

Allegheny Valley Railroad and Norfolk Southern COMMUTER RAIL INTERIM STUDY



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1. EXECUTIVE SUMMARY



1 Executive Summary

1.1 Introduction

The Allegheny Valley Railroad and Norfolk Southern Commuter Rail Interim Study was undertaken to develop and refine alternatives for proposed commuter rail service in the Allegheny Valley Railroad (AVR) corridor and the Norfolk Southern (NS) corridor in Allegheny and Westmoreland Counties, Pennsylvania. (See **Figure 1-1.**) A series of prior studies known as the *Eastern Corridor Transit Study* and the *Eastern Corridor Transit Study-Transitional Analysis* were undertaken by other planning agencies between 2002 and 2006, and had identified these two corridors as potential commuter rail corridors meriting further study.

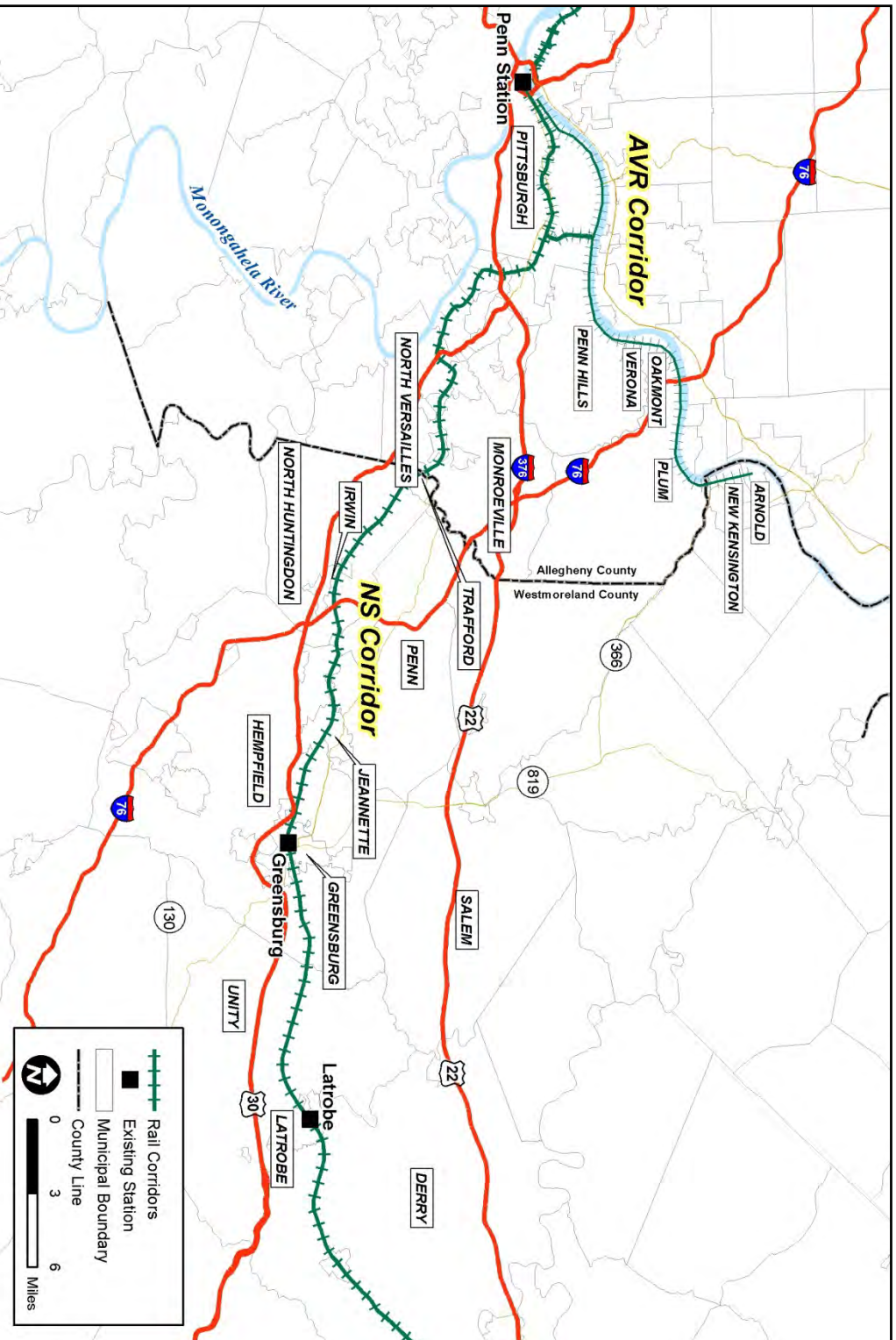
One of the primary markets for this service would be residents of Westmoreland County commuting to/from Pittsburgh and who today are served by express bus services of the Westmoreland County Transit Authority (WCTA) in the NS Corridor. As a consequence, this study was undertaken by WCTA to refine commuter rail alternatives; investigate reasonable options; estimate ridership, capital, and operating costs; and make a determination as to the viability of the project. WCTA engaged a consultant with national reputation in planning and engineering of passenger rail systems, HDR Engineering, Inc. (the project team) to provide the technical support for this study.

1.2 Rail Corridors

NS is a major Class I railroad in the Eastern United States, and the line being considered in this study is a portion of the NS major east-west line with significant daily freight traffic between the East Coast and Midwest. Historically, this line was the Pennsylvania Railroad mainline across Pennsylvania. The line includes existing stations at Pittsburgh (Penn Station), Greensburg, and Latrobe, all of which are currently used by Amtrak twice daily.

The AVR, a Class III rail carrier, is a local, single-track short-line railroad on the south side of the Allegheny River connecting the Pittsburgh Strip District and Arnold. It presently only operates limited freight service at night. The AVR connects with NS at Homewood via the 2.5-mile long Brilliant Branch, also owned by AVR. The line has not had passenger service since 1964.

Figure 1-1: Study Area and Potential Commuter Rail Lines



1.3 Project Approach and Scope

The project approach was designed to refine the concepts for commuter rail service that had been developed in previous studies, developing refined estimates of ridership, capital costs, and operating/maintenance costs. The approach also included more detailed analysis of station location feasibility and operating plan concepts, a review of possible sources of funding and financing, and investigation into possible implementation strategies.

This study was NOT a design or engineering study; although conceptual engineering at the planning level was used to evaluate alternatives and estimate costs, no engineering drawings, detailed plans, or designs were prepared.

WCTA established a Steering Committee for this study, which included elected officials and technical representatives of WCTA and related agencies. The Steering Committee provided general guidance and input to the study team including recommendations on commuter train routes, station locations and ridership potential.

1.4 Background Purpose and Need

The NS corridor connecting Latrobe and Greensburg with Pittsburgh runs generally parallel to, and in between the U.S. Routes 30 and 22 corridors and the connecting I-376 Parkway. Commuters into Pittsburgh from the east are chronically subject to delays, including both volume-related backups and significant incident-related delay. The Squirrel Hill Tunnel is a critical choke point for which there is no practicable solution. At present, the only alternative to the congested automobile commute along the noted corridors is commuter bus services that have access to the East Busway (which runs alongside the NS trackage from Swissvale into Pittsburgh) although accessing the busway requires traveling over congested local streets.

The AVR Corridor includes numerous parallel local roads but no direct commuter route into downtown Pittsburgh on the south side of the Allegheny River. The nearest expressways into town are the aforementioned I-376 to the south and the heavily-congested Route 28 expressway on the north side of the river, with only limited opportunities to cross the river to access it. In addition, Route 28 is currently in the early stages of a 10-year renovation during which capacity will be restricted even further. The proposed commuter rail service on the AVR could function as an alternate means of accessing downtown Pittsburgh for communities on the south side of the Allegheny River, and might even provide some relief for commuters from the other side of the river in select areas.

1.5 Proposed Service

The alternatives recommended in this study propose the implementation of a commuter rail service in the AVR Corridor with stops in Arnold, New Kensington, Oakmont, Verona, and Penn Hills (Nadine), routed to connect to the NS line so as to terminate at Pittsburgh-Penn Station. Service in the NS corridor would see stops in Latrobe, Greensburg, Jeannette, Irwin, and Trafford, and terminate at Penn Station in Pittsburgh. Both lines could benefit from the placement of a station in the Shadyside area (near S. Negley Avenue), to allow for frequent bus connections to Oakland.

Service is proposed generally during commuter oriented hours, with four trains spaced approximately 30 minutes apart in the peak direction (i.e. into Pittsburgh in the morning). In addition, the operating plan included one reverse-direction commute train (i.e. leaving Pittsburgh in the morning) during the peak period and one midday round trip train on each corridor. Travel times are expected to be 60-65 minutes from Latrobe and 40-45 minutes from Arnold, barring any railroad-imposed operational delays.

It should be noted that this operating plan has been developed without feedback from the host railroads. Although the project team has been working with the host railroads (NS and AVR), neither railroad has formally commented on the feasibility of running the proposed service. Since AVR only presently operates at night, it is not anticipated that obtaining capacity on AVR will be an issue (other than perhaps cost). The NS line, however, has significant daily freight traffic during daylight hours and therefore will likely present challenges in obtaining sufficient capacity to operate commuter services as planned.

1.6 Study Findings

Some of the important findings from the study are summarized below:

- 1) Downtown Pittsburgh remains the key commuter destination with Oakland/Shadyside as a strong secondary attraction.
- 2) Although more detailed analysis is needed, it appears that there is capacity sufficient to accommodate some level of commuter rail service on both lines.
- 3) Peak period reverse commute and mid-day services appear feasible, but have not been reviewed or approved by the host railroads, and may face challenges in securing sufficient commuter train “slots” into/out of Penn Station.
- 4) Because the close-in portion of the NS line is limited in its expansion possibilities by the

existence of the MLK East Busway, there may be constraints on the numbers of commuter rail trains that can operate over that segment.

- 5) Modeling of forecast ridership by the Southwestern Pennsylvania Commission (SPC) indicates sufficient ridership numbers to justify a start-up commuter rail service on each corridor, comparable to other recently established commuter rail systems.
- 6) The growth in the primary commuter market (Central Westmoreland and Allegheny Valley to downtown Pittsburgh) is not high, although this finding is based on a generally conservative forecast. Daily ridership (boardings) are estimated as follows:
 - NS Corridor Only: $\approx 1,500$
 - AVR Corridor Only: $\approx 2,700$
 - Both NS/AVR Corridors: $\approx 4,200$
- 7) Ridership analysis overwhelmingly indicated strong preference for routing the Allegheny Valley services onto the Brilliant Branch and NS to serve Penn Station, in preference to terminating further out in the Strip District.
- 8) While physically challenging to implement, the station stop in Shadyside (at S. Negley Avenue) would provide a valuable connection to the MLK East Busway, with easy connections to Oakland for both the AVR and NS corridor services.
- 9) Although a stop in the vicinity of Irwin is desirable, the physical terrain limits the possible station locations. Additional study is needed.
- 10) The ridership demand model is at the edge of its abilities to evaluate ridership potential, and cannot be relied upon to evaluate meaningfully between specific station locations.
- 11) Additional data collection and analysis of market trends in the two corridors are needed to enable a more aggressive forecast and to mitigate the uncertainty inherent in the forecasting process as developed and used by SPC.
- 12) Overall estimated capital costs are in line with the range of costs from the ECTS-TA study. The total capital costs estimated (in 2012\$) in this study for the three alternative services to Penn Station are:
 - NS Corridor Only: \$85.3 million
 - AVR Corridor Only: \$137.8 million
 - Both NS/AVR Corridors: \$208.7 million
- 13) Estimated total annual Operation and Maintenance (O&M) costs for the three project

alternatives are:

- Commuter Rail Service on NS Corridor Only: \$14.9 million
- Commuter Rail Service on AVR Corridor Only: \$12.6 million
- Commuter Rail Service on both NS/AVR Corridors: \$22.5 million

- 14) Establishment of commuter rail service in communities in the Eastern Corridor does offer opportunities for support of Transit Oriented Development (TOD) as well as support of land use policies of several of the urban centers in the AVR and NS corridors.
- 15) All of the identified potential state and local funding sources for the project require an increase in current funding levels, implementation of a new source of revenue or shifting of existing revenue from current projects to this project.
- 16) The Federal Transit Administration (FTA) funding process is complex and could last as long as eight to ten years but could potentially fund 50% of the total cost of the selected project under the New Starts program and up to \$75 million under the Small Starts program. Funding from the FTA does require a strong local commitment for match to the federal funds.
- 17) The federal process could change with reauthorization and should be consistently monitored to determine how the changes would affect the implementation of these projects.
- 18) The funding gap for the capital costs could be as much as \$209 million for the total cost of the AVR/NS line or as little as \$43 million for the 50% local match for the NS line.
- 19) Required local sources for O&M costs range from \$7.2 million to \$20.7 million annually depending on the level of funding received from the farebox and the lines operated.
- 20) Whatever operating entity sponsors this project would need to be responsible (at least through use of contractors) for all aspects of the commuter rail development, including, design, construction, financing, liability, insurance, and operations.

1.7 Recommendations for Further Action

The study findings led to a series of recommendations for further action to advance the proposed commuter rail project toward implementation. Some recommendations could get underway more or less immediately, since they do not require as many parties to be involved; others are more long-term and involve more parties:

1) Market Data Collection and Ridership Modeling

The ridership forecasts developed in this study were by their very design and nature conservative, and they are further limited by the fact that there is not detailed data (from an on-board origin-destination survey, for example) regarding the movements in the specific primary target markets (i.e. Central Westmoreland to Downtown Pittsburgh commuters, Allegheny Valley to Downtown Pittsburgh commuters, etc.). Accordingly, in order to increase the confidence level in more aggressive assumptions regarding potential ridership in these corridors, **the project team recommends that the forecasting approach should be refined using results from a series of data collection efforts on strategic assets in the corridors.**

2) NS Freight Train Operations Modeling

If either corridor of the proposed project is to advance, then the parameters for use of Norfolk Southern trackage needs to be established in order to develop refined estimates of capital and operating costs required. **The project team recommends that a full detailed operations modeling effort be undertaken in order for NS to evaluate whether they can accommodate the proposed passenger train services, and what, if any, additional track infrastructure would be needed to do so.** Because the project cannot advance without buy-in of NS to at least evaluate commuter rail service, funding and scoping of this analysis should be a high project priority.

3) Project Viability

At the present time, both corridors appear viable as startup commuter rail corridors in their own right, subject to the caveat that the railroads have not yet provided their feedback as to viability and corresponding costs. **The project team recommends that both the AVR and NS corridors of the project be advanced subject to further analysis and decision making.**

4) Project Sponsor Entity

For the project to advance any further, **the project team recommends that additional clarity as to the project “sponsor” needs to be obtained by consensus amongst all of the stakeholders expressing interest in commuter rail service in the region.** Although there is no one single correct approach or solution, all commuter rail startup sponsors do need to have the ability and authority to engage (or enter into contract relationship) in several activities:

- Ownership of the fixed and movable assets (stations, rolling stock, etc.).
- Operational control over schedules, work rules, labor, etc.

- Liability and insurance issues related to the service.
- Operating agreements with host railroads.
- Adherence to statutory requirements of a grantee agency.
- Financial management of capital and operating funds.
- Technical capability to support planning and operations.

As stated earlier, it may not be possible at this time to recommend a particular specific agency to be the sponsor of the project, as there are too many variables (particularly legal and political considerations) not yet known.

5) Capital Funding Sources and the FTA Question

One key decision in the funding of the project is whether or not to seek Federal Transit Administration (FTA) New Starts discretionary funds. Even with Federal funding, a significant share of the costs need to be borne by the state and by local sources, and FTA requires sufficient commitments locally to ensure the continued rating of the project.

Nothing in the analyses performed to date, either in the procedures and approaches followed, or in the apparent results, would preclude the project from seeking FTA funding for some portion of the cost. However, doing so would introduce additional requirements and limitations on the planning process, expanding the time and budget required to implement the project, and with no guarantee of actual funding. One such additional requirement would be the required collection of on-board survey data (Recommendation #1 above). Additionally, as a federally funded project, it would become subject to the National Environmental Policy Act of 1969, lengthening the project timeline even more.

Because of the time and cost required to advance the project in the New Starts pipeline, the project team recommends that the project be advanced as a *non-federal project* and that all non-federal funding options be examined. If further project development activities indicate that the project is only fundable as a federal project, this recommendation could be re-evaluated.

6) Encouraging Transit-Oriented Development (TOD) and Land Use

In order to facilitate the further development of the project in the communities served by the proposed commuter rail, **the project team recommends that, when opportunities to change local legislation and zoning regulations arise, that changes be considered to encourage and promote TOD.**

7) Design Activities and Environmental Reviews

To date, no actual preliminary or detailed engineering work has been done; all of the activities to date constitute planning or conceptual-level design only. Assuming that some or all of the previous decisions are made, and the project (s) remains on track, then **it is recommended by the study team that preliminary engineering work (approximately “30% design” standard) commence, together with environmental review (Pennsylvania-specific or federal NEPA environmental review as necessary).**

2. INTRODUCTION



2 Introduction

2.1 Study Objective

The objective of this commuter rail interim study is to further develop alternatives for commuter rail service on two existing rail lines connecting areas in Allegheny County and Westmoreland County east and northeast of the City of Pittsburgh to the downtown area of the city. While numerous studies have previously focused on examination of various transit options, including commuter rail, for enhanced transportation in the eastern side of the Pittsburgh region, this study is devoted to the analysis of commuter rail services on two existing rail lines.

The first rail line in the study is the Norfolk Southern Railway (NS) “Pittsburgh Line” which connects Penn Station in Pittsburgh to Greensburg and Latrobe, and eventually, Harrisburg. The second rail line is the Allegheny Valley Railroad (AVR) line presently connecting Arnold and New Kensington via Oakmont to the Pittsburgh Strip District and, via the Brilliant Branch connection to NS, to Penn Station on NS in downtown Pittsburgh.

NS is a major Class I railroad which serves much of the Eastern United States. The line being considered for commuter service is the NS’s Pittsburgh Line, which is a major two-track east-west line for the railroad and which carries freight between the East Coast and Midwest as well as two daily Amtrak intercity passenger trains connecting Pittsburgh with Harrisburg, Philadelphia and New York City. (Historically, this line was the Pennsylvania Railroad mainline across Pennsylvania.) The AVR, a Class III rail carrier, is a local 19.5-mile long shortline railroad which serves both shippers and receivers, on the south side of the Allegheny River via a one-track rail line. The AVR connects with NS at Homewood via the 2.5-mile long Brilliant Branch. The Pittsburgh region and the location of the two rail lines are shown in Figure 1-1 in the previous chapter.

Several earlier studies examined commuter rail service in the context of enhanced transit service in what has been referred to as the Eastern Corridor. These studies, examined in more detail in Chapter 4 of this study, form the foundation upon which this study has been undertaken. The earlier studies are:

- Eastern Corridor Transit Study (ECTS), 2003
- Eastern Corridor Transitional Analysis to Locally Preferred Alternatives (ECTS-TA), 2006

These studies were completed by the Southwestern Pennsylvania Commission (SPC), in cooperation with the Port Authority of Allegheny County (Port Authority) and the Westmoreland County Transit Authority (WCTA). The ECTS-TA study identified commuter rail service on the AVR and NS lines as addressing the study area's transportation and community needs.

Even earlier studies examined commuter rail service in the eastern region. These studies were entitled Allegheny Valley Railroad Passenger Feasibility Study (2000) prepared for SPC and Allegheny/Westmoreland Commuter Rail Study: Phases I and II (1977) by the Southwestern Pennsylvania Regional Planning Commission, the predecessor to the present-day SPC. Those studies examined in detail commuter rail service on the two subject rail lines and, although dated, do provide additional rationale and supporting material for examining the proposed service.

2.2 Study Approach

In formulating the scope of work for meeting the objective of this study, WCTA identified the major tasks and work progression that would update earlier efforts and explore the opportunities for moving forward with commuter rail service or, conversely, identify reasons why commuter rail service may not be a viable transit option in the defined study area. The tasks include:

- 1) Defining commuter rail services on the AVR and NS rail lines including station locations.
- 2) Reviewing and updating ridership forecasts.
- 3) Reviewing and updating capital cost estimates.
- 4) Identifying and assessing required rolling stock (locomotives and passenger cars) and train storage and maintenance facilities.
- 5) Determining levels of investment to maximize ridership.
- 6) Selecting recommended alternatives for each corridor.
- 7) Evaluating potential funding sources.
- 8) Evaluating the potential for Transit Oriented Development (TOD) at stations.
- 9) Recommending strategies and next steps for implementing commuter rail service if findings of the study warrant such action.

Each of these tasks is addressed in the following Chapters of this report.

During the course of preparation of this study WCTA also established a Steering Committee consisting of Members of the Commonwealth of Pennsylvania House of Representatives

and representatives of involved agencies such as SPC, Port Authority of Allegheny County, Pennsylvania Department of Transportation, Allegheny County, Westmoreland County and WCTA. The Steering Committee provided general guidance and input to the study team including recommendations on commuter train routes, station locations and ridership potential.

2.3 Purpose and Need for Commuter Rail Service

Traffic congestion and delays for commuters in the Pittsburgh region have been well documented in numerous previous studies, including the ECTS and ECTS-TA studies noted above. Those studies initially identified 29 potential transit investments in five corridors. Those investments encompassed three different modes: Light Rail Transit (LRT), Bus Rapid Transit (BRT), and Commuter Rail. The long list of 29 potential investments was first reviewed for their ability to address travel needs in the corridor and then further reviewed and reduced to first nine alternatives and then to a set of six recommended alternatives. These six alternatives are:

- 1) Norfolk Southern Commuter Rail
- 2) Allegheny Valley Commuter Rail
- 3) East Busway Extension
- 4) Mon Valley LRT
- 5) Spine Line LRT to Homestead or Wilkensburg

Downtown Pittsburgh to Oakland BRT

The focus of this study is further analysis and evaluation of the two commuter rail alternatives. Of particular interest of WCTA and the interested stakeholders in the consideration of commuter rail service along the NS and AVR corridors is congestion along the major parallel highway corridors, recent increases and volatility in fuel prices, the potential to utilize existing capacity of rail corridors and a greater awareness and interest by citizens of the region in the need for “greener” means of transportation and mobility.

2.3.1 Norfolk Southern Corridor

The NS corridor connecting Latrobe and Greensburg with Pittsburgh runs generally parallel to, and in between the U.S. Routes 30 (Lincoln Highway) and 22 (William Penn Highway) corridors and the connecting I-376 Penn-Lincoln Parkway. Congestion along the Parkway has been and is forecasted to be especially heavy with Volume/Capacity (V/C) ratios in the morning peak hours exceeding 1.5, i.e. the volume of traffic is 150% greater than the capacity of the roadway and results in congestion, backups and stop and go traffic. The Squirrel Hill Tunnel on the Parkway, where miles-long backups are not uncommon in the peak commuter hours, is a critical choke point for which there is no practicable solution.

The U.S. Route 30 corridor is also a major and regularly congested commuter route leading into the city and inner suburbs and serves as the single most important commuter route in central Westmoreland County. Portions of this corridor, even with WCTA commuter bus service, also experience V/C ratios ranging from 1.1 to 1.5 during peak morning hours of traffic. This route closely parallels the NS Pittsburgh Line between Latrobe and Wilkinsburg.

U.S. Route 22 is the major east-west commuter corridor serving north-central Westmoreland County and central Allegheny County. Although that corridor is several miles north of the NS Pittsburgh Line it does parallel the railroad and commuters using that route, and especially those between US22 and the NS right-of-way, could find commuter rail service on NS as a potentially inviting option given V/C ratios that match the Route 30 corridor.

Commuters on both the Route 30 and Route 22 corridors who are bound for downtown Pittsburgh via the Penn Lincoln Parkway are confronted with the daily backups, in both peak directions, posed by the Squirrel Hill Tunnel. At present, the only alternative to the congested automobile commute along the noted corridors is commuter bus services that have access to the Martin Luther King, Jr. East Busway (East Busway) and the unimpeded access it provides to downtown Pittsburgh from its terminus at Swissvale. However, buses using the Busway must still use locally congested streets and roadways to access it in Swissvale.

2.3.2 Allegheny Valley Railroad Corridor

The AVR rail line is located on the south side of the Allegheny River. The potential commuter rail corridor on that side of the river includes numerous parallel roads but not a single major direct commuter route into downtown Pittsburgh either for automobiles or buses. These numerous routes include Route 366 (Tarentum Bridge Road/Stevenson Boulevard), Cox Comb Hill Road, Route 130 (Allegheny River Boulevard) and Butler Street in Pittsburgh. Most of these roads consist of two-lane roadways and are heavily congested in peak travel hours with V/C ratios exceeding 1.1 on most roads in the morning peak hours. None of these roads are designed for efficient movement of large volumes of commuters. In recent years, new residential development in the Penn Hills and Plum areas of Allegheny County has only added to congestion on these commuter routes.

The Route 28 corridor (Allegheny Valley Expressway) on the north side of the Allegheny River also parallels the AVR rail line and is an important commuter route into Pittsburgh from the northeast portions of the metropolitan region. Route 28 today experiences severe morning peak-hour congestion along many portions of the roadway west of the Pennsylvania Turnpike (I-76) and especially in portions close into the city where access to downtown is limited to only three convenient bridge crossings of the Allegheny River and where morning peak-hour V/C ratios are above 1.5.

Route 28 is currently undergoing a major renovation that will last for approximately another ten years and with few options for commuters to avoid the additional congestion that is occurring as a result. The proposed commuter rail service on the AVR could function as an alternate means of accessing downtown Pittsburgh. This access could be established via the Tarentum Bridge connection to Route 28 and commuter rail stations at Arnold and New Kensington.

2.4 Proposed Commuter Rail Service

The ECTS and ECTS-TA studies examined the two proposed commuter rail corridors and identified station locations and possible operations including train frequencies and travel times. In this study, and through input of the Steering Committee, the two corridors were further defined and detailed in terms of stations served and the types of operations that would be expected. Each corridor is described in detail in Chapter 5 of this report.

2.4.1 Proposed Service Levels

Commuter rail services on each of the two recommended lines connecting Latrobe with Penn Station on the NS and Arnold with Penn Station on the AVR were examined for the following frequencies:

- 4 inbound morning peak period trains on 30-minute frequencies.
- 4 outbound afternoon peak period trains on 30-minute frequencies.
- 1 reverse commute morning peak period train from Penn Station to Latrobe on NS and 1 reverse peak period commute train to Arnold on the AVR.
- 1 reverse commute afternoon peak hour train from Latrobe to Penn Station on NS and 1 reverse commute peak hour train from Arnold to Penn Station on the AVR.
- 1 mid-day return train from Penn Station to Latrobe on NS and 1 mid-day return train from Penn Station to Arnold on the AVR.
- 1 mid-day return train from Latrobe to Penn Station on NS and 1 mid-day return train from Arnold to Penn Station on AVR.

Trip durations for the Latrobe/Penn Station service are expected to be 62 minutes and 41 minutes for the Arnold/Penn Station service.

2.4.2 Host Railroad Coordination

It is very important to note that the Norfolk Southern Railroad, as of June 2009, has not approved or otherwise agreed with the proposed service levels or station stops for commuter service on their railroad. NS has indicated that detailed simulation modeling of commuter train operations combined with their freight operations will be necessary before any such review and approval can be made. The cost and time for such an analysis and review by NS was not included in the scope of work for this interim study.

Consultations with the AVR indicate that since the railroad conducts its freight operations at night commuter train operations during the daytime should not result in any operational or capacity conflicts. However, rebuilding of the single-track AVR rail line while the railroad remains in operation would be a major concern of the AVR. Additional discussion of operating issues is presented in Chapter 7.

3. EXISTING CONDITIONS



3 Existing Conditions

This chapter provides a description of the study area for the two rail corridors including travel and congestion trends in the study areas, as well as relevant demographic and land use characteristics of the counties and municipalities that could be served by the commuter rail services. Data and information provided from numerous regional and county studies were used to characterize demographic and land use changes over the past decade within the region.

A brief description of the existing transportation network is provided in this chapter as well. This description includes the highway network that serves Westmoreland and Allegheny County commuters to and from employment centers, as well as the transit service offered to the County's commuters/residents. Finally, this chapter describes the existing freight and intercity passenger rail network in the study area.

3.1 Study Area Description

The Study Area for this analysis was previously defined by both the 2003 Eastern Corridor Transit Analysis (ECTA) and 2006 Eastern Corridor Transit Study (ECTS). The study area encompasses an approximate triangle shape fanning out from the City of Pittsburgh and roughly bound by municipalities on both sides of the Allegheny River to the north and the Monongahela River to the south. The study area triangle terminates at the region's employment centers within the City of Pittsburgh and extends approximately 60 miles to Derry in the east (see **Figure 3-1**).

As shown in **Figure 3-2**, the AVR corridor travels through numerous municipalities in both Westmoreland County and Allegheny County including:

- Arnold
- New Kensington
- Plum
- Oakmont
- Verona
- Penn Hills
- City of Pittsburgh

Figure 3-1: Study Area

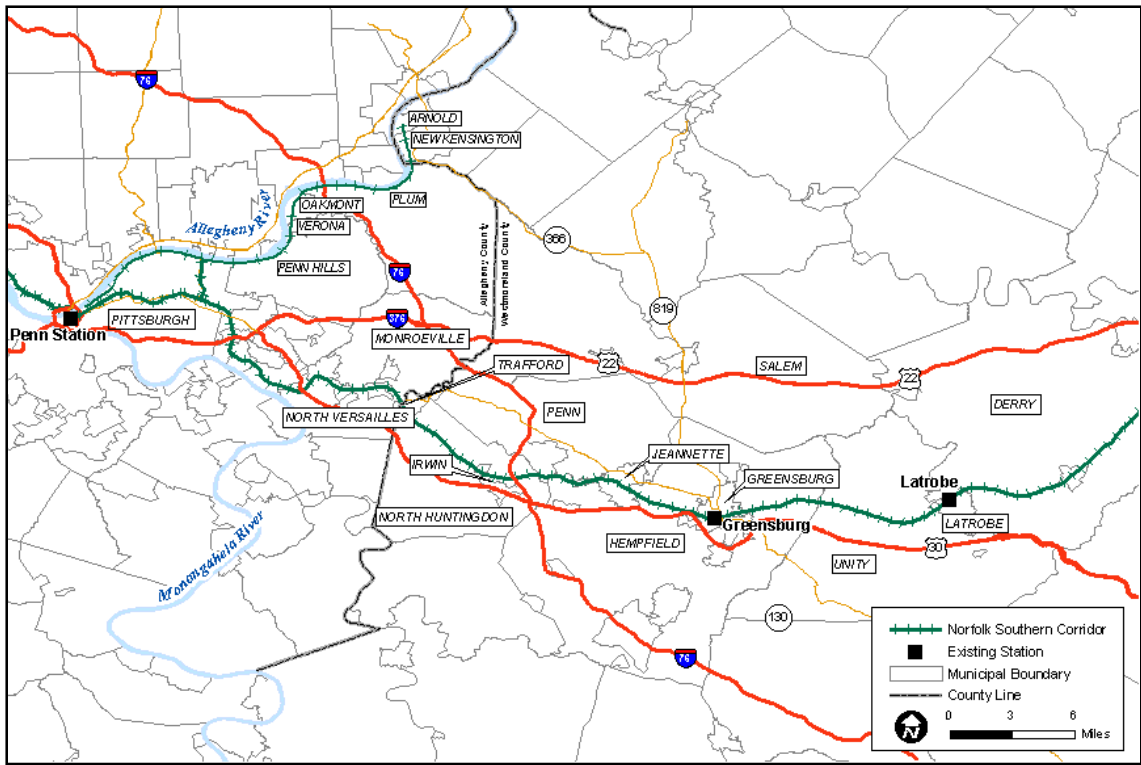


Figure 3-2: AVR Corridor

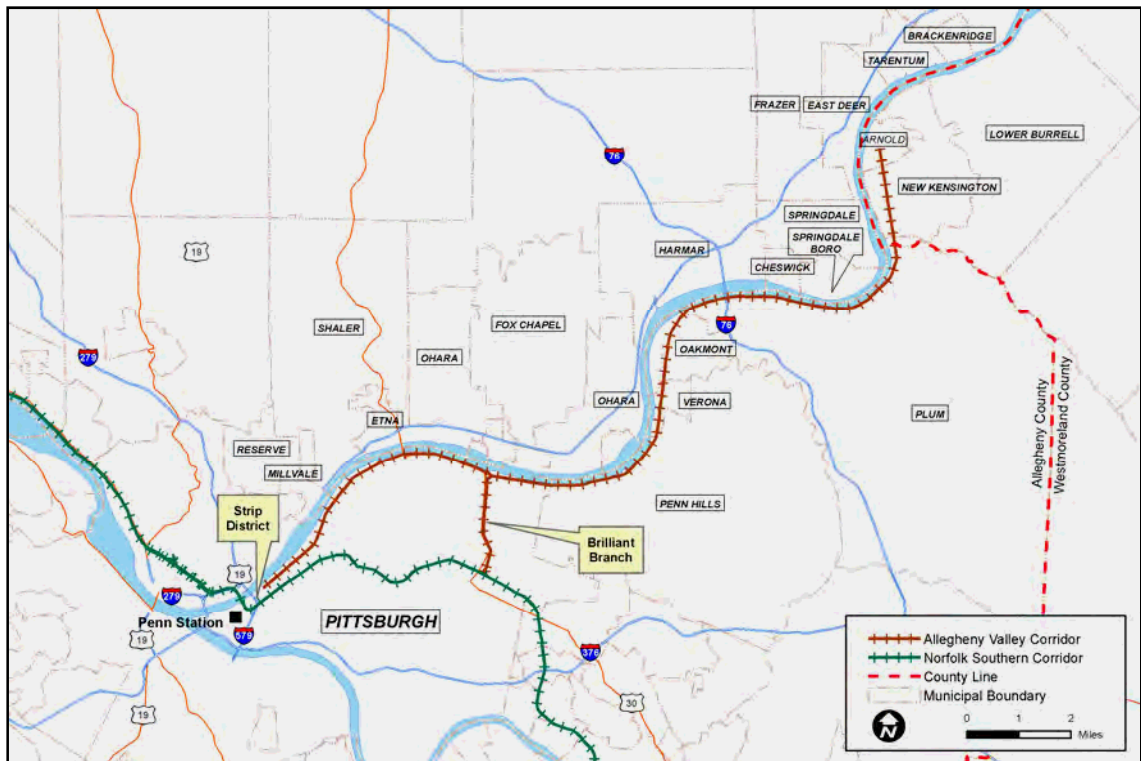
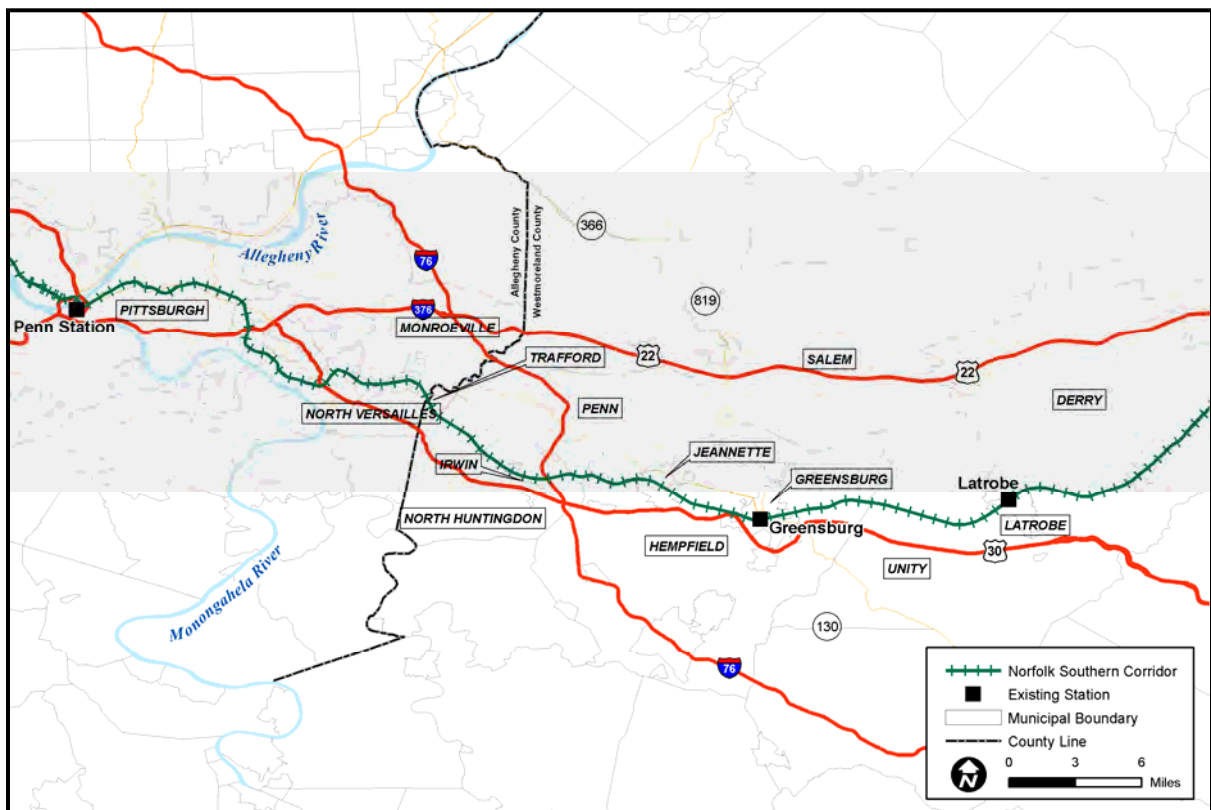


Figure 3-3 illustrates the 60-mile NS Corridor which travels through numerous municipalities in both Westmoreland County and Allegheny County:

- Derry
- Latrobe
- Greensburg
- Jeannette
- Irwin
- Trafford (at the Westmoreland/Allegheny County Line)
- East Pittsburgh
- Swissvale
- Wilkinsburg
- City of Pittsburgh

Figure 3-3: NS Corridor



3.2 Population Characteristics Affecting Traffic and Congestion

Although the population of both counties within the study area has declined since 1970, congestion in the region continues to increase. Congestion on the region’s roads may be related to a variety of factors:

- Increases in the total number of households in each county from decade to decade.
- Increases in household income correlating to increased vehicle ownership.
- Increases in Vehicle Miles Travelled (VMT) and trip generation rates for households.
- Limited opportunities for capacity improvements on the region's principle highways and interstate routes.
- The constraints posed by the natural hilly topography and geology of the region for highway capacity improvements.
- Increasing numbers of residents in the workforce including woman and those beyond retirement age.
- The willingness of the workforce to commute longer distances between work and home.
- The percentage of individuals who use public transportation to commute to work.

This section offers some selected statistics which illustrate the increasing demands on the region's highways.

3.2.1 Westmoreland County

There are several trends of Westmoreland County residents which could be indicators of increasing and future congestion on the region's highways:

- The number of County residents in the workforce increased from 1990 to 2000, from 156,108 workers to 167,303 workers. By 2007, the US Census¹ estimated that 180,556 County residents were in the workforce. Westmoreland County's workforce thus grew by nearly 16 percent between 1990 and 2007.
- Between 1990 and 2000, residents who "drive alone" to work grew from 79.5 percent of all workers to 84.1 percent of all workers. This is an increase of nearly 5 percent over the decade.
- The US Bureau of the Census conducted an interim American Community Survey within the County between 2005 and 2007. In that survey, approximately 80 percent of the households reported that they had access to 2 vehicles or more. About 33 percent of County residents had access to 3 or more vehicles and about 7 percent of County residents have no access to a vehicle.
- About 0.8 percent of residents reported using public transportation as a means for commuting to work in the American Community Survey.

In March 2000, for the purposes of air quality conformity and analysis, the Environmental Protection Agency (EPA) compiled information² on Vehicles Miles Travelled (VMT) in the region and forecasted increases in VMT growth for each county within the Commonwealth

¹ United States Bureau of the Census, 2005-2007 American Community Survey 3-Year Estimates, Westmoreland County, Pennsylvania, Accessed via: <http://factfinder.census.gov>

² Environmental Protection Agency, *VMT Growth Factors (%) by County: Pennsylvania, 3/24/00*, Accessed at: <http://www.epa.gov/ttn/naaqs/ozone/areas/vmt/vmtpagf.htm>

of Pennsylvania. VMT is a useful measure for congestion analysis and trends in demand on the region’s highways and interstates. **Table 3-1** illustrates VMT trends as forecasted by the EPA for Westmoreland County:

**Table 3-1: EPA VMT Growth Factors for Westmoreland County, PA
Forecast Scenarios from 1996-2030**

Forecast Period	1996-2007	1996-2030	2007-2030
Growth Factor (%)	17.7	60.1	36.0

Within the nine year timeframe from 1996-2007, the EPA forecasted that VMT generated by Westmoreland County residents would increase by 17.7 percent. The EPA forecasts a 36 percent increase in County VMT between 2007 and 2030.

3.2.2 Allegheny County

Similar demographic characteristics of Allegheny County residents were also compiled from 1990 and 2000 U.S. Census data as well as the 2005-2007 American Community Survey. These indicators also point to increasing and future congestion on the region’s highways:

- The number of housing units has grown in the County between 2000 and 2007, from 583,646 to 591,047 units.
- The number of County residents in the workforce saw a small decrease from 1990 to 2000, from 604,923 workers to 591,905 workers. By 2007, the US Census³ estimated that 582,823 County residents were in the workforce.
- Between 1990 and 2000, County residents who “drive alone” to work grew from 66.7 percent of all workers to 72.1 percent of all workers. This is an increase of nearly 5 percent over the previous decade.
- The US Bureau of the Census conducted an interim American Community Survey within the County between 2005 and 2007. In that survey, approximately 47 percent of households reported that they had access to 2 or more vehicles and about 12.5 percent of County residents had access to 3 or more vehicles.
- About 14 percent of County residents reported no vehicles in the household in the American Community Survey.
- About 10.5 percent of County residents reported using public transit to commute to work.

As mentioned in the previous section, the EPA also forecasted growth in VMT for Allegheny County. **Table 3-2** illustrates VMT trends as forecasted by the EPA for Allegheny County:

³ United States Bureau of the Census, 2005-2007 American Community Survey 3-Year Estimates, Westmoreland County, Pennsylvania, Accessed via: <http://factfinder.census.gov>

**Table 3-2: EPA VMT Growth Factors for Allegheny County, PA
Forecast Scenarios from 1996-2030**

Forecast Period	1996-2007	1996-2030	2007-2030
Growth Factor (%)	16.7	57.4	34.9

Within the nine year timeframe from 1996-2007, the EPA forecasted that VMT generated by Westmoreland County residents would increase by 17.7 percent. The EPA forecasts a 34.9 percent increase in County VMT between 2007 and 2030.

3.3 Demographic Trends

The two studies that are used to characterize land use and development patterns in the region are the Comprehensive Plans developed by both Westmoreland County and Allegheny County. The Westmoreland County Plan was completed in 2005 and the Allegheny County Plan was completed in 2007. Both locally developed plans offer good insight to the demographic trends occurring in the region and both counties.

3.3.1 Westmoreland County

Population

In 2008, the U.S. Bureau of the Census estimated the population of the County at 361,589, a decrease of population of 8,404 residents, i.e., approximately 2 percent of the 2000 population. This summary uses the Westmoreland County Plan to characterize population, housing and economic demographic trends occurring in the County over the past three decades from 1970 through 2005 (when the Plan was completed). The Plan summarizes several key demographic trends and shows that consistent with the rest of the region, Westmoreland County’s population has seen a slight decline from 1970 to 2000 of 1.8 percent. **Table 3-3** illustrates some selected population and household statistics for the County between 1970 and 2000.

**Table 3-3: Population and Household Trends, Westmoreland County, PA
1970-2000**

	1970	1980	1990	2000	Percent Change 1970-2000
Total Population	376,920	392,294	370,321	369,993	-1.8%
Total Households	N/A	139,034	144,080	149,813	+7.8%
Total Household Units	120,436	148,035	153,554	161,058	+33.7%

Source: Westmoreland County Department of Planning, Westmoreland County, Pennsylvania, *Westmoreland County Comprehensive Plan*, January 2005, pg. 400 (Via United States Census)

As **Table 3-3** illustrates, although the County's population declined from 1970 to 2000, the number of household units increased a substantial 33.7 percent. The growth in housing units is consistent with national trends – people now have longer life expectancies, get married later in life, and divorce is more common.

The Plan reports that the county's population is aging in place as the number of older people in the county increases and the number of young people is decreasing. A telling statistic, the Plan cites is the county's median age had increased from 31 in 1960 to 41 in 2000.

Within the study area, two municipalities had small increases in population between 1990 and 2000, Unity and North Huntingdon.

Work and Economics

- Average household income has grown in the County a substantial 44 percent from 1990 to 2000.
- The Plan's analysis found that Westmoreland County residents are experiencing longer commutes to work. The number of county workers who commute 30 minutes or more to work daily increased by 24.1 percent between 1990 and 2000, higher than the state average of 19.4 percent.
- The County's workforce grew by 6 percent between 1990 and 2000. The Plan reports that the number of jobs also increased in the County in the higher wage economic sectors of information technology, health care, services and education.
- The Plan reports that younger "working age" people and highly educated people are moving out of the county. Westmoreland ranks 52nd out of the state's 67 counties in the absolute change in younger workers between the age of 25 and 34.
- Educational attainment amongst county residents is increasing. Despite the fact that higher percentages of younger people (between the ages of 25 and 44) migrated out of the county during the period 1990 to 2000, educational attainment amongst residents who remained increased substantially. The percentage of residents with an associate's degree, bachelor's degree or graduate/professional degree increased by 19%, 35% and 46% respectively. However, the number of residents with only a high school diploma decreased by nearly 2% during the same period.

In summary, there are several trends in Westmoreland County that may point to increased traffic and congestion in future years:

- The County has increasing numbers of residents in the workforce and households, and saw an increase in average household income.
- The population is becoming more educated.
- The County has increasingly higher vehicle ownership rates.

- There are likely to be increases in VMT on the region's roads due to local and other external factors.
- Like many other parts of the nation, the region has constraints on the increase of highway capacity.

Environmental Equity

Part of the existing conditions analysis included the identification of area with low income and/or minority populations. In July 2008, SPC provided the project team with a spatial data set used to identify concentrations of low income and minority areas (census tracts) in the region. The SPC used the data to develop a report addressing environmental justice issues pursuant to Presidential Executive Order 12898 of February 11, 1994 which builds upon Title VI of the Civil Rights Act of 1964.

The 2009 SPC *Report on Environmental Justice* analyzes the equitable distribution of transportation funding throughout the region. This data can also be used to identify if low income or minority populations are being disproportionately impacted by a proposed transportation project. Within Westmoreland County, the City of Jeanette and Greensburg contain census tracts that contain populations that are classified as both "Minority and Low Income," i.e. the areas have higher concentrations of low income and minority populations than regional averages. Census tracts where the Latrobe Amtrak Station and the proposed Derry Maintenance Yard are located are classified as "low income."

3.3.2 Allegheny County

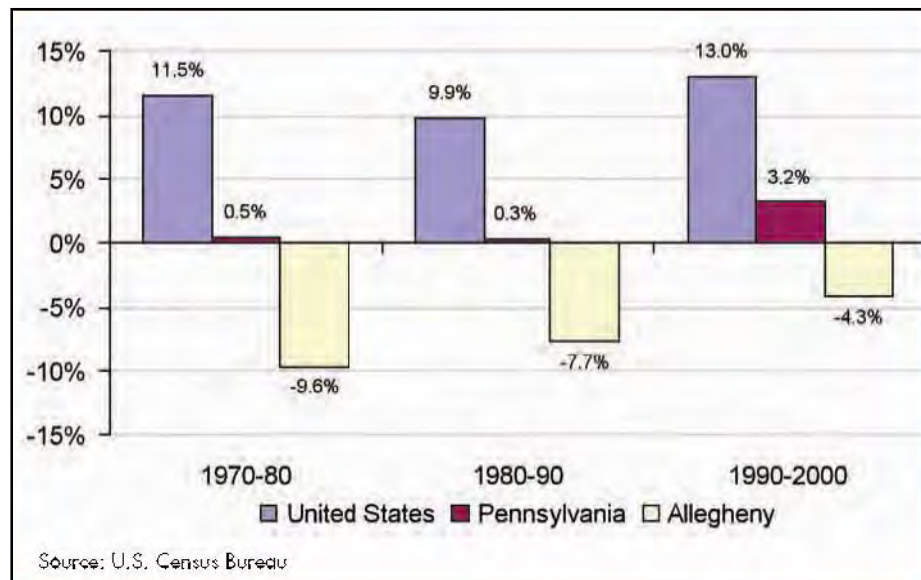
Population

Allegheny County is the region's largest County. The City of Pittsburgh is located in the County. The U.S. Bureau of the Census estimates the population of the County in 2008 was 1,215,103, and had declined about 5 percent from the year 2000. Allegheny County's most recent Comprehensive Plan also summarizes population, housing and economic demographic trends in the County. The Plan observes several key demographic trends. Between 1970 and 2000 the County has continually declined in population, although at a declining rate. **Figure 3-4** illustrates this trend.

Work and Economics

- Most municipalities in the County had continued to lose population between 2000 and 2006 at a rate of about 2 percent.
- About 22 percent of the population in the County was under the age of 18 which is a lower percentage of this age cohort in comparison with nationwide averages of similar regions. About 18 percent of the population is aged 65 or over, which is higher than nationwide averages of this age cohort.

Figure 3-4: Percent Change in Allegheny County Population 1970-2000



Source: Allegheny County Economic Development-Planning Division, Allegheny County, Pennsylvania, Allegheny Places: Allegheny County Comprehensive Plan, December 2008, pg. 3-4

- Between 1990 and 2000 municipalities along the NS corridor including the City of Pittsburgh and adjacent municipalities saw the greatest loss in population.
- There was a 15 percent increase in the foreign-born immigrant population between 1990 and 2000, although the Plan notes that the immigration patterns are low compared to other comparably sized urbanized areas of the United States. The region has lower percentages of Hispanic and Asian groups. The immigrants who do settle in Pittsburgh tend to be highly educated, working for the areas universities, hospitals or in high-tech industries.
- The City's African-American population is concentrated in the City of Pittsburgh and adjacent municipalities.

In summary, several trends in the County could point to increased traffic and congestion and continued use of transit as a mobility option:

- Allegheny County is Southwestern Pennsylvania's largest and most densely populated County, with over 1.2 million residents.
- 10 percent of the residents use transit as a means of commuting to work.
- Allegheny County is the region's employment center.
- There are likely to be increases in VMT on the region's roads.
- Like the rest of the nation, the region has constraints on the increase of highway capacity.

Environmental Equity

The 2009 SPC *Report on Environmental Justice* and the supplied spatial data were also used to identify low income and minority populations within Allegheny County. The highest concentrations of low income and minority populations are within the City of Pittsburgh and adjacent municipalities.

3.4 Land Use Trends

3.4.1 Westmoreland County

The County Plan provides several observations on land use trends:

- Westmoreland County's housing supply grew by 5 percent between 1990 and 2000 for a total of 7,500 new housing units. This was slightly below the state average during the same time period. Average home values had grown 60 percent over the decade and home ownership was on the rise in the County by 2005.
- About 12 percent of the County's total land area of 656,000 is developed.
- The plan reported on average 0.2 percent of the County's land area is developed each year.
- The number of farms and farm acreage is in decline within the County. The agricultural industry is changing and consolidation is occurring with fewer, larger farms. The number of farms in the county is decreasing by about 2 percent per year.
- Within the county, population shifts are occurring that are consistent with national trend of people moving from urban areas to the suburbs. These shifts follow a consistent pattern of population migration from the cities to the suburbs. During the past decade, the county's first class townships (municipalities with a population density of 300 or more residents per square mile) experienced a population gain of over 9% while cities witnessed a population decline of nearly 5%. The Plan also reported that boroughs and second class townships each lost about 2% of their populations from 1990 to 2000.

3.4.2 Allegheny County

As the County Plan illustrates, areas of growth between 1990 and 2000 were in the western and northwestern part of Allegheny County. Municipalities in those parts of the County had grown by 10 percent or more and included several municipalities along the AVR corridor. Plum had seen the greatest amount of growth in this timeframe, along with municipalities of Hampton and Indiana.

The Plan describes a "hollowing out" of the urban core, similar to nation wide trends toward suburbanization. The City of Pittsburgh lost the greatest number of residents between 1990 and 2000, with the population decreasing from 369,879 to 334,563.

The Plan characterizes the recent history development patterns in the County as “low density sprawl,” citing a Brookings Institution Study. The Brookings Institution had found that 202,000 acres had been developed in Metropolitan Pittsburgh between 1982 and 1997. The total land area of Allegheny County is approximately 476,160 acres. During this period 24,000 households were added. On a household unit basis, about eight times more land was being used for a single house than nationwide averages for a typical household unit.

Current developments in the County are increasingly incorporating smart growth principles, however. Brownfield sites are being redeveloped in the County, as attractive locations with existing infrastructure and large land areas available for redevelopment. The County recognizes (and recommends future) pedestrian and transit orientated development that already exists in neighborhoods and municipalities in the region, giving each location a sense of place. As it relates to land use, the County Plan is focused on the concept of “place making” and the preservation of neighborhoods and villages with unique character and walkable, pedestrian environments.

3.5 Transportation Network

3.5.1 Highway Network

This section describes the commuter routes in both counties serving employment centers in the City of Pittsburgh. Highways of interest are those which roughly parallel the railroad corridors and that are identified as major commuting routes between Westmoreland County and Pittsburgh/Allegheny County.

AVR Corridor

As noted in the Introduction, a “patchwork” of primarily state roads serves the municipalities along the AVR Corridor along both side of the Allegheny River as illustrated in **Figure 3-2**.

- State Route 8 (West side of Allegheny River to Pittsburgh)
- State Route 28 (West side of Allegheny River to Pittsburgh)
- State Route 56 (Butler County to New Kensington)
- State Route 130 (Northern Westmoreland County to Penn Hills to Pittsburgh)
- State Route 366 (West side of Allegheny River to Arnold and New Kensington)
- State Route 380 (Penn Hills to Pittsburgh)
- Interstate 76

NS Corridor

Three major highway routes roughly parallel east to west from Westmoreland County to the City of Pittsburgh:

- Interstate 376
- US Route 22
- US Route 30

Figure 3-1 illustrates the location of these routes in the region which can all be considered primary commuter routes for Westmoreland County residents into Allegheny County and the City of Pittsburgh. The 2003 Eastern Corridor Transit Study characterized congestion on these regional highways by calculating volume-to-capacity ratios. I-376 has the most acute congestions and volume to capacity (v/c) ratios over 1.5. A v/c ratio of 1.5 means a road segment is operating 50 percent above its design capacity.

Congestion problems on I-376 are worst at the Squirrel Hill Tunnel entering the City of Pittsburgh. Long stretches of US 22 and US 30 through Allegheny County have congestion issues with V/C ratios ranging from 1.1 to 1.5. As these roads converge in the area of Wilkesburg, all of the roads operate above capacity during the AM and PM peak hour.

3.5.2 Transit Operators

Westmoreland County Transit Authority (WCTA)

WCTA provides both contracted fixed route bus and demand response (paratransit) service to residents of Westmoreland County. WCTA's service area is 668 square miles and the population served is 296,066 residents according to the Federal Transit Administration (FTA) 2007 National Transit Database (NTD). The Transit Authority's operating budget in 2007 was \$3.9 million. State (43 percent) and Federal (32 percent) funds make up 75 percent of the agency's operating budget.

