



# I-40/81

## Multimodal Corridor Study



### Technical Memorandum **Project Priorities**

March 2022





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## 1. Introduction

### Purpose of this Memo

Previous stages of this study have identified existing and projected deficiencies for the I-40/81 corridor, as well as a range of potential multimodal solutions to meet needs in the following areas:

- Highway Capacity/Expansion
- Transportation Systems Management & Operations (TSMO)
- Freight
- Safety
- Transit
- Economic Access

As noted in the Multimodal Solutions Technical Memorandum, some of the potential solutions identified may prove less feasible based on cost, potential environmental impacts, public support, or other factors. The purpose of this memo is to provide a screening of the candidate solutions to identify their benefits, as defined by the degree to which they support corridor goals and objectives, and then provide relative ranking based on an index value that considers both benefits and the cost of implementation. This ranking is intended to inform future state planning and programming activities but should not be viewed as a recommendation to implement projects solely in order of ranking. TDOT's ongoing project selection decisions must also consider a variety of other factors, most importantly the availability of near-term funding since Tennessee does not borrow funds to support its transportation program. When selecting projects, TDOT must also consider its responsibility to carry out the projects included in the IMPROVE Act, geographic equity of investments, and the opportunity to leverage other improvements (for example, when a proposed interchange expansion may be initiated earlier than originally planned because its bridge is in need of replacement).

## 2. Project Evaluation Process

The criteria used for project evaluation are linked to a set of goals and objectives established for the corridor (Figure 1). These goals and objectives are consistent with the policy framework established by TDOT's Long Range Transportation Plan as well as other key planning documents such as the Statewide Multimodal Freight Plan. They also directly support the national planning factors outlined by Congress to be considered in transportation planning, including the need to maintain/improve system performance, enhance safety and security, promote a competitive economy through efficient movement of both people and goods, and maintain transportation assets in a state of good repair – while also minimizing environmental and community impacts, supporting local development plans, and practicing good stewardship of public funds.

The project evaluation criteria (Figure 2) include both qualitative and quantitative factors. Not all metrics can currently be generated by the statewide travel demand model; as also noted in previous technical memoranda, it is not practical to develop detailed operational solutions for every location, since limited funding means conditions will likely change by the time project development can be initiated.



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Figure 1: Corridor Goals and Objectives

Goal	Objectives
<p><b>SYSTEM PERFORMANCE</b> Provide efficient and reliable travel within and through the corridor for both people and goods.</p>	<ul style="list-style-type: none"> <li>• Maintain or improve travel times between destinations</li> <li>• Maintain or improve travel time reliability</li> </ul>
<p><b>SAFETY AND SECURITY</b> Minimize injuries and fatalities in the corridor and improve emergency preparedness and incident response time.</p>	<ul style="list-style-type: none"> <li>• Reduce crash rates and severity of crashes along the corridor through projects, policies, and programmatic investments in corridor</li> <li>• Implement operational strategies and system redundancy to maintain/improve incident response</li> </ul>
<p><b>FREIGHT AND GOODS MOVEMENT</b> Provide for the safe and efficient movement of freight while minimizing impacts to local communities.</p>	<ul style="list-style-type: none"> <li>• Enhance the safety and efficiency of freight movements, including the use of emerging technologies where appropriate</li> <li>• Improve access between modes and to activity centers and regional destinations</li> </ul>
<p><b>ECONOMIC DEVELOPMENT AND ACCESS TO OPPORTUNITIES</b> Make transportation investments that support economic growth, and link people to employment hubs and other key activity centers.</p>	<ul style="list-style-type: none"> <li>• Improve connectivity between workforce and jobs</li> <li>• Improve connectivity within and between modes by focusing on filling gaps in transportation networks</li> <li>• Align transportation decisions with statewide and local economic development initiatives</li> <li>• Provide alternatives to the single-occupancy vehicle</li> </ul>
<p><b>NATURAL, CULTURAL, AND ENVIRONMENTAL RESOURCES</b> In making improvements to the corridor, maintain the integrity of communities and historical sites, identify ways to minimize impacts on natural resources, and conserve energy.</p>	<ul style="list-style-type: none"> <li>• Reduce environmental impacts of projects</li> <li>• Identify transportation improvements that are not likely to result in major impacts to environmental, social, and cultural resources.</li> </ul>
<p><b>PUBLIC SUPPORT AND COORDINATION</b> In making improvements to the corridor, emphasize accountability and partnerships with local and regional stakeholders.</p>	<ul style="list-style-type: none"> <li>• Incorporate public and stakeholder feedback in corridor solutions</li> <li>• Leverage existing partnerships with local and regional partners</li> </ul>
<p><b>FINANCIAL SUSTAINABILITY</b> Emphasize financial sustainability and fiscal responsibility.</p>	<ul style="list-style-type: none"> <li>• Maximize Tennessee's share of federal transportation funding</li> <li>• Identify alternative funding strategies, when possible</li> <li>• Expend state and federal funds on projects that are anticipated to have benefits in proportion with the project cost.</li> </ul>
<p><b>STATE OF GOOD REPAIR</b> Protect existing assets and maintain efficiency of the system through cost-effective management.</p>	<ul style="list-style-type: none"> <li>• Maintain corridor infrastructure in state of good repair</li> </ul>



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Figure 2: Project Evaluation Criteria

First Tier of Screening: Does it meet a transportation need?		
GOAL	OBJECTIVES	PROJECT EVALUATION CRITERIA
<p><b>SYSTEM PERFORMANCE</b> Provide efficient and reliable travel within and through the corridor for both people and goods.</p>	<ul style="list-style-type: none"> <li>Maintain or improve travel times between destinations</li> <li>Maintain or improve travel time reliability</li> </ul>	<ul style="list-style-type: none"> <li>Improves LOS</li> <li>Reduces total VHD</li> <li>Improves average peak hour travel speed/travel time</li> <li>Incorporates TSMO strategies (e.g., incident management, ramp metering)</li> <li>Improves travel choice alternatives</li> </ul>
<p><b>SAFETY AND SECURITY</b> Minimize injuries and fatalities in the corridor and improve emergency preparedness and incident response time.</p>	<ul style="list-style-type: none"> <li>Reduce crash rates and severity of crashes along the corridor through projects, policies, and programmatic investments in corridor</li> <li>Implement operational strategies and system redundancy to maintain/improve incident response</li> </ul>	<ul style="list-style-type: none"> <li>Includes safety countermeasure(s) at an identified high crash segment of the corridor</li> <li>Implements policy/program that has primary goal of improving safety, incident response time, security, or system redundancy</li> <li>Addresses existing deficiency on an I-40/81 detour route</li> </ul>
<p><b>FREIGHT AND GOODS MOVEMENT</b> Provide for the safe and efficient movement of freight while minimizing impacts to local communities.</p>	<ul style="list-style-type: none"> <li>Enhance the safety and efficiency of freight movements, including the use of emerging technologies where appropriate</li> <li>Improve access between modes and to activity centers and regional destinations</li> </ul>	<ul style="list-style-type: none"> <li>Improves access between corridor and intermodal facility or other freight generator</li> <li>Improves average peak hour travel speed</li> <li>Reduces truck vehicle hours of delay</li> </ul>
<p><b>ECONOMIC DEVELOPMENT AND ACCESS TO OPPORTUNITIES</b> Make transportation investments that support economic growth, and link people to employment hubs and other key activity centers.</p>	<ul style="list-style-type: none"> <li>Improve connectivity between workforce and jobs</li> <li>Improve connectivity within and between modes by focusing on filling gaps in transportation networks</li> <li>Align transportation decisions with statewide and local economic development initiatives</li> <li>Provide alternatives to the single-occupancy vehicle</li> </ul>	<ul style="list-style-type: none"> <li>Improves access to state certified industrial sites, job centers, and other (planned) developments along corridor</li> <li>Improves travel choice alternatives</li> </ul>



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Figure 2: Project Evaluation Criteria (continued from previous page)

Second Tier of Screening: How well does it support other public goals?		
GOAL	OBJECTIVES	PROJECT EVALUATION CRITERIA
<p><b>STATE OF GOOD REPAIR</b> Protect existing assets and maintain efficiency of the system through cost-effective management.</p>	<ul style="list-style-type: none"> <li>Maintain corridor infrastructure in state of good repair</li> </ul>	<ul style="list-style-type: none"> <li>Includes maintenance of existing assets</li> <li>Incorporates emerging technologies to maximize existing capacity and/or preserve infrastructure</li> </ul>
<p><b>PUBLIC SUPPORT AND COORDINATION</b> In making improvements to corridor, emphasize accountability and partnerships with local and regional stakeholders.</p>	<ul style="list-style-type: none"> <li>Incorporate public and stakeholder feedback in corridor solutions</li> <li>Leverage existing partnerships with local and regional partners</li> </ul>	<ul style="list-style-type: none"> <li>Level of stakeholder and public support</li> <li>Identified as need in previous statewide, regional, or local planning effort</li> </ul>
<p><b>NATURAL, CULTURAL, AND ENVIRONMENTAL RESOURCES</b> In making improvements to corridor, maintain the integrity of communities and historical sites, identify ways to minimize impacts on natural resources, and conserve energy.</p>	<ul style="list-style-type: none"> <li>Reduce environmental impacts of projects</li> <li>Identify transportation improvements that are not likely to result in major impacts to environmental, social, and cultural resources.</li> </ul>	<ul style="list-style-type: none"> <li>Existence of environmental "red flag"/potential fatal flaws</li> <li>Potential for reducing energy consumption</li> </ul>
<p><b>FINANCIAL SUSTAINABILITY</b> Emphasize financial sustainability and fiscal responsibility.</p>	<ul style="list-style-type: none"> <li>Maximize Tennessee's share of federal transportation funding</li> <li>Identify alternative funding strategies, when possible</li> <li>Expend state and federal funds on projects that are anticipated to have benefits in proportion with the project cost.</li> </ul>	<ul style="list-style-type: none"> <li>Competitive benefit-cost index relative to other potential solutions</li> <li>Uses alternative funding strategies</li> </ul>



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As indicated in Figure 2, the evaluation followed a two-stage screening process: first, does the potential solution help to address an identified transportation safety, mobility or access need? Second, what is the feasibility of the project in terms of environmental impacts, level of public and stakeholder support, and financial resources required?

## Evaluation Criteria

### System Performance

#### *Improvement in Travel Time*

As discussed in the Existing and Future Conditions technical memorandum, travel times on I-40/81 between major cities in Tennessee are expected to increase between now and 2040, even with all of the corridor improvements that TDOT already has planned. In most cases it is unlikely that making improvements will result in travel taking less time than it does now, since growth in Tennessee's population and economy will continue to add traffic to the I-40/81 corridor. This evaluation factor is therefore focused on whether candidate projects will improve travel time by reducing the amount of delay that is otherwise expected if no improvements are made.

#### *Reduction in Total Vehicle-Hours of Delay*

This measure is closely related to travel time, since delay is measured by the amount of time drivers spend in congested conditions, defined as roadway level of service D, E and F for rural sections of the corridor, and as level of service E and F for urban sections of the corridor. Both this measure and travel time improvements can be calculated using TDOT's statewide travel demand model.

#### *Improvement in Average Peak Hour Travel Speed*

This measure is also closely related to travel time and can be calculated from TDOT's statewide travel demand model. As with travel time, in some cases it may not be feasible to actually increase average peak hour travel speeds in 2040 compared to existing conditions; however, making improvements to the corridor may prevent average travel speeds from decreasing as much as they might otherwise if no improvements are made.

#### *Incorporation of Transportation Systems Management & Operations (TSMO) Strategies*

Tennessee, along with every other state across the nation, is adopting strategies to manage its existing transportation systems and services more efficiently. These strategies can help reduce the costs of transportation system expansion as well as its impacts. This evaluation factor considers whether a candidate project expands the use of TSMO strategies.

#### *Incorporation of Technology to Enhance Mobility and Safety*

Not all TSMO strategies rely on advanced technology, although many do. In addition, there are projects which are not primarily for TSMO purposes but whose construction may include the addition of important elements, such as roadside devices or communications, that lay the necessary foundation for management and operations. This evaluation factor gives consideration to such projects as well as those that are directly TSMO-related.





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## Safety & Security

### *Improvement of Safety in Identified Segments*

As discussed in previous technical memoranda, certain sections of the I-40/81 corridor were identified as having higher crash rates. This evaluation factor considers whether a project improves safety in one of those identified segments.

### *Implementation of Safety Policy and/or Program*

This criterion reflects whether a project implements a policy or program that has the primary goal of improving safety, incident response time, security, or system redundancy. Examples would include expansion of TDOT's HELP program, or installation of closed-circuit television cameras to monitor a location that often experiences incidents.

### *Improvement of a Detour Route*

This factor considers whether a project improves geometric or other deficiencies along a route that has been designated by TDOT to serve as a detour route during periods when interstate traffic must be diverted. Examples could include adding shoulders or widening substandard lanes to allow for safer travel by larger vehicles. Even some state routes may not be well equipped to handle the levels of heavy truck traffic that occur when interstate traffic is diverted, especially in rural areas of the corridor.

## Freight and Goods Movement

### *Improvement in Truck Travel Time*

This factor is similar to the measure for overall travel time, but is concerned with whether the project improves travel time for commercial trucks. As the population and economy continue to grow, it is likely that truck travel times will increase somewhat even with improvements that are made, so the goal is to maintain travel conditions to the extent possible.

### *Reduction in Total Truck Vehicle-Hours of Delay*

This factor is similar to total vehicle-hours of delay but focuses specifically on the total hours of delay experienced by trucks. Travel delay in the freight industry has a particularly high cost because when a driver is late for a pickup or dropoff, it not only means the trucking company is less productive, it can also impact the productivity of other businesses that are waiting for a delivery to arrive.

### *Improvement in Average Peak Hour Truck Travel Speed*

This measure focuses on the average peak hour travel speed of commercial trucks, as distinguished from the average peak hour travel speed of all traffic.

## Economic Development & Access to Opportunities

### *Improvement in Access to Job Sites and Other Major Planned Development*

Due to the statewide scale and length of the I-40/81 corridor, this evaluation factor was applied based on project type rather than modeling trips associated with specific projects as might be done at a metropolitan scale. New interchanges were considered to provide the greatest benefit, followed by projects/programs that would improve travel time and delay.



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## *Improvement in Travel Choice*

This measure is focused primarily on whether the project improves non-auto options for the types of trips for which the interstate corridor is typically used. It would therefore include intercity and regional transit service.

## State of Good Repair

### *Incorporates maintenance of existing assets*

This factor is related to whether implementation of a project would be likely to improve overall condition of the existing system. For example, a project to add an auxiliary lane would likely result in related improvements to paving, signing and marking for other lanes in the same section of roadway.

## Public Support & Coordination

The degree of public support likely for a candidate project was evaluated on the basis of whether it is included in another adopted plan, as well as comments received through this study's public and stakeholder engagement process. In the case of strategies that would be new to Tennessee, such as ramp metering or HOT lanes, public support was estimated based on the level of public acceptance in other states where this type of project has been implemented, particularly in similar regions.

## Environmental Impact

### *Reduction of Energy Consumption*

Projects that enable and/or encourage the use of non-auto modes clearly have the highest potential to reduce energy consumption. This measure is also related to the system performance measures of travel speed and vehicle-hours of delay, since vehicles operate less efficiently when traveling in stop-and-go traffic.

### *Presence of Environmental "Red Flags" / Potential Fatal Flaws*

Potential environmental impacts were reviewed at a high level to identify the presence of any "red flag" indicators that would make it inadvisable for the Department to initiate even the earliest stages of project development. Since the majority of potential projects would likely fall within existing interstate right-of-way, the review did not identify any projects whose likely environmental impacts are so significant that they should not be at least initially explored. It should be noted that any project selected from this study for development by TDOT would undergo a comprehensive environmental review and public input process in order to determine whether any further work should occur.

Six projects (shown in Table 1) were identified as "environmentally challenging" due to their potential impacts on sensitive natural and cultural resources and/or environmental justice communities. More detail on the screening process is provided in Appendix A.



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Table 1: Projects Identified as Environmentally Challenging

Candidate Project	Environmental Issues
<p><i>Smith and Wilson counties:</i> SR 141 safety improvements from SR 26 (US 70) to Wilson-Smith County Line</p>	<p>Sensitive resources in the project area include a cemetery (NHRP-listed); historic home (NHRP-listed); wetlands; stream/river crossings; ponds; floodway; and environmental justice communities.</p>
<p><i>Shelby County:</i> I-40 widening from Exit 1E (I-240) to Exit 2A (SR-300)</p>	<p>Sensitive resources in the project area include historic districts; wetlands; stream/river crossings; floodway; and environmental justice communities.</p>
<p><i>Cocke County:</i> I-40 safety improvements to address 45 mph curves between Exit 443 (SR-339 [Foothills Parkway]) and Exit 451</p>	<p>Sensitive resources in the project area include Great Smoky Mountains National Park; wetlands; and river/stream crossings.</p>
<p><i>Davidson County:</i> I-40 safety improvements between Exit 204 (SR 155 [Briley Parkway/White Bridge Road]) and Exit 206 (I-440)</p>	<p>Sensitive resources in the project area include a historic district; stream/river crossings; floodways; and environmental justice communities.</p>
<p><i>Sullivan County:</i> Redevelop Kingsport Intermodal Yard so it is being used by truck and rail</p>	<p>High potential for hazardous materials to be found in the former intermodal yard.</p>
<p><i>Davidson County:</i> Increase clearance at CSX bridge in downtown Nashville for larger barges to pass</p>	<p>Work on the bridge will likely require permits and approvals from multiple agencies including the US Coast Guard and Army Corps of Engineers and could impact adjacent properties if the bridge were relocated.</p>

## Financial Sustainability

### *Use of Alternative Funding Strategies*

This measure considers the likelihood that a project and/or program could be partially funded through user fees, as in the case of conversion of High Occupancy Vehicle (HOV) lanes to High Occupancy Toll (HOT) lanes, or through a combination of public and private funds, as might be the case for some of the multimodal freight projects.



