VDOT We Keep Virginia Moving

PPMS: 67587 PROJECT NO: 0081-961-111
PPMS: 67588 PROJECT NO: 0081-962-116
PPMS: 67589 PROJECT NO: 0081-968-123

I-81 CORRIDOR IMPROVEMENT STUDY

Economics Technical Report

Tier 1 Environmental Impact Statement

Table of Contents

Table of Contents i

List of Tables ii

List of Figures iii

1 Introduction 1-1

2 Economic Forecast Modeling 2-1

2.1 Economic Forecast Modeling Methods and Assumptions 2-1

2.1.1 Economic Modeling 2-3

3 Existing Economic Conditions 3-1

3.1 I-81 Study Area 3-1

3.1.1 Population Characteristics 3-1

3.1.2 Labor Force 3-5

3.1.3 Commercial/Industrial Facilities 3-11

3.2 Rail Study Area 3-15

3.2.1 Population and Employment Characteristics 3-15

3.2.2 Labor Force 3-16

3.2.3 Commercial/Industrial Facilities 3-17

4 Baseline Trends and Economic Consequences 4-1

4.1 Baseline Economic Trends 4-1

4.1.1 Population 4-1

4.1.2 Employment 4-3

4.2 Economic Consequences 4-12

4.2.1 No-Build Concept 4-12

4.2.2 “Build” Concepts 4-13

4.2.3 Conclusions 4-25

List of Tables

Table No.	Description	Page
2-1	I-81 Corridor Economic Study Region	2-2
2-2	Assumptions Used in the REMI Model by Improvement Concept	2-6
2-3	Financing Assumptions Used in the REMI Model	2-7
2-4	Change in Effective Distance for Transportation Costs	2-8
2-5	Change in Effective Distance for Commuting Costs for "Build" concepts	2-9
2-6	Change in Effective Distance for Accessibility Costs for "Build" concepts	2-10
3-1	Population Trends: I-81 Study Area (1970 to 2003)	3-3
3-2	Population Projections: I-81 Study Areas (2003 to 2035)	3-4
3-3	Labor Force Trends: I-81 Study Area (1990 to 2003)	3-6
3-4	Labor Force Participation Rates (1990 to 2003): I-81 Study Area	3-8
3-5	Unemployment Trends (1994 to 2003): I-81 Study Area	3-10
3-6	Employment Trends (1970 to 2000): I-81 Study Area	3-11
3-7	Commercial Business Classifications: I-81 Study Area (2000)	3-12
3-8	Tourism-Related Business Classifications: I-81 Study Area (2000)	3-13
3-9	Proposed Development Projects: I-81 Study Area	3-14
3-10	Population Trends (1990 to 2003): Rail Section 7	3-15
3-12	Labor Force Trends and Participation Rate (1990 to 2003): Rail Section 7	3-16
4-1	Population Growth Trends (in Thousands)	4-2
4-2	Private, Non-Farm Employment Growth Trends (in Thousands)	4-4
4-3	Total Employment, By Share of Region	4-5
4-4	Gross Regional Product Growth Trends (in Fixed 1996 Billions)	4-6
4-5	Import/Export Trade Balance Trends (in Fixed 1996 Billions)	4-8
4-6	Real Disposable Personal Income Growth Trends (in Fixed 1996 Billions)	4-11
4-7	Population Growth Projections (in Thousands)	4-14
4-8	Projected Population Growth (in Thousands)	4-16
4-9	Private, Non-Farm Employment Growth Projections (in Thousands)	4-16
4-10	Total Employment, by Share of Region Total	4-18
4-11	Projected Employment Growth (in Thousands)	4-19
4-12	Gross Regional Product Growth Projections (in Fixed 1996 Billions)	4-19
4-13	Projected Gross Regional Product Growth (in Fixed 1996 Billions)	4-21
4-14	Real Disposable Personal Income Growth Projections (in Fixed 1996 Billions)	4-22
4-15	Projected Real Disposable Personal Income (in Fixed 1996 Billions)	4-23
4-16	Projected Delivered Price Ratio (Against National Average)	4-25

List of Figures

Figure No.	Description	Page
2-1	Three Study Regions for Economic Analysis	2-2
3-1	Age Distribution of Population: I-81 Study Area	3-5
3-2	Labor Force Trends and Projections I-81 Corridor Economic Study Region (1971-2035)	3-7
3-3	Labor Force Participation Rates (1971 to 2035): I-81 Corridor Economic Study Region	3-9
4-1	Population - Percentage Growth Trends 1970-2000	4-3
4-2	Private Non-Farm Employment – Percentage Growth Trends 1970-2000	4-4
4-3	Gross Regional Product - Percentage Growth Trends 1970-2000	4-7
4-4	Import/Export Trade Balance – Comparison of Export to Import Levels 1970-2000	4-9
4-5	Real Disposable Personal Income – Percentage Growth Trends 1970-2000	4-10
4-6	Composite Delivered Price Ratio as Compared to National Averages 1970-2000	4-12
4-7	Population Growth Projections 2000-2035 (Percentage)	4-15
4-8	Private, Non-Farm Employment Growth Projections 2000-2035 (Percentage)	4-17
4-9	Gross Regional Product Growth Projections 2000-2035 (Percentage)	4-20
4-10	Real Disposable Personal Income Growth Projections 2000-2035 (Percentage)	4-23
4-11	Composite Delivered Price Ratio as Compared to National Averages 2000-2035	4-24

1 Introduction

The Federal Highway Administration (FHWA) and the Virginia Department of Transportation (VDOT) have prepared a Tier 1 Draft Environmental Impact Statement (DEIS) for the *I-81 Corridor Improvement Study* in Virginia. The Tier 1 Draft EIS, prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), evaluates and addresses the potential effects associated with conceptual-level improvements along the entire 325-mile Interstate 81 (I-81) corridor in Virginia.

As an appendix to the Tier 1 Draft EIS, this Economics Technical Report provides detailed information on the data collection and analysis of existing and projected economic conditions for the *I-81 Corridor Improvement Study*. Information in this report is summarized in the I-81 Tier 1 Draft EIS.

2 Economic Forecast Modeling

This chapter describes the methods used to model future economic conditions in order to analyze the potential economic effects associated with improvements considered in the *I-81 Corridor Improvement Study*.

2.1 Economic Forecast Modeling Methods and Assumptions

Key factors that influence local and regional economic conditions are population and employment characteristics. These serve as baseline inputs into the economic model used for analysis purposes. For purposes of analyzing economic effects, three "study regions" were defined as shown in Figure 2-1:

- the I-81 Corridor Economic Study Region, including the counties and cities along I-81;
- the Commonwealth of Virginia (rest of Virginia); and
- the I-81 Trade Area, comprising 26 eastern states stretching from Texas to Maine.

Table 2-1 below shows the 37 cities and counties that are included in the I-81 Corridor Economic Study Region. The boundaries vary from the 20 cities and counties through which I-81 traverses. This is because 17 additional jurisdictions play a major factor in car and truck trips along the interstate.

It was assumed for economic modeling purposes that the I-81 Corridor Economic Study Region generally reflects existing and future economic conditions within the immediate I-81 study area (as represented by census block groups along I-81) as well as the economic conditions represented by the counties and cities that traverse I-81. The economic effects within the I-81 Corridor Economic Study Region were then compared to the Commonwealth of Virginia as a whole, and the I-81 Trade Area.

Figure 2-1 Three Study Regions for Economic Analysis

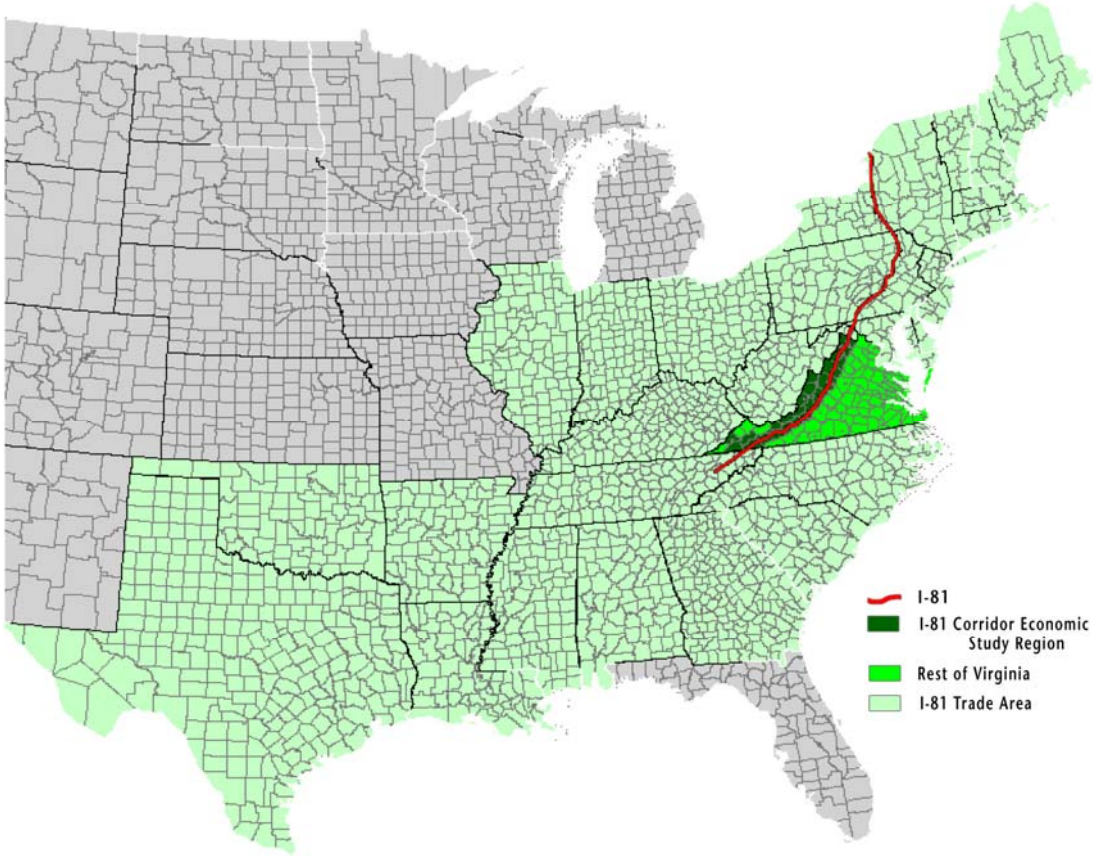


Table 2-1 I-81 Corridor Economic Study Region

Cities	Counties	
Staunton	Alleghany	Pulaski
Clifton Forge	Augusta	Roanoke
Covington	Bath	Rockbridge
Lexington	Bland	Rockingham
Buena Vista	Botetourt	Russell
Harrisonburg	Clarke	Scott
Roanoke	Craig	Shenandoah
Salem	Frederick	Smyth
Radford	Giles	Warren
Norton	Highland	Washington
Bristol	Montgomery	Wise
Waynesboro	Page	Wythe
Winchester		

2.1.1 Economic Modeling

The data in this analysis were generated from a sophisticated econometric modeling engine, created by Regional Economic Models, Incorporated (REMI), called Policy Insight. The Policy Insight model measures the impacts to a region's economy based on a prescribed economic stimulus introduced by the model's user. In this case, the economic stimulus is the potential improvements to I-81 and Norfolk Southern's Piedmont and Shenandoah rail lines. However, the Policy Insight model only accounts for the construction and operation spending impacts. It does not account for the improved transportation efficiency created by these improvements. To do that, REMI's TranSight model was also used.

The TranSight model provides the link between the potential transportation improvements and the economic vitality of the region by converting change in travel efficiency into economic output. These stimuli are then entered into the Policy Insight model to project the impacts. For example, while jobs would be created because of the construction and operation expenditures of a particular scenario, more substantial long-term job creation and economic development would likely occur as a result of improved transportation efficiency in the region.

Traditionally, the link between transportation improvements and the economy has been viewed as a reduction of business costs. The TranSight model employs a new economic geography theory to examine the importance of transportation systems to a region's economy. The methods used to bridge the gap between analysis of transportation projects and total economic activity are based on the concept of effective distance between products and employees. By simulating a change in distance (measured by travel time between separate regional economies), the model can change the relationships of these economies with one another. Depending on the economy's market-share size in each industry, a change in the transportation infrastructure between the areas can, over time, shift the market shares of these industries. In other words, the new economic geography can project the future economic impacts from the transportation improvements.

Effective Distance

One of the defining characteristics of the economic geography theory is how it describes the dependency of economic systems on the cost of transportation. The costs to move intermediate inputs, final goods, and labor directly affect a firm's production costs. In other words, a firm's production costs increase as its transportation costs rise. The three main transportation factors in production costs are a firm's access to intermediate inputs, access to labor, and the firm's ability to deliver their goods and services to consumers. It is difficult to assign dollar estimates for these factors. To more easily quantify transportation costs, economic geography theorists use the concept of effective distance.

Effective distance describes the logistical efficiency between regions. The concept is based on an economic geography gravity model. A gravity model describes how firms in similar industries tend to "gravitate" towards each other to keep production costs low. This effect is

also called agglomeration of industries. The amount of gravitation towards the economic center of a region depends on the effective distance between firms. A firm will want to decrease its effective distance to reduce its production costs.

For example, consider a region with three firms. Firm A supplies the intermediate inputs to Firms B and C. The effective distance between Firm A and Firm B is four miles, while the effective distance between Firm C and Firm A is eight miles. Assuming Firms B and C are similar both in structure and style, Firm B has an advantage over Firm C because Firm B's costs to transport the intermediate inputs from Firm A are lower. As such, Firm B can charge less for their final goods. Firm C's response must be to reduce its effective distance to Firm A.

There are several ways to alter the effective distance between regions. One is to move a firm geographically closer to its intermediate inputs. Another way is to alter the modes of transportation by adding new or improving arteries or modes of transportation. For example, adding a new highway lane can decrease congestion, making transportation quicker and more efficient. By reducing the effective distance for intermediate inputs, such as the labor force and/or finished product shipments, a firm can lower its production costs. In turn, the firm gains a competitive advantage in price, increasing its market share and promoting growth. Conversely, an increase in effective distance can have a negative effect on a firm, increasing its delivered price and, therefore, reducing its market share.

For the purposes of this analysis, the following were used: current estimates and future projections of vehicle trip count (trips); vehicle miles traveled (VMT); and vehicle hours traveled (VHT) created for the No-Build condition and each of the "Build" concepts. The data were entered into the TranSight model to calculate the economic impacts that each scenario would have based on the changes in transportation efficiency. These results were then entered into the Policy Insight model to project the impacts into the future.

Tolling

In addition to the changes in effective distance, the modeling process also accounted for tolling. For improvement concepts that include toll scenarios, the economic impacts of the tolling were also modeled. Most notably, tolls affect passenger traffic by reducing personal disposable income. A typical household using I-81 would experience a decline in household spending power in the amount equal to the amount spent on tolls. However, it is likely that some of the toll revenue from passenger vehicles would be generated by through traffic and tourists, and not be a direct substitution from the region's purchasing power.

Based on the origination of every trip, vehicle miles traveled were segregated to determine the share each region would pay. Then, an adjustment factor was used to determine how much of the toll money would be reallocated from spending within the I-81 Corridor Economic Study Region. Trips generated by tourists and through traffic were assumed to have a substitution effect of 50 percent, whereby money spent on tolls is not spent on other

goods and/or services. As a result, it was assumed that 86 percent of the money spent on toll fees is transferred from the I-81 Corridor Economic Study Region's spending power while 7 percent is from the rest of Virginia and 7 percent from the I-81 Trade Area.

Since tolls are paid by trucking carriers as they use the corridor, tolls to commercial vehicles are represented in the model through an increase in production costs for all industries. Under this assumption, the amount of the tolls being added to production costs within the three study regions was segregated by origination of trips and the vehicle miles traveled from each origin. To this end, the I-81 Corridor Economic Study Region accounts for 54 percent, the rest of Virginia accounts for 21 percent and the I-81 Trade Area accounts for 25 percent of the toll expenses. The model accounts for the toll revenue by increasing the cost of transporting goods between suppliers and to consumers. This change is based on the assumption that trucking companies are going to pass along the cost of shipment to the producers.

