I-81 WIDENING STUDY

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i-81study.com




# I-81 Widening Study
# Summary Report
February 2005

## S.R. 0081, Section 036
## Franklin, Cumberland, Dauphin & Lebanon Counties, PA

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PENNDOT

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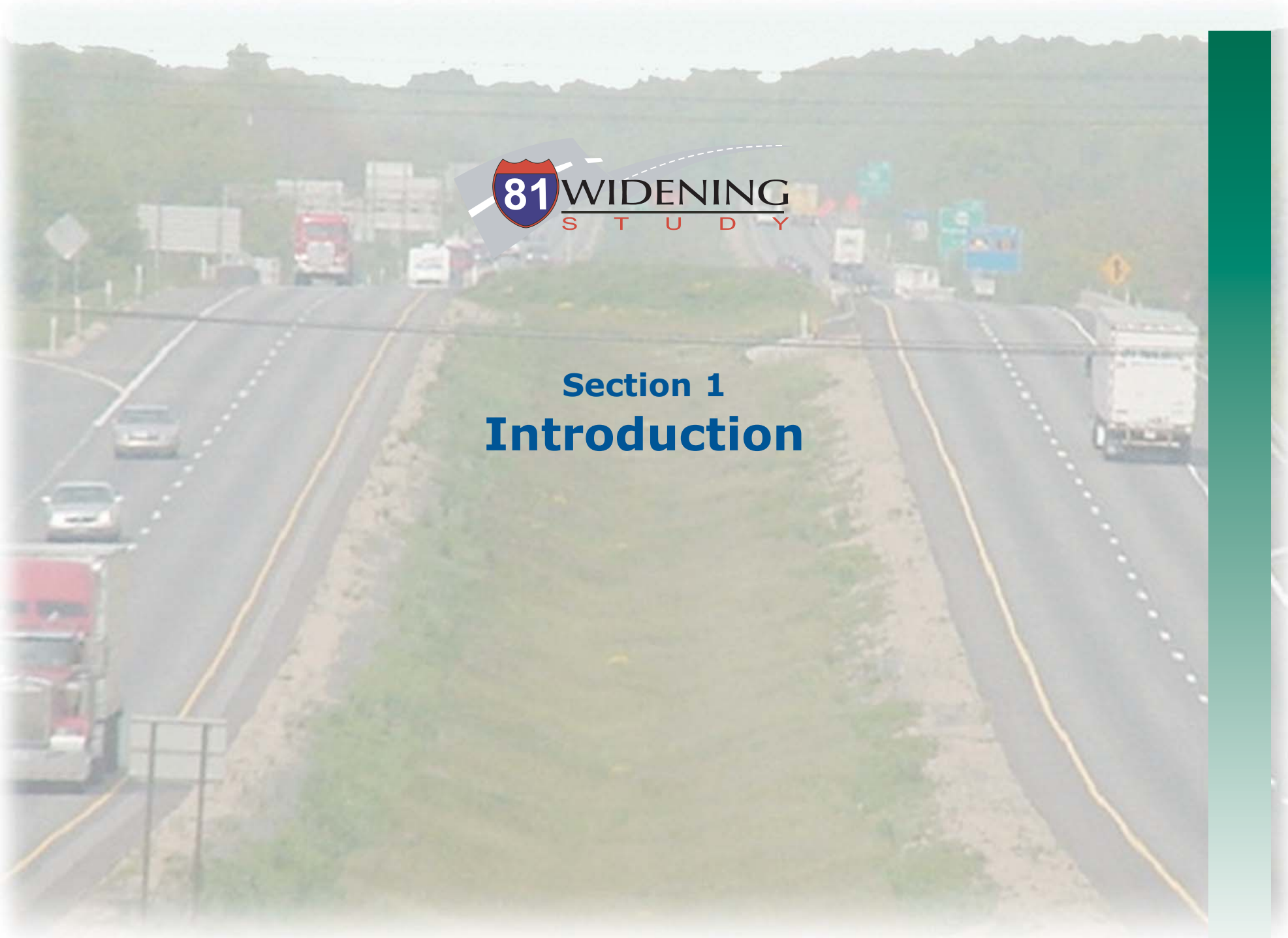



## Section 1

# Introduction

# INTRODUCTION

## Introduction

The Pennsylvania Department of Transportation (PENNDOT), in conjunction with the Federal Highway Administration (FHWA), has completed the **I-81 Widening Study,** a two-year study, of approximately 77+ miles of Interstate 81 (I-81) in south central Pennsylvania. This Study spans Franklin, Cumberland, Dauphin and Lebanon counties.

The purpose of the study was to evaluate the need for improving and/or widening I-81 from the Maryland State line (Exit 1) to PA 581 (Exit 59) and from Interstate 83 (Exit 70) to Interstate 78 (Exit 89). As the expressway is already six lanes between Exits 59 and 70, this section was not included in the study area. Through this four-phase study, PENNDOT identified existing and future transportation needs along the corridor and developed improvement concepts to address those needs.

Improvements to the 77+ mile corridor present funding and programming challenges to PENNDOT. In concert with the region's Metropolitan Planning Organizations, the Department must review hundreds of projects on a bi-annual basis to ensure that the optimal needs of the traveling public are met as effectively as possible.

There are several other factors to consider:

- Maryland is currently studying the widening of 12 miles of Interstate 81 from West Virginia to Pennsylvania. Environmental clearance is expected in 2005 and the State Highway Administration is seeking funding for design and construction.

- PENNDOT District 8-0 recently completed the Master Plan for Interstate 83 from I-81 (Exit 70) southward to the Susquehanna River in Harrisburg. This heavily traveled corridor is slated for a wide range of mainline, interchange and side road improvements.

- I-81 from PA 114 to PA 581 carries the highest peak hour traffic volumes of any sub-segment along the study area. Current and future level of service is expected to worsen.

- The I-81 Corridor in Carlisle has the highest concentration of interchanges along the entire study area with six interchanges within an eight mile stretch.

- Future Exit 17, a new diamond interchange north of US 30 in Chambersburg, has been awarded and will be under construction in 2004.

## Summary Report

This Summary Report is an initial step in PENNDOT's planning process which, working in concert with the Metropolitan Planning Organizations (MPOs), the State Transportation Commission, and the public to develop the Transportation Improvement Program for the addition

of important transportation solutions that address the needs of the overall region.

This report summarizes the analysis of the entire corridor, comprised of seven (7) segments (page 7), and development of conceptual roadway projects.

## *Segment Solutions*

Through the completion of this study, several concepts were identified and evaluated for their ability to provide the additional required capacity based on future traffic projections. **This study concluded that the widening of I-81 is necessary to achieve an acceptable Level of Service (LOS) for the 2030 projected traffic volumes.**

Moreover, an inside widening was chosen as the better of the widening concepts.

## *Conceptual Roadway Projects*

Since each of these segment widening projects range in cost from $130 million to $440 million, a more refined identification process, focused on remediation, yielded high priority locations within the segment limits.

These projects are approximately three to six miles in length with more manageable costs than the costs associated with constructing the entire length of a segment. These smaller conceptual projects can be constructed sooner and result in immediate positive impacts to the safety, LOS and overall operation of I-81. In addition, each project improvement will accommodate the projected 2030 traffic volumes, the associated widening schemes, and will set the template for future widening projects and ultimately the widening of the entire corridor.

Finally, it should be understood that commercial and residential developments and warehouse facilities are rapidly being proposed and built throughout the area and therefore are constantly changing the I-81 context. The projected traffic volumes used for this study included all planned developments at the time of this study. However, this document will need to be revisited from time to time to ensure that the projects identified still meet the overall goal of this study - to improve the safety, LOS and operation of I-81.

81 WIDENING STUDY

## Section 2

# Corridor Overview and Needs

# CORRIDOR OVERVIEW AND NEEDS

## This Study's Process

As an initial step of the I-81 Widening Study, PENNDOT assessed the condition of the existing highway and bridge facilities along I-81, as well as determined current and future traffic conditions. This phase also included an inventory of environmental features along the corridor. All of these aspects were summarized within a comprehensive document called the ***Corridor Planning Report.***

Subsequently, the Project Team developed and evaluated a variety of improvement concepts to address the areas of need. This effort culminated into the ***Concepts Evaluation Report.*** A wide-range of concepts was initially screened at a broad qualitative level based upon a variety of project objectives, and then, after the initial screening, the viable concepts were evaluated in greater detail using quantitative measures.

Both of these reports are available from Engineering District 8-0.

For study purposes only, I-81 was divided into seven segments based on several factors, e.g., interchange locations, land use and roadway classification. Illustrated in Figure 1 on Page 7 are the segment limits within the study area.

The limits of each Segment are as follows:

| | |
|---|---|
| **Segment 1: Greencastle** | Exit 1 (PA 163 / State Line) to Exit 10 (PA 914 / Marion) |
| **Segment 2: Chambersburg** | Exit 10 (PA 914 / Marion) to Exit 20 (PA 997 / Scotland) |
| **Segment 3: Shippensburg** | Exit 20 (PA 997 / Scotland) to Exit 44 (PA 465 / Plainfield) |
| **Segment 4: Carlisle** | Exit 44 (PA 465 / Plainfield) to Exit 52 (US 11 / New Kingstown / Middlesex) |
| **Segment 5: Mechanicsburg** | Exit 52 (US 11 / New Kingstown / Middlesex) to Exit 59 (Camp Hill) |
| **Segment 6: Harrisburg** | Exit 70 (JCT I-83 / York) to Exit 77 (PA 39 / Manada Hill / Hershey) |
| **Segment 7: Lebanon** | Exit 77 (PA 39 / Manada Hill / Hershey) to Exit 89 (JCT I-78 / Allentown). |

The ***Corridor Planning Report*** assessed the existing conditions, safety, geometric deficiencies, overall operations, traffic data, Level of Service (LOS), crash data and projected growth of the I-81 corridor for both present and future conditions. The following is a summary of the key elements gathered and evaluated during the course of this study.

### *Growth and Traffic*

Over the next 30 years, Franklin, Cumberland, Dauphin and Lebanon counties are projected to experience continued growth in population and employment. Of the four counties, Cumberland and Dauphin counties are expected to experience the most growth.

One of the reasons for the growth is that this corridor is within two days delivery time of 50% of the United States' markets. Because of this, the areas along I-81 are experiencing heavy development pressure from warehouse and distribution centers, resulting in an increase in truck traffic. Growth in some areas is expected to be so great that truck traffic in 2030

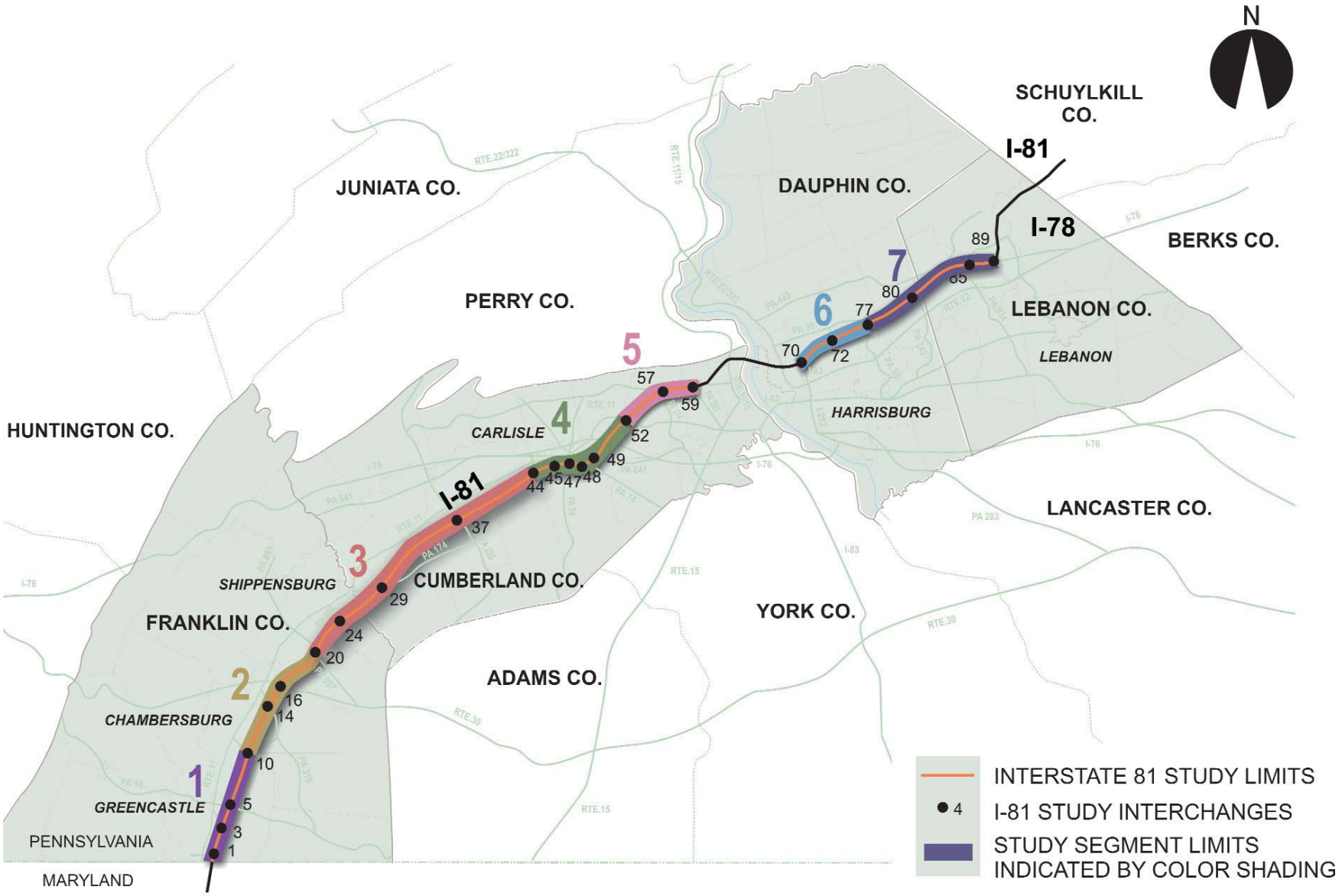



***Figure 1. I-81 Study Segment Plan Map***
*(not to scale)*

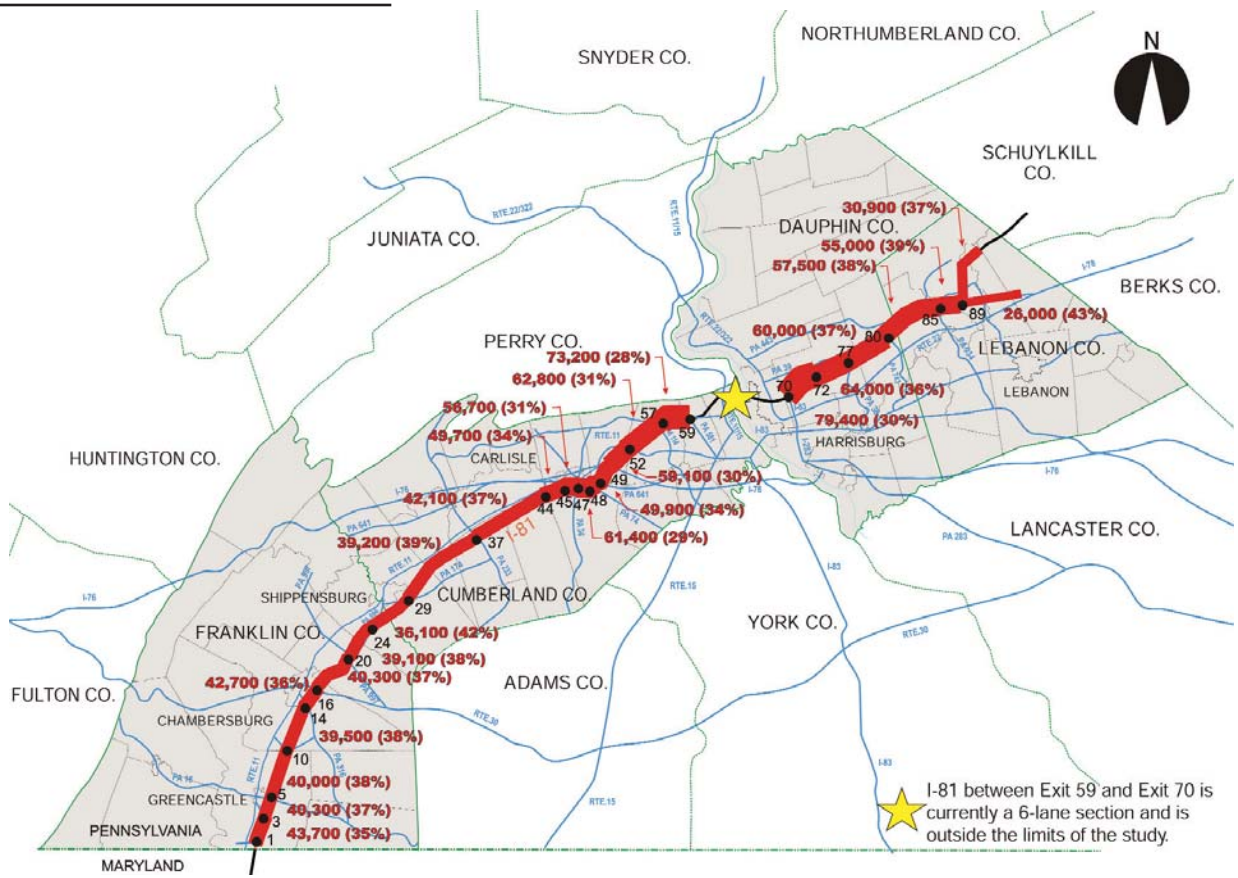



***Figure 2. 2002 Average Daily Traffic Volumes***

is projected to increase to a level equal to that of the total traffic today. It is also projected that the entire corridor within the study area, including almost all ramps at every interchange, will operate at an unacceptable LOS in the year 2030.

The present year 2002 traffic volumes along the corridor range from 36,000 vehicles per day (vpd) to 80,000 vpd and the projected 2030 Build traffic volumes will range from 95,000 vpd to 153,000 vpd. The estimation of future traffic volumes involved the use of a travel projection model that utilized existing population, employment and development trends and translated them into traffic volumes that can be distributed to the highway system. For the purposes of this project, the existing travel projection model from the Tri-County Regional Planning Commission was used for Dauphin and Cumberland Counties and expanded to include Franklin and Lebanon Counties.

As development occurs and population increases, both within the study area and the region, traffic volumes will increase. Traffic was assigned to the roadway network using the Tri-County traffic projection model. The model projects traffic volumes based on future demographic data and traffic patterns based on shortest travel time and distances of trips.

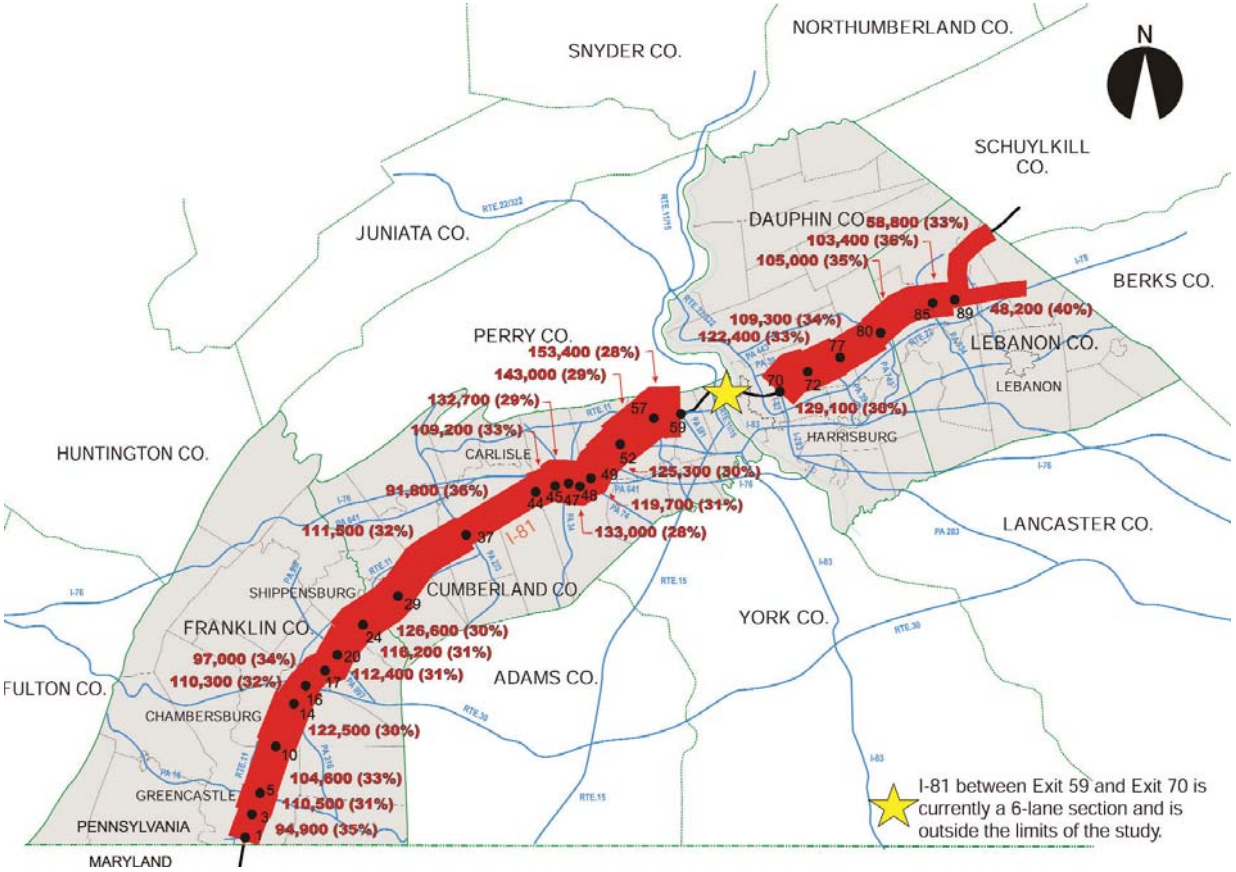



***Figure 3. 2030 No Build Average Daily Traffic Volumes***

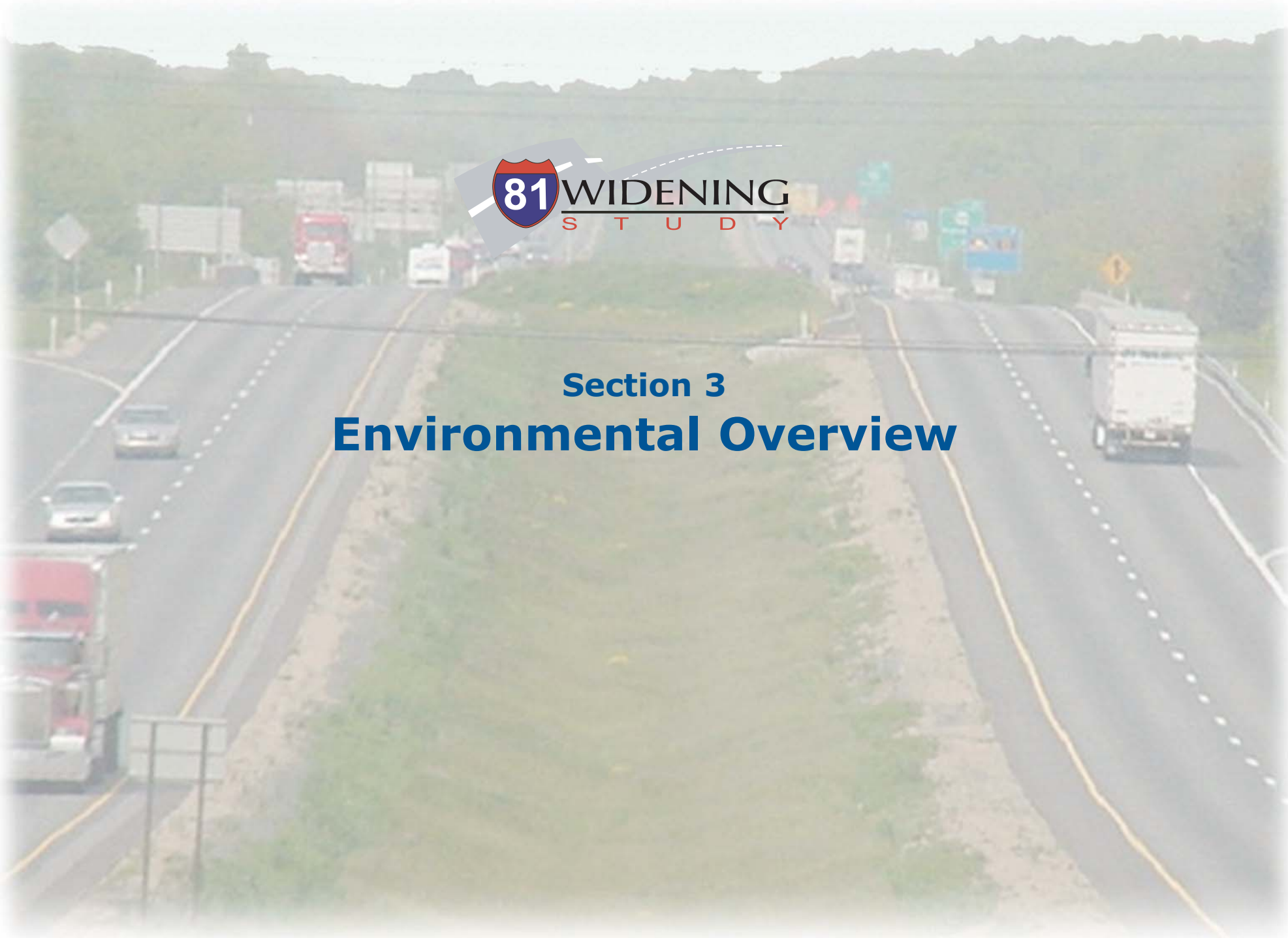
## Geometric Deficiencies

The existing corridor geometry compared to the current design standards revealed deficiencies that must be corrected in order to support the highest levels of safety and operation along the corridor. The primary deficiencies consistent throughout the corridor are as follows:

- Numerous areas possess insufficient superelevation rates;
- Many overhead bridge vertical clearances do not meet the minimum 16' - 6" requirement; and,
- Over 70% of the interchange ramp lengths are substandard.

