Railway/Memphis Intermodal Facility (east of the Memphis airport). This express route would have the most benefit to mobility on I-240.

It should be noted that projects Freight F6 and Economic Development ED1, which recommend evaluation of a new interchange near Holmes Road, received "NOs" to questions 1-5, related to capacity and safety. The current spacing between adjacent interchanges (Shelby Drive to the north and State Line Road to the south) is two miles. Holmes Road crosses I-55 approximately half way between the two, offering a proposed one-mile interchange spacing. Per FHWA, this is the minimum allowable interchange spacing in an urban area, primarily due to the interruptions caused by merge, diverge, and weave areas on the main line. Addition of any new interchange also increases the potential for crashes both on the mainline and at the ramp terminals. Since the spacing meets FHWA's minimum requirements, Freight F6 and Economic Development ED1 recommendations were moved forward to prioritization; however, further discussions regarding this project should consider the capacity and safety impacts on I-55.

Table 3-1. Phase 2 Alternative Screening Matrix — I-55

ID		Traffic Operations				Safety		Maintenance		Multimodal			TSM&O	Economy	
		Improves LOS on Interstate Corridor?	Improves Peak Hour Travel Speeds?	Improves Travel Times Between O&D Pairs?	Improves Peak Hour Densities at Interchange?	Reduces Ramp Queueing onto Interstate?	Reduces Crashes in Safety Hot Spots?	Addresses Bridge Deficiency?	Increases Pavement Quality?	Improves Ped/Bike Connectivity or Safety?	Provides Additional Truck Parking?	Potential to Reduce VMT in the Corridor?	Improves Incident Management?	Potential Economic Development Opportunity?	Project Moves Forward to Prioritization?
Safety	S1: Close Exit 12C; Convert enter/exit lanes to merge/exit lanes for I-55 (Metal Museum Drive) - Source: Data Analysis	YES	YES	YES	YES	YES	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
	S2: Install additional jersey barrier (Metal Museum Drive) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	YES	N/A	N/A	N/A	N/A	YES
	S3: Add pavement markings; add additional overhead signage (Metal Museum Drive) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
	S4: Add pavement markings (Metal Museum Drive) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
	S5: Interchange improvement (Crump Boulevard Interchange) - Source: Public/Stakeholder, TN Freight Plan (2018), Regional Freight Plan	YES	YES	YES	YES	YES	YES	N/A	N/A	N/A	N/A	N/A	YES	YES	YES
	S6: Resurface pavement (Mississippi River Bridge to Mill Branch Road) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES	N/A	N/A	N/A	N/A	N/A	YES
	S7: Realign ramps (South 3rd Street (US-61) interchange) - Source: Data Analysis	YES	YES	YES	YES	N/A	YES	YES	N/A	N/A	N/A	N/A	N/A	N/A	YES
	S8: Add advanced signage and pavement markings; Extend SB deceleration lane (I-240 interchange) - Source: Public/Stakeholder	Likely	Likely	Likely	Likely	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
	S9: Extend WB deceleration lane (I-240 interchange) - Source: Public/Stakeholder	Likely	Likely	Likely	Likely	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
	S10: Evaluate the need for additional drainage (Brooks Road) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	Likely	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES

Table 3-1. Phase 2 Alternative Screening Matrix (cont.) — I-55

ID	Traffic Operations				Safety		Maintenance		Multimodal			TSM&O	Economy	
	Improves LOS on Interstate Corridor?	Improves Peak Hour Travel Speeds?	Improves Travel Times Between O&D Pairs?	Improves Peak Hour Densities at Interchange?	Reduces Ramp Queueing onto Interstate?	Reduces Crashes in Safety Hot Spots?	Addresses Bridge Deficiency?	Increases Pavement Quality?	Improves Ped/Bike Connectivity or Safety?	Provides Additional Truck Parking?	Potential to Reduce VMT in the Corridor?	Improves Incident Management?	Potential Economic Development Opportunity?	Project Moves Forward to Prioritization?
Freight														
F1: Study interchange design to ensure safe efficient truck movement (I-240 Interchange) - Source: Data Analysis	Likely	Likely	Likely	Likely	N/A	Likely	N/A	N/A	N/A	N/A	N/A	Likely	N/A	YES
F2: Add auxiliary lane between off-ramps and on-ramps at McLemore Avenue - Source: TN Freight Plan (2018), Regional Freight Plan	YES	YES	YES	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
F3: Resurface so that at least 90% of corridor has good ride quality (Horn Lake Road to Mississippi River) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	Likely	N/A	YES	N/A	N/A	N/A	N/A	N/A	YES
F4: Add overnight truck parking capacity (~100 spaces) (Arkansas State Line to Mississippi State Line) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	YES
F5: Apply signal coordination on adjacent arterial streets (Crump, McLemore, US-61, Brooks) - Source: Data Analysis	Likely	Likely	Likely	Likely	YES	N/A	N/A	N/A	Likely	N/A	N/A	YES	N/A	YES
F6: New interchange at Holmes Road - Source: TN Freight Plan (2018), Regional Freight Plan, Livability 2040 RTP, Public/Stakeholder	NO	NO	NO	NO	NO	N/A	N/A	N/A	Likely	N/A	N/A	N/A	YES	YES
Multimodal														
T2: Improve shuttle service frequency to the Memphis International Airport and major employment centers in the vicinity of the airport - Source: MATA Short Range Transit Plan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	YES
T9: Express route along I-240 with select stops around the intermodal facility (SR-64/Stage Rd to BNSF Railway/Memphis International Airport) - Source: Livability 2040 Regional Transportation Plan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NO	N/A	N/A	NO
T10: Circulator shuttle allowing a more direct connection to places of employment (Memphis Intermodal Facility) - Source: Livability 2040 Regional Transportation Plan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	YES

Table 3-1. Phase 2 Alternative Screening Matrix (cont.) — I-55

ID	Traffic Operations				Safety		Maintenance		Multimodal			TSM&O	Economy	
	Improves LOS on Interstate Corridor?	Improves Peak Hour Travel Speeds?	Improves Travel Times Between O&D Pairs?	Improves Peak Hour Densities at Interchange?	Reduces Ramp Queueing onto Interstate?	Reduces Crashes in Safety Hot Spots?	Addresses Bridge Deficiency?	Increases Pavement Quality?	Improves Ped/Bike Connectivity or Safety?	Provides Additional Truck Parking?	Potential to Reduce VMT in the Corridor?	Improves Incident Management?	Potential Economic Development Opportunity?	Project Moves Forward to Prioritization?
Multimodal														
T12: Study transit extension into DeSoto County, Mississippi. - Source: Data Analysis, Livability 2040 Regional Transportation Plan	Likely	Likely	Likely	Likely	Likely	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	YES
BP1: Conduct a study to identify bike/ped accommodations at U.S. and State Route interchanges - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Likely	N/A	YES	N/A	N/A	YES
Capacity														
C1: Widen existing four lane section and/or improve entrance & exit ramps, including option lanes at exits (I-240 to US-61) - Source: Data Analysis, Regional Freight Plan, Livability 2040 Regional Transportation Plan	YES	YES	YES	YES	N/A	YES	YES	YES	N/A	N/A	N/A	YES	N/A	YES
C2: Improve interchange to maintain six lanes between ramps (McLemore Avenue interchange) - Source: Data Analysis, TN Freight Plan (2018), Regional Freight Plan	YES	YES	YES	YES	N/A	N/A	YES	YES	N/A	N/A	N/A	YES	N/A	YES
C3: Widen existing 4-lane bridge (Mississippi River Bridge) - Source: Data Analysis	YES	YES	YES	N/A	N/A	N/A	YES	YES	N/A	N/A	N/A	YES	N/A	YES
TSM&O														
TS1: Advance warning and pull-off OR collapsible barrier in the median for over-dimensional vehicles (Advance of Mississippi River bridge WB approach) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	Likely	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
TS2: Install corridor management assets (ITS/DMS)(throughout corridor) - Source: Public/Stakeholder	Likely	Likely	Likely	Likely	Likely	Likely	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
Economic Development														
ED1: Evaluate need for additional interstate access point to accommodate economic growth (I-240 to Mississippi State Line) - Source: Public/Stakeholder, TN Freight Plan (2018), Regional Freight Plan, Livability 2040 RTP	NO	NO	NO	NO	NO	N/A	N/A	N/A	Likely	N/A	N/A	N/A	YES	YES

4. Priority Settings and Phasing

Approach and Methodology

The prioritization settings developed for this study build on the goals and objectives detailed in Technical Memorandum 3 and summarized in Table 4-1. Aligning with previous TDOT multimodal corridor studies, the prioritization methodology for this study addresses coordinated construction efforts (priority given to projects that could be accomplished simultaneously at a given location) and culminates in a benefit-cost index for each project, which recognizes that the relative multimodal benefit of each project compared to the estimated financial investment. Consistency with TDOT and MPO programmed projects has been maintained throughout the alternatives development process, having identified such projects as part of the Trend Scenario in Technical Memorandum 2.

The most recent TDOT multimodal corridor study introduced a flexible decision-making support tool wherein weights can be applied to priority settings based on policy, programming, and political decisions. The prioritization criteria and measures for the I-55 corridor are structured in a similar fashion, such that weights can be applied by decision-makers. As indicated in Table 4-2, solutions developed for the I-55 corridor were evaluated over six categories: mobility, safety, economic development, system maintenance, implementation and cost efficiency. Specific criteria used to measure solutions by mode/strategy are discussed in the following section.

Table 4-1. Performance Goals and Objectives — I-55

Goals	Objectives		
 Provide efficient and reliable travel	Improve travel times and reduce delay	Provide transportation options for people and freight	Optimize freight movement
 Improve safety conditions	Reduce crash rates along the corridor – especially at identified crash "hot spots"	Implement or upgrade technologies that promote safety and effective incident management	Improve bicycle and pedestrian accommodations
 Coordinate transportation investments with economic development plans	Improve interchange on/ off ramps	Coordinate with MPOs/ RPOs to determine areas where new/improved Interstate access is needed	
 Invest equitably throughout the corridor	Expand transportation options for traditionally underserved populations within the corridor	Consider regional transit options	Identify areas with the greatest data-driven needs
 Protect the natural environment and sensitive resources within the corridor	Identify transportation improvements that are not likely to result in major impacts to environmental, social, and cultural resources		

Table 4-2. Prioritization Criteria and Measures by Mode and Strategy — I-55

Mode/ Strategy	Mobility	Safety	Economic Development	System Maintenance	Implementation	Cost Efficiency
 Highway Capacity	2040 Trend V/C	Crash Rate (Relative to Statewide Avg)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Methodology TBD
	2040 Build V/C	Project improves incident management (Y/N)	2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	
 Safety	2040 Trend V/C	Crash Rate (Relative to Statewide Avg)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Methodology TBD
	2040 Build V/C	Project improves incident management (Y/N)	2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	
		Crash Reduction Potential				
 TSM&O	2040 Trend V/C	Crash Rate (Relative to Statewide Avg)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Methodology TBD
	2040 Build V/C	Project improves incident management (Y/N)	2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	
 Freight	2040 Trend V/C	Project improves incident management (Y/N)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Methodology TBD
	2040 Build V/C		2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	
	% Trucks			Provides truck parking (Y/N)		
 Multimodal	2020 Population	Project improves incident management (Y/N)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Methodology TBD
	2040 Population		2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	
 Economic Development	2020 Population	Project improves incident management (Y/N)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Methodology TBD
	2040 Population		2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	

Prioritization Criteria and Measures

Mobility

Appropriate measures for mobility differ across modes/strategies. While the volume-to-capacity (V/C) ratio is appropriate for measuring highway capacity, it does not capture mobility for bicycles and pedestrians, for example. As shown in Table 4-2, comparison of the 2040 Trend V/C ratio versus the 2040 Build V/C ratio was used as a measure of mobility for highway capacity, safety, TSM&O, and Freight projects. Numeric scores 1, 2, and 3, were recorded based on the following thresholds, which consider the resulting change in V/C and, for freight projects, the percent trucks on the adjacent section of interstate:

Capacity, Safety, TSM&O

1 = No improvement to mobility

2 = Likely improvement to mobility

3 = Definite improvement to mobility

Freight

1 = No improvement to mobility

2 = Improvement to mobility, % trucks < 20%

3 = Improvement to mobility, % trucks > 20%

Comparison of 2020 population versus 2040 population within three miles of each project was used for multimodal and economic development projects. Population numbers were obtained via the Tennessee Statewide Travel Demand Model (TSM) and by traffic analysis zone. Resulting numeric scores were based on the following thresholds:

Multimodal, Economic Development

1 = 0-10% Increase

2 = 10-15% Increase

3 = 15% + Increase

Where criterion could not be measured and "N/A" was noted, engineering judgement was used to score the project's potential for mobility improvement within the applicable thresholds.

Safety

Criterion used to measure the potential safety improvement for each project also vary across mode/strategy. One measure common to all was a "yes" or "no" response to the question "Does the project improve incident management?" For freight, multimodal and economic development projects, this was the only measure used for safety. Thresholds were applied as follows:

Freight, Multimodal, Economic Development

1 = N/A

2 = No

3 = Yes

Building upon hot spot calculations from Technical Memorandum 2, capacity, safety, and TSM&O projects are measured by the relative crash rate as well. The impact of safety projects is further refined by the crash reduction potential, which was determined in Technical Memorandum 3. The following thresholds were applied:

Capacity, TSM&O

1 = Crash rate < statewide average crash rate[1]

2 = Crash rate > statewide average crash rate; Does not improve incident management

3 = Crash rate > statewide average crash rate; Improves incident management

Safety

1 = Crash rate < statewide average crash rate

2 = Crash rate > statewide average crash rate; Below average crash reduction potential

3 = Crash rate > statewide average crash rate; Above average crash reduction potential OR Improves incident management

Where criterion could not be measured and "N/A" was noted, engineering judgement was used to score the project's potential for safety improvement within the applicable thresholds.

Economic Development

The economic development potential of each project was measured by the projected change in employment from 2020 to 2040 within three miles of each project. Employment projections were obtained via the TSM and by traffic analysis zones. The following thresholds were used to score each project.

Capacity, Safety, TSM&O, Freight, Multimodal, Economic Development

1 = 10-20% increase

2 = 20-25% increase

3 = 25%+ increase

System Maintenance

System maintenance was added as a measure for the I-55 corridor prioritization to recognize opportunities where projects will also address existing bridge and/or pavement deficiencies. The following thresholds were used to score each project, given "yes" or "no" responses to the questions "Project addresses bridge deficiency?" and "Project addresses pavement

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.

deficiency?'. For freight projects, an additional "yes" / "no" question was added: "Project provides truck parking?"

Capacity, Safety, TSM&O, Multimodal, Economic Development

1 = No to both

2 = Yes to one

3 = Yes to both

Freight

1 = No to all

2 = Yes to one

3 = Yes to all

Implementation

The implementation measure was included to give priority to projects that could be constructed or initiated in conjunction with other projects, thus conserving the time and money associated with multiple, individual contracts. Figure 4-1 illustrates the relative proximity of the multimodal solutions prioritized for the I-55 corridor. The following thresholds were utilized to score the implementation of each project:

Capacity, Safety, TSM&O, Freight, Multimodal, Economic Development

1 = 0 overlapping projects

2 = 1 or 2 overlapping projects

3 = 3+ overlapping projects

Cost Efficiency

For the I-55 corridor project prioritization, a benefit-cost index and a dollar-per-benefit was been calculated for each solution. These measures capture the benefit of each prioritization criteria and compare the total relative benefit to the estimated project cost. Specifically, the score assigned to each of the five prioritization criteria were summed to represent the total relative benefit of each project. To calculate the benefit-cost index, this total relative benefit was divided by the cost (in millions) estimated for each project. The dollar-per-benefit is simply the cost estimate divided by the total benefit score. Note that cost estimates were prepared for solutions that were recommend further study. However, because the total benefit represents the potential of the associated capital improvement, no direct benefit-cost index or dollar-per-benefit was calculated for these solutions.

Figure 4-1. Relative Proximity of Multimodal Solutions — I-55

5. Project Rankings

When evaluated side-by-side, the total benefit score, benefit-cost index, and dollar-per-benefit indicates projects with high benefit that can be implemented with smaller financial investment. The project rankings are discussed per mode/strategy below. Tables 5-1 through 5-6 detail the prioritization effort and rank the projects by the total benefit score, which ranges from 5 (lowest) to 15 (highest).

Project Rankings by Mode and Strategy

Highway Capacity

Each of the three capacity solutions developed for the I-55 corridor received high total benefit scores. Note that the total benefit of capacity solution C1 reflects the capital improvement that would result from the recommended study. Improvements resulting from further evaluation of I-55 between US-61 and I-240 will address safety and capacity deficiencies, as well as structural deficiencies associated with the Illinois Central bridges which span this section of I-55.

The Mississippi River Bridge widening is by far the most expensive capacity solution; however, the dollars would address structural deficiencies (including seismic retrofit) and provide additional capacity on one of only two Mississippi River crossings within 60 miles of this strategic freight corridor.

C2 addresses the existing McLemore Avenue interchange lane drop, which will become more apparent when bottlenecks associated with the existing Crump Avenue interchange configuration are addressed. Widening through the McLemore Avenue interchange is a relatively low-cost solution that would also address the I-55 northbound and southbound bridges over McLemore Avenue which currently have sufficiency ratings that qualify for rehabilitation.

Safety

The benefit-cost index quickly identifies safety projects that offer high benefit and are low cost: (S2 and S3) signage, pavement marking and additional jersey barrier between the Mississippi River Bridge and the Crump Avenue interchange. S1 and S7 received the highest total benefit, representing safety improvements to the Metal Museum Drive area (which would work in concert with proposed Crump Avenue interchange modifications) and ramp reconfiguration at the 3rd Street (US-61) interchange. The latter aligns closely with capacity solution C1 and would also require modification of the Illinois Central bridges (addressing structural deficiencies). Note that S1, S2, S3, S4, and S5 are solutions which could be implemented as a single project, at an estimated cost of approximately $1 million.

TSM&O

Both TSM&O solutions have a similar total benefit. However, TS1 (collapsible barrier in advance of the Mississippi River bridge), has a much higher benefit-cost index and would address a stakeholder-reported, recurring incident management issue.

Freight

Of the six freight solutions that passed the Phase 2 screening, F2 (auxiliary lanes between the McLemore Avenue interchange ramps) scored the highest total benefit. This solution corresponds with capacity solution C2 and is attributed all the same benefits. F5 shows the highest benefit-cost index among the freight solutions. Signal coordination on adjacent arterial streets with heavy truck volumes has the potential to reduce on and off-ramp congestion at a relatively low cost. F5 specifically recommends this solution for Crump Avenue, McLemore Avenue, 3rd Street (US-61) and Brooks Road.

Multimodal

Evaluation of a transit extension into DeSoto County, Mississippi accumulated a total benefit score of 8, recognizing the potential positive impact on growing population and employment centers. Capital improvements resulting from a study of pedestrian / bicycle accommodations at interchanges would also benefit areas with expected population and employment growth.

Economic Development

Only one economic development solution was introduced as part of the I-55 corridor study. ED1 corresponds to freight solution F6. As discussed in Section 3, further evaluation of a new interchange at Holmes Road should focus on capacity and safety issues resulting from its proximity to adjacent interchanges.

6. Key Findings

As a result of the “1-2-3 bin” structure of this prioritization system, all projects have a potential total benefit range of 5-15, and can therefore be compared across modes/strategies. Table 6-1 tabulates all solutions for the I-55 corridor, sorted by total benefit score. Solutions which recommend studies are shown in Table 6-2. Projects with the highest total benefit scores have demonstrated benefit to mobility, safety, economic development, system maintenance, and implementation. Capacity solution S3 (Mississippi River bridge widening) is the only solution to score a 14, but it also has the highest dollar per benefit of all solutions reflecting an estimated capital cost of $164 million. Use of Table 6-1 in conjunction with Figure 4-1 can be used to inform decisions on fund allocation and construction packages. As mentioned previously, weights can easily be applied to the prioritization criteria in Tables 5-1 through 5-6 to adjust for policy, programming, and political decisions.

Table 5-1. Capacity Improvements- Project Rankings — I-55

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility				Safety			Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2040 Trend V/C	2040[2] Build V/C	% Trucks	Score	Crash Rate	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
C3	Widen existing 4-lane bridge	Mississippi River Bridge		N/A	1.0+	0.7-0.8	41	3	6.34	Y	3	136,003	169,682	2	Y	Y	3	4	3	14	$164,000,000	0.09	$11,714,286
C1	Evaluate options for increasing capacity and improving merge/diverge and weave areas between the US-61 and I-240 interchanges	I-240/I-69	US-61	1.8	1.0+	0.8-0.9	16	3	6.74	Y	3	94,417	114,707	2	Y	Y	3	2	2	13	$175,000	N/A	N/A
C2	Improve interchange to maintain six lanes between ramps	McLemore Ave Interchange		N/A	1.0+	0.7-0.8	49	3	1.36	Y	3	141,085	176,160	2	Y	Y	3	1	2	13	$9,930,000	1.31	$763,846

*Assumes improvements resulting from study will improve mobility by two "levels"

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	Crash Rate < Statewide Avg[1]	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	Likely improvement to mobility	2 =	Crash Rate > Statewide Avg, Does not Improve Incident Mgmt	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Definite improvement to mobility	3 =	Crash Rate > Statewide Avg, Improves Incident Mgmt	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.
2- Values reflect culmination of projects in 2040 Build conditions. The mobility improvement may not be attributed to an individual project. Impact of the individual project on the Build V/C ratio is indicated by the assigned Mobility score.

