2.0 ALTERNATIVES

2.1 INTRODUCTION

The October 2000 DEIS addressed a range of reasonable alternatives that were subjected to detailed study along with several alternatives that were eliminated from detailed study. As previously discussed, the determination as to whether a particular alternative would be subjected to detailed study was based on a number of screening criteria along with that alternative's ability to satisfy the purpose and need. Alternatives eliminated from detailed study in the DEIS because they did not meet purpose and need consisted of several iterations of corridor improvements involving U.S. Route 220 (the "low build or intermediate build alternatives"). Alternatives subjected to detailed study in the DEIS consisted of the No-Build, Transportation System Management (TSM), and eleven Build Alternative Options. Each alternative was evaluated with respect to its potential impacts. Alternatives addressed in this FEIS consist of the No-Build, TSM, those Build Alternative Options considered but not selected by the CTB, and the Build Alternative Option adopted by the CTB (hereinafter referred to as the "Adopted Location Corridor" or ALC). After completion of the FEIS, VDOT will request a Record of Decision (ROD) from FHWA. The ROD will identify the selected alternative, document FHWA's decision and outline required mitigation measures. The I-73 Location Study will be complete upon the issuance of a ROD. Project development may then continue as FHWA approves final design, right-of-way acquisition and construction.

2.2 ALTERNATIVES DEVELOPMENT AND ALTERNATIVES ELIMINATED FROM DETAILED STUDY

2.2.1 Corridor Feasibility Study

When ISTEA was passed in 1991, Congress established I-73 as a high priority corridor from Charleston, South Carolina through Winston-Salem, North Carolina, to Portsmouth, Ohio, to Cincinnati, Ohio, to Detroit, Michigan and north to Sault Ste. Marie. With this legislation, it became apparent that I-73 would have to pass through Virginia at some point. During the period 1993 to 1994, VDOT in conjunction with the VEC, prepared a feasibility study that included a preliminary evaluation of 13 broad corridors for the proposed I-73 in Virginia (See Figure 2.2-1). This feasibility study was categorically excluded from NEPA in accordance with 23 CFR § 771.117(c)(1). The VEC's Economic Information Services Division prepared an economic analysis of the corridors. The analysis estimated the potential growth for each alternative at potential interchanges using a rural interchange growth estimation method (Growth at Rural Interchanges, Hartgen et al., 1992). Four of the 13 corridors considered to have the most economic potential included the U.S. Route 220 Corridor south of Roanoke. The U.S. Route 220 alternatives were predicted to stimulate the greatest number of jobs.

Using the VEC conclusions, VDOT screened and ranked each of the 13 corridors for five evaluation criteria; environmental impact, economic impact, traffic service, capital cost and public support. A composite of the five evaluation criteria was developed resulting in an overall ranking for each of the 13 broad corridors considered. Supported by the results of the feasibility study, the CTB selected a single corridor for further analysis and study by VDOT. The CTB initially chose an alternative that followed Route 220 and Route 460 to I-81. However, at the request of local jurisdictions, the selected corridor was revised to route it through Roanoke to I-81.The selected corridor, as it was envisioned, started on U.S. Route 220 just north of the North Carolina State Line and continued generally along U.S. Route 220 to Roanoke, north to I-81 along I-581, and then west along I-81 to the Smart Highway and U.S. Route 460 into West Virginia. The CTB adopted a resolution supporting this corridor in March 1994. Funding sources were identified for the completion of a location study. A copy of the feasibility study is maintained on file at the VDOT Salem District Office.

Prior to the CTB's March 1994 and December 1994 resolutions supporting the general I-73 corridor through Virginia, five public information meetings were held in southwest Virginia during the months of January and February of 1994. Approximately 1,200 citizens attended these meetings held in Abingdon, Wytheville, Blacksburg, Roanoke, and Martinsville.

2.2.2 Location Study Alternatives Development

With the passage of the NHS Designation Act of 1995, Congress identified the location of I-73 through Virginia as generally following U.S. Route 220 from the Virginia/North Carolina state line to I-581 south of Roanoke;
I-581 to I-81 in the vicinity of Roanoke; I-81 to the proposed highway to demonstrate intelligent transportation systems in the vicinity of Christiansburg; to U.S. Route 460 in the vicinity of Blacksburg; and U.S. Route 460 to the West Virginia state line. With the passage of TEA-21, Congress provided funding for Virginia to conduct preliminary engineering (i.e. a location study) on the location of I-73 between the Virginia/North Carolina state line and I-81 in the vicinity of Roanoke.

A four-step alternative identification and screening process was used to develop the alternatives within the study corridor. The four steps included were:

- Identification of a broad range of options.
- Screening of the initial options to eliminate unsuitable or unreasonable elements.
- Selection of reasonable alternatives for further analysis (i.e., level 1 and level 2 screening).
- Selection of final alternatives for detailed analysis in the DEIS.

The broad range of options to be initially considered were developed through input from several sources: public input received during a series of open house meetings, input from local jurisdictions, stakeholder interviews, and input from the I-73 Location Study Team. (The I-73 Location Study Team includes VDOT staff and VDOT's consulting staff for this project.) Open forum citizen information meetings for the region were held in the City of Martinsville, the Town of Rocky Mount, and the City of Roanoke. Over 1,200 citizens attended these meetings, at which attendees were asked to suggest alternatives. For those who had a preference for a Build Alternative, a map was provided and the attendees were asked to draw alternative routes.

The Study Team received more than 750 Build Alternative suggestions from the public. Other alternatives received from the public included requests that nothing be done at all relative to a new Interstate, or that existing U.S. Route 220 be improved but not to interstate standards.

Screening of the initial options was based on a set of evaluation criteria developed by the Study Team, emphasizing (1) those obvious issues or screening criteria that could eliminate an option without further research and (2) those inherent deficiencies that could eliminate an option with respect to the project's stated purpose and need. The more than 750 suggestions were organized into geographic segments to which the screening criteria were applied. Screening criteria included:

- Crossing Smith Mountain Lake;
- Crossing Philpott Reservoir;
- Impacts to Fairy Stone State Park;
- Proximity to logical termini; and
- Excessive cost (i.e. tunneling, extensive bridging, massive cut and fill).

Selection of reasonable alternatives for the analysis was based on a more-detailed set of screening criteria that included known resources, which did not require substantial research or ground verification. A two-level screening process was used at this stage of alternative development. Level 1 screening criteria included such items as archaeological and historic resources, wetlands, threatened and endangered species, prime farmlands, initial identification of land uses, areas of development, and topographic features. Level 2 screening criteria were similar to Level 1 criteria but required some additional research and information to determine more fully the impacts of a particular segment. Level 2 criteria also considered impacts to the Blue Ridge Parkway and potential positive impacts of the proposed roadway, such as enhancing industrial and tourist access and the ability to enhance existing economic development plans. The Alternatives

Identification and Screening Technical Memorandum (VDOT, 2000), details this two-level-screening process. Figure 2.2-2 illustrates the 52 segments that constitute the build alternatives presented in the DEIS, including those segments comprising the ALC being advanced in this FEIS.

Selection of the alternatives for detailed analysis involved the combining of the remaining segments into full corridor options that would be carried forward for further analysis. In addition, an option for improving existing U.S. Route 220 to interstate standards was developed. These options are referred to cumulatively as the Build Alternative. Under the Build Alternative, a potentially large number of options can be derived using different segment combinations. Four general Build Alternative options, each containing several sub-option variations, were identified as reasonable alternatives warranting detailed analysis in the DEIS. The Build Alternative options presented in the DEIS were determined to be reasonably representative of a potentially larger range of Build Alternative options that could be formed using various combinations of segments. The various options comprising the Build Alternative along with the No-Build Alternative and the TSM Alternative were presented during a series of open forum citizen information meetings in May, June, and July of 1998 and during Location Public Hearings held in December of 2000.

Based on findings set forth in the DEIS along with comments received from the general public and reviewing agencies, the CTB in its 21 June 2001 resolution, with amendments by the CTB on 15 July 2004, adopted a 71.71-mile-long segment of limited access highway between the Virginia/North Carolina State Line and Interstate 81. Improvements to 5.7 miles of existing Interstate 581 would be provided and 66.01 miles of new limited access highway would be constructed to freeway design standards. The adopted alignment is comprised of Build Alternative segments 374, 375, 118C, 118, 118B, 400, 153, 202A, 385, 369, 373, 333, and 398 – all of which were assessed in the DEIS.

In its 21 June 2001 resolution and 15 July 2004 amendments, the CTB also resolved that the adopted segment be designated as “Virginia Interstate 73”. As discussed in this FEIS, the CTB adopted segment is referred to as the “Adopted Location Corridor” or ALC.

2.2.3 Alternatives Eliminated From Detailed Study

2.2.3.1 Highway Improvements Eliminated From Detailed Study

As discussed in section 2.3.2 of the DEIS, low build or intermediate build alternatives potentially capable of providing a principal arterial with a 60 mph design speed were assessed during early phases of the Interstate 73 Location Study. This alternative concept, as assessed, would provide no control of access and would utilize at-grade intersections. For the Interstate 73 Location Study, this design concept was tested on the U.S. Route 220 corridor. The low build design concept assessed for the U.S. Route 220 corridor did not include any improvements from I-81 to just south of Boone’s Mill. Under this low build design concept, the Martinsville Bypass and the Rocky Mount Bypass would remain in place with no proposed improvements. Although this concept would involve major construction of both the south-bound and north-bound lanes of existing U.S. Route 220, the extent of practicable corridor improvements was determined to be constrained by a high degree of right-of-way and relocation conflicts. As a result, practicable design options assessed as part of this alternative would fail to provide the degree of roadway improvements necessary to allow posted speeds to be increased above the currently posted speed of 55 mph (45 mph from Boone’s Mill to Route 419). Cost estimates indicate that the low build alternative assessed for U.S. Route 220 would cost approximately $495 million (2007 right-of-way and construction costs). As discussed in the DEIS, this concept would provide more safety improvements compared to the TSM alternative; however, it would do little to address the other purpose and need elements of freight transport, economic growth and vitality, operations (access & capacity), or general mobility and linkage (speed, travel time, travel delay and operational cost reduction). Based upon the foregoing factors and the realization that the benefits of a full interstate facility will not accrue, it was determined that the low build design concept assessed for the U.S. Route 220 corridor cannot be considered to be a reasonable alternative and, accordingly, that it did not warrant further detailed analysis in the DEIS.

The U.S. Route 220 low build design concept discussed in the DEIS has been further evaluated to determine whether the application of current VDOT rural principal arterial standards to the entire length of the corridor (the "Rt 220 upgrade alternative" of EPA terminology) would warrant detailed study within the context of stated purpose and need. As previously discussed, upgrading portions of U.S. Route 220 to a rural principal arterial were evaluated as part of the alternatives analysis leading up to the DEIS. This design concept has since been applied to that portion of U.S. Route 220 having a northern terminus at Route 419 (the Electric Road/Franklin Road/U.S. Route 220 interchange) and a southern terminus at the Virginia/North Carolina state line. Because of constraints imposed by existing land uses, historic district boundaries, and terrain, construction of a new 2.9-mile bypass around Boones Mill would be required as part of this design concept. Under this design concept, improving sight distances by reducing grades to four percent (and, in many cases, to attainable grades of only six percent) would require cuts or fills ranging as much as 15 to 20 feet. Construction of this sort would be difficult to achieve while maintaining traffic. The cost for this design concept has been estimated at 517.7 million dollars. This cost estimate was based on the assumption that traffic could be effectively and safely maintained with only one lane in each direction – a measure that proved problematic during improvements performed on U.S. Route 220 in Roanoke County during 1997 to 1998. Maintaining traffic in two lanes each direction would increase estimated costs substantially. This design concept would require the construction of two new bridges as part of the Boones Mill bypass, the replacement of 20 existing bridges, and the widening of 5 existing bridges. As a result, impacts to streams and associated wetlands could not be reasonably avoided and would be comparable to those associated with other build alternatives that use U.S. Route 220.

Most of the resource impacts associated with a rural principal design concept will mimic the impacts documented in the DEIS for Option 3. This is particularly true for residential and commercial relocations and other impacts associated with the direct construction footprint of the road. The typical section and subsequent right-of-way width for a 60 mph rural principle arterial is comparable to that of an interstate or freeway design with a comparable design speed (see Figure 2.3-1). Therefore, the level of direct resource impacts of a low-build design (i.e. the 'other principle arterial' design) would be similar to that of an interstate, except at intersections where an interstate facility would require interchanges as opposed to at-grade intersections (however, the number of access points represented by interchanges along an interstate facility would be far less than the number of access points provided along a non-interstate facility via at-grade intersections), but the benefits of an interstate would not be achieved. Some have suggested that VDOT pursue the 'other principle arterial' design but control access with the use of frontage roads to improve mobility and safety in the Route 220 corridor. While this suggestion would certainly improve safety and mobility in the corridor, a detailed traffic analysis and additional engineering would be required to identify the specific locations where frontage roads would be warranted. In the absence of this final design information and recognizing that the roadway footprint of a freeway facility and a facility designed to 'other principle arterial' design standards have comparable right-of-way requirements, especially when one considers the frontage roads that would be needed to make it work, this alternative does not offer an appreciable advantage environmentally speaking over a freeway design while being less effective at addressing the purpose and need.