## Crash Data

There were 1,722 documented crashes along the corridor over the five-year period from the years 1996 - 2000. The corresponding crash rate was at or below average for comparable facilities. Several observations from the data can be drawn. Nearly half of all crashes along the corridor occur at or within one-half mile of interchanges and one-quarter of all crashes are rear end collisions. Trucks are involved in 60% of all crashes and 80% of all fatal crashes. Even with relatively large median widths, median cross-over crashes exceed the expected averages for comparable facilities.




## Section 3

# Environmental Overview

# ENVIRONMENTAL OVERVIEW

## Natural and Cultural Resources

Through the development of GIS-based Environmental Resource Mapping, the ***Corridor Planning Report*** identified natural and cultural resources adjacent to I-81 in the study area. Information was collected about wetlands and other aquatic features, land uses, agricultural and public parklands, cultural resources and hazardous waste.

This section highlights the results of the investigation of environmental resources, identifying those *pertinent* resources that may influence the development and/or refinement of improvement concepts. While the entire corridor has been mapped, Table 1 shows the resource area concentrations that have been identified along I-81.

## Noise Studies

Conceptual noise studies were conducted at several dozen different locations along I-81 in order to assess the need for noise mitigation. The noise studies, developed in a conceptual manner, have been compiled into a separate report that was utilized to develop the preliminary locations and cost estimates for noise walls along the corridor. As roadway improvement projects are programmed, further refinement will be performed during preliminary design.

The conceptual noise studies are for planning, cost estimating and programming purposes only. Since noise impacts have been identified, a preliminary evaluation of noise abatement for the affected noise receptors is necessary.

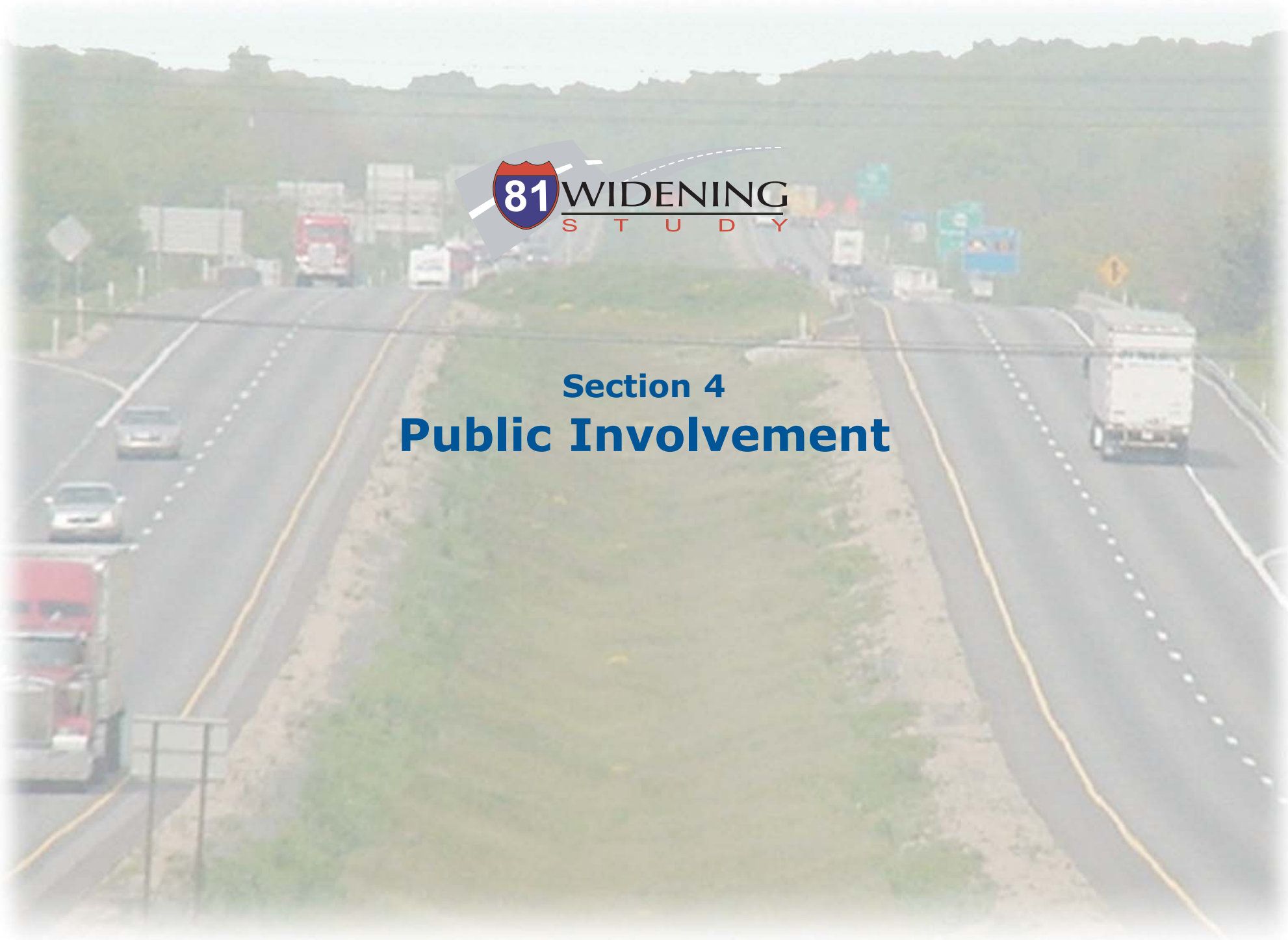
The preliminary investigation identified a potential for 37 noise abatement barriers throughout the study area. The use of 14 of 37 noise barriers was considered reasonable and feasible for abatement of noise impacts. Due to the preliminary nature of the noise studies, the results may change as more detailed mapping, engineering, traffic information, and more refined noise analysis is obtained.

***Table 1. Multiple Environmental Resources***

| Exit No. | County | Location | Description |
|---|---|---|---|
| 3 | Franklin | Molly Pitcher Hwy (US 11) / Greencastle | Recorded archaeological sites, Recreational Area, Agricultural Security Area (ASA), Streams, Wetlands |
| — | Franklin | Greencastle | Recorded archaeological sites, ASA, Streams, Wetlands |
| — | Franklin | North of Greencastle | Recorded archaeological sites, Potential waste sites, Streams, Wetlands |
| 14 | Franklin | Wayne Ave (PA 316) / Chambersburg | Archibald Rankin Farm and Jacob Etters Farmstead-Eligible for the National Register (Historic), Recreational Areas, Potential waste sites, ASA |
| 16 and 17 (Future) | Franklin | Chambersburg / Gettysburg (US 30) / Chambersburg | Eastern Greene Township Historic District - Listed on the National Register (Historic), Nissley White Farm, Peter Brindle Farm, S. Grove Farm - Eligible for the National Register (Historic), Recorded archaeological sites, Potential waste sites, Recreational Area, ASA, Stream, Wetlands |
| 20 | Franklin | Scotland (PA 997) / Chambersburg | Recorded archaeological sites, Potential waste sites, ASA, Streams, Wetlands |
| 24 | Franklin | Fayette Street (PA 696) / Shippensburg | ASA, Potential waste sites, Streams, Wetlands |
| 29 | Cumberland | King Street (PA 174) / Shippensburg | Proposed agricultural conservation easement, ASA, Recorded archaeological sites, Potential waste sites, Streams, Wetlands |
| — | Cumberland | North of Exit 29 / Shippensburg | Proposed agricultural conservation easement, ASA, Recorded archaeological sites, Streams, Wetlands |
| 37 | Cumberland | Newville (PA 233) / Newville | Permanent agricultural conservation easement, Proposed agricultural conservation easement, ASA, Potential waste sites, Streams, Wetlands |

***Table 1. Multiple Environmental Resources (continued)***

| Exit No. | County | Location | Description |
|---|---|---|---|
| 44, 45, 47 | Cumberland | Plainfield (PA 465); College Street; and Hanover Street (PA 34) / Carlisle | F.W. Serright Royal Farm - Eligible for the National Register (Historic), Recreation Areas, Potential waste sites, Letort Spring Run, Wetlands |
| 49 | Cumberland | High Street (PA 641) / North of Carlisle | Agricultural Security Area (ASA), Recreation Areas, Potential waste sites |
| — | Cumberland | South of I-76 (PA Turnpike) | Christian Crozer House - Eligible for the National Register (Historic), Stream, Wetland |
| — | Cumberland | North of New Kingston / Middlesex (US 11) and South of Mechanicsburg (PA 114) / Mechanicsburg | Proposed agricultural conservation easement, Agricultural Security Area (ASA), Potential waste sites, Appalachian Trail |
| 57 | Cumberland | Mechanicsburg (PA 114) | Walter Buchanan Farm - Eligible for the National Register (Historic), Recreational area, Agricultural Security Area (ASA), Conodoguinet Creek, Wetlands |
| 72 | Dauphin | Paxtonia / Linglestown (SR 3019 Mountain Road) | Recorded archaeological sites, Recreational area, Stream, Wetlands |
| 77 | Dauphin | Manada Hill / Hershey (PA 39) | Recorded archaeological sites, Agricultural Security Area (ASA), Potential waste sites, Stream, Wetlands |
| — | Lebanon | South of Annville / Ft. Indiantown Gap (PA 934) | Recorded archaeological sites, Stream, Wetlands |
| 85 | Lebanon | Annville / Ft. Indiantown Gap (PA 934) | Indiantown Gap Historic District - Listed on the National Register (Historic), Recorded archaeological sites, Agricultural Security Area (ASA), Potential waste sites, Stream, Wetlands |




## Section 4

# Public Involvement

# PUBLIC INVOLVEMENT

A comprehensive Public Involvement Program was conducted as an integral part of the overall I-81 Widening Study. The program involved:

- Public Meetings
- Corridor Advisory Committee
- Project Website
- Trucking Survey

## Public Meetings

During the preparation of the ***Summary Report,*** two sets of public meetings were held in the Fall of 2002 and Fall of 2003.

The Fall 2002 sessions were held on October 22, 2002 in Chambersburg, PA; October 23, 2002 in Carlisle, PA and October 30, 2002 in Grantville, PA.

The Fall 2003 sessions were held on November 5, 2003 in Shippensburg, PA and November 6, 2003 in Harrisburg, PA.

Before each of these sessions were formally opened to the general public, a brief presentation was made to public officials from the surrounding municipalities and state police troopers. This presentation included a brief tour of the various display stations and presentation boards.

In general, stations were entitled:

- Where Do You Live / Work?
- Introduction
- Traffic
- Environmental Resources
- Conceptual Roadway Projects
- Other Planned Development and Studies
- Conclusion
- Website

An informational flyer (Study Update), Frequently Asked Questions and Open House Floor plans were distributed to all attendees.

Moreover, an informal written survey was made available for all participants to complete at the last station.

Recurring public concerns and issues revolved around the following central themes:

- Truck traffic
- Noise
- Inadequate acceleration / deceleration ramps lengths
- Immediate need to improve highway
- Police enforcement along corridor
- Need for truck weigh station
- Rest areas are overcrowded
- Need for median barrier to prevent crossover crashes

## Corridor Advisory Committee

A Corridor Advisory Committee was formed at the onset of the project and was composed of Franklin, Cumberland, Dauphin and Lebanon County Planning Commissions, local and regional economic development agencies, the trucking industry and others from the region who could share and advise on the issues confronting the existing users and surrounding communities. This Committee met three times over the course of the study.

## Project Website

A project website, www.i-81study.com, was created. The web site described the purpose of the study and summarized existing and future conditions along the I-81 corridor. It also contained maps of the study area and information on how the public could get involved in the study. The public was able to e-mail PENNDOT about their specific concerns, suggestions for improvement as well as register for direct e-mail updates.

## Trucking Survey

PENNDOT, in consultation with the Pennsylvania Motor Truck Association (PMTA), developed a questionnaire for the telephone interviews of 85 businesses that operate trucks along I-81 in the study area. The sample was drawn from a portion of the Department's Commercial Registration database, which lists motor vehicles weighing over 26,000 pounds with the Bureau of Motor Vehicles. This database was augmented with the names of trucking companies observed using trucking terminals and I-81 in Carlisle.

The prevailing concern amongst respondents centered on the length of exit and entrance ramps, specifically at Exits 20, 47, 48, 49 and 52. Congestion along the corridor was also an issue as it affects the ability of trucks to provide its services in a timely fashion. Several companies would like to see commercial rest areas expanded and increased in number along I-81 in the study area.

## List of Municipalities

The following municipalities were provided the opportunity to participate in the study either through direct meetings or public open houses:

Franklin County
: Antrim Township; Chambersburg Borough; Greencastle Borough; Greene Township; Guilford Township; and Southampton Township.

Cumberland County
: Carlisle Borough; Dickinson Township; Hampden Township; Mechanicsburg Borough; Middlesex Township; Penn Township; Shippensburg Township; Silver Spring Township; South Middletown; South Newton Township; and Southampton Township.

Dauphin County:
: East Hanover Township; Lower Paxton Township; and West Hanover Township

Lebanon County:
: Bethel Township; East Hanover Township; Swatara Township; and Union Township.


## Section 5

# Transportation Solutions

# TRANSPORTATION SOLUTIONS

Based upon the needs, the Project Team developed and evaluated several improvement concepts to determine which were best suited to provide the additional capacity and mobility.

The concepts evaluated were:

- ITS with Incident Management;
- Transit;
- Transportation Demand Management;
- Intermodal Facility Improvements;
- Growth Management; and,
- Roadway Upgrades including Additional Inside Lanes, Additional Outside Lanes and Express Lanes

## ITS with Incident Management

Intelligent Transportation System (ITS) programs use advanced technologies, such as ramp metering, dynamic message signs (DMS), highway advisory radio (HAR), incident detection and closed circuit television cameras (CCTV), to improve the efficiency and safety of our transportation system. ITS programs also have an intermodal component that incorporates highways, transit, and railroads, thus requiring cooperation among diverse groups of public and private stakeholders.


Freeway incident management, which is a specific application of ITS, uses predetermined policies and procedures to effectively and efficiently react, respond, remove and reopen portions of a highway closed by an incident. Cooperation and communication between municipalities and government agencies are required to establish this organized effort. Policies may include the creation of highway service patrols and identification of emergency detour routes to aid in the clearing of an incident.

PENNDOT completed an ITS deployment study in 1999, which provided a foundation for ITS implementation within the region and along portions of I-81 within the study area. The strategies outlined in the report include short, medium and long term ITS deployments that will help improve and centralize the use of ITS equipment while increasing safety and reducing congestion in the area.

Some of the short-term solutions have already begun and can be seen within the I-81 Widening Study area. Milepost markers defining route and distance have been installed, and incident management plans for the Capital Beltway (encompassing portions of I-81, I-83 and I-283) have been completed. Other strategies include the deployment of permanent closed circuit television (CCTV) cameras, variable message signs (VMS), highway advisory radio (HAR) sites and roadway weather information systems (RWIS) throughout the region.

Overall, ITS can provide only nominal improvement in reducing congestion and can be measured in only a few percentage points in reduction of traffic volumes.

## Transit

Capital Area Transit (CAT) is the major provider of pubic transportation in the Harrisburg area. CAT operates 64 buses and two trolleys with a total annual ridership of approximately 2.5 million.

Public transit service is currently limited on Interstate 81. CAT runs one express bus in the morning and one express bus in the evening between Carlisle and Harrisburg to serve commuters who work in the capital city. There is only weekday service. According to CAT officials, the Route C Carlisle or C-X Carlisle Express bus is filled to capacity with 41 riders taking the bus in each direction. CAT projects that four peak hour buses each direction would be needed to accommodate the current demand for transit service along I-81 between Carlisle and Harrisburg.

The only other bus service that CAT runs in the I-81 Widening Study area is the Route C Carlisle bus that operates local service between Carlisle and Harrisburg along U.S. Route 11 parallel to the Interstate. The service runs seven round trips per day and it operates on weekdays only. CAT utilizes 15 park-and-ride lots in the region so that riders can drive to a parking lot and transfer to the bus.

## *CORRIDORone*

In 1997, Capital Area Transit was instrumental in forming the Modern Transit Partnership (MTP), a non-profit organization of private and public leaders dedicated to promoting public transportation and the development of passenger rail in central Pennsylvania. CAT and MTP advocate an intraregional rail network between Carlisle and Lancaster that would eventually expand to York, Hershey and Lebanon.

CORRIDORone would stretch between Carlisle and Lancaster and CORRIDORtwo would run from York to Harrisburg and Harrisburg through Hershey to Lebanon.

In July 2002, CAT and the MTP submitted a Transitional Analysis report to the Federal Transit Administration (FTA) for funding to begin preliminary engineering and environmental clearance for CORRIDORone. FTA recently approved funding for this work. The first phase of corridor development calls for a Minimum Operating Segment (MOS), the initial operating phase, between East Mechanicsburg and Lancaster via Harrisburg. The second phase of operations would extend the service to Carlisle. According to CAT officials, preliminary engineering for the MOS could take place in 2004, and design and construction between 2004 and 2007. The project must develop long-term operating and initial capital financial support, the bulk of which will be provided by the federal and state governments.

CAT explains that CORRIDORone would consist of 56 route miles between Lancaster and Carlisle and attract 7,000 - 12,000 riders per day by 2020. The MOS between East Lancaster and Harrisburg is expected to carry 2,200 - 3,400 riders per day. For the entire CORRIDORone route, approximately 60% of the ridership, 4,200 - 7,200, would be generated from the I-81 study area between Harrisburg and Carlisle.

Capital Area Transit explains that its express bus service that runs between Carlisle and Harrisburg is filled to capacity and that additional buses are needed to fulfill the demand. By 2020, it is likely that there will be at least four express buses that will run in the peak period removing a total of approximately 330 vehicle trips from I-81. If the rail service were instituted, by 2020 the railroad could remove up to 7,200 vehicular trips per day along I-81.

Overall, transit can provide only nominal improvement in reducing congestion and can be measured in only a few percentage points in reduction of traffic volumes.

# Transportation Demand Management

Transportation Demand Management (TDM) is the implementation of strategies designed to maximize the capability of the transportation system to accommodate travel. The primary purpose of TDM

is to reduce the number of vehicles using the roadway system while providing a variety of travel options. TDM strategies influence the time of travel, the mode of travel or the need to travel altogether. In order to be effective, TDM strategies must change the travel behavior of commuters in one or all of these realms. To accomplish these types of changes, TDM programs rely on incentives or disincentives to make changes in behavior attractive.

TDM measures fall within one of three major categories:

- Strategies that replace the single occupant vehicle (SOV), i.e., ridesharing (carpools and vanpools); transit enhancements (new services, route extensions, shuttles); and pedestrian and bicycle facilities.

- Economic incentives and disincentives, including: employer-sponsored trip reduction programs; rideshare and transit incentives.

- Alternative work schedules such as telecommuting (remote or work-at-home programs) or alternative / compressed / variable work hours.

Various government agencies in the I-81 Widening Study region are actively implementing and expanding TDM programs. For nearly 30 years the Tri-County Regional Planning Commission (TCRPC) has been managing the Harrisburg Area Ridesharing Program, the region's ridematching service. TCRPC is the metropolitan planning organization (MPO) for Cumberland, Dauphin and Perry counties. TCRPC receives telephone calls from residents who wish to carpool from the call-in number (717-234-RIDE) and requests through its carpool website page (www.tcrpc-pa.org/carpool). TCRPC also manages the ridematching database. In 2002 the TCRPC handled 99 requests and achieved a match rate of 81%.

The TCRPC is spearheading the formation of a new non-profit Transportation Management Association (TMA) to be called The Susquehanna Valley Regional Transportation Partnership (SRTP). SRTP would work to build support among the business community for ridesharing and for other types of TDM programs. The mission of the SRTP is to reduce SOVs and congestion in the region.