WCTA provides local bus service to the following municipalities in Westmoreland County:

- **Boroughs:** Avonmore, Delmont, Derry, East Vandergrift, Export, Irwin, Ligonier, Mt. Pleasant, Manor, New Florence, New Stanton, Scottdale, Seward, Vandergrift, Youngwood
- **Townships:** Allegheny, Bell, Derry, Hempfield, Ligonier, Mt. Pleasant, North Huntingdon, Penn, St. Clair, Sewickley, Unity, Washington
- **Cities:** Arnold, Greensburg, Jeannette, Lower Burrell, New Kensington, Latrobe
- **Municipality:** Murrysville

Along with local bus route service, WCTA provides commuter services for county residents to the City of Pittsburgh and Eastern Allegheny County. Examples of commuter services include the Greensburg-Pittsburgh Flyer which provides express bus service between park-n-ride type stops in Westmoreland County and major employment centers in Pittsburgh, including the Oakland neighborhood, location of the University of Pittsburgh and the University's Medical Center.

The FTA reports that WCTA provided 371,157 unlinked passenger trips and 5,247,053 passenger miles in 2007. WCTA provided 1,383 average weekday passenger trips in 2007. Fixed route ridership has increased since 2004 on the WCTA system from 281,272 trips in 2004.

Port Authority of Allegheny County (PAAC)

The PAAC is the region's largest provider of public transportation services. PAAC's service area encompasses 775 square-mile of the Southwest Pennsylvania region which includes the City of Pittsburgh, all of Allegheny County and portions of northwestern Westmoreland County (including Arnold and New Kensington). PAAC reports that the Authority has a fleet of:

- 861 fixed-route buses
- 83 Light Rail Vehicles (LRVs)
- 48 Mini-Buses
- Monongahela and Duquesne Inclines (tram type service on steep grades)
- ACCESS - a paratransit service for senior citizens and persons with disabilities

The NTD reports that PAAC provided 68,525,198 passenger trips and 323,201,519 passenger miles in 2007. Fixed route bus service made up 88 percent of all passenger trips in 2007 (60,310,697 trips). PAAC's annual operating budget in 2007 was approximately \$344.4 million, 68 percent of which is made up of state and federal funds. Capital Funds expended in 2007 by PAAC amounted to \$129.3 million, 70 percent of which was made up of state and federal funds. ACCESS is funded separately from other PAAC transit services.

3.6 Railroad Network and Train Operations

This section provides a brief summary of the comprehensive railroad network and train operations on the NS and AVR corridors completed for the analysis.

3.6.1 Allegheny Valley Railroad (AVR)

The Allegheny Valley Railroad (AVR) operates approximately 70 miles of track in the Pittsburgh vicinity. For this study, the corridor along the southern bank of the Allegheny River, known as the Allegheny Subdivision, was inventoried to assess the current facilities. The corridor, which is 19.5 miles in length, extends from 21st Street in the Strip District,

Allegheny County, to just north of Drey Street in Arnold, Westmoreland County. Although there is no track to the west of 21st Street, the AVR owns an easement from 21st Street to 16th Street. In general, the area surrounding the AVR is primarily industrial/commercial in the western portion near the Strip District of the corridor while the eastern portion is mainly residential with adjacent central business districts or undeveloped parcels. The AVR also owns the single track Brilliant Branch which connects the AVR line to the NS Pittsburgh Line at Homewood. This 2.5-mile connection joins the AVR at Coleman Junction just west of Nadine Road.

The AVR provided the project team with right-of-way and track maps, track charts, and timetables for both the AVR corridor and Brilliant Branch. In addition, the AVR conducted a hi-rail trip for the project team on the corridor on April 8, 2008 in order to gather field information.

3.6.2 Norfolk Southern (NS) Pittsburgh Line

Within the study area, Norfolk Southern operates between Derry, Westmoreland County and Pittsburgh, Allegheny County on its Pittsburgh Line which connects Harrisburg with Pittsburgh. The study corridor is approximately 45 miles in length with the eastern limit at N. Valley Street in Derry and the western limit at Penn Station in Pittsburgh. The NS line also crosses the Allegheny River to the northwest of Penn Station. Currently, NS operates freight service and Amtrak operates passenger rail service along the line which historically had been a 4-track line but which is now a 2-track mainline. Although over time two tracks were removed from the right-of-way, generally ownership and/or control of the full 4-track width has been retained by NS except for the section from Swissvale to Penn Station which is utilized by the East Busway.

NS provided the project team with track charts, operations information and property valuation maps that were utilized in evaluating station locations and right-of-way. The project team also had access to Penn Station to conduct a comprehensive review of track and platform capacities and conditions.

4. REVIEW OF PREVIOUS STUDIES



4 Review of Previous Studies

There have been several major studies dating as far back as 1977, which analyze the potential for commuter rail service in both the Allegheny Valley Railroad (AVR) corridor and the Norfolk Southern (NS) Pittsburgh Line corridor. The four studies reviewed in this document are as follows:

- Allegheny/Westmoreland Commuter Rail Study: Phase I and II, SPRPC Ford Bacon Davis Study (1977)
- Allegheny Valley Railroad Passenger Feasibility Study, SPC Wilbur Smith Study (2000)
- Eastern Corridor Transit Study, STV Incorporated (2003)
- Eastern Corridor Transit Study: Transitional Analysis to Locally Preferred Alternatives, STV Incorporated (2006)

4.1 Allegheny/Westmoreland Commuter Rail Study: Phase I and II (1977)

The Allegheny/Westmoreland Commuter Rail Study: Phase I and II (AWCR) was prepared by the Southwestern Pennsylvania Regional Planning Commission (SPRPC), predecessor to present-day Southwestern Pennsylvania Commission (SPC).

The 1977 Study is notable for its comprehensiveness and its similarity to the proposed geographic scope of this study. At the time of the study, both lines were part of the Conrail System; what is now known as the AVR was known as the Allegheny Branch. The age of the study limits its usefulness and applicability for this analysis; nevertheless, there are several interesting points to note:

- When the Study was being developed in late 1975 and 1976, the rail lines in question had only been disused as passenger commuter services for about 12 years.
- Around the time of the completion of the study, the region was poised to make a final decision regarding the construction of the East Busway (now known as the Martin Luther King, Jr. Busway), along the NS alignment between downtown Pittsburgh and Wilkinsburg, which would open in 1983 (and later extended to Swissvale). This facility would have significant impact on the viability of the now-NS corridor for expansion as it was routed along the disused edge of the right-of-way.
- Ridership forecasts were developed, using the SPRPC regional demand models at the time, which suggested potential daily ridership of approximately 5,800 in the NS

corridor (assuming 15-20 minute headway service) and approximately 2,900 in the AVR corridor (assuming 20 minute headway service).

4.2 Allegheny Valley Passenger Railroad Feasibility Study (2000)

The purpose of the Allegheny Valley Passenger Railroad Feasibility Study (AVRPFS) was to determine if there was potential for commuter service operations to take place between the City of Pittsburgh and the City of Arnold in Westmoreland County. The study looked at ridership potential, track conditions, station locations, capital and operating cost estimates, fare revenue, and management structures.

The 2000 Study examined the feasibility of not only typical commuter service, but also the potential for “excursion train” services. This study showed strong ridership potential on the AVR corridor inside of the Brilliant Branch interlocking (with stops at Washington Blvd/Zoo, 62nd Street, 40th Street showing several hundred boarding each) which would be missed if the Brilliant Branch were used to access Penn Station. Ridership was estimated to be between 3,000 daily (for the “Strip District” alternative) and 1,600 (for the “Busway” alternative).

The 2000 Study examined three operational alternatives:

- Alternative 1: Providing commuter rail service in the existing AVR rail corridor and right-of-way, terminating in the Strip District in Pittsburgh.
- Alternative 2: Providing commuter rail service in the existing AVR rail corridor to the “Brilliant” milepost, and deviating over the Brilliant Branch to connect to the NS Pittsburgh Line and terminating at Pennsylvania Station in downtown Pittsburgh.
- Alternative 3: The third alternative examined terminated commuter rail service at the southern end of the Brilliant Branch, and required a transfer to a bus on the East (MLK) Busway to access downtown Pittsburgh

The results of the study concluded that it is feasible for a commuter service to operate on the corridor with an investment of between \$7.5 million and \$17 million for capital improvements and equipment acquisition. The study further concluded that optimal operation on the corridor would be achieved by using the Brilliant Branch to connect to the NS line and Penn Station in downtown Pittsburgh. However, several issues were pointed out as needing further review or assessment before proceeding. Some of those issues included: discussions with Norfolk Southern, refining ridership analysis, conducting a more detailed study of options, public outreach, and funding options.

4.3 Eastern Corridor Transit Study (2003)

The Eastern Corridor Transit Study (ECTS) was commissioned by the Port Authority of Allegheny County (PAAC) and the Southwestern Pennsylvania Commission (SPC) jointly, in cooperation with Westmoreland County Transit Authority (WCTA). It was much larger in scope than the present study, and included evaluating the potential for transit development in the eastern section of the Pittsburgh region, essentially the wedged shaped area bound by the Allegheny River to the North and the Monongahela and Youghiogheny Rivers to the south, east into Westmoreland County.

The stated purpose of the ECTS was to “identify the transportation needs within the study area and develop appropriate transit solutions that efficiently and effectively satisfy those needs.”¹ The identification of public transportation investment opportunities was expected to lead to several benefits including showcasing the technical and economic advantages of the study area as well as increasing the competitiveness on a regional and national level.

The present study is essentially a focused subset of the projects analyzed in the original ECTS. In that study, transit improvements along both the AVR and NS corridors were examined. A comprehensive list of alternatives was examined (at least through initial screening).

Within the AVR corridor, three different modes were examined, including traditional commuter rail, LRT, and premium bus service on the East Busway. These services were examined on different alignments that included both the current Allegheny Valley Railroad alignment and the NS Conemaugh (north bank) alignment.

Alternatives which survived initial screening in the 2003 analysis were:

- A “push-pull” type commuter rail on the AVR corridor from Arnold to the Strip District (where a shuttle bus would transmit patrons into downtown Pittsburgh proper),
- A light-rail option along the AVR corridor connecting to the Convention Center “T” station in downtown Pittsburgh. This alternative would have required acquisition of right-of-way between 16th and 11th Streets.

Alignments using the NS Conemaugh line were dropped from further consideration because NS operations on that line would be adversely affected. The Busway-on-AVR alternative was dropped because it would require replacement of the existing railroad, thus requiring the elimination of (freight) rail service altogether.

¹ STV Incorporated. Eastern Corridor Transit Study. 2003. Pg. 4-1

In the NS corridor, only one primary alternative was developed, although some of the alternatives in the “East Busway Corridor” also used the NS right-of-way as far as Trafford. The recommended alternative in the 2003 Study for this corridor would have extended the East Busway to Monroeville (which uses the NS right-of-way as far as East Pittsburgh).

This alternative assumed that no additional right-of-way would be needed west of Trafford to accommodate commuter rail service. While this is a possible assumption (given the presence of the NS Mon branch from this point west), it is not given more than a cursory treatment in the 2003 Study. Note that this only applies to the right-of-way between East Pittsburgh and Swissvale (where the current East Busway terminates).

The ECTS-Final suggested that the Allegheny Valley Commuter Rail advance to the Alternatives Analysis / Draft Environmental Impact Statement (AA/DEIS) step or Environmental Assessment (EA) step with high priority and the approach of (1) investigating lower cost options, and (2) Evaluated “T” extension to Strip District station. The Norfolk Southern Commuter Rail to Greensburg option was also selected to advance with high priority. The approach for this option was to (1) investigate a lower cost option, (2) coordinate with NS for use of railroad right-of-way, and (3) coordinate or combine with AVR Commuter Rail steps.

4.4 Eastern Corridor Transit Study: Transitional Analysis (2006)

The *Eastern Corridor Transit Study: Transitional Analysis to Locally Preferred Alternatives* (ECTS-TA) was commissioned by SPC as a follow-up to the 2003 ECTS. The ECTS was completed with recommendations for further development in the two commuter rail corridors (as well as four additional corridors); however, it did not complete all the federal requirements for an Alternatives Analysis in each corridor.

After the completion of the ECTS, federal laws and regulations were revised (primarily the passage of SAFETEA-LU legislation). This change required that a “Transitional Analysis” (TA) be completed to update the work already performed in the ECTS if any of the alternatives were to advance to the next phase. One major component of the ECTS-TA was conducting the major public outreach effort required of federal alternatives analysis. This step ultimately led to the selection of a Locally Preferred Alternative (LPA) in each corridor and their acceptance into SPC’s Long Range Plan.

The 2006 Study suggests variation of the alternatives that arose from the public outreach process, and suggests that these be added and evaluated in the subsequent study phases (there is specific proscription for this in the scoping phase of the Environmental Impact

analysis, for example). The 2003 study mentions possible variations in the corridor alignment to include:

- Extension of the AVR to 11th Street in the Strip District.
- Use of the Brilliant Branch to access Penn Station via the NS Pittsburgh Line.
- Extension of commuter rail service along NS Pittsburgh Line corridor to Latrobe.

Additionally, the ECTS-TA presented various funding options that could potentially help finance the selected alternatives. The list of funding sources suggested federal funds as a means of affording the capital costs associated with the project. Items such as joint development partnerships between the transit agency and a private developer and special taxes were suggested to assist with operating costs.

4.5 Applicability for FTA Compliant Alternatives Analysis

4.5.1 Alternatives

It appears that for the AVR corridor, a sufficient set of alternatives were examined in the 2003 ECTS, including variations of alignment, mode, and service type. The only corridor which lacked sufficient variation was the NS corridor to Greensburg, for which variations in alignment and mode were not considered. It is possible that FTA would require the consideration of an enhanced bus network (using the existing road system) to be evaluated in this corridor prior to the Locally Preferred Alternative (LPA) selection, but it is likely that FTA would require this (an enhanced service concept that builds on existing commuter bus services) as a *Baseline Alternative* in project development/preliminary engineering if the project were to move forward pursuing federal funding.

4.5.2 Demand Forecasting

Demand forecasting of all alternatives was done using the SPC ridership model set, which is the designated travel demand model for the region. This model has been used for FTA New Starts projects in the Pittsburgh region, specifically for the North Shore Connector, in recent years and was considered acceptable by FTA.

FTA has modified its requirements since the time of the North Shore Connector's forecasts were submitted and this will likely necessitate model enhancements during the Project Development/Preliminary Engineering phase of the two alternatives corridors being evaluated in this analysis. One significant change is that FTA now requires recent (last 3 years) comprehensive survey information to identify and understand the underlying travel markets—typically achieved through a transit on-board survey.

4.5.3 Capital Costs

Capital cost estimates developed as part of the 2003 ECTS Study were updated as part of the 2006 ECTS-TA Study, and these cost estimates would need to be updated and further revised as part of subsequent analysis. Any variations on alternatives (e.g. use of Brilliant Branch) would need to be evaluated to the same level of detail.

4.5.4 Operating and Maintenance Costs

Operating and maintenance cost estimates were developed as part of the ECTS and were updated as part of the ECTS-TA. These would need to be updated as part of subsequent analysis. One critical (and frequently overlooked) portion of this analysis is development and modeling of reasonably accurate cost models for all of the transit services involved, including feeder buses and other services operated by affected agencies. As with the ridership forecasting models, the current cost models used by Port Authority of Allegheny for the North Shore Connector work would need modification as a result of revised FTA requirements in place since that study was completed.

4.5.5 Financing

The ECTS-TA outlined some of the potential funding sources and financing options for use in project development. However, it stopped short of developing a funding and financing plan for any or all of the LPA's. As part of any application to enter Project Development or Preliminary Engineering to FTA, an elemental plan would need to be developed (although this may be refined in subsequent studies).

The ECTS-TA selected an LPA for the AVR and the NS corridors, and recommended that they be formally entered into the SPC constrained long range plan via action of the SPC Board. For a federally funded project, this action provides the strongest signal to FTA that the project is locally supported and of sufficient priority to the region to warrant further study.

5. ALTERNATIVES, DEFINITIONS AND ANALYSIS



5 Alternatives Definitions

5.1 Applicable Previous Study Alternatives

The ECTS and ECTS-TA studies examined a variety of alternatives in the Eastern Corridor and Allegheny Valley. In the original study, a two-stage process was employed whereby initial alternatives (the “long list”) were subjected to a screening and review process. Based on this screening and review process, a more limited set of alternatives (the “short list”) were retained for more detailed comparative analysis. In addition to the Build alternatives, No-Build and Transportation System Management (TSM) alternatives were carried forward for further comparison. This overall approach is in keeping with Federal guidelines for Alternatives Analysis, and as such there is no reason to revisit this process in this study.

The Short List alternatives for each designated corridor were then analyzed in more detail, including development of ridership forecasts, detailed capital cost estimates, operating plans and costs, and the like. This analysis provided the basis for the selection of the Locally Preferred Alternatives (LPA).

The scope for the present study called for the analysis of the ECTS-recommended alternatives in each of the two corridors, with a comparative evaluation to be presented to this study’s Steering Committee in a workshop; this workshop was held July 24, 2008. At this workshop, the Committee selected alternatives in each corridor suitable for more detailed analysis. This more detailed analysis involved several variations (especially dealing with specific station locations and operating plans), and was the basis of subsequent work in the study.

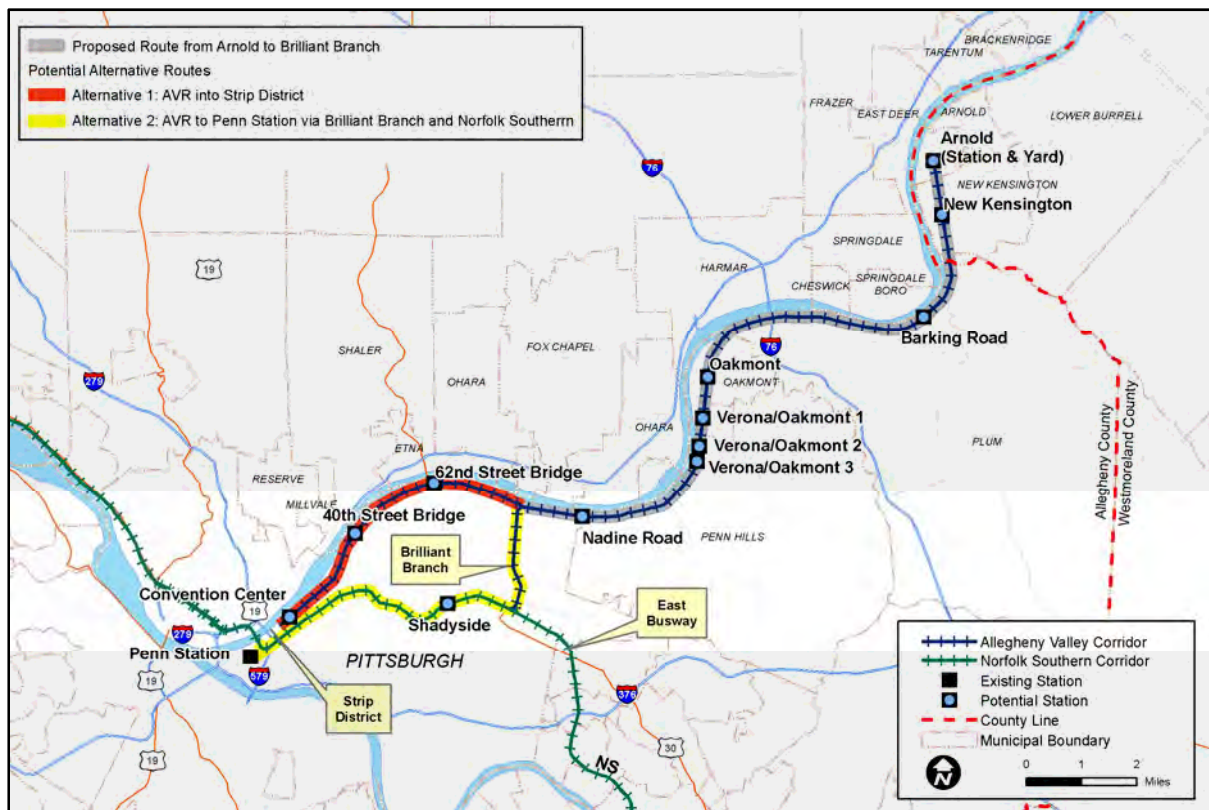
5.2 AVR Corridor Service Alternatives

In the Allegheny Valley corridor, the two build alternatives examined in detail in the ECTS Study were Commuter Rail from New Kensington to Pittsburgh (Strip District) via the Allegheny Valley Railroad line (AVR) and Light Rail from New Kensington to Pittsburgh (Convention Center) via the AVR (along with a bus-based TSM and No-Build options). While the use of the Brilliant Branch to access Penn Station via the NS line was examined as an all-busway alternative, it does not appear that a commuter-rail option was examined using this routing. At the recommendation of the Steering Committee the terminus of the AVR corridor was extended to Arnold for this study. (See **Figure 5-1.**)

In the more detailed analysis, three levels of service and investment were analyzed for the basic commuter-rail alternative (all assumed same routing); the light rail alternative did not have these variations. The ECTS recommended the Commuter Rail alternative, with additional definition of the level of investment to be done later.

While the selection process appears to have been grounded in sound Alternatives Analysis principles, this current study recommends that two additional variations to the basic commuter rail configuration be developed and examined for comparative analysis. The complete set of alternatives to be examined (or reviewed, in the case of non-LPA alternatives) is presented comparatively for evaluation, and selection is made of specific alternatives (one in each corridor) to use as the basis for more detailed analysis.

Figure 5-1: AVR Route Alternatives



The alternatives that were analyzed and compared for this corridor as part of the workshop were as follows:

- 0. No-Build
- 0.5. TSM/Baseline suitable for Federal New Starts analysis

1. Light Rail to Pittsburgh Convention center via AVR (*displayed for comparison only, not recommended*)
 - 2.1. Commuter Rail Arnold to Pittsburgh Strip District via AVR, basic level of service
 - 2.2. Commuter Rail Arnold to Pittsburgh Strip District via AVR, starter system
 - 2.3. Commuter Rail Arnold to Pittsburgh Strip District via AVR, minimal investment
3. Commuter Rail Arnold to Pittsburgh Penn Station via AVR, Brilliant Branch and NS (new)
4. Commuter Rail Arnold to MLK-East Busway "CP-Home" via AVR and Brilliant Branch (new)

Each of these alternatives is presented in more detail in the sections which follow.

Alternative 0: No Build

The No-Build alternative continues the current level of transit service using a mixture of Port Authority and WCTA buses to serve the corridor. The primary Arnold/New Kensington/Oakmont/Verona to Pittsburgh commuter market would continue to be served by the 78A routes and the single-run 3L, or by the AV/AVN and 93X express routes on the opposite side of the river. The fastest of these routes requires 48 minutes to travel to downtown, and most are in the 52-62 minute range.

Alternative 0.5: TSM/Baseline (Improved bus service)

The TSM alternative would feature a modified version of the present AV/AVN routing, with increased service to match the number of runs developed for the build alternatives. Other services would likely be maintained as at present.

Alternative 1: Conversion of AVR to Light Rail, into Strip District and Convention Center

(This alternative was analyzed, but not selected as part of the original ECTS. It was not tested in this study; it is listed here only for comparative purposes.)

This alternative would extend the present LRT system from the new Convention Center station (part of the North Shore Connector project) into the Strip District via a short tunnel, surfacing to join the AVR Right of Way between 16th and 21st Streets. A two-track light-rail alignment would essentially replace the present AVR trackage, with gauge provision for the AVR to continue to operation of freight service at night. Frequent service in both directions (10 minute peak, 20 minutes off-peak) would be provided. The track, signaling, overhead catenary, and new vehicle acquisitions would be standardized with the present PAAC LRT

fleet. Federal Railroad Administration (FRA) requirements would necessitate a strict temporal separation for any freight activities.

Alternative 2.1: AVR into Strip District Commuter Rail--Basic (“Enhanced”) Level of Service

(This alternative was described as the base case in the ECTS, but the ECTS-TA refers to this as the “enhanced” level of service)

This alternative features commuter rail service on AVR trackage, from Arnold and New Kensington to Pittsburgh via the entire AVR route through Lawrenceville and terminating at 16th Street in the Strip District.

Because AVR freight operation is only expected to occur at night, temporal separation is achieved and therefore non-FRA compliant vehicles could be used.

The ECTS estimated a travel time of 34 minutes end-to-end on the rail portion of the trip; because of the terminus in the Strip District, a bus shuttle would be required to reach the Golden Triangle proper, with additional time and cost consideration.

Competing Port Authority bus routes, such as the 78A Oakmont Express, would be reduced or re-deployed.

This particular variation of the alternative was tested in the ECTS as two way service with 30-minute headways in the peak and 90 minute headways in the off-peak period.

Alternative 2.2: AVR into Strip District Commuter Rail—Starter (“Standard”) Level of Service

(This alternative was described as the starter system option case in the ECTS, but the ECTS-TA refers to this as the “standard” level of service)

This alternative features commuter rail service on AVR trackage, from Arnold and New Kensington to Pittsburgh via the entire AVR route through Lawrenceville and terminating at 16th Street in the Strip District.

Because AVR freight operation is only expected to occur at night, temporal separation is achieved and therefore non-FRA compliant vehicles could be used.

The ECTS estimated a travel time of 34 minutes end-to-end on the rail portion of the trip; because of the terminus in the strip, a bus shuttle would be required to reach the Golden Triangle proper, with additional time and cost consideration.

Competing Port Authority bus routes, such as the 78A Oakmont Express, would be reduced or re-deployed.

This particular variation of the alternative was tested in the ECTS as two-way service with 60-minute headways in the peak and 90 minute headways in the off-peak period.

Alternative 2.3: AVR into Strip District Commuter Rail—Minimal Level of Service

(This alternative was described as the base case in the ECTS, but not further evaluated in the ECTS-TA)

This alternative features commuter rail service on AVR trackage, from Arnold and New Kensington to Pittsburgh via the entire AVR route through Lawrenceville and terminating at 16th Street in the Strip District.

Because AVR freight operation is only expected to occur at night, temporal separation is achieved and therefore non-FRA compliant vehicles could be used.

The ECTS estimated a travel time of 34 minutes end-to-end on the rail portion of the trip; because of the terminus in the strip, a bus shuttle would be required to reach the Golden Triangle proper, with additional time and cost consideration.

Competing Port Authority bus routes, such as the 78A Oakmont Express, would be reduced or re-deployed.

This particular variation of the alternative was tested in the ECTS as one-way commuter service with two inbound trains in the morning and two outbound in the evening.

Alternative 3: AVR into Penn Station via Brilliant Branch/NS

This alternative features the use of the AVR mainline between Arnold and Coleman's Junction near Nadine Road, where the interlocking to the Brilliant Branch is used to connect to the Norfolk Southern Pittsburgh Line at Homewood. Trains then travel over the NS line into Penn Station, where revenue service terminates.

This alternative was not explicitly tested in the ECTS, although its potential use was noted in the ECTS-TA final report.

Because this alternative requires the use of NS assets, schedule and capacity issues may dictate the level of service (and the schedule) achievable for this alternative. Additionally, because commuter trains would operate in mixed traffic with freight trains on the NS corridor, passenger equipment would need to comply with FRA regulations regarding

crashworthiness. Ideally, a 30-minute peak service could be accommodated, although this alternative was tested initially with a 60-minute peak service.

Alternative 4: AVR into New Station at “CP-Home” Brilliant Branch/NS Interlocking (Busway buses to downtown)

This alternative features the use of the AVR mainline between Arnold and Brilliant, where the interlocking to the Brilliant Branch is used to connect to the Norfolk Southern Pittsburgh Line at Homewood. Trains remain on the Brilliant Branch and terminate in the vicinity of “CP-Home”, the interlocking between the Brilliant Branch and the NS Pittsburgh Line. Patrons transfer here to a new offline stop along the M.L.K. East Busway, which is elevated at this location.

Construction of a terminus at “CP-Home” on the NS line would be a formidable task given the lack of space and the need to store commuter trains during the day.

This alternative was not explicitly tested in the ECTS. A detailed summary of characteristics, features, and the initial results for each alternative is found in **Table 5-1** below.

5.2.1 Alternatives Selected for Further Analysis

In the Allegheny Valley Railroad Corridor, the basic configurations selected by the Steering Committee for further, more detailed analysis included both a Penn Station commuter rail option (utilizing the Brilliant Branch to access the NS right-of-way) and an “all AVR” Strip District option. Both routings were to be tested with service levels of 30 minutes in the peak and occasional (approximately 90-minute) service in the midday period. Variations of this basic configuration would examine and analyze ridership, cost, and operational implications of varying the station locations/stopping patterns in Arnold, New Kensington, Oakmont and Verona, and variations to the operating scheme necessitated by the operations analysis. The routing via the Brilliant Branch/NS to Penn Station also included a stop along the Busway to service Shadyside and provide connections to Oakland.

In addition, a bus-only “baseline” alternative was carried forward for comparative purposes.

Table 5-1 AVR Corridor Alternatives

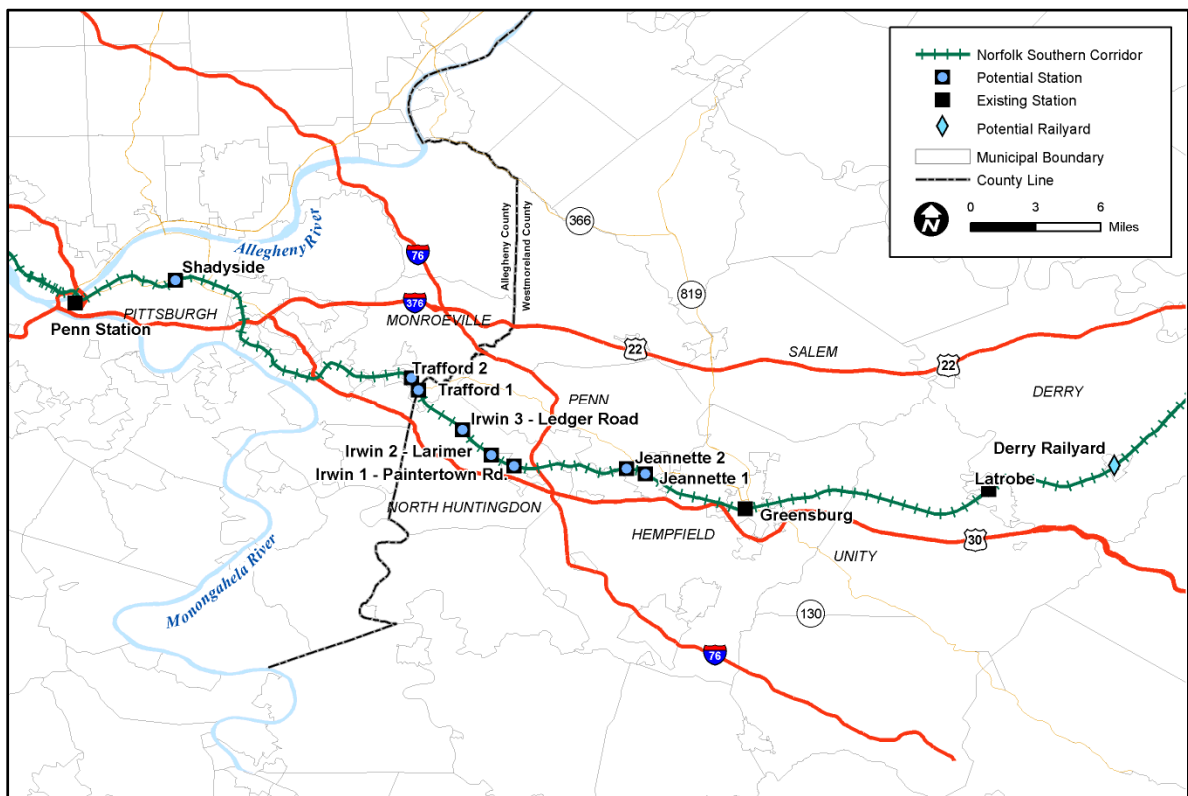
PHYSICAL CHARACTERISTICS						OPERATIONAL POLICY			ANALYSIS RESULTS			
NO.	ALTERNATIVE	TERMINI/LENGTH	MODE	TRANSFER LOCATIONS: TO DOWNTOWN	POSSIBLE STATION LOCATIONS (P = Parking available)	FREQUENCY AND SPAN OF SERVICE	TRAVEL TIME (in minutes)	CHANGES TO EXISTING BUS SERVICE	Ridership		Cost	
									LINE BOARDINGS (2025)	NEW TRANSIT RIDERS (2025)	CAPITAL COSTS (2006\$)	OPERATION AND MAINTENANCE COSTS (2006\$)
0	NO-BUILD	N/A	Bus	No transfer needed	N/A	30 min (AV/AVN)	Minimum of 48 (most 52 to 62)	N/A	0	0	0	0
0.5	TSM/ BASELINE SUITABLE FOR FTA NEW STARTS	N/A	Bus	No transfer needed	N/A	15 min (AV/AVN)	Minimum of 48 (most 52 to 62)	N/A	0	1,181	TBD	3.2M
1	LIGHT RAIL TO PITTSBURGH CONVENTION CENTER	Arnold to Downtown Pittsburgh (Convention Center or Steel Plaza T) 19.0 Miles	Light Rail	Transfer at Steel Plaza	Steel Plaza Convention Center 14th St, 21st St, 31st St 40th St (P), 51st St (P), 62nd St (P) Washington Blvd (P) Sandy Creek (P), Verona (P) Oakmont, New Kensington (P) Arnold	10 min (peak), 20 min (non-peak)	37	AVN will be replaced; Connections at Convention Center and Steel Plaza to all downtownbuses; **Other routes will get adjustments	18,200	6,679	804M (2002 Dollars)	23.1M (Δ 14.8)
2.1	COMMUTER RAIL- AVR Enhanced	Arnold to Pittsburgh Strip District (16th Street) 18.3 Miles	Commuter rail	Transfer required in Strip District to Shuttle Bus	16th St 40th St (P) 62nd St (P) Washington Blvd (P) Sandy Creek (P) Verona (P) Oakmont New Kensington (P) Arnold	30 min (peak), 90 min (non-peak)	34 (does not include shuttle-bus time)	AVN will be replaced; Shuttle Bus to downtown Pittsburgh; **Other routes will get adjustments	6,700	2,503	270-330M	13.4M (Δ 5.1)
2.2	COMMUTER RAIL- AVR Standard					60 min (peak), 90 min (non-peak)	41 (does not include shuttle-bus time)		1,900	1,159	140 - 170M	10.3M (Δ 3.8)
2.3	COMMUTER RAIL - AVR Minimal					Two trains to Pittsburgh in morning; two trains out of Pittsburgh in	42		800	771	64M (2002 Dollars)	4.7M (Δ -3.6)
3	COMMUTER RAIL - BRILLIANT BRANCH	Arnold to Downtown Pittsburgh (Penn Station) 20.0 Miles	Commuter rail	Transfer at Penn Station	Penn Station Washington Blvd (P) Sandy Creek (P) Verona (P) Oakmont New Kensington (P) Arnold	60 min (peak), 90 min (non-peak)	42	Connections at Penn Station to All Busway buses; **Other routes will get adjustments	2,229	1,289	TBD	12.5M (Δ 4.1)
4	COMMUTER RAIL- BUSWAY	Arnold to Busway ("CP Home" between East Liberty and Wilksburg) 15.4 Miles	Commuter rail and buses	Transfer required at Busway (CP Home)	CP-Home Busway Washington Blvd (P) Sandy Creek (P) Verona (P) Oakmont New Kensington (P) Arnold	60 min (peak), 90 min (non-peak)	33 (does not include 14 minutes on Busway to downtown)	Connections at CP-Hall to all Busway buses; **Other routes will get adjustments	2,107	1,141	TBD	7.8M (Δ 0)

5.3 NS Corridor Service Alternatives

Only one build alternative was developed for this corridor in the ECTS, although two initial alternatives for the “East Busway” Corridor did use the NS right-of-way east as far as Trafford (these alternatives were screened out in that corridor). The one build alternative was carried forward into the detailed analysis and recommended as the LPA.

It should be noted that original ECTS study did not examine the possibility of service east of Greensburg, although the ECTS-TA did extend service to Latrobe (although it appears that updated ridership forecasts were not done for this). The ECTS-TA furthermore developed two alternative variations (service levels). In this study, commuter rail service on NS is extended to Latrobe at the recommendation of the Steering Committee. (See **Figure 5-2.**)

Figure 5-2: NS Route Alternatives



While the selection process appears to have been grounded in sound Alternatives Analysis principles, this study recommends that two additional “variations” to the basic commuter rail configuration be developed and examined for comparative analysis. The complete set of alternatives to be examined (or reviewed, in the case of non-LPA alternatives) is presented comparatively for evaluation.

The recommended alternatives analyzed and compared for this corridor were as follows:

0. No-Build
- 0.5. TSM/Baseline suitable for Federal New Starts analysis
- 1.1. Commuter Rail Latrobe to Pittsburgh Penn Station via NS, basic level of service
- 1.2. Commuter Rail Latrobe (or Greensburg) to Pittsburgh Penn Station via NS, enhanced/maximum level of service
2. Commuter Rail Latrobe to Swissvale (Busway) via NS, basic level of service.

Each of these alternatives is presented in more detail in the sections which follow.

Alternative 0: No Build

The No-Build alternative continues the current level of transit service using a mixture of Port Authority and WCTA buses to serve the corridor. The primary US Route 30 Corridor in Westmoreland County would continue to be served by the 1F/2F routes. The fastest of these routes requires 80 minutes from Greensburg to Penn Station (the 2F Latrobe flyer route requires 97 minutes from Latrobe to Penn Station via a different route).

Alternative 0.5: TSM/Baseline (Improved bus service)

The TSM alternative would feature a modified version of the present 1F Greensburg Flyer routing, with increased service to match the number of runs developed for the build alternatives. Other services would likely be maintained as at present.

Alternative 1.1: Commuter Rail Latrobe to Pittsburgh Penn Station via NS, basic level of service

This alternative features commuter rail service on the NS Pittsburgh Line between Latrobe and Pittsburgh (Penn Station), a distance of approximately 41 miles. All day service would consist of average 60-minute frequency in the peak periods and 90 minutes in the midday off-peak.

The ECTS tested this alternative with service only to Greensburg, but a new run was made considering extended service to Latrobe. Travel time to Penn Station was estimated at 64 minutes from Greensburg and 76 from Latrobe. While service would terminate at Penn Station, some patrons may need to use one of many Port Authority bus routes to circulate within downtown, while some would be able to walk.

Competing Port Authority and WCTA bus routes, such as the T (Trafford) Express and the 1F Greensburg Flyer and 2F Latrobe Flyer would be eliminated, reduced, or re-deployed.

Alternative 1.2: Commuter Rail Latrobe (or Greensburg) to Pittsburgh Penn Station via NS, enhanced/maximum level of service

This alternative features commuter rail service on the NS Pittsburgh Line between Latrobe and Pittsburgh (Penn Station), a distance of approximately 41 miles. All day service would consist of average 30-minute frequency in the peak periods and 90 minutes in the midday off-peak.

The ECTS tested this alternative with service only to Greensburg. Travel time to Penn Station was estimated at 59 minutes from Greensburg, an improvement over the previous alternative because of the assumption of additional capital improvements (e.g. addition of third track and sidings) on the line. While service would terminate at Penn Station, some patrons may need to use one of many Port Authority bus routes to circulate within downtown, while some would be able to walk.

Competing Port Authority and WCTA bus routes, such as the T (Trafford) Express and the 1F Greensburg Flyer would be eliminated, reduced, or re-deployed.

Alternative 2: Commuter Rail Latrobe to Swissvale (Busway) via NS, basic level of service

This alternative features the use of the NS Pittsburg line between Latrobe and Swissvale, which is the current end of the M.L.K. East Busway (and hence where the right-of-way becomes more or less un-expandable). Trains terminate at what would be a new site to be determined in the vicinity of the Swissvale stop on the Busway.

This alternative was not explicitly tested in the ECTS.

Because this alternative could require significant property acquisition, engineering and construction costs to both accommodate train storage separate from the NS mainline and facilitate passenger transfers it was not considered beyond the initial round of evaluations.

A detailed summary of characteristics, features, and the initial results for each alternative is found in Table 5-2 below.

Table 5-2 NS Corridor Alternatives

PHYSICAL CHARACTERISTICS						OPERATIONAL POLICY			ANALYSIS RESULTS			
NO.	ALTERNATIVE	TERMINI/LENGTH	MODE (S)	TRANSFER LOCATIONS: TO DOWNTOWN	POSSIBLE STATION LOCATIONS (P = Parking available)	FREQUENCY AND SPAN OF SERVICE	TRAVEL TIME (in minutes)	CHANGES TO EXISTING BUS SERVICE	Ridership		Cost	
									LINE BOARDINGS (2025)	NEW TRANSIT RIDERS (2025)	CAPITAL COSTS (2006\$)	OPERATION AND MAINTENANCE COSTS (2006\$)
0	NO-BUILD	N/A	Bus	Direct service to all of downtown Pittsburgh	N/A	WCTA 1F: 30 min average (Tripper)	116	N/A	N/A	N/A	0	0
0.5	TSM/ BASELINE for NEW STARTS	N/A	Bus	Direct service to all of downtown Pittsburgh	N/A	WCTA 1F: 30 min average (Tripper)	116	N/A	N/A	1,609	TBD	1.9M
1.1	NS COMMUTER RAIL TO PENN STATION, Standard	Latrobe to Pittsburgh (Penn Station) 40.9 miles	Commuter rail	Direct to Penn Station area of downtown	Latrobe, Greensburg, Jeannette, Irwin, Trafford, East Pittsburgh, Wilksburg, Pittsburgh (Penn Station)	60 min (peak), 90 min (non-peak)	64 (Greensburg) 76 (Latrobe)	WCTA 1F /2F PAACT (Trafford) are replaced **Other routes will be adjusted	4,164 (Greensburg)	2,800 (Greensburg)	190 - 230M (Greensburg)	14.7M (Δ 10.6) (Greensburg)
1.2	NS COMMUTER RAIL TO PENN STATION, Enhanced			Transfer required at Wilksburg or Penn Station to reach Oakland		30 min (peak), 90 min (non-peak)	59 (Greensburg)		8,342 (Greensburg)	4,547 (Greensburg)	250 - 300M (Greensburg)	21.3M (Δ 17.9) (Greensburg)
2	NS COMMUTER RAIL TO BUSWAY	Latrobe to Swissvale (End of MLK Busway) 31.4 miles	Commuter rail to Swissvale; buses from Swissvale to Pittsburgh	Transfer to Busway required at Swissvale to reach Downtown Pittsburgh and Oakland	Latrobe, Greensburg, Jeannette, Irwin, Trafford, East Pittsburgh, Swissvale (Busway)	60 min (peak), 90 min (non-peak)	56 (does not include 23 minutes on busway to downtown)		3,850	5,221	TBD	13.3M (Δ 10.7)

5.3.1 Alternatives Selected for Further Analysis

In the Norfolk Southern corridor, the basic configuration selected by the Steering Committee for further, more detailed analysis was a hybrid of the alternatives examined above. The overwhelming choice for further investigation (including modified ridership forecasting analysis, station location analysis, operational analysis, and costing) was the basic Commuter rail service (enhanced level of service) from Latrobe to Pittsburgh-Penn Station, with intermediate stops generally in Greensburg, Jeannette, Irwin, Trafford, and along the Busway in Shadyside. Service levels would be 30 minutes in the peak and occasional (approximately 90-minute) service in the midday period. Variations of this basic configuration would examine and analyze ridership, cost, and operational implications of varying the station locations/stopping patterns in Trafford, Irwin, and Jeannette (Greensburg and Latrobe are assumed to have fixed station locations), and variations to the operating scheme necessitated by the operations analysis.

In addition, a bus-only “baseline” alternative was carried forward for comparative purposes.

The remainder of this chapter discusses the corresponding station location and operational variation issues in more detail.

5.4 Service Options

Commuter services are established to primarily transport workers between their places of residence and work. As such, the commuter rail services in the AVR and NS corridors are proposed to move riders to their places of employment in the Shadyside/Oakland and downtown Pittsburgh locations in the morning hours and return them home in the evening on schedules that are convenient as well as competitive with automobile travel. As part of the process of defining such schedules, the Steering Committee requested that the commuter services also include reverse commute services (i.e. morning downtown to suburb and evening suburb to downtown).

In developing the proposed schedules, the project team made a priority for the optimal use of commuter train equipment. For example, reverse commute trains would utilize trainsets that had earlier arrived in Pittsburgh for an in-bound peak train. By doing so, the number of trainsets (locomotives and passenger cars) could be kept to a minimum thus reducing capital and maintenance costs.

A mid-day return service was also seen as a potentially viable service that commuters could find attractive in case of a need to return home in the mid-day period to attend to family

matters, medical appointments or other similar matters requiring an early return home. Such a service would also permit half-day, morning or afternoon, shopping or other non-work trips to downtown Pittsburgh for residents of the outlying suburbs since the mid-day service would include an additional suburb-to-downtown train in the early afternoon.

It is very important to note that the proposed schedules discussed below have not been analyzed or approved by Norfolk Southern or the Allegheny Valley Railroad. Approval and agreement on schedules and train frequencies will be necessary as part of the overall access agreements with the railroads before commencement of service on either of the railroads. Detailed analysis of commuter train operations on the NS, including computer simulation modeling, will be necessary in order to evaluate the impacts of commuter service on the NS freight train operations in the corridor.

For each of the proposed commuter rail corridors (AVR and NS) the following general schedules were identified and analyzed in the ridership and operations tasks for this study.

5.4.1 Peak Period Services

Peak period commuter service on each line would consist of four (4) in-bound morning trains and four (4) out-bound evening trains operating on 30-minute headways on each line. Trains would be scheduled to arrive at the Penn Station, Strip District and Shadyside stations at morning hours convenient for commencement of work and generally between 7:00 a.m. and 9:00 a.m. With travel times of approximately 35 to 60 minutes from the furthest commuter rail station (Arnold on the AVR and Latrobe on the NS), the earliest train departures would be in the 6:00 a.m. to 6:30 a.m. timeframe depending upon which line and Pittsburgh terminus (Penn Station or Strip District) is being examined.

Evening peak period return services would be developed to match general work schedules and would likely commence at about 4:30 p.m. with the last train departing Penn Station or the Strip District at about 6:30 p.m. Surveys of potential riders may need to be conducted prior to establishing exact schedules.

5.4.2 Reverse Commute Services

Reverse commute service would allow persons living in Pittsburgh, or in other locations along each rail line, to commute to locations east of the city. This service could also be convenient for shift workers whose workday ends in the morning and wish to return home to the eastern suburbs at that time. (However, assuming such workers commence their shifts eight hours earlier – at about 12:00 a.m. – no commuter rail in-bound service would

be available to convey them to work.) A late afternoon return reverse commute train from each terminus location (Arnold and Latrobe) would also operate under this scenario. The analysis of operations shows that only one reverse commute train would be possible without purchasing additional trainsets specifically for that purpose. Consideration will also be necessary as to how reverse commute train schedules would impact NS freight schedules since outbound reverse commute trains would be utilizing NS corridor capacity at the same time inbound regular commuter trains are operating.

Reverse commuter service would depart Pittsburgh in generally the 7:30 a.m. to 8:30 a.m. timeframe with arrivals at the terminus stations of approximately 8:00 a.m. to 9:15 a.m. depending on the station and line. It must be noted that the Amtrak Train 41 (*Pennsylvanian*) operates today effectively as a reverse commute service eastbound on NS by departing Penn Station at 7:20 a.m. and arriving in Latrobe at 8:11 a.m. with a stop in Greensburg. Return reverse commuter rail service would depart the terminus stations at afternoon hours that would allow them to be staged in Pittsburgh for the return peak-hour service schedule. The return Amtrak Train 43 schedule can function as a late reverse commuter train departing Latrobe at 6:41 p.m. and arriving Penn Station at 8:05 p.m.

5.4.3 Mid-day Services

Mid-day return services, as noted above, would allow early return of commuters to their origin stations prior to the commencement of evening peak-hour service. Since this service would not be tied to a specific timeframe, some flexibility in establishing an operating schedule should be possible. In general, mid-day return trains should depart Pittsburgh before 12:00 p.m. noon for arrivals at the terminus stations no later than 1:00 p.m. Those trains would then return to downtown as a reverse mid-day train allowing them to be staged in Pittsburgh for the evening peak-hour return service.

5.5 Commuter Rail Station Location Options

For each of the three selected alternative commuter routes potential commuter stations were identified based on community locations, proximity to commuter routes, opportunities to provide commuter parking, opportunities for supporting Transit Oriented Development (TOD), expected ridership based on previous ridership analysis, and existing rail stations on the NS line at Greenburg and Latrobe.

The detailed selection criteria used to determine the adequacy of a site included site suitability, accessibility, surrounding demographics, and connecting transit and parking availability. Site suitability included analyzing the physical characteristics of a site and

especially its proximity to the rail line where level areas of land are required along a portion of the rail line which is crucial for providing access to station platforms that can reach 600 ft. in length. Sites needed to be of a size that could handle the station structure which would include a passenger shelter, platforms and compliant Americans with Disabilities Act (ADA) access; parking; and track infrastructure if necessary. Topography, space and access were often the biggest challenges with site selection. Other criteria include location along tangent track, existing compatible land uses, access to roads and the commuter roadway network, and access to other transit modes.

5.5.1 AVR Station Options

The AVR corridor along the southern bank of the Allegheny River was inventoried for potential station locations. The corridor, which is approximately 19.5 miles in length, extends from just north of Drey Street in Arnold, Westmoreland County to 21st Street in the Strip District in Pittsburgh. Although there is no track to the west of 21st Street, the AVR owns an easement from 21st Street to 16th Street and service is assumed to be extended to 16th Street. In general, the area surrounding the AVR is industrial/commercial in the western portion near the Strip District of the corridor while the eastern portion is mainly residential with adjacent central business districts. Much of the adjoining land along the AVR is flat since it is in a river bottom land. However, since this is also a narrow valley bottom the AVR right-of-way is also in very close proximity to other adjoining commercial and industrial land uses, especially in the Strip District. The railroad is a one-track line with several passing sidings. All new stations that would be constructed on the line are assumed to be serviced by a single platform.

5.5.1.1 Arnold

The Arnold area is residential, industrial and commercial in nature. The AVR runs parallel to Constitution Boulevard and has several at-grade crossings in the downtown business district. This portion of the AVR is roughly bounded by 2nd Street to the south and Drey Street to the north. Numerous industrial or former industrial sites are found adjacent to the rail line between it and the Allegheny River. (See **Figure 5-3.**)

A potential rail station and terminus yard location was identified on the northwest corner of

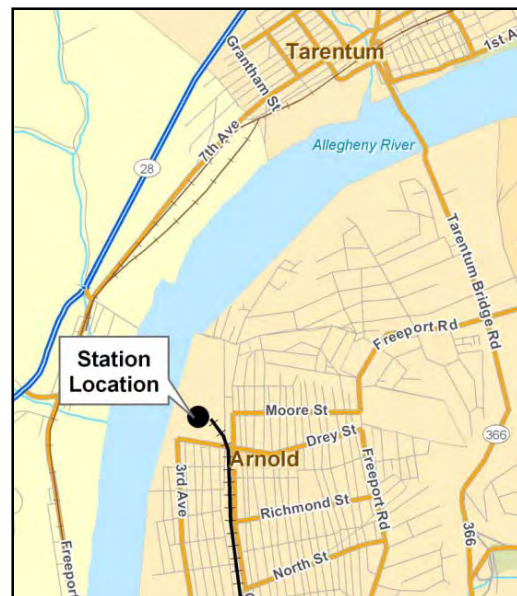


Figure 5-3: Potential Arnold Station Location

the intersection of the rail line with Drey Street. The site, now largely vacant, is a former industrial location with some remnant industrial structures on the parcel. Adequate space exists for a parking lot of up to 180 spaces, station platforms and a four-track rail yard for overnight storage of trains. (See **Figure 5-4.**)

The proposed station is located 3.1 miles from Route 28 via Drey Street and Tarentum Road. This location would serve as a terminus point for commuter rail on the AVR corridor. The site requires both the removal of old structures and potentially a substantial amount of environmental cleanup due to its former industrial use.

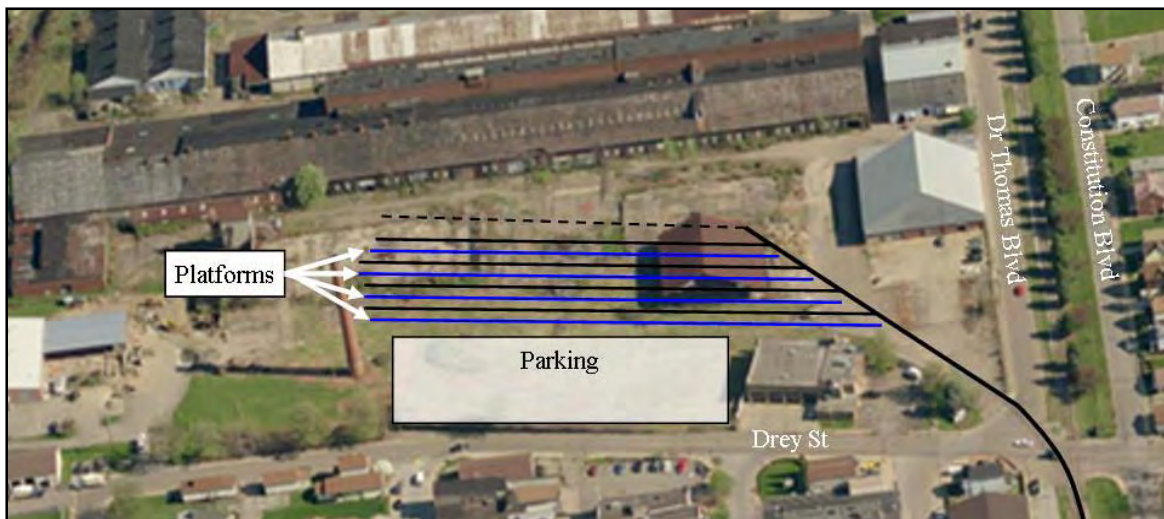


Figure 5-4: Arnold Station and Yard

5.5.1.2 New Kensington

The potential station location in New Kensington is located along Barnes Street and is situated near a concentrated residential area, which includes apartments, residential neighborhoods, the Education Center of the Westmoreland County Community College, and the New Kensington central business district. This location, a former rail station site, is 4.1 miles from Route 28. There is

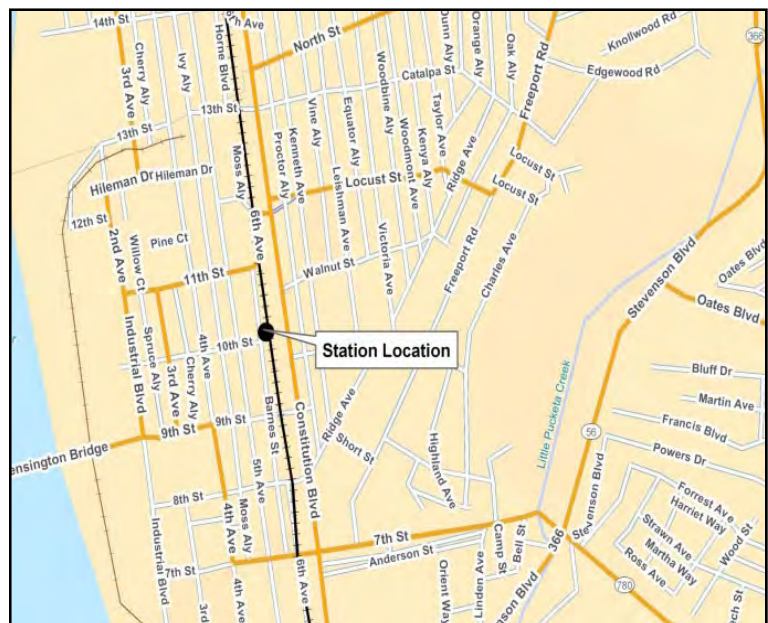


Figure 5-5: Potential New Kensington Station Location

ample off-street metered parking and an existing lot with approximately 140 parking spaces immediately adjacent to the proposed station site. (See **Figure 5-5** and **5-6**.)

