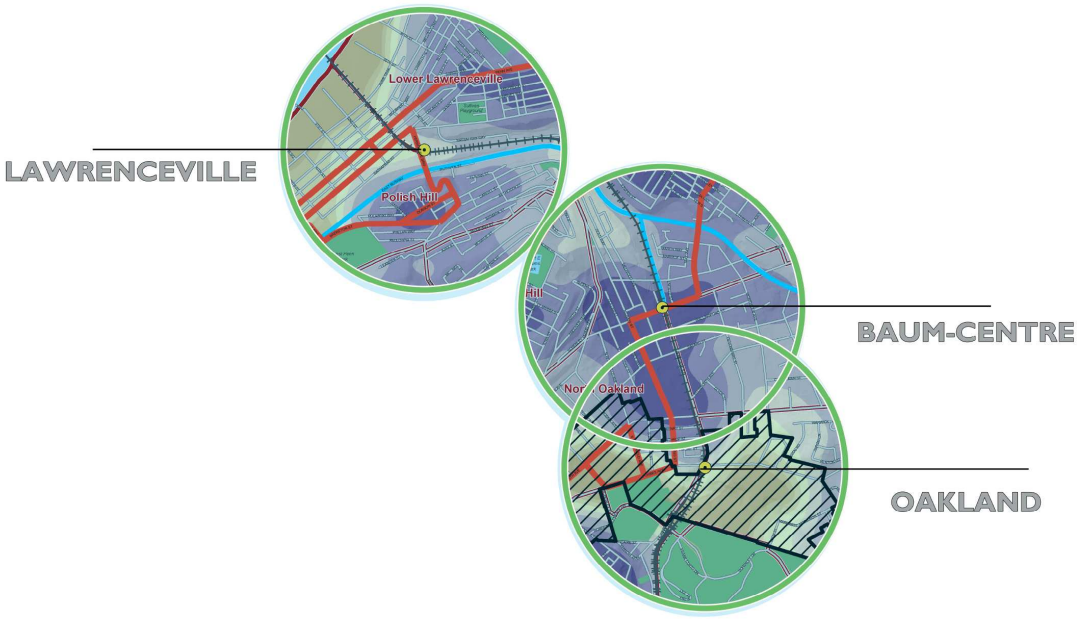

PITTSBURGH RAIL CONNECTION

Connecting Hazelwood to Lawrenceville

November 23 2010

Office of Councilman William Peduto

City of Pittsburgh Department of City Planning

Strategic Planning Division

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pittsburgh city planning

City of Pittsburgh

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Introduction

The City of Pittsburgh's industrial past provides many possibilities for the re-use and re-purposing of already existing infrastructure. This report examines the possibility of using the existing CSX/AVR rail corridor for commuter rail service that would connect Hazelwood to Lawrenceville via Oakland, which is the third largest job center in Pennsylvania. By using Diesel Multiple Units (DMU) on existing Ridership is estimated to average 3,434 weekday riders.

In order to start commuter rail services along the existing infrastructure, certain improvements would need to be made. Stations would have to be constructed, parking facilities would be needed, equipment would have to be purchased, and some track improvements would have to be made. These would all be considered capital costs and are estimated to be $66.5 million (2009 dollars). Potential sources for these costs include Federal Small Starts Funds (60%), Transit Funds/Flexible Highway Funds (20%), and State and Local Funds (20%).

Operation of the rail service could be run by an existing entity such as the Port Authority, a newly formed entity, or a third-party for-profit business. The operator would be responsible for the operating and maintenance costs of the rail line. These costs are estimated to be $8.05 million per year. By way of comparison, this figure represents approximately 2.3% of the Port Authority's annual operating budget.

Before operations may begin, agreements must be reached between the Operator and CSX regarding use of the track. Other obstacles that must be overcome are the challenging topography of the City of Pittsburgh as well as integrating the rail line with other segments of the public transportation system. This study examines these obstacles as well as the potential that exists in this underutilized resource.

1. OVERVIEW – PITTSBURGH RAIL CONNECTION (PRC)

The industrial past of the United States has created many opportunities for the City of Pittsburgh. One major benefit of our heritage can be seen in the transportation systems that have been in place for many years, most notably rail lines. In order to best utilize our resources and infrastructure the City of Pittsburgh has conducted a study to review the feasibility for the use of the rail line connecting Hazelwood, Oakland and Lawrenceville for passenger service.

The rail line that connects Lawrenceville to Hazelwood provides a corridor between the Allegheny River and the Monongahela River, traversing industrial, residential, institutional, park, and vacant lands with significant development potential. This rail line is currently under the control of CSX/AVRR and is being used mostly for the movement of freight within and through the Greater Pittsburgh area. Oakland, the third leading employment center of Pennsylvania, is located along this line. Oakland currently experiences significant traffic congestion and the ability of businesses and institutions to expand is severely limited by the lack of available land.

In fact, it was reported by the Pittsburgh Post-Gazette on February 25, 2010, that Oakland is experiencing a zero percent vacancy rate for top Class A space. This is a result of the ever-growing demand for space by universities and medical institutions and the scarcity of private land available for new office development.

Google Earth overview of the PRC

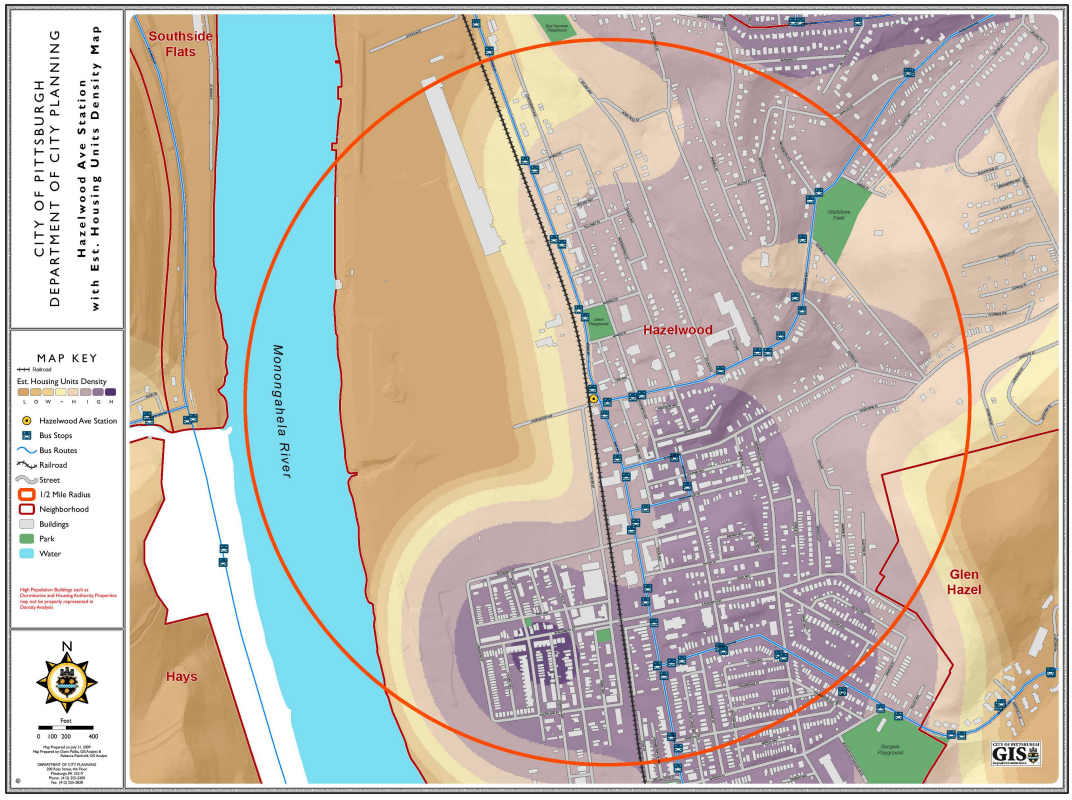
In order to help alleviate this congestion and provide sites for growth of the Oakland employment center, the study has identified issues, opportunities, strategies, and next steps associated with the Lawrenceville to Hazelwood transit connection. Included are identification of likely users and their numbers, connections into the neighborhoods traversed by this line but separated by topography, and connections to the existing public transit system.
The study also included the management of the proposed transit system, environmental protection, and adequate connection to existing and future development centers. The Pittsburgh Rail Connection (PRC) was designed with the premise of reusing infrastructure built over the last two centuries to create a transit system for the future.

Hazelwood Development Potential

The beginning of the line for the PRC is the ALMONO site located in Hazelwood. This 178 acre parcel of land was once home to a large steel mill and the epicenter for jobs in the neighborhood. Since its closure this predominately flat parcel of land located next to the Monongahela River has not been redeveloped.

Although large development has not occurred on the property it is still being utilized by a mixture of users. Carnegie Mellon has been using space in the rail roads old roundhouse for its automated vehicle program. Sunflowers have been grown for both demonstration and biofuel production on site. The old LTV steel mill – the largest structure on site – is currently used by artists for large scale installations.

Development constraints are now pushing onto the ALMONO site. In 2010 the Regional Industrial Development Corporation (RIDC) has retained the services of private consultants to create a Master Plan for the entire site. When this is done the project could create a home for institutions, residents and light manufacturing. All of these uses will not only attract development dollars but also, traffic.



Proposed PRC stop in Hazelwood

Hazelwood Transportation Connections

Currently, the connections between Hazelwood and the rest of Pittsburgh are not conducive for business development. A maze of predominately two lane roads wind through the City's topography creating long travel times between close geographic locations. Buy creating the PRC residents, business owners and institutions will have a direct alternative to vehicular travel to and from other neighborhoods that abut the rail line right of way. By creating the PRC the floodgates of development will open for Hazelwood, connecting the community across the City to Lawrenceville in what is projected to be one third of the time its takes to travel by car.

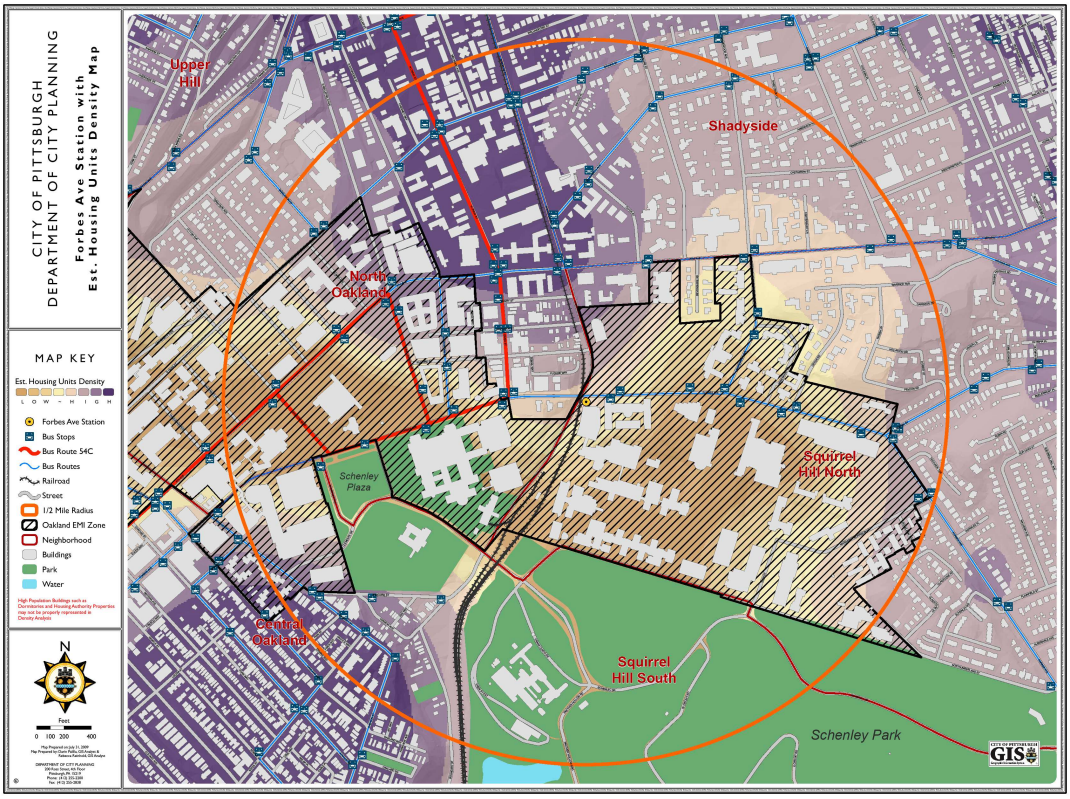
Oakland Development Potential

Oakland is the second largest economic center in the region and the third in the State of Pennsylvania. This community is home to Pittsburgh's cultural, medical and educational centers. It is a mixed income community ranging from service workers to neurosurgeons. This complexity has creating one of regions most interesting communities.

