Mon/Fayette Expressway
PA 51 to I-376

DESIGN
advisory team
Building Connections With Communities

Final Report

Mon/Fayette Expressway Transit Plan Coordination Report

Prepared for:
The Glenwood to Bates Street Design Advisory Team and The Transit & Intercept Lot/Satellite Committee

June 21, 2007

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MON/FAYETTE EXPRESSWAY TRANSIT PLAN COORDINATION REPORT

I. INTRODUCTION

In August 2006, the Mon/Fayette Expressway PA 51 to I-376 Glenwood to Bates Street Design Advisory Team (DAT) requested that the Pennsylvania Turnpike Commission (PTC) identify existing and emerging transit plans in the Oakland area and bring them to the DAT's attention in order to ensure that the design of the Mon/Fayette Expressway is completed with the knowledge of various transit plans. In addition, the DAT sought to identify potential owners and operators for intercept/satellite parking lots within the DAT area. The PTC accepted the request for additional assistance and a subcommittee of the Glenwood to Bates Street DAT was formed to oversee the work.

The scope of work for the transit plan and intercept/satellite parking coordination included the following tasks:

- Research and compile information on existing and emerging transit plans for the Glenwood to Bates Street DAT study area;
- Identify potential corridor envelopes for future transit service and design parameters for transit modes;
- Evaluate transit corridor constraints, both existing and those created by the Mon/Fayette Expressway;
- Identify stakeholders and potential owners of intercept/satellite lots and develop a plan of action to pursue development and ownership of the lots; and
- Create a concise report on the research findings.

The Glenwood to Bates Transit and Intercept/Satellite Lot Committee began meeting in late 2006. This report summarizes the findings of the tasks outlined above.

II. SUMMARY OF EXISTING AND EMERGING TRANSIT PLANS

The need for major transit investments in Oakland has been studied for nearly 100 years. More recent evaluations of Oakland transit investments began in the mid-1980s and continue today. The following is a summary of the major transit evaluations for the Oakland area in the past 25 years. Figure 1 illustrates the alignments of the transit plans' alternatives.

SPINE LINE CORRIDOR STUDY

Study Purpose

Begun in 1988 and completed in 1993, the *Spine Line Corridor Study* analyzed alternatives for improving transit service in the eight-mile Spine Line Corridor that included the communities of the near North Side, Downtown Pittsburgh, the Hill District/Midtown, Oakland, and Squirrel Hill. The study resulted from the Spine Line Transitional Analysis in 1985 that found that transit extensions in this corridor were feasible and merited further development.

The Alternatives

Numerous alternatives were considered for evaluating transit improvements in the corridor. The alternatives included light rail transit (LRT) extensions from Downtown to the North Side and from Downtown to Oakland. A final alternative included an extension from Oakland to Squirrel Hill, incorporating the existing LRT subway in the Downtown segment of the corridor.

Three primary alignments were developed for the corridor between Downtown Pittsburgh and Oakland with one proposed corridor for travel through Oakland. The following is a description of the alignment alternatives. The *Spine Line Corridor Study's* proposed alignments are shown in Figure 2.

Downtown to Oakland via Centre Avenue

The Centre Avenue alternative would connect with the existing T system downtown at the Steel Plaza Station and be constructed as a subway for its entire length. The subway would follow Centre Avenue to Soho Street and then turn southeast and enter Oakland near the intersection of Forbes Avenue and Craft Avenue. The subway would continue through Oakland beneath Forbes Avenue or Fifth Avenue. East of Bigelow Boulevard, the line would follow Forbes Avenue to Morewood Avenue across from Carnegie Mellon University (CMU).

Downtown to Oakland via Colwell Street

The Colwell alternative would also begin downtown at the Steel Plaza T station and follow Colwell Street through the Hill District and Midtown communities. The alternative proposed either an at-grade configuration or subway from Downtown Pittsburgh to Oakland. Similar to the Centre Avenue alternative, it would enter Oakland near the intersection of Forbes Avenue and Craft Avenue and continue as a subway beneath Fifth Avenue or Forbes Avenue to CMU.

LEGEND

- P — Intercept Parking
- East Busway
- Mon/Fayette

Eastern Corridor Transit Study Alternatives

- Wilkinsburg Light Rail
- Homestead Light Rail
- Mon Valley Light Rail

Spine Line Corridor Study Alternatives

- Center Avenue
- Colwell
- Technology Center
- Fifth / Forbes Avenue
- Panther Hollow

Oakland Transportation Study Alternatives

- HRT Line
- People Mover Line

Potential Intermodal Hub
5th Avenue
Forbes Avenue
Blvd. of the Allies
2nd Avenue
I-376
Bates Street
Hot Metal Bridge
Carson Street
Possible Railroad Relocation
© 1997-2005 AirPhoto
© 1997-2004 AirPhotoUSA

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Figure 1

Oakland Transit Alternatives from Existing and Emerging Plans, 1993 through 2007

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LEGEND

P Intercept Parking

Spine Line Corridor Study Alternatives

- Center Avenue
- Colwell
- Technology Center
- Fifth / Forbes Avenue
- Panther Hollow

Potential Intermodal Hub

5th Avenue

Forbes Avenue

Blvd. of the Allies

2nd Avenue

I-376

Bates Street

Hot Metal Bridge

Carson Street

Possible Railroad Relocation

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Figure 2

Spine Line Corridor Study Alternatives

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Downtown to Oakland via Technology Center

The Technology Center alternative would connect to the T system downtown at the site of the B&O Railroad Passenger Terminal (now the site of the Allegheny County Jail). The light rail line would travel at-grade to the Pittsburgh Technology Center using the former B&O right-of-way (now the Eliza Furnace Trail). At the Technology Center it would rise over the Parkway East to enter Oakland near the intersection of Forbes Avenue and Craft Avenue. It would continue east beneath Fifth Avenue or Forbes Avenue to CMU. The study also explored the option of accessing Oakland by continuing east from the Pittsburgh Technology Center and traveling north via Junction Hollow to Forbes Avenue at CMU (called the Panther Hollow alternative), but this option was set aside early in the study because of the much longer alignment between Downtown and Oakland and its inability to serve several major trip generators in Oakland.