As with those U.S. Route 220 improvements discussed in the DEIS, this concept would provide safety improvements, but would do little to address the other purpose and need elements of freight transport, economic growth and vitality, operations (access & capacity), or general mobility and linkage (speed, travel time, travel delay and operational cost reduction). Additionally, because the rural principal design concept does not control access adjacent to the highway, roadside development would not be prohibited along the improved U.S. Route 220 and subsequent concerns about safety and access would resurface. Because of the high capital cost associated with this U.S. Route 220 improvements concept ($854.21million in 2007 dollars), the subsequent resource impacts associated with a U.S. Route 220 improvement, and the fact that the benefits of a full interstate facility would not accrue, it was determined that this design concept cannot be considered to be a reasonable alternative and, accordingly, that it does not warrant further detailed analysis in the FEIS *(See Section 2.3.1.1)*.

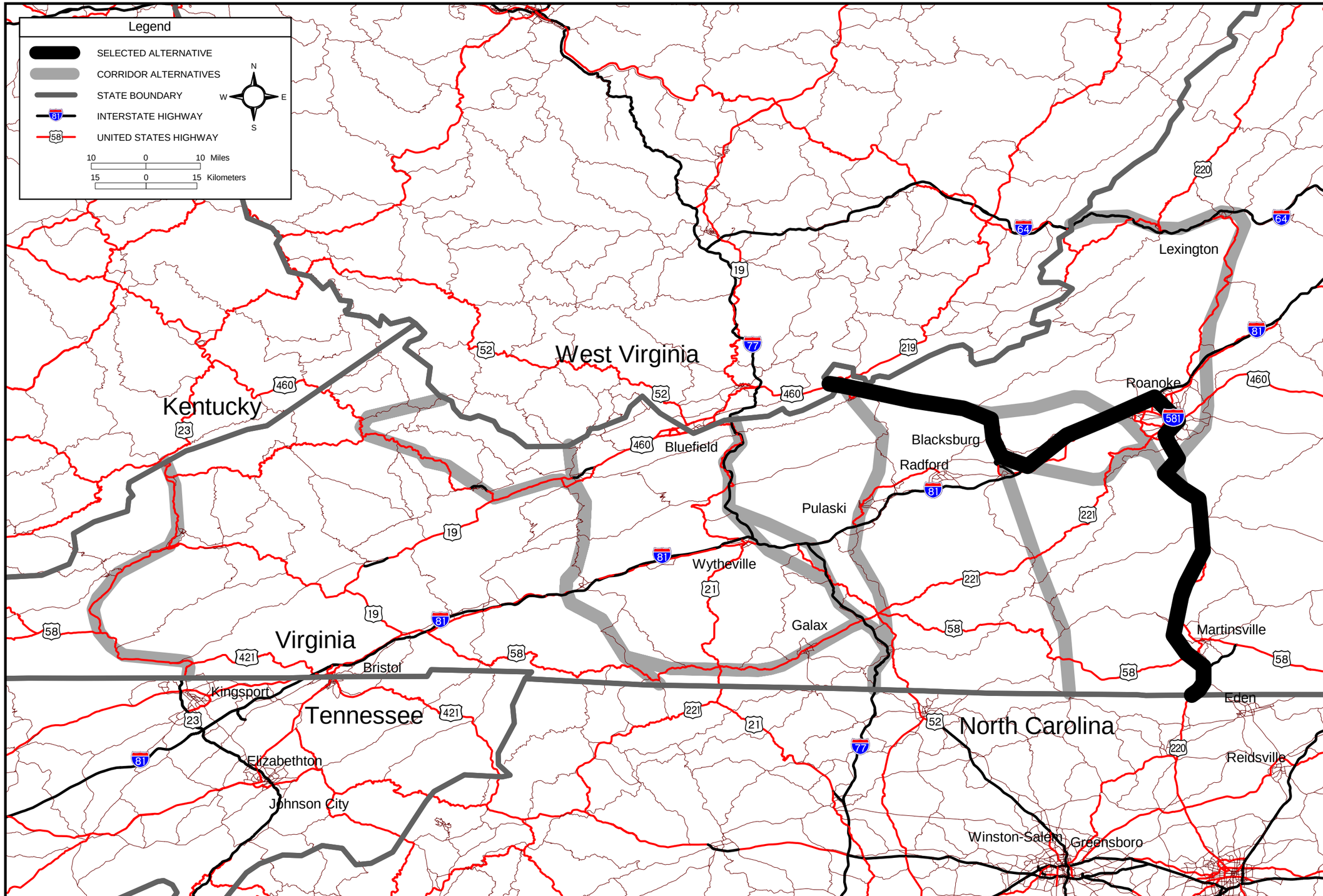
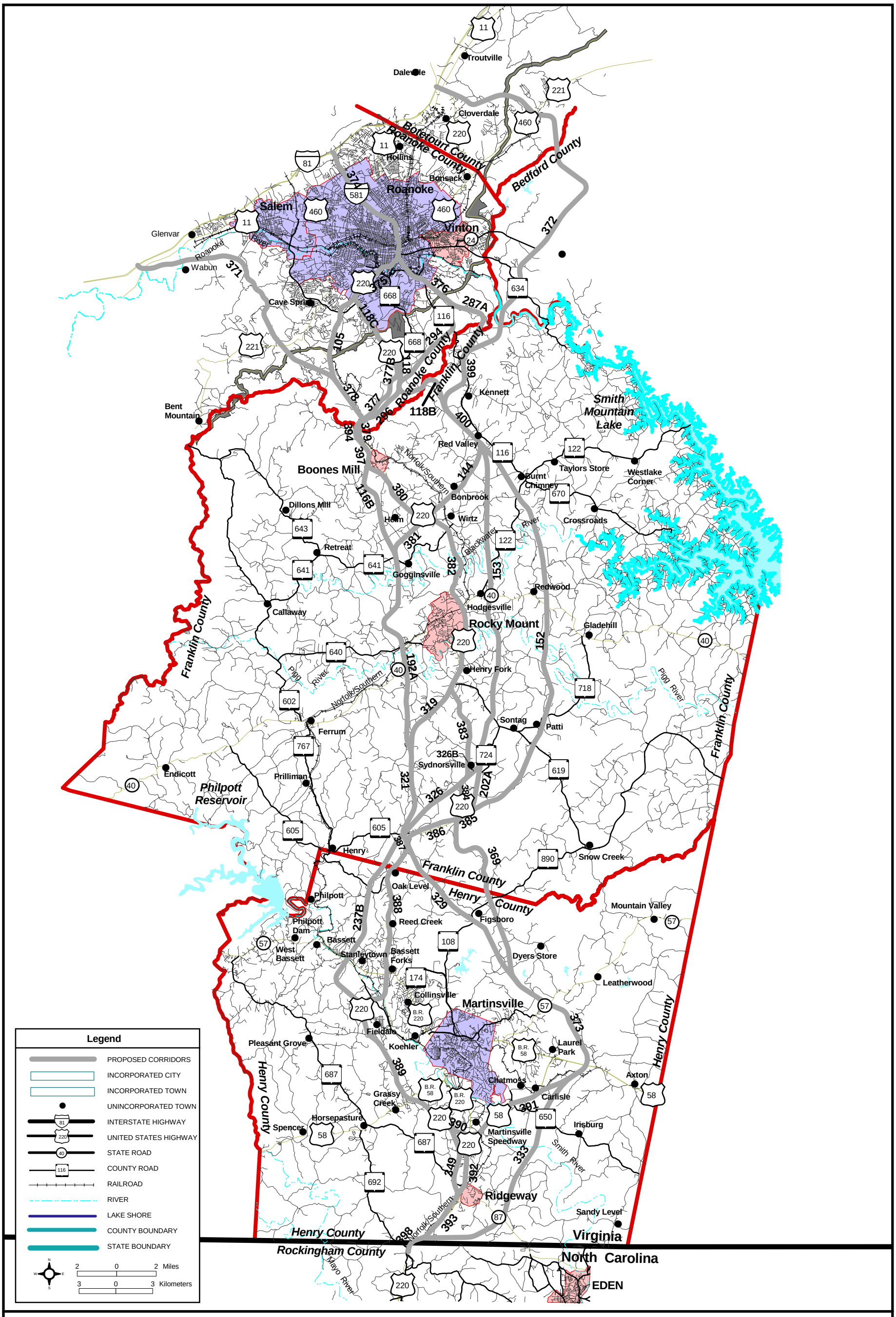


FIGURE 2.2-1
POTENTIAL I-73 CORRIDOR ALTERNATIVES
STUDY AREA

I-73 Location Study



FUTURE 73

I-73 Location Study

FIGURE 2.2-2
REMAINING SEGMENTS
FOR MORE DETAILED STUDY

2.2.3.2 Freight Rail Alternatives Eliminated From Detailed Study

Some commentors on the DEIS raised questions on the reasonableness of a rail alternative. The Virginia Intermodal Transfer Facility Study (VDOT June, 2000) was prepared to help determine the possibility of reducing heavy truck traffic on long-haul highways in the Commonwealth. As an alternative to truck freight the report explored the practicality of transferring freight movement to other modes (rail and ship). The report analyzed long-haul truck traffic using Virginia highways and provided an overview of freight operations in the Commonwealth. Table 2.2-1 illustrates the 1996 annual rail and truck movements in, out, and through the Commonwealth of Virginia. The data and analysis used in this study estimated that there are approximately 3,500,000 annual long-haul truck trips on Virginia highways. Approximately 81 percent of these trips pass through Virginia. The remaining trips (19 percent) originate or have a destination in Virginia.

Table 2.2-1
ANNUAL RAIL AND TRUCK MOVEMENTS, 1996

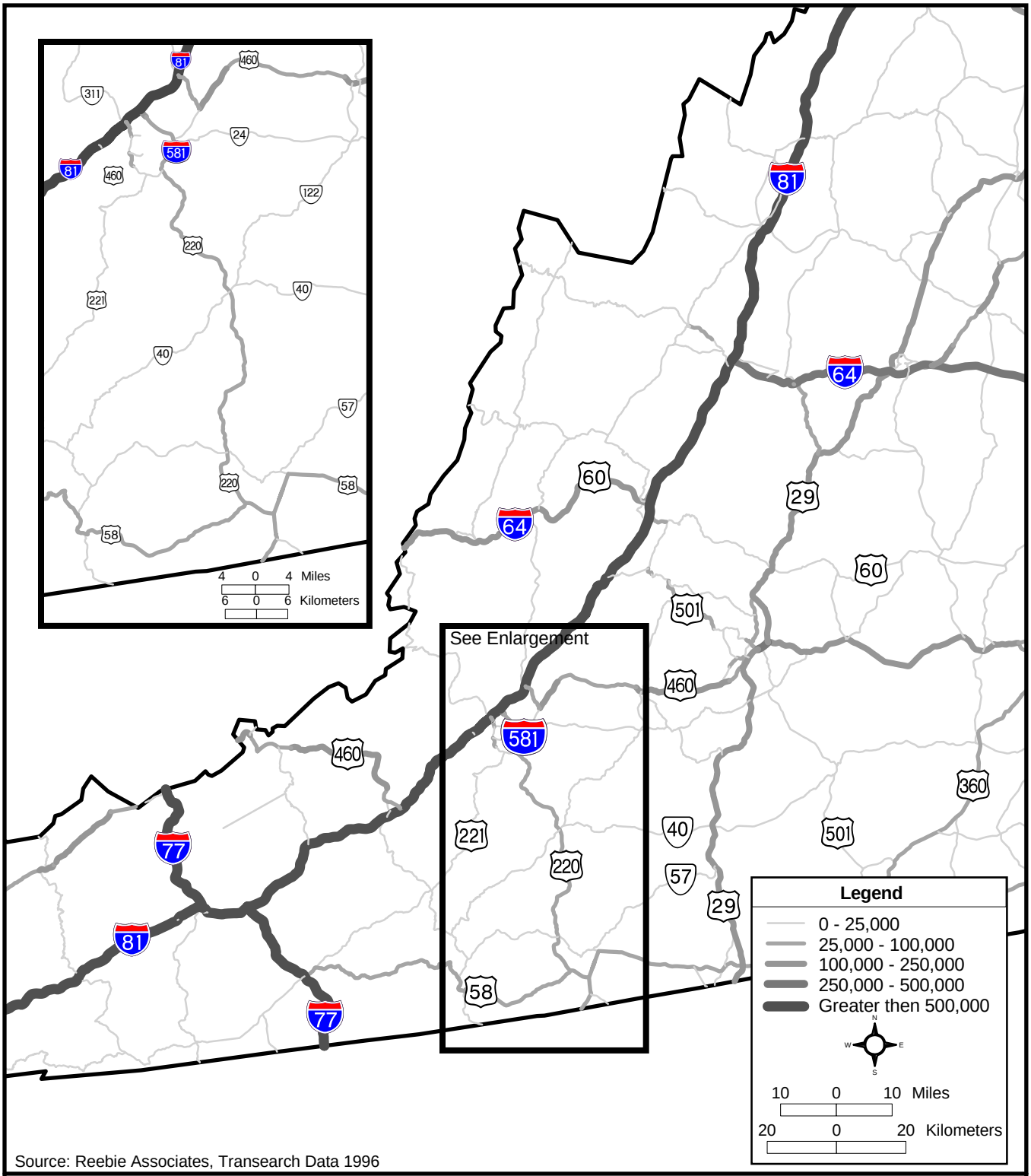
Destination	Rail[1]		Truck		Rail/Truck Combined	
	Total	Percent	Total	Percent	Total	Percent
Into Virginia	127,552	22%	432,963	12%	560,515	14%
Out Of Virginia	103,113	17%	242,627	7%	345,740	8%
Through Virginia	359,027	61%	2,839,256	81%	3,198,283	78%
Total	589,692	100%	3,514,846	100%	4,104,538	100%

Source: Reebie Associates, Transearch Data 1996

[1] Rail figures are equivalent truckloads based on 15 tons per truck.