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## Benefit-Cost Index

Similar to the approach used in other TDOT interstate corridor studies, a benefit-cost index (BCI) was developed for each project by dividing overall project score by the project cost in millions.<sup>1</sup> A benefit score was generated from the evaluation of each project relative to each of the criteria mentioned earlier in this section: system performance, safety and security, freight and goods movement, etc. Projects received between 0 and 2 points for each criterion based on the expected level of benefit. If a project was identified as environmentally challenging, one point was deducted from the total benefit score. Project costs were developed using TDOT's planning-level cost estimation tool, FHWA's TOPS-BC Tool, and/or from comparable projects programmed or recently completed.

A per-mile BCI was also developed for each project. Projects addressing longer sections of the corridor may have higher costs but may also have benefits that extend to a greater number of drivers. The per-mile BCI allows comparison of projects of significantly different length.<sup>2</sup> Project cost per mile was determined by dividing the project cost by the length of the project benefit. In many cases this could simply be the actual length of the project (in directional miles). For some projects, such as a significant interchange improvement, the area of benefit was defined as the distance to the next interchange in each direction.

## 3. Screening Results

### Candidate Project Evaluation

The results of applying the project evaluation criteria described in the previous section are shown in the following tables:

- Table 2: Highway Capacity/Expansion
- Table 3: Transportation System Management & Operations (TSMO)
- Table 4: Safety
- Table 5: Multimodal Freight
- Table 6: Transit
- Table 7: Economic Access

Projects for highway capacity/expansion, TSMO, and safety have been ranked by benefit/cost index (BCI) per mile, which as noted earlier, allows comparability across projects of varying length. Separate tables have been provided for multimodal freight, transit, and economic access, projects for which determining the length of benefit would require analysis beyond the scope of the study. If it is desired to compare these project types directly against others, the BCI value could be used. However, this study follows several of TDOT's other interstate corridor studies in presenting these modes/project types separately.

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<sup>1</sup> Please note that this is not the same as a benefit/cost ratio, in which benefits have been translated to a dollar value. It is important to recognize the difference, since many readers will be familiar with studies in which a B/C ratio less than 1 indicates that a project may not be a good investment. The benefit-cost index is a different approach. A project with a B/C index value less than 1 may still be a worthy improvement.

<sup>2</sup> If a specific project has had additional analysis conducted, the length was derived from this additional analysis.

Table 2: Capacity/Expansion Projects

ROUTE	PROJECT NO.	COUNTY	DESCRIPTION	TERMINI	System Performance					Safety & Security			Economic Development		Environment		Public support	Alt Funding Strategies	State of Good Repair	Benefit Score	Centerline Length (miles)	Cost	BCI	Per Mile BCI
					Travel Time	Total Delay (Veh-Hrs)	Avg Peak Hr Speed	TSMO Strategies	Technology	Higher Crash Area	Safety/ Security Program	Detour Route Safety	Economic Access	Improves travel choice	Envntl Challenges	Reduce energy use								
I-81	RMP-1-04	Sullivan	Ramp improvements to NB entrance ramp from SR 1 (US 11W, State Street) to provide operational and safety improvements	Exit 74 (SR 1 [US 11W, State Street])	1	1	1	0	0	0	1	0	1	0	No	0	1	0	1	7	4.8	\$2,700,000	2.6	12.4
I-40	RMP-2-01	Putnam	Add deceleration lane	Exit 301 (SR 24 [US 70N]) westbound off-ramp	2	2	2	0	0	0	1	0	1	0	No	0	1	0	1	10	0.5	\$1,100,000	9.1	4.5
I-40	INT-2-01	Putnam	Widen SR 56 and ramps through interchange to provide operational and safety improvements	Exit 280 (SR 56 [Baxter Road])	1	1	1	0	0	2	1	0	1	0	No	0	2	0	1	10	6.0	\$14,200,000	0.7	4.2
I-40	INT-1-01	Roane	Reconfigure interchange to provide operational and safety improvements	Exit 347 (SR 61 [US 27, South Roane Street])	1	1	1	0	0	2	1	0	1	0	No	0	1	0	1	9	8.9	\$26,200,000	0.3	3.1
I-40	RMP-1-01	Knox	Realign ramp terminal and right-turn lane channelization to improve operations at signalized intersection	Exit 374 (SR 131 [Lovell Road]) eastbound off-ramp	2	2	2	0	0	2	1	0	1	0	No	0	1	0	1	12	0.5	\$2,700,000	4.4	2.2
I-40	RMP-1-02	Knox	Ramp improvements to increase capacity and improve vertical/horizontal alignment for trucks	Exit 385 (Interstates 75/640) eastbound off-ramp	2	2	2	0	0	2	1	0	1	0	No	0	1	0	1	12	0.5	\$2,700,000	4.4	2.2
I-40	RMP-3-01	Davidson	Ramp improvements to enhance operations	Exit 221 (SR 45 [Old Hickory Boulevard])	2	2	2	0	0	2	1	0	1	0	No	0	1	0	1	12	0.5	\$2,700,000	4.4	2.2
I-40	C-3-06	Davidson	Add one auxiliary lane in the eastbound direction between relocated Donelson Pike interchange entrance ramp and interchange	Exit 216 (SR 255 [Donelson Pike]) to Exit 219 (Stewarts Ferry Pike)	2	2	2	0	0	0	0	0	2	0	No	1	1	0	1	11	1.5	\$8,300,000	1.3	2.0
I-40	C-2-02	Cumberland	Add auxiliary lanes between interchanges. Add deceleration lanes to off-ramps.	Exit 317 (SR 28 [US 127]) to Exit 322 (SR 101 [Peavine Road])	2	2	2	0	0	0	0	0	2	0	No	1	1	0	1	11	3.7	\$41,900,000	0.3	1.9
I-40	C-1-01	Knox and Loudon	Widen from 6 to 8 lanes	Exit 368 (I-75) to Exit 374 (SR 131 [Lovell Road])	2	2	2	0	0	0	0	0	2	0	No	1	1	0	1	11	6.5	\$68,400,000	0.2	1.9
I-40	RMP-2-02	Cumberland	Ramp improvements to remove islands at exit ramps (both eastbound and westbound)	Exit 317 (SR 28 [US 127])	2	2	2	0	0	0	1	0	1	0	No	0	1	0	1	10	0.5	\$2,700,000	3.7	1.9
I-81	C-1-05	Sullivan	Add southbound auxiliary lane between Welcome Center and exit ramp	Mile marker 75.3 (Welcome Center in Sullivan County) to Exit 74B (SR 1 [US 11W, State Street])	2	2	2	0	0	0	0	0	2	0	No	1	1	0	1	11	0.5	\$3,100,000	3.5	1.8
I-40	C-3-07	Dickson	Add one auxiliary lane in the westbound direction between interchange and interstate junction	Exit 172 (SR 46) to Exit 176 (I-840)	2	2	2	0	0	0	0	0	2	0	No	1	1	0	1	11	2.8	\$17,800,000	0.6	1.7
I-40	RMP-3-02	Davidson	Extend acceleration lanes approximately 0.5 miles to improve merge operations	Exit 205 (SR 155 [Briley Parkway]) westbound on-ramp	2	2	2	0	0	2	1	0	1	0	No	0	1	0	1	12	0.5	\$3,800,000	3.2	1.6
I-40	C-3-04	Davidson	In eastbound direction: - Widen I-40 from 5 to 6 lanes from Exit 213A-B to newly constructed SR 255 (Donelson Pike) interchange. - Close slip ramp from SR 1 (Murfreesboro Pike) to eastbound I-40 entrance ramp. Create left-hand turn at SR 1 to loop ramp to provide access to NB I-24/I-440 to I-40 connection. In westbound direction: - Improve exit ramp to NB SR 155, evaluate ramp merge/weave on SR 155 between I-40 and Elm Hill Pike	Exit 213A-B (I-40/24/440 interchange) to Exit 215A-B (SR 155 [Briley Parkway])	2	2	2	0	0	2	0	0	2	0	No	1	1	0	1	13	1.8	\$37,500,000	0.3	1.2
I-40	C-2-01	Putnam	Add auxiliary lanes between interchanges and ramp improvements	Exit 286 (SR 135 [South Willow Avenue]) to Exit 288 (SR 111)	2	2	2	0	0	0	0	0	2	0	No	1	1	0	1	11	2.1	\$19,500,000	0.6	1.2
I-40	RMP-3-04	Wilson	Widen to three lanes to provide operational improvements at signalized intersection	Exit 236 (Hartmann Drive) eastbound off-ramp	2	2	2	0	0	0	1	0	1	0	No	0	1	0	1	10	0.5	\$4,600,000	2.2	1.1
I-40	C-1-02	Knox	Widen from 8 to 10 lanes	Exit 374 (SR 131 [Lovell Road]) to Exit 385 (Interstates 75/640)	2	2	2	0	0	2	0	0	2	0	No	1	1	0	1	13	10.6	\$255,000,000	0.1	1.1
I-40	INT-1-03	Knox and Loudon	Reconfigure interchange to reduce weaving movements and capacity issues	Exit 369 (Watt Road)	1	1	1	0	0	0	1	0	1	0	No	0	2	0	1	8	3.0	\$48,900,000	0.2	1.1
I-40	C-1-04	Jefferson	Add one auxiliary lane in the eastbound direction between interchanges and rest area	Exit 417 (SR 92) to Exit 421 (I-81)	2	2	2	0	0	0	0	0	2	0	No	1	1	0	1	11	2.7	\$27,600,000	0.4	1.1
I-81	INT-1-07	Sullivan	Reconfigure interchange to provide operational and safety improvements	Exit 57 (Junction with I-26 [US 23])	1	1	1	0	0	0	1	0	1	0	No	0	2	0	1	8	2.6	\$19,700,000	0.4	1.1
I-40	INT-1-04	Knox	Reconfigure interchange to provide operational and capacity improvements	Exit 373 (Campbell Station Road)	1	1	1	0	0	0	1	0	1	0	No	0	2	0	1	8	3.6	\$58,800,000	0.2	1.0
I-40	C-4-01	Shelby	Widen from 6 to 8 lanes	Exit 1E (I-240) to Exit 2A (SR 300)	2	2	2	0	0	0	0	0	2	0	Yes	1	1	0	1	11	1.8	\$40,500,000	0.3	1.0
I-40	RMP-3-03	Wilson	Eastbound and westbound ramp improvements to northbound Golden Bear Gateway	Exit 229 (Beckwith Road)	2	2	2	0	0	0	1	0	1	0	No	0	1	0	1	10	0.5	\$5,400,000	1.9	0.9



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Table 2: Capacity/Expansion Projects (continued)

ROUTE	PROJECT NO.	COUNTY	DESCRIPTION	TERMINI	System Performance					Safety & Security			Economic Development		Environment		Public support	Alt Funding Strategies	State of Good Repair	Benefit Score	Centerline Length (miles)	Cost	BCI	Per Mile BCI
					Travel Time	Total Delay (Veh-Hrs)	Avg Peak Hr Speed	TSMO Strategies	Technology	Higher Crash Area	Safety/ Security Program	Detour Route Safety	Economic Access	Improves travel choice	Env'tal Challenges	Reduce energy use								
I-40	RMP-4-01	Madison	Ramp improvements to increase capacity	Exit 87 (SR 1 [US 70/US 412])	2	2	2	0	0	0	1	0	1	0	No	0	1	0	1	10	0.5	\$5,400,000	1.9	0.9
I-40	RMP-4-02	Shelby	Reconfigure ramps with intersection of North Watkins Street and Overton Crossing Street to improve traffic operations	Exit 3 (North Watkins Street)	2	2	2	0	0	0	1	0	1	0	No	0	1	0	1	10	0.5	\$5,400,000	1.9	0.9
I-40	INT-1-05	Knox	Separation of eastbound traffic to avoid weaving traffic between Exit 383 and Exit 385 (Interstates 75/640)	Exit 383 (SR 332 [Papermill Drive])	1	1	1	0	0	0	1	0	1	0	No	0	0	0	1	6	1.5	\$10,400,000	0.6	0.9
I-40	INT-1-06	Jefferson	Geometric and operational improvements to the interchange	Exit 421 (Junction with I-81)	1	1	1	0	0	0	1	0	1	0	No	0	1	0	1	7	9.0	\$82,500,000	0.1	0.8
I-40	INT-3-01	Davidson	Reconfigure interchange to provide operational and safety improvements.	Exit 201 (SR 24 [US 70, Charlotte Pike])	1	1	1	0	0	0	1	0	1	0	No	0	1	0	1	7	3.7	\$35,800,000	0.2	0.7
I-40	C-3-05	Davidson	Add one auxiliary lane in the westbound direction between relocated Donelson Pike interchange and interstate entrance ramp at westbound Old Hickory Blvd	Exit 216 (SR 255 [Donelson Pike]) to entrance ramp from Old Hickory Blvd (approximately MM 220)	2	2	2	0	0	2	0	0	2	0	No	1	1	0	1	13	2.5	\$49,200,000	0.3	0.7
I-40	C-3-02	Davidson	In eastbound direction, extend SR 155 entrance ramp as an auxiliary lane to Exit 206 (I-40/440). (This includes adjustment of 46th Avenue entrance ramp.) Add auxiliary lane from Exit I-440 on-ramp to I-65 off-ramp. In westbound direction, widen from 3 to 4 lanes from I-65 to I-440. Braid the Delaware Avenue ramp with the SR 155 exit off-ramp to eliminate weave.	Exit 204A-B (SR 155 [Briley Parkway], White Bridge Road) to Exit 208A-B (I-40/I-65 interchange)	2	2	2	0	0	2	0	0	2	0	No	1	1	0	1	13	2.0	\$86,600,000	0.2	0.6
I-40	C-3-03	Davidson	In eastbound direction: - Merge proposed Inner Loop C-D system into the I-40 mainline, as well as merge the I-24 lanes. - Widen I-40/24 mainline from 4 to 6 lanes - Shift I-40/24/440 junction westward for proper distance needed for ramp terminal spacing and lane balance requirements. In westbound direction: - Widen from 4 to 6 lanes west of I-40/24/440 junction - Remove left-hand I-24 merge, add flyover bridge to create right-hand merge - Add barrier to separate I-24 lanes and restrict traffic entering from Fesslers and Hermitage Avenue to access I-24 only. - At I-40/24 junction, transition proposed 6-lane section to accommodate ramp terminal spacing and lane balance requirements, both for I-24 and the proposed Inner Loop C-D system.	Exit 211A-B (I-40/24 interchange) to Exit 213A-B (I-40/24/440 interchange)	2	2	2	0	0	2	0	0	2	0	No	1	1	0	1	13	1.8	\$107,200,000	0.1	0.4
I-40	CD-3-01	Davidson	Develop a collector-distributor (C-D) system which separates downtown Nashville destination traffic from the interstate mainline through traffic	From Exit 208A-B (I-40/65 interchange on west side of Inner Loop) to Exit 211A-B (I-40/24 interchange)	2	2	2	0	0	2	1	0	1	0	No	0	0	0	0	10	2.4	\$122,200,000	0.1	0.4
I-40	INT-3-02	Davidson	Reconfigure interchange to eliminate weaving section in both directions	Exit 207 (Jefferson Street / 28th Avenue North)	1	1	1	0	0	2	1	0	1	0	No	0	1	0	1	9	1.7	\$44,800,000	0.2	0.3
I-40	C-1-03	Knox	Extend the two existing lanes from the US 129 entrance ramp to WB mainline such that one lane exits to I-640 and one lane continues through on I-40 mainline.	Interstates 75/640 to US 129	2	2	2	0	0	0	0	0	2	0	No	1	1	0	1	11	1.5	\$61,200,000	0.2	0.3
I-40	CD-4-01	Shelby	Add collector-distributor road to reduce weaving movements for westbound exiting traffic to SR 1 (US 51, Danny Thomas Boulevard) and Second Street.	Exit 1 (SR 1 [US 51, Danny Thomas Boulevard])	1	1	1	0	0	0	1	0	1	0	No	0	1	0	1	7	1.7	\$50,600,000	0.1	0.2
I-40	INT-1-02	Loudon	Reconfigure interchange to provide operational and safety improvements	Exit 368 (Junction with I-75)	1	1	1	0	0	0	1	0	1	0	No	0	1	0	1	7	4.2	\$146,300,000	0.0	0.2
I-40	RMP-1-03	Knox	Braid the I-275 entrance to I-40 WB with the Western Ave and US 129 exit ramps	Exit 387 (SR 62 [Western Avenue]) westbound off-ramp	2	2	2	0	0	2	1	0	1	0	No	0	1	0	1	12	0.5	\$63,600,000	0.2	0.1



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Table 3: Transportation System Management & Operations (TSMO) Projects