What also has been created is traffic and development that is reaching its limit. As referenced before Oakland's office space cannot keep up with demand and its housing market has been built out. In order to stay competitive the community must either start on the road to mass redevelopment in the form of more density or create better connections to other neighborhoods.

View of Oakland in foreground and downtown Pittsburgh in background

Oakland Transportation Connections



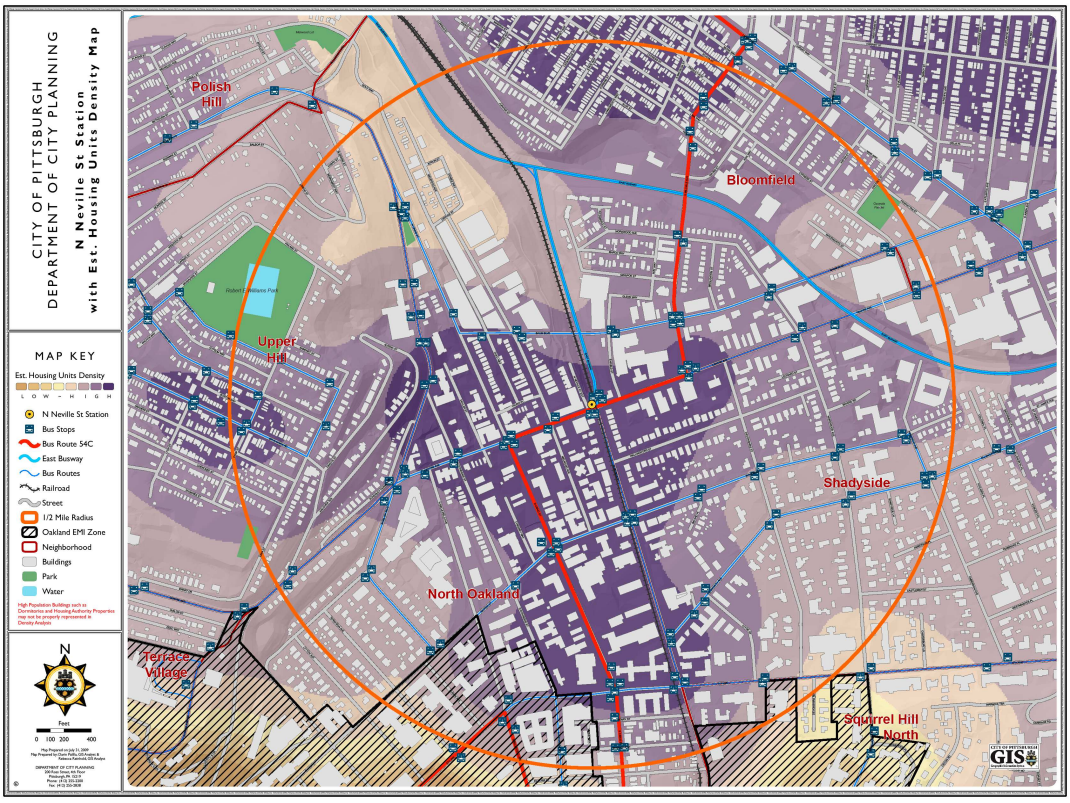
Proposed PRC stop in Oakland

The PRC will be the answer to Oakland development and connectivity constraints. By creating a system that has its own right of way disconnected from the usual traffic patterns commuters and residents will have the ability to travel throughout a majority of the City within less than fifteen minutes. Business owners will be able to connect satellite offices in other neighborhoods while institutions can expand classroom, laboratory and other uses by the way of quick transportation throughout the City. By creating an alternative to the conventional automobile and connecting the system with existing public transit people will have more choices in how they move about or too Oakland.

Baum-Centre Development Potential

The Baum Centre corridor comprises Baum Boulevard and Centre Ave crossing the neighborhoods of North Oakland, Bloomfield and Shadyside. This neighborhood has scene tremendous growth over the last ten years in the firm of new commercial development along with the expansion of the medical services industry; with two large employers in the Hillman Cancer Center and Shadyside Hospital. The neighborhoods also house a large residential population the covers all incomes levels and backgrounds.

Baum-Centre Transportation Connections



Proposed PRC stop at Baum-Centre

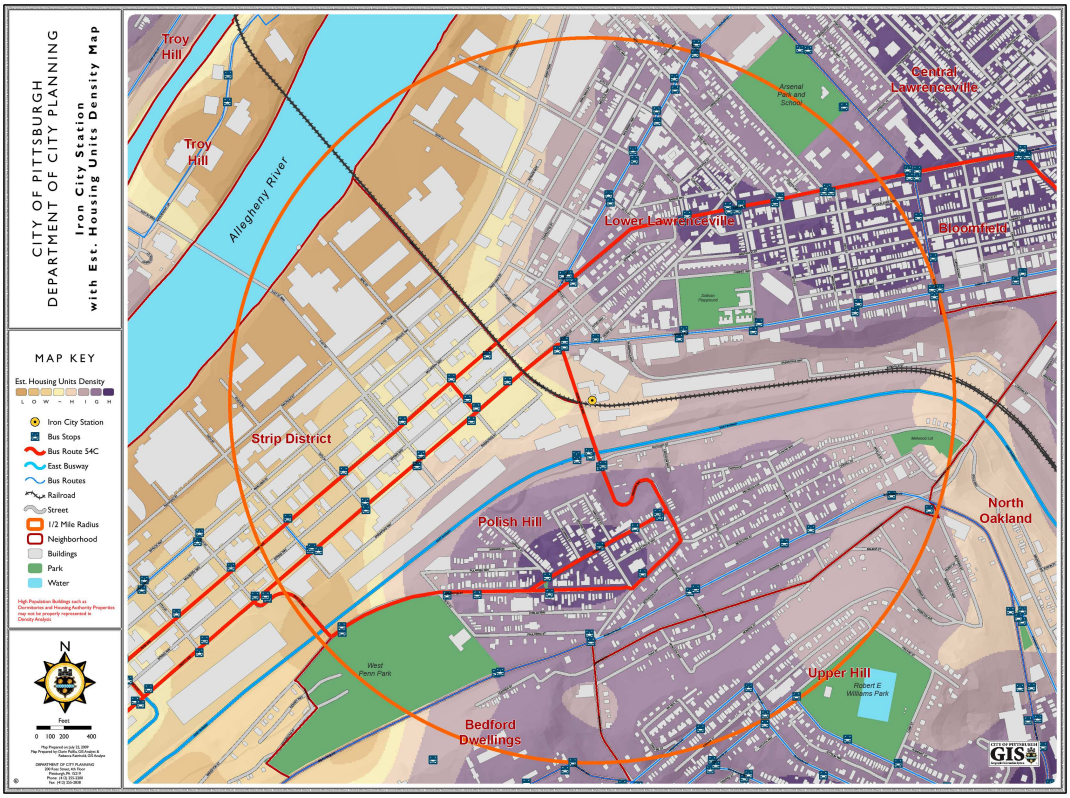
The Baum Centre corridor is major transportation connector by having a stop for the East Busway, a main artery for transit riders throughout the Eastern portion of the City and the Eastern suburbs. The transportation connections to the East are abundant, but movement to the North and South is done all on surface streets. By creating a North South connection residents and business owners will have a predictable and efficient transportation mode to many of the business and cultural centers of Pittsburgh. The new transit stop is proposed to connect directly to the East Busway and is envisioned to be a Transit Oriented Development site in the neighborhood.

Lawrenceville Development Potential

Lawrenceville continues to be a neighborhood on the rise. With a rebirth of it's long Butler St. business district to the remodeled or newly built homes within the community Lawrenceville is becoming a hot spot for business and night life.

Lawrenceville has also seen a growth in the institutional realm by having Carnegie Mellon locate its Robotics Institute along the Allegheny River and the Children's Hospital relocate within the neighborhood. These additions have created a more diverse community along with a higher demand for additional development. With these demands has come more traffic and to and from the community along with congestion throughout the City. By creating a new transportation connection to the rest of Pittsburgh, Lawrenceville can capitalize off Transit Oriented Development for the neighborhood while also being a capture point for commuters along route 28.

Lawrenceville Transportation Connections



Proposed PRC stop at Iron City

The East Busway skirts the Eastern edge of Lawrenceville already making this a neighborhood is transportation importance. The PRC will use the existing railroad alignment that runs parallel to the Busway as its route. This connection will be the

opposite terminus from Hazelwood creating the North South connection across the Eastern neighborhoods of Pittsburgh.

The actual stop location has been conceptually located at the Iron City Brewery on Liberty Avenue. This site was once a brewery and now only houses the office functions of the brewery. The Iron City site has a tremendous amount of potential for both a transit stop along with a mixed use commercial, retail and residential experience abutting two major transportation arteries.

Regional Transportation Connections

Creating the PRC will be the beginning stages of a regional rail commuter system. The PRC will not only be an efficient North South connection for the City it will also be the center piece of what could be direct connections for users of the Turnpike – by continuing up rail line through the Route 8 Corridor – or to Washington County on the Southern end of the rail line.

Recommendations for Coordination with Westmoreland Commuter Rail

In the "Allegheny Valley Railroad and Norfolk Southern Commuter Rail Interim Study" for the Westmoreland County Transit Authority (June 2009) it is proposed that a station connecting the WCTA service with the Port Authority's East Busway be established in Shadyside at the Negley Avenue Busway station. This station would be the last stop before Penn Station for the WCTA service and would, through transfer to the East Busway, provide the means for WCTA riders to reach Oakland. The location of this proposed connection offers no opportunity for transfer between these two services and the PRC.

In order to coordinate the PRC service with the proposed WCTA and Port Authority services, the transfer station could be established at the Herron Avenue Station on the East Busway instead of at Shadyside. Using an end-to-end station construction for the transfer between the proposed WCTA service and the Busway as proposed for the Shadyside station in the WCTA study, the two platforms could then be connected to the PRC Lawrenceville Station by means of an overhead pedestrian bridge or by use of the Herron Bridge. This would provide WCTA customers with two options to reach the Baum-Centre and Oakland areas, and would provide PRC patrons with a connection to Herron Avenue and two options to reach Penn Station in downtown Pittsburgh.

2. GOVERNANCE AND COORDINATION

The PRC will be a shuttle operation over a 4.22-mile route on a section of rail known as the P&W Subdivision[1] between Lawrenceville and Hazelwood over tracks owned by CSX Transportation (CSX or CSXT) and leased to the Allegheny Valley Railroad (AVR). Amtrak's Chicago-Pittsburgh-Washington, D.C. *Capitol Limited* also operates on this line.

Consistent with the preliminary nature of this study, there has been no official indication from CSX relative to the establishment or operation of future PRC service. Consequently, information herein regarding CSX is based on a preliminary conversation with CSX personnel.

Operating Agreements

The owner and the operator of the PRC service (which could be separate entities) will have to enter into a Joint Use Agreement with CSX and AVR, and possibly Amtrak. The details of the Joint Use Agreement will be the rules by which the PRC service and physical assets are owned, maintained and operated. Joint Use Agreements are in effect whenever a short line railroad or commuter rail agency operates its trains on CSX tracks. As of 2009, the AVR has 17 years remaining on its current 20-year Joint Use Agreement with CSX.

The procedure for establishing a Joint Use Agreement is well established at CSX, but prior to beginning negotiations for the agreement CSX will require that the owner enter into a Memorandum of Understanding with CSX detailing the limits of the project, responsibilities, expectations, cost allocation, etc. In addition, CSX must have a Non-Disclosure Agreement in place with any consultants and sub-consultants involved in the project. These documents must be in place before CSX can provide data and/or commit staff time to the project.