Table 5-2. Safety Improvements- Project Rankings — I-55

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety				Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2040 Trend V/C	2040[2] Build V/C	Score	Crash Rate	Improves Incident Mgmt (Y/N)	Crash Reduction Potential	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
S1	Close Exit 12C; Convert enter/exit lanes to merge/exit lanes for I-55	Metal Museum Drive Interchange		N/A	1.0+	0.7-0.8	3	2.81	N	Above Avg	3	136,003	169,682	2	N	N	1	5	3	12	$567,000	21.16	$47,250
S7	Realign Ramps	South 3rd Street Interchange		N/A	1.0+	0.9-1.0*	3	5.82	N	Above Avg	3	55,914	68,419	2	Y	N	2	1	2	12	$19,200,000	0.63	$1,600,000
S8	Add advanced signage and pavement markings; Extend SB deceleration lane	I-240 Interchange		N/A	0.9-1.0	0.8-0.9*	2	6.74	N	Above Avg	3	94,319	114,657	2	N	N	1	3	3	11	$1,560,000	7.05	$141,800
S3	Add pavement markings; add additional overhead signage	Metal Museum Drive Interchange		N/A	1.0+	0.7-0.8	1	2.81	N	Above Avg	3	136,003	169,682	2	N	N	1	5	3	10	$249,000	40.16	$24,900
S4	Add pavement markings	Metal Museum Drive Interchange		N/A	1.0+	0.7-0.8	1	2.81	N	Above Avg	3	136,003	169,682	2	N	N	1	5	3	10	$345,000	28.99	$34,500
S2	Install additional jersey barrier	Metal Museum Drive Interchange		N/A	1.0+	0.7-0.8	1	2.81	N	Below Avg	2	136,003	169,682	2	N	N	1	5	3	9	$26,700	337.08	$2,967
S5	Interchange improvement: Use existing pavement width from removed exit 12C to provide additional merge and exit ramp space at Crump Blvd	Crump Blvd Interchange		N/A	0.9-1.0	0.8-0.9*	3	15.35	N	Below Avg	2	136,003	169,682	2	N	N	1	0	1	9	$125,000	72.00	$13,889
S6	Resurface Pavement	MS River Bridge	Mill Branch Rd	8.2	N/A	N/A	1	N/A	N	Below Avg	2	227,560	279,416	2	N	Y	2	1	2	9	$6,520,000	1.38	$724,400
S9	Extend WB deceleration lane	I-240 Interchange		N/A	0.9-1.0	0.8-0.9*	2	6.74	N	Below Avg	2	94,319	114,657	2	N	N	1	2	2	9	$2,000,000	4.50	$222,200
S10	Evaluate need for additional drainage	Brooks Rd Interchange		N/A	0.7-0.8	0.7-0.8	1	4.48	N	Above Avg	3	84,915	101,009	1	N	N	1	0	1	7	$20,000	N/A	N/A

*Assumes combined improvements will improve mobility one "level"

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	Crash Rate < Statewide Avg[1]	1 =	15-20% Increase	1 =	No to Both	1 =	0
2 =	Likely improvement to mobility	2 =	Crash Rate > Statewide Avg, Below Avg Potential	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Definite improvement to mobility	3 =	Crash Rate > Statewide Avg, Improves Incident Mgmt OR Above Avg Potential	3 =	25-30% Increase	3 =	Yes to Both	3 =	3+

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.
2- Values reflect culmination of projects in 2040 Build conditions. The mobility improvement may not be attributed to an individual project. Impact of the individual project on the Build V/C ratio is indicated by the assigned Mobility score.

Table 5-3. TSM&O Improvements- Project Rankings — I-55

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety			Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2040 Trend V/C	2040[2] Build V/C	Score	Crash Rate	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
TS1	Advance warning and pull-off OR collapsible barrier in the median for over-dimensional vehicles	Advance of Mississippi River Bridge (WB approach)		N/A	1.0+	0.7-0.8	2	15.35	Y	3	139,538	174,395	2	N	N	1	1	2	10	$27,000	370.37	$2,700
TS2	Install corridor management assets (ITS/DMS)	Throughout Corridor		N/A	N/A	N/A	2	N/A	Y	3	227,560	279,416	2	N	N	1	0	1	9	$7,380,000	1.22	$820,000

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	Crash Rate < Statewide Avg[1]	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	Likely improvement to mobility	2 =	Crash Rate > Statewide Avg, Does not Improve Incident Mgmt	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Definite improvement to mobility	3 =	Crash Rate > Statewide Avg, Improves Incident Mgmt	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.
2- Values reflect culmination of projects in 2040 Build conditions. The mobility improvement may not be attributed to an individual project. Impact of the individual project on the Build V/C ratio is indicated by the assigned Mobility score.

Table 5-4. Freight Improvements- Project Rankings — I-55

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility				Safety		Economic Development			System Maintenance				Implementation		Total Benefit	Cost Efficiency		
					2040 Trend V/C	2040[2] Build V/C	% Trucks	Score	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Provides Truck Parking (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
F2	Add auxiliary lane between off-ramps and on-ramps at McLemore Avenue	McLemore Ave Interchange		N/A	1.0+	0.7-0.8	49	3	N	2	138,525	173,915	3	N	N	N	1	1	2	11	$9,930,000	1.11	$902,727
F1	Study interchange design to ensure safe efficient truck movement	I-240 Interchange		N/A	0.9-1.0	0.8-0.9*	16	2	Y	3	95,434	115,869	2	N	N	N	1	2	2	10	$25,000	N/A	N/A
F5	Apply signal coordination on adjacent arterial streets with heavy truck traffic manage on- and off- ramp congestion (Crump, McLemore, US-61, Brooks)	Throughout Corridor		N/A	N/A	N/A	N/A	3	Y	3	227,560	279,416	2	N	N	N	1	N/A	1	10	$1,090,000	9.17	$109,000
F3	Resurface so that at least 90% of the corridor has good ride quality	Horn Lake Rd	Mississippi River	4.2	N/A	N/A	N/A	1	N	2	109,246	131,705	2	N	Y	N	2	1	2	9	$3,120,000	2.88	$346,700
F4	Add overnight truck parking capacity (~100 spots)	Throughout Corridor		N/A	N/A	N/A	N/A	1	N	2	227,560	279,416	2	N	N	Y	2	N/A	1	8	$2,440,000	3.28	$305,000
F6	New interchange at Holmes Road	Holmes Rd		N/A	0.7-0.8	0.7-0.8	16	1	N	2	67,637	83,130	2	N	N	N	1	1	2	8	$29,700,000	0.27	$3,712,500

*Assumes combined improvements will improve mobility one "level"

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	N/A	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	Improvement to mobility, % Trucks >20	2 =	No	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Improvement to mobility, % Trucks <20	3 =	Yes	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

1- Values reflect culmination of projects in 2040 Build conditions. The mobility improvement may not be attributed to an individual project. Impact of the individual project on the Build V/C ratio is indicated by the assigned Mobility score.

Table 5-5. Multimodal Improvements- Project Rankings — I-55

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety		Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2020 Population	2040 Population	Score	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
T2	Improve shuttle service frequency to the Memphis International Airport and major employment centers in the vicinity of the airport	All Transit Centers	Memphis Airport	N/A	112,829	121,739	1	N	2	95,816	116,289	2	N	N	1	1	2	8	$1,200,000	6.67	$150,000
T10	Circulator shuttle allowing a more direct connection to places of employment	Memphis Intermodal Facility		N/A	114,878	123,947	1	N	2	95,914	116,339	2	N	N	1	1	2	8	$600,000	13.33	$75,000
T12	Study transit extension into DeSoto County	US-61	Goodman Rd (MS-305)	N/A	139,474	150,233	1	N	2	109,246	131,705	2	N	N	1	1	2	8	$50,000	N/A	N/A
BP1	Conduct study to identify bike/ped accommodations at U.S. and State Route interchanges	Throughout Corridor		N/A	181,070	195,918	1	N	2	227,560	279,416	2	N	N	1	0	1	7	$25,000	N/A	N/A

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	0-10% Increase	1 =	N/A	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	10-15% Increase	2 =	No	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	15-20% Increase	3 =	Yes	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

Table 5-6. Economic Development Improvements- Project Rankings — I-55

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety		Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2020 Population	2040 Population	Score	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
ED1	Evaluate need for additional interstate access point to accommodate economic growth	I-240	MS State Line	N/A	137,425	148,025	1	N	2	106,015	131,655	2	N	N	1	1	2	8	$100,000	N/A	N/A

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	0-10% Increase	1 =	N/A	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	10-15% Increase	2 =	No	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	15-20% Increase	3 =	Yes	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

Table 6-1. Project Ranking Across all Modes/Strategies — I-55

ID	Project Description	Termini	Cost Efficiency			
			Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
C3	Widen existing 4-lane bridge	Mississippi River Bridge	14	$164,000,000	0.1	$11,714,300
C2	Improve interchange to maintain six lanes between ramps	McLemore Ave Interchange	13	$9,930,000	1.3	$763,800
S1	Close Exit 12C; Convert enter/exit lanes to merge/ exit lanes for I-55	Metal Museum Drive Interchange	12	$567,000	21.2	$47,300
S7	Realign Ramps	South 3rd (US-61) Street Interchange	12	$19,200,000	0.63	$1,600,000
S8	Add advanced signage and pavement markings; Extend SB deceleration lane	I-240 Interchange	11	$1,560,000	7.1	$141,800
F2	Add auxiliary lane between off-ramps and on-ramps at McLemore Avenue	McLemore Ave Interchange	11	$9,930,000	1.1	$902,700
TS1	Advance warning and pull-off OR collapsible barrier in the median for over-dimensional vehicles	Advance of Mississippi River Bridge (WB approach)	10	$27,000	370.4	$2,700
S3	Add pavement markings; add additional overhead signage	Metal Museum Drive Interchange	10	$249,000	40.2	$24,900
S4	Add pavement markings	Metal Museum Drive Interchange	10	$345,000	30.0	$34,500
F5	Apply signal coordination on adjacent arterial streets with heavy truck traffic manage on- and off- ramp congestion (Crump, McLemore, US-61, Brooks)	Throughout Corridor	10	$1,090,000	9.2	$109,000
TS2	Install corridor management assets (ITS/ DMS)	Throughout Corridor	9	$7,380,000	1.2	$820,000
S2	Install additional jersey barrier	Metal Museum Drive Interchange	9	$26,700	337.1	$3,000
S5	Interchange improvement: Use existing pavement width from removed exit 12C to provide additional merge and exit ramp space at Crump Blvd	Crump Blvd Interchange	9	$125,000	72.0	$13,900
S9	Extend WB deceleration lane	I-240 Interchange	9	$2,000,000	4.5	$222,200
F3	Resurface so that at least 90% of the corridor has good ride quality	Horn Lake Rd to Mississippi River	9	$3,120,000	2.9	$346,700

Table 6-1. Project Ranking Across all Modes/Strategies — I-55

ID	Project Description	Termini	Cost Efficiency			
			Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
S6	Resurface Pavement	MS River Bridge to Mill Branch Rd	9	$6,520,000	1.4	$724,400
T2	Improve shuttle service frequency to the Memphis International Airport and major employment centers in the vicinity of the airport	All Transit Centers to Memphis Airport	8	$1,200,000	6.7	$150,000
T10	Circulator shuttle allowing a more direct connection to places of employment	Memphis Intermodal Facility	8	$600,000	13.3	$75,00
T12	Study transit extension into DeSoto County	US-61 to Goodman Rd (MS-305)	8	$50,000	N/A	N/A
F4	Add overnight truck parking capacity (~100 spots)	Throughout Corridor	8	$2,440,000	3.3	$305,000
F6	New interchange at Holmes Road	Holmes Rd	8	$29,700,000	0.3	$3,712,500

Table 6-2. Project Ranking Across all Modes/Strategies (Studies) — I-55

ID	Project Description	Termini	Cost Efficiency			
			Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
C1	Evaluate options for increasing capacity and improving merge/diverge and weave areas between the US-61 and I-240 interchanges	I-240/I-69 to US-61	13	$175,000	N/A	N/A
F1	Study interchange design to ensure safe efficient truck movement	I-240 Interchange	10	$25,000	N/A	N/A
ED1	Evaluate need for additional interstate access point to accommodate economic growth	I-240 to MS State Line	8	$100,000	N/A	N/A
S10	Evaluate need for additional drainage	Brooks Rd Interchange	7	$20,000	N/A	N/A
BP1	Conduct study to identify bike/ped accommodations at U.S. and State Route interchanges	Throughout Corridor	7	$25,000	N/A	N/A

I-155 Corridor

▶ Project Priorities

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I-155 Corridor

1. Introduction

The I-155 corridor serves as a backbone for economic development and growth in northwest Tennessee. As population and employment continue to grow and redevelopment changes the face of the region, new travel demands place pressure on the Interstate as well as parallel and intersecting highways. This results in increased traffic congestion, travel times, and conflicts, which threaten the corridor's ability to sustain future growth.

A previous technical memorandum (Technical Memorandum 1) provided a data and information inventory for the corridor. Technical Memorandum 2 assessed existing and future deficiencies and needs along the I-155 corridor, focusing on traffic operations, safety, and multimodal conditions. In Technical Memorandum 3, goals and performance measures were used to assess the effectiveness of various solutions to the problems – resulting in a universe of alternatives for the I-155 corridor. Technical Memorandum 4 filters the I-155 universe of alternatives through a solution screening and prioritization process (see Figure 1-1). This process evaluates solutions based on their impact on mobility and safety, potential environmental impacts, cost, and potential economic impacts. Ultimately, the prioritized solutions both resolve the identified deficiencies and have a high benefit/cost ratio.

2. Solutions Screening, Phase 1

The Phase 1 solutions screening process was intended to eliminate solutions with evident fatal flaws. To do so, each possible solution was evaluated against the following questions:

1. Does the proposed solution make sense given the identified deficiency?
2. Does the proposed solution align with other planned or programmed projects in the area?
3. Is the proposed solution supported by stakeholders and the public?
4. Does the proposed solution negatively impact environmental features such as wetlands, rare or protected species, or superfund sites?
5. Does the proposed solution negatively impact cultural features such as sensitive community populations, historic sites, public lands, or community institutions?

Projects which received a "NO" response for questions 1, 2, or 3, or a "YES" response for questions 4 or 5 were eliminated and did not move forward to the Phase 2 solutions screening. Exceptions include projects where the potential is high for environmental/cultural impact mitigation. As shown in Table 2-1, none of the solutions were eliminated as part of the Phase 1 screening.

Figure 1-1. Solutions Screening and Prioritization Process

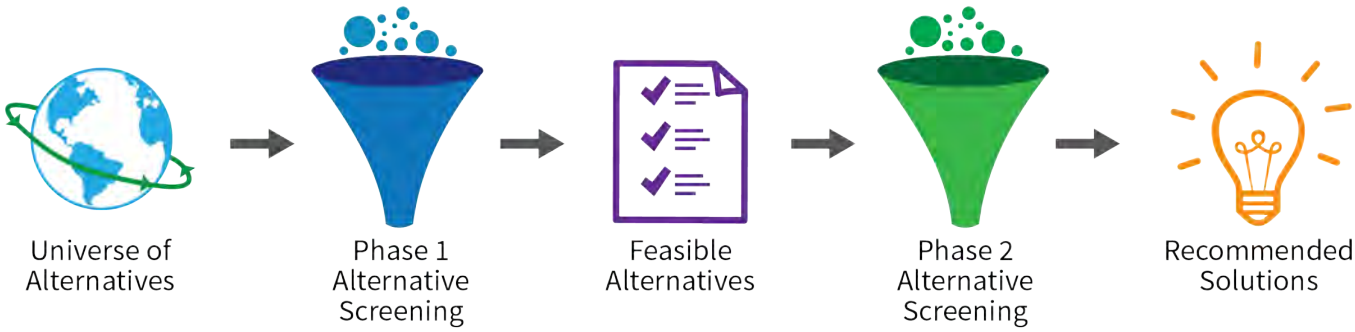


Table 2-1. Phase 1 Alternative Screening Matrix — I-155

	ID	Logical?	Align with Planned / Programmed Projects?	Supported by Stakeholders / Public?	Potential Environmental or Cultural Impact?	Advance to Phase 2 Screening?
Safety	S1: Install LED pavement markers (throughout corridor) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S2: Install lighting & longitudinal rumble stripes on westbound approach to bridge (Mississippi River Bridge) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S3: Install fencing (Lenox-Nauvoo Road to Lake Road) - Source: Data Analysis	Yes	Yes	Yes	No	YES
Freight	F1: Warning system for snow, ice, and inclement weather (Great River Road to Jenkinsville-Jamestown Road) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	F2: Evaluate the need to re-design interchange to reduce truck rollovers (US-412 Interchange) - Source: Data Analysis, Public/Stakeholder	Yes	Yes	Yes	No	YES[1]
	F3: Install appropriate signage and increase enforcement to remove farm equipment from the interstate (Mississippi River Bridge to US-412) - Source: Data Analysis	Yes	Yes	Yes	No	YES
TSM&O	TS1: Installation of structural impact monitoring system to identify severity of barge collisions (Mississippi River Bridge) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	TS2: Installation of barge sensor monitoring system (Mississippi River Bridge) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES

1- Existing radius measures approximately 380ft. Per TDOT standard drawing RD11-LR-2, minimum radius for maximum super-elevation is 444 ft at posted speed of 35 mph. If super is 8%, then could reduce posted speed to 30mph to meet standard of 314 ft. Recommend TDOT evaluate radius per the existing super-elevation. TRIMS Crash Data shows one overturn on inside ramp – serious injury 5/23/19; two overturns on outside ramp: minor injury 6/28/12, serious injury 11/4/05.

3. Solutions Screening, Phase 2

The Phase 2 alternatives screening process utilized performance measures identified in Section 3 of Technical Memorandum 3 to further refine the list of feasible alternatives. Potential solutions that passed the Phase 1 Screening were evaluated against the following questions:

1. Does the proposed solution improve level of service on the interstate corridor?
2. Does the proposed solution improve peak hour travel speeds on the interstate corridor?
3. Does the proposed solution improve travel times between key origin and destination (O&D) pairs along the corridor?
4. Does the proposed solution improve peak hour densities at the improved interchange?
5. Does the proposed solution reduce average and max queues at the improved interchange?
6. Does the proposed solution have the potential to reduce crashes in safety hot spots?
7. Does the proposed solution address deficiencies in bridges with a low sufficiency rating?
8. Does the proposed solution increase pavement quality?
9. Does the proposed solution provide for pedestrian/bicycle connectivity and safety at interchanges?
10. Does the proposed solution provide additional truck parking opportunities, particularly in urban areas?
11. Does the proposed solution have the potential to reduce vehicle miles traveled (VMT)?
12. Does the proposed solution improve incident management?
13. Does the proposed solution provide potential economic development opportunities?

Projects which received only “NO” responses were eliminated and did not move forward as feasible multimodal solutions. As shown in Table 3-1, all projects passed the Phase 2 screening and moved forward to project prioritization.

Table 3-1. Phase 2 Alternative Screening Matrix — I-155

ID	Traffic Operations				Safety		Maintenance		Multimodal			TSM&O	Economy	Project Moves Forward to Prioritization?
	Improves LOS on Interstate Corridor?	Improves Peak Hour Travel Speeds?	Improves Travel Times Between O&D Pairs?	Improves Peak hour Densities at Interchange?	Reduces Ramp Queueing onto Interstate?	Reduces Crashes in Safety Hot Spots?	Addresses Bridge Deficiency?	Increases Pavement Quality?	Improves Ped/Bike Connectivity or Safety?	Provides Additional Truck Parking?	Potential to Reduce VMT in the Corridor?	Improves Incident Management?	Economic Development Potential?	
Safety														
S1: Install LED pavement markers (throughout corridor) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
S2: Install lighting & longitudinal rumble stripes on westbound approach to bridge (Mississippi River Bridge) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
S3: Install fencing (Lenox-Nauvoo Road to Lake Road) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
Freight														
F1: Warning system for snow, ice, and inclement weather (Great River Road to Jenkinsville) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
F2: Re-design interchange to reduce truck rollovers (US-412 Interchange) - Source: Data Analysis, Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
F3: Install appropriate signage and increase enforcement to remove farm equipment from the interstate (Mississippi River Bridge to US-412) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	Likely	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
TSM&O														
TS1: Installation of structural impact monitoring system to identify severity of barge collisions (Mississippi River Bridge) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
TS2: Installation of barge sensor monitoring system (Mississippi River Bridge) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES

4. Priority Settings and Phasing

Approach and Methodology

The prioritization settings developed for this study build on the goals and objectives detailed in Technical Memorandum 3 and summarized in Table 4-1. Aligning with previous TDOT multimodal corridor studies, the prioritization methodology for this study addresses coordinated construction efforts (priority given to projects that could be accomplished simultaneously at a given location) and culminates in a benefit-cost index for each project, which recognizes that the relative multimodal benefit of each project compared to the estimated financial investment. Consistency with TDOT and MPO programmed projects has been maintained throughout the alternative development process, having identified such projects as part of the Trend Scenario in Technical Memorandum 2.