ROUTE	PROJECT NO.	COUNTY	DESCRIPTION	TERMINI	System Performance					Safety & Security			Economic Development		Environment		Public support	Alt Funding Strategies	State of Good Repair	Benefit Score	Centerline Length (miles)	Cost	BCI	Per Mile BCI
					Travel Time	Total Delay (Veh-Hrs)	Avg Peak Hr Speed	TSMO Strategies	Technology	Higher Crash Area	Safety/ Security Program	Detour Route Safety	Economic Access	Improves travel choice	Env'tal Challenges	Reduce energy use								
I-40	TS-1-01	Knox, Loudon, Roane	Implement "HELP Lite" service	From Roane/Cumberland county line to Exit 369	0	2	1	2	1	2	2	0	0	0	No	1	1	0	0	12	22.0	\$190,000	63.2	2,778.9
I-40	TS-4-01	Benton, Carroll, Decatur, Henderson, Madison	Implement "HELP Lite" service	From Madison/Haywood county line to the Tennessee River	0	2	1	2	1	2	2	0	0	0	No	1	1	0	0	12	67.0	\$660,000	18.2	2,436.4
I-40	TS-4-02	Fayette, Haywood, Shelby	Implement "HELP Lite" service	From Exit 25 to Haywood/Madison county line	0	2	1	2	1	2	2	0	0	0	No	1	1	0	0	12	41.0	\$410,000	29.3	2,400.0
I-40	TS-3-01	Davidson, Smith, Wilson	Implement "HELP Lite" service	From Exit 219 to Smith/Putnam county line	0	2	1	2	1	2	2	0	0	0	No	1	1	0	0	12	49.0	\$490,000	24.5	2,400.0
I-40	TS-3-02	Cheatham, Davidson, Dickson, Hickman, Humphreys	Implement "HELP Lite" service	From Exit 201 to the Tennessee River	0	2	1	2	1	2	2	0	0	0	No	1	1	0	0	12	58.0	\$580,000	20.7	2,400.0
I-40	TS-1-02	Cocke, Jefferson, Knox, Sevier	Implement "HELP Lite" service	East of Knoxville from Exit 398 to North Carolina state line	0	2	1	2	1	0	2	0	0	0	No	1	1	0	0	10	53.0	\$450,000	22.2	2,355.6
I-81	TS-1-03	Greene, Hamblen, Sullivan, Washington	Implement "HELP Lite" service	From I-40 junction to Virginia state line	0	2	1	2	1	0	2	0	0	0	No	1	1	0	0	10	73.0	\$620,000	16.1	2,354.8
I-40	TS-2-01	Cumberland, Putnam	Implement "HELP Lite" service	Throughout Putnam and Cumberland counties	0	2	1	2	1	2	2	0	0	0	No	1	1	0	0	12	72.5	\$810,000	14.8	2,148.1
I-40	TS-3-03	Davidson	Implement ramp metering	Exit 192 at Bellevue (US 70S) to Exit 221	2	2	2	2	2	2	1	0	2	0	No	1	0	0	0	16	28.0	\$5,850,000	2.7	153.2
I-40	TS-4-03	Shelby	Implement ramp metering	Between Exit 1 and Exit 16 (SR 177, Germantown Parkway)	2	2	2	2	2	0	1	0	2	0	No	1	0	0	0	14	18.0	\$4,990,000	2.8	101.0
I-40	TS-1-04	Knox	Implement ramp metering	Between Exit 374 (SR 131, Lovell Road) and downtown Knoxville near Broadway (US 441)	2	2	2	2	2	2	1	0	2	0	No	1	0	0	0	16	13.0	\$4,130,000	3.9	100.7
I-40	TS-3-04	Davidson	Implement Integrated Corridor Management	From Exit 192 (McCrary Lane) to Exit 221 (SR 45, Old Hickory Boulevard)	2	2	2	2	1	2	1	0	1	0	No	1	1	0	0	15	27.4	\$8,450,000	1.8	97.3
I-40	TS-1-06	Knox, Sevier	Implement Integrated Corridor Management	Between Exit 369 (Watt Road) and Exit 407 (SR 66)	2	2	2	2	1	2	1	0	1	0	No	1	1	0	0	15	32.9	\$10,720,000	1.4	92.1
I-40	TS-4-04	Shelby	Implement Integrated Corridor Management	From I-269 through the Memphis city core	2	2	2	2	1	0	1	0	1	0	No	1	1	0	0	13	25.8	\$8,070,000	1.6	83.1
I-40	TS-3-06	Wilson, Smith, Putnam	SmartWay Expansion	I-40 in Regions 2 and 3 (east of existing SmartWay deployment in Wilson County) through Smith and western Putnam counties	1	2	1	2	2	2	1	0	0	0	No	1	1	0	0	13	40.7	\$23,199,000	0.6	45.6
I-40	TS-1-05	Roane	SmartWay Expansion	Between existing SmartWay deployments	1	2	1	2	2	0	1	0	0	0	No	1	1	0	0	11	14.0	\$7,980,000	1.4	38.6
I-81	TS-1-07	Greene, Washington	SmartWay Expansion	I-81 in Greene and Washington counties	1	2	1	2	2	0	1	0	0	0	No	1	1	0	0	11	30.7	\$17,499,000	0.6	38.6
I-40	TS-3-05	Davidson, Wilson	Convert existing HOV lanes on I-40 on the east side of Nashville, both directions, from Exit 216 (Briley Parkway) to Exit 232 (SR 109).	Exit 216 (Briley Parkway) to Exit 232 (SR 109)	1	1	1	1	1	2	0	0	0	0	No	1	0	1	1	10	17.0	\$11,000,000	0.9	30.9
I-40	TS-4-05	Shelby	Convert existing HOV lanes on I-40 eastbound from MM 15 (near Sycamore View Road interchange) to MM 22 (near US 64 interchange), and I-40 westbound from MM 22 (near US 64 interchange), and I-40 westbound from MM 22 to MM 16	MM 15 (near the Sycamore View Road interchange) to MM 22 (near the US 64 interchange), and I-40 westbound from MM 22 to MM 16 (near the Sycamore View Road interchange).	1	1	1	1	1	2	0	0	0	0	No	1	0	1	1	10	6.0	\$6,500,000	1.5	18.5
I-40	TL-1-01	Roane	Add truck climbing lane	Westbound from Exit 340 (Airport Road) to Exit 347 (SR 61 [US 27, South Roane Street])	2	2	2	0	0	2	1	0	0	0	No	1	2	0	1	13	7.0	\$44,300,000	0.3	2.1
I-40	TL-3-01	Cheatham	Add truck climbing lane	Westbound from MM 185 to Exit 188 (SR 249 [Luyben Hills Road])	2	2	2	0	0	2	1	0	0	0	No	1	2	0	1	13	3.0	\$19,800,000	0.7	2.0
I-40	TL-1-02	Roane	Add truck climbing lane	Eastbound from Exit 347 (SR 61 [US 27, South Roane Street]) to Exit 350 (SR 29)	2	2	2	0	0	2	1	0	0	0	No	1	2	0	1	13	2.5	\$16,800,000	0.8	1.9
I-40	TL-2-01	Putnam	Add truck climbing lane	Eastbound from Exit 268 (SR 96 [Buffalo Valley Road]) to east of Exit 273 (SR 56)	2	2	2	0	0	0	1	0	0	0	No	1	2	0	1	11	6.0	\$35,900,000	0.3	1.8
I-81	TL-1-04	Greene, Washington	Add truck climbing lane through Exit 50 (SR 93) interchange	Northbound from MM 48 (Moody Road) to MM 51 (Link Road)	2	2	2	0	0	0	1	0	0	0	No	1	2	0	1	11	3.3	\$21,300,000	0.5	1.7
I-81	TL-1-03	Greene, Hamblen	Add truck climbing lane	Northbound from Exit 15 (SR 340 [Fish Hatchery Road]) to Exit 23 (SR 34 [US 11E, West Andrew Johnson Highway])	2	2	2	0	0	0	1	0	0	0	No	1	2	0	1	11	7.8	\$56,700,000	0.2	1.5
I-40	TL-2-02	Putnam	Add truck climbing lane	Eastbound from Exit 290 (SR 24 [US 70N]) to Exit 300 (SR 24 [US 70N])	2	2	2	0	0	2	1	0	0	0	No	1	2	0	1	13	10.0	\$98,000,000	0.1	1.3

HELP Lite cost estimates include some costs for software and equipment that may be covered partially or completely by Smartway expansion if it is implemented first.



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Table 4: Safety Projects

ROUTE	PROJECT NO.	TDOT REGION(S)	COUNTY	DESCRIPTION	TERMINI	System Performance					Safety & Security			Economic Development		Environment		Public support	Alt Funding Strategies	State of Good Repair	Benefit Score	Centerline Length (miles)	Cost	BCI	Per Mile BCI
						Travel Time	Total Delay (Veh-Hrs)	Avg Peak Hr Speed	TSMO Strategies	Technology	Higher Crash Area	Safety/ Security Program	Detour Route Safety	Economic Access	Improves travel choice	Enviral Challenges	Reduce energy use								
I-40	S-2-01	2	Putnam	Infrastructure-oriented safety treatments	Exit 276 (Old Baxter Road) to Exit 280 (SR 56)	0	1	0	0	0	2	2	0	0	0	No	0	1	0	1	7	4.0	\$ 320,000	21.9	175.0
SR 1 (US 70)	SD-4-01	4	Madison	Safety improvements	From Huntersville-Denmark Road to Algje Neely Road	0	0	0	0	0	0	2	2	0	0	No	0	1	0	1	6	1.0	\$ 37,000	162.2	162.2
I-40	S-2-03	2	Cumberland	Infrastructure-oriented safety treatments	Exit 329 (Market Street) to Exit 338 (SR 299 [Westel Road])	0	1	0	0	0	2	2	0	0	0	No	0	1	0	1	7	9.0	\$ 860,000	8.1	146.5
I-40	S-2-02	2	Cumberland	Addition of median cable barrier system	Exit 317 (SR 28 [US 127]) to Exit 322 (SR 101 [Peavine Road])	0	1	0	0	0	1	2	0	0	0	No	0	1	0	1	6	4.4	\$ 670,000	9.0	78.8
SR 24 (US 70)	SD-3-04	3	Smith	Safety improvements	From SR 264 to Putnam/Smith county line	0	0	0	0	0	0	2	2	0	0	No	0	1	0	1	6	6.1	\$ 583,000	10.3	62.8
SR 1 (US 70)	SD-2-03	2	Cumberland	Safety improvements	From Market Street to Cumberland/Roane county line	0	0	0	0	0	0	2	2	0	0	No	0	1	0	1	6	9.4	\$ 900,000	6.7	62.7
SR 24 (US 70)	SD-2-02	2	Putnam	Safety improvements	From I- 40 (Exit 290) to SR 84	0	0	0	0	0	0	2	2	0	0	No	0	1	0	1	6	11.9	\$ 1,140,000	5.3	62.6
SR 230	SD-3-01	3	Hickman, Humphreys	Safety improvements	From SR 48 to SR 13	0	0	0	0	0	0	2	2	0	0	No	0	1	0	1	6	25.2	\$ 2,421,000	2.5	62.5
SR 265 (Central Pike)	SD-3-02	3	Wilson	Safety improvements	From SR 171 (Mount Juliet Road) to SR 109	0	0	0	0	0	0	2	2	0	0	No	0	1	0	1	6	6.9	\$ 664,000	9.0	62.3
Old Baxter Road/Main Street/Ward Mill Road	SD-2-01	2	Putnam	Safety improvements	From I-40 (Exit 276) to SR 56	0	0	0	0	0	0	2	2	0	0	No	0	1	0	1	6	5.8	\$ 600,000	10.0	58.0
SR 141	SD-3-03	3	Smith, Wilson	Safety improvements	From SR 26 (US 70) to Wilson/Smith county line	0	0	0	0	0	0	2	2	0	0	Challenging	0	1	0	1	5	10.5	\$ 1,012,000	4.9	51.9
SR 1 (US 70)	SD-1-01	1	Roane	Safety improvements	From Cumberland/Roane county line to SR 29 (US 27, Spring City Highway)	0	0	0	0	0	0	2	2	0	0	No	0	1	0	1	6	2.7	\$ 400,000	15.0	40.5
SR 1 (US 70)	SD-1-02	1	Loudon, Roane	Safety improvements	From SR 326 to SR 73 (US 321)	0	0	0	0	0	0	2	2	0	0	No	0	1	0	1	6	10.6	\$ 1,700,000	3.5	37.4
I-40	S-3-02	3	Davidson	Infrastructure-oriented safety treatments	Exit 204 (SR 155 [Briley Parkway / White Bridge Road]) to Exit 206 (I-440)	0	1	0	0	0	2	2	0	0	0	Challenging	0	1	0	1	6	12.4	\$ 7,000,000	0.9	21.3
I-40	S-4-01	4	Henderson	Add crossover to facilitate emergency services and detours	Between Mile Marker 115.5 and 118.8 (near Exit 116 [SR 114, Natchez Trace State Parkway])	0	1	0	0	0	0	2	0	0	0	No	0	1	0	0	4	3.3	\$ 2,910,000	1.4	9.1
I-40	S-3-01	3	Davidson	Ramp improvements to WB off-ramp – add deceleration lane and widen ramp	Exit 196 (SR 1 [US 70S]) westbound off-ramp	0	1	0	0	0	2	2	0	0	0	No	0	1	0	1	7	0.5	\$ 2,700,000	2.6	1.3
I-40	S-1-02	1	Cocke	Realign interstate in order to remove 45 MPH horizontal curves	Exit 443 (SR 339 [Foothills Parkway]) to Exit 451	0	1	0	0	0	0	2	0	0	0	Challenging	0	1	0	1	4	7.4	\$ 93,000,000	0.0	0.6
I-40	S-1-01	1	Cocke	Interchange improvements to lengthen deceleration/acceleration lanes	Exit 447 (Hartford Road)	0	1	0	0	0	0	2	0	0	0	No	0	1	0	1	5	0.5	\$ 5,400,000	0.9	0.5
I-40	S-1-03	1	Roane	Add runaway truck ramp(s)	Eastbound from Exit 340 (Airport Road) to Exit 347 (SR 61 [US 27, South Roane Street])	0	0	0	0	0	0	2	0	0	0	No	0	1	0	0	3	7.2	\$ 56,700,000	0.1	0.4
I-40	S-2-04	2	Putnam	Add runaway truck ramp(s)	Westbound from Exit 290 (SR 24 [US 70N]) to Exit 300 (SR 24 [US 70N])	0	0	0	0	0	0	2	0	0	0	No	0	1	0	0	3	10.6	\$ 98,200,000	0.0	0.3



Table 5: Multimodal Freight Projects

CORRIDOR	PROJECT NO.	TDOT REGION(S)	COUNTY	DESCRIPTION	System Performance					Safety & Security			Economic Development		Environment		Public support	Alt Funding Strategies	State of Good Repair	Benefit Score	Cost	BCI
					Travel Time	Total Delay (Veh-Hrs)	Avg Peak Hr Speed	TSMO Strategies	Technology	Higher Crash Area	Safety/ Security Program	Detour Route Safety	Economic Access	Improves travel choice	Envtl Challenges	Reduce energy use						
I-40	MF-4-01	4	Shelby, Tipton	Construct a CN rail spur from Memphis 18 miles east to CN Fulton Subdivision and Memphis Regional Megasite	1	1	1	0	0	0	1	0	1	2	Further study needed to determine general alignment	1	2	2	0	12	\$ 41,700,000	0.29
I-40	MF-3-01	3	Davidson	Increase clearance at CSX bridge in downtown Nashville for larger barges to pass	1	1	1	0	0	0	1	0	1	2	Challenging	1	2	2	1	12	\$ 53,600,000	0.22
I-40	MF-4-02	4	Shelby, Haywood	Construct a CSX rail spur from Memphis to I-40 Advantage Industrial Park in Brownsville	1	1	1	0	0	0	1	0	1	2	Further study needed to determine general alignment	1	2	2	0	12	\$ 93,700,000	0.13
I-81	MF-1-01	1	Sullivan	Redevelop Kingsport Intermodal yard so it is being used by truck & rail	1	1	1	0	0	0	1	0	1	2	Challenging	1	2	2	1	12	\$ 206,000,000	0.06

Table 6: Transit Projects

CORRIDOR	PROJECT NO.	TDOT REGION(S)	COUNTY	DESCRIPTION	System Performance					Safety & Security			Economic Development		Environment		Public support	Alt Funding Strategies	State of Good Repair	Benefit Score	Cost	BCI
					Travel Time	Total Delay (Veh-Hrs)	Avg Peak Hr Speed	TSMO Strategies	Technology	Higher Crash Area	Safety/ Security Program	Detour Route Safety	Economic Access	Improves travel choice	Envtl Challenges	Reduce energy use						
I-40	TR-2-02	2	Putnam	Expand or replace park & ride lot at Exit 280	1	1	1	2	0	0	0	0	1	2	No	2	2	0	1	13	\$ 1,200,000	10.8
I-81	TR-1-01	1	Sullivan	New park & ride lots, Exits 56 to 66	1	1	1	2	0	0	0	0	1	2	No	2	2	0	0	12	\$ 3,000,000	4.0
I-40	TR-2-01	2	Smith	New park & ride lots, Exits 258 and 273	1	1	1	2	0	0	0	0	1	2	No	2	2	0	0	12	\$ 3,000,000	4.0
I-40	TR-3-01	3	Williamson	New park & ride lots at Exit 172 and/or Exit 182	1	1	1	2	0	0	0	0	1	2	No	2	2	0	0	12	\$ 3,000,000	4.0
I-40	TR-1-02	1	Knox	New park & ride lots at Exits 369, 373 and 374	1	1	1	2	0	0	0	0	1	2	No	2	2	0	0	12	\$ 4,500,000	2.7
I-40	TR-1-03	1	Knox	New park & ride lots at Exits 376, 378 and 379	1	1	1	2	0	0	0	0	1	2	No	2	2	0	0	12	\$ 4,500,000	2.7

Table 7: Economic Access Projects

CORRIDOR	PROJECT NO.	TDOT REGION(S)	COUNTY	DESCRIPTION	System Performance					Safety & Security			Economic Development		Environment		Public support	Alt Funding Strategies	State of Good Repair	Benefit Score	Cost	BCI
					Travel Time	Total Delay (Veh-Hrs)	Avg Peak Hr Speed	TSMO Strategies	Technology	Higher Crash Area	Safety/ Security Program	Detour Route Safety	Economic Access	Improves travel choice	Envtl Challenges	Reduce energy use						
I-81	ED-1-01	1	Sullivan	New interchange at Buttermilk Road	0	0	0	0	0	0	0	0	2	0	No	1	2	0	0	5	\$ 16,000,000	0.3
I-40	ED-3-01	3	Wilson	New interchange at Peyton Road	0	0	0	0	0	0	0	0	2	0	No	1	2	0	0	5	\$ 16,000,000	0.3
I-40	ED-4-01	4	Shelby	New interchange at Chambers Chapel Road	0	0	0	0	0	0	0	0	2	0	No	1	2	0	0	5	\$ 41,300,000	0.1
I-40	ED-1-02	1	Knox	New interchange at Gov. John Sevier Highway	0	0	0	0	0	0	0	0	2	0	No	1	2	0	0	5	\$ 51,700,000	0.1



## Candidate Projects Not Screened

A small number of candidate projects were not advanced for screening, shown in Table 8. In most cases it was either observed that stakeholders identified a location that is addressed by another candidate project, or a project is already in some stage of development.

