

INTRODUCTION

Congress created the Appalachian Regional Commission (ARC) in 1965 to facilitate economic and social development in the Appalachian Region. The Appalachian Region is a 200,000-square-mile region that follows the spine of the Appalachian Mountains from southern New York to northern Mississippi. It includes all of West Virginia and parts of 12 other states: Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia.

Recognizing the importance of an efficient transportation system to the Region's development, Congress established the Appalachian Development Highway System (ADHS) as the centerpiece of ARC's economic and social development programs. The ADHS was designed to connect Appalachia, both physically and economically, to the rest of the nation and to generate jobs across the Region.

The Appalachian Regional Development Act of 1965 authorized the construction of 2,350 miles of ADHS corridor highways. Over the past four decades, Congress has added 740 miles to the ADHS: 350 miles were added in 1967; 200 miles in 1975; 125 miles in 1978; and 65 miles in 2006. The 3,090 miles of corridor highways that are now part of the authorized ADHS system are fully contained within 31 designated corridors.

ARC has programmatic oversight over the ADHS program as well as responsibility for determining the corridor locations and termini. Individual states take the lead in planning, designing, constructing, and maintaining ADHS projects; the Federal Highway Administration (FHWA) is charged with the day-to-day oversight of the ADHS program. The Appalachian governors have placed a top priority on a modern highway system as the key to economic development. Today the resulting ADHS is the backbone of ARC's cooperative regional approach to problem solving and of all other development efforts.

Federal funding for the ADHS is currently authorized through the federal transportation authorization act SAFETEA-LU (Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users). The act authorizes \$470 million for the ADHS for each of the fiscal years 2005 through 2009, to cover 80 percent of the costs associated with constructing eligible ADHS miles. It directs these funds to be apportioned to the Appalachian states based on the most current ADHS cost-to-complete estimate. The funds remain available until expended.

Completed portions of the ADHS corridors have been instrumental in creating new jobs, increasing productivity, and making health care and education accessible to the people of Appalachia. A 1998 economic study of completed ADHS corridors found that every dollar invested in the ADHS yielded, on average, \$1.32 in economic development benefits (as measured by jobs, wages, and production) as well as \$1.18 in travel efficiencies (reduced travel time, operating costs, and accidents).

A recent study on the economic impact of completing the ADHS estimated the economic development benefit-cost ratio for the Appalachian Region at 3.6, using a medium-growth scenario based on the most conservative, high-cost projections. The estimated return for the nation, using the same scenario, is \$3.00 for every \$1.00 invested. In addition, the study estimated the travel-efficiency benefit-cost ratio of completing the ADHS, using the medium-growth scenario based on the most conservative, high-cost projections, at 1.9 for the Appalachian Region and 2.9 for the nation as a whole.

As of September 30, 2006, 76.4 percent of the 3,090 miles authorized for the ADHS were complete. Studies of completed segments indicate that the improvements on the ADHS can have significant impacts on the Region’s economy and the safety of the traveling public. But the final miles of the system are among the most difficult and expensive to construct.

Despite the magnitude of the work remaining, the economic impetus to complete the system has never been more compelling. In today’s global marketplace, a modern system of highways is an essential first step toward fostering economic growth and enabling Appalachia to become a net contributor to the national economy. The Commission strongly supports the completion of the existing 31 corridors that make up the ADHS.

In this context, ARC in 2007 undertook a full-scale study of the cost to complete the ADHS, the first formal estimate since 2002. The purpose of the ADHS 2007 Cost-to-Complete Estimate was to determine the level of federal funding needed to complete the system and to provide the basis for apportioning and allocating the funds authorized and appropriated for the ADHS. In addition, the cost-to-complete estimate will be used to provide information to key decision-makers regarding ADHS progress. The estimate established new ARC state apportionment factors based on remaining federal funds needed for the ADHS as of September 30, 2006. These apportionment factors are to be implemented on October 1, 2008. Table 1 (below) shows the apportionment factors currently used to distribute ADHS funds to the states, and the new state apportionment factors determined by the ADHS 2007 Cost-to-Complete Estimate.

