OCTOBER 2011

TAMING TRAFFIC

STATE OF THE PRACTICE

CONTEXT-SENSITIVE SOLUTIONS IN THE DVRPC REGION

DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

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PLANNING COMMISSION

The Delaware Valley Regional Planning Commission is dedicated to uniting the region's elected officials, planning professionals and the public with a common vision of making a great region even greater. Shaping the way we live, work and play, DVRPC builds consensus on improving transportation, promoting smart growth, protecting the environment and enhancing the economy. We serve a diverse region of nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia Region — leading the way to a better future.

dvrpc

The symbol in our logo is adapted from the official DVRPC seal and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole, while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

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TABLE OF CONTENTS

FIgures and Tables

Photo Acknowledgements

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Executive Summary

A little research into the origins of the word traffic yields multiple entries. Common among them is the claim that the English word *traffic* is taken from the Arabic word *taraffaqa*, which means to walk along slowly together. Today, the word does typically mean moving slowly together, but is almost never used to reference pedestrian movements. In transportation circles and beyond, traffic has come to mean motor vehicles on congested roadways.

In America and some other countries, 20th century development trends have prioritized separating vehicular traffic, on roadways, from pedestrians, on sidewalks. While this has been mostly positive for pedestrians, it has also helped create an automobile-dominated culture. Sidewalks allow faster vehicle speeds by providing drivers a dedicated right-of-way which pedestrians are either legally or implicitly prohibited from, and which most do avoid because of the threat of bodily harm. Statistics show that the probability of death for a pedestrian involved in a motor vehicle crash rises dramatically when vehicle speeds exceed 30 MPH. And when traffic volumes and speeds increase, the desire to travel by foot diminishes. The negative impacts of traffic extend well beyond pedestrians, affecting businesses, the environment, bicycling, and a host of quality of life issues.

Context-Sensitive Solutions (CSS) is a set of planning techniques designed to reverse the negative effects of traffic. CSS "looks beyond the pavement" to the way that a road fits into its environment, and seeks to accentuate the positive characteristics of a place's natural features, historical landmarks, and sense of community, to transform it into a unique destination.

This document marks the end of DVRPC's five-year CSS project known as Taming Traffic: Context-Sensitive Solutions in the DVRPC Region. During that time, 10 *Taming Traffic* case studies were undertaken covering each county in the DVRPC region. During the process, the DVRPC team collaborated with local stakeholders to identify problems and design appropriate improvements. Traffic calming, one of the tools in the CSS toolbox, figured prominently in project locations where the desire to bicycle and walk was a priority. And in every case, the improvements were designed to complement one another, promote multi-modal transportation options, and establish a sense of place.

Section One of this document provides an overview of CSS and describes a variety of CSS strategies which have been implemented throughout the region. The section ends with an investigation of the future of CSS, highlighting trends from outside the United States which may soon play a larger role in American cities. Section Two provides a snapshot of each case study examined over the life of the *Taming Traffic* project and includes project photos, and before and after photo-simulations of select recommended improvements. The report closes with a resource guide intended to aid local officials and planners in developing their own CSS applications and provide information on possible funding sources.

SECTION 1

CONTEXT-SENSITIVE SOLUTIONS

What is CSS?

Context-sensitive solutions (CSS) is an approach to roadway planning and design in which transportation facilities complement the local context and are safe for all users. CSS incorporates a range of planning techniques that attempt to balance the competing needs of all modes of travel, while preserving and enhancing the scenic, aesthetic, historic, and environmental resources of a community. There are many definitions of CSS; however, most share the following principles:

- Consideration for all modes of travel, not just automobiles;
- Public and stakeholder involvement early and throughout the process;
- An interdisciplinary team of professionals tailored to project needs;
- Flexible application of design controls, guidelines, and standards; and
- Identification of a broad range of goals related to safety, mobility, community, and environment.

CSS represents a fundamental shift from conventional thoroughfare design. The conventional approach essentially provides design guidance for only two contexts–rural and urban. Within urban contexts, the same design criteria are frequently used regardless of the surrounding intensity or type of development. Furthermore, conventional thoroughfare design is based primarily on functional class and design speed. It is often governed by travel demand and level-of-service criteria.

In contrast, the CSS approach to planning emphasizes the way that roads interact with their environment. While criteria such as functional classification, travel forecasts, and levels of service are still critical elements, CSS balances these criteria with consideration of the financial, community, land use, and environmental context to determine an appropriate design solution. In this way, CSS is a planning method that looks "beyond the pavement" to the role that streets and roads can play in enhancing communities and natural environments. It is grounded in the principle that many roadways, particularly residential and local streets, do not exist solely to facilitate automotive use, and thus transportation solutions should not focus exclusively on the motorist and the cartway.

With CSS, the design of a roadway should change as it transitions from rural to suburban to urban areas because changes in roadway widths, the presence or absence of on-street parking, and other factors provide clues to motorists on how fast to drive as they pass from one context to another. Furthermore, CSS promotes streets as transportation routes that serve automobiles, as well as transit (where applicable), walking, and bicycling.

CSS recognizes that the best transportation solutions arise from a process in which a multidisciplinary team, considering a wide range of solutions, works closely with the community. This type of process can help communities reach their transportation goals by considering land use, transportation, and

This center island in Centreville, Delaware, narrows travel lanes and acts as a gateway. Special paving is also used to create a safe buffer for cyclists.

Placemaking elements, such as decorative lighting and landscaping, can give a roadway a distinct character. Here, a variety of elements create a unique sense of place in Collingswood, New Jersey.

infrastructure in an integrated way. The benefits of a CSS planning process may also include increased cooperation among agencies, a reduction in project delays and cost overruns, and an enhanced awareness of environmental resources. Finally, because CSS planning reflects community input, a successful CSS process builds consensus on the best possible solution and encourages public support of transportation plans.

CSS Strategies

By looking "beyond the pavement," CSS recognizes that driving behavior is often linked to a motorist's perception of the surrounding context. Accordingly, CSS responds to the fact that in order to have safe and attractive communities, roads should be designed so that drivers behave differently depending on the context. To implement CSS along a corridor, a variety of techniques can be packaged into a comprehensive improvement strategy. Unlike traditional transportation planning, CSS techniques will not only include typical engineering improvements, but may also incorporate a series of holistic components to create a highly functioning roadway environment.

These techniques can be classified into four broad categories: placemaking elements, pedestrian/bicycle/transit amenities, traffic calming, and smart growth development patterns. Some of these techniques are illustrated in Figure 1 on page 7. An effective CSS strategy will likely combine techniques from each of these categories with the principles discussed above–community involvement, flexible engineering techniques, and attention to the surrounding environment–to develop a comprehensive strategy tailored to match the location and function of a given roadway.

Placemaking Elements

Features, such as decorative lighting, landscaping, and public art, can give a roadway a distinct character. CSS encourages these features to be selected and designed in ways that reflect the architectural style and local context of the surrounding community. These elements may be placed along the sides of the roadway or introduced in the cartway through the use of bulb-outs or center medians. While elements such as landscaping and lighting do not force a change in driver behavior, they can provide the visual cues that encourage people to drive more slowly.

The consistent placement and appearance of informational and wayfinding signage along a corridor can contribute to a community's sense of place. The thoughtful organization of signage and other placemaking elements can also reduce confusion associated with roadway visual clutter and lead to more predictable traffic movements.

Pedestrian/Bicycle/Transit Amenities

Sidewalks, visually bold and texturally distinct crosswalks, median islands, and pedestrian signal heads and push buttons help create safe environments for pedestrians and raise the profile of crossing points.

Designated bike lanes, commonly within the cartway, provide a safe riding area for cyclists and serve to heighten driver awareness and encourage sharing of the road. Roadside shelters, benches, and lighting all provide convenient and safe accommodations for transit users and create a more transit-friendly environment. CSS encourages transit facilities to be carefully designed to contribute to the character of the roadway and its surroundings.

Traffic Calming

The most commonly cited definition of traffic calming comes from the Institute of Transportation Engineers (ITE), which states that it is "the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior, and improve conditions for nonmotorized street users." Accordingly, traffic calming aims to reduce the speed and volume of traffic to a level appropriate for the type of roadway and the surrounding land use context.

Traffic calming solutions involve both engineering and policy modifications, but can also include education and enforcement components. The most effective and long-term traffic calming techniques are engineering measures that actually alter the form of the roadway to impact driver behavior. Traffic calming measures can be combined with placemaking elements to create a distinct roadway character and heightened driver perception. More information on traffic calming and the engineering measures associated with it can be found in the following pages.

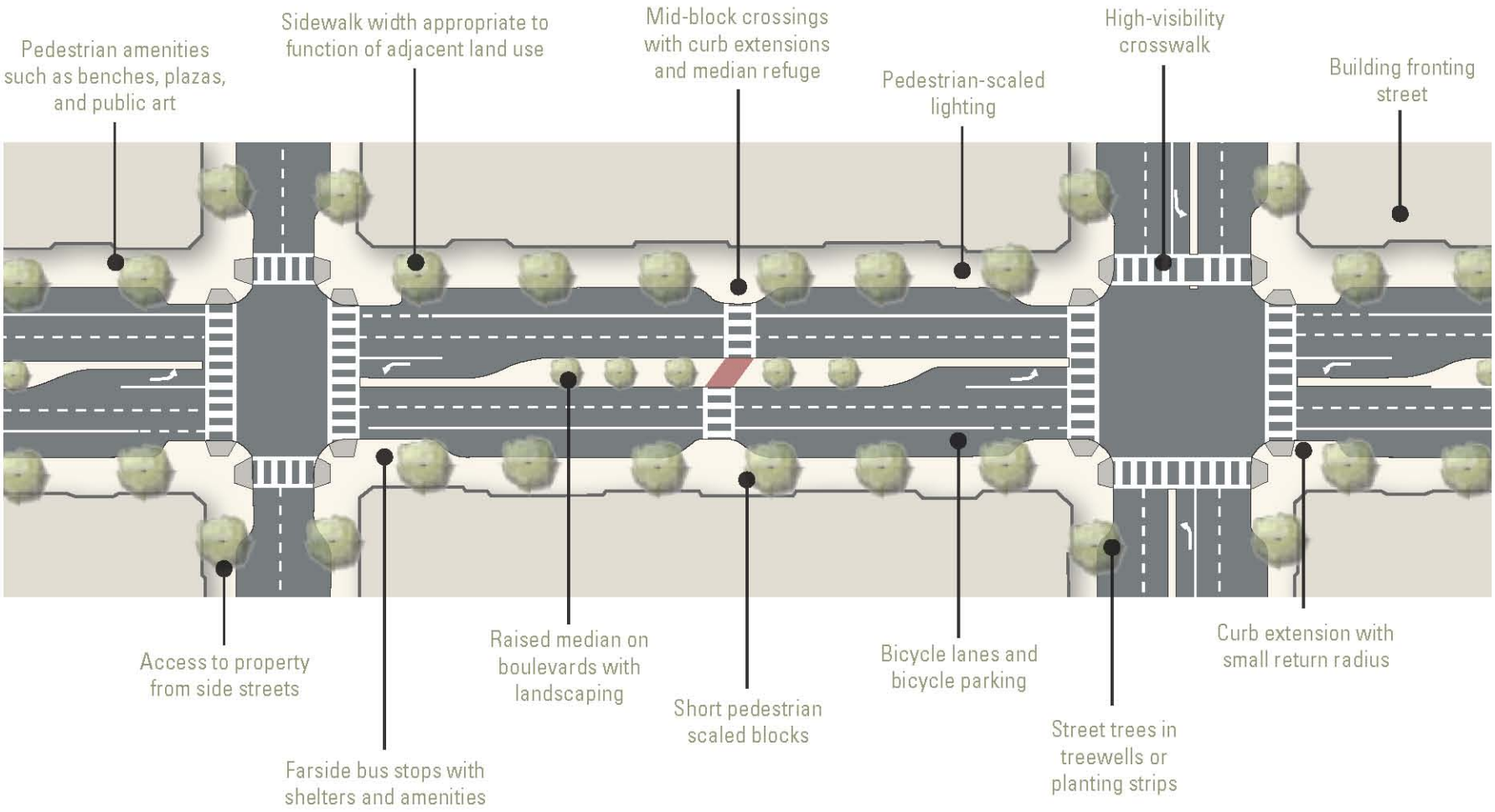
Smart Growth Development Pattern

Much of a roadway's character, configuration, and driver behavior are determined by the pattern of development along the roadway itself. Uses such as big-box stores, large parking lots, suburban-style housing developments, and warehouses may convey the image of a sprawling, high-speed corridor, where drivers do not need to be concerned about pedestrians or cyclists.

In contrast, focusing development into compact, mixed-use centers may create a different type of roadway character. Smart growth is the term often used to describe this type of development. Elements of smart growth include a mix of land uses, a diversity of housing types, guidelines for the physical form of the built environment, and an overall emphasis on walking and mass transit. Even conventional uses, such as big-box stores, can be creatively designed to portray more of a town-center type of character, which can help influence the way drivers use and perceive the adjacent roadway.

The compact, mixed-use nature of many of the region's traditional downtowns has a natural traffic calming effect. Pictured here, Broad Street in West Chester, Pennsylvania.

FIGURE 1: ELEMENTS OF CONTEXT-SENSITIVE DESIGN



Source: Concept by Community, Design + Architecture. A version of this graphic appeared in Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, An ITE Recommended Practice.

Traffic Calming

Traffic calming is often implemented as a component of a complete CSS strategy. Traffic calming techniques help communities manage the impacts of traffic by decreasing vehicular speed and volume to better fit corresponding land uses. Many traffic calming techniques provide solutions to alleviate potentially dangerous conditions, increase driver awareness, and improve safety for pedestrians, cyclists, and motorists. Traffic calming objectives include:

- Applying physical, engineered measures to compel drivers to slow down and to decrease traffic volumes;
- Implementing self-enforcing rather than regulatory measures;
- Reducing cut-through traffic;
- Increasing the safety of children, pedestrians, bicyclists, and motorists;
- Maximizing street life and pedestrian activity;
- Preventing crime; and
- Enhancing urban redevelopment.