Financing

For the purposes of this analysis, an 80/20 split financing package was assumed for the "Build" concepts. Under this assumption, the federal government would fund 80 percent of the projects, while the Commonwealth would be responsible for the remaining 20 percent. In addition, the Commonwealth's portion was assumed to be paid out of general funds. While it is unknown whether these assumptions would come to fruition, they were made for three reasons. First, the REMI model needs to account for financing to provide useful comparative results. Without making an assumption on financing, the model defaults to a 100 percent federal funding assumption. Second, it is necessary to assume a uniform financing method for comparative purposes in the absence of the actual funding sources. Actual financing programs have not been finalized for the potential projects. While it is likely that a range of funding sources would ultimately be used, this Tier 1 analysis still provides a comparison of each improvement concept. Third, making the assumption that all state funding comes from the general fund removes the need to make further assumptions about bonding issues, such as interest rates and the term of the bonds. Removing this additional level of assumptions does not affect the relevance of the comparative analyses.

Table 2-2 shows the assumptions made for construction and operation of the improvement concepts that have the minimum and maximum economic impacts. These concepts were chosen because they provided the least and the greatest demographic and economic benefit to the I-81 study area compared to the No-Build condition, as determined by the REMI model. The minimum economic impact is generated by the scenario with lowest efficiency gains and the highest tolling rate. In this case, the scenario with the minimum economic benefit is the Maximum Width template that includes high tolls for all vehicles and Rail Concept 3. In contrast, the greatest incremental economic benefit comes from the scenario with the greatest efficiency gains and no tolling. The scenario that has the maximum economic benefit compared to the No-Build condition is the Minimum Width template that includes Rail Concept 3, but does not include tolls.

Table 2-2 Assumptions Used in the REMI Model by Improvement Concept

	Construction			Toll Rate (Per Mile)	
Improvement Concept	Estimated Cost	Start Date	End Date	Passenger Vehicle	Commercial Vehicle
No-Build	$84,434,000	2005	2010	$0	$0
Maximum Width including High Toll and Rail Concept 3	$13,000,000,000	2008	2022	$0.14	$0.07
Minimum Width including No Toll and Rail Concept 3	$5,600,000,000	2008	2019	$0	$0

Assumptions

To run the REMI model, several key assumptions were made. A discussion of all these assumptions, broken into categories that represent the different facets of the REMI model, is in the following paragraphs.

Financing

To run the REMI model effectively, an assumption was made about how each of the improvement concepts are to be financed. For the purposes of this analysis, it was assumed that all "Build" concepts would be financed the same way. Since this is a Tier 1 analysis, the actual funding sources have not been identified. Although actual funding for improvements to I-81 and rail may be a combination of federal, state, and private sources (including tolling), any assumptions made at this point would be premature. To this end, it was necessary to assume a uniform financing structure to make a meaningful comparison of the projections.

Following historical highway construction funding trends, it was assumed that 80 percent of improvement concept would be funded by the federal government and 20 percent would be funded using Commonwealth of Virginia funds (Table 2-3). While it is unknown whether this particular funding scenario would be used if any of the "Build" concepts were selected for construction, this is the most straightforward and reasonable assumption that could be entered into the REMI model.

Table 2-3 Financing Assumptions Used in the REMI Model

	Construction		
Improvement Concept	Estimated Cost	Federal Share (80%)	Commonwealth Share (20%)
No-Build	$84,434,000	$67,547,200	$16,886,800
Maximum Width including High Toll and Rail Concept 3	$13,000,000,000	$10,400,000,000	$2,600,000,000
Minimum Width including No Toll and Rail Concept 3	$5,600,000,000	$4,480,000,000	$1,120,000,000

Transportation Costs

Transportation costs are defined as the costs for firms to deliver their goods and services, defined economically as delivered price. Delivered price is a way of putting a cost value on inter-regional trade flows. For example, if it costs $10 to deliver one unit of lumber from Region 1 to Region 2 and it costs $15 to deliver one unit of lumber from Region 1 to Region 3, firms in Region 1 will have a higher priority to sell their goods to Region 2 than to Region 3. This is because Region 1 will have to charge a higher price in Region 3 than in Region 2, resulting in fewer consumers for their goods in Region 3. This difference would be an incentive to increase transportation efficiency from Region 1 to Region 3. For example, creating a better highway between Regions 1 and 3 would reduce the travel time (*i.e.*, through reduced congestion), thus, reducing the delivered price. Once the delivered price decreases, consumers in Region 3 will want to buy more of Region 1's goods, increasing the amount of trade flow between the two regions.

The REMI model accounts for changes in transportation costs through changes in effective distance (discussed above) for companies shipping goods for sale. There are several steps, detailed below, that make this calculation.

- The difference between the average speed along I-81 of each "Build" concept to that of the No-Build condition was calculated. The percent difference in speed is applied to calculate the change in effective distance of transportation.
- The percent difference in average speed was then adjusted to represent the amount of traffic within the I-81 region to avoid overstating the impact of improvements to I-81. Calculations of total regional traffic indicate that I-81 accounts for roughly 23 percent of all vehicle miles traveled within the I-81 Corridor Economic Study Region. As such, the percent difference in speed is reduced by this amount.
- The impacts to intra-regional traffic along I-81 would be more substantial than to inter-regional traffic (that traffic originating or ending outside the I-81 corridor). This is because fewer miles, in terms of the total trip length for inter-regional trips between the I-81 Corridor Economic Study Region and the rest of Virginia, would be along I-81.

Therefore, impact to the inter-regional trips was reduced. A multiplier of 0.50 was applied.

- Since the full benefits of any of the "Build" concepts would not occur until construction is complete, the changes in effective difference were assumed to be phased over the period of construction. A linear change in effective distance was assumed, shifting proportionately from 1.00 in the first year of construction to the fully applied difference at completion.

In summary, the transportation cost entry in the REMI model was adjusted for improved speeds (a decrease in commuting costs). The new effective distance for commuting for each "Build" concept was entered into the REMI model (Table 2-4).

Table 2-4 Change in Effective Distance for Transportation Costs

		Transportation				
	Average Speed Difference From No-Build	% of Regional Adjustment	Transportation Adjustment	Inter-Regional Adjustment	Adjusted Change	Fully Applied Difference
I-81 to I-81						
Maximum Width including High Toll and Rail Concept 3	0.2740	0.2300	1.0000	1.0000	0.0630	0.9370
Minimum Width including No Toll and Rail Concept 3	0.2895	0.2300	1.0000	1.0000	0.0666	0.9334
I -81 to Virginia and Virginia to I-81						
Maximum Width including High Toll and Rail Concept 3	0.2770	0.2300	1.0000	0.5000	0.0319	0.9681
Minimum Width including No Toll and Rail Concept 3	0.2996	0.2300	1.0000	0.5000	0.0345	0.9655

Source: REMI and RKG Associates, 2004

Commuting Costs

Commuting indicates how difficult it is for workers to travel within and between regions during morning and evening peak travel times. A substantial deterrent for commuters to travel longer distances for work is congestion. If a transportation project, such as the improvement of I-81, decreases an area's congestion, it increases commuters' ability to get to work.

Decreasing congestion allows workers who live farther from any particular work place to be willing to commute to that location. Firms along the I-81 Corridor Economic Study Region would now have access to a larger pool of workers than before. This change in transportation infrastructure becomes an economic shock because firms have access to a larger number of

workers. The improved commuting cost gives firms the ability to "specialize" their workers, which means that they can find workers who are more suitable to the position that needs to be filled in the firm. As a result, productivity is improved by these new laborers.

The REMI model accounts for changes in commuting costs the same way as with the transportation costs. However, the model assumes that improved travel times only benefit commuters during peak travel periods. As a result, the benefits to commuters are only a portion of that for transporting goods. To this end, the standard provided by REMI was used, taking one-eighth of the change to transportation costs. This represents an estimated 3 hours of a 24-hour day that commuters use I-81.

The effective distance of commuting, however, is also affected by tolls. Tolls were assumed to adversely affect commuters, as the cost of using I-81 would directly add to a commuter's cost to travel to work. For the purposes of this analysis, a one percent decrease in effective distance because of tolling was used.[1] (This value was recommended by REMI as the appropriate number to use based on the travel distances and tolling rates used for this study.) In other words, the increase in the cost of commuting because of tolls would decrease the distance that workers are willing to travel to work in the I-81 corridor. People who travel long distances along I-81 to get to their job would likely look for alternative employment if they cannot efficiently divert from I-81 (Table 2-5).

Table 2-5 Change in Effective Distance for Commuting Costs for "Build" concepts

		Commuting				
	Average Speed Difference From No-Build	% of Regional Adjustment	Commuting Adjustment	Inter-Regional Adjustment	Adjusted Change	Fully Applied Difference
I-81 to I-81						
Maximum Width including High Toll and Rail Concept 3	0.2740	0.2300	0.1250	1.0000	0.0079	0.9921
Minimum Width including No Toll and Rail Concept 3	0.2895	0.2300	0.1250	1.0000	0.0083	0.9917
I-81 to Virginia and Virginia to I-81						
Maximum Width including High Toll and Rail Concept 3	0.2770	0.2300	0.1250	0.5000	0.0043	0.9957
Minimum Width including No Toll and Rail Concept 3	0.2996	0.2300	0.1250	0.5000	0.0043	0.9957

Source: REMI and RKG Associates, 2004

1 The 1 percent change represents a decrease in the effective distance a business can expect to attract new employees. The REMI model translates this shift in effective distance as a decrease in worker productivity (due to decrease in the size of the potential labor pool).

Accessibility Costs

While commuting costs reflect a firm's cost to choose between a varied number of workers, accessibility costs reflect the cost for firms to choose from a varied number of intermediate inputs. Firms are not homogeneous and different firms require different inputs even within the same industry. A greater amount of available intermediate inputs increases a firm's ability to find the inputs that best suit their needs. Similar to commuting costs, the productivity benefit from an intermediate input also depends on the effective distance between the plant selling the intermediate input and the plant buying the intermediate input.

A key concept in determining accessibility costs is distance deterrence elasticity. As the effective distance increases between a firm and its intermediate supplier, the firm's incentive to switch to another intermediate supplier increases as well. This concept helps explain agglomerated economies in terms of intermediate inputs. Because lowering production costs is always a concern of a firm, firms will want to locate in an area with the lowest effective distance to a large variety of intermediate input firms.

Similar to transportation and commuting costs, the REMI model measures accessability costs by using effective distance ratios. The change in effective distance of accessability is calculated by applying one-half of the percent difference in average speed between the "Build" concept and the No-Build condition. This assumption is based on the standard that REMI uses when running scenarios with TranSight (Table 2-6).

Table 2-6 Change in Effective Distance for Accessibility Costs for "Build" concepts

		Accessibility				
	Average Speed Difference From No-Build	% of Regional Adjustment	Accessibility Adjustment	Inter-Regional Adjustment	Adjusted Change	Fully Applied Difference
I-81 to I-81						
Maximum Width including High Toll and Rail Concept 3	0.2740	0.2300	0.5000	1.0000	0.0315	0.9685
Minimum Width including No Toll and Rail Concept 3	0.2895	0.2300	0.5000	1.0000	0.0333	0.9667
I-81 to Virginia and Virginia to I-81						
Maximum Width including High Toll and Rail Concept 3	0.2770	0.2300	0.5000	0.5000	0.0159	0.9841
Minimum Width including No Toll and Rail Concept 3	0.2996	0.2300	0.5000	0.5000	0.0172	0.9828

Source: REMI and RKG Associates, 2004

3
Existing Economic Conditions

This section provides a general overview of local and regional economic conditions that would potentially be affected by highway and/or rail improvements.

3.1 I-81 Study Area

Two study areas were established for purposes of characterizing population, labor force and employment. First, data were characterized at the census block group level to represent local economic conditions within the immediate I-81 study area. The block group is the smallest geographic area for which the data is readily available. In general, the block group analysis remains within 500 feet of either side of I-81. However, a few of the block groups extend beyond the Interstate, with their furthest borders being several miles away. Second, for a broader regional view, data were collected at the county/city level for the 13 counties and seven cities through which I-81 travels. (In some cases, data was generated by the model for a larger region, the I-81 Corridor Economic Study Region, comprised of 17 additional local jurisdictions.) Both study areas are compared to data collected for the Commonwealth of Virginia as a whole.

For local economies, major areas of commercial and industrial development were also identified within 500 feet of either side of the I-81 pavement and rail centerline. In addition, planning officials from 10 counties and several major cities along I-81were interviewed in the summer of 2004 to identify economic development plans and proposed development projects at interchanges along I-81 that could influence future traffic demands along and adjacent to the corridor.

3.1.1 Population Characteristics

Demographic characteristics that influence economic conditions include population and labor force profiles and trends. This information is used as inputs to the econometric models discussed in Chapter 2.

Population Trends (1970-2003)

Population trends are characterized for the counties/cities along I-81 as well as for census block groups close to I-81. As illustrated in Table 3-1, total population in the counties and cities along I-81 has grown steadily since 1970. The total population increased by approximately 243,700 persons, which is a 38 percent increase, or roughly a 1.2 percent annual increase. Based on the block group data, the areas closest to I-81 have experienced slightly faster growth rates than the 13 counties and seven cities on average. Since 1970, the census block groups adjacent to I-81 have grown by almost 84,400 persons, or 42 percent.

Population growth has not been equally distributed along the 325-mile length of I-81. The majority of this growth (61 percent) has occurred between Frederick County and Rockbridge County, where the major east-west interstate connections meet with I-81. These connections allow easy access to the larger economic centers, most notably to Washington, D.C. (via I-66) and Richmond (via I-64). Just west of Roanoke, Montgomery County has experienced the fastest population growth since 1970, benefiting greatly from the expansion of Virginia Tech, the Commonwealth's largest research university.

Overall, the 13 counties along the I-81 corridor had a greater increase in population than the seven cities. Only Wythe County experienced a population decline. The fastest growing counties/cities include Frederick County (124 percent), Warren County (119 percent), and the City of Harrisonburg (117 percent). The Cities of Roanoke and Staunton have declined 13 percent and 3.5 percent, respectively.

Table 3-1 Population Trends: I-81 Study Area (1970 to 2003)

	Total Persons		Overall Change (1970-2003)	
County/City	1970	2003	Persons	Percent Change
Smyth County	31,350	32,715	1,365	4.4%
Washington County	40,653	51,433	10,780	26.5%
Wythe County	28,049	27,875	-174	-0.6%
City of Bristol	15,044	17,007	1,963	13.0%
Botetourt County	18,195	31,616	13,421	73.8%
Montgomery County	47,164	86,138	38,974	82.6%
Pulaski County	29,564	34,985	5,421	18.3%
Roanoke County	52,584	86,005	33,421	63.6%
City of Radford	11,595	15,584	3,989	34.4%
City of Roanoke	106,890	93,415	-13,475	-12.6%
City of Salem	24,948	24,873	-75	-0.3%
Augusta County	44,110	67,680	23,570	53.4%
Frederick County	28,899	64,640	35,741	123.7%
Rockbridge County	16,634	20,763	4,129	24.8%
Rockingham County	47,797	69,058	21,261	44.5%
Shenandoah County	22,855	36,868	14,013	61.3%
Warren County	15,300	33,496	18,196	118.9%
City of Harrisonburg[1]	18,951	41,104	22,153	116.9%
City of Staunton	24,394	23,536	-858	-3.5%
City of Winchester[2]	14,643	24,513	9,870	67.4%
Census Block Group Totals	200,890	285,255	84,365	42.0%
I-81 County/City Totals	639,619	883,304	243,685	38.1%
Commonwealth of Virginia	4,602,011	7,389,108	2,787,097	60.6%

Source: DemographicsNow and RKG Associates, 2004
1 Harrisonburg annexed 11.4 acres in 1983, resulting in an increase of 5,729 persons, or 95 percent of the growth between 1980 and 1990.
2 Winchester had an annexation at the end of 1970, resulting in an increase of 4,786 persons, or 86 percent of the growth between 1970 and 1980.

Population in the I-81 study areas has grown at a substantially slower rate since 1970 than that experienced by the rest of Virginia. The southern portion of I-81, which includes the Commonwealth's coal communities, has historically lagged behind the Virginia economy, contributing to the region's slow population growth rates since 1970.

Population Projections

According to projections published by the Virginia Employment Commission, the total population in the cities and counties along I-81 should continue to grow through 2035, but at nearly half the rate of the past three decades (see Table 3-2). Near-term population projections indicate that areas closest to I-81 will continue to have slightly higher growth rates than the overall cities and counties along the I-81 corridor. This is consistent with local land use policies that encourage development along I-81. Population projections beyond

2008 are not available at the Census block group level and, therefore, are not illustrated in the table below.