Oakland to Squirrel Hill

The *Spine Line Corridor Study* also proposed an extension from Oakland to Squirrel Hill. From CMU near Morewood Avenue, the subway would continue through Squirrel Hill under Forbes Avenue to its terminus east of South Dallas Avenue.

Conclusion

The study included a trade-off analysis among the alternatives based on ridership projections, topographic and engineering constraints, capital and operating costs, access to destinations, and redevelopment potential among others. The analysis found the following:

- The Centre Avenue alternative would reach the most current users in the Midtown segment and may help to revitalize the Hill District. It had the highest capital cost and a slightly slower travel time between Downtown and Oakland.
- The Technology Center alternative had the lowest capital expense but would not serve many residents in the Midtown segment.
- The Colwell Alternative was mid-range in costs and support for redevelopment, but had the highest ridership projections.

The study did not select a preferred alignment among the Downtown to Oakland alternatives.

EASTERN CORRIDOR TRANSIT STUDY (2003) AND EASTERN CORRIDOR TRANSIT STUDY TRANSITIONAL ANALYSIS TO LOCALLY PREFERRED ALTERNATIVES (2006)

Study Purpose

The region's 2025 Long-Range Transportation and Development Plan (adopted by the Southwestern Pennsylvania Commission in July 2000) noted that over $1.0 billion of major new transit facilities would be completed by 2010 including the West Busway/Wabash HOV; South Hills LRT Phase II; East Busway Extension to Swissvale; and the North Shore Connector. Three

major studies were also identified in the plan to investigate the need for additional transit investments. These studies included the *Airport Multi-Modal Corridor Study*, the *Regional Transit Visioning Study*, and the *Eastern Corridor Transit Study*.

The *Eastern Corridor Transit Study* (ECTS) was initiated in 2001 and completed in 2003. It was sponsored by the Port Authority of Allegheny County (PAAC), the Southwestern Pennsylvania Commission (SPC), and the Westmoreland County Transit Authority (WCTA). The study area was defined as extending from the Golden Triangle in Downtown Pittsburgh eastward to Greensburg in central Westmoreland County and between the Allegheny and Monongahela rivers. The study sought to identify public transportation investments to address the needs of the study area, which were defined in the ECTS as:

1. Improve transit choices in the study corridor.
2. Improve the quality of service and amenities at station stops and transfer points.
3. Preserve, protect, and utilize existing transportation resources.
4. Enhance environmental quality.
5. Reduce congestion with effective transit solutions.
6. Coordinate transit and community planning to enhance economic development and quality of life.
7. Develop a transit network that conveniently and continuously links people and activity centers.

During the study, a long list of 29 transit investments was identified through public outreach. The list of 29 initial alternatives was screened to eight alternatives that were analyzed in detail. Of those eight alternatives, six were recommended to be advanced further. The project partners undertook an extensive public involvement process to develop and evaluate the study's alternatives.

In 2005, SPC, WCTA, and the Pennsylvania Department of Transportation (PennDOT) sponsored the *Eastern Corridor Transit Study Transitional Analysis to Locally Preferred Alternatives* (ECTS-TA) to identify Locally Preferred Alternatives for future study. Both the ECTS and ECTS-TA were completed in a manner consistent with the federally prescribed process for development of transit investments that may seek federal funding.

The alternatives under consideration in the ECTS-TA were the six recommended alternatives from the ECTS plus one alternative that was originally a component of the Transportation Systems Management alternative. The alternatives were updated and modified to reflect changes in conditions and costs in the two years between the two studies. A public outreach process was employed to assess local support for the alternatives.

The Alternatives

Among its six alternatives, the ECTS-TA evaluated three alternatives that would serve Oakland. Two alternatives are light rail options and one alternative involves making improvements to existing bus service in the area. The ECTS-TA alternatives serving Oakland are shown in Figure 3.

LEGEND

P Intercept Parking

Eastern Corridor Transit Study Alternatives

- Wilkinsburg Light Rail
- Homestead Light Rail
- Mon Valley Light Rail

Potential Intermodal Hub

5th Avenue

Forbes Avenue

Blvd. of the Allies

2nd Avenue

I-376

Bates Street

Hot Metal Bridge

Carson Street

Possible Railroad Relocation

F

Figure 3

Eastern Corridor Transit Study Alternatives

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Mon Valley Light Rail

This alternative was defined as a light rail line from Steel Plaza in Downtown Pittsburgh. The line would be underground between Steel Plaza and the Convention Center. Beginning near the Convention Center, the line would travel at-grade through the Strip District using the Allegheny Valley Railroad right-of-way to 31st Street. At 33rd Street, the line would split and one branch would turn north, along the CSX right-of-way, to serve Millvale and Etna while the southern branch would terminate in McKeesport. The McKeesport branch would turn south from 33rd Street utilizing the CSX right-of-way and traveling through Oakland in the Schenley Tunnel (Neville Street Tunnel) and then at-grade through Junction Hollow. From Junction Hollow the line would continue to follow CSX right-of-way along the north/eastern shore of the Monongahela River and end in McKeesport with proposed stations in Greenfield, Hazelwood, Rankin (including the Carrie Furnace site), and Braddock.

A large portion of this alternative proposes to use CSX right-of-way. It should be noted that the Allegheny Valley Railroad leases a portion of the CSX right-of-way from Etna to the Glenwood Yard. In addition, Amtrak's Capital Limited also uses a segment of CSX right-of-way from 33rd Street to the Glenwood Yard.