The report concluded “as a general rule, there are a few characteristics that make rail a viable alternative to freight trucking. For rail travel to be competitive with trucks, the distance between origin and destination should be greater than 500 miles. To put this in perspective, goods movement from Greensboro, North Carolina to Baltimore, Maryland (less than 400 miles) would not be a strong candidate for shipment by rail. Longer distances, such as from Greensboro to New York (approximately 540 miles), would be more suited for rail travel. The most viable freight commodities for rail intermodal diversion are dry van container goods. Intermodal transfer facilities need to be available at the origin and destination. Additionally, the rail service needs to meet both production timing and market needs.” Intermodal transfer facilities are locations where goods can be moved from one mode of transportation to another, such as from truck to rail or from rail to ship.

Figure 2.2-3 illustrates the volume of long-haul truck trips on selected Virginia highways within approximately 100 miles of the study area. This information is summarized in Table 2.2-2. The highest annual volume of long-haul truck trips in Virginia was found where I-77 and I-81 overlap near Wytheville. At this location there was an estimated 1,895,000 long-haul truck trips or approximately 6,070 to 7,290 trips per day. U.S. Highways show far less long-haul truck volumes compared to the interstate system. U.S. Route 29 is one of the most utilized U.S. Highways for the movement of goods for a distance of over 500 miles. The annual volume of long-haul trucks is estimated at 231,100 between I-64 and U.S. Route 460. In comparison, the data indicated that the highest annual volume of long-haul truck trips on U.S. Route 220 in the study area (including portions shared with I-581) was 10,600 or approximately 320 to 390 trips per day.



FUTURE 73

I-73 Location Study

FIGURE 2.2-3
ANNUAL LONG-HAUL TRUCK VOLUMES

Table 2.2-2
ANNUAL AND DAILY LONG-HAUL TRUCK VOLUMES

	From	To	Annual Truck Volumes	Daily Truck Volumes (Range)
I-64	West Virginia	I-81 S	161,800	520 - 620
I-64	I-81 S	I-81 N	1,701,300	5,450 - 6,540
I-64	I-81 N	U.S. Route 29	445,800	1,430 - 1,710
I-77	West Virginia	I-81 S	1,023,100	3,280 - 3,940
I-77	I-81 S	I-81 N	1,894,600	6,070 - 7,290
I-77	I-81 N	North Carolina	1,418,100	4,550 - 5,450
I-81	I-77 S	I-581	1,575,300	5,050 - 6,060
I-81	I-581	I-64 W	1,615,900	5,180 - 6,210
I-81	I-64 W	I-64 E	1,701,300	5,450 - 6,540
I-581/U.S. Route 220	I-81	U.S. Route 220	100,600	320 - 390
U.S. Route 29	I-64	U.S. Route 460	231,100	740 - 890
U.S. Route 29	U.S. Route 460	North Carolina	199,000	640 - 770
U.S. Route 58	I-77	U.S. Route 220	44,600	140 - 170
U.S. Route 58	U.S. Route 220	U.S. Route 29	66,400	210 - 260
U.S. Route 60	I-81	U.S. Route 29	33,600	110 - 130
U.S. Route 220	I-581	Route 40	81,300	260 - 310
U.S. Route 220	Route 40	Route 57	68,900	220 - 260
U.S. Route 220	Route 57	U.S. Route 58 W	54,100	170 - 210
U.S. Route 220	U.S. Route 58 W	U.S. Route 58 E	95,500	310 - 370
U.S. Route 220	U.S. Route 58 E	North Carolina	58,200	190 - 220
U.S. Route 221	I-77	I-581	5,900	20 - 20
U.S. Route 460	West Virginia	I-81	134,500	430 - 520
U.S. Route 460	I-581	U.S. Route 29	128,200	410 - 490
U.S. Route 501	U.S. Route 60	U.S. Route 460	51,300	160 - 200

Source: Reebie Associates, Transearch Data 1996

Note: Daily long-haul truck volume ranges are based on a 5 to 6 day per week operation

From Table 1.5-2, there is an estimated ADT for all vehicles of 48,800 to 57,900 on I-81 north and south of I-581. Table 1.5-1 indicates that approximately 19 percent of the traffic at this segment on I-81 is related to trucks. This equates to approximately 9,300 to 11,000 total truck trips per day. Comparing this with the data in Table 2 above suggests that about 55 percent of all trucks traveling along I-81 near I-581 are long-haul trucks and the remaining 45 percent are regional or local trips. Using the same tables for U.S. Route 220, the volume of trucks ranges from 2,500 (22 percent of 11,400 ADT near the North Carolina State line) to 6,100 (19 percent of 32,300 ADT south of Route 419). Based on the data in Table 2.2-2 above, only 5 to 9 percent of the truck volumes on U.S. Route 220 are related to long-haul truck trips. The remaining 91 to 95 percent truck related ADT is for regional or local freight movement.

Although there is a high percent of trucks using U.S. Route 220, the data indicates that most of the trucks using this corridor are for local, regional, and interstate trips of less than 500 miles, which are not strong candidates for conversion to rail. If the number of long-haul truck trips that are using U.S. Route 220 were converted to rail, the number of trips reduced would be less than 200 trips per day. Rail improvements in the study area could have the potential for reducing some long-haul truck trips for Virginia highways, but the

reduction along U.S. Route 220 *in the study area* would be marginal. Therefore, upgrading of the rail line in the corridor would not meet the purpose and need.

2.2.3.3 Passenger Rail Alternatives Eliminated From Detailed Study

Intercity passenger rail and commuter passenger rail alternatives were eliminated from further study early in the study process principally for two reasons; passenger rail is not competitive in terms of capturing ridership and passenger rail did not meet the Congressional intent that the I-73 corridor be a component of the NHS.

The former Norfolk and Western Railroad provided east west passenger service into Roanoke with a line that ran from Norfolk to Cincinnati. Additional north south passenger service from Winston–Salem, NC to Roanoke was also provided by Norfolk and Western Railroad. This service was in place from approximately the early part of the 19th century to 1971. From 1971 to approximately 1976 or 1977 Amtrak provided service to Roanoke along the Norfolk to Cincinnati route. After Amtrak abandoned the service for lack of ridership, all passenger rail service in and out of Roanoke was discontinued.

A parallel can be drawn regarding the competitiveness of passenger rail and interstate facilities by looking at the I-64 Major Investment Study in Southeastern Virginia. In 1996, vehicular travel accounted for 92.5% of the daily person trips in the I-64 corridor between Hampton and Richmond. Passenger rail accounted for only 0.1% of that demand. The remaining 7.4% of the demand was handled with express bus and local bus service. By year 2015, with the addition of a $498 million High Speed Rail investment, the I-64 corridor passenger rail capture rate was at 0.4% of the total travel demand in the corridor. Vehicular travel demand dominated the mode choice in the corridor capturing just over 93% of the total person trips in the corridor. Future (2015) travel demand in the I-64 corridor is approximately three times the anticipated travel demand on I-73 in 2020.

Given the marginal corridor person mile capture rate (0.1% to 0.4%) of existing and future passenger rail in the I-64 corridor, it is unlikely that passenger rail service in the U.S. Route 220 corridor would prove to be a more viable transportation alternative over an interstate option. Furthermore, the lack of a large metropolitan area in the southern terminus of the I-73 study area, insufficient urban densities and dominate rural land uses in the study area would further diminish the competitiveness of rail over vehicular demand, particularly for commuter trip purposes.

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2.3 BUILD OPTIONS THAT ADDRESS PURPOSE AND NEED

2.3.1 Purpose and Need Applied to Alternatives

2.3.1.1 Background and Congressional Intent

Both the study team and the public provided input on two variations of build options, the controlled access highway and the limited access highway. The controlled access facility provides similar geometric features to the Interstate (freeway) design along the mainline. The controlled access highway will likely require parallel frontage roads to access stranded properties on either side of the roadway. The controlled access highway would resemble an Interstate in that access would only be provided at key primary, secondary and arterial roads. At those locations the access would be at-grade and either signalized or unsignalized depending upon through and turning movement volumes at the intersection. This distinction separates the controlled access highway from the limited access highway. The limited access highway would have full control not only along the mainline but also at the key intersecting roads. The limited access facility would provide grade separated interchanges as opposed to the at-grade, signalized intersections prevalent in the controlled access highway. Typically, the controlled access highway would be designed to a 60 mph design standard and have a posted speed of 55 mph. The Interstate highway would be designed to a 70 mph design standard and have a posted speed of 65 mph. The controlled access design resembles the Interstate design in that the lane, shoulder and median width would be very similar. Finally, a controlled access facility does not mean that additional access points would not be provided in the future. These decisions are worked out between a locality and VDOT. Localities could and historically do request additional access points over time which degrades the operation of the controlled access highway.

After discussion and review of the economic development potential and the safety features of signalized intersections versus grade separated interchanges, it was determined that the limited access highway provided the type of transportation alternative that best met the Purpose and Need for I-73. The limited access highway built to Interstate (freeway) standards results in the safest high speed facility and promotes the type of managed economic growth at interchanges and adjacent land uses desired by the local jurisdictions.

FHWA believes that the designation by Congress of “I-73" indicates the congressional intent that this route would be an Interstate highway as indicated in the Purpose and Need section of this document. Further reinforcing this intent, Congress has amended existing legislation and passed additional legislation designating the section of I-73 from Charleston, South Carolina to Portsmouth, Ohio as a future part of the Interstate system subject to the conditions that the section to be added meets Interstate design criteria and connects to an existing Interstate segment.

Therefore, the Interstate design standard is the design alternative being used for I-73 in Virginia in keeping with the documented purpose and need that includes congressional intent.

Section 101(a)(8) of the National Highway Designation Act states,

> *Upon the completion of feasibility studies, the Secretary shall add to the National Highway System any congressional high priority corridor or any segment thereof established by Section 1105 of the ISTEA of 1991…*

The purpose of the National Highway System is defined in ISTEA. Section 1006(b)(1) states,

> *The purpose of the National Highway System is to provide an interconnected system of principal arterial routes which will serve major transportation centers, international border crossings, ports, airports, public transportation facilities, and other major travel destinations; meet national defense requirements; and serve interstate and interregional travel.*

Minimally, Interstate 73, as well as major improvements to U.S. Route 220, would need to be designed to principle arterial design standards because the facility would be functionally classified (in the case of

Interstate 73) or is functionally classified (in the case of U.S. Route 220) as a principal arterial route. The functional classification of roadways is required in all states; it is a process carried out by the state highway agencies in rural areas and state highway agencies in cooperation with Metropolitan Planning Organizations in urbanized areas to classify roads based on how they function when it comes to mobility and access. The functional classification then dictates the design standards that are used to maximize mobility and/or access. The design standards for a principal arterial are broken down into "freeways" and "other principal arterials"; it is noted that an interstate is a specific type of principal arterial, namely, a "freeway." Typical sections for both the freeway design and the other principal arterial design are depicted in Figure 2.3-1. Based upon the design standards, the only difference between the two sections is the width of the shoulders and ditches. The slight reduction in shoulder and ditch widths under the standards for the "other principal arterials" typical section requires that the width of the safety slopes be increased to ensure that an adequate clear zone is maintained. The result is an overall section width that is identical to the freeway design.

Early in the initial stages of the development of the DEIS, the decision was made to overlay a 600-foot-wide (183-meter-wide) corridor on the environment to evaluate the direct environmental impacts associated with each new location build alternative. These direct impacts include wetlands, farmlands, forested lands, parks, and others. This decision was based upon the environmental features in the corridor and the topography through which the build alternatives would traverse. Other environmental concerns were evaluated using a larger corridor overlay. For example, historic resources were evaluated up to 500 feet (152 meters) on either side of the candidate build alternative consistent with VDHR recommendations, and noise impacts were evaluated up to 1,000 feet (305 meters) on either side of the candidate build alternative consistent with FHWA/VDOT Noise Policy. In contrast, air quality impacts were assessed at receptors located closest to the candidate build alternatives. Another exception to the 600-foot-wide corridor can be found in urban areas where an urban typical section would likely be used (see Figure 2.6-1A). These overlay corridors for assessing environmental impacts are being used to accommodate a principal arterial facility regardless of whether the facility is a "freeway" or "other principal arterial" facility. Therefore, for documentation purposes in the FEIS, the impacts associated with a freeway design and other principal arterial design would be similar. Differences in the design would eventually manifest themselves in the maximum allowable grade, slopes, and curvature. These differences would be reflected in the earthwork quantities. Still, it is anticipated that this earthwork would all take place within the 600-foot-wide corridor assessed for impacts. Yet, this level of design detail is not something that is normally developed during the location study because of regulatory restrictions on final design.

For most areas assessed, the Interstate (freeway) design standard typically represents the maximum impact on the environment - or worst-case scenario. A lower design speed (less than 60 mph) for other principal arterials would allow for steeper grades and slopes, sharper curves, and a narrower median. A lower design speed for other principal arterials would require a smaller footprint and, therefore, require less earthwork; however, this type of design would not necessarily lead to a lower degree of environmental impacts in all areas. For example, noise and air quality impacts *may* to be greater with this design because of steeper grades and a lower design speed.