Between now and 2030 it is anticipated that all forms of ridesharing from carpooling to vanpooling will increase. Furthermore, with the support of the Tri-County Planning Commission and the Susquehanna Partnership, TDM programs will expand and the business community will participate in such programs. While high-profile commute options programs can reduce SOV trips by up to 40% at individual work sites, the impact to the region of such reductions is quite modest. Nationwide, a net reduction of total vehicle trips in a region is typically in the 1% - 2% range. Similar reductions can be anticipated along the I-81 corridor.

## Intermodal Facility Improvements

A railroad facility designed for the loading and unloading of containers and trailers between railroad flat cars and trucks is defined as an intermodal facility in this report.

The movement of bulk goods, such as grains, coal, and ores, comprises a large share of the tonnage carried on the U.S. freight network. However, lighter and more valuable goods, such as computers and office equipment, now make up an increasing proportion of total freight. The Federal Highway Administration (FHWA) estimated in 1998 that trucks carried about 71 percent of all tonnage and 80 percent of the value of U.S. shipments.

Interstate 81 serves as a major north-south route through Pennsylvania connecting New York State, New Jersey, Canada, Maryland and Virginia. Harrisburg, located adjacent to the I-81 Widening study limits, is home to one of the largest warehousing and distribution areas in Pennsylvania.

Through the interstate highway system, the location of Harrisburg is central to major destinations along the eastern seaboard and function as a gateway to points west as well.

In fact, this corridor is within two days delivery time of 50% of the United States' markets. Because of this, the areas along I-81 are experiencing heavy development pressure from warehouse and distribution centers, resulting in an increase in truck traffic and the potential for greater rail service.

A recent Corridor Marketing Study for the Northeast Corridor which includes I-81 through Pennsylvania was recently published by Reebie Associates. This study was prepared specifically for the Virginia Department of Rail and Public Transportation. The study claims that in the near term 500,000 trucks per year can be diverted to parallel rail and in the longer term, nearly 3,000,000 trucks per year can be diverted off of Virginia's portion of I-81. Although no formal analysis has been performed, similar diversions could be applied to the I-81 Corridor.

However, based upon these diversion estimates, equal to 10% and 20% reduction, respectively, in the short and long term truck levels, the congestion would not be reduced enough to mitigate need for widening. In addition, delivery times cannot currently compete with the trucking industry and as such, this concept is not yet fully realized.

The Harrisburg area is home to two intermodal facilities: Rutherford Intermodal Facility located off of I-83 near Paxton Street, and the Harrisburg Intermodal Facility located off of I-81 near Cameron Street. Together with major terminals in Atlanta and Chicago, these facilities form the backbone of a comprehensive intermodal network serviced by Norfolk Southern.


Currently, an average of 425 trucks use both facilities on a daily basis. According to Norfolk Southern representatives no future expansions to accommodate increased truck or rail activity are planned.

Most recently, CSX Transportation, Inc. (Railroad) purchased several hundred acres in Guilford Township near Exit 14 for a potential truck terminal/intermodal facility.

Overall, intermodal can provide only nominal improvement in reducing congestion.

## Growth Management

In many areas of the United States, citizens have become concerned with the consequences of growth. These concerns center on highway congestion, air and water pollution, the dearth of affordable housing, and shrinking open space and farmlands. Uncontrolled growth can lead to communities that lack character and reduce opportunities for social interaction. Many communities have turned to growth management to address these problems. Growth management can situate growth wisely and time it to occur when highways, sewers, water supplies, parks and schools are available. Development occurs in locations and on a schedule that does not degrade natural and historic resources.

Various government agencies in the I-81 Widening Study region are actively promoting growth management programs. The Tri-County Regional Planning Commission (TCRPC), the Cumberland, Dauphin and Perry County Planning Commissions and the Harrisburg Area Transportation Study (HATS) have efforts underway to manage the region's growth while supporting economic development. The Franklin County Planning Commission recently updated their comprehensive master plan and its goal is to promote growth that maintains the county's quality of life and preserves important environ-

mental and historic features. The Cumberland County Economic Development Corporation is currently evaluating the I-81 corridor for the most advantageous location of a proposed industrial park based upon the existing and future transportation infrastructure.

The most far-reaching program in the region is Tri-County's Regional Growth Management Plan (RGMP). The goal of the plan is to guide and concentrate residential and commercial development into Planned Growth Areas (PGAs), locations that are closest to existing public services.

In the I-81 corridor, eight municipalities affected by increasing congestion at Exit 44 in Cumberland County have decided to cooperatively zone in order to avoid unwanted development and truck traffic. For example, Carlisle recently reduced the amount of land dedicated to industrial development after learning the impact of development and congestion on local streets.

Further south along I-81, Franklin County recently updated its comprehensive plan. The plan provides overall guidance for development, land use, economic progress and the preservation of the quality of life long-term in the County. Similar to Tri-County's plan, Franklin County's comprehensive plan seeks to direct development into locations where public services can be efficiently provided. One of its goals is to plan for needed transportation improvements and to coordinate transportation with development.

If the RGMP is fully implemented, there could be a reduction in trips and vehicle miles traveled because the plan calls for a concentration of development that is conducive to increased travel by ridesharing, transit, bicycling and walking. Similarly, a reduction in the range of 1% -2% in total vehicle trips can be expected, thus not fully meeting the needs to the corridor

## Roadway Upgrade

There are two distinct median widths throughout the corridor - 60' and 84',

***Figure 4. 60' Existing Median***

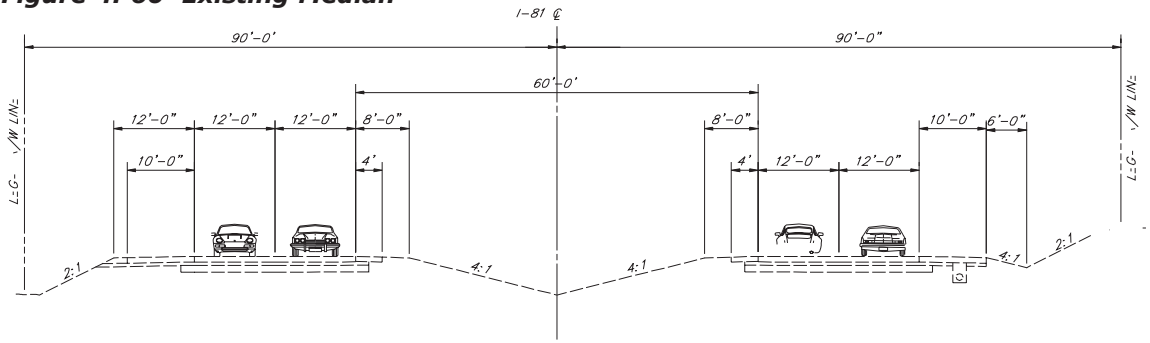
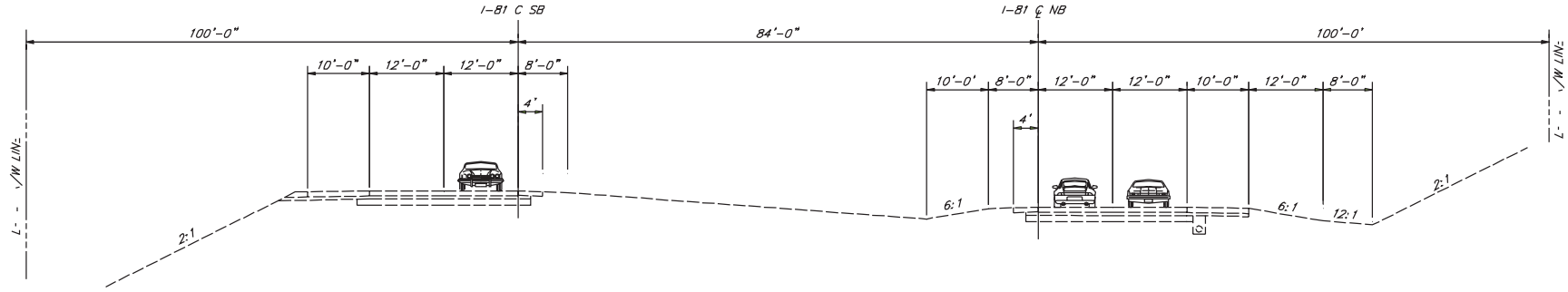



***Figure 5. 84' Existing Median***



which are illustrated in Figures 3 and 4, respectively. Segments 1, 2, 3, 4 and portions of Segment 6 have a 60' median width whereas Segments 5, 6 (remaining portion) and 7 have a predominate median width of 84'. The three predominant Roadway Upgrade options that were evaluated include Inside Widening; Outside Widening and Express Lanes.

## *Widening*

As described in the ***Concepts Evaluation Report,*** adding an additional lane, adjacent to the existing lanes and within the median is referred to as inside widening, and, adding an additional lane outside, adjacent to the existing lanes, is referred to as outside widening.

The additional inside lane typical sections for the 60' and 84' existing median widths are illustrated in Figures 5 and 6. The inside widening and outside widening evaluations of the physical characteristics of I-81 include the existing cross section, right-of-way width, bridge configurations, median width, as well as the existing and projected traffic data.

***Figure 6. Proposed Inside Widening (60' Existing Median)***

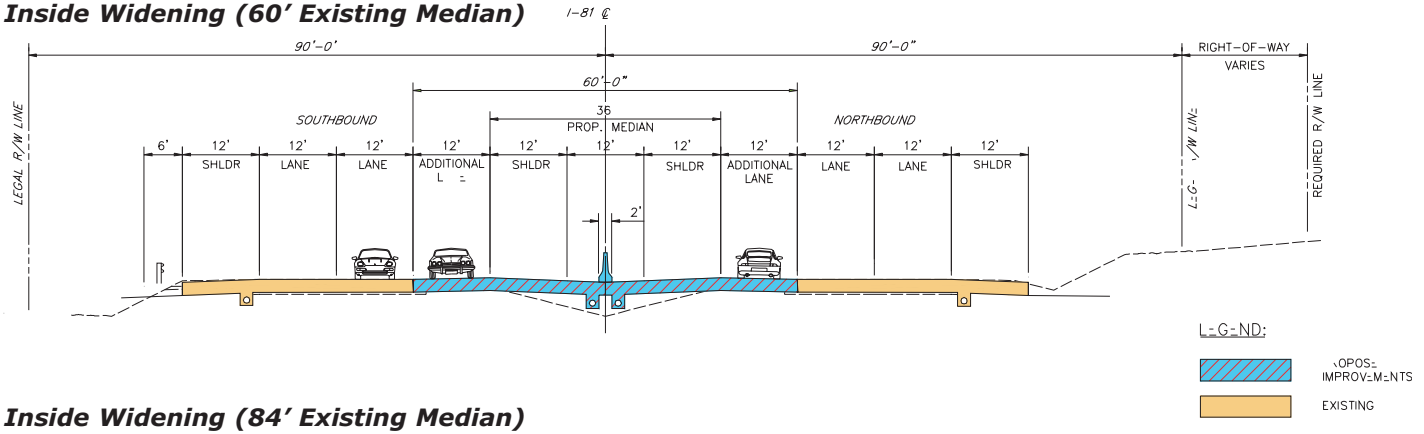
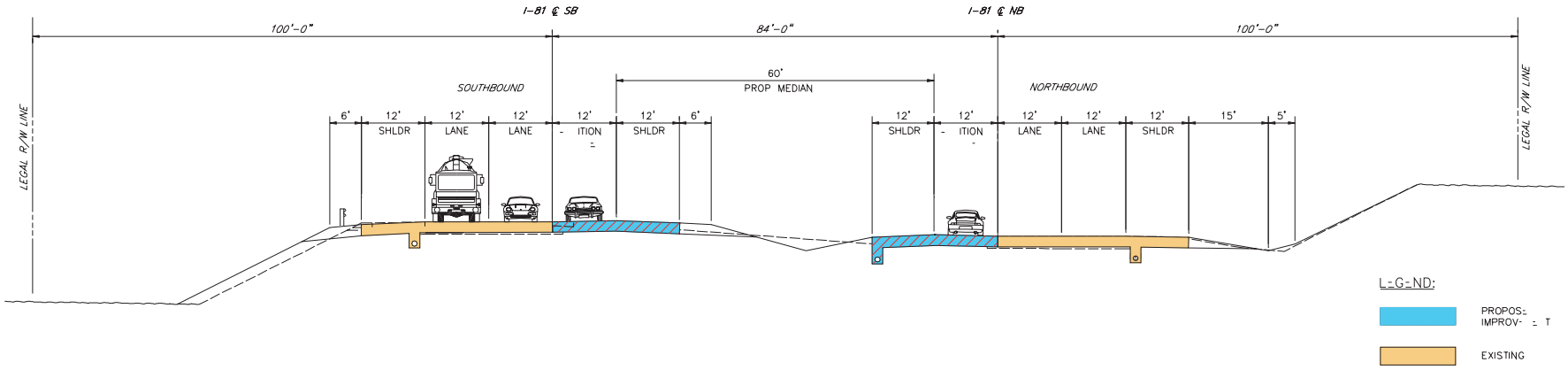



***Figure 7. Proposed Inside Widening (84' Existing Median)***



**Inside Widening.** The existing 60' and 84' median widths provide ample room for the additional lanes and shoulders without affecting the alignment of the existing travel lanes. Some existing overhead bridges provide enough horizontal clearance to allow for the additional lanes and the required clear zone. However, 12 overhead bridges do not meet the required clearances and must be replaced. As directed by PENNDOT, all 45 mainline (dual) bridges will be replaced due to their age and new design requirements. With the inside widening concept, no major improvements will occur along the outside, therefore, no major right-of-way impacts are anticipated.

For the entire corridor, the total cost of an Inside Widening was estimated at $1.52 Billion.

**Outside Widening.** Only limited grading and widening is required in the median for an outside widening, therefore, the occasional variance in median width does not affect this concept. Within the 60’ median areas, the additional grading extends beyond the legal right-of-way limits, requiring extensive right-of-way acquisition. Outside widening also requires the replacement of 42 overhead bridges as the structures are not wide enough to provide the additional lane and required clear zones. All 45 mainline (dual) bridges will be replaced. In addition, an outside widening will require reconstruction of 22 of the 25 interchanges due to the outside lane conflicting with the ramps.

For the entire corridor, the total cost of an Outside Widening was estimated at $2.12 Billion. This estimate includes the reconstruction of the 22 interchanges (enlargement/relocation of ramps) indicated above which conservatively amounts to $550M.

## *Express Lanes*

One of the available uses for the additional lane option is to designate them as express lanes. Express lanes physically separate through traffic from local traffic allowing through traffic to circumvent the merging traffic from interchanges. These are especially useful in the areas where there are closely spaced interchanges along I-81, such as in the vicinity of Carlisle, PA (Exits 44 to 49) or Chambersburg, PA (Exits 10 to 20).

Whereas **upwards of 40% of traffic on I-81 is truck traffic,** express lanes could serve as a way to separate through truck traffic from the local traffic.

Various express lane concepts were considered, including: single lane vs. dual lane express lanes with or without concrete median barrier separation to the local lanes. A dual express lane is preferred to a single lane for safety, mobility and incident management reasons.

In order for an express lane to be operationally effective, a corridor length of 10 miles was determined to be the minimum viable express lane length for the I-81 Corridor. This length would bypass a series of relatively closely spaced interchanges within densely populated areas generating numerous on-off movements (e.g., Exits 44-49 in Carlisle and Exits 14-17 in Chambersburg).

However, traffic analysis revealed less than 100% utilization of the express lanes. This underutilization would subsequently cause a degradation of the mainline (local traffic) LOS as more traffic would be confined to two lanes. Moreover, the express lane concept requires interchange reconstruction as well as a greater amount of right-of-way acquisition since the local lanes are pushed outwards to accommodate the express lanes.

**The preferred express lane concept consists of the two express lanes each way with concrete median separating the two local lanes. This concept costs $250M for a 10-mile section. The additional pavement and structure costs contribute to the cost premium compared to an inside widening improvement. Overall, the express lane concept results in a poor cost/benefit ratio.**

**Therefore, given this relatively expensive cost and lacking the effectiveness in improving the overall LOS along the corridor, the Express Lane was dismissed as a viable concept for the I-81 corridor.**

## Summary

Based on the concepts evaluation, the most viable concept able to provide the additional capacity, resolve deficiencies and improve safety is the Roadway Upgrade, i.e., a roadway widening of I-81.

Applied by themselves, the alternative transportation solutions do not provide the additional capacity necessary to address the future demand. Nonetheless, incorporating these concepts in concert with the additional lanes will only enhance the positive effect of the improvements to the corridor.
These other concepts will provide incremental improvements to traffic flow through improved incident management and response, reduced traffic volumes through transit usage, and modest increase in freight movement along the parallel rail facilities.

**The corridor studies concluded that providing inside widening requires far less:**

- **right-of-way acquisitions;**
- **environmental impacts;**
- **noise mitigation;**
- **embankment grading;**
- **structure replacements;**
- **overall cost; and**
- **meets project needs.**

As a result, the Inside Widening concept was applied to the corridor.


## Section 6

# Deployment Plan

# DEPLOYMENT PLAN

## Segment Solutions and Costs

An inside widening benefits the entire corridor with additional capacity, improved Level of Service and an overall safer condition.

The following summarizes the segment by segment improvements and costs. See Figure 1 (page 7) for the segment plan map.

Present day cost estimates for an Inside Widening were developed for each segment and were comprised of the following major elements:

- Roadway costs include pavement, drainage, earthwork, median protection, traffic control, etc.;
- Structure costs include bridges, noise walls, sign structures, culverts, etc.;
- Construction Engineering and Inspection (12%);
- Contingency—includes inflation factor (25%);
- Engineering Design (12%);
- Right of Way; and,
- Utility Relocation – Utility costs are estimated for those overhead bridge attachments and relocations.

As individual projects are programmed, an Engineering and Environmental (E&E) Scoping Field View will be held for the purpose of establishing logical terminii and the level of environmental documentation required to obtain environmental clearance.

**It should be emphasized that no interchange improvement costs are included within these cost estimates.**

The segments may be refined in length or scope of improvements as PENNDOT, in cooperation with the MPOs and planning organizations, define the transportation projects along the corridor. For example, Segment 3 at 24 miles may need to be subdivided into 2 or 3 subsegments.

### *1. Segment 1 (Greencastle):*

**Objective:** Continue the proposed inside widening by Maryland SHA northward, eliminating a restriction point at the state line and providing additional capacity to reduce congestion and improve safety.

**Existing:** Segment 1, in Franklin County, begins at Exit 1 (SR 0163) at the Maryland - Pennsylvania State Line and extends approximately 10 miles north to Exit 10 (PA 914). There are four interchanges located within this segment (Figure 8). This segment travels through the Greencastle area (Exit 5), as well as other small communities in Franklin County, but the majority of the surrounding area is agricultural. Other features within this segment include the Pennsylvania Welcome Center and a truck weigh station in the northbound direction. The median width occasionally varies, but is predominantly 60'. This segment is classified as a Rural Segment.

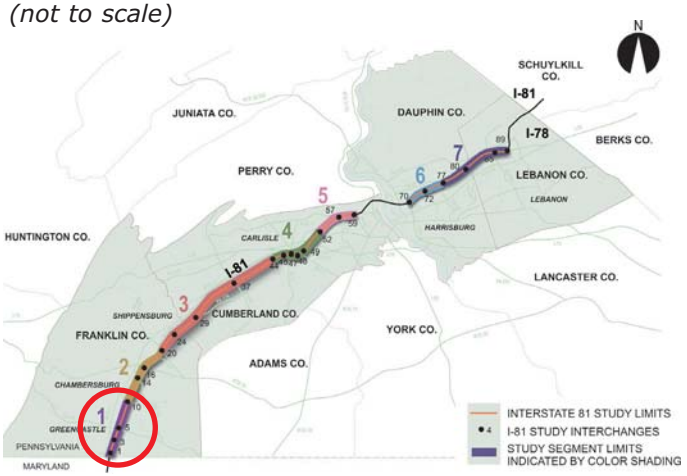
**Mainline:** Inside widening from four to six lanes. Including the 2 additional travel lanes, all pavement will be fully reconstructed. Several interchanges within Segment 1 contain acceleration/deceleration ramp lengths that are not in accordance with the current ramp length design criteria and require lengthening. The existing 60' median width provides ample space for the two additional lanes, as well as two 12' shoulders. With the inclusion of the concrete glare screen in the median, the entire median will be paved.

**Structures:** Segment 1 has two mainline (dual) bridges and seven overhead bridges. With the exception of 2 bridges, the overhead bridges in Segment 1 can accommodate the inside widening. All mainline bridges will be replaced. Currently, several of the overhead bridges do not meet the current vertical clearance requirement of 16'-6". At the existing locations to remain, the vertical clearance will be increased by re-profiling I-81. Based on the conceptual noise studies, noise barriers are required along select portions.

**Right-of-Way:** The right-of-way varies with a minimum width of 180'. The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Nominal right-of-way acquisition is anticipated.

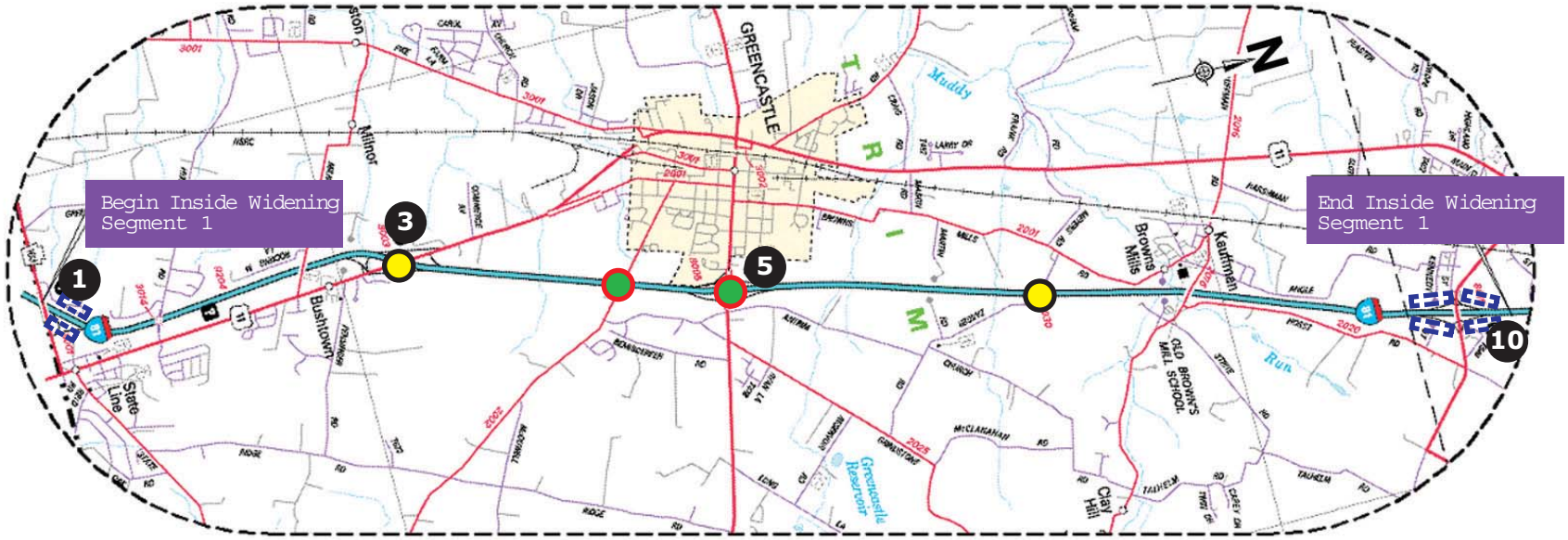
**Environmental:** The following features are present: Recorded Archaeological Sites, Recreational Area, Agricultural Security Area (ASA), Streams, Wetlands, and Potential Waste Sites.