Spine Line Light Rail

This alternative was defined as a light rail service beginning at the Steel Plaza Station in Downtown Pittsburgh and continuing east through Oakland with options to terminate in Wilkinsburg or Homestead. The line would operate beneath Centre Avenue through the Hill District between Downtown and Oakland. At Kirkpatrick Street, the line would turn southeast and continue as a subway through Oakland. The line would continue under Forbes Avenue to Wilkinsburg or turn south at Craig Street and continue to Homestead. From Craig Street, the Homestead branch would utilize CSX right-of-way through Junction Hollow to Greenfield and Hazelwood before crossing the Monongahela River (on an existing railroad bridge) near the Glenwood Bridge and terminating near the Waterfront development in Homestead.

Shared station locations for the two options include Steel Plaza, Mellon Arena, Dinwiddie Street, Soho Street, Forbes Avenue at Craft Avenue, and Forbes Avenue at Atwood Street. The Wilkinsburg line also has stations along Forbes Avenue at Morewood Avenue, Murray Avenue, Braddock Avenue, and Wilkinsburg. The Homestead line also has proposed stations at Craig Street, Greenfield Avenue, Tecumseh Street, and the Glenwood Bridge.

Both studies included a preliminary analysis of constructing the lines at-grade for all or portions of the lines. The final alignment and station locations would be determined in subsequent phases of planning.

Downtown Pittsburgh to Oakland Bus Rapid Transit (BRT)

This alternative proposes to use traffic signal priority, improved fare collection methods, and modified passenger boarding procedures to improve the speed and reliability of bus routes that operate along the Fifth/Forbes corridor in Oakland. The ECTS-TA estimated that these

improvements would reduce travel time on the Oakland bus routes by a minimum of five percent as measured from Downtown to Oakland. A BRT alternative could also include amenities such as attractively designed stations, real-time passenger information for riders, and specially designed vehicles.

Improved bus operations along the Fifth/Forbes corridor was originally evaluated as a component of the Transportation System Management (TSM) alternative during the ECTS. Since the completion of the ECTS, a new federal transportation law was enacted in 2005 which includes a new transit capital program called Small Starts. The Federal Transit Administration (FTA) Small Starts program provides funding for smaller transit investments with total capital costs less than $250 million and a federal contribution less than $75 million. The capital funding can be used for corridor-based bus improvements. Thus, the ECTS-TA evaluated the Downtown Pittsburgh to Oakland BRT project as a separate transit alternative. More recently, FTA identified a Very Small Starts program consisting of projects with total capital costs less than $50 million.

The Locally Preferred Alternative

In the ECTS-TA, all of the six alternatives performed well in an analysis of how they would address the study area's community and transportation needs. Based on performance, public support, and each alternative's cost relative to public support, the study recommended that four of the alternatives be designated as LPAs. The ECTS-TA designated a Downtown Pittsburgh to Oakland Investment - the Spine Line and/or BRT as one of four LPAs. The final report noted that the Mon Valley Light Rail alternative performed well in evaluation and has public support; however, the timing for a major transit investment in the Mon Valley will be more appropriate when redevelopment efforts have progressed further.

The next step to advance the LPAs is to enter them into SPC's Long Range Plan. SPC's current long range plan, the 2030 Plan, contains a recommendation to advance a transit facility project between Oakland and the Pittsburgh International Airport. In addition, funding is identified in SPC's FFY 2007-2010 Transportation Improvement Program to conduct advanced planning and environmental review of an East-West Corridor Rapid Transit project to connect the Airport, Downtown Pittsburgh, and Oakland. A scope of work has not been developed yet for this work nor is there a project sponsor or financing plan.

The next steps for advancing an LPA from the ECTS-TA include the following:

- Identify a project sponsor;
- Secure funding commitments for the next planning phases;
- Develop a credible financing plan for project construction and ongoing operation; and
- Identify the project on SPC's Long Range Transportation Plan.

OAKLAND TRANSPORTATION STUDY

Study Purpose

The *Oakland Transportation Study*, an on-going study, was commissioned by the Allegheny Conference on Community Development with the objective of conducting a thorough assessment of the transit needs of Oakland and of the potential of various transit improvements to meet those needs. The study area was broadened to include the "Technology Crescent", an area of medical and research institutions and adjacent areas of growth that extends from Oakland north to Shadyside and Lawrenceville and south to Hazelwood and the South Side.

A number of studies have evaluated potential transit improvements serving Oakland. However, these studies have been regional in nature; none has focused on Oakland. This study was intended to provide the level of detail that is necessary to fully analyze the impacts of a major transit investment on this neighborhood.

The study began by defining the Oakland transportation customers. Data was obtained from major Oakland institutions regarding the home origins of employees, commuter students, and visitors and was supplemented by data obtained from the Southwestern Pennsylvania Commission. This data indicated that the largest shares of commuters to Oakland come from the City of Pittsburgh's eastern neighborhoods, followed in rank by the eastern and rapidly-growing northern suburbs of Allegheny County. Transit accounts for 22% of all trips to Oakland and accounts for nearly half of the trips between Oakland and the eastern section of the City.

The study then established the baseline of existing transportation services. This was developed based upon peak period travel times. Travel times were calculated between 20 destinations consisting of major Oakland institutions, nearby institutions and projected growth areas, Downtown Pittsburgh, and Pittsburgh International Airport. Travel times were calculated for automobile travel, transit, existing institutional shuttles, walking, and bicycling. All travel times were calculated as door-to-door travel times, incorporating such factors as walking to bus stops or parking garages, parking circulation, and transit headways. It was found that in corridors with frequent transit service, transit travel time is competitive with the automobile while transit is far less competitive for trips requiring a transfer between routes. The existing transit service is primarily oriented towards radial trips to Oakland or Downtown, with north/south connections within the Technology Crescent generally not as well served.