The techniques used to achieve these objectives can be classified in a variety of ways. While physical or engineering techniques are most prominent, traffic calming techniques may also include education, enforcement, and policy components.

Engineering

From an engineering standpoint, traffic calming is a way to design streets, using physical measures, to alter driver behavior. Engineering techniques include raised intersections, speed bumps, medians, roundabouts, sidewalk curb extensions, and various degrees of road closures. All of these devices are designed to create physical and visual cues that modify driver speed. In this way, traffic calming is self-enforcing. The design of the roadway itself results in the desired effect, without relying on traffic control devices, such as signals and signs, or on enforcement. Although most traffic calming measures that involve changes to the physical environment have some effect on both volume and speed, they can be generally classified according to their dominant effect: volume or speed control. Descriptions of some the most common physical engineering techniques can be found in Table 1.

One of the most definitive resources on traffic calming is the Institute of Transportation Engineers (ITE). In 1999, ITE published *Traffic Calming: State of the Practice*. Currently, ITE maintains an extensive website, www.ite.org/traffic, which contains several follow-up reports and a variety of resources related to traffic calming.

This mini traffic circle helps manage traffic in a residential neighborhood in Seattle.

These curb bumpouts in Jenkintown, Pennsylvania, force traffic to slow down, while shortening the pedestrian crossing.

TABLE 1: SELECTED PHYSICAL TRAFFIC CALMING ELEMENTS

Type	Description	Applications		Impacts		Cost Estimates*
		Arterials	Local	Volumes	Speeds	
Speed tables, raised crosswalks	Ramped surface above roadway, 3-4 inches high, 10-14 feet long	With caution	X	Possible	Yes	$8,000-$9,000
Median island	Raised island in the road center narrows lanes and provides pedestrians with a safe place to stop	X	X	No	Yes	$8,000-$20,000
Channelization island	A raised island that forces traffic in a particular direction, such as right-turn-only	X	X	Possible	Yes	$6,000-$12,000
Speed humps	Rounded, raised humps placed across the roadway, typically 3-4 inches high, 10-14 feet long hump	X	X	Possible	Yes	$4,000-$8,000
Rumble strips	Low bumps across road make noise when driven over	X	X	Possible	Yes	$2,000-$5,000
Mini-circles	Small traffic circles at intersections	No	X	No	Yes	$10,000-$20,000
Roundabouts	Medium to large circles at intersections	X	No	Possible	Yes	Variable
Pavement treatments	Special pavement textures (cobblestone, brick, etc.) and markings to designate special areas	X	X	Not Likely	Yes	$7-$10 per sq.ft.
Curb extensions (bulbs, chokers)	Extending curbs into the street to control traffic and/or reduce pedestrian crossing distances	X	X	Possible	Yes	$40,000-$80,000 per intersection
Road Diets	Reducing the number of traffic lanes, typically 4 lanes to 2 lanes with a turning lane where needed	X	No	Yes	Yes	Variable
Chicanes	Curb bulges or planters on alternating sides force motorists to slow down	No	X	Possible	Yes	$12,000-$20,000

Source: Victoria Transport Policy Institute

**Cost estimates gathered from numerous sources including examples compiled by ITE*

Education

Education-based traffic calming measures include a variety of programs designed to inform and guide the behavior of motorists, bicyclists, and pedestrians. Educational components can often be implemented quickly and at a relatively low cost. By comparision, engineering techniques may require more extensive planning and design, and, in some cases, right-of-way acquisition, which can be costly and time consuming.

Educational efforts can take a variety of forms. Neighborhood Traffic Safety Campaigns urge local residents to comply with traffic laws. The campaigns typically consist of personalized letters or other materials, which explain the dangers associated with speeding and other traffic issues, distributed to residents of a town or neighborhood. Drive 25 Campaigns use media coverage and promotional materials to encourage motorists to obey speed limits. The effectiveness of this program can be bolstered by increased police presence and enforcement of the speed limit. Additionally, Safe Routes to School (SRTS) is a federally funded program designed to make physical improvements that promote safe walking and biking passages to our schools. The Pennsylvania Department of Transportation (PennDOT) and New Jersey Department of Transportation (NJDOT) each have their own program that they administer with federal funds. DVRPC also administers the SRTS program that is part of the Transportation Enhancements Program.

Enforcement

Police enforcement of traffic laws is an effective way of raising awareness at select locations. Unfortunately, it is cost prohibitive to target multiple traffic calming locations simultaneously by using enforcement. In addition, the effect of enforcement on driver behavior is temporary. Such constraints make this approach less successful and unsustainable in a practical sense when compared to self-policing engineering techniques. Enforcement is, however, a practical complementary strategy when used in companion with Neighborhood Traffic Safety Campaigns.

Another enforcement-based program is a Radar Speed Trailer unit that displays motorists' speed as they approach the device. Speed trailers serve to draw drivers' attention to the fact that they may be traveling above the speed limit, thus encouraging them to slow down. The Neighborhood Speed Watch program empowers residents by allowing them to record the speeds of passing motorists and submit the vehicle information of speeding cars to local law enforcement.

The Cranford, NJ Police Department's traffic safety program adopted the national safety campaign "Keep Kids Alive Drive 25®" (KKAD25) in June of 2005. The program is designed to allow residents to contribute to a reduction in speeding. It was developed in response to the fact that most speeders live in or around the neighborhoods that they speed in, and that residential streets have a death rate per mile driven over twice that of highways.

Keep Kids Alive Drive 25® is a trademark of Keep Kids Alive Drive 25, a Non-Profit 501(c)(3) Organization

Policy

The policy approach to traffic calming is much more proactive when compared to the education, engineering, and enforcement techniques previously described, which tend to be reactive. The policy approach seeks to set standards or performance measures for the transportation system and its users that maintain mobility, create connectivity, and ensure safety. The policy approach covers two areas: retrofits of existing problem areas and standards for new construction. For retrofits, a framework to rank projects based on roadway characteristics and factors, such as vehicle speed, crashes, and proximity to schools, could be established. Opportunities to add traffic calming measures when resurfacing roadways should also be analyzed. Ideally, a retrofitting policy would be integrated into the transportation component of the local comprehensive plan.

The most comprehensive approach is to alter subdivision and land development ordinances to include traffic calming measures in new construction projects. Engineering specifications can be tailored to ensure that roadway designs that complement the surrounding land use are created at the outset; thus, conflicts requiring corrective traffic calming measures are less likely to occur in the future. For instance, requiring narrow lane widths in residential areas may lead to drivers exercising additional care and engaging in behavior more appropriate for a residential setting. The policy approach to traffic calming shares the proactive smart growth planning approach by setting standards that maintain mobility, create connectivity, and promote safety. If the goals of traffic calming can be incorporated at the policy level, a municipality can help mitigate the negative impacts of traffic in a comprehensive manner.

An additional tool that may be utilized in a policy approach is the municipal Comprehensive or Master Plan. This policy document often contains a municipality's Official Map, delineating road rights-of-way, bicycle and pedestrian routes, and multi-purpose shared facilities.

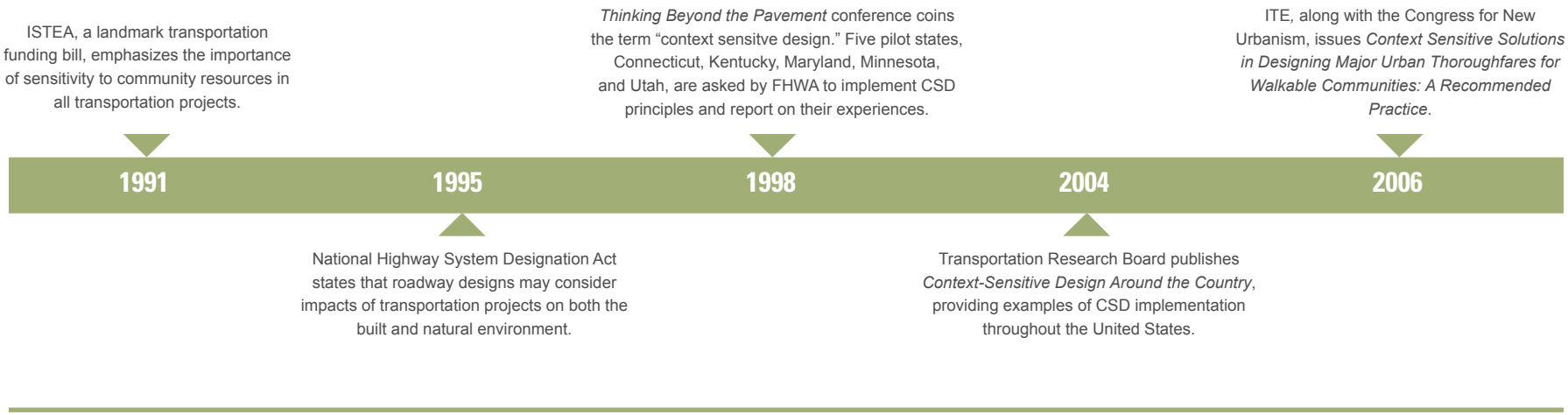
The Evolution of CSS

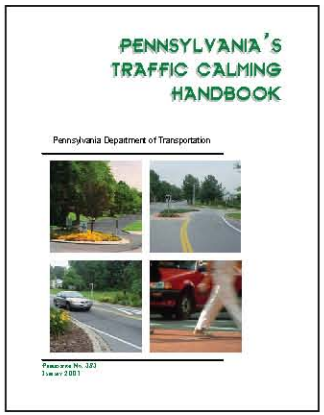
While the principles of CSS are now widely accepted in the United States, European cities have long been at the forefront of integrating these principles into transportation planning. European traffic calming, for instance, began as a grassroots movement in Dutch cities during the late 1960s. Residents–in cities such as Delft–fought cut-through traffic by turning their streets into "woonerven," or "living yards." Space previously reserved for traveling cars became shared areas that now contained tables, benches, play areas, and parking bays. By introducing these elements, motorists were forced to drive more carefully and residents gained valuable outdoor space.

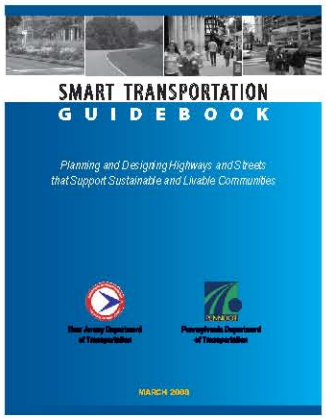
Despite Europe's head start, the concept of CSS has been evolving in America's transportation industry since the National Environmental Policy Act (NEPA) of 1969. This Act required transportation agencies to consider possible adverse impacts of transportation projects on the surrounding environment. CSS received a significant boost in 1998, when the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA) hosted the *Thinking Beyond the Pavement* national conference, which helped define context sensitive design (CSD) and introduced a series principles intended to guide the application of CSD in state transportation programs.

The FHWA has continued to promote a CSS approach in recent surface transportation programs. Signed into law in 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) strengthens and enhances requirements for public involvement and the integration of environmental and livability considerations into the decision-making progress.

FIGURE 2: CSS MILESTONES







Publications like Pennsylvania's Traffic Calming Handbook and the Smart Transportation Guidebook are valuable resources for planners, engineers, and municipal officials.

CSS in the Region

While FHWA is an advocate for CSS at the national level, CSS has been endorsed by many state departments of transportation, including the Pennsylvania Department of Transportation (PennDOT) and the New Jersey Department of Transportation (NJDOT). In January 2001, PennDOT published *Pennsylvania's Traffic Calming Handbook*. The handbook provides guidance for PennDOT when considering the use of traffic calming measures on state roadways in Pennsylvania. It also provides municipalities with information that can help them establish a traffic calming program for roadways within their jurisdictions. Several years ago, PennDOT began reevaluating road projects using an approach known as "right-sizing." Right-sizing seeks to meet transportation needs while considering social and environmental considerations, such as community and regional goals and objectives, quality-of-life concerns, economic development initiatives, and fiscal constraints. Right-sizing is context-sensitive, as it considers a much wider range of factors than just traditional mobility issues.

NJDOT has updated its roadway design manual to include traffic calming techniques. NJDOT has also embraced traffic calming, planning, and implementation by funding projects through its Local Technical Assistance Program (LTAP). Additionally, NJDOT has launched an effort known as NJFIT: Future in Transportation. NJFIT is a partnership between NJDOT, the Office of Planning Advocacy, and other state agencies to tackle the root causes of congestion by fostering strengthened connections between transportation and land use. For example, in the Borough of Flemington, instead of building a bypass, a new parkway boulevard with extensive connectivity to the local grid is being designed. This smart growth alternative is context-sensitive, as it will increase the number of travel choices and support existing settlement patterns at one-third the cost of a limited access freeway.

At the regional level, DVRPC promotes CSS and traffic calming in *Connections: The Regional Plan for a Sustainable Future*, its long-range plan for the Delaware Valley region. According to the plan, "Smart Transportation works to resolve transportation problems with solutions that are context-sensitive, affordable, supported by the communities involved, and can be implemented in a reasonable timeframe."

NJDOT and PennDOT, in conjunction with DVRPC, released a joint publication in spring 2008 titled *Smart Transportation Guidebook*. It identifies roadway and roadside design values appropriate for different types of roadways in a variety of land use contexts, recommends a process for implementing context-sensitive design projects, and provides guidelines for improving the transportation system in accordance with context-sensitive and smart growth principles.