The most recent TDOT multimodal corridor study introduced a flexible decision-making support tool wherein weights can be applied to priority settings based on policy, programming, and political decisions. The prioritization criteria and measures for the I-155 corridor are structured in a similar fashion, such that weights can be applied by decision-makers. As indicated in Table 4-2, solutions developed for the I-155 corridor were evaluated over six categories: mobility, safety, economic development, system maintenance, implementation and cost efficiency. Specific criteria used to measure solutions by mode/strategy are discussed in the following section.

Table 4-1. Performance Goals and Objectives — I-155

Goals	Objectives		
Provide efficient and reliable travel	Improve travel times and reduce delay	Provide transportation options for people and freight	Optimize freight movement
Improve safety conditions	Reduce crash rates along the corridor – especially at identified crash "hot spots"	Implement or upgrade technologies that promote safety and effective incident management	Improve bicycle and pedestrian accommodations
Coordinate transportation investments with economic development plans	Improve interchange on/ off ramps	Coordinate with MPOs/ RPOs to determine areas where new/improved Interstate access is needed	
Invest equitably throughout the corridor	Expand transportation options for traditionally underserved populations within the corridor	Consider regional transit options	Identify areas with the greatest data-driven needs
Protect the natural environment and sensitive resources within the corridor	Identify transportation improvements that are not likely to result in major impacts to environmental, social, and cultural resources		

Table 4-2. Prioritization Criteria and Measures by Mode and Strategy — I-155

Mode/ Strategy	Mobility	Safety	Economic Development	System Maintenance	Implementation	Cost Efficiency
 Safety	2040 Trend V/C	Crash Rate (Relative to Statewide Avg)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Build V/C	Project improves incident management (Y/N)	2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit
		Crash Reduction Potential				
 TSM&O	2040 Trend V/C	Crash Rate (Relative to Statewide Avg)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Build V/C	Project improves incident management (Y/N)	2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit
 Freight	2040 Trend V/C	Project improves incident management (Y/N)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Build V/C		2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit
	% Trucks			Provides truck parking (Y/N)		

Prioritization Criteria and Measures

Mobility

Appropriate measures for mobility differ across modes/strategies. While the volume-to-capacity (V/C) ratio is appropriate for measuring highway capacity, it does not capture mobility for bicycles and pedestrians, for example. As shown in Table 4-2, comparison of the 2040 Trend V/C ratio versus the 2040 Build V/C ratio was used as a measure of mobility for safety, TSM&O, and freight projects. Numeric scores 1, 2, and 3, were recorded based on the following thresholds, which consider the resulting change in V/C and, for freight projects, the percent trucks on the adjacent section of interstate:

Safety, TSM&O

1 = No improvement to mobility

2 = Likely improvement to mobility

3 = Definite improvement to mobility

Freight

1 = No improvement to mobility

2 = Improvement to mobility, % trucks < 20%

3 = Improvement to mobility, % trucks > 20%

Where criterion could not be measured and "N/A" was noted, engineering judgement was used to score the project's potential for mobility improvement within the applicable thresholds.

Safety

Criterion used to measure the potential safety improvement for each project also vary across mode/strategy. One measure common to all was a "yes" or "no" response to the question: "does the project improve incident management?" For freight projects, this was the only measure used for safety. Thresholds were applied as follows:

Freight

1 = N/A

2 = No

3 = Yes

Building upon hot spot calculations from Technical Memorandum 2, safety and TSM&O projects are measured by the relative crash rate as well. The impact of safety projects is further refined by the crash reduction potential, which was determined in Technical Memorandum 3. The following thresholds were applied:

TSM&O

1 = Crash rate < statewide average crash rate[1]

2 = Crash rate > statewide average crash rate; Does not improve incident management

3 = Crash rate > statewide average crash rate; Improves incident management

Safety

1 = Crash rate < statewide average crash rate

2 = Crash rate > statewide average crash rate; Below average crash reduction potential

3 = Crash rate > statewide average crash rate; Above average crash reduction potential OR Improves incident management

Where criterion could not be measured and "N/A" was noted, engineering judgement was used to score the project's potential for safety improvement within the applicable thresholds.

Economic Development

The economic development potential of each project was measured by the projected change in employment from 2020 to 2040 within three miles of each project. Employment projections were obtained via the TSM and by traffic analysis zones. The following thresholds were used to score each project.

Safety, TSM&O, Freight

1 = 10-20% increase

2 = 20-25% increase

3 = 25%+ increase

System Maintenance

System maintenance was added as a measure for the I-155 corridor prioritization to recognize opportunities where projects will also address existing bridge and/or pavement deficiencies. The following thresholds were used to score each project, given "yes" or "no" responses to the questions "project addresses bridge deficiency?" and "project addresses pavement deficiency?'. For freight projects, an additional "yes" / "no" question was added: "project provides truck parking?"

Safety, TSM&O

1 = No to both

2 = Yes to one

3 = Yes to both

Freight

1 = No to all

2 = Yes to one

3 = Yes to all

Implementation

The implementation measure was included to give priority to projects that could be constructed or initiated in conjunction with other projects, thus conserving the time and money associated with multiple, individual contracts. Figure 4-1 illustrates the relative proximity of the multimodal solutions prioritized for the I-155 corridor. The following thresholds were utilized to score the implementation of each project:

Safety, TSM&O, Freight

1 = 0 overlapping projects

2 = 1 or 2 overlapping projects

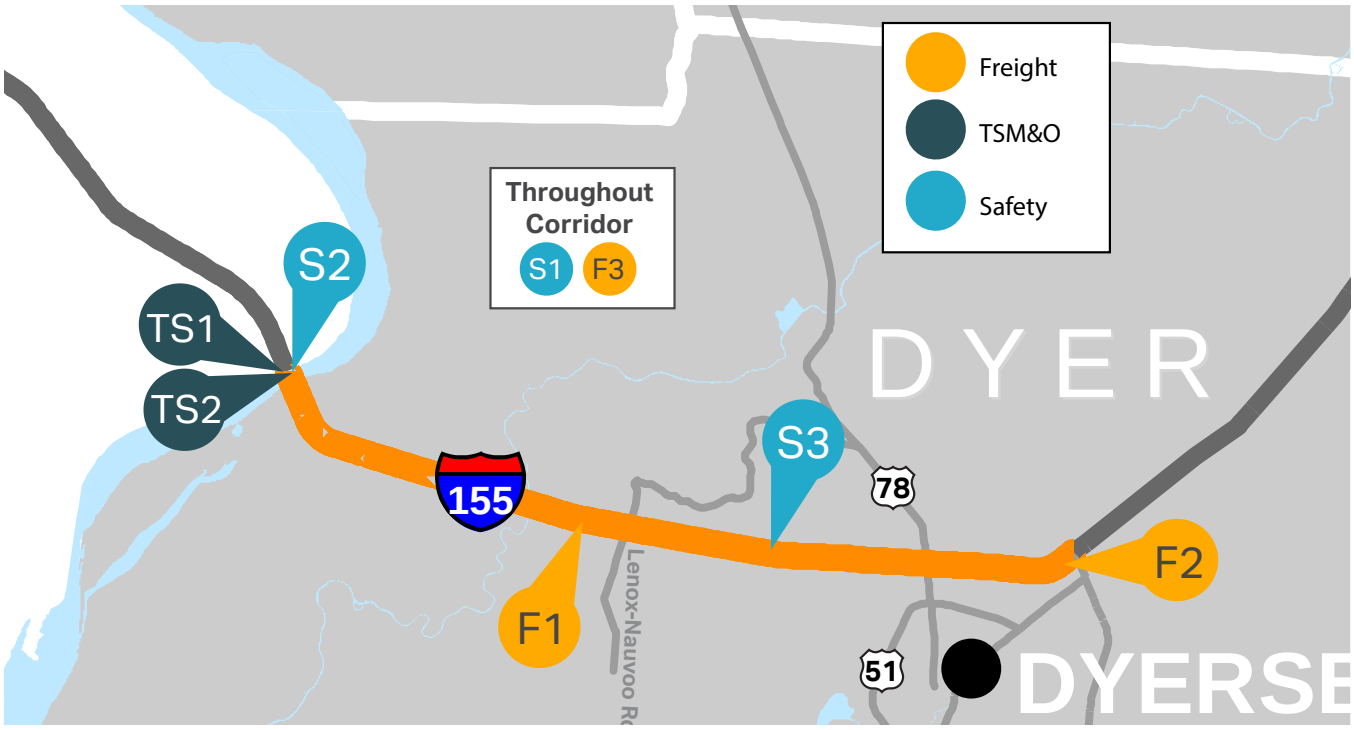
3 = 3+ overlapping projects

Cost Efficiency

For the I-155 corridor project prioritization, a benefit-cost index and a dollar-per-benefit was calculated for each solution. These measures which capture the benefit of each prioritization criteria and compare the total relative benefit to the estimated project cost. Specifically, the score assigned to each of the five prioritization criteria were summed to represent the total relative benefit of each project. To calculate the benefit-cost index, this total relative benefit was divided by the cost (in millions) estimated for each project. The dollar-per-benefit is simply the cost estimate divided by the total benefit score. Note that cost estimates were prepared for solutions that recommend further study. However, because the total benefit represents the potential of the associated capital improvement, no direct benefit-cost index or dollar-per-benefit was calculated for these solutions.

1- The statewide average crash rate for rural interstate facilities is 0.528

Figure 4-1. Relative Proximity of Multimodal Solutions — I-155



5. Project Rankings

When evaluated side-by-side, the total benefit score, benefit-cost index, and dollar-per-benefit indicate projects with high benefit that can be implemented with smaller financial investment. The project rankings are discussed per mode/strategy below. Tables 5-1 through 5-3 detail the prioritization effort and rank the projects by the total benefit score, which ranges from 5 (lowest) to 15 (highest).

Project Rankings by Mode and Strategy

Safety

Safety solution S2 received the highest total benefit score. Installation of lighting and longitudinal rumble stripes on the westbound approach to the Mississippi River Bridge has an above average crash reduction potential and is one of several recommended projects related to the Mississippi River Bridge. Installation of LED pavement markers (S1) has a high benefit-cost index due to the low cost associated with the improvement; however, the total benefit score is on the lower end.

TSM&O

Both TSM&O solutions have a similar total benefit, offering crash reduction potential and improved incident management in safety hot spot areas. The cost associated with each is relatively low, resulting in higher benefit-cost indexes.

Freight

Of the three freight solutions that passed the Phase 2 screening, F1 (warning system for snow, ice and inclement weather) scored the highest total benefit. The benefit-cost indexes for F2 and F3 are much higher due to the low associated costs; however, the total benefit for these improvements is lower.

Table 5-1. Safety Improvements- Project Rankings — I-155

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety				Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2040 Trend V/C	2040 Build V/C	Score	Crash Rate	Improves Incident Mgmt (Y/N)	Crash Reduction Potential	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
S2	Install lighting and longitudinal rumble stripes on WB approach to bridge	Mississippi River Bridge		N/A	0.0-0.7	0.0-0.7	1	1.71	Above Avg	N	3	158	184	1	N	N	1	3	3	9	$394,000	22.84	$43,778
S1	Install LED pavement markers	Entire Corridor		16	0.0-0.7	0.0-0.7	1	2.64	Below Avg	N	2	26,503	32,775	2	N	N	1	2	2	8	$112,000	71.43	$14,000
S3	Install fencing	Lenox-Nauvoo Rd	Lake Rd	5.6	0.0-0.7	0.0-0.7	1	1.57	Above Avg	N	3	26,463	32,721	2	N	N	1	0	1	8	$573,000	13.96	$71,625

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	Crash Rate < Statewide Avg[1]	1 =	15-20% Increase	1 =	No to Both	1 =	0
2 =	Likely improvement to mobility	2 =	Crash Rate > Statewide Avg, Below Avg Potential	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Definite improvement to mobility	3 =	Crash Rate > Statewide Avg, Improves Incident Management OR Above Avg Potential	3 =	25-30% Increase	3 =	Yes to Both	3 =	3+

Table 5-2. TSM&O Improvements- Project Rankings — I-155

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety			Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2040 Trend V/C	2040 Build V/C	Score	Crash Rate	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
TS1	Installation of structural impact monitoring system to identify severity of barge collisions	Mississippi River Bridge		N/A	0.0-0.7	0.0-0.7	1	1.71	Y	3	158	184	1	N	N	1	2	2	8	$50,000	160.00	$6,250
TS2	Installation of barge sensor monitoring system	Mississippi River Bridge		N/A	0.0-0.7	0.0-0.7	1	1.71	Y	3	158	184	1	N	N	1	2	2	8	$200,000	40.00	$25,000

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	Crash Rate < Statewide Avg[1]	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	Likely improvement to mobility	2 =	Crash Rate > Statewide Avg, Does not Improve Incident Management	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Definite improvement to mobility	3 =	Crash Rate > Statewide Avg, Improves Incident Management	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

1- The statewide average crash rate for rural interstate facilities is 0.528

Table 5-3. Freight Improvements- Project Rankings — I-155

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility				Safety		Economic Development			System Maintenance				Implementation		Total Benefit	Cost Efficiency		
					2040 Trend V/C	2040 Build V/C	% Trucks	Score	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Provides Truck Parking (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
F1	Install warning system for snow, ice, and inclement weather	Great River Rd	Jenkinsville-Jamestown Rd	9.6	0.0-0.7	0.0-0.7	39	1	Y	3	25,486	31,390	2	N	N	N	1	1	2	9	$250,000	36.00	$27,800
F2	Evaluate the need to re-design of interchange due to truck rollovers	US-412 Interchange		N/A	0.0-0.7	0.0-0.7	29	1	N	2	26,293	32,455	2	N	N	N	1	0	1	7	$25,000	280.00	$3,571
F3	Install appropriate signage and increase enforcement to remove farm equipment from the interstate	Mississippi River Bridge	US-412	16	0.0-0.7	0.0-0.7	38	1	N	2	26,463	32,721	2	N	N	N	1	0	1	7	$18,200	384.60	$2,600

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility			1 =	N/A			1 =	10-20% Increase			1 =	No to ALL			1 =	0						
2 =	Improvement to mobility, % Trucks >20			2 =	No			2 =	20-25% Increase			2 =	Yes to One			2 =	1 or 2						
3 =	Improvement to mobility, % Trucks <20			3 =	Yes			3 =	25-30% Increase			3 =	Yes to ALL			3 =	3+						

6. Key Findings

As a result of the "1-2-3 bin" structure of this prioritization system, all projects have a potential total benefit range of 5-15 and can therefore be compared across modes/strategies. Table 6-1 tabulates all solutions for the I-155 corridor, sorted by total benefit score. Projects with the highest total benefit scores have demonstrated benefit to mobility, safety, economic development, system maintenance, and implementation. Safety solution S2 (installation of lighting and longitudinal rumble stripes on the westbound approach to the Mississippi River bridge) scored the highest total benefit, supported by a high benefit-cost index. Use of Table 6-1 in conjunction with Figure 4-1 can be used to inform decisions on fund allocation and construction packages. As mentioned previously, weights can easily be applied to the prioritization criteria in Tables 5-1 through 5-3 to adjust for policy, programming, and political decisions.

Table 6-1. Project Ranking Across all Modes/Strategies — I-155

ID	Project Description	Termini	Cost Efficiency			
			Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
S2	Install lighting and longitudinal rumble stripes on WB approach to bridge	Mississippi River Bridge	9	$394,000	22.8	$43,800
F1	Install warning system for snow, ice, and inclement weather	Great River Rd to Jenkinsville-Jamestown Rd	9	$250,000	36.0	$27,800
S1	Install LED pavement markers	Entire Corridor	8	$112,000	71.4	$14,000
S3	Install fencing	Lenox-Nauvoo Rd to Lake Rd	8	$573,000	14.0	$71,600
TS1	Installation of structural impact monitoring system to identify severity of barge collisions	Mississippi River Bridge	8	$50,000	160.0	$6,250
TS2	Installation of barge sensor monitoring system	Mississippi River Bridge	8	$200,000	40.0	$25,000
F2	Evaluate the need to re-design of interchange due to truck rollovers	US-412 Interchange	7	$25,000	280.0	$3,600
F3	Install appropriate signage and increase enforcement to remove farm equipment from the interstate	Mississippi River Bridge to US-412	7	$18,200	384.6	$2,600

I-75 Corridor

▶ Project Priorities

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I-75 Corridor

1. Introduction

The I-75 corridor serves as a backbone for economic development and growth in east central Tennessee. As population and employment continue to grow and redevelopment changes the face of the region, new travel demands place pressure on the Interstate as well as parallel and intersecting highways. This results in increased traffic congestion, travel times, and conflicts, which threaten the corridor's ability to sustain future growth.

A previous technical memorandum (Technical Memorandum 1) provided a data and information inventory for the corridor. Technical Memorandum 2 assessed existing and future deficiencies and needs along the I-75 corridor, focusing on traffic operations, safety, and multimodal conditions. In Technical Memorandum 3, goals and performance measures were used to assess the effectiveness of various solutions to the problems – resulting in a universe of alternatives for the I-75 corridor. Technical Memorandum 4 filters the I-75 universe of alternatives through a solution screening and prioritization process (see Figure 1-1). This process evaluates solutions based on their impact on mobility and safety, potential environmental impacts, cost, and potential economic impacts. Ultimately, the prioritized solutions both resolve the identified deficiencies and have a high benefit/cost ratio.

2. Solutions Screening, Phase 1

The Phase 1 solutions screening process was intended to eliminate solutions with evident fatal flaws. To do so, each possible solution was evaluated against the following questions:

1. Does the proposed solution make sense given the identified deficiency?
2. Does the proposed solution align with other planned or programmed projects in the area?
3. Is the proposed solution supported by stakeholders and the public?
4. Does the proposed solution negatively impact environmental features such as wetlands, rare or protected species, or superfund sites?
5. Does the proposed solution negatively impact cultural features such as sensitive community populations, historic sites, public lands, or community institutions?