The Alternatives

The study evaluated transit improvements based upon four different technologies: bus rapid transit (BRT), light rail transit (LRT), heavy rail transit (HRT - using self-propelled vehicles on

existing railroad tracks) and People Mover, a form of automated guideway transit (AGT)[1]. For each of these modes, a hypothetical network was developed to provide the maximum level of service within the Technology Crescent.

For each mode, travel time, capital costs, and operating costs were estimated. This analysis showed that all four modes have the potential to provide significant improvements over the existing transit service. With five-minute headways, travel times are projected to be shorter than automobile travel times in most cases. With 15-minute headways, transit travel times are generally projected to be competitive with the auto. People Mover generally provided the best travel times, with different modes offering different levels of improvements in different corridors.

Conclusion

The study recommended the following transportation improvements be considered for further advancement:

- New and adjusted bus routes
- Centre Avenue bus routes
- Enhanced suburban transit service
- Construction of intermodal/intercept garages
- Enhancement of Forbes Avenue as a pedestrian-friendly Main Street
- Improvements to Existing Fifth/Forbes Transit Service
- Junction Hollow Connection via People Mover or HRT

In general, these are improvements based upon extensions and enhancements of existing transit services. The Junction Hollow Connection provides the opportunity to significantly improve transit service by implementing a new transportation mode, either People Mover or HRT. These recommendations were presented to the Allegheny Conference staff and subsequently to the Oakland Investment Committee (OIC) on October 17, 2005. Of these improvements, the OIC expressed a strong desire to move forward with implementation of the Junction Hollow Connection including extensions to central Oakland and the Hazelwood site. It was determined that further study would be required on this option, in order to fully investigate the feasibility of using People Mover primarily with HRT as a potential short-term implementation phase for the Junction Hollow portion of the system and to develop detailed patronage estimates, engineering feasibility, cost, and schedule estimates.

The alignments of transit improvements that are currently under review by the Allegheny Conference are shown in Figure 4.

[1] During the early stages of the Oakland Transportation Study, the People Mover transit mode was known as personal rapid transit (PRT), another form of automated guideway transit that carries fewer than 20 passengers per vehicle. Subsequent to the completion of the Oakland Transportation Study, the Allegheny Conference selected the People Mover type of automated guideway transit over personal rapid transit to serve the circulation needs of Oakland. People Mover vehicles carry a larger number of passengers than PRT. The proposed People Mover system is similar to what is used in many airports and in a few cities such as Miami, Florida.

LEGEND

P Intercept Parking

Oakland Transportation Study Alternatives

HRT Line

People Mover Line

Potential Intermodal Hub

5th Avenue

Forbes Avenue

Blvd. of the Allies

2nd Avenue

I-376

Bates Street

Hot Metal Bridge

Carson Street

Possible Railroad Relocation

Figure 4

Oakland Transportation Study ALternatives

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OAKLAND HUB

As a part of the planning process undertaken to create Allegheny County's Comprehensive Plan, project planners, local officials, and the public reviewed past and recent transit proposals for Oakland. The Comprehensive Plan recommends the development of an Oakland Area Circulator System as well as the construction of a rapid transit line between Downtown Pittsburgh and Oakland.

To support these transit investments and facilitate transfers between modes, the Comprehensive Plan also recommends establishing a multimodal hub in Oakland. The future hub, currently known as the "University Station" will provide multimodal connection options between taxis, the Oakland Circulator, buses and shuttle buses, bicycle, and pedestrian modes. A proposed location, shown in Figure 1, is located at the corner of Fifth Avenue and South Bouquet Street.

BATES STREET BUS OPERATIONS

Port Authority and other operators of large transit vehicles are currently unable to travel on Bates Street south of the Boulevard of the Allies due to a height restriction near the intersection with Second Avenue. The height restriction is caused by an Eliza Furnace Trail bridge that crosses Bates Street just north and east of Second Avenue. The existing clearance of the trail bridge over Bates Street is 11' 6".

The Eliza Furnace Trail bridge is programmed for replacement beginning in 2008 with completion in 2009. When replaced, the clearance of the trail bridge over Bates Street will be 19' 4". If the Mon/Fayette Expressway is constructed the clearance will be reduced slightly to 18' 3". In either situation, the clearance of the trail bridge will allow transit buses to pass underneath the bridge. The bridge replacement provides transit operators with new options for serving the South Side, the South Hills, and Homestead among other Mon Valley communities.

The Port Authority does not have any immediate plans to use Bates Street for its transit operations. According to the agency, Bates Street will be a useful link between central Oakland and the Almono site in Hazelwood once it becomes developed. The agency may consider operating a fringe/shuttle route that begins in Hazelwood. Direct service to Oakland via bus routes from the Becks Run, West Mifflin, and Jefferson areas are also possible. In addition, on and off road trips for Route 56U have service possibilities from the West Mifflin Garage. Because the 59U operates effectively via the Birmingham Bridge between South Side Works and Oakland, Port Authority does not anticipate re-routing using Bates Street and the Hot Metal Bridge.

III. DESIGN PARAMETERS OF TRANSIT MODES

Before identifying corridor constraints for transit investments, the design parameters of the transit modes under consideration were collected. The following is summary of the envelopes required by light rail, heavy rail, and People Mover transit modes.

LIGHT RAIL TRANSIT

The light rail transit design guidelines, shown in Figure 5, are based on both national and local standards. Light rail design criteria standards were collected from the Port Authority and other light rail agencies. For a two-track system, the horizontal clearance is 27 to 30 feet with an additional 9 feet of horizontal clearance needed next to structures such as bridge piers. The total vertical clearance measured from the top of the rail is 18 to 19 feet. An additional six feet of vertical clearance is required for overhead structures. The desired maximum grade is 5 percent, however, short distances of higher grades are allowed.