Table 8: Candidate Projects Not Screened

Candidate Project	Notes
Geometric improvements to Jackson Avenue interchange (Exit 1F)	Included in another candidate project
Geometric improvements to Willow Avenue interchange (Exit 286)	Included in another candidate project
Installation of weigh-in-motion technology at I-40 weigh stations in Dickson, Haywood, Knox, and Shelby counties	Already under development
HOV lane extensions in Nashville and Memphis	Based on discussions with TDOT, HOT lane implementation would be a more effective solution based on (1) serious challenges faced in current HOV enforcement, and (2) better ability to maximize use of the lane, since prices can be varied infinitely based on real-time changes in demand.
Geometric improvements to SR 53 and SR 56 interchanges (Exits 254 and 273), Smith County	These locations were not identified in the screening of the corridor’s interchanges against applicable geometric design standards. These locations can be monitored as traffic grows.
Geometric improvements to James White Parkway and Hall of Fame Drive (Exits 388A and 389), Knox County	These locations were not identified in the screening of the corridor’s interchanges against applicable geometric design standards. These locations can be monitored as traffic grows.

It should also be noted that a need has been identified in the Memphis area for a third bridge crossing the Mississippi River to create more network redundancy. A “Southern Gateway” study initiated by TDOT and partnering states to evaluate alternatives for a new bridge was later canceled due to cost, but the project remains in TDOT’s Statewide Freight Plan as an identified need. The new bridge is not necessarily an I-40/81-specific corridor project, since multiple alignments have been considered over a broad geographic area, but the project is very important to east-west travel, including major freight movements, and is therefore mentioned here.



## I-40/81 Multimodal Corridor Study

### Travel Times Between Key Cities Along the Corridor

As described in the Existing and Future Conditions Technical Memorandum, travel times between major cities in the I-40/81 corridor are expected to increase as the state continues to grow, even after implementation of all of the highway improvements that TDOT will implement as part of the state's IMPROVE Act. Under this "base case" scenario, trips are expected to take roughly 15 to 25 percent longer between Cookeville, Nashville and Dickson, as well as between Knoxville and Morristown.

Implementing the improvements recommended in this study will help maintain or improve travel conditions across the corridor, as shown in Table 10 through Table 12 on the following pages. The percent increase in travel times between key cities across the entire corridor is projected to be less than 10 percent except in the section between Nashville and Cookeville, where the recommended projects result in a slight improvement over the do-nothing scenario. The greatest benefits are seen on the sections between Dickson and Nashville, Crossville and Knoxville, and Knoxville and Morristown.



# I-40/81 Multimodal Corridor Study

Table 9: Peak Travel Time Between Key Cities, Eastbound/Northbound, Without Proposed Improvements

Cities	2018	2040 Base Case	Change, 2018 to 2040 Under Base Case	
	Minutes	Minutes	Minutes	Percent
Memphis and Jackson	74.1	79.3	5.1	6.9%
Jackson and Dickson	76.6	79.2	2.7	3.5%
Dickson and Nashville	38.8	45.3	6.6	16.9%
Nashville and Cookeville	77.2	90.1	12.9	16.8%
Cookeville and Crossville	26.1	28.9	2.8	10.9%
Crossville and Knoxville	80.3	91.4	11.1	13.9%
Knoxville and Morristown	44.4	51.4	7	15.7%
Morristown and Kingsport	40.6	42.2	1.6	3.9%
Kingsport and Bristol	15.3	15.7	0.4	2.3%

Table 10: Peak Travel Time Between Key Cities, Westbound/Southbound, Without Proposed Improvements

Cities	2018	2040 Base Case	Change, 2018 to 2040 Under Base Case	
	Minutes	Minutes	Minutes	Percent
Bristol and Kingsport	15.0	15.2	0.2	1.2%
Kingsport and Morristown	39.8	40.8	0.9	2.4%
Morristown and Knoxville	40.7	46	5.3	13.1%
Knoxville and Crossville	80.4	92.4	12	14.9%
Crossville and Cookeville	25.5	27.6	2.2	8.5%
Cookeville and Nashville	74.5	86.6	12.1	16.2%
Nashville and Dickson	41.7	52.7	11	26.4%
Dickson and Jackson	76.5	81.7	5.2	6.7%
Jackson and Memphis	72.1	73.9	1.8	2.5%



# I-40/81 Multimodal Corridor Study

Table 11: Peak Travel Time Between Key Cities, Eastbound/Northbound, With Proposed Improvements

Cities	2040 Improvement Scenario	Change, 2018 to 2040 With Improvements		Change from 2040 Base Case	
		Minutes	Minutes	Percent	Minutes
Memphis and Jackson	78.5	4.45	6.0%	-0.8	-0.9%
Jackson and Dickson	79.5	2.89	3.8%	0.3	0.4%
Dickson and Nashville	41.5	2.73	7.0%	-3.8	-8.3%
Nashville and Cookeville	87.3	10.13	13.1%	-2.8	-3.1%
Cookeville and Crossville	27.9	1.82	7.0%	-1.0	-3.4%
Crossville and Knoxville	82.0	1.72	2.1%	-9.4	-10.3%
Knoxville and Morristown	44.8	0.43	1.0%	-6.6	-12.8%
Morristown and Kingsport	41.5	0.92	2.3%	-0.7	-1.6%
Kingsport and Bristol	15.8	0.50	3.3%	0.1	0.6%

Table 12: Peak Travel Time Between Key Cities, Westbound/Southbound, With Proposed Improvements

Cities	2040 Improvement Scenario	Change, 2018 to 2040 With Improvements		Change from 2040 Base Case	
		Minutes	Minutes	Percent	Minutes
Bristol and Kingsport	15.2	0.20	1.3%	0.0	0.0%
Kingsport and Morristown	40.6	0.80	2.0%	-0.2	-0.5%
Morristown and Knoxville	41.7	1.00	2.5%	-4.3	-9.3%
Knoxville and Crossville	80.0	-0.40	-0.5%	-12.4	-13.4%
Crossville and Cookeville	26.7	1.20	4.7%	-0.9	-3.3%
Cookeville and Nashville	85.6	11.10	14.9%	-1.0	-1.2%
Nashville and Dickson	45.0	3.30	7.9%	-7.7	-14.6%
Dickson and Jackson	81.7	5.20	6.8%	0.0	0.0%
Jackson and Memphis	73.5	1.40	1.9%	-0.4	-0.5%



## Project Prioritization

Results of the highway capacity/expansion, TSMO, and safety project evaluations were combined and then ranked on the basis of BCI per mile. Project rankings are shown in Table 13. As can be seen, TSMO and safety projects rank highest. In particular, the implementation of “HELP Lite” service across all sections of I-40/81 has a very high BCI per mile, indicating that it helps to support multiple goals and objectives established for the corridor.

As noted, projects for multimodal freight, transit, and economic access were ranked independently on the basis of BCI. New interchanges for economic access have a relatively low BCI score since most of the project evaluation criteria are concerned with system performance on the corridor. Providing additional access to the interstate is likely to increase the number of vehicles using I-40/81, which would not improve highway operations although it could provide local economic benefit.

Application of the evaluation criteria did not result in distinction among multimodal freight projects, partly due to lack of detailed information needed to determine their benefits to the I-40/81 corridor. However, it may be noted that the Statewide Multimodal Freight Plan indicates “high” priority for the CSX rail bridge improvements in downtown Nashville, and “medium priority” for the two West Tennessee rail projects and Kingsport intermodal yard redevelopment.



# I-40/81 Multimodal Corridor Study

Table 13: Project Rankings by Per Mile BCI (Capacity/Expansion, TSMO and Safety)

ROUTE	PROJECT NO.	COUNTY	DESCRIPTION	TERMINI	Benefit Score	Centerline Length (miles)	Cost	BCI	Per Mile BCI
I-40	TS-1-01	Knox, Loudon, Roane	Implement "HELP Lite" service	From Roane/Cumberland county line to Exit 369	12	22.0	\$190,000	63.2	2,778.9
I-40	TS-4-01	Benton, Carroll, Decatur, Henderson, Madison	Implement "HELP Lite" service	From Madison/Haywood county line to the Tennessee River	12	67.0	\$660,000	18.2	2,436.4
I-40	TS-4-02	Fayette, Haywood, Shelby	Implement "HELP Lite" service	From Exit 25 to Haywood/Madison county line	12	41.0	\$410,000	29.3	2,400.0
I-40	TS-3-01	Davidson, Smith, Wilson	Implement "HELP Lite" service	From Exit 219 to Smith/Putnam county line	12	49.0	\$490,000	24.5	2,400.0
I-40	TS-3-02	Cheatham, Davidson, Dickson, Hickman, Humphreys	Implement "HELP Lite" service	From Exit 201 to the Tennessee River	12	58.0	\$580,000	20.7	2,400.0
I-40	TS-1-02	Cocke, Jefferson, Knox, Sevier	Implement "HELP Lite" service	East of Knoxville from Exit 398 to North Carolina state line	10	53.0	\$450,000	22.2	2,355.6
I-81	TS-1-03	Greene, Hamblen, Sullivan, Washington	Implement "HELP Lite" service	From I-40 junction to Virginia state line	10	73.0	\$620,000	16.1	2,354.8
I-40	TS-2-01	Cumberland, Putnam	Implement "HELP Lite" service	Throughout Putnam and Cumberland counties	12	72.5	\$810,000	14.8	2,148.1
I-40	S-2-01	Putnam	Infrastructure-oriented safety treatments	Exit 276 (Old Baxter Road) to Exit 280 (SR 56)	7	4.0	\$ 320,000	21.9	175.0
SR 1 (US 70)	SD-4-01	Madison	Safety improvements	From Huntersville-Denmark Road to Algje Neely Road	6	1.0	\$ 37,000	162.2	162.2
I-40	TS-3-03	Davidson	Implement ramp metering	Exit 192 at Bellevue (US 70S) to Exit 221	16	28.0	\$5,850,000	2.7	153.2
I-40	S-2-03	Cumberland	Infrastructure-oriented safety treatments	Exit 329 (Market Street) to Exit 338 (SR 299 [Westel Road])	7	9.0	\$ 860,000	8.1	146.5
I-40	TS-4-03	Shelby	Implement ramp metering	Between Exit 1 and Exit 16 (SR 177, Germantown Parkway)	14	18.0	\$4,990,000	2.8	101.0
I-40	TS-1-04	Knox	Implement ramp metering	Between Exit 374 (SR 131, Lovell Road) and downtown Knoxville near Broadway (US 441)	16	13.0	\$4,130,000	3.9	100.7
I-40	TS-3-04	Davidson	Implement Integrated Corridor Management	From Exit 192 (McCrary Lane) to Exit 221 (SR 45, Old Hickory Boulevard)	15	27.4	\$8,450,000	1.8	97.3
I-40	TS-1-06	Knox, Sevier	Implement Integrated Corridor Management	Between Exit 369 (Watt Road) and Exit 407 (SR 66)	15	32.9	\$10,720,000	1.4	92.1
I-40	TS-4-04	Shelby	Implement Integrated Corridor Management	From I-269 through the Memphis city core	13	25.8	\$8,070,000	1.6	83.1
I-40	S-2-02	Cumberland	Addition of median cable barrier system	Exit 317 (SR 28 [US 127]) to Exit 322 (SR 101 [Peavine Road])	6	4.4	\$ 670,000	9.0	78.8
SR 24 (US 70)	SD-3-04	Smith	Safety improvements	From SR 264 to Putnam/Smith county line	6	6.1	\$ 583,000	10.3	62.8
SR 1 (US 70)	SD-2-03	Cumberland	Safety improvements	From Market Street to Cumberland/Roane county line	6	9.4	\$ 900,000	6.7	62.7
SR 24 (US 70)	SD-2-02	Putnam	Safety improvements	From I- 40 (Exit 290) to SR 84	6	11.9	\$ 1,140,000	5.3	62.6
SR 230	SD-3-01	Hickman, Humphreys	Safety improvements	From SR 48 to SR 13	6	25.2	\$ 2,421,000	2.5	62.5
SR 265 (Central Pike)	SD-3-02	Wilson	Safety improvements	From SR 171 (Mount Juliet Road) to SR 109	6	6.9	\$ 664,000	9.0	62.3
Old Baxter Road/Main Street/Ward Mill Road	SD-2-01	Putnam	Safety improvements	From I-40 (Exit 276) to SR 56	6	5.8	\$ 600,000	10.0	58.0
SR 141	SD-3-03	Smith, Wilson	Safety improvements	From SR 26 (US 70) to Wilson/Smith county line	5	10.5	\$ 1,012,000	4.9	51.9
I-40	TS-3-06	Wilson, Smith, Putnam	SmartWay Expansion	I-40 in Regions 2 and 3 (east of existing SmartWay deployment in Wilson County) through Smith and western Putnam counties	13	40.7	\$23,199,000	0.6	45.6



# I-40/81 Multimodal Corridor Study

Table 13: Project Rankings by Per Mile BCI (Capacity/Expansion, TSMO and Safety) [continued]