The Environmental Impact Statement (EIS) process, culminating with a ROD, is a decision-making tool to determine the general location, general facility features, and project environmental impacts associated with the facility. The EIS process is evaluated based upon preliminary design information. Once a location alternative is selected, the location of the roadway alignment will be further defined as it is shifted within the corridor to minimize environmental impacts and facilitate engineering. It is anticipated that a more detailed design alternative will not be selected until after the FEIS is prepared and circulated, a ROD is issued, final design is initiated, and a design public hearing is held.

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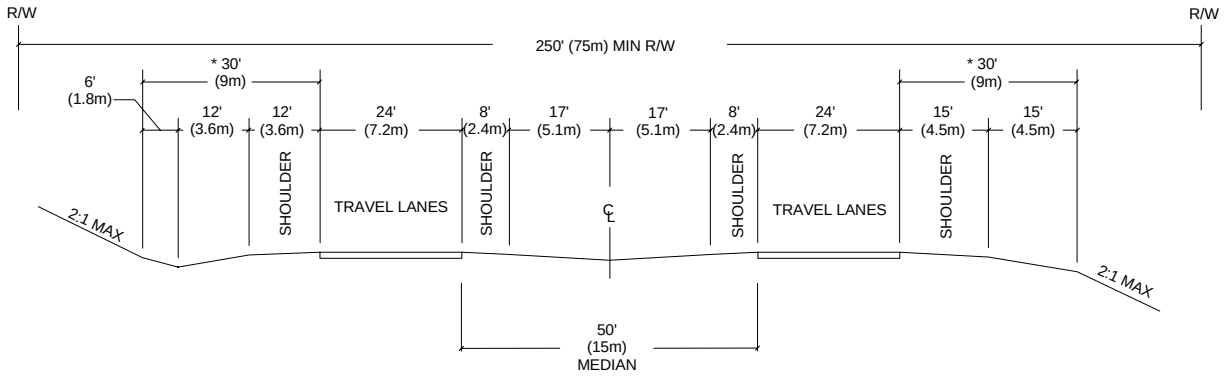
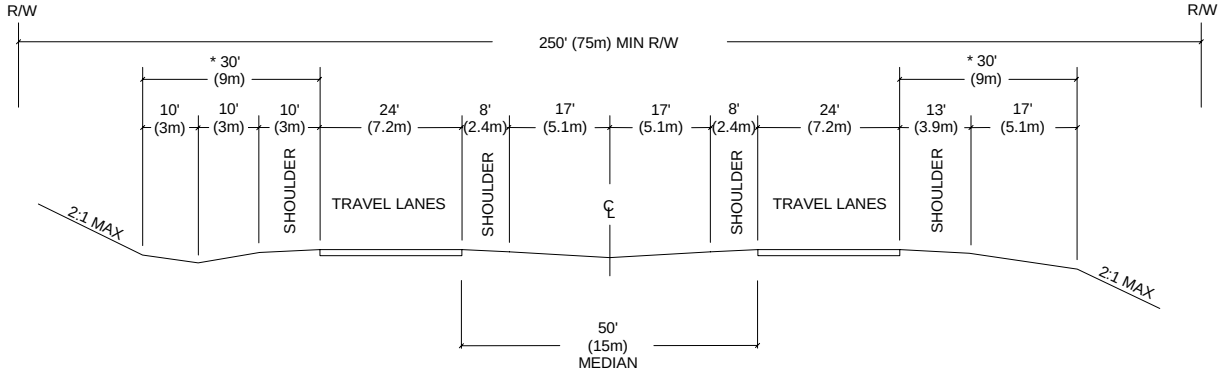


FREEWAY



OTHER PRINCIPAL ARTERIAL (70 mph)

* 30' (9m) CLEAR ZONE APPLIES TO BOTH FREEWAYS & OTHER PRINCIPAL ARTERIALS

NOT TO SCALE

I-73 Location Study

FIGURE 2.3-1
COMPARISON OF OTHER PRINCIPAL ARTERIALS AND FREEWAY DESIGN STANDARDS

2.3.1.2 Economic Development

The relationship between economic development activity and investment in transportation facilities is fundamental to the understanding of market activity and the distribution of that activity. The VEC report in 1994 illustrated the ability of Interstate type improvements to generate expansion in the service industry. Broader economic impacts to more dispersed employment sectors can likewise be anticipated by transportation investments. The VEC report investigated only vehicular transportation systems, as the I-73 corridor was Congressionally designated a high priority corridor for inclusion in the NHS.

To gain an understanding of the potential impact of a roadway on economic development issues/factors, we can look at what other studies have found. In 1999, VDOT conducted the TransAmerica Corridor Feasibility Study from Beckley, West Virginia to Virginia Beach. The TransAmerica Study projected substantial improvement in job creation, economic spending, and fiscal revenue growth in the localities adjacent to the corridor. The TransAmerica corridor traverses the study area in Botetourt, Bedford, and Roanoke counties. The TransAmerica study concluded that improvements to the U.S. Route 460 and U.S. Route 220 corridor would provide statewide user benefits that exceeded the project's cost by a factor of 4.1 to 2.6 depending upon the alternative selected. Additionally, economic spending in the state would increase from $3.02 billion for the controlled access alternative to $7.78 billion for the limited access alternative. Similarly for employment, under the controlled access alternative employment would grow by 27,000 jobs whereas under the limited access alternative employment in the TransAmerica corridor was projected to grow by 70,000 full time equivalent jobs. Under the controlled access alternative state/local revenues would increase $51.3 million and under the limited access alternative $132.1 million local and state tax revenues would be added to the TransAmerica corridor. All economic spending and tax revenue benefits for the TransAmerica study are provided in 1999 dollars.

In a research paper titled “Contribution of Highway Capital to Industry and National Productivity Growth” provided by an economic consultant to FHWA in 1996, the summary and conclusions chapter asserted the following findings:

1. Total highway capital and NHS capital contribute significantly to economic growth and productivity at the industry and national economy levels.
2. Total highway capital and NHS capital have a significant effect on employment, private capital formation and demand for materials input in all industries.
3. The report did indicate that the net "social" rate of return to total highway capital cost was higher in the 1950's and 1960's than the late 1980's. Of course, this was a period of our country's largest growth in auto ownership, and the roads were simply catching up to demand.
4. The research effort also evaluated the optimal level of highway investment and found that while the 1950's and 1960's were strong "rate of return" years they also represented an imbalance in the ratio of private versus public investments and the subsequent effect upon growth in productivity. By the end of the 1980's there appears to be no over or under investment of highway capital by the public sector in relation to private investment.
5. The contribution of highway capital to total factor productivity growth is positive in almost all industries except some non-manufacturing sectors.

In a report titled "Economic Impact of I -73 Alignments On the City of Roanoke, February 2000", the City of Roanoke conducted an economic impact analysis of the I-73 alternatives to get a sense of which alternative provided the city with the best economic advantage. The mission of the Roanoke economic impact study was to demonstrate "how any of the alternatives may affect the city's economic base and tax revenues, and whether any of the alternatives may lead to dis-investment in established commercial areas in the City." The Roanoke study did not provide employment, spending or tax revenue forecasts for each of the I-73 alternatives. It did recognize the relationship between transportation and economic activity but the emphasis was comparative in terms of the affect of I-73 directly through town or bypassing the city on the east or west side. Case study reports of bypass facilities in cities equivalent to Roanoke were developed. The Roanoke economic impact study provided an analysis of five factors in which I-73 could influence the city's economic

base; expanded access to sites, travel time reduction, shifting of traffic volumes, congestion/delay, and business disruptions/relocations.

To determine what is known about the economic impacts of highway bypasses on rural communities and urban areas less than 50,000 population, the National Cooperative Highway Research Program (NCHRP) assessed 1996 economic survey results from 47 state DOTs and six Canadian province DOTs. Additionally the NCHRP reviewed the published results of 190 research articles. The results of the surveys and literature review indicated business sales, employment, land use, and land value were clearly affected by bypass construction.

In general, business activity as measured by gross sales and employment improved and grew more rapidly in communities where bypasses were constructed. In 50 cases where bypassed communities were compared to non-bypassed or control area communities, 66 percent of the cases exhibited higher rates of sales growth in the bypassed communities. In cases where employment impacts were assessed, over three-quarters of the cases (36 of 47) exhibited an increase in study area employment following bypass construction.

The NCHRP study further illustrates the impact of bypass construction upon land use and valuation is more dramatic than business sales and employment. Practically all communities evaluated (93 of 98 cases) exhibited increases in commercial and industrial land uses along both existing routes and the new bypasses. Land values increased along the new bypass in 100 percent of the comparisons (68 cases). Along the older, existing routes, increases in land value were recorded in 47 of 50 cases or 94 percent of the communities.

2.3.1.3 Travel Time Comparisons

A summary of the forecast U.S. Interstate travel times under the No-Build, TSM, and the New Interstate I-73 (Build) Alternative conditions is shown in Table 2.3-1. This analysis was limited to an interstate only route assumption unless no direct interstate connection is available. While common routes may utilize state and local roadways and highways, the interstate only assumption may be more indicative of any restrictive goods or commodity movement and should be used as comparative in purpose. The analysis under the Build condition assumes a completed I-73 roadway facility from Michigan to Charleston, South Carolina, consistent with the Congressional designation of the high priority corridor. The analysis assumes a speed of 60 MPH for travel on an interstate facility. This speed is intended to represent a typical commodity movement speed along this type of facility.

Table 2.3-1
TRAVEL TIME COMPARISON

Origin City	Destination City	2025 No-Build/TSM		2025 Build Alternative		Savings (minutes)
		TT[1] (hr)	Route	TT[1] (hr)	Route	
Flint, MI	Roanoke, VA	11.31	I-75 to I-80 to I-77 to I-81	10.25	I-75 to I-73	63.6
Flint, MI	Greensboro, NC	12.74	I-75 to I-80 to I-77 to I-40	11.85	I-75 to I-73	53.4
Toledo, OH	Roanoke, VA	9.06	I-75 to I-80 to I-77 to I-81	8.00	I-75 to I-73	63.6
Toledo, OH	Greensboro, NC	10.49	I-75 to I-80 to I-77 to I-40	9.60	I-75 to I-73	53.4
Roanoke, VA	Greensboro, NC	1.94	*U.S. Route 220	1.60	I-73	20.4
Roanoke, VA	Charleston, SC	6.68	I-81 to I-77 to I-26	5.94	I-73	44.4
Roanoke, VA	Raleigh, NC	3.39	*U.S. Route 220 to U.S. Route 29 to I-40	3.05	I-73 to I-85 to I-40	20.4
Martinsville, VA	Greensboro, NC	0.83	*U.S. Route 220	0.68	I-73	9.0
Martinsville, VA	Charleston, SC	5.55	*U.S. Route 220 to NC 68 to I-40 to U.S. Route 52 to I-85 to I-77 to I-26	5.02	I-73	31.8

Note: *No direct U.S. interstate connection. No-Build travel time estimated.
1. TT = Travel Time.

As indicated, a vehicular trip from Roanoke to Raleigh, North Carolina is anticipated to take approximately 3.39 hours using a route of U.S. Route 220, U.S. Route 29, and I-40 under the No-Build Alternative. The addition of I-73 to the roadway network would reduce the travel time on this trip by 20 minutes, to 3.05 hours. A vehicular trip from Toledo, Ohio to Roanoke would be expected to take approximately 9.06 hours using the

existing interstate highway system. The same trip with the inclusion of a Build Alternative in the interstate highway network would reduce this trip by 63.6 minutes, to 8.00 hours overall. Vehicular trips from Roanoke under the No-Build Alternative would likely use the current interstate system and not travel through Martinsville in route to Charleston, South Carolina. As indicated, the inclusion of I-73 in the interstate highway network could produce significant travel time savings for interstate highway trips originating in Roanoke or Martinsville, and for those trips passing through the study area.

A summary of the forecast Virginia statewide travel times under the No-Build Alternative conditions and the Build Alternative options are shown in Table 2.3-2. As indicated, a vehicular trip from Roanoke to Martinsville is anticipated to take approximately 1.10 hours (66.0 minutes) using a route of I-581 to U.S. Route 220 under the No-Build Alternative. This same trip would be expected to take approximately 0.92 hours (55.2 minutes) with the inclusion of any of the Build Alternative options in the roadway network. A vehicular trip from Roanoke to the Smith Mountain Lake area would be expected to take approximately 0.83 hours (49.8 minutes) on U.S. Route 220 under the No-Build Alternative. This same trip would be expected to take approximately 0.71 hours (42.6 minutes) with the inclusion of any of the Build Alternative options in the roadway network, a savings of 7.2 minutes. The travel time savings are a result of a combination of improved travel speeds along the new I-73 facility and the opportunity for a more direct route between the identified locations.

Table 2.3-2
STUDY AREA STATEWIDE TRAVEL TIMES COMPARISON

Origin City	Destination City	2025 No-Build/TSM		2025 Build Alternative		Savings (min)
		TT[1.] (hr)	Route	TT (hr)	Route	
Roanoke, VA	Martinsville, VA	1.10	U.S. Route 220	0.92	I-581 to I-73 to U.S. Route 220	10.8
Roanoke, VA	Rocky Mount, VA	0.50	U.S. Route 220	0.42	I-581 to I-73 to Route 122	4.8
Roanoke, VA	Smith Mountain Lake, VA	0.83	I-581 to U.S. Route 220 to Route 122	0.71	I-581 to I-73 to Route 122	7.2

Source: Traffic/Transportation Technical Memorandum.
Note: [1]TT = Travel Time - The interstate travel times are based on an average free flow speed of 60 MPH with travel limited to interstates only. The Virginia statewide travel times are based on congested speeds along major roadways through Virginia. Origin to destination travel times is shown in hours. Travel-time savings are shown in minutes.