***I-81 Study Segment Plan Map***
*(not to scale)*




| Segment 1: Exit 1 (PA 163 / State Line) to Exit 10 (PA 914 / Marion) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 11,940 |
| Right-of-Way | 547 |
| Utilities | 470 |
| Construction | 163,578 |
| Total | $ 176,535 |

***Figure 8. Segment 1, Franklin County (10 miles)***




Replace Mainline Bridge
Replace Overhead Bridge
Upgrade Ramp Lengths
Indicates Substandard Vertical Clearance

## 2. Segment 2 (Chambersburg):

**Objective:** Continue the inside widening from Segment 1 northward through the Chambersburg area providing additional capacity to reduce congestion and improve safety.

**Existing:** Segment 2 begins immediately north of Exit 10 (PA 914) and continues north ten miles to and including Exit 20 (PA 997). Segment 2 is located entirely in Franklin County and provides access to the Chambersburg area (Figure 9). There are three existing interchanges within this segment and one proposed interchange (Exit 17). Throughout the segment there are locations with residential developments or businesses that abut the right-of-way. A southbound weigh station is located at Milepost 10.5. The median width occasionally varies, but is predominantly 60'. Segment 2 is classified as a Rural Segment. Although only slightly above the state average, this segment possesses the highest crash rate along the corridor.

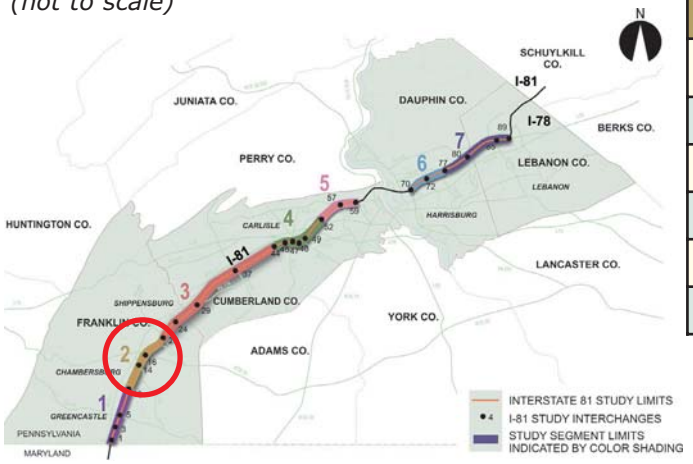
**Mainline:** Inside widening from four to six lanes. Including the 2 additional travel lanes, all pavement will be fully reconstructed. Exits 14 and 16, in Segment 2, contain acceleration/deceleration ramp lengths that are not in accordance with the current ramp length design criteria and require lengthening. The existing 60' median width provides ample space for the two additional lanes, as well as two 12' shoulders. With the inclusion of the concrete glare screen in the median, the entire median will be paved.

**Structures:** Segment 2 has five mainline (dual) bridges and nine overhead bridges. The overhead bridges in Segment 2 can accommodate the inside widening. All mainline bridges will be replaced. Currently, one overhead bridge does not meet the current vertical clearance requirement of 16'-6". The bridge will be replaced with a new bridge meeting all design criteria as part of the Exit 17 project. Based on the conceptual noise studies, noise barriers are required along select portions.

**Right-of-Way:** The right-of-way varies with a minimum width of 180'. The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Nominal right-of-way acquisition is anticipated.

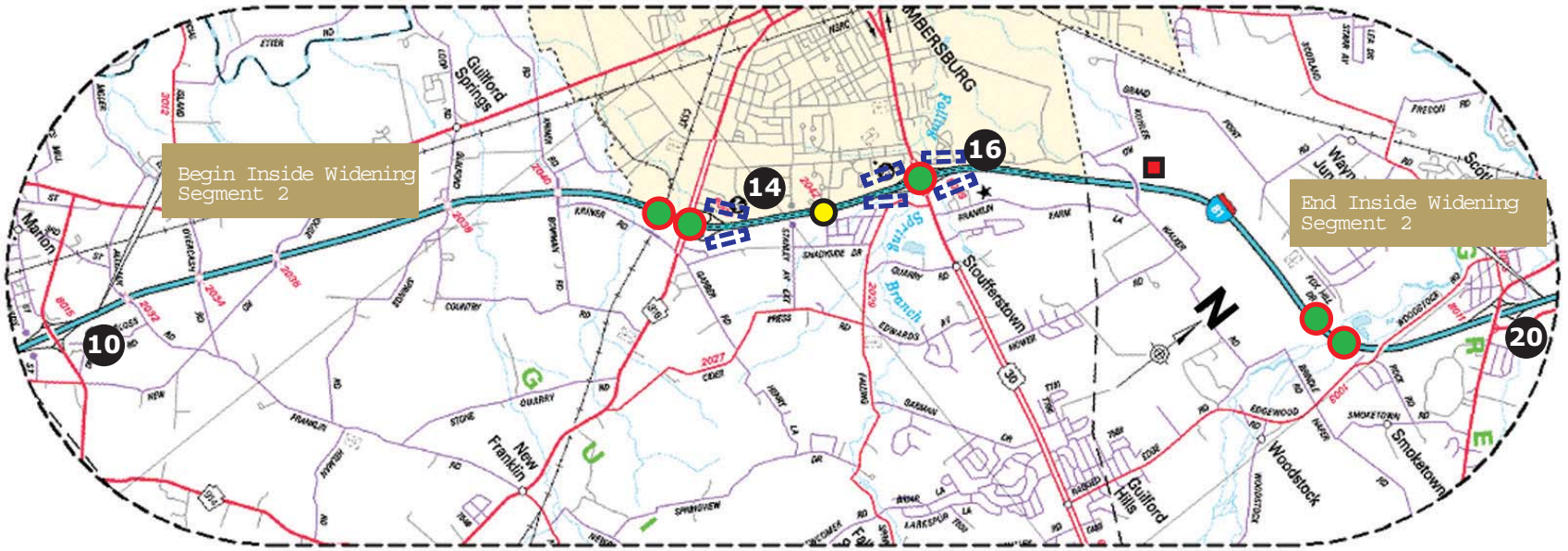
**Environmental:** The following features are present: Archibald Rankin Farm and Jacob Etters Farmstead- Eligible for the National Register (Historic); Eastern Green Township Historic District - Listed on the National Register (Historic); Nissley White Farm, Peter Brindle Farm, S. Grove Farm - Eligible for the National Register (Historic); Recreational Area, Agricultural Security Area (ASA), Streams, Wetlands, and Potential Waste Sites.

***I-81 Study Segment Plan Map***
*(not to scale)*




| Segment 2: Exit 10 (PA 914 / Marion) to Exit 20 (PA 997 / Scotland) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 14,805 |
| Right-of-Way | 764 |
| Utilities | 470 |
| Construction | 169,023 |
| Total | $ 185,062 |

***Figure 9. Segment 2, Franklin County (10 miles)***




Replace Mainline Bridge
Replace Overhead Bridge
Upgrade Ramp Lengths
Indicates Substandard Vertical Clearance (Bridge to be replaced as part of Exit 17)

## 3. Segment 3 (Shippensburg):

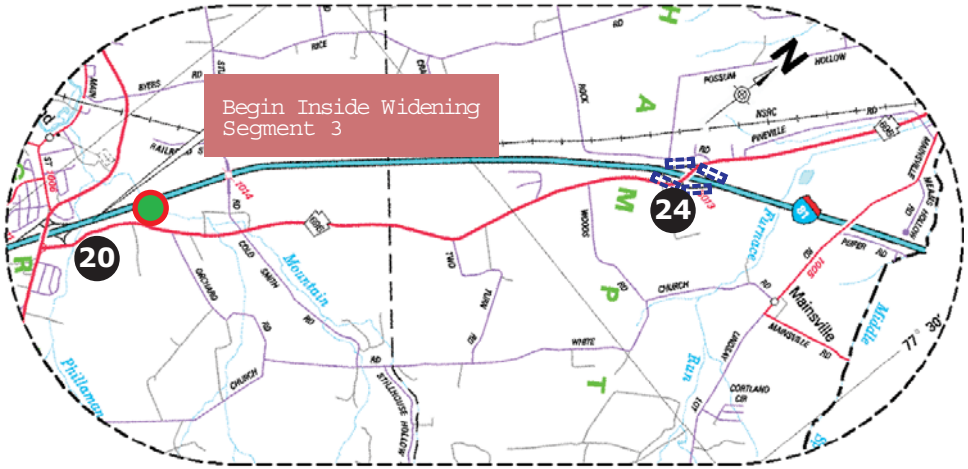
**Objective:** Continue the inside widening between Segments 2 and 4 providing additional capacity to reduce congestion and improve safety. Segment 3 begins immediately north of Exit 20 (PA 997) and extends 24 miles north to the southern limits of Exit 44 (PA 465).

**Existing:** This segment lies within Franklin and Cumberland Counties (Figure 10). Rest areas can be accessed north of Exit 37 from the northbound and southbound directions. The southern portion of this segment provides access to the Shippensburg area. Although this is the longest segment in the study, there are only three interchanges within its limits. Also within this segment is Norfolk Southern Hagerstown Secondary railroad track that abuts and parallels the right-of-way for over one mile. Several large warehouses are located along the right-of-way as well. The median width occasionally varies, but is predominantly 60'. Segment 3 is classified as a Rural Segment.

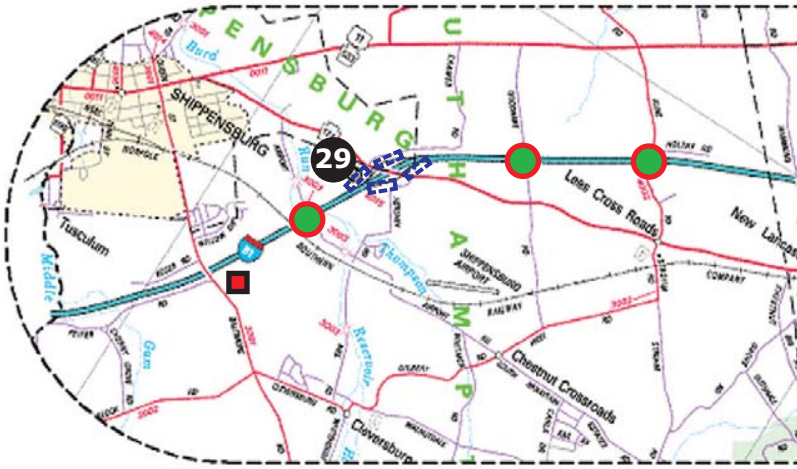
**Mainline:** Inside widening from four to six lanes. Including the 2 additional travel lanes, all pavement will be fully reconstructed. All interchanges in Segment 3, contain acceleration/deceleration ramp lengths that are not in accordance with the current ramp length design criteria and require lengthening. The existing 60' median width provides ample space for the two additional lanes, as well as two 12' shoulders. With the inclusion of the concrete glare screen in the median, the entire median will be paved.

**Structures:** Segment 3 has thirteen mainline (dual) bridges and ten overhead bridges. The overhead bridges in Segment 3 can accommodate the inside widening. All mainline bridges will be replaced. Currently, four overhead bridges do not meet the current vertical clearance requirement of 16'-6". At these locations, the vertical clearance will be increased by re-profiling I-81. Based on the conceptual noise studies, noise barriers are required along select portions.

***Figure 10. Segment 3, Franklin County (5.5 miles)***




***Segment 3, Cumberland County (lower half, 9.5 miles)***

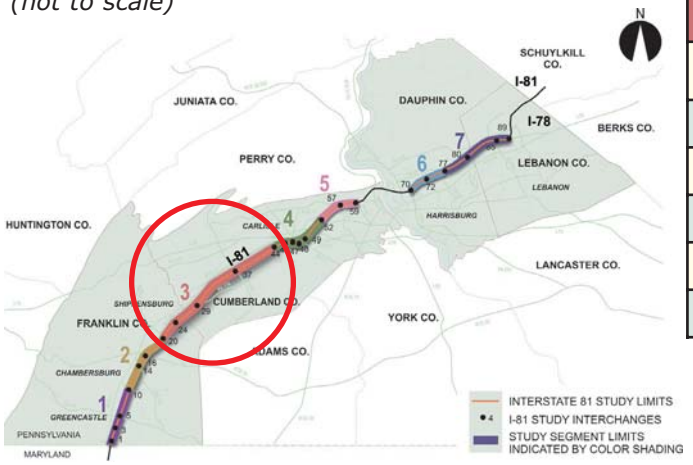


# Segment 3 (Shippensburg)

**Right-of-Way:** The right-of-way varies with a minimum width of 180'. The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Nominal right-of-way acquisition is anticipated.

**Environmental:** The following features are present: Proposed Agricultural Conservation Easements, Recorded Archaeological Sites, Agricultural Security Area (ASA), Streams, Wetlands, and Potential Waste Sites.

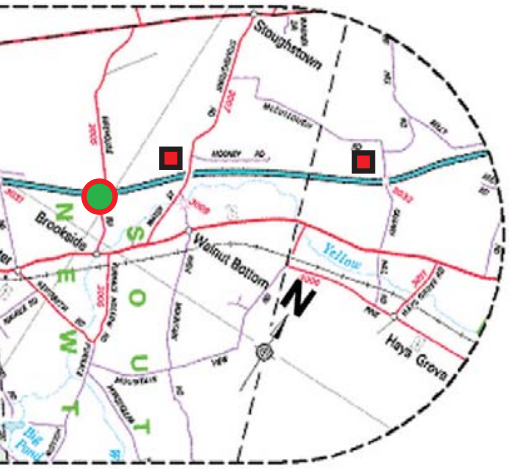
***I-81 Study Segment Plan Map***
*(not to scale)*

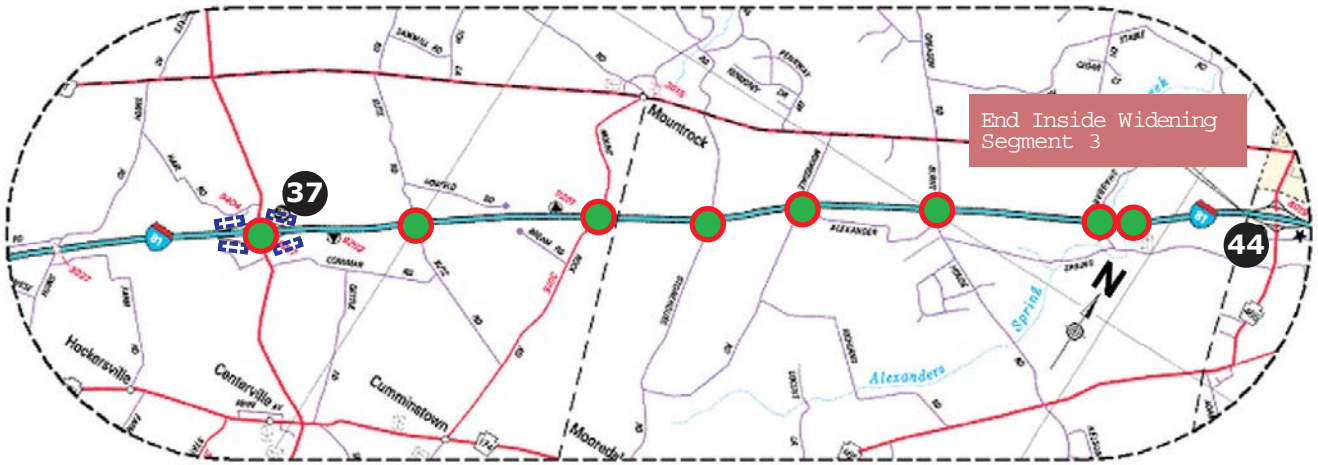



| Segment 3: Exit 20 (PA 997 / Scotland) to Exit 44 (PA 465 / Plainfield) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 29,744 |
| Right-of-Way | 3,111 |
| Utilities | 1,127 |
| Construction | 407,492 |
| Total | $ 441,474 |

Replace Mainline Bridge
Replace Overhead Bridge
Upgrade Ramp Lengths
Indicates Substandard Vertical Clearance

***Segment 3, Cumberland County (upper half, 9 miles)***



## 4. Segment 4 (Carlisle):

**Objective:** Provide a third lane in each direction and connect ramps between interchanges improving capacity and reducing congestion within Carlisle's closely spaced interchanges. Connecting ramps will provide an auxiliary lane (4 lane) condition between the interchanges.

**Existing:** Segment 4 begins at the southern limits of Exit 44 (PA 465) and extends eight miles north to and including Exit 52 (US 11) which provides access to the Pennsylvania Turnpike. Although this Segment is only eight miles long, it contains six interchanges (Figure 11). There are no rest areas or weigh stations within this segment. The existing median predominantly has a 60' width with some steep slopes. This segment contains the most development adjacent the existing right-of-way. Segment 4 is classified as an Urban Segment.

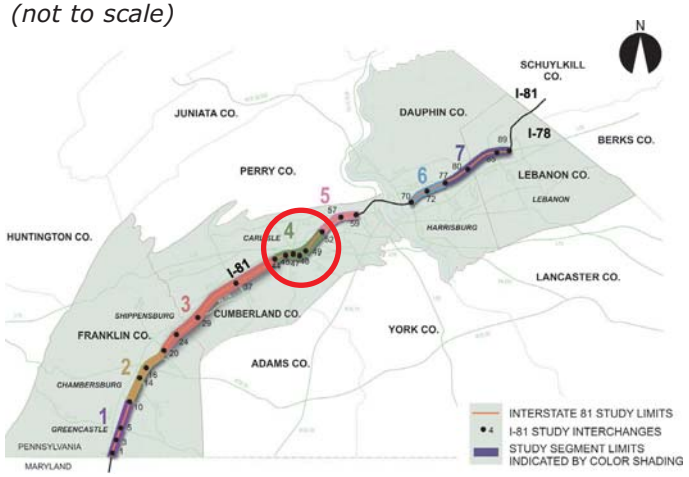
**Mainline:** Inside widening from four to six lanes. Including the 2 additional travel lanes, all pavement will be fully reconstructed. Several interchanges within Segment 4 contain acceleration/deceleration ramp lengths that are not in accordance with the current ramp length design criteria and require lengthening. The existing 60' median width provides ample space for the two additional lanes, as well as two 12' shoulders. With the inclusion of the concrete glare screen in the median, the entire median will be paved.

**Structures:** Segment 4 has twelve mainline (dual) bridges and three overhead bridges. The overhead bridges in Segment 4 can accommodate the inside widening. However, all mainline bridges will be replaced. Based on the conceptual noise studies, noise barriers are required along select portions.

**Right-of-Way:** The right-of-way varies with a minimum width of 180'. The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Nominal right-of-way acquisition is anticipated.

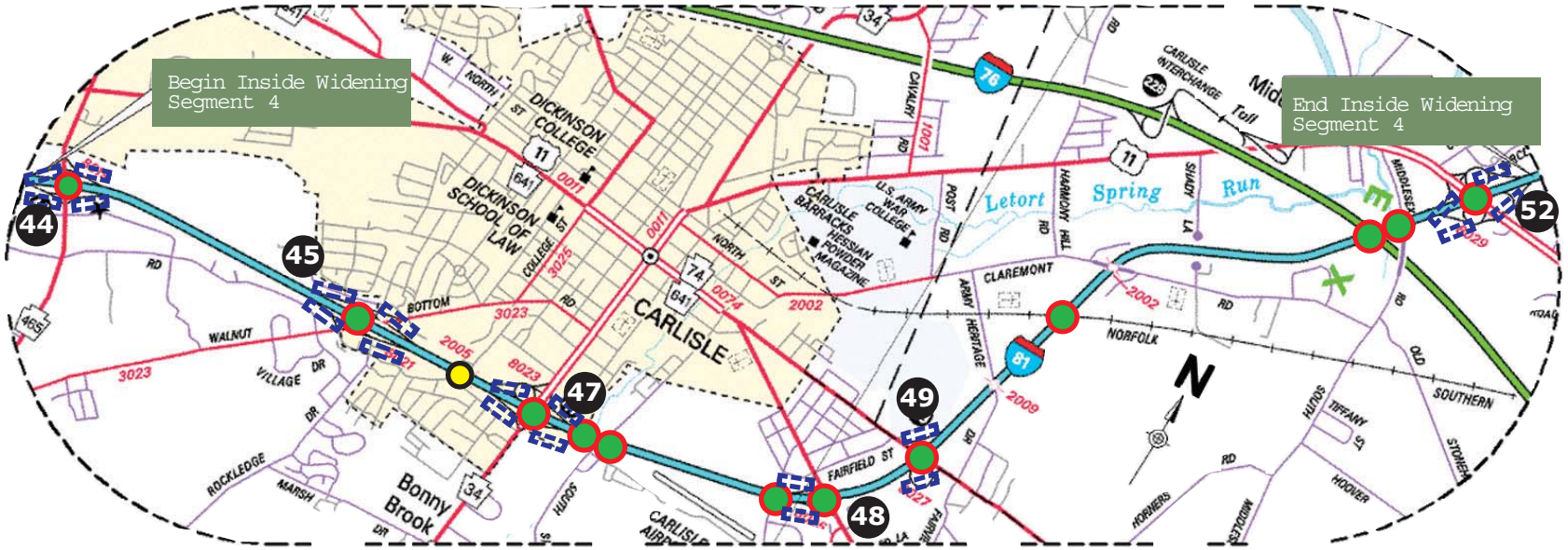
**Environmental:** The following features are present: F.W. Serright Royal Farm and Christian Crozer House - Eligible for the National Register (Historic), Letort Spring Run, Proposed Agricultural Conservation Easement, Recreational Area, Agricultural Security Area (ASA), Streams, Wetlands, and Potential Waste Sites.

***I-81 Study Segment Plan Map***
*(not to scale)*




| Segment 4: Exit 44 (PA 465 / Plainfield) to Exit 52 (US 11 / New Kingstown / Middlesex) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 14,584 |
| Right-of-Way | 204 |
| Utilities | 376 |
| Construction | 199,807 |
| Total | $ 214,971 |

***Figure 11. Segment 4, Cumberland County (8 miles)***



## 5. Segment 5 (Mechanicsburg):

**Objective:** Extend the existing six-lane condition southward through PA 581 (Exit 59) to US 11 (Exit 52).

**Existing:** Segment 5 begins immediately north of Exit 52 (US 11) and extends approximately 7.5 miles north to Exit 59 (PA 581). There are two interchanges located within Segment 5 (Figure 12) including the PA 581 interchange at Exit 59. The landscape is predominantly agricultural with small communities bordering along the right-of-way. A few roads, buildings and a stream are located directly adjacent the right-of-way. The predominant median width is 84'. However, between Exits 57 and 59 the median width transitions from 84' to over 300' wide at Exit 59. This segment carries the highest volume of traffic along the corridor and is classified as a Rural Segment.