Philadelphia

In recent years, Philadelphia has undertaken a variety of projects aimed at improving transportation access and safety for all roadway users throughout the city.

The Philadelphia City Planning Commission is in the process of creating a new Bicycle and Pedestrian Plan for the city. The goal of the plan is to identify and help prioritize strategies to encourage walking and biking in the city by improving the connectivity, safety, convenience, and attractiveness of the pedestrian and bicycle networks. The first phase, including Center City, North Philadelphia, Northwest Philadelphia, and South Philadelphia, was completed in fall 2010. The second phase is currently underway and encompasses Southwest Philadelphia, West Philadelphia, Olney/Oak Lane, Northeast Philadelphia, and the River Wards.

A number of individual roadways have also received context-sensitive upgrades. For example, a road diet was instituted along Allegheny Avenue (shown to the right) to improve safety and bicycle access. Improving safety was also central to recent improvements made to Roosevelt Boulevard/U.S. 1. Historically one of the most dangerous roads in Philadelphia, Roosevelt Boulevard/U.S. 1 has been the focus of a comprehensive vehicle and

Philadelphia's Allegheny Avenue was reconfigured through a road diet in 2003. To the right is an image of Allegheny Avenue prior to the conversion. After the road diet (below), the roadway includes two lanes of traffic, a turning lane, and bike lanes.

Photos: Bicycle Coalition of Greater Philadelphia

Photo: Microsoft Bing Maps

Roosevelt Boulevard/U.S. 1, at points 12 lanes wide, presents numerous challenges for pedestrians. Over the last several years, a variety of measures have been incorporated to improve safety and pedestrian access. The intersection of Roosevelt Boulevard/U.S. 1 and Rhawn Street (shown here) was one of the intersections to receive new pedestrian crosswalk countdown timers and new crosswalk striping.

pedestrian safety campaign. In 2008, PennDOT, in conjunction with the City of Philadelphia, installed 488 pedestrian crosswalk countdown timers at 46 locations, new pedestrian crosswalk pavement markings at 30 locations, and new curbs and ADA curb cuts in three locations.

In addition to these physical improvements, Roosevelt Boulevard/U.S. 1 from 9th Street to the Bucks County line was designated a Highway Safety Corridor, which doubles fines for traffic violations such as speeding, reckless driving, and tailgating. Additional strategies have included the use of speed-display trailers, the installation of red light cameras, adjusting the timing of traffic signals for better traffic flow, and a public education and information campaign aimed at enhancing vehicular and pedestrian safety.

PennDOT is also in the midst of a long-term multi-phase initiative to improve and rebuild I-95 through Philadelphia. This is a major project, known as Revive 95, with the goal of ensuring that the region's primary north-south artery continues to meet the long-term needs of commuters and commerce. What makes this project relevant to a discussion of CSS is the attention being given to the underside of the highway, which winds through numerous Philadelphia neighborhoods. PennDOT has formed a Sustainable Action Committee (SAC) to help improve the relationship between the highway and the various neighborhoods by transforming the underside of I-95 into a series of inviting, accessible, and animated spaces that will help connect people from the city's river wards to the Delaware River waterfront. The SAC is charged with evaluating potential streetscapes, wall treatments, decorative lighting, and the integration of various community projects into the ongoing reconstruction of the highway.

Pennsylvania

Pennsylvania municipalities throughout the region have implemented CSS strategies to improve their communities. For example, Warminster Township and Jenkintown Borough have adopted official traffic calming policies to ensure transportation and mobility objectives support other quality of life goals. Additionally, other communities such as Upper Makefield Township, Newton Township, Collegeville Borough, and Schuylkill Township have undertaken a variety of projects designed to calm traffic and promote alternative transportation options. A number of specific examples of CSS in Pennsylvania are included here.

The road diet of High Street in downtown Pottstown, Pennsylvania calms traffic and enhances safety by replacing two lanes of traffic with bicycle lanes and back-in diagonal parking.

Photos: Complete Streets. Online Image, Flickr

▲ *The West Court Street traffic calming project in Doylestown incorporated a number of elements to slow traffic in front of Central Bucks West High School and create a gateway into the borough.*

Photos: Gilmore & Associates, Inc.

▶ *Midblock crosswalk with pedestrian-activated overhead signals near Bryn Mawr Hospital in Lower Merion Township.*

▼ *Souderton Borough won the 2010 Revitalization Award from the Montgomery County Planning Commission for the successful transformation of Souderton Main Street into a community focal point that is attracting new visitors and businesses. In addition to several building renovations, the revitalization focused on enhancing the pedestrian environment and sense of place through the use of public art, high-visibility crosswalks, decorative streetlights, benches, and landscaping.*

Photo: Montgomery County Planning Commission

New Jersey

Many communities throughout New Jersey have also embraced various CSS and traffic calming strategies. For example, after experiencing a high number of pedestrian crashes at unauthorized midblock locations along the same corridor in Hamilton Township, the township began a concerted safety campaign involving education, engineering, and enforcement solutions. After installing fencing along highway medians, improved intersection markings, and countdown timers, the township undertook aggressive enforcement of jaywalking, and gave presentations at schools and community centers.

Similarly, Burlington County engineers have addressed the issue of children's safety while walking to and from school across county roads in Pemberton Township. The county instituted three new design solutions to make crosswalks more visible: in-pavement warning lights along a mid-block crosswalk, fluourescent green striping along a crosswalk that serves as a bus stop, and the installation of permanent radar driver feedback signs in several school zones.

Additional examples of CSS and traffic calming are highlighted here.

This curb extension in downtown Swedesboro reduces the pedestrian crossing distance. Also, by removing a problematic right turn slip lane, the number of crashes at this location dropped significantly.

Roundabout in a residential portion of Washington Town Center in Robbinsville, New Jersey.

One of a series of traffic islands located in a residential neighborhood in Princeton Borough. The design of the islands allows them to be driven over by large trucks or emergency vehicles if necessary.

Photo: Walk Bike Jersey Blog

The 7th Street Promenade in the Cooper Plaza Neighborhood of Camden (near Cooper University Hospital) creates a long linear park and uses a variety of paving textures to create a sense of place and encourage drivers to slow down.

Although not located in the DVRPC region, the recently completed Route 18 reconstruction project in New Brunswick, New Jersey, is one of the largest roadway transformation projects in state history. The project used a CSS approach that included regular community meetings and public outreach efforts. In addition to improving corridor traffic operations, the reconfigured roadway enhances access for pedestrians, bicyclists, and transit users. Boyd Park, pictured here, was extended along the Raritan River as part of the project.

Photo: The Conti Group

CSS and Traffic Calming Issues and Concerns

Though traffic calming measures may create more predictable and safe motorist behavior, there are also concerns that these engineering techniques may negatively impact other roadway functions, including emergency service vehicles, drainage, and Americans with Disabilities Act (ADA) requirements.

Emergency and Heavy Service Vehicles

Many communities are hesitant to install traffic calming techniques, as some can cause delay and other problems for emergency vehicles and heavy service vehicles (buses, garbage trucks, and snowplows). According to *Pennsylvania's Traffic Calming Handbook*, a speed hump causes delays from zero to nine seconds, while roundabouts cause one to 11 seconds of delay. Though it is important to identify and weigh this response time increase, the incremental risk to residents from fire truck delays is typically much smaller than the benefit of increased road safety and improved quality of life resulting from the installation of traffic calming techniques.

Many of the emergency vehicle concerns with respect to speed humps and roundabouts also apply to transit vehicles. Additionally, bulb-outs at intersections may make it difficult for buses to pick up and drop off passengers. Coordination with transit agencies is essential to ensure that accessibility and convenience are not hampered. Impact on snow removal is a common concern, but when the locations of traffic calming treatments are clearly identified, municipalities have found the impact to be minimal. With any traffic calming program, it is vital that emergency responders and road crews be consulted during design and implementation.

These problems can be minimized if they are considered in project planning. Some street closures include short-cuts for emergency and service vehicles, while medians, roundabouts, and other driving obstructions may be outfitted with mountable curbing for use by oversized vehicles or in emergency situations. If accommodations for these vehicles cannot be determined, communities may also purchase smaller fire and garbage trucks for use in traffic calmed areas or elect not to install such treatments on roadways that are major emergency response routes.

Drainage and Landscaping Concerns

As the installation of traffic calming treatments may change the drainage pattern of the roadways on which they are located, it is very important to review drainage characteristics when determining the appropriateness of certain measures. Poorly-sited bulb-outs and chicanes, for example, may lead to the accumulation of ice/water on the roadway or pedestrian walkways. However, when properly designed, these features can serve as filtering strips that improve stormwater management.

Choosing the correct landscaping elements is also an important consideration to include in any traffic calming program. To reduce maintenance efforts, some local governments recruit neighborhood residents for routine landscape maintenance or opt

for a low-maintenance landscape plan. Along with maintenance concerns, one must consider safety issues that could arise if the wrong types of plantings are used, resulting in decreased sight distance or the creation of obstacles for bicyclists and pedestrians. For this reason, any traffic calming program suggesting landscaping elements should consider plant type, growth, and location.

ADA Requirements

Finally, traffic calming must accommodate all people in the community. Measures that impact pedestrian travel must be designed to meet the requirements set forth in the Americans with Disabilities Act (ADA).

Liability Claims

Current experience indicates that traffic calming projects do not cause significant liability claims. Most legal experts agree that CSS will not cause the engineer problems as long as they are well reasoned and comprehensively documented. A 1997 survey by ITE found that out of more than 1,500 total lawsuits brought against traffic engineers in 68 jurisdictions, only six involved traffic calming devices, and only two were successful. Vehicle damage during construction and inadequately signed speed humps appear to be the most common cause of claims. Monetary awards tend to be relatively small. As designers and motorists become more familiar with traffic calming, and as specific strategies become widely accepted practices, the risk of claims is likely to decline. Liability can be minimized by using standard strategies and designs published by organizations such as ITE and by using appropriate signage to warn drivers.

Temporary Traffic Calming Applications

Traffic calming measures may not always work, or may be a hard sell to neighbors, municipal governments, or state DOTs. For this reason, many municipalities implement temporary traffic calming applications prior to installing permanent treatments. These temporary applications simulate the more permanent treatments, but with materials that are cheap and easy to install or remove.

While not always terribly attractive, temporary traffic calming installations allow for a trial run–to see if the treatment impacts driver behavior. Traffic calming treatments often take time for drivers to become acclimated to them. For this reason, temporary applications, made of rubber, low pavers, or pavement striping, are minimally destructive if involved in a collision. Sometimes temporary applications are used simply to help drivers acclimate to the new roadway configuration before installing a hardscape treatment.

Complete Streets

The complete streets movement is an important trend in the evolution of CSS. A complete streets policy refers to the design and operation of roadways to facilitate safe access for pedestrians, cyclists, transit riders, and motorists. One of the first pieces of complete streets legislation was passed in 1971 in the State of Oregon. Known as the "bike bill," it requires the accommodation of pedestrians and bicyclists wherever a road is built or rebuilt. Today, many cities and states across the United States have adopted complete streets policies to address the accessibility needs of all road users in new road projects. DVRPC recommends a complete streets approach in its long range plan, *Connections 2035*. Within the DVRPC region, both NJDOT and the City of Philadelphia have developed complete streets policies and Philadelphia is currently in the process of developing a complete streets manual. Similarly, PennDOT policy mandates the evaluation of pedestrian and cyclist mobility needs in all highway and bridge projects.

The National Complete Streets Coalition recommends ten elements in any comprehensive complete streets policy, regardless of the location of policy implementation. These elements provide a framework for complete streets policies, while allowing for the flexibility necessary in geographically diverse implementation. The list includes:

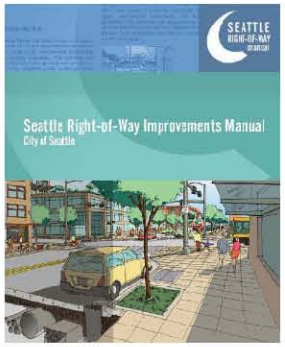
- community vision,
- the specification of 'all users' as pedestrians, bicyclists, transit passengers, trucks, buses, and automobiles,
- the application to both new and retrofit projects,
- a clear procedure in addressing any policy exceptions,
- the encouragement of street connectivity,
- the adoption by all agencies to cover all roads,
- the latest and best design criteria,
- a sensitivity to context,
- the use of performance standards, and
- the inclusion of specific next steps for policy execution.

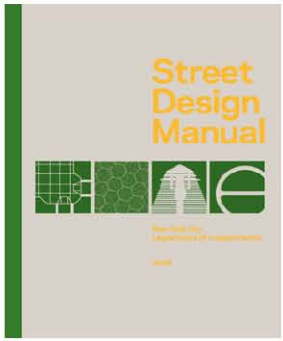
A useful tool in policy implementation as used by the Charlotte Department of Transportation (CDOT), PennDOT, and the Metropolitan Transportation Commission (MTC) has been the checklist. The checklist serves as an important policy component because it ensures the consideration of all road users at the very beginning of each road project. It also establishes a procedure for considering land use and transportation needs on a larger scale and also allows for improved coordination with local communities.

Seattle, Washington, is one jurisdiction that has already created several successful complete streets and may serve as an example to cities looking to integrate complete streets policy into transportation planning efforts. In 2007, the city passed an ordinance requiring the improvement of travel for all users in all transportation projects. This has led to the integration of complete streets policy into all guiding planning documents and the introduction and standardization of complete streets concepts

In 2009, Charlotte, North Carolina won the National Award for Smart Growth Achievement in Policies and Regulations for its Urban Street Design Guidelines. These guidelines helped guide the transformation of East Boulevard (above) into a complete street. By instituting a road diet and adding bicycle lanes and curb ramps, East Boulevard can better accommodate all users.

