

## CHAPTER 5. Complete the Street



### 5.1 WHAT IS A COMPLETE STREET?

The term “complete streets” is relatively new; it was coined in 2003 by the advocacy group “America Bikes” as it worked to include pedestrians, bicyclists, and transit users in SAFETEA-LU, the federal transportation funding bill. The term was defined as follows: “A complete streets policy ensures that the entire right-of-way is routinely designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists, and transit riders of all ages and abilities must be able to safely move along and across a complete street.”<sup>2</sup>

This policy was not included in SAFETEA-LU when the bill passed in 2005, but the effort sparked the formation of the National Complete Streets Coalition ([www.completestreets.org/](http://www.completestreets.org/)) and a nationwide movement to enact complete streets policy at the municipal and state level. Early members of the Complete Streets Coalition included the Institute of Transportation Engineers, AARP (formerly known as the American Association of Retired Persons), the American Society of Landscape Architects, the American Planning Association, Smart Growth America, Paralyzed Veterans of America, and the American Public Transportation Association.



*Sidewalk with adequate clear width and buffer*

The impetus for complete streets grew partly out of the recognition that the previous approach for accommodating pedestrians and bicyclists on federally funded studies – arguing for the inclusion of pedestrian and bicycle facilities on a project-by-project basis – had limited potential for changing infrastructure. Under the complete streets approach, all projects begin with the assumption that pedestrians, bicyclists, and transit users of all ages and abilities should be accommodated.

In this chapter, complete streets practice is defined, along with a discussion of complete streets policy elements. This is followed by a discussion of the potential for re-visioning three example projects that are serving as prototypes for **ACTIVE ALLEGHENY** using complete streets principles.

There is no standard design or template for a complete street, and the National Complete Streets Coalition has actively discouraged attempts to prescribe specific roadway components. The emphasis of the complete streets movement has been primarily on policy, and less on design practices. As noted in *Complete Streets: Best Policy and Implementation Practices* (APA 2010), “changing the overall approach to design is of greatest importance.” Practitioners thus have great flexibility in working toward the goal of creating roadways that provide safe mobility for all modes. The Coalition has indicated that examples of features that might be included in a Complete Street are sidewalks, bike lanes (or wide paved shoulders), special bus



*Separated bike lane in NYC*

<sup>2</sup> Information on the history of complete streets, and complete streets practices discussed in this chapter, is found in the text *Complete Streets: Best Policy and Implementation Practices*, Planning Advisory Service Report 559, American Planning Association, March 2010. <http://www.planning.org/apastore/search/Default.aspx?p=4060>.

lanes, comfortable, and accessible transit stops, frequent crossing opportunities, median islands, accessible pedestrian signals, and curb extensions.

In short, the tools to be used in designing complete streets are not unique to roadways designated as complete streets. They include planning and design techniques that are regularly used to develop pedestrian and bicycle facilities; those discussed elsewhere in the ACTIVE ALLEGHENY Plan. In complete streets, there is also a strong emphasis on accommodating the more vulnerable groups in our population: children and older adults and persons with disabilities.

Along with facilities regularly incorporated into roadway projects (curb ramps), consideration should be given to facilities such as audible traffic signals, preferably with vibrating arrows, as intersection improvements. A sidewalk may exist on a corridor, but if the clear width is impeded by utilities and street furniture or if sidewalk panels are uneven, travel by persons in wheelchairs is difficult. As part of the public involvement process on projects, input should be gathered on the presence of disabled persons in the vicinity and facility needs.

## 5.2 THE SMART TRANSPORTATION CONNECTION

A complete streets approach is consistent with PennDOT's Smart Transportation Initiative. That initiative is built around 10 Smart Transportation themes, including the theme "accommodate all modes." The *Smart Transportation Guidebook* (<ftp.dot.state.pa.us/public/Bureaus/design/SMART%20TRANSPORTATION%20.pdf>) was jointly developed by PennDOT and NJDOT to guide the planning and design of all land service roadways. The Guidebook is essentially a complete streets practice in its emphasis on flexibility in creating transportation facilities that work well for all users, and in balancing trade-offs between vehicular, pedestrian, bicycle, and transit mobility.

For example, the Guidebook does not specify the type of bike facility that should be provided on roadways to accommodate bicyclists; rather, the planner or designer must evaluate all pertinent factors in selecting an outside travel lane width, bike lane width, or shoulder width that would be compatible with bicycle travel.

Similar flexibility is offered in the Guidebook for pedestrian facilities. Sidewalks are the cornerstone of any pedestrian network, but their width, and their setback from the roadway, will vary depending upon roadway type and land use context). Although critical on urban and most suburban roadways, sidewalks are not vital to many roadways in rural areas. Further, there will be choices for how pedestrian travel throughout the community: signalized or unsignalized crossings, the frequency of designated pedestrian crossings, the provision of medians for multilane roadways, accessible pedestrian signals, and curb extensions are examples of how pedestrian movement can be accommodated.



*Bicyclist, pedestrian, and motor vehicles in Pittsburgh*  
Photo: Lynn Heckman

Accommodation of transit service is another component of a complete street. This can be viewed from two perspectives:

- Accommodation of transit riders traveling to and from bus stops
- Accommodation of the transit vehicle

The ability of transit riders to safely access bus stops and rail stations depends in large measure on the provision of adequate pedestrian and bicycle facilities proximate to the stops and stations. As discussed in the *Smart Transportation Guidebook*, there are unique issues associated with bus boarding that must be taken into account. Bus stops are

typically better positioned at intersections than mid-block locations, since they offer the best pedestrian access from both sides of the street as well as cross-street locations, and will reduce the tendency for jaywalking. However, at some locations, major land use generators will suggest the need for midblock bus stops; in these cases, the accommodation of safe midblock crossings must be evaluated.

The need for balancing modes in complete streets is illustrated by the issue of transit. Pedestrians find it easier to cross roadways with narrow travel lanes, and modest curb radii at intersections (smaller curb radii result in reduced pedestrian crossing length, and also slow vehicular speeds through intersections). However, buses have different needs than passenger vehicles. The roadway width needed to accommodate buses depends in part on the frequency of service. As discussed in the Guidebook, on arterial roadways with regular bus service, a travel lane width of 12' is recommended. On collector roadways, travel lane width of 11' is recommended. At intersections where buses make regular turning movements, a curb radius of at least 25' may be needed.



*Suburban roadway with high visibility crosswalks, median and bike lanes*

## 5.3 POLICY

### Complete Streets Policy

The most fundamental step that Allegheny County and its constituent local municipalities can take to advance complete streets practice is to adopt and implement a complete streets policy. **ALLEGHENYPLACES**, the County's comprehensive plan, advocates for complete streets. The National Complete Streets Coalition recommends consideration of 10 elements in a comprehensive complete streets policy document. Following is a summary of these 10 elements, along with a discussion of each element.