Because no Memorandum of Understanding has been established with CSX for this project, CSX would not discuss how the agreement between the PRC operating entity, AVR and CSX might be structured. However, CSX does have agreements in place with several commuter rail agencies including MTA Maryland's MARC Train Service. Under that agreement CSX operates the service for MARC and furnishes the crews, and MARC pays an access fee per train-mile operated, regardless of the length of the train, plus fuel and crew costs. The access fee is increased periodically by CSX, and is currently approximately $16.00 per train mile for MARC. Track access fees are generally considered to be O&M costs, but some percentage of them may be capitalized. For the purpose of this study, track access fees are considered to be an O&M cost and are addressed in that section of the report.

[1] The P&W Subdivision runs from Rankin north through Pittsburgh to "West Pittsburgh" (near New Castle) along what was once the Pittsburgh and Western Railroad.

One major item in the operating agreement will be who will physically operate the PRC service. CSX has said that it would not provide crews for the CR operation. Amtrak is not a likely supplier since it neither owns the right-of-way nor has crews based locally. Therefore, the options appear to be:

- For AVR to hire and train crews and operate the service;
- To contract with a transportation company like Veolia Transportation or Herzog Transit Services; or
- To have Port Authority or one of the regional transit providers operate the service.

3. CURRENT AND PROPOSED OPERATIONS

Current Operations

The P&W Subdivision is currently operated by the AVR which leases from CSX the single track west of Schenley Park (East Schenley) and the westbound track from East Schenley to the east end of Glenwood Yard. From East Schenley to Glenwood Yard is double track, and single track from East Schenley to Lawrenceville, Control Point (CP) "Field."

All train movements, turnouts and crossovers through the study area are controlled by the CSX dispatcher in Baltimore. CSX uses the eastbound track between East Schenley and Glenwood to operate the two daily Amtrak trains, and while the Amtrak trains are moving across the P&W Subdivision, AVR loses priority for all CSX and Amtrak train movements. CSX controls the main line crossovers at the east end of Glenwood Yard and controls and operates the main line east of the yard. No CSX trains operate through the study area unless CSX detours trains over this line due to an emergency or major maintenance work on its main line (the former P&LE line on the south side of the Monongahela River, also known as the Pittsburgh Subdivision), but CSX reserves the right to operate as many trains as it wants at any time on the P&W Subdivision.

AVR controls all train movements into and out of Glenwood Yard. The yard itself is also controlled by AVR which uses it as a staging area of trains for delivery to CSX, Norfolk Southern (NS), the Wheeling & Lake Erie RR (W&LE), the Buffalo & Pittsburgh RR (B&P), and to customers on its lines. Two AVR customers that were located within the study area, Bellefield Boiler and Iron City Brewery, have both ceased rail service, though the Iron City Brewery property is being advertised for lease with rail service listed as one of the site features.

AVR's typical daily operations on the P&W Subdivision are as follows:

- One round trip, daylight, Glenwood to Island Ave. Yard (NS) in Manchester six days per week - Train AVR-1
- One round trip, daylight, Glenwood to Bakerstown (B&P RR) five days per week - Train AVR - 4
- One round trip, night, Glenwood to 36th Street, then up the Valley Line to New Kensington and Arnold as much as 6 days per week - Train AVR-2

From a temporal standpoint, the overall daily traffic on the line is separated as follows:

<u>6:00 a.m. to 6:00 p.m.</u>

- Train AVR-1. This train leaves/enters the P&W Subdivision at the NS interchange at CP "Field" near the 33rd St. Bridge.
- Train AVR-4. This train leaves/enters CSX control at CP "Field" and crosses the Allegheny River on the 33rd St. Bridge.
- Amtrak Train #30 (if it's running late), eastbound

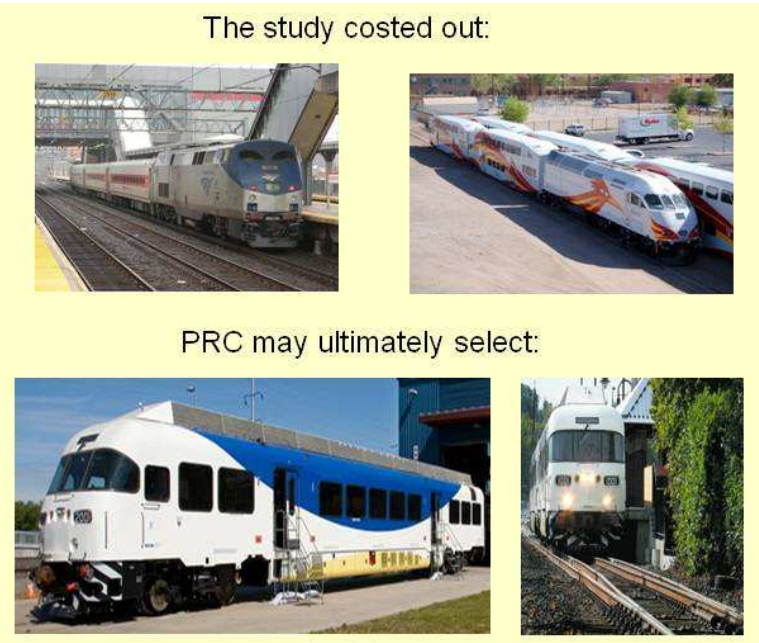
6:00 p.m. to 6:00 a.m.

- Train AVR-2 (10:00 p.m. to early a.m.) from Glenwood to the Valley Line to switch whatever industries need it on any given day as far up as New Kensington
- Amtrak Train #29, westbound, due to arrive Pittsburgh at 11:43 p.m.
- Amtrak Train #30, eastbound, due to depart Pittsburgh at 5:45 a.m.

The track condition is rated as FRA Class 3, which would permit freight trains to operate at a maximum speed of 40 mph and passenger trains to operate at a maximum speed of 60 mph. AVR's current maximum operating speed is 25 mph. While the track condition is FRA Class 3, the single-track section from East Schenley to CP "Field" at Lawrenceville has always been restricted to 30 mph likely because of limited sight distance due to curvature and Schenley (formerly Panther Hollow) Tunnel.

Proposed PRC Operations

The study assumed PRC would use diesel-electric locomotives pulling passenger cars; PRC may ultimately select Diesel Multiple Unit (DMU) vehicles that have recently entered into operation in the U.S. Examples of the vehicles are shown in the figure below:



Potential trains for the PRC

The proposed PRC operation with trains consisting of a locomotive and one cab car for bi-directional operation shuttling between Lawrenceville and Hazelwood on 30-minute headways would more closely resemble light rail than a commuter rail operation. A maximum operating speed of 25 mph and a dwell time at each station of 45 seconds would produce a run time between Hazelwood and Lawrenceville of 13 minutes over

the 4.22-mile route for an average speed of 19.5 mph. These times include 30 seconds (0.21 miles) for acceleration and deceleration to/from 25 mph.
Times between stations are:

-Lawrenceville to Baum-Centre: 3 minutes
-Baum-Centre to Oakland: 2 minutes
-Oakland to Hazelwood: 6 minutes

Adding in dwell time at stations, the end-to-end travel time would be 13 minutes, which would be a savings of up to 75% in travel time via automobile at congested times of the day.

The proposed 25 mph maximum operating speed would be compatible with the current FRA track class as well as the current operating speed of the AVR trains on the line. While the 25 mph speed may not seem to be a high enough speed, it still produces a savings in travel time over the route of up to 75% versus automobiles and transit buses. Increasing the proposed train speed may not be advantageous since the constant acceleration and deceleration to and from a higher speed would result in extra cost for fuel, equipment maintenance and track maintenance for a very small decrease in running time. It would also require more time and distance for acceleration and deceleration and less running time at the maximum speed between stations that are closer together than is typical for most commuter rail operations. Also, if the proposed speed were to be increased above 30 mph it would mean that the track must be maintained for FRA Class 3, which is more stringent in its requirements than Class 2 track. If the track is currently Class 3, as it appears to be, the PRC could likely get its operation started with a minimum investment in repair or maintenance of the track.

Separation of the types of railroad traffic (commuter, long distance passenger, local freight and through freight) will likely require improvements to the track signals and, to the extent possible, some type of temporal separation (separation by time of day). Although a formal response from AVR is not available, they have indicated that they would support the proposed PRC operation provided that there would be some type of temporal separation of the AVR and PRC trains.

There are three basic types of temporal separation:

- Scripted temporal separation - involves carefully defined procedures and scheduled movements.
- Short interval temporal separation - the period of temporal separation is not precisely defined by law, but it is implied. This technique positively restricts the train movements (i.e., separates them) for limited but shorter periods. These shorter operating windows are shifted from freight to passenger to freight more frequently within 24 hours, rather than only once.
- Extended temporal separation - applies vital train control technology to increasing portions of the route, thus enforcing fail-safe train separation over more tracks.

On most days train movements across the P&W Subdivision take place as described above and are predictable within certain windows of time. The AVR and Amtrak trains

operate on a relatively regular schedule, though the Amtrak trains can be thrown off their schedule by problems encountered anywhere between Pittsburgh and Washington, D.C. or Chicago. Train AVR 1 operates regularly but must wait at CP "Field" in Lawrenceville until the NS dispatcher permits the train to move onto the NS track to continue its run to Island Avenue Yard. During this wait no other trains can operate on the P&W Subdivision. However, CSX can elect to run trains through the project limits with little or no warning.

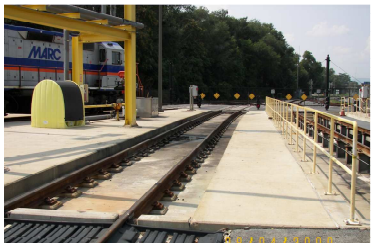
All of these factors indicate that either short interval temporal separation or extended temporal separation would be the most appropriate to apply to the PRC service. (Further elaboration on signals is provided in a later section.)

4. EQUIPMENT SERVICING AND INSPECTION FACILITY

Rail yards for short-term passenger rail equipment storage are commonly referred to as layover or service and inspection (S&I) yards, or facilities, in commuter rail operations. These yards should have tracks capable of holding the longest trainset (locomotive and cars) that is anticipated to use the facility, though not all tracks need to be that long if shorter trainsets will also be operated. S&I yards should, whenever possible, have two lead tracks that connect the yard tracks to the main line, or connect to another track that provides access to the main line, in order to keep a derailment or equipment failure on one lead track from trapping the rest of the equipment in the yard. For the proposed PRC operation, this facility would likely also serve as the operations center and the point at which the train crews would go on and off duty.

Though only a small facility is required for the start-up operation, it should be located so that it can be expanded as the operation grows in the future. The initial PRC service will operate with a locomotive and one or two passenger cars in each trainset. The two trainsets could be stored on one track, a second track could be provided for spare equipment storage, and a third track could be provided for equipment maintenance and repair. The tracks should be set approximately 20 feet on center and be long enough for the proposed trainsets as well as some extra length to accommodate one or two additional future cars on each trainset. The facility should also include the following features:

- Paved surfaces between the tracks that would allow a small utility-type vehicle access to the full length of the train to service the cars (cleaning, trash removal, equipment servicing and emptying of toilet holding tanks) and to allow a person to make inspections and minor repairs as necessary.
- A portion of each track, long enough to spot the locomotive, should be equipped with a spill containment system where the locomotives can be refueled from either a delivery truck or from an on-site fuel storage and distribution system. To save costs for the PRC start-up, fueling the locomotives by delivery truck is recommended.



Fuel Spill Containment Pit, MARC S&I Yard, Frederick, MD

- An inspection pit should be provided on at least one track to allow maintenance personnel to access the undersides of the cars and locomotives to check wheels and brakes. The pit may be installed in an open track as shown in the photo, or enclosed in a building. The open pits shown in the photo are used for inspection only at that facility because the Maryland MARC system has other repair facilities enclosed in a building to which defective equipment can be moved and serviced. Since the PRC may not be able to conveniently send its equipment to another nearby facility for repairs or periodic inspections, it would be prudent to include a small maintenance building as part of the S&I yard.

- Some means to wash the locomotives and cars should be provided. The PRC's start-up operation will not be large enough to justify the installation of a stationary wash unit, but portable wash units are available that would be able to drive along the 10-foot aisles and wash the cars and locomotives in place.
- A 480-volt standby power system should be provided so that the head end power (HEP) units on the locomotives do not have to be operated all night to keep the cars warm or cool and lighted for the cleaning crews.