Figure 5: Light Rail Transit Design Criteria

Light Rail Transit Design Criteria	Sources of Design Standards	
	National Light Rail Design Standards	Port Authority Manual of Design Criteria (1998)
Horizontal Clearance		
Two Track Alignment		
Distance between Track Centers (with catenary poles between tracks)	14 feet	13.6 feet
Distance on outside of track center	6.5 feet	
Total Horizontal Clearance	**27 to 30 feet**	
Single Track Alignment		
Distance on either side of Track Center	6.5 feet	
Distance on one side for Overhead Contact System	2 feet	
Total Horizontal Clearance	**15 feet**	
Vertical Clearance		
Minimum contact wire height	14 feet	13 feet
Total vertical clearance	**18 to 19 feet**	**17.25 feet**
Additional Clearance Requirements for Mon-Fayette Structures (e.g. Bridges and piers)		
Horizontal clearance on the outside	9 feet	
Vertical clearance	6 feet	
Maximum Grade		
Desirable Maximum	5% indefinitely 6% for up to 2,640 feet 7% for 500 to 1,000 feet	5%
Absolute Maximum		9% Grades greater than 5% shall not be sustained for more than 500 feet without approval.
Turning Radius		
Minimum Turning Radius	82 feet	

HEAVY RAIL

The design parameters for heavy rail transit are shown in Figure 6. The design parameters are based on standards used for a commuter rail project in Denver, Colorado as well as on the specifications of the Colorado Railcar (the type of vehicle proposed by the Oakland Transportation Study).

A two-track heavy rail system requires a horizontal clearance of 34 feet and a vertical clearance of 23 feet. The recommended maximum vertical grade is 1.5 percent. The minimum horizontal radius is 250 feet.

Figure 6: Heavy Rail Design Criteria

Design Criteria	Heavy Rail Transit [1]
Horizontal Clearance	
Two Track Alignment	34
Single Track Alignment	17
Vertical Clearance	23 feet
Maximum Vertical Grade	1.5 - 2.5%
Minimum Horizontal Radius	250 feet

[1] HRT design guidelines based on Denver Commuter Rail Design Criteria and Colorado Railcar specifications.

PEOPLE MOVER

As a part of its efforts to determine the constructability of a People Mover system in Oakland, the Allegheny Conference on Community Development's consultants developed design criteria for the system. The criteria, shown in Figure 7, represent minimum design standards required for the People Mover system.

The People Mover is constructed above grade on piers that are a minimum of 16.5 feet in height. Taking into account the guideway thickness and height of the People Mover cars, the total vertical clearance is at least 38 feet. The horizontal clearance is 30 feet. The maximum vertical grade is six percent.

Figure 7: People Mover Design Criteria

Design Criteria	People Mover [1]
Horizontal Clearance	
Two Track Alignment	30 feet
Single Track Alignment	N/A
Vertical Clearance	38 feet
Maximum Vertical Grade	6%
Minimum Horizontal Radius	150 feet

[1] People Mover design guidelines provided by the Allegheny Conference on Community Development

IV. EXISTING CORRIDOR ENVELOPES AND CORRIDOR CONSTRAINTS

In the Glenwood to Bates Street DAT study area, there are three primary corridors of interest for transit improvements: 1) Second Avenue, 2) the Bates Street Valley, and 3) Junction Hollow. For each of the transit proposals described in this report, this section outlines constraints for transit improvements – both existing constraints and potential constraints that would be associated with the proposed design of the Mon/Fayette Expressway. Figure 8 illustrates the transit constraints.

SPINE LINE CORRIDOR STUDY

LRT Downtown to Oakland via Center Avenue

This alternative is outside of the Glenwood to Bates DAT study area and is not constrained by the proposed design of the Mon/Fayette Expressway.

LRT Downtown to Oakland via Colwell

This alternative is outside of the Glenwood to Bates DAT study area and is not constrained by the proposed design of the Mon/Fayette Expressway.

LRT Downtown to Oakland via Technology Center

As originally proposed, this LRT alternative would travel from Downtown to Oakland using the former B&O Railroad right-of-way, now the Eliza Furnace Trail. It would serve the western end of the Pittsburgh Technology Center before rising over the Parkway East to enter Oakland near the intersection of Forbes Avenue and Craft Avenue. One variation on this alternative proposed to continue the line eastward on Second Avenue along the Pittsburgh Technology Center and travel north through Junction Hollow to access Oakland. This alternative and its variation face several limitations along its alignment.

Downtown to the Pittsburgh Technology Center

While this corridor is outside of the DAT study area, it is noted that the proposed alignment is now constricted by the conversion of the B&O Railroad right-of-way to a recreational trail and the construction of the Allegheny County Jail, First Avenue Parking Garage and Light Rail Station, and PNC Firstside.

Second Avenue from Pittsburgh Technology Center to Bates Street

In this corridor, there are two constraints for this alternative.

- **Existing Constraint**: The alternative proposes to use former B&O railroad right-of-way that has been converted to a recreational use - the Eliza Furnace Trail which is owned by the City of Pittsburgh. Section 4f of the USDOT Act of 1966 states that the US Secretary of Transportation shall not approve any transportation

LEGEND

- Area of Constraint
- Intercept Parking
- East Busway
- Mon/Fayette

Spine Line Corridor Study Alternatives

- Center Avenue
- Colwell
- Technology Center
- Fifth / Forbes Avenue
- Panther Hollow

Eastern Corridor Transit Study Alternatives

- Wilkinsburg Light Rail
- Homestead Light Rail
- Mon Valley Light Rail

Oakland Transit Study Alternatives

- HRT Line
- People Mover Line

Potential Intermodal Hub

5th Avenue

Forbes Avenue

Blvd. of the Allies

2nd Avenue

I-376

Bates Street

Hot Metal Bridge

Carson Street

Mon/Fayette: Elevation and ramp configuration

Existing: Recreational use (Eliza Furnace Trail) Mon/Fayette: Trail reduced to minimum 18' width

Existing: Vertical clearance of Eliza Furnace Trail bridge is 11'-6" over Bates Street

Existing: Recreational use (Eliza Furnace Trail) Mon/Fayette: Trail reduced to minimum of 12' width

Mon/Fayette: Vertical clearance of roadway

Mon/Fayette: Vertical clearance with 43N to I-376 ramp

Mon/Fayette: Vertical clearance with relocated railroad

Existing: CSX ROW is 48' - Constrained by Swinburne Street bridge & Parkway East overpass

Possible Railroad Relocation

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Figure 8: Transit Constraints in the GTB-DAT Study Area (Existing Constraints & Mon/Fayette Design Constraints)

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project that requires the use of publicly owned land from parks and recreational areas unless 1) there is no feasible and prudent alternative to the use of such land and 2) such project will include all planning to minimize the harm to such park and recreational area resulting from such use.