- *A vision for how and why the community wants to complete its streets.* The primary purpose of the complete streets policy should be identified.
- *Specifies that "all users" includes pedestrians, bicyclists, and transit passengers of all ages and abilities, as well as automobile drivers and transit vehicle operators.* This provision is particularly important given the significant concentrations of disabled persons living in some Allegheny County municipalities. As noted on the Complete Streets website ([www.completestreets.org](http://www.completestreets.org)), narrow sidewalks or sidewalks with obstacles and uneven surfaces can discourage wheelchair travel, and signalized intersections without audible signals can increase the danger for blind pedestrians.
- *Encourages street connectivity and aims to create a comprehensive, integrated connected network for all modes.* A well-connected network greatly enhances the ability of pedestrians and bicyclists to move around a community, and is a vital complement to complete streets.
- *Is adoptable by relevant agencies to cover all roads.* Local officials should work with state officials to ensure that complete streets principles are applied to state roadways within their jurisdiction.
- *Applies to both new and retrofit projects, including design, planning, maintenance, and operations, for the entire right-of-way.* Even a relatively simple resurfacing project should involve an evaluation as to whether the roadway can better accommodate bicyclists; for example, can travel lanes be narrowed to provide wider shoulders or bike lanes?
- *Makes any exceptions specific and sets a clear procedure that requires high-level approval of exceptions.* Many jurisdictions with complete streets policies recognize the need for exceptions on some projects; this policy should be clearly stated in advance to avoid confusion.

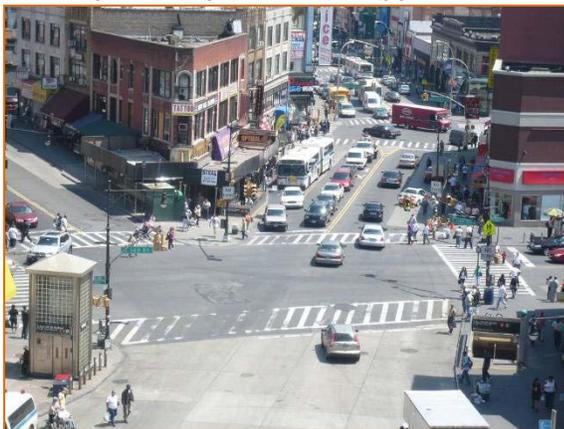


*Intersections developed under a Complete Streets Policy accommodate all users  
Photo: FHWA*

- *Directs the use of the latest and best design standards while recognizing the need for flexibility in balancing user needs.* Detailed design standards should not be included in an ordinance or resolution, but there should be a commitment to revisit existing standards in municipal subdivision and land development ordinances or design manuals.
- *Directs that complete streets solutions will complement the context of the community.* Roadway design that is tailored to fit the context of the surrounding community is at the heart of Pennsylvania’s Smart Transportation initiative, and the key guiding principle to the *Smart Transportation Guidebook*.
- *Establishes performance standards with measurable outcomes.* Goals should be set on improving pedestrian and bicycle facilities, and existing standards for vehicular service may need to be revised. For example, vehicular levels of service may need to be lowered if these promote major roadway improvements at the expense of pedestrian or bicycle facilities.
- *Includes specific next steps for implementing the policy.* The policy should state other steps, such as revision of manuals or procedures that will be necessary to better implement policy.

There are a variety of measures by which local municipalities can adopt a complete streets policy, and not all of the above 10 elements are vital to every measure. For example, the establishment of performance measures would be appropriate for a complete streets plan, but detailed performance measures should be left out of an ordinance.

**Before Complete Streets Application**



**After Complete Streets Application**



Photos: CompleteStreets.org

Complete streets practice can be adopted in a wide variety of ways:

- Ordinance or Legislation
- Resolution
- Executive Order
- Internal Policy
- Plan

Ordinances and resolutions are the preferred means for adopting complete streets policies, since they provide a concise, direct declaration of municipal intent by the municipality’s governing body. Resolutions have been chosen by the largest plurality of municipalities, representing 47% of municipalities with complete streets policies. An ordinance is second in popularity, being adopted by 22% of municipalities.<sup>3</sup> Plans and internal policies can be useful in providing guidelines for implementing ordinances, resolutions, or executive orders.

<sup>3</sup> Percentages were calculated based on summary of adopted policies, [www.completestreets.org](http://www.completestreets.org).

Below is a model ordinance recommended for adoption by Allegheny County’s local municipalities. The text is based on model policy language recommended by the National Policy and Legal Analysis Network to Prevent Childhood Obesity (NPLAN), and also incorporates language from adopted policies for Rochester, Minnesota and Seattle, Washington. The model ordinance is concise by intent, focusing on the simple principle that roadway projects should accommodate all users. The language can be modified for use on resolutions and executive orders.

### Complete Streets Model Ordinance

AN ORDINANCE relating to complete streets policy for the \_\_\_\_ of \_\_\_\_\_, stating guiding principles and practices so that transportation improvements are planned, designed and constructed to encourage walking, bicycling and transit use while promoting safe operations for all users.

WHEREAS, implementing transportation improvements that are planned, designed and constructed to safely accommodate walking, bicycling, and transit use increase the general safety, health and overall welfare of the citizens of and visitors to the \_\_\_\_ of \_\_\_\_\_; and,

WHEREAS, the \_\_\_\_ of \_\_\_\_\_ will seek to enhance the safety, access, convenience and comfort of all users, including pedestrians, bicyclists, transit users and drivers, motorists and freight drivers, and people of all ages and abilities, including children, older adults, and persons with disabilities, through the design, operation and maintenance of the transportation network so as to create a connected network of facilities accommodating each mode of travel; and,

WHEREAS, transportation improvements are to be planned and designed in a manner consistent with, and supportive of, the surrounding community, recognizing that all streets are different and that the needs of various users will need to be balanced in a flexible manner;

NOW, THEREFORE, BE IT ORDAINED BY THE \_\_\_\_\_ OF \_\_\_\_\_ AS FOLLOWS:

**Section 1.** All roadway projects, including construction, re-construction, re-paving and rehabilitation, will provide appropriate accommodation for pedestrians, bicyclists, transit riders and drivers, motorists and freight drivers, and people of all ages and abilities, including children, older adults and persons with disabilities, except under one or more of the following conditions:

- The roadway project is comprised of ordinary maintenance activities designed to keep assets in serviceable condition (e.g., mowing, cleaning, sweeping, spot repair and surface treatments such as chip seal);
- Where use by nonmotorized users is prohibited by law;
- The cost would be excessively disproportionate to the need or probable future use over the long term;
- There is an absence of current and future need.

**Section 2.** Appropriate accommodations include facilities and amenities that are recognized as contributing to complete streets, which may include sidewalks and pedestrian safety improvements such as median refuges, pedestrian signals, bulbouts and crosswalks; street and sidewalk lighting; improvements that provide ADA (Americans with Disabilities Act) compliant accessibility; transit accommodations including improved pedestrian access to transit stops and bus shelters; bicycle accommodations including shared-use lanes, wide travel lanes or bike lanes as appropriate; paved shoulders; bicycle parking; street trees, landscaping, street furniture and adequate drainage facilities; and other facilities.

**Section 3.** Complete streets principles will be incorporated into the comprehensive plan, subdivision and land development ordinance, and other plans, manuals, regulations and programs as appropriate.

The first paragraph of the model ordinance summarizes the ordinance, and indicates the purpose. The preamble (“Whereas” clauses) indicate the reasons why the municipality is adopting a complete streets ordinance; it is recommended that officials of local municipalities in Allegheny County add reasons specific to their community, if possible.

Section 1 indicates that complete streets policies will be followed on roadway projects in the municipality, with the exception of simple maintenance projects, and projects where there is no need or where implementation of the policy will result in disproportionate costs. These exceptions are common provisions in adopted complete streets policies nationwide. They help address concerns on the part of some that implementation of a complete streets policy will significantly increase costs.

Section 2 provides examples of complete streets facilities. The examples are similar to those found in the NPLAN model ordinance, and in adopted policies. However, not every local municipality has listed typical examples of complete streets facilities in their adopted policies.