Inspection Pit, MARC S&I Yard, Frederick, MD

- An air compressor and compressed air distribution system should be provided for operation of air tools.
- Potable water line connections for refilling the water tanks on the passenger cars would be needed.
- A small structure should be provided that would include locker room facilities for the train crews, a break room for train crews to relax between runs and to hold safety meetings, an office for a supervisor, a communications room, a janitors closet, and a supplies closet. This structure can be nothing much more than a large office trailer furnished with lavatory facilities, a lunch table, comfortable chairs, a desk, chairs and filing cabinets typical of a basic office, land line telephones, and a computer terminal or some other means by which printed messages can be received, and must comply with ADA.
- Small sheds for storage of the utility-type vehicle, anything that may be needed for re-provisioning the passenger cars, bagged sand for the locomotives, ice and snow melting salt, and possibly items like air and electrical hoses and brake shoes for making running repairs to the passenger cars.
- A toilet dump facility with connection to either a sanitary sewer system or an on-site holding/treatment facility. An alternative to an on-site holding system, should a sanitary sewer connection be found to be impractical, would be to contract with a waste removal service that specializes in transportation vehicles such as railroad cars, boats and aircraft.

An S&I yard should be located as near as possible to the main line track, and as close as possible to the point at which the trains will go into and out of service. An examination of the properties along the PRC route indicated that an area at the east end of the AVR yard in Glenwood should be a suitable location for the facility. This site is located in an existing railroad yard, has easy access to the main line, is located near the AVR's operations center, is expandable for storage of future equipment, and is close to one end of the PRC route, thereby minimizing deadhead time between the beginning/ending

service point (the Hazelwood Station) and the yard. The AVR controls all train movements to and from the Glenwood Yard, and CSX controls the main line tracks beyond the yard. CSX and AVR have established routine operating procedures that control these train movements, so it should not be necessary to develop any new procedures for the PRC train movements.

5. COMMAND AND CONTROL

Effective command and control over all train movements requires a train control system, communications, and rules and procedures, all of which work together in such a way that if one fails the other two compensate for the failure of the third. The primary consideration when selecting a train control system is that it must be fail-safe.

Signal System

The signal system is the primary train control and safety system for the line and should never be compromised. The P&W Subdivision currently has an ABS (automatic block signal) system controlled by the CSX dispatcher in Baltimore. The CSX dispatcher who controls the P&W Subdivision also controls a number of other lines. Currently the operation of several AVR trains and the two Amtrak trains does not pose an unreasonable burden on the dispatcher's attention. But the addition of the two PRC trains every 30 minutes may place a demand on the dispatcher's attention that would be unacceptable to CSX and should be considered unacceptable to PRC. The result could be delays to the PRC service when the dispatcher would have to devote his full attention to some situation on another line, and could potentially pose risks to the reliability of the PRC service.

The solution to this situation would be the installation of an automatic interlocking system of train control. Train control systems provide train separation, train detection, and route interlocking (prevention of unsafe moves on/off sidetracks or conflicting routes through turnouts and crossovers). The automatic interlocking system allows trains to operate through specific sections of track on a "first-come-first-served" basis and is train approach activated. The entrance/exit signal logic locks out specific sections of track to specific modes using split point derails placed at strategic locations to positively stop trains that do not respond to the signals (the fail-safe feature). The automatic interlocking system can also be switched back to the ABS system on demand by the CSX dispatcher for any train movements that do not fit the normal pattern of operation. In this case, the automatic interlocking system would be programmed to recognize the PRC trains as the normal operation, while AVR, Amtrak and CSX trains moving across the line would be held out until released by the CSX dispatcher. This is the system currently in use on The River Line in New Jersey, which operates FRA non-compliant DMUs and freight trains on the same tracks using extended temporal separation (short window separation) for the freight trains.

Grade crossing warning devices are considered to be part of the signal system. On the P&W Subdivision there are two grade crossings that will be traversed by the PRC trains while in revenue service: Boundary Street in Oakland and Hazelwood Avenue in Hazelwood. If the servicing and inspection yard is located in Glenwood Yard, the trains will cross two other grade crossings when they are in non-revenue service traveling to and from the yard. These additional two crossings are Tecumseh Street in Hazelwood and Vespucius Street in Glenwood.

The Boundary Street and Hazelwood Avenue crossings have had a good safety record since the installation of flashing light signals and gates. However, motorists who frequently use these crossings probably see trains only infrequently, and those trains are probably the AVR's freight trains since Amtrak's trains usually travel this route in the late night/early morning hours. Therefore, the introduction of frequent passenger trains on this line will be a changed condition, and extra precautions should be taken to prevent collisions. It is therefore recommended that these two crossings be equipped with four-quadrant crossing gates and/or other grade crossing warning devices and traffic calming features, especially in light of the anticipated increase in pedestrian traffic around the proposed Oakland Station. Additionally, renewal or replacement of the grade crossing surfaces at both crossings should be considered to improve pedestrian access to the stations. The crossings at Tecumseh Street and Vespucius Street may not require upgrades to their current warning devices since the PRC trains will not be in service when traveling over them.

The increased train traffic on the P&W Subdivision will result in a considerable increase in noise generated by train horns at the Boundary Street and Hazelwood Avenue grade crossings. If it is determined that the increased use of train horns may become a problem for adjacent properties, PRC may have to look at two options for reducing that noise, both of which affect the grade crossing warning devices. The first option would be to apply to the FRA for establishment of a "Quiet Zone" at each crossing. Quiet Zone applications are approved by the FRA only if they meet FRA risk assessment criteria. The application of supplemental safety measures (SSMs) or alternative safety measures (ASMs) to the warning devices at a given crossing provide credits to the FRA formula to lower the risk at the crossing below the Nationwide Significant Risk Threshold. Depending on the level of risk, the application of SSMs and/or ASMs can be a significant cost. The second option is the application of wayside horns which provide an audible horn warning directed at highway traffic in lieu of the locomotive sounding its horn. Wayside horns are so effective at directing the sound where it is required that they are used within Quiet Zone corridors at individual crossings without rendering the Quiet Zone ineffective. These devices may only be used in conjunction with, at a minimum, flashing light signals and gates, and are mounted on the masts of that equipment, but they are more cost effective and easier to get approved than a full Quiet Zone.

Communications System

Communications, typically by radio, help to control train movements and communicate with wayside equipment through "SCADA" control systems. Train movement authority is a function of the communication system and should come from only one control center. In the case of the PRC, the control center should be the PRC's control center. If the AVR elects to operate the PRC, modifications to their existing communication system to handle the new protocols required by the PRC operation should be a simple matter. If a third party will operate the PRC, a separate communication system will be established that will maintain direct communication with the CSX dispatcher as well as

the AVR's dispatcher. There are a number of proven technologies on the market to achieve this as well as proven protocols governing their use.

Rules and Procedures

Rules and procedures for train operations on this line are beyond the scope of this study, but are likely well established between the AVR and CSX. The importance of operating rules and procedures is evidenced by FRA specifically requiring that freight and passenger operations be capable of communicating directly with each other and adhering to common operating rules on shared tracks. The FRA treats this subject specifically in the Code of Federal Regulations (CFR) in 49CFR Part 211, and treats it further in 49CFR Part 214 Railroad Workplace Safety, Part 217 Railroad Operating Rules, Part 218 Railroad Operating Practices, and Part 225 Railroad Accident and Incident Reporting.

Introduction of the PRC service on this line will require extensive modifications of those rules and procedures. This would be typical for any commuter rail service on any railroad and should be considered to be part of the agreement process. As stated above, the rules and procedures will be tailored to be compatible with the train control and communications systems selected during design.

6. PASSENGER STATIONS

Four stations are proposed for the PRC. These would be located at Lawrenceville near the former Iron City Brewery facility, in the Baum-Centre corridor midway between Craig Street and Hillman Cancer Center, in Oakland along Forbes Avenue adjacent to Collaborative Innovation Center, and in Hazelwood at Hazelwood Avenue. In general, these stations would be typical of transit stop stations and would feature 12-foot-wide low-level platforms approximately 200 feet long on one side of the track with the following features:

- ADA accessibility.
- A transit-type shelter, ticket vending machines, platform lighting and a passenger notification system.
- Platform lighting, which needs to be uniform as well as bright, should consider the view of the engineer from an approaching train at night. Bright, spotty lighting can adversely affect the engineer's night vision and can possibly be a safety hazard.
- A passenger notification system that would include a public address system and illuminated information signs. These need to be able to deliver clear, concise messages that can be understood and quickly discerned by patrons with sight and hearing disabilities.
- Ticket vending machines (TVMs) should be located outside any areas that are to be secured for the night or on weekends to allow patrons and servicing personnel 24-hour access to the machines. Such an arrangement dictates that the TVMs be protected as much as possible from direct exposure to the elements and made as vandal-resistant as possible.

Low-level platforms will be necessary because CSX will not permit high-level platforms due to the need to maintain horizontal clearances for freight train movements. To meet ADA accessibility regulations, portable lifts will have to be kept at the stations. These are moved into position alongside the coach vestibule to serve as an elevator for disabled patrons. An alternative to the use of portable lifts would be the installation of a high-block which provides an ADA compliant ramp from the main platform to a smaller raised platform that is set at the car floor height of the passenger car. The edge of the high-block is set back a sufficient distance to meet or exceed the minimum legal horizontal clearance requirement of 8.5 feet from the centerline of the track. The gap between the high-block and the vehicle is then bridged by a retractable ramp (see two photos).

Access to the station platforms will have to be ADA compliant, and this does not appear to be a problem at three of the station locations. The location of the Baum-Centre Station, however, will pose a challenge due to the topography of the surrounding area. While various ramp and elevator options are available to address this issue, they will be expensive to build and maintain. The station platforms will be located on only one side of the track, so pedestrian access will have to be provided from the opposite side of the track at both the Hazelwood and Oakland Stations because there are two tracks at these two stations. Since these stations will be located adjacent to public at-grade road

crossings, the existing crossings at these two locations should be rebuilt with new roadway surfaces and improved pedestrian travel ways or sidewalks. By combining the pedestrian crossings with the road crossings, it will be a simple matter to have the grade crossing warning devices control both vehicles and pedestrians. At Baum-Centre, again due to the topography, no pedestrian traffic will need to cross the track. At Lawrenceville a pedestrian bridge may be required to provide access to Herron Avenue and the East Busway Herron Station. This should be an enclosed, well-lighted structure with a stair/elevator tower. If the bridge portion of the structure needs to cross above any railroad tracks, it should be kept in mind that the bottom of the structure must be no less than 23 feet above the top of the highest rail of any track.

High-block at Wilmapco/ SEPTA Churchman's Crossing Station at Stanton, DE

Retractable Bridge on High-Block at Churchman's Crossing Station, DE

Parking should be provided at the Lawrenceville and Hazelwood Stations. The Baum-Centre and Oakland Stations are more likely to be destinations and would not require parking as part of the start-up operation (though parking may be provided there at a later date or parking might be provided as part of adjacent developments). At Hazelwood and Lawrenceville station parking should be coordinated with transit-oriented development (TOD) to produce a design that is the most advantageous to both. As much as possible, parking for the stations should complement parking for the proposed TOD. Surface parking appears to be feasible at Hazelwood, while a parking structure may be required at Lawrenceville due to the limited space available for a surface lot. A 500-vehicle surface parking lot would require approximately 4.5 acres.

7. EQUIPMENT

The PRC equipment will be typical of commuter rail operations, though its actual operation will more closely resemble light rail. (Some of the new commuter rail lines using DMUs are in fact referred to locally as light rail.) Trainsets would initially consist of a locomotive and cab car (a coach with controls for the locomotive located in the end of the car farthest from the locomotive), or a locomotive, coach and cab car. Cab cars allow bi-directional (push-pull) operation of a train, similar to most light rail and heavy rail transit trains, by permitting the engineer to operate the train from either end without having to either turn the train or move the locomotive to the other end of the train. In one direction the locomotive pulls the train, and in the other direction the locomotive pushes the train.

Locomotives

The most cost effective choice for locomotives for the PRC start-up would be to use rebuilt locomotives, or second-hand locomotives. Rebuilt locomotives are units that have been traded-in, stripped completely down to the frames and rebuilt for passenger operations with the latest emissions controls, electrical and safety equipment, and new car-bodies. These units are essentially new locomotives but cost approximately $1 million less, on average. They are generally more powerful than trade-in units and capable of hauling longer trains. Motive Power, Inc. of Boise, Idaho, currently manufactures rebuilt locomotives. Second hand locomotives would be units already configured for passenger service and traded in on new or rebuilt locomotives. For example, MARC is trading-in 19 GP40 locomotives that are reliable but can handle only a five- or six-car train. These locomotives, or units similar to them, could probably be obtained at favorable prices for a start-up operation. The second hand locomotive market is very fluid, so it is not possible to predict what may be available at the time PRC begins the procurement process. General Electric and Electro Motive Diesel, Inc. are the two North American manufacturers of new locomotives. Currently there is a lead time of approximately three years for new locomotives. It is anticipated that three locomotives will be required for PRC service; two in service and one spare.