Table 1. ADHS Funding Apportionment Factors

	FY 2003-2008	FY 2009-2013
Alabama	6.2%	34.7%
Georgia	3.8%	1.6%
Kentucky	14.6%	7.6%
Maryland	1.4%	2.0%
Mississippi	1.1%	0.1%
New York	4.8%	1.0%
North Carolina	8.1%	6.2%
Ohio	4.4%	4.0%
Pennsylvania	22.0%	23.6%
South Carolina	0.6%	0.5%
Tennessee	7.4%	4.4%
Virginia	7.1%	7.4%
West Virginia	18.4%	6.9%
Total	100.0%	100.0%

METHODOLOGY

This cost estimate is based on the cost to complete the 31 corridors of the designated 3,090-mile ADHS. The estimate includes all remaining work on eligible sections of the ADHS not obligated as of September 30, 2006, including engineering, right-of-way acquisition, environmental mitigation, and construction.

All eligible activities included in the estimate are within prevailing federal-aid policies, highway standards, and specifications and guides used for typical federal-aid highways. The state estimates were based on current project designs, using the most recently approved design features and corridor locations, and estimates of quantities needed for construction, as of September 30, 2006. All costs are in 2005 dollars. Only ADHS projects not authorized as of September 30, 2006, are included in the estimate, with the exception of pre-financed projects. (Estimates assume that all authorized ADHS work, including under-runs and over-runs, has been accomplished.) Costs for corridor sections that did not have location approval as of September 30, 2006, were based on the location used in the ADHS 2002 Cost-to-Complete Estimate.

The cost estimating process was undertaken in coordination with the Federal Highway Administration (FHWA). ARC, FHWA, and the state departments of transportation (DOTs) worked together to prepare an accurate estimate in a consistent and efficient manner. Estimates were developed by each of the 13 Appalachian states in accordance with the *Guidelines and Software Instruction Manual for Preparation and Submission of the Appalachian Development Highway System 2007 Cost to Complete Estimate*, which provided instructions and outlined requirements to ensure consistency among state estimates. A training session on the use of the manual was conducted for the state DOTs and FHWA representatives responsible for preparing and reviewing the state ADHS estimates. In addition, ARC worked with the Nick J. Rahall II Appalachian Transportation Institute at Marshall University to develop an Internet-based system for state DOTs to use in preparing and submitting their cost estimates. The system gave ARC and FHWA simultaneous access to data for review, analysis, and verification of the estimates.

In preparing their estimates, state DOTs used estimating processes consistent with those used for other projects in a similar state of development. In addition, estimates were prepared in accordance with prevailing federal-aid policies, highway standards and specifications, and guides used for typical federal aid highways. FHWA, through its states division offices, reviewed the state cost estimates to validate procedures and results.

Each state's DOT chief executive and FHWA state division administrator certified that its ADHS 2007 Cost-to-Complete Estimate had been developed according to prescribed guidelines.

STATUS OF COMPLETION

As of September 30, 2006, a total of 2,506.6 miles, or 81.1 percent of the 3,090 miles authorized for the ADHS, were open to traffic. All eligible work has been completed on 2,362.3 of those miles; stage construction work, such as adding interchanges, lanes, second-stage pavement, and rest areas, is required on the remaining 144.3 miles. In addition, 128.9 miles were in the construction phase; 172.4 miles were in the design phase, and 282.2 miles were in the location phase. (See table 2 and figure 1 on page 6, and figure 2 on page 7.)

Since the ADHS 2002 Cost-to-Complete Report, 123 miles of ADHS highways have been opened to traffic.

Table 2. Status of Completion of the ADHS (Miles)
(as of September 30, 2006)

State	Miles Open to Traffic		Miles Not Open to Traffic			Total Miles Eligible for ADHS Funding
	Complete	Remaining Stage Construction	Construction Underway	Design Stage	Location Stage	
Alabama	146.6	42.1	37.1	6.2	63.7	295.7
Georgia	100.9	0.0	0.0	11.1	20.5	132.5
Kentucky	387.9	0.0	15.8	22.6	0.0	426.3
Maryland	77.0	3.7	0.0	0.0	2.5	83.2
Mississippi	90.3	0.0	6.7	20.5	0.0	117.5
New York	207.9	1.3	3.7	3.6	5.5	222.0
North Carolina	175.4	4.2	0.0	16.4	8.3	204.3
Ohio	178.2	0.0	0.0	16.2	7.1	201.5
Pennsylvania	275.7	7.6	44.6	13.9	111.3	453.1
South Carolina	18.6	0.0	0.0	4.3	0.0	22.9
Tennessee	217.3	82.0	3.6	8.9	17.5	329.3
Virginia	160.0	0.0	0.0	16.6	15.6	192.2
West Virginia	326.5	3.4	17.4	32.1	30.2	409.6
System Totals	2,362.3	144.3	128.9	172.4	282.2	3,090

NOTE: Highway totals reflect corrections and adjustments made in December 2006.