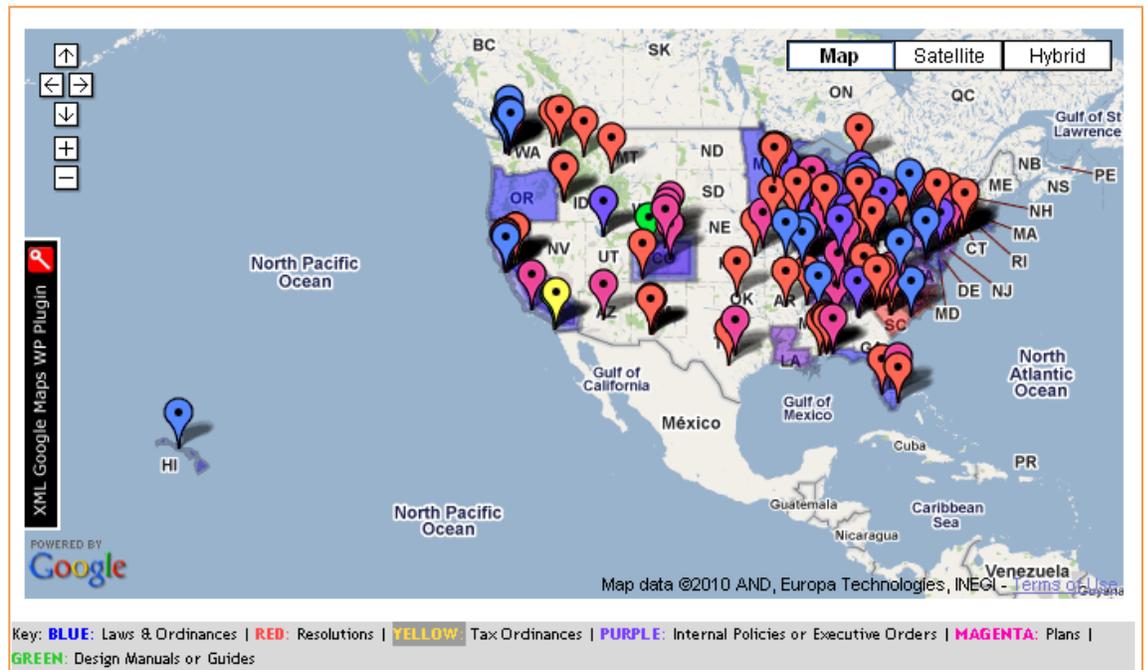
Section 3 indicates that the local municipality will incorporate complete streets principles into other municipal ordinances, plans, and standards as appropriate. Although, as discussed earlier, there is not a prescribed complete streets treatment, the municipal standards should be reviewed to determine whether there are basic standards for sidewalks and bike facilities. Further, there should not be one set standard for travel lanes; flexibility for this feature is desirable.

In addition to local municipalities, developers should consider Complete Streets approaches when planning, designing and building large scale projects (e.g., The Waterfront at Homestead and South Side Works).

### Where Have Complete Streets Policies Been Adopted?

According to the National Complete Streets Coalition, over 150 jurisdictions across the country – state, county, and local governments – have adopted complete streets policies, or committed to doing so. PennDOT does not have a formal complete streets policy, but it has increasingly followed a complete streets approach to roadway projects in policy and implementation. This approach is exemplified in its Bicycle and Pedestrian Checklist. When issuing the Checklist, PennDOT stated:

“Department policy requires the evaluation of the access and mobility needs of pedestrians and bicycle users in highway and bridge transportation corridors. This revised policy mandates that highway and bridge projects must evaluate the existing, latent, and projected needs of pedestrians and bicycle users. It requires the integration of the identified needs into project planning and design processes.”



Google Map showing where Complete Streets Policies have been enacted  
Source: [CompleteStreets.org](http://CompleteStreets.org)

At the local level in Pennsylvania, interest in complete streets is also growing. The City of Philadelphia was the first municipality in the state to adopt a complete streets policy, issuing an Executive Order in 2009. The City directed all city departments and agencies to:

- Give full consideration to the safety and convenience of all users of the transportation system, be they pedestrians, bicyclists, public transit users, or motor vehicle drivers;
- Place a high priority on the safety of those traveling in the public right-of-way, and in particular the safety of children, the elderly, and persons with disabilities.



Philadelphia is also currently preparing a complete streets handbook. The City of Franklin in Venango County recently became the second municipality in Pennsylvania to adopt a complete streets policy, in its case doing so through a resolution (<http://www.completestreets.org/webdocs/policy/cs-pa-franklin-resolution.pdf>). The City of Allentown has been preparing a complete streets policy to incorporate into *Connecting our Community*, which is the city's bicycle and pedestrian trail plan.

## 5.4 IMPLEMENTATION

Following approval of a complete streets policy, a local municipality can move immediately to implementation. Depending upon the level of detail of the adoption instrument, the municipality may wish to consider preparation of a plan or policy at this point. As discussed above, a plan or policy is not recommended as the primary adoption instrument.

### Transportation Plan

A municipality's transportation plan or transportation element of a comprehensive and/or master plan should express support for complete streets goals and establish a framework for improving pedestrian, bicycle, and transit facilities. It should also identify areas of the municipality where transit service is needed, or where greater frequency/extended service periods are needed. Safe and accessible routes to transit stops or stations are needed, with consideration of relocating transit stops, if safe routes to transit stops are not feasible at the current location. Although the transportation plan is the most common plan used to express municipal goals for roadways, some municipalities have adopted a complete streets implementation plan.



*Transportation elements play a vital role in Complete Streets Policy making.*  
Photo: [CompleteStreets.org](http://CompleteStreets.org)

Programs complementary to pedestrian and bicycle facility improvements, such as travel demand management and parking management programs, should be included in a complete streets plan where appropriate.

Performance measures may also be included. For example, the plan could state that by 2020, 20% of trips will occur by bicycling or walking; the number of injuries to pedestrians and bicyclists will be reduced by 20%, and the number of miles of roadways with 5' sidewalk will increase by 20%.

### SALDO and Design Standards

An important step will be to revise every local municipality's Subdivision and Land Development Ordinance (SALDO) or their public and private improvements codes to provide standards for pedestrian and bicycle facilities. Equally important, the standards should be revised to approve roadway design supportive of pedestrian and bicycle movement, ranging from a well-connected street network, to discouraging excessively wide roadways, large curb radii, and other features that promote vehicular speeding. One of the most important components of a complete streets approach is

moving away from a “one size fits all” idea that permeates the SALDO standards in many municipalities, in which existing standards for roadway design are narrowly prescriptive. For example, it is not unusual to encounter travel lane widths of 12’ as a minimum standard for arterial roadways, regardless of whether the roadway is along a fast-moving commercial corridor or in a busy downtown, and whether the travel lanes are accompanied by bike lanes. In complete streets, the entire context of the roadway is taken into consideration, and the travel lane width should change depending upon the need to complement the surrounding land use context, manage vehicular speeds, provide room for bike lanes, and other factors.