Passenger Cars

Commuter rail passenger cars come in three basic configurations; single-level, bi-level, and gallery cars. These cars have seating capacity ranges as follows:

- Single-level cars – 95 to 125 passengers
- Bi-level cars – 145 to 180 passengers
- Gallery cars – 105 to 145 passengers

Any car in any one of these configurations can be rebuilt as a cab car. However, installation of the control cab will reduce the cars' seating capacity by eight to ten seats. The anticipated ridership and service plan for the PRC start-up service would warrant the use of single-level coaches configured as cab cars.

The most cost effective way to acquire equipment for the start-up operation would be through the purchase of second-hand passenger cars, but, as with locomotives, the market is very fluid and the desired equipment may not be available at the time of the procurement process. Purchase of second-hand equipment should also be done with some caution, as older equipment may come with asbestos and lead paint issues in addition to becoming more prone to failures with parts difficult to obtain. Older equipment also may not meet ADA accessibility requirements or the FRA requirements for crashworthiness as set forth in 49CFR Part 238 for mixed traffic operations. Currently, New Jersey Transit, Virginia Railway Express and the Metra system in Chicago are potential sources of compliant second hand equipment. The purchase of new equipment, if possible, would ensure reliability and compliance. A cost effective way to purchase new equipment would be to request an option on the final contract for new cars made by another agency. This carries no immediate financial obligation and provides a placeholder for the ordering agency to exercise if it chooses. As with the locomotives, there is a two- to three-year lead time for new passenger cars. It is anticipated that three cab cars will be required for PRC service; two in service and one spare. Two standard coaches should also be acquired so that the trainsets can be increased for added capacity during events.

Diesel Multiple-Units (DMUs)

One other option is available for passenger equipment, and that is diesel multiple-units (DMUs), which are self-propelled passenger cars. These units are essentially diesel powered light rail vehicles configured for bi-directional operation. Trainsets are typically married pairs of coaches connected by an articulation joint or drawbar. Since DMUs are both locomotive and passenger car, fewer pieces of equipment are required to operate the service. For the PRC start-up service, three DMUs, two in service and one spare, would be required. DMUs operating in mixed traffic without temporal separation are required to meet the FRA crash-worthiness requirements set forth in 49 CFR Part 229 and Part 238 or the operator must obtain a federal waiver to operate non-compliant units in mixed traffic. The only manufacturer of FRA-compliant DMUs (whose DMUs are in use in Portland, OR) has ceased building vehicles. However, the company has been purchased by US Railcar, LLC, and will resume manufacturing at a new plant being built at Gahana, OH. There are several other manufacturers of FRA non-compliant DMUs, including Siemens, and Stadler Rail, though all are European manufacturers. Several systems using FRA non-compliant DMUs are in operation or under construction in the U.S., including the New Jersey Transit River Line, the Northern San Diego County Sprinter, and the Austin Capital MetroRail. No projected cost figures are available for the FRA compliant DMUs to be manufactured in Ohio.

8. CAPITAL COSTS

Assumptions and Exceptions

- General
  - Where normal costs, field conditions, or future operating conditions are not available, a 40% contingency has been applied
  - Cost escalation has been assumed to be 4% per year
  - No real estate costs have been included
  - Track access fees are O&M costs some percentage of which can be capitalized; for the purpose of this study track access fees are considered to be 100% O&M costs and are therefore not included here
- Locomotives, Cab Cars and Coaches
  - 3 each locomotives and cab cars required – 2 in service, 1 spare
  - 7% has been added to base cost for spare parts
  - 20% has been added to base cost plus spare parts for "soft costs" (warranties, field support, training, tools, etc.)
- Stations
  - Four stations assumed
  - No major environmental, zoning or aesthetic issues are assumed
  - Estimate includes the following elements: 12' x 200' low platform; access; portable lift for ADA access to train; 6' x 50' shelter; lighting; TVMs; passenger notification devices; professional services; and contingencies.
  - $1.5 million added at Baum-Centre Station for access from street level
- Servicing and Inspection Yard
  - Estimate includes the following elements: new track in the facility (2 double-end tracks and 1 stub-end track); 5 turnouts; yard air system; 480V standby power system; portable train washer; utility vehicle; 30' x 140' metal shop building with 100' concrete pit; 20' x 40' office/locker room building; 2 sheds for vehicle and supply storage; asphalt paving; site lighting; and perimeter fence.
  - Facility will be located in Glenwood Yard
  - No rehab of existing yard tracks included
- Track Improvements
  - No rail renewal
  - No additional ballast required
  - 20% crosstie renewal, Glenwood to CP "Field," reuse existing tie plates and rail anchors
  - Surfacing and lining, Glenwood to CP "Field"
  - Labor rate based on R. S. Means B-14 crew plus 120% for overhead and fringes in case work is performed by CSX forces
  - 5% included on all material costs for handling
- Track Signal Improvements
  - Existing automatic block signal system to be completely replaced CP "Field" to the Glenwood Hold-Out Track
  - Replacement signal system will be enhanced automatic train stop system

- Install 6 split-point derails at strategic locations in existing tracks

- Grade Crossing Improvements
  - Estimate includes the following elements: new flashing light signals; 4-quadrants gates; and crossing surface improvements
  - New crossing surface to be concrete panels
  - Two crossings, only: Boundary St. and Hazelwood Ave.
  - New crossing width will include sidewalks
  - No improvements to approach sidewalks
- Parking, Surface Lot
  - No significant environmental remediation required
  - Assumed 500 spaces – 10' x 18' spaces and 24' wide aisles
  - 4.5-acre footprint required including 30% for stormwater management, cross aisles and green space
- Parking, Structure
  - Assumed 180' x 210' footprint
  - 500 spaces at base cost of $24,000 per space plus contingency
  - No major environmental, zoning or aesthetic issues are assumed

Table 1 Capital Cost Summary Table

	Quantity	2009 - $Million	2014 - $Million
Locomotives – Rebuilt	3	9.7	11.8
Cab Cars, Single-Level, New	3	9.7	11.8
Stations	4	15.7	19.1
Servicing & Inspection Yard	LS	4.5	5.5
Track Improvements	LS	0.7	0.9
Track Signal Improvements	LS	9.9	12.0
Grade Crossing Improvements	LS	1.3	1.6
Parking, Surface Lot, Hazelwood	LS	3.0	3.6
Parking, Structure, Lawrenceville	LS	12.0	14.6
TOTAL w/ Rebuilt Locomotives		**$66.5**	**$80.9**

LS = Lump Sum

9. TOPOGRAPHICAL CONSTRAINTS AND ENVIRONMENTAL SUSTAINABILITY

The purpose of this chapter is to address Best Management Practices (BMPs) related to topographical limitations and environmental sustainability issues.

Topographical Constraints

Pittsburgh is a hilly city in which it can be more difficult to walk than in other cities, so it is important to provide good access for pedestrians and transit riders in the vicinity of stations. The good news relative to pedestrian access is that the City is walkable despite its topography, with ubiquitous sidewalks and pedestrian crosswalks provided at signalized intersections. Pittsburgh also has pedestrian-scale zoning and design standards; mixed-use is encouraged in many areas; store-fronts and residences are located relatively close to the sidewalks; and on-street parking provides a buffer between moving traffic and pedestrians. These are all elements that should derive a high rating relative to land use and transit-supportive urban design in Federal Transit Administration's (FTA) transit New-Starts project evaluation system.

The 4.2-mile AVR right-of-way that would be used by the PRC is located in a valley for much of its length; in addition, a section of greater than ½-mile in length is in a tunnel. Accordingly, some of the PRC alignment is not very visible in the neighborhoods through which it runs. This has good aspects in that the railroad does not negatively impact traffic, but the visual separation provides a challenge for making the stations visible to riders and potential riders.

Fortunately, the potential stations are, for the most part, located centrally in the neighborhoods they serve. Hazelwood Station is located at the nexus between the Hazelwood neighborhood's current development pattern and the very large development that is being planned on Almono's 178 acres. The station's entrance is next to the major intersection of Irvine Street and Hazelwood Avenue.

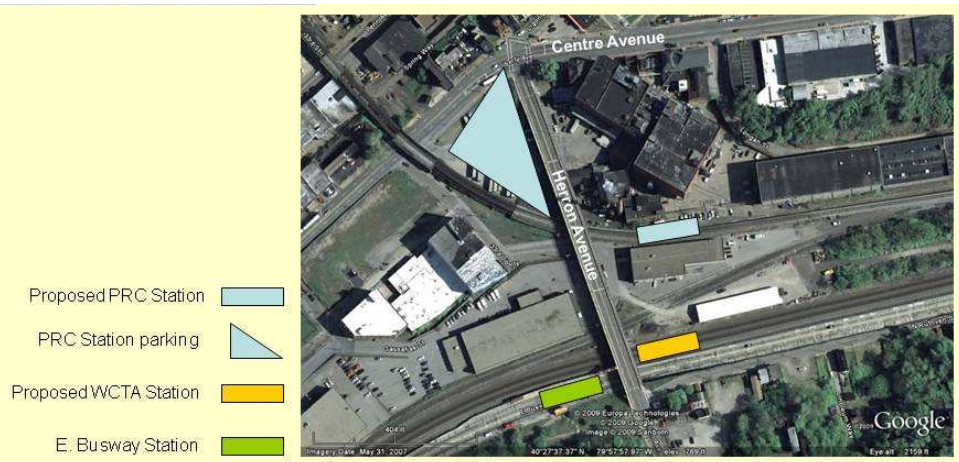
Oakland Station is centrally located astride the CMU campus, the Carnegie Museum complex, and University of Pittsburgh; and the station's entrance will face Forbes Avenue.

Baum-Centre Station is located right on that development corridor that is adjacent to the East Busway. The station entrance will be from Centre Avenue.

Iron City Station is located within a block of the East Busway Herron Station providing enhanced intermodal connectivity. The station will have entrances off of Herron Avenue and Liberty Avenue, and is located between the four neighborhoods of Lower Bloomfield, Lower Lawrenceville, Upper Strip and Polish Hill. It will be accessible to all of those neighborhoods, though it is not central to any of the neighborhoods. Intermodal accessibility of the PRC station will be enhanced by two other commuter rail

projects that are currently under consideration by Westmoreland County Transit Authority (WCTA).

The proposed Allegheny Valley Commuter Rail and Westmoreland Commuter Rail would utilize the Norfolk Southern Railroad corridor which crosses (via a grade-separated crossing) the PRC corridor. There potentially could be a station of these commuter rail projects located next to the Iron City Station of the PRC. The following figure shows how the proposed PRC station, the Herron Avenue East Busway Station, and the potential station of the WCTA Commuter Rail proposals would interface.



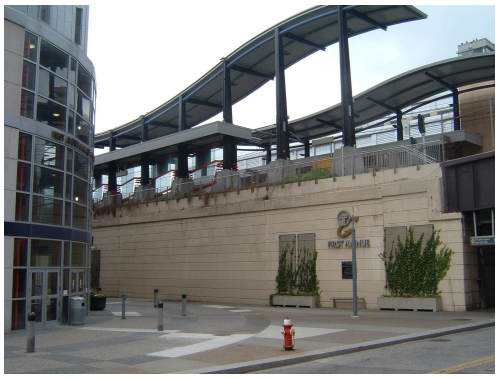
Potential Stations at Iron City

Overcoming topographical limitations involves providing access to PRC stations for customers. Elevated stations or stations located below street level require vertical accessibility for customers. Even at-grade stations may require vertical accessibility, in order to go from one train platform to the other, or to pass from one side of the railroad corridor to the other.