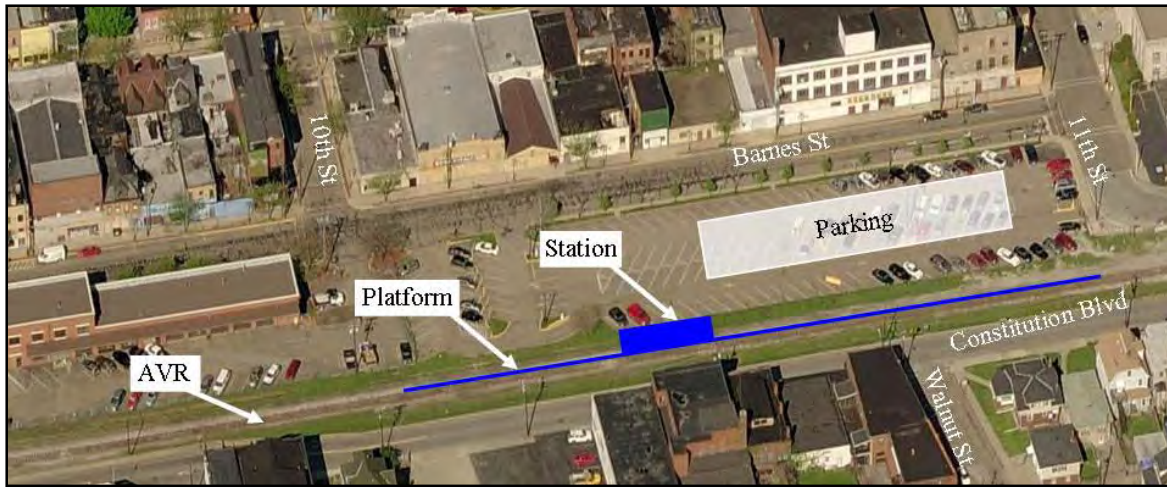


Figure 5-6: New Kensington

5.5.1.3 Barking Road

A station location in the vicinity of Cox Comb Hill Road and Logans Ferry Road to serve the Plum community east of the Turnpike was also examined. (See **Figure 5-7**.)

The Barking Road option for this station consists of a station location adjacent to the Allegheny River on the north and Barking Road and Cox Comb Hill Road on the south.



Figure 5-7: Potential Barking Road Station Location

To make for a safe and easy transition into the site, the intersection at Cox Comb Hill and Logans Ferry Roads would need to be rebuilt. Due to the industrial nature of the location and existing industrial and warehouse buildings on the site, the Barking Road option would need substantial environmental cleanup and involve demolition of numerous existing industrial buildings, some of which are in use today. This site could provide more than 350 parking spaces for commuters using the AVR Corridor. (See **Figure 5-8**.)

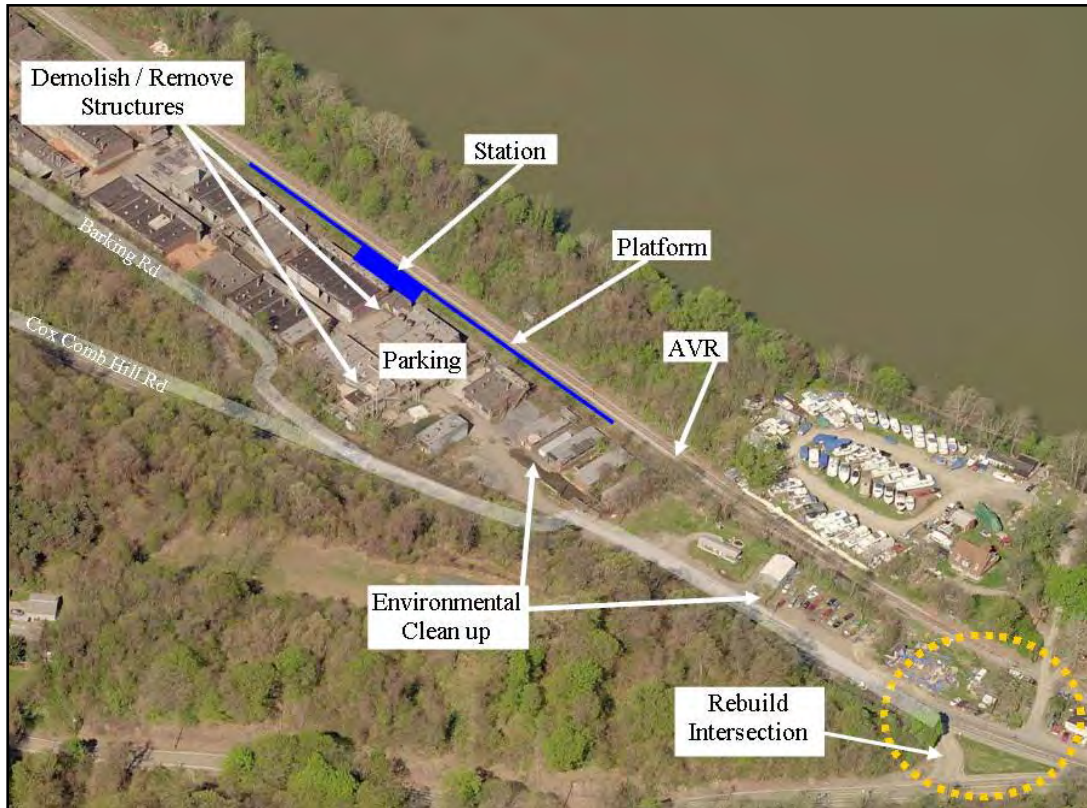


Figure 5-8: Barking Road

5.5.1.4 Oakmont

Oakmont is primarily a residential area with an active downtown district. The AVR runs parallel to Allegheny River Boulevard through Oakmont. One potential station location would be to re-establish a station near downtown. Many homes and businesses are within walking distance of the AVR. On-street parking is available in

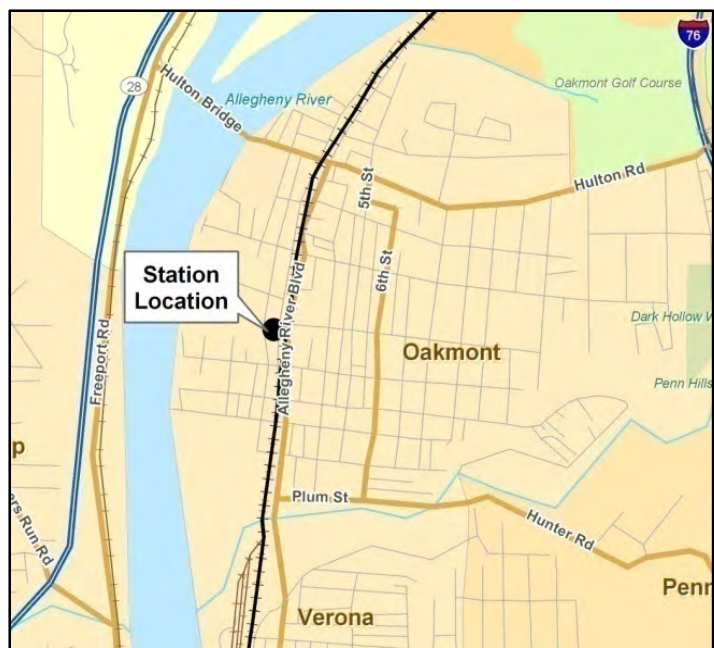


Figure 5-9: Potential Oakmont Station Location



Figure 5-10: Oakmont Station

downtown Oakmont, however, there does not appear to be adjacent commuter-type parking currently existing or available land where adequate parking could be created. A station in the downtown area of Oakmont, however, could easily serve the community as a walk-up or drop-off station. (See **Figure 5-9** and **5-10**.)

5.5.1.5 Verona/Oakmont

There were three sites examined as potential locations for a Verona/Oakmont commuter rail station. (See **Figure 5-11**.) These three sites were examined as station locations that could potentially serve Oakmont, Verona and Penn Hills.

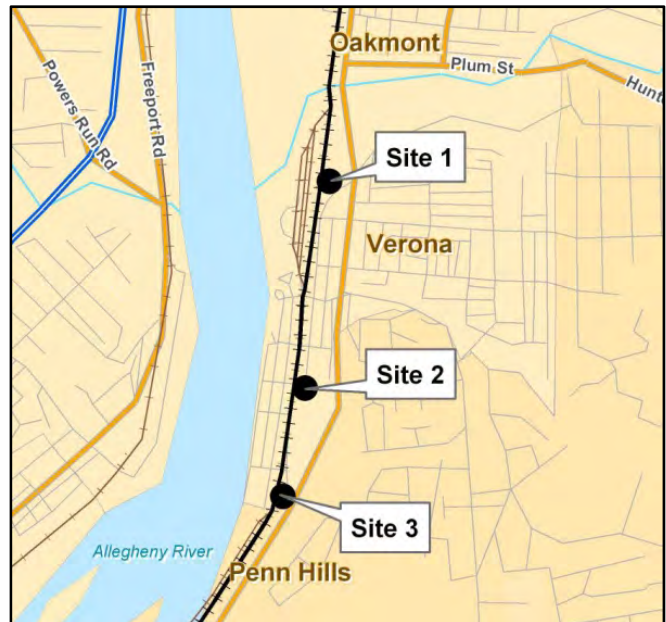


Figure 5-11: Potential Verona/Oakmont Station Locations

Verona/Oakmont 1: The first and recommended site for this stations location is situated



Figure 5-12: Verona/Oakmont 1

near the intersection of East Railroad Avenue and Center Avenue in the northern area of Verona which borders the Oakmont town line (**Figure 5-12**). With incorporation of pedestrian access along the AVR line, the site would be less than 2,000 feet from residential areas on the south side of Oakmont. The site is currently being utilized apparently as a waste/storage location. This site can accommodate more than 500 parking spaces for commuters and is also located across the AVR rail line and Plum Creek from a major proposed mixed residential community of approximately 400 housing units. (See Chapter 10 for further discussion of this proposed development.) Due to the current state and previous history of the site, environmental cleanup would be required.

Verona/Oakmont 2: The second site is located in the center of Verona, along West Railroad Avenue between James and Grant Streets. The site is on a long narrow parcel of AVR property and would be ideal for a passenger shelter and platforms. The closest parcel of land adequate for commuter parking is the open space along the AVR just south of the Verona Municipal Building. However, that site could only accommodate approximately 50 additional parking spaces beyond the number already existing there and would require taking of public open space in the town center which, if federal (FTA) monies were used to fund the project, may be prohibited. (See Section 5.5.2.6 for a discussion of the Trafford 1 station site, below, and use of publicly-owned parkland.)

Verona/Oakmont 3: The third site is on the south side of Verona in the vicinity of Jones Street and Allegheny River Boulevard. The River Town Shopping Center exists at this location adjacent to the AVR rail line. However, the parking lot of the shopping center is heavily used by shoppers and has little apparent excess capacity for commuters. Other

nearby space along the AVR line is inadequate in size for a station and parking lot or would require the demolition of existing businesses.

5.5.1.6 Nadine Road

Between Verona and Pittsburgh, the AVR runs adjacent to the Allegheny River and is not easily accessible by vehicular traffic. There is very limited development along the rail line in this area. The AVR Brilliant Branch, which connects to the NS Pittsburgh Line at

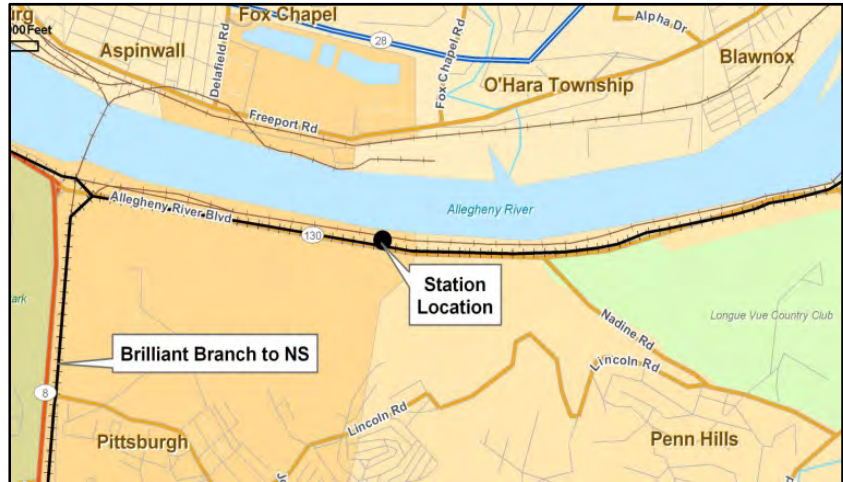


Figure 5-13: Potential Nadine Road Station Location

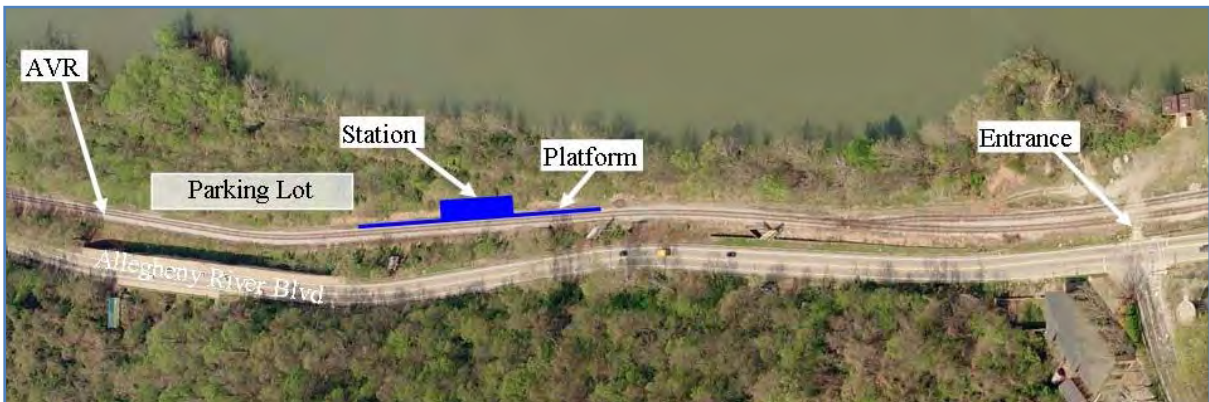


Figure 5-14: Nadine Road

Homewood, begins at Coleman Junction on the AVR near MP 6.68, east of Highland Park Bridge. Nadine Road intersects Allegheny River Boulevard (Rt. 130) just to the east of Coleman Junction allowing a station site to be located west of Nadine Road and North of Route 130 (**Figure 5-13**). Coleman Junction is a former rail yard located in a long flat area between the existing tracks and river. The site would require an intersection upgrade and an access road built to the parking lot. More than 250 parking spaces could be provided at this location. This station location could serve commuter trains on either a route to the Strip District or, via the Brilliant Branch connections to NS, to Penn Station in Pittsburgh. A moderate level of environmental cleanup is expected at this site. (See **Figure 5-14**.)

5.5.1.7 62nd Street Bridge

The Steering Committee requested that a commuter parking location and station in the vicinity of 62nd Street Bridge be examined on the AVR line to the Strip District (**Figure 5-15**). The Committee reasoned that this location may be able to serve as a commuter lot attracting riders from north of the Allegheny River. The area in the vicinity of 62nd Street and Butler Street was examined for possible parking lot and station locations. However, due to the presence of large industrial buildings and facilities both in current use and abandoned, no adequate open areas adjacent to the AVR rail line could be identified.

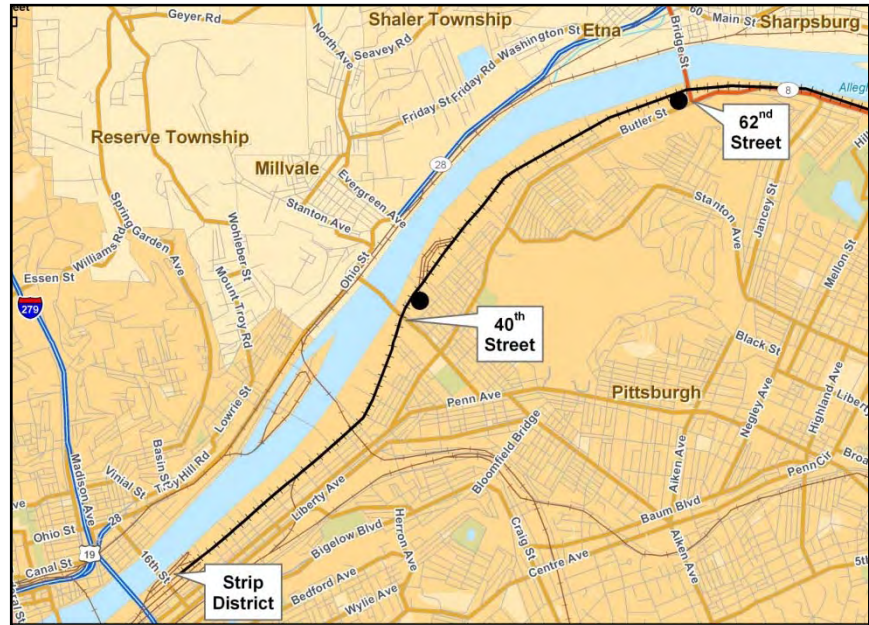


Figure 5-15: Potential 62nd, 40th and Strip District Locations

The location of the AVR line is also considerably removed from residential areas of the nearby Stanton Heights and Lawrenceville communities with no direct pedestrian access due to severe topographic conditions. Given the lack of an adequate station and parking site and lack of connections to the nearest communities, this location is not recommended as a commuter rail station.

5.5.1.8 40th Street Bridge

The Steering Committee also requested that a commuter parking location and station in the vicinity of 40th Street Bridge be examined on the AVR line to the Strip District. The Committee reasoned, as with the 62nd Street Bridge, that this location may possibly also serve as a commuter lot attracting riders from north of the Allegheny River. The area in the vicinity of 40th Street and Butler Street was examined for possible parking lot and station locations. Although a potential location for a station and parking lot was identified at a vacant parcel on Willow Street between Banner Way and 42nd Street it was also determined by the study team that the location is only 26 blocks from what would be the terminus of the AVR line at 16th Street in the Strip District. Given this proximity to the terminus of the

commuter line and the time required both for gaining access to the parking lot from the 40th Street Bridge and the wait for a commuter train it is expected that few commuters using the bridge would utilize commuter rail for traveling the last 1.9 miles to the Strip District. Additionally, local residents in the vicinity of the station site are already served by transit in the Butler Street corridor. The 40th Street Bridge location is not recommended for a commuter rail station.

5.5.1.9 16th Street Strip District Station

The AVR commuter rail line would terminate in the Strip District at 16th Street where a terminus station would be constructed using, in part, AVR right-of-way. (See **Figure 5-16.**) This station would consist of platforms and track to serve four trains including storage of the trains during the mid-day period. A small shelter would also be constructed for passengers waiting for connecting buses or for the departure of evening trains. The track would be configured for train storage which would allow efficient arrivals and departures and would not preclude further extension of the AVR commuter line to the west in the future. Security fencing, lighting and a train crew building would also be included with the station at this location.

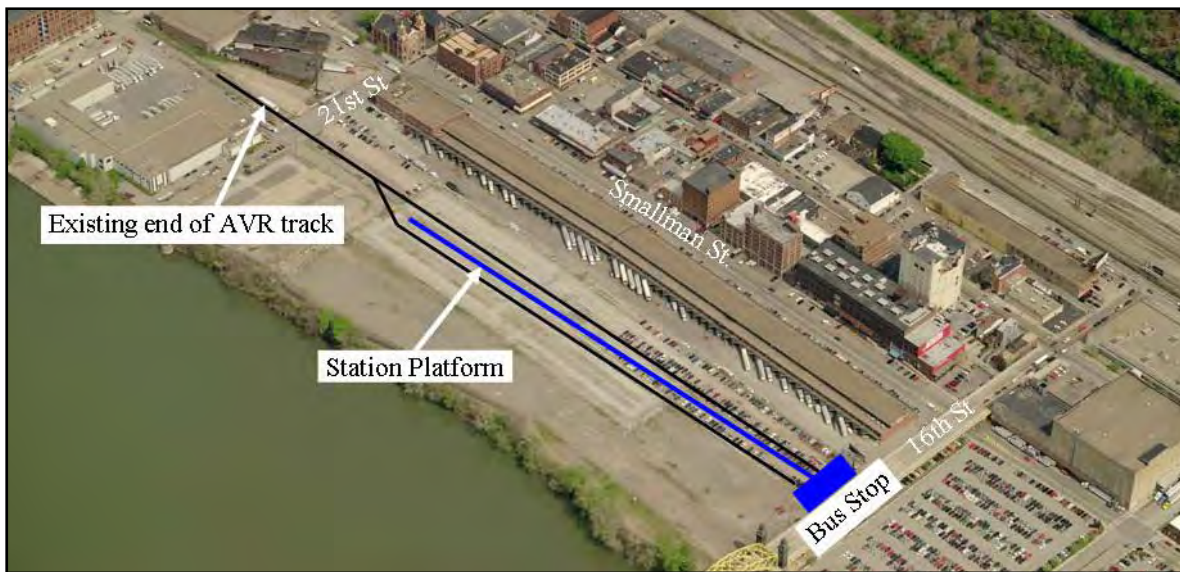


Figure 5-16: Strip District

5.5.2 NS Station Options

The previous studies defined the NS corridor as extending from Greensburg to Penn Station in Pittsburgh along the NS Pittsburgh Line. Following discussions with and guidance from the Steering Committee a decision was made to extend the study corridor and proposed service area to Latrobe, which was noted as a possible future extension in the ECTA study. Station locations on the NS line were also examined with the Committee and a consensus was reached that commuter rail origin stations would not be located further west than Trafford, this mainly due to the adequacy of commuter bus service and access to the East Busway west of that location. While the ECTA study identified a station at Wilkinsburg, the Committee and the project team agreed that a destination station located on the East Busway at the S. Negley Avenue Station in Shadyside to serve that location and Oakland would be of much value, as ridership forecasts confirmed.

The biggest challenge in locating potential commuter rail stations on the NS Pittsburgh Line was to identify locations where roadways and sections of track were at the same grade or were not separated by streams. In this hilly portion of Westmoreland County there are few such locations. Since the rail lines were often located in stream valleys there is often a stream in very close proximity to the tracks thus making access to one side of the track very difficult. Additionally, in urban areas the rail line had been elevated over the years to eliminate the at-grade street crossings thus adding to differences in elevations. Because of the elevated track, providing ADA-compliant access can still be a problem at existing stations (Latrobe) as well as at sites of former stations (Jeannette, Irwin, Trafford). The identified stations on the NS line, based on both desired service to the community and on forecasted ridership, are described below along with the terminus rail yard and maintenance facility at Derry.

5.5.2.1 Derry Rail Yard and Maintenance Facility

Commuter rail service on NS would begin and terminate at Latrobe. However, due to a lack of adequate space for train storage and maintenance in or immediately outside of Latrobe, an alternative site for such a facility was identified on the south side of the NS line on the west side of Derry, five miles east of Latrobe. This location is the site of a former rail yard and consists of a large flat parcel adjacent to the Pittsburgh Line at approximately MP 308. Access to the site would be from N. Valley Street. (See **Figure 5-17.**)



Figure 5-17: Potential Derry Yard and Maintenance Location

A rail yard with sufficient capacity to store a minimum of four commuter trainsets plus a spare engine and rail cars would be constructed at this site. A maintenance facility would also be constructed for the performance of heavy maintenance activities on the commuter rolling stock. This would include, for instance, use of a service pit for servicing train wheels and brakes and components on the under side of the equipment. Daily light maintenance and cleaning, as well as safety inspections of equipment would also take place at the yard.

The yard would be located adjacent to NS Track 1 (south side track) and with the construction of a new crossover west of the yard on the mainline track, trains would be able to access the Track 2 side of Latrobe Station after departing the yard. The available vacant and flat land associated with the former rail yard could also be used for an eventual commuter parking lot and station if demand for commuter rail service from this location should materialize in the future.

5.5.2.2 Latrobe

The Latrobe area is both residential and commercial in nature with industrial sites located near the central urban core. The NS Pittsburgh Line runs parallel to State Route 981 and has

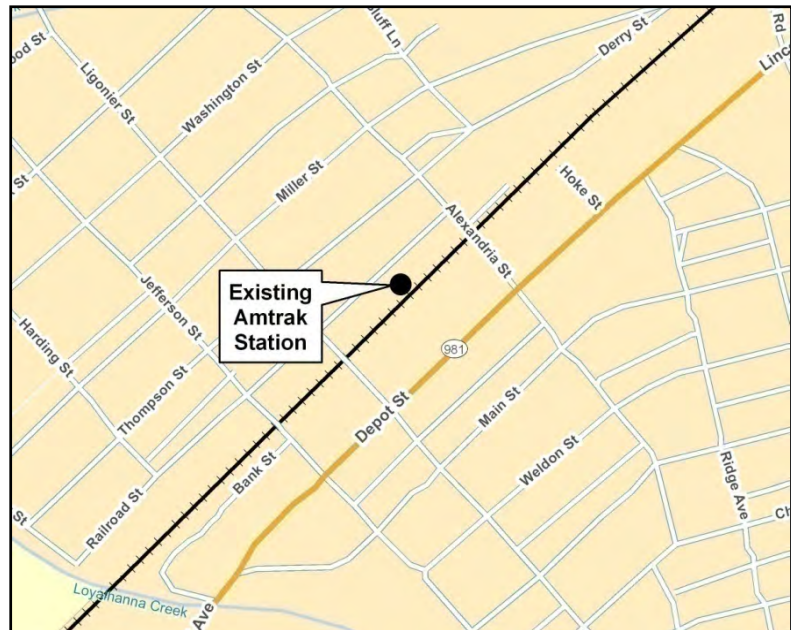


Figure 5-18: Latrobe Station Location

several overpasses at intersecting roadways in the downtown business district. There is an existing Amtrak station in Latrobe which is 2.7 miles from US Route 30 and 7.1 miles from US Route 22. As stated in Section 3.6.11, there is an adjacent parking lot for the station and city-owned off-street metered parking adjacent to the site is also available. Since the former station building has been converted to a restaurant, the existing Amtrak facility is limited to a covered platform and enclosed shelter on the north side of the station (Track 2).

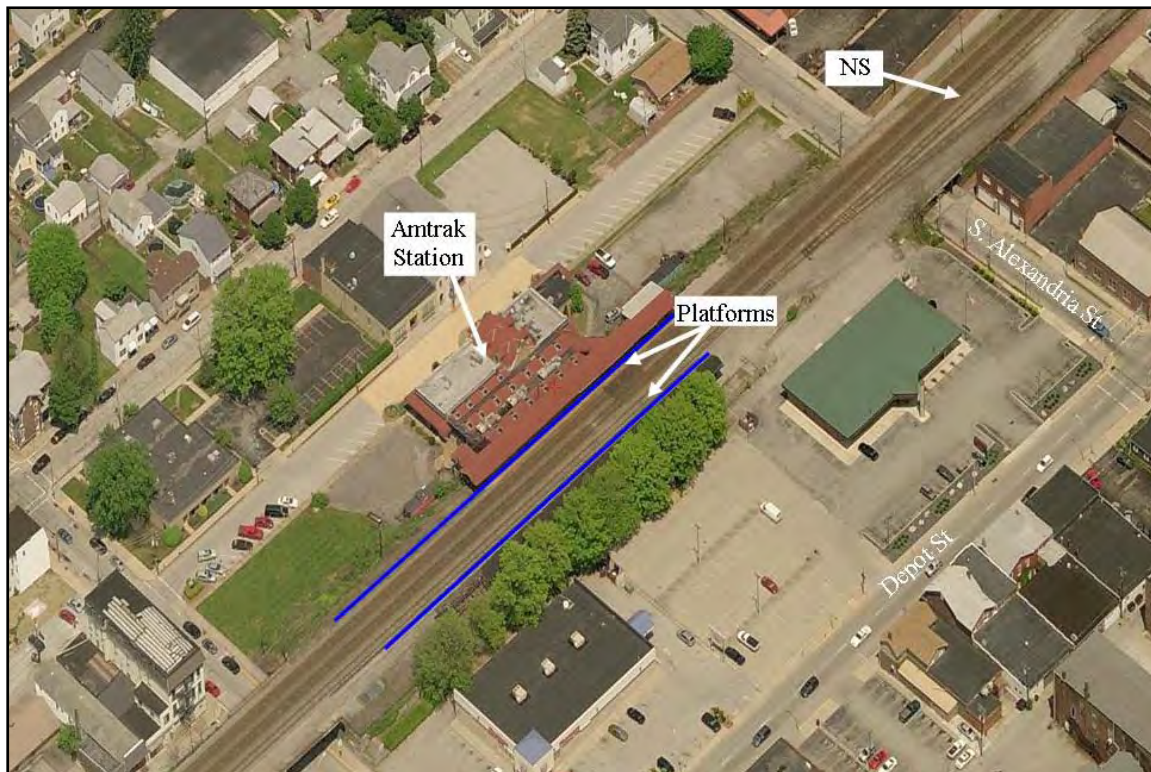


Figure 5-19: Latrobe Station

There is no ADA access to the active platform which must be accessed via stairs from the parking lot and street level. The platform and canopy on the south side (Track 1) of the station are in very poor condition with posted warnings to pedestrians. That platform is located on a siding that connects with Track 1 approximately 2,000 ft. west of the station and has no direct access across the tracks to the platform on Track 2. Safe and legal access between the platforms can only be made via the local street network and the roadway underpasses on S. Alexandria Street or Ligonier Street. A former pedestrian underpass is now part of the privately run restaurant occupying the historic train station structure. (See Figures 5-18 and 5-19.)

5.5.2.3 Greensburg

Within Greensburg, the NS line generally runs parallel to State Route 130 and is surrounded by both residential and commercial developments. There are three roadway bridges over the NS line near the existing Greensburg Station and rail bridges

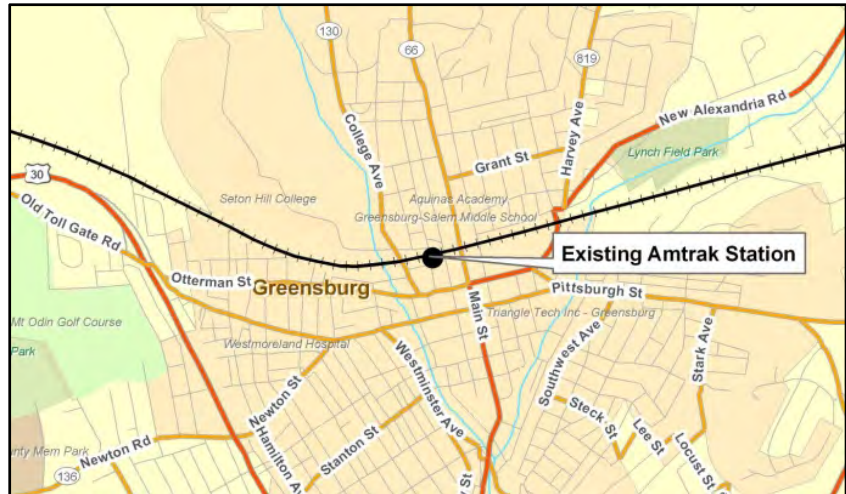


Figure 5-20: Greensburg Station Location

over State Route 819 and State Route 130 (see **Figure 5-20**). The existing Amtrak station is the proposed location of the commuter rail station. As stated earlier in Section 3.6.11, this station has undergone substantial rehabilitation in recent years and now houses a restaurant and brew pub along with offices of the local Pennsylvania State Representative. The station also contains public restrooms, ADA elevator access to the platforms, and overhead canopies for the platforms which serve both tracks. There is adjacent parking available with a limited number of metered spots and the remaining on-site parking is either permit only or for the restaurant. However, nearby city-operated parking lots are

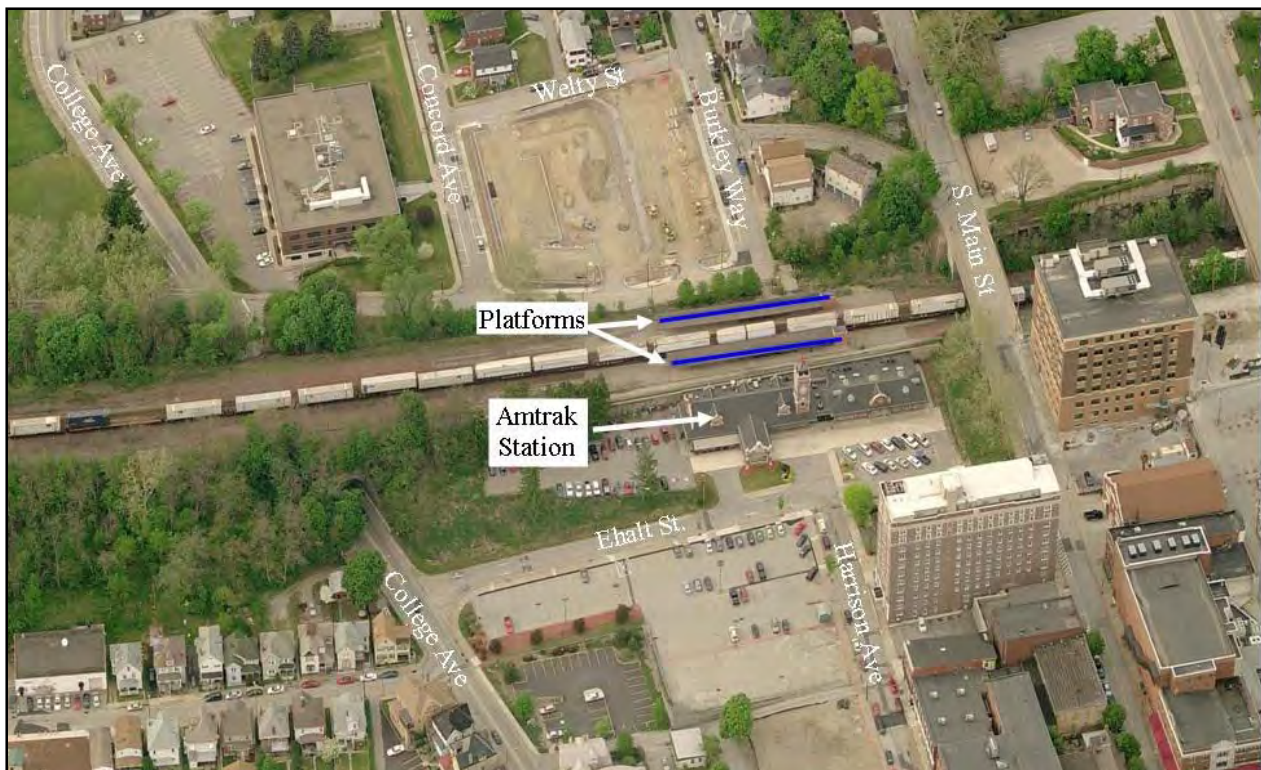


Figure 5-21: Greensburg Station

available, many of which offer long-term paid monthly parking plans. The station is less than two miles from US Route 30 and 8.1 miles from US Route 22. The pedestrian access route to the north side of the station is currently closed. (See **Figure 5-21.**)

5.5.2.4 Jeannette

The area surrounding the NS corridor through Jeannette is primarily residential and commercial in nature with limited industrial or former industrial sites as well. Two alternative sites for the station location have been identified in Jeannette. (See **Figure 5-22.**)



Figure 5-22: Potential Jeannette Station Locations

Jeannette 1. The first site is located at McGee Avenue between 2nd and 4th Streets. The site was the location of a former station; however, new platforms, improved access and parking are required before commuter rail can service the location. It may also

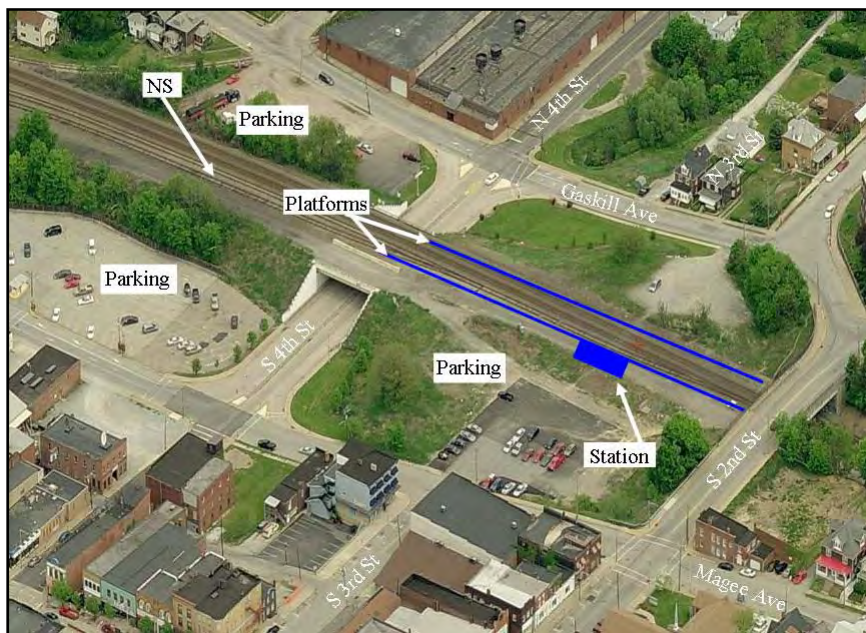


Figure 5-23: Jeannette 1

be necessary to construct a pedestrian overpass or underpass to provide convenient access to both NS tracks at this location. Because the proposed station would offer access on the south (Track 1) side of the railroad it would also be in good proximity to the downtown Jeannette commercial district, thus

supporting opportunities for Transit Oriented Development in the community (see Chapter 10). More than 250 parking spaces can be accommodated at the site principally on existing nearby lots. This location is approximately 1.7 miles from US Route 30 via Lowry Avenue and 4th Street and approximately 7.3 miles from US Route 22. (See **Figure 5-23.**)

Jeannette 2. The second station location option in Jeannette is on Clay Avenue Extension 2,300 ft. west of the first site. This site is adjacent to the railroad and would require the addition of platforms, improved vehicle access and parking. Approximately 400 commuter vehicles could park at a lot that would be constructed across Clay Avenue Extension from

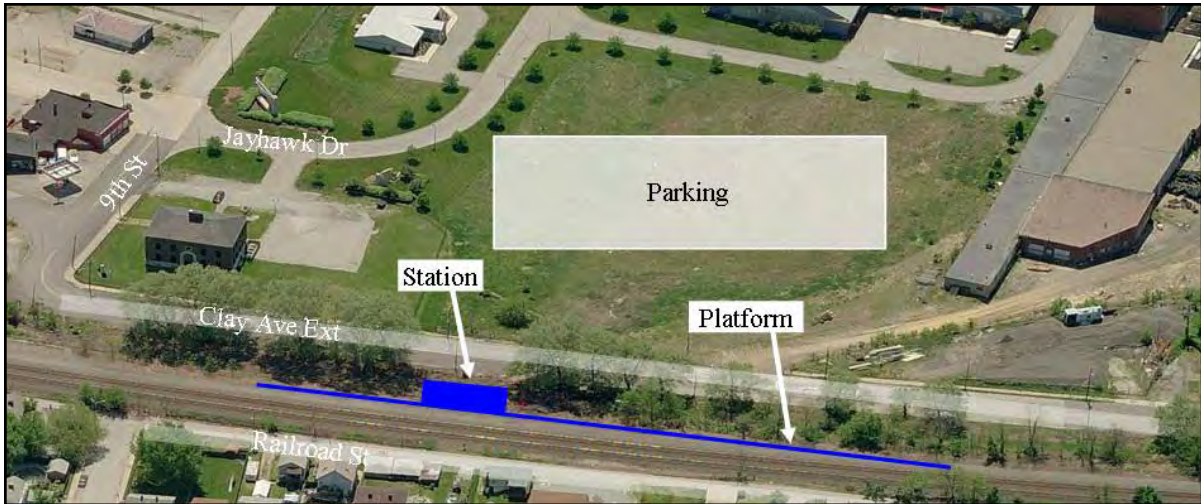


Figure 5-24: Jeannette 2

this location on a former industrial site. The parking lot portion of the site may require a moderate level of environmental cleanup. Because this site is not as centrally located in Jeannette and offers no other clear advantage, it is not recommended as the Jeannette station. (See **Figure 5-24.**)

5.5.2.5 Irwin

The NS line in the Irwin area runs parallel to US Route 30 with Irwin to the south and the Pennsylvania Turnpike (I-76) to the east. The surrounding area is primarily residential. Three options were examined for a potential commuter rail station location in or near Irwin. (See **Figure 5-25.**)



Figure 5-25: Potential Irwin Station Location

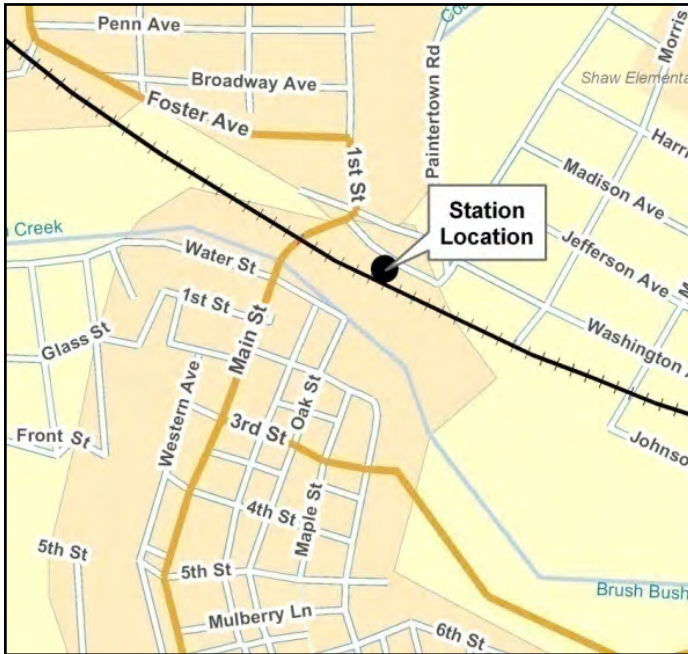


Figure 5-26: Irwin 1 Station Location

Irwin 1. The first option is located on Paintertown Road on the north side (Track 2) of the NS line and is less than a mile from US Route 30 but 9.1 miles from US Route 22 (see **Figures 5-26** and **5-27**). A location on the south side of the tracks would be difficult and not practicable to construct due to the presence of Bush Creek immediately adjacent to the tracks. The site, which is a vacant parcel, is near the former Main Street commuter rail platforms served by the Pennsylvania Railroad in the past but is also considerably below the



Figure 5-27: Irwin 1

railroad grade and would likely require elevators to access the platforms. This confined location would not have the ability to accommodate commuter parking and therefore would be a Kiss-n-Ride or walk-up option only. However, public parking lots operated by the Borough of Irwin are located approximately 1,000 to 1,500 feet from the station site in the downtown Irwin area via the Main Street underpass of the NS line.

Irwin 2. The second option for an Irwin station is located near Route 993 (Water Street) and Larimer, 1.7 miles west of the Irwin 1 site. (See **Figure 5-28.**) The site, which is partially occupied by a large



Figure 5-28: Irwin 2 Station Location



Figure 5-29: Irwin 2

garage, is 1.4 miles from US Route 30 and 7.4 miles from US Route 22. The most convenient route to and from US 30, however, utilizes Brownstown Road and traverses several residential neighborhoods. Above-grade station platforms would have to be constructed at this site due to the elevated NS right-of-way. This would require the use of elevators for ADA-compliant access. Approximately 100 parking spaces could be provided on an adjacent parcel but expansion of parking at this location in the future would be difficult due to surrounding residences. (See **Figure 5-29.**)



Figure 5-30: Irwin 3 Station Location

At this time, either the Irwin 1 or the Irwin 2 sites can be designated as the potential Irwin station location, although each has several constraints dealing with access routes and convenient and adequate parking. A final decision on a recommended site should be based on further design analysis of the sites, commuter routing to them from US Route 30 and community input.

Irwin 3. The third Irwin site is located on Route 993 (Trafford Road), 3.1 miles west of the Irwin 1 site. This potential station site consists of a narrow parcel of vacant land adjacent to the north (track 2) side of the NS line and the intersection of Route 993 with Ledger Road. One attribute of this site is that it is on a parcel of land that is at the same grade as the rail line, a rarity among the new station sites examined for the NS corridor. Of the three Irwin sites, Site 3 is the furthest from US Route 30 and would require access via Ledger Road, a narrow winding two-lane roadway, and over a wood deck bridge spanning the NS line. Substantial improvements to Ledger Road would most likely be required for it to become a meaningful commuter route. For these reasons, the Irwin 3 site is not recommended. (See **Figures 5-30** and **5-31.**)



Figure 5-31: Irwin 3

5.5.2.6 Trafford

The Borough of Trafford is the westernmost suburban community to be served on the NS line. Two station site alternatives were reviewed in the Trafford area, both with access to US Route 30 via Route 48. (See Figure 5-32.)

Trafford 1. This site, which is 2.9 miles from US Route 30 and 4.5 miles from US Route 22, is located on a portion of NS

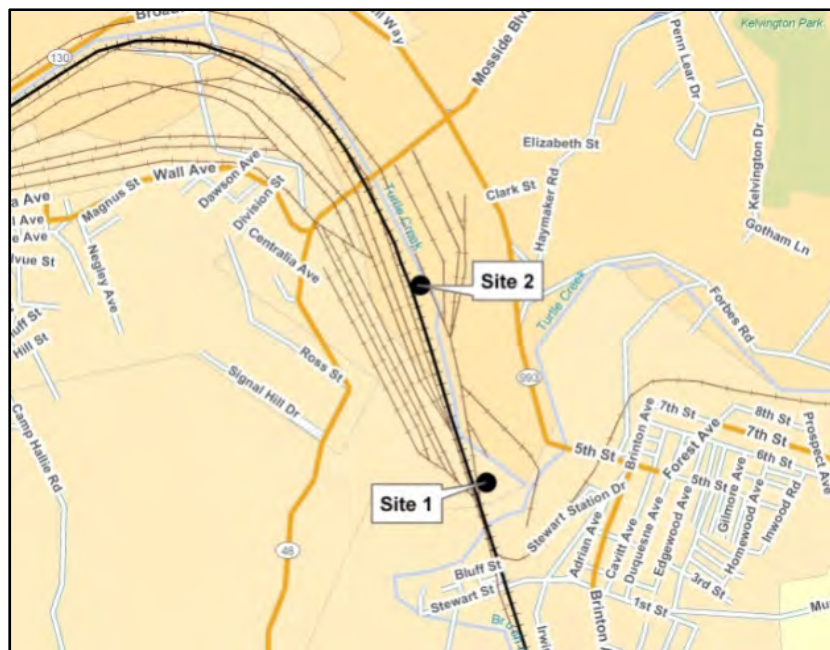
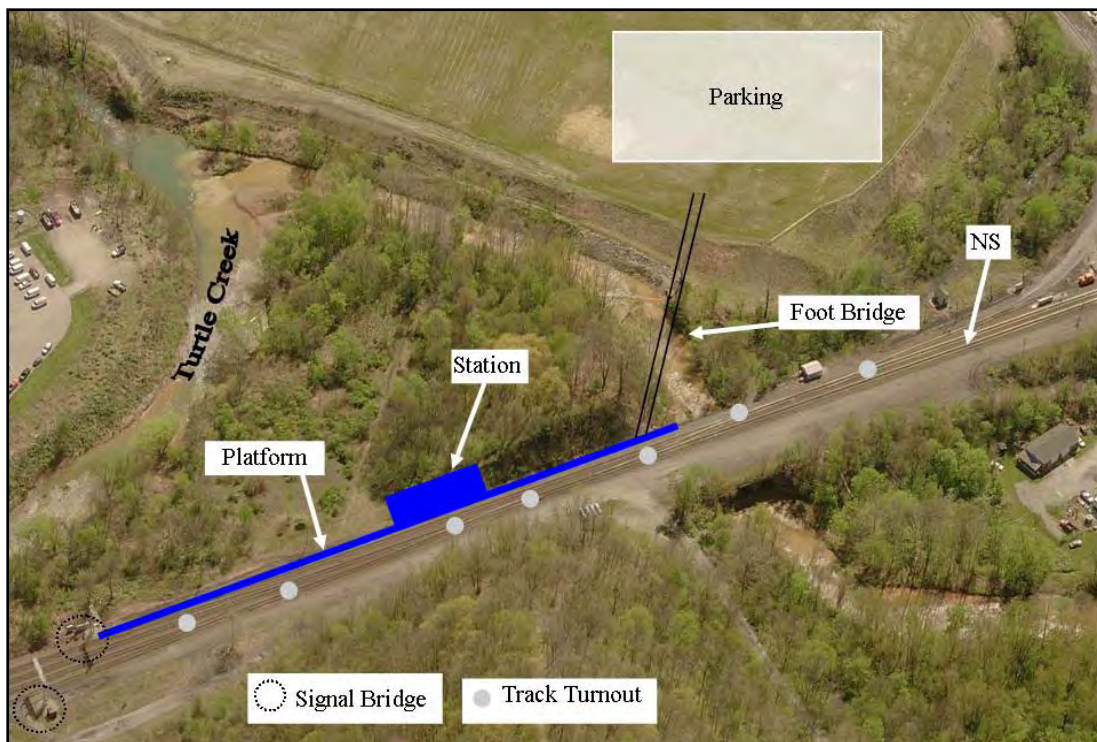


Figure 5-32: Potential Trafford Station Locations

tangent track just west of Trafford and would require a pedestrian bridge across Bush Creek for access. The platform location on the north (Track 2) side of the NS line would need to be situated so as not to interfere with a rail line connection of the Turtle Creek Industrial Railroad, an 11-mile shortline railroad, and the interlocking consisting of six turnouts and two signal bridges that connects tracks associated with access to the NS Pitcairn Yard. Because of this interlocking it would be very unlikely that a second passenger platform could be built on Track 1 at this location. (See **Figure 5-33.**)

Figure 5-33: Trafford 1



The parking lot that was examined for this site consists of a portion of a public-access soccer field on the west side of Trafford and could accommodate up to 250 vehicles if about one-third of the field were to be used. This lot is the only available flat parcel in proximity to the station site. If federal (FTA) monies were to be used to fund the commuter rail project this could prove to be a fatal flaw in that Section 4(f) of the U.S. Department of Transportation of 1966 prohibits the use of such funds for a project resulting in the taking of publicly-owned parkland unless there is not other “prudent and feasible” alternative. Given the physical and potential regulatory constraints associated with this site, it is not recommended for further study.

Trafford 2. Trafford 2 is 2.7 miles from U.S. Route 30 and 3.7 miles from U.S. Route 22. The site is located in a large vacant former rail yard that can be accessed off of Route 130, Broadway Boulevard. To access the station platforms on the NS line a pedestrian bridge would need to be constructed across Turtle Creek from the parking lot. An access drive to

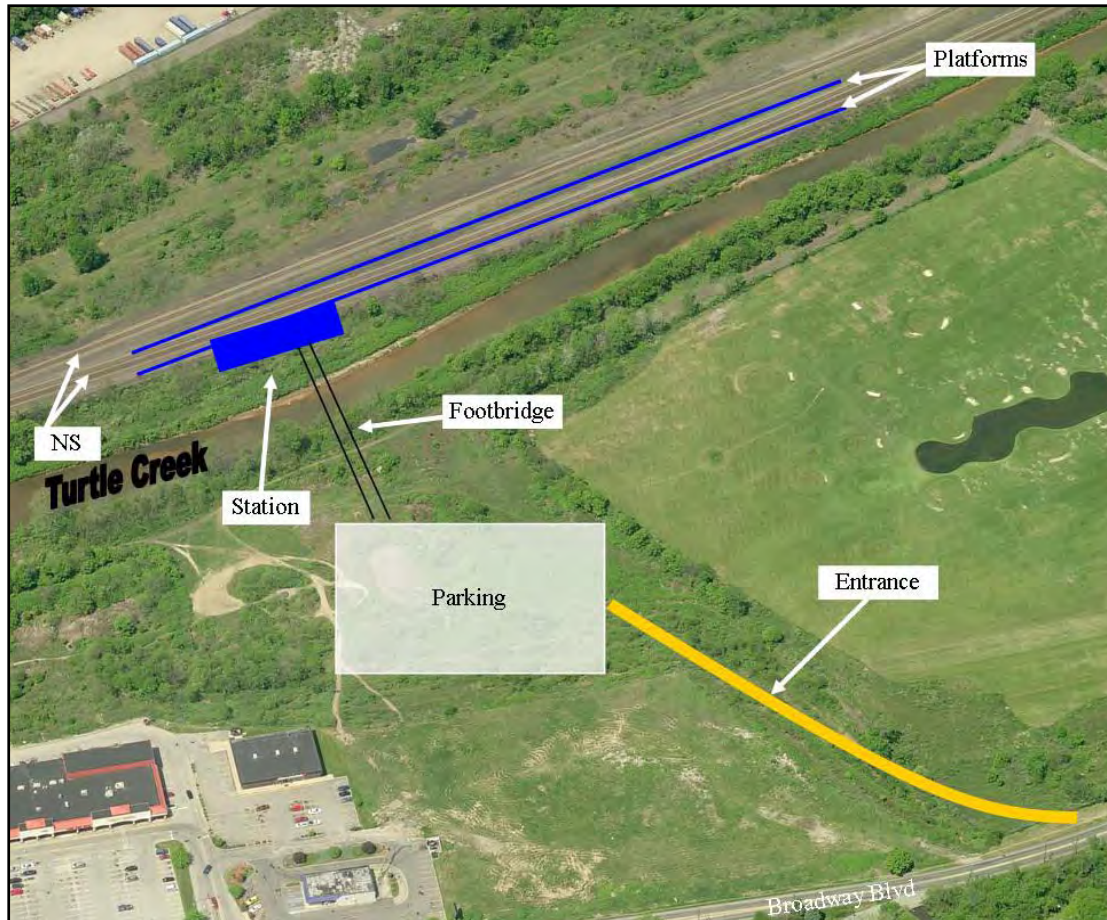


Figure 5-34: Trafford 2

the parking lot would also be required from Route 130. The passenger platforms at this station would be located on the NS mainline opposite the lead tracks to the Pitcairn Yard. The large open area that the parking lot could be located in provides space for an estimated 500 or more vehicles. (See **Figure 5-34.**) Some moderate level of environmental cleanup of the former rail yard may be required. Given the reasonable accessibility to the Trafford 2 site from both US Routes 30 and 22 as well as Route 130 and the potential capacity of the parking lot, this site is recommended by the project team as the Trafford station location.