ROUTE	PROJECT NO.	COUNTY	DESCRIPTION	TERMINI	Benefit Score	Centerline Length (miles)	Cost	BCI	Per Mile BCI
SR 1 (US 70)	SD-1-01	Roane	Safety improvements	From Cumberland/Roane county line to SR 29 (US 27, Spring City Highway)	6	2.7	\$ 400,000	15.0	40.5
I-40	TS-1-05	Roane	SmartWay Expansion	Between existing SmartWay deployments	11	14.0	\$7,980,000	1.4	38.6
I-81	TS-1-07	Greene, Washington	SmartWay Expansion	I-81 in Greene and Washington counties	11	30.7	\$17,499,000	0.6	38.6
SR 1 (US 70)	SD-1-02	Loudon, Roane	Safety improvements	From SR 326 to SR 73 (US 321)	6	10.6	\$ 1,700,000	3.5	37.4
I-40	TS-3-05	Davidson, Wilson	Convert existing HOV lanes on I-40 on the east side of Nashville, both directions, from Exit 216 (Briley Parkway) to Exit 232 (SR 109).	Exit 216 (Briley Parkway) to Exit 232 (SR 109)	10	17.0	\$11,000,000	0.9	30.9
I-40	S-3-02	Davidson	Infrastructure-oriented safety treatments	Exit 204 (SR 155 [Briley Parkway / White Bridge Road]) to Exit 206 (I-440)	6	12.4	\$ 7,000,000	0.9	21.3
I-40	TS-4-05	Shelby	Convert existing HOV lanes on I-40 eastbound from MM 15 (near Sycamore View Road interchange) to MM 22 (near US 64 interchange), and I-40 westbound from MM 22 to MM 16	MM 15 (near the Sycamore View Road interchange) to MM 22 (near the US 64 interchange), and I-40 westbound from MM 22 to MM 16 (near the Sycamore View Road interchange).	10	6.0	\$6,500,000	1.5	18.5
I-81	RMP-1-04	Sullivan	Ramp improvements to NB entrance ramp from SR 1 (US 11W, State Street) to provide operational and safety improvements	Exit 74 (SR 1 [US 11W, State Street])	7	4.8	\$2,700,000	2.6	12.4
I-40	S-4-01	Henderson	Add crossover to facilitate emergency services and detours	Between Mile Marker 115.5 and 118.8 (near Exit 116 [SR 114, Natchez Trace State Parkway])	4	3.3	\$ 2,910,000	1.4	9.1
I-40	RMP-2-01	Putnam	Add deceleration lane	Exit 301 (SR 24 [US 70N]) westbound off-ramp	10	0.5	\$1,100,000	9.1	4.5
I-40	INT-2-01	Putnam	Widen SR 56 and ramps through interchange to provide operational and safety improvements	Exit 280 (SR 56 [Baxter Road])	10	6.0	\$14,200,000	0.7	4.2
I-40	INT-1-01	Roane	Reconfigure interchange to provide operational and safety improvements	Exit 347 (SR 61 [US 27, South Roane Street])	9	8.9	\$26,200,000	0.3	3.1
I-40	RMP-1-01	Knox	Realign ramp terminal and right-turn lane channelization to improve operations at signalized intersection	Exit 374 (SR 131 [Lovell Road]) eastbound off-ramp	12	0.5	\$2,700,000	4.4	2.2
I-40	RMP-1-02	Knox	Ramp improvements to increase capacity and improve vertical/horizontal alignment for trucks	Exit 385 (Interstates 75/640) eastbound off-ramp	12	0.5	\$2,700,000	4.4	2.2
I-40	RMP-3-01	Davidson	Ramp improvements to enhance operations	Exit 221 (SR 45 [Old Hickory Boulevard])	12	0.5	\$2,700,000	4.4	2.2
I-40	TL-1-01	Roane	Add truck climbing lane	Westbound from Exit 340 (Airport Road) to Exit 347 (SR 61 [US 27, South Roane Street])	13	7.0	\$44,300,000	0.3	2.1
I-40	C-3-06	Davidson	Add one auxiliary lane in the eastbound direction between relocated Donelson Pike interchange entrance ramp and interchange	Exit 216 (SR 255 [Donelson Pike]) to Exit 219 (Stewarts Ferry Pike)	11	1.5	\$8,300,000	1.3	2.0
I-40	TL-3-01	Cheatham	Add truck climbing lane	Westbound from MM 185 to Exit 188 (SR 249 [Luyben Hills Road])	13	3.0	\$19,800,000	0.7	2.0
I-40	C-2-02	Cumberland	Add auxiliary lanes between interchanges. Add deceleration lanes to off-ramps.	Exit 317 (SR 28 [US 127]) to Exit 322 (SR 101 [Peavine Road])	11	3.7	\$41,900,000	0.3	1.9
I-40	TL-1-02	Roane	Add truck climbing lane	Eastbound from Exit 347 (SR 61 [US 27, South Roane Street]) to Exit 350 (SR 29)	13	2.5	\$16,800,000	0.8	1.9
I-40	C-1-01	Knox and Loudon	Widen from 6 to 8 lanes	Exit 368 (I-75) to Exit 374 (SR 131 [Lovell Road])	11	6.5	\$76,400,000	0.1	1.9
I-40	RMP-2-02	Cumberland	Ramp improvements to remove islands at exit ramps (both eastbound and westbound)	Exit 317 (SR 28 [US 127])	10	0.5	\$2,700,000	3.7	1.9
I-40	TL-2-01	Putnam	Add truck climbing lane	Eastbound from Exit 268 (SR 96 [Buffalo Valley Road]) to east of Exit 273 (SR 56)	11	6.0	\$35,900,000	0.3	1.8
I-81	C-1-05	Sullivan	Add southbound auxiliary lane between Welcome Center and exit ramp	Mile marker 75.3 (Welcome Center in Sullivan County) to Exit 74B (SR 1 [US 11W, State Street])	11	0.5	\$3,100,000	3.5	1.8





# I-40/81 Multimodal Corridor Study

Table 13: Project Rankings by Per Mile BCI (Capacity/Expansion, TSMO and Safety) [continued]

ROUTE	PROJECT NO.	COUNTY	DESCRIPTION	TERMINI	Benefit Score	Centerline Length (miles)	Cost	BCI	Per Mile BCI
I-40	C-3-07	Dickson	Add one auxiliary lane in the westbound direction between interchange and interstate junction	Exit 172 (SR 46) to Exit 176 (I-840)	11	2.8	\$17,800,000	0.6	1.7
I-81	TL-1-04	Greene, Washington	Add truck climbing lane through Exit 50 (SR 93) interchange	Northbound from MM 48 (Moody Road) to MM 51 (Link Road)	11	3.3	\$21,300,000	0.5	1.7
I-40	RMP-3-02	Davidson	Extend acceleration lanes approximately 0.5 miles to improve merge operations	Exit 205 (SR 155 [Briley Parkway]) westbound on-ramp	12	0.5	\$3,800,000	3.2	1.6
I-81	TL-1-03	Greene, Hamblen	Add truck climbing lane	Northbound from Exit 15 (SR 340 [Fish Hatchery Road]) to Exit 23 (SR 34 [US 11E, West Andrew Johnson Highway])	11	7.8	\$56,700,000	0.2	1.5
I-40	TL-2-02	Putnam	Add truck climbing lane	Eastbound from Exit 290 (SR 24 [US 70N]) to Exit 300 (SR 24 [US 70N])	13	10.0	\$98,000,000	0.1	1.3
I-40	S-3-01	Davidson	Ramp improvements to WB off-ramp – add deceleration lane and widen ramp	Exit 196 (SR 1 [US 70S]) westbound off-ramp	7	0.5	\$ 2,700,000	2.6	1.3
I-40	C-3-04	Davidson	<b>In eastbound direction:</b> - Widen I-40 from 5 to 6 lanes from Exit 213A-B to newly constructed SR 255 (Donelson Pike) interchange. - Close slip ramp from SR 1 (Murfreesboro Pike) to eastbound I-40 entrance ramp. Create left-hand turn at SR 1 to loop ramp to provide access to NB I-24/I-440 to I-40 connection. <b>In westbound direction:</b> - Improve exit ramp to NB SR 155, evaluate ramp merge/weave on SR 155 between I-40 and Elm Hill Pike	Exit 213A-B (I-40/24/440 interchange) to Exit 215A-B (SR 155 [Briley Parkway])	13	1.8	\$37,500,000	0.3	1.2
I-40	C-2-01	Putnam	Add auxiliary lanes between interchanges and ramp improvements	Exit 286 (SR 135 [South Willow Avenue]) to Exit 288 (SR 111)	11	2.1	\$19,500,000	0.6	1.2
I-40	RMP-3-04	Wilson	Widen to three lanes to provide operational improvements at signalized intersection	Exit 236 (Hartmann Drive) eastbound off-ramp	10	0.5	\$4,600,000	2.2	1.1
I-40	C-1-02	Knox	Widen from 8 to 10 lanes	Exit 374 (SR 131 [Lovell Road]) to Exit 385 [Interstates 75/640])	13	10.6	\$255,000,000	0.1	1.1
I-40	INT-1-03	Knox and Loudon	Reconfigure interchange to reduce weaving movements and capacity issues	Exit 369 (Watt Road)	8	3.0	\$48,900,000	0.3	1.1
I-40	C-1-04	Jefferson	Add one auxiliary lane in the eastbound direction between interchanges and rest area	Exit 417 (SR 92) to Exit 421 (I-81)	11	2.7	\$27,600,000	0.4	1.1
I-81	INT-1-07	Sullivan	Reconfigure interchange to provide operational and safety improvements	Exit 57 (Junction with I-26 [US 23])	8	2.6	\$19,700,000	0.4	1.1
I-40	INT-1-04	Knox	Reconfigure interchange to provide operational and capacity improvements	Exit 373 (Campbell Station Road)	8	3.6	\$52,700,000	0.2	1.0
I-40	C-4-01	Shelby	Widen from 6 to 8 lanes	Exit 1E (I-240) to Exit 2A (SR 300)	11	1.8	\$40,500,000	0.3	1.0
I-40	RMP-3-03	Wilson	Eastbound and westbound ramp improvements to northbound Golden Bear Gateway	Exit 229 (Beckwith Road)	10	0.5	\$5,400,000	1.9	0.9
I-40	RMP-4-01	Madison	Ramp improvements to increase capacity	Exit 87 (SR 1 [US 70/US 412])	10	0.5	\$5,400,000	1.9	0.9
I-40	RMP-4-02	Shelby	Reconfigure ramps with intersection of North Watkins Street and Overton Crossing Street to improve traffic operations	Exit 3 (North Watkins Street)	10	0.5	\$5,400,000	1.9	0.9
I-40	INT-1-05	Knox	Separation of eastbound traffic to avoid weaving traffic between Exit 383 and Exit 385 (Interstates 75/640)	Exit 383 (SR 332 [Papermill Drive])	6	1.5	\$10,400,000	0.6	0.9



# I-40/81 Multimodal Corridor Study

Table 13: Project Rankings by Per Mile BCI (Capacity/Expansion, TSMO and Safety) [continued]

ROUTE	PROJECT NO.	COUNTY	DESCRIPTION	TERMINI	Benefit Score	Centerline Length (miles)	Cost	BCI	Per Mile BCI
I-40	INT-1-06	Jefferson	Geometric and operational improvements to the interchange	Exit 421 (Junction with I-81)	7	9.0	\$82,500,000	0.1	0.8
I-40	INT-3-01	Davidson	Reconfigure interchange to provide operational and safety improvements.	Exit 201 (SR 24 [US 70, Charlotte Pike])	7	3.7	\$35,800,000	0.2	0.7
I-40	C-3-05	Davidson	Add one auxiliary lane in the westbound direction between relocated Donelson Pike interchange and interstate entrance ramp at westbound Old Hickory Blvd	Exit 216 (SR 255 [Donelson Pike]) to entrance ramp from Old Hickory Blvd (approximately MM 220)	13	2.5	\$49,200,000	0.3	0.7
I-40	S-1-02	Cocke	Realign interstate in order to remove 45 MPH horizontal curves	Exit 443 (SR 339 [Foothills Parkway]) to Exit 451	4	7.4	\$ 93,000,000	0.0	0.6
I-40	C-3-02	Davidson	In eastbound direction, extend SR 155 entrance ramp as an auxiliary lane to Exit 206 (I-40/440). (This includes adjustment of 46th Avenue entrance ramp.) Add auxiliary lane from Exit I-440 on-ramp to I-65 off-ramp. In westbound direction, widen from 3 to 4 lanes from I-65 to I-440. Braid the Delaware Avenue ramp with the SR 155 exit off-ramp to eliminate weave.	Exit 204A-B (SR 155 [Briley Parkway], White Bridge Road) to Exit 208A-B (I-40/I-65 interchange)	13	2.0	\$86,600,000	0.2	0.6
I-40	S-1-01	Cocke	Interchange improvements to lengthen deceleration/acceleration lanes	Exit 447 (Hartford Road)	5	0.5	\$ 5,400,000	0.9	0.5
I-40	C-3-03	Davidson	<b>In eastbound direction:</b> - Merge proposed Inner Loop C-D system into the I-40 mainline, as well as merge the I-24 lanes. - Widen I-40/24 mainline from 4 to 6 lanes - Shift I-40/24/440 junction westward for proper distance needed for ramp terminal spacing and lane balance requirements. <b>In westbound direction:</b> - Widen from 4 to 6 lanes west of I-40/24/440 junction - Remove left-hand I-24 merge, add flyover bridge to create right-hand merge - Add barrier to separate I-24 lanes and restrict traffic entering from Fesslers and Hermitage Avenue to access I-24 only. - At I-40/24 junction, transition proposed 6-lane section to accommodate ramp terminal spacing and lane balance requirements, both for I-24 and the proposed Inner Loop C-D system.	Exit 211A-B (I-40/24 interchange) to Exit 213A-B (I-40/24/440 interchange)	13	1.8	\$107,200,000	0.1	0.4
I-40	CD-3-01	Davidson	Develop a collector-distributor (C-D) system which separates downtown Nashville destination traffic from the interstate mainline through traffic	From Exit 208A-B (I-40/65 interchange on west side of Inner Loop) to Exit 211A-B (I-40/24 interchange)	10	2.4	\$122,200,000	0.1	0.4
I-40	S-1-03	Roane	Add runaway truck ramp(s)	Eastbound from Exit 340 (Airport Road) to Exit 347 (SR 61 [US 27, South Roane Street])	3	7.2	\$ 56,700,000	0.1	0.4
I-40	INT-3-02	Davidson	Reconfigure interchange to eliminate weaving section in both directions	Exit 207 (Jefferson Street / 28th Avenue North)	9	1.7	\$44,800,000	0.2	0.3
I-40	S-2-04	Putnam	Add runaway truck ramp(s)	Westbound from Exit 290 (SR 24 [US 70N]) to Exit 300 (SR 24 [US 70N])	3	10.6	\$ 98,200,000	0.0	0.3
I-40	C-1-03	Knox	Extend the two existing lanes from the US 129 entrance ramp to WB mainline such that one lane exits to I-640 and one lane continues through on I-40 mainline.	Interstates 75/640 to US 129	11	1.5	\$61,200,000	0.2	0.3
I-40	CD-4-01	Shelby	Add collector-distributor road to reduce weaving movements for westbound exiting traffic to SR 1 (US 51, Danny Thomas Boulevard) and Second Street.	Exit 1 (SR 1 [US 51, Danny Thomas Boulevard])	7	1.7	\$50,600,000	0.1	0.2
I-40	INT-1-02	Loudon	Reconfigure interchange to provide operational and safety improvements	Exit 368 (Junction with I-75)	7	4.2	\$146,300,000	0.0	0.2
I-40	RMP-1-03	Knox	Braid the I-275 entrance to I-40 WB with the Western Ave and US 129 exit ramps	Exit 387 (SR 62 [Western Avenue]) westbound off-ramp	12	0.5	\$63,600,000	0.2	0.1



# **Appendix A: Environmental Screening**



# I-40/81 Multimodal Corridor Study

As part of the development of the I-40/81 Project Priorities Technical Memorandum, a high-level review of environmental resources within a 500-foot buffer of each candidate project was undertaken to determine the presence of any “red flags,” i.e. major issues or impacts that would be so significant that even the initial stages of project development should not be considered.

Table 1 identifies the cultural, natural and community resources evaluated as part of the screening.

Table 1: Resources Evaluated for Project Screening

Resource Type	Source
<b>Environmental Justice</b>	
Minority Populations	U.S. Census Bureau
Low-Income Populations	U.S. Census Bureau
<b>Cultural Resources</b>	
National Historic Landmarks (Districts, Structures, Cemeteries, Monuments)	National Park Service
National Register of Historic Places (incorporated)	National Park Service
<b>Natural Resources</b>	
Wetlands	United States Fish and Wildlife
Rivers/Streams	TIGER LINE files via U.S. Census Bureau
Ponds/Lakes	TIGER LINE files via U.S. Census Bureau
Protected Lands (National Parks, State Parks, Wildlife Management Areas)	National Park Service and Tennessee Wildlife Resources Agency
Floodways (100-year flood area and flood hazard areas A and AE classification)	Federal Emergency Management Agency (FEMA)

## Environmental Justice Populations

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. In accordance with Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994), federal agencies are required to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law.

In 2012, the United States Department of Transportation (USDOT) issued an update to Departmental Order 5610.2(a), Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. This Order updated the USDOT's original Environmental Justice Order, which was published

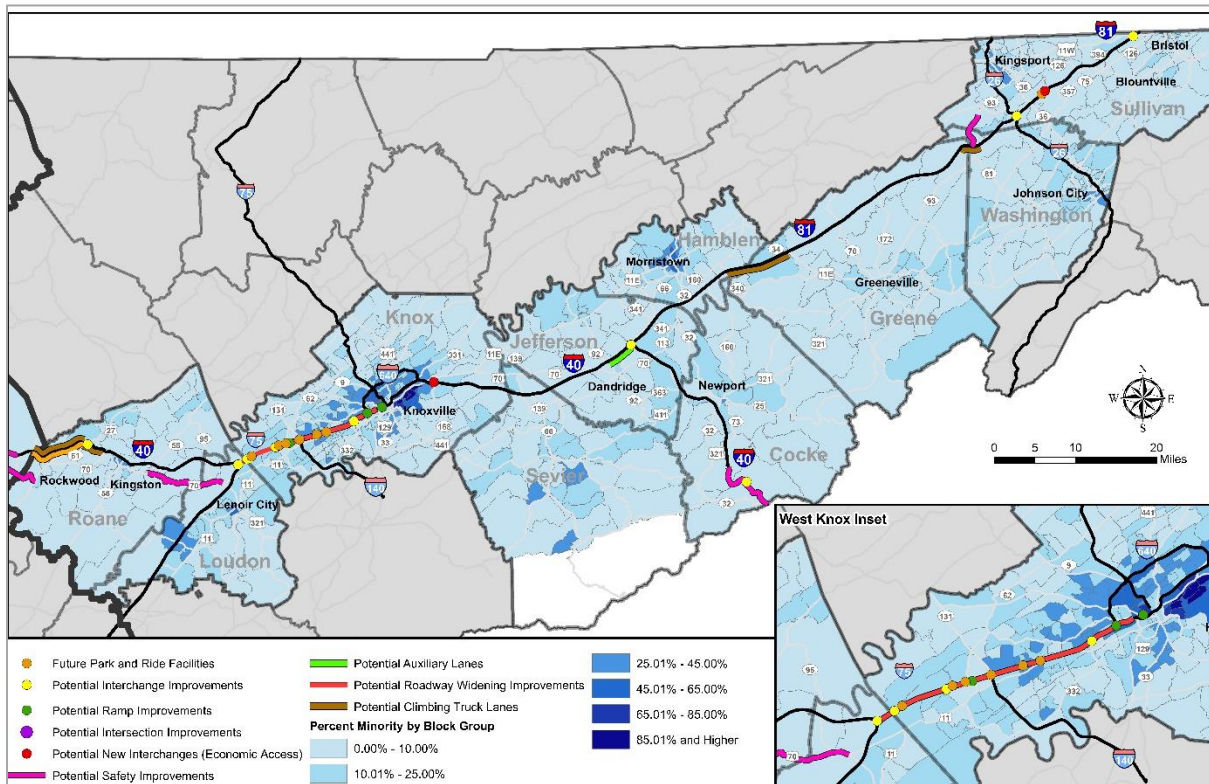


# I-40/81 Multimodal Corridor Study

in 1997. DOT Order 5610.2(a) sets forth the policy to consider environmental justice principles in all USDOT programs, policies, and activities.