2.3.1.4 Congested Flow Speeds

A study area average of congested flow travel speeds along main roadways was identified for comparative purposes. Average travel speeds are higher under the Build Alternative and lowest under a No-Build Alternative. The study area roadway average indicates that all four Build Alternative options will have a higher travel speed than either the No-Build or TSM Alternatives (see Table 4.1-11, Congested Flow Speed).

2.3.1.5 Vehicle Miles Traveled

Under the Build Alternative options, total VMT in the study area will range from 5.69 to 6.98 million vehicle miles per day. Excluding the I-73 VMT, the remaining 2025 daily VMT indicates I-73 will divert travel away from other regions to and through the Roanoke - Rocky Mount - Martinsville corridor. Build Alternative Options 2 and 3 have the advantage of absorbing more local travel due to their centralized location in the travel network. The reduction in study area VMT will be partially absorbed by the proposed Build Alternative. This behavior favors the urbanized areas in Roanoke, Rocky Mount, and Martinsville as it relieves congested or near congested conditions by removing VMT from the local network and placing it on the Build Alternative (see Table 4.1-12).

2.3.1.6 Vehicle Hours Traveled

As indicated in Table 2.3-3, VHT will increase by approximately 41 percent under No-Build conditions and 33 percent under the Build Alternative. Thus, the duration of travel time for motorists within the study area would decrease if the Build Alternative were constructed.

Table 2.3-3
COMPARISON OF FORECAST VEHICLE HOURS TRAVELED

	1997 Existing Conditions	2025 No Build & TSM	2025 Build Alternative
Study Area	54,100	76,300	72,100

2.3.1.7 Origin – Destination Analyses

An origin and destination analysis for selected roadway links was conducted for each Build Alternative option within the study area. The analysis was conducted for two locations along proposed I-73, just north of Martinsville and south of Roanoke. The results of the analysis are summarized in the Traffic and Transportation Technical Memorandum (VDOT, 2000). Detailed origin and destination breakdowns are located in the Appendix of that document.

The origin and destination link analysis confirms the Congressional goals for I-73 to serve as a new transportation facility linking ports in South Carolina to mid-west manufacturing and to the ports of the Great Lakes. For northbound travelers leaving Martinsville on the proposed I-73 facility, 50 percent to 70 percent are from areas south of the Virginia border and 51 percent to 71 percent are bound for north and west of Virginia on either I-81 or the proposed I-73. Similarly, in the reverse, for southbound travelers leaving the study area just above Martinsville, 37 percent to 50 percent are from West Virginia or other areas served by I-73 in the mid-west. Another 13 percent to 21 percent of these travelers are from points north along I-81. Of these same southbound travelers, 50 percent to 70 percent are destined for areas south of the Virginia border.

2.3.1.8 Safety

The limited access freeway, designed to interstate standards, is the safest roadway design in the United States. The interstate design standard assures safe roadway geometry at high speeds facilitating access, mobility, and linkage goals. All other functional classes of roadway design do not come close to matching the ability of the interstate design to reduce crashes involving property damage, personal injury or fatalities. Table 2.3-4 illustrates the comparative advantage of the interstate (freeway) design over the controlled and the uncontrolled access roadway. Accident rates are provided for illustrative functional classes of roadway based upon 1995 through 1997 Virginia statewide averages for crash, injury, and fatality rates per 100 million vehicle miles traveled.

Table 2.3-4
AVERAGE CRASH, INJURY AND FATALITY RATES BY FUNCTIONAL ROADWAY CLASSIFICATION

Functional Roadway Classification	Average Crash Rate	Average Injury Rate	Average Fatality Rate
Principal Arterial – Freeway (Interstate)	66.0	39.0	0.6
Principal Arterial – Partially Controlled Access, 4 Lane, Divided Median	101.0	70.0	1.3
Principal Arterial – Un-controlled Access, 4 Lane, Divided Median	107.7	78.0	1.2
Secondary Roads – Generally, Minor Arterials and Collectors, Two Lane	245.7	155.0	2.1

1. Source: Summary of Crash Data, 1995, 1996 & 1997, VDOT. Rates are statewide averages and are expressed per 100 million VMT. For example, interstate crashes that result in injuries occurred at an average rate of 39 injuries per 100 million vehicle miles driven for the three-year period 1995 to 1997.

2.3.2 Interstate vs. Non-Interstate Conclusions

After evaluation of cost, environmental, operational, and economic development potential, it was determined that an Interstate (freeway) design for all build alternatives best fulfilled the elements of purpose and need. Other build options were considered and assessed in the DEIS as documented previously.

TSM alternatives were explored that stretched the traditional low build, safety and system efficiency assumptions inherent in the definition of TSM. TSM is a traditionally urban solution, where the efficiency of the network is tested with low dollar safety and capacity enhancements to get the best operating system without major investment in high capital cost construction programs. The TSM alternative assessed in the DEIS calls for improving U.S. Route 220 to a 50 mph design standard only in areas where current safety conditions are compromised by the older design features of the roadway. The estimated cost for the TSM is $146 million and this addresses only the most pressing safety areas in the U.S. Route 220 corridor. The TSM improves safety in the near term. The TSM does not improve operating speeds, reduce delay, increase travel time, improve regional linkage, accommodate further freight movements, or attract major economic activity.

As previously discussed, several variations of low build or intermediate build alternatives were explored that evaluated the feasibility of providing a principal arterial with a 60 mph design speed. This alternative would provide no control of access and at-grade intersections. This design concept was tested on the U.S. Route 220 corridor. The variation of this design concept assessed in the DEIS, did not include any improvements from I-81 to just south of Boone's Mill. The Martinsville and Rocky Mount Bypasses would remain in place as part of the system with no improvements. This concept would involve major construction of both the south and north bound lanes of existing U.S. Route 220, would not raise the posted speed above the current 55 mph (45 mph from Boone's Mill to Route 419) and would cost approximately $300 million (ROW and construction costs). In response to agency comments, a variation of this design concept has since been applied to that portion of U.S. Route 220 having a northern terminus at Route 419 (the Electric Road/Franklin Road/U.S. Route 220 interchange) and a southern terminus at the Virginia/North Carolina state line. The cost for this design concept has been estimated at 517.7 million dollars. Although both variations of this concept address safety better than the TSM, they do little to address the other purpose and need elements of freight transport, economic growth and vitality, operations (access and capacity), or general mobility and linkage (speed, travel time, travel delay and operational cost reduction). See Section 2.3.1.1

Planning estimates from a previous VDOT study (TransAmerica Corridor Feasibility Study, May 1999), where freeway alternatives were compared to principal arterial alternatives across the state, indicate that retrofitting an enhanced (controlled access) principal arterial design over a lower functional class facility is an expensive proposition. The difference in per mile cost for the freeway alternative and the principal arterial alternative were insignificant, yet the benefits of reduced accidents, operational enhancements, travel time savings, economic spending, fiscal revenue return, and employment growth were projected to be substantially greater for the freeway alternative.

There does not appear to be any discriminating advantage, environmentally, between the freeway *(i.e.* interstate*)* and other principal arterial classifications when it comes to the construction footprint. The footprint of the freeway typical section particularly in rural settings is not materially different from that of other principal arterials, hence marginalizing any differences in environmental impact between the two facilities.

Unlike the grade separated interchange provided by the Interstate alternative, development patterns around at-grade intersections typically do not foster safety nor do they protect the high speed through movement along the principal arterial. Between intersections, the Interstate affords the locality protection of the mainline access between interchanges and assures a safer through movement in the interchange area.

As documented in Chapter 1, both VDOT and FHWA believe that it is the congressional intent of the ISTEA Act of 1991 to designate I-73 as an Interstate transportation facility. In addition, an interstate facility would

provide an advantage in terms of economic development potential, safety, mobility, and linkage. Accordingly, the Interstate (freeway) design standard is being used for the Build Alternative described further in section 2.6 of this FEIS for purposes of assessing environmental impacts. Notwithstanding the inability of the no-build and TSM alternatives to address the purpose and need of the location study, these alternatives are discussed in the remainder of the FEIS alongside the ALC to provide the public and the decision makers with a comparative evaluation of the benefits as well as the impacts associated with each alternative. The decision makers will use this information to weigh the relative advantage of each alternative to address the purpose and need of the study against the relative disadvantages of each alternative such as cost, environmental impacts, and social impacts. To further accommodate this review and to provide documentation of the process leading to CTB-approval of the ALC, Build Alternative options considered in the DEIS but not selected have been incorporated by reference in following sections of the FEIS.

2.3.3 Status of I-73 Development in Other States

While Congress recognized and designated the I-73 corridor as a nationally significant facility, they did not identify or appropriate funding for the planning, design and construction of the facility. Consequently, some states have made more progress with I-73 than others due primarily to funding availability.

In Michigan the Michigan Department of Transportation (DOT) completed a preliminary corridor feasibility study in June 2001. The study concluded that there is sufficient traffic to warrant a freeway/Interstate investment. Three feasible location alternatives were advanced in the feasibility study. Each of the three alternatives has been screened for environmental flaws and each has the potential for further investigation. National Environmental Policy Act (NEPA) is the next step and the DOT will program that for later. For Michigan much of the corridor (approximately 80%) designated by Congress for I-73 is already freeway standard with limited access, grade separated interchanges and appropriate median widths for both urban and rural conditions. The existing freeway section of the corridor consists of I-75 and U.S. Routes 27/127. There is funding allocated for improvements to interchanges and the median along the existing I-75/U.S. Route 27/127 corridor. The most difficult part to completing I-73 in Michigan is in the southeast part of the state where I-73 ties into Ohio.

In Ohio an I-73 toll feasibility study for the Turnpike Commission in Ohio has been completed. The results were not sufficiently strong enough to influence the Turnpike Commission to advance I-73 as a toll road at this time. The Ohio DOT has provided some I-73 components along the U.S. Route 23 alignment, which is the I-73 corridor in Ohio. From Columbus to Michigan few improvements are planned or underway. North of Columbus a few grade separated interchanges are in the program. A limited access bypass was proposed for an area just north of Columbus but has not advanced. From Columbus south to Portsmouth, spot improvements, intersection improvements and safety items are advancing. In Portsmouth, Ohio a bypass along the west and north side is currently undergoing NEPA evaluation. This section ties into the I-73 corridor in West Virginia. Funding for the Portsmouth bypass was secured from the Appalachian Corridor Development Fund, the same source that has provided much of the funding for West Virginia's I-73.

In West Virginia I-73, also known as the King Coal Highway, generally follows existing U.S. Route 52 from Williamson to Bluefield. Most of this corridor has been through the NEPA process. Much of it has been designed and segments are currently under construction; however, King Cole Highway is not being designed or built to freeway standards.

In North Carolina approximately 60% of I-73 is Interstate or near Interstate standards. The current issue is funding. North Carolina DOT has identified and programmed all of the I-73 segments in the state with the exception of a portion of US 220 in Rockingham County. In areas where I-73 bypasses towns or cities and in large areas in Richmond, Montgomery, and Guilford counties, I-73 will occur on new location and will be built to Interstate standards. The area of U.S. Route 220 near the Virginia state line will remain as is until travel demand increases or Virginia's I-73 is completed. The intent along this section is to improve U.S. Route 220 to near Interstate standards as demand and need warrant the improvement. The Virginia Department of Transportation's (VDOT's) progress on I-73 to the Virginia-North Carolina state line would heavily influence North Carolina DOT's program for U.S. Route 220 from NC Route 704 to the state line. The Interstate shield is in place on I-73 in North Carolina.

In South Carolina, a feasibility study has been completed and a broad corridor has been identified. Charleston has been replaced with Myrtle Beach as the preferred eastern terminus of I-73. A construction price tag of $5.0 billion has been estimated in the feasibility study. Under H.R. 3550, "The Transportation Equity Act: A Legacy for Users" (TEA-LU), approved by the House Transportation Committee on March 24th, 2004, South Carolina would be authorized to receive $10 million for I-73. An effort is underway to designate all of I-73 as a project of regional and national significance so that it can be put among the top priorities to receive further funding. State officials believe I-73 will boost tourism as well as economic development, which will diversify the economy and create new jobs. Nationally, the House approved a six-year transportation bill that would obligate $275 billion over six years for highway and transit programs on April 2, 2004. The bill must be reconciled in a conference committee with the $318-billion version the Senate passed in February 2004. The amount of money attached to the bill in its final form could determine how quickly I-73 gets built. South Carolina DOT is moving ahead with the NEPA process and is hoping to finish the Final Environmental Impact Statement (FEIS) before the end of 2007.

On February 11, 2005 the South Carolina Director of Transportation, South Carolina DOT Commission Chairman, North Carolina Secretary of Transportation and North Carolina Transportation Board Chairman agreed to an interstate compact which facilitates the I-73 connection between the two states. The agreement provides for a new connection west of I-95, utilizing SC Route 38. The agreement also allows the South Carolina DOT to advance the environmental documentation for I-73 west of I-95 which was on hold until both states agreed to the SC Route 38 connection.