- **Mon/Fayette Design Constraint**: The proposed design of the Mon/Fayette Expressway at this location requires a shifting of the Parkway East that will reduce the envelop of the Eliza Furnace Trail to 18 feet wide at most points. As shown in Figure 5, an at-grade two-track LRT system requires a horizontal clearance of 27 to 30 feet. Thus, a two-track LRT alignment is precluded at this location.
- **Possible Alternative:** In this segment of Second Avenue, there is potential for a two-track LRT line in the area between Second Avenue and the Monongahela River.

Second Avenue from Bates Street to Junction Hollow

East of Bates Street, this alternative has similar restrictions.

- **Existing Constraint:** The alternative proposes to use former B&O Railroad right-of-way that has been converted to a recreational use.
- **Mon/Fayette Design Constraint:** In order to minimize the potential impacts on the Pittsburgh Technology Center, the DAT has advised the Turnpike Commission on a design option in which the Bates Street ramps are shifted and constructed on top of the Eliza Furnace Trail (see DAT Decision Chronicle V-1). This shift of the Mon/Fayette ramps reduces the Eliza Furnace Trail envelop to a minimum of 12 feet. As shown in Figure 5, a two-track LRT system requires a horizontal clearance of 27 to 30 feet. Thus, an at-grade two-track LRT alignment is precluded at this location.
- **Possible Alternative:** In this segment of Second Avenue, there is potential for a two-track LRT line in the area between Second Avenue and the Monongahela River.

Junction Hollow from Second Avenue to Forbes Avenue

In this corridor, there is one primary constraint.

- **Existing Constraint:** This proposal recommends utilizing Junction Hollow to connect Oakland to the Pittsburgh Technology Center. CSX currently owns a two-track right-of-way in the corridor.

  The primary constraint in this corridor is its horizontal width where the Swinburne Street Bridge and the Parkway East cross the existing railroad right-of-way. The current horizontal width at this location is 48 feet. When operating

next to piers, CSX requires a minimum of 25 feet from track centerline to the pier. At this location, there is approximately 17 feet from track centerline to the bridge piers. Because of the bridge piers, the horizontal width does not meet CSX's minimum width criteria for track next to piers. Thus, there is no additional right-of-way that can be used for a new LRT line.

CSX Right-of-Way at Swinburne Street Bridge

- **Possible Alternative:** LRT is potentially feasible along this corridor if there is an agreement with CSX to share the right-of-way or if CSX sells or abandons the line.

Crossing from Junction Hollow to the Second Avenue Corridor

If an alternative to using the former B&O right-of-way parallel to Second Avenue is found and the CSX right-of-way can be used, there is an issue of connecting the LRT line from the Second Avenue corridor to Junction Hollow.

- **Mon/Fayette Design Constraint:** The proposed design of the Mon/Fayette Expressway will require a relocation of the CSX right-of-way near the south portal of Junction Hollow continuing along the Monongahela River towards Hazelwood. The design of the LRT would need to include a junction with the relocated right-of-way in order to access Junction Hollow.

EASTERN CORRIDOR TRANSIT STUDY

Spine Line Light Rail

The *Eastern Corridor Transit Study's* Wilkinsburg LRT and Homestead LRT alternatives share the same alignment between Downtown Pittsburgh and Oakland. This portion of their alignments is outside of the DAT study area and is not affected by the design of the Mon/Fayette Expressway. The Wilkinsburg LRT option continues east through Squirrel Hill to Wilkinsburg and is not affected by the design of the Mon/Fayette Expressway. The Homestead LRT alternative proposes to travel east through Oakland to Craig Street where it would turn south and use CSX right-of-way through Junction Hollow, eventually terminating in Homestead. The Homestead LRT has the following constraint in the DAT study area.

Junction Hollow from Forbes Avenue to Second Avenue

- **Existing Constraint:** As outlined previously, CSX currently owns a two-track right-of-way through Junction Hollow. The corridor is constrained by the piers of the Swinburne Street Bridge and the Parkway East overpass where the horizontal

clearance is less than the railroad's requirements. Thus, there is no additional right-of-way that can be used for a new LRT line.

- **Possible Alternative:** LRT is potentially feasible along this corridor if there is an agreement with CSX to share the right-of-way or if CSX sells or abandons the line. At the south end of Junction Hollow, the CSX right-of-way is being relocated towards the Monongahela River due to the proposed design of the Mon/Fayette Expressway. South of Junction Hollow, LRT to Homestead would follow this relocated section.

Mon Valley Light Rail

The Mon Valley LRT proposal also recommends using Junction Hollow to travel south through Oakland, ultimately terminating in McKeesport. It has the following constraint.

Junction Hollow to Second Avenue

- **Existing Constraint:** This proposal is also constrained by the existing CSX railroad right-of-way at the Swinburne Street Bridge and Parkway East overpass. At this location there is no additional width for an LRT line.
- **Possible Alternative:** LRT is potentially feasible along this corridor if there is an agreement with CSX to share the right-of-way or if CSX sells or abandons the line. At the south end of Junction Hollow, the CSX right-of-way is being relocated towards the Monongahela River due to the design of the Mon/Fayette Expressway. Potential LRT to the Mon Valley would follow this relocated section.