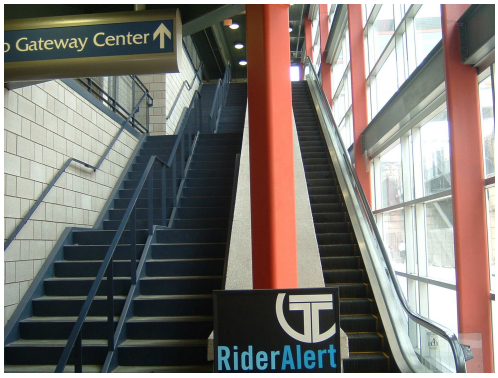
Vertical access is provided by stairs, ramps, escalators, and/or elevators. These facilities could be provided as stand-alone facilities by the implementer of the transit system; or they could be provided as part of a commercial or other building, or as part of a parking garage. If a development occurs where a PRC station will be located, it is possible that vertical (and horizontal) transitions for station passengers can be accomplished as part of the adjacent development.

An example of a transit station integrated with development is First Avenue Station along the T Light Rail System in downtown Pittsburgh. The LRT station and the adjacent Pittsburgh Parking Authority public garage were developed at the same time along with the nearby PNC Firstside Center, and the station and parking garage designs were coordinated. Vertical connections take place in the parking garage: via stairway, escalator and elevator. These facilities are used by transit passengers as well as customers of the garage. In addition, there is a horizontal connection via skywalk that

connects the garage with the inbound T station platform, permitting inbound passengers to connect directly between the garage and the station.



Parking garage next to LRT station, and pedestrian connection to inbound platform



Vertical transition in garage used by transit riders as well as garage customers

There are many advantages in coordinating design of the transit station with an adjacent development. These include creating a pleasing environment for transit customers, facilitating economic activity, providing opportunities to access a mix of funding sources, and minimizing construction costs of the transit project.

If a station is not designed and constructed in conjunction with an adjacent development, then connections to the existing local sidewalks would be accomplished by the PRC implementing entity. The implementing agency would construct stairways and ramps to connect to the local sidewalks. The following photos provide examples of stairway and ramp connections on Port Authority's light rail and busway system.

Pedestrian ramps and stairways at the Boggs Station of Port Authority S. Hills LRT

Pedestrian ramps and stairways at the Herron Station of Port Authority East Busway

In much the same manner as illustrated above, there is significant potential to create high-quality pedestrian interface at all of the stations of the PRC.

At Hazelwood, a new, large-scale neighborhood that is envisioned as an extension of the existing neighborhood is being developed along the river by Almono. Pittsburgh Technology Center, Southside Works, and the Waterfront along the Mon River near Hazelwood, are three very successful riverfront developments that provide templates for riverfront development.

In Oakland, the Collaborative Innovation Center (CIC) is adjacent to the proposed PRC station, and the rail station could potentially use the CIC garage elevator and existing street-level walkways as the pedestrian interface for transit customers. A short pedestrian overpass over the railroad tracks and Boundary Street, if constructed, could provide connection between the transit station, CIC garage, and the walkway and elevator systems of the parking lots and garage of the Carnegie Museums. The pedestrian facilities associated with the Museum complex provide a path to Schenley Plaza, thereby serving the central part of Oakland. In addition to providing a pedestrian

path to central Oakland, this overpass would connect with the development that is being planned along Forbes Avenue east of Craig Street.

The Baum-Centre Station would provide access to the Baum-Centre corridor, which is also the East Busway corridor, which has seen over $600 million of development since the Busway opened in 1983. The PRC station would serve North Oakland, parts of Hill District, and portions of Shadyside. It is within 9 minutes walking time to Hillman Cancer Institute and 10 minutes to Shadyside Hospital. There have been development proposals for the vicinity of the station, though no recent proposals have been made for the immediate station site. Because of the difference in elevation between the platform level of the proposed station and street level (Centre Avenue), it would be beneficial to integrate transit station access with development and redevelopment of the parcels adjacent to the proposed station.

The station located next to the former Iron City Brewery is one potential location to serve the Lawrenceville area (another possible location along the rail line slightly north, at Smallman Street and 33rd Street, may be possible but is not included in this study). The Iron City location is accessible to four neighborhoods: Polish Hill to the south, and Lower Lawrenceville, Lower Bloomfield, and Upper Strip to the north. Polish Hill is, as indicated by its name, very hilly, and this makes pedestrian access difficult. On the other hand, ½-block south of the station is the East Busway Herron Avenue Station, which provides access to the Busway serving Downtown Pittsburgh, eastern City neighborhoods, and eastern and southeastern suburbs.

There has been significant development and/or planned development in the Strip, Lawrenceville and Bloomfield neighborhoods. However, the immediate vicinity of the station is underdeveloped, and accordingly could use improvement from a pedestrian perspective even though there are sidewalks. A development possibility adjacent to the station is the potential redevelopment of the former Iron City Brewery, as has been discussed in the news media, which could provide an improved pedestrian interface along with economic development.

It is recommended that accessibility constraints due to topography be overcome and addressed by pursuing a hierarchy of station access design. The highest priority should be to implement the transit stations at the same time station area development takes place, in order to coordinate the access requirements of the transit station with those of the adjacent development, and to minimize overall construction costs.

The next priority in station design would be to design the station in conjunction with adjacent park and ride facilities (applies to stations which will include park and ride). As was shown with First Avenue Station, pedestrian provisions in the parking facility can serve transit riders; this applies even when the parking is for non-transit riders as well as users of the transit.

The final hierarchy of station implementation would be to develop the station prior to the time when adjacent development takes place. If station construction occurs in advance of economic development, then the PRC implementer would need to provide vertical access via elevators, ramps and stairways in order to connect with the local sidewalks.

Environmental Sustainability

Sustainability addresses improving the quality of human life while living within the carrying capacity of supporting eco-systems. In considering implementation of a transit system, sustainability has to do with taking note of the many benefits of improved transit while mitigating any negative impacts of implementing and operating the transit system.

Positive impacts of developing a transit line include transportation/transit improvements for transit riders and non-riders, economic development benefits of transit, pedestrian improvements in the vicinity of the transit stations, improving air quality, reducing energy requirements of the transportation system, and provision of stations as community assets. The PRC will improve travel time for transit riders; this will result in increased transit ridership and environmental benefits including improved air quality and reduced energy consumption of the transportation system.

One of the elements of need that was identified for a transportation improvement in this corridor is the spillover of development from Oakland into the adjacent and nearby neighborhoods. There is need for improved transportation to enhance access to the economic generator that is Oakland, to mitigate congestion and other impacts, and to provide improved access within the greater Oakland area. The proposed PRC could be a significant transportation enhancement to the greater Oakland development area. In addition, the potential for specific economic development activities in conjunction with implementation of PRC stations has been noted.

In addition to understanding these positive impacts, there are also potential negative impacts that would be addressed in detail during subsequent design of the system. Areas of potential negative impact may include the following:

- Cultural Resources [From the project map, City will discuss potential impact of the PRC]

- Parklands and Recreation Facilities [From the project map, City will discuss potential impact of the PRC]

- Noise – Train noise comes from two sources: operating noise, as the train moves along the track; and noise from the horn blowing that will occur when the trains pass through the few grade crossings that are located along the line. Federal Railroad Administration rules allow for crossings to be designated "quiet zones" which waive the horn blowing requirement in the event that additional safety measures are met. This would involve equipping crossings with flashing

lights and special barrier gates and/or medians that do not allow motorists to sneak around a gate.

The capital cost estimate for PRC includes an amount set-aside for constructing quiet zones at these two locations. The entity that implements the PRC will determine whether quiet zones will be established.

Because PRC headway will be ½ hour (a train will arrive every ½ hour in each direction), there will be four occurrences per hour when a train whistle blows at each of the two grade crossings.

Another method to mitigate noise is to use DMUs for the service, rather than diesel locomotives and passenger cars. DMUs make less noise than diesel locomotives. (See discussion in Chapter 7 of vehicles that may be used to operate the PRC service.)

- Hazardous and Residual Waste – Construction will take place at stations and at the overnight storage, light maintenance and operations facility, for which a Hazelwood location has been suggested. As was done for WCTA's study of commuter rail in the Allegheny Valley and Norfolk Southern corridors, we have assumed a component of capital costs of between 4% and 8% to account for environmental cleanup and purchasing. No upgrades of the track should be needed to institute rail service on the PRC. However, without CSX's input it is difficult to anticipate what requirements it may place on the startup of PRC service. It is also assumed that any upgrades of the line to accommodate future needs will take place as part of a future project.

10. OPERATING AND MAINTENANCE (O&M) COST ESTIMATION

O&M cost information from a recent study of proposed commuter rail serving the eastern portion of southwestern Pennsylvania was used to derive an estimate of O&M costs for the PRC. HDR Inc., under contract to Westmoreland County Transit Authority (WCTA), conducted a study (2009) of proposed commuter rail in the Allegheny Valley corridor between Arnold and Downtown Pittsburgh, and another line between Latrobe and Downtown. It was a detailed study of these two proposed passenger rail lines, and the O&M information from that study can be adapted for use in the PRC study.

Since the PRC would be operated on trackage currently leased by AVR from CSX Transportation, this study will focus on the AVR Corridor alternative from the WCTA study. Following is a description of the items covered in the O&M costs for that study, to clarify all the elements that are covered in operating and maintenance costs.

In the WCTA study, an Operating Agency ("Agency") was assumed to oversee a Contract Operator ("Operator"). Annual commuter rail O&M costs would be the sum of annual costs in these two overall categories. See Appendices 1 and 2 for information on components of O&M cost for Agency and Contractor.

Under Contract Operator of the PRC service, the following categories of cost were used to derive personnel and other costs:

- General Manager's office
- Safety & training
- Operations
- Equipment maintenance
- Engineering/maintenance of way
- Administration & finance
- Management fee

The WCTA report estimated this area of cost (to the Contract Operator) at $7.4 million per year. To translate this estimate to an estimate for PRC, adjustments were made in the categories of expense, according to the following:

- The following categories were kept unchanged from the WCTA estimate for O&M costs of the AVR commuter rail: General Manager's office; safety & training; and administration & finance.
- Operations costs were doubled from the WCTA estimate for AVR, to account for the much higher number of train hours that would be operated on PRC. The number of hours would be greater because PRC would be operated on Saturdays as well as weekdays, and weekday service would be from very early to

very late at night; whereas AVR commuter rail would be operated mostly during peak periods on weekdays only.

- Equipment maintenance costs would be 2/9 of AVR CR, because that is the estimated ratio of vehicles operated in maximum service for the two systems.
- Engineering and maintenance-of-way costs of PRC would be ¼ that of the estimate for AVR. This category of cost is roughly proportional to number of directional route miles. The actual ratio between PRC and AVR is less than ¼, but ¼ is used to be conservative.

Interestingly, the net of these changes is that annual O&M costs would be approximately the same for the two systems ($7.5 million of costs by the PRC Contract Operator, compared with $7.4 million of O&M cost by the AVR Contract Operator).

Functions assumed to be performed by the Agency are administration, purchasing, contract compliance, budgeting/finance, marketing/public information, and service planning. In addition to those administrative-type functions, the Agency would perform oversight of contracted functions: operations, passenger and employee safety, scheduling, equipment and facilities maintenance, and security.

The categories of cost to the Agency covered:

- Administrative staff in the following areas:
  - Executive Director's office
  - Administration & finance; including federal, state and local grants and programs
  - Customer service
  - Service planning
  - Monitoring of contract operations
- Liability insurance
- Payment to railroad to pay for access to the line owned by the railroad company

Insurance for PRC is estimated at $750,000 and cost of administrative staff (5.5 full-time employee equivalents) is $800,000; payment to the railroad is discussed below. It is assumed herein that the oversight Agency would be the Port Authority of Allegheny County or one of the regional transit operators, because administrative staff in the Executive Director's office, administration and finance, service monitoring, and contract monitoring already perform oversight of transit operations. The assumption of using an existing transit agency means fewer administrative staff would be needed than would be the case with other arrangements.

Result of this analysis is the $800,000 for administrative costs plus $750,000 for liability insurance for a total base cost for the Agency of $1.55 million.

Adding the $7.5 million Operator costs (contracted) to $1.55 million Agency costs; results in a base PRC cost of $9.05 million.

An additional cost is an estimated $1 million in annual payment to the railroad for use of their tracks. However, if this cost is capitalized, in other words, offset by capital grants such as those in the existing federal Section 5307 and 5309 grant programs, then it would not be a net cost to the operating budget. Minnesota Northstar Commuter Rail used this approach.

Bus operating costs could be reduced by an estimated $1 million. Route 56U would no longer be needed because it parallels PRC's Oakland-Hazelwood segment; and Route 54C could have some reduction in service because it parallels the northern portion of PRC (54C also extends beyond the PRC corridor).