Table 3-2 Population Projections: I-81 Study Areas (2003 to 2035)

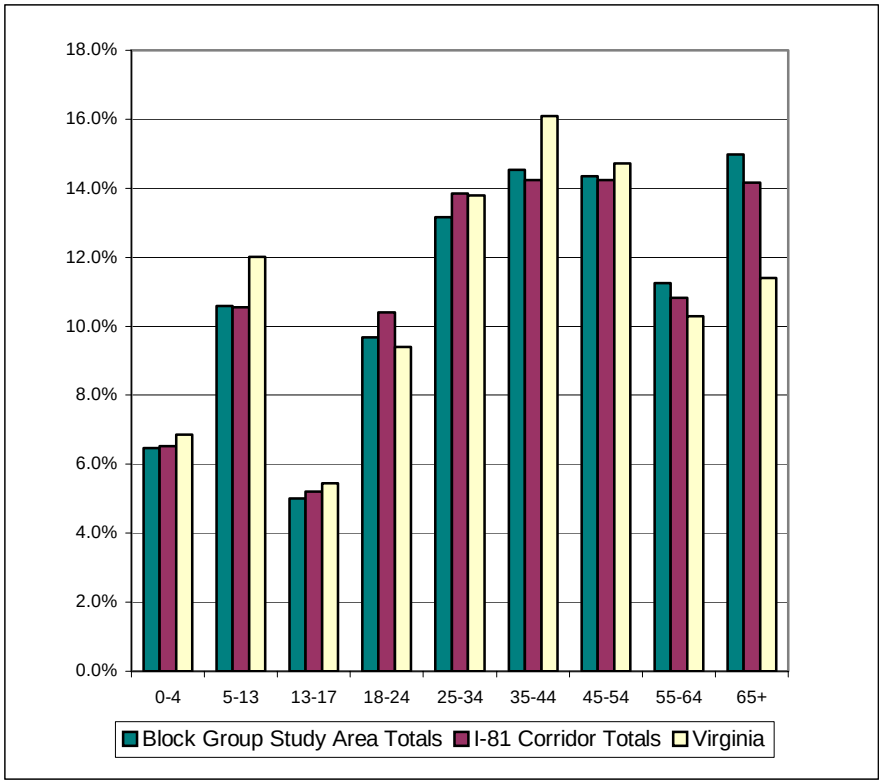
	Total Persons		Overall Change (2003-2035)	
County/City	2003	2035	Persons	Percent Change
Smyth County	32,715	35,654	2,849	8.7%
Washington County	51,433	54,919	3,486	6.8%
Wythe County	27,875	31,135	3,260	11.7%
City of Bristol	17,007	16,302	-705	-4.1%
Botetourt County	31,616	43,246	11,630	36.8%
Montgomery County	86,138	109,105	22,967	26.7%
Pulaski County	34,985	33,950	-1,035	-3.0%
Roanoke County	86,005	101,974	15,969	18.6%
City of Radford	15,584	15,700	116	0.7%
City of Roanoke	93,415	92,153	-1,262	-1.4%
City of Salem	24,873	26,533	1,660	6.7%
Augusta County	67,680	83,623	15,943	23.6%
Frederick County	64,640	104,009	39,369	60.9%
Rockbridge County	20,763	24,087	3,324	16.0%
Rockingham County	69,058	89,254	20,196	29.2%
Shenandoah County	36,868	49,509	12,641	34.3%
Warren County	33,496	47,971	14,475	43.2%
City of Harrisonburg	41,104	57,211	16,107	39.2%
City of Staunton	23,536	21,630	-1,906	-8.1%
City of Winchester	24,513	30,230	5,717	23.3%
I-81 County/City Totals	883,304	1,066,720	183,416	20.8%
Commonwealth of Virginia	7,389,108	9,681,164	2,292,056	31.0%

Source: Virginia Employment Commission and RKG Associates, Inc., 2004

Age Distribution

Figure 3-1 below depicts the estimated age distribution of the current (2003) population for the counties/cities along I-81 (I-81 Corridor), and the Commonwealth of Virginia. Within the I-81 Corridor, roughly 64 percent of the total population is within the age cohort of 18 to 64 years. About 22 percent of the population is under the age of 18 and the remaining 14 percent is 65 or older. Overall, the I-81 Corridor has an older population distribution than Virginia as a whole.

Figure 3-1 Age Distribution of Population: I-81 Study Area



Source: DemographicsNow and RKG Associates, Inc., 2004

3.1.2 Labor Force

The following section examines changes in labor force since 1990 because historical labor force data were not available at the local level before 1990. The data cover 1990 to 2003.

Labor Force Trends

Labor force trends are illustrated in Table 3-3 for the census block groups closest to I-81, the counties/cities along I-81, and the Commonwealth of Virginia. In 1990, the total labor force (ages 16 to 64) for the counties/cities along the I-81 corridor was estimated at 399,500 workers, or roughly 12 percent of Virginia's labor force of 3.3 million. In 2000, this labor force also accounted for nearly 12 percent of Virginia's total, indicating that the labor force in the counties and cities along I-81 grew at a similar pace with the Commonwealth during the 1990s. Since 2000, however, Virginia's labor force has increased more than three times the rate of the counties/cities along I-81. This corresponds with the disparity in population growth between the counties/cities and the rest of Virginia during the same time period.

The census block groups that are closest to I-81 have experienced a slightly higher labor force growth since 1990 as compared to the counties and cities along I-81 (see Table 3-3).

Table 3-3 Labor Force Trends: I-81 Study Area (1990 to 2003)

	Total Workers			Percent Change		
County/City	1990	2000	2003	1990-2000	2000-2003	1990-2003
Smyth County	15,311	15,644	15,450	2.2%	-1.2%	0.9%
Washington County	22,253	24,834	24,952	11.6%	0.5%	12.1%
Wythe County	12,578	13,807	13,924	9.8%	0.8%	10.7%
City of Bristol	8,551	7,643	7,436	10.6%	-2.7%	-13.0%
Botetourt County	13,405	16,178	16,982	20.7%	5.0%	26.7%
Montgomery County	36,436	41,847	41,875	14.9%	0.1%	14.9%
Pulaski County	16,965	17,410	17,282	2.6%	-0.7%	1.9%
Roanoke County	43,664	45,056	45,460	3.2%	0.9%	4.1%
City of Radford	6,815	7,696	7,111	12.9%	-7.6%	4.3%
City of Roanoke	48,278	47,333	46,180	-2.0%	-2.4%	-4.3%
City of Salem	12,467	12,921	12,960	3.6%	0.3%	4.0%
Augusta County	28,663	33,847	35,261	18.1%	4.2%	23.0%
Frederick County	25,051	31,768	35,136	26.8%	10.6%	40.3%
Rockbridge County	9,122	10,497	10,528	15.1%	0.3%	15.4%
Rockingham County	30,822	35,938	36,962	16.6%	2.8%	19.9%
Shenandoah County	16,280	18,262	19,273	12.2%	5.5%	18.4%
Warren County	13,541	16,248	17,395	20.0%	7.1%	28.5%
City of Harrisonburg	15,648	20,729	19,980	32.5%	-3.6%	27.7%
City of Staunton	11,629	11,560	11,297	-0.6%	-2.3%	-2.9%
City of Winchester	12,022	12,788	13,154	6.4%	2.9%	9.4%
Census Block Group Totals	127,342	142,132	144,785	11.6%	1.9%	13.7%
I-81 County/City Totals	399,501	442,006	448,598	10.6%	1.5%	12.3%
Commonwealth of Virginia	3,340,036	3,694,910	3,874,873	10.6%	4.9%	16.0%

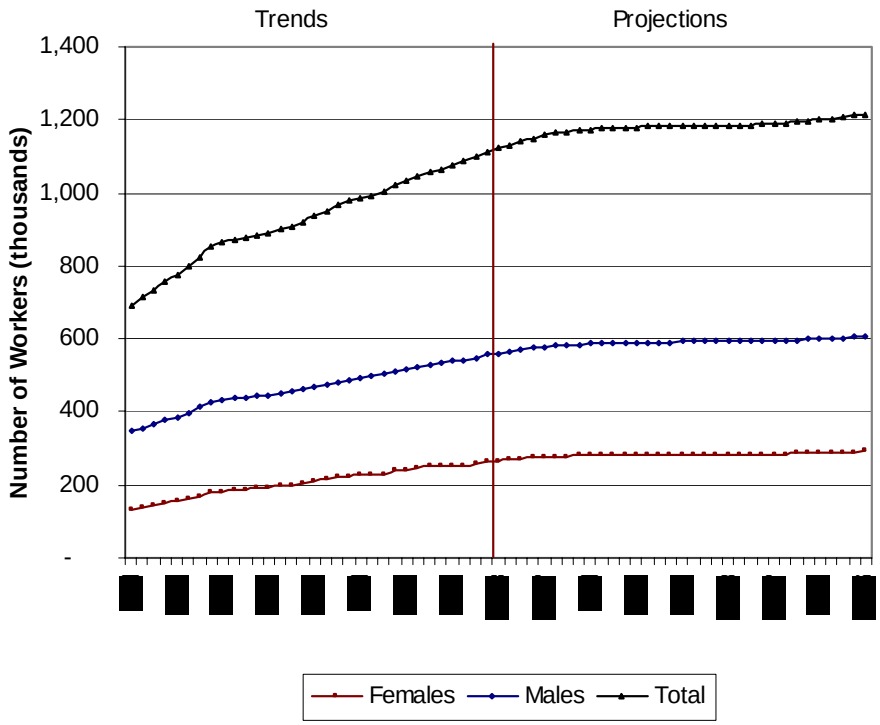
Labor Force Projections

Because no long-term labor force projections were published for the counties/cities along I-81, labor force projections from REMI's Policy Insight econometric model were used. The model projected labor force for the I-81 Corridor Economic Study Region, an area that is larger than the 13 counties and seven cities reported in this section but assumed to be representative of the counties/cities along I-81. More information on the REMI model can be found in Chapter 2 of this Technical Report.

According to the model, the I-81 Corridor Economic Study Region is projected to experience slow labor force growth for the next 10 to 15 years. Beyond 2015, the labor force is projected to level off and increase slightly between 2030 and 2035 (see Figure 3-2).

The growth rate for female workers is projected at 0.3 percent annually until 2035, which is approximately 50 percent higher than the average annual growth rate (0.2 percent) projected for male workers. These projections assume no major changes in the structure of the regional economy.

Figure 3-2 Labor Force Trends and Projections
I-81 Corridor Economic Study Region (1971-2035)



Source: REMI Policy Insight Model and RKG Associates, Inc., 2004

Labor Force Participation

The rate at which people over the age of 15 participate in the labor force is an important economic indicator. Low participation rates can indicate a mismatch between local jobs and the skill levels of local workers. The rate reflects the percentage of people between the ages of 15 and 64 that are either employed or actively seeking employment.

The overall labor participation rate for the I-81 Corridor Economic Study Region was estimated at 73 percent in 2003. This rate has increased nearly 10 percent since 1990 when the

rate was 63 percent. The influx of females in the workforce since the 1970s has steadily raised the participation rate both regionally and nationally (see Table 3-4).

Within the census block groups closest to I-81, labor participation rates are approximately 10 percent less than the county/city averages. This is especially pronounced in the southern part of I-81 where, in 2003, those persons living closest to I-81 participate in the labor force at a rate of 59 percent, nearly 12 percent below the county/city rate.

Labor force participation tends to decrease during periods of economic recession as fewer jobs are available, and as discouraged workers stop seeking employment. In addition, rural areas with fewer employment opportunities can have lower participation rates as do regions undergoing periods of economic transition or restructuring. Such has been the case in Virginia's coalfield economy at the southern end of the I-81 corridor.

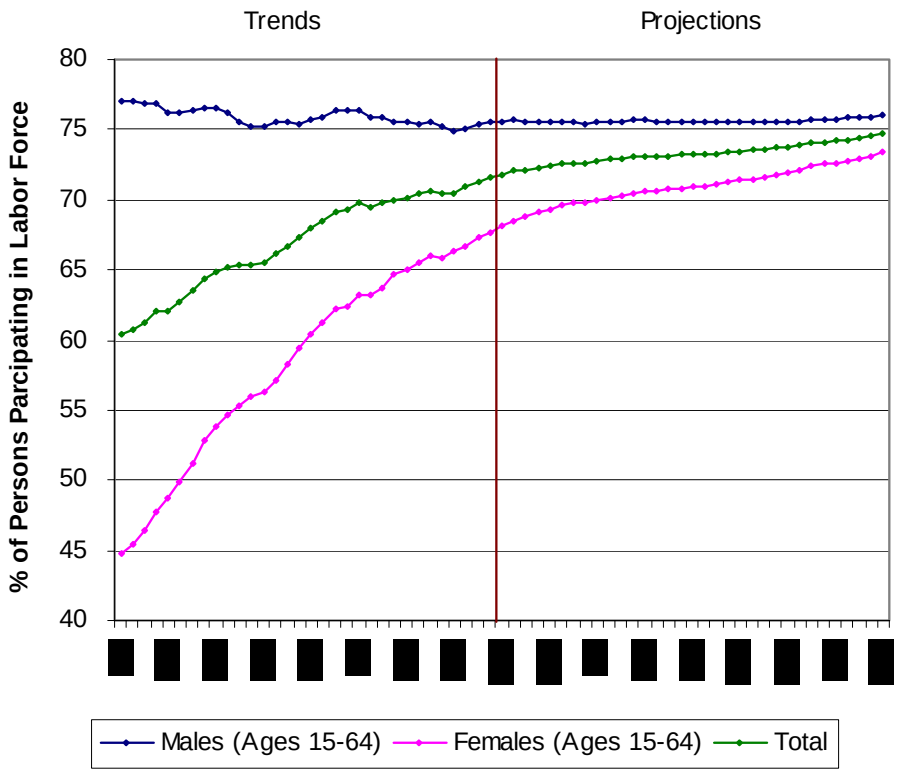
Table 3-4 Labor Force Participation Rates (1990 to 2003): I-81 Study Area

	Percent of Eligible Workforce			Percent Change		
County/City	1990	2000	2003	1990-2000	2000-2003	1990-2003
City of Bristol	56.7%	68.4%	68.3%	20.7%	-0.1%	20.6%
Smyth County	58.9%	70.6%	70.5%	19.9%	-0.2%	19.7%
Washington County	60.4%	71.1%	71.0%	17.8%	-0.2%	17.6%
Wythe County	62.1%	72.4%	72.3%	16.6%	-0.2%	16.5%
Botetourt County	67.2%	75.1%	74.9%	11.7%	-0.2%	11.5%
Montgomery County	58.6%	70.9%	70.8%	21.1%	-0.2%	20.9%
Pulaski County	60.8%	71.8%	71.7%	18.0%	-0.2%	17.8%
City of Radford	48.1%	68.9%	58.8%	43.3%	-0.2%	43.0%
City of Roanoke	62.3%	72.8%	72.7%	16.9%	-0.2%	16.7%
Roanoke County	68.4%	74.5%	74.3%	8.8%	-0.2%	8.6%
City of Salem	63.5%	73.5%	73.4%	15.7%	-0.2%	15.5%
Augusta County	67.0%	74.2%	74.1%	10.7%	-0.2%	10.5%
Frederick County	72.0%	77.0%	76.8%	6.9%	-0.2%	6.7%
City of Harrisonburg	59.2%	71.1%	71.0%	20.1%	-0.2%	19.9%
Rockbridge County	62.1%	72.8%	72.7%	17.3%	-0.2%	17.0%
Rockingham County	68.6%	75.7%	75.6%	10.5%	-0.2%	10.3%
Shenandoah County	64.1%	74.1%	73.9%	15.5%	-0.2%	15.3%
City of Staunton	58.0%	70.8%	70.6%	22.1%	-0.2%	21.9%
Warren County	66.6%	74.1%	75.0%	12.8%	-0.2%	12.6%
City of Winchester	68.0%	75.3%	75.1%	10.7%	-0.2%	10.5%
Census Block Group Totals	63.8%	63.3%	63.1%	-0.7%	-0.4%	-1.1%
I-81 County/City Totals	63.4%	73.1%	73.0%	15.3%	-0.1%	15.2%

Source: DemographicsNow and RKG Associates, Inc., 2004

Using the REMI model, a longer trend and projection period (1971 to 2035) was examined for labor force participation within the I-81 Corridor Economic Study Region. The most dramatic trend has been the steady increase in female participation in the labor force. Since 1971, females between the ages of 15 to 64 have increased their participation levels from 45 percent to 68 percent (see Figure 3-3). During the same period, male participation stabilized at 75 percent to 77 percent. By 2035, male and female labor force participation is projected to be within 2 or 3 percent.