Photo: City of Charlotte and Mecklenburg County





In recent years, cities like Seattle, New York, and San Francisco have published manuals designed to make their streets safer, attractive, and accessible to all modes of transportation.

into the daily operations of the Seattle Department of Transportation (SDOT). Some of the complete streets projects completed by SDOT include painted bike lanes, added sidewalks, crosswalks, and curb extensions, the replacement of automobile parking with bike parking, improved signage, bus bulbs, and the rechannelization of streets. More innovative design approaches have been introduced as pilot projects and made permanent if successful.

Seattle has been able to keep costs down by considering any and all improvements that can be made during repaving or intersection redesign work, such as painting and signing stop bars or reconfiguring existing right-of-way. When adding a pedestrian or cyclist improvement is too costly (on bridge projects, for example), SDOT ensures that project design does not preclude future complete streets initiatives when funding may be available.

As complete streets policy develops around the country, new challenges in measuring performance are being introduced. Street design performance measures traditionally prioritize vehicular Level of Service (LOS), so evaluating pedestrian and cyclist accommodations requires a shift in perspective for engineers and planners. A preliminary version of the 2010 Highway Capacity Manual (HCM) provides new methodology to measure cyclist, pedestrian, and transit rider LOS. Meanwhile, many communities have developed their own methods of measuring quality of travel. The cities of Louisville, Seattle, and Charlotte, as well as the Commonwealth of Massachusetts, have developed their own approaches to bike and/or pedestrian LOS (BLOS and PLOS) to be utilized along with traditional vehicular LOS measures. DVRPC employs BLOS and PLOS models developed by Bruce W. Landis in collaboration with the Tampa and Miami MPOs, as well as the Florida DOT. Further development of existing multimodal performance measures will allow for improved needs assessment, project prioritization, impact assessment, and project evaluation for jurisdictions with complete streets policies.

The Future of CSS

Looking toward the future of traffic calming in the region, it may prove useful to revisit the country whose methods originally inspired planners and traffic engineers in the United States. Ever since the Netherlands introduced the concept of 'woonerven' to the world in the 1960s, the country has been a driving force behind innovation in traffic calming. Today, one of the country's most significant contributions to the field is an approach called 'shared space.' Its successful implementation abroad suggests that it may be appropriate in certain American contexts.

Shared Space

Pioneered by traffic engineer Hans Monderman, shared space involves the removal of traffic control devices from a roadway, including traffic lights, signs, road markings, and curbs. The goal is to eliminate separation between modes and give motorists, pedestrians, and cyclists equal priority. Road users are forced to interact by making

eye contact or giving a nod of the head in order to navigate an intersection. Innately counterintuitive to Americans, shared space functions best when intersections appear ambiguous or even dangerous to approaching road users. This stems from the idea that people's sense of risk shifts according to subtle changes in their environment. When uncertainty is introduced to the roadway, motorists tend to slow down, becoming more attentive and engaged. As a result, the risk of traversing the roadway is redistributed among road users, giving cyclists and pedestrians more control.

The city of Drachten, Holland (population 40,000), implemented one of the best-known shared space schemes in 2001.[1] At a busy four-way intersection (AADT 22,000), Monderman removed traffic signals, signs, curbs and all road markings except those required by Dutch law. A roundabout was placed in the center. In two years, accident rates fell by 20 and average traffic speeds were reduced. At the same time, traffic flow improved and delays were reduced.[2] Motorists' waiting time of 50 seconds fell to 10 to 30 seconds. Public buses, which previously needed over 50 seconds to cross the intersection (even with priority transponders for the traffic signals), only took 26 to 38 seconds after the changes. The new design also allowed pedestrians and cyclists to cross the intersection without significant delay. In fact, most did not need to pause or wait, as drivers began to cede priority.[3]

Early shared space schemes were so successful that the European Commission sponsored seven pilot projects across Europe between the years 2004 and 2008. Initial findings suggest that shared space initiatives can relieve congestion and improve safety, while addressing complex matters of livability, economic stimulation, and transportation efficiency.[4]

As with CSS, adjacent land use plays an important role in the basic principles of shared space. Shared space is most successful in village-like settings– in the United States this includes urbanized and suburban areas–areas with stores, restaurants, playgrounds, parks, etc. Activity generators such as these signal to motorists that the street is a public space with multiple uses. Importantly, motorists can avoid using shared space streets as through routes by taking advantage of highways and major arterials. Otherwise, motorists are treated as guests within networks of slower, fine-meshed streets.

Other international examples of successful shared space projects suggest possible applications in the United States. The city of Brighton, United Kingdom implemented a shared space scheme on New Road to make the street attractive to pedestrians and maximize its potential as a cultural destination. Existing land use included theaters and restaurants, but the area was run-down and dominated by vehicular traffic. After a shared space design was completed in 2007, the street saw a 62 percent increase in pedestrian traffic and a 22 percent increase in cyclist traffic.[5] New Road is now the city's fourth-most popular visitor attraction, an impressive distinction in a city already known for its status as a vacation destination.[6]

Drachten, Holland before and after the installation of a roundabout.

Photos: Hamilton-Ballie Associates

New Road (shown before and after implementing shared space strategies) has become one of the most popular places to spend time in Brighton, UK. This shared space remains open to vehicles.

Photos: Gehl Architects

Shared space is not a panacea for all locations in need of traffic calming, but it can, in certain contexts, yield significant benefits. As noted in the Drachten and Brighton examples, benefits are varied and depend primarily on land use. In Drachten, the treated intersection had served as an important thoroughfare, with various amenities scattered nearby. New Road, in contrast, had the potential to become a cultural destination, but was busy with vehicular traffic. Because of these differing land uses, the two locations saw very different results; Drachten's shared space project resulted in notably improved traffic flow and safety, while Brighton's success involved the creation of a true public space and popular city attraction.

Folk Traffic Calming

Another, less formal, attempt at traffic calming involves direct citizen action. Creativity spurred what is now known as "Roadwitching." As a Halloween prank in 2002, locals in Oxford, England, created an in-road crash scene installation in an effort to get motorists to slow down. This effort has grown to become a "creative form of road repurposing and campaigning for road justice away from a 'roads are for cars' attitude towards 'roads are for people.'"[7]

On Beech Croft Road in Oxford, England, resident Ted Dewan has been implementing 'folk' traffic calming techniques in his own neighborhood. By creating scenes in the roadway, such as a fake accident or an outdoor 'living room' complete with a carpet, sofa, and TV, he has forced motorists to slow down and negotiate a street that had become increasingly unsafe. In 2010, SusTrans, a British charity that promotes sustainable transportation, teamed up with the Beech Croft Residents' Association to implement more permanent DIY traffic calming measures. The results have included planters, bike racks, and painted patterns on the roadway. Two examples of psychological calming devices are shown on the next page; the first mimics a carpet and implies a multi-use street, while the second blurs the division between street and sidewalk. Overall, the endeavor kept a low budget while engaging residents in making relevant changes to their street.

Second Generation Traffic Calming

While these initiatives may seem radical in an American context, innovative traffic calming techniques have already been implemented with success in the United States. Some of these techniques have been branded as 'second generation traffic calming.' Second generation traffic calming borrows from the shared space approach to traffic management and suggests that traffic will flow more safely if drivers are forced to pay more attention to their driving than conventional roads typically require. Contrary to conventional traffic engineering, second generation traffic calming efforts might include removing traffic lights and other controls, such as stop signs and lane markings. Without this guidance, drivers are forced to slow down and make eye contact with pedestrians, cyclists, and other drivers before navigating certain parts of a roadway.

In West Palm Beach, what started as a streetscaping program was eventually identified as 'second generation traffic calming'. The initial project on Clematis Street included lateral shifts, narrowings, and a raised intersection. Traffic signals and turn lanes were removed. At one end of the street, the public library was also given a facelift. These projects were so successful that similar ones were completed in other challenged neighborhoods. Aside from the traditional benefits of traffic calming, West Palm Beach has seen a significant increase in property values and a decrease in crime in the poverty-stricken neighborhoods that were included in the scheme.[8]

Significantly, second generation traffic calming techniques can cost less than traditional approaches to traffic calming. In one case, planner Raymond Heinrich combined engineering with graphic arts and psychology to improve safety at an intersection in suburban New Jersey. Heinrich analyzed the intersection, the site of several recent collisions, by looking at what drivers saw from different approaches to the site. He identified a series of misleading visual cues and ill-placed signs that contributed to problems at the intersection.

Heinrich worked with city engineers, the mayor, and police to improve the intersection by implementing changes that would improve drivers' perception of their surroundings at that location. Previously difficult to detect, they made the crossroad more prominent by reinforcing the white horizontal crosswalks with thick, raised marking material. An existing playground structure was relocated because it had the effect of camouflaging a stop sign located in the foreground. Finally, stop signs were made more visible by painting the posts the same red as the signs.

Eight years after these changes were made, accidents were reduced to an average of two per year. The cost of this safety improvement was far less than a conventional solution such as the installation of traffic signals. Traffic signal installation might have cost $1.25 million and taken up to three years to erect, whereas Heinrich's adjustments cost just $10,500 and took two weeks to install.

The preceding examples underscore the potential of shared space and second generation calming techniques in a variety of contexts. Marking a shift from traditional, one-size-fits-all solutions to problematic roadways, second generation traffic calming varies widely depending on context to provide increased LOS and safety to all road users. By engaging motorists with their surroundings, not only do pedestrians and cyclists feel safer and more confident, but the surrounding community often sees social and economic benefits.

Folk traffic calming on Beech Croft Road in Oxford, England.

Photos: Beech Croft Residents' Association

SECTION 2

DVRPC'S TAMING TRAFFIC PROGRAM

Program Overview

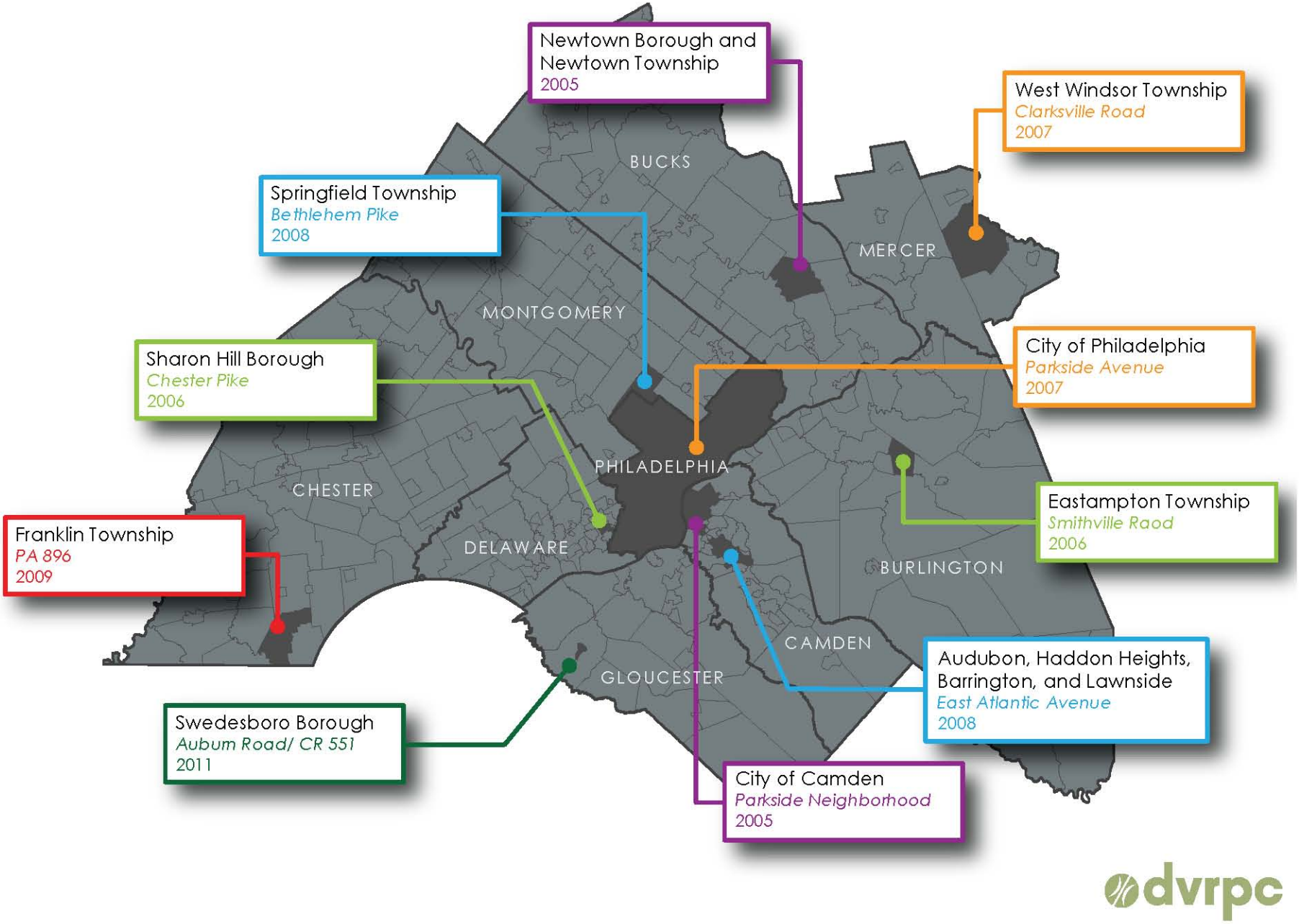
In 2005, DVRPC launched a new program entitled Taming Traffic: Context Sensitive Solutions in the DVRPC Region. The project was focused on identifying places where the speed and behavior of vehicular traffic was misaligned with the present or desired context. Walking, bicycling, traffic calming, and establishing a sense of place were recurring priorities with each subsequent case study. Local study participants often expressed issues with vehicle-dominance and sought DVRPC's help through the *Taming Traffic* study to balance mobility needs with improvements that increased livability.