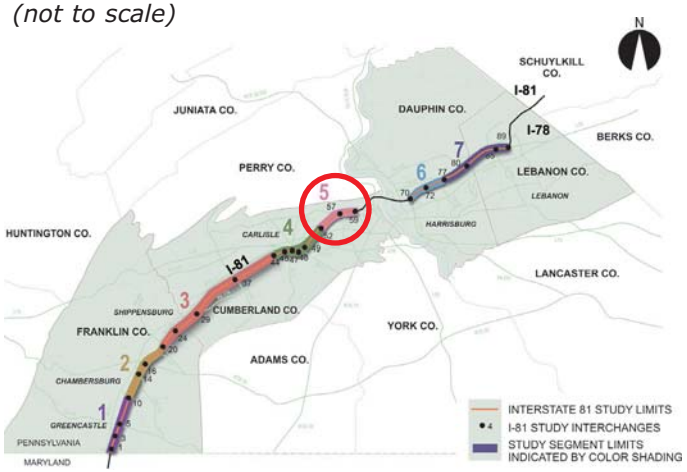
**Mainline:** Inside widening from four to six lanes. Including the 2 additional travel lanes, all pavement will be fully reconstructed. Exit 57 and Exit 59 have inadequate acceleration/deceleration ramp lengths and require lengthening.

**Structures:** Segment 5 has two (2) mainline (dual) bridges and seven overhead bridges. The typical overhead bridge in Segment 5 accommodates the inside widening. Where necessary, I-81 will be reprofiled to achieve the minimum required vertical clearance. Therefore, there is no cost associated with the replacement of overhead bridges. However, all mainline bridges will be replaced. Based on the conceptual noise studies, no noise barriers are required.

**Right-of-Way:** The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Overall, the existing right-of-way should be adequate for the proposed cut and fill grading for the additional inside lane concept.

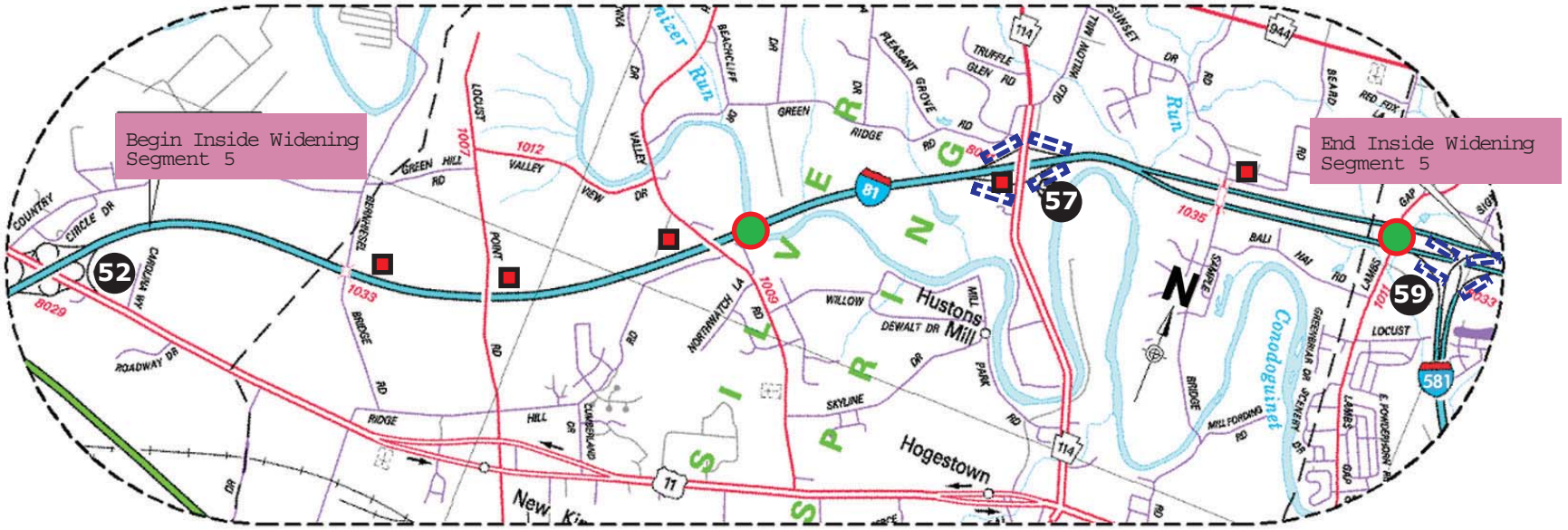
**Environmental:** The following features are present: Walter Buchanan Farm - Eligible for the National Register (Historic), Proposed Agricultural Conservation Easement, Appalachian Trail, Recreational Area, Agricultural Security Area (ASA), Conodoguinet Creek, Streams, Wetlands, and Potential Waste Sites.

***I-81 Study Segment Plan Map***
*(not to scale)*




| Segment 5: Exit 52 (US 11 / New Kingstown / Middlesex) to Exit 59 (Camp Hill | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 8,912 |
| Right-of-Way | 0 |
| Utilities | 321 |
| Construction | 122,097 |
| Total | $ 131,330 |

***Figure 12. Segment 5, Cumberland County (7.5 miles)***



## 6. Segment 6 (Harrisburg):

**Objective:** Extend the existing six lane condition northward from Interstate 83 (Exit 70) through Mountain Road (Exit 72) to PA 39 (Exit 77).

**Existing:** Segment 6 continues the study area on the east side of Harrisburg in Dauphin County. It begins at Exit 70 (I-83) and extends eight (8) miles north to Exit 77 (PA 39). Segment 6 has two interchanges (Figure 13) and provides access to Harrisburg and Linglestown. There are no rest areas or weigh stations. Segment 6 has characteristics of both the 60' and 84' median width segments. The median width is 60' for approximately 40% of the length of the segment on the southern side, while the remaining northern portion remains 84' wide. This segment is classified as an Urban Segment. This segment possesses the highest crash average (per mile) and is second to Segment 5 in traffic volumes. In addition, the I-83 Master Plan has recommended improvements for I-83 terminating into this segment.

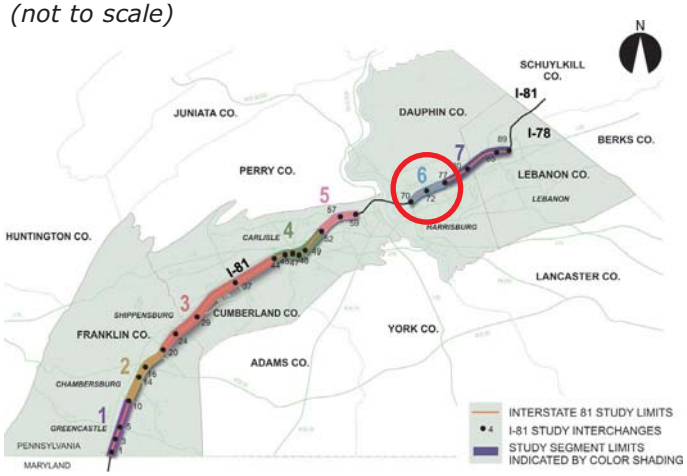
**Mainline:** Inside widening from four to six lanes. Including the 2 additional travel lanes, all pavement will be fully reconstructed. All interchanges within Segment 6 contain acceleration/deceleration ramp lengths that are not in accordance with the current ramp length design criteria and require lengthening.

**Structures:** Segment 6 has two (2) mainline (dual) bridges and five overhead bridges. Three overhead bridges in Segment 6 cannot accommodate the inside widening and must be replaced. Where necessary, I-81 will be reprofiled to achieve the minimum required vertical clearance. All mainline bridges will be replaced. Based on the conceptual noise studies, noise barriers are required along select portions.

**Right-of-Way:** The right-of-way widths remain fairly constant and are based on the 84' median right-of-way widths. The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. The right-of-way acquisitions would be very minor due to the wide right-of-way.

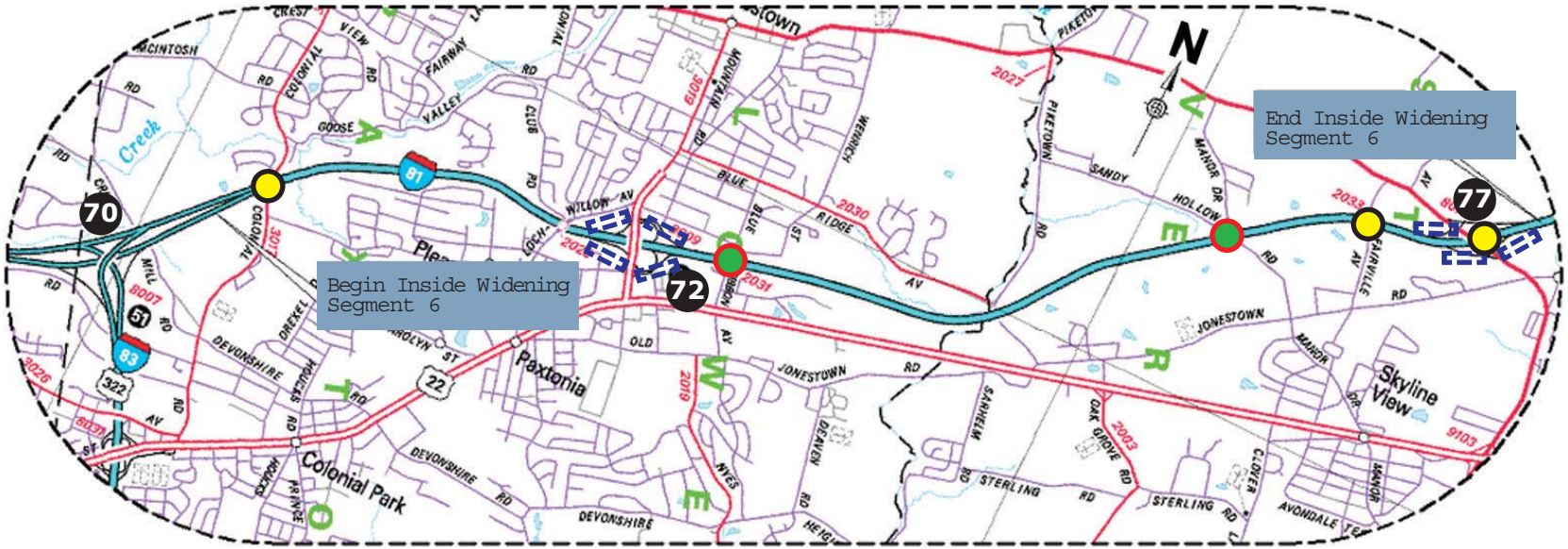
**Environmental:** The following features are present: Recorded Archaeological Sites, Recreational Area, Agricultural Security Area (ASA), Streams, Wetlands, and Potential Waste Sites. (Existing sound barriers may require reassessment for future compatibility).

***I-81 Study Segment Plan Map***
*(not to scale)*




| Segment 6: Exit 70 (JCT I-83 / York) to Exit 77 (PA 39 / Manada Hill / Hershey) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 10,174 |
| Right-of-Way | 0 |
| Utilities | 316 |
| Construction | 139,379 |
| Total | $ 149,869 |

***Figure 13. Segment 6, Dauphin County (7 miles)***




Replace Mainline Bridge
Replace Overhead Bridge
Upgrade Ramp Lengths

## 7. Segment 7 (Lebanon):

**Objective:** Extend the inside widening between Segment 6 PA 39 (Exit 77) and the I-78 junction (Exit 89).

**Existing:** Segment 7 is the northern most segment in the I-81 corridor study area (Figure 14) and begins immediately north of Exit 77 (PA 39) and extends approximately 12 miles north to Exit 89 (I-78). Segment 7 is located in Dauphin and Lebanon Counties and the surrounding areas are mostly used for agricultural purposes. Two interchanges exist within Segment 7, along with two weigh station/rest areas - one in each direction. The median width that occasionally varies but the predominant median width is 84'. This segment is classified as a Rural Segment.

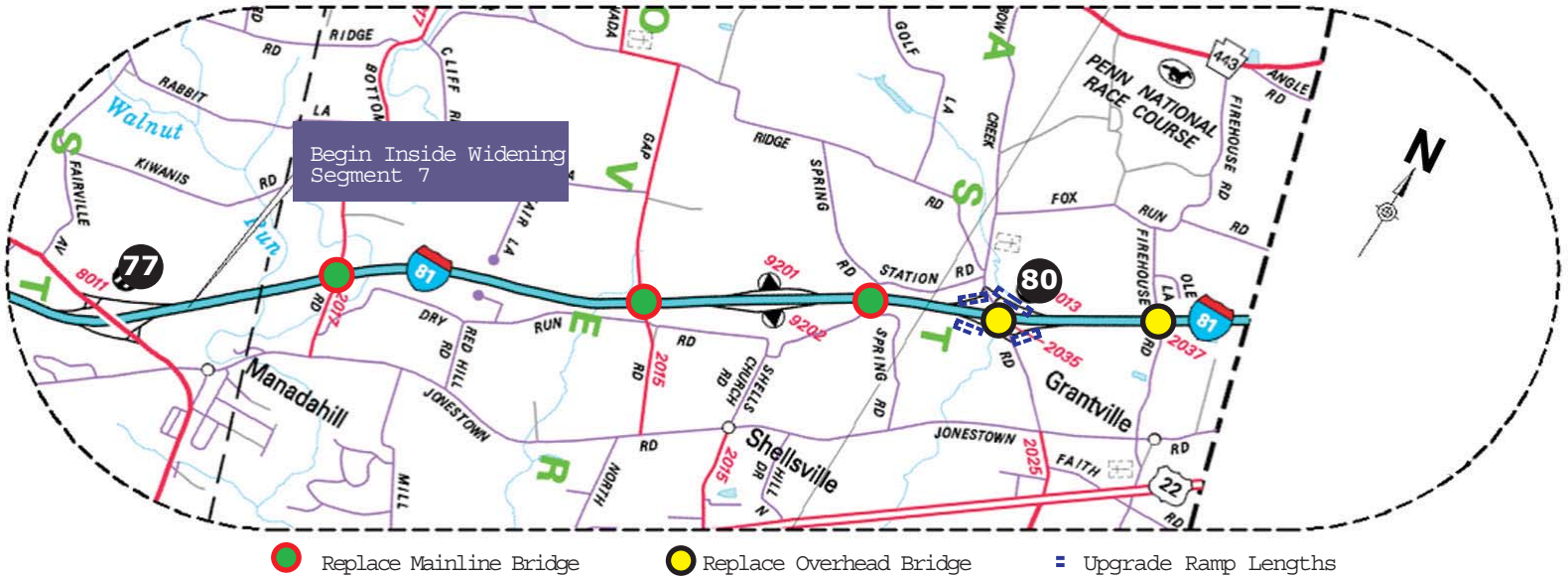
**Mainline:** Inside widening from four to six lanes. Including the 2 additional travel lanes, all pavement will be fully reconstructed. (The pavement was fully reconstructed in 1995). The two interchanges within the segment contain acceleration/deceleration ramp lengths that are not in accordance with the current ramp length design criteria and require lengthening.

**Structures:** Segment 7 has five mainline bridges and seven overhead bridges. All of the overhead and mainline bridges in Segment 7 will be replaced. Based on the conceptual noise studies, no noise barriers are required.

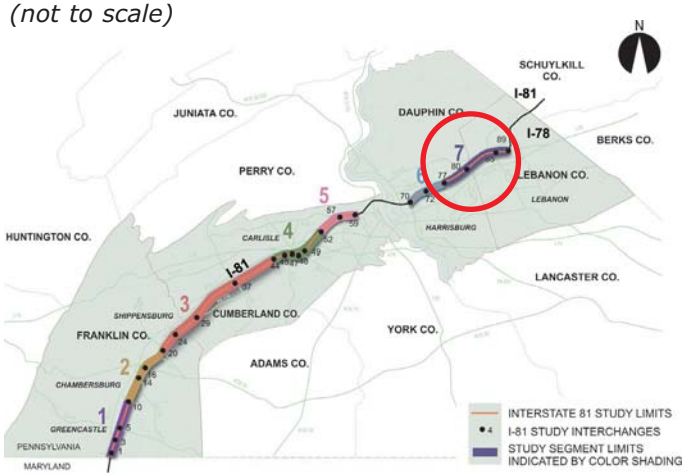
**Right-of-Way:** The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Overall, the existing right-of-way should be adequate for the proposed cut and fill grading for the additional inside lane concept.

**Environmental:** The following features are present: Indiantown Gap Historic District - Listed on the National Register (Historic), Recorded Archaeological Sites, Agricultural Security Area (ASA), Streams, Wetlands, and Potential Waste Sites.

***Figure 14. Segment 7, Dauphin County (4.5 miles)***

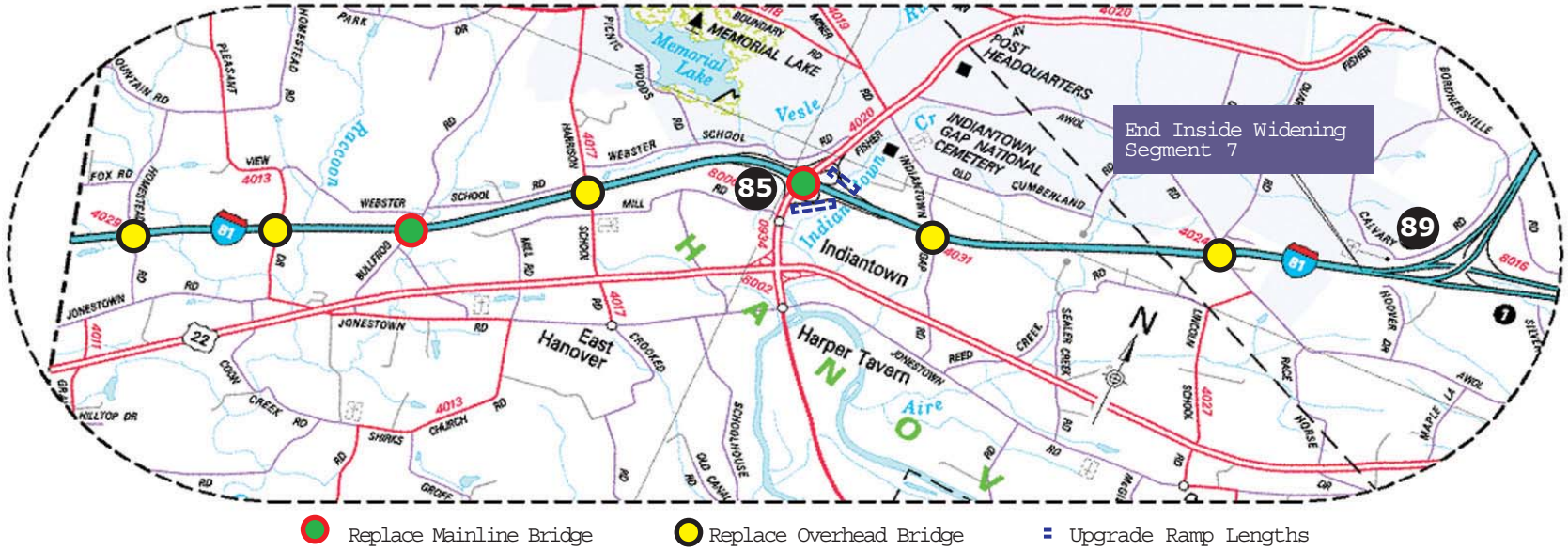


***I-81 Study Segment Plan Map***
*(not to scale)*




| Segment 7: Exit 77 (PA 39 / Manada Hill / Hershey) to Exit 89 (JCT I-78 / Allentown) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 14,919 |
| Right-of-Way | 0 |
| Utilities | 527 |
| Construction | 204,393 |
| Total | $ 219,839 |

***Figure 14. Segment 7, Lebanon County (7.5 miles)***



# Conceptual Projects and Costs

The segment-by-segment deployment will encumber a minimum of $130+ million for any one segment. Projects of this size and cost cannot be easily integrated into PENNDOT's 12 Year Transportation Program. As an alternative, this section identifies specific locations along the corridor that would immediately benefit from an additional lane or other improvements and conform to a cost that enables PENNDOT to program funds more readily.

These conceptual projects may be refined in length or scope as PENNDOT, in cooperation with the MPOs and planning organizations, defines the transportation projects along the corridor.

Building upon the recommendations from the ***Concepts Evaluation Report***, an effort was made to identify smaller conceptual roadway projects that could be developed to provide immediate relief to areas currently experiencing:


- Higher than average crash rates
- Unacceptable LOS
- Inadequate ramp lengths

With this approach, specific locations along the 77-mile corridor were evaluated as candidate conceptual roadway projects. The size of these projects must be limited to only a few miles to keep the total cost for each project within a practical range for individual construction projects. **In addition, these projects have the ability to serve as a template for future segment widening projects.**

In summary, conceptual projects serve immediate improvements, set templates for future segment long widening and meet long term needs of the corridor within their specific limits.

Seven conceptual roadway projects, C1 to C7, were identified and illustrated on Figure 15. Please note that the projects are listed in geographical order from south to north along the I-81 corridor and not in any particular priority sequence.

The conceptual roadway projects are as follows:

- C1-Exit 1 (PA 163 / State Line) to Exit 5 (PA 16 / Greencastle / Waynesboro)
- C2-Exit 14 (PA 316 / Wayne Avenue) to Exit 17 (Future SR 1010 / Walker Road)
- C3-Exit 17 (Future SR 1010) to Exit 20 (PA 997 / Scotland)
- C4-Exit 44 (PA 465 / Plainfield) to Exit 48 (PA 74 / York Street)
- C5-Exit 49 (PA 641 / High Street) to Exit 52 (US 11 / New Kingstown / Middlesex)
- C6-Exit 57 (PA 114 / Mechanicsburg) to Exit 61 (PA 944 / Wertzville Road)
- C7-Exit 70 (JCT I-83 / York) to Exit 72 (SR 3019 / Mountain Road)

In general, each conceptual roadway project includes:

- Providing additional inside lanes
- Reconstructing mainline pavement
- Lengthening entrance and exit ramps to current design standards
- Connecting entrance and exit ramps for closely spaced interchanges
- Increasing superelevation rates to current design standards
- Replacing overhead bridges with insufficient horizontal clearances
- Replacing all mainline bridges (each mainline bridge constitutes two bridges - one for each direction of travel)
- Improving existing horizontal or vertical geometry

The same cost estimating procedures and assumptions used for the Segments are applied to these projects.