5.6 Combined AVR/NS Station Options

Two commuter destination stations would be used in implementation of either or both the AVR and NS commuter rail alternatives. These stations are in the City of Pittsburgh and consist of (1) a station stop in Shadyside adjacent to the MLK East Busway station at S. Negley Avenue and (2) Penn Station in downtown Pittsburgh. Each station is briefly described below.

5.6.1 Shadyside

The Steering Committee recognized the potential advantage to a commuter rail station in the vicinity of Shadyside that could serve the complex of commuter destinations in that area of the city via the connecting transit network. Major employers in the Shadyside-Oakland area include the University of Pittsburgh, Carnegie Mellon University and the University of Pittsburgh Medical Center. The AVR/NS station on the Norfolk Southern Pittsburgh Line would be located in the railroad right-of-way immediately adjacent to the Port Authority of Allegheny County's East Busway Station at S. Negley Avenue. (See **Figure 5-35.**) Because of the narrow right-of-way at this location the rail station platform would be limited to the south (Track 1) side of the rail line and would have an end-to-end connection to the Busway station platform. Commuters using this station would have convenient access to all transit buses making stops at the Busway Station. No parking would be provided at this commuter rail station. (See **Figure 5-36.**)



Figure 5-35: Potential Shadyside Station Location



Figure 5-36: Shadyside

5.6.2 Penn Station

Penn Station would be the terminus for the AVR and/or NS commuter rail lines utilizing the NS Pittsburgh Line to downtown Pittsburgh. The station has long been an Amtrak intercity train station and previously, under the Pennsylvania Railroad, had also served as a commuter rail station.

The station is characterized by a complex of tracks passing through or terminating at the facility (see **Figure 5-37**). The two NS mainline tracks pass through the station with Track 2 on the north side and Track 1 on the south side. Several sidings are also located in the station complex, one of which is used for overnight storage of the Amtrak *Pennsylvanian* which connects Pittsburgh with Harrisburg, Philadelphia, and New York City. The other existing sidings have capacity for the mid-day storage of at least four commuter trainsets consisting of an engine and four passenger cars. Sidings to store additional trainsets would need to be constructed if the station is to serve as a terminus for both AVR and NS commuter rail services requiring storage of up to eight commuter trains. A field review of the station indicates that adequate space should exist for additional storage sidings

although the columns supporting the overhead I-579 highway bridge structure may limit the placement and length of new sidings and platforms.

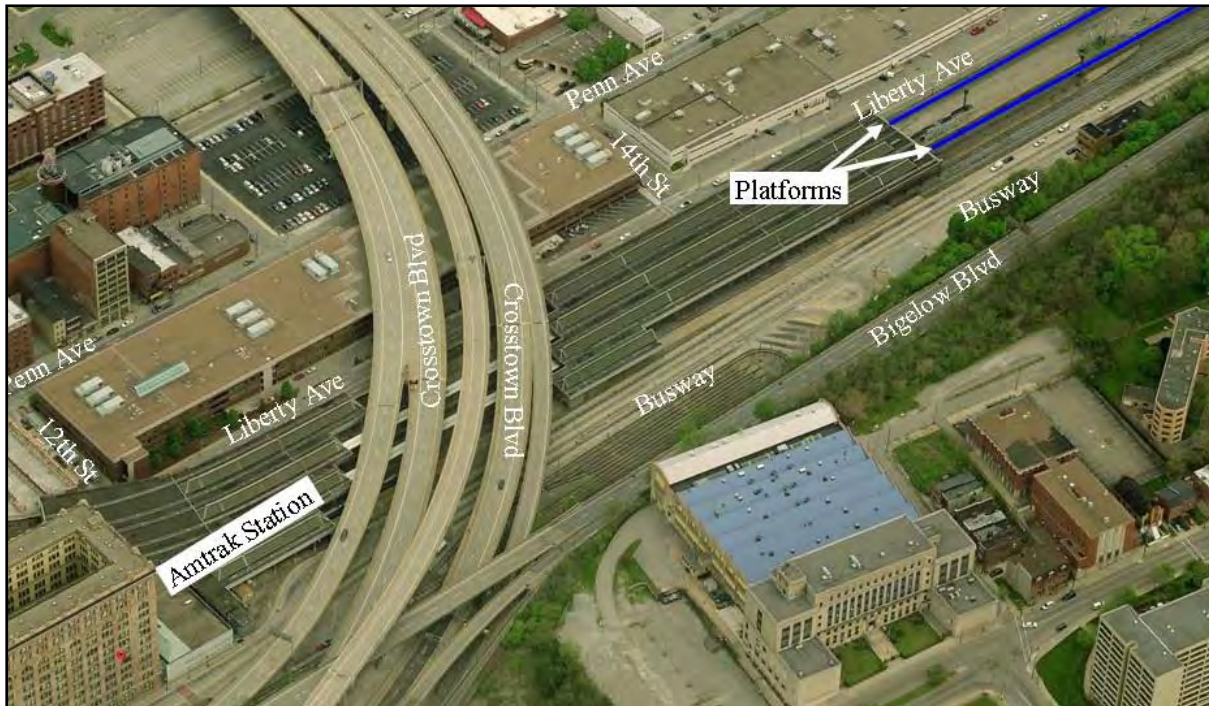


Figure 5-37: Penn Station

Passenger platforms are presently located along the NS Track 1 mainline (but not Track 2) and along the sidings in that area under the train shed. An Amtrak waiting room is located on the lower level and there is convenient at-grade pedestrian access to the East Busway station adjacent to Penn Station. No additional parking would be constructed at Penn Station. A modest level of environmental cleanup may be required for the construction of new track and platforms.

6. RIDERSHIP ESTIMATES



6 Ridership Estimates

A series of alternatives were modeled to provide understanding of routing and station locations and how they impact ridership on the proposed commuter rail services. This chapter summarizes the commuter rail ridership forecasts for the proposed commuter rail services to Pittsburgh on the Allegheny Valley Railroad and Norfolk Southern corridors, discusses some of the station and routing options, illustrates how the results compare to other startup systems in recent years, and provides a discussion of potential risks or uncertainties in the forecasts as they might impact the precision of the forecasts.

6.1 Forecast Methodology

Ridership forecasts were developed by the Southwestern Pennsylvania Commission (SPC), the designated Metropolitan Planning Organization (MPO) for the region, using the regional travel demand model tool set maintained by SPC. This model is a set of complex mathematical models which forecast the daily travel patterns for all auto and transit modes throughout the SPC Modeling Region, which includes all of Allegheny, Westmoreland, and eight other counties in the region.

This model set has been used for FTA New Starts projects (specifically the North Shore Connector) in recent years and was considered acceptable by FTA. However, modifications to FTA requirements since that time would necessitate model enhancements if this or any other project were to be advanced under the FTA New Starts/Small Starts program. The SPC model is a variation on a traditional “four-step” travel demand model used throughout the U.S. and worldwide to evaluate proposed transportation system improvements. It uses forecasts of population and employment, together with a schematic representation of the transportation system (highway and transit) to estimate traffic levels on regional highways and ridership on transit lines. It is calibrated using the most recent census information, together with traffic counts, ridership counts, and other periodic surveys of trip-makers.

The SPC model is scripted using the CUBE/TP+ model software, as well as custom programs written in FORTRAN and C. It divides the region into 1,068 individual traffic analysis zones, approximately 120 of which comprise Westmoreland County. All of the major highway facilities in the study corridor, such as the Pennsylvania Turnpike, Penn Lincoln Parkway West, US22 and US30, are represented in the model; all of the regional transit services are represented as well, including WCTA fixed-route services (paratransit services which do not operate on a fixed route or schedule were not included).

The specific alternatives developed for this study were developed by the project team and given to SPC for coding and running of the model. SPC staff coded the specific parameters of each alternative, then ran the model for each alternative, and provided results for analysis.

6.2 Forecasted Alternatives and Assumptions

After an initial round of forecasts were presented to the project Steering Committee on October 17, 2008, the Committee expressed a strong desire to obtain a more comprehensive set of forecasts specifically designed to evaluate a couple of potential options (“either/or/both” type questions) of station location and routing. A series of detailed alternatives specifications was developed and modeled by SPC for this purpose; a brief summary of the relevant model runs is described here. (One additional run was developed in January 2009 to evaluate the potential for a station at Barking Road on the AVR corridor.)

A series of forecast runs were performed to evaluate service in each of the two corridors separately; no “combined” or “through” service was explicitly forecast.

In both corridors, a “baseline-style” run (one for each corridor) was performed using only a modified version of the existing bus service with no rail service, to provide a point of comparison; this run was developed to serve (if necessary) as a ready Baseline alternative for FTA New Starts. The build alternatives, by contrast, featured reduced bus services in the U.S. Route 30 corridor (NS alternatives) and the Allegheny Valley (AVR alternatives).

In the Norfolk Southern corridor, all build alternatives were tested assuming service in both directions, with 30 minute peak-period headway and 90-minute midday headway. Three different build alternatives varied only in the station location configuration. Stations common to all alternatives included:

- Latrobe
- Greensburg
- Jeannette
- Shadyside/ S. Negley Avenue
- Pittsburgh Penn Station

The different alternatives allowed the team to comparatively evaluate the following station locations:

- Trafford (Turtle Creek area)
- Irwin
- Trafford and Irwin together

In the Allegheny Valley Corridor, the build alternatives were tested assuming service in both directions, with 30 minute peak-period headway and 90-minute midday headway. Three different build alternatives varied in the station location and the route into Pittsburgh.

Stations common to all alternatives included:

- Arnold
- New Kensington
- Oakmont (Verona/Oakmont 3)

The different alternatives allowed the team to comparatively evaluate the following station locations (either/or):

- South Verona (near the Giant Eagle), or
- Nadine Road

In addition, these two station location options were tested in combination (4 alternatives total) with the following alternative routings into Pittsburgh:

- Continue on AVR trackage into the Strip District, with stops at 62nd, 40th, and 16th Streets (terminus), or
- Use the Brilliant Branch to CP-Home, NS to Penn Station, with stops at Shadyside/S. Negley Avenue and Penn Station

One last alternative was developed subsequently to evaluate the potential for a station at Barking Road on the AVR corridor. These combinations of stations and alignments provide the best insight into the ridership patterns likely to respond to the service.

6.3 Forecast Results

This section presents the commuter rail ridership forecasts from the different alternatives, adjusted to account for nonwork trips occurring in the peak (see Section 6.6, Uncertainties and Risks, below). The tables below show a summary of the ridership results for each alternative by direction, and time period, for the projected opening year (2012) and the region's long-range forecasting year (2035). A more detailed ridership review was presented in the February 2009 Technical Memorandum: Summary and Analysis of Revised Ridership Forecast (Round 3). It should be noted that these trips are aligned by primary direction of travel and represent all day travel as if it were all occurring from the home end of the trip. Thus, a trip listed as "commute" direction could either be a morning inbounds trip or an afternoon outbound trip; both are counted as "commute" direction trips since they represent trips from the primary commute market. Similarly, a trip reverse-commuting (e.g. Pittsburgh to Greensburg in the morning) might represent either a morning-outbound trip or an evening-inbound trip; both are counted as "reverse-commute direction trips.

6.3.1 AVR Corridor Forecast

Several interesting conclusions can be drawn from these results. In the AVR corridor, there is clearly a strong preference for the Brilliant Branch/Penn Station alignment (AV-1 and AV-3) versus their counterparts using the AVR into the Strip District (AV-2 and AV-4, respectively). This finding is not surprising, and is consistent with trends seen in the earlier studies; the terminus in the Strip District is simply too far away from, and not well connected to, the heart of Downtown. While Penn Station is only on the edge of the downtown area, its location at the edge, together with its connectivity to the busway buses for easy distribution, makes it a strong preference. In addition, the potential to access Shadyside at South Negley Avenue (for easy access to Oakland) adds an additional positive component not possible with the AVR alignment. The 40th and 62nd Street Stations on the other hand, produce little in the way of marginal ridership to justify their cost or operation.

Even though a shuttle bus was coded to meet each train at 16th Street (making no assumption in these forecasts about crowding or having enough buses to meet the train ridership), which would add to the cost of this alternative vis-a-vis the Penn Station alternatives, ridership was still markedly lower. Penn Station is that much closer on the edge of the golden triangle, within easy walking distance from a notable portion of downtown (and does not require crossing the wide railroad viaduct). Moreover, for those locations (such as Gateway Center or the North Shore) which are too far to walk, Penn Station provides easy connections to frequent bus service off the MLK/East Busway for distribution all throughout downtown and environs. Furthermore, the Brilliant Branch/Penn Station routing allows for an interchange station in Shadyside/S. Negley Avenue, to allow access to this important area and also easy busway-route access to Oakland; the AVR Strip District routing does not provide this, although a connection bus could potentially be implemented at 65th or 40th Street for this purpose.

It should be noted that there is considerable fringe-parking activity occurring in the near Strip District today; in fact the 16th Street terminus of the AVR corridor would be roughly at the farthest (from the Golden Triangle) area of the existing fringe parking lot. More insight is needed into why people are willing to drive, park in the Strip District fringe areas, and walk (or take a shuttle bus) into downtown when they are less inclined to do so when disembarking a commuter rail train. Perhaps more analysis of the geographic distribution of the fringe parking patrons is necessary to more completely evaluate the issue.

The other major alternative tested in the AVR corridor is the question of a station location to serve as a park-and-ride for the Verona and Penn Hills areas. Alternatives AV-1 (Brilliant Branch to Penn Station) and AV-2 (AVR to Strip District) tested a station location in the south end of Verona (Verona-Oakmont 3), in the vicinity of the River Town (Giant Eagle) Shopping Center; and AV-3 (Brilliant Branch to Penn Station) and AV-4 (AVR to Strip District) tested a station location in the vicinity of Nadine Road. All alternatives featured a nearby station stop at the north end of Verona (Verona/Oakmont 1, at the south end of Oakmont). The model results show a strong preference (approximately 300 additional boardings) for

**Figure 6-1: Summary of Forecast Commuter Rail Ridership (Opening Year 2012)
"Round 3" Forecast Alternatives**

Allegheny Valley Corridor Alternatives			
AV-1	Peak	Offpeak	Total
Commuter	1,752	116	1,867
Reverse	275	195	470
Total	2,027	310	2,337
<i>(S. Verona, Brilliant Branch/NS to Penn Station)</i>			
AV-2	Peak	Offpeak	Total
Commuter	771	67	837
Reverse	134	67	200
Total	904	133	1,037
<i>(S. Verona, AVRR to Strip District)</i>			
AV-3	Peak	Offpeak	Total
Commuter	1,895	180	2,075
Reverse	364	250	614
Total	2,259	430	2,689
<i>(Nadine Rd., Brilliant Branch/NS to Penn Station)</i>			
AV-4	Peak	Offpeak	Total
Commuter	926	165	1,090
Reverse	166	88	253
Total	1,091	252	1,343
<i>(Nadine Rd., AVRR to Strip District)</i>			
AV-5	Peak	Offpeak	Total
Commuter	1,839	184	2,023
Reverse	358	267	625
Total	2,197	451	2,648
<i>(Nadine Rd., Brilliant Branch/NS to Penn Station, Barking Rd.)</i>			
<i>Source: HDR Adjustments to SPC Analysis, 2/2009</i>			

Norfolk Southern Corridor Alternatives			
NS-1	Peak	Offpeak	Total
Commuter	656	275	931
Reverse	248	188	436
Total	904	463	1,367
<i>(Trafford)</i>			
NS-2	Peak	Offpeak	Total
Commuter	507	232	739
Reverse	164	349	513
Total	671	581	1,252
<i>(Irwin)</i>			
NS-3	Peak	Offpeak	Total
Commuter	704	328	1,032
Reverse	271	192	463
Total	976	519	1,495
<i>(Trafford + Irwin)</i>			
<i>Source: HDR Adjustments to SPC Analysis, 12/2008</i>			

**Figure 6-2: Summary of Forecast Commuter Rail Ridership (Long Term Year 2035)
"Round 3" Forecast Alternatives**

Allegheny Valley Corridor Alternatives

AV-1	Peak	Offpeak	Total
Commuter	2,260	81	2,340
Reverse	262	157	419
Total	2,522	237	2,759

(S. Verona, Brilliant Branch/NS to Penn Station)

AV-2	Peak	Offpeak	Total
Commuter	1,108	69	1,177
Reverse	134	74	207
Total	1,242	142	1,384

(S. Verona, AVRR to Strip District)

AV-3	Peak	Offpeak	Total
Commuter	2,606	207	2,812
Reverse	380	288	668
Total	2,985	495	3,480

(Nadine Rd., Brilliant Branch/NS to Penn Station)

AV-4	Peak	Offpeak	Total
Commuter	1,336	186	1,522
Reverse	178	98	276
Total	1,514	284	1,798

(Nadine Rd., AVRR to Strip District)

AV-5	Peak	Offpeak	Total
Commuter	2,486	214	2,700
Reverse	365	297	662
Total	2,851	511	3,362

(Nadine Rd., Brilliant Branch/NS to Penn Station, Barking Rd.)

Source: HDR Adjustments to SPC Analysis, 2/2009

Norfolk Southern Corridor Alternatives

NS-1	Peak	Offpeak	Total
Commuter	753	294	1,047
Reverse	280	203	483
Total	1,033	497	1,530

(Trafford)

NS-2	Peak	Offpeak	Total
Commuter	594	257	851
Reverse	323	264	587
Total	917	521	1,438

(Irwin)

NS-3	Peak	Offpeak	Total
Commuter	808	354	1,161
Reverse	322	211	533
Total	1,130	564	1,694

(Trafford + Irwin)

Source: HDR Adjustments to SPC Analysis, 12/2008

the Nadine Road location. This is reasonable as this location further away from the Oakmont station provides a little more uniform station spacing, and significantly provides better access from both Sandy Creek and Nadine Roads from the Penn Hills areas to the line. The South Verona location would furthermore require a “backtrack” move up Allegheny River Boulevard for patrons from these areas.

A final alternative was subsequently developed to evaluate the potential of a future station on the old industrial site near Barking Road on the AVR corridor. This alternative (designated “AV-5”) added this station to the basic AV-3 (Brilliant Branch to Penn Station, Nadine Road) alternative. Patrons in the Plum Township area were allowed to Park and Ride to Barking Road but were still allowed to use other stations (Verona/Oakmont, New Kensington, etc.) Overwhelmingly, the forecast riders prefer to select other stations (chiefly Verona/Oakmont) which yield them a shorter trip in any case. The difference in ridership is minimal given the extra station which itself is a brownfield site.

6.3.2 NS Corridor Forecast

In the Norfolk Southern corridor alignments, the variations tested included a Trafford (Turtle Creek) station, an Irwin station, and both Trafford and Irwin together. These stations were assumed along with significant corresponding reduction in express bus service from Norwin Town Square (although not all bus service is discontinued). The results indicated that there is a strong market for several hundred boardings from the Trafford area (especially when competing bus service is correspondingly reduced), and a lesser market from the Irwin area (approximately 100 boardings). The Irwin market appears to operate very much independently of the Trafford market, since the gains as a result of adding Irwin are about the same whether Trafford is included or not. This suggests that (a) Irwin is not a good substitute station for Trafford, since very few patrons will backtrack to Irwin to board the train, (b) a station in the vicinity of Trafford really is necessary to make the line successful, and (c) a station in Irwin is helpful but may not generate enough trips to justify the cost and locational challenges there.

6.4 Common Ridership Characteristics

Other interesting characteristics were revealed across all alternatives (but not specifically related to any one alternative). Each of these is discussed below.

6.4.1 Reverse Commute Trip Patterns

The two-way nature of the service as tested encourages a number of reverse-commute trips, particularly to Greensburg, and the SPC ridership forecasting model used in this analysis is sensitive to this. While this finding is not necessarily surprising (given its status as the county seat) the magnitude of the demand seems a bit high. It also presents an operational challenge (especially on the NS corridor) as it will be more difficult and costly to secure operating slots from the host railroad in both directions simultaneously. Care will

have to be given in implementation to strike a balance between operating reality (on NS) and serving this reverse commute market (perhaps with a more limited train schedule supplemented by bus service). Similar reverse commute tendencies are shown in the AVR corridor as well. As noted elsewhere in this study, NS has not reviewed or agreed to the proposed commuter operations on their railroad at this time.

6.4.2 Shadyside Station Preference

The model also shows a strong preference in both corridors for the station in Shadyside to allow transfers to the East Busway. While there are may be operational and design challenges associated with this connection, it appears to add significant value in terms of regional connectivity and ridership (in fact many riders in the model choose to exit commuter trains at this point to switch to a frequent East Busway bus for their ultimate destination downtown, rather than riding until Penn Station and transferring; such a condition may be over-stated). While the physical challenges of constructing this station in the narrow NS+East Busway corridor may be challenging, and may necessitate implementation at a later time, it appears that there is benefit to providing this connection (perhaps in concert with some joint-development activities in Shadyside).

6.4.3 Close-In AVR Corridor Stations

Of less importance appears to be the provision of extra “close-in” stations on the AVR-Strip District alignment. Station stops at 62nd Street and 40th Street show little usage and the physical configuration of the line at these locations makes bus interface or parking challenging (See Chapter 5 for descriptions of these stations). Despite both locations being adjacent to bridges, the stations do not attract much ridership from the north side of the Allegheny River; this seems reasonable since the line-haul time and distance over the AVR is not large for these trips. If one is going to drive all the way from one’s origin on the other side of the river to a station at 62nd or 40th, one might just as easily drive all the way downtown (perhaps even parking in the Strip District fringe parking areas).

6.5 Comparison of Opening Year Ridership for Other Systems

One useful way of understanding the scope of the ridership forecasts is to examine recent experience with similar metropolitan commuter rail systems at their startup. While none of these systems is exactly like the NS or AVR corridors (nor are their regions exactly like Pittsburgh or Westmoreland County), nonetheless some useful information can be gleaned. Three recent successful startups which are of interest are Virginia Railway Express (VRE) which started in 1992, Connecticut’s Shore Line East, which started in 1990, and the New Mexico RailRunner in Albuquerque, which commenced operations in 2006.

6.5.1 Virginia Railway Express (1992)

The proposed AVR/NS corridors have many similarities to the VRE system which started service in 1992. Two lines provide service from Fredericksburg (on CSX trackage) and

Manassas (on NS trackage) converging at Alexandria to serve Washington, DC and inner suburban activity centers (Crystal City, Alexandria). Both lines have become very successful, beneficiaries of the rapid suburban growth (and increasingly severe highway congestion) in the Washington region in the last seventeen years. But VRE faced numerous challenges in development and significant skepticism in the region prior to its beginning. Initially it began with directional service (inbound only in the morning, outbound in the afternoon) in peak hours only, with a total of 16 trains per day (4 inbound and 4 outbound trains on each line). In addition, an arrangement was made with Amtrak to allow multi-ride ticket users to use Amtrak trains on a limited basis. The following table shows the historical average daily ridership (bi-directional) for both Fredericksburg and Manassas lines in 1992/3 and today.

Figure 6-3: Virginia Railway Express (VRE) Average Daily Ridership Historical Context

	Fredericksburg	Manassas	Combined
1992/93	3,220	2,506	5,726
2007/08	7,979	6,683	14,662

Source: VRE

Although the absolute numbers for the two lines were larger in 1992 than the forecasts for the AVR and NS corridors, it should be noted that the Washington, DC downtown core is larger than Pittsburgh’s, serves two different employment cores with two downtown stations (L’Enfant Plaza and Union Station), and that the secondary destination stations in Alexandria and Crystal City in Virginia provide direct access to significant employment centers. In addition, Alexandria, L’Enfant Plaza, and Union Station provide good connections to the extensive Metro heavy rail transit system. VRE reports that recent ridership figures from early 2009 are exceeding 15,600 per day.

VRE service is limited to weekdays only. There is limited reverse-commute service, in combination with Amtrak scheduled services, and a mid-day return service (VRE or Amtrak) on each line.

6.5.2 Shore Line East (1990)

The Shore Line East commuter service is the Connecticut Department of Transportation’s commuter service along the Connecticut coast between New Haven and Old Saybrook, and was initiated in 1990, initially as a construction mitigation measure on parallel I-95. Commuter service west of New Haven (to New York’s Grand Central Terminal) is provided by Metro-North and never experienced a break in service. In addition, the line is owned by Amtrak, which operates Northeast Corridor Regional and Acela Express service, albeit only with stops in New Haven, Old Saybrook (Regional only) and New London.

A key component of Shore Line East service is connectivity to the Metro-North service which provides connecting trains not only to New York, but the coastal employment centers of southwest Connecticut such as Stamford, Norwalk, and Bridgeport. Startup service levels

included four trains per day westbound (toward New Haven/New York) in the mornings, with timings to meet Metro-North trains at New Haven. Since that time, service has been extended both east (one train per day begins/ends at New London) and west (three through trains per day each way to Bridgeport and Stamford). Most recently, weekend service has been added, first during the 2007 holiday season and permanently since summer 2008. Limited reverse commute and mid-day services are also operated on the Shore Line East.

Figure 6-4: Shore Line East Average Daily Historical Ridership

Shore Line East	
1990	833
1991	1,002
2001	1,184

Source: TrainWeb

Ridership has grown slowly, and has suffered some ups and downs over the years; some of this can be attributed to Amtrak’s electrification and reconstruction efforts on this line, and the reconstruction of portions of the parallel Connecticut Turnpike/I-95 during this time. Nevertheless, the ridership levels are in line with what the Round 3 forecasts in this study are showing, and suggest that a line with this level of ridership can be successful. Connecticut DOT is presently in the planning stages for providing a similar service in the New Haven-Hartford-Springfield corridor to complement the Shore Line East, and converting Shore Line East equipment to take advantage of the electrification of the line.

6.5.3 New Mexico RailRunner Express (2006)

This new commuter rail line provides service in the north-south corridor (roughly parallel to I-25) into Albuquerque, New Mexico, from southern suburbs (Belen and Los Lunas) and points north (Bernalillo). An extension northward to Santa Fe is in development. The line was developed entirely as a state-funded project, and was implemented quickly (2 years from initial concept to service), although the rapid implementation did necessitate stations coming on-line incrementally. In order to build interest in a region with no significant history of commuter rail (and because only a few stations were operational at the official July 2006 opening) fares were not charged in the first month. After fare collection began, the Bernalillo to Albuquerque service (approximately 17 miles) ridership was reported as “around 1,000”. After the stations at Belen and Los Lunas opened, and fares began being charged, ridership climbed to approximately 2,000 per day on a consistent basis. Service is provided six days per week, with no service on Sunday.

6.5.4 Comparison of Ridership to Existing Bus Service

The best checkpoint for potential commuter ridership patronage, in the Norfolk Southern Corridor especially, is to examine how the forecast ridership compares to today’s ridership on WCTA’s express bus services. Ridership on these express routes has been growing steadily in recent years, and is in many measures constrained by the lack of transit vehicle

availability. According to the most recent ridership statistics reported by WCTA, the average daily ridership on the three Pittsburgh express routes (1F, 2F, 3F), which serve most of the same areas as the proposed commuter rail line, with some overlap, is over 600 one-way trips per day (156,000 annual trips as reported divided by an estimated annualization factor of 253 operation days per year). This compares quite well (conservatively, in fact) with the 650-700 commuter-direction peak trips indicated in alternatives NS-1, NS-2, and NS-3.

6.6 Risks and Uncertainties

Any forecast inherently has uncertainties and risks built into the results, since it is based on a mathematical model representation of real behavior, and on input data and assumptions that themselves have uncertainty associated with them. Understanding and mitigating these risks is the key to drawing the appropriate conclusions from the forecasts. This section presents some of the likely issues and areas of uncertainty with the SPC models, input data, and assumptions, and some thoughts about how these might be expected to impact the conclusions to be derived from the forecasts.

6.6.1 Model (Systemic) Issues

The basic travel demand model set maintained by SPC is a complex set of mathematical models used for a broad range of planning tasks, including long-range transportation planning, air quality conformity analysis, highway planning and development, land use planning, and transit plan and project development throughout the Southwestern Pennsylvania region.

Because of the wide variety of tasks to which the model is applied, many simplifications are necessary; this is not unique to SPC or the Pittsburgh region, but is a necessary characteristic of all such models. Models seek to evaluate trip patterns and trip-making decisions for the universe of travelers in the region, and seeks to simplify analysis by classifying trips into different groups in which each trip within the group can be expected to behave in a similar manner (as evidenced by years of significant research) with respect to key inputs such as time, cost, and convenience.

One such classification is trip purpose; travelers making their regular commute-trips to work can be expected to have different sensitivities to time and cost than the same person making a shopping trip, (because workers generally have to arrive by a certain time, work trips tend to be more sensitive to time than non-work trips). Another classification is the socioeconomic level of the traveler (as applied in Pittsburgh, the number of autos available in the household is used to represent this); a traveler with a high household income is likely more willing to pay to save time than one of a lower income level; moreover, it stands to reason that a traveler from a household where numerous vehicles are available for their use will have a different propensity to use transit than a household with only one or zero cars available.

6.6.2 Time Period Simplification

The SPC travel demand model has one simplification that is material to the evaluation of potential commuter rail service in these (or any) corridors. The model is calibrated to match to a reasonable degree traffic levels at key points and transit ridership on key lines and at key nodes. Like many models nationwide, the model is set up to assume that work trips (known as Home-Based-Work or HBW in the model) occur in the peak travel hours (AM and PM peak periods) and other, nonwork trip purposes (known as Home-based Other and Non-Home-Based trips in the model) occur in the offpeak (midday) period. Significantly, the work trips “see” the transportation network as it appears in the peak period (with attendant highway congestion, and peak-level transit service), and the nonwork trips “see” the network as it appears in the offpeak (midday) period (lesser highway congestion, possibly significantly reduced transit service levels). This is typically an acceptable simplification for regional transit system planning, transit planning in the urban core (where service tends to remain fairly constant during the day), or in markets which are overwhelmingly work-commute only (i.e. where there are little if any nonwork trips). If the work trips occur in significant numbers outside the peak hours (such as can happen in areas with a lot of factory or hospital shift work), the model could over-estimate transit usage. Similarly, if a large enough percentage of the nonwork trips (shopping, recreational, “personal business” and the like, along with work trips not starting from home such as sales calls, etc.) in fact occur in the peak periods, the model could under-estimate the ridership.

In the case of the NS and AVR commuter rail corridors, the majority of the work trips which are the target market (downtown Pittsburgh office workers, and other workers such as those in Greensburg or Oakland) probably do occur during the traditional peak hours. But it is more difficult to assess how many nonwork trips occur in the peak hours (and should therefore be able to experience the peak level of service), short of collecting a significant amount of survey data (which might be required if this project were to progress as an FTA New Start). Moreover, it would be a significant model development effort to implement true time-of-day stratification in the model (and would still need to be based on some collected trip data). In order to mitigate this uncertainty somewhat, a simpler post-processing adjustment of the SPC modeled results was developed to account for some portion of the nonwork trips which do in fact occur in the peak period. Data shown in Figures 6-1 and 6-1 (along with those presented in the February 2009 Technical Memorandum: Summary and Analysis of Revised Ridership Forecast (Round 3)) display these “adjusted” results, which provide for some accounting of this market while still being conservative in nature.

6.6.3 Land Use Inputs/Trip Distribution Issues

The earlier generation of the SPC forecasting procedures, which were used to generate the forecasts for the 2003 Eastern Corridor Transit Study, relied on a different set of socioeconomic zonal inputs to generate their long-range forecasts (at the time, 2025 was the long-range forecast year), using what was known regionally as the “Cycle 6” set of

regionally adopted land-use forecasts of population and employment by zone. The current set of forecasts (for both the anticipated opening year of 2012 and the new long-range forecast year of 2035) are based on what is known as the “Cycle 8” set of regionally adopted land-use forecasts. These forecasts have been reviewed by local regional entities and approved by the MPO (SPC) board for use in planning activities in the region.

Several significant differences between the long-range land-use forecast exist between Cycle 6 and Cycle 8 which have relevance here. First, the Cycle 6 forecasts were based on 1990s demographic information and trends, and were accordingly aggressive and optimistic as concerned growth in employment in the region, as well as population. The Cycle 8 forecasts were by contrast not as aggressive, particularly in the outer counties. **Figure 6-5** and **Figure 6-6** on the next pages show the difference between Cycle 6 and Cycle 8 forecasts for the 25-year horizon (2025 in Cycle 6, 2035 in Cycle 8) for population and employment, respectively. In these maps, areas which experienced a significant positive change (from one forecast to another) are a shade of green, areas which experienced a significant negative change are shaded in varying shades of red, and areas with little or no difference are shown uncolored. It is important to note that these maps do not show growth in population/employment from the present to the forecast year; rather it compares the growth (from the present to the forecast year) in one set of forecasts to another.

As can be seen in these maps, there is a significant change in travel patterns in the region (as compared to forecasts generated by Cycle 6) favoring population in closer-in areas in Allegheny County—to the detriment of Westmoreland County. This would tend to favor a project with more of it in Allegheny County such as the AVR Corridor, while at the same time decreasing the interest of the primarily Westmoreland-oriented NS Corridor, which is seen in the results. Another consequence is that the Pittsburgh CBD employment (for the Golden Triangle and environs) did get adjusted downward in the 5-20% down range. Since Commuter Rail lines tend to rely heavily on work trips into the downtown core for riders, this cannot help but have an impact on the ridership on the two proposed lines (as compared to the ECTS).

It is important to note that nothing in this analysis is meant to imply that either land use forecast is “wrong”; rather, it seeks to explain one reason for why the ridership forecasts are different (and generally lower) than those developed in the 2003 ECTS. Both Cycle 6 and Cycle 8 forecast sets were subjected to a rigorous review process prior to regional adoption. While it is possible that Westmoreland-to-Pittsburgh CBD trips (these projects’ most important constituent market) might be under-represented (beyond the bounds of what could be considered a “conservative forecast”), the appropriate means for correcting this would require not only significant data collection (in the form of on-board and home-interview/trip diary surveys) but also an involved amendment process to further refine the regionally approved land-use set, with ultimate incorporation into the regional land use datasets and approval by the MPO Board.

Figure 6-5: Cycle 6 Forecast

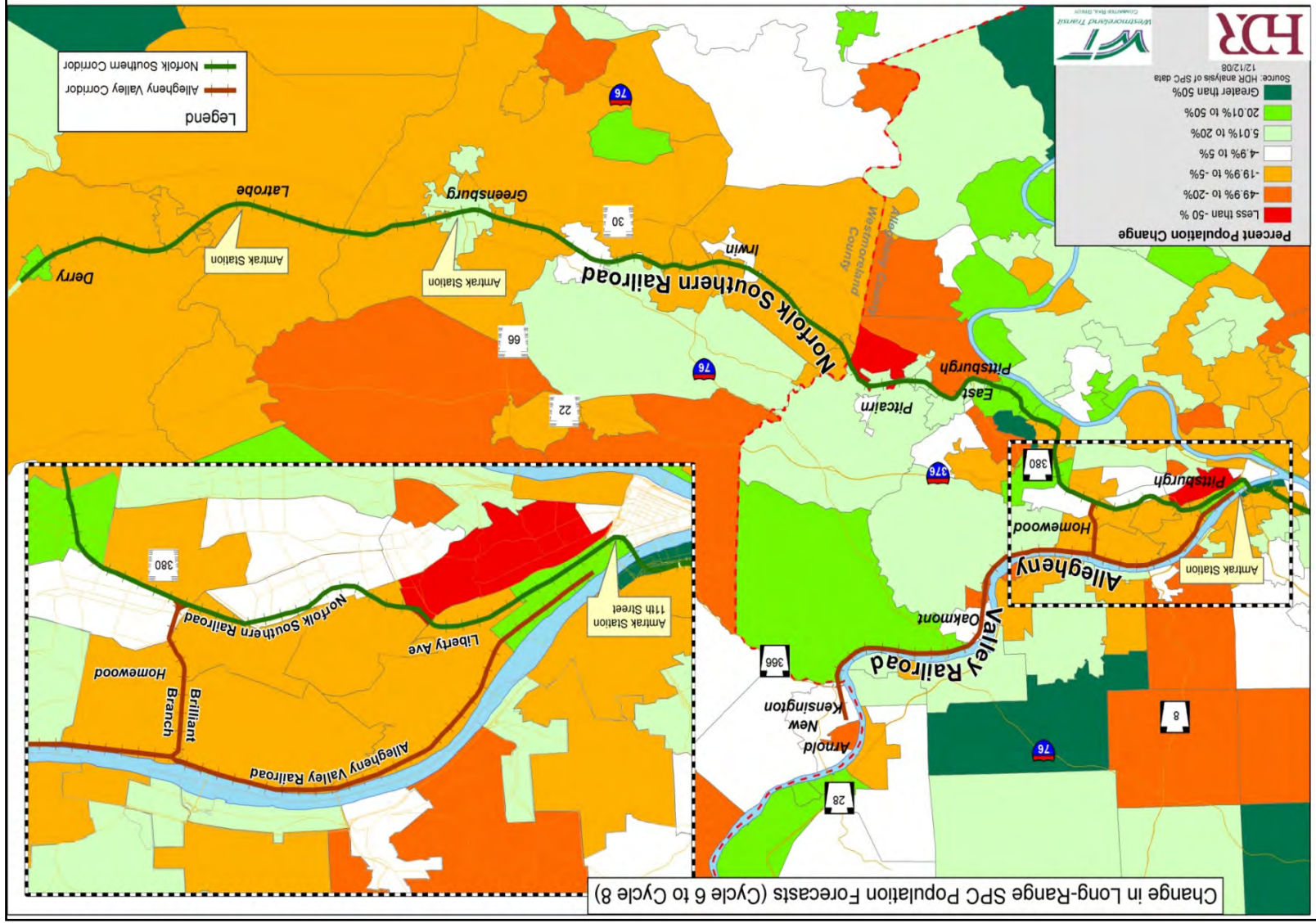
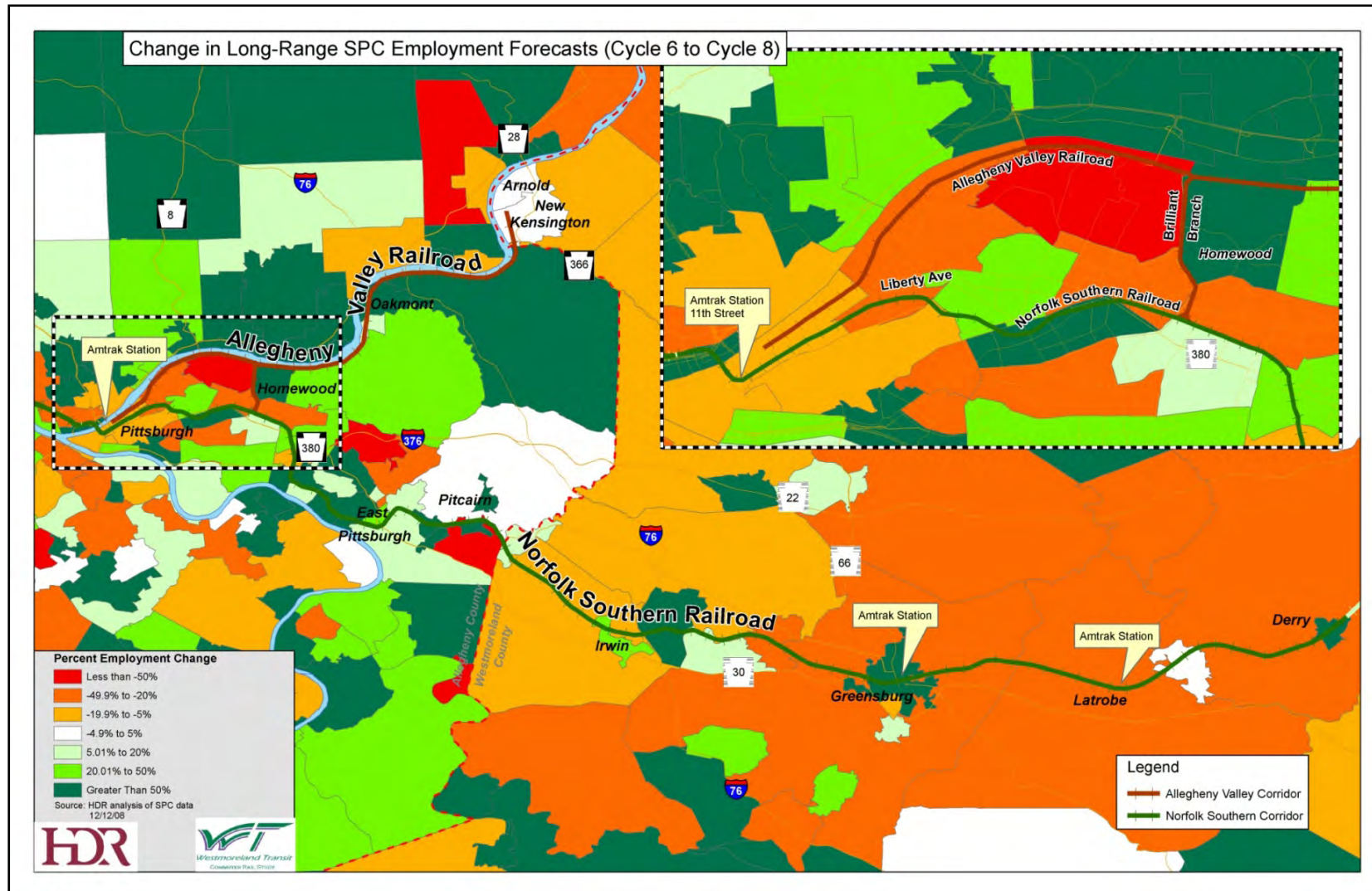


Figure 6-6: Cycle 8 Forecast



SPC forecasting staff reviewed the analysis provided above and offered the following additional comments:

Cycle 6 was (relatively) a much more optimistic growth forecast than Cycle 8. Part of that has to do with the national economic condition in the years immediately preceding the base year forecast. Cycle 6 was produced in late 1999, just before the “tech bubble” popped. Economic conditions were very good immediately preceding that recession, so the forecast model (REMI) started with a “robust” (relatively for our region) growth assumption. Cycle 7 was produced in 2003 during a period when the effects of the tech bubble recession and the effects of 9/11 were heavily weighted in the modeling growth assumptions. Not surprisingly, Cycle 7 showed a much lower rate of growth for the region. Cycle 8 was produced in 2006 when the economy was growing again, but not at the pace of the late ‘90s. The growth assumptions in the forecast for Cycle 8 are between Cycle 6 and Cycle 7. The overall rate of growth is very modest in all of our recent forecasts (on the order of between 0.25% and 0.5% per year). We have characterized the overall trend for Cycles 6, 7, and 8 (and earlier forecasts) as a “low to no growth” forecast.

Also, we have recently completed a comparison of Census 2000 Journey to Work data with SPC 2005 HBW (home-based work) person trip tables (production/attraction format) in the two commuter rail corridors. Overall the travel patterns in SPC’s trip file compare very favorably with the Census derived work trip flows. Overall, SPC’s estimate of the number of trips is about 50% higher than Census estimates. This should be expected since Census only asked about travel to a primary job, while SPC’s estimates represent all home based work travel. But, shares of travel to/from the corridor from/to various destinations in and around downtown Pittsburgh and Oakland match pretty close to shares derived from Census 2000 data.

6.7 Ridership Considerations/Conclusions

The opening-year (2012) ridership forecasts suggest that commuter rail services on both corridors are feasible on ridership considerations alone (i.e. notwithstanding cost and other impacts), and light growth in ridership can be expected by 2035, in keeping with the relatively modest growth forecast for the region.

The results seem to be generally in line with the actual opening-day ridership seen on other recent startup systems such as VRE (Virginia), Shore Line East (Connecticut), and RailRunner Express (New Mexico). As with all forecasts, there are some uncertainties built into the process which may have an impact on potential rail ridership. While likely not sufficient to make the proposed corridors non-viable, they nevertheless provide some insight as to why the forecasts are different than those from the earlier ECTS study.

Furthermore, it should be noted that the ridership forecasts were by design conservative in nature, since they are based on the regionally accepted land use inputs. Accordingly, they do not take explicit account of the recent economic recession of 2008-2009, nor do they take into account the recent volatility (both up and down) in gasoline prices over the past two years¹. Both of these events, if sustained, could have a significant impact on potential ridership along the proposed commuter rail lines. While it might be possible to make some “sensitivity” inferences about the impact of these situations on the regional demand for travel (and, correspondingly, the potential ridership on these proposed commuter rail lines), the magnitude and duration of these events is a matter for significant debate, and incorporating them into the analysis would introduce significant uncertainty into the forecasts.

¹ It should also be noted that a rise in fuel prices significant enough to drive large numbers of people to choose the train versus driving will also have a noticeable effect on the rail line’s operating costs and fare box revenues.

7. SELECTION OF RECOMMENDED ALTERNATIVES



7 Selection of Recommended Alternatives

7.1 Ridership

As discussed in Chapter 6, forecasts of ridership were a primary consideration when deciding which alternatives would be advanced for further detailed analysis. Potential forecasted ridership was used to evaluate route selection (in the case of the AVR corridor, as route selection was not really an issue for the NS corridor), and provide some insight into the general station location and operational parameters. However, the ridership forecasting model is limited in its ability to evaluate detailed station location issues or evaluate detailed operating schemes of the type typical for startup commuter rail operations such as being studied here. The remainder of this chapter describes the selection of recommended alternatives (to be subjected to further analysis of costs and implementational feasibility) using the ridership forecasts and market analysis, the station location analysis, and the operations planning efforts described in previous chapters.

7.2 Route Selection

Because the AVR corridor was tested with two basic routing configurations (one to the Strip District and one via NS to Penn Station), it was necessary to evaluate and recommend which routing made more sense from an operational, ridership, and station location perspective. As the routing over the NS corridor was already well-defined, route selection was not an issue and the analysis could concentrate on station location and operational issues.

7.2.1 Allegheny Valley Railroad Corridor

The alternatives selected for further analysis after the initial screening and Steering Committee workshop included running from Arnold to Pittsburgh-Strip District traveling entirely over the AVR and running from Arnold to Pittsburgh-Penn Station over the AVR, Brilliant Branch, and NS. Several variations on station locations and operations were tested to these two general alignments, as described in Chapter 6.

In all of the combinations of station location and operational parameters tested, one conclusion was abundantly clear, that the “all AVR” routing into the Strip District was considerably weaker in its potential to generate ridership. Although the Strip District is changing and has more employment and activity than in prior years, the fact remains that the terminus of the railroad (between 21st and 16th streets in the vicinity of Smallman

Street) is still a significant distance from much of the activity in the Golden Triangle proper, with limited shuttle bus connections. In addition, the unique potential in-city stations along the AVR (downstream of the Brilliant Branch turnoff) at 62nd Street and 40th Street which were also considered do not attract any significant ridership of their own. While this result might initially seem counterintuitive — locating the stops near major bridges could be expected to draw riders from across the Allegheny River. In fact the location of the stations is far below the bridge decks and difficult to access. Moreover, there is not significant population within walking distance of 62nd Street station, and the population in the Lawrenceville neighborhood is more centrally served by frequent PAAC bus service along Butler Street. For anyone connecting to these stations from further afield, the time spent accessing the station, to ride for just a few short minutes, to access a shuttle bus, is not sensibly competitive with driving or other transit options.

The routing over the Brilliant Branch and NS into Penn Station is preferable since Penn Station is that much closer to the hub of destinations in the Golden Triangle (some locations are even walkable from Penn Station). Even though Penn Station and 16th/Smallman Streets are really only a few blocks apart (approximately ½ mile), the blocks are long, and walking from 16th Street would necessitate crossing under three significant structures—the 16th Street Bridge, the Crosstown Freeway (I-579), and the Norfolk Southern Railway trestle, all of which make the pedestrian experience less comfortable. Conversely, Penn Station has exits out to Liberty Avenue just above 11th Street, directly across from the Federal Building (and convenient to several bus lines), and also out to the adjacent stops on the M.L. K. East Busway, which provide extremely frequent connecting bus service throughout the downtown area (this exit is also convenient to the now-disused Penn Park station on the T light rail system). These stops are also inside the Golden Triangle free fare zone.

In addition to the significantly enhanced convenience of using Penn Station as a downtown terminus, the Brilliant Branch routing has one other key advantage over the Strip District routing. While the AVR stations at 62nd and 40th Streets provided relatively little benefit (to offset their cost and the time penalty associated with slowing down and stopping there), the possibilities for intermediate stops along the Brilliant Branch/NS routing show considerably more market promise. Although there are significant physical and engineering challenges with adding a commuter rail stations somewhere along the Brilliant Branch and NS line, the opportunity to serve communities such as Homewood and Shadyside, and to provide for fast, easy connections to Oakland and other “midtown” destinations, is a significant benefit. A stop in the vicinity of the present busway stop at S. Negley Avenue, if feasible, would provide an excellent opportunity for intermodal connections with Busway buses bound for Oakland and other key non-downtown destinations. Potential development opportunities in Shadyside adjacent to the tracks further suggest that a

suburban intermodal facility in the vicinity of Baum Boulevard/Centre Avenue could be jointly developed as well.

For these reasons, the AVR-Brilliant Branch-NS alignment to Penn Station is recommended by the project team for further detailed analysis. **Figure 7-1** illustrates the route and stations recommended by the project team for the AVR line.

7.2.2 Norfolk Southern Corridor

The alternatives selected for further analysis after the initial screening and Steering Committee workshop included running from Latrobe to Pittsburgh-Penn Station traveling entirely over the NS. Several variations on station locations and operations were tested over this alignment, as described in Chapter 6, because the challenges in this corridor have more to do with station locations and operational challenges due to the high number of freight trains (approximately 50) per day on this line. These issues are discussed later in this chapter.

The NS alignment from Latrobe to Penn Station is recommended for further detailed analysis as shown in **Figure 7-2**.

7.3 Station Location and Selection

An analysis of which stations would be included in the commuter rail service, coupled with an investigation of multiple specific sites for stations was built into the analysis. In general, the ridership forecasts were developed with stations in generalized locations within communities (e.g. an “Irwin” station, a “Verona” station), and the specifics between stations within a particular community were analyzed against engineering feasibility, availability of parcels, potential space for parking, ease of access, and other physical factors.

7.3.1 Allegheny Valley Railroad Corridor

Within the AVR corridor, the stations tested in the ridership forecasts included Arnold, New Kensington, Barking Road, Oakmont, Verona, and Nadine Road, plus S. Negley Avenue (Shadyside) and Pittsburgh Penn Station. The ridership model was successfully able to evaluate that, of the two stations outside of communities (i.e. primarily park-n-ride facilities) Barking Road (in Plum Borough) was not a significant enough draw to warrant recommendation, but Nadine Road station site (in Penn Hills) was a strong recommendation, and significantly preferable to a station in the south end of Verona (i.e. Verona 3).

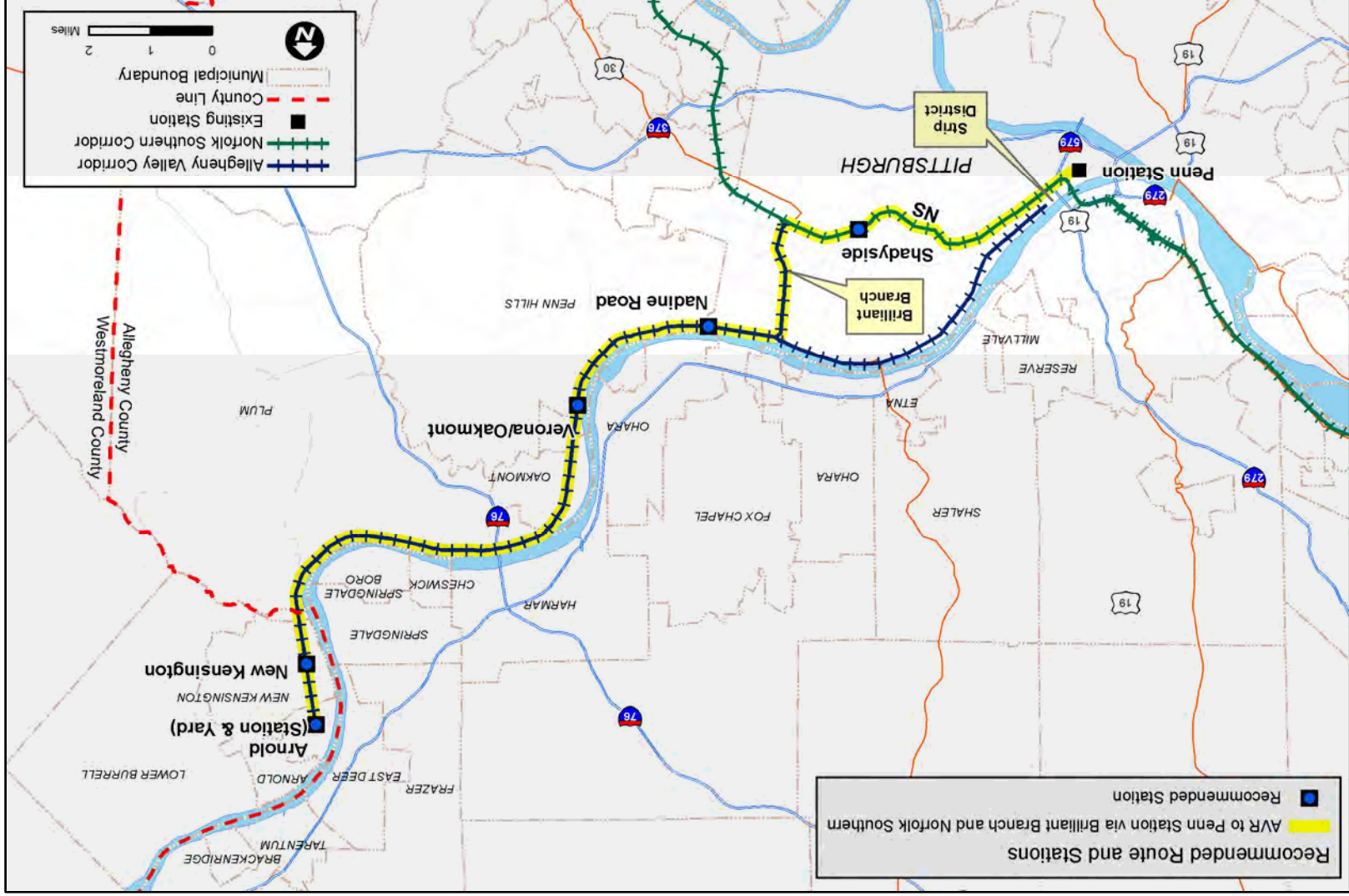
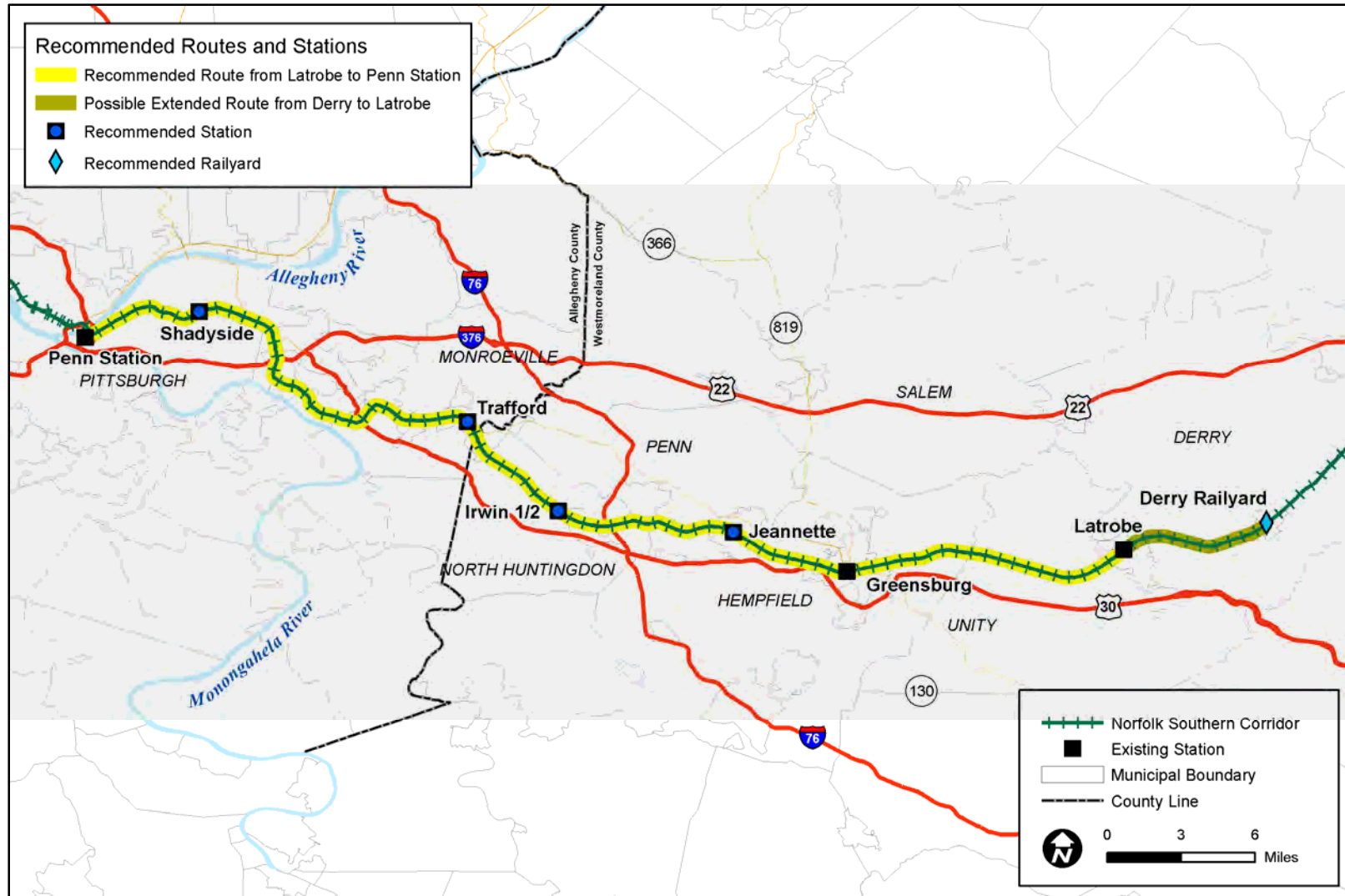


Figure 7-1 AVR Line – Recommended Route and Stations

Figure 7-2 NS Line – Recommended Route and Stations



7.3.1.1 Arnold

The Arnold station would be co-located with the train storage yard at the terminus of the AVR rail line. Since trains would be parked overnight in the yard it would be convenient to build a station and parking lot at this location to allow commuters to board trains prior to their morning departures for Pittsburgh. The proximity of Arnold to the Tarentum Bridge and connection to Route 28 also makes this an attractive station location. Arnold is recommended as a station location for the AVR service.