An important resource for local municipalities that wish to revise their roadway design standards is the *Smart Transportation Guidebook* (<ftp.dot.state.pa.us/public/Bureaus/design/SMART%20TRANSPORTATION%20.pdf>). **Table 5-1** shows suggested design values for arterial and collector roadways, based on the Guidebook:

**Table 5-1. Smart Transportation Guidebook Design Values**

Feature	Land Use Context		
	Urban	Suburban	Rural
<b>Travel Lanes</b>	Evaluate 10’ to 11’ lanes for roadways of 35 mph or below; 12’ for roadways of 35 mph or above and high traffic volumes and heavy vehicles. 14’ shared lane recommended for bike compatible treatment on roads without shoulders.	11’ to 12’, with 14’ shared lane recommended for bike compatible treatment, on roads without shoulders.	Evaluate 10’ for lightly trafficked roadways; 11’ to 12’ for roadways with regularly trafficked roadways, or with speeds above 35 mph.
<b>Shoulders</b>	4’ to 6’ on roadways where sidewalks are not provided.	8’ to 10’ for suburban corridors; 4’ to 8’ for suburban neighborhoods.	8’ to 10’ for arterials; 4’ to 8’ for collector roadways.
<b>Medians</b>	Provide depending upon access control, left turn and “pedestrian refuge” needs. Left turn medians are 12’ to 18’; pedestrian refuges 4’ to 8’.	Provide depending upon access control, left turn and “pedestrian refuge” needs. Left turn medians are 12’ to 18’; pedestrian refuges 4’ to 8’.	Design depending upon access control, left turn needs.
<b>On-Street Parking</b>	7’ to 8’ parallel parking.	Provide on-street parking as needed.	NA
<b>Grass buffer</b>	4’ to 6’ along neighborhood streets; typically absent in urban/town centers.	4’ to 8’.	NA
<b>Clear Sidewalk Width</b>	6’ to 14’ in urban/town centers, 5’ to 8’ in urban/town neighborhoods.	Min. 5’.	NA

### Checklist

As part of the normal review process of projects advanced by private developers, a checklist should be used to ensure that developers have considered the needs of pedestrians, bicyclists, and transit users. Further, the municipal capital improvements program should be reviewed to determine whether all projects are consistent with complete streets principles. The implementation of complete streets goals should be coordinated with the planned resurfacing or reconstruction of streets, utility projects, or other public improvement projects.

### Training

Some municipalities that have adopted complete streets policies have conducted training sessions on the design of pedestrian and bicycle facilities for planners and engineers. Other municipalities have emphasized procedural training, provided to all members of staff that might have a hand in implementation, such as zoning officers that do site plan review. Training has also been provided to contractors and consultants who regularly provide municipal services.

## 5.5 PROTOTYPES IN ALLEGHENY COUNTY

### Criteria

In this section, recommendations are provided for three (3) roadways using complete streets principles. The three prototypical projects are representative of different cross sections in Allegheny County and represent what could be implemented for a complete street candidate. The complete streets candidates (**Appendix O**, which is included in a separate document) were selected after input from the ACTIVE ALLEGHENY Core and Study Advisory Committees and an extensive review process. The following are the primary criteria used to evaluate candidate projects:

- Arterial or collector roadway
- Average daily traffic greater than 5,000
- Volume demand does not exceed capacity
- At least minimal pedestrian activity
- Proposed bike route and/or existing transit route
- Existing pedestrian and bicycle facilities are not ideal
- Economic growth area (identified as “places” in ALLEGHENY PLACES), or otherwise identified as proposed and targeted development areas

There is a preference for applying complete streets treatments to arterial and collector roadways, and roadways with daily volumes greater than 5,000, since the potential exists for a higher number of conflicts between motorists and non-motorized travelers on these roadways. However, it is recommended that when beginning a complete streets program, municipalities concentrate on roadways where traffic volumes do not significantly exceed capacity. It will be more difficult to reconfigure roadways where existing traffic congestion is seen as a serious issue, potentially shifting right-of-way to non-motorized modes or slowing vehicular traffic.

Complete streets implementation is recommended for roadways with at least minimal pedestrian activity, to address situations with demonstrated existing need. For the same reason, municipalities should focus on roadways where existing accommodations for pedestrians or bicyclists are not already ideal. Roadways with transit routes are preferred, to help foster multi-modal connections between transit and non-motorized modes. Finally, treatments should be prioritized for economic growth areas, since infrastructure improvements have the ability to help spur reinvestment.

Similar criteria can be used by study area municipalities when evaluating complete streets projects in the future. As these projects are advanced, it is recommended that local municipalities focus on those areas that meet vital planning goals, and thus consider the additional contextual criteria below:

- *Alignment of other public investments:* Is the county, local municipality or another public entity planning to make investments in the areas under study?
- *Land use impacts:* Will the complete street designation impact land use decisions in the areas adjacent to the designated streets?
- *System preservation and enhancement:* Are other transportation investment scheduled for the areas being proposed, and if so, can a complete streets approach be incorporated into the planned improvement?
- *Density and capture area:* Is the roadway in proximity to a good population base of pedestrians and bicyclists?

## Complete Streets Prototypes

The complete streets prototypes for ACTIVEALLEGHENY are:

- Freeport Road, Blawnox Borough and O’Hara Township
- South Braddock Avenue, Swissvale Borough
- Broadway Avenue, Beechview, City of Pittsburgh

The three prototypes, selected from the candidate list as representative projects, were chosen to serve as examples for the other candidates based on diversity in location and roadway type. Freeport Road dramatically changes character as it transitions from the traditional downtown center of Blawnox Borough to the strip commercial corridor of O’Hara Township (just west of the Waterworks Mall); solutions discussed for this corridor can be applied to many other locations in the region where urban areas adjoin busy suburban retail corridors. South Braddock Avenue is a constrained roadway in an older urban neighborhood, with a poorly maintained pedestrian infrastructure in Swissvale. Options for major roadway reconfiguration are limited, but the pedestrian infrastructure can be upgraded, making a clear difference in the lives of the many residents that depend upon walking (including walking to transit) as their primary mode of transportation. Broadway Avenue has more roadway capacity than needed to accommodate vehicular traffic, and has potential to upgrade bicycle accommodations, in particular.

### 1) Freeport Road, O’Hara Township, Blawnox Borough

Freeport Road is an ideal example of why a complete streets approach is needed in transportation planning. Sidewalks or other pedestrian infrastructure are missing on significant sections of the roadway in O’Hara Township, although they could easily have been installed as part of the original land developments along the corridor. In this pilot project, the condition of Freeport Road, a state owned road, is reviewed in both O’Hara Township and Blawnox Borough, as the roadway changes quite markedly between the two municipalities. It also illustrates a common problem: it is difficult for pedestrians and bicyclists living in urban areas to access the major retail areas that have migrated to the outside of boroughs and cities.



Land uses along Freeport Road in Blawnox Borough are mixed: residential, retail, commercial, and institutional. Freeport Road serves as the “main street” of the community. Different land uses are also found along Freeport Road in O’Hara Township, however, they are not as mixed as they are in Blawnox Borough. The Waterworks Mall, a large retail center located west of Fox Chapel Road and on the north side of Freeport Road, is near a compact residential subdivision to the east, and other scattered retail uses. Closer to Blawnox, a number of office and industrial uses are present.

*Sidewalk clear width in Blawnox is reduced by utilities and parking meters. Maintenance is needed for some sections.*



*Freeport Road in Blawnox*

Freeport Road in Blawnox Borough is typically 40' wide, comprised of two travel lanes of about 12' in width and two parking lanes of about 8' in width. The roadway is posted at 25 mph. In O'Hara Township, the total pavement width of Freeport Road west of the Route 28 ramps is typically 40' to 42', with 13' to 15' travel lanes and 5' to 6' shoulders. However, the shoulder width is not consistent on this section, and shoulders are narrow or non-existent closer to Fox Chapel Road. Our survey indicates that Fox Chapel Road is a very popular biking destination for riders from the East End of Pittsburgh.