For the environmental screening, data from the latest U.S. Census American Community Survey (2014-2018) for the I-40/81 project corridor was reviewed. Within the 500-foot buffer, census block groups with minority and/or low-income populations exceeding 50 percent of the overall population of the block group were identified as environmental justice populations. It should be noted that this is a high-level review for purposes of a study that makes recommendations over a 20-year period. If TDOT proceeds with any environmental or design activities, additional field reviews would be required. Figures 1 through 8 show minority populations and low-income populations throughout the corridor based on 2014-2018 data, displayed by TDOT region.

Figure 1: TDOT Region 1 Minority Populations





# I-40/81 Multimodal Corridor Study

Figure 2: TDOT Region 1 Low-Income Populations

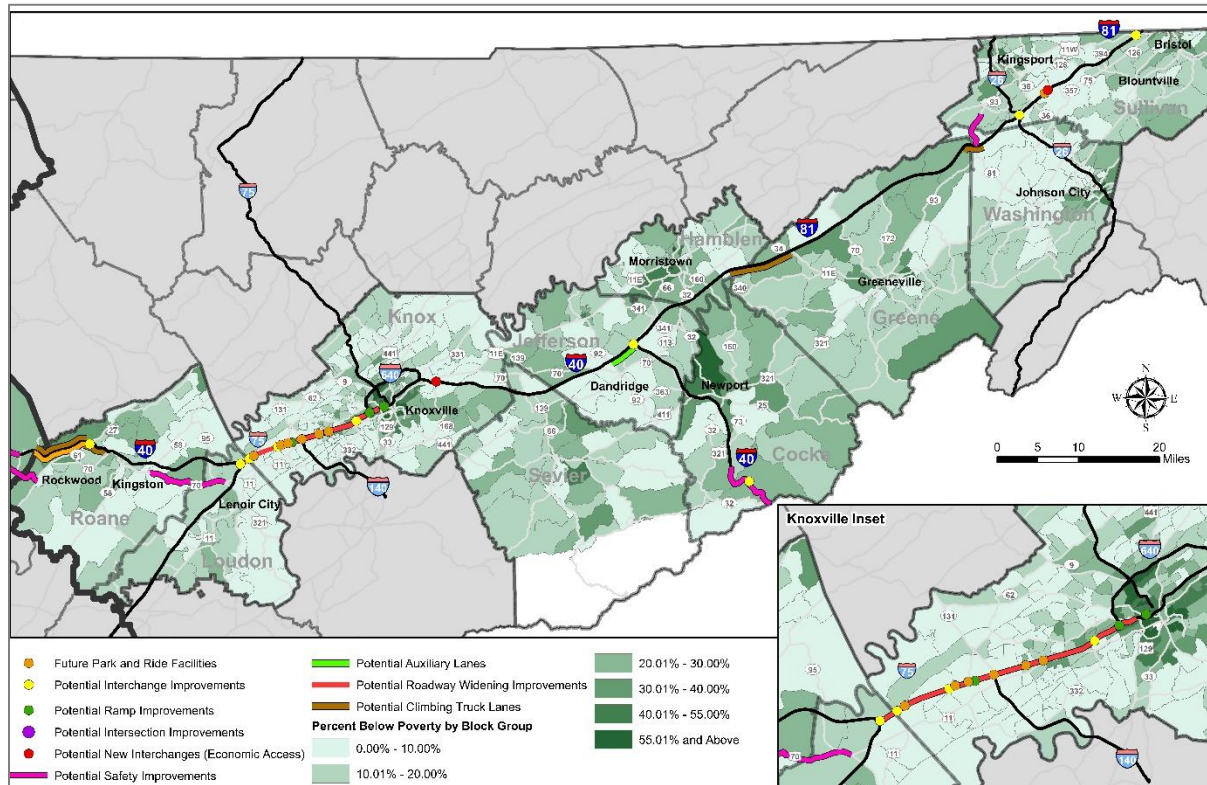
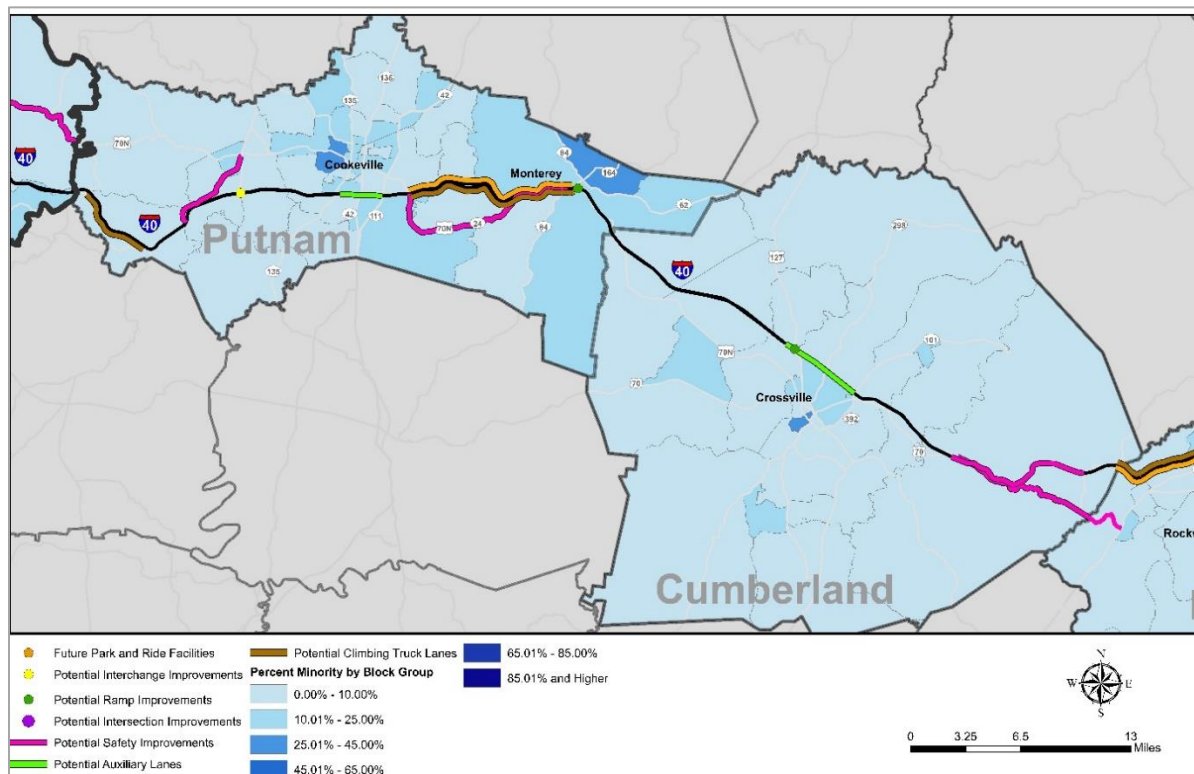


Figure 3: TDOT Region 2 Minority Populations





# I-40/81 Multimodal Corridor Study

Figure 4: TDOT Region 2 Low-Income Populations

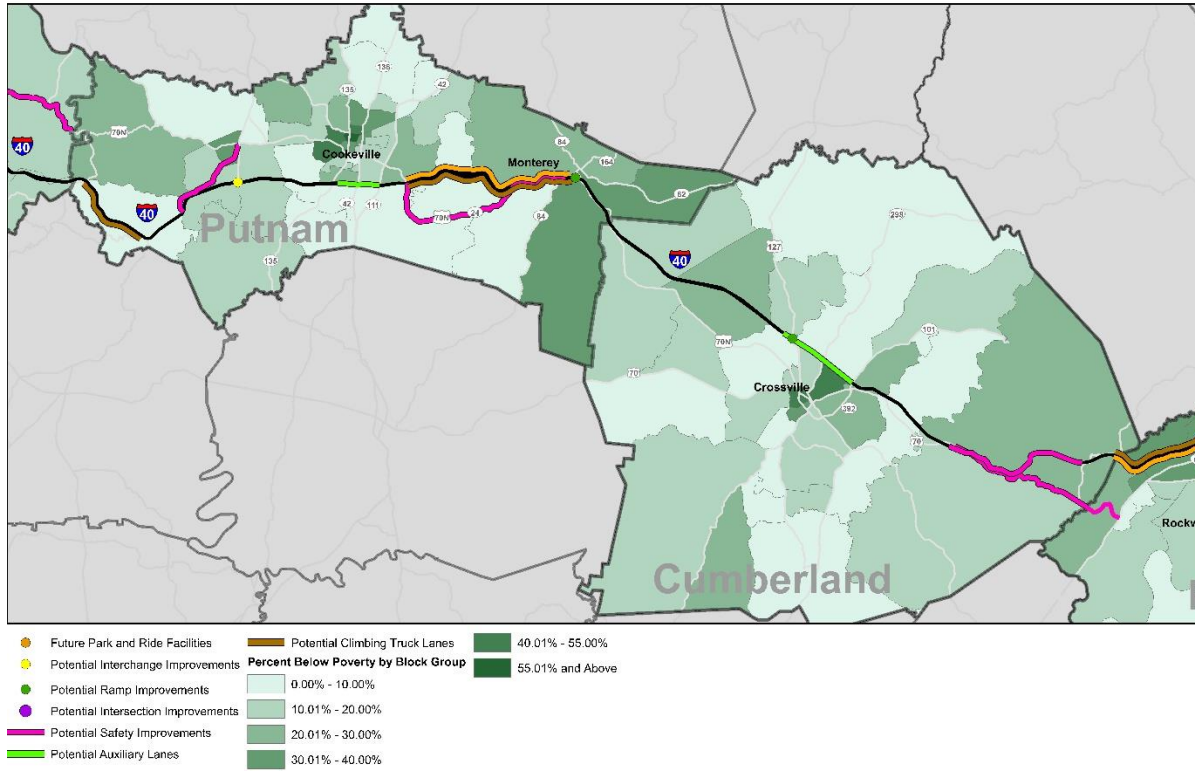
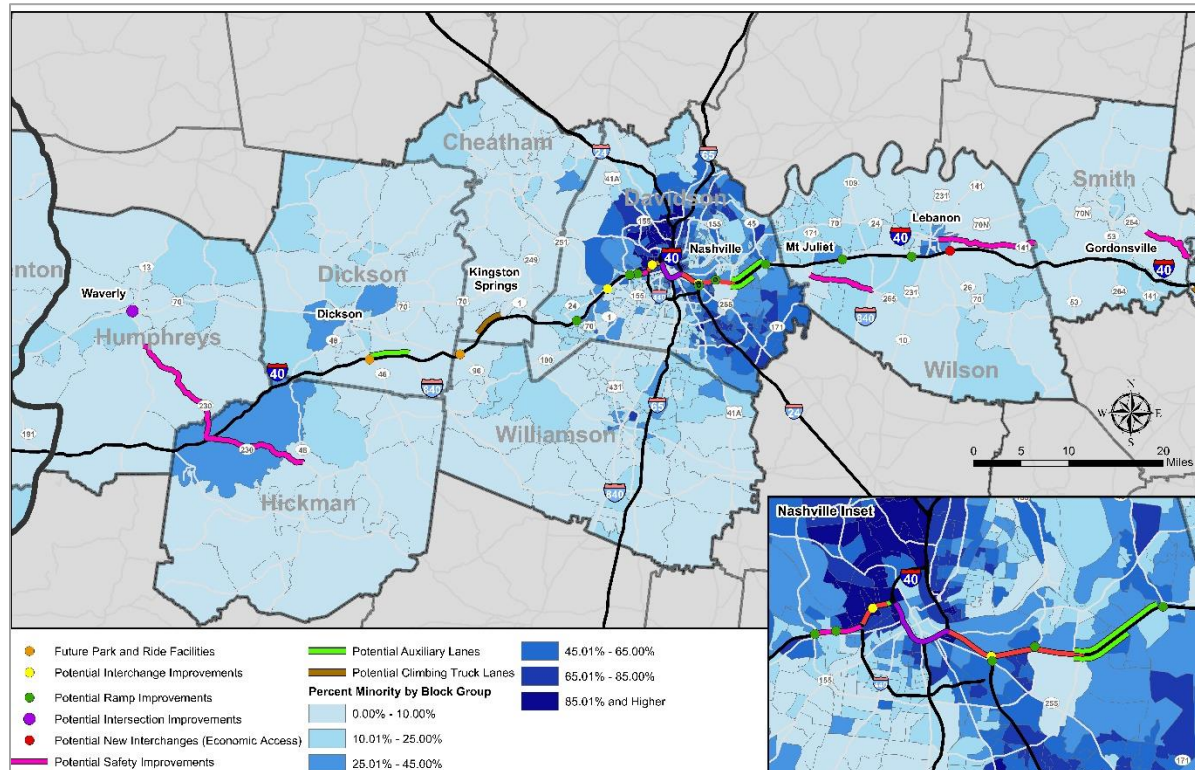