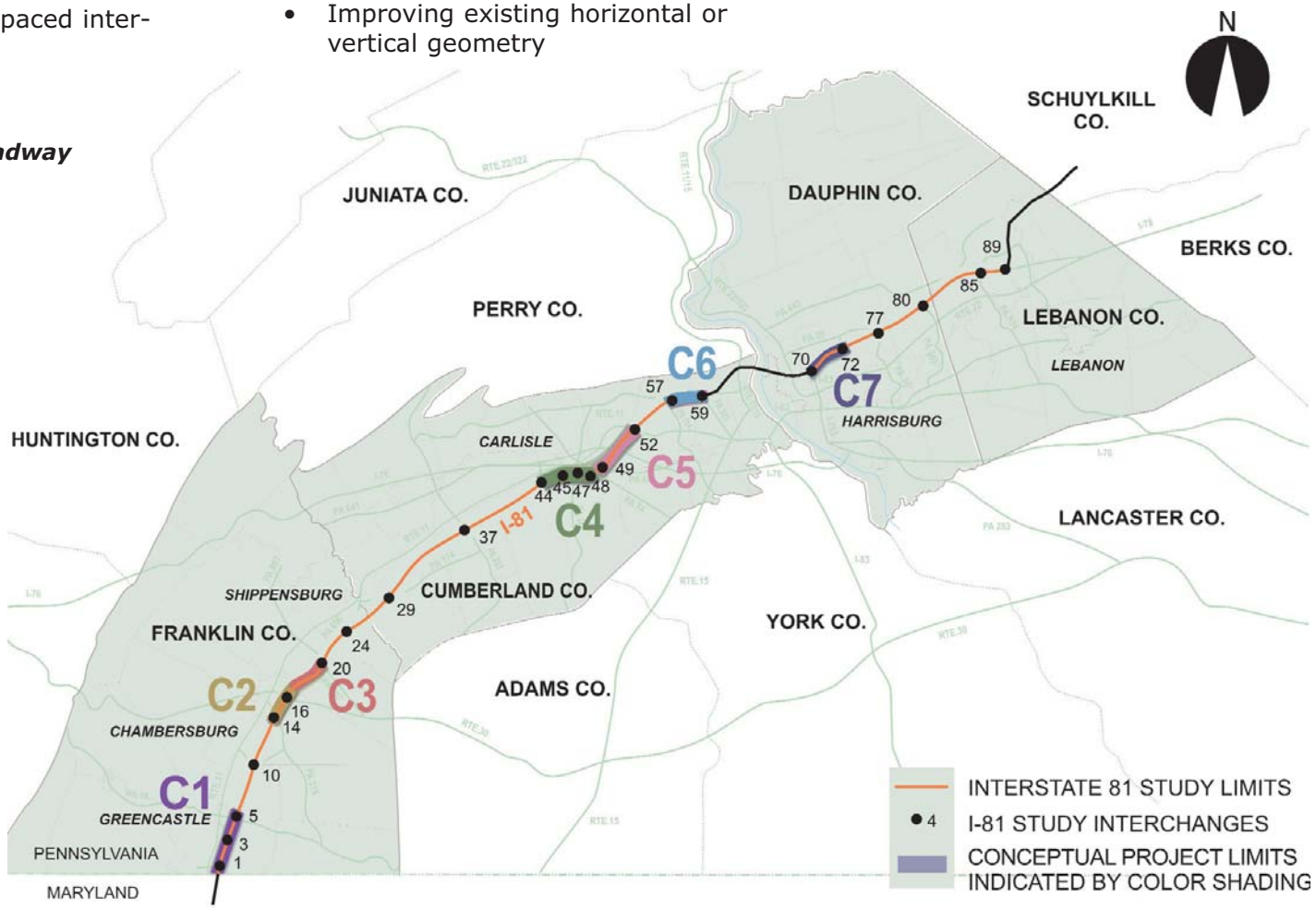



***Figure 15. Conceptual Roadway Projects***

## C1 - Exit 1 (PA 163 / State Line) to Exit 5 (PA 16 / Greencastle / Waynesboro)

This conceptual roadway project is located in Franklin County and has an average 60' median width. The project begins at the Pennsylvania-Maryland state border and extends through Antrim Township to PA 16 (Exit 5), which is partially located in the Borough of Greencastle. Refer to Figure 16 for this conceptual roadway project.

Currently, Maryland State Highway Administration (SHA) is conducting a widening study (Environmental Assessment) for I-81. **Therefore, this project serves as a continuity project** from the future Maryland I-81 widening. The Design Team has coordinated with the SHA and it is expected that an inside widening will be proposed in Maryland. Continuing the improved section from Maryland into Pennsylvania creates a streamlined design allowing travelers to enter Pennsylvania without a pinch point at the state line.

**Mainline.** The conceptual project would continue future additional inside lanes from the Maryland state line six miles north, past PA 16 (Exit 5). Terminate the additional inside lanes beyond the northbound entrance ramp of Exit 5.

The northbound additional inside lane must be transitioned into an additional outside lane at the US 11 overhead bridge. The existing northbound auxiliary lane under the US 11 bridge creates an existing median width of 48'. In order to provide an additional lane in the northbound direction, the existing lane configuration must be shifted to the outside, which requires the replacement of the overhead bridge and the installation of an additional outside lane.

Due to the age of existing mainline pavement, reconstruction of the entire mainline is suggested for this project.

**Ramps.** The interchange ramps within this project have been previously lengthened to current design standards and therefore do not require reconstruction. However, with the additional outside lane that is required in the northbound direction at the US 11 (Exit 3) interchange, ramp modifications may be required to accommodate the ramp impacts from the lane shifts. In addition, an inactive project on the TIP (SR 0081, Section 30) proposes to add a ramp to this exit.

**Structures.** Replace one overhead bridge at Exit 3 (US 11) to accommodate the additional inside lane in the southbound direction and the outside widening in the northbound direction.

All the mainline bridges within the project limits will be replaced. The mainline bridges are located at Leitersburg Road (SR 2002) and the PA 16 interchange (Exit 5).

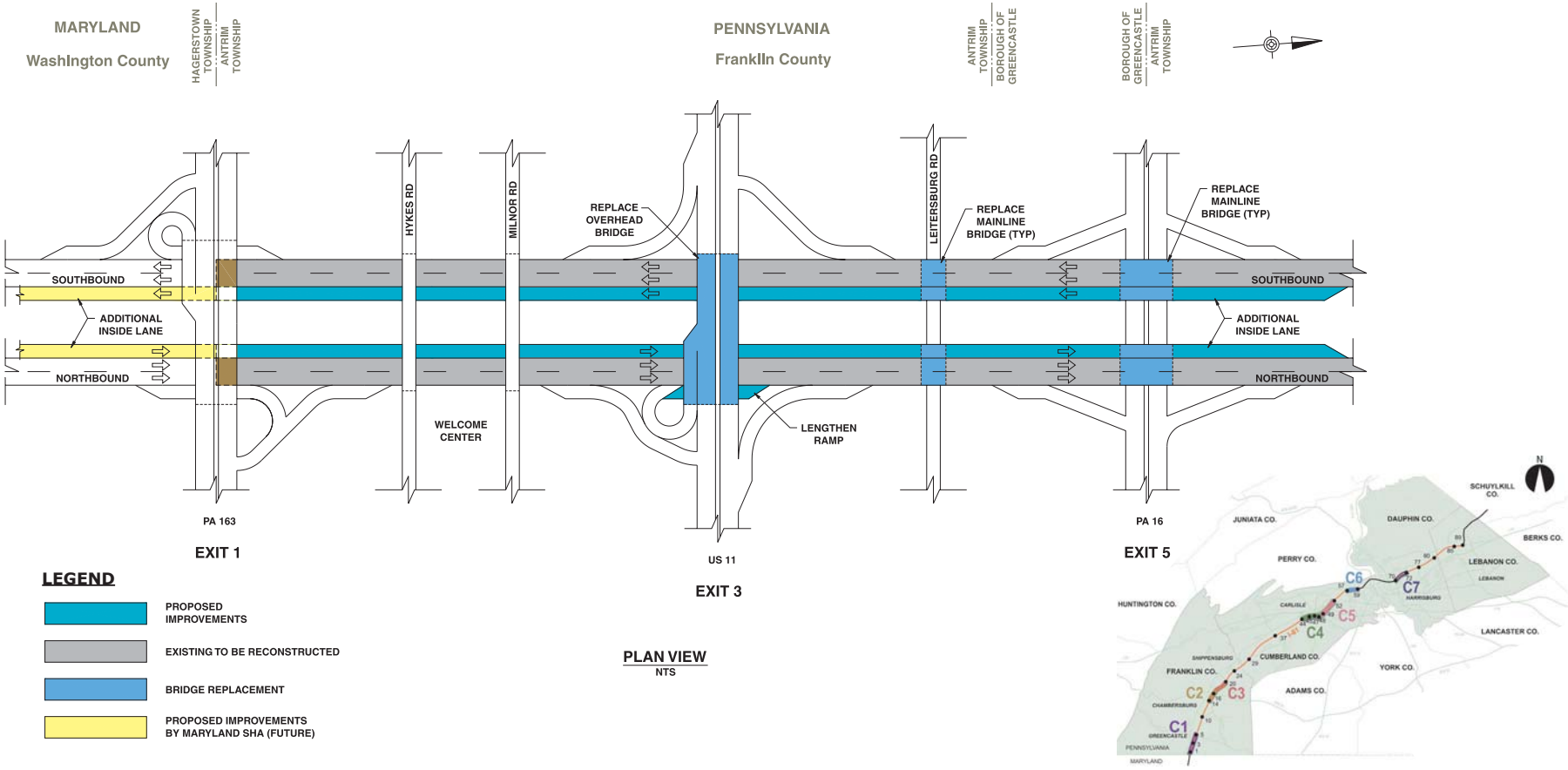
**Right-of-Way.** The right-of-way varies with a minimum width of 180'. The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Nominal right-of-way acquisition is anticipated.

**Environmental.** The following features are present: Recorded Archaeological Sites, Recreational Area, Agricultural Security Area (ASA), Streams and Wetlands.

# C1 - Exit 1 to Exit 5

| Exit 1 (PA 163 / State Line) to Exit 5 (PA 16 / Greencastle / Waynesboro) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 10,700 |
| Right-of-Way | 312 |
| Utilities | 248 |
| Construction | 88,930 |
| Total | $ 100,190 |

***Figure 16. Conceptual Project C1 (Approximate Length : 6 Miles)***



## C2 - Exit 14 (PA 316 / Wayne Avenue) to Exit 17 (Future SR 1010)

This conceptual roadway project is also located within Franklin County and has a typical 60' median width. A portion of the project, from Exit 14 to a point between Exits 16 and 17, is split down the median between two municipalities. The Borough of Chambersburg is on the western side and Guilford Township is on the eastern side. North of this area, I-81 is within the boundaries of Greene Township. Refer to Figure 17 for this conceptual roadway project. **This project serves as a safety and capacity improvement project for the I-81 corridor.**

The crash data shows this location to have a higher crash average than the state average. In addition, a capacity analysis shows this area to have an existing unacceptable Level of Service (LOS). These conditions will only deteriorate with an increase in traffic volumes. However, the improvements proposed with this project will help alleviate these conditions with the additional capacity provided by additional lanes and the reconstruction of the mainline.

**Mainline.** Provide additional inside lanes just south of PA 316 (Exit 14) entrance ramps and extend the lanes 4.4 miles north through SR 1010 (Exit 17) — currently under construction in 2004. Terminate additional inside lanes following the northbound entrance ramp from Exit 17.

Providing additional inside lanes within an existing 60' median requires full median paving. Sections within this project are bifurcated; therefore, the median barrier must be transitioned into a retaining wall to accommodate the difference in elevation between the two sides.

Due to the age of existing mainline pavement, reconstruction of the entire mainline is suggested for this project.

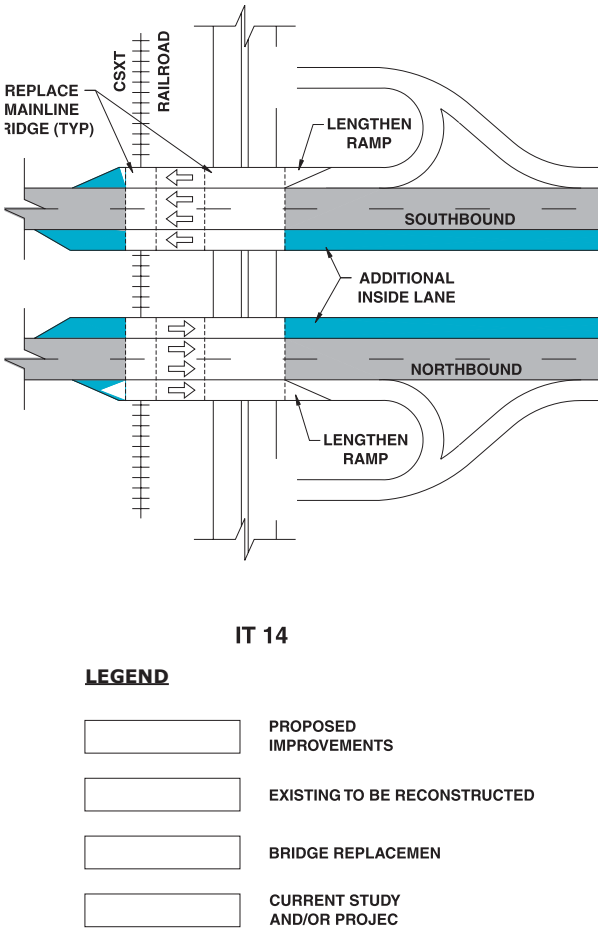
**Ramps.** Lengthen the southbound entrance ramp and the northbound exit ramp to current design standards for PA 316 (Exit 14). Connect the ramps between Exits 14 and 16, creating a four-lane section to maximize capacity between the interchanges and eliminate concentrated merging movements from traffic entering or exiting the expressway.

**Structures.** Replace one overhead bridge at McKinley Street, a Township road, to accommodate the inside and outside widening in the northbound and southbound directions.

All mainline bridges within the project limits will be replaced. The mainline bridges are located at the CSXT Railroad crossing, the PA 316 interchange (Exit 14) and US 30 interchange (Exit 16). A project has recently been programmed (SR 0081, Section 029) that proposes to perform the preliminary engineering for the replacement of the same bridges.

**Right-of-Way.** The right-of-way varies with a minimum width of 180'. The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Nominal right-of-way acquisition is anticipated.

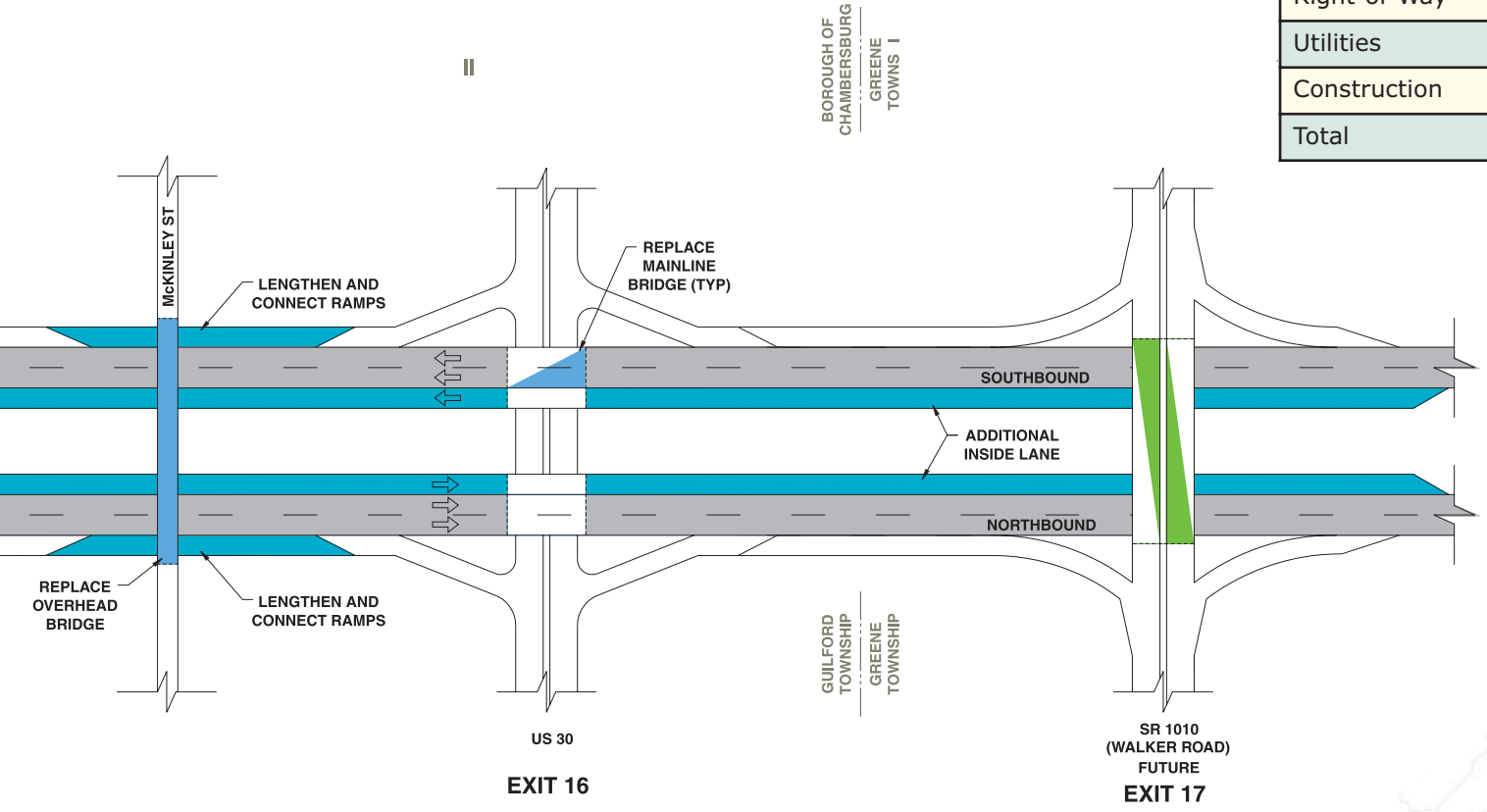
***Figure 17. Conceptual Project C2 (Approximate Length : 4.4 Miles)***



# C2- Exit 14 to Exit 17 (Future)

**Environmental.** The following features are present: Archibald Rankin Farm and Jacob Etters Farmstead- Eligible for the National Register (Historic); Eastern Green Township Historic District - Listed on the National Register (Historic); Nissley White Farm, Peter Brindle Farm, S. Grove Farm - Eligible for the National Register (Historic); Recreational Area, Agricultural Security Area (ASA), Streams, Wetlands, and Potential Waste Sites.

| Exit 14 (PA 316 / Wayne Avenue) to Exit 17 (Future SR 1010) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 8,000 |
| Right-of-Way | 984 |
| Utilities | 167 |
| Construction | 66,620 |
| Total | $ 75,771 |

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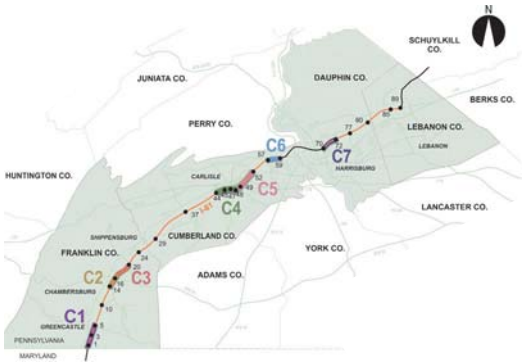


## C3 - Exit 17 (Future SR 1010) to Exit 20 (PA 997 / Scotland)

This conceptual roadway project is located completely within the boundaries of Greene Township, Franklin County and has a typical 60' median width. **This project serves as a safety and capacity improvement project,** as well as a continuity project from the Exit 14 to Exit 17 project. Refer to Figure 18 for this conceptual roadway project.

The crash data shows the crash rate at Exit 20 is the highest along the entire study area.

**Mainline.** Continue additional inside lanes from the Exit 14 to Exit 17 project and extend the lanes three miles north past PA 997 (Exit 20) to increase capacity. Terminate the inside widening beyond the Exit 20 northbound entrance ramp and the southbound exit ramp.

Due to the age of existing mainline pavement, reconstruction of the entire mainline is suggested for this project.

**Ramps.** The Exit 20 ramps have been lengthened to current design standards in project SR 0081, Section 015. The northbound off-ramp will be improved as part of the SR 0997 bridge replacement. The lengthening of these ramps will improve queuing capacity which may reduce the crash rate that occurs at this interchange. No ramp improvements are anticipated with this project.

**Structures.** The PA 997 (Exit 20) overhead bridge will be replaced in a future project and will accommodate future additional inside lanes. The existing Woodstock Road (SR 1003) overhead bridge will also accommodate future inside widening and therefore will not need to be replaced.

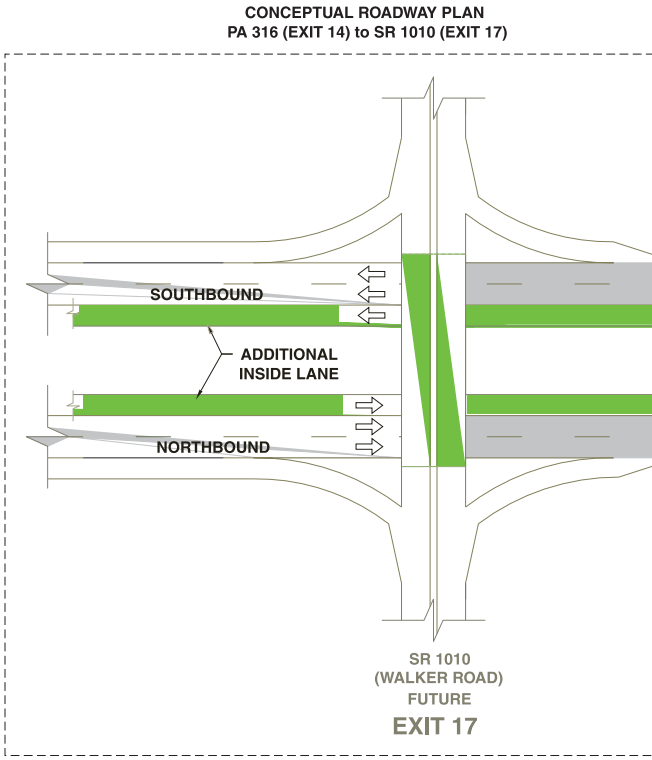
All mainline bridges within the project limits will be replaced. The mainline bridges are located at the abandoned railroad crossing and the Conococheague Creek crossing.

As stated for project C2, these mainline bridges will be replaced as part of SR 0081, Section 029.

**Right-of-Way.** The right-of-way varies with a minimum width of 180'. The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Nominal right-of-way acquisition is anticipated.