Between 2005 and 2010, DVRPC's *Taming Traffic* project explored CSS and traffic calming issues in 10 locations covering each of the nine counties, the City of Philadelphia, and the City of Camden. For each project round, the DVRPC study team solicited three candidate locations from county and city partners for consideration. After a data review and field visit to a short list of candidates, one case study location was selected from each state. For balance, the team attempted to select two different settings per year from either an urban, suburban, or rural context.

Case study teams typically included representatives from local and county planning departments, local police and public works departments, transit agencies, PennDOT or NJDOT, and local elected officials, when available. Often, the teams included local residents or local business owners, who provided valuable insight that is sometimes missing from more traditional planning studies.

The *Taming Traffic* process was collaborative and interactive. Through multiple meetings and field visits, the DVRPC staff would research and document issues identified by the study team. Once the problem list was finished, the study team was asked for its endorsement of the identified problems for which improvements could be designed. Through an iterative process, improvement recommendations were vetted by the group and displayed graphically through maps and photo-simulations in the final report.

The following pages provide a snapshot of each case study, complete with examples of the graphics and photo-simulations used in each final report, plus a publication number for each report for further reading. Figure 3 depicts the location of each study corridor within the DVRPC region, the municipality, the name of the study corridor, and the date of the publication.


Newtown Borough and
Newtown Township
2005
West Windsor Township
Clarksville Road
2007
BUCKS
Springfield Township
Bethlehem Pike
2008
MERCER
MONTGOMERY
City of Philadelphia
Parkside Avenue
2007
Sharon Hill Borough
Chester Pike
2006
PHILADELPHIA
CHESTER
Eastampton Township
Smithville Raod
2006
Franklin Township
PA 896
2009
DELAWARE
BURLINGTON
CAMDEN
Audubon, Haddon Heights,
Barrington, and Lawnside
East Atlantic Avenue
2008
GLOUCESTER
Swedesboro Borough
Auburn Road/ CR 551
2011
City of Camden
Parkside Neighborhood
2005

CASE STUDY

CR 551

Swedesboro, NJ

Location: Swedesboro, NJ

Street Name: CR 551/Auburn Avenue

Extents: Grant Avenue to High Hill Road/CR 662

Functional Class: Rural Connector

Speed Limit: 35 MPH

AADT: 14,000-15,000

Publication Number: 09025

Date Published: April 2011

Case for Study

CR 551/Auburn Avenue is an important commuter corridor and rural connector road for Swedesboro and Woolwich Township in Gloucester County. The *Taming Traffic* study area evaluated a half-mile stretch of this roadway between downtown Swedesboro and rapidly growing Woolwich Township.

Within the study area limits, Auburn Avenue is approximately 30 feet wide and is configured as one travel lane in each direction with a small shoulder. There are few sidewalks and the overall lack of pedestrian amenities is one of the defining characteristics of the roadway. Auburn Avenue itself contains a mixture of commercial, institutional, and residential development along the roadway.

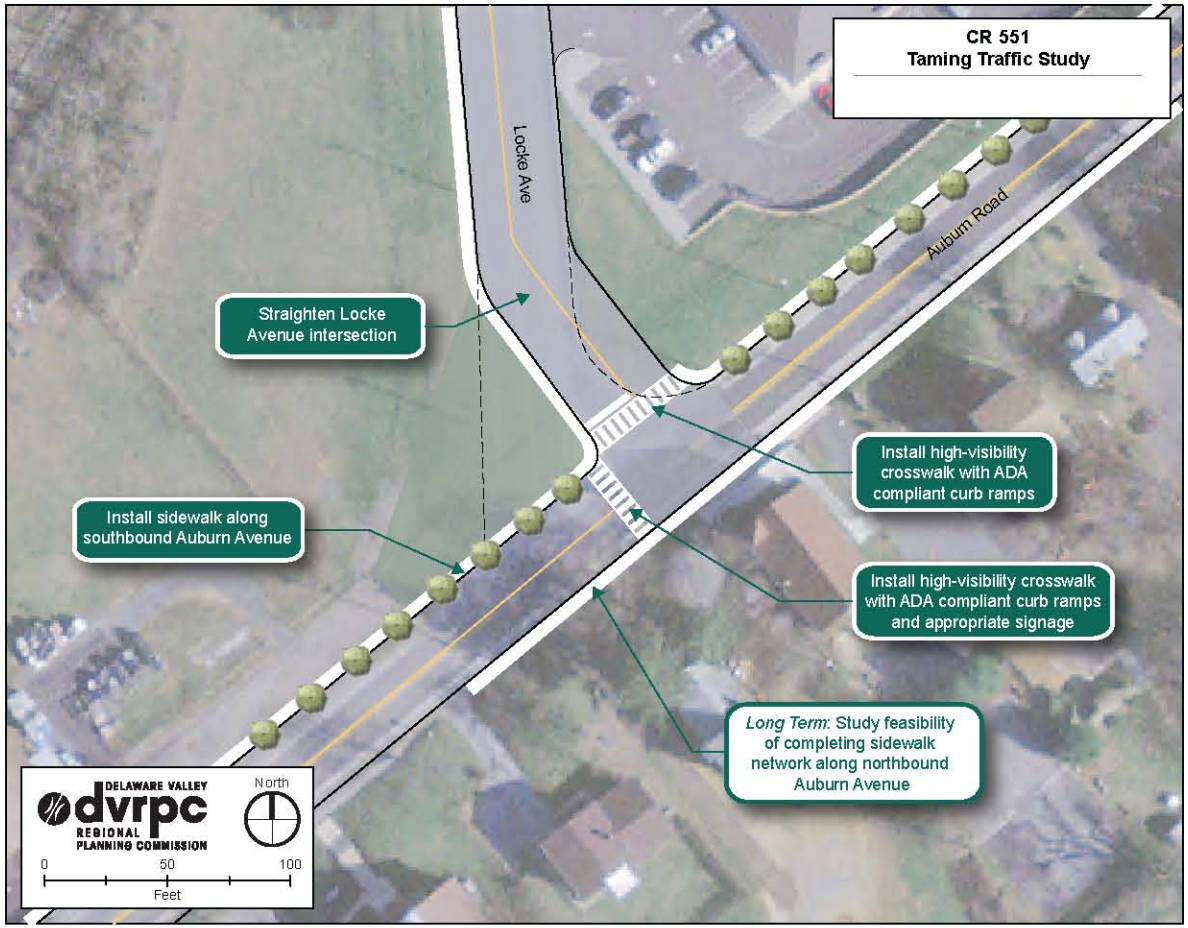
In addition to poor pedestrian access, excessive vehicle speed was reported as an issue. The corridor's location and roadway design may explain some of this behavior. Drivers entering the study area from downtown Swedesboro, with its lower speeds and variety of traffic calming treatments, receive few contextual clues to maintain slower speeds as they travel south along Auburn Avenue, a straight road with long sight distances. South of the High Hill Road, the speed limit increases to 50 MPH. Motorists traveling north on Auburn Avenue may still feel comfortable driving near this speed until they approach the downtown area.

The Auburn Avenue study area represents an important transitional area between the more dense, mixed-use village character of downtown

The lack of sidewalks and frequent curb cuts discourage walking along Auburn Avenue.

Shopping center along Auburn Avenue.

FIGURE 4: CR 551 FOCUS AREA IMPROVEMENTS



The Swedesboro study area was divided into four focus areas. This focus area map illustrates several recommendations, including the realignment of Locke Avenue and the installation of a sidewalk along the southbound side of Auburn Avenue.

Swedesboro and the surrounding rural and rapidly suburbanizing area. Currently, the existing roadway characteristics create an unbalanced environment in which walking and bicycling are discouraged and even dangerous. The *Taming Traffic* study recommends a variety of context-sensitive solutions to build on the study area's existing assets, improve streetscape design, and enhance vehicle, pedestrian, and bicycle mobility.

Identified Problems

- Lack of walkability and pedestrian amenties
- Excessive vehicle speeds
- Lack of bicycle accommodations
- Poorly defined vehicular access points
- Large curb cuts that impede pedestrians
- Limited sight distance for motorists at the intersection of Locke Avenue and Auburn Avenue
- Poorly defined sense of place
- Anticipated vehicular use due to new residential development

Key Recommendations

- Install shared lane markings, also know as sharrows, along Auburn Avenue to improve safety for cyclists
- Add placemaking elements such streetscaping and pedestrian scale lighting to enhance the identity of this gateway corridor
- Install sidewalk along the southbound side of Auburn Avenue
- Add high-visibility crosswalk over High Hill Road and ensure ADA-approved curb ramps are installed
- Study feasibility of completing sidewalk along northbound Auburn Avenue
- Realign Locke Avenue intersection
- Formalize distinct entry and exit ways for commercial parking areas

FIGURE 5: CR 551 - EXISTING CONDITIONS

This before and after simulation illustrates what a segment of Auburn Avenue could look like if some of the recommendations were implemented. The before image shows a portion of Auburn Avenue near the Clifford School and a shopping center as it exists today. The after image shows how a sidewalk and street trees can improve the pedestrian environment. In the roadway, shared lane marking can help make cycling safer.

FIGURE 6: CR 551 - SIMULATION

CASE STUDY

PA 896

Franklin Township, PA

Location: Franklin Township, PA

Street Name: Newark/New London Road/PA 896

Extents: Good Hope Road to Kimbelot/Parsons Road

Functional Class: Rural Minor Arterial

Speed Limit: 35 MPH

AADT: 9,300-10,000

Publication Number: 09067

Date Published: September 2009

Case for Study

PA 896 is a major connector between fast-growing townships in Chester and Lancaster counties, Pennsylvania and the cities of Newark and Wilmington, Delaware. As a historic village along this route, the Kemblesville section provides a unique opportunity and challenge for traffic calming and roadway design.

Accident data collected for the DVRPC Route 896 Road Safety Audit (November 2006) indicated concentrations of accidents at the Parsons Road, Appleton Road, and Good Hope Road intersections. Because speeding was recognized as a contributing factor at these intersections, it was the consensus of the Road Safety Audit team that traffic calming measures in and around the village could potentially slow traffic and improve safety conditions.

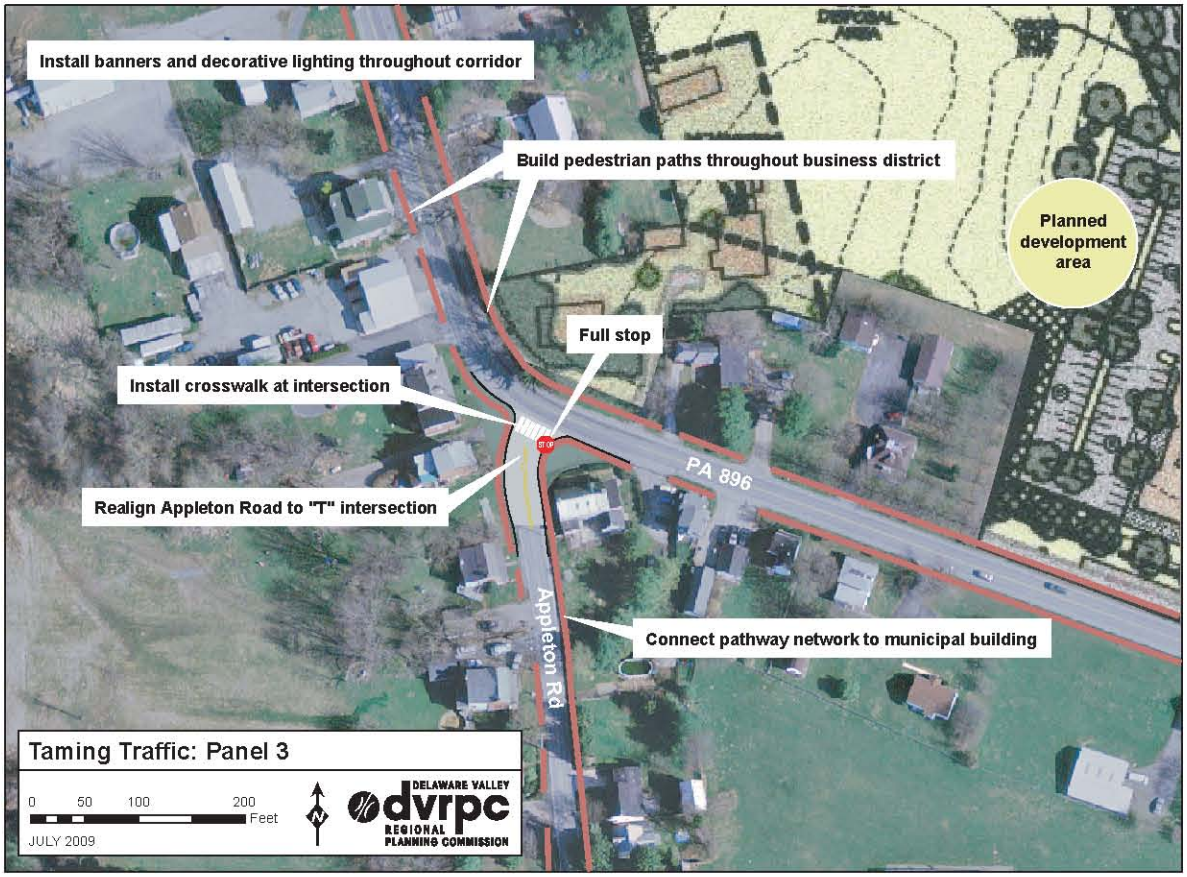
Additionally, the geometric configuration of these intersections compromises site distance and further warrants the need for context sensitive solutions. Continuous development of the townships along this corridor, including proposals for a mixed-use subdivision in Kemblesville, will significantly increase the mobility need for Kemblesville residents.