In addition, there is some evidence that recent commuter rail projects, such as the Sprinter DMU service in northern San Diego County, are operated at lower unit contracting costs than other systems. This may have the potential to reduce O&M costs.

The following table summarizes the O&M cost estimation that was derived utilizing a cost-buildup approach:

Table 2 O&M Cost Estimation

Operator O&M cost	$7,500,000
Insurance cost to Agency	$750,000
Agency administrative staff	$800,000
PRC base O&M cost*	$9,050,000
Save bus O&M cost	$1,000,000
Net project O&M cost	$8,050,000

* Note: Another $1 million annually to cover payment to the railroad for access to the tracks would be added, but that amount could be subtracted assuming the cost can be capitalized

Various factors could increase or decrease the O&M cost from these estimates. Following is a "risk assessment" of the O&M cost estimation:

- Because the PRC would operate on CSX-owned tracks, it is possible that unit costs determined by future negotiations between the Implementing Agency and the railroad companies could result in a higher cost.
- Within the previous issue, it is uncertain the extent to which maintenance of the tracks used by PRC, which will be a subset of tracks owned by CSX, will be charged to the PRC operation. Often, this determination involves a calculation of the cost of maintaining the tracks used by PRC allocated from a larger of system of tracks maintained by the railroad, and is a subject of negotiation.

- On the other hand, the cost could be lower than shown, depending on negotiations with the railroad regarding operating and maintenance costs, and the extent to which administrative costs of passenger rail could be combined with those costs for the Agency overall.
- Some information received from newer systems indicated that a lower cost framework might be possible. This should be investigated further.
- Similarly, there is uncertainty as to how much liability insurance the public sector will need to incur in order to operate service on the privately owned lines. Some instances of passenger rail services that have been proposed in other areas have resulted in very high liability insurance requirements.
- It was assumed that an existing transit operator would be the Agency because the existing transit operators in southwestern Pennsylvania already perform contract monitoring, transit service planning, and transit capital and operating budgeting and planning including the intricacies of applying for federal and state transit funding. If a different entity is selected, O&M costs in the administrative area could be higher.
- It is assumed that security for stations and park and ride lots would be provided in part by City of Pittsburgh and other police forces, such as university police. Furthermore, the 5.5 full-time employee estimate for Agency administrative staff assumes some level of security staffing. This may underestimate the costs for PRC security.

Appendix 1 – Services that are Contracted

Functions assumed to be performed under contract are as follows:

Fare collection – The fare collection method assumed is ticket vending machines (TVM) with proof of payment inspection. The approach assumes two-person train crews, one Train Engineer and one Conductor/Fare Inspector. In addition to fare inspection, the conductor would be there for safety and customer service purposes.

Train operations – such as crew and extra-board, transportation management, regulatory compliance and fare inspection.

Maintenance of rolling stock – includes management, inspection, routine/preventive maintenance, minor repairs, repair of major components, and major repair of vehicles.

Maintenance of facilities – such as track and wayside equipment, buildings, and grounds; covers maintenance yard, outlying storage yards, terminal stations, signals, switches, TVMs, shop equipment, communication systems, yards, stations and parking lots.

Administration – yard security, audit and legal services, risk management, information systems and revenue collection and accounting.

Yards – There will be one maintenance yard that also can serve as the Contract Operator's administrative facility; for PRC, it assumed to be located at the Hazelwood end of the line. Work in the main yard maintenance facility will include vehicle inspection, maintenance, repair and overhaul. Spare vehicles, equipment and materials will be stored there.

Security – Security to protect facilities and equipment in the yards will be the responsibility of the Contract Operator. Local jurisdictions will participate in 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 on-board all trains.

Appendix 2 – Functions of the PRC Operating Agency

Functions assumed to be performed by the Operating Agency are administration, purchasing, contract compliance, budgeting/finance including federal, state and local funding and programs, marketing/public information, service planning and contract oversight of operations, scheduling, and security. Security personnel of the operating agency will share PRC security responsibility, with yard security provided by the contracted operator; and security support at stations and along the line provided by police personnel of Pittsburgh, the universities, and institutions.

Appendix 3 - PRC Financial Planning

Through the years many different programs for funding transportation projects have been proposed, but the overwhelming paradigm is a funding partnership among federal-state-local-private sources.

The following provides an overview of sources of funding for project capital and O&M costs; reviews approaches used to pay for commuter rail projects in other cities; discusses candidate funding sources for PRC; and is followed by a sample financing plan for PRC.

Overview of Project Funding Sources for Capital and O&M Costs

Traditional funding sources – Fixed-guideway transit projects such as light rail, busway or commuter rail have been funded for many years in southwestern Pennsylvania with a combination of federal, State and local funds. The most commonly used funding shares have been 80% federal, 16 2/3% State, and 3 1/3% county. However, current federal policy regarding major transit projects is to favor projects which use no more than 60%, and often no more than 50% federal funding. It should be noted that as part of the federal transportation re-authorization process currently underway in Congress, the policy of funding 50% or less may change.

The federal funding being referred to here is the "New Starts" category of funding, which is the discretionary funding used for major transit capital projects that involve new guideways or extensions of existing guideways (such as light rail, busway, commuter rail, etc.) Other categories of federal transportation funds can also be used to finance projects.

Even though federal funding is pursued for nearly all major transit projects in the United States, the idea of funding projects without using federal funds is often taken into consideration. Not using federal funds would likely speed the process since one less level of government approval would be required, and would enable a project to avoid going through the rigorous comparative-evaluation process that is prescribed in the federal transportation act for major transit projects.

As discussed below, one recent new commuter rail project implemented without federal funding was the Albuquerque Rail Runner which was funded mostly by the State of New Mexico. Nevertheless, because of limited ability of local, state and private sources to finance new transit systems in Pennsylvania without federal funding, and because all of the other commuter rail projects in the U.S. advanced in recent years have sought federal funding, it is recommended the PRC pursue this option.

Non-Traditional (as applies to Pennsylvania) Funding Approaches

Dedicated transit funding – Most transit systems in the U.S. support funding of transit capital and operating expenses using dedicated transit funding. This typically takes a portion of funding from a source, for example sales tax, and devotes that piece of funding to transit. In recent years in most places, general referenda have often been used to approve establishing dedicated transit funding. These referenda give the public a chance to approve not only use of the funding source, but also to approve (or not approve) the transit project or set of projects as part of the referendum. The processes for having referenda establish transit funding and selection of a project typically arise out of state legislation.

In Pennsylvania, the act that establishes dedicated funding for transit and highways is Act 44. The major new funding sources for Act 44 are increasing tolls on the Pennsylvania Turnpike and institution of tolls on I-80. I-80 tolling has not been put into place yet (the proposal is controversial), and consequently Act 44 is only partially funded. As a result, there is little potential for the State to fund large portions of the PRC capital costs, though matching of federal funds might be possible.

In Allegheny County, a drink tax was established as permitted by state law, and a portion is used for dedicated local funding to match state funding from Act 44.

"Creative" financing – Although creative financing has sometimes been applied as a general term to denote any kind of "non-traditional" funding (see above for "traditional" funding), creative financing is herein defined as use of grant programs, dedicated funding, or another existing funding source to leverage additional funding. This additional funding might involve obtaining interest revenue from investing available funds, or borrowing against future grant or dedicated funding in order to obtain capital funding for a specific purpose. It is a way for "money to make money". An example is Grant Anticipation Notes, in which borrowing is done against future grants.

Contributions from benefiting entities – Transportation Development Districts (TDD) are permitted in Pennsylvania, wherein properties within an area that might benefit from a transportation project would be assessed in order to raise funding for transportation improvements within the District. Transit Revitalization Investment Districts (TRID) take advantage of future increases in real estate or other taxes from development near transit in order to provide capital improvements for the transit project and for traffic, parking, or other infrastructure improvements required as part of the development. These are similar in approach to tax increment financing (TIF) initiatives.

Real estate – Real estate can be the largest component of what is alternatively termed as "non-traditional" financing or "alternative" financing. Real estate can also be the key to engender private sector participation in transportation finance. Generally speaking, the private sector is better able to generate value from real estate, since real estate development in the U.S. is generally a private sector initiative. Accordingly, the private

sector might be able to offer significant funding to a transportation project if, as part of the development of that project, the private sector gains access to valuable real estate. For example, a private company paid significant dollars to the transit district in Portland, Oregon in exchange for a significant plot of property near the Portland Airport, on which it undertook large-scale development.

Public-private participation – This involves cooperation of the private and public sectors in implementation of a transportation project or provision of a transit service. In fact, such cooperation is common in the operation of southwestern Pennsylvania transit systems, ranging from a number of the smaller regional operators contracting out their service, to other small operators that contract out demand response service, and the Port Authority, which contracts out operation and management of its ACCESS paratransit service. In southwestern Pennsylvania and nationally, transit authorities fund a small percentage of their operating budgets from private advertising receipts.

Looking at the national picture, the smaller commuter rail systems, as well as some lines of some of the larger systems in the U.S., contract out their operations to the private sector. On the other hand, capital costs of commuter rail generally involve federal funding, with the exception of the New Mexico RailRunner Express system serving Albuquerque and environs. A summary of funding approaches for capital costs of various CR projects is included in a later section.

Parking – When a fee is charged for parking, the funding generated can help offset operating and maintenance costs of the parking facility, and sometimes a portion of capital costs of the facility. Accordingly, when parking is provided as part of some or all of the stations of the PRC, parking revenues can assist in offsetting costs.

First Avenue LRT Station in downtown Pittsburgh provides an example of ways in which parking triggers funding. The station was added to the existing LRT system in 1991. Allegheny County, City of Pittsburgh and the Pittsburgh Parking Authority agreed to participate in the funding of the LRT station because it would serve as an intercept parking facility for downtown Pittsburgh traffic mitigation. As a consequence, City and County agreed that some regional flexible highway funding ("flex" funding) would be used for construction costs of the station. Furthermore, the Pittsburgh Parking Authority provides on an ongoing basis some parking revenue to Port Authority to help offset First Avenue Station maintenance and operating costs.

Traditional Funding Sources for Transit Capital Costs

Federal Funding – The U.S. Department of Transportation funds up to 80% of the capital cost of worthy major transit projects; though current federal policy regarding major transit projects is to favor projects which use no more than 60%, and often no more than 50% federal funding. The New-Starts funding program is for projects costing more than $250 million; and the Small-Starts program generally covers projects under that

amount. The PRC would potentially qualify for either of these two programs, but the focus of this discussion is on the Small-Starts program.
FTA has identified a set of "Project Justification" evaluation criteria under Small Starts. These are:

- Cost effectiveness
- Transit supportive land use and future patterns
    - Existing land use
    - Transit supportive plans and policies
    - Performance and impacts of policies
- Other factors including economic development

The PRC is likely to rank very highly by land use and economic development criteria. FTA defines cost effectiveness as the cost per hour of travel time saved by transit users for a given project compared to without the project. In this definition, effectiveness is measured as hours of (equivalent) travel time saved by transit users. Congressional legislation identifies other effectiveness measures such as environmental benefits, operating efficiencies, transit supportive land use and future patterns, and other factors such as economic development and addressing local goals and objectives. However, FTA's definition of effectiveness in the cost-effectiveness formula includes only transit-rider travel time savings, though there is significant interest nationally in modifying the method used by Federal Transit Administration to calculate cost-effectiveness .

In addition to the three Project Justification factors, FTA's Small-Starts evaluation process also considers Local Financial Commitment in determining a finance rating for the project based on three factors: the project sponsor identifying a reasonable plan to secure funding for the local share; the additional O&M cost is less than 5 percent of the operating agency's annual operating budget; and the agency is in reasonably good financial condition. (For an agency newly operating a commuter rail or other system, the 5% would not apply.) If a Small-Starts project requests 50 percent or less in Small Starts funding, it will receive a High rating for local financial commitment; generally, 50-60% gets a Medium-High rating (FTA considers a rating of Medium or better to be a good rating).

Many transit authorities that are considering trying for Small-Starts (or New-Starts) funding, in their financial plans utilize between 50 and 60 percent from this source. For discussion purposes, assume it is 60% Small-Starts funding. To get up to the desired 80% federal share, "flexible" highway funds are sometimes used as permitted in federal transportation legislation. In the case of an $80 million project, this would involve $48 million Small-Starts funding, $16 million "flex" highway funding, and $16 million state and local sources.