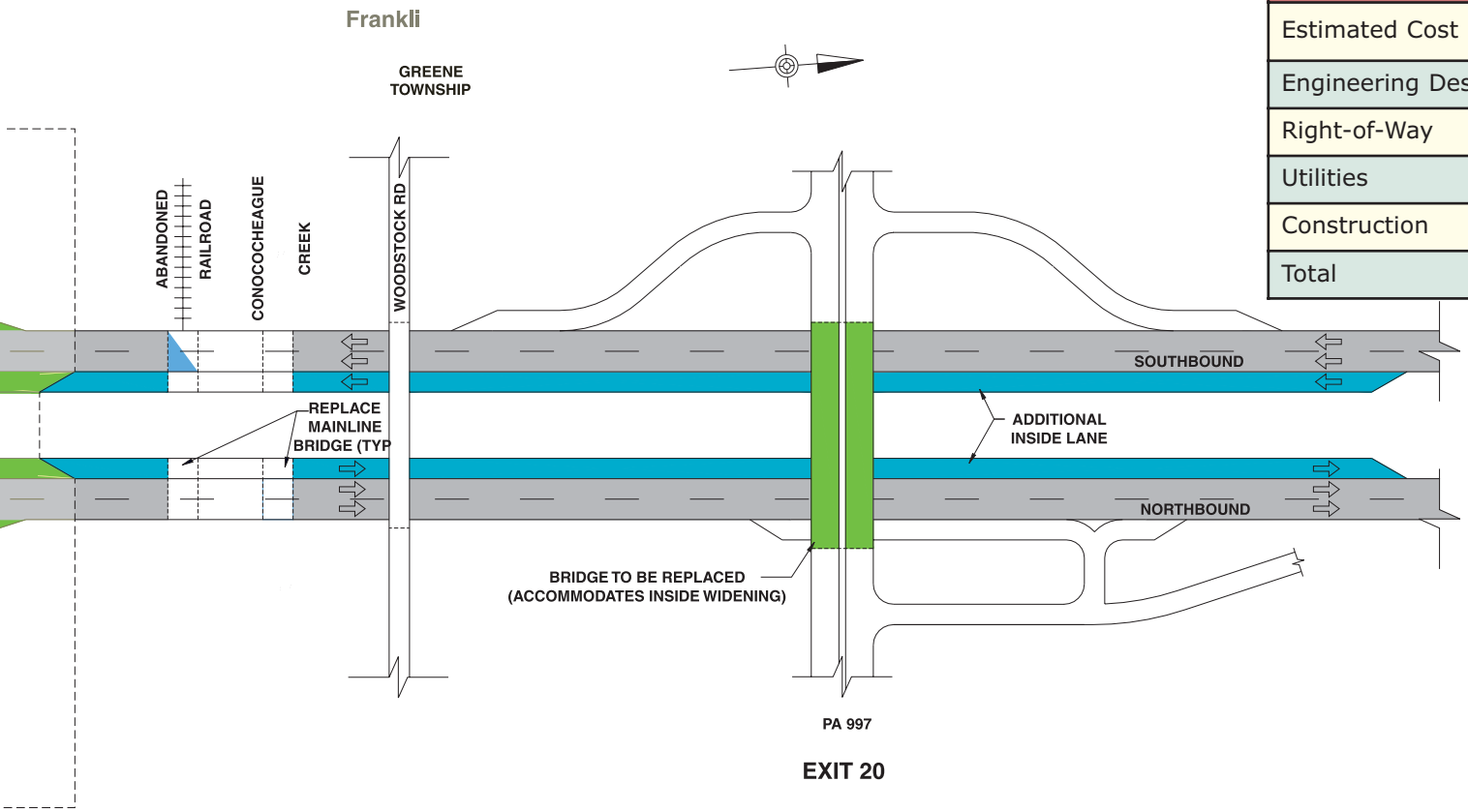
**Environmental.** The following features are present: Recreational Area, Agricultural Security Area (ASA), Streams, Wetlands, and Potential Waste Sites.

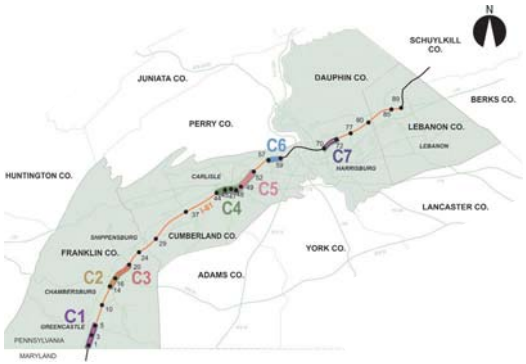
***Figure 18. Conceptual Project C3***



# C3 - Exit 17 (Future) to Exit 20

| Exit 17 (Future SR 1010) to Exit 20 (PA 997 / Scotland) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 5,353 |
| Right-of-Way | 614 |
| Utilities | 130 |
| Construction | 44,610 |
| Total | $ 50,707 |



## C4 - Exit 44 (PA 465 / Plainfield) to Exit 48 (PA 74 / York Street)

This conceptual roadway project is located within Cumberland County and has a typical 60' median width. South Middleton Township bookends the project with the Borough of Carlisle located in the center. **This project serves as a safety and capacity improvement project** for the I-81 corridor. The reconstruction of PA 465 (Exit 44), another safety and capacity improvement project in this area, has already been initiated by the Cumberland County Planning Commission. Refer to Figure 19 for this conceptual roadway project.

A capacity analysis shows this area to have an existing unacceptable LOS. This condition will only deteriorate with an increase in traffic volumes. However, the improvements proposed with this project will alleviate this poor condition with the additional capacity provided by additional lanes, connecting ramps and reconstructing the mainline.

**Mainline.** Provide additional inside lanes from the northern limits of PA 465 (Exit 44) four miles north through PA 74 (Exit 48). Terminate additional inside lanes between PA 74 (Exit 48) and PA 641 (Exit 49), which are closely spaced, half diamond interchanges.

Due to the age of existing mainline pavement, reconstruction of the entire mainline is suggested for this project.

**Ramps.** All ramps within this project will be connected to create a four-lane section to maximize capacity between interchanges and eliminate concentrated merging movements from traffic entering and exiting the expressway.

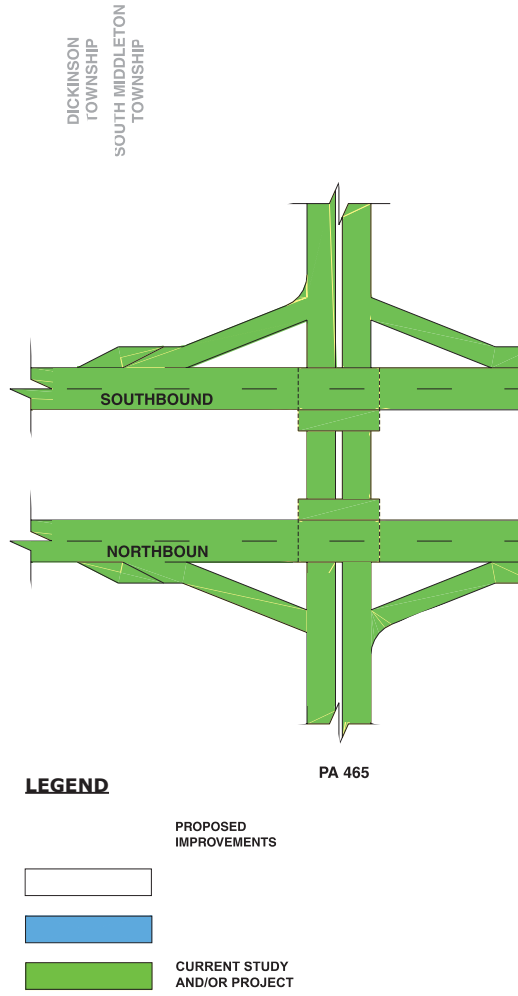
**Structures.** The West Ridge Street, a Borough road, overhead bridge will be replaced in order to accommodate the additional inside lanes. (Not all bridges are shown on Figure 19.)

All mainline bridges within the project limits will be replaced. The mainline bridges are located at Walnut Bottom Road (SR 3023 - Exit 45), PA 34 (Exit 47), South Spring Garden Street and Petersburg Road, both Township roads.

**Right-of-Way.** The right-of-way varies with a minimum width of 180'. The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Nominal right-of-way acquisition is anticipated.

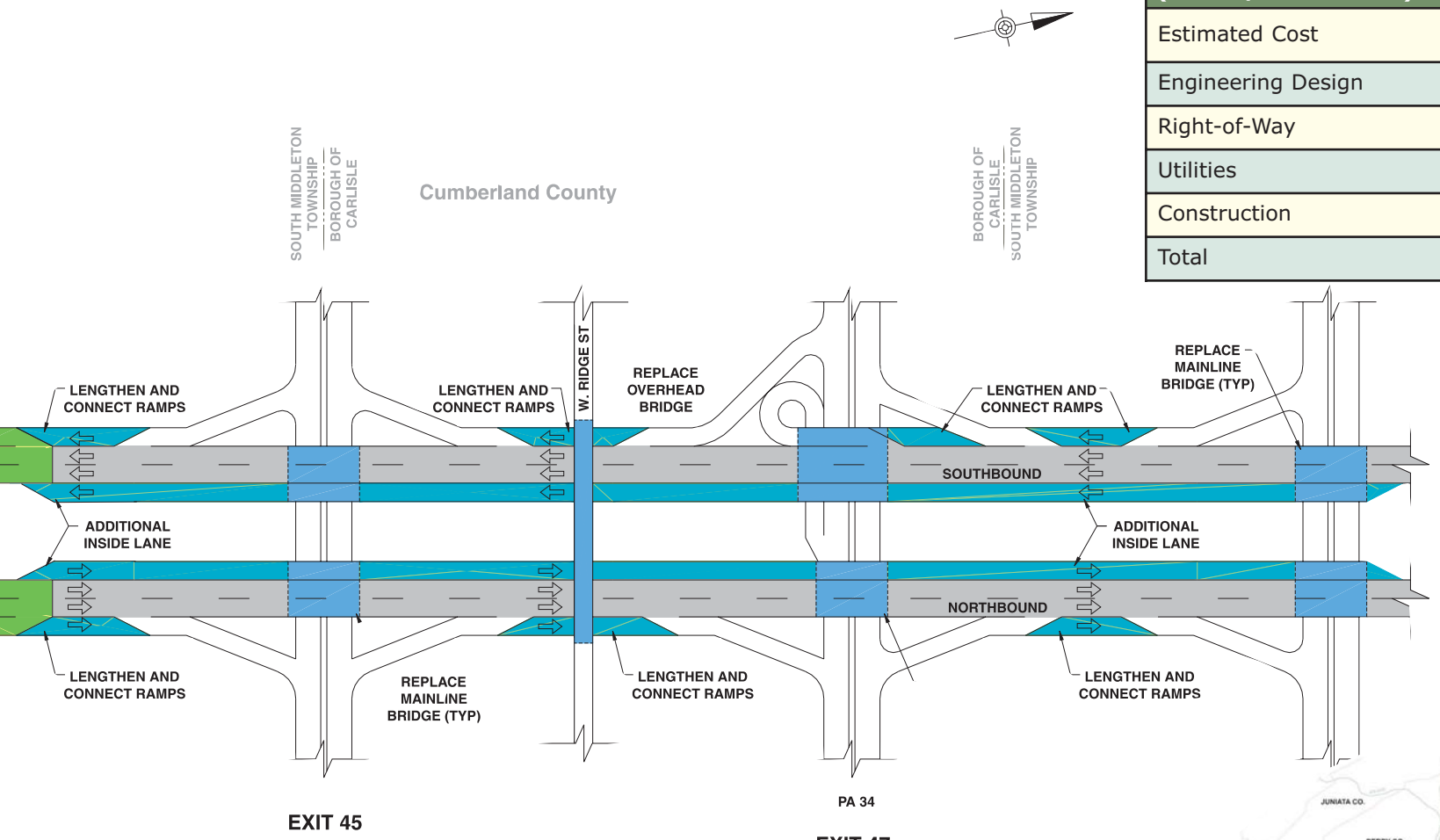
**Environmental:** The following features are present: F.W. Serright Royal Farm - Eligible for the National Register (Historic), Letort Spring Run, Streams, Wetlands, and Potential Waste Sites.

***Figure 19. Conceptual Project C4 (Approximate Length: 4 Miles)***



# C4 - Exit 44 to Exit 48

| Exit 44 (PA 465 / Plainfield) to Exit 48 (PA 74 / York Street) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 11,726 |
| Right-of-Way | 462 |
| Utilities | 203 |
| Construction | 97,720 |
| Total | $ 110,111 |




**NOT :**

NOT ALL MAINLINE CROSSINGS DISPLAYED FOR CLARITY

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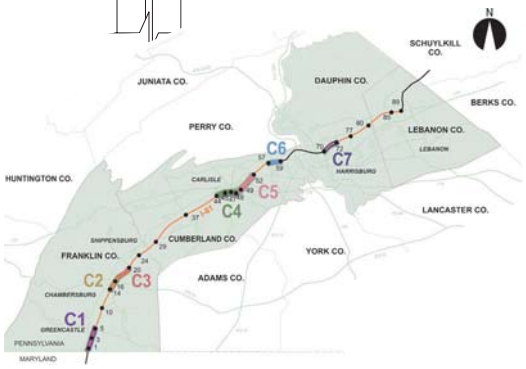


## C5 - Exit 49 (PA 641 / High Street) to Exit 52 (US 11 / New Kingstown / Middlesex)

This Conceptual roadway project is located within South Middleton Township, south of Exit 49 and within Middlesex Township on the north side of Exit 49, all of which is in Cumberland County. **This project serves as a continuity project from the previous Exit 44 to Exit 48 project and extends the additional lanes to the US 11, the PA Turnpike exit (Exit 52).** This project has a typical 60' median width. Refer to Figure 20 for this conceptual roadway project.

**Mainline.** Provide additional inside lanes from the limits of the Exit 44 to Exit 48 project, four miles north, past US 11 (Exit 52). Terminate additional inside lanes north of the northbound entrance ramp and the southbound exit ramp of Exit 52.

Since the mainline pavement was reconstructed in 1993, no mainline pavement replacement is anticipated for this project. However, the pavement will need to be assessed in the future for integrity and ability to carry projected traffic volumes.

**Ramps.** The southbound loop entrance ramp at Exit 52 will be lengthened to meet current design criteria with this project. No other ramp work is anticipated.

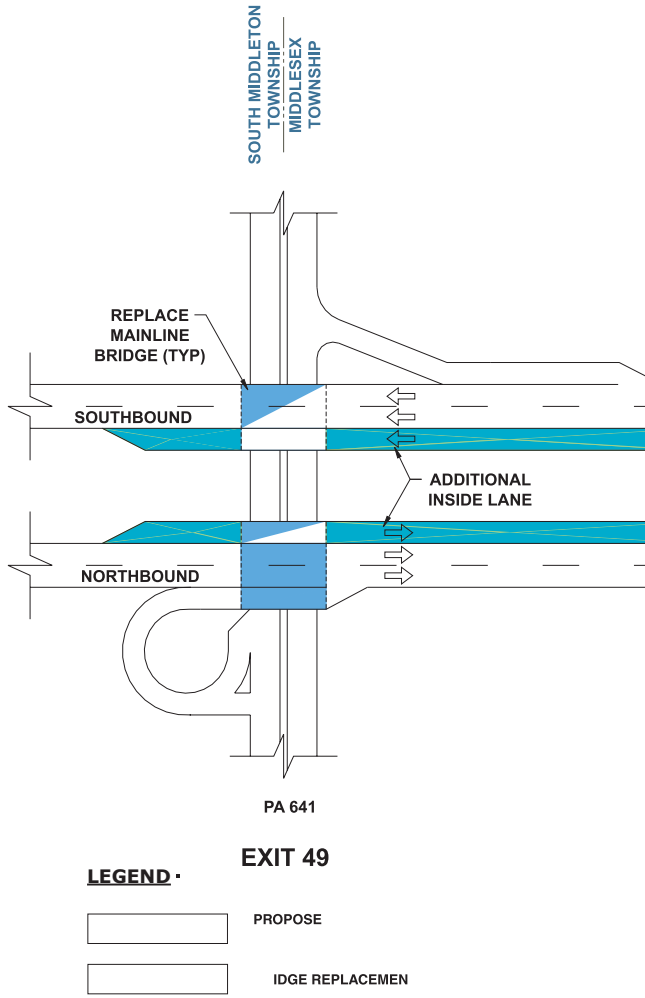
**Structures.** There are no overhead bridge replacements anticipated with this project. The Claremont Drive and the Claremont Road, both township roads, overhead bridges will accommodate the additional inside lanes.

All mainline bridges within the project limits will be replaced. The mainline bridges are located at PA 641 (Exit 49), Norfolk Southern Railroad crossing, the PA Turnpike (I-76), South Middlesex Road, a Township road, and US 11 (Exit 52).

**Right-of-Way.** The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Overall, the existing right-of-way should be adequate for the proposed cut and fill grading for the additional inside lane concept.

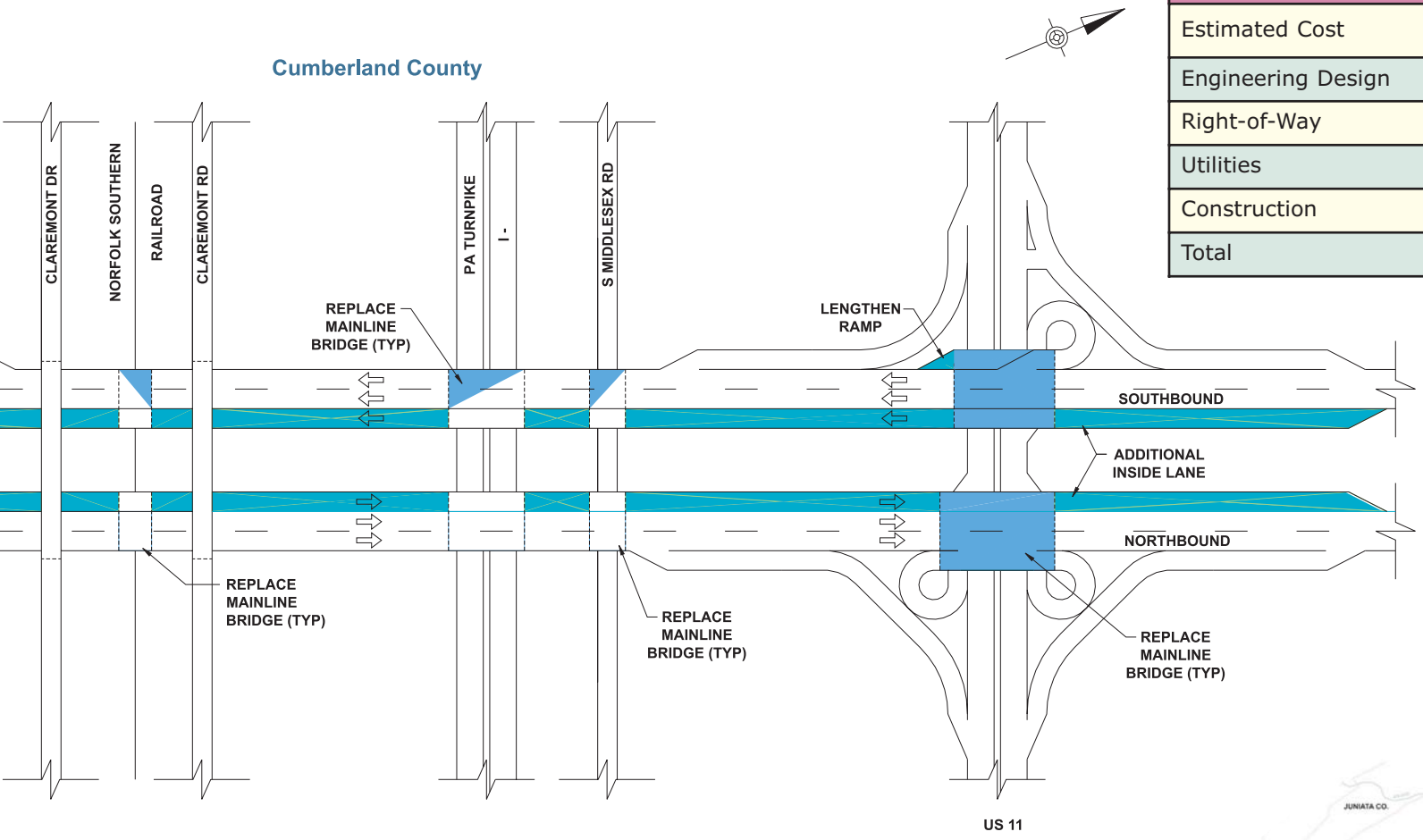
**Environmental.** The following features are present: Christian Crozer House - Eligible for the National Register (Historic), Appalachian Trail, Proposed Agricultural Conservation Easement, Recreational Area, Agricultural Security Area (ASA), Streams, Wetlands, and Potential Waste Sites.

***Figure 20. Conceptual Project C5 (Approximate Length: 4 Miles)***



# C5 - Exit 49 to Exit 52

| Exit 49 (PA 641 / High Street) to Exit 52 (US 11 / New Kingstown / Middlesex) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 7,766 |
| Right-of-Way | 446 |
| Utilities | 107 |
| Construction | 64,720 |
| Total | $ 73,039 |




**PLAN VIEW**
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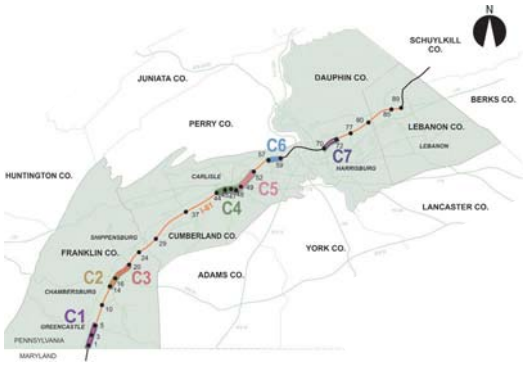


## C6 - Exit 57 (PA 114 / Mechanicsburg) to Exit 61 (PA 944 / Wertzville Road)

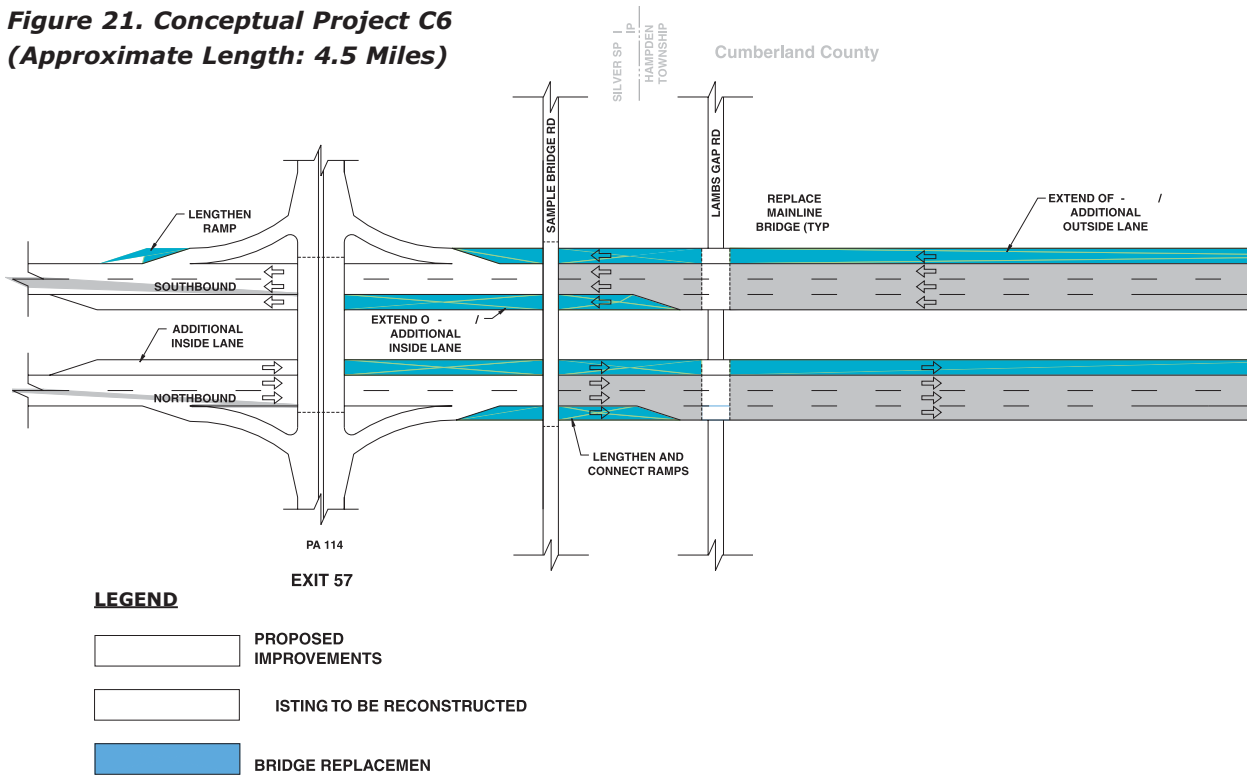
This conceptual roadway project is located within Silver Springs Township and Hampden Township, Cumberland County, and serves as a **safety and capacity improvement project** for the area around the I-81/PA 581 interchange (Exit 59). Within this project, I-81 has two lanes in each direction south of PA 581 and three lanes in each direction north of PA 581. The traffic using the 581/81 interchange is extremely heavy during peak hours causing delays. This project will specifically address those issues by extending ramps and providing widening for additional capacity. The median width for this project exceeds 84'. Refer to Figure 21 for this conceptual roadway project.