The DVRPC Study Team recognized the opportunity to contribute a complementary element to previous studies through the *Taming Traffic* effort, recommending strategies for altering the roadway to match its emerging context as a safer, bicycle and pedestrian-friendly village segment of the PA 896 corridor.

The existing conditions on PA 896, looking south toward the intersection of Appleton Road.

The village center, shown above, lacks basic pedestrian infrastructure, such as sidewalks.

FIGURE 7: PA 896 FOCUS AREA IMPROVEMENTS



This section of PA 896 was identified in PA 896 Road Safety Audit - Chester County as having a demonstrated crash history. The study recommends that the intersection be reengineered so that Appleton Road meets PA 896 at a "T" intersection with a full stop control for Appleton Road Traffic. Other recommendations include extending the pedestrian trailway network through the business district on PA 896 and also south along Appleton Road to connect to the municipal building.

Identified Problems

- Documented history of crashes
- Compromised sight distances due to horizontal and vertical curves
- Vehicle speeds inappropriate for roadway context
- Unresolved issue of Peacedale Road alignment
- Roadway fails to match future land-use context
- Lack of walkability and pedestrian amenities
- Commuter population underserved by transit
- Anticipated impact of new development on rural character

Key Recommendations

- Realign Good Hope Road to form a "T" intersection
- Realign Appleton Road to form a "T" intersection
- Install placemaking elements (banners, decorative village lamps, etc.)
- Install pedestrian pathways
- Install a crosswalk over PA 896 on the south side of McMaster Boulevard
- Realign Peacedale Road as proposed in the Road Safety Audit (2006)

FIGURE 8: PA 896 - EXISTING CONDITIONS

This simulation was used to illustrate recommended improvements to PA 896 south of Appleton Road. The study suggested installing a planted gateway median, as well as a variety of placemaking elements, such as banners and decorative lamps, to enhance the idenity of Kemblesville Village.

FIGURE 9: PA 896 - SIMULATION

CASE STUDY

East Atlantic Avenue

Camden County, NJ

Location: Audubon, Haddon Heights, Barrington, and Lawnside boroughs

Street Name: Chestnut Street to Davis Road

Extents: Chestnut Street to Davis Road

Functional Class: Urban Collector

Speed Limit: 25 MPH

AADT: N/A

Publication Number: 08044

Date Published: December 2008

Case for Study

The study corridor is a two-mile section of East Atlantic Avenue, a county route that runs through the Camden County municipalities of Audubon, Haddon Heights, Barrington, and Lawnside boroughs. Besides having similar demographic and landscape characteristics, each of these towns is along the Beasleys Point Secondary Rail line that follows East Atlantic Avenue. This is an active freight line that runs twice daily and is operated by Conrail Shared Assets.

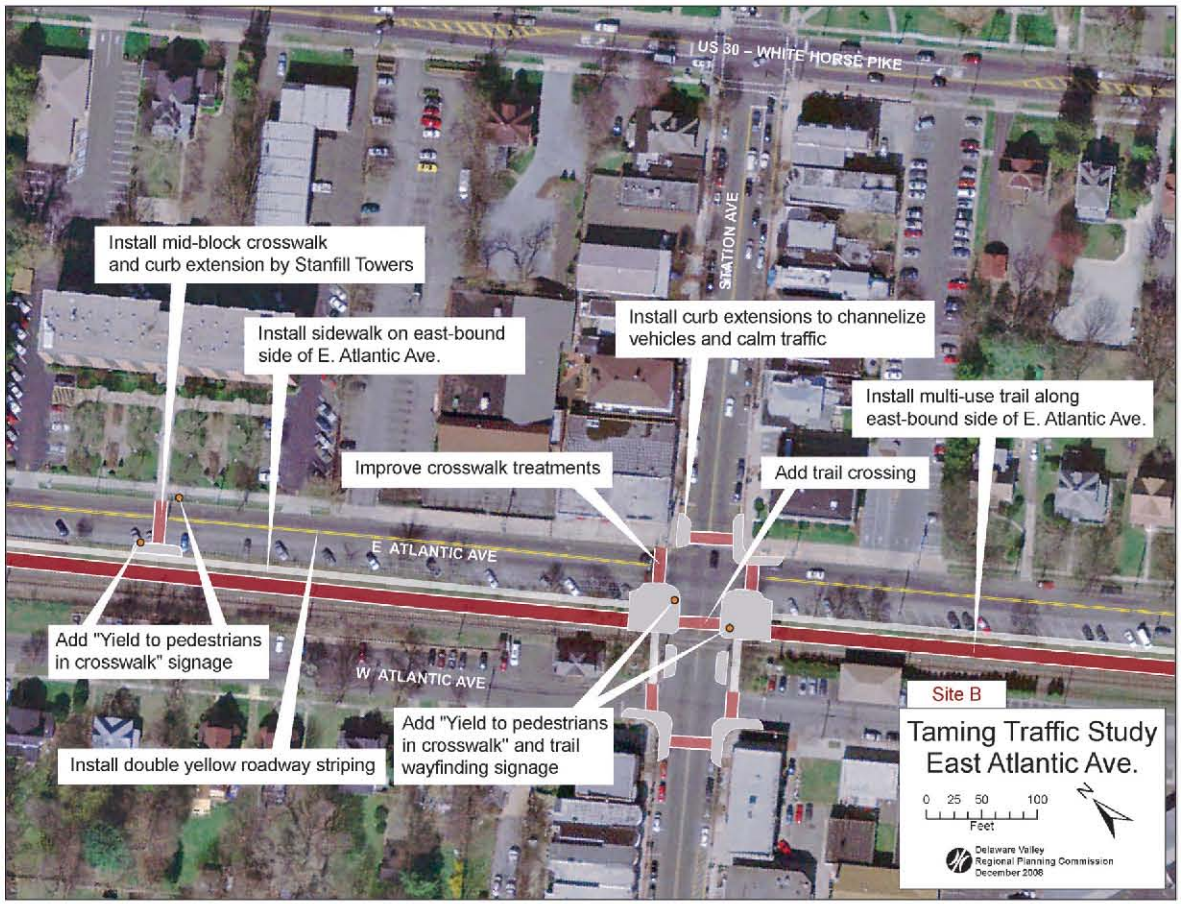
The study corridor is an important secondary facility connecting several business districts that also provides an alternative to the White Horse Pike. These characteristics are both a blessing and a curse. Local travelers depend on this corridor for easy access between towns and shopping destinations, while regional travelers often use the route as a cut-through for avoiding the higher volumes of the White Horse Pike. Although East Atlantic Avenue is an indispensable component of the transportation network, the driving speed and behavior of the motorists using the facility compromises the quality of life desired by those residents who live along the roadway. In addition, bikers and walkers are accommodated with few amenities, which are inconsistently available. This is of particular concern due to the number of school children who daily traverse and/or cross East Atlantic Avenue to attend schools in each of the towns.

The study committee was focused on issues such as walkability and bicycle access, traffic calming, traffic flow, and creating stronger connections

Looking east along East Atlantic Avenue toward Haddon Heights Elementary School.

Existing railroad tracks along East Atlantic Avenue near Clements Bridge Road.

FIGURE 10: EAST ATLANTIC AVENUE FOCUS AREA IMPROVEMENTS



Recommended improvements in the vicinity of Station Avenue in Haddon Heights include adding curb extensions, improving crosswalk treatments, and installing a multi-use trail along the east-bound side of East Atlantic Avenue.

between towns and linking shopping districts. A key recommendation that arose from the process was a rail-with-trail concept that would retain the existing freight service and add a multi-use path in the wide right-of-way that is currently undeveloped adjacent to the rail tracks. This bold idea was introduced to the local stakeholders by the DVRPC study team, and quickly took hold as an important concept for the future of the corridor.

East Atlantic Avenue has an ideal alignment and is strategically located to become an important corridor for multi-modal connectivity between each of the four study area municipalities. With the proper treatments, this goal can be achieved without sacrificing the roadway's utility as reliever to the White Horse Pike and as a commuter route.

Identified Problems

- Inadequate or unsafe pedestrian access along most of the corridor
- Inadequate pedestrian crossings
- Corridor lacks bicycling accommodations
- East Atlantic Avenue is used as a cut-through or bypass route for circumventing US 30
- Corridor parking lacks connections to adjacent downtown business districts
- Corridor-wide center line striping is not consistent
- East Atlantic Avenue lacks maintenance of vegetation along the lesser developed sections of the corridor
- Peak period congestion

Key Recommendations

- Install a corridor-wide Rail-with-Trail system adjacent to East Atlantic Avenue for multi-modal access between the towns
- Chicane the roadway to the west (toward the tracks) in order to create space for the addition of a four foot minimum width sidewalk that will connect Ervin Avenue in Audubon to Green Street in Haddon Heights
- Install a mid-block pedestrian crosswalk between the entrance to Stanfill Towers and the parking area located directly across East Atlantic Avenue
- Install a mid-block pedestrian crosswalk between Garden Street and the proposed multi-use Rail-with-Trail
- Add sidewalk/walkway along westbound East Atlantic Avenue to connect Haines Avenue with the White Horse Plaza

FIGURE 11: EAST ATLANTIC AVENUE - EXISTING CONDITIONS

This set of before and after images illustrates potential improvements to the East Atlantic Avenue study area near Clements Bridge Road. The simulation highlights the lane re-striping of East Atlantic Avenue and the installation of a multi-use trail along the railway.

FIGURE 12: EAST ATLANTIC AVENUE - SIMULATION

CASE STUDY

Bethlehem Pike

Springfield Township, PA

Location: Springfield Township, Montgomery County

Street Name: Bethlehem Pike

Extents: Paper Mill Road/Stenton Avenue to Skippack Pike

Functional Class: Urban Minor Arterial

Speed Limit: 35 MPH

AADT: 17,000-23,000

Publication Number: 08044

Date Published: December 2008

Case for Study

Running through Springfield and Whitemarsh townships, in Montgomery County, a 2.5 mile stretch of Bethlehem Pike was the focus of the Pennsylvania-side *Taming Traffic* case study during the 2009 fiscal year. Situated between the northern edge of Philadelphia's Chestnut Hill neighborhood and PA Route 73 at the northern end of the study area, Bethlehem Pike is a commuter corridor and downtown street serving a strong local shopping district and the residential neighborhoods of Springfield and Whitemarsh. Bethlehem Pike has the potential to become a vibrant and prosperous corridor, as it has the types of mixed-use, street-edge, historic buildings that comprise other nearby downtowns.

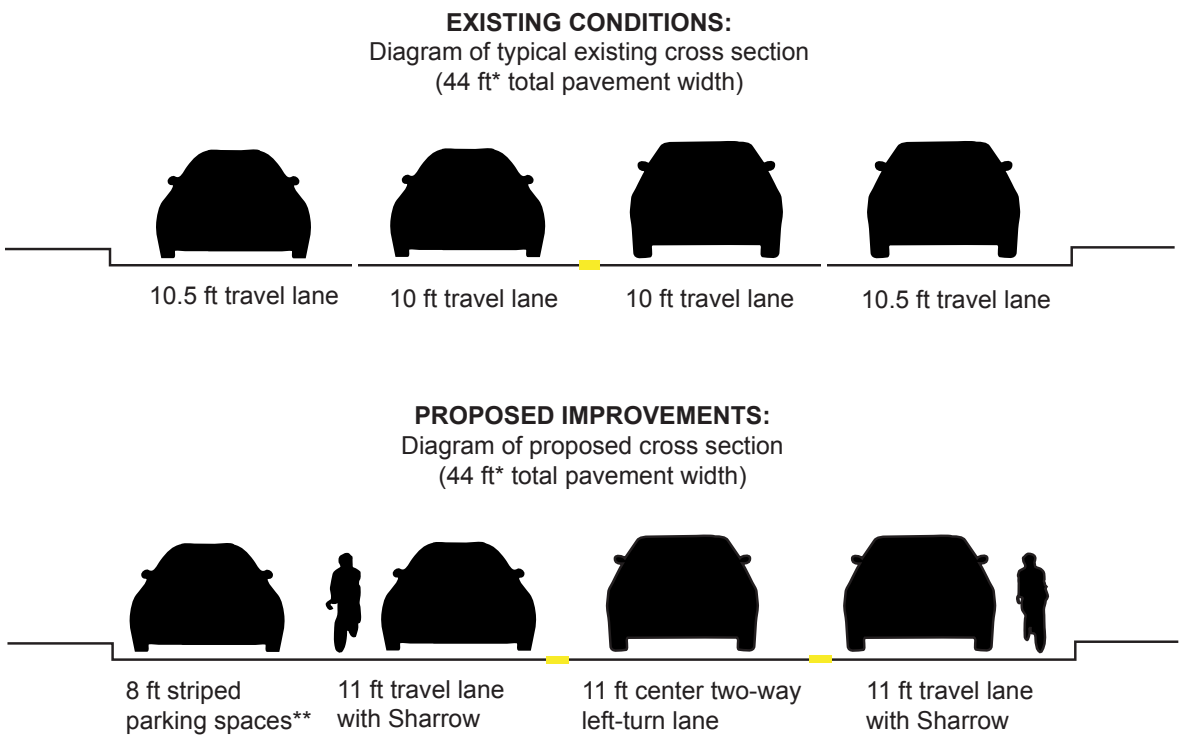
This *Taming Traffic* effort benefited from several preceding efforts that considered the same corridor study area, including: the *Flourtown Erdenheim Vision Plan for the Flourtown-Erdenheim Enhancement Association* (2004), the *Bethlehem Pike Corridor Study* (2005), and the Village Center Zoning District plan introduced to the Springfield Township Commission in 2008. Common among these plans is a vision for Bethlehem Pike that prioritizes a pedestrian-oriented main street, improved pedestrian and bicyclist accommodations, economic development, traffic calming, and consistent branding.