Figure 5: TDOT Region 3 Minority Populations





# I-40/81 Multimodal Corridor Study

Figure 6: TDOT Region 3 Low-Income Populations

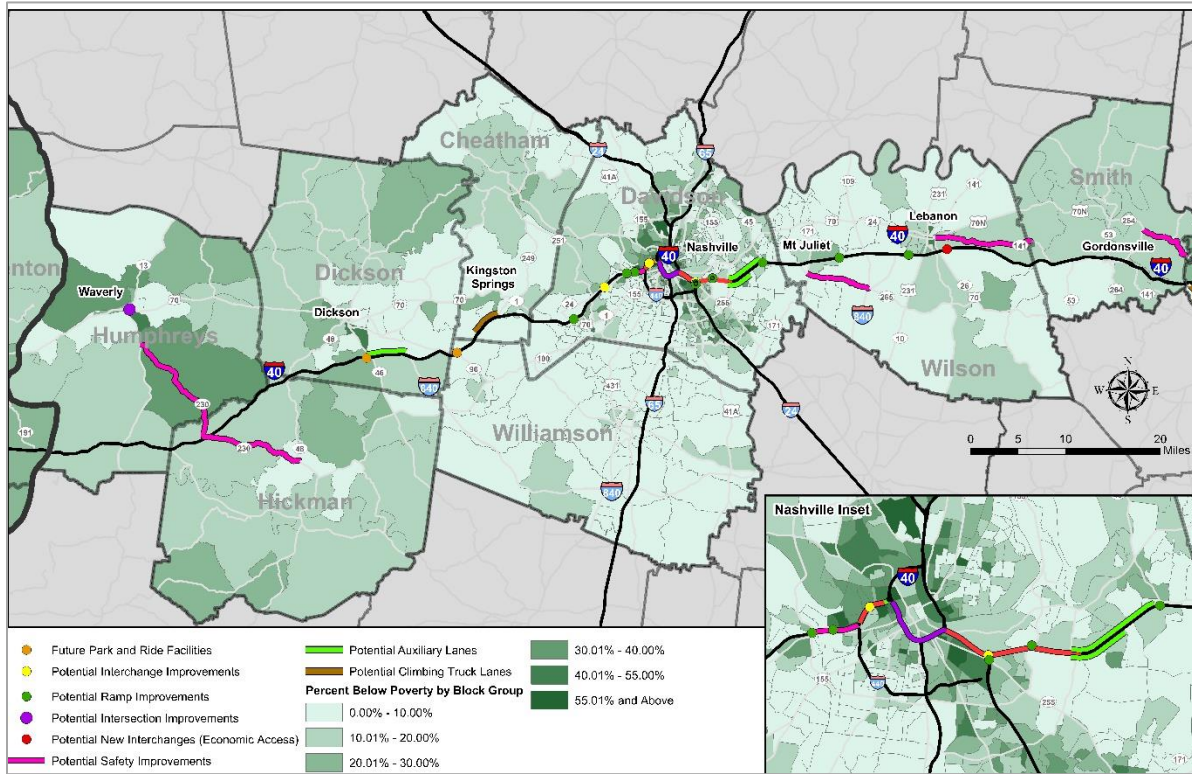


Figure 7: TDOT Region 4 Minority Populations

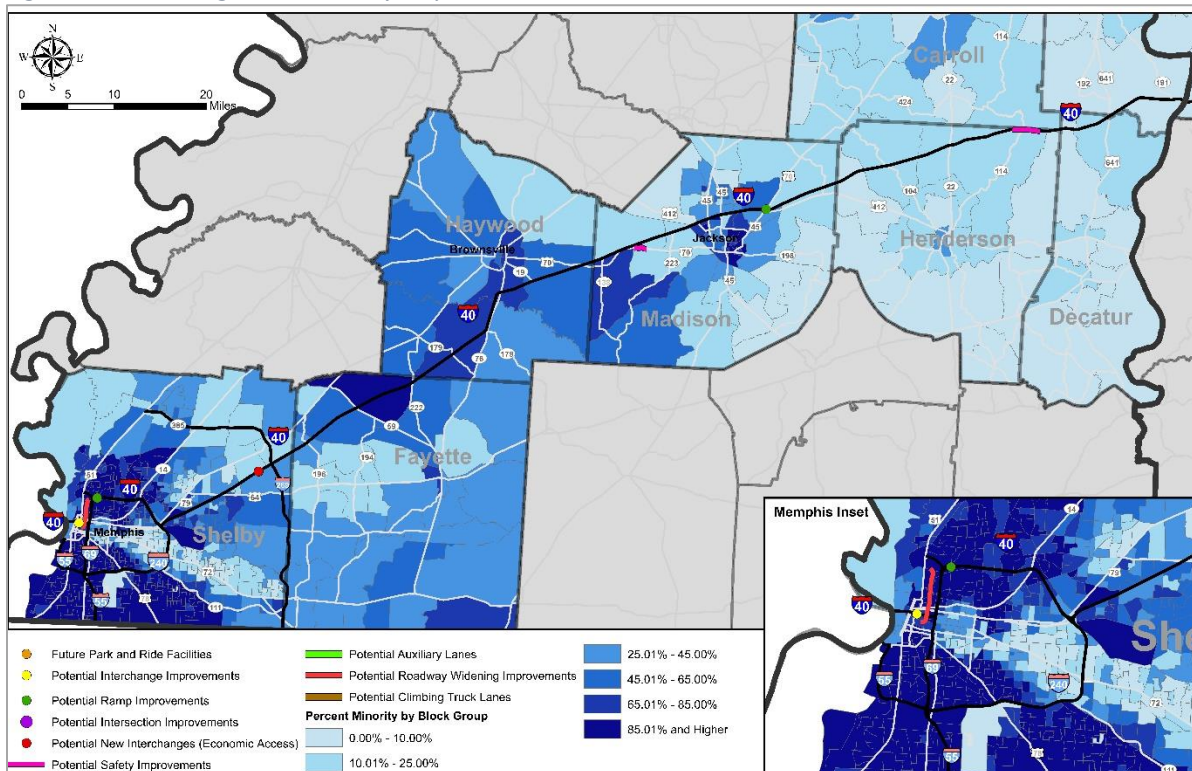
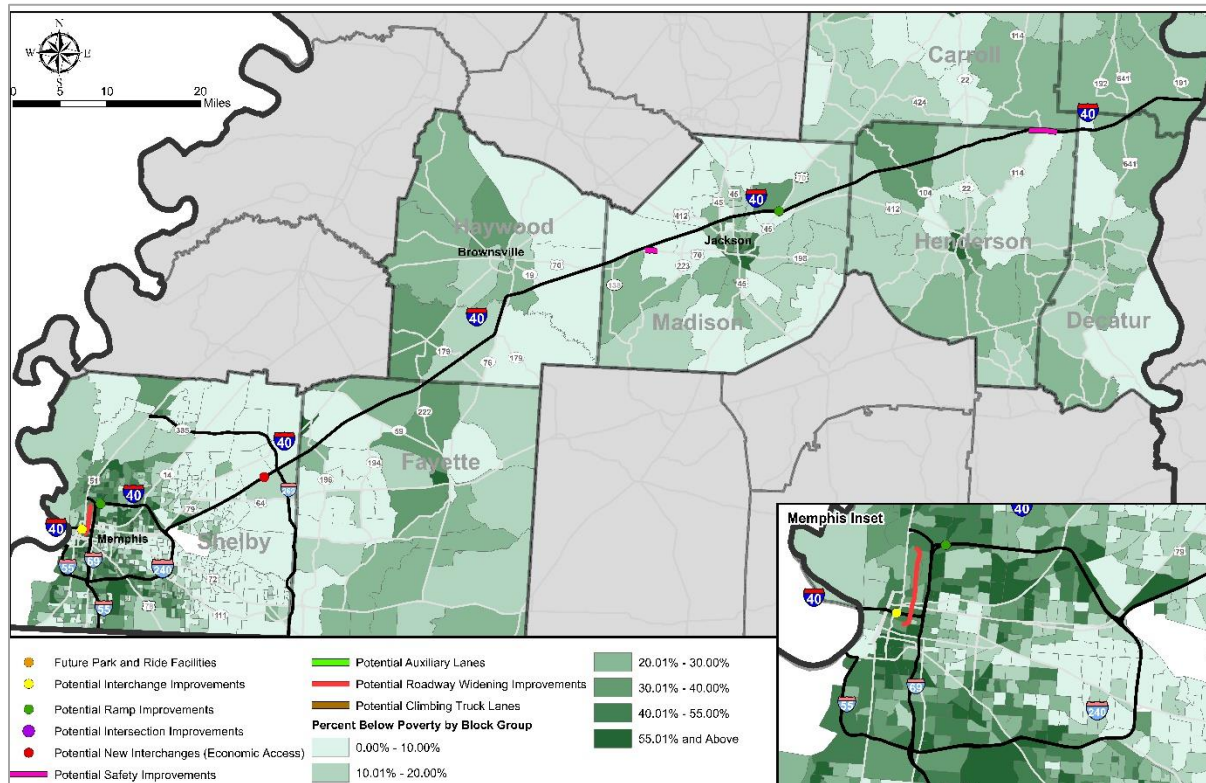




Figure 8: TDOT Region 4 Low-Income Populations



## Cultural Resources

Cultural Resources are tangible remains of past human activity, including buildings, structures, and prehistoric sites. The National Historic Preservation Act of 1966 was passed primarily to acknowledge the importance of protecting the nation’s heritage from rampant development. The Act established the National Register of Historic Places (NRHP), which is the official list of the nation's historic places worthy of preservation. To be considered eligible for the NRHP, a property must meet the National Register Criteria for Evaluation, which involves examining the property’s age, significance, and integrity.

For the environmental screening, data from the NRHP database was reviewed and NRHP properties within the 500-foot buffer were identified. It should be noted that this is only a high-level review of cultural resources within the I-40/81 corridor and additional field reviews would be necessary as part of any environmental or design activities to identify potential impacts to historic and/or archaeological resources. Figures 9-12 show identified cultural resources by TDOT region throughout the corridor.



# I-40/81 Multimodal Corridor Study

Figure 9: TDOT Region 1 Cultural Resources

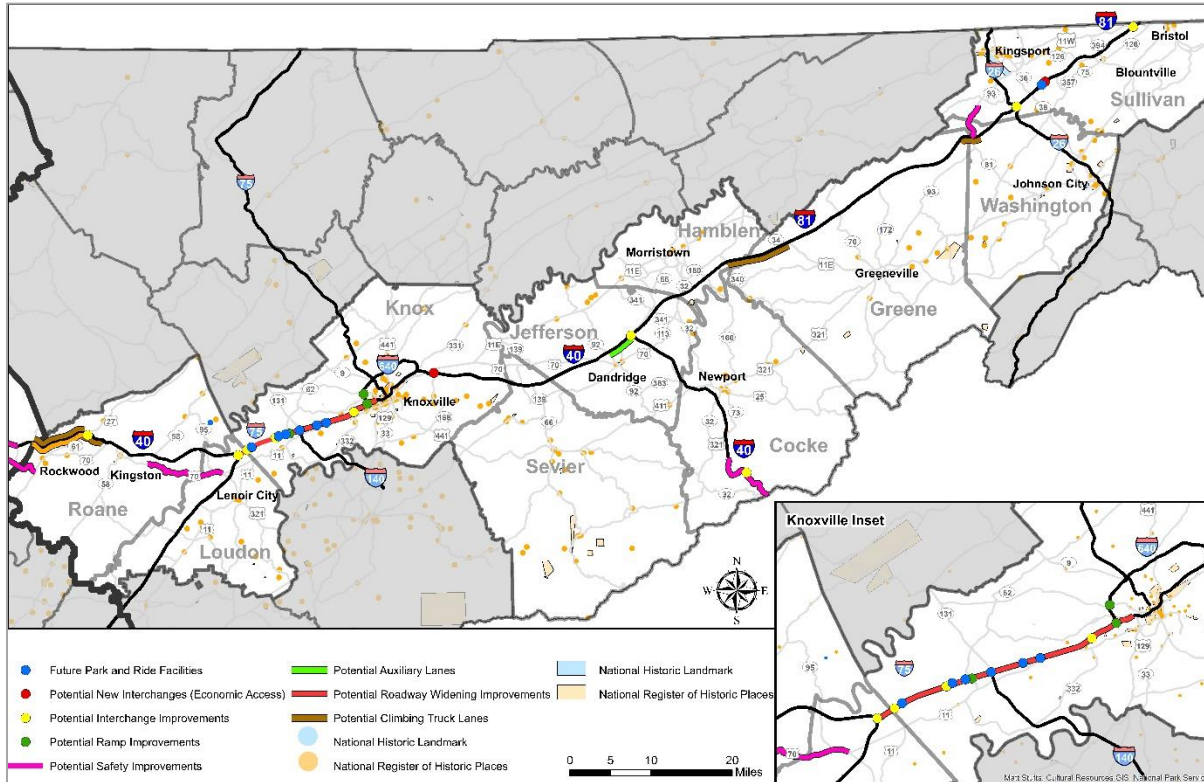


Figure 10: TDOT Region 2 Cultural Resources

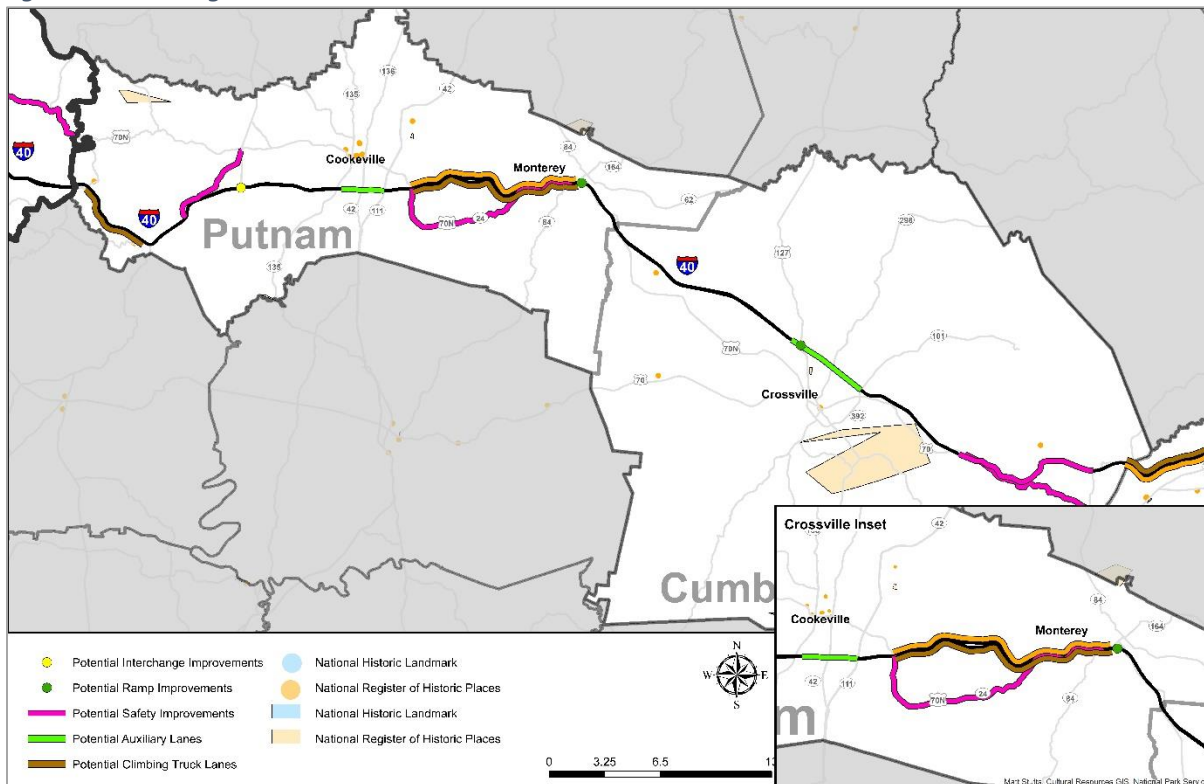


Figure 11: TDOT Region 3 Cultural Resources

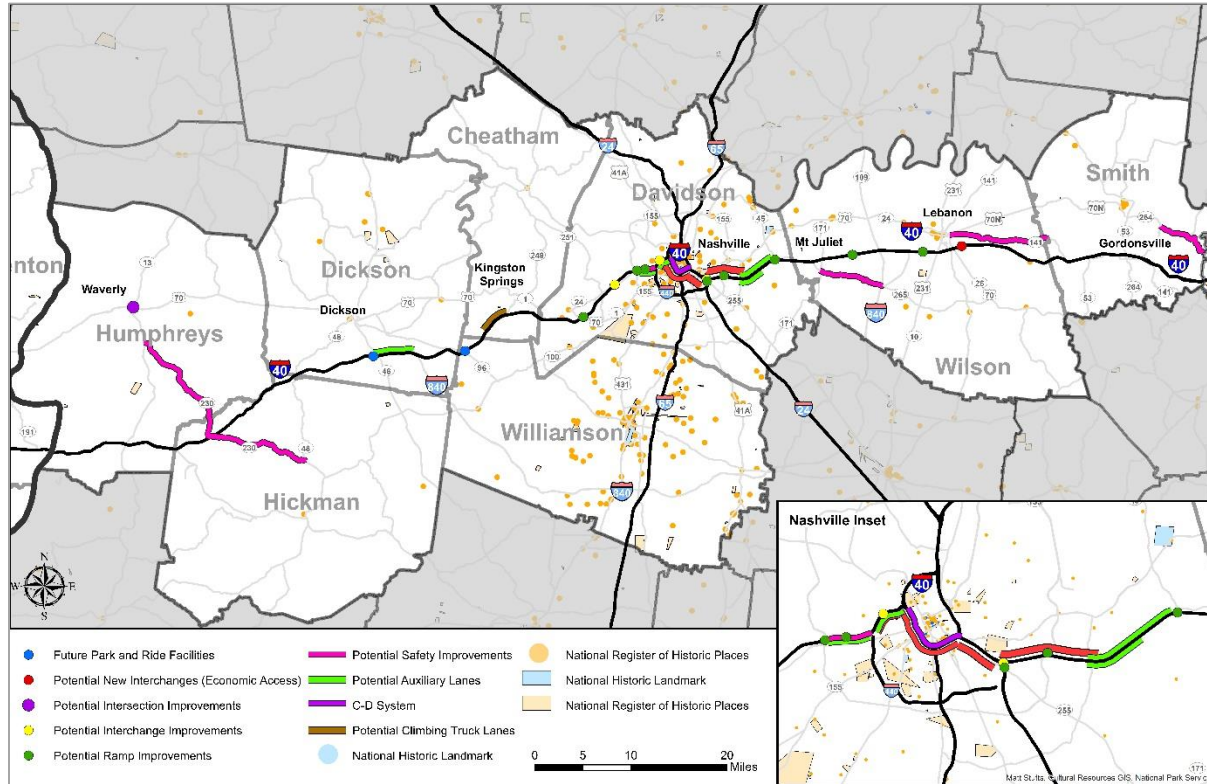
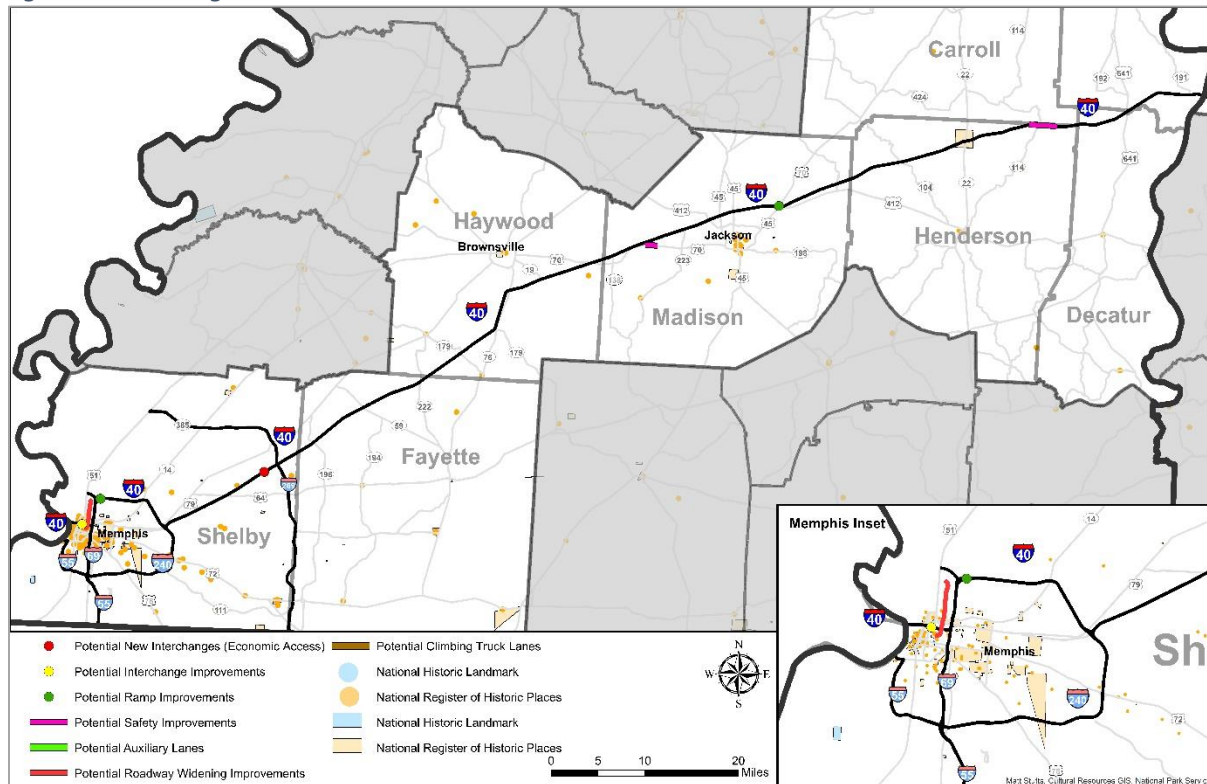