Figure 3-3 Labor Force Participation Rates (1971 to 2035): I-81 Corridor Economic Study Region



Source: DemographicsNow and RKG Associates, Inc., 2004

Unemployment Rates

Based on data obtained from the Virginia Employment Commission, the economy for the counties/cities along I-81 has enjoyed favorable unemployment conditions over the past decade. Despite a sluggish national economy, in 2003, the I-81 study area posted an average annual unemployment rate of 3.9 percent. Since 1994, the study area has experienced a nearly one percent drop in unemployment. Improved employment conditions have occurred as the number of unemployed persons has decreased by over 11 percent since 1994, while the labor force has grown by over 5 percent. A similar trend has occurred at the state level, but the

counties/cities along I-81 outperformed the Commonwealth in this regard during the 1994 to 2003 period (see Table 3-5).

Table 3-5 Unemployment Trends (1994 to 2003): I-81 Study Area

	Unemployment Rate			Change in Rate (1994-2003)		
County/City	1994	1999	2003	1994-1999	1999-2003	1994-2003
City of Bristol	6.2%	3.7%	6.8%	-2.5%	3.1%	0.6%
Smyth County	10.3%	6.1%	9.6%	-4.2%	3.5%	-0.7%
Washington County	6.9%	4.6%	5.9%	-2.3%	1.3%	-1.0%
Wythe County	6.3%	4.1%	5.8%	-2.2%	1.7%	-0.5%
Botetourt County	3.2%	1.8%	2.8%	-1.4%	1.0%	-0.4%
Montgomery County	3.9%	1.8%	2.4%	-2.1%	0.6%	-1.5%
Pulaski County	7.0%	4.4%	7.2%	-2.6%	2.8%	0.2%
City of Radford	5.1%	2.8%	4.6%	-2.3%	1.8%	-0.5%
City of Roanoke	4.5%	2.6%	5.2%	-1.9%	2.6%	0.7%
Roanoke County	2.8%	1.3%	2.5%	-1.5%	1.2%	-0.3%
City of Salem	2.9%	1.6%	3.1%	-1.3%	1.5%	0.2%
Augusta County	5.2%	2.4%	3.1%	-2.8%	0.7%	-2.1%
Frederick County	4.4%	2.1%	3.4%	-2.3%	1.3%	-1.0%
City of Harrisonburg	2.3%	1.3%	2.4%	-1.0%	1.1%	0.1%
Rockbridge County	5.7%	2.1%	3.1%	-3.6%	1.0%	-2.6%
Rockingham County	3.0%	1.3%	2.5%	-1.7%	1.2%	-0.5%
Shenandoah County	3.6%	2.6%	3.8%	-1.0%	1.2%	0.2%
City of Staunton	5.3%	2.3%	3.7%	-3.0%	1.4%	-1.6%
Warren County	5.8%	2.7%	4.0%	-3.1%	1.3%	-1.8%
City of Winchester	5.5%	3.0%	3.3%	-2.5%	0.3%	-2..2%
I-81 County/City Totals	4.6%	2.5%	3.9%	-2.1%	1.4%	-0.7%
Commonwealth of Virginia	4.9%	2.8%	4.1%	-2.1%	1.3%	-0.8%

Source: Virginia Employment Commission and RKG Associates, Inc., 2004

Industry Employment Trends

Over the last 30 years, the I-81 study area has steadily transformed from a primarily manufacturing-based economy to a more service-oriented economy (see Table 3-6). Manufacturing jobs accounted for nearly one-third of all non-farming employment in 1970, as compared to approximately 20 percent of all jobs in 2000. In contrast, the services and retail trade sectors increased its share of all employment from 31.3 percent in 1970 to nearly 44 percent in 2000. The employment growth trends in the different sectors are very similar to the overall population growth numbers. The services and retail trade industries constituted the largest share of growth, while the manufacturing and mining sectors lagged.

Table 3-6 Employment Trends (1970 to 2000): I-81 Study Area

	Total Workers		Overall Change (1970-2000)	
	1970	2000	Workers	Percent Change
Employment Sectors				
Total Non-Farm Employment	232,424	464,569	232,145	99.9%
Agricultural Services	1,406	5,119	3,713	264.1%
Mining	1,399	1,327	(72)	-5.1%
Construction	15,169	29,631	14,462	95.3%
Manufacturing	76,219	92,753	16,534	21.7%
Transportation and Public Utilities	10,954	16,636	5,682	51.9%
Wholesale Trade	6,751	19,524	12,773	189.2%
Retail Trade	33,666	84,715	51,049	151.6%
Finance, Insurance and Real Estate	10,462	26,440	15,978	152.7%
Services	38,993	119,438	80,445	206.3%
Government	37,405	68,986	31,581	84.4%

Source: U.S. Bureau of Economic Analysis and RKG Associates, Inc., 2004

3.1.3 Commercial/Industrial Facilities

The following section discusses commercial and industrial facilities in the I-81 study area.

Industrial Parks

The primary locations for commercial and industrial activity are at the interchanges along I-81. A total of 75 interchanges have commercial and/or industrial uses within the I-81 study area. Five industrial concentrations are found at Exits 22, 47, 50, 118, and 243. These industrial areas are dependent on the interstate highway system for moving intermediate and finished goods.

Commercial Facilities

Within the I-81 study area, there are 557 commercial businesses that are part of the Statewide Travel Information Clearinghouse.[2] These include eating and drinking establishments, hotels and motels, shopping venues, and auto-related services, as listed in Table 3-7.

2 The Statewide Travel Information Clearinghouse is a database maintained by the Virginia Tech Transportation Institute designed to provide travelers, tourists, and local residents' information about traveler services, tourist attractions, and food and lodging venues along the entire 325-mile length of I-81 in Virginia.

Table 3-7 Commercial Business Classifications: I-81 Study Area (2000)

Business Type	Count	Percent of Commercial Businesses	Percent of Total Number of Businesses
Commercial			
Auto Services	58	10.4%	8.8%
Gas & Convenience	102	18.3%	15.5%
Bed & Breakfast	10	1.8%	1.5%
Hotels & Motels	114	20.5%	17.3%
Coffee & Dessert	8	1.4%	1.2%
Fast Food	69	12.4%	10.5%
Family Dining	127	22.8%	19.3%
Fine Dining	3	0.5%	0.5%
Shopping	66	11.8%	10.0%
Total	557	100.0%	84.5%

These businesses tend to serve through traffic because of the convenient on-and-off access of the interchanges. As a result, most commercial interchanges have a collection of gasoline stations, truck stops, fast food restaurants, and hotels/motels that serve the thousands of highway passengers traveling the interstate. Interchanges within the cities and large towns tend to have the highest concentration of development. Exits 117 and 118 in Christiansburg and Exits 245 and 247 in Harrisonburg have the most commercial activity in terms of number of businesses.

In addition to the commercial services at interchanges that support transient traffic, there are 13 commercial centers that support local and regional consumers. These centers typically have a substantial collection of retail opportunities and are near Exits 5, 7, 14, 17, 35, 70, 81, 118, 143, 227, 243, 247, 283, and 313. The commercial centers at Exits 7 (Bristol), 118 (Christiansburg), 247 (Harrisonburg), and 313 (Winchester) are regional shopping centers that offer more commercial development than the local population alone could typically support. At Exit 243 in Harrisonburg, there is a large car dealership, known as the Harrisonburg Auto Auction, as well as a Holiday Inn, Red Carpet Inn, and Ramada Inn. East of Exit 283 in Woodstock, there is a collection of auto service businesses, such as Sunoco, Exxon, Shell, and Liberty, as well as fast food restaurants and a Wal-Mart store.

A portion of the commercial development within the I-81 study area is along U.S. Route 11. U.S. Route 11 runs roughly parallel to I-81, staying close to the interstate and crossing it in several locations. The commercial development along U.S. Route 11 tends to serve local and regional consumer needs rather than through traffic. The commercial and industrial uses along the highway are, however, dependent on I-81 for receiving supplies, equipment, and shipping products.

Tourism-Related Industries

Many of the economies of the communities along I-81 corridor are partly based on tourism-related businesses. Visitors are attracted to the region by recreational opportunities in the Shenandoah Valley and Blue Ridge Mountains, American Civil War history, and numerous attractions. The Shenandoah Valley is home to several prominent national battlefield sites from the Civil War. Table 3-8 lists tourism-related businesses in the I-81 study area by classification. Several businesses have multiple classifications but were listed once based on the primary function of the business.

Table 3-8 Tourism-Related Business Classifications: I-81 Study Area (2000)

Business Type	Count	Percent of Recreational Businesses	Percent of Total Number of Businesses
Recreational			
Campgrounds	13	12.7%	2.0%
Outdoor Activities	24	23.5%	3.6%
Family Fun	12	11.8%	1.8%
Museums & Historic Places	24	23.5%	3.6%
Theaters	15	14.7%	2.3%
Visitor & Tour Centers	12	11.8%	1.8%
Wineries	2	2.0%	0.3%
Total	102	100.0%	15.5%

Of the 102 businesses classified as recreational, roughly 47 percent are traditional tourist destinations (outdoor activities and museums/historic places). Other notable destinations are the Civil War battlefields and several large attractions near I-81, namely the Appalachian Trail (Exits 54 and 150), Luray Caverns (Exit 264), Shenandoah National Park (several interchanges between Mileposts 220 and 300), Natural Bridge (Exit 175), and Bristol Motor Speedway (Exit 5).

Proposed Development

Local planning professionals were interviewed in the summer of 2004 to identify economic development plans and proposed development projects at interchanges along I-81 that could influence future traffic demands along and adjacent to the corridor. Table 3-9 details the information gathered from the interviews.

Table 3-9 Proposed Development Projects: I-81 Study Area

Community	Plans
Washington County	Exit 14 is zoned for commercial and is the proposed site of a new Wal-Mart store. The property is near a residential development.
City of Bristol	Commercial development is being pushed at Exits 5 and 7. A major retail establishment is planned for Exit 5.
Smyth County	Commercial development exists along I-81, with the potential for industrial development at Exits 35 and 39. The potential for industrial development also exists on both sides of I-81 at Exit 47. South of Exit 35, the land is rural residential. Development potential at Exit 50 includes a retirement home and apartment complexes near the site of a church complex.
Wythe County	Musser Lumber continues expansion of its lumber operation north of Exit 60 at Rural Retreat. Northwest of Exit 73 at Wytheville, the Pepsi Bottling Company has opened a plant within the Wytheville corporate limits. Northeast of this interchange, Wythe County is developing a 1,200-acre industrial park, known as Progress Park. The southern portion of this park is accessed by a service road between Exits 73 and 77. The northern portion of the park is accessed by State Route 610 and Peppers Ferry Road. The latter is accessed by Exit 42 on I-77 or Exit 80 on I-81. Exits 77 through 84 have seen strong growth in travel/tourism service businesses because of the overlap of Interstates 77 and 81 within this corridor and the water/sewer services available. Examples are truck stops, motels, gas stations, and restaurants.
Pulaski County	Groundbreaking for a Lowe's store is to commence during the fall of 2004 in Fairlawn.
Montgomery County	Exit 105 has adequate utility connections and is fully planned for industrial and some residential development. Ideally, planning personnel would like to see commercial activity also incorporated. Also, at Exit 109, there are utility connections and the area has potential for development. The Ironto interchange in the eastern portion of the county has potential for industrial development as water and sewer services are available in this area.
City of Roanoke	Cove Road and Route 419 have potential for development.
City of Salem	Everything from Exits 137 to 141 adjacent to I-81 is residential from Exits 137 to 141 with other areas along the corridor zoned for commercial activity. Generally, the City is at capacity for development. No development (especially commercial) is wanted at Exit 140 on Salem property because this is the most scenic entrance into Salem.
Roanoke County	Exit 132 at Dixie Caverns is being planned for an expanded industrial park. Exit 146 at Plantation Road has potential for commercial and industrial development. Generally, the County is emphasizing commercial and industrial development and discourages residential development along I-81 and at interchanges.
Botetourt County	No large developments are proposed at this time, although there is potential for small commercial/residential development at interchanges in the northern portion of the County. At interchanges, the future land use plans are for low-density commercial. Residential development would abut I-81, but noise may be prohibitive for such plans.
Rockbridge County	No large projects have been proposed, however, there is the potential for an industrial park to be located at the Raphine interchange.
City of Staunton	Converting the Frontier Culture Museum property to massive commercial development is being proposed by the Mayor.
Rockingham County	Southeast of the Mt. Crawford interchange, a Wal-Mart distribution center is being constructed. Water and sewer connections are expected by summer 2004. Other possible uses at this interchange include offices and lodging. The northernmost interchange in the county is used for agricultural purposes, but it is anticipated that a service station and convenience store will be built. The next interchange south on I-81 is anticipated to include a mixture of lodging and restaurants and is anticipated to be complete during summer 2004.
City of Harrisonburg	The possibility exists for small-scale retail uses to occur at Country Club Road (which may be widened) and Linda Lane.
Shenandoah County	At the northern end of the county at Strasburg, there is a proposed expansion of the industrial park along Radio Road to connect U.S. Route 11 and Route 55 with I-81. Industrial potential also exists at Mt. Jackson in the southern end of the county.

3.2 Rail Study Area

All the rail improvements under consideration, except for those proposed in rail improvement section 7 at Riverton Junction, would occur within the rail right-of-way. For purposes of this Tier 1 analysis, it is assumed that the potential rail improvements within the rail right-of-way do not affect local economic conditions. For this reason, the economic setting for the rail study area was limited to rail improvement section 7. Two block groups are within this rail section. A review of aerial photographs indicates that there is little economic activity around the rail section. The only non-residential property in the study area is a farm.

3.2.1 Population and Employment Characteristics

Population Trends

The 2003 population for the two block groups within rail improvement section 7 was approximately 2,500 people (see Table 3-10) within 780 households. Since 1990, the population has increased 36 percent while the number of households increased 33 percent. Both these growth rates outpaced the population and number of households for the I-81 study area (13 and 23 percent, respectively) and Virginia (19 and 29 percent, respectively).

Table 3-10 Population Trends (1990 to 2003): Rail Section 7

	Persons		Overall Change (1990-2003)	
	1990	2003	Persons	Percent Change
Rail Block Group Totals	1,816	2,461	645	35.5%
I-81 County/City Totals	782,144	883,304	101,160	12.9%
Commonwealth of Virginia	6,187,393	7,389,108	1,201,715	19.4%

Age Distribution

The median age within the Riverton Junction block group area was 29.8 in 2004. This is well below the median age for the I-81 corridor (37.7 years) and the Commonwealth of Virginia (36.7 years). This disparity is primarily due to the comparatively high concentration of 5- to 17-year-old persons (26 percent). In comparison, 5- to 17-year-olds only constitute 16 percent of the I-81 study area and 18 percent of Virginia (see Table 3-11).

Table 3-11 Age Distribution of Population: Rail Section 7

	Age									Total	Median
	0-4	5-13	13-17	18-24	25-34	35-44	45-54	55-64	65+	Population	Age
Net Population											
Rail Block Group Totals	145	363	277	325	254	362	288	253	194	2,461	29.8
I-81 County/City Totals	57,554	92,893	45,877	91,668	122,046	125,467	125,423	95,378	124,773	881,079	37.7
Commonwealth of Virginia	505,241	886,083	402,040	692,350	1,016,299	1,186,039	1,085,476	758,649	840,735	7,372,912	36.7
Percentage of Population											
Rail Block Group Totals	5.9%	14.8%	11.3%	13.2%	10.3%	14.7%	11.7%	10.3%	7.9%	100.0%	-
I-81 County/City Totals	6.5%	10.5%	5.2%	10.4%	13.9%	14.2%	14.2%	10.8%	14.2%	100.0%	-
Commonwealth of Virginia	6.9%	12.0%	5.5%	9.4%	13.8%	16.1%	14.7%	10.3%	11.4%	100.0%	-

3.2.2 Labor Force

Labor Force Trends

The Riverton Junction block group area had a labor force of 1,274 workers in 2003, representing a nearly 10 percent increase from the 2000 Census (see Table 3-12). This growth in labor force is higher than comparable trends for the I-81 corridor and the Commonwealth. This finding is consistent with the population growth data. It is likely that the increase in population is due to new households moving into the area, bringing additional participants into the labor force.