To the east of the Route 28 ramps, the total roadway width is 44', with four 11' travel lanes, and no shoulders. The AADT (Annual Average Daily Traffic) along the corridor is 32,000 west of the Route 28 interchange, and 16,000 east of the Route 28 interchange. The corridor is very heavily trafficked by motor vehicles. Access management along Freeport Road is poor, and there are many curb cuts/driveways intersecting with Freeport Road along the corridor.

**Pedestrian Conditions** – Sidewalks are present along Freeport Road in Blawnox Borough. The typical width is 4' to 5', with the presence of utility poles, street lights, meters and other street furniture reducing the clear width to 2.5' to 3'. Sections of the sidewalk are deteriorated. Curb ramps are typically present, with some in poor condition. Crosswalks are provided across Freeport Road at regular intervals at both unsignalized intersections and at mid-block locations. Standard crosswalks with parallel stripes are provided, as well as a unique crosswalk design with diagonal crossing lines and foot patterns.

In O'Hara Township, sidewalks are missing from the vast majority of the corridor. They are present on the north side of Freeport Road, just east of the Route 28 ramps. However, based on the presence of highly worn foot paths, many pedestrians prefer to walk on the south side of Freeport Road, in part to avoid having to cross the ramps to Route 28. During field investigation, pedestrians were observed walking in the shoulder of several sections of the roadway. Curb ramps are missing from the corridor, largely due to the lack of sidewalks.



*Crosswalk with foot pattern in Blawnox*



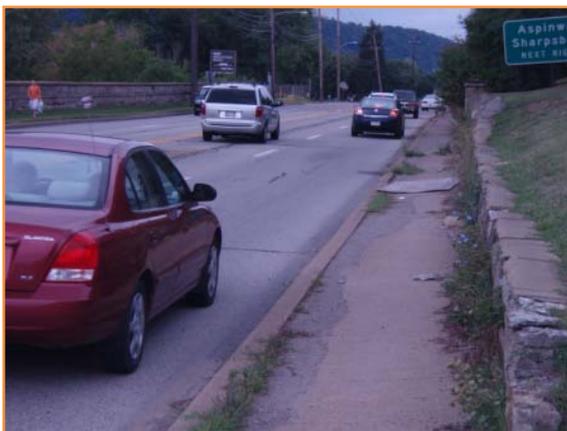
*Freeport Road in O'Hara Township.*

**Bicycle Conditions** – There are no designated bicycle facilities along the corridor. Based on PennDOT's *Bicycle Guidelines*, the section of Freeport Road west of Route 28 is typically bicycle compatible, due to the presence of shoulders at least 5' to 6' in width. However, shoulders are not consistent on this section. East of Route 28, the roadway is not bicycle compatible, since shoulders are absent. Freeport Road is not bicycle compatible within Blawnox Borough; for that context, 14' shared lanes are recommended in the *Bicycle Guidelines*.

**Transit Conditions** – The Route 1 bus between Tarentum and Downtown serves this corridor. Bus stop shelters are located on the corridor adjacent to the edge of cartway in O’Hara Township.

**Complete Streets Analysis** – Freeport Road presents very different issues for non-motorized travelers within the two municipalities. Most pedestrians would prefer walking on Freeport Road through Blawnox Borough to walking in O’Hara Township. Blawnox Borough has a well-connected sidewalk system with well-defined midblock crossings, and the presence of parked cars shields pedestrians on the sidewalk from passing vehicles. The sidewalk clear width is not ideal; at 2.5’ to 3’, it is less than the recommended minimum of 5’, and would discourage two pedestrians from walking side-by-side. Sidewalks should be widened where readily permitted, but will be difficult to widen in most places. The presence of slopes and a retaining wall on the north side of Freeport Road through much of the Borough will make widening on this side challenging. Shifting the curb line and extending the sidewalk into the existing roadway would reduce the width of Freeport Road below 40’, considered the minimum ideal width for a “main street” with on-street parking. It would also further reduce the compatibility of the roadway for bicyclists and transit vehicles. Deteriorated sidewalk should be replaced to improve travel, particularly for persons with disabilities.

Increasing the compatibility of the roadway for bicyclists within Blawnox would also prove difficult. Shifting on-street parking to only one side of the roadway would free-up roadway space to create bike lanes, but few urban commercial districts have shown interest in this strategy. A more feasible strategy would involve re-striping parking stalls from their existing width of 8’ to 7’. Studies show that motorists park slightly closer to the curb with narrower parking stalls, thus reducing the potential for a car door to be opened into the path of a passing bicyclist.<sup>4</sup> This treatment should be combined with the use of shared lane (sharrow) markings (centered 11’ from the curb), to encourage bicyclists to appropriately position themselves in the roadway to avoid being “doored.” Since only limited improvements are possible in Blawnox, consideration should be given to traffic calming treatments to reduce the speed of vehicles moving through the Borough. Landscaped curb extensions and other measures could be employed downtown. Based on recent field views, parking space occupancy is low for several blocks downtown; well-used on-street parking spaces are an effective traffic calming measure.



*A sidewalk is provided on the north side of Freeport Road east of Route 28, however sidewalk does not exist on the south sides where many pedestrians prefer to walk.*

In O’Hara Township, the most pressing need is to begin development of a sidewalk network. Sidewalks are missing along the entire corridor, so it will be necessary to prioritize sections, if public funding is desired. Local municipal officials should ask landowners along the corridor to install sidewalks as part of all future developments and redevelopments. An example of a high priority for a new sidewalk is in front of the Community Supermarket shopping center at the northeast corner of Fox Chapel Road and Freeport Road. A new sidewalk could be readily installed here, with space created by restriping the parking lot. Unlike Blawnox Borough, where widening a sidewalk would present significant challenges, sidewalks could readily be installed along much of the corridor in O’Hara Township, with minimal impact to existing land uses.

As noted, most of Freeport Road west of Route 28 is bike compatible due to the presence of shoulders. However, to provide a greater setback for bicyclists from the high traffic volumes – especially since

<sup>4</sup> P. Furth, D. Dulaski, M. Buessing, and P. Tavakolian, *Parking Lane Width and Bicycle Operating Space*, Transportation Research Board 2010 Annual Meeting.

pedestrians are equally dependent upon the shoulders for travel, given the absence of sidewalks – shoulders should be expanded to 8’ as part of future roadway improvements. Shoulders of this width would also enable buses to pull completely off the roadway at transit stops along the corridor. Shoulders are needed on Freeport Road east of Route 28; the lack of shoulders on this section, combined with vehicles moving onto the Route 28 ramps, could discourage bicycle traffic.

Some shoulder improvements could take part in the absence of roadway widening projects. As noted, travel lanes are about 13’ to 15’ in width in sections of O’Hara Township close to Fox Chapel Road. While a travel lane of this width permits safer side-by-side travel with bicycles than the standard lane width of 11’ to 12’, a shoulder would be considered more desirable for bicyclists on a high volume corridor. The travel lanes should be reduced in size, and the width added to shoulders.



*Bicycles are prohibited at Waterworks Mall*

As part of future redevelopment, retail uses along the corridor should also be required to install bike racks, with the number of bike rack spaces proportionate to the number of vehicle parking spaces. At a minimum, all land uses should be prevented from prohibiting bicycle access. Such a prohibition is in place at the Waterworks Mall.

Transit shelters are present along Freeport Road in O’Hara Township. More shelters are needed in Blawnox Borough. There is no room to install shelters, so officials might wish to identify landowners willing to host shelters.