Figure 1. Status of Completion of the ADHS: Percentage of Miles in Each Stage of Development
(as of September 30, 2006)

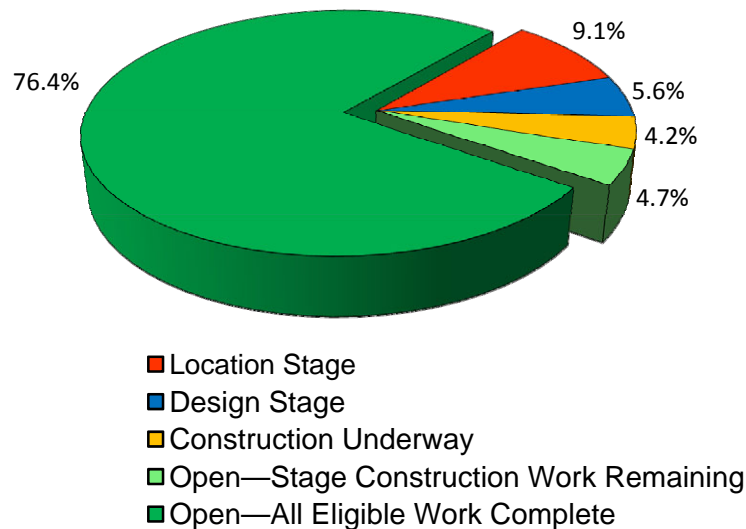
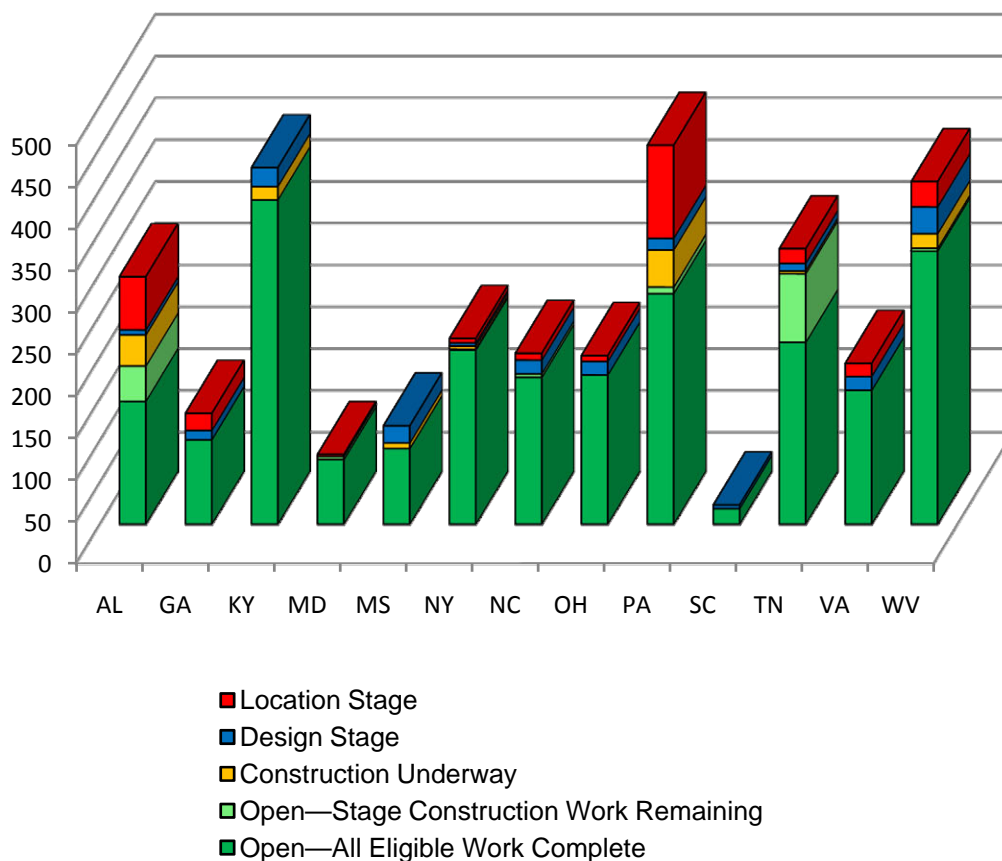