7.3.1.2 New Kensington

New Kensington is one of the most populous communities on the AVR line and had been served earlier by a commuter rail station. The recommended location for a station is in the immediate downtown area and would also be convenient to students of the new Westmoreland County Community College campus on 12th Street. Parking is available immediately adjacent to the proposed station site and potentially on other vacant parcels within several blocks. The location is also reachable by potential commuters from the Route 28 corridor. The downtown New Kensington site is recommended as a station location.

7.3.1.3 Barking Road

Consideration was given to the construction of a station in the vicinity of the Barking Road intersection with Cox Comb Hill Road, a location with access to the Plum area via Logans Ferry Road. The only potential station site along the AVR rail line in this area is occupied by a former industrial plant which is now at least partially being used for storage of unknown materials. The site had an apparent former use that indicates substantial potential soil and other contamination. With removal of the storage and former industrial buildings the site could accommodate as many as 350 or more vehicles for commuters. However, due not only to the poor ridership the location would be expected to draw, as noted above, and the need for environmental cleanup, as well as the rebuilding and reconfiguration of a highway intersection for access, the Barking Road station location is not recommended.

7.3.1.4 Verona/Oakmont

The communities of Verona and Oakmont are located adjacent to one another with their small central downtowns just one mile apart. Due to a lack of any real commuter parking available in Oakmont along the AVR, the task of locating a station in this area focused on Verona. As noted in Chapter 5, three locations were examined in the south, central and north sections of the town. A determination was made by the project team, in conjunction

with the analysis of ridership, that the ideal location was the Verona/Oakmont 1 site on the boundary of Verona and Oakmont. The site offers space for as many as 500 cars, is within walking distance of southern portions of Oakmont and is also adjacent to a major proposed residential development along the river. The Verona/Oakmont 1 site is recommended as the station location for these two communities.

7.3.1.5 Nadine Road

A station site near the intersection of Nadine Road and Allegheny River Boulevard was explored as a means of serving commuters from the Pen Hills area of Allegheny County. The site of a former rail yard at the junction of the AVR line and the Brilliant Branch was selected due to its size, available flat land and proximity to the intersection of Nadine Road and an access road to the site on the AVR. Although a short access road would need to be constructed to reach the site, its location and size – over 250 cars can be accommodated – led the project team to recommend the site for a station on the AVR.

The Shadyside/Oakland station located at S. Negley Avenue and Penn Station in Pittsburgh are discussed below as part of the discussion of stations on the NS corridor.

7.3.2 Norfolk Southern Corridor

Within the NS Corridor, the stations tested in the ridership forecasts included Latrobe, Greensburg, Jeannette, Irwin, and Trafford, plus Shadyside (S. Negley Avenue) and Pittsburgh Penn Station. The ridership forecasts showed that an alternative with all stations did draw more riders than one without Irwin or one without Trafford.

Specific station location variations were analyzed for Trafford, Irwin, and Jeannette, with consideration as to cost, construction feasibility, likely environmental issues, and access to major population/road network (chiefly access to US Route 30).

7.3.2.1 Latrobe

The existing Amtrak Station at Latrobe was selected as the recommended terminus station on the NS corridor due to its present use as a station, downtown location and the apparent availability of parking. Transit oriented development (TOD) opportunities have also been recognized by the project team at this location.

7.3.2.2 Greensburg

The Greensburg Amtrak station, which has been renovated into a fully functional mixed-use train station, is the recommended station to serve Greensburg. Although commuter parking immediately adjacent to the station is limited, the city does have numerous other

lots within a ½ mile radius that could serve commuters wishing to access the station. TOD opportunities, already recognized by the City and discussed further in Chapter 10, would be further enhanced with the establishment of a commuter station at this location.

7.3.2.3 Jeannette

Two potential station locations were examined at Jeannette. The two sites are about ½ mile apart with the Jeannette 1 site adjacent to the downtown and at the location of a former rail station and the Jeannette 2 site west of that site at a former industrial location.

Commuter access to both locations from US Route 30 is about equal but does involve traversing residential neighborhoods of the city. Evaluation of the two sites resulted in a determination by the project team that the Jeannette 1 site is preferable due to its location on the edge of downtown, availability of adequate existing parking and opportunities for TOD.

7.3.2.4 Irwin

Irwin is located in good proximity to US Route 30 and had served in the past as a walk-up commuter station on the Pennsylvania Railroad (PRR). Three station sites were examined in the Irwin area. Irwin 1 is near downtown Irwin but has only very limited space that would not permit construction of on-site commuter parking. Irwin 2 is in the Larimer community to the west of Irwin (1.2 rail miles) and has space adequate for parking about 100 cars but requires access to Route 30 through local residential neighborhoods. The Irwin 3 location is about 1.3 track miles from Irwin 2 and at a rural location with good potential for provision of parking but poor access to US Route 30. At this time the project team is recommending that both the Irwin 1 and Irwin 2 sites be carried to the next phases of study with a selection of one or the other be conducted only after further study of parking, access and impacts on communities.

7.3.2.5 Trafford

Trafford is located on the eastern edge of Westmoreland County and had been served by a commuter rail station on the PRR in the past. Two sites were examined for a commuter station – one near the center of Trafford and one located off of Broadway Boulevard near the intersection with Route 48 (Moss Side Boulevard). The Trafford 1 site would require the partial use of a public soccer field for parking and could result in potential resistance from NS due to its proximity to track turnouts (switches) and other rail infrastructure. Use of the soccer field could also prove problematic if federal funds were pursued for the project since there are restrictions on use of public parkland unless there are no other prudent and feasible alternatives available. The Trafford 2 site is located at a former rail yard with good

access by road and parking for more than 500 cars. That site, which is located in Allegheny County and which would require the construction of a pedestrian bridge across Turtle Creek to access the station platforms, also provides better direct access to Route 30, a distance of about 2.7 miles. Given these differences between the two sites, the project team recommends the Trafford 2 site for the location of a commuter rail station.

7.3.2.6 Shadyside (S. Negley Avenue)

The proposed station at Shadyside would serve the Shadyside, Homewood and Oakland areas of Pittsburgh, have excellent connections with the express buses serving the Busway Station and, as noted above, generate considerable destination ridership. The commuter rail station would be immediately adjacent (end to end) to the East Busway station but would need to be located in the NS right-of-way. Given the narrow right-of-way at this location, design of the commuter rail platform – at least 12 feet in width – would need to be carefully coordinated with NS and the Port Authority, operator of the Busway. The Shadyside station is recommended as a commuter rail stop.

7.3.2.7 Penn Station – Pittsburgh

As the terminus of commuter rail service on both the AVR and NS corridors, Penn Station is recommended to be advanced into the next phases of the project. This station is located on the edge of the downtown area and adjacent to an East Busway station. Adequate mid-day train storage capacity presently exists at the station for either the AVR or NS service. However, if both services are instituted into Penn Station, additional storage track capacity would need to be constructed. Field reviews of the station indicate that there is presently space at the station to accommodate the additional storage track.

7.4 Proposed Commuter Rail Operations

Section 5.4 of Chapter 5 discusses the proposed operation schedules for commuter rail service on each rail line the highlights of which are repeated here. The operations schedules would, ideally, provide peak period, reverse commute and mid-day services on each line and make as efficient use of the trainsets (locomotives and passenger cars) purchased for the peak period service. For example, reverse commute trains would utilize trainsets that had earlier arrived in Pittsburgh for an in-bound peak train. By doing so, the number of trainsets could be kept to a minimum thus reducing capital and operating costs.

For each of the proposed commuter rail corridors (AVR and NS) the following general schedules were identified and analyzed in the ridership and operations tasks for this study.

Peak period commuter service on each line would consist of four (4) in-bound morning trains and four (4) out-bound evening trains operating on 30-minute headways on each line. Trains would be scheduled to arrive at Penn Station at morning hours convenient for commencement of work and generally between 7:00 a.m. and 9:00 a.m. With travel times of approximately 40 to 60 minutes from the furthest commuter rail station (Arnold on the AVR and Latrobe on the NS), the earliest train departures would be in the 6:00 a.m. to 6:30 a.m. timeframe depending upon which line is being examined.

Evening peak period return services would be developed to match general work schedules and would likely commence at about 4:30 p.m. with the last train departing Penn Station at about 6:30 p.m. Surveys of potential riders may need to be conducted prior to establishing exact schedules.

The schedules for AVR and NS train services would need to be coordinated in order to feed trains onto the NS line at Homewood where the Brilliant Branch connects with the NS Pittsburgh Line and then into Penn Station. Several track capacity issues in this section of the NS corridor will need to be considered when scheduling trains through that 4.5 mile two-track section. First, all AVR and NS trains would need to serve the Shadyside Station located on Track 1 (south side) meaning that the AVR trains would need to cross over Track 2 to reach that station platform possibly conflicting with out-bound reverse commute trains on Track 2. Secondly, all passenger platforms at Penn Station are expected to be located on the Track 1 side of the station requiring all commuter trains to enter and leave the station on that side. In addition, NS freight trains transiting the Homewood to Penn Station section may need to be confined to Track 2 to avoid conflicts with commuter trains on Track 1.

It is very important to note that the proposed schedules discussed above have not been analyzed or approved by Norfolk Southern or the Allegheny Valley Railroad. Approval and agreement on schedules and train frequencies will be necessary as part of the overall access agreements with the railroads before commencement of service on either of the railroads.

7.4.1 Through Service Operation Opportunities

In the scenario, raised by the Steering Committee, where joint corridor operation is assumed (i.e. operation on both AVR and NS lines simultaneously), it would be possible to initiate “through service” between Latrobe and Arnold via Penn Station or via Homewood, both using the Brilliant Branch. However, at this time, there is nothing to suggest any particular ridership market demand for this service between Latrobe and Arnold, nor any particular operational advantage to doing so. While the location of a single maintenance facility in Derry suggests that equipment will need to rotate between the two lines, the

implementation of any dedicated “through” service on both lines is not recommended at this time.

7.5 Next Steps

The recommended routing (AVR and NS services to Penn Station), stations, and operational schedules presented in this chapter were carried through the next steps of the study in which estimates of Capital Costs and Operations and Maintenance (O&M) Costs were developed. These are detailed in Chapters 8 and 9, respectively.

8. CAPITAL COST ESTIMATES



8 Capital Cost Estimates

The capital cost elements analyzed in this study include (1) the development or rehabilitation of train stations, (2) the construction or upgrade of track, signals and other railroad infrastructure along the proposed Allegheny Valley Railroad (AVR) and the Norfolk Southern (NS) Commuter Rail Corridors (including maintenance facilities), and (3) rolling stock equipment to support the alternative commuter rail services under study. Each of these elements is discussed below along with a synopsis of the cost estimates developed for the Eastern Corridor Transit Study (ECTS).

8.1 Review of ECTS Capital Cost Estimates

The ECTS estimated the capital costs for the commuter rail service on the AVR and NS corridors. The unit costs for improvements were determined with inputs from both local and national sources. The categories associated with the capital cost estimates in the ECTS included guideway, trackwork, facilities, systems, stations, special conditions, mobilization, contingency, administrative soft costs, locomotives and passenger cars, and property.

The ECTS estimated the capital costs for a commuter rail system from Arnold to the Strip District in Pittsburgh along the AVR corridor to include a complete upgrade of the existing track, new passing sidings, a train control and communications system, full grade crossing protection, nine new stations, park & ride facilities, a fleet of 4 diesel locomotives (3 plus 1 spare) and 18 coach/cab cars (15 plus 3 spares), a maintenance facility, contingency fees and soft costs (e.g. engineering and design, construction management, insurance costs). The ECTS capital costs for the AVR commuter rail also include right-of-way and property acquisition. The ECTS estimated this commuter system along the AVR corridor to cost \$258 million (2003 dollars).

As a variation, the ECTS also estimated that a starter system with a lower service level, longer headways and less infrastructure and right-of-way requirements would cost approximately \$131 million (in 2003 dollars). A minimal investment option was also provided. It included only two trains inbound and outbound during peak periods and would cost approximately \$64 million (in 2003 dollars).

The ECTS also estimated the capital cost for commuter rail service along the NS corridor that would include both station and parking infrastructure along the existing railroad. The total capital cost for the NS commuter rail system from Greensburg to Penn Station in

Pittsburgh, as estimated in the ECTS, would be \$233 million (in 2003 dollars) and would include the addition of a third track between East Pittsburgh (the junction of the NS Mon River Line and Pittsburgh Line) and Greensburg. By modifying service and infrastructure options, either a starter system or a minimal investment system could be achieved with capital costs of \$142 million or \$76 million, respectively.

8.2 Commuter Rail Station Cost Elements

Eight potential station locations were examined along the AVR Corridor and twelve stations were considered along the NS Corridor in this study.

8.2.1 Station Infrastructure

The infrastructure estimates for all the stations are composed of platform, shelter, and lighting and security costs. The platform costs are generally the most expensive improvement at all stations and can range from approximately \$1.4-\$5 million depending on length, elevation above grade and other local conditions. Platform costs are based primarily on length, which are generally 400 feet to accommodate at a minimum a four-car train, and are assumed to be 12 feet wide. At each station a shelter would be provided to protect commuters from inclement weather. In order to contain costs, the project team determined that shelters, as opposed to enclosed station buildings, would adequately serve commuters who normally have only minutes to wait for their train. The length of the shelter would be approximately one-fourth the length of the platform area, therefore, the smaller the platform, the smaller the shelter. This design reduces the cost of the station's total infrastructure because shelters are not required to completely cover the platforms. **Figure 8-1** illustrates an example of the type of station shelter and platform that could serve a new commuter rail stop. Lighting and security is a lump sum figure that accounts for station lighting and miscellaneous security features at each location. At termini, fencing costs have been estimated to secure the rolling stock and other equipment.

8.2.2 Parking and Roadway Infrastructure

Parking and roadway infrastructure accounts for items associated with the access roads that lead to the stations, parking lots, pedestrian sidewalks, and light poles. Site work activities such as excavation and clearing and grubbing are also included as parking and roadway infrastructure costs.

Fig. 8-1 Example Station and Platform (VRE Virginia)



Property/Right-of-Way The ability to purchase and acquire land for the commuter rail project is essential to creating an efficient system on both corridors. In order to estimate the land value, a former Pennsylvania Department of Transportation Right-Of-Way (ROW) Administrator was consulted and estimated values were determined based on each site location.

In Westmoreland County, rural areas were valued at \$5,000 per acre; while urban areas with better access roads and closer access to utilities were valued at \$25,000 per acre. In Allegheny County, rural areas were assumed to have a price of \$10,000 per acre while urban areas of the county were valued at \$25,000 per acre. The land value for the Strip District is the highest and the land is assumed to be worth \$1 million per acre.

In addition to the cost of land, some locations have surrounding structures or businesses that may also need to be purchased. While a business may not need to be completely bought out, relocation expenses could also be a factor and are considered in the acquisition cost.

Property demolition is an important consideration as well. For several locations, once the land has been acquired for the station site, existing buildings and structures will need to be

torn down. The various demolition costs have been estimated for locations where this process is needed and is based on the number of structures and their existing or former use.

8.2.3 Station and Yard Track Infrastructure

In order to provide the necessary track infrastructure at the recommended termini stations of each line, costs have been developed based on the amount of site work and yard track needed. Yard track estimates are composed of both the labor and materials necessary to complete the work. Track infrastructure is also included on the main line portions of the AVR and NS railroads and is discussed in Section 8.8, below.

8.2.4 Environmental and Permitting

The project team considered anticipated environmental and permitting issues for each station along the two corridors. Mapping and aerial imagery sources and site visits were used to assist in estimating the level of environmental and permitting effort that would need to go into each station. The amount of estimated effort to one of three categories (low, moderate, or high) as defined below. The project team then applied a corresponding percentage of the estimated construction cost at the respective rates of 4%, 6% and 8% per station for the associated environmental and permitting efforts. These rates are based on observed costs encountered in similar transportation projects. Some stations are considered to require exceptionally high environmental efforts, based on their current or known former uses and reflect a higher percentage rate than the highest 8% listed above.

- Low Environmental / Permitting Effort (4% of construction cost):
 - Appears that there are no unusual environmental impediments within the limits of construction (LOC).
 - Mainly undeveloped areas.
- Moderate Environmental / Permitting Effort (6% of construction cost):
 - Appears to be one or two but not major environmental factors likely within the LOC.
 - Mainly urban residential or commercial locations.
- High Environmental / Permitting Effort (8% of construction cost):
 - Appears to have more than two or major environmental factors likely within the LOC.
 - Indicates wetlands or a stream are within the LOC.
 - Mainly former or existing industrial or rail yard locations
- Exceptionally High Environmental / Permitting Effort (9 % or more of construction cost):

- Sites that meet the definition of High Environmental /Permitting effort and that were likely involved in heavy industrial or polluting uses.
- Sites that imply a higher financial effort for cleanup and remediation.

8.2.5 Management, Engineering Services and Owner Review

This category accounts for professional design and construction engineering services required for preparation of construction documents (i.e. plans and specifications) as well as construction engineering and management required for review of contractor submittals and construction inspection. The project team calculated engineering fees as a percentage of the estimated construction subtotal cost.

The most costly stations to design have been assigned a rate of 19% for the engineering fees based on the following items:

- 8% for Concept and Preliminary Design
- 4% for Final Design
- 6% for Construction Engineering / Management
- 1% for Owner Review

Some stations are considered easier to design and construct than others based on topographic conditions, existing parking capacity, access to roadways and other local factors; 12% or 15%, depending on design complexity, have been attached to stations requiring less effort. Any decrease in these percentages is subtracted from the Concept and Preliminary Design phase and Construction Engineering/Management costs.

8.2.6 Construction Contingency

As noted above, this interim study has not included engineering design or engineering field investigations (e.g. surveying, geotechnical investigations, determination of the presence of utilities, etc.) typically included in engineering analysis. In an effort to account, nonetheless, for typical, unforeseen construction costs related to these types of pre-construction activities and investigations, a contingency has been included. Given the level of information and purpose of this study, a minimum construction contingency of 30% has been applied to the estimated subtotal construction costs. Contingency values are usually reduced as more information is obtained and unknown conditions are reduced through subsequent planning, surveying and design stages. Contingency costs typically range from 5% to 12% of construction in final pre-bid estimates.

8.3 AVR Corridor Station Costs

The AVR corridor would provide commuter rail service from Arnold Station to Penn Station via the Brilliant Branch and NS trackage with a total estimated station cost of \$30,028,000. Commuter rail service on the AVR could operate either independent of or concurrently with commuter rail service on the NS corridor (the dual service option is discussed in section 8.5). In order to determine the cost for the entire corridor, the total cost of each relevant station was calculated. Table 8-1 summarizes the capital costs for the AVR corridor alone by listing each station considered for AVR service, the station’s cost and if project team recommends the location as a station site along the corridor. The project team, however, does not recommend the purchase of that portion of AVR rail line that would be utilized for commuter rail service. Access to the railroad would be gained through negotiation of access and payment of access fees to AVR on an annual basis as part of operating costs.

Table 8-1: AVR Corridor Station Capital Cost Estimates (2012\$)

Station	Cost Estimate	AVR to Penn	Recommended
Arnold Station and Yard	\$12,819,000	\$12,819,000	Yes
New Kensington Station	\$2,807,000	\$2,807,000	Yes
Barking Road Station	\$9,165,000		No
Oakmont Station	\$2,292,000		No (Possible Future)
Verona/Oakmont Site 1 Station	\$4,437,000	\$4,437,000	Yes
Nadine Station	\$5,147,000	\$5,147,000	Yes
Shadyside Station	\$3,114,000	\$3,114,000	Yes
Penn Station (Cost for AVR Service Only)	\$1,704,000	\$1,704,000	Yes
Total Estimated Cost of Recommended Stations:		\$30,028,000	

Each of the stations and station sites examined on the AVR line to Penn Station is briefly described below.

8.3.1 Arnold Station and Yard

Location: Drey St. and Dr. Thomas Blvd., Arnold

The Arnold station would be the endpoint of the AVR Corridor. The construction cost for this station and terminus yard is estimated at \$12.8 million. This site would require the

acquisition of seven acres of land to create the station and a parking facility. Since this station would also serve as a terminus storage yard, four storage tracks would also be constructed. Four platforms would allow commuters easy transition from the parking lot to the trains stored overnight on the four tracks. Unlike the other sites, and due to the possible need for high level platforms, an inspection pit and excavated walkway is required along each platform face at this site in order to perform daily wheel maintenance checks on all cars.

There is an industrial history associated with this site and two industrial structures would need to be demolished. Due to the history, both the environmental and management and engineering services for this site are considered high.

8.3.2 New Kensington

Location: Moss Alley and 10th St., New Kensington

The New Kensington station is the second station on the AVR Corridor. The estimated cost for this station is \$2.8 million. The station design is straight forward and comprised of the standard amenities for a commuter rail station consisting of a platform and shelter. While there is an adjacent parking lot, the cost estimate assumes the existing parking lot would be resurfaced and lighting would be replaced. The environmental and management and engineering services for this site are in the middle for both categories.

8.3.3 Barking Road

Location: Barking Rd. and Cox Comb Hill Rd. (Route 908)

The Barking Road site is not recommended as a station location. The station is estimated to be the most costly station to construct on the AVR Corridor, at \$9.2 million. Only the yard and layover facilities are priced higher. This station would have the standard station infrastructure based on the cost of a single 400-foot platform. The parking lot cost assumes that there would be 375 parking spaces available for commuters. The roadway infrastructure for this site would also be costly. The intersection that would lead to the entrance to the station would need to be reconstructed for better access and flow and a traffic signal would also need to be incorporated into the intersection.

This potential station site appears to have an industrial history. The environmental clean-up at this site is expected to be exceptionally high based on anticipated environmental and permitting work and is estimated at 15% of the construction costs for a total of \$839,000. The active business on the site would require both the purchase and demolition of buildings for an estimated total of \$2 million.

8.3.4 Oakmont

Location: Allegheny Avenue, Oakmont

The Oakmont site would be the least expensive station to construct at just under \$2.3 million, but is recommended only as a future local walk-up station. The site has existing public on-street parking available but little in the way of public parking that would be available to commuters making it a poor commuter option. If high level platforms are required, they may destroy the landscaped setting and ADA access across the AVR rail line now available at the existing site of what would be the future station.

8.3.5 Verona/Oakmont

Location: Anchor Dr. and Center Ave., Verona

This station site (Verona/Oakmont 1) adequately serves the Verona / Oakmont area and is a recommended station location. The station cost estimate is \$4.4 million. Nine acres of land would be acquired for the site. The cost estimate for this site is based on 250 parking spaces, but the location has the potential to increase to nearly 1,000 parking spaces if necessary.

The estimated environmental and permitting costs for this station are exceptionally high at 12% since it was previously an industrial area, and is currently used as an apparent disposal location and would presumably require a large amount of environmental cleanup.

8.3.6 Nadine Road

Location: Nadine Road and Allegheny River Blvd.

The Nadine Road station is the most costly of the recommended station-only sites on the AVR Corridor at \$5.1 million. The land cost is estimated at \$15,000 per acre and is lower than the other sites considered along the corridor. The high construction costs can be attributed to the need to build a connecting entrance roadway to the station and parking lot. This site also has an industrial (railroad) history and would require an assumed high environmental cleanup and permitting effort.

The AVR Corridor to Penn Station would also include use of a new station at Shadyside and use of Penn Station itself. Capital costs associated with these stations are discussed below in Section 8.4.12 and 8.4.13, respectively.

8.4 NS Corridor

The Norfolk Southern Pittsburgh Line Corridor is planned to operate from Derry Yard in Derry to Penn Station in Pittsburgh with commuter service starting/terminating at Latrobe, four miles west of the rail yard at Derry. Table 8-2 provides the total cost of the recommended stations for only the NS Corridor into Penn Station is \$22,356,000. Like the AVR corridor, the NS corridor could support a stand-alone commuter rail service or be combined with the AVR commuter rail service. If NS and AVR both serve Penn Station, Penn Station will need to undergo more costly station enhancements and construction of additional mid-day storage track to handle both corridor services. This dual service option is discussed in section 8.5.

Table 8-2: NS Corridor Station Capital Cost Estimates (2012\$)

Station	Cost Estimate	NS to Penn	Recommended
Latrobe Station	\$3,269,000	\$3,269,000	Yes
Greensburg Station	\$760,000	\$760,000	Yes
Jeannette Station Site 1	\$4,941,000	\$4,941,000	Yes
Jeannette Station Site 2	\$3,723,000		No
Irwin Station Site 1 (central Irwin)	\$3,156,000		Possible
Irwin Station Site 2* (Larimer)	\$3,973,000	\$3,973,000	Possible*
Irwin Station Site 3 (Ledger Rd.)	\$3,193,000		No
Trafford Station Site 1	\$4,137,000		No
Trafford Station Site 2	\$4,595,000	\$4,595,000	Yes
Shadyside Station	\$3,114,000	\$3,114,000	Yes
Penn Station (service on NS only)	\$1,704,000	\$1,704,000	Yes
Total Estimated Cost of Recommended Stations:		\$22,356,000	

**For station costing purposes at Irwin, the cost for the site at Irwin-2 is used, although either Irwin-1 or Irwin-2 could be selected following further evaluation.*

Each of the stations and station sites examined on the NS Pittsburgh Line to Penn Station is briefly described below.

8.4.1 Latrobe

Location: McKinley Ave., Latrobe

The Latrobe location is at an existing station that presently serves Amtrak, but would require rehabilitation to make the station functional and efficient for local commuter rail service. Latrobe would be the first station on the NS Corridor. This station, with two platforms includes a 300-foot platform on the opposite side of the tracks from the existing station which needs to be re-built to accommodate commuter rail service. Rehabilitation of existing street underpasses may also be needed to assist with accessibility from one side of the station to the other. Although there is a dedicated pedestrian underpass, it is now part of the privately owned restaurant and is not open for public use. To comply with ADA requirements, in addition to construction of an elevator at the Track 2 (north) side of the station, a 400-foot ramp would also be required and has been estimated at \$232,000.

Adjacent parking is available on city-owned lots and at on-street spaces that are metered for hourly parking. The parking administrator for the city has indicated that it may be possible to re-meter portions of the parking capacity for long-term daily use to accommodate commuters. One lot with 64 spaces is located immediately adjacent to the south side platform at the station and another 32 metered spaces are available on the north side of the station on McKinley Ave.

Both the environmental costs and the management and engineering services for this station are low. Total cost for rehabilitation and expansion of the Latrobe station is estimated at approximately \$3.3 million.

8.4.2 Greensburg

Location: Ehalt St. and Harrison Ave., Greensburg

Greensburg has an existing train station serving Amtrak. The station, with platforms serving both tracks, may require platform extensions to adequately serve commuter trains. The shelters at the station are in good condition and do not need rehabilitation. Parking for this station is assumed to be provided by the City of Greensburg and numerous public lots and a parking garage are currently available within a several block radius of the station. Many of the spaces at these lots can currently be leased for \$60 per month (\$2.77 per weekday). Pedestrian access from north of the station, which directly accesses the platform on Track 2, is currently restricted by a locked gate and fencing. Consideration to opening this access route for walk-up commuters may be advisable although that access may also lead to the station becoming a general pedestrian route between downtown Greensburg and neighborhoods on the north side of the NS tracks. Total cost for extension of platforms at the station is estimated at \$760,000.

8.4.3 Jeannette 1

Location: McGee Ave. and 2nd/4th Streets, Jeannette

Jeannette Site 1, a former station site, is a recommended station location and would have one 400-foot platform although consideration is given to a second platform and elevated pedestrian crossover if NS requires such for operational purposes. This station is unlike other sites because it would require relocation of a track siding and turnouts used by Norfolk Southern.

The station platform is recommended for the south side (Track 1) of the station site which is the track side adjacent to the commercial center of Jeannette. Expansion of parking already available at the station site is recommended. Other adjacent commercial and public parking lots contain an estimated 200 spaces. Some parking areas immediately adjacent to the station would need to be repaired. Total estimated cost for construction of a station at this location is \$4.9 million

8.4.4 Jeannette 2

Location: Clay Ave. Extension, Jeannette

Jeannette Site 2 is a single platform location with the platform located on the south Track 1 side. The site could accommodate up to 480 parking spaces, with 240 spaces developed initially, on a vacant lot on the opposite side of Clay Avenue Extension. Jeannette 2 has high environmental and engineering needs due to the likely former industrial use of the parking lot area. This site is not recommended due primarily to its distance from downtown Jeannette. Construction costs of Jeannette 2 are estimated at \$3.7 million.

8.4.5 Irwin 1

Location: Paintertown Rd., Irwin

Irwin 1 would be designated as a “Kiss-n-Ride” and walk-up station only because of no parking being available due to the severe topography and lack of space. The location of the station site would be on NS Tracks opposite the commercial center of Irwin. An elevator would be needed to provide access to the single platform on the north side of Track 2. While the project team recommends that a station site be located in Irwin, with Irwin 1 being one of the two suggested locations (Irwin 2 is the other), further examination of the proposed sites, available parking and access routes to US Route 30 is necessary before a final decision can be made.

The estimated cost for constructing a station at the Irwin 1 location is \$3.2 million.

8.4.6 Irwin 2

Location: Route 993, Larimer

Irwin 2 requires the demolition of two buildings at the site, both of which appear to be garages or storage buildings. The station would require an elevator to be compliant with the Americans with Disabilities Act (ADA). This addition would add \$250,000 to the overall station costs. This site is recommended as the other potential recommended option for an Irwin station; however, parking (about 100 spaces) and access to U.S. Route 30 are somewhat limited. A decision between Irwin 1 and Irwin 2 would require further evaluation prior to selecting a final station site for the Irwin area on the NS commuter rail corridor. The cost estimate for Irwin 2 is approximately \$800,000 more than Irwin 1; therefore, Irwin 2 figures will be used as a conservative estimate for a station to serve the Irwin area.

The estimated cost for constructing a station at the Irwin 2 location is \$3.97 million.

8.4.7 Irwin 3

Location: Ledger Rd. and Route 993

A third potential Irwin Station location (Irwin 3 at Ledger Road) was evaluated. The site is 2.2 miles from U.S. Route 30. Currently it can only be accessed directly from Route 30 via narrow Leger Road and a wood deck bridge over the NS tracks. The cost to improve this access route is not included in the estimate. The cost estimate only considers a single platform, but two platforms could be constructed if a second platform is found necessary to satisfy NS operations. The site could accommodate approximately 190 spaces. Due to its poor proximity to major commuter routes and population centers, Irwin 3 is not recommended.

The estimated cost for constructing a station at the Irwin 3 location is \$3.2 million.

8.4.8 Trafford 1

Location: Westmoreland Rd., Trafford

Trafford 1 is not a recommended site due to several physical constraints including existing track turnouts used by NS to access Pitcairn Intermodal Yard, the presence of a short-line railroad connection, an existing creek, and a railroad signal bridge at this location. The fact that a soccer field would be required for the parking lot also leads to potential regulatory complications involving Section 4(f) of the U.S. Department of Transportation Act if federal funds are utilized.

The estimated cost for constructing a station at the Trafford 1 location is \$4.1 million.

8.4.9 Trafford 2

Location: Broadway Blvd., Trafford

Trafford 2 is recommended site for the Trafford area. The cost for this site includes the standard station infrastructure with a single platform. Infrastructure costs include over one million dollars for the parking lot which would provide up to 500 parking spaces. A pedestrian bridge across Turtle Creek is also required for this site as well as an ADA ramp and roadway connection to Broadway Boulevard. This site would require a moderate level of environmental cleanup and permitting due to its former use as a rail yard. A second platform can also be constructed at this location if necessary.

The estimated cost for constructing a station at the Trafford 2 location is \$4.6 million.

8.4.10 Dual Corridor Stations (Shadyside, Penn Station)

Any alternative intended to serve Penn Station, be it on the AVR or NS, is proposed to also serve the Shadyside Station in Pittsburgh. If both commuter rail lines are brought to fruition, these are the only two stations that could potentially see commuter trains from both corridors. Each is discussed below along with the two variations on the use of Penn Station.

8.4.10.1 Shadyside

Location: S. Negley Avenue, Pittsburgh

Shadyside would be the last stop before the Penn Station terminus. This station stop also serves an Eastern Busway stop and is located at S. Negley Avenue in Pittsburgh. As a destination station, there would be no parking at the station so the roadway and parking infrastructure cost is eliminated. There is, however, a need for an ADA ramp but the general access ramp to the commuter rail platform could be design to accommodate ADA needs as well. The station platform would need to be designed and built in a narrow portion of the NS right-of-way between the tracks and Busway alignment with an end-to-end connection with the Busway platform.

Only a small amount of land is needed (0.2 acres) at Shadyside. The environmental costs are average, but the management and engineering costs are high due to the anticipated level of involvement required with NS.

If commuter rail service is implemented concurrently on NS with service on the AVR line between Arnold and Penn Station, the cost of a station at Shadyside would be shared between both services.

The estimated cost for constructing a station at Shadyside is \$3.1 million.

8.4.10.2 Penn Station 1 (AVR or NS Service Only)

Location: Liberty Ave., Pittsburgh

Penn Station 1 includes estimated costs for station upgrades to Penn Station for only the AVR Corridor or the NS Corridor service. The station infrastructure required for the site includes a station office, signals and communications, and wayside power. No roadway infrastructure is needed and no additional train storage tracks would be required since adequate track capacity currently exists for storage of four (4) commuter trains. This scenario does not provide the necessary upgrades if both corridors are in operation.

There are no environmental fees estimated for this site, and the management and engineering services for this site are lower at 10% due to construction being limited to upgrading of existing infrastructure and a lack of roadway and parking lot construction.

The estimated cost for construction upgrading and making necessary improvements at Penn Station to support a single commuter rail operation (either NS or AVR) is \$1.7 million.

8.4.10.3 Penn Station 2 (AVR and NS Service)

Location: Liberty Ave., Pittsburgh

Penn Station 2 provides cost estimates for station upgrades to allow both the AVR Corridor and the NS Corridor services to simultaneously use Penn Station. In order to accommodate both AVR and NS corridor services, additional wayside signals and communications as well as storage tracks and platforms are needed, increasing the stations cost by over two million dollars and bringing total estimated costs of the station improvements to \$3.5 million.

The cost for environmental services is estimated at 6% for the necessary work at this site.

8.5 NS and AVR to Penn Station (Dual Service Option)

The total cost of both the NS and AVR commuter rail service into Penn Station is a combination of all the recommended commuter stations plus the cost of Penn Station 2. Penn Station 2 provides for the necessary infrastructure improvements needed to support both commuter rail systems. A summary of these combined corridor costs is presented in Table 8-3 and total \$49,365,000.

Table 8-3: NS/AVR Dual Service Station Capital Cost Estimates (2012\$)

Recommended Station Location	Cost Estimate
AVR Corridor	
Arnold Station and Yard	\$12,819,000
New Kensington Station	\$2,807,000
Verona/Oakmont Station	\$4,437,000
Nadine Station	\$5,147,000
NS Corridor	
Latrobe Station	\$3,269,000
Greensburg Station	\$760,000
Jeannette Station Site 1	\$4,941,000
Irwin Station*	\$3,973,000
Trafford Station Site 2	\$4,595,000
Shadyside Station	\$3,114,000
Penn Station 2	\$3,437,000
Total Estimated Cost of Recommended Stations:	\$49,299,000

*Assumes construction of Irwin 2 at Larimer.

8.6 Maintenance Facilities and Additional Infrastructure

The location of maintenance facilities depends greatly on the operating plan for the commuter rail lines. Establishing a joint maintenance facility if both rail corridors are placed into operation would be the most cost effective alternative. The project team examined the rail yard behind Penn Station as a location for a joint maintenance facility given its location that could serve both AVR and NS commuter operations on a daily basis. However, two factors work against a joint facility at that location. First, servicing of train equipment would be limited largely to the daytime hours (about 8-10 hours in total) since trains would need to serve returning commuters starting in the late afternoon. An overnight servicing at a commuter line terminus at Arnold or Derry would provide a longer 10-14 hour service window. Secondly, space for a maintenance facility at Penn Station may be difficult to configure and, although marginally possible, would preclude any long-term expansion of mid-day train storage capacity at that location.

The maintenance facility at Derry can support rolling stock and locomotive servicing on both lines, thus eliminating the need for a separate maintenance facility on the AVR line,

although an overnight storage yard at Arnold would still be required. However, if it is determined that separate facilities need to be created for each corridor, the facility costs would automatically be doubled from \$7.0 million to \$14.0 million.

The cost of the maintenance facility is a lump sum figure that includes the cost of site work necessary to build the Service and Inspection (S&I) building, storage track, and an administrative building which includes employee parking and sidewalks. The S&I building would include a concrete inspection pit, startup maintenance equipment, and rail car carwash. The administrative building will be a reporting center for the employees which will include office space and worker welfare facilities. The cost estimates for these facilities are based on the estimates for similar MBTA (Boston) and Virginia Railway Express (VRE) maintenance facilities.

Commuter trains and maintenance facilities require special utility connections to operate. Wayside electrical power is necessary to heat and cool the trains throughout the year and has been calculated as a lump sum cost in the amount of \$650,000 per terminus location. Compressed air (yard air) is also a necessary component of the maintenance facility that allows the operation of the equipment and machinery used to maintain the cars on the system. Provision of yard air is estimated at \$125,000 per location.

Currently, the AVR Corridor, assuming commuter service on that line only, does not have a designated location for the maintenance facility; the terminus yard in Arnold does not contain sufficient space. However, the lump sum figure for the facility can be added to the overall capital cost of the commuter line to determine the overall corridor cost. The owner of the AVR has indicated that several appropriate locations for a maintenance facility exist on siding tracks in the Arnold and New Kensington area. Examination of potential sites and selection of a recommended location for a maintenance facility on the AVR would only be done if the commuter service on the NS Pittsburgh Line (and use of a facility at Derry) is eliminated from further consideration.

8.6.1 Derry Maintenance Yard and Storage Facility

Location: Coal Loader Rd. and N. Valley St., Derry

Derry Yard is proposed as the location of the storage and maintenance facility on the NS Corridor. The yard will not serve commuters, therefore, platforms and shelters are not necessary. The \$7.0 million maintenance facility cost along with \$650,000 wayside power estimates have been added to the cost of the yard. Track infrastructure is necessary and in addition to including the site work and yard track, and turnouts. Total cost of the Derry Yard and Maintenance Facility would be \$13,347,000.

The environmental, management and engineering services are categorized as high for this site due to its former use as a rail yard.

8.6.2 AVR Maintenance Facility

The location for the AVR Corridor’s maintenance facility has not been determined. However, a lump sum cost of \$7.0 million dollars has been calculated and added to the cost of the overall. The facility would be constructed in the vicinity of Arnold or New Kensington and as near as possible to the Arnold Station and Yard.

8.6.3 NS Second Platforms and Pedestrian Bridges

On the NS Corridor, second platforms and connecting structures may be needed to serve both sides of the NS mainline. The station locations where these structures may be necessary have not been determined and would only be done following detailed analysis (computer simulation modeling) of the proposed commuter rail operations in conjunction with NS freight operations on the Pittsburgh Line. However, the cost for the installation of two second platforms and crossovers has been added to the total cost of the NS Corridor in anticipation of the need for greater flexibility in serving the proposed stations. The pedestrian crossover structures would include an elevator and staircase up, and pedestrian bridge over the tracks to a second elevator and staircase that takes commuters down to a second platform. **Figure 8-2** illustrates an example of a second platform and pedestrian crossover at a commuter rail station in Northern Virginia. The infrastructure cost for one of the second platforms and pedestrian crossovers is estimated at \$2,860,000.

Fig. 8-2: Example Second Platform and Pedestrian Crossover (Virginia Railway Express)



8.7 Rolling Stock (Engines and Passenger Cars)

Ridership estimates play an important role in estimating the cost of rolling stock. Cost estimates for the rolling stock necessary to operate a “conventional” commuter trainsets comprised of Federal Rail Administration (FRA) safety compliant diesel-electric locomotives, coach cars and cab cars. The rolling stock estimates have been calculated at 2011 dollars, assuming 2011 would be the year of placing an order for the equipment, and have been provided based on the following three service scenarios:

- *Scenario 1: NS and AVR-Brilliant Branch Combined Service via the NS Pittsburgh Main Line to Penn Station.*
- *Scenario 2: AVR Corridor Service Only via the Brilliant Branch and NS Pittsburgh Line to Penn Station.*
- *Scenario 3: Commuter Rail Service via NS Pittsburgh Line Only to Penn Station.*

Originally, two types of trainsets were being considered for commuter rail service in the project corridors. They were Diesel Multiple Units (DMUs) and “conventional” rolling stock. Conventional rolling stock comprises:

- Diesel-electric locomotive providing motive power to propel the train and to provide “hotel” power for heating, cooling, and lighting of passenger cars;
- Coach cars for passenger seating; and
- Cab cars which are similar to coach cars but also contain control equipment for the train engineer to operate a train in the opposite direction in a push-pull configuration.¹

The DMUs were being considered for commuter rail service operations on the AVR corridor only. DMUs are self-contained rail cars with diesel engine units for motive power, passenger seating, and an engineer control compartment. DMUs are sometimes configured as a “married pair” unit of two semi-permanently coupled cars, frequently sharing common components such as air compressors, auxiliary power generators, etc. These married pairs can also be coupled to create longer consists. Unfortunately, Colorado Railcar (CRC), the only company that manufactured FRA-compliant DMU equipment, ceased operation in December 2008 and is no longer in business. In June 2009, Columbus, Ohio-based American Railcar Co. acquired the rights to build diesel multiple-unit (DMU) trains based on the designs of Colorado Railcar Corp. The Colorado Rail type DMU may thus be available again in the future. Remanufactured DMU equipment, much of it more than 25 years old, may be

¹ By using a push-pull trainset it is possible to easily operate a train in either direction without having to construct and operate a costly turning wye track to turn a train completely around or by having the locomotive “run around” the train moving to the opposite end to move in the opposite direction.

available at a lower cost, but used equipment has been found to be increasingly difficult to obtain and maintain.

8.7.1 Conventional Rolling Stock

Conventional push-pull commuter rail trainsets or “consists” are typically comprised of a diesel electric locomotive, passenger coaches and a cab car. This configuration is widely used by commuter railroads in the United States, including services in Boston, Philadelphia, New York, Chicago, South Florida (Miami-West Palm Beach), San Francisco, Los Angeles and Washington, D.C.

The equipment described in this category is compliant with the safety standards established in FRA regulations, including 49 CFR 229 regulating locomotive safety and 49 CFR 238 regulating passenger equipment safety. FRA-compliant stock also meets horizontal and vertical clearance requirements, a “clearance envelope,” that allow commuter trains to operate in freight rail corridors.

Diesel-Electric Locomotives

Diesel-electric locomotives are the most popular form of motive power for commuter rail services in the United States. The prime mover of this type of locomotive is a powerful diesel engine that drives an electric alternator whose output provides power to the traction motors, typically providing up to 3,000-4,000 horsepower to push or pull a train. This type of locomotive has a long history of successful usage in the United States for both freight and passenger rail service and, therefore, the service and reliability record is well established. Domestic manufacturers of diesel-electric locomotives include General Electric, Electro Motive Diesel, Inc. (EMD - formerly the General Motors GM Electro-Motive Division) and Motive Power. The passenger locomotives are typically designed for push or pull commuter rail trains to a maximum of 12-car consists per individual locomotive.

Typical freight and commuter rail diesel-electric locomotives are shown in **Figure 8-3**.

Fig. 8-3: Motive Power Diesel-Electric Locomotives



Photo Credit: Rick Scibelli, Jr.

Coach Cars

Coach cars provide the seating capacity for the passenger service. These cars are coupled to the locomotive in consists suitable to the service demand. Coach cars are available in three configurations:

- **Single-Level Coaches (typical seating capacity of 95 to 125 passengers).** Single level coaches typically provide passenger seating in 3-seat X 2-seat configurations (3x2) on a single level. Single-level coaches are advantageous in situations where there are vertical clearance issues on a rail corridor. (See **Figure 8-4.**)
- **Bi-Level Coaches (typical seating capacity from 145 to 180 passengers).** An increasingly popular option with service providers in the United States, bi-level coaches provide seating in a more spacious 2X2 seat configuration on both levels. These cars are more efficient on a unit basis than single-levels coaches for the number of passengers carried per car. (See **Figure 8-5.**)
- **Gallery Coaches (typical seating capacity from 105 to 145 passengers).** Gallery coaches can provide between 15 to 30 percent more seating capacity than a single level coach. A gallery coach is a variation of the bi-level coach and offers open space between the two sides of the upper level seating area, which allows a train conductor to make one pass through the car to collect passenger tickets. (See **Figure 8-6.**)

Figure 8-4: Single-Level Coach



Figure 8-5: Bi-Level Coach



Figure 8-6: Gallery Coach Interior



Cab Cars

Cab cars are a type of passenger coach that provides passenger seating and train control equipment for an engineer for “push-pull” train operation, i.e. an engineer can operate the train from both ends of the train consist. This increases the efficiency of the commuter rail operation by eliminating the need to either:

- Turn the entire train set around;
- Uncouple the locomotive from the train and move the locomotive to the opposite end of the train to go in the opposite direction; or
- Provide a locomotive on each end of the train.

The addition of control equipment into a passenger coach decreases the passenger seating capacity of the car by 8 to 10 seats depending on how the car is specified. Like coach cars,

cab cars can be manufactured in a bi-level configuration increasing a single car's passenger seating capacity. For this analysis, it was assumed that a cab car could seat 135 passengers. Figure 8-6 illustrates a typical cab car. Manufacturers of FRA-Compliant cab and coach cars operating in the United States include Bombardier, Sumitomo and Kawasaki.

Fig. 8-7: Cab/Gallery Car



8.7.2 Conventional Rolling Stock

Unit cost estimates for standard, FRA-compliant rolling stock were developed through research of recent existing and proposed commuter rail services, procurement processes and feasibility studies completed in the United States. This analysis uses unit cost estimates taken from commuter rail feasibility studies and commuter rail agency procurements completed within the past four years on commuter rail systems in Connecticut, Florida, Maine, New Mexico, Virginia and Wisconsin. Table 8-4 summarizes the results of this analysis, providing a median unit cost for each component of commuter rail train consist. This median unit cost is used later in the analysis to develop a total capital cost estimate for the three service scenarios.

The costs presented here are for new equipment. Although used equipment may be purchased when available, it is uncertain if such equipment, and in what condition, would be available at the time of acquisition preceding startup of operations.

Table 8-4: Results of Rolling Stock Cost Analysis for New Equipment

Equipment Type	Median Unit Cost
Diesel Electric Locomotive	\$ 3,550,000
Single Level Coach	\$ 1,600,000
Bi-Level Coach	\$ 1,700,000
Gallery Coach	\$ 2,030,000
Bi-Level Cab	\$ 2,300,000

The capital costs were indexed in accordance with Association of American Railroad (AAR), *Railroad Cost Indexes* (December 2008) at an assumed inflationary rate of 4.3 percent per year and for a purchase year of 2011 for 2012 start-up of operations. A primary assumption for the cost estimates is that for each train consist, each passenger would be seated and that there will be no standees or overloading.

8.7.3 Scenario 1: AVR and NS Pittsburgh Line Corridor Service

Based on ridership forecasts, this scenario assumes that nine (9) locomotives, six (6) bi-level coaches and ten (10) cab cars would be procured for service on both corridors. This amount includes a spare locomotive and two spare cab cars, which could presumably be used interchangeably on both the NS and AVR corridors. In this scenario, daily peak ridership is forecasted at 1,895 passenger trips on the AVR Corridor and 704 passenger trips on the NS Corridor. Using these ridership assumptions, the total rolling stock capital cost estimate in the 2011 purchase year would be approximately \$76,900,000.

To estimate the total capital cost investment in rolling stock, this scenario makes the following assumptions:

- Conventional rolling stock are assumed, using a diesel-electric locomotive, bi-level coaches and a cab car based on the median unit cost estimate provided in Table 8-4. This analysis assumes a bi-level coach capacity of 145 seated passengers and 135 seated passengers for a cab car.
- The rolling stock requirements for four inbound AM peak trips and four outbound PM peak trips on both corridors are assumed in the cost estimate.
- AVR commuter service would serve Penn Station in Pittsburgh via the Brilliant Branch and the NS Pittsburgh Main Line.

- Peak Daily ridership (Opening Year 2012) will be 1,895 passengers on the AVR Corridor, and 704 daily passengers on the NS Corridor.
- Trips are assumed to be evenly distributed between the AM and PM peak periods, i.e. AM peak ridership was determined by dividing daily peak ridership in half (AVR Corridor AM or PM peak ridership is 1,895/2 or 947 trips).
- The maximum loading for the “peak train” on the AVR Corridor was calculated at 40 percent of the AM (or PM) peak ridership. The peak trip for the AVR corridor must therefore accommodate 379 seat passengers. This trip would thus require a three car consist of two coaches (accommodating 145 seated passengers) and one cab car (accommodating 135 seated passengers). The remaining three trips are assumed to have an even distribution of 190 passengers. The remaining three trips could be accommodated in two car consists of one bi-level coach and one cab car.
- The maximum loading for the “peak train” on the NS Corridor was calculated at 40 percent of the AM (or PM) peak ridership. The peak trip for the NS corridor must therefore accommodate 141 seated passengers in this scenario. This trip would thus require a two car consist of one coach (accommodating 145 seated passengers) and one cab car (accommodating 135 seated passengers). Although the 141 passengers could be accommodated in the single coach car, the cab car would still be needed for push-pull service. The remaining three trips are assumed to have an even distribution of 70 passengers who would be accommodated in a single cab car.
- The total capital cost estimates include a 4 percent spare parts inventory as part of the initial capital cost.
- No additional equipment for mid-day or reverse commute options is assumed, the analysis therefore assumes a unique consist is required for each of the four AM inbound and PM outbound trips in both corridors. Mid-day or reverse commute service could be easily accommodated by the four trainsets that would be purchased due to the anticipated lighter loads.

Table 8-5 provides a breakdown of the capital cost estimate in this scenario.

Table 8-5: Rolling Stock Cost Estimate for Scenario 1 – Combined NS / AVR Service

	AVR Corridor	NS Corridor	Spare Units	Total Units	Median Unit Cost	Total
Locomotives	4	4	1	9	\$3,550,000	\$31,950,000
Bi-Level Coaches	5	1	0	6	\$1,700,000	\$10,200,000
Cab Cars	4	4	2	10	\$2,300,000	\$23,000,000
Subtotal						\$65,150,000
Spare Parts Inventory at 4%						\$2,606,000
Total Cost 2008 Dollars						\$67,756,000
2011 Total Cost at 4.3% Inflation						\$76,900,000

8.7.4 Scenario 2: AVR Corridor Service Only to Penn Station

Based on the opening year ridership forecasts, this scenario assumes that five (5) locomotives, five (5) bi-level coaches and five (5) cab cars would be procured to operate service on the AVR corridor. This amount includes a spare locomotive and one spare cab car. In this scenario the total rolling stock capital cost estimate in the 2011 purchase year would be approximately \$44,600,000.

To estimate the total capital cost investment rolling stock, this scenario makes the following assumptions:

- A standard configuration of train consist was used to include a diesel-electric locomotive, bi-level coaches and a cab car based on the unit cost estimates provided in Table 8-4. This analysis assumes a bi-level coach capacity of 145 seated passengers and 135 seated passengers for a cab car.
- The rolling stock requirements for four inbound AM peak trips and four outbound PM peak trips are assumed in the cost estimate.
- AVR commuter service would serve Penn Station in Pittsburgh via the Brilliant Branch and the NS Pittsburgh Main Line.
- Peak Daily ridership (Opening Year 2012) is forecasted to be 1,895 passenger trips in this scenario.
- Trips are assumed to be evenly distributed between the AM and PM peak periods, i.e. AM peak ridership was determined by dividing daily ridership in half (AVR Corridor AM or PM peak ridership is $1,895/2$ or 947 trips).
- The maximum loading for the peak train was calculated at 40 percent of the AM (or PM) peak ridership. The remaining passenger trips were distributed evenly between the remaining three trains. The peak trip for the AVR corridor must therefore accommodate 379 seat passengers. This trip would thus require a three car consist of two coaches (accommodating 145 seated passengers) and one cab car (accommodating 135 seated passengers). The remaining three trips are assumed to have an even distribution of 190 passengers. The remaining three trips would be served by two car consists of one coach and one cab car.
- The total capital cost estimates include a four percent spare parts inventory as part of the initial capital cost
- No additional equipment for mid-day or reverse commute options is assumed, the analysis therefore assumes a unique consist is required for each of the four AM inbound and PM outbound trips. Mid-day service could be accommodated by one of the four trainsets that would be purchased.