2.4 NO-BUILD

The No-Build Alternative provides a baseline of conditions against which other alternatives are compared by assuming that all highway and transit projects programmed and funded for construction within the study area will be implemented. The No-Build Alternative includes all planned minor intersections, interchange, and roadway improvements that address local problems, as well as routine maintenance improvements that maintain the continuing operation of the existing roadway network. It also includes committed and funded roadway and transit projects recommended in the 1998-1999 Virginia's Statewide Transportation Improvement Program (STIP) for implementation by 2020. Table 2.4-1 lists all committed projects in the STIP of the No-Build Alternative. Secondary improvements are not shown on this list but are reflected in the Alternatives Identification and Screening Technical Memorandum, Figures 2.4-1a through 2.4-1d illustrate the primary projects.

Table 2.4-1
NO-BUILD ALTERNATIVE PROGRAMMED CONSTRUCTION IN THE STUDY CORRIDOR

#	Locality	Road	Location	Type of Improvement	Phase
1	Roanoke	I-581	Between Liberty Road and Hershberger Road	Construct Interchange and CD Roads	Interchange under construction. Partial funding for CD Roads
2	Roanoke	I-581	Interchange at Valley View Road	Construct interchange - Phase 1	Construction underway through 1999
3	Roanoke	I-581	From Orange to Elm	Widen from 4 to 8 lanes	Roanoke Valley Area Constrained Long Range Plan 1995-2015
4	Roanoke	I-581	Hershberger to 1 mile south of Herschberger	Widen to 6 lanes with CD	Roanoke Valley Area Constrained Long Range Plan 1995-2015
5	Roanoke	I-81	From Route 419 to the Botetourt County line	Widen from 4-6 lanes	PE[1] after 2003
6	Roanoke	I-81	From Route 619 to Route 419	Widen from 4-6 lanes	PE after 2003

#	Locality	Road	Location	Type of Improvement	Phase
7	Roanoke	I-81	From Route 643 to Route 619	Widen from 4-6 lanes	PE 2001 - 2003
8	Roanoke	I-81	Bridge over Mason Creek, Norfolk Southern Railroad and Route 630	Bridge widening/ replacement	Under construction through 2000
9	Roanoke	Route 220	Elm to Wonju	Widen from 4 to 8 lanes	Roanoke Valley Area Constrained Long Range Plan 1995-2015
10	Roanoke	U.S. Route 220	Southbound over Norfolk Southern Railroad	Bridge Replacement Southbound	RW[2] through 1998; Money allocated for construction 1998 through 2000
11	Roanoke	U.S. Route 220	Elm Avenue to 0.3 miles south of Route 419 overpass	Widen from 4 to 6 lanes	Construction complete
12	Roanoke	Route 11/460	From the West County Line to Route 612	Widen to 5 lanes	PE through 2002
13	Roanoke	U.S. Route 221	Route 752 to 3.1 kilometer south of Route 419	Reconstruction – 2 to 4 lanes	PE through 1999
14	Roanoke	U.S. Route 221	South of Route 688 to 3.1 kilometer south of Route 419	Reconstruction – 2 to 4 lanes	RW through mid-2001
15	Roanoke	Route 419	At Hidden Valley Drive	Construct right turn lane	Under construction through 1999
16	Roanoke	10th Street	From Gilmer Avenue to Andrews Road	Reconstruction	Construction 2002 – 2004
17	Roanoke	10th Street	From Andrews Road to Williamson Avenue	Reconstruction	Construction 2002 – 2004
18	Roanoke	Hollins/13th Street	Extension from Dale Avenue to Orange Avenue	Extension - 4 lanes	PE through 2000; RW through 2002; Construction 2003-2004
19	Roanoke	Wonju Street	Extension from Colonial Avenue to Brandon Avenue	Extension – 4 lanes	PE through 2000; RW through 2002; Construction
20	Roanoke	Route 676	Route 676 southbound at Route 657	Construct right turn and taper lane	Construction to begin 1999
21	Roanoke	Route 657	Route 657 northbound at Route 676	Construct right turn land and taper lane	Construction to begin 1999
22	Roanoke, Montgomery & Botetourt	I-81	U.S. Route 460/11 (Christiansburg) to North Route 11 (Buchanan)	Widen from 4-6 lanes	PE only through mid-1999
23	Botetourt	I-81	At Exit 150	Construct Right Turn Lane	Under Construction through 1998
24	Botetourt	I-81	1.6 kilometer north of U.S. Route 220 to Route 640	Widen from 4-6 lanes	PE through mid-1999; Money allocated for construction
25	Botetourt	I-81	Route 640 to 1.6 kilometer north of Route 11	Widen from 4-6 lanes	PE only through mid-1999
26	Botetourt	I-81	From Roanoke County Line to just north of U.S. Route 220	Widen from 4-6 lanes	PE after 2003
27	Bedford	Route 24	Route 791 to Route 746	Widen from 2-4 lanes	PE only through mid-1999
28	Vinton	Hardy Road	From Niagara Road to the east county line	5 Lane	Construction 2002
29	Vinton	Mountain View Road	From Washington Street to the east county line	2 Lanes	PE through 2000; RW past 2003
30	Salem	East Main Street	Route 311 to Parkdale Drive	4 lanes	PE through 1999; RW through 2002; Construction

#	Locality	Road	Location	Type of Improvement	Phase
31	Salem	East Main Street	Parkdale Drive to Route 419	4 lanes	PE through 1998; RW through 2000; Construction through 2002
32	Rocky Mount	South Main Street	Bridge over the Pigg River	4 Lanes	RW through 1999; Construction through 2002
33	Franklin County	Route 40	From U.S. Route 220 to Route 122	Widen from 2 to 4 lanes	Construction in 1999 - 2000
34	Martinsville	Liberty Street	At Clearview Drive and Stultz Road	Liberty Street Intersection improvements	PE through 1999; RW through 2000; Construction through 2002
35	Martinsville	Common-wealth Boulevard	Extension from Fairy Street to East Church Street	Extension - 4 lanes	PE through 2001; RW through 2004
36	Martinsville	Fayette Street	At Norfolk and Southern Railroad	Widening and underpass - 2 lanes	PE through 2001; RW through 2004
37	Henry County	U.S. Route 220	At Route 902 intersection	Intersection improvements	Construction through 1999

Source: Virginia Commonwealth Transportation Board 1998-1999 Six Year Improvement Program, VDOT and Virginia Department of Rail and Public Transportation. This program is currently being amended by the tentative Virginia Transportation Development Plan, 2000 - 2001 (VTDP). As of this date, the final version of the VTDP has not been adopted by the CTB. Certain improvements such as I-81 have been amended in the 2000 -2001 Transportation Development Plan to reflect a 4 - 8 lane widening of I-81. Other changes in this table may be anticipated upon final adoption of the VTDP.
Roanoke Valley Area Long Range Transportation Plan 1995-2015, VDOT and the Fifth PDC, August 1996.
FY 1998-2000 Transportation Improvement Program for the Roanoke Valley Area Metropolitan Planning Organization, Fifth PDC, August 1997.

Note: [1] Preliminary Engineering Phase: Preliminary field survey, utility location, environmental/historical studies, road design alternatives, drawings, final field inspections, and public hearings are completed.

[2] Right of Way Acquisition: Negotiations with property owners take place, payments are made and arrangements with utility companies are finalized to obtain the necessary land for the project.

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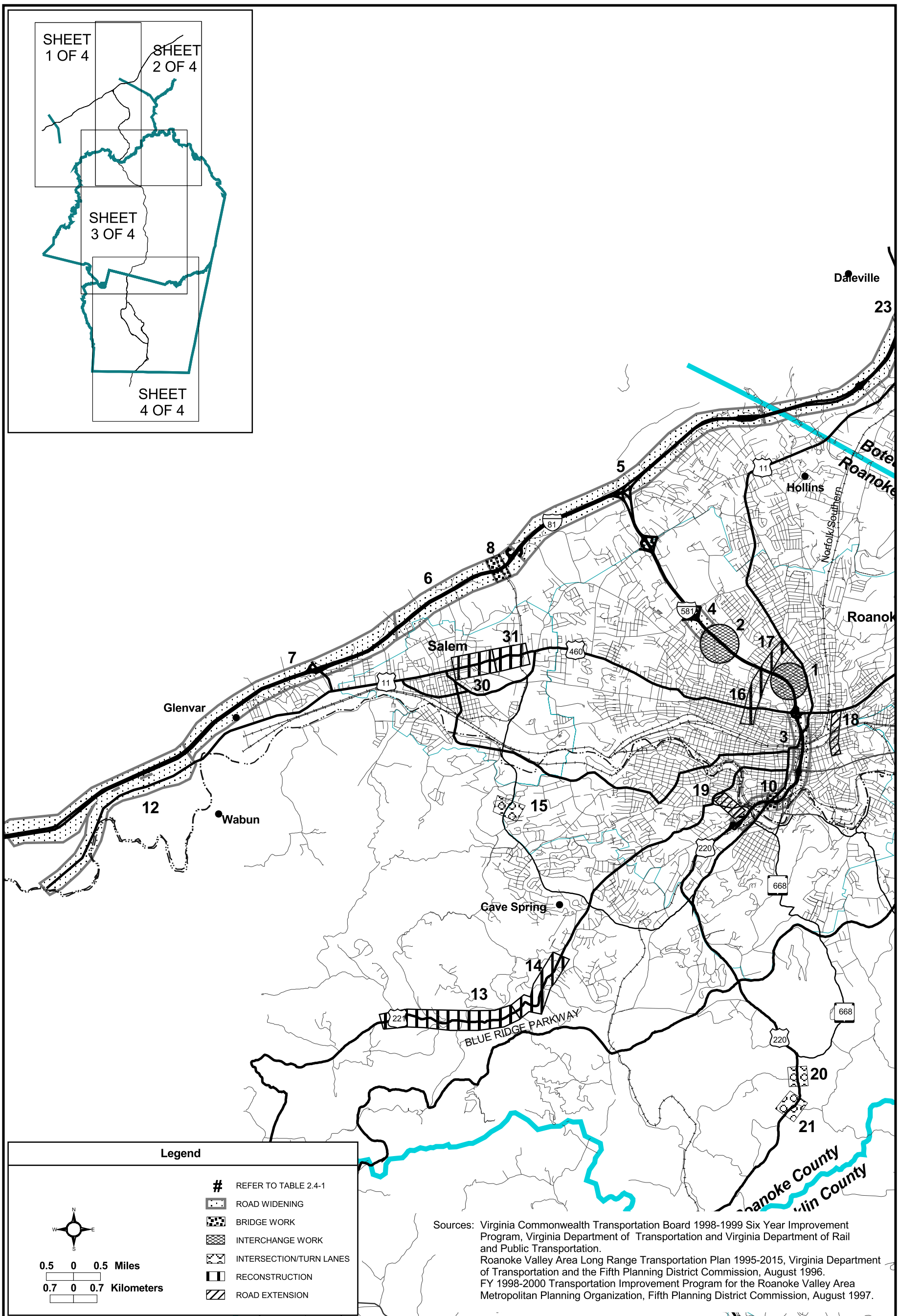

I-73 Location Study

FIGURE 2.4-1a
NO-BUILD ALTERNATIVE - WESTERN ROANOKE CO
(SHEET 1 OF 4)