Projects which received a "NO" response for questions 1, 2, or 3, or a "YES" response for questions 4 or 5 were eliminated and did not move forward to the Phase 2 solutions screening. Exceptions include projects where the potential is high for environmental/cultural impact mitigation. As shown in Table 2-1, nine of the solutions were eliminated as part of the Phase 1 screening. Freight solutions F4 and F5, and capacity solution C3 will be evaluated as part of TDOT's I-40/I-81 Multimodal Corridor Study, and therefore will not be considered here. Safety solution S1 has already been included in recommendations resulting from a 2017

Figure 1-1. Solutions Screening and Prioritization Process

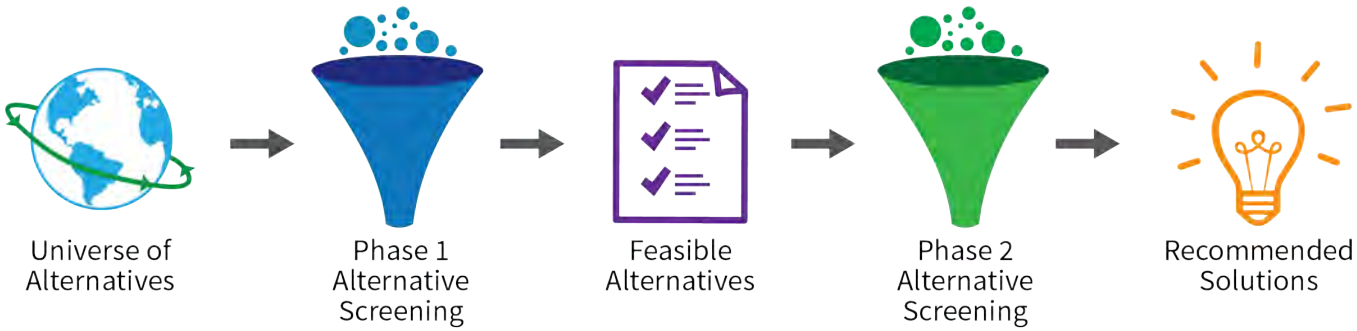


Table 2-1. Phase 1 Alternative Screening Matrix — I-75

	ID	Logical?	Align with Planned / Programmed Projects?	Supported by Stakeholders / Public?	Potential Environmental or Cultural Impact?	Advance to Phase 2 Screening?
Safety	S1*: Install retroreflective markers and increased pavement friction layer (S. 5th Street Interchange) - Source: Data Analysis	Yes	No[1]	-	-	NO
	S2*: Speed limit reduction/warning signage/retroreflective markers (Jellico Mountain Area) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S3: Extend length of southbound deceleration and northbound acceleration lanes (SR-63 (Oneida) Interchange) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S4: Extend length of northbound and southbound deceleration lanes (SR-63 (Caryville) Interchange) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S5: Add right-turn only lane on northbound off-ramp (SR-61 (Charles G Sievers Boulevard) Interchange) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S6: Add pavement markings to indicate lanes for I-40 junction (Western Avenue Interchange) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	S7: Extend length of northbound deceleration lane (US-321 Interchange) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	S8: Install additional lighting on northbound exit ramp (McMinn County Rest Area) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S9: Increase length of northbound and southbound deceleration lanes; Install advanced signage for northbound off-ramps (SR-60 Interchange) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S10: Install advanced signage and increase capacity of northbound exit ramp; Modify interchange to remove weave caused by loop ramps (SR-320 Interchange) - Source: Data Analysis	Yes	Yes	Yes	No	YES
Freight	F1: Add overnight truck parking in or near Chattanooga (Georgia State Line to Bradley County Line) - Source: TN Freight Plan (2018)	Yes	Yes	Yes	No	YES
	F2: Resurface so that at least 90% of the corridor has good ride quality (Georgia State Line to Bradley County Line) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	F3: Address bridge deficiency to maintain appropriate load carrying capacity (Tennessee River Bridge) - Source: Data Analysis	Yes	Yes	Yes	Yes[2]	YES
	F4: Add lanes; Redesign interchange to reduce flooding (Campbell Station Road Interchange) - Source: TN Freight Plan (2018)	No	-	-	-	NO[3]

*2017 TDOT Road Safety Audit (PIN 125015.00) recommended improvements to I-75 from the Kentucky State Line to Rarity Mountain Interchange. Recommendations include median drainage improvements, re-lensing existing pavement markers, additional LED pavement markers, median barrier delineation, and warning signs. Recommended improvements are currently in the Design Phase.

1- Safety Audit Already conducted. Barrier /guardrail visibility & water on roadway already being addressed.

2- Impact to Tennessee River

3- Evaluated as part of I-40/I-81 Corridor Study

Table 2-1. Phase 1 Alternative Screening Matrix (cont.) — I-75

	ID	Logical?	Align with Planned / Programmed Projects?	Supported by Stakeholders / Public?	Potential Environmental or Cultural Impact?	Advance to Phase 2 Screening?
Freight	F5: Add lanes (I-40 to I-275) - Source: TN Freight Plan (2018)	No	-	-	-	NO[3]
	F6: Address bridge deficiency to maintain appropriate load carrying capacity (East Wolf Valley Road Interchange) - Source: Data Analysis	Yes	Yes	Yes	Yes[4]	YES
	F7: Address bridge deficiencies to maintain appropriate load carrying capacity (Bruce Gap Road Bridge) - Source: Data Analysis	Yes	Yes	Yes	Yes[4]	YES
Multimodal	T9: Study to establish a Regional Transit Authority to provide inter-county transit service (Knox County) - Source: Knoxville Regional Transit Corridor Study	Yes	Yes	Yes	No	YES
	T10: Improve and expand parking area at TVA boat launch for park-and-ride opportunities (TVA Boat Launch along SR-170) - Source: Mobility 2040: Connecting People and places	No	-	-	-	NO[6]
	T13: Extend CARTA Express Route 4 (Hamilton Place to Lee Highway Interchange Park-and-ride) - Source: Chatt-Hamilton Co/North Georgia 2045 Regional Transportation Plan Update	Yes	Yes	No[7]	No	NO
	T21: Study commuter route between Chattanooga and Cleveland (Hamilton and Bradley County) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	BP1: Study to identify bike/ped connectivity and safety at existing U.S. and State Route Interchanges (throughout corridor) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	BP2: Midtown Pathway (Spring Creek Road to Greenway View Drive) - Source: Public/Stakeholder	Yes	Yes	Yes	No	NO[8]
	BP3: Trail Connector (Facilities west of I-75 and Camp Jordan Park)	Yes	Yes	Yes	No	YES
Capacity	C1: Widen existing four lane section (US-64 Bypass/US-74 to SR-60) - Source: Data Analysis	Yes	Yes	Yes	Yes[9]	YES
	C2: Widen existing four lane section (SR-72 to I-40) - Source: Data Analysis/I-75 Corridor Feasibility Study	Yes	Yes	Yes	Yes[10]	YES
	C3: Widening (I-40 to I-275) - Source: Data Analysis	No	-	-	-	NO[3]
	C4: Widen existing six lane section (Western Avenue to I-275) - Source: Data Analysis	Yes	Yes	Yes	Yes[11]	YES
	C5: Construct auxiliary lane northbound between interchanges (Callahan Drive to SR-131) - Source: Data Analysis	Yes	Yes	Yes	Yes[12]	YES

Table 2-1. Phase 1 Alternative Screening Matrix (cont.) — I-75

ID	Logical?	Align with Planned / Programmed Projects?	Supported by Stakeholders / Public?	Potential Environmental or Cultural Impact?	Advance to Phase 2 Screening?
Capacity					
C6: Widen existing four lane section; consider truck climbing lanes (SR-170 to US-441) - Source: Data Analysis, TN Freight Plan (2018), I-75 Corridor Feasibility Study	Yes	Yes	Yes	Yes[13]	YES
C7: Widen northbound lanes; consider truck climbing lanes - Source: Data Analysis	Yes	Yes	Yes	Yes[14]	YES
C8: Widen/Apply TSM&O and/or Arterial Management Strategies to address forecasted congestion (I-75/I-24 Interchange to Georgia State Line) - Source: Data Analysis, TN Freight Plan (2018), Chatt-Hamilton Co/N Georgia 2045 RTP Update	Yes	Yes	Yes	No	YES
C9: Evaluate options for increasing capacity and improving merge/diverge and weave areas between the SR-320 and SR-153 interchanges - Source: Data Analysis	Yes	Yes	Yes	No	YES
C10: Widen northbound to create auxiliary lane (Merchants Drive to Callahan Drive) - Source: Data Analysis	Yes	Yes	Yes	Yes[15]	YES
C11: Evaluate ramp queue on southbound I-75 off-ramp (Shallowford Road Interchange) - Source: Public/Stakeholder	Yes	Yes	Yes	No	NO[16]
TSM&O					
TS1: Signal coordination on adjacent spillover streets to manage on- and off-ramp congestion (Brainerd Road, Shallowford Road, Harrison Road, Kingston Pike, Central Ave Pike) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
TS2: Study to evaluate correlation between travel speed and crash severity (I-75 & adjacent, parallel arterials) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
TS3: Integrated Corridor Management, with real-time technology platform (Ringgold Road to Shallowford Road) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
TS4: Evaluate locations that would benefit from ramp metering and queue detection systems (Hamilton & Knox Counties) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
TS5: Transit Signal Prioritization (Ringgold Road) - Source: Public/Stakeholder	No[17]	-	-	-	NO
TS6: Evaluate balanced alternative routing opportunities (Hamilton County) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES

4- Blue Line Stream
5- Floodplain
6- This boat launch on SR-170 is located in the Oak Ridge area (near SR-62 intersection). May help with commuters from Oak Ridge to Knoxville, but likely would not use I-75 from this location.
7- Recommendation not supported by new CARTA ReDesign study. Instead recommend Regional Transit Authority.
8- Project added to Chattanooga TIP 10/25/17 with TAP-S funding.
9- Six blue line stream crossings
10- TN River bridge & 23 blue line stream crossings
11- West Ford Third Creek parallels I-75 for about half of this segment. Currently 80-100 ft tree buffer between interstate and adjacent neighborhoods. Cornerstone Christian Church close to I-75 near Gap Road.
12- Knob Fork and Beaver Creek (blue line stream) crossings.
13 -Whitcox Branch (blue line stream), Moore Branch plus 18 other blue line stream crossings. Includes Clinch River, Coal Creek, and Hinds Creek.
14- Impact to one railroad bridge, 9 blue line stream crossings & parallel streams (Right Fork Coal Creek).
15-Approx 65-100 feet between edge of shoulder & adjacent subdivision homes and commercial buildings.
16- Currently programmed project at the Hamilton Place Mall interchange includes modifications to the Shallowford Road interchange, which will address this ramp queue issue
17- Does not directly impact the I-75 Corridor

Road Safety Audit of I-75 in the Jellico Mountain Area. Multimodal solution T10 and TSM&O solution TS5 do not directly impact I-75. Multimodal solution BP2 was added to the Chattanooga TIP in 2017 with TAP-S funding and is therefore considered a programmed project. Capacity solution C11 will be included as part of the programmed improvements to the Hamilton Place Mall interchange. Finally, Multimodal solution T13 does not align with CARTA's recent ReDesign study. This recommendation was eliminated and Multimodal solution T21 was updated to add that regional transit access would likely require implementation of a Regional Transit Authority in the Chattanooga area.

3. Solutions Screening, Phase 2

The Phase 2 alternatives screening process utilized performance measures identified in Section 3 of Technical Memorandum 3 to further refine the list of feasible alternatives. Potential solutions that passed the Phase 1 Screening were evaluated against the following questions:

1. Does the proposed solution improve level of service on the interstate corridor?
2. Does the proposed solution improve peak hour travel speeds on the interstate corridor?
3. Does the proposed solution improve travel times between key origin and destination (O&D) pairs along the corridor?
4. Does the proposed solution improve peak hour densities at the improved interchange?
5. Does the proposed solution reduce average and max queues at the improved interchange?
6. Does the proposed solution have the potential to reduce crashes in safety hot spots?
7. Does the proposed solution address deficiencies in bridges with a low sufficiency rating?
8. Does the proposed solution increase pavement quality?
9. Does the proposed solution provide for pedestrian/bicycle connectivity and safety at interchanges?
10. Does the proposed solution provide additional truck parking opportunities, particularly in urban areas?
11. Does the proposed solution have the potential to reduce vehicle miles traveled (VMT)?
12. Does the proposed solution improve incident management?
13. Does the proposed solution provide potential economic development opportunities?

Projects which received only "NO" responses were eliminated and did not move forward as feasible multimodal solutions. As shown in Table 3-2, all projects passed the Phase 2 screening and moved forward to project prioritization.

Table 3-1. Phase 2 Alternative Screening Matrix — I-75

ID	Traffic Operations				Safety		Maintenance		Multimodal			TSM&O	Economy	
	Improves LOS on Interstate Corridor?	Improves Peak Hour Travel Speeds?	Improves Travel Times Between O&D Pairs?	Improves Peak hour Densities at Interchange?	Reduces Ramp Queuing onto Interstate?	Reduces Crashes in Safety Hot Spots?	Addresses Bridge Deficiency?	Increases Pavement Quality?	Improves Ped/Bike Connectivity or Safety?	Provides Additional Truck Parking?	Potential to Reduce VMT in the Corridor	Improves Incident Management?	Potential Economic Development Opportunity?	Project Moves Forward to Prioritization?
Safety														
S2: Speed limit reduction/warning signage/retroreflective markers (Jellico Mountain Area) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
S3: Extend length of southbound deceleration and northbound acceleration lanes (SR-63 (Oneida) Interchange) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
S4: Extend length of northbound and southbound deceleration lanes (SR-63 (Caryville) Interchange) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
S5: Add right-turn only lane on northbound off-ramp (SR-61 (Charles G Sievers Boulevard) Interchange) - Source: Data Analysis	N/A	N/A	N/A	Likely	YES	YES	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
S6: Add pavement markings to indicate lanes for I-40 junction (Western Avenue Interchange) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
S7: Extend length of northbound deceleration lane (US-321 Interchange) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
S8: Install additional lighting on northbound exit ramp (McMinn County Rest Area) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
S9: Increase length of northbound and southbound deceleration lanes; Install advanced signage for northbound off-ramp (SR-60 Interchange) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
S10: Install advanced signage and increase capacity on northbound exit ramp; Modify interchange to remove weave caused by loop ramps (SR-320 Interchange) - Source: Data Analysis	YES	YES	YES	YES	YES	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES

Table 3-1. Phase 2 Alternative Screening Matrix (cont.) — I-75

	ID	Traffic Operations				Safety		Maintenance		Multimodal			TSM&O	Economy	Project Moves Forward to Prioritization?
		Improves LOS on Interstate Corridor?	Improves Peak Hour Travel Speeds?	Improves Travel Times Between O&D Pairs?	Improves Peak hour Densities at Interchange?	Reduces Ramp Queuing onto Interstate?	Reduces Crashes in Safety Hot Spots?	Addresses Bridge Deficiency?	Increases Pavement Quality?	Improves Ped/Bike Connectivity or Safety?	Provides Additional Truck Parking?	Potential to Reduce VMT in the Corridor	Improves Incident Management?	Potential Economic Development Opportunity?	
Freight	F1: Add overnight truck parking in or near Chattanooga (Georgia State Line to Bradley County Line) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	YES	N/A	N/A	YES
Freight	F2: Resurface so that at least 90% of the corridor has good ride quality (Georgia State Line to Bradley County Line) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	YES
Freight	F3: Address bridge deficiency to maintain appropriate load carrying capacity (Tennessee River Bridge) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	YES
Freight	F6: Address bridge deficiency to maintain appropriate load carrying capacity (East Wolf Valley Road Interchange) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	YES
Freight	F7: Address bridge deficiencies to maintain appropriate load carrying capacity (Bruce Gap Road Bridge) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	YES
Multimodal	T9: Study to establish a Regional Transit Authority to provide inter-county transit service (Knox County) - Source: Knoxville Regional Transit Corridor Study	Likely	Likely	Likely	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	Likely	YES
Multimodal	T21: Study commuter route between Chattanooga and Cleveland (Hamilton and Bradley Counties) - Source: Data Analysis	Likely	Likely	Likely	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	Likely	YES
Multimodal	BP1: Study to identify bike/ped connectivity and safety at existing U.S. and State Route Interchanges - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES	N/A	N/A	YES
Multimodal	BP3: Trail Connector (Facilities west of I-75 and Camp Jordan Park)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES	N/A	N/A	YES

Table 3-1. Phase 2 Alternative Screening Matrix (cont.) — I-75

ID	Traffic Operations				Safety		Maintenance		Multimodal			TSM&O	Economy	Project Moves Forward to Prioritization?
	Improves LOS on Interstate Corridor?	Improves Peak Hour Travel Speeds?	Improves Travel Times Between O&D Pairs?	Improves Peak hour Densities at Interchange?	Reduces Ramp Queuing onto Interstate?	Reduces Crashes in Safety Hot Spots?	Addresses Bridge Deficiency?	Increases Pavement Quality?	Improves Ped/Bike Connectivity or Safety?	Provides Additional Truck Parking?	Potential to Reduce VMT in the Corridor	Improves Incident Management?	Potential Economic Development Opportunity?	
Capacity														
C1: Widen existing four lane section (US-64 Bypass/US-74 to SR-60) - Source: Data Analysis	YES	YES	YES	N/A	N/A	N/A	Likely	YES	N/A	N/A	N/A	Likely	N/A	YES
C2: Widen existing four lane section (SR-72 to I-40) - Source: Data Analysis/I-75 Corridor Feasibility Study	YES	YES	YES	N/A	N/A	N/A	YES	YES	N/A	N/A	N/A	Likely	N/A	YES
C4: Widen northbound to create an auxiliary lane (Western Avenue to I-275) - Source: Data Analysis	YES	YES	YES	N/A	N/A	N/A	Likely	YES	N/A	N/A	N/A	Likely	N/A	YES
C5: Construct auxiliary lane northbound between interchanges (Callahan Drive to SR-131) - Source: Data Analysis	YES	YES	YES	YES	YES	N/A	Likely	YES	N/A	N/A	N/A	Likely	N/A	YES
C6: Widen existing four lane section; consider truck climbing lanes (SR-170 to US-441) - Source: Data Analysis, TN Freight Plan (2018), I-75 Corridor Feasibility Study	YES	YES	YES	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	Likely	N/A	YES
C7: Widen northbound lanes; consider truck climbing lanes (US-441 to SR-63) - Source: Data Analysis	YES	YES	YES	N/A	N/A	N/A	YES	YES	N/A	N/A	N/A	Likely	N/A	YES
C8: Widen/Apply TSM&O and/or Arterial Management Strategies to address forecasted congestion (I-75/I-24 Interchange to Georgia State Line) - Source: Data Analysis, TN Freight Plan (2018), Chatt-Hamilton Co/N Georgia 2045 RTP Update)	YES	YES	YES	YES	Likely	N/A	N/A	YES	N/A	N/A	N/A	Likely	N/A	YES
C9: Evaluate options for increasing capacity and improving merge/diverge and weave areas between the SR-320 and SR-153 interchanges - Source: Data Analysis	YES	YES	YES	YES	N/A	YES	Likely	YES	N/A	N/A	N/A	Likely	N/A	YES
C10: Widen northbound to create auxiliary lane (Merchants Drive to Callahan Drive) - Source: Data Analysis	YES	YES	YES	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	Likely	N/A	YES

Table 3-1. Phase 2 Alternative Screening Matrix (cont.) — I-75

ID	Traffic Operations				Safety		Maintenance		Multimodal			TSM&O	Economy	Project Moves Forward to Prioritization?
	Improves LOS on Interstate Corridor?	Improves Peak Hour Travel Speeds?	Improves Travel Times Between O&D Pairs?	Improves Peak hour Densities at Interchange?	Reduces Ramp Queuing onto Interstate?	Reduces Crashes in Safety Hot Spots?	Addresses Bridge Deficiency?	Increases Pavement Quality?	Improves Ped/Bike Connectivity or Safety?	Provides Additional Truck Parking?	Potential to Reduce VMT in the Corridor	Improves Incident Management?	Potential Economic Development Opportunity?	
TSM&O														
TS1: Signal coordination on adjacent spillover streets to manage on- and off-ramp congestion (Brainerd Road, Shallowford Road, Harrison Road, Kingston Pike, Central Ave Pike) - Source: Public/Stakeholder	Likely	Likely	Likely	YES	YES	Likely	N/A	N/A	Likely	N/A	N/A	N/A	N/A	YES
TS2: Study to evaluate correlation between travel speed and crash severity (I-75 & adjacent, parallel arterials) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
TS3: Integrated Corridor Management, with real-time technology platform (Ringgold Road to Shallowford Road) - Source: Public/Stakeholder	Likely	Likely	Likely	N/A	N/A	Likely	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
TS4: Evaluate locations that would benefit from ramp metering and queue detection systems (Hamilton & Knox Counties) - Source: Public/Stakeholder	Likely	Likely	Likely	Likely	N/A	Likely	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
TS6: Evaluate balanced alternative routing opportunities (Hamilton County) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Likely	YES	N/A	YES
Economic Development														
ED1: Evaluate need for additional interstate access point to accommodate economic growth (SR-60 to SR-74) - Source: Public/Stakeholder	N/A	N/A	N/A	Likely	Likely	Likely	N/A	N/A	Likely	N/A	N/A	N/A	YES	YES
ED2: Evaluate need for new interchange to accommodate growth (Ooltewah to Cleveland) - Source: Public/Stakeholder	N/A	N/A	N/A	Likely	Likely	Likely	N/A	N/A	Likely	N/A	N/A	N/A	YES	YES

4. Priority Settings and Phasing

Approach and Methodology

The prioritization settings developed for this study build on the goals and objectives detailed in Technical Memorandum 3 and summarized in Table 4-1. Aligning with previous TDOT multimodal corridor studies, the prioritization methodology for this study addresses coordinated construction efforts (priority given to projects that could be accomplished simultaneously at a given location) and culminates in a benefit-cost index for each project, which recognizes that the relative multimodal benefit of each project compared to the estimated financial investment. Consistency with TDOT and MPO programmed projects has been maintained throughout the alternative development process, having identified such projects as part of the Trend Scenario in Technical Memorandum 2.

The most recent TDOT multimodal corridor study introduced a flexible decision-making support tool wherein weights can be applied to priority settings based on policy, programming, and political decisions. The prioritization criteria and measures for the I-75 corridor are structured in a similar fashion, such that weights can be applied by decision-makers. As indicated in Table 4-2, solutions developed for the I-75 corridor were evaluated over six categories: mobility, safety, economic development, system maintenance, implementation and cost efficiency. Specific criteria used to measure solutions by mode/strategy are discussed in the following section.