An Access Management Plan should be instituted for the Freeport Road corridor, encompassing O’Hara Township and other sections along the roadway, including immediately to the west – in Pittsburgh, adjacent to the Waterworks Mall – and to the east, such as the retail strip in Harmar Township. By better controlling the frequency, location, and design of driveways along the corridor, an Access Management Plan can reduce the number of conflicts between turning vehicles, bicycles and pedestrians walking along the corridor. An Access Management Plan could also improve mobility for motorists, and has the potential to lower crash rates.

**Conclusion** – In O’Hara Township, Freeport Road is a typical suburban strip corridor, built primarily to accommodate motorists. Complete streets improvements are needed, to enable pedestrians and bicyclists to travel between land uses along the strip corridor, and to enable persons to travel here from adjacent urban communities, such as Blawnox. The most basic improvements are sidewalks for pedestrians and shoulders of an adequate width for bicyclists. Further, the proposed improvements would enable pedestrians and bicyclists to better access transit service along the corridor. Although facilities have not been installed to accommodate pedestrians and bicyclists, both groups travel the corridor today. Their numbers could increase with these improvements. In Blawnox, options for improvements are more limited, but upgrades of pedestrian facilities are desirable. Installation of such measures as shared lane markings (sharrows) would increase motorists’ awareness of bicyclists.

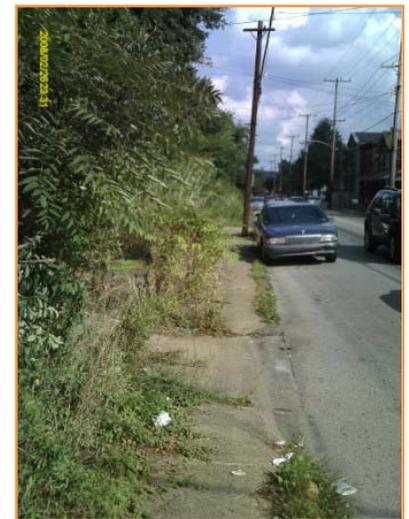
## 2) South Braddock Avenue/Belmar Place, Swissvale

The study area on South Braddock Avenue, a locally owned road, extends from immediately east of the interchange with I-376 to Woodstock Avenue, for a distance of about one mile. A small section of Belmar Place (at the eastern end of South Braddock Avenue) is also included in this analysis. That extends the corridor to just past the driveway for the MLK East Busway Swissvale Station. East of Edgewood Avenue, South Braddock Avenue lies wholly within Swissvale Borough. West of Edgewood Avenue, South Braddock Avenue lies between Swissvale Borough and Edgewood Borough. Land uses

are mixed along the corridor, although residential uses are predominant east of Roslyn Street. SPC demographic data indicates that Swissvale has a high concentration of low-income, disabled, and minority populations. Based on field observation, there is a presence of older adults and minority persons in the study area. Swissvale is adjacent to the Edgewood Towne Center retail complex, and as such, it would be desirable to facilitate the ability of Swissvale residents to walk or bicycle to these retail services.

There are two typical roadway sections in the study area. On the western half of the corridor, the roadway width is 30', consisting of two 15' travel lanes, without parking. However, the width increases proximate to I-376 and Edgewood Avenue, due to the presence of auxiliary lanes. On the eastern half of the corridor, the roadway width is also 30', with the cross-section comprised of an 11' eastbound travel lane and a 19' westbound travel lane, with on-street parking permitted but not striped. The roadway is posted at 25 mph east of Edgewood Avenue.

**Pedestrian Conditions** – Much of the pedestrian infrastructure in the study area east of Church Street is in poor condition. Many of the crosswalks, which consist almost exclusively of standard parallel stripes as opposed to high-visibility treatments, are badly faded. Crosswalk markings are missing on the approaches at some signalized intersections, such as Center Drive. Curb ramps are missing at many intersections, and of the existing curb ramps, few have detectable warning pads. Sidewalk width varies from 6' to as little as 3'. Even on sections of 5' to 6' width, the presence of utilities and other obstructions often effectively narrow the sidewalk clear width to 3'. Weeds and other growth have encroached on the sidewalks at a number of locations. Sidewalks are absent on the north side of South Braddock Avenue in several sections, such as adjacent to wooded lots at Ormond Street and Melrose Street. Portions of the sidewalk are badly overgrown, with uneven panels.



*Many sidewalks along S. Braddock Avenue are in poor condition*

West of Church Street, the pedestrian infrastructure is in much better condition. The sidewalk is relatively new, and “Yield to Pedestrians” channelizing devices alert motorists to the potential presence of pedestrians.

**Bicycle Conditions** – There are no designated bicycle facilities on the corridor. The section of South Braddock Avenue comprised of two 15' lanes is bicycle compatible, based on PennDOT *Bicycle Guidelines*. The section of South Braddock with parking and two 11' lanes is not bicycle compatible. On field views, children were seen riding their bicycles on the sidewalk.

**Transit Conditions** – The corridor enjoys access to good transit service. The Swissvale Station on the East Busway is one block removed from the corridor.

**Complete Streets Analysis** – The study area is characteristic of many roadways in older urban areas: a constrained roadway with existing land uses in close proximity, limiting options for improvements. The most significant complete streets improvements possible on this corridor would involve addressing the pedestrian infrastructure. The installation of sidewalks is needed on the north side of South Braddock Avenue where missing. Sidewalk should also be replaced where deteriorated. Sidewalk clear width is preferably 5', and should be 4' at a minimum. Curb ramps need to be installed at intersections where missing. High-visibility crosswalks are recommended for signalized intersections with higher pedestrian volumes. Crosswalks are also recommended for uncontrolled intersections with higher pedestrian volumes, accompanied by “Yield to Pedestrian” channelizing devices. At signalized intersections, auditory pedestrian signals are recommended.

Given the high concentrations of elderly and disabled persons in Swissvale, the above steps for improving the pedestrian infrastructure are key recommendations. Although curb ramps are perhaps the most visible example of facilities for disabled persons, sidewalks of an even grade, free of debris and obstacles, are also important in facilitating travel by this population.

Pedestrians can cross South Braddock Avenue at a number of stop-controlled intersections between Roslyn Street and Woodstock Avenue. These intersections are Vernon Avenue, Melrose Street, and Cheyenne Street, all of which are T-intersections with South Braddock Avenue. It should also be noted that no stop bars or crosswalks are located on South Braddock Avenue at these intersections. Based on field views, motorists on the corridor regularly roll through these stop signs without coming to a complete stop. This activity should be evaluated, since it may increase the potential for conflicts, with both cars and pedestrians. If volumes on South Braddock Avenue are significantly higher than side street volumes, consideration should be given to shifting the stop control to the side street. However, a crosswalk with “Yield to Pedestrians in Crosswalk” sign could then be installed for South Braddock traffic to facilitate safer pedestrian crossings.

Although, as noted earlier, sidewalk condition is typically in good condition west of Church Street, steps can be taken here to improve pedestrian infrastructure as well, to facilitate travel between the Edgewood Towne Center and the dense residential uses in Swissvale. This area is marked by roadway design typical of newer suburban areas, including large curb radii and channelized islands. For example, the Towne Centre driveway intersecting with South Braddock Avenue between Schoyer Avenue and McClure Avenue is channelized (using striping only), with no crosswalk along South Braddock. A stop sign does control vehicular egress here, but it is placed close to the beginning of radius curvature, and the natural motorist movement would be to roll through this stop sign (no stop bar) and be in motion at the point of pedestrian crossing. It is recommended that a physical island and crosswalks be installed here to improve pedestrian crossings. Similar reviews should occur for the newer, suburban-type infrastructure west of Church Street.