Table 8-6 provides the capital cost estimates in this scenario (using the unit costs provided in Table 8-4).

Table 8-6: Rolling Stock Cost Estimate for Scenario 2 – AVR Service Only

	Number of Units	Spare Units	Total Units	Median Unit Cost	Total
Locomotives	4	1	5	\$3,550,000	\$17,750,000
Bi-Level Coaches	5	0	5	\$1,700,000	\$8,500,000
Cab Cars	4	1	5	\$2,300,000	\$11,500,000
Subtotal					\$37,750,000
Spare Parts Inventory at 4%					\$1,510,000
Total Cost 2008 Dollars					\$39,260,000
2011 Total Cost at 4.3% Inflation					\$44,600,000

8.7.5 Scenario 3: NS Corridor Service Only

Based on the ridership forecasts, five (5) locomotives, one (1) bi-level coach and five (5) cab cars would be needed to operate service in the NS Corridor. This amount includes a spare locomotive and one spare cab car. In this scenario, the total rolling stock capital cost estimate in the 2011 purchase year would be approximately \$36,600,000.

Scenario 3 assumes that passenger service would be provided on the NS corridor only, with a daily peak ridership of 704 passenger trips. To estimate the total capital cost investment rolling stock, this scenario makes the following assumptions:

- A standard configuration of train consist would be used to provide service. The train consist would include a diesel-electric locomotive, bi-level coaches and a cab car based on the median unit cost estimates provided in Table 8-4. This analysis assumes a bi-level coach capacity of 145 seated passengers and 135 seats for a cab car.
- The rolling stock requirements for four inbound AM peak trips and four outbound PM peak trips are assumed in the cost estimate.
- Peak Daily ridership (Opening Year 2012) would be 704 trips in this scenario. This analysis assumes that passenger trips are evenly distributed between the AM and PM period, i.e. AM peak ridership was determined by dividing daily ridership in half (704/2 Daily Peak Trips or 352 AM or PM peak trips). Daily Peak Ridership would be reduced to 656 passenger trips if Irwin was not served, but this would not change the rolling stock requirements.
- The maximum loading for the peak train was calculated at 40 percent of the AM (or PM) peak ridership. The cost estimate thus assumes 141 passengers would use the service in the peak trip. To accommodate this trip, one bi-level coach and one cab car are needed. The remaining 211 passenger trips were assumed to be evenly distributed between the remaining three train trips with a loading of 70 passengers each (who could be accommodated single bi-level cab car for each trip).

- The total capital cost estimates include a 4 percent spare parts inventory as part of the initial capital cost.
- No additional equipment for mid-day or reverse commute options is assumed, the analysis therefore assumes a unique consist is required for each of the four AM inbound and PM outbound trips. Mid-day service could be accommodated by one of the four trainsets that would be purchased.

Table 8-7 presents a breakdown for the rolling stock cost estimates for this scenario.

Table 8-7: Rolling Stock Cost Estimate for Scenario 3 – NS Service Only

	Number of Units	Spare Units	Total Units	Median Unit Cost	Total
Locomotives	4	1	5	\$3,550,000	\$17,750,000
Bi-Level Coaches	1	0	1	\$1,700,000	\$1,700,000
Cab Cars	4	1	5	\$2,300,000	\$11,500,000
Subtotal					\$30,950,000
Spare Parts Inventory at 4%					\$1,238,000
Total Cost 2008 Dollars					\$32,188,000
2011 Total Cost at 4.3% Inflation					\$36,600,000

8.8 Mainline Track Infrastructure

In addition to track upgrades and new track infrastructure associated with the terminal stations, yards and maintenance facilities as included in the cost estimates provided in the previous section, additional track and signal work will be required on the affected mainline portions of the AVR and NS rail lines. These projects and improvements would range from relocation of siding tracks to a major rebuilding and addition of new track on 17.4 miles of the AVR corridor. Cost estimates for the necessary track improvements for each corridor are presented below.

8.8.1 AVR Corridor Track Improvements

The AVR rail line from Arnold to the Coleman Junction with the Brilliant Branch is currently supporting freight operations over jointed rail track at speeds restricted to 10 mph. In order to bring this track up to standards that could support commuter rail operating speeds of up to 70 mph, a major rebuilding of the track would be necessary. This rebuilding would be with new continuous welded rail (CWR) that would provide a quiet and smooth ride for passenger trains. In addition, passing sidings at stations and at the junction of the Brilliant Branch with NS would also be necessary on the one-track mainline railroad. These passing

sidings would also allow freight trains to bypass the tracks serving the proposed single platforms at stations on the AVR line if high level ADA-compliant platforms were required since horizontal clearances are reduced with high level platforms.

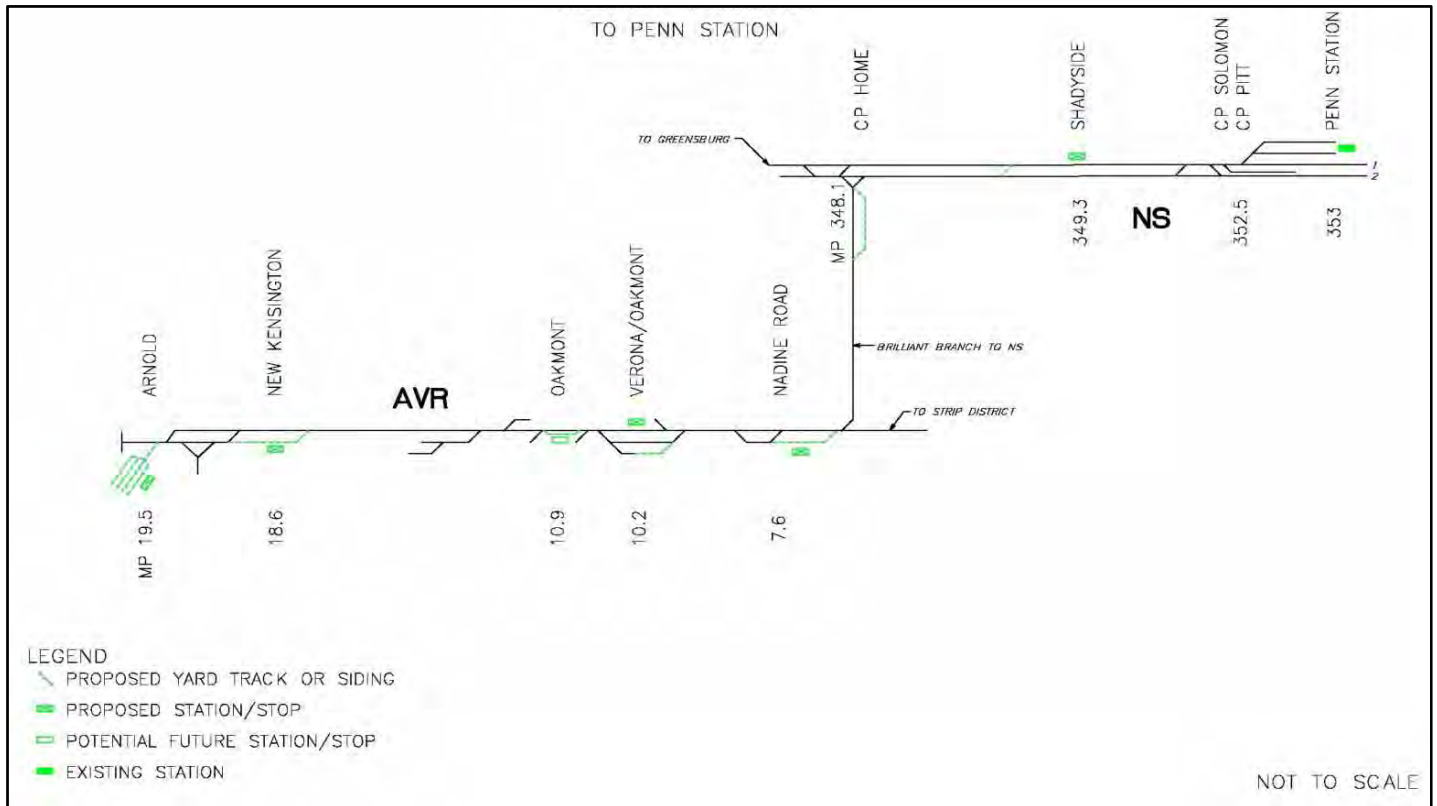
Reduced clearances increase the risk of passing freight equipment contacting the platform edge leading to damage or derailment. If, after consultations with the Federal Railroad Administration (FRA), it is determined that high level platforms are not required, the cost may be reduced for track work at these stations. See **Figure 8-8** for a schematic diagram of the AVR commuter rail line which includes notations of the track system and added improvements.

The cost estimates for proposed improvements on the AVR would include labor and materials for:

- Track upgrades of 91,714 track feet, including siding construction and extensions.
- Mobilization/demobilization for trackwork.
- Eight (8) track turnouts.
- Eight (8) switch heaters.
- Wayside signals and communications for upgraded operations.
- Up-grade crossing protection for 22 at-grade roadway crossings.
- Construction of one (1) mainline left-hand crossover on the NS between Homewood and Shadyside to allow movement of AVR commuter trains to and from the Shadyside Station at S. Negley Avenue.

Engineering and contingency costs as well as a cost additive for environmental cleanup and permitting are included in the cost of the improvements. One challenge that will be encountered with upgrading the AVR line is the need to do so while that railroad is in operation. This could be made somewhat easier, however, since AVR operates principally during the night time hours.

Figure 8-8: Proposed AVR Rail Corridor



In summary, total estimated costs for the track improvements on the AVR Corridor as noted above are \$56,140,000. Details of these costs are presented in Table 8-8.

Table 8-8: AVR Corridor Track Improvements – AVR Service Only

Item Description	Total
Mobilization/Demobilization for Trackwork	\$2,832,000
Sitework	\$267,300
Track Upgrades & Siding Extensions	\$18,511,300
Mainline Crossover on NS to Access Shadyside	\$657,600
Track Turnouts	\$921,600
Switch Heaters	\$662,400
Wayside Signals & Communications	\$4,438,000
Labor	\$3,376,400
Grade Crossing Protection	\$7,331,000
Construction Subtotal	\$38,997,600
Engineering Costs	\$3,119,800
Environmental Cleanup & Permitting	\$2,323,700
Contingency (30% of Construction Cost)	\$11,699,200
TOTAL CONSTRUCTION COSTS	\$56,140,000

8.8.2 NS Corridor Track Improvements

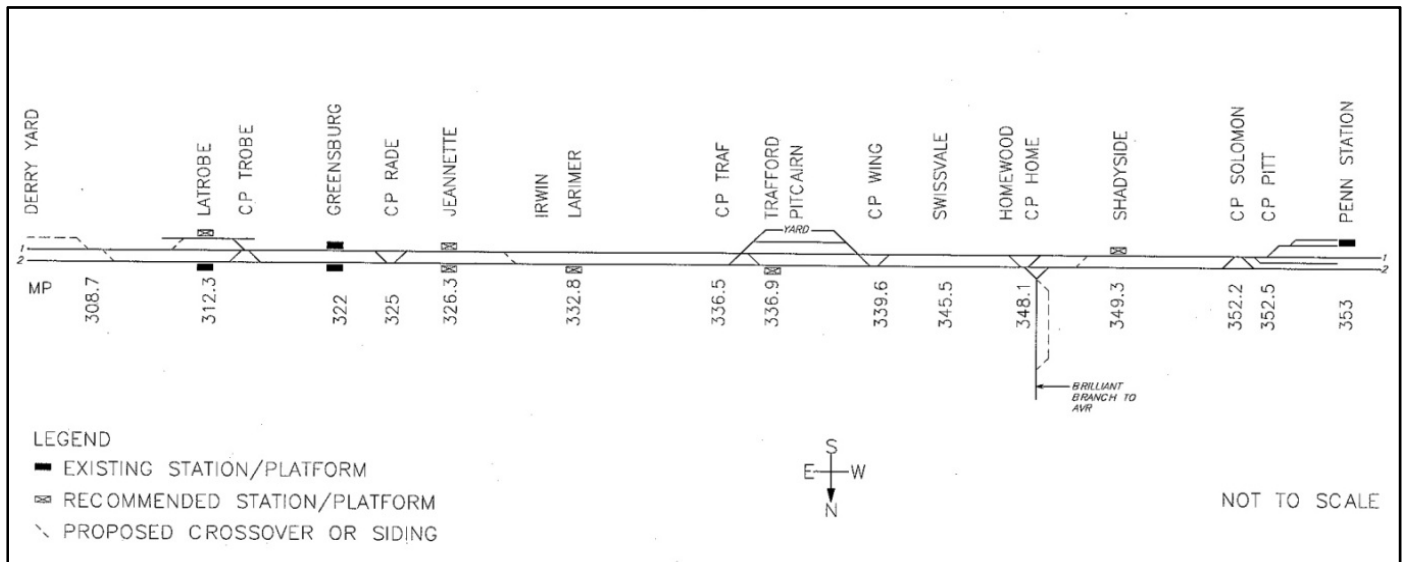
The Norfolk Southern Pittsburgh Line is a two-track rail line that is presently serving as a mainline corridor for the railroad. The portion of the corridor from Derry to Penn Station that would be utilized for commuter service is 44.3 miles in length. The maximum authorized speed (MAS) for passenger trains on this line is 79 mph and would not be increased for commuter rail service. Track improvements along the corridor would thus consist of added infrastructure to access yards and stations and to facilitate train operations. **Figure 8-9** illustrates the corridor and includes notations of recommended improvements to support commuter train operations. These track improvements would include the following:

- Construction of a right-hand crossover at Milepost (MP) 308.7 to access Derry Rail Yard to and from Track 2 which would facilitate use of both platforms at Latrobe.
- Upgrade of siding track and construction of a new connection to Track 1 at Latrobe for access to the station platform on the Track 1 side.
- Construction of a new right-hand crossover between Jeannette and Irwin to better access the Track 1 platform at the Jeannette Station.
- Relocation of an existing siding at Jeannette (Track 1 side) to an undetermined location.

The crossover between CP Home and Shadyside and the passing siding on the Brilliant Branch noted in **Figure 8-9** would only be constructed if commuter rail service were instituted on the AVR. It is important to note that Norfolk Southern as not reviewed these improvements in detail nor has the railroad agreed at this time to the proposed track and operating plan for commuter rail service. NS has indicated they will only provide responses to the proposed services once detailed simulation modeling of all freight and passenger train operations is completed and a determination made of the capacity of the railroad to accommodate the proposed commuter rail service. NS has emphasized the need to reserve and protect adequate capacity on the Pittsburgh Line for future growth in freight service.

The assumption made at this level of planning for service on NS is that the two-track mainline will provide sufficient capacity for at least startup operations of four daily commuter trains to and from Penn Station. The ECTS study had, in its proposal for its full service option on NS, included the addition of a third track between East Pittsburgh (the junction of the NS Mon River Line and Pittsburgh Line) and Greensburg. In this current study that third track is not included and would only be considered once detailed simulation modeling of operations on and capacity of the line is conducted. At an estimated cost of \$2.5 million per mile for a 28-mile third track from East Pittsburgh to Latrobe (the new terminus) a third track could add \$70 million to the capital cost of providing commuter rail service on the NS Corridor.

Figure 8-9: Proposed NS Commuter Rail Corridor



In summary, total estimated costs for the track improvements on the NS Corridor as noted above are \$7,246,000. Details of these costs are presented in Table 8-9.

Table 8-9: NS Corridor Track Improvements – NS Service Only

Item Description	Total
Mainline Crossover to Access Derry Yard	\$805,600
Mainline Crossover at Jeannette/Irwin	\$805,600
Upgrade Siding & New Connection at Latrobe	\$2,427,500
Jeannette Siding Relocation	\$1,137,100
Construction Subtotal	\$5,175,800
Engineering Costs	\$310,500
Environmental Cleanup & Permitting	\$207,000
Contingency (30% of Construction Cost)	\$1,552,740
TOTAL CONSTRUCTION COSTS	\$7,246,000

8.8.3 NS / AVR Dual Service Track Improvements

The cost of mainline track improvements for implementing concurrent commuter service on both the NS and AVR corridors would be additive of the two separate services. Differences in capital construction costs for the combined systems would be associated with shared use of the Shadyside Station by both services and the need for additional train storage capacity at Penn Station as is discussed in Section 8.5, above.

The total combined cost of mainline track improvement for concurrent NS and AVR commuter rail services would be \$63,386,000. Costs for trackwork at the Derry and Arnold Yards and at Penn Station are not included in this total but rather in the costs of each of those facilities. A summary of the costs for track improvements for the combined NS/AVR services is presented in **Table 8-10**, below.

Table 8-10: Corridor Track Improvement Costs – Combined NS/AVR Services

Item Description	Total
Total NS Track Improvement Costs	\$7,246,000
Total AVR Track Improvement Costs	\$56,140,000
TOTAL CONSTRUCTION COSTS	\$63,386,000

8.9 Summary of Capital Costs

This chapter identified and evaluated the capital cost categories and total estimated capital costs that would be incurred in developing commuter rail service on the AVR, NS or combined AVR/NS Corridors. **Table 8-11** which follows summarizes these costs for the three alternatives.

Table 8-11: Summary of Estimated Capital Costs for Commuter Rail Service to Penn Station (2012\$)

Capital Cost Category	NS Only	AVR Only	Combined NS/AVR
Stations	\$22,356,000	\$30,028,000	\$49,299,000
NS 2 nd Platforms (2)	\$5,720,000	-	\$5,720,000
NS Track Improvements	\$7,246,000	-	\$7,246,000
AVR Track Improvements	-	\$56,140,000	\$56,140,000
Derry Yard & Maintenance Facility	\$13,347,000	-	\$13,347,000
AVR Maintenance Facility	-	\$7,000,000	-
Rolling Stock: Locomotives & Cars (2011\$)	\$36,600,000	\$44,600,000	\$76,900,000
TOTAL ESTIMATED CAPITAL COSTS	\$85,269,000	\$137,768,000	\$208,652,000

In a way of comparison, the total capital costs for the two stand-alone alternatives (NS or AVR only) are in general line with the costs estimated in the ECTS study for the NS minimum system (\$76 million in 2003\$) and the AVR starter service to the Strip District in Pittsburgh (\$131 million in 2003\$). The ECTS study did not consider a combined commuter system to Penn Station utilizing the Brilliant Branch connection between the AVR and NS. Again, these estimated costs do not include track and other infrastructure improvements that may be required by the host railroads (AVR and NS) and cannot be determined until both railroads are able to analyze the proposed operations plans in detail. NS has indicated that this will require computer simulation modeling of combined freight and passenger train operations.

9. OPERATION AND MAINTENANCE COST ESTIMATES



9 Operation and Maintenance Cost Estimates

9.1 Introduction

This section addresses the operating and maintenance (O&M) costs for the Commuter Rail Alternatives examined in this study. A resource build-up cost model was used to estimate annual operating and maintenance costs for the three considered alternatives:

- Arnold to Penn Station via the AVR and NS corridors
- Latrobe to Penn Station via the NS corridor
- Combined AVR and NS service via the AVR and NS corridors

Each alternative was examined using a schedule of operations that provided for each rail line four (4) round trip commuter trains, one round trip reverse commuter train and one round trip mid-day return train. In addition, sensitivity testing was also conducted to ascertain the impact of reduced or adjusted schedules on O&M costs.

9.2 General Model Description

Consistent with Federal Transit Administration (FTA) requirements for alternatives analysis studies, the cost model is resource build-up in structure. Resource build-up models compute costs by estimating the labor and materials needed to provide a given level of service, and then apply projected unit costs of labor and material to estimate O&M costs on the basis of system operating statistics.

The cost model applied in this study assumes that an Oversight Agency will oversee a Contract Operator and the other various contract services (e.g., stations, maintenance yards). The Contract Operator is assumed to have responsibility for operation of service and maintenance of rail equipment at a Contract Operator yard facility or facilities. Costs in the cost model are reported as: (a) operating agency expenses and (b) contract operator functions. The cost model consists of a spreadsheet divided into two tables. The first table contains input variables, which are operating statistics that quantify the extent of the system and level of service. The second table relates specific budget categories to the most appropriate input variables.

The following sections describe general operating assumptions for the project alternatives that impact the O&M cost model organization and unit costs.

9.3 Operating Entity

In Chapter 12 of this report alternative potential commuter rail operating entities are identified and evaluated. Alternative operating entities can include existing county, regional or state agencies, or combinations of these, or newly formed entities explicitly formed to operate a commuter rail system. Factors to be considered in choosing the operating entity are identified in Chapter 12 along with recommendations for moving that process forward and selecting the optimal operating framework.

In this chapter the project team assumes that the commuter rail system would be the responsibility of an existing or new Operating Agency with a policy of structuring management and administrative practices to minimize overhead costs. Functions assumed to be performed by the Operating Agency are administration, purchasing, contract compliance, budgeting/finance, marketing/public information, service planning and contract oversight of operations, passenger and employee safety, scheduling, equipment and facilities maintenance and security.

9.3.1 Fare Collection and Structure

The fare collection method assumed for the model is ticket vending machines (TVMs) with proof of payment inspection. The model assumes two-person train crews (one Train Engineer and one Conductor/Fare Inspector) with conductors available to inspect fares aboard the trains. In bus, light rail transit (LRT) or subway transit systems where the vehicle operators sits in the same vehicle as the passengers, it is most often the case that an additional crew member in the form of a fare inspector or conductor is not needed thus allowing for one-person crews. The engineers on conventional commuter rail trains operating with an engine separate from the individual passenger coaches, does not normally have access to the passenger cars. In this case, an operating crew member is normally present in the passenger cars not only to inspect for payment of fares but also for safety and customer service purposes.

9.3.2 Contract Philosophy

Functions that are most suitable for contracting generally include highly specialized tasks such as ticket vending machine maintenance or tasks where private sources are widely available, such as landscape maintenance or janitorial services. The cost model assumes a high level of contract services including:

- Train operations – such as crew and extra board (Train Engineers on standby to relieve or fill-in for ill or absent engineers), transportation management, regulatory compliance and fare inspection.
- Maintenance of rolling stock – includes a variety of tasks from management to inspection, routine/preventative maintenance, minor repairs, repair of major components (e.g., engine rebuilding, axle and wheel work, seat repair, HVAC equipment and other equipment not

under warranty), major repair of vehicles (e.g., body and paint work following an accident) and warranty inspection.

- Maintenance of facilities – such as track and wayside equipment, buildings and grounds. Contracts for track-related maintenance would apply to all agency-owned right-of-way (maintenance yard, outlying storage yards, and terminal stations). Other than the track itself, related maintenance includes inspection, troubleshooting and repair of signals and switches within the yards and maintenance facility. Other equipment to be maintained under the Operator Contract will include ticket vending machines, shop equipment and communications systems (e.g., public address). Contract maintenance of buildings and grounds include yards, stations and parking lots. Assumed contract functions include landscaping and grounds maintenance, HVAC, janitorial services and graffiti removal.
- Administration – yard security, audit and legal services, risk management, information systems and revenue collection and accounting.

9.3.3 Yards

The O&M cost model assumes the Commuter Rail system for the NS and combined NS/AVR alternatives will have one maintenance yard at Derry on the NS line, which will also serve as the overnight/storage yard for commuter trains operating on the NS line. The AVR line model assumes an end-of-line overnight storage facility at Arnold, which will also serve as a light maintenance facility. For the AVR-only alternative, a separate maintenance facility would be constructed at a yet to be determine location in the vicinity of Arnold or New Kensington where numerous sidings and available properties exist for such a building. Work in the main yard maintenance facilities will include vehicle inspection, maintenance, repair and overhaul. Spare vehicles, repair parts and materials will also be stored in the main yard maintenance facilities. Light cleaning may be completed at the end-of-line yards including at Penn Station in Pittsburgh which will serve as the mid-day layover location for both AVR and NS line trains.

9.3.4 Security

Security to protect facilities and equipment in the yards will be the responsibility of the Contract Operator. Local jurisdictions will be responsible for policing/patrolling station areas, parking lots, and railroad crossings as part of their routine duties. Conductors/Fare Inspectors will provide fare inspection as well as a security presence aboard all trains.

9.4 Cost Model Structure

The O&M cost model consists of two tables: (1) Input Statistics and (2) Line Item Cost Detail. Following is a brief description of each of these model components.

9.4.1 Input Statistics

Directly or indirectly, input variables determine costs for every line item in the model. Input statistics must be developed for each alternative based on proposed operating plans and ridership forecasts. The model input variables are:

1. Annual Passenger Trips – Total number of passenger boardings.
2. Peak Passenger Cars – The maximum number of passenger vehicles scheduled in service at the same time.
3. Peak Trainsets – The maximum number of trains in scheduled service at the same time.
4. Annual Revenue Train-Hours – Total hours of revenue service operated by all trains in one year.
5. Annual Revenue Car-Hours – Total hours of passenger car-hours operated by all trains in one year.
6. Annual Revenue Train-Miles – Total miles of revenue service operated by all trains in one year.
7. Annual Revenue Car-Miles – Total miles of revenue service operated by all passenger vehicles in one year.
8. Directional Route-Miles – Total miles of track in the system that is used for revenue train service, excluding maintenance yards, storage and rail track. For example, a five-mile segment of double track counts as ten directional route-miles.
9. Stations – Total number of passenger stations in the rail system.
10. Maintenance Yards – The number of yards with maintenance and shop facilities.
11. Daily Revenue Train Trips – The number of one-way revenue train trips operated each day.
12. Average Price of Diesel Fuel – The current average price of diesel fuel.

9.4.2 Line Item Detail

The Line Item Detail table includes a build-up of specific labor costs, by department and position, and non-labor expenses, by department and type of expense. The following departments and functions were identified for the Contracting Agency and the Contract Operator:

Operating Agency

- Executive Director's Office
- Administration & Finance
- Insurance
- Customer Service
- Contract Operations
- Payment to Railroad

Contract Operator

- General Manager's Office
- Safety & Training

- Operations
- Equipment Maintenance
- Engineering / Maintenance of Way
- Administration & Finance
- Management Fee

Specific positions within each office were identified based on an established peer commuter rail system: the Virginia Railway Express (VRE), and another system which is currently in Final Design, SunRail (Orlando, FL). Labor productivity factors were developed based on SunRail’s staffing plan and staffing data derived from VRE. Average labor wage rates and fringe benefit rates were derived for comparable positions at agencies within proximity to the peer systems. Wage rates for specialized positions (e.g., Track and Signal Maintainers) were derived from other commuter rail operators.

Non-labor costs were derived from Maintenance-of-Way cost estimates prepared using cost data provided by VRE and other commuter rail operators (e.g., fuel, insurance, travel and training, etc.).

For each labor and non-labor line item, the model then calculated the annual O&M cost based on the wage rate, productivity factor, and unit cost and the value of the corresponding input variable (e.g., annual revenue car-miles).

9.5 O&M Cost Results

9.5.1 Project Alternatives / Assumptions

Operating and maintenance cost estimates were developed for the three alternatives, as described in Table 9-1, below. More detailed operating characteristics are included for each alternative in the attached appendices.

Table 9-1: Project Alternatives

Alternative	# Daily Trips	One-Way Route Miles	Travel Time	Stations	Description
AVR	12 (8 peak, 2 reverse, 2 mid-day)	20.04	40 minutes	6	AVR service from Arnold to Penn Station via Brilliant
NS	12 (8 peak, 2 reverse, 2 mid-day)	41.11	62 minutes	7	NS service from Latrobe to Penn Station
AVR+NS	24 (16 peak, 4 reverse, 4 mid-day)	56.25	N/A	11	Combined AVR and NS alternatives

9.5.2 Cost Estimates

Estimated O&M Costs for the three project alternatives, with service levels as noted above, are listed in Table 9-2, below, and are presented in 2012 dollars.

**Table 9-2: O&M Costs
(2012\$)**

Alternative	Annual Cost	Cost per Passenger
AVR Corridor	\$12,625,200	\$18.48
NS Corridor	\$14,851,300	\$42.77
AVR Corridor + NS Corridor	\$22,479,400	\$21.82

It is important to note that the per passenger costs shown in Table 9-2 are for the assumed opening year of 2012. As ridership grows there would be a substantial decrease in O&M costs on a per passenger basis, especially in the early years prior to the need to add any additional passenger car equipment.

9.5.3 Sensitivity Testing

Tests were also made of O&M costs of two variations in the service levels noted above. In Test 1, an assumption was made that only basic inbound AM and outbound PM commuter services, four round trips on each line, would be offered. No reverse commute or mid-day services would be provided. This scenario would see a reduction in passengers but also a reduction in variable operations and train costs. Some fixed costs, such as building maintenance costs, would remain constant. The results of this test are shown in Table 9-3, below, along with the percentage change in the cost in comparison to the full service costs noted in Table 9-2, above.

**Table 9-3: O&M Costs – Test 1: Four-Train Basic Commuter Service Only
(2012\$)**

Alternative	Annual Cost	Cost per Passenger
AVR Corridor	\$11,432,000 (-9.5%)	\$23.75 (+15.9%)
NS Corridor	\$13,266,200 (-10.7%)	\$74.19 (+73.5%)
AVR Corridor + NS Corridor	\$19,701,100 (-12.4%)	\$29.84 (+36.8%)

With all three alternatives the fixed and variable operating costs would be reduced by running fewer trains. However, the number of passengers carried would be reduced as well and to a greater proportion than the O&M costs resulting in substantial increases in Cost per Passenger as noted.

In Test 2, an assumption was made that the basic inbound AM and outbound PM commuter services, four round trips on each line, would be offered along with 90 Minute Off Peak services throughout the day in lieu of just morning or evening reverse commute service and what was considered a single mid-day return service to Arnold on the AVR and to Latrobe on NS. This test assumes a service more closely aligned to traditional transit service (bus or light rail) throughout the day. This scenario would not see, however, a reduction in passengers in comparison to the

full service scenarios offered with the basic Alternatives since it would be able to generally maintain the same level of overall service in each corridor only at a slightly greater frequency. There would be an increase in variable operations and train costs due to trains operating at greater frequencies. Some fixed costs, such as building maintenance costs, would remain constant. The results of this test are shown in Table 9-4, below, along with the percentage change in the cost in comparison to the full service costs noted in Table 9-2, above.

Table 9-4: O&M Costs – Test 2: Four-Train Basic Commuter Service + 90 Minute Off Peak Service (2012\$)

Alternative	Annual Cost	Cost per Passenger
AVR Corridor	\$13,868,300 (+9.8%)	\$18.31 (+9.8%)
NS Corridor	\$16,584,700 (+11.7%)	\$47.76 (+11.7%)
AVR Corridor + NS Corridor	\$25,393,600 (+13.0%)	\$24.65 (+13.0%)

With all three alternatives in Test 2 the variable O&M costs would be increased due to running a greater number of trains to cover the 90-minute service throughout the day. However, since the number of passengers carried would remain the same as the base case, the Cost per Passenger would increase proportionally as well, as noted in Table 9-4.

The sensitivity testing has shown that substantial variations in O&M costs can occur based on commuter trains service frequencies and number of passengers utilizing the services. The challenge to the Operating Agency would be to balance service frequencies, hours of service and ridership in order to arrive at acceptable O&M operating costs when calculating trip fares and provision of subsidies to cover the shortfall in funds not covered by the fare box.

10. LAND USE AND TOD



10 Rail Station Land Use and Transit Orientated Development Potential

The purposed of this chapter is to preliminarily assess the potential for transit orientated development at selected (proposed) station locations in both the Norfolk Southern (NS) and Allegheny Valley Railroad (AVR) commuter rail corridors. This analysis seeks to accomplish several objectives:

- Assess existing and future land use plans and patterns of development in the commuter rail corridors to identify if either or both of the commuter rail projects would receive a medium or higher rating for transit supportive land uses by the Federal Transit Administration (FTA). This task is being undertaken in anticipation that the projects could be evaluated in the FTA New Starts process.
- Describe the characteristics of Transit Orientated Development (TOD).
- Describe FTA transit-supportive land use evaluation and ranking criteria.
- Review existing land use plans at the local, county, regional and state level to identify transit supportive land use and zoning policies and goals.
- Determine if the proposed station locations are targeted for transit orientated development, or if the existing development pattern is transit supportive.

To enhance the position and rankings of the NS and AVR corridor projects for potential funding in the FTA federal funding programs both corridors should be able to demonstrate:

- Land use patterns at the existing and proposed stations that are transit-supportive.
- Transit-supportive land use policies and plans at the local, county, regional and state level.
- Municipal zoning codes and ordinances that allow transit-oriented development (TOD) pedestrian access and reduced parking requirements.
- Good pedestrian, bicycle and disabled access at the proposed station locations
- Higher residential, commercial, retail or employment densities within a $\frac{1}{4}$ and $\frac{1}{2}$ mile radius of a station location.
- Transit-supportive projects within a $\frac{1}{2}$ -mile radius of the proposed station locations in the development approval process.
- Other unique local land use factors at proposed station locations, such as downtown development, historic preservation/adaptive reuse plans, brownfield remediation and redevelopment, supportive public facilities, and multimodal opportunities.

10.1 Station and Corridor Locations

This analysis specifically focuses on two existing and five proposed stations on the Norfolk Southern (NS) and Allegheny Valley Railroad (AVR) Corridors. **Figure 7-1** and **Figure 7-2** shown earlier illustrate the preferred station locations on NS and AVR rail corridors. The seven stations, all in or adjacent to the downtown areas they are located in, are:

NS Corridor

1. *Latrobe*. Latrobe is an existing train station served by Amtrak on NS corridor and would be the eastern terminus on the NS corridor.
2. *Greensburg*. Greensburg is an existing train station on the NS corridor also served by Amtrak.
3. *Jeannette*. Jeannette, a location of former commuter rail station site, is a proposed station on the NS corridor.
4. *Irwin*. Irwin is a proposed station on the NS corridor. There are two alternative locations under consideration.

AVR Corridor

1. *Arnold*. Arnold is a proposed station that would be the northern terminus of the AVR corridor.
2. *New Kensington*. This proposed station would serve the City of New Kensington on the AVR Corridor and is located in the downtown area.
3. *Oakmont/Verona Station*. This proposed station is well located to serve both communities of Oakmont and Verona.

The two stations not evaluated in this analysis are the major employment destination stops at Penn Station in Downtown Pittsburgh and the proposed Shadyside Station in the Oakland area of Pittsburgh. Oakland is the location of Carnegie Mellon University, the University of Pittsburgh and numerous health care centers which serve the region and universities. Both Penn Station and the proposed Shady Side station are densely developed areas and primary employment centers for the region. The conclusion for both these stations is that the land use patterns around the station are already highly transit supportive and are already well served by the East Busway. Whereas the other stations identified have a range transit supportive land use and development opportunities.

10.2 Transit Orientated Development (TOD)

Transit Orientated Development (TOD) provides communities with an alternative to low-density suburban sprawl and automobile-dependent land use patterns. In one recent Caltrans study in California, TOD was defined as follows:

“Transit Oriented Development (TOD) is moderate to higher density development, located within an easy walk of a major transit stop, generally with a mix of residential, employment and shopping opportunities designed

for pedestrians without excluding the auto. TOD can be new construction or redevelopment of one or more buildings whose design and orientation facilitate transit use.”¹

TOD seeks to align transit investments with a community’s vision for how it wants to grow, creating a “livable” mixed-use, possibly denser, walkable “transit village.” A successful TOD will reinforce both the community and the transit system.

In general, people living and working in TODs walk more, use transit more, and own fewer cars. TOD households are twice as likely to not own a car and own roughly half as many cars as the “average” household. At an individual station, TOD can increase ridership by 20 to 40 percent and up to five percent overall at the regional level. People who live in a TOD are five times more likely to commute by transit than other residents. Locations next to fixed guideway systems such as Commuter Rail Transit and Light Rail Transit can enjoy increases in land values over 50 percent in comparison to locations away from transit stops.

10.2.1 TOD Land Use and Design Principles

Transit-oriented development may be described by four basic principles, which define the essential characteristics of all successful TODs:

- Greater density than community average.
- Mix of land uses, residential, retail, etc. within walking distance.
- Quality pedestrian environment offering convenient and comfortable places for pedestrians.
- Defined center offering multiple attractions and to frequent the area.

These basic four principals are dependent upon one another to collectively create the transit and pedestrian supportive environments exemplified by successful TODs. Used together, they provide the opportunity to create great places at transit stations.

10.3 FTA Criteria for Transit Supportive Land Uses

The FTA evaluates and prepares a list of transit of projects it recommends for funding to Congress on an annual basis. The FTA evaluates transit projects based on five criteria:

- Mobility Improvements
- Environmental Benefits
- Operating Efficiencies
- Cost Effectiveness
- Transit Supportive Land Use

¹ California Department of Transportation TOD Study Technical Advisory Committee, January 2002

Transit supportive land use is thus a critical component in the FTA's evaluation and ranking of a transit project for funding. The FTA quantifies the land use assessment using a 5-point scale with "1" being a "low" rating and "5" being a "high" (most effective) rating. The FTA ranks transit supportive land use characteristics of a project by evaluating: 1) Existing Land Use; 2) Transit Supportive Plans and Policies (in a transit corridor); 3) Performance and impact and of [transit supportive] policies. Table 10-1 summarizes the criteria that FTA uses to rank a potential project's land use characteristics. The previous section describes elements of transit orientated development which are generally considered attributes of "transit supportive land use."

The FTA will assess a proposed project's potential for encouraging TOD type development at both a station (municipal) and corridor (regional) level. This FTA's land use assessment for a proposed transit project is oriented to understanding a community's existing land use patterns and its ability to be transit-supportive.

Within this context, FTA asks communities to evaluate existing land use, transit-supportive plans and policies, performance and impacts of land use policies, and other land use considerations (e.g. an existing train station served by Amtrak for intercity passenger service). The intent of FTA is to demonstrate how communities progressively move from a current position (possibly limited) land use potential to a position of greater transit-supportiveness.

Table 10-1: FTA Criteria for Evaluating Land Use

Land Use Rating Category and Associated Factors	Supporting Factors
I. EXISTING LAND USE	
a. Existing Land Use	<ul style="list-style-type: none"> • Existing corridor and station area development
	<ul style="list-style-type: none"> • Existing corridor and station area development character
	<ul style="list-style-type: none"> • Existing station area pedestrian facilities, including access for persons with disabilities
	<ul style="list-style-type: none"> • Existing corridor and station area parking supply
II. TRANSIT SUPPORTIVE PLANS AND POLICIES	
a. Growth Management	<ul style="list-style-type: none"> • Concentration of development around established activity centers and regional transit
	<ul style="list-style-type: none"> • Land conservation and management
b. Transit-Supportive Corridor Policies	<ul style="list-style-type: none"> • Plans and policies to increase corridor and station area development
	<ul style="list-style-type: none"> • Plans and policies to enhance transit-friendly character of corridor and station area development
	<ul style="list-style-type: none"> • Plans to improve pedestrian facilities, including facilities for persons with disabilities
	<ul style="list-style-type: none"> • Parking policies
c. Supportive Zoning Regulations Near Transit Stations	<ul style="list-style-type: none"> • Zoning ordinances that support increased development density in transit station areas
	<ul style="list-style-type: none"> • Zoning ordinances that enhance transit-oriented character of station area development and pedestrian access
	<ul style="list-style-type: none"> • Zoning allowances for reduced parking and traffic mitigation
d. Tools to Implement Land Use Policies	<ul style="list-style-type: none"> • Outreach to government agencies and the community in support of land use planning
	<ul style="list-style-type: none"> • Regulatory and financial incentives to promote transit supportive development
	<ul style="list-style-type: none"> • Efforts to engage the development community in station area planning and transit-supportive development
III. PERFORMANCE AND IMPACTS OF POLICIES	
a. Performance of Land Use Policies	<ul style="list-style-type: none"> • Demonstrated cases of development affected by transit supportive policies
	<ul style="list-style-type: none"> • Station area development proposals and status
b. Potential Impact of Transit	<ul style="list-style-type: none"> • Adaptability of station area land for development
Investment on Regional Land Use	<ul style="list-style-type: none"> • Corridor economic environment
IV. OTHER LAND USE CONSIDERATIONS (Optional)	
Exceptional Examples	<ul style="list-style-type: none"> • Historic, environmental, community preservation, etc.

Source: Federal Transit Administration, Office of Planning, *Guidelines and Standards for Assessing Transit-Supportive Land Use*, May 2004.

10.3.1 FTA Land Use Assessment Process

Under the FTA New Starts process and using the criteria described in Table 10-1, the evaluation of a transit project's transit orientated land use potential is the responsibility of three parties:

1. Project Sponsor Agencies, e.g. a Regional Transit Authority
2. FTA
3. FTA's Land Use Assessment Contractors

It is the responsibility of the project sponsor agency to compile the land use information necessary for analysis and ranking by the FTA. The FTA and FTA Regional Offices (Region III Office in Philadelphia for projects in Pennsylvania) determine the final land use assessment ranking for a project.

10.4 Review of Local, County and Regional Plans

As described in Section 10.3, the FTA criteria specifically address transit-supportive plans and policies as a primary evaluation factor. Where available, municipal zoning ordinances and comprehensive plans for each community with a proposed rail station were evaluated.

Both Westmoreland County and Allegheny County develop and maintain Comprehensive Plans to ensure land use planning consistency at the county level. The Project Team conducted a complete review of the relevant planning documents at the county and regional level. Both the county and regional plans provide clear guidance and recommendations for transit supportive land use and development. These regional and county plans are highly consistent with transit supportive land use goals set out by the FTA at the municipal and corridor level. The Commonwealth of Pennsylvania also encourages municipalities in the State through the implementation of Transit Revitalization Investment Districts (TRID).

This section examines each plan in more detail.

10.4.1 US Route 30 Corridor Proposed Vision Plan

The Smart Growth Partnership of Westmoreland County (SGPWC) is a community-based non-profit organization located at the University of Pittsburgh, Greensburg campus. SGPWC advocates for smart growth type development within Westmoreland County that is entirely consistent with transit-supportive land use design principles. In July 2007, the SGPWC prepared the *US Route30 Corridor Proposed Vision Plan for the Year 2030*. The plan analyzed land use and made recommendations for improved land use patterns along the Route 30 highway corridor east to west from Ligonier Township to North Huntingdon Township at the border of Allegheny County. Included in the study area were the municipalities of Latrobe, Greensburg, Jeannette, and Irwin.

The Route 30 plan provides excellent locally developed guidance for different types of Transit and Pedestrian Orientated Development (TOD and POD) concepts that are applicable in both commuter rail corridors.

The examples in the Route 30 Master Plan provide context sensitive TOD and POD design concepts that are appropriate to the population and scale of development for the municipalities in the study area. The Plan classifies the proposed station areas in Latrobe, Greensburg, Jeannette and Irwin as municipalities with existing “Urban Mixed Use” development patterns and provides a potential “Urban Mixed Optimized” development concept. The Urban Mixed-Use Optimized concept would be a TOD/POD type circular development zones one-half mile in diameter with clearly defined activity center, pedestrian focus and higher densities. **Figure 10-1** illustrates the Urban Mixed Use Optimized development concept. Within a half mile development zone, this concept holds residential densities at approximately 10 units/acre, and recommends minor increases in park and land devoted to industrial/employment use. As discussed in the next few sections, the historical development patterns in many of the town and city centers of the region are implicitly pedestrian orientated, compact, mixed use and in some cases transit orientated. Thus this Plan recommends incremental changes to development patterns around the station areas. As station locations are further analyzed, SGPWC and their planning efforts provide valuable development recommendations to the municipalities of Westmoreland County.

10.4.2 Allegheny County

Three locations in Allegheny County are found on either the NS or AVR Corridors and were considered for commuter rail stations. Oakmont and Verona are located on the AVR Corridor and the Trafford 2 site on NS is also located in Allegheny County.

As required by Pennsylvania Municipalities Planning Code, Allegheny County completed a comprehensive plan in December 2008 titled “Allegheny Places: The Allegheny County Comprehensive Plan.” The Plan put specific emphasis on the concept of “placemaking,” and makes recommendations guiding future growth, economic development as well as conservation in the region. Central to the land use elements of the Plan is the concept of “placemaking” and transit orientated development. Placemaking is defined in the Plan as existing or future locations with a unique character and strong associations with local residents, a “sense of place.”

The Plan refers to Oakmont as one of numerous “Trolley Suburbs” in the County. Trolley suburbs in Pittsburgh were developed in the 1890’s in the Pittsburgh region as commuter neighborhoods and have existing desirable compact, mixed use transit supportive land use characteristics within the municipal centers.

Figure 10-1 SGPWC Urban Mixed-Use POD Concept

Enhanced Urban Landscape

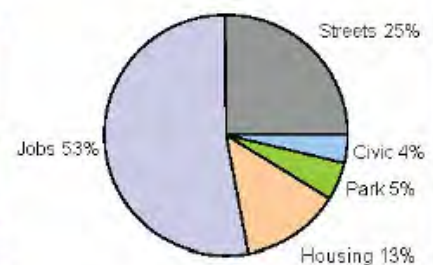
Urban mixed use development patterns enhance the existing urban areas of Irwin, Jeannette, Greensburg and Latrobe with jobs and housing better integrated into the urban fabric.

urban mixed use



@10 net dwelling units/acre
@33 jobs/acre

urban mixed use optimized



@10 dwelling units/acre
@40 jobs/acre

Source: Smart Growth Partnership of Westmoreland County, *US Route30 Corridor Proposed Vision Plan for the Year 2030*, July 2007

The Allegheny County Plan also includes a model Transit Orientated Development (TOD) zoning ordinance which municipalities in Allegheny County could choose to adopt.

10.4.3 Westmoreland County

Westmoreland County contains seven of the municipalities within the study area proposed for commuter rail stations, including the municipalities of Latrobe, Greensburg, Jeannette, Irwin, and Trafford on the NS Line and Arnold and New Kensington on the AVR Line.

As required by Pennsylvania Municipalities Planning Code, the Westmoreland County Department of Planning and Development completed a Comprehensive Plan in January 2005. The County's Comprehensive Plan provides each municipality in the County with guidance toward regional land use planning goals, and to ensure land use, transportation and economic planning consistency across the County. The County Comprehensive Plan provides the municipality of Westmoreland County with a clear set of transit supportive land use polices and goals.

As it relates to transit supportive land use, the Plan states:

“The land use goal for suburban areas is to encourage a higher quality of development that improves the visual environment and reduces traffic congestion. Towards this end, the number of curb cuts on commercial highways should be limited and contiguous development tracts should be linked. Mixed uses should be encouraged wherever possible. Shopping areas should be connected to residential areas in a way that reduces dependency on the automobile.”²

The County's Comprehensive Plan defines clear goals for municipalities as it relates to “smart growth.” The Plan also supports the community design and planning principles recommended by the SGPWC.

As it relates to transit supportive land use, the County Plan observes existing, desirable land use characteristics in many of the settled areas of the County. Many municipalities settlement predates the automobile, Euclidean zoning and “implicitly” transit and pedestrian orientated. Often villages grew around the factories that employed residents. Another important observation are settlement patterns around the railroad (particularly industrial sites) that often were pedestrian accessible.

10.4.4 Southwest Pennsylvania Commission (SPC)

The Pittsburgh region's Metropolitan Planning Organization (MPO), the Southwest Pennsylvania Commission (SPC), regularly maintains a Constrained Long Range

² Westmoreland County, *Westmoreland County Comprehensive Plan*, January 2005, pg. 14.

Transportation Plan. This Plan includes recommendations for transportation investments for the region as a whole, including both Westmoreland and Allegheny County. In addition to transportation investments, this plan also provides land use and economic development recommendations. The most current SPC Plan was revised in June 2007 and January and 2009 and is titled “2035 Transportation and Development Plan for Southwestern Pennsylvania.”

As it relates to transit supportive land use in the municipalities with proposed commuter rail stations, the plan provides guidance and investment recommendations for:

- Bike and Pedestrian Facilities
- Planned Transit Investments
- Identified linear corridors (including) rail
- An analysis of a “TOD Growth Scenario” envisioning land use development patterns out to the year 2035.

The TOD Growth Scenario was one of five potential growth scenarios presented to stakeholders for further analysis. The TOD growth scenario met the following regional land use and transportation policy objectives:

- Development Locations: Development within or adjacent to existing communities with existing public transportation.
- Development Density: Medium to high-density is necessary to support public transportation.
- Development Mix: mixed-use, primarily residential commercial, mixed-income communities with pedestrian connectivity and containing employment centers.
- Transportation System Elements: Strong public transit focus with intermodal and multimodal options available.
- Policy goals for TOD Growth Scenario are also outlined in the SPC Plan including:
 - Maintenance of the existing transportation system will be a regional priority.
 - Transportation and development choices will reflect a priority on multimodal and intermodal networks for both people and goods.
 - The expansion and enhancement of infrastructure to accommodate regional growth will be a priority.
 - The region’s transit system will connect people with resources throughout the entire region.

An important element and exercise in the Plan was the engagement of stakeholders and the public to reach consensus on a future growth scenario for the region. Three alternative growth patterns were further analyzed to arrive at a preferred regional growth scenario:

- The Dispersed/Fringe Scenario that would further spread development and lower density in the region.
- The Compact/Infill/Transit Orientated Scenario that would have the highest development density and lowest land use impact.
- The Corridor/Cluster Scenario which was hybrid scenario, having the second highest development density and second lowest land use impact.

The SPC Plan found advantages and disadvantages to a future TOD type growth scenario in the region. On the positive side, the TOD scenario had the highest development density and hence impacted the least amount of land impacted and preserved more open space. This growth scenario would also maximize the number of households close to transit stops, but would create a situation where the second fewest number of households would be located in proximity to major highway interchange. The scenario minimized household trip generation rates in comparison to the other Dispersed/Fringe Scenario. The TOD Scenario also had the forecasted lowest cost for future investment in basic infrastructure. On the negative side, regional stakeholders concluded that it would be difficult to implement a TOD scenario because of the lack of dependable transit service in all areas of the region. Regional stakeholders also felt there would be a “reticence to change” if this land use scenario was carried forward.

Below is a summary of the positives and negatives as outlined in the SPC Plan for a TOD Growth Scenario for the Region³:

The Positives

- Leverages existing and previous investment in infrastructure.
- Preserves agricultural and open space areas.
- Better services for transit dependent and the elderly.
- More energy efficient.
- More bicycle and pedestrian friendly.
- Reinvestment in older communities and brownfields.
- Better utilization of public services.

The Negatives

- High cost and other challenges of redevelopment.
- Areas of the region that do not have good transit would suffer.
- There are economic costs tied to social challenges that need to be considered.
- Drive up home prices and real estate taxes.
- Tough to get people to change.

³ Southwestern Pennsylvania Commission, *2035 Transportation and Development Plan for Southwestern Pennsylvania*, June 2007. Updated January 2009, pp. 4-32

- Does not take care of small towns.
- Under current transit climate this is not realistic.
- Impact on historic areas.

The Preferred Growth Scenario would focus development along the US Route 30 Corridor in Westmoreland County for example, encouraging higher density and infill development wherever possible.

The SPC Plan also had Economic Development component that is interrelated to both transportation and land use. The Plan outlines major policy goals in which state or other economic developing funding is sought through the SPC:

The AVR and NS Commuter Rail project appear to support a number of the economic development goals in the plan in several ways:

- Encouraging redevelopment and infill within existing town and city centers focused around a commuter rail station.
- Focusing development along a multi-county rail corridor.
- Connecting education and medical clusters in the City of Pittsburgh with the regions workforce.
- Proactively supporting colleges and universities by connecting them with municipalities on the AVR and NS corridors.

10.4.5 State Transit Revitalization Investment Districts (TRID)

In 2004, the Commonwealth of Pennsylvania legislature enacted legislation to encourage transit supportive land use policies within the state's municipalities.⁴ The legislation, known at the State Transit Revitalization Investment District Act (TRID) of 2004 sought to encourage transit orientated development through several means:

- Establish defined geographic areas 1/8th mile to ½ mile around a major transit facility (formalized through zoning approval) in which the real estate tax increment from new development occurring within the TRID is shared among partners.
- Designate partners in the TRID development area which are typically the municipality, transit agency, school district and county to make public improvements within the TRID.
- Use public funding established by TRID for community infrastructure improvements including transit facilities, roadways, sidewalks, water, sewage, etc.

The development within a TRID is transit oriented in nature (TOD) and should be mixed use, walkable, bikeable, etc. TRID has also been referred to as "Tax Increment Financing (TIF) for transit."

⁴ Southwest Pennsylvania Commission, *2035 Transportation and Development Plan for Southwestern Pennsylvania* June 2007 and January 2009, pp. 6-61.

In February 2009, the City of Greensburg completed a study to evaluate TRID type development opportunities within the City. The study identifies underutilized, vacant or potentially redevelopable land within a one-half mile radius of the Westmoreland County Transit Authority (WCTA) Transit Center (at 41 Bell Way) in Greensburg. The Transit Center is located within 700 feet of Greensburg's train station and thus the analysis is useful to evaluate transit supportive development potential for the train station as well. The study identifies seven locations in the downtown Greensburg area that would be priorities for mixed-used, higher density transit-supportive development. The Study also identified other lower ranking properties within the half mile radius which offer development opportunities. The analysis for Greensburg Train Station is discussed in more detail in the next section.

The Greensburg TRID Study is a good example for other municipalities (particularly in Westmoreland County) to follow. This study serves as a framework/analytical tool for municipalities to evaluate transit-supportive development opportunities for vacant, undeveloped or underutilized property around (existing and proposed) transit stations. Additionally, the same County stakeholders who collaborated on the Greensburg TRID Study could be involved in a potential future TRID analysis for Latrobe, Jeannette, Irwin, Arnold or New Kensington.

10.5 Preliminary Station Analysis

This section provides a preliminary development analysis for potential transit oriented development around each of the recommended stations locations on the AVR and NS corridors. The proposed commuter rail station locations are spread widely across the region but most of the settled areas where train stations exist (or existed) have implicit TOD land use patterns as discussed in the previous section. Downtown station locations are compact, and mixed use commercial/residential. Proposed locations in Arnold and Trafford may remain more industrial or commercial in character but future development could be transit orientated as an employment center. For most of the municipalities any future TOD would likely be infill type redevelopment around already settled residential or downtown areas.

The approach to the analysis follows the basic methodology outlined in the TRID Study completed by the City of Greensburg, i.e. identification of vacant or underutilized property within a half-mile radius of a recommended train station location. High resolution oblique imagery and aerials, and GIS were used to identify:

- The center point for the analysis which is proposed or existing commuter rail station location.
- A half-mile development boundary (zone) around a station.
- Vacant and underutilized property which could include brownfield/former industrial sites.

- Existing land use and residential neighborhoods. This task was accomplished through field review at each site and the interpretation of high resolution oblique and aerial imagery.
- Existing pedestrian and bicycle facilities in the half-mile zones.
- Existing and future activity centers, e.g. the New Kensington Campus of Westmoreland County Community College (WCCC).

This evaluation assumes that existing residential neighborhoods and parks and recreation areas would be preserved in all cases.