Figure 12: TDOT Region 4 Cultural Resources

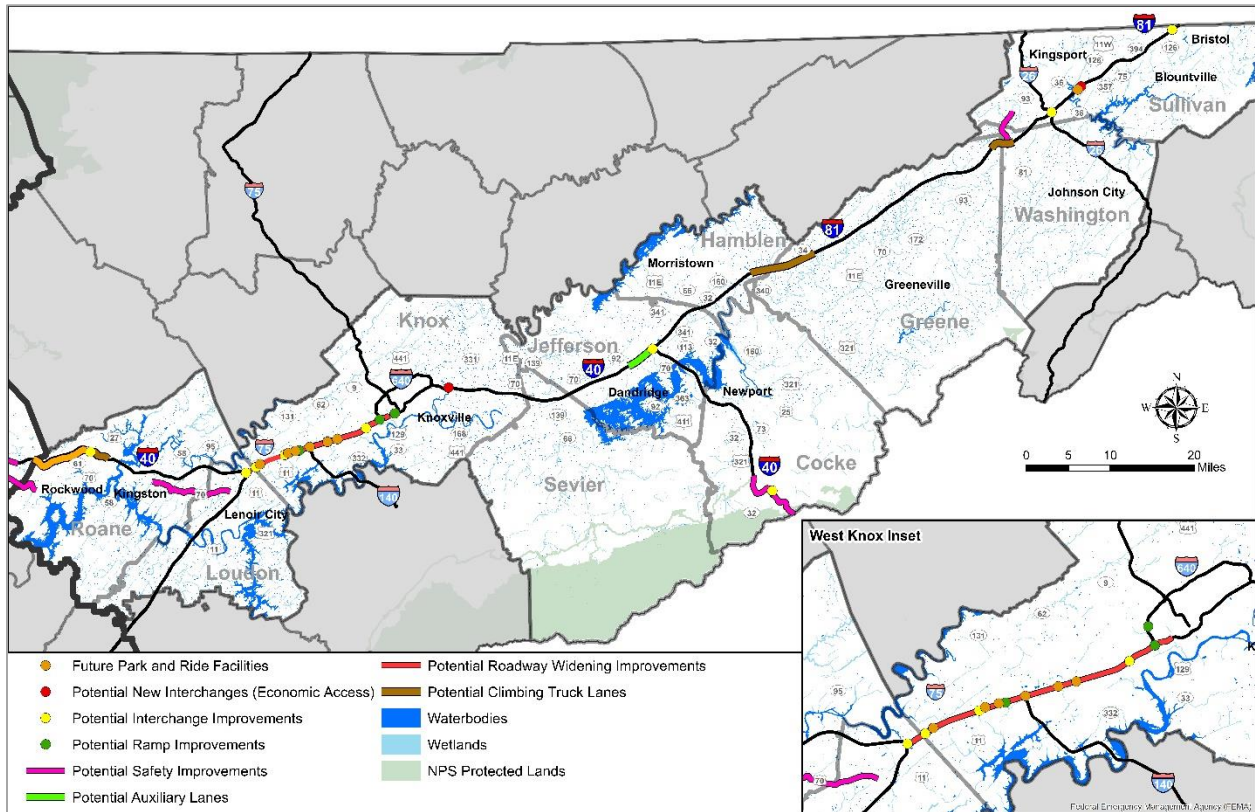


## Natural Resources

Natural Resources include waterbodies (streams, rivers, ponds, and lakes), wetlands, floodways, and protected lands (federal, state and local). Each of these natural resources are crucial to the environment and provide both intrinsic and economic value. The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. Executive Order 11988, Floodplain Management (1977) requires federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Protected lands are governed by a variety of federal, state, and local requirements.

For the environmental screening, waterbody and wetlands data from the United States Fish and Wildlife Service (National Wetlands Inventory), floodway data from the Federal Emergency Management Agency, and protected lands data from the National Park Service and the Tennessee Department of Environment and Conservation within the 500-foot buffer were identified. It should be noted that this is only a high-level review of natural resources within the I-40/81 corridor and additional field reviews would be necessary as part of any environmental or design activities to identify potential impacts to natural resources. Figures 13 through 16 show identified natural resources by TDOT region.

Figure 13: TDOT Region 1 Natural Resources





# I-40/81 Multimodal Corridor Study

Figure 14: TDOT Region 2 Natural Resources

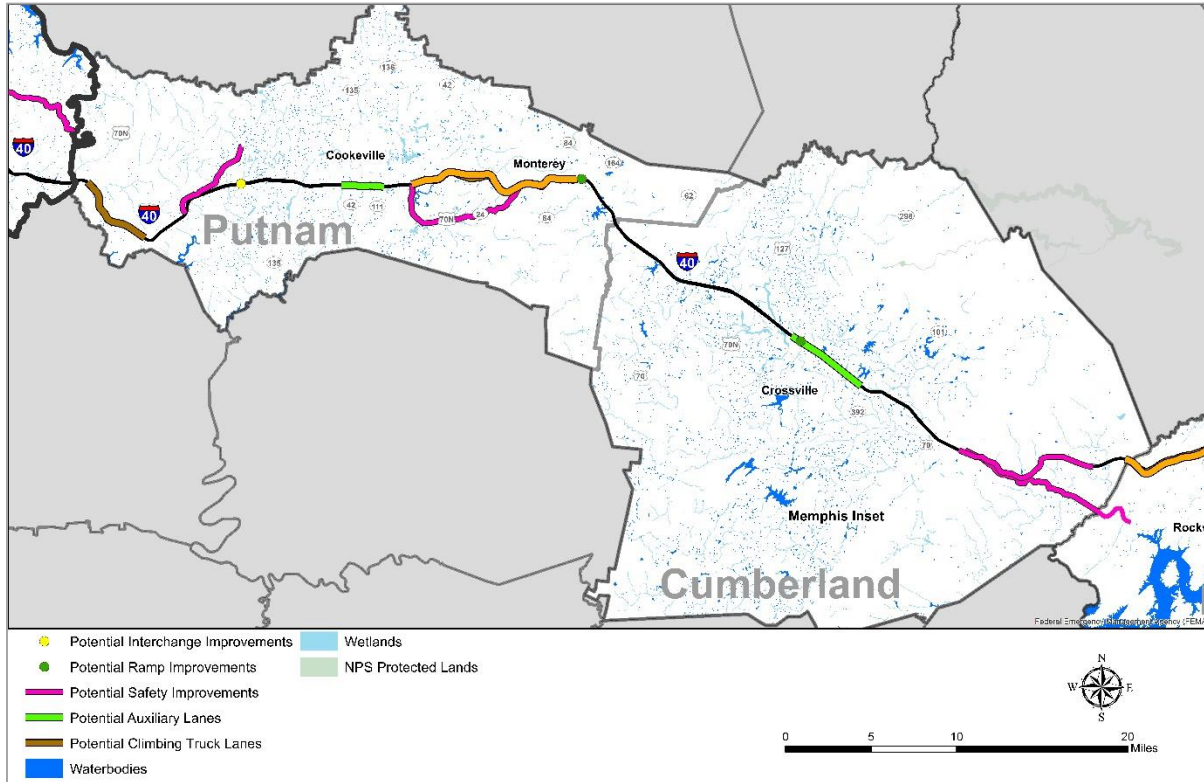


Figure 15: TDOT Region 3 Natural Resources

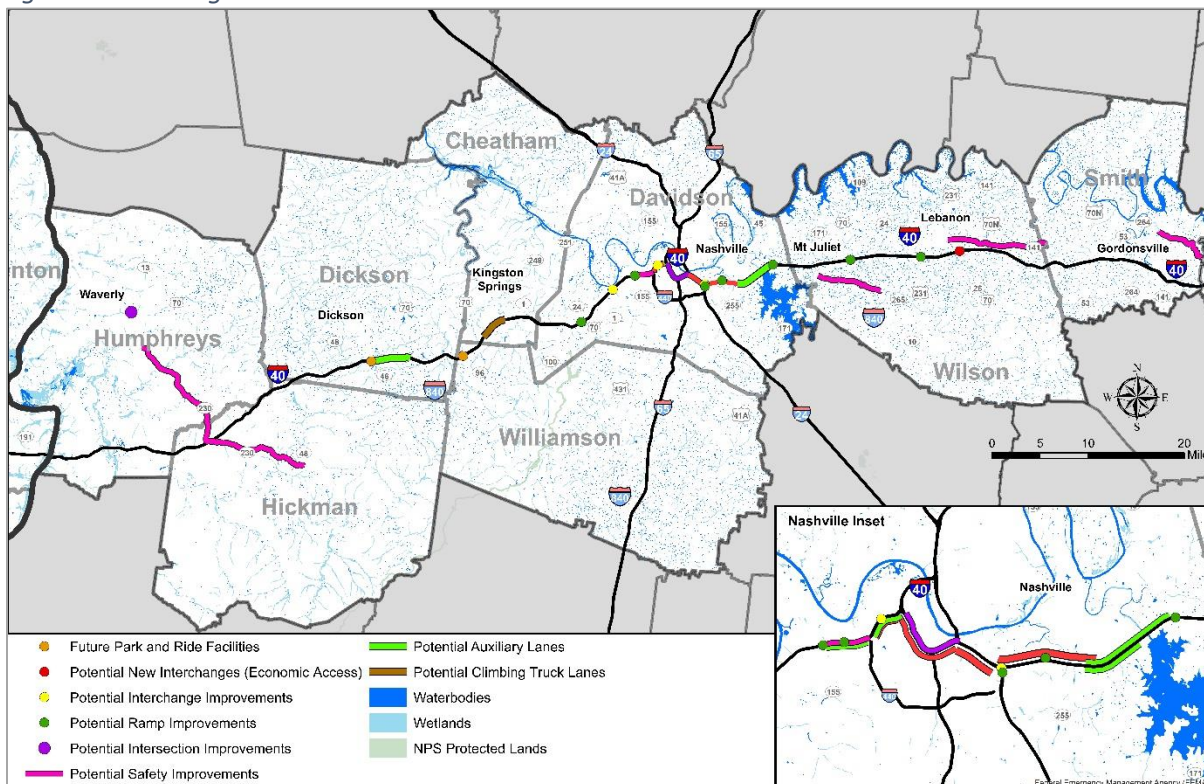
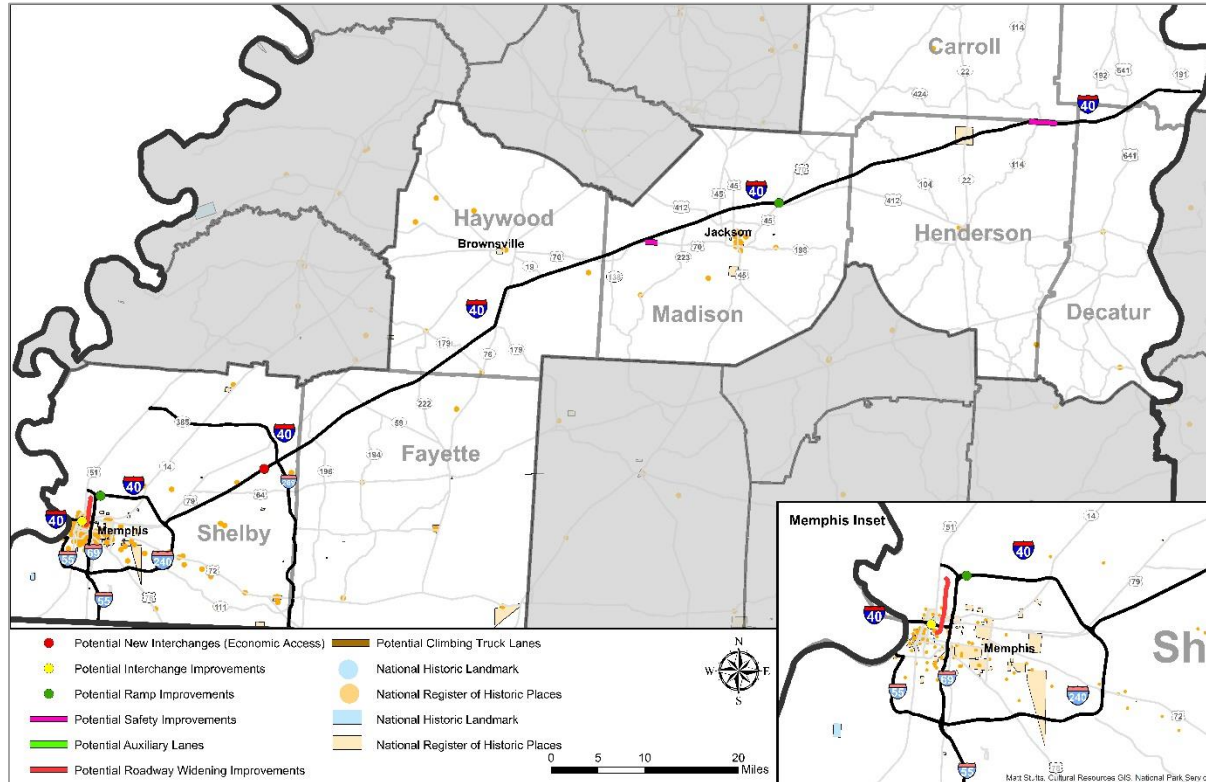


Figure 16: TDOT Region 4 Natural Resources



## Environmental Screening Results and Findings

### Highway Projects

As a result of the high-level environmental screening, no “red flags” were identified that would impede any of the projects identified as part of the I-40/81 corridor study from moving forward. However, four highway projects had a high number of environmental resources present in the project area. Additional field reviews would be necessary as part of any environmental or design activities to identify potential impacts to these environmental resources, but given the number of environmental resources present in the project proximity, it is likely that these projects would require a greater level of analysis and coordination and have the potential to face increased costs and lengthened implementation schedules. Highway projects identified as environmentally challenging are listed in Table 2.



# I-40/81 Multimodal Corridor Study

Table 2: Environmentally Challenging Highway Projects

Project	Environmental Resources Present in Project Area
SR 141 Safety Improvement (Detour Route), from SR 26 (US 70) to Wilson-Smith county line, Smith and Wilson Counties	Cemetery (NHRP-listed)
	Historic Home (NHRP-listed)
	Wetlands
	Stream/River Crossings
	Ponds
	Floodway
	Environmental Justice Communities
I-40 Physical Capacity Improvement, from Exit 1E (I-240) to Exit 2A (SR-300), Shelby County	Historic Districts
	Wetlands
	Stream/River Crossings
	Floodway
I-40 Safety Improvement, from Exit 443 (SR-339 [Foothills Parkway]) to Exit 451, Cocke County	Great Smoky Mountains
	Appalachian Mountains
	Wetlands
	River/Stream Crossings
I-40 Safety Improvement, from Exit 204 (SR 155 [Briley Parkway/White Bridge Road]) to Exit 206 (I-440), Davidson County	Historic District
	Stream/River Crossing
	Floodways
	Environmental Justice Communities



# I-40/81 Multimodal Corridor Study

## Multimodal Freight Projects

The I-40/81 Multimodal Solutions Technical Memorandum identified four non-highway projects to benefit mobility and safety on the I-40/81 corridor, each of which is already included in the Statewide Multimodal Freight Plan:

- Sullivan County: Redevelop Kingsport Intermodal yard so it is being used by truck & rail
- Davidson County: Increase clearance at CSX bridge in downtown Nashville for larger barges to pass
- Shelby and Tipton counties: Construct a CN rail spur from Memphis 18 miles east to CN Fulton Subdivision and Memphis Regional Megawite
- Shelby and Haywood counties: Construct a CSX rail spur from Memphis to I-40 Advantage Industrial Park in Brownsville

The two projects involving construction of a rail spur will require further study to establish a general alignment that can be mapped against known sensitive resources. At that point, potential environmental impacts can be reviewed.

However, the two remaining multimodal freight projects can be considered environmentally challenging, likely requiring a greater level of analysis and coordination and the potential for higher costs and longer time needed for implementation. While neither is considered to have a fatal flaw, the two projects are considered environmentally challenging, similar to the highway projects listed in Table 2.

Table 3: Environmentally Challenging Multimodal Freight Projects

Project	Potential Issues
Redevelop Kingsport Intermodal yard so it is being used by truck & rail (Sullivan County)	High potential for hazardous materials to be found on site
Increase clearance at CSX bridge in downtown Nashville for larger barges to pass (Davidson County)	Work would likely require permits and approvals from multiple agencies, including the U.S. Coast Guard and Army Corps of Engineers, and could impact adjacent properties if the bridge were relocated.