Figure 2: Status of Completion of the ADHS: Number of Miles in Each Stage of Development, by State
(as of September 30, 2006)



COST TO COMPLETE THE ADHS AND REMAINING NEEDS

The 2007 total estimated cost to complete the ADHS (combined federal and state cost) is \$11.8 billion, including \$309 million in pre-financed projects as of September 30, 2006. (Pre-financed projects are ADHS projects that use non-ADHS funds—federal and/or state—to accelerate ADHS completion and that have been approved for reimbursement when ADHS funds become available.) At an 80 percent participation rate, the federal share of the cost to complete the ADHS is \$9.4 billion. *Due to limitations in federal participation placed on the states of Mississippi, New York, Pennsylvania, and Virginia by ARC for specific ADHS corridors or corridor segments, the actual federal share of the cost to complete the ADHS is \$8.8 billion.*

Through FY 2009, approximately \$2.279 billion in federal funds will be available to the Appalachian states to construct ADHS corridors. This includes funds from SAFETEA-LU and the Transportation Equity Act for the 21st Century (TEA-21), as well as additional funds made

available to the ADHS through U.S. Department of Transportation appropriation acts. Therefore, as of September 30, 2006, the estimated remaining federal funding required for completion of the ADHS is \$6.5 billion (in year 2005 dollars).

Table 3 (below) shows the cost to complete each state's ADHS corridors, federal funds needed beyond FY 2009, and each state's share (as determined by FY 2009 apportionment factors) of the remaining ADHS federal funds needs.

Table 3. Cost to Complete the ADHS and Remaining ADHS Funds Needed
Based on the ADHS 2007 Cost-to-Complete Estimate (in 2005 dollars)

State	Total Cost to Complete (State and Federal Funds)	Federal Share of Cost to Complete	Available Federal Funds	Remaining Federal Funds Needed	State Apportionment Factor (Percentage of Remaining ADHS Needs)
Alabama	\$3,001,056,000	\$2,400,845,000	\$152,284,000	\$2,248,561,000	34.7072%
Georgia	369,339,000	295,471,000	193,339,000	102,132,000	1.5764%
Kentucky	1,017,687,000	814,150,000	322,982,000	491,168,000	7.5813%
Maryland	228,481,000	182,785,000	54,261,000	128,524,000	1.9838%
Mississippi	79,721,000	50,298,000*	45,738,000	4,560,000	0.0704%
New York	205,549,000	145,237,000*	78,112,000	67,125,000	1.0361%
North Carolina	757,300,000	605,840,000	202,658,000	403,182,000	6.2232%
Ohio	413,253,000	330,602,000	73,405,000	257,197,000	3.9699%
Pennsylvania	2,748,494,000	1,865,086,000*	335,506,000	1,529,580,000	23.6095%
South Carolina	63,568,000	50,854,000	15,504,000	35,350,000	0.5456%
Tennessee	827,234,000	661,787,000	376,661,000	285,126,000	4.4010%
Virginia	1,178,875,000	633,402,000*	156,381,000	477,021,000	7.3630%
West Virginia	902,256,000	721,805,000	272,666,000	449,139,000	6.9326%
Total	\$11,792,813,000	\$8,758,162,000	\$2,279,497,000	\$6,478,665,000	100.0000%

* Federal funding cap.

FACTORS AFFECTING THE COST OF REMAINING WORK

The estimated cost of completing the ADHS increased from \$8.5 billion in the ADHS 2002 Cost-to-Complete Estimate to \$11.8 billion in the ADHS 2007 Cost-to-Complete Estimate. Three factors were responsible for the increase.

- **New ADHS Corridor.** A new ADHS corridor authorized by Congress after the ADHS 2002 Cost-to-Complete Estimate added 65 miles and at least seven major interchanges to the ADHS. This corridor (Corridor X-1 in Alabama) accounts for \$2.04 billion of the \$6.5 billion federal dollars needed after 2009 to complete the ADHS.
- **Inflation.** Nationwide, highway construction costs have increased an average of 26 percent since the ADHS 2002 Cost-to-Complete Estimate; however, in the Appalachian Region, highway construction costs increased more than 40 percent during the same time

frame. (Note: dollar amounts in the ADHS 2002 Cost-to-Complete Estimate were in year 2000 dollars; dollar amounts in the ADHS 2007 Cost-to-Complete Estimate are in year 2005 dollars.) (Source: *FHWA Price Trends for Federal Aid Construction, Fourth Quarter 2006*, states that highway constructions costs increased an average of 26 percent between calendar years 2000 and 2005 nationwide and an average of 52 percent in 11 Appalachian states.)