Table 4-1. Performance Goals and Objectives — I-75

Goals	Objectives		
Provide efficient and reliable travel	Improve travel times and reduce delay	Provide transportation options for people and freight	Optimize freight movement
Improve safety conditions	Reduce crash rates along the corridor – especially at identified crash "hot spots"	Implement or upgrade technologies that promote safety and effective incident management	Improve bicycle and pedestrian accommodations
Coordinate transportation investments with economic development plans	Improve interchange on/ off ramps	Coordinate with MPOs/ RPOs to determine areas where new/improved Interstate access is needed	
Invest equitably throughout the corridor	Expand transportation options for traditionally underserved populations within the corridor	Consider regional transit options	Identify areas with the greatest data-driven needs
Protect the natural environment and sensitive resources within the corridor	Identify transportation improvements that are not likely to result in major impacts to environmental, social, and cultural resources		

Table 4-2. Prioritization Criteria and Measures by Mode and Strategy — I-75

Mode/ Strategy	Mobility	Safety	Economic Development	System Maintenance	Implementation	Cost Efficiency
Highway Capacity	2040 Trend V/C	Crash Rate (Relative to Statewide Avg)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Build V/C	Project improves incident management (Y/N)	2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit
Safety	2040 Trend V/C	Crash Rate (Relative to Statewide Avg)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Build V/C	Project improves incident management (Y/N)	2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit
		Crash Reduction Potential				
TSM&O	2040 Trend V/C	Crash Rate (Relative to Statewide Avg)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Build V/C	Project improves incident management (Y/N)	2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit
Freight	2040 Trend V/C	Project improves incident management (Y/N)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Build V/C		2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit
	% Trucks			Provides truck parking (Y/N)		
Multimodal	2020 Population	Project improves incident management (Y/N)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Population		2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit
Economic Development	2020 Population	Project improves incident management (Y/N)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Population		2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit

Prioritization Criteria and Measures

Mobility

Appropriate measures for mobility differ across modes/strategies. While the volume-to-capacity (V/C) ratio is appropriate for measuring highway capacity, it does not capture mobility for bicycles and pedestrians, for example. As shown in Table 4-2, comparison of the 2040 Trend V/C ratio versus the 2040 Build V/C ratio was used as a measure of mobility for highway capacity, safety, TSM&O, and Freight projects. Numeric scores 1, 2, and 3, were recorded based on the following thresholds, which consider the resulting change in V/C and, for freight projects, the percent trucks on the adjacent section of interstate:

Capacity, Safety, TSM&O

1 = No improvement to mobility

2 = Likely improvement to mobility

3 = Definite improvement to mobility

Freight

1 = No improvement to mobility

2 = Improvement to mobility, % trucks < 20%

3 = Improvement to mobility, % trucks > 20%

Comparison of 2020 population versus 2040 population within three miles of each project was used for multimodal and economic development projects. Population numbers were obtained via the Tennessee Statewide Travel Demand Model (TSM) and by traffic analysis zone. Resulting numeric scores were based on the following thresholds:

Multimodal, Economic Development

1 = 0-10% Increase

2 = 10-15% Increase

3 = 15% + Increase

Where criterion could not be measured and "N/A" was noted, engineering judgement was used to score the project's potential for mobility improvement within the applicable thresholds.

Safety

Criterion used to measure the potential safety improvement for each project also vary across mode/strategy. One measure common to all was a "yes" or "no" response to the question "Does the project improve incident management?" For freight, multimodal and economic development projects, this was the only measure used for safety. Thresholds were applied as follows:

Freight, Multimodal, Economic Development

1 = N/A

2 = No

3 = Yes

Building upon hot spot calculations from Technical Memorandum 2, capacity, safety, and TSM&O projects are measured by the relative crash rate as well. The impact of safety projects is further refined by the crash reduction potential, which was determined in Technical Memorandum 3. The following thresholds were applied:

Capacity, TSM&O

1 = Crash rate < statewide average crash rate[1]

2 = Crash rate > statewide average crash rate; Does not improve incident management

3 = Crash rate > statewide average crash rate; Improves incident management

Safety

1 = Crash rate < statewide average crash rate

2 = Crash rate > statewide average crash rate; Below average crash reduction potential

3 = Crash rate > statewide average crash rate; Above average crash reduction potential OR Improves incident management

Where criterion could not be measured and "N/A" was noted, engineering judgement was used to score the project's potential for safety improvement within the applicable thresholds.

Economic Development

The economic development potential of each project was measured by the projected change in employment from 2020 to 2040 within three miles of each project. Employment projections were obtained via the TSM and by traffic analysis zones. The following thresholds were used to score each project.

Capacity, Safety, TSM&O, Freight, Multimodal, Economic Development

1 = 10-20% increase

2 = 20-25% increase

3 = 25%+ increase

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.

System Maintenance

System maintenance was added as a measure for the I-75 corridor prioritization to recognize opportunities where projects will also address existing bridge and/or pavement deficiencies. The following thresholds were used to score each project, given "yes" or "no" responses to the questions "Project addresses bridge deficiency?" and "Project addresses pavement deficiency?'. For freight projects, an additional "yes" / "no" question was added: "Project provides truck parking?".

Capacity, Safety, TSM&O, Multimodal, Economic Development

1 = No to both

2 = Yes to one

3 = Yes to both

Freight

1 = No to all

2 = Yes to one

3 = Yes to all

Implementation

The implementation measure was included to give priority to projects that could be constructed or initiated in conjunction with other projects, thus conserving the time and money associated with multiple, individual contracts. Figures 4-1 illustrates the relative proximity of the multimodal solutions prioritized for the I-75 corridor. The following thresholds were utilized to score the implementation of each project:

Capacity, Safety, TSM&O, Freight, Multimodal, Economic Development

1 = 0 overlapping projects

2 = 1 or 2 overlapping projects

3 = 3+ overlapping projects

Cost Efficiency

For the I-75 corridor project prioritization, a benefit-cost index and a dollar-per-benefit was calculated for each solution. These measures which capture the benefit of each prioritization criteria and compare the total relative benefit to the estimated project cost. Specifically, the score assigned to each of the five prioritization criteria were summed to represent the total relative benefit of each project. To calculate the benefit-cost index, this total relative benefit was divided by the cost (in millions) estimated for each project. The dollar-per-benefit is simply the cost estimate divided by the total benefit score. Note that cost estimates were prepared for solutions that recommend further study. However, because the total benefit represents the potential of the associated capital improvement, no direct benefit-cost index or dollar-per-benefit was calculated for these solutions.

Figure 4-1a. Relative Proximity of Multimodal Solutions (north) — I-75

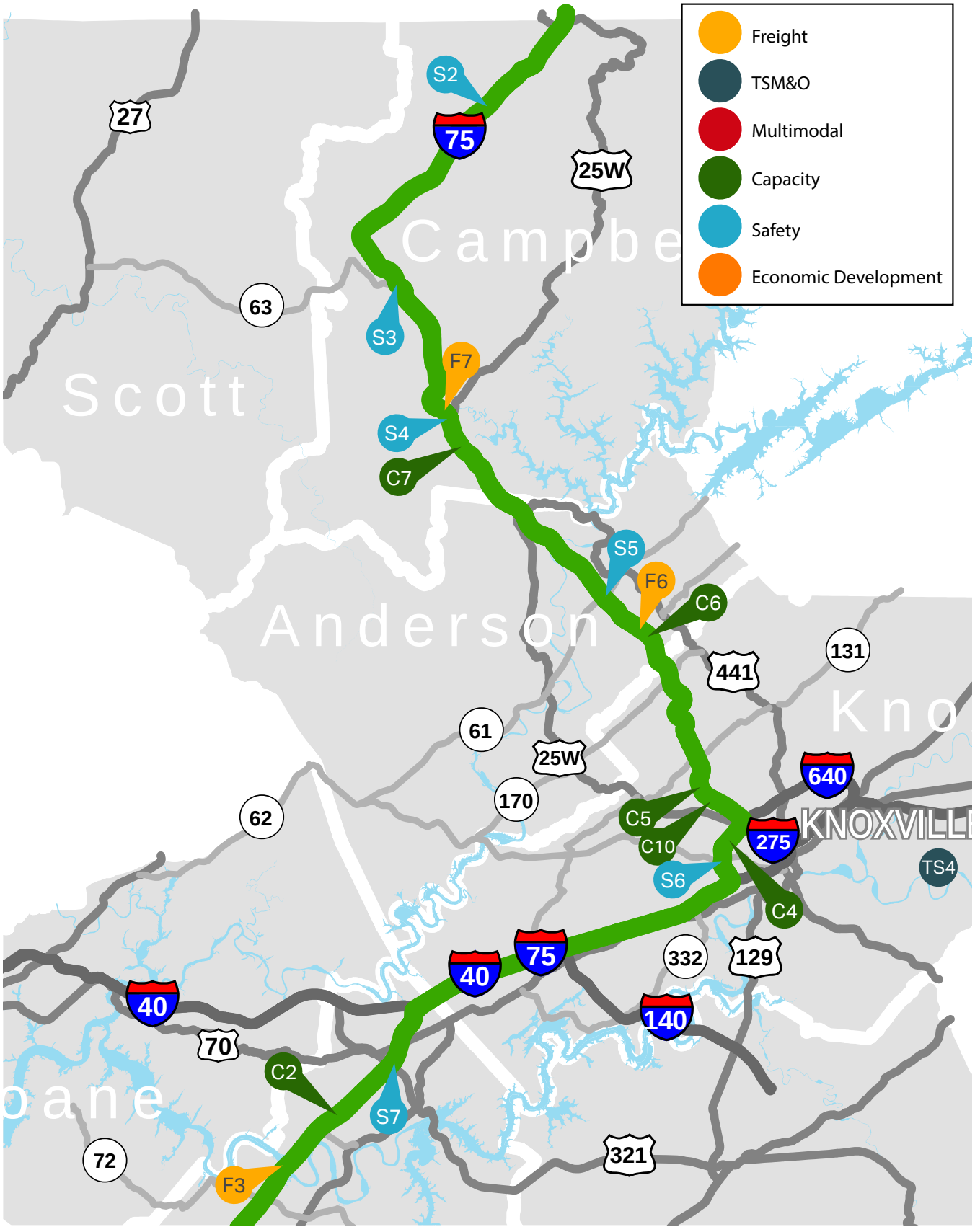
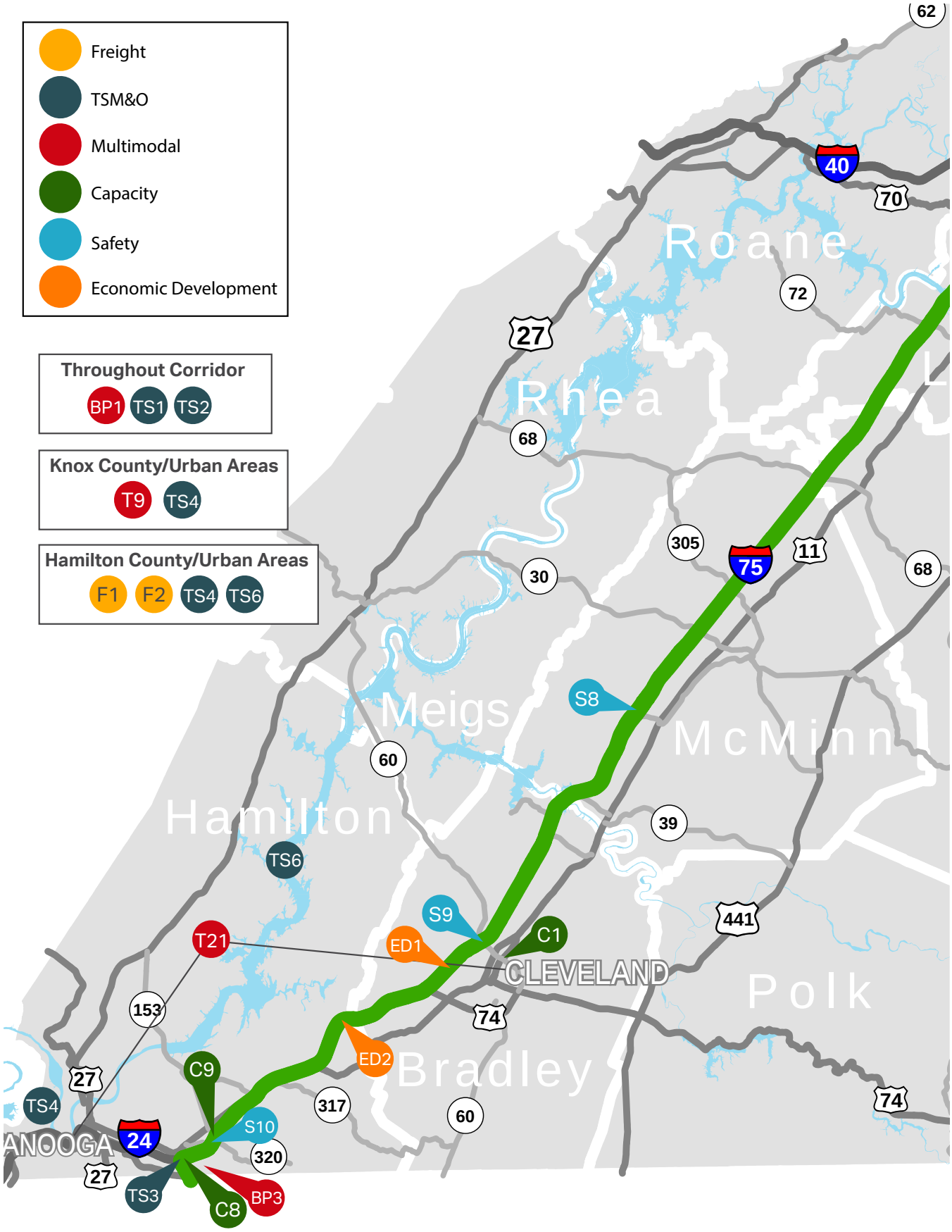


Figure 4-1b. Relative Proximity of Multimodal Solutions (south) — I-75



5. Project Rankings

When evaluated side-by-side, the total benefit score, benefit-cost index, and dollar-per-benefit indicate projects with high benefit that can be implemented with smaller financial investment. The project rankings are discussed per mode/strategy below. Tables 5-1 through 5-6 detail the prioritization effort and rank the projects by the total benefit score, which ranges from 5 (lowest) to 15 (highest).

Project Rankings by Mode and Strategy

Highway Capacity

As shown in Table 5-1, each of the Capacity solutions score a high total benefit (11+). Due to the project lengths and cost associated with widenings, these projects have low benefit-cost indexes. Capacity solution C2 received the highest possible total benefit score, reflective of its benefit to mobility, safety, economic development, system maintenance, as well as its relation to other projects including S7, F3, and TS1. The total cost for widening this 12.7 mile section of I-75 is estimated at $108,000,000, which includes widening of 15 bridges - the structurally deficient Tennessee River Bridge accounting for the highest costs. It should also be noted that according to the Knoxville TPO, the Loudon County representative has recently introduced to the TPO Technical Committee the need for a truck-climbing lane on I-75 northbound north of U.S. 321. Evaluation of a truck climbing lane at this location should be included in further analyses of Capacity solution C2.

Safety

Safety solution S5 (addition of right turn lane on the northbound off-ramp at SR-61) boasts a high total benefit score as well as a high benefit-cost index. This solution is relatively low cost, yet has the potential to significantly improve mobility and safety on I-75 and impacts a growing employment population. Safety solutions S10, S6, S7, and S9 also received high total benefit scores, with S6 also receiving a very high benefit-cost-index.

TSM&O

As shown in Table 5-3, four of the five TSM&O solutions scored high total benefit numbers. Signal coordination on adjacent spillover arterial streets (TS1) and integrated corridor management in the Chattanooga area (TS3) also showed positive benefit-cost indexes.

Freight

Addressing structural deficiencies on the Tennessee River Bridge in Loudon County (F3) and on the East Wolf Valley Road Bridge in Anderson County (F6) received high total benefit scores. Due to the size and environmental mitigation factors associated with improvements to the Tennessee River Bridge, the benefit-cost index for F3 was much lower than that of F6.

Multimodal

As indicated in Table 5-5, a study to evaluate existing pedestrian and bicycle connectivity/accommodations at U.S. and state route crossings (BP1) scored the highest total benefit among multimodal solutions. The resulting study should consider the factors listed in Section 9 of Technical Memorandum 3 as well as local initiatives, such as Cleveland's recent multi-modal access grant for a mutli-use path on SR-60 near the interchange. In addition to BP1, multimodal solution T9 (study to establish a Regional Transit Authority in Knox County) also received a high total benefit score.

Economic Development

Both Economic Development solutions, ED1 and ED2, received high total benefit scores of 11. New access points in the Cleveland area and between Ooltewah and Cleveland would benefit these two distinct areas of growing population and employment.

Table 5-1. Capacity Improvements- Project Rankings — I-75

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety			Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2040 Trend V/C	2040[2] Build V/C	Score	Crash Rate	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
C2	Widen existing four lane section	SR-72	I-40	12.7	1.0+	0.7-0.8	3	10.68	Y	3	54,998	72,498	3	Y	Y	3	3	3	15	$108,000,000	0.14	$7,200,000
C4	Widen existing six lane section	Western Avenue	I-275	2.3	0.9-1.0	0.7-0.8	3	1.72	Y	3	156,436	195,589	3	Y	Y	3	2	2	14	$16,600,000	0.84	$1,185,714
C5	Construct auxiliary lane NB between interchanges	Callahan Drive	SR-131	1.7	0.9-1.0	0.7-0.8	3	3.23	Y	3	39,562	55,718	3	Y	Y	3	1	2	14	$15,700,000	0.89	$1,121,429
C7	Widen NB lanes; consider truck climbing lanes	US-441	SR-63	6.4	0.9-1.0	0.7-0.8	3	2.63	Y	3	15,427	20,766	3	Y	Y	3	1	2	14	$77,900,000	0.18	$5,564,286
C1	Widen existing four lane section	US-64 Bypass/ US-75	SR-60	4.5	0.9-1.0	0.0-0.7	3	1.59	Y	3	48,724	60626	2	Y	Y	3	2	2	13	$40,700,000	0.32	$3,130,769
C6	Widen existing four lane section; consider truck climbing lanes	SR-170	US-441	11.3	0.9-1.0	0.7-0.8	3	8.97	Y	3	38,982	54,581	3	N	Y	2	2	2	13	$131,700,000	0.10	$10,130,769
C9	Evaluate options for increasing capacity and improving merge/ diverge and weave areas between the SR-320 and SR-153 interchanges.	SR-320	SR-153	0.8	1.0+	0.8-0.9*	3	9.50	Y	3	64,289	71,947	1	Y	Y	3	5	3	13	$200,000	N/A	N/A
C8	Widen/Apply TSM&O and/or Arterial Management Strategies to address forecasted congestion	I-75/I-24 Interchange	GA State Line	1.4	1.0+	0.8-0.9	3	6.27	Y	3	39,241	43,357	1	N	Y	2	3	3	12	$8,110,000	1.48	$675,800
C10	Widen northbound to create auxiliary	Merchants Drive	Callahan Drive	1.7	1.0+	0.8-0.9	3	0.78	Y	1	58,633	77,781	3	N	Y	2	2	2	11	$9,850,000	1.12	$895,500

*Assumes solution will improve V/C by two "levels"

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	Crash Rate < Statewide Avg[1]	1 =	10-20% Increase	1 =	No to ALL	1 =	0													
2 =	Likely improvement to mobility	2 =	Crash Rate > Statewide Avg, Does not Improve Incident Management	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2													
3 =	Definite improvement to mobility	3 =	Crash Rate > Statewide Avg, Improves Incident Management	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+													

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.
2- Values reflect culmination of projects in 2040 Build conditions. The mobility improvement may not be attributed to an individual project. Impact of the individual project on the Build V/C ratio is indicated by the assigned Mobility score.