Table 3-12 Labor Force Trends and Participation Rate (1990 to 2003): Rail Section 7

	Total Workers			Percent Change		
	1990	2000	2003	1990-2000	2000-2003	1990-2003
Labor Force Trends						
Rail Block Group Totals	993	1,164	1,274	17.2%	9.5%	28.3%
I-81 County/City Totals	399,501	442,006	448,598	10.6%	1.5%	12.3%
Commonwealth of Virginia	3,340,036	3, 694,910	3,874,873	10.6%	4.9%	16.0%
Labor Force Participation Rate	Percent of Eligible Workers					
Rail Block Group Totals	70.2%	67.2%	66.6%	-4.3%	-0.9%	-5.1%
I-81 County/City Totals	63.6%	63.3%	63.1%	-0.7%	-0.4%	-1.1%
Commonwealth of Virginia	63.4%	73.1%	73.0%	15.3%	-0.1%	15.2%

Labor Force Participation

Labor force participation within the Riverton Junction area (also presented in Table 3-12) was 66.6 percent in 2003. This is higher than the I-81 study area but below the Commonwealth's average. Labor force participation in the block group area has steadily declined in the Riverton Junction study area since 1990. Participation has declined from slightly more than 70 percent in 1990 to under 67 percent in 2003. This trend contrasts both the I-81 study area, which remained relatively stable, and the rest of Virginia, which realized an increase in labor force participation.

3.2.3 Commercial/Industrial Facilities

There are no commercial facilities/centers or industrial parks within 500 feet of the rail line at Riverton Junction.

Proposed Development

There is no known proposed development within 500 feet of the rail line at Riverton Junction.

4

Baseline Trends and Economic Consequences

This section discusses baseline economic trends and the potential effects the improvement concepts may have on the future local and regional economies. Existing and future economic conditions are represented by a variety of economic indicators including population and employment growth, gross regional product, real disposable income, and delivered price. For economic analysis purposes, three economic "study regions" were defined: 1) the I-81 Corridor Economic Study Region, 2) the Commonwealth of Virginia (rest of Virginia), and 3) the I-81 Trade Area.

4.1 Baseline Economic Trends

The data presented in this section highlight the socioeconomic growth within the three study regions between 1970 and 2000. These data detail the patterns for each study region's social and economic development and provides the necessary background to better understand the context in which the REMI model generates future projections.

4.1.1 Population

Generally, increases in population are an indication of the desirability of an area as a place to live. Regions that provide the most attractive combination of quality of life, employment opportunities, recreational amenities, and ease of access to other regions tend to experience the largest population gains. Conversely, areas that have poor employment opportunities, have few amenities, and are geographically remote or isolated, generally tend to have flat or negative population changes.

The population in each of the three regions has steadily increased since 1970. Growth in population in the communities within the I-81 Corridor Economic Study Region has outpaced the I-81 Trade Area, but has not kept pace with the rest of Virginia. The population in the I-81 Corridor Economic Study Region has increased by nearly 260,000, or 31 percent, between 1970

and 2000. In comparison, the population of Virginia has increased by 57 percent over the same time period, while the population of the I-81 Trade Area increased 26 percent (see Table 4-1).

Figure 4-1 reveals the percentage population growth in five-year increments for each of the three study areas. As seen in the figure, the population of Virginia has increased between 6 percent and 10 percent every five years since 1970. The population in the I-81 Corridor Economic Study Region increased substantially in the early 1970s, but has been comparatively lower than Virginia since then.

Table 4-1 Population Growth Trends (in Thousands)

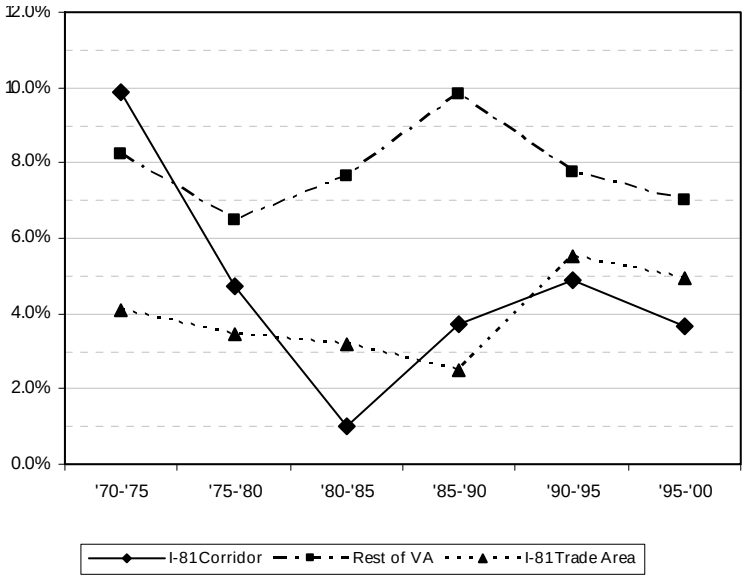
	1970	1975	1980	1985	1990	1995	2000	'70-'00
Net Population								
I-81 Corridor	834.8	917.4	961.0	970.6	1,006.8	1,056.0	1,094.5	-
Rest of VA	3,825.2	4,139.0	4,407.3	4,744.5	5,210.1	5,614.7	6,009.5	-
I-81 Trade Area	127,663.7	132,861.7	137,422.0	141,805.0	145,338.0	153,381.6	160,934.5	-
Net Change								
I-81 Corridor	N/A	82.6	43.6	9.7	36.1	49.2	38.5	259.7
Rest of VA	N/A	313.8	268.4	337.2	465.6	404.6	394.8	2,184.3
I-81 Trade Area	N/A	5,198.0	4,560.3	4,383.0	3,533.0	8,043.7	7,552.9	33,270.8
Growth Rate								
I-81 Corridor	N/A	9.9%	4.7%	1.0%	3.7%	4.9%	3.6%	31.1%
Rest of VA	N/A	8.2%	6.5%	7.6%	9.8%	7.8%	7.0%	57.1%
I-81 Trade Area	N/A	4.1%	3.4%	3.2%	2.5%	5.5%	4.9%	26.1%

Source: REMI and RKG Associates, 2004

In the recent past, population growth in the rest of Virginia and the I-81 Trade Area has outpaced the I-81 Corridor Economic Study Region. The population in the I-81 Corridor Economic Study Region has increased approximately four percent every five years since 1985, while the I-81 Trade Area has increased approximately five percent and Virginia has increased 8 percent every five years.

The data indicate that population growth in the I-81 Corridor Economic Study Region has historically been competitive with the rest of Virginia. However, recent trends indicate that the I-81 Corridor Economic Study Region has experienced more modest population growth.

Figure 4-1 Population - Percentage Growth Trends 1970-2000



4.1.2 Employment

Similar to population, changes in employment levels are a good indicator of economic vitality within a region. Regions that provide competitive advantages to businesses, such as lower cost labor, transportation, and fuel costs, will attract more commercial development than those that have high costs of doing business.

Private non-farm employment growth has been fairly robust in each of the three study regions between 1970 and 2000. The cities and counties that compose the I-81 Corridor Economic Study Region experienced an increase in employment of 246,000 jobs, or 76 percent, during this time period (see Table 4-2). In comparison, the rest of Virginia outperformed the I-81 Corridor at a 134 percent growth in employment, while the I-81 Trade Area was comparable to the I-81 Corridor at 72 percent.

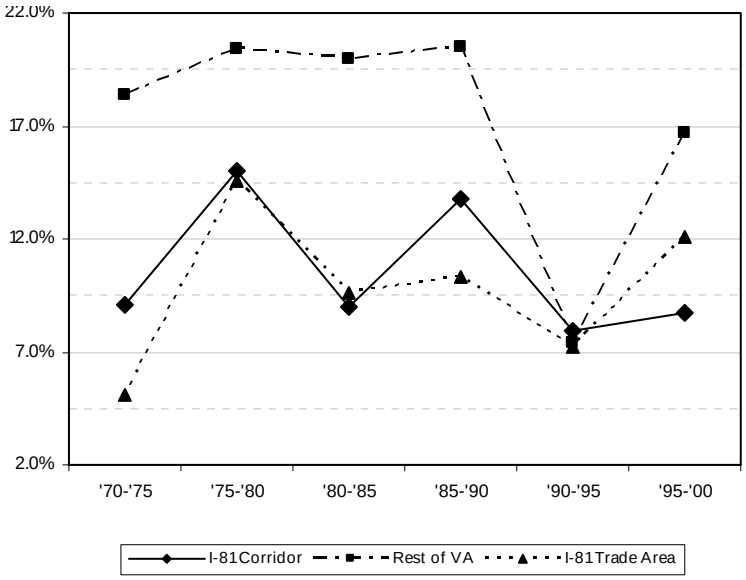
Figure 4-2 depicts the percentage growth of employment in each of the three study regions at five-year increments. Similar to population trends, the I-81 Corridor Economic Study Region experienced comparable growth rates to the greater I-81 Trade Area, but lagged behind the employment growth of the rest of Virginia. Employment growth in the I-81 Corridor Economic Study Region ranged from 8 to 15 percent in each five-year period between 1970 and 2000. In contrast, Virginia experienced growth rates over 17 percent every five years, except between 1990 and 1995. This disparity during the early 1990s is likely due to the economic recession during the early 1990s and the deep cuts in national defense spending since the end of the Cold War. These impacts were particularly felt in the Northern Virginia and Hampton Roads areas, where there are concentrations of defense-related industries.

Table 4-2 Private, Non-Farm Employment Growth Trends (in Thousands)

	1970	1975	1980	1985	1990	1995	2000	'70-'00
Net Employment								
I-81 Corridor	297.5	324.7	373.4	407.2	463.2	499.9	543.7	-
Rest of VA	1,169.0	1,383.8	1,666.5	1,999.8	2,408.9	2,587.5	3,019.7	-
I-81 Trade Area	45,771.3	48,119.3	55,141.9	60,440.0	66,676.6	71,508.8	80,166.4	-
Net Change								
I-81 Corridor	N/A	27.1	48.8	33.7	56.0	36.7	43.8	246.2
Rest of VA	N/A	214.8	282.7	333.3	409.1	178.6	432.3	1,850.7
I-81 Trade Area	N/A	2,348.1	7,022.6	5,298.1	6,236.6	4,832.2	8,657.5	34,395.1
Growth Rate								
I-81 Corridor	N/A	9.1%	15.0%	9.0%	13.8%	7.9%	8.8%	82.7%
Rest of VA	N/A	18.4%	20.4%	20.0%	20.5%	7.4%	16.7%	158.3%
I-81 Trade Area	N/A	5.1%	14.6%	9.6%	10.3%	7.2%	12.1%	75.1%

Source: REMI and RKG Associates, 2004

Figure 4-2 Private Non-Farm Employment – Percentage Growth Trends 1970-2000



The mix of employment has shifted substantially during this time period. In each of the three regions, manufacturing employment has declined as a percentage of all employment. In the communities included in the I-81 Corridor Economic Study Region, manufacturing jobs dropped from 34 percent of total employment in 1970 to only 21 percent in 2000. Table 4-3

shows that similar changes occurred in the rest of Virginia (23 percent to 10 percent) and the I-81 Trade Area (30 percent to 14 percent) as well. Net employment in manufacturing jobs increased in both the I-81 Corridor and the rest of Virginia, just not at the same pace as the rest of the industry sectors.

In contrast to the manufacturing sector, the share of employment attributed to the service sector increased substantially in each region. The I-81 Corridor Economic Study Region service sector's share of employment increased from 22 to 31 percent between 1970 and 2000. Virginia (26 to 41 percent) and the I-81 Trade Area (23 to 37 percent) experienced similar growth in service sector jobs.

Table 4-3 Total Employment, By Share of Region

	I-81 Corridor Economic Study Region				Rest of Virginia				I-81 Trade Area			
	1970	2000	Net Change	Percent Change	1970	2000	Net Change	Percent Change	1970	2000	Net Change	Percent Change
Private Non-Farm	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%
Manufacturing	33.5%	20.8%	-12.7%	-37.9%	23.0%	9.5%	-13.4%	-58.5%	30.0%	14.3%	-15.6%	-52.2%
Durables	11.5%	10.6%	-1.0%	-8.3%	9.7%	5.1%	-4.6%	-47.4%	16.5%	8.3%	-8.2%	-49.8%
Non-Durables	21.9%	10.2%	-11.7%	-53.4%	13.3%	4.4%	-8.8%	-66.6%	13.5%	6.0%	-7.4%	-55.1%
Non-Manufacturing	66.5%	79.2%	12.7%	19.1%	77.0%	90.5%	13.4%	17.4%	70.0%	85.7%	15.6%	22.3%
Ag. For. & Fish.	0.7%	1.4%	0.7%	101.8%	0.7%	1.3%	0.6%	85.8%	0.6%	1.2%	0.7%	122.2%
Mining	1.8%	0.8%	-1.0%	-57.6%	0.9%	0.3%	-0.7%	-70.3%	1.1%	0.7%	-0.4%	-38.5%
Construction	7.2%	7.6%	0.4%	5.6%	8.3%	8.0%	-0.3%	-4.0%	6.1%	6.7%	0.6%	10.5%
TCPU	7.9%	5.4%	-2.5%	-31.8%	7.0%	6.1%	-0.9%	-13.2%	6.7%	6.0%	-0.7%	-10.9%
FIRE	6.0%	6.9%	0.9%	14.3%	9.4%	9.4%	0.0%	0.1%	8.2%	9.5%	1.3%	15.5%
Retail Trade	17.5%	21.6%	4.2%	23.9%	20.2%	19.7%	-0.5%	-2.6%	18.3%	19.1%	0.8%	4.4%
Wholesale Trade	4.0%	4.9%	0.9%	22.1%	4.8%	4.5%	-0.3%	-6.6%	5.9%	5.4%	-0.4%	-7.6%
Services	21.5%	30.7%	9.2%	42.9%	25.7%	41.2%	15.5%	60.6%	23.2%	37.1%	13.8%	59.6%

Source: REMI and RKG Associates, 2004

4.1.3 Gross Regional Product

The concept of gross regional product (GRP) is a measure of total economic output, analogous to gross domestic product, which is used to describe regional economic activity. The REMI model measures the past and projected GRP for each study region.

The GRP for the I-81 Corridor Economic Study Region has increased steadily since 1970. The GRP of the communities along the I-81 Corridor has increased $23 billion, or 136 percent, between 1970 and 2000 (see Table 4-4). This growth is slightly below the rest of Virginia growth (144 percent) and slightly higher than the I-81 Trade Area (125 percent).

Table 4-4 Gross Regional Product Growth Trends (in Fixed 1996 Billions)

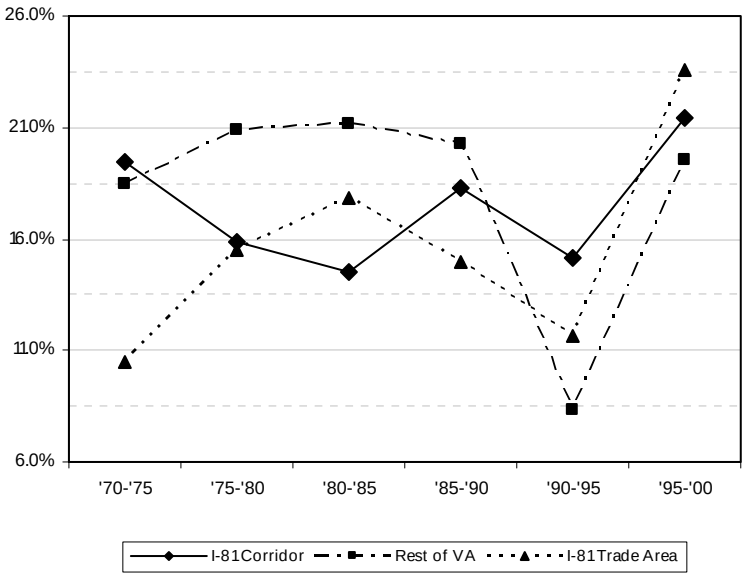
	1970	1975	1980	1985	1990	1995	2000	'70-'00
Net Employment								
I-81 Corridor	$14.2	$16.9	$19.6	$22.5	$26.6	$30.6	$37.2	-
Rest of VA	$80.1	$94.9	$114.7	$139.0	$167.2	$181.1	$216.4	-
I-81 Trade Area	$2,251.4	$2,488.4	$2,874.6	$3,386.9	$3,894.1	$4,347.4	$5,371.6	-
Net Change								
I-81 Corridor	N/A	$2.8	$2.7	$2.8	$4.1	$4.0	$6.6	$23.0
Rest of VA	N/A	$14.8	$19.8	$24.3	$28.2	$13.9	$35.3	$136.3
I-81 Trade Area	N/A	$237.0	$386.2	$512.4	$507.2	$453.3	$1,024.2	$3,120.2
Growth Rate								
I-81 Corridor	N/A	19.5%	15.9%	14.5%	18.3%	15.2%	21.5%	162.2%
Rest of VA	N/A	18.4%	20.9%	21.2%	20.3%	8.3%	19.5%	170.2%
I-81 Trade Area	N/A	10.5%	15.5%	17.8%	15.0%	11.6%	23.6%	138.6%

Source: REMI and RKG Associates, 2004

As seen in Figure 4-3, the percentage growth increments for the I-81 Corridor Economic Study Region have ranged between 14 percent and 22 percent every five years. The rest of Virginia has been slightly higher, consistently near 21 percent, except between 1990 and 1995. As mentioned earlier, this drop off is most likely due to the reduction in federal spending on national defense. The Northern Virginia and Hampton Roads areas are more heavily influenced by these types of spending changes than the I-81 Corridor. Trends for the I-81 Trade Area reflect a more modest version of Virginia trends, with slightly less impact during the early 1990s.