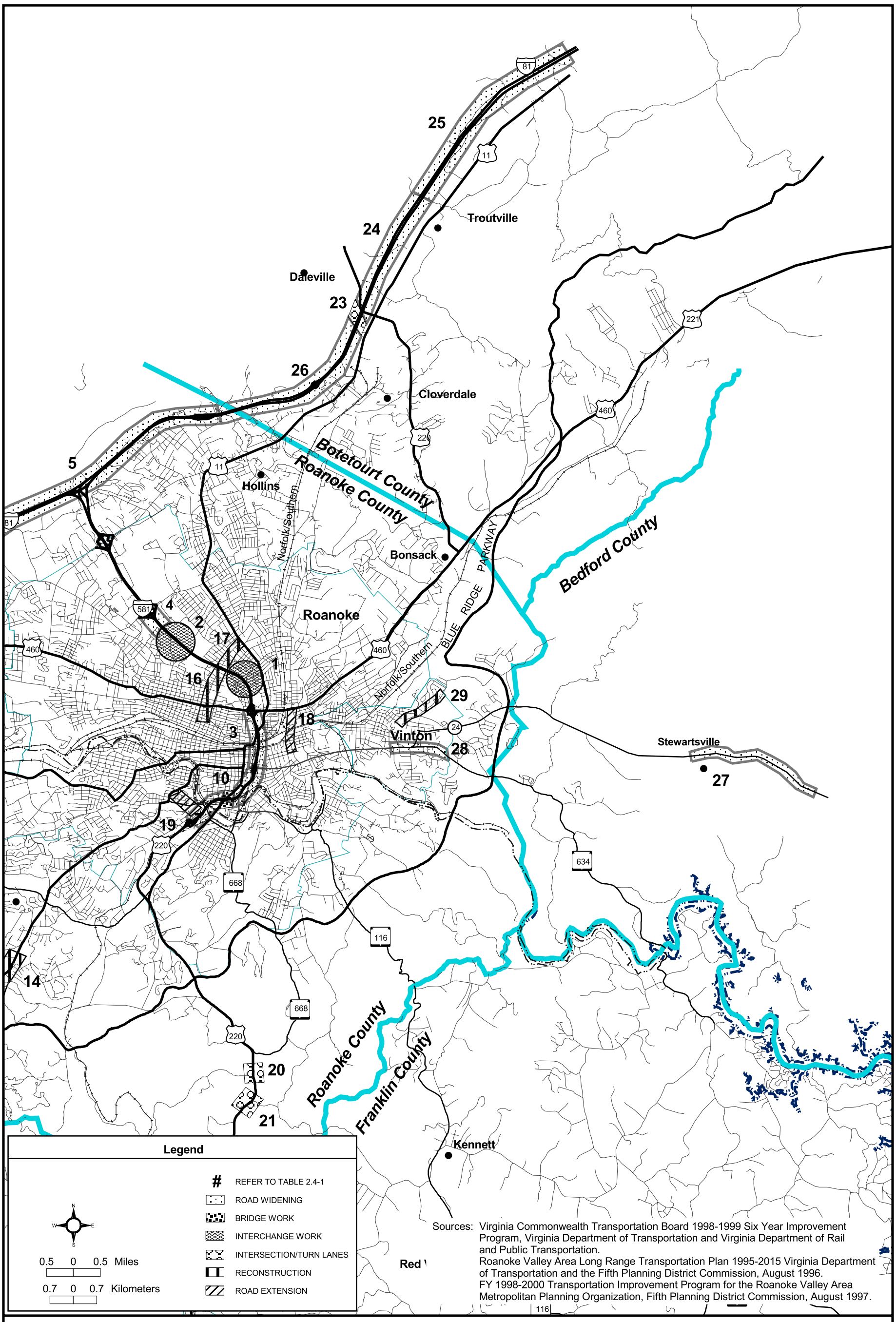

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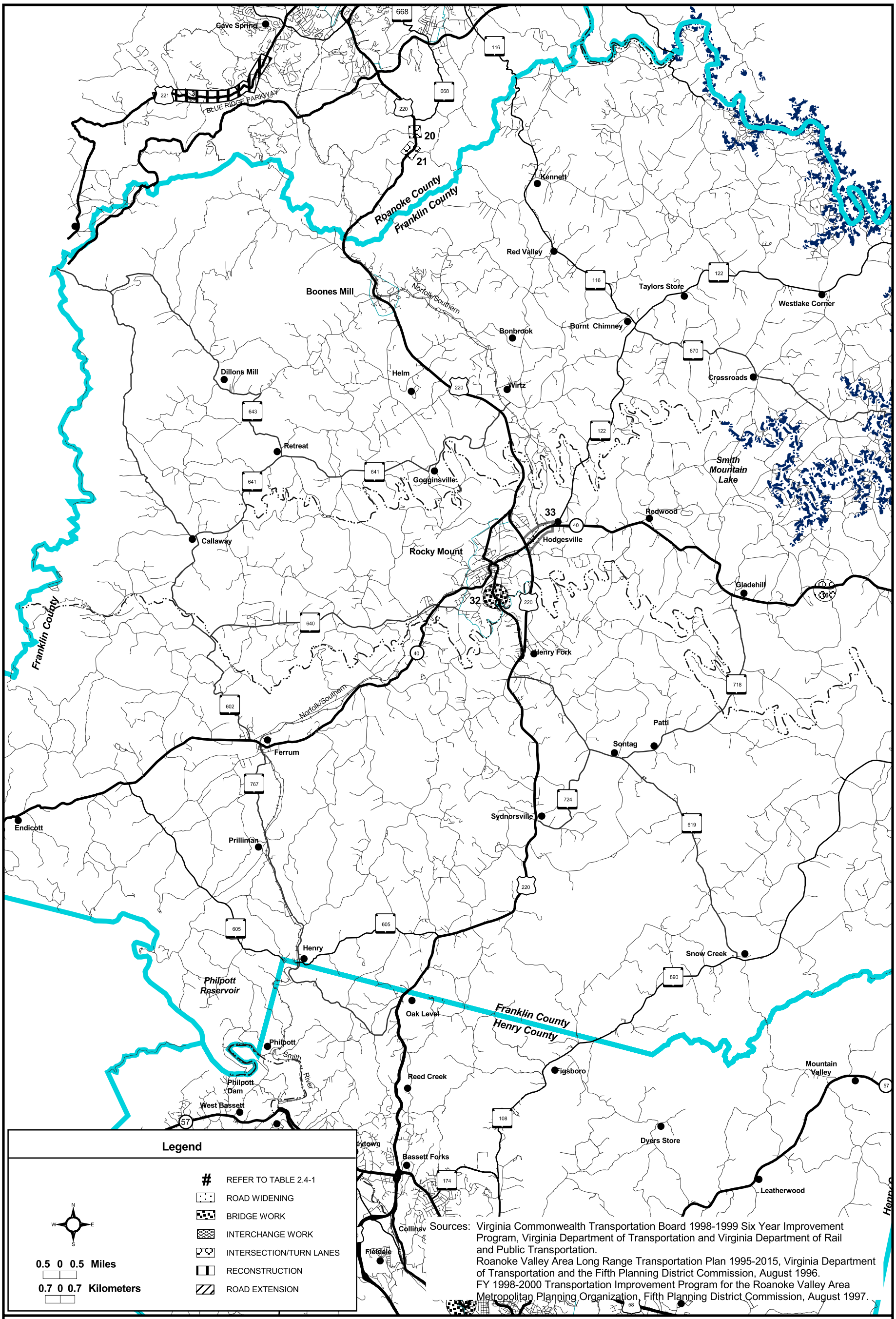
FIGURE 2.4-1b
NO-BUILD ALTERNATIVE - EASTERN ROANOKE CO
(SHEET 2 OF 4)



FUTURE 73

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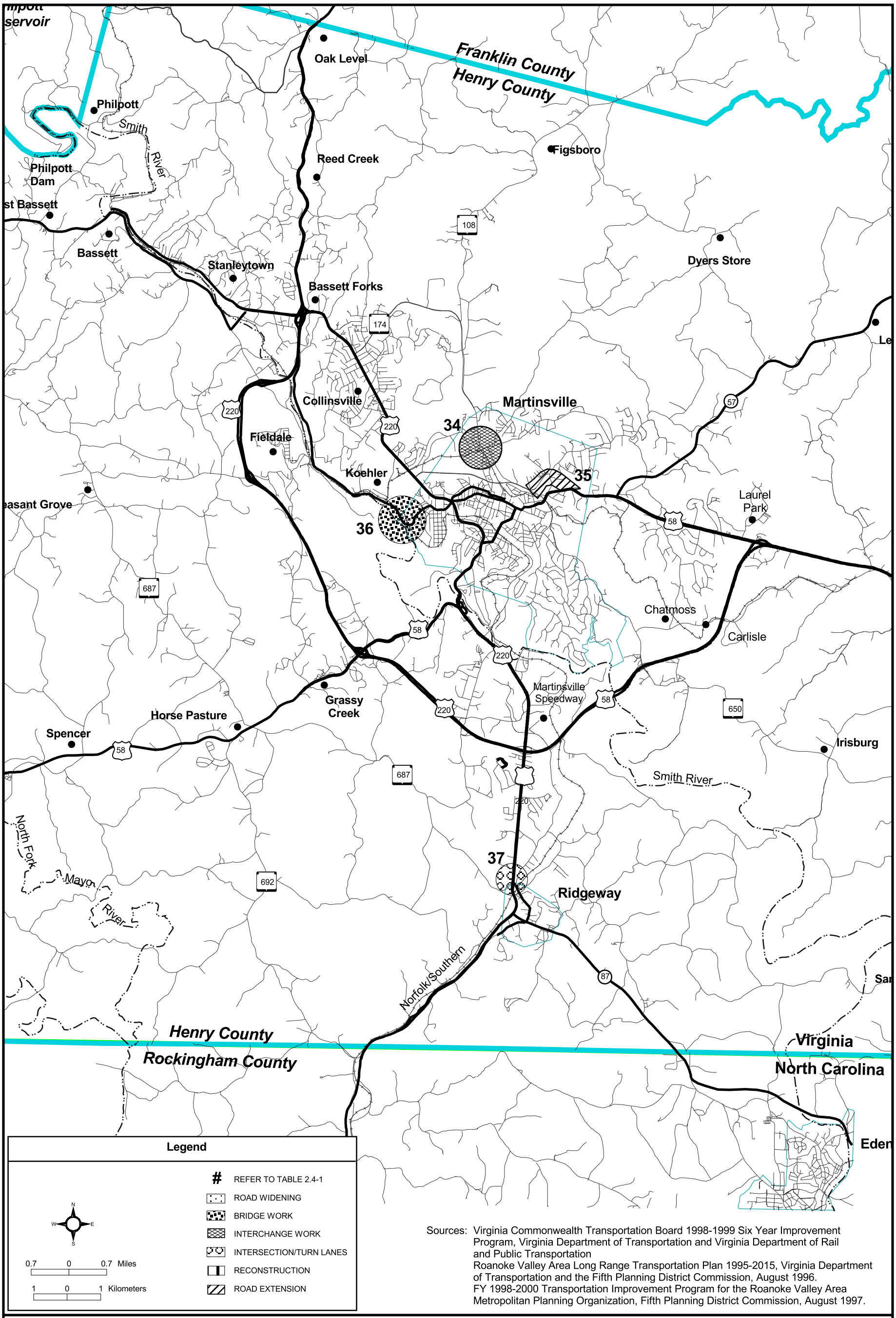
FIGURE 2.4-1c
NO-BUILD ALTERNATIVE - FRANKLIN CO
(SHEET 3 OF 4)



Sources: Virginia Commonwealth Transportation Board 1998-1999 Six Year Improvement Program, Virginia Department of Transportation and Virginia Department of Rail and Public Transportation
Roanoke Valley Area Long Range Transportation Plan 1995-2015, Virginia Department of Transportation and the Fifth Planning District Commission, August 1996.
FY 1998-2000 Transportation Improvement Program for the Roanoke Valley Area Metropolitan Planning Organization, Fifth Planning District Commission, August 1997.

FUTURE 73

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FIGURE 2.4-1d
NO-BUILD ALTERNATIVE - HENRY CO
(SHEET 4 OF 4)

2.5 TSM Alternative

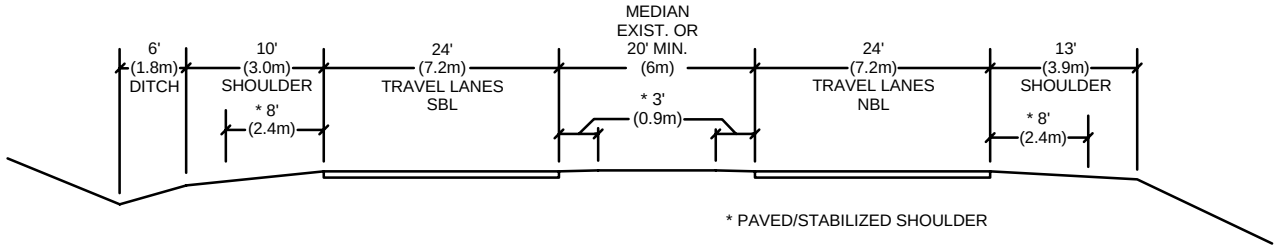
This alternative would include all of the improvements in the No-Build Alternative plus certain improvements to upgrade U.S. Route 220 to design standards for a rural principal arterial system (GS-1) using a design speed of 50 miles per hour (80 kilometers per hour) from the North Carolina state line to Roanoke. Figure 2.5-1 shows the typical cross section of VDOT's rural principal arterial and Table 2.5-1 indicates the minimum geometric standards for this type of road. Sight distance improvements and crossover elimination in selected locations on U.S. Route 220 are included to enhance safety. Improvements are not recommended, however, where the grades are in excess of 5 percent for short distances except where sight distances at the crest of a grade are less than the desirable distance in the vicinity of high accident locations (See Chapter 1, Purpose and Need, for high accident locations). Table 2.5-2 lists the type and location of the TSM Alternative geometric improvements.

There is no regulatory basis for considering the TSM alternative. The impetus to consider a TSM alternative goes back approximately 20 years when significant advances were being made in computers and communication. Planners saw TSM as an inexpensive solution for addressing congestion while minimizing environmental impacts. Information on the purpose and intent of the TSM alternative is limited, with the only source being FHWA's Technical Advisory T6640.8A. The TSM alternative was intended to be a stand-alone alternative that completely addresses the purpose and need for the project. The intent of the TSM alternative is to maximize the efficiency of the existing transportation system; therefore, it should only consist of minor improvements with little work outside the right-of-way. Major improvements such as the addition of lanes, the wholesale correction of geometric deficiencies, or the reconstruction of an entire route would be considered a separate build alternative and not a TSM alternative. The TSM alternative was developed in keeping with FHWA guidance. Additional improvements to the Route 220 corridor can certainly be identified and added to the TSM alternative beyond those listed. However, because the TSM alternative is limited by its very nature to improvements within the existing right-of-way, its ability to address the purpose and need of the project remains limited.

Table 2.5-1
RURAL PRINCIPAL ARTERIAL IMPROVEMENT STANDARDS

Improvement Characteristic	Variable	Distance
Minimum width of lane		12 feet (3.6 meters)
Minimum width of grade shoulders	- fill	13 feet (3.9 meters)
	- cut	10 feet (3.0 meters)
Paved/stabilized shoulder width	- right	8 feet (2.4 meters)
	- left	3 feet (0.9 meters)
Width of ditch front slope		6 feet (1.8 meters)
Minimum degree of curvature (English)		7 degrees 30 minutes
Minimum radius of curvature		755 feet (230 meters)
Stopping sight distance	- desirable	475 feet (140 meters)
	- minimum	400 feet (113 meters)
Maximum Grades	- rolling terrain	5 percent
	- mountainous terrain	7 percent

Source: VDOT Geometric Design Standards for Rural Principal Arterial (GS-1).