Table 5-2. Safety Improvements- Project Rankings — I-75

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety				Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2040 Trend V/C	2040[2] Build V/C	Score	Crash Rate	Improves Incident Mgmt (Y/N)	Crash Reduction Potential	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
S5	Add right-turn only lane on NB off-ramp	SR-61 (Charles G Seivers Blvd) Interchange		N/A	0.9-1.0	0.7-0.8	2	8.97	Y	Below Avg	3	7,646	10,990	3	N	N	1	2	2	11	$406,000	27.09	$36,909
S10	Install advanced signage and increase capacity of NB exit ramp; Modify interchange to remove weave caused by loop ramps	SR-320 (Brainerd Rd) Interchange		N/A	1.0+	0.9-1.0*	3	4.13	N	Above Avg	3	61,546	68,749	1	N	N	1	6	3	11	$15,000,000	0.73	$1,363,636
S6	Add pavement markings to indicate lanes for I-40 junction	Western Ave Interchange		N/A	0.9-1.0	0.7-0.8	1	1.72	N	Above Avg	3	141,467	174,872	2	N	N	1	3	3	10	$9,090	1,100.11	$909
S7	Extend length of NB deceleration lane	US-321 Interchange		N/A	0.9-1.0	0.7-0.8	2	10.68	N	Below Avg	2	13,359	18,475	3	N	N	1	2	2	10	$1,740,000	5.75	$174,000
S9	Increase length of NB and SB deceleration lane; Install advanced signage for NB off-ramp	SR-60 Interchange		N/A	0.9-1.0	0.0-0.7	2	5.98	N	Below Avg	2	44,883	55,884	2	N	N	1	3	3	10	$2,160,000	4.63	$216,000
S3	Extend length of SB deceleration and NB acceleration lanes	SR-63 (Oneida) Interchange		N/A	0.0-0.7	0.0-0.7	2	2.67	N	Below Avg	2	8,082	10,031	2	N	N	1	2	2	9	$2,100,000	4.29	$233,333
S4	Extend length of NB and SB deceleration lanes	SR-63 (Caryville) Interchange		N/A	0.0-0.7	0.0-0.7	2	1.47	N	Below Avg	2	6,809	8,297	2	N	N	1	2	2	9	$2,100,000	4.29	$233,333
S2	Speed limit reduction / warning signage/ retroreflective markers	Jellico Mountain Area		23	0.0-0.7	0.0-0.7	1	3.80	N	Below Avg	2	13,917	16,808	2	N	N	1	1	2	8	$262,000	30.53	$32,750
S8	Install additional lighting on NB exit ramp	McMinn County Rest Area		N/A	0.7-0.8	0.7-0.8	1	1.23	N	Above Avg	3	24,001	28,460	1	N	N	1	0	1	7	$75,900	92.23	$10,843

*Assumes solution will improve V/C by one "level"

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	Crash Rate < Statewide Avg[1]	1 =	15-20% Increase	1 =	No to Both	1 =	0
2 =	Likely improvement to mobility	2 =	Crash Rate > Statewide Avg, Below Avg Potential	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Definite improvement to mobility	3 =	Crash Rate > Statewide Avg, Improves Incident Mgmt OR Above Avg Potential	3 =	25-30% Increase	3 =	Yes to Both	3 =	3+

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.
2- Values reflect culmination of projects in 2040 Build conditions. The mobility improvement may not be attributed to an individual project. Impact of the individual project on the Build V/C ratio is indicated by the assigned Mobility score.

Table 5-3. TSM&O Improvements- Project Rankings — I-75

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety			Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2040 Trend V/C	2040[2] Build V/C	Score	Crash Rate	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
TS4	Evaluate locations that would benefit from ramp metering and queue detection systems	Urban Areas of Chattanooga and Knoxville		N/A	N/A	N/A	2	10.68	Y	3	644,423	807,547	3	N	N	1	9	3	12	$250,000	N/A	N/A
TS1	Signal coordination on adjacent spillover streets to manage on-and off-ramp congestion	Brainerd Rd, Shallowford Rd, Harrison Rd, Kingston Pk, Central Ave Pk		N/A	N/A	N/A	3	9.50	N	2	309,821	386,662	2	N	N	1	6	3	11	$1,410,000	7.80	$128,182
TS3	Integrated Corridor Management (with real-time technology platform)	Ringgold Rd	Shallowford Rd	N/A	0.9-1.0+	0.9-1.0*	3	9.50	Y	3	79,634	94,105	1	N	N	1	6	3	11	$3,000,000	3.7	$272,700
TS6	Evaluate balanced alternative routing opportunities	Hamilton County		N/A	N/A	N/A	2	10.68	Y	3	644,423	807,547	3	N	N	1	2	2	11	$100,000	N/A	N/A
TS2	Conduct study to evaluate correlation between travel speed and crash severity	I-75 and adjacent, parallel arterials		N/A	N/A	N/A	1	9.50	N	2	109,423	128,541	1	N	N	1	0	1	6	$25,000	N/A	N/A

*Assumes solution will improve V/C by one "level"

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	Crash Rate < Statewide Avg[1]	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	Likely improvement to mobility	2 =	Crash Rate > Statewide Avg, Does not Improve Incident Management	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Definite improvement to mobility	3 =	Crash Rate > Statewide Avg, Improves Incident Management	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.
2- Values reflect culmination of projects in 2040 Build conditions. The mobility improvement may not be attributed to an individual project. Impact of the individual project on the Build V/C ratio is indicated by the assigned Mobility score.

Table 5-4. Freight Improvements- Project Rankings — I-75

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility				Safety		Economic Development			System Maintenance				Implementation		Total Benefit	Cost Efficiency		
					2040 Trend V/C	2040[2] Build V/C	% Trucks	Score	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Provides Truck Parking (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
F3	Address bridge deficiency to maintain appropriate load carrying capacity	Tennessee River Bridge		N/A	0.9-1.0	0.7-0.8	25	1	N	2	20,087	26,678	3	Y	N	N	2	1	2	10	$11,600,000	0.86	$1,160,000
F6	Address bridge deficiency to maintain appropriate load carrying capacity	East Wolf Valley Rd Bridge		N/A	0.9-1.0	0.7-0.8	26	1	N	2	36,695	51,642	3	Y	N	N	2	1	2	10	$1,230,000	8.13	$123,000
F2	Resurface so that at least 90% of the corridor has good ride quality	GA State Line	Bradley Co Line	16	N/A	N/A	N/A	1	N	2	114,843	135,171	1	N	Y	N	2	2	2	8	$10,400,000	0.77	$1,300,000
F7	Address bridge deficiency to maintain appropriate load carrying capacity	Bruce Gap Road Bridge		N/A	0.7-0.8	0.7-0.8	29	1	N	2	11,816	14,449	2	Y	N	N	2	0	1	8	$903,000	8.86	$112,875
F1	Add overnight truck parking in or near Chattanooga	GA State Line	Bradley Co Line	N/A	N/A	N/A	N/A	1	N	2	114,843	135,171	1	N	N	Y	2	0	1	7	$1,270,000	5.5	$181,400

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	N/A	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	Improvement to mobility, % Trucks >15	2 =	No	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Improvement to mobility, % Trucks <15	3 =	Yes	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

1- Values reflect culmination of projects in 2040 Build conditions. The mobility improvement may not be attributed to an individual project. Impact of the individual project on the Build V/C ratio is indicated by the assigned Mobility score.

Table 5-5. Multimodal Improvements- Project Rankings — I-75

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety		Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2020 Population	2040 Population	Score	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
BP1	Study to identify bike/ped connectivity and safety at existing U.S. and SR interchanges	Throughout Corridor		N/A	948,023	1,130,315	3	N	2	644,423	807,547	3	N	N	1	7	3	12	$100,000	N/A	N/A
T9	Study to establish a Regional Transit Authority to provide inter-county transit service	Knox County		N/A	341,499	412,835	3	N	2	290,163	375,144	3	N	N	1	0	1	10	$250,000	N/A	N/A
T21	Study commuter route between Chattanooga and Cleveland. Regional transit access would likely require implementation of a Regional Transit Authority	Chattanooga	Cleveland	27	153,501	174,576	2	N	2	109,423	128,541	1	N	N	1	2	2	8	$100,000	N/A	N/A
BP3	Trail connector	Facilities west of I-75	Camp Jordan Park	N/A	106,859	121,264	2	N	2	88,792	98,814	1	N	N	1	2	2	8	$7,290,000	1.10	$911,250

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	0-10% Increase	1 =	N/A	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	10-15% Increase	2 =	No	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	15-20% Increase	3 =	Yes	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

Table 5-6. Economic Development Improvements- Project Rankings — I-75

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety		Economic Development			System Maintenance			Implementation		Total Benefit	Cost Efficiency		
					2020 Population	2040 Population	Score	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score		Cost Estimate	Benefit Cost Index	Dollar per Benefit
ED1	Evaluate need for additional interstate access point to accommodate economic growth	SR-60	SR-74	N/A	68,252	83,715	3	N	2	48,724	60,626	2	N	N	1	4	3	11	$100,000	N/A	N/A
ED2	Evaluate need for new interchange to accommodate growth (consider existing overpass for Ooltewah/ Georgetown Rd)	Ooltewah	Cleveland	N/A	173,333	206,783	3	N	2	94,581	120,234	3	N	N	1	2	2	11	$100,000	N/A	N/A

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	0-10% Increase	1 =	N/A	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	10-15% Increase	2 =	No	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	15-20% Increase	3 =	Yes	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

6. Key Findings

As a result of the "1-2-3 bin" structure of this prioritization system, all projects have a potential total benefit range of 5-15, and can therefore be compared across modes/strategies. Table 6-1 tabulates all solutions for the I-75 corridor, sorted by total benefit score. Solutions which recommend studies are shown in Table 6-2. Projects with the highest total benefit scores have demonstrated benefit to mobility, safety, economic development, system maintenance, and implementation. Capacity solutions C2, C4, C5, and C7 each received 14+ total benefit scores. These benefits come with high dollar per benefit values reflective of multi-mile widening projects. Safety solutions S5 and S6 also received high total benefit scores and as a result of low estimated costs, have two of the highest benefit-cost indexes. Use of Table 6-1 in conjunction with Figure(s) 4-1a-b can be used to inform decisions on fund allocation and construction packages. As mentioned previously, weights can easily be applied to the prioritization criteria in Tables 5-1 through 5-6 to adjust for policy, programming, and political decisions.

Table 6-1. Project Ranking Across all Modes/Strategies — I-75

ID	Project Description	Termini	Cost Efficiency			
			Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
C2	Widen existing four lane section	SR-72 to I-40	15	$108,000,000	0.1	$7,200,000
C4	Widen existing six lane section	Western Avenue to I-275	14	$16,600,000	0.8	$1,185,700
C5	Construct auxiliary lane NB between interchanges	Callahan Drive to SR-131	14	$15,700,000	0.9	$1,121,400
C7	Widen NB lanes; consider truck climbing lanes	US-441 to SR-63	14	$77,900,000	0.2	$5,564,300
C1	Widen existing four lane section	US-64 Bypass/US-75 to SR-60	13	$40,700,000	0.3	$3,130,800
C6	Widen existing four lane section; consider truck climbing lanes	SR-170 to US-441	13	$131,700,000	0.1	$10,130,800
C8	Widen/Apply TSM&O and/or Arterial Management Strategies to address forecasted congestion	I-75/I-24 Interchange to GA State Line	12	$8,110,000	1.5	$675,800
S5	Add right-turn only lane on NB off-ramp	SR-61 (Charles G Seivers Blvd) Interchange	11	$406,000	27.1	$37,000
S10	Install advanced signage and increase capacity of NB exit ramp; Modify interchange to remove weave caused by loop ramps	SR-320 (Brainerd Rd) Interchange	11	$15,000,000	0.7	$1,363,600
TS1	Signal coordination on adjacent spillover streets to manage on- and off-ramp congestion	Brainerd Rd, Shallowford Rd, Harrison Rd, Kingston Pk, Central Ave Pk	11	$1,410,000	7.8	$128,200
TS3	Integrated Corridor Management (with real-time technology platform)	Ringgold Rd to Shallowford Rd	11	$ 3,000,000	3.7	$272,700
C10	Widen northbound to create auxiliary lane	Merchants Drive to Callahan Drive	11	$9,850,000	1.1	$895,500
S6	Add pavement markings to indicate lanes for I-40 junction	Western Ave Interchange	10	$9,090	1,100.1	$900
S7	Extend length of NB deceleration lane	US-321 Interchange	10	$1,740,000	5.8	$174,000
S9	Increase length of NB and SB deceleration lane; Install advanced signage for NB off-ramp	SR-60 Interchange	10	$2,160,000	4.6	$216,000
F3	Address bridge deficiency to maintain appropriate load carrying capacity	Tennessee River Bridge	10	$11,600,000	0.9	$1,160,000
F6	Address bridge deficiency to maintain appropriate load carrying capacity	East Wolf Valley Rd Bridge	10	$1,230,000	8.1	$ 123,000
S3	Extend length of SB deceleration and NB acceleration lanes	SR-63 (Oneida) Interchange	9	$2,100,000	4.3	$233,300
S4	Extend length of NB and SB deceleration lanes	SR-63 (Caryville) Interchange	9	$2,100,000	4.3	$233,300

Table 6-1. Project Ranking Across all Modes/Strategies — I-75

ID	Project Description	Termini	Cost Efficiency			
			Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
S2	Speed limit reduction / warning signage/ retroreflective markers	Jellico Mountain Area	8	$262,000	30.5	$32,800
F2	Resurface so that at least 90% of the corridor has good ride quality	GA State Line to Bradley Co Line	8	$10,400,000	0.8	$1,300,000
F7	Address bridge deficiency to maintain appropriate load carrying capacity	Bruce Gap Road Bridge	8	$903,000	8.9	$112,900
BP3	Trail connector	Facilities west of I-75 to Camp Jordan Park	8	$7,290,000	1.1	$911,300
S8	Install additional lighting on NB exit ramp	McMinn County Rest Area	7	$75,900	92.2	$10,800
F1	Add overnight truck parking in or near Chattanooga	GA State Line to Bradley Co Line	7	$1,270,000	5.5	$181,400

Table 6-2. Project Ranking Across all Modes/Strategies (Studies) — I-75

ID	Project Description	Termini	Cost Efficiency			
			Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
C9	Evaluate options for increasing capacity and improving merge/ diverge and weave areas between the SR-320 and SR-153 interchanges.	SR-320 to SR-153	13	$200,000	N/A	N/A
BP1	Study to identify bike/ped connectivity and safety at existing U.S. and SR interchanges	Throughout Corridor	12	$100,000	N/A	N/A
TS4	Evaluate locations that would benefit from ramp metering and queue detection systems	Urban Areas of Chattanooga and Knoxville	12	$250,000	N/A	N/A
TS6	Evaluate balanced alternative routing opportunities	Hamilton County	11	$100,000	N/A	N/A
ED1	Evaluate need for additional interstate access point to accommodate economic growth	SR-60 to SR-74	11	$100,000	N/A	N/A
ED2	Evaluate need for new interchange to accommodate growth (consider existing overpass for Ooltewah/ Georgetown Rd)	Ooltewah to Cleveland	11	$100,000	N/A	N/A
T9	Study to establish a Regional Transit Authority to provide inter-county transit service	Knox County	10	$250,000	N/A	N/A
T21	Study commuter route between Chattanooga and Cleveland. Regional transit access would likely require implementation of a Regional Transit Authority	Chattanooga to Cleveland	8	$100,000	N/A	N/A
TS2	Conduct study to evaluate correlation between travel speed and crash severity	I-75 and adjacent, parallel arterials	6	$25,000	N/A	N/A

I-26 Corridor

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I-26 Corridor

1. Introduction

The I-26 corridor serves as a backbone for economic development and growth in the northeast Tennessee region. As population and employment continue to grow and redevelopment changes the face of the region, new travel demands place pressure on the Interstate as well as parallel and intersecting highways. This results in increased traffic congestion, travel times, and conflicts, which threaten the corridor's ability to sustain future growth.

A previous technical memorandum (Technical Memorandum 1) provided a data and information inventory for the corridor. Technical Memorandum 2 assessed existing and future deficiencies and needs along the I-26 corridor, focusing on traffic operations, safety, and multimodal conditions. In Technical Memorandum 3, goals and performance measures were used to assess the effectiveness of various solutions to the problems – resulting in a universe of alternatives for the I-26 corridor. Technical Memorandum 4 filters the I-26 universe of alternatives through a solution screening and prioritization process (see Figure 1-1). This process evaluates solutions based on their impact on mobility and safety, potential environmental impacts, cost, and potential economic impacts. Ultimately, the prioritized solutions both resolve the identified deficiencies and have a high benefit/cost ratio.

2. Solutions Screening, Phase 1

The Phase 1 solutions screening process was intended to eliminate solutions with evident fatal flaws. To do so, each possible solution was evaluated against the following questions:

1. Does the proposed solution make sense given the identified deficiency?
2. Does the proposed solution align with other planned or programmed projects in the area?
3. Is the proposed solution supported by stakeholders and the public?
4. Does the proposed solution negatively impact environmental features such as wetlands, rare or protected species, or superfund sites?
5. Does the proposed solution negatively impact cultural features such as sensitive community populations, historic sites, public lands, or community institutions?

Projects which received a "NO" response for questions 1, 2, or 3, or a "YES" response for questions 4 or 5 were eliminated and did not move forward to the Phase 2 solutions screening. Exceptions include projects where the potential is high for environmental/cultural impact mitigation. As shown in Table 2-1, two I-26 solutions were eliminated in the Phase I solutions screening process – both because the recommended infrastructure is already in place.

Figure 1-1. Solutions Screening and Prioritization Process

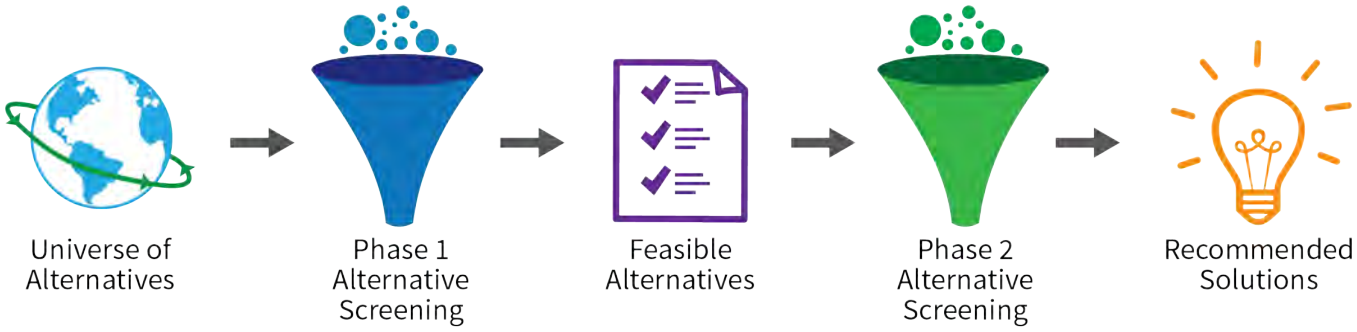


Table 2-1. Phase 1 Alternative Screening Matrix — I-26

	ID	Logical?	Align with Planned/ Programmed Projects?	Supported by Stakeholders/ Public?	Potential Environmental or Cultural Impact?	Advance to Phase 2 Screening?
Safety	S1: Install fencing by Bays Mountain Preserve (US-11W to Meadowview Parkway) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	S2: Widen inside shoulders (SR-93 to SR-347) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	S4: Install road weather information system (Tennessee/North Carolina State Line to Unicoi/Carter County Line) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	S5: Install additional lighting and signage (Johnson City and Kingsport urbanized areas) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	S6: Install additional overhead signage (State of Franklin Road Interchange) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	S7: Install additional guardrail and median cable barrier where roadside recovery area is not available (throughout corridor) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
	S8: Reconfigure interchange to address ramp geometry (I-26/I-81 Interchange) - Source: Public/Stakeholder & TN Freight Plan (2018)	Yes	Yes	Yes	No	YES
Freight	F1: Add capacity to relieve bottleneck south of US-11W (US-11W to Meadowview Parkway) - Source: Public/Stakeholder & TN Freight Plan (2018)	No[2]	-	No	-	NO
	F2: Add eastbound truck climbing lane (SR-93 to SR-347) - Source: Kingsport MPTO 2040 LRTP	Yes	Yes	Yes	No	YES
	F3: Study the I-81/I-26 Interchange for capacity, design for ease of truck use - Source: Kingsport MPTO 2040 LRTP	Yes	Yes	Yes	No	YES
	F4: Install CCTV to monitor for congestion and accidents, advise trucks via HAR (SR-381-US-321) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	F5: Add at least one overnight parking location along the corridor (~50 truck parking spaces) - Source: Data Analysis	Yes	Yes	Yes	No	YES
	F6: Add eastbound truck climbing lane (west of Clear Branch Access to east of Clear Branch Access) - Source: TN Freight Plan (2018)	Yes	Yes	Yes	No	YES
	F7: Add eastbound truck climbing lane (Flag Pond Road to North Carolina State Line) - Source: TN Freight Plan (2018)	Yes	Yes	Yes	No	YES

Safety solution S3 was removed prior to Phase 1 Screening, as recommendations have been addressed by a TDOT project (PIN#112457.00), completed in 2018).
2- Very low traffic volumes. Already truck climbing lanes in each direction over Bays Mountain
3- Already has wide outside lane, shoulder & carries one-way traffic
4- Braided ramps, C-D system, increasing spacing would have a bigger impact on bridges/surrounding community than would widening exit lanes to add option lane. Railroad and Brush Creek blue line stream run E-W under I-26 between Watauga Avenue & Market Street. Braided ramps removed based on detailed traffic analyses results.
5- Blue line stream crosses I-26 between interchanges
6- Assumes utilization of bridge at Ford Creek Road. Sinking Creek parallels Ford Creek Road