- **Cost Refinements.** As highway projects progress through the stages of development (location, design/right of way, and construction), earlier estimates are refined and updated to reflect changing specifications and costs for construction, right of way, environmental mitigation measures, and design standards. Estimating costs for highway miles in the location phase is particularly challenging, as final alignments have not yet been determined, and engineering requirements such as fills and number and types of bridges are not known at that stage.

PROJECTED ADHS OBLIGATIONS

As part of the cost estimate process, states were asked to provide project schedules for their ADHS corridors through FY 2012. Table 4 (below) shows projected ADHS obligations (in 2005 dollars) for FY 2007 through FY 2012. In preparing their ADHS work plans, states assumed that their ADHS funding would remain at the FY 2002-FY 2008 level.

Table 4. Projected Annual ADHS Federal Funding Obligations, by State*
(in millions of dollars)

State	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	Total
Alabama	\$256.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$256.40
Georgia	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kentucky	97.44	120.24	0.00	208.16	9.44	79.20	514.48
Maryland	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mississippi	63.20	0.00	0.00	0.00	0.00	0.00	63.20
New York	23.20	11.20	51.20	0.00	0.00	0.00	85.60
North Carolina	0.00	21.80	19.46	0.00	0.00	0.00	41.26
Ohio	0.00	0.00	94.00	0.00	0.00	0.00	94.00
Pennsylvania	100.62	26.78	185.28	0.00	0.00	113.77	426.45
South Carolina	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tennessee	7.84	87.76	17.36	26.80	406.96	0.00	546.72
Virginia	0.00	0.00	24.80	12.00	0.00	0.00	36.80
West Virginia	257.76	51.52	0.00	66.56	0.00	0.00	375.84
Total	\$806.46	\$319.30	\$392.10	\$313.52	\$416.40	\$192.97	\$2,440.75

*Based on state DOT detailed ADHS work plans, assuming federal funding at current level. Projected obligations at 80 percent of estimated total cost.

ADHS UNOBLIGATED BALANCES

In order to determine the remaining federal funding needed to complete the ADHS, an inventory of each state's unobligated ADHS funds from all federal sources (TEA-21, SAFETEA-LU, earmarks, and special U.S. DOT appropriations) was developed. The inventory showed that as of September 30, 2006, a total of \$1,326,430,000 in ADHS funding was unobligated. These funds, as well as projected ADHS apportionments for FY 2008 and FY 2009, were subtracted from the estimated cost to complete the ADHS to determine remaining federal funding needed. Table 5 (below) shows unobligated ADHS funds by state.

Table 5. ADHS Unobligated Balances
(as of September 30, 2006; 2005 dollars)

State	Unobligated Balance
Alabama	\$ 89,014,000
Georgia	157,503,000
Kentucky	185,848,000
Maryland	41,433,000
Mississippi	35,134,000
New York	25,144,000
North Carolina	126,186,000
Ohio	32,367,000
Pennsylvania	128,703,000
South Carolina	9,696,000
Tennessee	306,241,000
Virginia	89,511,000
West Virginia	99,650,000
Total	\$1,326,430,000

BENEFITS OF THE ADHS

Studies undertaken to evaluate the impact of ADHS corridors on economic development and highway safety have demonstrated the clear benefits of these corridors for the Region.

Analysis of the Economic Contributions of Completed Sections of the ADHS

In 1998, Wilbur Smith Associates conducted an economic study that focused on the contributions of completed sections of 12 ADHS corridors in 165 counties (of the 399 counties in the Appalachian Region at the time) to economic development and the quality of life of the Region's citizens. The study quantified the impact of the sections on economic development (as measured by jobs, wages, and production) and travel efficiencies (reduced travel time, operating costs, and accidents) by estimating the difference between what had occurred in counties with completed ADHS sections and what would have occurred in those counties without the ADHS sections. The study found that every \$1.00 invested in the ADHS yielded, on average, \$1.32 in economic development impacts and \$1.18 in travel efficiencies.