OAKLAND TRANSPORTATION STUDY

Heavy Rail Transit

As shown in Figure 4, the Allegheny Conference has proposed a heavy rail transit (HRT) line that follows existing right-of-way along the Monongahela River (from the west end of the Technology Center to the west end of the Almono development) and through Junction Hollow. The proposed design of the Mon/Fayette Expressway does not impact the HRT along the Monongahela River. The HRT line has a constraint in Junction Hollow.

Junction Hollow from Second Avenue to Forbes Avenue

- **CSX Right-of-Way Width:** Because this alternative proposes to use the railroad corridor in Junction Hollow, it is constrained by the existence of the CSX right-of-way. As noted previously, the width of this right-of-way is limited where the Swinburne Street Bridge and the Parkway East cross the right-of-way. There is no additional room for a one-track or two-track HRT line.

- **Possible Alternative:** HRT is potentially feasible along this corridor if there is an agreement with CSX to share the right-of-way or if CSX sells or abandons the line.

People Mover

The alignment of Oakland Circulator proposal, also known as People Mover, is shown in Figure 4. It has the following constraints.

Bates Street Valley

- **People Mover Elevation and Pier Placement:** As shown in Figure 4, the People Mover alignment travels southwest through the Bates Street Valley to access the Pittsburgh Technology Center. The People Mover must cross the Mon/Fayette Expressway, the Parkway East, and Second Avenue to serve the Technology Center. According to the People Mover preliminary designs, the elevation of the People Mover at these crossings will be approximately 100 feet, a height that provides sufficient clearance for all three roadways.
- **Mon/Fayette Design Constraint:** One possible constraint in this area is the placement of the People Mover guideway piers. People Mover design guidelines generally recommend allowing 80 feet between piers. In this area, it will be difficult to accommodate that pier spacing guideline given the location of the Parkway, the Mon/Fayette Expressway, and the Bates Street ramps. The People Mover designers do not consider this a fatal flaw. The pier spacing can be modified in coordination with the Mon/Fayette Expressway.

Bates Street to Almono Development

- **Mon/Fayette Design Constraint:** Just south and east of the Hot Metal Bridge, it is recommended that the People Mover alignment shift south slightly to avoid conflicts with the Mon/Fayette Expressway. Where the People Mover crosses the relocated CSX line, it is recommended that the People Mover adjust its vertical alignment slightly. A vertical alignment adjustment is also recommended where it would cross the ramp for 43N to I-376 West. None of these adjustments represent fatal flaws which would preclude the People Mover from being constructed in this area. In the Almono development, both the People Mover and the Mon/Fayette Expressway will need to coordinate with the development's local road system.

BATES STREET BUS OPERATIONS

There is currently a transit operations constraint on Bates Street near Second Avenue.

- **Existing Constraint:** The height of the Eliza Furnace Trail bridge over Second Avenue is 11' 6" which restricts the ability of large vehicles such as transit buses from passing underneath the bridge.
- **Alternative:** The Eliza Furnace Trail Bridge is programmed to be replaced in 2008 and 2009. When it is replaced, the clearance height will be 19' 4". The proposed design of the Mon/Fayette Expressway would reduce the clearance slightly to 18'3". In either situation, the clearance of the trail bridge will be sufficient to allow transit vehicles to pass underneath the bridge.

V. INTERCEPT/SATELLITE LOTS

The purpose of this task was to refine details for three potential satellite/intercept parking lots (shown in Figure 1) in the Glenwood to Bates Street DAT study area. The Transit Plan and Intercept/Satellite Subcommittee sought to obtain and refine the following information for each lot:

- Location
- Type of facility (surface lot or parking garage)
- Site access
- The PTC's responsibility
- The Subcommittee's responsibility
- Potential owners
- Potential operators
- Potential funding for construction

Figure 9 summarizes the information collected regarding the parking facilities.

Figure 9: Summary of Satellite/Intercept Lot Information

Location	Parking Facility	Site Access	PTC's Responsibility	Sub-committee's Responsibility	Potential Owners	Potential Operators	Potential Funding
Lot #1 (DPW Garage/Parking Area)	Surface Lot and/or Parking Garage	Vehicle access would be from new local street connection No direct access from Second Avenue, the Mon/Fayette, and I-376 Westbound	* See Notes 1 and 2	Share conceptual plans in order to gauge interest in ownership and maintenance of facility	PAAC, Pittsburgh Parking Authority, UPMC Parking Services, Existing property owner, other	PAAC, Pittsburgh Parking Authority, UPMC Parking Services, Existing property owner, other	Surface Lot (in accordance with Note 1): Funding for design/construction--PTC project Parking Garage: Funding would not be part of PTC project
Lot #2 (ALMONO site near or within the "Blue Building")	Parking Garage	Access from ALMONO site local streets and direct access from Rutherglen Street connection and from tolled exit ramp from Mon Fayette Expressway outbound (which provides direct tolled access from I-376 EB)	Through DAT process, access is provided to a potential parking facility by others via a proposed ramp, and proposed relocated Rutherglen Street. There is no specific FEIS commitment for providing parking at this location. * See Note 3	ALMONO to determine minimum/maximum parking spaces needed at this site	RIDC/ALMONO	RIDC/ALMONO to determine	Parking Garage: Funding would not be part of PTC project.
Lot #3 (at the top of the Bates Street valley below the Duquesne Light substation)	Parking Garage	Current concept would required a new roadway (by others) which would provide direct access to parking site from the inbound I-376 ramp to Bates Street (SB)	At DAT meeting, PTC agreed to prepare a parking garage concept for possible further consideration by others. There is no specific FEIS commitment for providing a parking garage or access to the garage at this location.	Share conceptual plans in order to gauge interest in developing the design, construction and ultimately ownership and maintenance of facility	PAAC, Pittsburgh Parking Authority, UPMC Parking Services, other	PAAC, Pittsburgh Parking Authority, UPMC Parking Services, other	Parking Garage: Funding would not be part of PTC project. New Roadways/Site Development: Funding would not be part of PTC project.