The data indicate that the I-81 Corridor Economic Study Region and the I-81 Trade Area have experienced a more substantial gain in total economic output (136 percent and 125 percent, respectively) as compared to employment gains (76 percent and 72 percent, respectively) than Virginia (144 percent product output and 134 percent employment gains). This is likely due to the different employment composition of the regions. The I-81 Corridor and the I-81 Trade Area have a higher concentration of manufacturing employment and much smaller shares of service sector employment. While service industries tend to have to hire additional staff to become more productive, manufacturing industries tend to invest in new technologies that allow greater productivity without increasing human capital.

Figure 4-3 Gross Regional Product - Percentage Growth Trends 1970-2000



4.1.4 Import/Export Trade Balance

Another means to measure economic vibrancy is by the relative import/export trade balance. While GRP is a solid measure for net production output growth, it does not account for intermediate input production or use. As a result, the GRP for regions that produce (or consume) large amounts of intermediate inputs does not reflect this activity. The import/export trade analysis includes the use and production of intermediate inputs.

Economies that export more goods and services, in terms of dollar value, tend to experience more robust economic growth, since more money is entering the local economy than is being spent elsewhere. Conversely, local economies that import more goods and services (in dollar terms) than they export tend to require alternative means to increase economic activity, such as greater employment growth or increased household spending.

The I-81 Corridor Economic Study Region was the only region to experience a greater increase in the value of its exports than the value of its imports between 1970 and 2000. Exports increased $23.8 billion (in fixed 1996 dollars) during this time period from $13.6 billion to $37.3 billion. In comparison, the value of all imports into the region only increased $22.4 billion (see Table 4-5). The rest of Virginia experienced an increase of more than $32 billion more for imported goods and services than exported goods and services, for a percent shift of 30.2 percent. The I-81 Trade Area also experienced a higher net growth of import value, but at a lower percent difference (19.7 percent) than the rest of Virginia (32.4 percent).

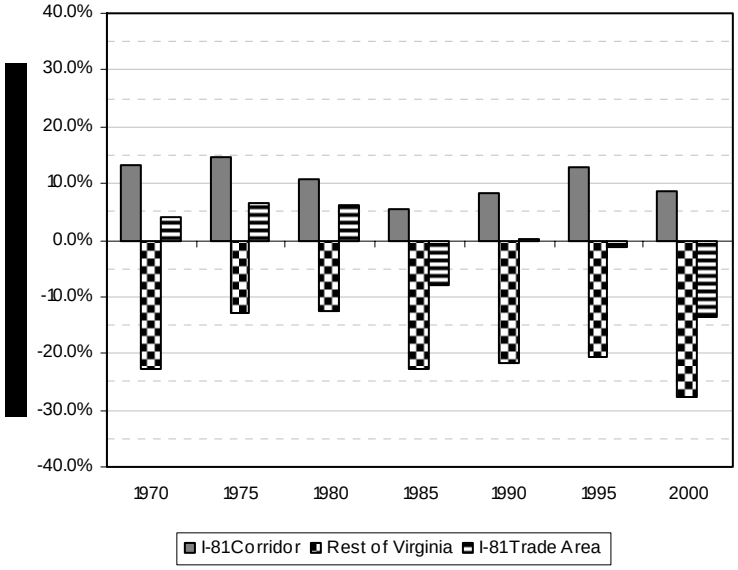
Table 4-5 Import/Export Trade Balance Trends (in Fixed 1996 Billions)

	1970	1975	1980	1985	1990	1995	2000	'70-'00	1970
I-81 Corridor									
Exports	$13.6	$16.2	$19.1	$21.0	$24.3	$29.5	$37.3	$23.8	$13.6
Imports	$12.0	$14.1	$17.2	$19.9	$22.4	$26.1	$34.4	$22.4	$12.0
Trade Balance	$1.6	$2.1	$1.8	$1.1	$1.9	$3.4	$2.9	$1.3	$1.6
% Difference	13.2%	14.7%	10.6%	5.4%	8.4%	13.0%	8.5%	5.9%	13.2%
Rest of Virginia									
Exports	$40.9	$52.7	$64.8	$72.7	$85.0	$94.0	$115.9	$74.9	$40.9
Imports	$53.0	$60.4	$74.0	$94.1	$108.2	$118.7	$160.3	$107.3	$53.0
Trade Balance	($12.0)	($7.7)	($9.2)	($21.4)	($23.3)	($24.7)	($44.4)	($32.4)	($12.0)
% Difference	-22.7%	-12.8%	-12.4%	-22.8%	-21.5%	-20.8%	-27.7%	-30.2%	-22.7%
I-81 Trade Area									
Exports	$468.5	$556.7	$699.3	$789.7	$956.2	$1,158.0	$1,516.2	$1,047.7	$468.5
Imports	$451.0	$522.8	$658.5	$858.2	$955.3	$1,170.5	$1,756.3	$1,305.3	$451.0
Trade Balance	$17.5	$34.0	$40.8	($68.6)	$1.0	($12.5)	($240.1)	($257.6)	$17.5
% Difference	3.9%	6.5%	6.2%	-8.0%	0.1%	-1.1%	-13.7%	-19.7%	3.9%

Source: REMI and RKG Associates, 2004

As seen in Figure 4-4, only the I-81 Corridor Economic Study Region maintained a net export trade balance over the 30-year period, ranging from 5 to 15 percent higher values of its exports than its imports. In comparison, the I-81 Trade Area experienced a net export trade balance until 1980. After that, the region consumed more goods and services produced elsewhere than it shipped goods and services to those areas (except for 1990). The rest of Virginia has historically been a net importer of goods and services. The value of goods and services imported into Virginia have been 12 to 28 percent higher than the goods and services exported.

Figure 4-4 Import/Export Trade Balance – Comparison of Export to Import Levels 1970-2000



These findings are consistent with previous data reported in this analysis. Manufacturing industries tend to export higher-value goods than they import for production. As a result, the I-81 Corridor Economic Study Region, with its higher concentration of manufacuring employment, is more likely to have a higher concentration of product output than the other two regions.

4.1.5 Real Disposable Personal Income

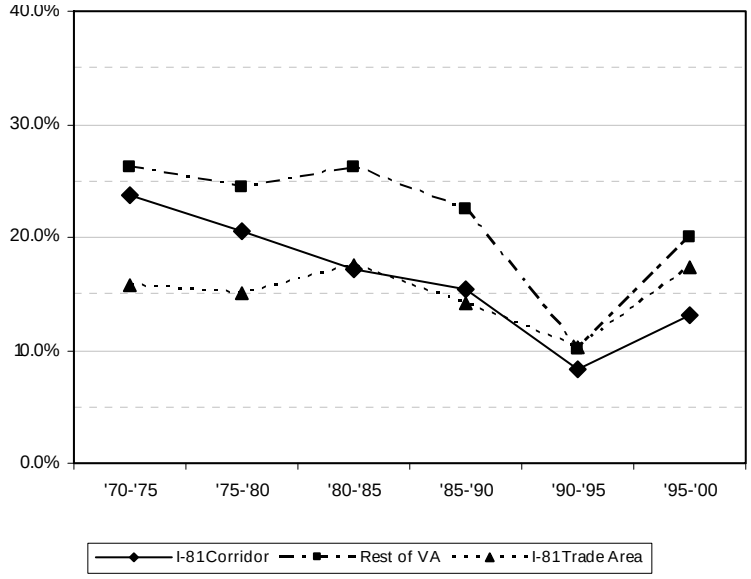
Real disposable personal income measures the amount of net income remaining for all employed persons who live within a particular region after adjusting for taxes and cost of living. Changes in real disposable personal income indicate whether the wages of residents are increasing faster, slower, or at the same rate as their basic expenses. Increases in average real disposable personal income is generally an indicator of positive job growth and improved living conditions (increases in salaries and wages above basic expenses). Conversely, a decrease in real disposable personal income is an indication that taxes and cost of living are increasing faster than salaries and wages.

The real disposable personal income for residents living in the I-81 Corridor Economic Study Region was $20.8 billion (in fixed 1996 dollars) in 2000, up from $8.4 billion in 1970 (see Table 4-6). This increase constitutes a growth rate of 4.9 percent annually during this time period. The I-81 Trade Area's growth rate was slightly lower at 4.4 percent. In comparison, the rest of Virginia experienced a higher growth rate for real disposable personal income at 7.4 percent annually.

As Figure 4-5 shows, the I-81 Corridor Economic Study Region has consistently lagged behind Virginia in percentage growth of real disposable personal income. This is most likely due to the

faster employment growth in the eastern portion of the Commonwealth. The I-81 Corridor compared favorably against the Trade Area up to 1990. Since 1990, the I-81 Trade Area has surpassed the I-81 Corridor region. It is believed that this shift in trends is primarily due to the larger Trade Area rebounding from the recession of the early 1990s more completely than the I-81 Corridor region.

Figure 4-5 Real Disposable Personal Income – Percentage Growth Trends 1970-2000



As mentioned, these findings are consistent with employment growth trends. The rest of Virginia region experienced a much faster growth in employment than the I-81 Corridor Economic Study Region or the I-81 Trade Area. Since disposable income measures gross totals, real disposable personal income has increased substantially faster within the rest of Virginia as well.

Table 4-6 Real Disposable Personal Income Growth Trends (in Fixed 1996 Billions)

	1970	1975	1980	1985	1990	1995	2000	'70-'00
Net Annual Wage Rate								
I-81 Corridor	$8.4	$10.4	$12.6	$14.7	$17.0	$18.4	$20.8	-
Rest of VA	$46.4	$58.6	$72.9	$92.0	$112.7	$124.0	$148.8	-
I-81 Trade Area	$1,617.5	$1,872.1	$2,155.3	$2,534.7	$2,894.0	$3,190.1	$3,745.7	-
Net Change								
I-81 Corridor	N/A	$2.0	$2.1	$2.1	$2.3	$1.4	$2.4	$12.4
Rest of VA	N/A	$12.2	$14.3	$19.1	$20.7	$11.3	$24.9	$102.4
I-81 Trade Area	N/A	$254.5	$283.2	$379.4	$359.3	$296.2	$555.6	$2,128.2
Growth Rate								
I-81 Corridor	N/A	23.8%	20.6%	17.1%	15.4%	8.4%	13.1%	147.3%
Rest of VA	N/A	26.2%	24.4%	26.2%	22.5%	10.0%	20.1%	220.6%
I-81 Trade Area	N/A	15.7%	15.1%	17.6%	14.2%	10.2%	17.4%	131.6%

4.1.6 Delivered Price

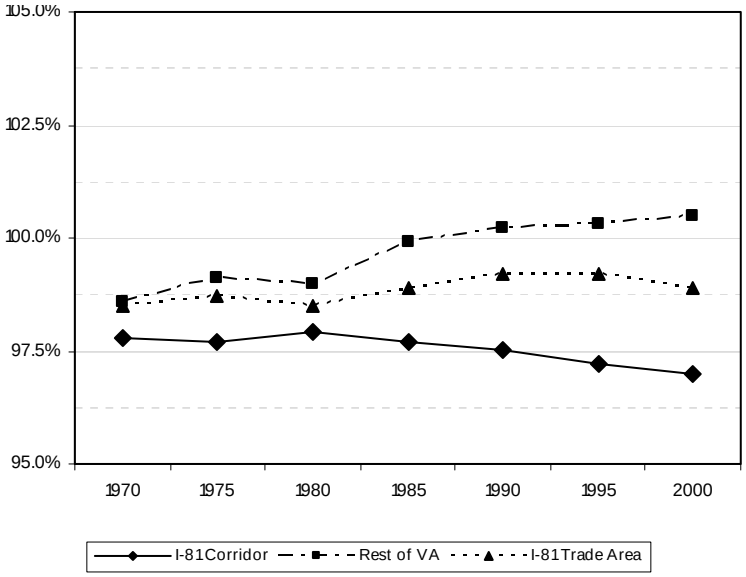
The relative delivered price ratio measures what all producers within a particular region charge (including transportation costs) for their goods, as compared to the national average. A region with a relative delivered price of 1.00 indicates that the region is price competitive with the national average. In other words, the costs relating to labor, fuel, capital, intermediate inputs, and transportation are similar to the national average. A delivered price ratio below 1.00 indicates the region has a competitive cost advantage in delivering goods. The opposite is true for regions with ratios above 1.00. This is typically the case where one or more of the inputs are priced below national average. Analyzing the changes in delivered price for a region reveals how inputs, such as transportation costs, are affecting the local economy.

The I-81 Corridor Economic Study Region historically has had a competitive price advantage over the national average. The composite delivered price has steadily declined in comparison to national averages since 1970 (see Figure 4-6). The composite delivered price ratio for cities and counties within the I-81 Corridor Economic Study Region has dropped from 97.8 percent of national average in 1970 to 97.0 percent of national average in 2000. In comparison, the composite delivered price ratio for the rest of Virginia has steadily increased, reaching 100.5 percent of national average by 2000. The ratio for the I-81 Trade Area has remained fairly stable during this time period at roughly 1.3 percent below national average.

The I-81 Corridor Economic Study Region's competitive advantage is primarily due to its relatively low average wage rate. The I-81 Corridor had an average wage rate almost $7,000 below the rest of Virginia and the I-81 Trade Area in 2000. This relative labor saving allows I-81 businesses to deliver goods at a lower cost. The above findings also are consistent with the data presented earlier. The I-81 Corridor has experienced a much greater percentage increase in GRP

than in employment or wage rates, as compared to the larger regions. In other words, the relative gain from labor productivity has been more substantial in the I-81 Corridor Economic Study Region. As a result, businesses can capitalize on lower relative labor costs and deliver goods at a lower price.

Figure 4-6 Composite Delivered Price Ratio as Compared to National Averages 1970-2000



4.2 Economic Consequences

4.2.1 No-Build Concept

The No-Build Concept would generally maintain the existing conditions on I-81 with the exception of 16 federally-funded minor highway improvements as described in Chapter 3. It was assumed that these projects would be constructed by 2035.

Models were used to forecast the baseline economic trends and projections. The baseline analysis models the impacts to the economy using the No-Build condition. For purposes of this Tier 1 Draft EIS, it was assumed that the No-Build condition would not positively or negatively affect existing economies along I-81. However, the No-Build condition could potentially affect local and regional economic conditions if the interstate does not provide safe and efficient movement of goods and services in the future. The No-Build condition was used as the basis for comparison with the "Build" concepts (see "*Build" Concepts* below).

4.2.2 "Build" Concepts

The results of the baseline analysis were compared against the results from the range of improvement concepts to capture the economic impacts to the I-81 Corridor Economic Study Region, the Commonwealth of Virginia (rest of Virginia), and the I-81 Trade Area. The analysis reports the changes in population, employment, gross regional product, import/export trade balances, disposable personal income, as well as industry productivity and delivered price. The importance of each of these variables is explained in more detail later in this section.

The baseline and potential improvements to rail are included within this analysis. REMI's TranSight and Policy Insight models do not differentiate the impacts by mode of transportation. Rather, these models reflect the cumulative impacts of all changes to the transportation efficiency of the entire network, as it relates to the I-81 corridor. As such, the following analysis represents the trends and projections of the economy, based on all impacts from the range of roadway and rail improvements.

Population and Employment Growth

The data presented in this section highlight the projected population and employment trends for the I-81 Corridor Economic Study Region, the rest of Virginia and the I-81 Trade Area as determined by the REMI model. Each section begins by illustrating the baseline forecasted growth patterns of the three study regions with the No-Build condition. Those projections are then compared to the projections generated for the "Build" concepts to illustrate potential impacts.