*Towne Center Driveway Stop Sign Location*

Options for specifically accommodating bicyclists on the corridor are limited. Where two 15' travel lanes are present, it would be possible to stripe 5' shoulders and 10' travel lanes. These shoulders could essentially serve as bike lanes. However, the extent of this treatment would be limited; only from Roslyn Street to Ormond Street on the west, and east of Vernon Avenue. This treatment is not possible for the entire length of the corridor due to the presence of parked vehicles in front of two section of row houses on the north side of South Braddock Avenue, where the cross-section consists of an 11' eastbound travel lane and a 19' westbound travel lane. This cross-section represents an appropriate response to the need to accommodate parked vehicles on a section with no off-street parking, and where the roadway width is constrained.

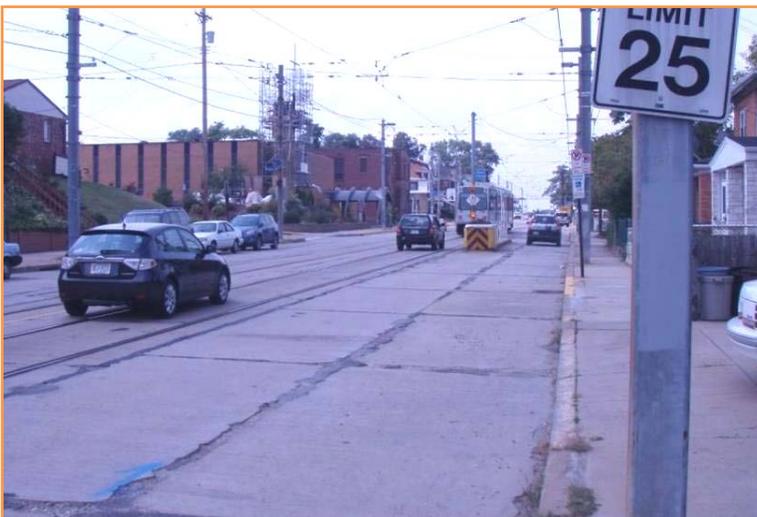
Although buses do not travel the corridor between Roslyn Street and the Swissvale MLK East Busway Station driveway, residents along the corridor have access to excellent transit service in close proximity.

**Conclusion** – Major changes in roadway configuration are not envisioned for South Braddock Avenue. This will be characteristic of many complete streets projects in the region; major upgrades will be possible for one non-motorized mode, but not for all. In the case of South Braddock Avenue, there is potential to provide significant improvements for pedestrians, particularly those with disabilities.

### 3) Broadway Avenue, Beechview, City of Pittsburgh and the Borough of Dormont

Broadway Avenue, is located in the City of Pittsburgh (Beechview neighborhood) and Borough of Dormont, extending 1.2 miles in length from Fallowfield Avenue in the north to Potomac Avenue on the south. North of Neeld Avenue, Broadway is 52' in width, with two travel lanes. In this section, the northbound and southbound lanes share the same roadway space as the T Red Line northbound and southbound tracks. Between Potomac Avenue and Neeld Avenue, the rail lines occupy dedicated right-of-way, with northbound and southbound travel lanes of 20' in width on either side.

North of Neeld Avenue, Red Line passenger platforms are located at the intersections of a number of roadways with Broadway. The platforms are 6' in width, and placed 9' from the curbline. On-street parking is permitted along most of Broadway Avenue. Parking spaces are striped south of Neeld Avenue; unstriped between Neeld Avenue and Coast Avenue; and striped north of Coast Avenue. Parking is typically prohibited proximate to intersections with streetcar platforms. The roadway between streetcar platforms and curbing is used by many motorists as an auxiliary lane, although it is not striped as such. Some motorists use these areas to turn right onto side streets. Other motorists essentially use these areas as a passing area. For example, if the streetcar stops at the platform, some motorists circumvent the slower-moving streetcar by driving to the right of the platform. Based on field views, other motorists use these areas to bypass slower motorists.



*A vehicle drives to the right of the T passenger platform before turning right*

The large majority of Broadway Avenue is posted at 25 mph, but a small northbound section of Broadway, south of Neeld Avenue, is posted at 20 mph. North of Coast Avenue, the roadway surface is comprised of asphalt for the approximately 11' wide travel lanes, with the rest of the surface being bricked.

The land uses are predominately residential, with substantial retail and commercial land uses mixed in at several locations. The commercial/retail facilities have a high percentage of marginal uses or vacancies. There are also some public and institutional uses. Pittsburgh is beginning a TRID (Transit Revitalization Investment District) study of Beechview (SmartTRID) and is interested in determining potential new commercial and retail uses along Broadway Avenue.

**Bicycle Conditions** – There are no designated bicycle facilities along Broadway Avenue. The roadway is bicycle compatible according to the PennDOT *Bicycle Guidelines*, which recommends 14' shared travel lanes for this roadway type and land use context.

**Pedestrian Conditions** – The typical sidewalk width is 5', but the width increases in segments, particularly proximate to commercial or institutional uses. The presence of utility poles and other obstacles reduce the sidewalk clear width to 3'. Sidewalks are directly adjacent to the curb. At driveway locations, the sidewalk grade changes due to the presence of driveway cross-slopes.

Crosswalks are located on Broadway Avenue at the majority of signalized intersections. However, crosswalks are not consistently available for every controlled crossing. Crosswalks are also installed at a number of unsignalized intersections, usually where T platforms are present. At these intersections, a crosswalk is installed at only one

approach on Broadway. Virtually all of the crosswalks are standard; with the exception of one ladder striped crosswalk which traverses Broadway Avenue at its intersection with Belasco Avenue.

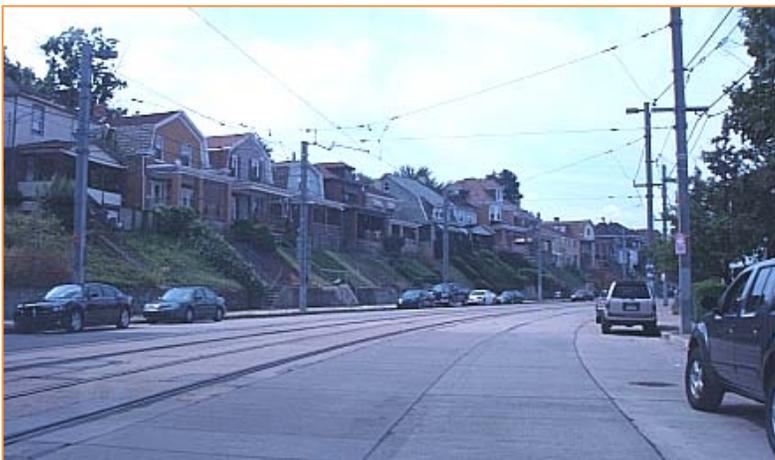
Most of the curb ramps along the corridor are older, without detectable warning surfaces (e.g., truncated domes). At many intersections, the curb ramps are installed only to accommodate pedestrians walking along Broadway, not across Broadway.

**Transit Conditions** – The PAAC T Red Line provides excellent transit service to the Beechview neighborhood. Light rail vehicle (LRT) service operates in this neighborhood with 10-minute headways during weekday peak periods and with 15-minute headways during weekday off-peak periods. The streetcar has 20-minute headways on weekends. Regular service is provided between Castle Shannon and Downtown via Beechview. Red Line service may be reduced in 2011 based on Port Authority proposed service reductions.