Table 2-1. Phase 1 Alternative Screening Matrix (cont.) — I-26

ID	Logical?	Align with Planned/ Programmed Projects?	Supported by Stakeholders/ Public?	Potential Environmental or Cultural Impact?	Advance to Phase 2 Screening?
Multimodal					
T3: Study a commuter route between JCT Transit Center and Citi Commerce Solutions/Frontier Health (Gray) - Source JCT Comprehensive Operations Analysis	Yes	Yes	Yes	No	YES
T9: Study a commuter route between Johnson City and Kingsport - Source: Data Analysis	Yes	Yes	Yes	No	YES
BP1: Add bicycle lane/multi-use path on SR-400 through I-26 interchange - Source: Data Analysis	No[3]	-	-	-	NO
BP2: Add bicycle lane/multi-use path on SR-1/US-11W through I-26 interchange (W. Stone Drive Interchange) - Source: Data Analysis	Yes	Yes	Yes	No	YES
BP3: Study to identify bicycle and pedestrian connectivity and safety improvements at existing U.S. and State Route Interchanges (throughout corridor) - Source: Data Analysis	Yes	Yes	Yes	No	YES
T10: Designate park-and-ride lots near SR-93, SR-347, and SR-75 - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
Capacity					
C1: Increase spacing between ramps OR create collector-distributor (C-D) system OR construct braided ramps OR widen eastbound off-ramp to provide option lane (SR-400 to SR-91) - Source: Data Analysis	Yes	Yes	Yes	Yes[4]	YES, with option lane
C2: Evaluate the need for C-D lanes and/or other improvements between interchanges (Meadowview Parkway to SR-93/SR-126) - Source: Public/Stakeholder	Yes	Yes	Yes	Yes[5]	YES
TSM&O					
TS1: HELP Truck expansion to I-26 (throughout corridor) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
TS2: ITS Installation (CCTV & DMS) (Kingsport and Johnson City urbanized areas) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
TS3: Evaluate need for ramp metering (Kingsport and Johnson City urbanized areas) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
TS4: Conduct a speed study on I-26 (Eastern Star Road to Boones Creek Road) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
TS5: Construct median break to allow for EMS vehicle turnaround (Erwin to North Carolina State Line) - Source: Public/Stakeholder	Yes	Yes	Yes	No	YES
Economic Development					
ED1: Evaluate need for additional interstate access point to accommodate economic growth (Eastern Star Road to SR-75) - Source: Public/Stakeholder	Yes	Yes	Yes	Yes[6]	YES
ED2: Improve interchange capacity and geometry to accommodate expected economic growth - Source: Public/ Stakeholder	Yes	Yes	Yes	No	YES

3. Solutions Screening, Phase 2

The Phase 2 alternatives screening process utilized performance measures identified in Section 3 of Technical Memorandum 3 to further refine the list of feasible alternatives. Potential solutions that passed the Phase 1 Screening were evaluated against the following questions:

1. Does the proposed solution improve level of service on the interstate corridor?
2. Does the proposed solution improve peak hour travel speeds on the interstate corridor?
3. Does the proposed solution improve travel times between key origin and destination (O&D) pairs along the corridor?
4. Does the proposed solution improve peak hour densities at the improved interchange?
5. Does the proposed solution reduce average and max queues at the improved interchange?
6. Does the proposed solution have the potential to reduce crashes in safety hot spots?
7. Does the proposed solution address deficiencies in bridges with a low sufficiency rating?
8. Does the proposed solution increase pavement quality?
9. Does the proposed solution provide for pedestrian/bicycle connectivity and safety at interchanges?
10. Does the proposed solution provide additional truck parking opportunities, particularly in urban areas?
11. Does the proposed solution have the potential to reduce vehicle miles traveled (VMT)?
12. Does the proposed solution improve incident management?
13. Does the proposed solution provide potential economic development opportunities?

Projects which received only “NO” responses were eliminated and did not move forward as feasible multimodal solutions. As shown in Table 3-1, all projects passed the Phase 2 screening and were moved forward to project prioritization.

Table 3-1. Phase 2 Alternative Screening Matrix — I-26

ID		Traffic Operations				Safety		Maintenance		Multimodal			TSM&O	Economy	
		Improves LOS on Interstate Corridor?	Improves Peak Hour Travel Speeds?	Improves Travel Times Between O&D Pairs?	Improves Peak hour Densities at Interchange?	Reduces Ramp Queueing onto Interstate?	Reduces Crashes in Safety Hot Spots?	Addresses Bridge Deficiency?	Increases Pavement Quality?	Improves Ped/Bike Connectivity or Safety?	Provides Additional Truck Parking?	Potential to Reduce VMT in the Corridor?	Improves Incident Management?	Potential Economic Development Opportunity?	Project Moves Forward to Prioritization?
Safety	S1: Install fencing by Bays Mountain Nature Preserve (US-11W to Meadowview Parkway) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
Safety	S2: Widen inside shoulders (SR-93 to SR-347) - Source: Public/Stakeholder	Likely	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
Safety	S4: Install road weather information system (Tennessee/North Carolina State Line to Unicoi/Carter County Line) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
Safety	S5: Install additional lighting and signage (Johnson City and Kingsport urbanized areas) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
Safety	S6: Install additional overhead signage (State of Franklin Road Interchange) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
Safety	S7: Install additional guardrail and median cable barrier where roadside recovery area is not available (throughout corridor) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
Safety	S8: Reconfigure interchange to address ramp geometry (I-26/I-81 Interchange) - Source: Public/Stakeholder & TN Freight Plan (2018)	Likely	Likely	Likely	Likely	Likely	YES	N/A	Likely	N/A	NA	N/A	N/A	Likely	YES
Freight	F2: Add eastbound truck climbing lane (SR-93 to SR-347) - Source: Kingsport MTPO 2040 LRTP	YES	YES	YES	N/A	N/A	Likely	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
Freight	F3: Study I-81/I-26 Interchange for capacity, design for ease of truck use - Source: Kingsport MTPO 2040 LRTP	Likely	Likely	Likely	Likely	N/A	Likely	N/A	Likely	N/A	N/A	N/A	N/A	Likely	YES

Table 3-1. Phase 2 Alternative Screening Matrix (cont.) — I-26

	ID	Traffic Operations				Safety		Maintenance		Multimodal			TSM&O	Economy	Project Moves Forward to Prioritization?
		Improves LOS on Interstate Corridor?	Improves Peak Hour Travel Speeds?	Improves Travel Times Between O&D Pairs?	Improves Peak hour Densities at Interchange?	Reduces Ramp Queueing onto Interstate?	Reduces Crashes in Safety Hot Spots?	Addresses Bridge Deficiency?	Increases Pavement Quality?	Improves Ped/Bike Connectivity or Safety?	Provides Additional Truck Parking?	Potential to Reduce VMT in the Corridor?	Improves Incident Management?	Potential Economic Development Opportunity?	
Freight	F4: Install CCTV to monitor for congestion and accidents, advise trucks via HAR (SR-381 to US-321) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	Likely	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
Freight	F5: Add at least one overnight parking location along the corridor (~50 truck parking spaces) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	YES
Freight	F6: Add eastbound truck climbing lane (West of Clear Branch Access to east of Clear Branch Access) - Source: TN Freight Plan (2018)	Likely	Likely	Likely	N/A	N/A	Likely	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
Freight	F7: Add eastbound truck climbing lane (Flag Pond Road to North Carolina State Line) - Source: TN Freight Plan (2018)	Likely	Likely	Likely	N/A	N/A	Likely	YES[1]	N/A	N/A	N/A	N/A	N/A	N/A	YES
Multimodal	T3: Study a commuter route between JCT Transit Center and Citi commerce Solutions/Frontier Health (Gray) - Source: JCT Comprehensive Operations Analysis	Likely	Likely	Likely	Likely	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	Likely	YES
Multimodal	T9: Study a commuter route between Johnson City and Kingsport - Source: Data Analysis	Likely	Likely	Likely	Likely	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	Likely	YES
Multimodal	BP2: Add bicycle lane/multi-use path on SR-1/US-11W through I-26 interchange (W. Stone Drive Interchange) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES	N/A	Likely	YES
Multimodal	BP3: Study to identify bike/ped connectivity and safety improvements at existing U.S. and State Route Interchanges (throughout corridor) - Source: Data Analysis	N/A	N/A	N/A	N/A	N/A	Likely	N/A	N/A	Likely	N/A	YES	N/A	Likely	YES
Multimodal	T10: Designate park-and-ride lots near SR-93, SR-347, and SR-75 - Source: Public/Stakeholder	Likely	Likely	Likely	Likely	Likely	N/A	N/A	N/A	N/A	N/A	YES	N/A	Likely	YES

Table 3-1. Phase 2 Alternative Screening Matrix (cont.) — I-26

	ID	Traffic Operations				Safety		Maintenance		Multimodal			TSM&O	Economy	Project Moves Forward to Prioritization?
		Improves LOS on Interstate Corridor?	Improves Peak Hour Travel Speeds?	Improves Travel Times Between O&D Pairs?	Improves Peak hour Densities at Interchange?	Reduces Ramp Queueing onto Interstate?	Reduces Crashes in Safety Hot Spots?	Addresses Bridge Deficiency?	Increases Pavement Quality?	Improves Ped/Bike Connectivity or Safety?	Provides Additional Truck Parking?	Potential to Reduce VMT in the Corridor?	Improves Incident Management?	Potential Economic Development Opportunity?	
Capacity	C1: Widen eastbound off-ramp to provide option lane (SR-400 to SR-91) - Source: Data Analysis	YES	YES	YES	YES	YES	Likely	N/A	Likely	N/A	N/A	N/A	N/A	Likely	YES
Capacity	C5: Evaluate the need for C-D lanes and/or other improvements between interchanges (Meadowview Parkway to SR-93/SR-126) - Source: Public/Stakeholder	Likely	Likely	Likely	Likely	Likely	Likely	N/A	Likely	Likely	N/A	N/A	N/A	N/A	YES
TSM&O	TS1: HELP Truck expansion to I-26 (throughout corridor) - Source: Public/Stakeholder	Likely	Likely	Likely	N/A	N/A	Likely	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
TSM&O	TS2: ITS Installation (CCTV & DMS) (Kingsport and Johnson City urbanized areas) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	Likely	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
TSM&O	TS3: Evaluate need for ramp metering (Kingsport and Johnson City urbanized areas) - Source: Public/Stakeholder	Likely	Likely	Likely	Likely	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
TSM&O	TS4: Conduct a speed study on I-26 (Eastern Star Road to Boones Creek Road) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	Likely	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES
TSM&O	TS5: Construct median breaks to allow for EMS vehicle turnaround (Erwin to North Carolina State Line) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	YES
Economic Development	ED1: Evaluate need for additional interstate access point to accommodate economic growth (Eastern Star Road to SR-75) - Source: Public/Stakeholder	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	YES
Economic Development	ED2: Improve interchange capacity and geometry to accommodate expected economic growth - Source: Public/Stakeholder	Likely	Likely	Likely	Likely	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	YES

1- See Figure 5-2 in Tech Memo 2. Opportunity to rehabilitate bridge #15 (I-26 over Branch)

4. Priority Settings and Phasing

Approach and Methodology

The prioritization settings developed for this study build on the goals and objectives detailed in Technical Memorandum 3 and summarized in Table 4-1. Aligning with previous TDOT multimodal corridor studies, the prioritization methodology for this study addresses coordinated construction efforts (priority given to projects that could be accomplished simultaneously at a given location) and culminates in a benefit-cost index for each project, which recognizes that the relative multimodal benefit of each project compared to the estimated financial investment. Consistency with TDOT and MPO programmed projects has been maintained throughout the alternative development process, having identified such projects as part of the Trend Scenario in Technical Memorandum 2.

The most recent TDOT multimodal corridor study introduced a flexible decision-making support tool wherein weights can be applied to priority settings based on policy, programming, and political decisions. The prioritization criteria and measures for the I-26 corridor are structured in a similar fashion, such that weights can be applied by decision-makers. As indicated in Table 4-2, solutions developed for the I-26 corridor were evaluated over six categories: mobility, safety, economic development, system maintenance, implementation and cost efficiency. Specific criteria used to measure solutions by mode/strategy are discussed in the following section.

Table 4-1. Performance Goals and Objectives — I-26

Goals	Objectives		
Provide efficient and reliable travel	Improve travel times and reduce delay	Provide transportation options for people and freight	Optimize freight movement
Improve safety conditions	Reduce crash rates along the corridor – especially at identified crash "hot spots"	Implement or upgrade technologies that promote safety and effective incident management	Improve bicycle and pedestrian accommodations
Coordinate transportation investments with economic development plans	Improve interchange on/ off ramps	Coordinate with MPOs/ RPOs to determine areas where new/improved Interstate access is needed	
Invest equitably throughout the corridor	Expand transportation options for traditionally underserved populations within the corridor	Consider regional transit options	Identify areas with the greatest data-driven needs
Protect the natural environment and sensitive resources within the corridor	Identify transportation improvements that are not likely to result in major impacts to environmental, social, and cultural resources		

Table 4-2. Prioritization Criteria and Measures by Mode and Strategy — I-26

Mode/ Strategy	Mobility	Safety	Economic Development	System Maintenance	Implementation	Cost Efficiency
Highway Capacity	2040 Trend V/C	Crash Rate (Relative to Statewide Avg)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Build V/C	Project improves incident management (Y/N)	2040 Employment	Project addresses pavement deficiency (Y/N)		Dollar per Benefit
Safety	2040 Trend V/C	Crash Rate (Relative to Statewide Avg)	2020 Employment	Project addresses bridge deficiency (Y/N)	Cost Estimate	Benefit-Cost Index
	2040 Build V/C	Project improves incident management (Y/N)	2040 Employment	Project addresses pavement deficiency (Y/N)	# of related projects	Dollar per Benefit
		Crash Reduction Potential				
TSM&O	2040 Trend V/C	Crash Rate (Relative to Statewide Avg)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Build V/C	Project improves incident management (Y/N)	2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit
Freight	2040 Trend V/C	Project improves incident management (Y/N)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Build V/C		2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit
	% Trucks			Provides truck parking (Y/N)		
Multimodal	2020 Population	Project improves incident management (Y/N)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Population		2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit
Economic Development	2020 Population	Project improves incident management (Y/N)	2020 Employment	Project addresses bridge deficiency (Y/N)	# of related projects	Benefit-Cost Index
	2040 Population		2040 Employment	Project addresses pavement deficiency (Y/N)	Cost Estimate	Dollar per Benefit

Prioritization Criteria and Measures

Mobility

Appropriate measures for mobility differ across modes/strategies. While the volume-to-capacity (V/C) ratio is appropriate for measuring highway capacity, it does not capture mobility for bicycles and pedestrians, for example. As shown in Table 4-2, comparison of the 2040 Trend V/C ratio versus the 2040 Build V/C ratio was used as a measure of mobility for highway capacity, safety, TSM&O, and Freight projects. Numeric scores 1, 2, and 3, were recorded based on the following thresholds, which consider the resulting change in V/C and, for freight projects, the percent trucks on the adjacent section of interstate:

Capacity, Safety, TSM&O

1 = No improvement to mobility

2 = Likely improvement to mobility

3 = Definite improvement to mobility

Freight

1 = No improvement to mobility

2 = Improvement to mobility, % trucks < 20%

3 = Improvement to mobility, % trucks > 20%

Comparison of 2020 population versus 2040 population within three miles of each project was used for multimodal and economic development projects. Population numbers were obtained via the Tennessee Statewide Travel Demand Model (TSM) and by traffic analysis zone. Resulting numeric scores were based on the following thresholds:

Multimodal, Economic Development

1 = 0-10% Increase

2 = 10-15% Increase

3 = 15% + Increase

Where criterion could not be measured and "N/A" was noted, engineering judgement was used to score the project's potential for mobility improvement within the applicable thresholds.

Safety

Criterion used to measure the potential safety improvement for each project also vary across mode/strategy. One measure common to all was a "yes" or "no" response to the question "Does the project improve incident management?" For freight, multimodal and economic development projects, this was the only measure used for safety. Thresholds were applied as follows:

Freight, Multimodal, Economic Development

1 = N/A

2 = No

3 = Yes

Building upon hot spot calculations from Technical Memorandum 2, capacity, safety, and TSM&O projects are measured by the relative crash rate as well. The impact of safety projects is further refined by the crash reduction potential, which was determined in Technical Memorandum 3. The following thresholds were applied:

Capacity, TSM&O

1 = Crash rate < statewide average crash rate[1]

2 = Crash rate > statewide average crash rate; Does not improve incident management

3 = Crash rate > statewide average crash rate; Improves incident management

Safety

1 = Crash rate < statewide average crash rate

2 = Crash rate > statewide average crash rate; Below average crash reduction potential

3 = Crash rate > statewide average crash rate; Above average crash reduction potential OR Improves incident management

Where criterion could not be measured and "N/A" was noted, engineering judgement was used to score the project's potential for safety improvement within the applicable thresholds.

Economic Development

The economic development potential of each project was measured by the projected change in employment from 2020 to 2040 within three miles of each project. Employment projections were obtained via the TSM and by traffic analysis zones. The following thresholds were used to score each project.

Capacity, Safety, TSM&O, Freight, Multimodal, Economic Development

1 = 10-20% increase

2 = 20-25% increase

3 = 25%+ increase

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.

System Maintenance

System maintenance was added as a measure for the I-26 corridor prioritization to recognize opportunities where projects will also address existing bridge and/or pavement deficiencies. The following thresholds were used to score each project, given "yes" or "no" responses to the questions "Project addresses bridge deficiency?" and "Project addresses pavement deficiency?'. For freight projects, an additional "yes" / "no" question was added: "Project provides truck parking?"

Capacity, Safety, TSM&O, Multimodal, Economic Development

1 = No to both

2 = Yes to one

3 = Yes to both

Freight

1 = No to all

2 = Yes to one

3 = Yes to all

Implementation

The implementation measure was included to give priority to projects that could be constructed or initiated in conjunction with other projects, thus conserving the time and money associated with multiple, individual contracts. Figure 4-1 illustrates the relative proximity of the multimodal solutions prioritized for the I-26 corridor. The following thresholds were utilized to score the implementation of each project:

Capacity, Safety, TSM&O, Freight, Multimodal, Economic Development

1 = 0 overlapping projects

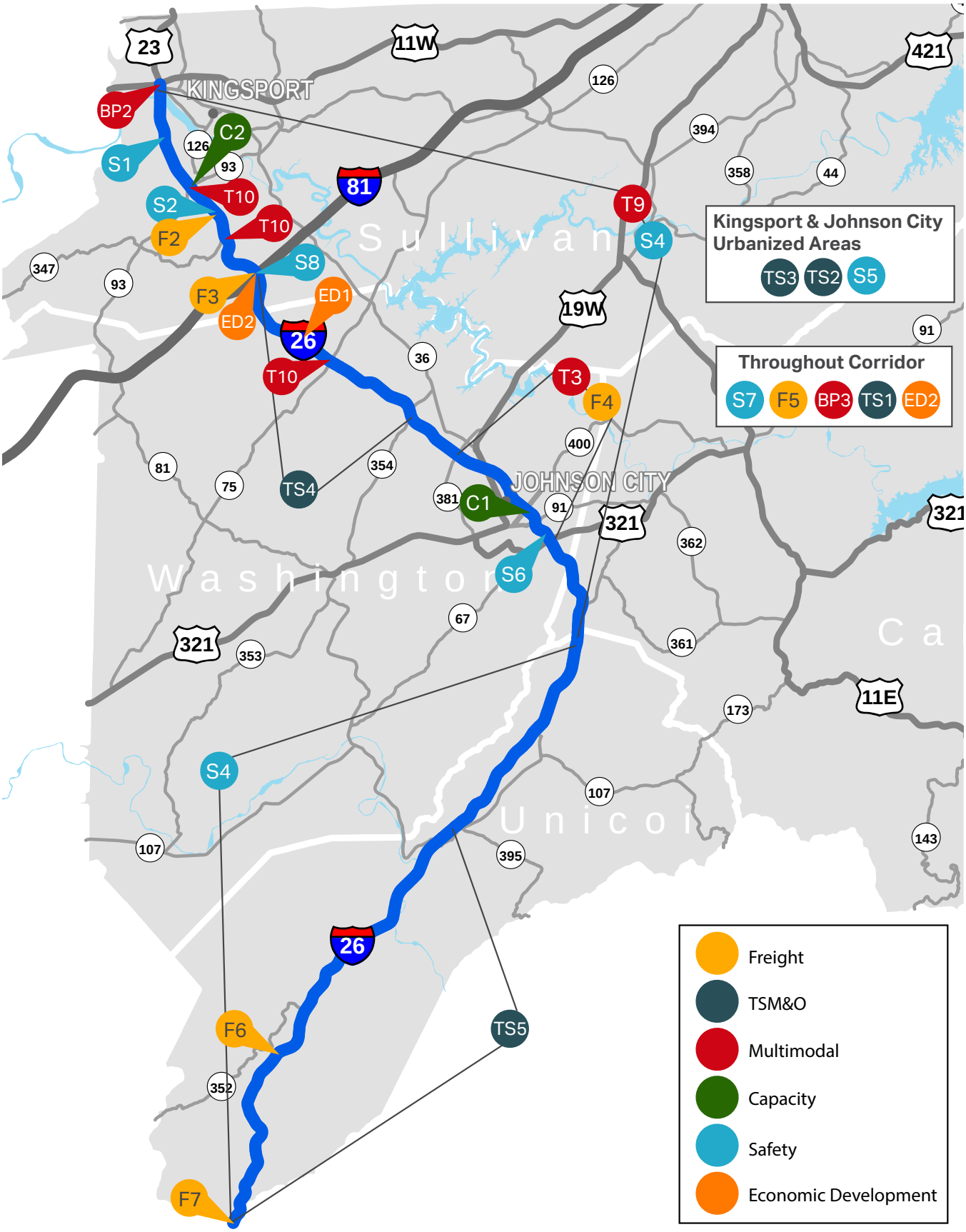
2 = 1 or 2 overlapping projects

3 = 3+ overlapping projects

Cost Efficiency

For the I-26 corridor project prioritization, a benefit-cost index and a dollar-per-benefit was calculated for each solution. These measures capture the benefit of each prioritization criteria and compare the total relative benefit to the estimated project cost. Specifically, the score assigned to each of the five prioritization criteria were summed to represent the total relative benefit of each project. To calculate the benefit-cost index, this total relative benefit was divided by the cost (in millions) estimated for each project. The dollar-per-benefit is simply the cost estimate divided by the total benefit score. Note that cost estimates were prepared for solutions that were recommended for further study. However, because the total benefit represents the potential of the associated capital improvement, no direct benefit-cost index or dollar-per-benefit was calculated for these solutions.