**Mainline.** Northbound - Begin the additional inside lane prior to PA 114 (Exit 57) and extend it 4.5 miles north to the exit ramp of PA 944 (Exit 61). Also in the northbound direction, connect the ramps between PA 114 (Exit 57) and PA 581 (Exit 59). These improvements would result in a four-lane section in the northbound direction between Exits 57 and 59, providing the necessary increase in capacity for the PA 581 interchange.

The additional inside lane continues through the PA 581 interchange area and creates a three-lane section between the exit and entrance ramps. Following the addition of the PA 581 entrance ramp, the additional inside lane creates four lanes in the northbound direction that will ultimately return to the existing three lane configuration as the lanes are shifted outward to allow the outside lane to drop at the exit ramp for PA 944 (Exit 61).

Southbound - Connect the ramps between PA 944 (Exit 61) and PA 114 (Exit 57). This creates a four-lane section to the exit ramps for PA 581, at which point one lane drops for the exit ramp and the existing two-lane section becomes a three-lane section between the exit and entrance ramps of PA 581. At the entrance ramp from PA 581, begin an additional inside lane and use the inside lane as the extension of the entrance ramp, thereby creating a four-lane section. Extend this lane through PA 114 (Exit 57) and terminate following the entrance ramp from Exit 57. Also included with ramp improvements, lengthen the entrance

***Figure 21. Conceptual Project C6 (Approximate Length: 4.5 Miles)***



ramp from Exit 57 to meet current design standards.

Due to the age of existing mainline pavement, reconstruction of the entire mainline is suggested for this project.

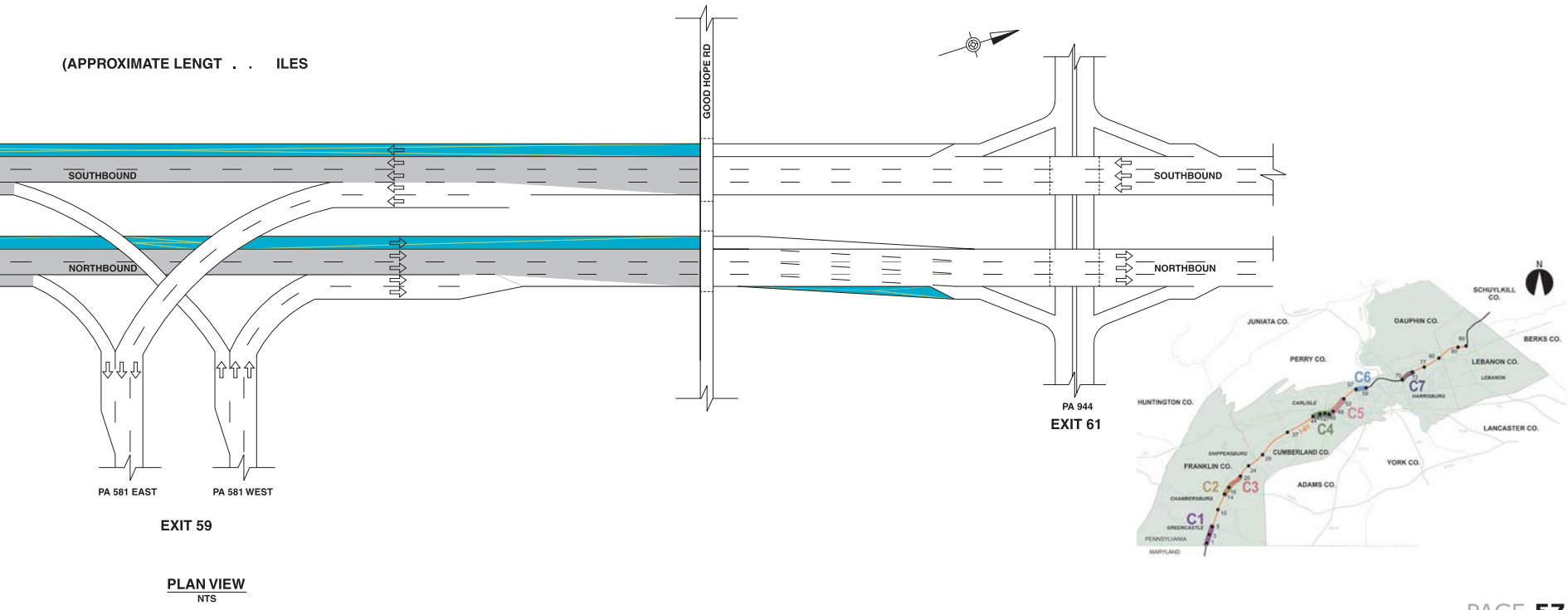
**Structures.** There are no overhead bridge replacements anticipated with this project. The Sample Bridge Road, a Township road, and the Good Hope Road (SR 1013) overhead bridges will accommodate the proposed improvements, as well as the PA 581 overhead bridges.

The mainline bridge, located at Lambs Gap Road (SR 1011), will be replaced.

**Right-of-Way.** The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. Overall, the existing right-of-way should be adequate for the proposed cut and fill grading for the additional inside lane concept.

**Environmental.** The following features are present: Walter Buchanan Farm - Eligible for the National Register (Historic), Recreational Area, Agricultural Security Area (ASA), Conodoguinet Creek, Streams and Wetlands.

| Exit 57 (PA 114 / Mechanicsburg) to Exit 61 (PA 944 / Wertzville Road) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 8,869 |
| Right-of-Way | 1,149 |
| Utilities | 240 |
| Construction | 73,910 |
| Total | $ 84,169 |



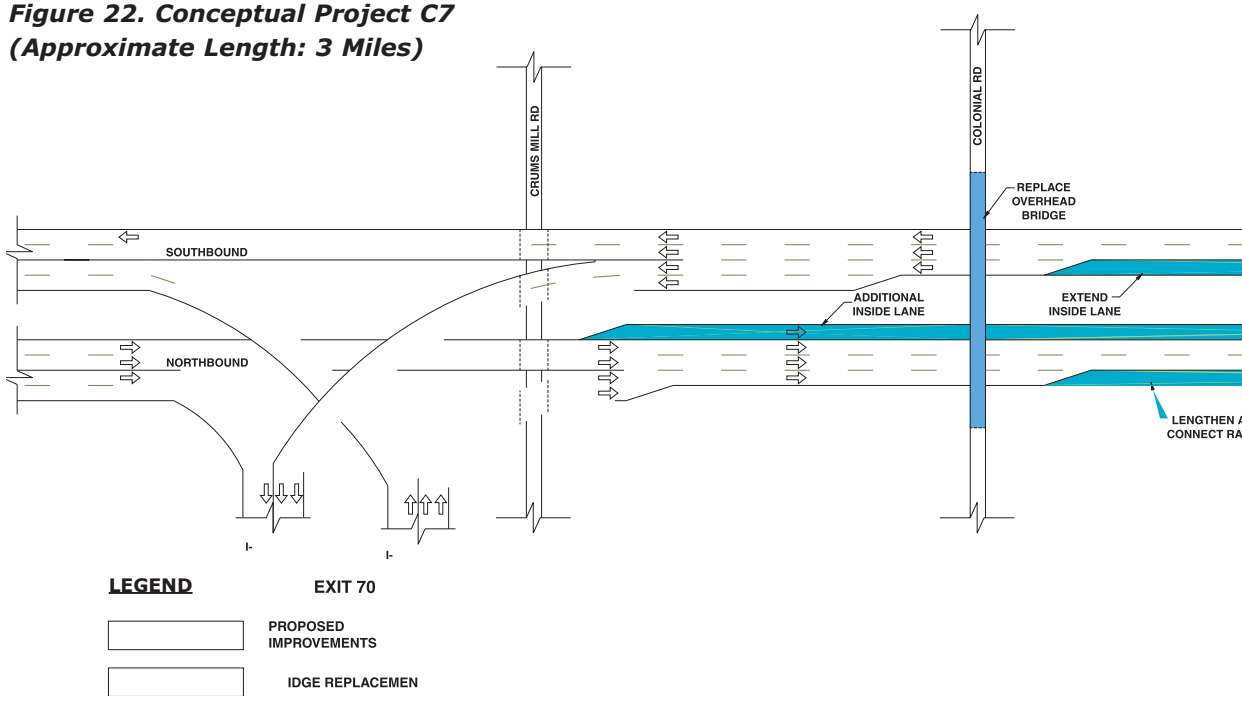
## *C7 - Exit 70 (JCT I-83 / York) to Exit 72 (SR 3019 / Mountain Road)*

This conceptual roadway project is located within Lower Paxton Township, Dauphin County, and serves as a **continuity project from the I-83 Master Plan improvements.** The purpose of this project is to provide three lanes in each direction between South Mountain Road (SR 3019) and I-83 and to ultimately set the template for inside widening of I-81 north/east of Blue Ribbon Avenue, a Township road. The median width varies for this project from over 100' at I-83 to 28' at South Mountain Road (SR 3019) to 60' east of Blue Ribbon Avenue. Refer to Figure 22 for this conceptual roadway project.

**Mainline.** Northbound - Begin an additional inside lane prior to the entrance ramp of I-83 and extend to Lockwillow Avenue, a Township road. Also in this area, connect the ramps between I-83 (Exit 70) and SR 3019 (Exit 72). This creates a four-lane section in the northbound direction between Exits 70 and 72. The outside fourth lane will drop at the loop exit ramp at Exit 72, allowing the three-lane section to continue with an additional outside lane (instead of an additional inside lane due to limited available median width). The Exit 72 entrance ramp will be realigned and extended to meet current design criteria. The additional inside lane will begin where the median width increases toward 60'. Terminate the northbound additional inside lane at a location where the typical 60' existing median width is established and the proposed inside widening typical can be continued with a future project.

Southbound - Begin an additional inside lane at the location of termination of the northbound inside lane and continue and taper out near the South Mountain Road (Exit 72) interchange as the median width decreases. At this location, the additional outside lane and realignment of the exit ramps of Exit 72 allows for three lanes. Following the end of the entrance ramps of Exit 72, begin the additional inside lane to create the third lane by shifting the lane configuration to the inside. Extend the additional inside lane to the existing three lane configuration at Colonial Road (SR 3017).

***Figure 22. Conceptual Project C7 (Approximate Length: 3 Miles)***



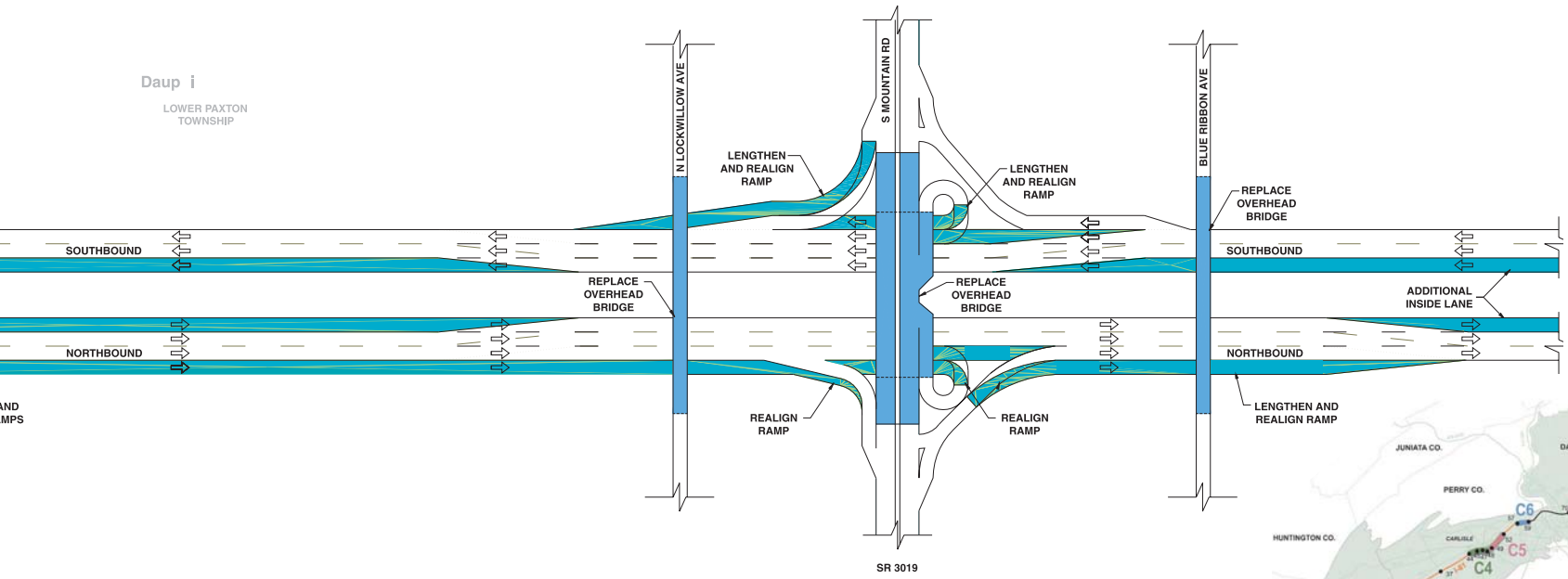
Due to the recent reconstruction of the mainline pavement in 1995, no mainline pavement reconstruction is anticipated for this project.

**Structures.** The following overhead bridges will be required to be replaced to accommodate the proposed improvements, Colonial Road (SR 3017), North Lockwillow Avenue, Mountain Road (SR 3019) and Blue Ribbon Avenue.
There are no mainline bridges within the project limits.

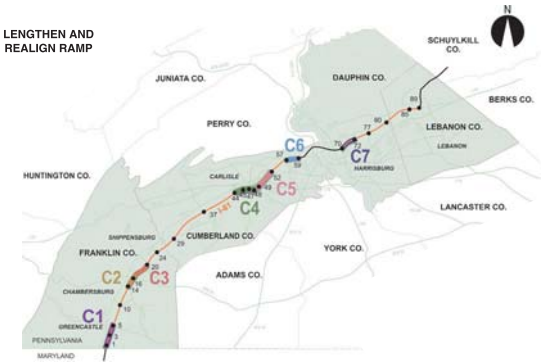
**Right-of-Way.** The right-of-way widths remain fairly constant and are based on the 84' median right-of-way widths. The wider pavement and associated grading will extend the limit of disturbance beyond the existing toe of slope in a few locations. The right-of-way acquisitions would be very minor due to the wide right-of-way.

**Environmental.** The following features are present: Recorded Archaeological Sites, Recreational Area, Streams, Wetlands, and Potential Waste Sites.

| Exit 70 (JCT I-83 / York) to Exit 72 (SR 3019 / Mountain Road) | |
|---|---|
| Estimated Cost | Total (x 1000) |
| Engineering Design | $ 4,051 |
| Right-of-Way | 823 |
| Utilities | 73 |
| Construction | 33,760 |
| Total | $ 38,707 |




PLAN VIEW
NTS




## Section 7

# Plan Results

# PLAN RESULTS

This planning study has provided an overview of the conditions on the I-81 corridor from the Maryland State line to Interstate I-78 - a distance of over 77 miles. The existing traffic problems were identified and future traffic volumes calculated. Existing and future traffic levels of service were determined to assess the capacity needs along the corridor. Crash data was collected in order to identify high incident locations. The corridor wide needs are:

- Reduce congestion;
- Resolve substandard design characteristics;
- Improve overall mobility and safety along the corridor.

After identifying the problems, several diverse transportation solutions were considered and evaluated using a screening process. These include:

- ITS with Incident Management;
- Transit;
- Transportation Demand Management;
- Intermodal Facility Improvements; and,
- Roadway Upgrades.

The corridor was divided into seven segments based on various factors including overall length, interchange locations, land use and population. The transportation solutions were screened to identify the viable concepts for further evaluation. In addition, environmental resources were inventoried and approximate construction costs developed for each segment.

Based on this evaluation process, the most viable concept able to provide the additional capacity, resolve deficiencies and improve safety is the Roadway Upgrade, i.e., a roadway widening of I-81. Applied by themselves, the alternative transportation solutions do not provide the additional capacity necessary to address the future demand. Moreover, an Inside Widening was identified as the most logical roadway upgrade concept. The design and construction costs were calculated as follows:

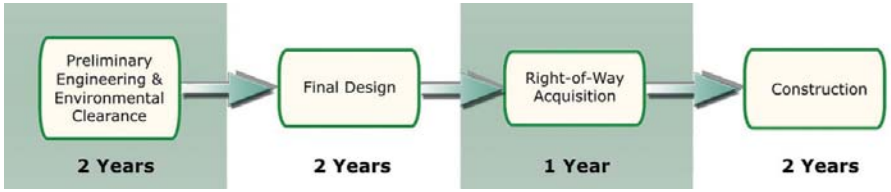
**Segment Solutions (Roadway Upgrade - Inside Widening)**

| Segment No. and Name | Estimated Costs (x 1,000) | | | | |
|---|---|---|---|---|---|
| | Design | Right-of-Way | Utilities | Construction | Total |
| 1 (Greencastle) | $11,940 | $547 | $470 | $163,578 | $176,535 |
| 2 (Chambersburg) | $14,805 | $764 | $470 | $169,023 | $185,062 |
| 3 (Shippensburg) | $29,744 | $3,111 | $1,127 | $407,492 | $441,474 |
| 4 (Carlisle) | $14,584 | $204 | $376 | $199,807 | $214,971 |
| 5 (Mechanicsburg) | $8,912 | $0 | $321 | $122,097 | $131,330 |
| 6 (Harrisburg) | $10,174 | $0 | $316 | $139,379 | $149,869 |
| 7 (Lebanon) | $14,919 | $0 | $527 | $204,393 | $219,839 |
| Total Cost | $105,078 | $4,626 | $3,607 | $1,405,769 | $1,519,080 |

As funding constraints exist along the corridor, smaller projects were developed. The individual segments are based on long term needs, so conceptual projects were developed to address both short term and long term needs within an overall segment. These conceptual projects satisfy both short term and long term needs and serve as a template for the Corridor widening.

| Conceptual Projects (Roadway Upgrade - Inside Widening) | | | | | |
|---|---|---|---|---|---|
| Project No. and Limits | Estimated Costs (x 1,000) | | | | |
| | Design | Right-of-Way | Utilities | Construction | Total |
| C1 (Exit 1 to Exit 5) | $10,700 | $312 | $248 | $88,930 | $100,190 |
| C2 (Exit 14 to Exit 17) | $8,000 | $984 | $167 | $66,620 | $75,771 |
| C3 (Exit 17 to Exit 20) | $5,353 | $614 | $130 | $44,610 | $50,707 |
| C4 (Exit 44 to Exit 48) | $11,726 | $462 | $203 | $97,720 | $110,111 |
| C5 (Exit 49 to Exit 52) | $7,766 | $446 | $107 | $64,720 | $73,039 |
| C6 (Exit 57 to Exit 61) | $8,869 | $1,149 | $240 | $73,910 | $84,168 |
| C7 (Exit 70 to Exit 72) | $4,051 | $823 | $73 | $33,760 | $38,707 |
| Total Cost | $56,465 | $4,790 | $1,168 | $470,270 | $532,693 |

The next step in this planning study is to identify the sequence of projects and the time frame for engineering design and construction. Each segment project, or conceptual project, would need to go through the following process:




In closing, by entering into this planned approach, PENNDOT and the MPOs have assured that the improvements to this economically important highway corridor are completed in an effective and fiscally responsible manner.


## Section 8

# Project Participants

# Project Participants

## The Study Team:

PENNDOT District 8-0
PENNDOT Central Office - Bureau of Design
Federal Highway Administration
DMJM+HARRIS Consultant Team
with: Orth-Rodgers Associates, Inc.
A.D. Marble & Company, Inc.

## Study Area Municipalities:

Franklin County
Antrim Township; Chambersburg Borough; Greencastle Borough; Greene Township; Guilford Township; and Southampton Township.
Cumberland County
Carlisle Borough; Dickinson Township; Hampden Township; Mechanicsburg Borough; Middlesex Township; Penn Township; Shippensburg Township; Silver Spring Township; South Middletown; South Newton Township; and Southampton Township.
Dauphin County:
East Hanover Township; Lower Paxton Township; and West Hanover Township
Lebanon County:
Bethel Township; East Hanover Township; Swatara Township; and Union Township.

## Planning Organizations:

Cumberland County Planning Commission
Franklin County Planning Commission
Lebanon County Planning Commission
Tri-County Regional Planning Commission
Washington County-Hagerstown Area Planning Commission

## Other Project Stakeholders

Corridor Advisory Committee
Pennsylvania State Police
Franklin County Economic Development Agency
Cumberland County Economic Development Agency
Emergency Service Providers

## Contact Us

If you have a question or need more information, please contact:

**Mike Lapano**
**PENNDOT Project Manager**
**PENNDOT District 8-0**
**2140 Herr Street**
**Harrisburg, PA 17103-1699**
**717.787.7482**

81 WIDENING STUDY

## *CONTACT US*

**If you have a question or need more information, please contact:**

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