Baseline Population Projections

Generally, increases in population are an indication of the general desirability of an area as a place to live. Regions that provide the most attractive combination of housing, employment opportunities, recreational amenities, and ease of access to other regions tend to experience the largest population gains. Conversely, areas that have poor employment opportunities, have few amenities, and are geographically remote or isolated, generally tend to have flat or negative population changes.

Under the No-Build condition, the population in all three study regions is forecasted to increase through 2035, with the I-81 Corridor Economic Study Region increasing 14 percent from 1.10 million in 2000 to 1.25 million in 2035 (see Table 4-7). In comparison, the rest of Virginia and the I-81 Trade Area are projected to increase at a greater rate (37 percent and 25 percent, respectively).

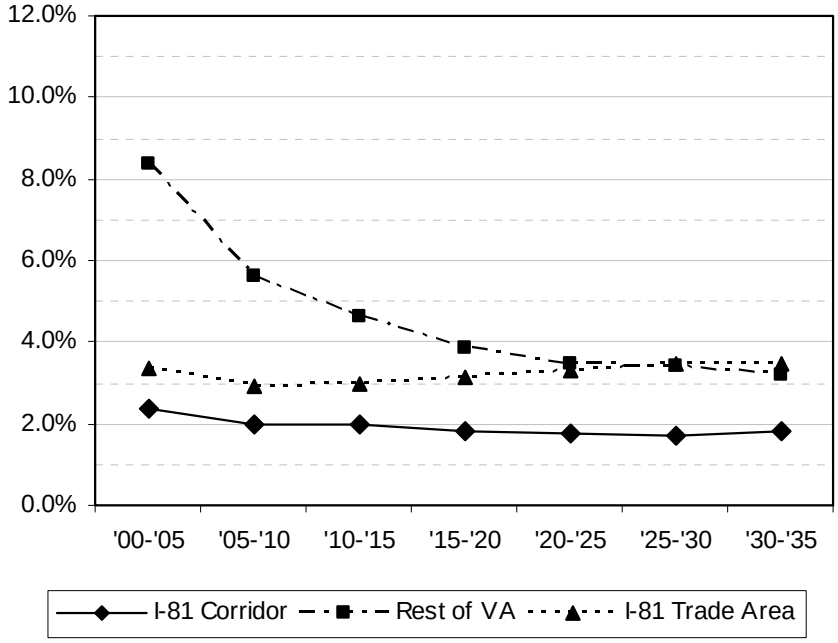
Table 4-7 Population Growth Projections (in Thousands)

	2000	2005	2010	2015	2020	2025	2030	2035	2000-2035
Net Population									
I-81 Corridor	1,094.5	1,120.7	1,143.1	1,165.5	1,186.8	1,207.5	1,228.4	1,250.9	N/A
Rest of VA	6,009.5	6,513.4	6,879.4	7,197.1	7,474.1	7,734.5	7,998.2	8,252.3	N/A
I-81 Trade Area	160,934.5	166,380.3	171,241.2	176,301.0	181,803.7	187,809.6	194,304.8	200,996.5	N/A
Net Change									
I-81 Corridor	N/A	26.2	22.4	22.4	21.2	20.7	20.9	22.5	156.4
Rest of VA	N/A	503.9	366.1	317.6	277.1	260.4	263.7	254.1	2,242.8
I-81 Trade Area	N/A	5,445.8	4,860.9	5,059.8	5,502.7	6,005.9	6,495.2	6,691.7	40,062.0
Growth Rate									
I-81 Corridor	N/A	2.4%	2.0%	2.0%	1.8%	1.7%	1.7%	1.8%	14.3%
Rest of VA	N/A	8.4%	5.6%	4.6%	3.8%	3.5%	3.4%	3.2%	37.3%
I-81 Trade Area	N/A	3.4%	2.9%	3.0%	3.1%	3.3%	3.5%	3.4%	24.9%

Source: REMI and RKG Associates, 2004

Figure 4-7 shows the growth rates expressed in terms of percentages for the three study regions in five-year increments. As depicted, the population in the rest of Virginia would grow at a higher rate than the I-81 Corridor Economic Study Region through the year 2020. In contrast, the difference in population growth between the I-81 Corridor and the I-81 Trade Area remains constant during the study period. Projections in the population growth percentages past 2020 become relatively constant for each study region.

Figure 4-7 Population Growth Projections 2000-2035 (Percentage)



The data indicate that, with the No-Build condition, the I-81 Corridor Economic Study Region will continue its trend of population growth. However, the intensity of this growth would continue to lag behind Virginia and the greater I-81 Trade Area. These projections also suggest that the employment and other factors along I-81 would continue to attract migrants into the area, but not at the same rate as the growth centers in the region. Virginia is forecasted to attract the largest percentage growth of the three regions. This is most likely due to the thriving employment centers in and around the District of Columbia, the City of Richmond and the Hampton Roads area.

Effects on Population Growth

All the "Build" concepts are projected to result in additional population growth, as compared to the No-Build condition. The population gains over the No-Build condition range from a minimum value of approximately 34,100 to a maximum of almost 38,300, based on the "Build" concepts analyzed. This disparity is primarily due to the imposition of tolls. Generally, tolling adversely affects job creation and, since population changes are linked to employment growth, lower job creation results in less population gain. However, the variation between "Build" concepts with high tolls and "Build" concepts with no tolls is not substantial. As illustrated in Table 4-8, the overall percent growth in population through 2035 ranges from 2.7 percent for a High Toll scenario to 3.1 percent for a No Toll scenario. The data suggest that improving I-81 likely would attract additional residents to the corridor. However, tolling would slightly reduce population gains by adversely affecting employment growth.

Table 4-8 Projected Population Growth (in Thousands)

	Forecast (Persons)			Difference			Percent Difference		
Concept	2005	2020	2035	2005	2020	2035	2005	2020	2035
No-Build	1,121	1,187	1,251	N/A	N/A	N/A	N/A	N/A	N/A
Maximum Width including High Toll and Rail Concept 3	1,121	1,197	1,285	0.0	10.2	34.1	0.0%	0.9%	2.7%
M Minimum Width including No Toll and Rail Concept 3	1,121	1,203	1,289	0.0	16.4	38.3	0.0%	1.4%	3.1%

Source: REMI, RKG Associates, and Jack Faucett Associates, 2005

Baseline Employment Projections

Similar to population, changes in employment levels are a good indicator of economic vitality within a region. Regions that provide competitive advantages to businesses, such as lower cost labor and transportation, and fuel costs will attract more commercial development than those that have high costs of doing business.

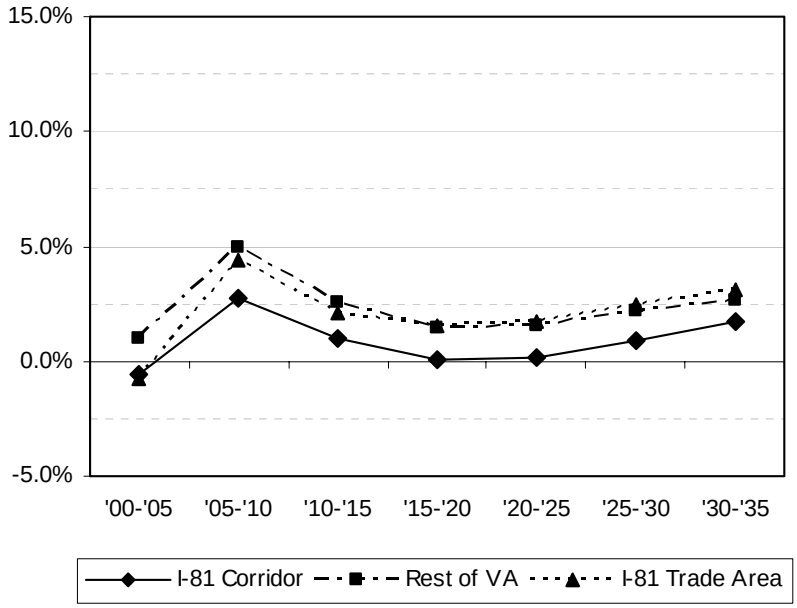
Projections indicate that future employment growth within the three regions would be more modest than recent trends. The data indicate that employment within the I-81 Corridor Economic Study Region is projected to increase 6 percent between 2000 and 2035, or roughly 0.2 percent annually (see Table 4-9). This growth rate is more than 13 times below the historic growth rate experienced between 1970 and 2000. Trends for the rest of Virginia (nine times lower) and I-81 Trade Area (five times lower) are similar to that of the I-81 Corridor.

Table 4-9 Private, Non-Farm Employment Growth Projections (in Thousands)

	2000	2005	2010	2015	2020	2025	2030	2035	2000-2035
Net Population									
I-81 Corridor	543.7	540.8	555.6	560.9	561.0	562.2	567.3	577.3	N/A
Rest of VA	3,019.7	3,050.3	3,200.5	3,280.9	3,327.6	3,378.6	3,453.9	3,546.9	N/A
I-81 Trade Area	80,166.4	79,593.5	83,120.4	84,853.2	86,141.2	87,661.8	89,794.8	92,604.7	N/A
Net Change									
I-81 Corridor	N/A	-2.9	14.8	5.3	0.1	1.1	5.2	10.0	33.6
Rest of VA	N/A	30.6	150.2	80.4	46.6	51.1	75.2	93.0	527.2
I-81 Trade Area	N/A	-572.8	3,526.8	1,732.8	1,288.1	1,520.6	2,133.1	2,809.9	12,438.3
Growth Rate									
I-81 Corridor	N/A	-0.5%	2.7%	0.9%	0.0%	0.2%	0.9%	1.8%	6.2%
Rest of VA	N/A	1.0%	4.9%	2.5%	1.4%	1.5%	2.2%	2.7%	17.5%
I-81 Trade Area	N/A	-0.7%	4.4%	2.1%	1.5%	1.8%	2.4%	3.1%	15.5%

Figure 4-8 indicates that short-term projections of employment levels for the I-81 Corridor Economic Study Region and the I-81 Trade Area regions will decline slightly from 2000, with total employment falling nearly 1 percent between 2000 and 2005. While this trend is expected to reverse in the long term, the percent growth of employment is not forecasted to rise above an annual growth rate of 1 percent for any of the three study regions.

Figure 4-8 Private, Non-Farm Employment Growth Projections 2000-2035 (Percentage)



Projected shifts in employment concentration is projected to follow previous trends experienced within all three regions. The I-81 Corridor Economic Study Region is projected to continue to see an increased concentration of service sector jobs through 2035, with the share of employment for the service sector increasing from 31 percent in 2000 to 39 percent in 2035. In contrast, the manufacturing sector is expected to contract, with its share of all employment declining by an additional 2 percent by 2035. The situation is similar for the rest of Virginia and the I-81 Trade Area as well. Both regions are expected to continue to experience an increase in the share of service sector jobs while the share of manufacturing jobs decreases (see Table 4-10).

Table 4-10 Total Employment, by Share of Region Total

	I-81 Corridor Regional Study Area				Rest of Virginia				I-81 Trade Area			
	2000	2035	Net Change	Percent Change	2000	2035	Net Change	Percent Change	2000	2035	Net Change	Percent Change
Private Non-Farm	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%
Manufacturing	20.8%	19.2%	-1.6%	-7.5%	9.5%	9.0%	-0.5%	-5.5%	14.3%	12.9%	-1.4%	-10.0%
Durables	10.6%	9.9%	-0.6%	-5.8%	5.1%	5.1%	0.0%	-0.1%	8.3%	7.5%	-0.8%	-9.2%
Non-Durables	10.2%	9.3%	-1.0%	-9.3%	4.4%	3.9%	-0.5%	-11.6%	6.0%	5.4%	-0.7%	-11.1%
Non-Manufacturing	79.2%	80.8%	1.6%	2.0%	90.5%	91.0%	0.5%	0.6%	85.7%	87.1%	1.4%	1.7%
Ag., For. & Fish.	1.4%	3.4%	2.0%	148.2%	1.3%	3.0%	1.6%	121.2%	1.2%	2.6%	1.4%	112.1%
Mining	0.8%	0.2%	-0.5%	-67.4%	0.3%	0.1%	-0.2%	-66.6%	0.7%	0.7%	0.1%	8.2%
Construction	7.6%	5.4%	-2.2%	-29.2%	8.0%	5.8%	-2.2%	-28.0%	6.7%	5.1%	-1.6%	-23.7%
TCPU	5.4%	4.6%	-0.8%	-14.9%	6.1%	4.8%	-1.3%	-20.9%	6.0%	5.3%	-0.7%	-11.6%
FIRE	6.9%	5.8%	-1.1%	-15.7%	9.4%	7.6%	-1.8%	-19.1%	9.5%	7.5%	-1.9%	-20.2%
Retail Trade	21.6%	19.6%	-2.0%	-9.2%	19.7%	17.6%	-2.0%	-10.2%	19.1%	16.5%	-2.7%	-13.9%
Wholesale Trade	4.9%	3.0%	-1.8%	-37.6%	4.5%	2.5%	-2.0%	-43.7%	5.4%	3.2%	-2.2%	-40.7%
Services	30.7%	38.7%	8.0%	26.0%	41.2%	49.6%	8.4%	20.3%	37.1%	46.1%	9.0%	24.3%

Source: REMI and RKG Associates, 2004
TCPU – Transportation, Communications, and Public Utilities
FIRE – Finance, Insurance and Real Estate

Effects on Employment

As illustrated in Table 4-11, the "Build" concepts are projected to attract additional employment growth to the I-81 corridor by 2035, compared to the No-Build condition. The incremental growth rate is projected to range from 4.4 to 4.7 percent above the No-Build levels. This translates into 25,200 to 27,300 additional jobs by the year 2035.

As previously stated, the disparity between the minimum and maximum economic impacts from the "Build" concepts largely is due to the imposition of tolling. Tolling was found to have an adverse impact on potential employment growth compared to the No-Build condition. This adverse impact is due to the added cost that tolls would impose on businesses along the I-81 corridor, constraining growth.

Table 4-11 Projected Employment Growth (in Thousands)

	Jobs			Difference			Percent Difference		
Concept	2005	2020	2035	2005	2020	2035	2005	2020	2035
No-Build	540.8	561.0	577.3	N/A	N/A	N/A	N/A	N/A	N/A
Maximum Width including High Toll and Rail Concept 3	540.8	579.1	602.5	0.0	18.1	25.2	0.0%	3.2%	4.4%
Minimum Width including No Toll and Rail Concept 3	540.8	578.9	604.6	0.0	17.9	27.3	0.0%	3.2%	4.7%

Source: REMI and RKG Associates, 2005

Gross Regional Product

The data presented in this section highlight the projected gross regional product trends for the I-81 Corridor Economic Study Region, the rest of Virginia, and the I-81 Trade Area as determined by the REMI model. Each section begins by illustrating the baseline forecasted growth patterns of the three study regions with the No-Build condition. Those projections are then compared to the projections generated for the "Build" concepts to illustrate potential impacts.

Baseline Gross Regional Product Projections

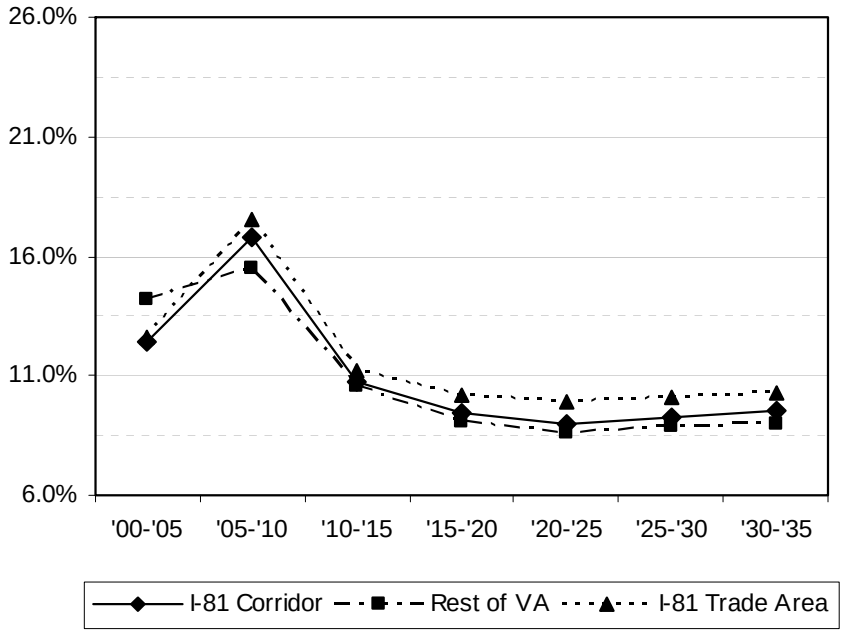
GRP is projected to grow into the future for each of the three study regions. The data indicate the I-81 Corridor Economic Study Region is projected to experience an increase in GRP of $39.9 billion, or 107 percent, between 2000 and 2035 (see Table 4-12). This growth rate is commensurate to the rest of Virginia and I-81 Trade Area.