The Port Authority supports implementation of Complete Streets approaches so long as transit operations are not compromised. A traffic analysis is needed to better understand the impacts to rail operations and motor vehicle traffic for a Complete Streets concept on Broadway Avenue.

**Complete Streets Analysis** – The opportunity for the most significant reconfiguration of Broadway Avenue along complete streets principles involves bicycle facilities. Although the roadway is currently bike compatible, the design of the roadway complicates bicycle travel. As discussed above, motorists traveling along Broadway routinely depart from the major travel path (proximate to the roadway centerlines) to bypass traffic at intersections by driving to the right of passenger platforms. These motorist actions have the potential to create conflicts with bicyclists, both before and after the passenger platforms, but particularly directly between platforms and the curb, where motorist and bicyclist would be squeezing into an area of only nine feet in width. This configuration also reduces the comfort level of bicyclists.

Pittsburgh has begun investigating the potential for creating bicycle lanes on the roadway. At 52', Broadway Avenue north of Neeld Avenue is significantly wider than needed for a two lane roadway. Bike lanes can thus be accommodated. In the process, it will be necessary to better define the vehicular travelway. The presence of the Red Line, and particularly of the platforms for passengers boarding the Red Line, presents unusual design issues.



*Broadway Avenue has ample capacity for accommodating bike lane*

If the passenger platforms are kept in place, one potential midblock configuration could involve 11' travel lanes, 9' parking lanes, and 6' bike lanes. The travel lane width would need to remain at about 11' to maintain the combination travel lane/light rail track on the inside of existing passenger platforms. An unusually wide parking lane (9') is recommended, as opposed to bike lanes wider than 6', in order to help discourage motorists from using the bike lane as an auxiliary travel lane.

Pittsburgh has also begun preliminary consideration of the idea of separating bike lanes from vehicular traffic, and placing the bike lanes next to the curb. This design has recently been implemented on a number of roadways in New York City and other municipalities, and has been implemented in many European cities. It is sometimes referred to as a "cycle track." Many bicyclists like this design. To be implemented on Broadway Avenue, a number of issues will need to

be addressed. It will be important to prohibit on-street parking for a sufficient distance at all intersections to permit good visibility of motorists and bicyclists of each other when they approach intersections, in order to avoid conflicts. Some bicycle advocates have also expressed general concerns that such designs have the effect of discouraging bicyclists from “taking the lane” or otherwise positioning themselves to conduct a vehicular-style left turn at intersections. In the case of Broadway, however, bicyclists will likely be less inclined to turn left from the travel lane in any event, given the constrained travel lane between the centerline and the streetcar passenger platforms. This design will require significant study; one possible configuration (from centerline to curb) would involve 11’ travel lanes; 7’ parking lanes; 3’ buffer, with pylons, curbing, or other physical means to demarcate the travelway from the bike lane; and a 5’ bike lane. The 3’ buffer will also serve to protect bicyclists from passengers who exit from their car curbside, since it will place bicyclists beyond the “door zone.”

Under a reconfiguration, whether bike lanes are placed next to the curb or next to the travel lane, the new roadway configuration will indicate that motorists will no longer be able to use the area between the platform and the curb as a bypass. Keeping vehicles in one travel lane will increase vehicular delays at intersections, but any increase should not be significant. The design will also have the effect of tempering vehicular speeds on Broadway, acting as a “traffic calming” measure.

It should be noted that the section of Broadway Avenue to the south of Neeld Avenue would not be affected by this proposed roadway reconfiguration. At a width of 20’ each for northbound and southbound lanes, including parking, the installation of bike lanes is not possible. Particularly if it is proposed to designate all of Broadway Avenue as a bike route, it is recommended to install shared lane markings (also known as “sharrows”) to indicate where bicyclists should position themselves in order to avoid being struck by opened car doors, and to alert motorists to the potential presence of bicyclists.

Other changes in roadway design will be necessary. For example, the bricked portion of Broadway Avenue will need to be replaced with asphalt or other smooth surface to improve the comfort level and safety of bicyclists. Angle parking will need to be changed to parallel parking.

Connecting Broadway Avenue bicycle facilities to the larger network will need to be investigated. At the south, Broadway terminates at Potomac Avenue. The Potomac Avenue area has recently been studied as a Transit-Oriented Development (TOD) “place”. Plans for this area are included in the South Hills TRID Study, and may be accessed at <http://www.mtlebanon.org/index.aspx?nid=338>. Potomac Avenue is a two-lane roadway of only 38’ in width, with on-street parking on both sides. No designated bicycle facility is possible here, but the appearance of this roadway – traditional commercial/retail buildings with residences above and with zero building setback, landscaped curb extensions, and well-used on-street parking – have the effect of traffic calming motorists. This is a densely settled residential neighborhood with a senior citizen high rise located at the Potomac T station. It should be noted that there are other quiet side streets in Dormont, on blocks surrounding Potomac Avenue that can accommodate bike access to Brookline’s residential and commercial retail area or to West Liberty Avenue in Dormont, another commercial/retail corridor a few blocks away from Potomac. To the north where the T crosses a narrow bridge which cannot accommodate bikes, the City has expressed interest in a bicycle route to tie into Brashear High School, and the investigation of a crossing of the Route 19 viaduct to the Mt. Washington area. These aspects will require longer range plans, which will occur during the upcoming SMART TRID study process.

To further enhance bicycle travel along Broadway Avenue, it would be desirable to improve the capacity of Red Line cars to accommodate bicycles. The T service currently accepts up to two bicycles on streetcars, but only during off-peak hours. It also accepts folding bicycles anytime. The T is very popular and filled to capacity during peak travel times. PAAC and interested parties can work together to explore alternative ways to expand bicycle storage capacity, and

expedite bicycle boarding during peak hours. A small flatcar added to the front of the T may be one avenue worth exploring, although it will likely necessitate costly adjustments to the length of the T platforms which may not be feasible at all stations/stops.

Although the most dramatic changes to Broadway Avenue would affect bicyclists, pedestrians would also benefit from the reconfiguration. Motorist movements would be better defined and controlled at intersections. The installation of bike lanes would reduce the width in which pedestrians are exposed to motorized traffic.

New pedestrian facilities should be installed along Broadway Avenue, whether or not a reconfiguration with bike lanes proceeds. High visibility crosswalks should be installed at intersections with large numbers of pedestrian crossings. More crosswalks are needed at intersections with T Red Line passenger platforms. Curb ramps are recommended where missing to facilitate crossings of Broadway, not just pedestrians along Broadway. “Yield to Pedestrians” signs mounted on stanchions are recommended to accompany installation of crosswalks. New equipment is recommended at signalized crossings, including auditory pedestrian signals.

As noted, clear sidewalk width is often reduced to 3’ by the presence of utilities and other obstacles. Driveways that run across the sidewalks result in uneven grades. Where existing right-of-way permits, sidewalks should be widened to provide greater sidewalk clearance. Because the roadway is wider than needed to accommodate traffic, the curbs could be moved away from the right-of-way line in order to widen the sidewalk. It should be noted that this would reduce the ability to install certain roadway treatments with bike lanes, and would also involve considerable expense.

**Conclusion** – Because the roadway capacity of Broadway Avenue is greater than necessary, a number of options are available for a complete streets approach to this roadway. A proposed reconfiguration of Broadway Avenue would improve conditions for pedestrians and bicyclists, and abet the ability of both modes to access the T Red Line on this corridor.

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