From Mitigation Report:

Note 1: Coordination with the Port Authority of Allegheny County (PAAC) will be undertaken during final design and construction to ensure that adequate provisions are made to maintain transit services to traditionally served locations during construction.

In addition, coordination is ongoing with PAAC regarding the maintenance and operation of Park-and-Ride lots as an enhancement to this project. If agreement is reached with PAAC to own, maintain, and operate the Park-n-Ride lots then they will be constructed as part of the PA Route 51 to I-376 Project.

Note 2: The PTC will coordinate with the Children's Hospital Parking Services and the operator of the existing park-and-ride to address issues with schedules and any other identified concerns.

Note 3: Mitigation issues addressed by the GBDAT will include features such as:…Ensure community input is considered in the design of the expressway in the area of the former LTV site.

From Mitigation Report Tracking System Forms:

Socioeconomic Environmental Features (from FEIS) for entire corridor:

- Coordination with the PAAC regarding existing and planned transit service access and operations through the construction of the expressway

Socioeconomic Environmental Features (from FEIS) for 53N and 53M:

- Ensure community input is considered in the design of the expressway in the area of the former LTV site (as developed by the GBDAT)
- UPMC Children's Hospital Parking Area: Coordinate with the Children's Hospital Parking Services and the operator of the park and ride to address issues with schedules and any other concerns.

VI. CONCLUSION

Given its important role as a center for education, employment, and housing in the Pittsburgh region, there have been numerous studies and plans in the past (both distant and recent) to improve transportation to and through the community. For more than 100 years, community planners have looked at ways of providing improved transit service to the area, while more recently regional leaders evaluated, planned, and began designing a major new highway that will impact automobile and transit access to the neighborhood.

The Glenwood to Bates Street DAT requested the assistance of the Pennsylvania Turnpike Commission to review existing and emerging transit plans to ensure that the design of the Mon/Fayette Expressway is completed with the knowledge of various transit plans. This report reviewed three major transit studies that include eight different proposals for implementing transit improvements in Oakland. The following is a summary of the comparisons of proposed Mon/Fayette Expressway designs and potential constraints for implementing transit improvements in the DAT study area.

- Three of the transit proposals that were reviewed propose alignments that are outside of the Glenwood to Bates Street DAT study area and are not affected by the design of the Mon/Fayette Expressway.
  - LRT Downtown Pittsburgh to Oakland via Centre Avenue
  - LRT Downtown Pittsburgh to Oakland via Colwell Street
  - Spine Line Wilkinsburg LRT

- There are three existing constraints that affect potential transit investments in the DAT study area:
  - The Eliza Furnace Trail is a publicly owned recreational facility. In addition, the potential to use the Eliza Furnace Trail for future LRT lines is also restricted by the trail's width as well as construction that occurred along the trail at the Downtown end.
  - The CSX railroad right-of-way is constrained by the piers of the Swinburne Street Bridge and the Parkway East overpass which preclude the installation of one or two tracks for light rail or heavy rail transit.
  - The existing height of the Parkway East in the vicinity of Bates Street affects the vertical envelop of the potential People Mover line that connects Oakland to the Pittsburgh Technology Center.

- There are three potential constraints related to the proposed design of the Mon/Fayette Expressway.
  - Along Second Avenue and Bates Street, portions of the Parkway East and the Mon/Fayette Expressway will be constructed over the Eliza Furnace trail, reducing the Eliza Furnace Trail envelop to between 12 feet and 18 feet in some locations. However, without the right-of-way reduction due to the Mon/Fayette Expressway, the

Eliza Furnace Trail right-of-way is not wide enough to accommodate an at-grade two-track LRT line.

- Due to the proposed design of the Mon/Fayette Expressway Bates Street ramps, the People Mover guideway piers may not be able to be placed 80 feet apart as specified in the People Mover design guidelines.
- There are slight clearance conflicts of the People Mover and Mon/Fayette Expressway at the People Mover's junction with the relocated CSX right-of-way, south and east of the Hot Metal Bridge, and at the Mon/Fayette ramp for 43N to I-376.

- Transit buses are currently restricted from using Bates Street due to the clearance of the Eliza Furnace Trail Bridge. This restriction will be lifted when the bridge is replaced. The proposed design of the Mon/Fayette Expressway will reduce the new clearance slightly, but it will not restrict buses from using the roadway.

- Transit subcommittee members refined details for three potential satellite/intercept parking lots in the Glenwood to Bates Street DAT study area. Project stakeholders will continue to work together to finalize plans for the lots.

Despite the existing constraints and potential constraints related to the proposed Mon/Fayette Expressway design, there are potential ways of mitigating the constraints or adjusting the designs of transit proposals to address the constraints.

- Instead of using the Eliza Furnace Trail, transit planners could evaluate a possible LRT corridor between Second Avenue and the Monongahela River.
- LRT and HRT planners should coordinate with CSX on potential arrangements to utilize the railroad's right-of-way through Junction Hollow.
- The People Mover designers should continue to work with the Mon/Fayette Expressway designers to coordinate the placement of guideway piers near the Bates Street interchange.
- The People Mover designers should continue to coordinate with the Mon/Fayette designers on the People Mover's horizontal clearance east of the Pittsburgh Technology Center and its vertical elevation over the Mon/Fayette Expressway ramp for 43N to I-376.
- The People Mover designers should continue to coordinate with the Mon/Fayette designers on the People Mover's vertical clearance at its junction with the relocated CSX right-of-way.

It was the consensus of the DAT subcommittee that the design of the Mon/Fayette Expressway does not preclude any of the transit proposals developed in the past 25 years. Since one or more of the transit proposals could advance ahead of the Mon/Fayette's construction, the group also stressed the need for continued coordination among the area's transportation stakeholders.