TSM ALTERNATIVE
TYPICAL SECTION

NOT TO SCALE

A barrier may be required for median widths less than 40 feet (12 meters).

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FIGURE 2.5-1
TSM ALTERNATIVE TYPICAL SECTION

Table 2.5-2
TSM ALTERNATIVE IMPROVEMENTS

Number	Location	Deficiency	Improvement
1	Roanoke County - 0.08 miles (0.13 kilometers) north of Route 789 South (north of Blue Ridge Parkway crossing)	Sight distance 325 feet (100 meters).	Rebuild approximately 2,000 feet (600 meters) roadway to increase sight distance to 475 feet (140 meters).
From 1 to 2	Roanoke County - 0.08 miles (0.13 kilometers) north of Route 789 South (north of Blue Ridge Parkway crossing) to Route 679 (Clearbrook)	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
2	Roanoke County - Route 679 (Clearbrook) to Route 930	High Accident Rate.	Remove raised median and widen pavement enough to introduce a 12-16 feet (3.6-4.9 meters) wide center turning lane.
3	Roanoke County - Route 930 to Route 668	Narrow median and inadequate crossover spacing.	Close all median openings and widen median to 20 feet (6 meters).
4	Roanoke County - Route 668 to Back Creek	Narrow median and inadequate crossover spacing.	Close all median openings except at Route 676 and Route 668 and widen median to 20 feet (6 meters).
5	Roanoke County - Back Creek to Route 715 North	Narrow median and inadequate crossover spacing.	Close all median openings except at Route 657 and widen median to 20 feet (6 meters).
From 5 to 6	Roanoke County - Route 715 North to Intersection Route 677 (North and South)	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
6	Roanoke County - Intersection Route 677 (North and South)	High accident rate – steep crossover with inadequate sight distance.	Rebuild southbound lane to raise lane to level of northbound lane and increase sight distance on both approaches to 475 feet (140 meters) minimum. Adjust grade on Route 677 west as required.
From 6 to 7	Roanoke & Franklin counties - Intersection Route 677 (North and South) to Route 613	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
7	Franklin County - Route 613 to Maggodee Creek	High accident rate – inadequate horizontal and vertical geometry, northbound lane.	Rebuild approximately 5,000 feet (1520 meters) of northbound lane with alignment and grade adjacent and parallel to southbound lane. Close all median openings except at Route 824 and Route 613.
From 7 to 8	Franklin County - Maggodee Creek to Route 919	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
8	Franklin County - Route 919 to Route 691 North	High accident rate – 7 percent grade and inadequate sight distance.	Rebuild approximately 4,100 feet (1250 meters) of both lanes to reduce grade to 6 percent and increase sight distance on crest of grade to 475 feet (140 meters) minimum.
From 8 to 9	Franklin County - Route 691 North to Route 691 South	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
9	Franklin County - Route 691 South to Route 693	7 percent grade and inadequate sight distance.	Rebuild approximately 3,200 feet (975 meters) of both lanes to reduce grade to 6 percent and increase sight distance to 475 feet (140 meters) minimum.
From 9 to 10	Franklin County - Route 693 to Intersection Route 697 North	Narrow median and substandard shoulder width.	Widen median and outside shoulder.

Number	Location	Deficiency	Improvement
10	Franklin County - Intersection Route 697 North	6 percent grade and inadequate sight distance.	Rebuild approximately 1,700 feet (520 meters) both lanes to increase sight distance on crest of grade to 475 feet (140 meters) minimum Rebuild Route 697 north to west as required.
From 10 to 11	Franklin County - Intersection Route 697 North to Intersection Route 697 South	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
11	Franklin County - Intersection Route 697 South	High accident rate – 7 percent grade, inadequate sight distance, congested area.	Rebuild approximately 2,800 feet (850 meters) both lanes to reduce grade to 6 percent and to increase sight distance on crest of grade to 650 feet (200 meters).
From 11 to 12	Franklin County - Intersection Route 697 South to 0.4 miles (0.65 kilometers) south of Blackwater River	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
12	Franklin County - 0.4 miles (0.65 kilometers) south of Blackwater River to 1.5 miles (2.4 kilometers) south of Blackwater River	High accident rate, steep grades, inadequate sight distance, congested area.	Rebuild approximately 4,700 feet (1430 meters) both lanes to reduce grades to 5 percent maximum and increase sight distance to 475 feet (140 meters) minimum, except at crest of grade in southbound lane at 0.6 miles (0.97 kilometers) from Blackwater River sight distance should be increased to 650 feet (200 meters).
From 12 to 13	Franklin County - 1.5 miles (2.4 kilometers) south of Blackwater River to 0.03 miles (0.05 kilometers) south of Route 619 South	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
13	Franklin County - 0.86 miles (1.38 kilometers) south of Route 40 to 0.79 miles (1.27 kilometers) south of Pigg River	Steep grades.	Rebuild approximately 3,850 feet (1170 meters) of both lanes to reduce grade to 5 percent maximum.
From 13 to 14	Franklin County - 0.79 miles (1.27 kilometers) south of Pigg River to 0.03 miles (0.05 kilometers) south of Route 619 South	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
14	Franklin County - 0.03 miles (0.05 kilometers) south of Route 619 South to 0.79 miles (1.27 kilometers) south of Route 619 South	Steep grades.	Rebuild approximately 4,000 feet (1200 meters) of both lanes to reduce grade to 5 percent maximum.
From 14 to 15	Franklin County - 0.79 miles (1.27 kilometers) south of Route 619 South to 0.56 miles (0.90 kilometers) south of Route 755	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
15	Franklin County - 0.56 miles (0.90 kilometers) south of Route 755 to 1.31 miles (2.10 kilometers) south of Route 755	Steep grades.	Rebuild approximately 4,000 feet (1200 meters) of both lanes to reduce grade to 5 percent maximum.
From 15 to 16	Franklin County - 1.31 miles (2.10 kilometers) south of Route 755 to 0.31 miles (0.50 kilometers) north of Route 827	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
16	Franklin County - 0.31 miles (0.50 kilometers) north of Route 827 to 0.42 miles (0.68 kilometers) south of Route 827	Steep grades.	Rebuild approximately 3,900 feet (1190 meters) of both lanes to reduce grade to 5 percent maximum.

Number	Location	Deficiency	Improvement
From 16 to 17	Franklin County - 0.42 miles (0.68 kilometers) south of Route 827 to 0.39 miles (0.63 kilometers) north of Route 724	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
17	Franklin County - 0.39 miles (0.63 kilometers) north of Route 724 to 0.02 miles (0.03 kilometers) north of Route 724	Steep grade and inadequate sight distance.	Rebuild approximately 1,500 feet (450 meters) of both lanes to reduce grade to 5 percent maximum and increase sight distance on crest of grade to 475 feet (140 meters) minimum.
From 17 to 18	Franklin County - 0.02 miles (0.03 kilometers) north of Route 724 to 0.31 miles (0.50 kilometers) north of Big Chestnut Creek	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
18	Franklin County - 0.31 miles (0.50 kilometers) north of Big Chestnut Creek to 0.91 miles (1.46 kilometers) north of Route 618	Steep grade, inadequate sight distance, and narrow crossover width.	Rebuild approximately 2,000 feet (600 meters) of both lanes to reduce grade to 5 percent maximum, increase sight distance on crest of grade to 475 feet (140 meters) minimum and eliminate crossover located 0.31 miles (0.50 kilometers) north of Big Chestnut Creek.
From 18 to 19	Franklin County - 0.91 miles (1.46 kilometers) north of Route 618 to 0.61 miles (0.98 kilometers) north of Route 618	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
19	Franklin County - 0.61 miles (0.98 kilometers) north of Route 618 to 0.21 miles (0.34 kilometers) south of Route 608	Steep grades.	Rebuild approximately 7,000 feet (2100 meters) of both lanes to reduce grades to 5 percent max.
From 19 to 20	Franklin County - 0.21 miles (0.34 kilometers) south of Route 608 to 0.34 miles (0.55 kilometers) south of Route 605	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
From 20 to 21	Franklin & Henry counties - 0.18 miles (0.29 kilometers) south of Route 609 to 0.24 miles (0.39 kilometers) north of Mountain Top Court	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
21	Henry County - 0.24 miles (0.39 kilometers) north of Mountain Top Court	Hazardous location.	Close median opening.
From 21 to 22	Henry County - 0.24 miles (0.39 kilometers) north of Mountain Top Court to 0.25 miles (0.40 kilometers) north of Route 987	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
22	Henry County - 0.25 miles (0.40 kilometers) north of Route 987	Inadequate crossover spacing.	Close median opening.
From 22 to 23	Henry County - 0.25 miles (0.40 kilometers) north of Route 987 to 0.16 miles (0.26 kilometers) south of Route 987	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
23	Henry County - 0.16 miles (0.26 kilometers) south of Route 987	Hazardous location.	Close median opening.
From 23 to 24	Henry County - 0.16 miles (0.26 kilometers) south of Route 987 to 0.21 miles (0.34 kilometers) north of Route 657	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
24	Henry County - 0.21 miles (0.34 kilometers) north of Route 657	6 percent grade.	Rebuild approximately 1,000 feet (300 meters) of both lanes to reduce grade and

Number	Location	Deficiency	Improvement
			increase sight distance at crest of grade.
From 24 to 25	Henry County - 0.21 miles (0.34 kilometers) north of Route 657 to Route 657	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
25	Henry County - Route 657 to 0.63 miles (1.01 kilometers) south of Route 657	High accident rate, 7 percent grade and inadequate horizontal geometry.	Rebuild approximately 3,100 feet (950 meters) of both lanes to reduce grade and increase sight distance on crest of grade. Rebuild approximately 3,100 feet (950 meters) of southbound lane with alignment parallel to northbound lane.
From 25 to 26	Henry County - 0.63 miles (1.01 kilometers) south of Route 657 to 0.79 miles (1.27 kilometers) north of Route 669 North	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
26	Henry County - 0.79 to 0.45 miles (1.27 kilometers to 0.72 kilometers) north of Route 669 North	Inadequate horizontal geometry.	Rebuild approximately 1,500 feet (450 meters) of northbound lane with alignment adjacent and parallel to southbound lane.
From 26 to 27	Henry County - 0.79 miles (0.45 kilometers) north of Route 669 North to 0.10 miles (0.16 kilometers) north of Route 699 North	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
27	Henry County - 0.10 miles (0.16 kilometers) north of Route 699 North	Inadequate horizontal geometry.	Rebuild approximately 700 feet (215 meters) of northbound lane with alignment parallel to southbound lane.
From 27 to 28	Henry County - 0.10 miles (0.16 kilometers) north of Route 699 north to Route 669 South	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
28	Henry County - Route 669 South to 0.03 miles (0.05 kilometers) south of Route 669 South	Inadequate horizontal and vertical geometry, northbound lane. Inadequate vertical geometry, southbound lane.	Rebuild approximately 800 feet (240 meters) of northbound lane with alignment parallel to southbound lane. Rebuild approximately 1,000 feet (300 meters) both lanes to reduce grade and improve sight distance.
From 28 to 29	Henry County - 0.03 miles (0.05 kilometers) south of Route 669 South to 0.08 miles (0.13 kilometers) south of Reed Creek	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
29	Henry County - 0.08 miles (0.13 kilometers) south of Reed Creek	Hazardous location.	Close median opening.
From 29 to 30	Henry County - 0.08 miles (0.13 kilometers) south of Reed Creek to Route 1310	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
30	Henry County - Route 1310 to Route 1301	High accident rate, 6 percent grade and inadequate crossover spacing.	Rebuild approximately 1,900 feet (580 meters) of both lanes to reduce grade to 5 percent max. and increase sight distance on crest of grade. Add right turn lane to Drewry Mason High School to provide safe entry for buses. Close median openings at 0.10 and 0.24 miles (0.16 and 0.39 kilometers) north of Route 1310.
From 30 to 31	Henry County - Route 1301 to 0.10 miles (0.16 kilometers) north of Route 902	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
31	Henry County - 0.10 miles (0.16 kilometers) north of Route 902	Inadequate crossover spacing.	Close median opening.

Number	Location	Deficiency	Improvement
From 31 to 32	Henry County - 0.10 miles (0.16 kilometers) north of Route 902 to 2.52 miles (4.05 kilometers) north of the Virginia/North Carolina State line	Narrow median and substandard shoulder width.	Widen median and outside shoulder.
32	Henry County - 2.52 miles (4.05 kilometers) north of the Virginia/North Carolina State line	Steep crossover.	Close median opening.
From 32 to State Line	Henry County - 2.52 miles (4.05 kilometers) north of the Virginia/North Carolina State line to the Virginia/North Carolina State line	Narrow median and substandard shoulder width.	Widen median and outside shoulder.

Source: U.S. Route 220 Safety Report, VDOT, Traffic Engineering Division, September 27, 1994.
Notes: * Locations that were identified with high accident rates and corresponding primary roadway deficiencies.
Assumes: VDOT Geometric Design Standards for Rural Principal Arterial System (GS-1) – Other Principal Arterials, Rolling Terrain, 50 mph design speed.

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