Figure 4-1. Relative Proximity of Multimodal Solutions — I-26



5. Project Rankings

When evaluated side-by-side, the total benefit score, benefit-cost index, and dollar-per-benefit indicate projects with high benefit that can be implemented with smaller financial investment. The project rankings are discussed per mode/strategy below. Tables 5-1 through 5-6 detail the prioritization effort and rank the projects by the total benefit score, which ranges from 5 (lowest) to 15 (highest).

Project Rankings by Mode and Strategy

Highway Capacity

As shown in Table 5-1, capacity solution C1 received a high total benefit score reflective primarily of its improvement to mobility through the Johnson City urban area. Detailed traffic analyses of the braided ramps versus option lane indicated that an option lane at the eastbound off-ramp to SR-91 would best accommodate future volumes with the least impact to adjacent structures and land uses. Details of the traffic analysis can be found in the Traffic Operations Technical Memorandum.

Capacity solution C2 received a lower total benefit score. As discussed in Technical Memorandum 2, this section of I-26 is expected to operate at acceptable levels of service into 2040, and it does not have a crash rate indicative of a safety hot spot. The location should continue to be monitored by the Kingsport MTPO over time as the ramp proximity could create issues if unexpected new development were to occur in the area.

Safety

Safety solutions S2 and S5 received both high total benefit scores and high benefit-cost indexes. Widening inside shoulders through the Bays Mountain area (S2) and installing additional interchange lighting in the urban areas (S5) address safety hot spots and improve incident management. Safety solution S5 additionally offers an above average crash reduction potential and could be designed in cooperation with ITS and communication components of TSM&O solutions TS2 and TS3. At a higher dollar per benefit, but with the potential to impact the whole corridor, safety solution S7 also scored a high total benefit.

TSM&O

TSM&O solution TS2 scored a high total benefit and a benefit-cost index of 3.1. This reflects potential for improving incident management in a safety hot spot location, potential for implementation in conjunction with other projects, and a relatively low cost.

Freight

Of the six freight solutions that passed the Phase 2 screening, F4 (CCTV to monitor congestion and accidents/ advise trucks via HAR) scored the highest total benefit. This solution, initiated by stakeholders, corresponds closely to TSM&O solution TS2 and is attributed the same benefits. Study of the I-81/I-26 interchange (F3) scored the second highest total benefit. Study of this interchange is also identified in Safety and Economic Development strategies, as S8 and ED2, respectively.

Multimodal

Study of a commuter route between the Johnson City Transit Center and Gray (T3) scored the highest total benefit among multimodal solutions. The route would benefit an expected nearby 10-15% increase in population and 25-30% increase in employment. Addition of a bicycle lane/multi-use path on US-11W through the I-26 interchange (BP2) would also benefit a growing population and would provide connectivity on TDOT's proposed Nashville to Bristol State Bicycle Route.

Economic Development

Neither of the Economic Development solutions received high total benefit scores. However, it should be noted that study of improvements to the I-26/I-81 interchange was also recommended in Freight and Safety strategies.

Table 5-1. Capacity Improvements- Project Rankings — I-26

					Mobility				Safety			Economic Development			System Maintenance			Implementation		Cost Efficiency			
ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	2040 Trend V/C	2040 Build V/C	% Trucks	Score	Crash Rate	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score	Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
C1	Widen EB Off-Ramp to Provide Option Lane	SR-400	SR-91	0.5	1.0+	0.8-0.9*	6	3	1.12	N	2	79,341	98,532	2	N	Y	2	4	3	12	$1,290,000	9.30	$107,500
C2	Evaluate Need for C-D Lanes and/or Other Improvements Between Interchanges	Meadowview Pkwy	SR-93/ SR-126	0.5	0.0-0.7	0.0-0.7	8	2	0.24	N	1	59,246	69,177	1	N	N	1	3	3	8	$160,000	N/A	N/A

*Results based on traffic analyses detailed in the Traffic Operations Technical Memorandum

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	Crash Rate < Statewide Avg[1]	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	Likely improvement to mobility	2 =	Crash Rate > Statewide Avg, Does not Improve Incident Management	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Definite improvement to mobility	3 =	Crash Rate > Statewide Avg, Improves Incident Management	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.

Table 5-2. Safety Improvements- Project Rankings — I-26

					Mobility			Safety				Economic Development			System Maintenance			Implementation		Cost Efficiency			
ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	2040 Trend V/C	2040 Build V/C	Score	Crash Rate	Improves Incident Mgmt (Y/N)	Crash Reduction Potential	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score	Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
S2	Widen Inside Shoulders	SR-93	SR-347	2.3	0.0-0.7	0.0-0.7	2	2.38	Y	Below Avg	3	64,368	79,054	2	N	N	1	1	2	10	$3,180,000	3.14	$318,000
S5	Install Additional Lighting & Signage	Kingsport and Johnson City Urbanized Areas		N/A	N/A	N/A	1	7.48	Y	Above Avg	3	154,474	190,594	2	N	N	1	6	3	10	$6,490,000	1.54	$649,000
S7	Install Additional Guardrail & Median Cable Barrier	Throughout Corridor		54	N/A	N/A	1	N/A	N	Above Avg**	3	162,233	199,630	2	N	N	1	N/A	3	10	$14,400,000	0.69	$1,440,000
S8	Reconfigure Interchange to Address Ramp Geometry	I-26/I-81 Interchange		N/A	0.7-0.8	0.7-0.8	2	0.41	N	Above Avg	1	41,878	53,878	3	N	N	1	2	2	9	$18,000,000	0.50	$2,000,000
S4	Install Road Weather Information System	TN/NC State Line	Unicoi/Carter Co Line	26.7	0.0-0.7	0.0-0.7	1	4.87	Y	Below Avg	3	57,214	67,429	1	N	N	1	3	3	8	$12,200,000	0.66	$1,525,000
S6	Install Additional Overhead Signage	State of Franklin Rd Interchange (SR-381)		N/A	0.0-0.7	0.0-0.7	1	7.02	N	Above Avg	3	85,018	106,068	2	N	N	1	0	1	8	$248,000	32.26	$31,000
S1	Install Fencing by Bays Mountain Nature Preserve	US-11W	Meadowview Pkwy	3.5	0.0-0.7	0.0-0.7	1	7.48	N	Above Avg	3	60,256	70,287	1	N	N	1	0	1	7	$441,000	15.87	$63,000

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

*Assumes auxiliary lane will improve V/C by one "level"

**56% of crashes on I-26 were "NO COLLISION W/VEHICLE"

1 =	No improvement to mobility	1 =	Crash Rate < Statewide Avg[1]	1 =	15-20% Increase	1 =	No to Both	1 =	0
2 =	Likely improvement to mobility	2 =	Crash Rate > Statewide Avg, Below Avg Potential	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Definite improvement to mobility	3 =	Crash Rate > Statewide Avg, Improves Incident Management OR Above Avg Potential	3 =	25-30% Increase	3 =	Yes to Both	3 =	3+

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.

Table 5-3. TSM&O Improvements- Project Rankings — I-26

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety			Economic Development			System Maintenance			Implementation		Cost Efficiency			
					2040 Trend V/C	2040 Build V/C	Score	Crash Rate	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score	Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
TS2	ITS Installation (CCTV & DMS)	Kingsport and Johnson City Urbanized Areas		24	N/A	N/A	1	7.48	Y	3	154,474	190,594	2	N	N	1	5	3	10	$3,270,000	3.06	$327,000
TS3	Evaluate Need for Ramp Metering	Kingsport and Johnson City Urbanized Areas		24	N/A	N/A	2	7.48	N	2	154,474	190,594	2	N	N	1	5	3	10	$75,000	N/A	N/A
TS4	Conduct Speed Study	Eastern Star Rd	Boones Creek Rd (SR-354)	6.8	0.7-0.8	0.7-0.8	1	1.96	N	2	107,280	134,342	3	N	N	1	1	2	9	$25,000	N/A	N/A
TS5	Construct Median Breaks for EMS Vehicle Turnaround	Erwin	NC State Line	17	0.0-0.7	0.0-0.7	1	1.66	Y	3	3,089	3,470	1	N	N	1	0	1	7	$77,000	90.91	$11,000
TS1	HELP Truck Expansion to I-26	Throughout Corridor		54	N/A	N/A	1	N/A	N	1	162,233	199,630	2	N	N	1	0	1	6	$675,000	8.89	$112,500

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	Crash Rate < Statewide Avg[1]	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	Likely improvement to mobility	2 =	Crash Rate > Statewide Avg, Does not Improve Incident Management	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2

1- The statewide average crash rate for rural interstate facilities is 0.528 and 1.112 for urban interstates.

Table 5-4. Freight Improvements- Project Rankings — I-26

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility				Safety		Economic Development			System Maintenance				Implementation		Cost Efficiency			
					2040 Trend V/C	2040 Build V/C	% Trucks	Score	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Provides Truck Parking (Y/N)	Score	# of Related Projects	Score	Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
F4	Install CCTV to Monitor Congestion & Accidents, Advise Trucks Via HAR	SR-381	US-321	4.8	0.8-0.9	0.8-0.9	6	1	Y	3	89,538	112,522	3	N	N	N	1	4	3	11	$1,950,000	5.64	$177,300
F3	Study I-81/I-26 Interchange for Capacity, Truck Use	I-26/I-81 Interchange		N/A	0.7-0.8	0.7-0.8	8	1	N	2	41,878	53,878	3	N	N	N	1	2	2	9	$220,000	N/A	N/A
F5	Add Overnight Parking Location (~50 spaces)	Along Corridor		54	N/A	N/A	N/A	1	N	2	162,233	199,630	2	N	N	Y	2	0	1	8	$1,270,000	6.30	$158,750
F2	Add eastbound truck climbing lane	SR-93	SR-347	1.7	0.0-0.7	0.0-0.7	8	1	N	2	64,368	79,054	2	N	N	N	1	2	2	8	$6,720,000	1.19	$840,000
F7	Add Eastbound Truck Climbing Lane	Flag Pond Rd	NC State Line	4.5	0.0-0.7	0.0-0.7	24	1	N	2	136	153	1	Y	N	N	2	1	2	8	$40,800,000	0.20	$5,100,000
F6	Add Eastbound Truck Climbing Lane	W of Clear Branch Access	E of Clear Branch Access	N/A	0.0-0.7	0.0-0.7	21	1	N	2	3,089	3,470	1	N	N	N	1	1	2	7	$32,700,000	0.21	$4,671,429

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	No improvement to mobility	1 =	N/A	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	Improvement to mobility, % Trucks >15	2 =	No	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	Improvement to mobility, % Trucks <15	3 =	Yes	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

Table 5-5. Multimodal Improvements- Project Rankings — I-26

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety		Economic Development			System Maintenance			Implementation		Cost Efficiency			
					2020 Population	2040 Population	Score	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score	Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
T3	Study Commuter Route Between JCT Transit Center & Citi Commerce Solutions/ Frontier Health (Gray)	Johnson City	Gray	12	161,927	185,778	2	N	2	101,203	130,001	3	N	N	1	1	2	10	$50,000	N/A	N/A
BP2	Add Bicycle Lane/ Multi-Use Path on US-11W Through I-26 Interchange	I-26 / US-11W Interchange		N/A	106,362	122,574	3	N	2	83,298	102,670	2	N	N	1	1	2	10	$2,050,000	4.88	$205,000
T9	Study Commuter Route Between Johnson City & Kingsport	Johnson City	Kingsport	24	229,152	257,382	2	N	2	154,474	190,594	2	N	N	1	1	2	9	$75,000	N/A	N/A
BP3	Study to Identify Bike/ Ped Connectivity & Safety Improvements at U.S. & State Route Interchanges	Throughout Corridor		54	239,800	267,793	2	N	2	162,233	199,630	2	N	N	1	1	2	9	$50,000	N/A	N/A
T10	Designate Park-and-Ride Lots Near SR-93, SR-347, SR-75	Various Locations		N/A	N/A	N/A	1	N	2	N/A	N/A	2	N	N	1	0	1	7	$ 906,000	7.73	$129,429

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	0-10% Increase	1 =	N/A	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	10-15% Increase	2 =	No	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	15-20% Increase	3 =	Yes	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

Table 5-6. Economic Development Improvements- Project Rankings — I-26

ID	Project Description	Termini (From)	Termini (To)	Approx Length (miles)	Mobility			Safety		Economic Development			System Maintenance			Implementation		Cost Efficiency			
					2020 Population	2040 Population	Score	Improves Incident Mgmt (Y/N)	Score	2020 Employment	2040 Employment	Score	Addresses Bridge Deficiency (Y/N)	Addresses Pavement Deficiency (Y/N)	Score	# of Related Projects	Score	Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
ED1	Evaluate Need for Additional Interstate Access Point	Eastern Star Rd	SR-75	3.2	79,407	90,624	1	N	2	51,551	70,685	3	N	N	1	1	2	9	$100,000	N/A	N/A
ED2	Improve Interchange Capacity & Geometry to Accommodate Expected Economic Growth	I-26/I-81 Interchange		N/A	65,194	72,716	1	N	2	41,878	53,878	3	N	N	1	2	2	9	$18,000,000	0.50	$2,000,000

In alignment with TDOT's Excel-based cost estimation tool, estimates represent 2018 dollars.

1 =	0-10% Increase	1 =	N/A	1 =	10-20% Increase	1 =	No to ALL	1 =	0
2 =	10-15% Increase	2 =	No	2 =	20-25% Increase	2 =	Yes to One	2 =	1 or 2
3 =	15-20% Increase	3 =	Yes	3 =	25-30% Increase	3 =	Yes to ALL	3 =	3+

6. Key Findings

As a result of the "1-2-3 bin" structure of this prioritization system, all projects have a potential total benefit range of 5-15, and can therefore be compared across modes/strategies. Table 6-1 tabulates all solutions for the I-26 corridor, sorted by total benefit score. Solutions which recommend studies are shown in Table 6-2. Projects with the highest total benefit scores have demonstrated benefit to mobility, safety, economic development, system maintenance, and implementation. Capacity solution C1 is the only solution to score a total benefit of 12. C1 also has a comparatively high benefit-cost index. Use of Table 6-1 in conjunction with Figure 4-1 can be used to inform decisions on fund allocation and construction packages. As mentioned previously, weights can easily be applied to the prioritization criteria in Tables 5-1 through 5-6 to adjust for policy, programming, and political decisions.

Table 6-1. Project Ranking Across all Modes/Strategies — I-26

ID	Project Description	Termini	Source of Solution	Cost Efficiency			
				Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
C1	Widen EB Off-Ramp to Provide Option Lane	SR-400 to SR-91	Data Analysis	12	$1,290,000	9.3	$107,500
F4	Install CCTV to Monitor Congestion & Accidents, Advise Trucks Via HAR	SR-381 to US-321	Data Analysis	11	$1,950,000	5.6	$177,300
S2	Widen Inside Shoulders	SR-93 to SR-347	Public/ Stakeholder	10	$3,180,000	3.1	$318,000
S5	Install Additional Lighting & Signage	Kingsport and Johnson City Urbanized Areas	Public/ Stakeholder	10	$6,490,000	1.5	$649,000
S7	Install Additional Guardrail & Median Cable Barrier	Throughout Corridor	Public/ Stakeholder	10	$14,400,000	0.7	$1,440,000
TS2	ITS Installation (CCTV & DMS)	Kingsport and Johnson City Urbanized Areas	Public/ Stakeholder	10	$3,270,000	3.1	$327,000
BP2	Add Bicycle Lane/ Multi-Use Path on US-11W Through I-26 Interchange	I-26 / US-11W Interchange	Data Analysis	10	$2,050,000	4.9	$205,000
S8	Reconfigure Interchange to Address Ramp Geometry	I-26/I-81 Interchange	Public/ Stakeholder, TN Freight Plan	9	$18,000,000	0.5	$2,000,000
ED2	Improve Interchange Capacity & Geometry to Accommodate Expected Economic Growth	I-26/I-81 Interchange	Public/ Stakeholder	9	$18,000,000	0.5	$2,000,000
S4	Install Road Weather Information System	TN/NC State Line to Unicoi/Carter Co Line	Public/ Stakeholder	8	$12,200,000	0.7	$1,525,000
S6	Install Additional Overhead Signage	State of Franklin Rd Interchange (SR-381)	Public/ Stakeholder	8	$248,000	32.3	$31,000
F5	Add Overnight Parking Location (~50 spaces)	Along Corridor	Data Analysis	8	$1,270,000	6.3	$158,800

Table 6-1. Project Ranking Across all Modes/Strategies (cont.) — I-26

ID	Project Description	Termini	Source of Solution	Cost Efficiency			
				Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
F2	Add Eastbound Truck Climbing Lane	SR-93 to SR-347	Kingsport MTPO 2040 LRTP	8	$6,720,000	1.2	$840,000
F7	Add Eastbound Truck Climbing Lane	Flag Pond Rd to NC State Line	TN Freight Plan	8	$40,800,000	0.2	$5,100,000
S1	Install Fencing by Bays Mountain Nature Preserve	US-11W to Meadowview Pkwy	Data Analysis	7	$441,000	15.9	$63,000
F6	Add Eastbound Truck Climbing Lane	Near Clear Branch Access	TN Freight Plan	7	$32,700,000	0.2	$4,671,400
TS5	Construct Median Breaks for EMS Vehicle Turnaround	Erwin to NC State Line	Public/ Stakeholder	7	$77,000	90.9	$11,000
T10	Designate Park-and-Ride Lots Near SR-93, SR-347, SR-75	Various Locations	Public/ Stakeholder	7	$906,000	7.7	$129,400
TS1	HELP Truck Expansion to I-26	Throughout Corridor	Public/ Stakeholder	6	$675,000	8.9	$112,500

Table 6-2. Project Ranking Across all Modes/Strategies (Studies) — I-26

ID	Project Description	Termini	Source of Solution	Cost Efficiency			
				Total Benefit	Cost Estimate	Benefit Cost Index	Dollar per Benefit
TS3	Evaluate Need for Ramp Metering	Kingsport and Johnson City Urbanized Areas	Public/ Stakeholder	10	$75,000	N/A	N/A
T3	Study Commuter Route Between JCT Transit Center & Citi Commerce Solutions/Frontier Health (Gray)	Johnson City to Gray	JCT Comprehensive Operations Analysis	10	$50,000	N/A	N/A
F3	Study I-81/I-26 Interchange for Capacity, Truck Use	I-26/I-81 Interchange	Kingsport MTPO 2040 LRTP	9	$220,000	N/A	N/A
TS4	Conduct Speed Study	Eastern Star Rd to Boones Creek Rd (SR-354)	Public/ Stakeholder	9	$25,000	N/A	N/A
ED1	Evaluate Need for Additional Interstate Access Point	Eastern Star Rd to SR-75	Public/ Stakeholder	9	$100,000	N/A	N/A
T9	Study Commuter Route Between Johnson City & Kingsport	Johnson City to Kingsport	Data Analysis	9	$75,000	N/A	N/A
BP3	Study to Identify Bike/ Ped Connectivity & Safety Improvements at U.S. & State Route Interchanges	Throughout Corridor	Data Analysis	9	$50,000	N/A	N/A
C2	Evaluate Need for C-D Lanes and/or Other Improvements Between Interchanges	Meadowview Pkwy to SR-93/ SR-126	Public/ Stakeholder	8	$160,000	N/A	N/A