10.5.1 AVR Corridor

10.5.1.1 Arnold

Arnold is the northern terminus of the AVR Corridor in proximity to the intersection of Drey Street and Dr. Thomas Boulevard and is described in more detail in Chapter 5. A commuter rail station and storage yard is proposed for construction in Arnold at an abandoned industrial site. Passenger platforms are also proposed for construction along each storage track in the yard.

Figure 10-2 illustrates the preferred station/yard location and highlights certain properties within a half-mile boundary potential TOD zone.

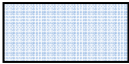



Arnold was originally settled in the eighteenth century, and like many municipalities in the region grew rapidly around industry in the late nineteenth and early twentieth century. Within a half mile of the station site (east of the Allegheny River) are densely settled residential neighborhoods. The western side of the half-mile buffer crosses into the Allegheny River and is not considered in this analysis. Within the half-mile zone around the station, the development pattern is predominantly residential. The settlement pattern appears to be situated around the former industrial sites that are within walking distance from surrounding residential areas. Like nearly all the station locations proposed, Arnold presents opportunities for infill development because of its existing transit supportive settlement pattern. Established retail downtown areas, compact residential neighborhoods, and existing employers in the central urban area would be activity centers. The streets and sidewalks around the proposed station are arranged in a grid pattern.

Figure 10-2 also illustrates properties (parcels) that could offer potential infill development opportunities. These properties include those adjacent to the rail station site itself and isolated parcels to the south of the proposed storage yard. These areas must be investigated further to determine ownership, owner desire for future development, zoning and consistency with existing municipal land use plans.

Pedestrian and bicycle circulation could be categorized as “good.” A majority of the streets within a half mile to the rail station have sidewalks on both sides of the street. Sidewalks

Figure 10-2: Arnold Station Half-Mile Development Area



-  Potential Development Areas
-  Proposed Station Site
-  Half-Mile Boundary
-  Rail Corridor

lead directly to the station site from residential neighborhoods and employers within a half-mile. Modest improvements may be necessary for resurfacing, maintenance and pedestrian crosswalk striping and signals. Pedestrians and bicyclists would have to cross the tracks to reach the passenger platforms, so pedestrian crosswalks/signals should be considered at the track crossing near the intersection of Drey Street and Dr. Thomas Boulevard. Recommended improvements in the half-mile station zone could include on-road bicycle lanes and further pedestrian signalization if the future pedestrian and bicycle traffic warrants.

10.5.1.2 New Kensington

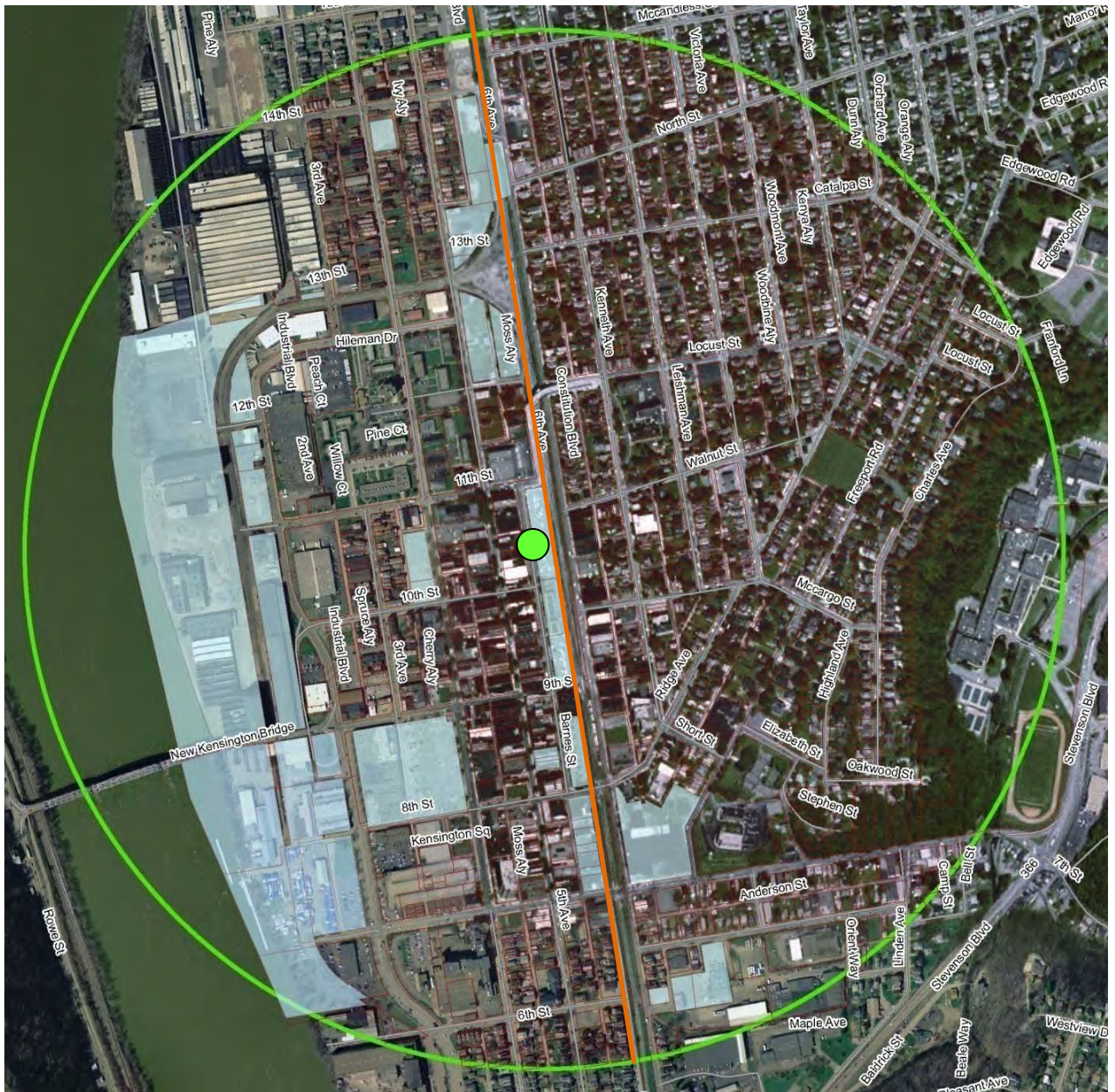
The New Kensington station would be located in proximity to the intersection of Moss Alley and 10th Street. Chapter 5 provides more information on station design, costs and location. **Figure 10-3** illustrates the preferred station location and highlights certain properties within a proposed half-mile development boundary.





New Kensington's development patterns are similar in character to Arnold, with densely settled residential and "mixed use" neighborhoods. These residential neighborhoods are within walking distance to active and former industrial sites along the river. The western side of the half-mile buffer crosses into the Allegheny River and is not considered in this analysis. The settlement pattern appears to be situated around current and former industrial sites that are within walking distance from surrounding residential areas. New Kensington presents opportunities for infill development because of its existing transit supportive settlement pattern and large former industrial properties. The streets and sidewalks around the station are arranged in a grid pattern.

Figure 10-3 also illustrates properties (parcels) that could offer potential infill development opportunities. Within the half-mile boundary, there are development opportunities immediately adjacent to the track for the length of the corridor through New Kensington, including the station location itself and adjacent properties. Large industrial properties along the Allegheny River to the southeast of the station also appear as good candidates for infill development. These areas must be investigated further to determine ownership, owner desire for future development, zoning and consistency with existing municipal land use plans. Major activity centers in New Kensington would be the residential neighborhoods, major employers and the new campus location of Westmoreland County Community College at 1150 5th Avenue just north of the proposed station site.

The pedestrian and bicycle circulation in New Kensington could be categorized as "good." A majority of the streets within a half mile to the proposed station have sidewalks on both sides of the street. Modest improvements may be necessary for resurfacing, maintenance and pedestrian crosswalk striping and signals. Sidewalks lead directly to the station site, residential neighborhoods, employers and WCCC-New Kensington. Pedestrians and bicyclists would have to cross the tracks to reach the station. Recommended improvements

Figure 10-3: New Kensington Station Half-Mile Development Area



-  Potential Development Areas
-  Proposed Station Site
-  Half-Mile Boundary
-  Rail Corridor

in the half-mile station zone could include on-road bicycle lanes and further pedestrian signalization if the future pedestrian and bicycle traffic warrants.

10.5.1.3 Oakmont/Verona

The preferred Oakmont/Verona station location is in proximity to the intersection of Allegheny River Boulevard and Seldon Avenue at the border of Verona and Oakmont. Chapter 5 provides more information on station design, costs and location for the preferred site. **Figure 10-4** illustrates the preferred station location and highlights certain properties within a proposed half-mile development boundary.

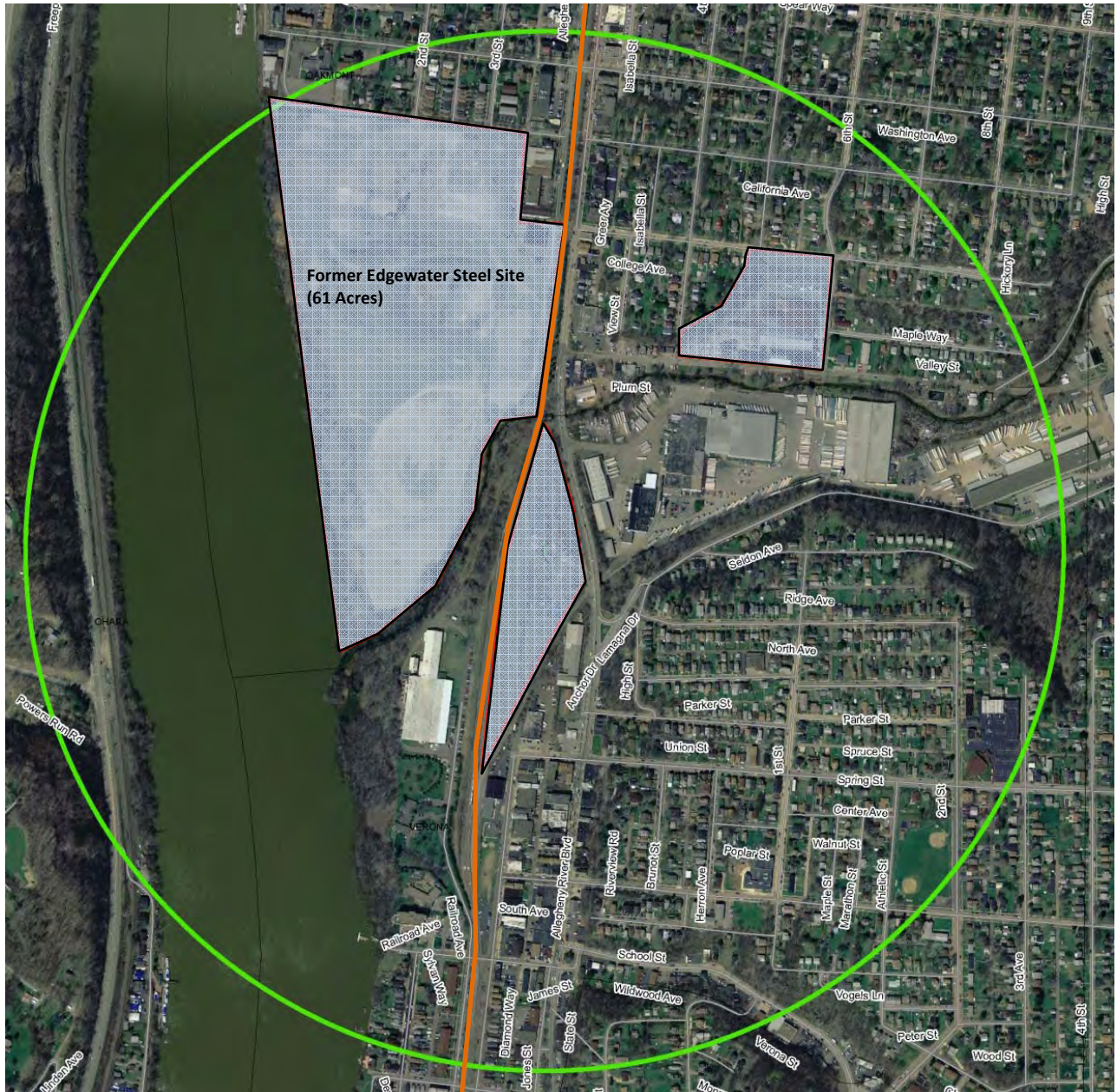
Existing high-density residential neighborhoods surround the station site within the half-mile boundary. Compact residential neighborhoods are within walking distance to active and former industrial sites along the river. The western side of the half-mile buffer crosses into the Allegheny River and is not considered in this analysis. The settlement pattern appears to be situated around current and former industrial and rail yard sites that are within walking distance from surrounding residential areas. The streets and sidewalks in the boundary area are arranged in a grid pattern in the residential neighborhoods.





Within the half-mile zone, there are development opportunities immediately adjacent to the track in Oakmont. Large industrial properties along the Allegheny River to the southeast of the station appear to be good candidate for infill development, including the former Edgewater Steel site which is discussed in more detail. These areas must be investigated further to determine ownership, owner desire for future development, zoning and consistency with existing municipal land use plans. Major activity centers at the station location include the residential neighborhoods and an industrial employer west and adjacent to the site. A larger 7-acre [former] industrial site at the intersection of Plum and 6th Streets in Oakmont appears to have potential for infill redevelopment. The station site itself is vacant area about 8 acres in size. **Figure 10-4** highlights these areas in red.

There are presently no sidewalks for bicyclists and pedestrians that lead directly to the station site however sidewalks exist on both sides of the road within the residential areas of the half-mile boundary. The site is divided from the residential areas by a major four-lane arterial, Allegheny River Boulevard. A highway overpass (over a rail industrial spur off the AVR) next to the station site should be investigated further as grade-separated connection to the station. The use of this overpass as a pedestrian is highly dependant on whether on the spur is used and traffic frequency. Pedestrians and bicyclists would not have to cross the tracks to reach the station. Incremental improvements in the half-mile station boundary could include on-road bicycle lanes and further pedestrian signalization if the future pedestrian and bicycle traffic warrants.

Adjacent to the station site, two large mixed-use residential developments are proposed that were designed using TOD principles. Both developments would be constructed at the former Edgewater Steel site in Oakmont that is adjacent and northeast to the station site.

Figure 10-4: Oakmont-Verona Station Half-Mile Development Area



-  Potential Development Areas
-  Proposed Station Site
-  Half-Mile Boundary
-  Rail Corridor

The Edgewater Steel site is about 61 acres in total size. Future residents could easily walk to the station by crossing the AVR tracks.

Edgewater Condominiums is the first development on the former Edgewater Steel site in Oakmont. The development is a proposed a 34-acre, \$80 million dollar proposed 240 unit mixed residential/retail developed that would be constructed on College Avenue. Retail space would also be developed along Allegheny Avenue within a short walking distance to the retail shops and railroad tracks. Edgewater Condominiums was recommended for approval by the Oakmont Planning Commission in March 2008. The development would consist of 240 single-family homes, condominiums and townhouses, home costs would range from \$250,000 to \$600,000 to encourage a mix of age groups as potential buyers.

River's Edge at Oakmont is the second development at the former Edgewater Steel site and would sit adjacent and south of the proposed Edgewater Condominiums development. This site would also be within easy walking distance to the proposed Oakmont/Verona train station. The estimated cost for the development is \$60 million to construct 168 condominiums, single-family homes, townhomes and apartments, as well as 10,000 square feet of retail space. The developer is also proposing to construct a riverfront restaurant, clubhouse, park, private boat dock and walking trails on the 28 acres of land.

At the current time, the River's Edge development is finalizing engineering design before seeking recommendations from Oakmont's Planning Commission. The development would also construct a public riverfront park and ball fields for Oakmont residents.

10.5.2 NS Corridor

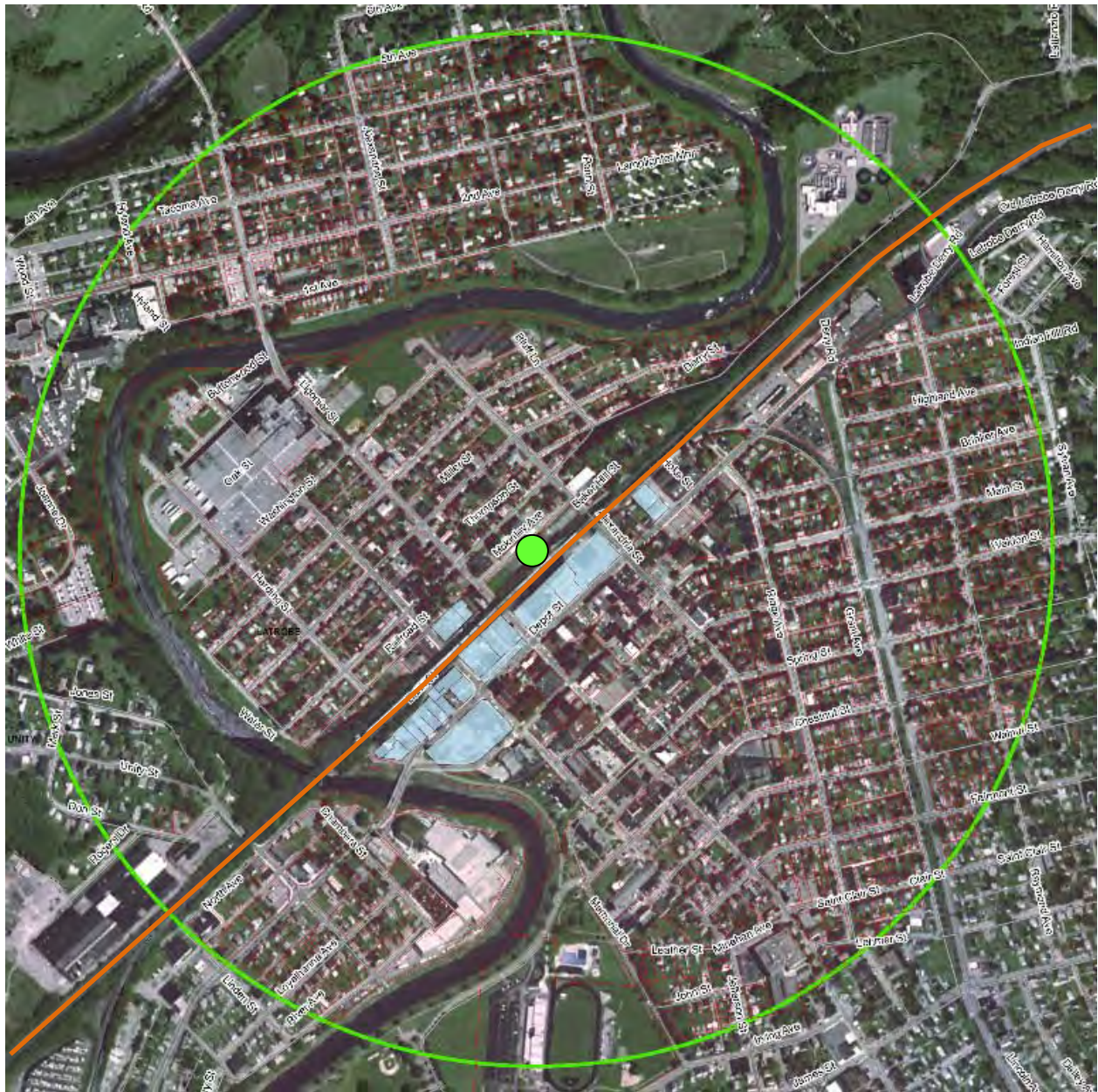
10.5.2.1 Latrobe





As stated in other sections of this study, the City of Latrobe has an existing train station served by Amtrak on McKinley Avenue in downtown Latrobe. Chapter 5 provides more information on station modifications that are needed to accommodate commuter service at Latrobe's train station. **Figure 10-5** illustrates the station location and highlights certain properties within a proposed half-mile development boundary.

Consistent with the AVR Corridor, existing high-density "mixed-use" residential neighborhoods surround the station site within the half-mile boundary. The existing settlement pattern is therefore transit supportive. The residential areas are particularly concentrated at the periphery of the boundary. The streets and sidewalks in the downtown area are arranged in a grid pattern and the residential neighborhoods are within walking distance to activity centers including the downtown train station.

Overall the Loyalhanna Creek bisects the half-mile boundary area separating the far residential areas north and west of the station from the downtown area. Infill development opportunities across the creek may be more limited because of existing development,

Figure 10-5: Latrobe Station Half-Mile Development Area



-  Potential Development Areas
-  Proposed Station Site
-  Half-Mile Boundary
-  Rail Corridor

environmental constraints related to the river, and that only one road bridge (Ligonier Street) connects the northern neighborhoods of Latrobe to the remainder of the City.

Within the half-mile boundary, there are development opportunities immediately adjacent to the track for the length of the corridor through Latrobe. A modest number of vacant properties and parking lots on Depot Street appear to provide good opportunities for infill development. These areas should be investigated further to determine ownership, owner desire for future development, zoning and consistency with existing municipal land use plans. **Figure 10-5** highlights these areas in blue.

The pedestrian and bicycle circulation in downtown Latrobe and the surrounding neighborhoods could be categorized as “good.” A majority of the streets within a half mile to the proposed station have sidewalks on both sides of the street. Modest improvements may be necessary for resurfacing, maintenance and pedestrian crosswalk striping and signals. There are sidewalks that lead directly to the station site, residential neighborhoods and downtown area. The NS tracks are grade separated and pedestrians walk under rail overpasses to reach the station on the north side of the tracks. Sidewalks also exist along both sides of the Ligonier Street Bridge. Recommended improvements in the half-mile station boundary could include on-road bicycle lanes and further pedestrian signalization if the future pedestrian and bicycle traffic warrants.

The project team also obtained the City’s zoning ordinance and Master Plan for this analysis. The boundary area is a mix of both residential and commercial zones. The zoning code could be considered “Euclidean” and hierarchal, i.e. clearly delineated residential, commercial and industrial zones. Districts in the half-mile boundary include residential, commercial and industrial zones. Within the zoning code there is flexibility to implement TOD in Latrobe, although neither the zoning code nor the Master Plan specifically recommend TOD development patterns. Minor changes to the zoning code could provide further flexibility or encourage TOD type infill development in Latrobe. Future updates to the City’s Master Plan should further analyze and recommend infill development around the train station.

10.5.2.2 Greensburg

Greensburg is also served by Amtrak and the train station was recently renovated. Existing land use and settlement patterns are transit supportive and future redevelopment would be more infill or rehabilitation. Major activity centers in Greensburg include Seton Hill University, the County Courthouse and an active downtown and retail area. The streets and sidewalks in the downtown area are arranged in a grid pattern.

As discussed in Section 10.4.5, a Transit Revitalization Investment District (TRID) Analysis was completed by the City of Greensburg in February 2009⁵. The center point for the

⁵ City of Greensburg, Pennsylvania, *Transit Revitalization Investment District (TRID) A Study For the City of Greensburg, Westmoreland County, Pennsylvania*, February 2009.

analysis was the Westmoreland County Transit Authority (WCTA) facility in downtown Greensburg and the analysis was undertaken in coordination with the WCTA. The study identifies specific properties within the downtown area which are prioritized for TOD and infill redevelopment. These properties are illustrated in **Figure 10-6** (as provided by the City's study). Priority areas for infill development in Greensburg include:

1. Vacant lots at College and Otterman Streets
2. The former Troutman Department Store building
3. The Wib Albright parking lots
4. Mid-Towne Plaza
5. Vacant Moose and Elks buildings
6. The Buncher lots
7. The Library site

The February 2009 TRID Study provides the most accurate assessment for infill development in Greensburg. Greensburg also provides flexibility in the City's zoning code for compact mixed-use development in the City's "Gateway Overlay District" that allows for multi-family housing, live/work housing units and the allowance for commercial activities such as bars and restaurants. This also is a model overlay district that would be easily adaptable for other municipalities in the study area to support TOD.

Like other municipalities in the study area, the pedestrian and bicycle circulation in downtown Greensburg and the surrounding neighborhoods could be categorized as "good." A majority of the streets within a half mile to the proposed station have sidewalks on both sides of the street. Modest improvements may be necessary for resurfacing, maintenance and pedestrian crosswalk striping and signals. The NS tracks are grade separated and pedestrians would walk over the track on highway overpass (on North Pennsylvania, North Main and North Maple) to reach the station on the south side of the tracks (or access the station directly from the north side off of Seton Hall Drive). Recommended improvements in the half-mile station boundary could include on-road bicycle lanes and further pedestrian signalization if the future pedestrian and bicycle traffic warrants.

10.5.2.3 Jeannette

The preferred site for the Jeanette station would be located in proximity to the intersection of Gaskille Avenue and South 2ND Street. Chapter 5 provides more information on station design, costs and location. **Figure 10-7** illustrates the preferred station location and highlights certain properties within a proposed half-mile development boundary. Major activity centers in Jeannette include the downtown retail area, warehouse employers and surrounding residential neighborhoods within walking distance of the station site.

Figure 10-6: City of Greensburg Defined Priority Development Areas







 Existing Train Station Site

Priority Development Sites (highest to lowest)

-  1) Troutman Building
-  2) College / Otterman Lots
-  3) Mid-Town Plaza
-  4) Wib Albright Parking Lot
-  5) Buncher Parking Lots
-  6) Vacant Elks & Moose Building (w/Parking Lot)
-  7) Greensburg Library
-  Non-Priority Development Site

Figure 10-7: Jeanette Station Half-Mile Development Area



-  Potential Development Areas
-  Proposed Station Site
-  Half-Mile Boundary
-  Rail Corridor

The area around the proposed train station is densely settled residential and “mixed use” neighborhoods. These residential neighborhoods are focused around former glass factories and are within walking distance to former industrial sites and train station. Like nearly all the station locations proposed, Jeannette presents opportunities for infill development because of its existing transit supportive residential settlement pattern and large former industrial properties. The streets and sidewalks around the station are arranged in a grid pattern.

Figure 10-7 illustrates properties (parcels) that could offer potential infill development opportunities. Within the half-mile zone, there are numerous properties particularly south of the station in the downtown area, where there are former industrial properties greater than 10 acres in size. These include the highlighted sites along Bullitt and Chambers Avenue. These areas must be investigated further to determine ownership, owner desire for future development, zoning and consistency with existing municipal land use plans.

The pedestrian and bicycle circulation in Jeannette could be categorized as “good.” A majority of the streets within a half mile of the proposed station having sidewalks on both sides of the street. Modest improvements may be necessary for resurfacing, maintenance and pedestrian crosswalk striping and signals. Sidewalks lead directly to the station site, residential neighborhoods, and downtown area of Jeannette. Pedestrians and bicyclists would use grade separated highway overpasses to cross the tracks. Recommended improvements in the half-mile station zone could include on-road bicycle lanes and further pedestrian signalization if the future pedestrian and bicycle traffic warrants.

Proposed Development

Jeannette Revitalization Project. As part of a neighborhood revitalization project, a non-profit group known as Westmoreland Community Action (WCA), partnered with the City of Jeannette to construct 25 single-family homes in the downtown area which is short walking distance to the proposed station. WCA is also partnering with the City of Jeannette to complete a large scale housing project using the Pennsylvania Housing Finance Agency (PHFA) and U.S. Department of Housing and Urban Development (HUD) HOME Investment Partnership Program. WCA will lead the project to re-construct 25 single-family homes. WCA has been actively acquiring properties and will continue with an aggressive approach for securing site control. The project involves building 25 single-family homes in three phases and 18 townhouses between the 300 and 400 blocks of South Sixth Street from Bullitt Avenue to Cassatt Avenue. The development is within walking distance (about 2000 feet) from the proposed commuter rail station. The goal is to completely rebuild that area into an urban neighborhood. WCA owns 34 of the 44 homes on the block that will be razed to make room for the new development.

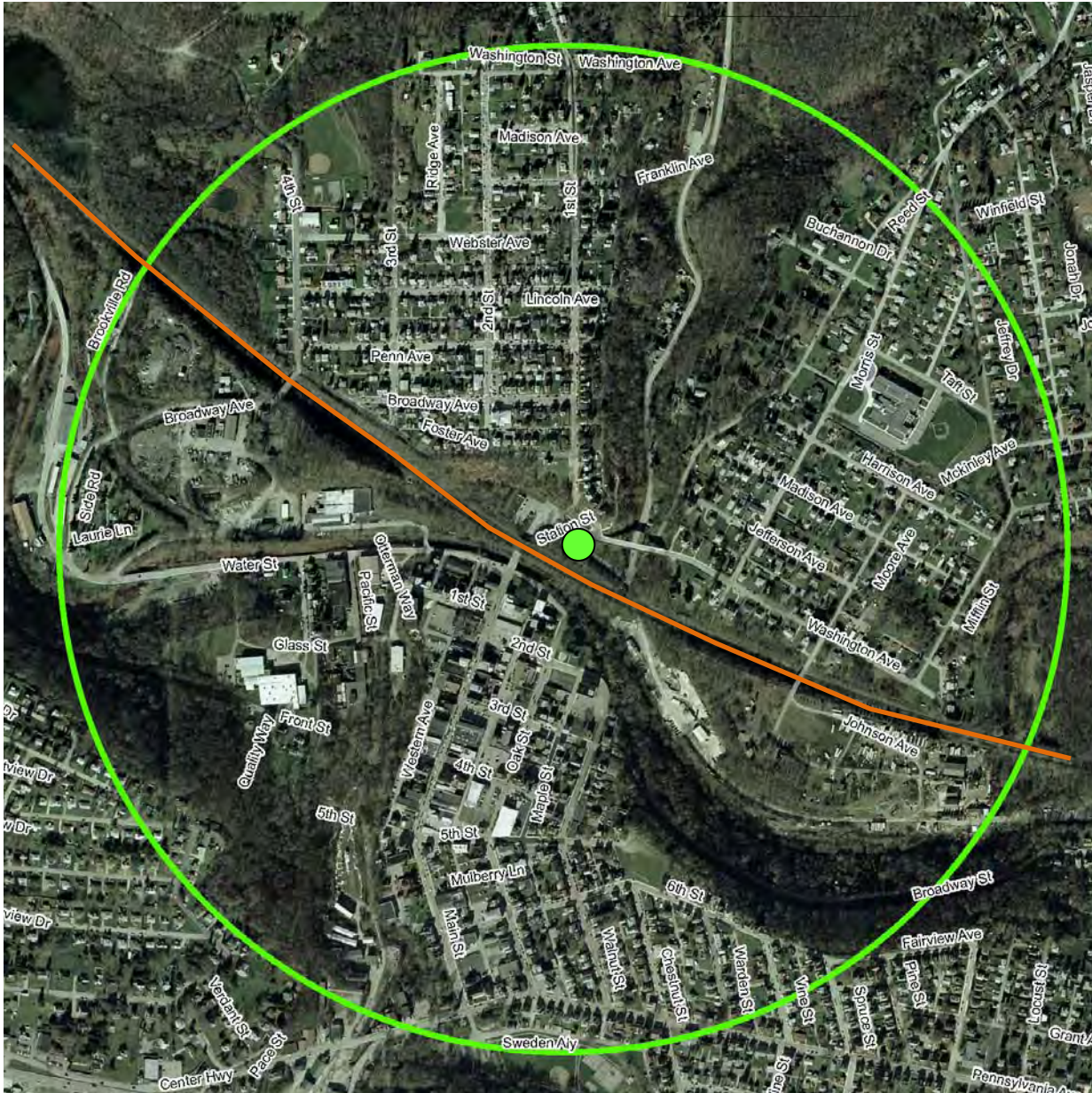
10.5.2.4 Irwin Sites





Two alternative station sites are being considered for Irwin. Irwin Site 1 is located off Paintertown Road near the intersection of Station Street in Downtown Irwin on the north side of the tracks. The second location, Irwin Site 2, is off State Route 993 (Water Street) at the intersection with Frog Road (in North Huntingdon). Chapter 5 provides more information on station design, costs and location. Irwin Site 2 was evaluated for station costs; however, Irwin Site 1 appears to have better TOD opportunities with a more urban location. **Figure 10-8** illustrates Irwin Site 1 (Urban Center) location and the half-mile development boundary.

Within the half-mile boundary, the most favorable infill development sites appear in the downtown area south of the tracks (parcels along the blocks of 2nd, 3rd and 4th Street) as well as the property adjacent to the tracks along Paintertown Road. These areas should be investigated further to determine ownership, owner desire for future development, zoning and consistency with existing municipal land use plans. **Figure 10-8** highlights these areas in blue. Residential neighborhoods on the periphery of the TOD boundary have desirable densities, but access to areas south of the tracks is limited to the Station Street rail underpass.

The pedestrian and bicycle circulation in downtown Irwin and the surrounding neighborhoods could be categorized as “good” except that access north and south of the tracks is limited to one underpass. A majority of the streets within a half mile to the proposed station have sidewalks on both sides of the street. Modest improvements may be necessary for resurfacing, maintenance and pedestrian crosswalk striping and signals. There are sidewalks that lead directly to the station site, residential neighborhoods and downtown area. The NS tracks are grade separated and pedestrians would walk under a single rail overpass to reach the station. Sidewalks exist along both sides of the Station Street underpass. Recommended improvements in the half-mile station boundary could include on-road bicycle lanes and further pedestrian signalization if the future pedestrian and bicycle traffic warrants.

Figure 10-8: Irwin Site 1 Station Half-Mile Development Area



-  Potential Development Areas
-  Proposed Station Site
-  Half-Mile Boundary
-  Rail Corridor

11. FUNDING SOURCES – FINANCIAL PLAN



11 Funding Sources and Financial Plan

11.1 Introduction

This chapter, addressing Funding Sources and Financial Plan, provides (1) an overview of several comparable commuter rail projects and the funding for those projects, and (2) a description of the many federal and local funding and financing options for the capital and operating costs of the three commuter rail options examined in this study. The capital and operating costs for the alternatives are detailed in Chapters 8 and 9, respectively. Those costs were used to prepare a conceptual finance plan and identify the funding gaps.

This discussion is divided into four sections:

- Funding in other areas,
- Funding and financing options,
- Finance plan, and
- Next steps.

Four systems were included in the section on funding of other comparable commuter rail systems. The funding and financing options section covers the federal and non-federal options, the pros and cons of each option and any issues that should be considered with the options. Potential funding and gaps for each of the alternatives are discussed in the finance plan section, followed by next steps.

11.2 Funding Arrangements in Other Metropolitan Areas

11.2.1 Capital Funding

Table 11-1 below shows the capital funding allocation of four commuter rail systems similar to the alternatives being studied in this report. The systems included for comparison include the Virginia Railway Express (VRE) in Northern Virginia, SunRail in Orlando, Florida, Trinity Railway Express (TRE) in the Dallas/Ft. Worth, Texas area, and the Railrunner serving Albuquerque, New Mexico. For reference, the estimated cost and cost per mile for the three commuter rail alternatives studied in this report are included in the table.

The VRE started operations in 1992 and has continued to grow since then. Planning for the line began in 1986 and had to work through funding shortfalls, issues with liability insurance and opposition from the host railroads. Two lines opened in Virginia in 1992, connecting Union Station in the District of Columbia to Fredericksburg on a CSX rail line



Table 11 - 1 – Comparative Capital Funding Allocations (in Millions)

System	Phase	Year Opened	Route Miles	Capital Cost (M\$)	Cost /Mile (YOE)	Fed. Contribution %	Federal Funding Mechanism	State Contribution %	State Funding Mechanism	Local Contribution %	Local Funding Mechanism
WCTA	AVR	20.04	\$137.768	\$6.874							
	NS	41.11	\$85.269	\$2.074							
	AVR +NS	56.25	\$208.652	\$3.709							
VRE	Manassas & Fredericksburg	1992	97	\$127.000	\$1.309	<1%	Federal	18.1%	Commonwealth	81.9%	Bonds, Local Funds, Investment Income
SunRail	Deland to Poinciana	2011*	61.5	\$615.000	\$10.000	50%	New Starts	25%	FDOT Transportation Trust Fund	25%	Volusia, Seminole, Orange & Osceola Counties & City of Orlando
TRE	South Irving to Medical Center to Phase 1 (Belton to Bernalillo)	1996	10	\$70.000	\$7.000	43%	Federal			57%	DART, The T
RailRunner	Phase 1 (Belton to Bernalillo)	2006	48	\$135.000	\$2.813	-	N/A	92.6%	GRIP Funds	7.4%	Sandoval County

*Expected opening of Phase 1 (31 miles)

and to Manassas on a Norfolk Southern line. The majority of the funding for this service was from local sources with small contributions from the Commonwealth of Virginia and the Federal Government.

The SunRail system in Florida is currently under development with the initial line expected to open in 2011. Total system length is 61.5 miles connecting DeLand to Poinciana via Orlando. Although there have been recent delays on final State approval, this system has received significant support from the State and the Federal Government. The current funding plan includes the Federal Government funding 50% of the project costs, the State funding 25% of the match to the federal grant and the jurisdictions served by the line funding the remaining 25%.

The TRE is a commuter rail line that is jointly funded and managed by the Dallas Area Rapid Transit (DART) system and The T in Fort Worth. The initial segment was 10 miles and connected Union Station in Dallas to South Irving. The system has been expanded to connect Dallas with Fort Worth. The total cost of the project was \$70.00 million.

Phase 1 of the RailRunner in New Mexico is a 48 mile line that connects Belen to Bernalillo that began service in 2006. Implementation of this line began in 2003 when Governor Bill Richardson provided \$1.0 million in state funds to begin the process. In that same year, the Governor worked with legislators to develop a \$1.6 billion transportation improvement package which is now known as Governor Richardson's Investment Partnership (GRIP). The majority of the funding for this initial line came from GRIP. The local jurisdictions also provided a small amount of funding for the project.

Federal participation in the selected systems ranges from less than one percent on the low end to fifty percent on the high end. Federal funding for commuter rail systems varies greatly depending on the project and the support at the federal level for the project.

State funding levels for the selected systems ranges from zero to over 90% in New Mexico where the Governor has made transportation a priority. Local funding levels for the selected commuter rail systems range from seven percent on the low end to over 80 percent on the high end.

11.2.2 Operating Funding

Funding for operations and maintenance of these systems varies much like the capital funding. The VRE is supported by the local jurisdictions through a formula that is based on ridership. This local subsidy allocation is derived from various sources at the local level and includes gas tax, general fund revenue and in-kind support. In addition to the local subsidies, passenger fares and grant funding is used for the operating and maintenance costs.

The TRE is supported by the transit agencies in the area, DART and the T. Fares are used to pay for a portion of the costs but the majority of the costs are subsidized by the two transit systems. The primary revenue source for the transit agencies is a local sales tax.

The RailRunner operations and maintenance costs during the first three years of operation were supported in part by the use of Congestion Mitigation Air Quality (CMAQ) funds in addition to fares and support from the local jurisdictions general funds. A dedicated sales tax in the amount of 1/16 % was approved by the voters to support ongoing funding of the operations and maintenance for the commuter rail line to replace the CMAQ funding.

The SunRail system is expected to fund the operations and maintenance costs from fares, advertising revenue, federal funds and state funds. The State of Florida has agreed to subsidize the first seven years of operation.

To summarize, the review of these selected systems supports the need to develop a funding plan that is unique to each project and builds support among community champions of the project.

11.3 Funding and Financing Options

11.3.1 Non-Federal Funding and Financing Options

Each transit rail project is funded and financed differently depending on the local circumstances and most systems use a combination of funding mechanisms for their projects. There have been some systems that have chosen to fund an initial line locally due to the length of time it takes to work through the federal process.

In addition to using taxes to fund the local share, there is also potential for private sector participation. Typically, private financial participation in the provision of transit services is limited to specific projects such as joint development of a tract of real estate or leasing of new equipment. Potential private fund sources include:

- Advertising
- Joint development
- Concession agreements
- Park and ride agreements
- Lease equipment agreements
- Grant anticipation notes
- Revenue anticipation notes
- Infrastructure banking
- Design, build, operate, maintain and finance (DBOMF)
- Some combination of the above

Operating expenses are often a larger share of total project cost and funding for these expenses is sometimes overlooked or not planned for over the long term. Many sources of funding exist for ongoing operating expenses and include:

- Fare revenues
- Advertising revenues
- Interest
- Taxes
- Parking revenues
- Joint development funds

In addition to these funding sources, there are various ways to finance commuter rail projects including public/private partnerships (P3), bonding, State Infrastructure Banks, loans, and commercial paper programs.

11.3.2 State Funding

In 2007, the Commonwealth of Pennsylvania created a new funding structure for transportation, including transit, known as Act 44. The Public Transportation Trust Fund supports four programs: Transit Operating Assistance, Asset Improvement Program, New Initiatives Program and Programs of Statewide Significance. Funding for the Public Transportation Trust Fund comes from the Pennsylvania Turnpike, a 4.4% state sales tax and lottery funds.

The transit operating assistance fund (Section 1513) supports the operating and maintenance costs of transit agencies using a historic base amount and a formula based on passengers, revenue vehicle hours, revenue vehicle miles and senior passengers. A transit system can not receive less funding than they received in a prior year. The amount of funding in this fund is relatively flat and comes from the sales tax collections. Funding a new service using this source simply dilutes the amount of funding received by the other agencies. It is not a new source of funding and funding the commuter rail alternatives from this source reduces the amount of funding that other systems would receive. In addition, since an agency can not receive less funding than they received in a prior year, the amount of additional funds is limited. A 15% local match is required for this funding.

The Asset Improvement Program (Section 1514) is a discretionary capital program administered by the Pennsylvania Department of Transportation (PennDOT). The program is expected to be funded at \$150 million for fiscal year 2009-2010 and expected to grow by 2.5% annually in future years. There are more eligible projects than funds available under the program. A local match of 3.33% is required for this program. Projects are to be funded in the following order of priority:

1. Funds to support existing local bond issues supported by state revenue sources and not future issues.
2. Funds to match projects funded under the Federal 5307 and 5309 capital programs.

3. Other non-federal capital projects in the following order of priority: Essential Emergency Asset Improvement, Asset Improvements to extend an asset's useful life and acquisition of new assets.

While the proposed commuter rail system could technically be funded through this program, the probability of receiving funding is low.

A New Initiatives Program (Section 1515) could be funded by transferring \$50 million from the Section 1514 program after all of the other transportation programs are funded. To date this program has not been funded. Under this program, funding for expansion of a capital project must include evidence that sufficient operating funds are available to support the expansion. Funding for FTA New Starts match receives priority under this program. Other capital projects can be funded if the project can meet all of the following:

- investments in existing service areas have been optimized,
- an analysis reveals a reasonable return on investment,
- the public benefit of the project has been identified,
- there exists a local dedicated funding commitment to pay any required local match for the project and ongoing operating costs,
- there exists local technical ability and capacity to manage, construct, and operate the project, and
- the project is supported by the adoption of an integrated land use plan by local municipalities.

A 3.33% local match is required. Again, while the commuter rail alternatives could be funded under this program, the probability is low.

The Programs of Statewide Significance (Section 1516) was set up to support an intercity rail program in addition to a few other programs. Funding can be provided for an efficient and coordinated intercity common carrier surface transportation program consisting of both intercity passenger rail service and intercity bus service, with the intent of sustaining strong intercity connections. Operating and capital assistance may be provided for intercity bus and rail service as determined by PennDOT. A local match is required and for passenger rail is determined on a case by case basis.

The Program of Statewide Significance was used to fund the Keystone Corridor, an inter-city rail service provided by Amtrak between Harrisburg and Philadelphia. It is currently understood that all funding under this program is spoken for, and there are not anticipated to be additional funds available, so that this program is not appropriate for consideration here.

In addition, PennDOT has recently implemented a grant program to encourage the development of "smart transportation". The total funding available with this program is

\$60 Million with individual grants not to exceed \$5 million. Grants will be awarded for projects that support local economic or community developments, encourage walkable mixed-use developments or corridors with multiple modes of transportation, or aid brownfield redevelopment.

11.4 Federal Funding Options and Potential Ratings

There are many federal programs available for funding passenger rail projects as noted in Section 11.5. Two primary sources of federal funding for the commuter rail lines being evaluated are New Starts and Small Starts.

11.4.1 New Starts

The discretionary Section 5309 New Starts program administered by the FTA is the primary federal funding source for transit fixed guideway projects, including bus rapid transit and busways, light rail, heavy rail and commuter rail. New Starts projects are typically financed with about 50% Section 5309 discretionary New Starts funds. The remaining 50% comes from local sources. A feasible financial plan depends upon the identification of secure funding sources with sufficient revenue capacity to support the financing, operation, and implementation of any existing and proposed transit options. Local funds are necessary to provide the local match share of the federal capital grants and the operating and maintenance costs not covered by the passenger farebox revenue and federal or state assistance.

For a project to be considered for funding under the New Starts process, a detailed financial plan must be developed and is intended to provide documentation to the FTA regarding the system's ability to financially carry out the proposed project. The financial plan includes a 20-year cash flow that documents the capital and operating costs of the system and the funding sources for those costs. The financial plan documents the financial history of the system, describes its current financial health, documents projected costs and revenues and demonstrates the reasonableness of key assumptions underlying these projections. A significant local commitment to the project is necessary to receive New Starts funding.

The local commitment needed varies as the federal process progresses. Early in the process, potential matching funds and the levels of funding available should be identified. As the process continues, a stronger commitment needs to be demonstrated. As an example, if the local match is to come from a sales tax that does not currently exist, then a successful referendum would need to take place. If state funds are to be used as match, a commitment from the state would need to be documented. If financing is included as a potential mechanism to provide local match, documentation regarding the ability to obtain financing would need to be presented as part of the financial plan.

Due to the limited funding available and the large number of requests for New Starts funding, all New Starts projects are required to go through a rigorous evaluation process. The FTA conducts the evaluation and then makes a recommendation regarding funding the project. Projects are evaluated using a number of criteria which include:

- mobility improvements,
- environmental benefits,
- cost effectiveness,
- operating efficiencies,
- transit supportive land use & future patterns and
- other optional factors.

These projects are evaluated during the entire project development process. The FTA makes decisions about moving the projects through the phases of project development to a funding recommendation and finally to the execution of a full funding grant agreement (FFGA) based on these criteria.

Mobility improvements are measured by the travel time benefits per project passenger miles, low income households served and employment near stations. Environmental benefits are measured by the change in regional pollutant emissions, change in regional energy consumption and EPA air quality designation. Cost effectiveness is measured as the cost per hour of travel time saved. Operating efficiencies are measured by system operating cost per passenger mile. Transit supportive land use and future patterns are measured by existing land use, transit supportive plans and policies and performance, and impacts of such policies. The other optional factors include the projected economic development impacts of the project.

In addition to the criteria noted above, the FTA will evaluate the local financial commitment of the project sponsor. The reliability of the proposed capital plan, the ability of the agency to fund operations and maintenance and the amount and availability of the local match are all evaluated as part of the local financial commitment.

Once each of these areas is evaluated, an overall project rating is assigned. The FTA considers the individual ratings and combines the ratings into an overall finance and project justification rating. The cost effectiveness and land use criteria both receive a 50 percent weight to establish a summary project justification rating. The mobility improvement rating is introduced as a tiebreaker if the two ratings fall equally between two ratings. The overall project justification rating and the overall finance rating are averaged into an overall project rating.

11.4.2 Small Starts

The Small Starts program, component of the New Starts, is intended to fund projects with a capital cost under \$250 million and with a federal share of under \$75 million in year of expenditure dollars and was introduced in 2005. The Small Starts program has a total of \$200 million per year available for projects. The intent of the program is to provide a method of funding projects that has streamlined criteria and a streamlined approval process. However, experience has shown that the process is just as lengthy and complicated as the New Starts process.

In addition to the funding limits, a Small Starts project must:

- 1) meet the definition of a fixed guideway for at least 50 percent of the project length in the peak period;
- 2) be a new fixed guideway project or;
- 3) be a new corridor-based bus project with all of these minimum elements: substantial transit stations, traffic signal priority, low floor vehicles or level boarding, branding for the proposed service, and 10 minute peak/15 minute off peak headways or better while operating at least 14 hours per weekday.

For project justification, a Small Starts project is evaluated using the following criteria:

- cost effectiveness,
- transit supportive land use policies, and
- future patterns and other factors, including economic development.

Local Financial Commitment is also evaluated to determine a finance rating for the project if the project sponsor can demonstrate a reasonable plan to secure funding for the local share; the additional operating and maintenance cost to the agency is less than 5 percent of the overall operating budget; and the agency is in reasonably good financial condition they may qualify for a simplified financial evaluation. If a Small Starts project requests 50 percent or less in Small Starts funding, it will receive a *High* rating for local financial commitment.

The phases for a Small Starts project include Alternatives Analysis and Project Development. In the Small Starts program, preliminary engineering and final design are combined into the Project Development phase. Generally, Small Starts projects must demonstrate the completion of an alternatives analysis, selection of a Locally Preferred Alternative (LPA), adoption of the LPA into the region's constrained long range plan, development of a project management plan and preparation and submittal of the same information for evaluation and rating as New Starts projects entering preliminary engineering. There are, however, the following differences: the cost effectiveness rating will be calculated and reported using the

opening year forecast; the land use information should be appropriate to the importance of land use to the project's success; the financial plan should cover the period up to and including the opening year; and mobility improvements information is not required.

With a federally funded project at any funding level, the federal government makes the decisions regarding the project. The federal process requirements are more stringent, add time to the project, and cause the overall cost of the project to be higher. A federally funded project could take from eight to ten years to be implemented. The benefit to using federal funds is that the requirement for local funds is lower. Going through the federal process, however, requires a significant level of local expense just to compete in the process and does not guarantee federal funding. Many projects are competing for the same dollars, and not all projects get funded at the necessary levels.

As of May 2009 FTA is proposing changes to its ratings of project justification for projects seeking New Starts and Small Starts funding. These changes have been necessitated by the SAFETEA-LU Technical Corrections Act of 2008. The final policy guidance is anticipated to be issued "sometime in late spring 2009," and will take effect immediately according to the request for comments by FTA on the revised guidance.

The proposed changes to the project evaluation process include using all of the major project justification criteria in statute in the evaluations with "comparable but not necessarily equal" weights for each as specified in the SAFETEA-LU Technical Corrections Act. Any changes made in response to comments will be included in Final Guidance on New Starts/Small Starts Policies according to FTA.

These proposed changes would continue to require that FTA determine that projects proposed for New Starts and Small Starts funding meet a variety of criteria, including:

- that they are the result of an alternatives analysis;
- are included in a Federally approved transportation plan;
- that the applicant has the legal, financial, and technical capability to carry out the project;
- that the project is justified based on a review of the criteria specified in law; and
- that the project is likely to continue to meet those requirements in the future.

These criteria must be met before projects are allowed to begin preliminary engineering, project development, or final design

FTA proposes that the project justification rating of a project seeking New Starts funding be based on ratings for the following criteria with the proposed weights shown in parentheses:

- mobility improvements (20%),
- environmental benefits (10%),
- cost effectiveness (20%),
- operating efficiencies (10%),

- economic development effects (20%), and
- public transportation supportive land use policies and future patterns (20%).

FTA's approach to the measures and ratings is to base them on existing procedures and information produced by project sponsors to the extent possible. This allows for their immediate implementation because new information, along with the additional time required for project sponsors to develop it, is not required. More significant changes have been postponed until FTA completes development of more robust measures, particularly for environmental benefits and economic development effects.

11.5 Table of Options

Table 11-2 includes federal and local funding and financing options for the capital and operating components of projects similar to the proposed commuter rail services connecting Arnold and Latrobe to Penn Station in Pittsburgh. The table includes funding and financing mechanisms that have been implemented or are being considered for implementation to fund similar type projects across the United States. Some of the suggested financing and funding mechanisms could require changes to enabling legislation and significant public outreach and discussion.