Early on, the road diet concept was identified as the key ingredient needed to achieve the visions laid out in previous studies. The road diet provides consistent left-turn opportunities without impeding

On-street parking is permitted in an active travel lane of Bethlehem Pike near Montgomery Avenue.

A segment of Bethlehem Pike between Bysher Avenue and Mill Road.

FIGURE 13: BETHLEHEM PIKE ROAD DIET CROSS-SECTION



The illustrations above show cross-sections of the existing roadway and the proposed road diet for Bethlehem Pike through Springfield Township. The road diet would transform the four-lane roadway into two lanes, with a center left-turn lane and on-street parking.

throughput, calms traffic, opens up cartway width for parking and bicycle accommodations, and enhances economic opportunities supporting a destination-style context. This became the main concept desired by the local study team, supported by county and local officials, and echoed in previous studies.

Upon completion of this report, DVRPC worked with Springfield Township and PennDOT to test the road diet concept in an engineering analysis. Referred to as the Bethlehem Pike Phase II Road Diet Evaluation, this project will be completed in 2011. The objective of the phase II work was to test the feasibility of the road diet concept using traffic-modeling software, as per PennDOT standards. The results of that study will determine whether or not the road diet will be implemented on Bethlehem Pike as per the original *Taming Traffic* study.

Identified Problems

- Excessive vehicle speeds northbound due to steep grade between Stenton Avenue and Gordon Lane
- Potentially dangerous conditions created by Bethlehem Pike's inconsistent parking scheme
- Retail hub in the vicinity of Bysher Avenue experiences high volume of traffic and pedestrians and has a demonstrated crash history
- Town center area lacks a distinctive sense of place
- Conflicts with turning and through traffic at major destinations

- Shortage of safe and highly visible pedestrian crossings, especially in the vicinity of heavily used bus stops
- Corridor lacks adequate bicycle amenities
- Lack of accommodations and safety considerations for transit users/minimal presence of transit amenities along the corridor

Key Recommendations

- Convert Bethlehem Pike from a four-lane configuration to a three-lane road diet, with a center two-way-left-turn lane throughout the Springfield Township segment of the corridor
- Create dedicated, on-street parking (part of the Road Diet plan)
- Install shared lane markings ("sharrows") to accommodate bicyclists
- Install placemaking elements consistent with local branding
- Add a transit shelter and/or refuge area in the vicinity of the current SEPTA bus stops along Bethlehem Pike
- Install a continuous sidewalk along both sides of Bethlehem Pike to provide enhanced connectivity

FIGURE 14: BETHLEHEM PIKE - EXISTING CONDITIONS

This photo-simulation helps visualize recommended improvements for Bethlehem Pike near Weiss Avenue. Major improvements include the new crosswalk at the unsignalized intersection, reconfigured roadway with three travel lanes and parking, curb extension, enhanced crosswalks, sharrows, and streetscaping.

FIGURE 15: BETHLEHEM PIKE - SIMULATION

CASE STUDY

Parkside Avenue

Philadelphia, PA

Location: Philadelphia, PA

Street Name: Parkside Avenue (SR 3017)

Extents: 40th Street and Girard Avenue to 52nd Street

Functional Class: Collector

Speed Limit: 35 MPH

AADT: 3,000-7,000

Publication Number: 07054

Date Published: October 2007

Case for Study

The study corridor selected for the City of Philadelphia is a one-mile stretch of Parkside Avenue. Parkside Avenue is a state route that serves as the main corridor through Philadelphia's historic Fairmount Park, and is home to the Mann Center for the Performing Arts and Memorial Hall, where the 1876 Centennial exposition was held. Though steeped in tradition, this location has not thrived in recent decades. Currently in transition thanks to recently completed developments and other planned improvements, this corridor is ripe for a renaissance.

The foundation for the *Taming Traffic* effort was set forth in the recommendations of *The Centennial District Master Plan,* which envisions "a more dynamic relationship between the park and neighborhood. Aided by appropriate traffic calming measures, Parkside and Girard Avenues should be tree-lined city streets with pedestrian-scaled lighting, rebuilt sidewalks, and numerous controlled intersections." Parkside Avenue is planned to be the spine of the Centennial District, linking numerous destinations and bringing the park and the neighborhood together. The study team included a very long list of interested and eager representatives from state and city offices, SEPTA, local elected officials, city police, neighborhood groups, consultants, and key players from the park's managing body, the Fairmount Park Commission.

The team spent several meetings discussing issues that plague the corridor study area, including excessive roadway width, speeding, and a general

The intersection of Parkside Avenue, Girard Avenue, and 40th Street is confusing and potentially dangerous.

View of Parkside Avenue by West Memorial Hall Drive.

FIGURE 16: PARKSIDE AVENUE FOCUS AREA IMPROVEMENTS

Recommended improvements for Parkside Avenue near the intersection of East and West Memorial Hall Drives include closing two roads, expanding park land, installing a median island, and adding midblock crosswalks.

disconnect between the park and the neighborhood. Parkside Avenue is used as a commuter route, and its engineering and signal spacing allow high speeds on long, vacant stretches of open road.

The final report includes a robust set of corridor-wide and site-specific improvement strategies fully supported by the study team. When implemented collectively, these improvements will create a consistent corridor treatment that enhances the existing strengths of the study area, while improving mobility and safety for all roadway users.

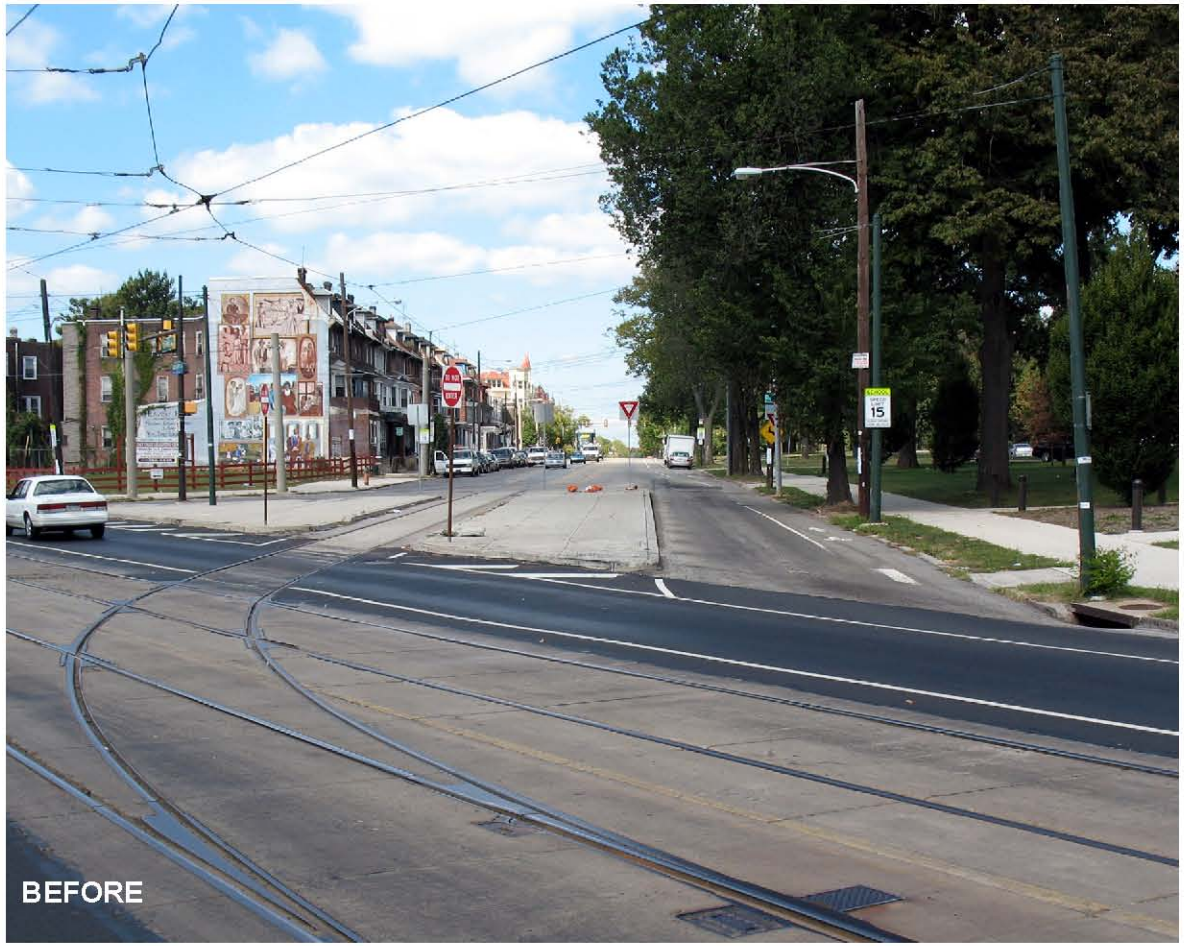
Identified Problems

- Roadway design encourages speeding and motorcycle racing
- Insufficient number of crosswalks, poor pedestrian connectivity
- Corridor lacks a sense of place and connection with the park
- Transit stops are unwelcoming
- Corridor lacks sufficient planning to mediate issues with adjacent institutions
- Girard Avenue intersection is confusing and potentially dangerous, especially for pedestrians

Key Recommendations

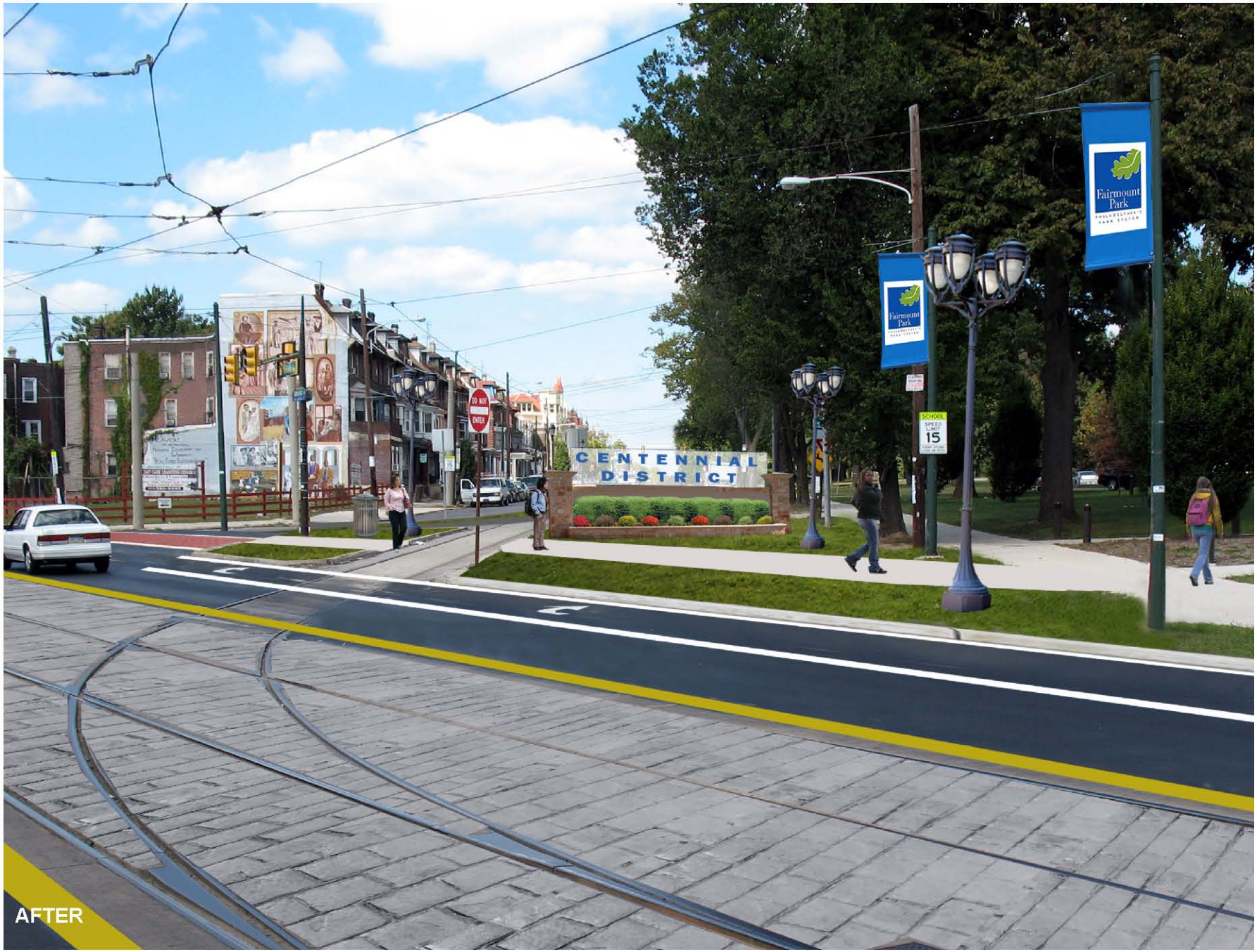
- Planted median island along entire corridor length
- Pedestrian and transit stop improvements
- Remove right-turn pocket from Parkside Avenue north to 52nd Street
- Close South Concourse Drive and replace it with parkland
- Install an "Urban Single-Lane" roundabout at 50th Street and realign 50th Street to become one of the three roundabout approaches
- Close East Memorial Drive and replace it with parkland
- Close southbound access road (in the vicinity of 41st Street) and convert to parkland. Change the northbound road (aligned with 41st Street) from a one-way to a two-way road
- Close the right-turn channel from Girard Avenue onto Parkside Avenue and replace it with a traditional right-turn-only lane at the intersection
- Visually mark the trolley right-of-way to discourage automobile access in the right-of-way

FIGURE 17: PARKSIDE AVENUE - EXISTING CONDITIONS



The intersection of Parkside Avenue and Girard Avenue is confusing and has poor pedestrian access.This photo-simulation illustrates numerous recommended improvements for the intersection, including the removal of the right-turn channel from Girard onto Parkside Avenue, the creation of a landscaped gateway, and the use of distinctive materials to mark the trolley right-of-way.