Assessment of the Economic Benefits of Completing the ADHS

A study of the economic impact of the ADHS conducted for ARC by Cambridge Systematics and Economic Development Research Group in 2007 assessed the economic benefits of completing the remaining segments of the ADHS. The study assessed the travel performance, trade, and economic development impacts directly related to completing the ADHS. In addition, it assessed connectivity, accessibility, and network effects—how corridor improvements connect Appalachian people and businesses to other highway facilities, multi-modal transportation, and economic markets (labor force, buyers and suppliers, and tourists). The study will be released in 2008.

There are a number of key differences between the 1998 study and the 2008 study, including the following: 1) the 1998 study examined benefits from 12 already-completed highway segments rather than estimating benefits of the future completion of the ADHS; 2) similarly, the 1998 study was based on an analysis of individual highway segments, while the 2008 study emphasized the network benefits of a complete highway system; 3) the 2008 study made use of national freight flow data not previously available, which allowed for a more complete capture of national freight system benefits; and 4) the new study estimated an additional benefit not previously examined—the potential for economic development benefits due to improved market access to labor force, buyers, suppliers and multimodal facilities.

Key findings from the study include the following:

Travel Efficiency Benefits:

Completing the ADHS will result in significant travel benefits, including lower travel times and costs for businesses and individuals both inside and outside of Appalachia. Nationally, total user benefits (savings in travel time, fuel and non-fuel operating costs, and increased safety) are estimated to be \$1.6 billion annually by the year 2020—the hypothesized year of system completion—and to grow to \$5.1 billion annually by 2035 under a medium-growth scenario.

- Completing the ADHS has national significance: it will facilitate the movement of freight into, out of, and through the Region. More than 65 percent of the benefits of freight flows will accrue to areas outside the Appalachian Region.
- Completing the ADHS will result in a significant reduction in travel time for business and personal trips, as well as for long-distance freight trips. By 2020, the aggregate savings in travel time are estimated to be over 84 million hours annually, growing to almost 212 million hours by 2035.

Direct Economic Benefits:

The Appalachian Region will gain an estimated \$2.1 billion annually in value-added activity by 2035 due to economic development effects from market accessibility gains.

- Completing the ADHS will result in improved market accessibility for large segments of the Appalachian Region. Three hundred twenty-five of the 410 Appalachian counties will benefit from improved accessibility to buyer and supplier markets within a 3-hour drive.

Total Economic Impacts

Reduced business-related travel time and costs, along with increased regional growth made possible by market accessibility gains and associated multiplier effects (supplier and consumption effects and induced effects on regional output and employment) will directly impact the economy of the Appalachian Region. These regional impacts will gradually increase over time and by 2035 will generate an estimated 80,500 jobs and \$3.2 billion in increased wages

for the Region's workers, as well as a total of \$5.0 billion in increased economic activity (as measured by value added).

Benefit-Cost Analyses of Travel Efficiency and Economic Growth Impacts

Two benefit-cost analyses were examined in the study: one on travel efficiency for the Region and the nation, and one on economic growth impacts for the Region and the nation. While costs were the same in each, the benefits varied: travel efficiency benefits were higher for the nation than for the Region, while economic growth impacts, resulting from increased market access, were greater for the Region than for the nation, reflecting the attainment of the systems' strategic development goal.

The estimated travel efficiency benefit-cost ratio of completing the ADHS, using a medium-growth scenario based on the most conservative, high-cost projections, was 1.9 for the Appalachian Region, and 2.9 for the nation as a whole. The estimated economic growth impacts benefit-cost ratio, using the same scenario, was 3.6 for the Appalachian Region and 3.0 for the nation as a whole. Thus, the estimated return for the nation as a whole is \$3.00 for every \$1.00 invested in completing the ADHS.

ADDING CAPACITY TO THE INTERSTATE SYSTEM

The ADHS has been instrumental in adding capacity to the nation's interstate system. A number of ADHS corridors are currently designated as interstate highways:

- Corridor B (Interstate 26) in North Carolina and Tennessee;
- Corridor E (Interstate 68) in Maryland and West Virginia;
- Corridor O (Interstate 99) in Pennsylvania (from Bedford County line to Interstate I-80);
- Corridor P (Interstate 180) in Pennsylvania (from Interstate 80 to Williamsport);
- Corridor T (Interstate 86) in Pennsylvania and New York;
- Corridor U-1 (Interstate 99) in Pennsylvania and New York (from Williamsport, PA to I-86);
- Corridor V (Interstate 22) in Mississippi; and
- Corridor X (Interstate 22) in Alabama and Mississippi.