PA Act 44 – Act 44, passed in 2007, created a new funding structure for transportation, including public transit. 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. In addition, Act 44 had intended that funding be derived from instituting tolls on I-80, but this funding source has not come about.

A New Initiatives Program (Section 1515) would be a likely candidate to provide state capital funding for PRC. Section 1515 can be funded by transferring $50 million from the Asset Improvement (Section 1514) Program after all of the other transportation programs are funded. To date the Section 1515 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. The PRC could be funded under this program, though there is insufficient funding in the program at the current time, due to various factors exacerbated by the incomplete funding picture for Act 44.

Financing Commuter Rail in Other Cities

Capital funding shares were reviewed for eight commuter rail projects that have been implemented in recent years or have recent funding plans. Federal funding was used in seven of the eight projects, with the exception of the New Mexico RailRunner Express system serving the Albuquerque region.

For the eight projects, the following graph shows the percentage of capital funding that was provided out of federal, state and local funding sources.

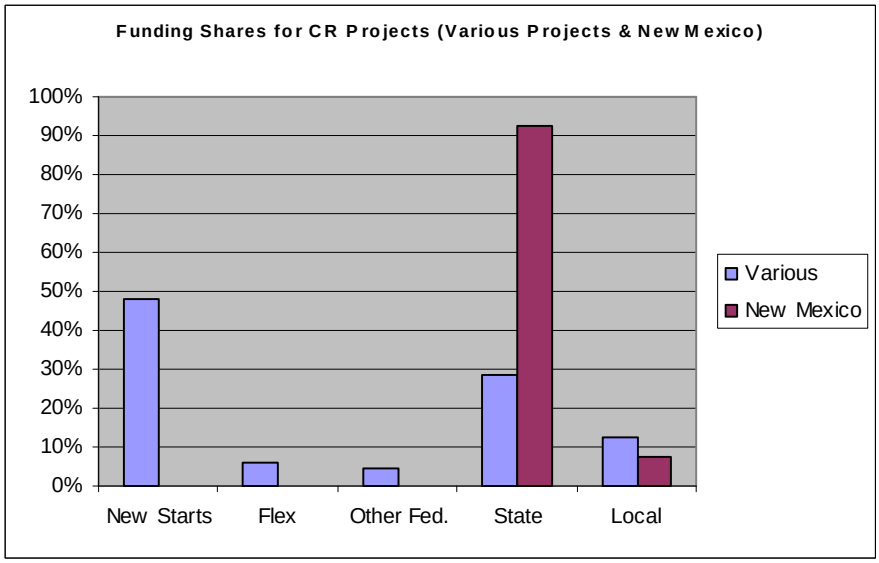


Figure 1 Funding Shares for CR Projects

The average cost of the eight CR projects was $228.6 million. New Starts was the largest funding category, providing 48% of the funds. Flex funding and Other Federal funding were each less than 10% but adding all the federal pieces comes out to 58.7%. State funding comprised 28.8%, and local funding the remainder (12.5%). Phase I of the New Mexico project cost $135 million, of which the state funded 92.6% and local funding the remainder.

Based on this pattern, a mixture of federal, state and local funding will likely be needed to finance the PRC project. New Mexico was able to finance without federal funds, but a very large state share was used to make up the difference. New Mexico's state share of 90% is much higher than most states, including Pennsylvania, typically contribute to transit projects. The Commonwealth of Pennsylvania traditionally has covered 16 2/3% of the total capital cost of transit projects with most of the rest being funded from federal sources.

The following are examples of the funding plans for various recent commuter rail projects:

- The financial plan for Minnesota Northstar Commuter Rail called for 49% New-Starts funding, 2% other federal funding, 31% from the state, 16% from counties, 2% from the Metropolitan Planning Organization (MPO), and 1% from the Minnesota Twins whose ballpark is served by the rail. Keys to the funding plan were the state's ability to float general obligation bonds, and the ability of the counties to provide significant funding.

- Sales tax revenue available to the Utah Transit Authority was key in providing 13.5% of the costs for the FrontRunner Commuter Rail. The Authority had

previously spent $103 million for the right-of-way, of which 58% was from regional sales tax revenue and 42% from the state.

- The financial plan for the Sprinter line serving northern San Diego County called for 43% New-Starts, 3.6% flexible funding, 31% state funding (gasoline taxes are included in the state funding sources for highways and transit), and 22% from regional sales tax revenues.

- The financial plan for the Westside Express in Portland Oregon called for 50% New-Starts, 9% flexible highway funding, 30% from state lottery bond proceeds, and 8% from local sources including county and transit authority general funds, local bond interest, and local general funds.

The above information indicates the use of a variety of funding sources. Use of federal New-Starts funding was common, and small percentage contributions from flexible funding were available. State funding was significant, in some cases coming from specific funding sources, and in other cases from general funds including as a result of bonding. Local funding was from a combination of county budgets, MPO funding, and transit authority funding including dedicated sales taxes in some cases.

A Sample Capital Funding Plan for PRC

The following table is in two parts. The first part provides a breakdown of capital costs by major elements of the project. The capital cost of the project is $66.5 million in 2009$, and $80.9 million in 2014$ (using an annual inflation rate of 4%). The $80.9 million is what the funding plan must address.

Table 3 Capital Cost and Financing

Pittsburgh Rail Connection - Capital Cost and Financing (millions)			
Capital Item	2009$	2014$	% Total
Line Improvements - Track, Signals, Yard	$16.4	$20.0	25%
Vehicles - Locomotives, Cab Cars	$19.4	$23.6	29%
Stations	$15.7	$19.1	24%
Parking	$15.0	$18.2	23%
Total	$66.5	$80.9	
Source of Capital Funds		2014$	% Total
Federal Small Starts Funds		$48.5	60%
Transit Funds; Flexible Highway Funds		$16.2	20%
State & Local Funds		$16.2	20%
Total		$80.9	

The bottom half of the table provides a feasible financial scenario to finance the project.

The scenario calls for using Small-Starts funds for 60% of the project costs, or $48.5 million. The measure currently utilized by FTA, the "cost-effectiveness index," which is cost divided by a measure of effectiveness (equivalent travel time savings for transit riders), is currently a major factor in determining eligibility for New (or Small) Starts funding. It is typically calculated as part of the travel demand forecasting process. Unless the evaluation process that uses this index is modified as part of the federal transportation re-authorization process currently underway in Congress, the index will be calculated during the next more-detailed phase of planning for PRC.

The above scenario calls for providing 20% of the project cost, or $16.2 million, out of transit funding, flexible highway funding, or a mixture of both, to be used as a federal match for Small Starts funds. It is likely that the funds would need to be provided over approximately a 3-year period, requiring $5.4 million per year. Similarly, another 20% or $16.2 million would be required from a combination of state and local funds, to be used as a local match for federal and state funds; this would also come out to $5.4 million per year assuming a three-year payout period. A yearly payment of $5.4 million each for transit/flexible funds as well as state/local funds, is a reasonable amount.

Operating and Maintenance (O&M) Costs

As indicated in the chapter on O&M costs, the net impact of the PRC on O&M costs is $8.05 million per year. (As an indicator of order of magnitude, this amounts to 2.3% of Port Authority of Allegheny County's annual operating budget of $350 million.) A portion of the annual O&M costs can be offset by fares collected from riders, calculated as follows. According to the estimate produced by SPC, there would be an average of 3,434 weekday riders on the PRC. Multiplying by an annualization factor of 286 yields 980,000 annual riders, which yields annual fare revenue of $1.28 million based on the average rider paying $1.30 per ride. (That is the average fare currently paid by riders of Port Authority's LRT system, and is an estimate used for PRC.) Subtracting that $1.28 million from $8.05 million yields a cost of $6.77 million that would need to be financed each year to cover O&M costs.

The above financial plan represents a reasonable potential approach to generating funding to implement the project. In future phases of study, the financial plan will need to be re-generated based upon a more detailed ridership estimate, and the funding sources and amounts available at that time.

Appendix 4 – Summary of Existing and Potential Sources of Funding for PRC Implementation and Operation

This appendix summarizes the various funding sources that could potentially be used to fund the PRC. These sources represent a long list of potential funding to be looked at during the future studies. The appendix includes three tables. Table 4 shows existing funding sources that could be used for the PRC. Table 5 shows sources that are available to fund transit today or have been used to fund transit in the past. Table 6 indicates loans and borrowing mechanisms that may be able to be used for the project, but which would of course have to be paid back. Accordingly, it would require a funding source from one of the other tables to be available to pay back the loan.

Table 4: Existing Funding Sources that can be used by PRC

Funding Source	Comment
Flexible Highway Funding (Flex Funding)	Provision of the federal transportation act allows highway funds to be used for transit projects
Fares	Provide funding to help offset O&M costs; used when the PRC is in operation and fares are collected
Pennsylvania Transit Operating Assistance	Part of Act 44; this funding source can be used to fund the operation of PRC
Pennsylvania Asset Improvement Program	This is an element of Act 44; funds are programmed for ongoing transit capital improvements, so can be used to help fund the ongoing operation of PRC
Pennsylvania New Initiatives Program	To date this program has not been funded; funding for FTA New Starts match receives priority under this program, and thus could be a good source of funding for PRC
Pennsylvania "Smart Transportation" Grants	Original source of this funding is highway flex funding; intended for projects that link transportation and land-use planning and decision-making; see Flex Funding
Dedicated Sales Tax	Already part of the fiscal basis of Act 44
Tolls / Distance-Based Road User Fee	Already part of the Act 44 funding mix; tolls on the Pennsylvania Turnpike are distance-based
Allegheny County Alcoholic Beverage Tax	Funding from this source supports transit spending in the county; could be used to match federal and state funding

Property Tax for Transit	Property taxes are used as a general funding source for counties and municipalities, and thus are a component of counties' transit funding match
FTA Fixed-Transit Guideway Modernization and Transit Formula Funds	Federal transit-funding using a formula based on the amount of service provided, number of fixed-transit guideway miles, and other factors; through these factors PRC would attract some additional funding to the region

Table 5: Potential Sources of Funds for PRC

Funding Source	Comment
FTA New Starts Funding	The Small Starts program is a subset of New Starts, and is a potential funding candidate for 50-60% of capital costs
Federal Discretionary Funds	From time to time there is a new funding program announced, for example the funding announced 12/1/09 for urban circulator projects; otherwise, see "FTA New Starts Funding"
Transportation Development Districts (TDDs)/Development Impact Fees/Benefit Assessment Districts	A TDD could be formed; it can be difficult to determine direct benefit of a transit (or other transportation) project to specific businesses and thus can be difficult to implement
Tax Increment Financing (TIF)/Tax-Increment Reinvestment Zones/Transit Revitalization Investment District (TRID)	TRIDs are a relatively new approach, and it remains to be seen how well they will work; funding from a TIF or TRID is likely to be applied to station area infrastructure improvements; it remains to be seen whether there would be sufficient money to fund the station itself
Public Private Partnerships	PPPs involve the private sector in the implementation or operation of a transportation project; PRC would be a PPP because the tracks are privately owned; PPPs take advantage of real estate opportunities, parking revenues, creative financing, etc. to provide financing for transportation projects

Parking Revenues from City and Park and Ride Lots	A potential funding source for capital and O&M; could become a significant contributor as part of a robust station area development plan
Private Donations	Foundation grants and contributions from major medical, educational, or cultural institutions have potential in the PRC corridor
Leasing of Right-of-Way (ROW)	Could be part of a significant station area development plan
Partnerships	Public-public partnerships will facilitate implementation and foster financial contributions from various grant programs; also see Public Private Partnerships
Joint Development on Existing and Planned Facilities	Should be pursued as part of station area development plan
Advertising Revenue (buses, benches, shelters)/sponsorships	Can be a contributor to O&M costs

Table 6: Loans and Borrowing that can be used to fund PRC

Funding Source	Comment
Bonding	Requires a funding source as a basis for the bond
Grant Anticipation Notes	A form of "Creative Financing" wherein borrowing is done backed by receipt of future grants. This is generally not "new" funding, but it allows project development to continue on a regular basis even though funding comes in on an irregular basis
State Infrastructure Bank (SIB)	It is a loan program and accordingly needs to be repaid
Transportation Infrastructure Finance and Innovation Act (TIFIA) Loans	Provided by U.S. DOT, generally applicable to very large projects