Table 4-12 Gross Regional Product Growth Projections (in Fixed 1996 Billions)

	2000	2005	2010	2015	2020	2025	2030	2035	2000-2035
Net Gross Regional Product									
I-81 Corridor	$37.2	$41.8	$48.8	$54.0	$59.1	$64.4	$70.4	$77.0	N/A
Rest of VA	$216.4	$247.1	$285.3	$315.4	$344.0	$373.8	$407.1	$443.6	N/A
I-81 Trade Area	$5,371.6	$6,048.0	$7,108.3	$7,904.3	$8,712.5	$9,574.1	$10,541.4	$11,627.0	N/A
Net Change									
I-81 Corridor	N/A	$4.6	$7.0	$5.3	$5.1	$5.3	$5.9	$6.7	$39.9
Rest of VA	N/A	$30.7	$38.2	$30.1	$28.6	$29.8	$33.3	$36.6	$227.2
I-81 Trade Area	N/A	$676.4	$1,060.3	$796.0	$808.2	$861.6	$967.2	$1,085.6	$6,255.4
Growth Rate									
I-81 Corridor	N/A	12.4%	16.8%	10.8%	9.4%	9.0%	9.2%	9.5%	107.2%
Rest of VA	N/A	14.2%	15.4%	10.6%	9.1%	8.6%	8.9%	9.0%	105.0%
I-81 Trade Area	N/A	12.6%	17.5%	11.2%	10.2%	9.9%	10.1%	10.3%	116.5%

Figure 4-9 indicates that the five-year percentage growth rates for the I-81 Corridor Economic Study Region mirror those of the other two regions. The percentage growth of GRP is projected to substantially outpace the growth of employment through 2035. The I-81 Corridor is expected to have the greatest increase in GRP, as compared to employment growth (107 percent and 6 percent, respectively). However, the ratio of projected GRP growth to employment growth for the rest of Virginia and I-81 Trade Area are similar to the I-81 Corridor. In other words, the data indicate that productivity gains are expected to continue within the I-81 Corridor Economic Study Region.

Figure 4-9 Gross Regional Product Growth Projections 2000-2035 (Percentage)



Effects on GRP

As compared to the No-Build condition, the gross regional product of the I-81 Corridor Economic Study Region is projected to increase $3.1 to $3.3 billion by 2035. On a projected GRP of $77 billion in 2035, the I-81 Corridor is expected to experience up to a 4.2 percent increase in GRP over what is projected to occur with the No-Build condition (Table 4-13). This finding suggests that the "Build" concepts would contribute modestly to the region's economic growth over the 30-year projection period. However, in practical terms, the decline in levels of service on I-81 with the No-Build condition could eventually create a disincentive for individuals and companies to locate in the corridor or cause others to relocate from the corridor. Under such a scenario, individuals and companies that are most dependent on the interstate would be affected. These could include some of the region's larger and old-line industries (*e.g.*, furniture

manufacturing and chemical production) who operate in very price competitive, global markets.

Table 4-13 Projected Gross Regional Product Growth (in Fixed 1996 Billions)

	Forecasts			Difference			Percent Difference		
Concept	2005	2020	2035	2005	2020	2035	2005	2020	2035
No-Build	$41.8	$59.1	$77.0	N/A	N/A	N/A	N/A	N/A	N/A
Maximum Width including High Toll and Rail Concept 3	$41.8	$60.6	$80.2	$0.0	$1.5	$3.2	0.0%	2.6%	4.0%
Minimum Width including No Toll and Rail Concept 3	$41.8	$60.8	$80.3	$0.0	$1.7	$3.3	0.0%	2.9%	4.2%

Source: REMI and RKG Associates, 2005

Real Disposable Personal Income

Real disposable personal income measures the amount of net income remaining for all employed persons who live within a particular region after adjusting for taxes and cost of living. Changes in real disposable personal income indicate whether the wages of residents are increasing faster, slower, or at the same rate as their basic expenses. Increases in average real disposable personal income is generally an indicator of positive job growth and improved living conditions (increases in salaries and wages above basic expenses). Conversely, a decrease in real disposable personal income indicates that taxes and cost of living are increasing faster than salaries and wages.

Baseline Forecasts for Disposable Income

The I-81 Corridor Economic Study Region is projected to experience slower growth in real disposable personal income through 2035 than the other two regions. The I-81 Corridor is forecasted to increase by 109 percent, or 3.1 percent annually, between 2000 and 2035 (see Table 4-14). In comparison, the growth rates for the rest of Virginia and the I-81 Trade Area are greater for net percentage growth (144 and 128 percent, respectively) and annual growth (4.1 and 3.7 percent, respectively).

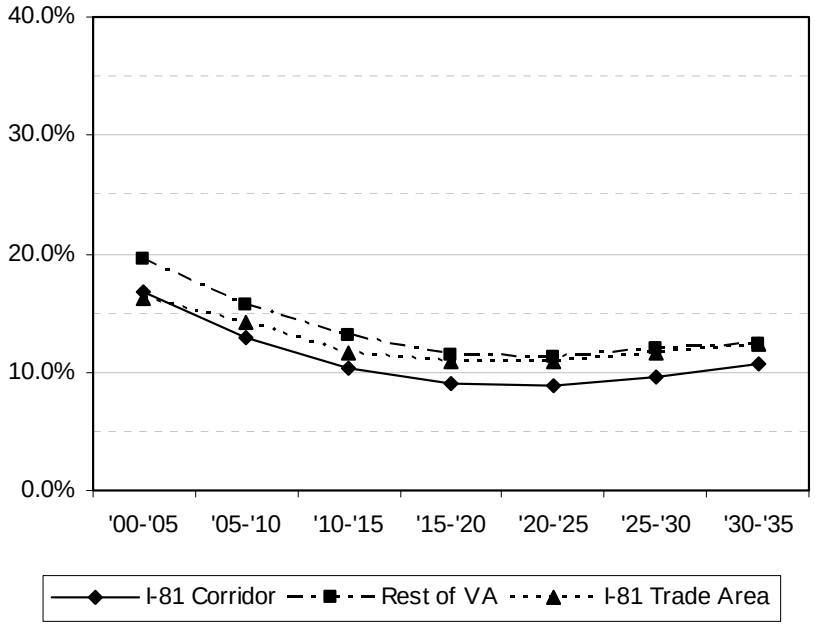
Table 4-14 Real Disposable Personal Income Growth Projections (in Fixed 1996 Billions)

	2000	2005	2010	2015	2020	2025	2030	2035	2000-2035
Net Annual Wage Rate									
I-81 Corridor	$20.8	$24.3	$27.4	$30.2	$33.0	$35.9	$39.3	$43.6	N/A
Rest of VA	$148.8	$177.9	$206.0	$233.0	$259.7	$289.0	$323.7	$363.7	N/A
I-81 Trade Area	$3,745.7	$4,350.0	$4,964.3	$5,541.7	$6,142.8	$6,815.5	$7,607.8	$8,547.9	N/A
Net Change									
I-81 Corridor	N/A	$3.5	$3.1	$2.8	$2.7	$2.9	$3.4	$4.2	$22.8
Rest of VA	N/A	$29.1	$28.0	$27.0	$26.8	$29.2	$34.7	$40.0	$214.9
I-81 Trade Area	N/A	$604.3	$614.4	$577.4	$601.1	$672.7	$792.4	$940.1	$4,802.2
Growth Rate									
I-81 Corridor	N/A	16.7%	12.9%	10.4%	9.0%	8.9%	9.6%	10.7%	109.4%
Rest of VA	N/A	19.6%	15.8%	13.1%	11.5%	11.3%	12.0%	12.4%	144.4%
I-81 Trade Area	N/A	16.1%	14.1%	11.6%	10.8%	11.0%	11.6%	12.4%	128.2%

Source: REMI and RKG Associates, 2004

Figure 4-10 depicts the progression of the growth in real disposable personal income for each of the three study regions. The five-year growth rates for each of the three regions follow a similar trendline. However, the percentage growth for the I-81 Corridor Economic Study Region remains below the rates for the other two regions. The relative disparity in real disposable income between these regions is projected to increase through 2035. The data suggest that higher concentrations of lower-paying manufacturing and retail trade jobs in the I-81 Corridor will continue to keep the average wage rate below that of the greater area.

Figure 4-10 Real Disposable Personal Income Growth Projections 2000-2035 (Percentage)



Effects on Disposable Income

By 2035, real disposable personal income is projected to increase beyond baseline growth for the "Build" concepts, as compared to the No-Build condition. The percent growth above the No-Build condition projection ranges from 2.7 to 3.0 percent. The No Toll scenarios have the greatest positive impact above the No-Build condition. These scenarios add as much as $1.3 billion in real disposable personal income to the I-81 Corridor Economic Study Region in 2035. In comparison, the High Toll scenarios have slightly less economic benefits, at roughly $1.2 billion above the No-Build condition.

Table 4-15 Projected Real Disposable Personal Income (in Fixed 1996 Billions)

	Real Disposable Personal Income			Difference			Percent Difference		
Concept	2005	2020	2035	2005	2020	2035	2005	2020	2035
No-Build	$24.3	$33.0	$43.6	N/A	N/A	N/A	N/A	N/A	N/A
Maximum Width including High Toll and Rail Concept 3	$24.3	$33.5	$44.8	$0.0	$0.6	$1.2	0.0%	1.7%	2.8%
Minimum Width including No Toll and Rail Concept 3	$24.3	$33.6	$44.9	$0.0	$0.6	$1.3	0.0%	1.9%	3.0%

Source: REMI and RKG Associates, 2005

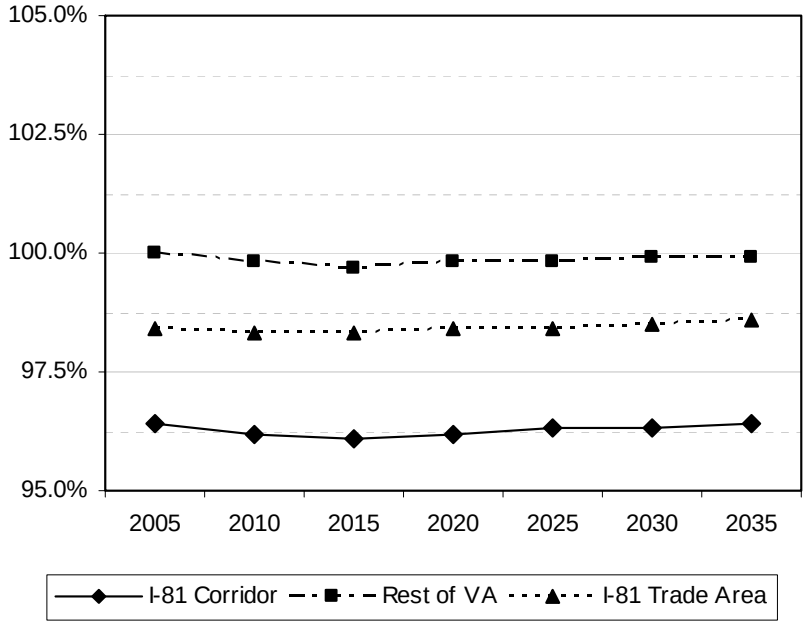
Delivered Price

The relative delivered price ratio measures what all producers within a particular region charge (including transportation costs) for their goods, as compared to the national average. A region with a relative delivered price of 1.00 indicates that the region is price competitive with the national average. In other words, the costs relating to labor, fuel, capital, and transportation are similar to the national average. A delivered price ratio below 1.00 indicates the region has a competitive cost advantage in delivering goods. The opposite is true for regions with ratios above 1.00. Analyzing the changes in delivered price for a region reveals how inputs, such as transportation costs, are affecting the local economy.

Baseline Forecasts for Delivered Price

The REMI model projects that the delivered price within each study region will stabilize after 2005. As Figure 4-11 depicts, the I-81 Corridor Economic Study Region will continue to have a competitive advantage in pricing over the rest of Virginia and the I-81 Trade Area. The I-81 corridor is projected to have a composite delivered price that is 95 percent of the national average through 2035. In comparison, the delivered price for the rest of Virginia is expected to remain at the national average through 2035. The I-81 Trade Area will fall between the two, with an average delivered price around 98.5 percent of the national average.

Figure 4-11 Composite Delivered Price Ratio as Compared to National Averages 2000-2035



Effects on Delivered Price

The data indicate that the range of I-81 "Build" concepts would not greatly affect the projected cost to deliver goods to the marketplace. As seen in Table 4-16, companies within the I-81 Corridor Economic Study Region already benefit from being price competitive (having lower costs to get goods to market) with companies elsewhere in Virginia and the United States.

Table 4-16 indicates that delivered price is more heavily affected by improvements in traffic flow along I-81 than it is by tolling. As seen in Table 4-16, the competitive delivered price was lowered uniformly for the I-81 Corridor Economic Study Region in each of the modeled scenarios. However, this change is relatively small, only adding a 0.2 percent competitive advantage over the projected No-Build delivered price in 2035.

These findings suggest that the cost of transporting goods along I-81, although an important consideration to many companies, is a fairly small portion of the overall cost of production for local companies. As such, improving I-81 would provide a more competitive market, on average, for local businesses regardless of the implementation of tolls. Therefore, the imposition of tolls should not create an unfavorable economy for the region's businesses.

Table 4-16 Projected Delivered Price Ratio (Against National Average)

	Delivered Price Ratio			Difference			Percent Difference		
Concept	2005	2020	2035	2005	2020	2035	2005	2020	2035
No-Build	0.964	0.962	0.964	N/A	N/A	N/A	N/A	N/A	N/A
Maximum Width including High Toll and Rail Concept 3	0.964	0.961	0.962	0.000	(0.001)	(0.002)	0.0%	-0.1%	-0.2%
Minimum Width including No Toll and Rail Concept 3	0.964	0.961	0.962	0.000	(0.001)	(0.002)	0.0%	-0.1%	-0.2%

Source: Jack Faucett Associates, REMI and RKG Associates, 2005

4.2.3 Conclusions

Transportation efficiency gains are the greatest determinant of economic benefit. As roadway efficiency increases, the greater the positive economic effects over the baseline projections.

The traffic analysis indicates that roadway efficiency gains, compared to the No-Build condition, are similar among the "Build" concepts and toll scenarios examined. As such, the economic benefits, regardless of the implementation of tolls, are very similar (typically within 5 percent). For example, the projected 2035 gross regional product for the I-81 Corridor Economic Study Region ranged from a low of $80.2 billion ($3.1 billion above the No-Build) to a high of $80.3 billion ($3.3 billion above the No-Build) for the various scenarios.

It is important to note that these projections do not include the impacts that may be generated by the need to pay for these improvements from other than traditional funding sources. As such, it is impossible to estimate the magnitude of impacts from having to repay bonds that may be needed to build the project. Rather, this analysis provides a comparative review of the "Build" concepts to show relative effects from changes in highway efficiency and tolls.

The Effect of Tolls on Businesses

Companies within the I-81 Corridor are already price competitive with companies elsewhere in Virginia and the United States. The cost of transporting goods, although an important consideration to many companies, is a fairly small portion of the overall cost of production. As such, there is very little variation found between the No-Build condition and the "Build" concepts (including those with tolls) in the cost to deliver goods. For the most part, the "Build" concepts would not greatly affect the projected cost to deliver goods to the marketplace, regardless of the whether tolls ar implemented or not. Therefore, the imposition of tolls should not create an unfavorable economy for the region's businesses.

The Effect of Tolls on Individuals

The data indicate that all the "Build" concepts would have a positive, but minor, effect on local residents. Real disposable personal income is projected to increase at a faster rate than if no improvements were made to I-81.

Individual impacts on local residents from tolling are relatively small. The percentage difference in real disposable personal income between the concept with the minimum economic benefit and the concept with the maximum economic benefit is in line with the percentage difference in total employment. This indicates that the difference in real disposable personal income is largely attributable to the effects of job creation rather than the loss of income to toll charges. Stated another way, tolling would have a negative influence on the overall potential economic benefits that can be derived from improvements to I-81, but would not necessarily have a substantial economic impact on local individuals who use I-81.