Table 11-2: Summary of Funding Options

Potential Issues/Comments	Cons	Pros	Used for Operating or Capital	Description	Funding/Financing Mechanism
<ul style="list-style-type: none"> Can be set up in one time payments or annual assessments in area, could make total already being collected If development fees are fees too high and development might not be feasible 	<ul style="list-style-type: none"> Typically cities and counties interpret this financing mechanism as though funding is being taken away from them 	<ul style="list-style-type: none"> Those that directly benefit from project pay for a portion or all of the project 	<ul style="list-style-type: none"> Primarily used on capital projects 	<ul style="list-style-type: none"> Fee collected on new development that occurs within project area Fee assessment of existing property owners to pay for specific infrastructure that benefits area 	<ul style="list-style-type: none"> Development Impact Fees/Benefit Assessment Districts
<ul style="list-style-type: none"> Many requirements related to TIF/TIRZ financing 	<ul style="list-style-type: none"> Competitive process requires strong local support and effective lobbying Depending on type of funds could require additional work for application and could make process longer 	<ul style="list-style-type: none"> The project that causes the increase in the value receives the benefit of the increased value 	<ul style="list-style-type: none"> Primarily used on capital projects 	<ul style="list-style-type: none"> Using a portion of increased taxes from values due to a specific transit/road project to pay for the project 	<ul style="list-style-type: none"> Tax Increment Financing (TIFs)/TIRZs
	<ul style="list-style-type: none"> Competitive process Requires strong local support and effective lobbying Depending on type of funds could require additional work for application and could make process longer 	<ul style="list-style-type: none"> Provides additional capital funding 	<ul style="list-style-type: none"> Primarily used on capital projects 	<ul style="list-style-type: none"> Federal Transit Administration funds that are earmarked by Congress 	<ul style="list-style-type: none"> Federal Discretionary Funds
	<ul style="list-style-type: none"> Competitive process Increases timeline for project Increases cost of project due to additional time needed to follow FTA guidelines 	<ul style="list-style-type: none"> Potential new funding for project for up to 50% of the total project cost 	<ul style="list-style-type: none"> Primarily used on capital projects 	<ul style="list-style-type: none"> Federal Transit Administration funds earmarked by Congress for rail, BRT projects 	<ul style="list-style-type: none"> FTA New Starts Funding

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Federal Railroad Administration Intercity Passenger Rail Investment Grants	<ul style="list-style-type: none"> Grant program administered by the FRA to increase a state's role in intercity passenger rail development \$30,000,000 in federal dollars available 	<ul style="list-style-type: none"> Used on capital for intercity rail projects Can be used on planning, rail car acquisition, improvements to tracks, interlockings, and/or signal systems 	<ul style="list-style-type: none"> Potential funding for an intercity passenger rail option 	<ul style="list-style-type: none"> 50% match required Grants are for states so would require coordination with the state 	<ul style="list-style-type: none"> Applications will continue to be received until all funding is allocated or September 30, 2009, whichever is earlier First round of funding applications due June 30, 2008
Public Private Partnerships	<ul style="list-style-type: none"> Comes in many forms including private funding of infrastructure based on benefits, Design Build Finance Operate Maintain (DBFOM) of infrastructure or any combination 	<ul style="list-style-type: none"> Primarily used on capital projects 	<ul style="list-style-type: none"> Additional funding source and potential financing mechanism that does not impact bonding capacity Allows cost to be spread out over time Potentially decreases cost of project due to inflation Portion of risk assumed by private organization Allows projects to be started and completed sooner 	<ul style="list-style-type: none"> Potentially higher costs due to financing by private entity Potentially higher costs due to risk assumed by private entity Need identified revenue source to repay investment 	



Potential Issues/Comments	Cons	Pros	Used for Operating or Capital	Description	Funding/Financing Mechanism
<ul style="list-style-type: none"> • There are currently more project needs than funds available for the program • Funding for the program for the fiscal year 2009-2010 is expected to be \$150 million 	<ul style="list-style-type: none"> • Can not be used on operating projects funded based on the following priorities: Support existing local bond issues supported by state revenues, match for 5307 and 5309 funded capital projects, other projects 	<ul style="list-style-type: none"> • Potential funding source for capital match for federal funding • Local match is only 3.3% 	<ul style="list-style-type: none"> • Used on capital projects 	<ul style="list-style-type: none"> • Funding for capital from the Public Transportation Trust Fund 	<ul style="list-style-type: none"> • Pennsylvania Asset Improvement Program
<ul style="list-style-type: none"> • Not currently funded 	<ul style="list-style-type: none"> • Funded only after other transportation projects are funded 	<ul style="list-style-type: none"> • Potential source of funding • Local match is only 3.3% 	<ul style="list-style-type: none"> • Used on capital projects 	<ul style="list-style-type: none"> • Funding for capital projects • Total program funding is \$50 million 	<ul style="list-style-type: none"> • Pennsylvania New Initiatives Program
<ul style="list-style-type: none"> • Would need to determine if this could be an additional source in the future 	<ul style="list-style-type: none"> • Projects to be awarded • Maximum award \$5 million 	<ul style="list-style-type: none"> • Potential funding source up for a portion of the capital costs 	<ul style="list-style-type: none"> • Used on capital projects 	<ul style="list-style-type: none"> • Program to encourage economic development and smart growth 	<ul style="list-style-type: none"> • "Smart Transportation" Grants
	<ul style="list-style-type: none"> • Costs associated with issuance of bonds • Election required to issue bonds • Need identified revenue source to repay bonds 	<ul style="list-style-type: none"> • Financing mechanism that can allow projects to happen sooner than with pay as you go • Potentially decrease cost of project due to inflation • Allows cost to be spread out over time 	<ul style="list-style-type: none"> • Used on capital projects 	<ul style="list-style-type: none"> • Can include issuing bonds using fare revenues, sales tax revenues, grant revenues, toll revenues from the state or any other revenue source 	<ul style="list-style-type: none"> • Bonding

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Grant Anticipation Notes	<ul style="list-style-type: none"> Notes payable issued to be paid from grant proceeds 	<ul style="list-style-type: none"> Used on capital projects 	<ul style="list-style-type: none"> Financing mechanism based on anticipated grants Can be used to implement projects sooner 	<ul style="list-style-type: none"> Can only be issued to mature within three years of issuance Need identified revenue source to repay notes 	
TIFIA Loans	<ul style="list-style-type: none"> Federal credit program for eligible transportation projects Three types of credit assistance: secured (direct) loans, loan guarantees and standby lines of credit 	<ul style="list-style-type: none"> Used on capital projects 	<ul style="list-style-type: none"> Financing mechanism that allows projects to be completed sooner Low interest loans Easier than bonds to implement 	<ul style="list-style-type: none"> Need identified revenue source to repay loans 	
State Infrastructure Banks (SIB)	<ul style="list-style-type: none"> Allows certain states to use regular Federal-aid highway apportionments to capitalize state-administered revolving funds 	<ul style="list-style-type: none"> Used on capital projects 	<ul style="list-style-type: none"> Financing mechanism that allows projects to be completed sooner Low interest loans Easier than bonds to implement 	<ul style="list-style-type: none"> Need identified revenue source to repay loans 	
Fares	<ul style="list-style-type: none"> Cost to customer for use of transit system Plan for regular increases in fares tied to Cost of Inflation 	<ul style="list-style-type: none"> Primarily used for operating 	<ul style="list-style-type: none"> Can plan for additional revenue Allows customers to plan to pay a larger fare Fare keeps up with inflation Potential less ridership loss due to smaller increases 	<ul style="list-style-type: none"> Public hearings required to raise fares 	<ul style="list-style-type: none"> Important to communicate need for increases to customers



Potential Issues/Comments	Cons	Pros	Used for Operating or Capital	Description	Funding/Financing Mechanism
<ul style="list-style-type: none"> • Negotiations would have to take place with the transit systems that are currently using these funds for operating 	<ul style="list-style-type: none"> • 5307 shift of funds that could be used on capital for three specific programs: Capital Cost of Contracting, ADA services and Preventative Maintenance. 5307 shift of funds reduces the amount of funding available for capital projects in the area • JARC/CMAQ funds are typically programmed for only a few years – would require additional source for continued funding 	<ul style="list-style-type: none"> • Additional source of revenue for operating expenses 	<ul style="list-style-type: none"> • Primarily used for operating 	<ul style="list-style-type: none"> • Use of 5307, JARC, CMAQ on operating expenses 	<ul style="list-style-type: none"> • City to increase parking fees and give all or a portion of the fees to the selected project • Charge a parking fee at Park and Ride locations for either all parking or premium parking
<ul style="list-style-type: none"> • Politics of increasing city parking fees 	<ul style="list-style-type: none"> • Parking fees at Park and Ride locations could discourage transit use 	<ul style="list-style-type: none"> • Increase in city parking fees could encourage increased use of transit 	<ul style="list-style-type: none"> • Primarily used for operating 	<ul style="list-style-type: none"> • City to increase parking fees and give all or a portion of the fees to the selected project • Charge a parking fee at Park and Ride locations for either all parking or premium parking 	<ul style="list-style-type: none"> • Park and Ride Lots • Parking Revenues from City and
<ul style="list-style-type: none"> • Can be set up as a percentage or fixed fee on each ticket sold 	<ul style="list-style-type: none"> • Ticket promoters or owners of the venues may not want to include fee because they might be concerned that people would not attend events because of fees 	<ul style="list-style-type: none"> • Provides another source of revenue • Allows customers of venues to pay for transit services that serve the entertainment venues 	<ul style="list-style-type: none"> • Typically used for operating expenses 	<ul style="list-style-type: none"> • Charge a fee on tickets sold at entertainment venues to pay for transit services that serve the location 	<ul style="list-style-type: none"> • Fees on Tickets Sold at Entertainment Venues

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Private Donations	<ul style="list-style-type: none"> • Donation from a private foundation • Can be trust fund or endowment 	<ul style="list-style-type: none"> • Can be used for operating or capital 	<ul style="list-style-type: none"> • Provides another source of revenue 	<ul style="list-style-type: none"> • May include specific stipulations that don't fit the overall goal of project 	
Leasing of ROW	<ul style="list-style-type: none"> • Lease Railroad ROW to utilities for cables and other utilities 	<ul style="list-style-type: none"> • Can be used for operating or capital 	<ul style="list-style-type: none"> • Additional source of revenue • Allows utilities to provide services where they are required • Allows use of cables or utilities by system 	<ul style="list-style-type: none"> • Need to get utilities to agree to payment structure • Could be complicated structure 	
Partnerships	<ul style="list-style-type: none"> • Develop additional partnerships where private companies pay for all or a portion of transit services or capital projects 	<ul style="list-style-type: none"> • Can be used for operating or capital 	<ul style="list-style-type: none"> • Facilitate the implementation of new services and capital programs sooner 	<ul style="list-style-type: none"> • Need to get partners to understand the value of the partnership 	
Dedicated Sales Tax	<ul style="list-style-type: none"> • A percentage tax on all items sold in service area 	<ul style="list-style-type: none"> • Can be used for operating or capital 	<ul style="list-style-type: none"> • Additional dedicated source of funding 	<ul style="list-style-type: none"> • Election may be required • Citizens would need to see the value in the project • Little control over amount received each year – dependent on economy 	
Pennsylvania Transit Operating Assistance	<ul style="list-style-type: none"> • Funding from the state for operating assistance based on a formula 	<ul style="list-style-type: none"> • Used for operating 	<ul style="list-style-type: none"> • Potential funding for operating costs 	<ul style="list-style-type: none"> • Dilutes the amount of funding to other systems • Not a new source of funding 	
Allegheny County Alcoholic Beverage Tax	<ul style="list-style-type: none"> • 10% tax on alcoholic beverages sold in Allegheny County 	<ul style="list-style-type: none"> • Used for operating 	<ul style="list-style-type: none"> • Additional source to fund operating 	<ul style="list-style-type: none"> • Would require agreement from Allegheny County to use funds on commuter rail • Could only fund a portion of the costs 	<ul style="list-style-type: none"> • Negotiation with the Port Authority for use of funding for a portion of operating costs • To extend this tax to other counties, changes



Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Hotel/Motel Tax	<ul style="list-style-type: none"> Percentage tax on hotel/motel fees 	<ul style="list-style-type: none"> Can be used for operating or capital 	<ul style="list-style-type: none"> Additional source of funding Diversification of funding sources 	<ul style="list-style-type: none"> Tourism industry may believe that additional tax will cause certain groups not to plan a trip to Pittsburgh May be similar funding mechanism in place for other projects 	
Car Rental Tax	<ul style="list-style-type: none"> Percentage tax on car rentals in Allegheny County 	<ul style="list-style-type: none"> Can be used for operating or capital 	<ul style="list-style-type: none"> Additional source of funding for commuter rail Diversification of funding sources 	<ul style="list-style-type: none"> Car rental businesses may believe that the additional tax will cause a decrease in the car rental business Can only be used in Allegheny County 	<ul style="list-style-type: none"> Currently being used in Allegheny County for transit services Would require negotiations with Port Authority to use funds for commuter rail
Vehicle Registration Fee	<ul style="list-style-type: none"> Increase the vehicle registration fee and allocate additional revenues to transportation 	<ul style="list-style-type: none"> Can be used for operating or capital 	<ul style="list-style-type: none"> Additional source of funding Diversification of funding Based on car ownership in area 	<ul style="list-style-type: none"> Difficulty in getting appropriate agency to agree to increasing fees 	
Property Tax for Transit	<ul style="list-style-type: none"> Implement a property tax to pay for transit 	<ul style="list-style-type: none"> Can be used for operating or capital 	<ul style="list-style-type: none"> More reliable source of funding Will typically increase year to year based on property values 	<ul style="list-style-type: none"> Property owners will not want to pay additional taxes Requires legislative changes 	
Advertising Revenue (buses, benches, shelters)/sponsorships	<ul style="list-style-type: none"> Allow for advertising on buses, benches, shelters, and other amenities for a fee Can be a long-term contract for advertising on a shelter or other 	<ul style="list-style-type: none"> Can be used for operating or capital 	<ul style="list-style-type: none"> Additional source of funding Depending on contract structure, could be a fixed revenue source each year 	<ul style="list-style-type: none"> Administration costs for program can offset some of the additional revenue 	<ul style="list-style-type: none"> Program can be set up to have advertising company be responsible for maintenance of shelters or benches in exchange for advertising fees Need strong marketing

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
	<ul style="list-style-type: none"> amenity in exchange for the construction costs Naming rights could be sold for park and ride facilities or other infrastructure 				component
Joint Development on Existing and Planned Facilities	<ul style="list-style-type: none"> Private funds are used to develop property resulting in profit for the private developer and a developed asset 	<ul style="list-style-type: none"> Typically used for capital projects Ongoing revenues could be used to offset operating expenses 	<ul style="list-style-type: none"> Increase revenue Potential increase in ridership on transit Enhances facilities Sharing of risk on project 	<ul style="list-style-type: none"> Creation of joint development structure can be complicated Ensuring fair distribution of revenues and risk can take time Process to choose developer within required procurement guidelines can be a challenge Potential that costs to implement are more than revenues from project 	<ul style="list-style-type: none"> Need for knowledgeable staff in evaluation of different proposals
Tolls	<ul style="list-style-type: none"> Fees charged on highway system 	<ul style="list-style-type: none"> Could be used on operating or capital 	<ul style="list-style-type: none"> Additional revenue source 	<ul style="list-style-type: none"> Would required enabling legislation and possible partnership with State Need for an understanding by the state on the benefits of sharing toll revenues for projects that are not road related 	

Potential Issues/Comments	Cons	Pros	Used for Operating or Capital	Description	Funding/Financing Mechanism
	<ul style="list-style-type: none"> • Would require partnership with state and/or city for increasing tolls or parking revenues • Need for an understanding by state and city on the benefits of sharing toll and parking revenues on projects that are not road related • Peak-period pricing could be considered a fare increase • Would require commitment by transit operators to charge correct fare 	<ul style="list-style-type: none"> • Additional revenue source 	<ul style="list-style-type: none"> • Could be used on operating or capital 	<ul style="list-style-type: none"> • Work with state to implement congestion pricing on toll roads and allocate a portion of toll revenues to transit • Congestion pricing is based on demand. When the tolls are higher, demand is higher, the tolls are higher, Peak-period pricing on bus system • Peak-period parking fees by the county and allocate a portion of those fees to transit 	<ul style="list-style-type: none"> • Safety Inspection Fee • Charge a fee when cars are inspected • Could be used on operating or capital • Source of revenue with little fluctuation because it is based on number of vehicles • Source of revenue that doesn't impact current citizens • Could deter new residents from registering vehicles
	<ul style="list-style-type: none"> • Implementation of new fee could draw criticism • Need legislative support for implementation 				<ul style="list-style-type: none"> • New Resident Impact Fee • One time fee applied to vehicle registration for new residents • Could be used on operating or capital • Source of revenue that is user based
	<ul style="list-style-type: none"> • High start up costs for calculating VMT • Need for technology • Need for education 		<ul style="list-style-type: none"> • Could be used on operating or capital 	<ul style="list-style-type: none"> • Fee charged to all that use roadways based on vehicle miles traveled (VMT) • A portion could be used to fund transit 	<ul style="list-style-type: none"> • Distance-Based Road User Fee

11.6 Financial Plan Options and Findings

The total capital costs in 2012 dollars are estimated to be \$137.8 million for the AVR line, \$85.3 million for the NS line and \$208.7 million for the combined lines. Table 11-3 below details some federal funding alternatives and the gap that would need to be funded with other state or local options. The gaps range from \$ 43 million on the low end for the NS line to the total capital costs for the AVR/NS line of \$ 209 million on the high end. The high end of the range of 50% for federal participation is the maximum percentage that the FTA typically funds rail projects. On the low end of the range, an assumption was made that the lines would be implemented with only local funds.

A consideration in determining project funding is the difference between a locally funded and a federally funded project. With a locally funded project, the funding is “your money” and decisions are made at the local level. The time necessary to complete a locally funded project is less than the time required to complete a federally funded project. This is primarily a result of not having to meet all of the stringent federal processes. A locally funded project could be implemented in four to five years and a federally funded project would typically take twice the amount of time. Adding five years to a project development schedule with price escalation of a modest 4.0% per year can result in a total increase of over 21% in the project cost. Overall, the project cost is lower with a locally funded project because of time savings and the value of the dollar. Utilizing local funds exclusively to finance construction of a project does place a greater financial burden on locals as compared to a federally funded project.

As decisions are made regarding a funding strategy, the differences between the New Starts and Small Starts programs need to be evaluated and a decision about which program, if any, to apply for funds under also needs to be made. The benefit to using the Small Starts program is that the process has fewer requirements than the New Starts program but the total amount of funding possible under this program is \$75 million. The New Starts program includes more requirements but can fund up to 50% of the total project cost which could be as much as \$104 million for the combined AVR/NS commuter services.

Funding the Operating and Maintenance (O&M) Costs of any project is particularly challenging since those costs continue through the life of the project. This is especially pronounced for commuter rail projects on host railroads, since the lease payments (for the railroad access) are significant and annual. The annual O&M costs in 2012 dollars range between \$12.6 million for the AVR line only and \$22.5 million for the combined AVR/NS lines. Federal funding for the O&M costs are limited under the 5307 program. The 5307 funds are typically sent to the designated recipient in the urbanized area. Some of the 5307 funds could be used to fund a portion of the O&M costs if the service was contracted out to a third party provider and the designated recipient was willing to provide a portion of the 5307 funds to cover those costs.

Project	Farebox Recovery Rate	Fares	Funding Gap (source to be determined)	Total Annual Operating Cost
AVR Only	8% 11% 17% 43%	\$1.010 \$1.389 \$2.146 \$5.429	11.615 11.236 10.479 7.196	\$12.625 \$12.625 \$12.625 \$12.625
NS Only	43% 17% 11% 8%	\$6.376 \$2.521 \$1.631 \$1.186	8.453 12.308 13.198 13.643	\$14.829 \$14.829 \$14.829 \$14.829
AVR/NS	8% 11% 17% 43%	\$1.797 \$2.470 \$3.818 \$9.657	20.660 19.987 18.639 12.800	\$22.457 \$22.457 \$22.457 \$22.457

(in Million \$)

Table 11-4 – Fare Generation and Funding Gap

Project	Federal Funding Percentage	Federal Funding	Funding Gap (source to be determined)	Total
AVR Only	0% 20% 40% 50%	- \$27.56 \$55.12 \$68.9	137.8 110.24 82.68 68.9	\$137.8 \$137.8 \$137.8 \$137.8
NS Only	50% 40% 20% 0%	\$42.65 \$34.12 \$17.06 -	42.65 51.18 68.24 85.3	\$85.3 \$85.3 \$85.3 \$85.3
AVR/NS	0% 20% 40% 50%	- \$41.74 \$83.48 \$104.35	208.7 166.96 125.22 104.35	\$208.7 \$208.7 \$208.7 \$208.7

(in Million \$)

Table 11-3 – Capital Costs



A typical funding source for O&M costs is farebox revenues, or those fees paid by the users of the system. Table 11-4 shows approximately what the fares could generate under different scenarios and the funding gap for the O&M costs. A farebox recovery rate is used in each of the scenarios and is defined as the percentage of operating costs that are covered by fares. Recovery rates of four systems were used to give a range of potential fares and the resulting gap that would need ongoing funding. The systems and recovery rates are as follows: VRE, 43%, TRE, 8%, Nashville, 11%, Miami, 17%.

Required local sources for O&M costs range from \$7 million to \$21 million annually depending on the level of funding received from the farebox and the lines operated.

The gaps for these alternatives are significant at this time but with commitment at the state and local levels these gaps could potentially be narrowed. Further discussion with the appropriate political leaders should continue to determine the best mix of local and state commitments. Those commitments are necessary to receive federal funding at any level. The federal funding option should continue to be reviewed as the implementation process for these alternatives continues.

11.7 Next Steps

As planning for this project continues, funding should be further evaluated and a determination regarding federal, local or a mix of funding needs to be made. If federal funds are to be used to fund the project(s), a strong constituency needs to be developed to show the FTA the community's commitment. Demonstrated community support for the project is key to successfully implementing the proposed commuter rail system.

The steps in the federal funding process include:

- Alternatives Analysis
- Draft Environmental Impact Statement (DEIS)
- Preliminary Engineering
- Final Environmental Impact Statement (FEIS)
- Final Design
- Full Funding Grant Agreement (FFGA)
- Construction

In the Alternatives Analysis phase of the project, local project sponsors are required to perform an alternatives analysis that evaluates the mode and alignment options for a particular corridor. The analysis informs local officials and community members on the benefits, costs, and impacts of transportation options so the community can identify a preference. This phase is complete when local and regional decision makers select a

locally preferred alternative (LPA), and the LPA is adopted by the metropolitan planning organization (MPO) into the region's long-range transportation plan.

The Eastern Corridor Transit Study Transitional Analysis to Locally Preferred Alternatives (ECTS-TA) issued in September 2006 reviewed the alternatives in a manner consistent with the federal processes but a Locally Preferred Alternative was not adopted at that time (it was subsequently). This study was not a full Alternatives Analysis but completed an incremental analysis that built on the statement of need and the recommendations from the ECTS. This ECTS-TA updated the work from the ECTS and completed the public outreach necessary to identify the LPAs.

The DEIS, preliminary engineering, and FEIS are completed during the Preliminary Engineering phase in this order. During this phase, local project sponsors consider design options to refine the LPA and complete the National Environmental Policy Act (NEPA) process. Preliminary engineering refines the estimates of project costs, benefits and impacts. Also during this phase, local project sponsors finalize management plans, demonstrate their technical capabilities to develop the project, and commit local funding sources. The NEPA process includes the development of the DEIS and FEIS which require that a substantial technical analysis and public review process be conducted to evaluate alternatives; identify potential social, economic, and environmental impacts of the project, and identify methods to avoid or mitigate these impacts.

Final Design is the last phase of project development, which includes the preparation of final construction plans, detailed specifications, and bid documents.

Transit projects are evaluated by the FTA during the entire project development phase. The FTA decides during each phase whether the project should move to the next phase until they ultimately recommend the project for funding. Once funding is approved, construction can begin on the project.

Many similar projects have been implemented with many lessons to learn from those projects. Being flexible, starting small, and engaging federal partners early in the process are keys to implementing a successful project. Local funding will be required to match the federal participation or to fund the entire project, if federal funding is not pursued. Building support and consensus in the community early in the process is an important step in obtaining the local funding commitment.

Reauthorization of the transportation legislation will occur over the next several months and the opportunity for increased funding for transit is likely due to the strong support for transit in the current administration. The outcome of reauthorization could change the potential for the funding of this project and attention to the process will be important as this project develops.

12. OPERATING ENTITIES



12 Operating Entities

12.1 Introduction

Who plans, constructs, finances, operates and maintains the commuter rail services considered in this report is an important consideration in the implementation of the potential alternatives. The project team explored various choices and detailed a number of the key considerations in addressing this issue, as discussed below. Numerous of these potential operating entities may require enabling legislation by the Commonwealth of Pennsylvania.

12.2 Potential Operating Authorities

12.2.1 County or Consortium of Counties

The commuter rail alternatives will provide service in, into, and through two counties, Allegheny and Westmoreland. One or both of these counties could take the lead on developing an implementation strategy for the selected commuter rail alternative. The county or consortium of counties could structure this new operating authority to be responsible for all aspects of the commuter rail development, including, design, construction, financing and operations or any combination of those aspects.

Under this alternative, the counties should create an oversight board to assist in making the policy decisions. The county or consortium of counties would be responsible for deciding what aspects of the commuter rail system operations should be contracted to outside parties and for issuing any Requests for Proposals for the design, construction and operations of the system, if applicable. This option would allow the counties to have significant input into and control of the development and operations of the commuter rail services.

12.2.2 Commonwealth of Pennsylvania

There are examples of commuter rail systems where the state is the entity planning, designing, building, operating and maintaining the system. For example, in Maryland the Maryland Transit Administration (MTA) operates the MARC commuter rail system serving Baltimore and Washington, DC. MTA undertook planning, design and construction activities in addition to operating the service on both Amtrak and CSX rail lines. The Commonwealth

of Pennsylvania (e.g. PennDOT) could contract with consultants and other contractors to implement the commuter rail system with the Commonwealth ultimately responsible for the implementation and operation of the system.

12.2.3 New Regional Entity or Authority

A regional entity could be created to specifically address the implementation of the commuter rail systems serving both counties. This entity could be another governmental entity created by the Commonwealth with the sole purpose of planning, designing, implementing and operating the commuter rail system. This regional entity should have representation from the areas that would be served by the commuter rail. Another alternative to evaluate could be the creation of a non-profit entity as was done in Phoenix, Arizona.

The Valley Metro Rail project in Phoenix is being implemented using this approach. At the time of implementation of the rail project, the community leaders decided that the best approach was to create a non-profit corporation to implement the rail system. METRO was subsequently formed as a non-profit public corporation in 2002 by the cities of Phoenix, Tempe, Glendale and Mesa. In 2007, the cities of Chandler and Peoria joined the corporation and in 2008, Scottsdale also joined.

This non-profit public corporation is charged with the design, construction and operation of the Valley's light rail system. The cities that participate in the light rail system each have a member on the Board of Directors. The METRO Board has the ability to establish policies, receive and disburse funds and grants, has the power to enter into contracts, hire or contract for staff, and to undertake extensions of the system. The METRO Board members are generally the mayors of the participating cities and have weighted voting to ensure those cities that are investing more in light rail have a corresponding level of authority. No city, however, has more than a 50 percent weight.

12.2.4 Existing Authority: Port Authority of Allegheny County

The Port Authority of Allegheny County was created to provide transit services to Allegheny County and portions of adjacent counties. The Port Authority is the designated recipient for federal transit funds for the Pittsburgh area, understands how to provide transit services, including rail, and how to design, construct, and operate a rail system. However, the Port Authority does not have recent experience working with host freight railroads as would be necessary in this case. Moreover, the Port Authority currently has funding challenges and would not have the funds to construct or operate a commuter rail system. The Port Authority does, however, know how to operate transit services and one alternative to be

explored could be that the counties, state or other entity contract with the Port Authority to plan, design, construct and operate the system.

12.2.5 Existing Authority: Westmoreland County Transit Authority (WCTA)

The Westmoreland County Transit Authority is the transit provider for Westmoreland County and was created by the County Commissioners in 1978 to provide transit services to the county. WCTA could be the entity that plans, designs, constructs and operates the commuter rail system. WCTA also has funding challenges (not the least of which that the capital and operating budget for the commuter rail would significantly exceed WCTA's current budget), and currently does not operate rail service in the county. In addition, WCTA is mandated to contract out all of the services provided to the county. If WCTA was the entity responsible for the implementation of commuter rail, all services would be required to be contracted out.

12.2.6 Consortium of Transit Authorities

Another alternative to the implementation of the commuter rail would be a consortium of the transit authorities in the area, Port Authority of Allegheny County and Westmoreland County Transit Authority. The structure could be modeled after the Trinity Railway Express in Dallas/Ft. Worth, as discussed in Section 12.3, below. Both entities could be 50/50 partners in the assets of the system and could provide the necessary funding for the operating subsidy of the system. This arrangement, while potentially workable, could have significant challenges with accountability and representation.

12.3 System Phases

12.3.1 System Planning, Construction and Implementation

Any of the operating entities described in Section 12.1 could be the entity that plans, constructs and implements the commuter rail alternatives. Typically, the operating entity will contract with various consultants to do the majority of the system implementation work. The entity that is chosen to lead the implementation will need qualified staff to complement the services of the consultant.

The operations and maintenance of the commuter rail alternatives can be provided by the entity planning and implementing the program or can be contracted out to a third party. There are many instances of providing the services both ways but start-up commuter rail systems typically contract out the operations and maintenance. Contracting out these services to a private provider has many benefits which include lower cost to provide the

service, a knowledgeable entity that provides these services in other locations, the ability to implement the services faster, and access often to national resources. Contracting with Amtrak to provide the operations and maintenance is another option since Amtrak currently provides passenger service on the same tracks as NS does and would thus have familiarity with combined passenger and freight operations.

There would by definition be some kind of contractual relationship between the host railroads (Norfolk Southern and Allegheny Valley Railroad, in this case), covering at a minimum the usage fees to use the trackage; accordingly there may be some economy-of-scale in contracting with the host railroad in other operational areas such as NS dispatching trains on the AVR. Current state legislation requires certain entities, like Westmoreland County Transit Authority, to contract all transit services. The Port Authority, however, provides transit services with employees of the Authority. Contracting out the provision of service could be the most effective method since this will be a new service in the area.

It should be noted that all of these variations must also be considered within the context of federal, state, and local labor laws and rules. It is beyond the scope of this study to examine the labor-related implications of a particular entity selection.

12.3.2 Future Expansion

Any future expansion of commuter rail services could and should be implemented by the same entity that was responsible for the initial implementation. The benefit to this approach is related to building off of work already performed and the costs of the project could be reduced by using existing data, plans and designs.

12.3.3 Design Build Operate and Maintain (DBOM)

The operating entity, once chosen, could use the DBOM method for project delivery. Under this method one contractor, with many sub contractors, is used to design, build, operate and maintain the system. The DBOM method of project delivery could speed up the implementation of the project and may save the project construction costs due to the faster implementation timeframe and the value of money.

A benefit to using this approach is that the procurement process is shortened since only one procurement is issued. The DBOM procurement process is complicated, however, and requires that agency staff have a good understanding of the DBOM process. Nonetheless, DBOM is a way to transfer risk in the implementation of the commuter rail. It can also reduce the risk of a project that will end up over budget by allowing the operating entity to set a fixed price for the project.

Finally, by including the operations and maintenance in the procurement, capital expenditures are optimized because the contractor has the knowledge that many of the design decisions will impact the ability to provide efficient services.

12.4 System Comparisons

This section presents a description of the operating entity setup for four recent commuter rail startups, to provide insight into the impact of the decision on selecting an entity.

12.4.1 Virginia Railway Express (VRE)

VRE is the commuter railroad connecting Northern Virginia commuters with Washington, DC. The VRE Operations Board was created by two transportation commissions: the Northern Virginia Transportation Commission (NVTC) and the Potomac and Rappahannock Transportation Commission (PRTC). The Operations Board consists of three voting members plus alternates from each of the two commissions, and a voting representative of the Commonwealth of Virginia. VRE is a joint project of the two commissions with no independent legal standing. Agreements with the Commonwealth help provide indemnification to the freight railroads whose tracks are used by the VRE.

The commissions, whose board members are comprised primarily of local and state elected officials approve VRE's policies, fares, budgets and major spending decisions. The VRE Operations Board hires the Chief Executive Officer (CEO) and the two commissions co-own much of the VRE assets (rolling stock, most stations, maintenance facilities, etc.). VRE leases access to the track from the CSXT and Norfolk Southern railroads and leases access to Washington Union Terminal and mid-day storage space from Amtrak. Amtrak provides VRE's crews and light maintenance under contract.

VRE's organization structure is cumbersome but it allows for careful vetting of controversial issues. The VRE Operations Board and commissions share many of the same local elected officials who sit on the Board of the Washington Metropolitan Area Transit Authority and the Transportation Planning Board of the National Capital Region (which is the Metropolitan Planning Organization). This allows these individuals to obtain a solid understanding of the transportation issues in the area.

12.4.2 Sunrail

The Central Florida Commuter Rail Commission Governing Board was created to assist the Florida Department of Transportation with policy direction during the planning, design, construction and the first seven years of operations of the Sunrail system in the

Orlando/Central Florida region. The Governing Board consists of five members – one each from Volusia, Seminole, Orange and Osceola counties as well as the City of Orlando.

This system is in the development phase of the project and the State of Florida decided to use contractors/consultants to develop and oversee the implementation of the system. State employees are used for overhead functions, such as procurement, finance, etc. The plan for the operations of the system is to also use contractors to provide the service.

12.4.3 Trinity Railway Express (TRE)

The cities of Dallas and Fort Worth purchased the former Rock Island line between the two cities (the line travels within the city limits of these two cities but also through other incorporated and unincorporated areas) in 1983. The TRE was established through an interlocal agreement between Dallas Area Rapid Transit (DART) and the Fort Worth Transportation Authority (the T). Each transit authority owns a 50% share in the rail project and jointly developed the service and currently manages the service. Herzog is the operator of the service on the line and provides the dispatching and operators. Track maintenance is provided through a contract by the BNSF Railroad who has rights to operate freight on line. In addition to BNSF, Union Pacific also has rights to operate freight trains on the line.

12.4.4 New Mexico Rail Runner Express

Initially, the New Mexico Department of Transportation (NMDOT) and the Mid Region Council of Governments (MRCOG) received grants from the state and developed a strategy for the implementation of commuter rail. The NMDOT and MRCOG worked together during all phases of implementation of the Rail Runner. In May 2005, the MRCOG and the NMDOT signed a contract with Herzog to be the operator for the service. Herzog is responsible for crewing and operating the trains, maintaining the equipment and rights-of-way and constructing some of the capital improvements required.

While the NMDOT and the MRCOG are actively involved in the development and implementation of the Rail Runner, Regional Transit Districts (RTD) were created to assist in the funding of the Rail Runner. RTDs are organizations that were created to plan and provide public transportation services on a regional basis. They can plan, finance and operate transit services to an entire region.

The entire length of the line is owned by NMDOT. From Belen to Lamy, the former BNSF line was purchased (actually purchasing as far north as Trinidad, Colorado), with BNSF retaining freight operation rights. The former BNSF spur between Lamy and Santa Fe, subsequently sold to the Santa Fe Southern railway, was acquired as well. Additionally, the state built 19

miles of new rail, mostly in the median of I-25 between Lamy and Santa Fe. Freight operations are not allowed on this median portion.

12.5 Recommendation on Formation of an Operating Entity

Formation of an entity to build, operate and maintain a commuter rail system that serves two counties in an urban region would be a complex process that can involve local, county, regional and state interests. Since each commuter rail system in the country is different in terms of the communities served, the ridership base, the political institutions involved, supporting funding sources, and the legal foundation upon which it rests, there is no single answer as to what operating authority is best. Rather, the involved primary political subdivisions, in this case Allegheny County and Westmoreland County, in cooperation with the Commonwealth, should undertake a comprehensive evaluation of their interests, resources, and commitments to the provision of commuter rail services, assuming a decision is made to move forward with implementation of the project. This evaluation should include:

- Identifying anticipated benefits.
- Long-term funding commitments.
- Expected levels of service.
- Identifying populations served.
- Equitable measures for sharing of costs and benefits.
- Abilities to meet operating deficits.
- Requirements for insurance and liability.
- Abilities to oversee or actually operate a rail system.
- Legal frameworks upon which various alternative operating entities can be established.

Once a comprehensive evaluation of all alternatives is made, the participating sponsors of commuter rail service can select an optimal organizational framework and identify the existing or needed enabling legislation allowing a single authority to plan, build and operate the commuter rail system. As this project advances to the next stages the project team recommends that this evaluation and identification of an operating entity be given an appropriate level of priority within the larger schedule of project development and implementation.

13. FINDINGS AND RECOMMENDATIONS



13 Findings and Recommendations

This chapter summarizes the major findings identified in the Commuter Rail Interim Study and presents a list of recommendations developed by the project team. These recommendations, developed in part through consultations with the Steering Committee, layout a framework and path for advancing the commuter rail project forward. As was anticipated by WCTA in this “interim” study, the recommendations do call for further information collection and analysis but also focus on the need for moving to the next steps of sponsor organization, consultations with the host railroads (especially Norfolk Southern), and the making of decisions on whether to move forward in pursuit of federal funding. While recommendations or optional courses of action are formulated and presented by the project team, the ultimate decisions for advancing the project, or declining to do so, must ultimately be made by the project sponsors.

13.1 Summary of Findings

This section summarizes the major findings identified in the preceding chapters. In doing so, the presentation below follows the general order of discussion in those chapters.

13.1.1 Existing Conditions

- 1) The review of recent trends in demographics, household numbers, volatility in fuel costs, development trends and traffic congestion, although not showing significant population growth in Allegheny and Westmoreland Counties, does show that conditions continue to point toward the need for greater transportation mobility and choice options. Commuter rail could be one of those options.
- 2) Although capacity analysis has not been performed on the Norfolk Southern rail corridor connecting Latrobe with Pittsburgh, preliminary evaluation and observations do indicate existing potential capacity sufficient to accommodate some level of commuter rail service. Use of the AVR line for commuter rail service between Arnold and Pittsburgh has very high potential given the operation of freight trains in the nighttime hours only and the cooperation and interest voiced by the owner of the railroad.
- 3) Capacity limitations on NS in that portion of the Pittsburgh Line occupied by the MLK East Busway may have constraints on the numbers of commuter rail trains that can operate over that segment.

- 4) The Central Business District (CBD) of Pittsburgh, with its continued large employment base, remains a strong attraction for commuters.
- 5) The Oakland/Shadyside areas of the city are also major employment bases that draw commuters from throughout the region.
- 6) The geographies of the AVR and NS corridors differ and have differing impacts on identification of station locations along each corridor. The AVR rail line is largely at-grade and easily accessible through the corridor it serves although trains currently must operate at very low speeds (10 mph) due to poor track conditions. The NS line traverses hilly portions of Westmoreland County, often runs adjacent to streams and is nearly all above grade in the communities it runs through making location of stations more difficult. The NS line, however, is a well-maintained track that currently can accommodate passenger trains speeds up to 79 mph.

13.1.2 Previous Studies

- 1) The previously conducted studies of commuter rail service in the study area identified potential ridership supportive of such services and concluded that commuter rail service is feasible on both the AVR and NS corridors.
- 2) These studies also recognized the need to do follow-up updating of construction costs with an objective of identifying ways to reduce costs.
- 3) The previous studies encompassed a range of transit options in the Eastern Corridor with commuter rail service on the AVR and NS corridors being only two of six final alternatives. The studies were not detailed or focused, necessarily, on the two commuter rail corridors or services.

13.1.3 Alternatives Definitions

- 1) Downtown Pittsburgh remains the key commuter destination with Oakland/Shadyside as a strong secondary attraction.
- 2) Convenience and connectivity to other transit systems are very important.
- 3) Operational flexibility with host railroads will be necessary but at this time can only be assumed for the NS.
- 4) Identification of potential commuter rail stations is based on historic presence and present day use (Greensburg and Latrobe), access to major commuter routes, and physical site capabilities for station structures and commuter parking. Potential for support of land use policies for transit oriented development are a strong secondary attraction.
- 5) Peak period, reverse commute and mid-day commuter rail services are all possible on a conceptual basis on each corridor but have not been reviewed or approved by the host

railroads (AVR and NS). The alternatives utilizing the NS corridor assume a degree of operational flexibility by NS in the operation of their freight trains and the availability of adequate commuter train “slots” for service on NS and accessing Penn Station.

13.1.4 Ridership

- 1) Modeling of forecasted ridership by SPC as part of this study indicates adequate ridership numbers to justify a start-up commuter rail service on each corridor. The forecasted start-up ridership is comparable to other similar recently established commuter rail systems in Connecticut, Virginia, and New Mexico.
- 2) Forecasted slow growth of population in the region constrains the long-term growth of potential commuter rail ridership.
- 3) The growth in the primary commuter market (Central Westmoreland and Allegheny Valley to downtown Pittsburgh) is not high, although this finding is based on a generally conservative forecast.
- 4) Additional data collection and analysis of market trends in the two corridors is needed to enable a more aggressive forecast and to reduce the uncertainty inherent in the forecasting process as developed and used by SPC.

13.1.5 Analysis and Alternatives Selection

- 1) Ridership analysis overwhelmingly indicated strong preference for routing the Allegheny Valley services onto the Brilliant Branch and NS to serve Penn Station, in preference to terminating further out in the Strip District.
- 2) While physically challenging to implement, the station stop in Shadyside (at S. Negley Avenue) would provide a valuable connection to the MLK East Busway, with easy connections to Oakland for both the AVR and NS corridor services.
- 3) The ridership demand model is at the edge of its abilities to evaluate ridership potential, and cannot be relied upon to evaluate meaningfully between specific station location variations (e.g. Irwin 1, 2, and 3).
- 4) Although there exists a strong desire for a stop in the vicinity of Irwin, the physical terrain limits the possible station locations. Ability to construct the station, provide adequate convenient parking, minimize impacts on residential communities, and access from US Route 30 are the key determinants and suggest that additional study of a station in the Irwin area is need before a decision can be made between the Irwin 1 and Irwin 2 sites.

13.1.6 Capital Costs

- 1) The approach taken on estimating capital costs is based on construction of a reasonable startup operation consisting of basic services and basic stations.
- 2) The cost of stations is based on the construction of passenger shelters (not enclosed building structures) and platforms to accommodate at least four-car trains.
- 3) Station costs do not include consideration for possible joint public-private ventures that could reduce public costs, although for select urban locations this may be possible.
- 4) Property requirements and costs for stations outside of railroad right-of-way has been accounted for but use of railroad property, especially for platform construction, is assumed to be part of the operating and access costs that would be charged by the railroads.
- 5) Parking would be provided in lighted paved lots and not in parking structures.
- 6) Trains storage and maintenance facilities would be built to accommodate at least four trainsets (consists) on each line (AVR and NS). Some economies of scale are realized if services on both lines are implemented and operated into Penn Station, although existing mid-day train storage space in Penn Station would have to be expanded.
- 7) The rolling stock (locomotives and passenger cars) costs are based on the purchase of new equipment. It may be possible to purchase lower cost used equipment prior to startup of operations, but since the availability and condition of such equipment can only be determined closer to startup, a more conservative calculation for new equipment was used in this study.
- 8) Further refinement of construction costs can only be done thorough future engineering and design of facilities that may require thorough field investigations and surveying that were not part of this study.
- 9) Due to uncertainties in project designs, the possible presence of contaminated soils and utility lines, geologic conditions and other conditions that could affect construction costs, a contingency construction cost additive of 30% was applied to the total construction cost. As a project moves through the design phases and more information becomes available, this contingency could be reduced.
- 10) Overall estimated capital costs of the proposed services to Penn Station on the AVR and NS are in line with the range of costs estimated in the ECTS-TA study which were based on variations in service options. The total capital costs estimated (in 2012\$) in this study for the three alternative services to Penn Station are:

Commuter Rail Service on NS Corridor Only:	\$85.3 million
Commuter Rail Service on AVR Corridor Only:	\$137.8 million
Commuter Rail Service on both NS/AVR Corridors:	\$208.7 million

13.1.7 Operating and Maintenance Costs

- 1) Operating and maintenance (O&M) costs calculations and analyses were conducted consistent with FTA requirements for alternatives analysis studies.
- 2) The model used in the study assumes an Operating Entity that would contract out operations and maintenance to a Contract Operator.
- 3) Fare collection would be through ticket vending machines with proof of payment inspection usually taking place on board the train.
- 4) The model assumes a two-person train crew (1 engineer and 1 conductor/fare inspector).
- 5) If both the AVR and NS services are jointly implemented only one maintenance center at Derry would be built and operated for both services.
- 6) Railroad access costs are based on those of similar commuter railroads operating on host freight railroads. These costs can vary depending on the capacity (number of train slots and hours) required by the commuter trains.
- 7) Sensitivity testing shows that O&M costs per passenger can vary greatly depending on the levels of service provided since reductions in total passengers carried does not necessarily translate into a commensurate reduction in passenger rail cars.
- 8) Estimated total annual O&M costs for the three project alternatives are:

Commuter Rail Service on NS Corridor Only:	\$14.9 million
Commuter Rail Service on AVR Corridor Only:	\$12.6 million
Commuter Rail Service on both NS/AVR Corridors:	\$22.5 million
- 9) Estimated O&M costs on a per passenger basis for the three project alternatives are:

Commuter Rail Service on NS Corridor Only:	\$42.77/passenger
Commuter Rail Service on AVR Corridor Only:	\$18.48/passenger
Commuter Rail Service on both NS/AVR Corridors:	\$21.82/passenger
- 10) The estimated per passenger O&M costs are those calculated for the opening year (2012) and would be expected to be reduce substantially as ridership grows, especially in the early years of operation and prior to the need to add additional rolling stock.

13.1.8 Transit Oriented Development (TOD)

- 1) TOD is a land use form that takes advantage of and encourages opportunities for energy efficient development based on the close proximity of residences, job, retail shopping and services with transit systems resulting in less dependence on the automobile.
- 2) FTA New Starts land use criteria were utilized in analyzing TOD opportunities in the AVR and NS corridors.

- 3) Establishment of commuter rail service in communities in the Eastern Corridor does offer opportunities for support of TOD as well as support of land use policies of several of the urban centers in the AVR and NS corridors.
- 4) TOD could be focused in those urban locations (as opposed to suburban commuter stations in more rural locations) that have vacant or redevelopment properties within a ½ mile walking distance of the commuter rail stations and existing or forecasted population densities within this same access zone.
- 5) Station locations in four communities on the NS corridor were identified and evaluated for TOD opportunities: Latrobe, Greensburg, Jeannette and Irwin. Greensburg was found to have TOD support land use plans and zoning regulations in place that could be used as a model for other communities under study.
- 6) Locations of three stations on the AVR corridor were identified and evaluated for TOD development: Arnold, New Kensington and Oakmont/Verona.
- 7) Any TOD development opportunity in a community must also be evaluated in balance with the need to serve those commuter train patrons who would be accessing a station by automobile.
- 8) TOD is not a “magic bullet” in spurring urban redevelopment or revitalization in a community but it can play a role in such actions with the right mix of other stimulus actions and investments. The involved municipalities that could find themselves with a new commuter rail station must take the lead in fostering TOD as part of any redevelopment effort.

13.1.9 Funding Sources and Financial Plan

- 1) The funding sources identified include federal, state and local sources. There are many options that need to be evaluated further to determine the best solution for the region.
- 2) All of the identified state and local funding sources require an increase in current funding levels, implementation of a new source of revenue or shifting of existing revenue from current projects to this project.
- 3) The federal process is cumbersome and could last as long as eight to ten years but could potentially fund 50% of the total cost of the selected project under the New Starts program and up to \$75 million under the Small Starts program. The funding from the FTA does require a strong local commitment for match to the federal funds.
- 4) The federal process could change with reauthorization and should be consistently monitored to determine how the changes would affect the implementation of these projects.
- 5) The funding gap for the capital costs could be as much as \$209 million for the total cost of the AVR/NS line or as little as \$43 million for the 50% local match for the NS line.

- 6) Required local sources for O&M costs range from \$7 million to \$21 million annually depending on the level of funding received from the farebox and the lines operated.

13.1.10 Operating Entities

- 1) Who plans, constructs, finances, operates and maintains a commuter rail system is an important consideration in the implementation of the potential alternatives.
- 2) Multiple operating entities were examined in this report and numerous of these potential entities may require enabling legislation by the Commonwealth of Pennsylvania.
- 3) An operating authority would need to be responsible for all aspects of the commuter rail development, including, design, construction, financing, liability, insurance and operations or any combination of those aspects.
- 4) Either Westmoreland County or Allegheny County, or a consortium of both counties, could become the operating entity. The new entity would be responsible for deciding what aspects of the commuter rail system operations should be contracted outside. This option would allow the counties to have significant input into and control of the development and operations of the commuter rail services.
- 5) The Commonwealth of Pennsylvania (e.g. PennDOT) could become the operating entity much the way the Maryland Transit Administration operates the MARC commuter rail system serving Baltimore and Washington, DC.
- 6) The Allegheny County Port Authority does know how to operate transit services and one alternative could be that the counties, state or other implementing entity contract with the Port Authority to operate the commuter rail system.
- 7) A new regional entity, created by the Commonwealth, could specifically undertake the implementation and operation of the project serving both counties. This alternative would be similar to that adopted for the Valley Metro Rail project in Phoenix, Arizona, or the Virginia Railway Express which serves Washington, DC.
- 8) The WCTA, as the transit provider for Westmoreland County, could be the entity that operates the commuter rail system. If WCTA was the entity responsible for the implementation of system, all services would be required, in accordance with state law, to be contracted out.
- 9) A consortium of the transit authorities in the area, Port Authority of Allegheny County and Westmoreland County Transit Authority, could also operate the rail system, a model adopted by the Trinity Railway Express in Dallas/Ft. Worth, Texas. This arrangement, while potentially workable, could have significant challenges with accountability and representation.

13.2 Recommendations for Immediate Consideration

Activities in a couple of technical areas could be initiated quickly and with relatively little debate and discussion. The two major technical review areas to be recommended include (1) the collection of more definitive data (surveys, counts, etc.) on the primary travel markets and corresponding refinement of the ridership forecasting approach, and (2) the detailed operational analysis on the host railroads, and especially Norfolk Southern, to provide a basis for capital cost and operating parameter refinement and to initiate at least a “buy in” by the railroads for assessing the feasibility of commuter rail operations on their properties.

13.2.1 Market Data Collection and Ridership Modeling

The ridership forecasts developed in this study (and used in previous studies, with different input data) were by their very design and nature conservative; furthermore the current model is being used here at the edge of its capabilities given that (i) there is presently no commuter rail line in service in the modeling region, (ii) the primary calibration tool for the current version of the model is the 2000 census, now several years old, and (iii) there is not strong information (from an on-board origin-destination survey, for example) regarding the movements in the primary target markets (i.e. Central Westmoreland to Downtown Pittsburgh commuters, Allegheny Valley to Downtown Pittsburgh commuters, etc.) to confidently be more aggressive in the forecasts.

Accordingly, in order to increase the confidence level in more aggressive assumptions regarding potential ridership in these corridors, **the project team recommends that the forecasting approach should be refined using results from a series of data collection efforts on strategic assets in the corridors.** The chief vehicle for this should be an on-board origin-destination survey of current riders on WCTA Pittsburgh-bound routes (with particular emphasis placed on the Park-n-Ride market using Norwin Towne Square) and other transit services of interest (PAAC Allegheny Valley routes). Such a survey would ideally collect not only the rider’s origin and destination locations, but also where they board and alight the bus, their trip purpose, mode of access, and frequency of use. Stated-preference questions (such as “If the train were 10 minutes faster than bus, would you take it?”) are interesting but not necessarily useful in refining the ridership model. Although the survey would be designed to be useful for refining the regional ridership forecasting model, it could also be extremely useful for WCTA and other agencies as they continue to plan other transit projects. Ideally the survey collection effort would be paired with other data collection such as comprehensive on-off counts by stop, a running time travel check data, and possibly some select home-based interviewing in key areas such as North Huntingdon Township.

At the present time, such a scope has not been developed, nor has budget been allocated for such activities; however, scope could be developed quickly and the surveys designed, tested, administered, and evaluated relatively quickly, with minimal involvement necessary from others.

Subsequent infusing of the ridership forecasting models with better knowledge gained from the surveys would benefit the entire region, and would by necessity involve SPC technical staff (however the enhancements could be developed and implemented by another party and worked into the SPC process later).

13.2.2 NS Freight Train Operations Modeling

If either corridor of the proposed project is to advance, then the parameters for use of Norfolk Southern trackage needs to be established in order to develop refined estimates of capital and operating costs required. **A full detailed operations modeling effort is recommended by the project team to be undertaken in order for NS to evaluate whether they can accommodate the proposed passenger train services, and what, if any, additional track infrastructure would need to be to do so.**

This operational model, known as the Rail Traffic Controller (RTC), is a computer program which uses a schematic representation of the physical layout of the system and then loads onto that network all of the anticipated operations (freight, passenger, Amtrak, etc.) to perform a simulation of actual operations. The simulations help identify system conflicts, bottlenecks, and opportunities and necessities for improving overall speed, throughput, and performance. NS will use the results of this analysis as a basis for specifying capital capacity improvements (third track, crossovers, signals, etc.) which may be necessary to accommodate the proposed passenger service, as well as providing a starting point for their determination of the operational (lease) payments necessary to allow passenger service on the railroad. Although a similar analysis could be done on the AVR, the low traffic and nighttime operations on that line suggests that significantly less capital improvement (other than the already-necessary rebuilding the line to bring it up to passenger standards) would be necessary to accommodate additional traffic. The recommended list of improvement on the AVR as discussed in Chapter 8 and illustrated in Figure 8-7.

Because the project cannot advance without buy-in of NS to at least evaluate commuter rail service, funding and scoping of this analysis should be a high project priority. Although the complete analysis may require four to six months, it can be initiated quickly, as it involves only the railroad and their designated consultant modeling staff. The cost of this modeling step is estimated at \$350,000, which includes sufficient time to analyze the findings and incorporate them into the study process. This is highly recommended as an immediate-term priority.

13.3 Recommendations for Further Advancement

Several additional activities, discussions, and decisions will be necessary in order to advance the project toward implementation. Each of these can be centered on the following key decisions that will need to be made, and these are summarized below.

13.3.1 Project Viability

The first key decision to be made is whether or not the project should advance on known technical grounds. At the present time, both corridors appear viable as startup commuter rail corridors in their own right, subject to the caveat that the railroads have not yet provided their feedback as to viability and corresponding costs. **It is recommended by the project team that both the AVR and NS corridors of the project be advanced subject to further analysis and decision making.**

13.3.2 Project Sponsor Entity

For the project to advance any further, **the project team recommends that additional clarity as to the project “sponsor” and champion needs to be obtained through, perhaps, a reaching of consensus amongst all of the stakeholders expressing interest in commuter rail service in the region.** The project sponsor is viewed as the agency or other entity to be the appropriate responsible party going forward. As discussed in Chapter 12, there is no one single correct approach or solution for all cases, but all commuter rail startup sponsors do need to have the ability and authority to engage (or enter into contract relationship) in several activities:

- Ownership of the fixed and movable assets (stations, rolling stock, etc.)
- Exert operational control over schedules, work rules, labor, etc.
- Handle liability and insurance issues related to the service
- Sign operating agreements with host railroads
- Fulfill statutory requirements of a grantee agency
- Financial management of capital and operating funds
- Technical capability to support planning and operations

As stated earlier, it may not be possible at this time to recommend a particular specific agency to be the sponsor of the project, as there are too many variables (particularly legal and political considerations) not yet known. It should be noted that it is not unreasonable for the project sponsor to shift from one entity to another (especially in cases where a new entity needs to be created through legislative action); one sponsor could act as a “placeholder” until the other entity is created.

13.3.3 Capital Funding Sources and FTA Requirements

The funding of the project will have a direct correlation to the successful advancement of the project, and will likely be closely related to the project sponsor vehicle chosen. Within this decision is placed the significant decision of whether or not to seek Federal Transit Administration (FTA) New Starts discretionary funds. Nothing in the analyses performed to date, either in the procedures and approaches followed or in the apparent results, would preclude the project from seeking FTA funding for some portion of the cost. Given what is known at present, the project appears that it would be competitive. However, it is likely that additional requirements and limitations would be placed on the proposed projects if they were to proceed as a federally funded project:

- First and foremost, it is unlikely to be accepted as a single project as the two corridors are sufficiently different to warrant separate evaluation in FTA's view.
- Secondly, there are additional requirements on FTA New Starts projects at present which have not to date been part of the analysis; while the analysis done to date would likely form the bulk of the eventual Alternatives Analysis (AA), not every element of an AA required by FTA has been performed. There are additional procedural requirements (preparation of a Project Initiation Package, Public Involvement Plan, etc.) and technical requirements (refinements to the travel forecast procedures, collection of on-board surveys as recommended earlier).
- Third, FTA New Starts funding (in fact, ANY federal funding) would be subject to the National Environmental Policy Act of 1969 (NEPA) review process. As a result of this, the project implementation timeline is likely to lengthen (beyond what may be locally or politically acceptable).
- Finally, as FTA New Starts is a competitive, discretionary program, the project(s) would have to be competitively rated against other New Starts /Small Starts projects. Even if the project is recommended by FTA, Congress makes the ultimate funding decisions and there is no guarantee year after year that any specific project would get funded.

Even with Federal funding, a significant share of the costs need to be borne by the state and by local sources, with sufficient commitments locally to ensure the continued rating of the project (otherwise recommended projects have been cancelled because local match funding commitments disappeared after local elections or other changes). The local financial commitment is a key rating factor for New Starts projects; this work has also not been undertaken to date.

Because of the reasons above, and the likely time and cost required to advance the project in the New Starts pipeline, the project team recommends that the project be advanced as a

non-federal project and that all non-federal funding options be examined. If further project development activities indicate that the project is only fundable as a federal project, this recommendation could be re-evaluated.

13.3.4 Encouraging Transit-Oriented Development (TOD) and Land Use

In order to facilitate the further development of the project, local entities and governments should support land-use and other planning policies which are supportive of and encouraging to, transit and development around proposed stations. Some progress in this area has been made by select local jurisdictions; **it is recommended by the project team that, when opportunities to change local legislation and zoning regulations arise, that changes be considered to encourage and promote TOD.**

13.3.5 Design Activities and Environmental Reviews

To date, no actual preliminary or detailed engineering work has been done; although the project has been reviewed by engineers, all of the activities to date constitute planning or conceptual-level design and not actual engineering. Assuming that some or all of the previous decisions are made, and the project (s) remains on track, then **it is recommended by the project team that preliminary engineering work (approximately “30% design” standard) commence, together with state-specific or federal NEPA environmental review as necessary.** This activity will allow the costs, ridership, and operational issues to be revised; accordingly revised Cost Estimates will be able to reduce contingency costs (although actual cost estimates may rise).