FIGURE 18: PARKSIDE AVENUE - SIMULATION



CASE STUDY

Clarksville Road

West Windsor Township, NJ

Location: West Windsor Township, Mercer County, NJ

Street Name: Clarksville Road/CR 638

Extents: North of Meadow Road to Princeton-Hightstown Road

Functional Class: Urban Minor Arterial

Speed Limit: 45/20/35 MPH

AADT: 13,000-20,000

Publication Number: 07054

Date Published: October 2007

Case for Study

In 2007, the *Taming Traffic* team examined a 2.5 mile stretch of Clarksville Road (CR 638) located in West Windsor Township, Mercer County, New Jersey. Connecting Quaker Bridge Road to Princeton-Hightstown Road, Clarksville Road is an important arterial carrying traffic to the nearby Princeton Junction Station of the NJTransit Northeast Corridor Line, which provides service to New York City. Locally, Clarksville Road serves a shopping center, the local middle and high schools, offices, residential neighborhoods, and the municipal complex. This study location has enough density to make walking between destinations possible, but too few pedestrian amenities, combined with steady traffic, for it to be desirable or accommodating to everyone.

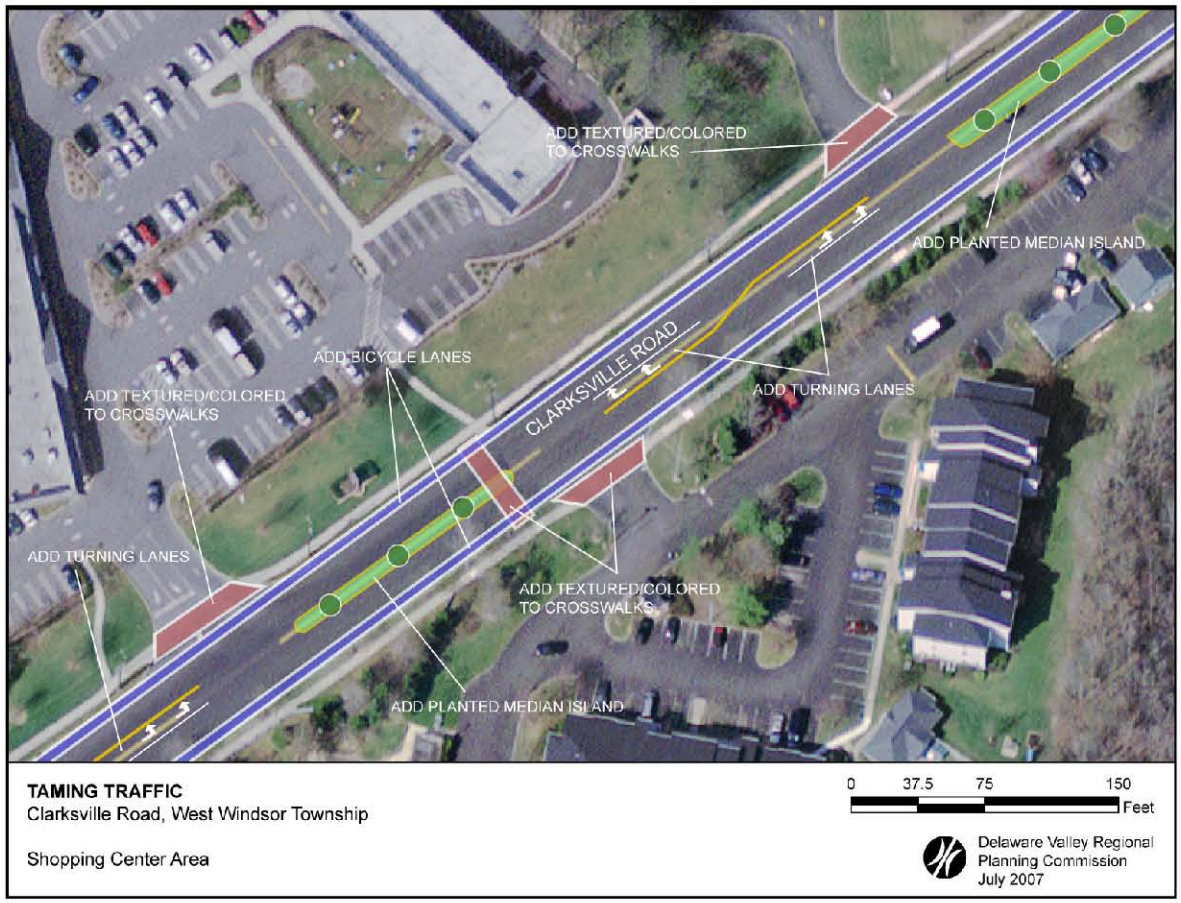
The study team was fortunate to have as a member a representative from the West Windsor Bicycle and Pedestrian Alliance, who provided a keen insight on the bike/ped issues of Clarksville Road. Also serving on the team were representatives from the county (planning and engineering), NJTransit, and several people from West Windsor Township, including the chief of police, the township engineer, the school district, community development, and the mayor. This diverse, interested group raised many concerns, including the speed of traffic on Clarksville Road, peak period traffic, crash problems, lack of adequate pedestrian crossings, and the safety of school students.

The current design of Clarksville Road may not be

Clarksville Road near North Post Road.

This section of Clarksville Road contains a housing complex (left) and a shopping center (right), but no pedestrian crossing between the two.

FIGURE 19: CLARKSVILLE ROAD FOCUS AREA IMPROVEMENTS



The study team identified this section of Clarksville Road between the Village Square Shopping Center and the Avalon Watch residential development as having high pedestrian activity with few pedestrian amenities. Recommendations for the area included installing high-visibility crosswalks, adding a planted median, and designating left-turn lanes at three locations.

appropriate for a corridor with residential uses and community facilities, such as schools. When fully implemented, the new and proposed development will likely result in additional residents and increased traffic volume within the study area. These imminent changes necessitate a strategy for maintaining and improving the quality of life for the local residents of the study area and all users of Clarksville Road. The improvement recommendations identified in the study process are designed to create a context and character that complements the roadway and its surrounding land uses, provides multi-modal transportation options, and establishes a sense of place for the local community.

Identified Problems

- Posted and observed speeds inappropriate for the context
- Inconsistent roadway width
- Corridor lacks a sense of place
- Inadequate and infrequent pedestrian crossings
- Lane configuration is confusing and potentially dangerous, especially for pedestrians and bicyclists
- Roadway does not adequately accommodate bicyclists
- Lacking sidewalks/pedestrian amenities in some sections

Key Recommendations

- Create bike lanes along the corridor
- Crosswalk improvements
- Designate left-turn lanes at the Village Square Shopping Center, Avalon Watch, and Heather Drive
- Install a planted center median along the corridor, except in areas where left-turn lanes exist
- Improve engineering and alignment of Post Road intersection
- Improve engineering and alignment of Penn Lyle Road intersection
- Reduce cartway to one through lane on Clarksville Road northbound, between Penn Lyle Road and Princeton-Hightstown Road, while not reducing the number of turning lanes

FIGURE 20: CLARKSVILLE ROAD - EXISTING CONDITIONS

This set of before and after images was used to illustrate suggested improvements for the intersection of Clarksville Road and Penn Lyle Road. The simulation illustrates the removal of the right-turn channel on northbound Penn Lyle Road and the subsequent realignment of the intersection. Straightening the intersection and increasing the visibility of crosswalks will help calm traffic and enhance pedestrian safety.

FIGURE 21: CLARKSVILLE ROAD - SIMULATION

CASE STUDY

Smithville Road

Eastampton Township, NJ

Location: Eastampton Township, Burlington County, NJ

Street Name: Smithville Road/CR 684

Extents: Railroad Avenue to Powell Road

Functional Class: Urban Collector

Speed Limit: 45 MPH

AADT: 4,498

Publication Number: 06040

Date Published: September 2006

Case for Study

Smithville Road is an urban collector located approximately one mile east of Route 206 that connects to NJ 38 and serves as the main access road to Smithville Park. Extending through Smithville Park and past the Smithville Mansion, Smithville Road traverses large tracts of farmland, wetlands, and the Rancocas Creek. Within the park a multi-use path parallels a former freight rail line and intersects Smithville Road at Railroad Avenue.

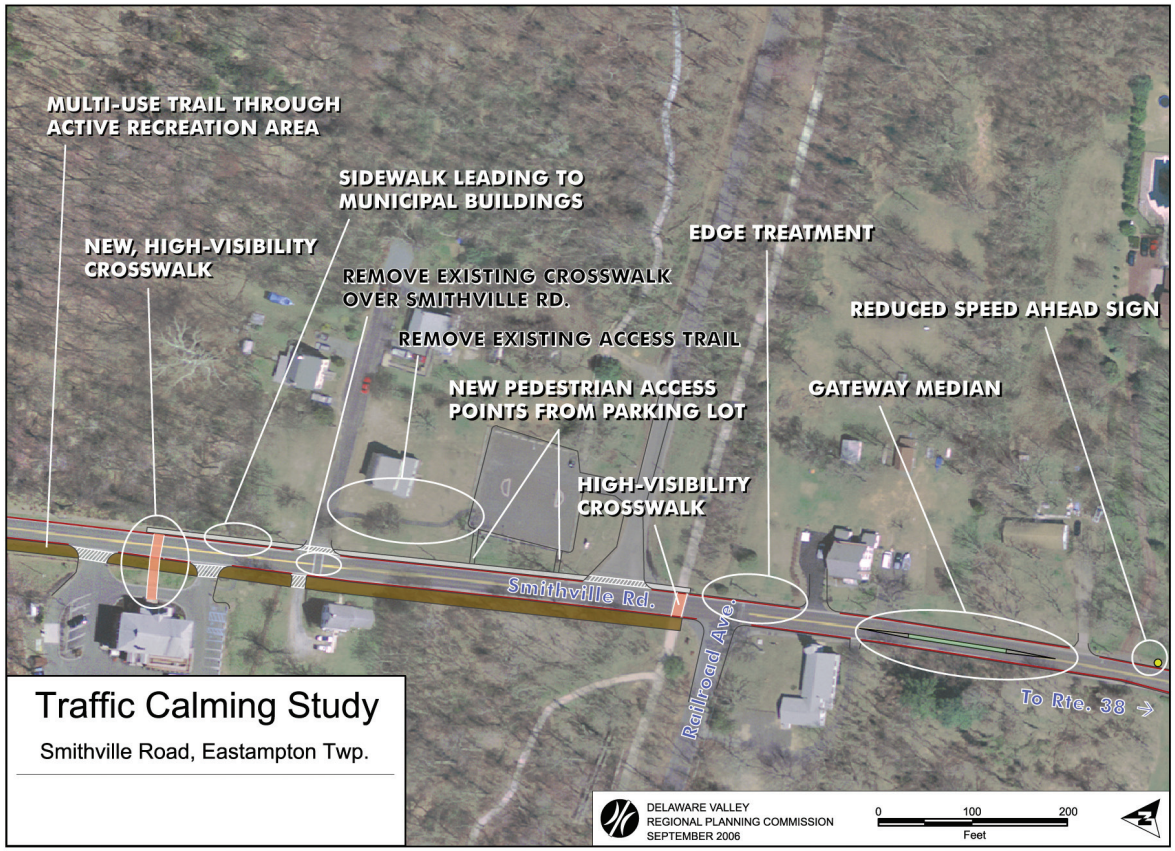
Over the past few years, Smithville Park has changed dramatically, and visitation to the park has increased significantly. During the 2005 park season, Smithville Park patronage spiked tenfold, primarily due to the creation of new trails, boating and fishing docks, a floating footbridge, and bicycle paths. The county has also undertaken significant historic preservation efforts to restore and interpret the mansion, and the industrial and village buildings, as well as the connecting roads, trails, and bridges. In addition to increasing park traffic, new private development over recent years has increased the residential population near the study area. As a result, Smithville Road has become a direct route to residential developments from NJ 38.

Theses changes have resulted in increased vehicle and pedestrian traffic along Smithville Road. Current operating speeds, and the posted speed limit of 45 MPH, reflect the former usage patterns of the roadway. However, considering the recreational park activity and the new residential growth in and near the study area, these traffic speeds and patterns

Pedestrian crossing near Railroad Avenue.

Smithville Road at the entrance to Eastampton Township.

FIGURE 22: SMITHVILLE ROAD FOCUS AREA IMPROVEMENTS



Recommended improvements for the southern section of the Smithville Road study area include new sidewalks, signage, and the installation of high-visibility crosswalks.

on Smithville Road are no longer appropriate for the evolving park setting. With support from Eastampton Township, the county parks department has worked with county engineers in an attempt to lower speeds along Smithville Road through conventional approaches, but was not able to meet the county's criteria to warrant a speed limit change.

The study team was very eager to develop innovative solutions to the traffic and mobility issues of Smithville Road and Smithville Park. Areas of keen interest include providing a pedestrian way along Smithville Road, establishing gateways to alert motorists that they are entering the park, improving crossings over Smithville Road to better connect the various features of the park, and to reducing both the speed limit and subsequently lowering the average travel speed.

Identified Problems

- Observed typical speed inappropriate for park setting
- Park entrances minimally impact driver behavior
- Lack of pedestrian amenities
- Minimum pedestrian trail crossing amenities
- Lack of bicycle amenities
- Compromised turning sight distances

Key Recommendations

- Create gateways at either end of the park to alert motorists of the changing context
- Install edge treatments to help establish the park's identity
- Improve crosswalks by making them more substantial, with tactile treatments, and raise their profile by adding pedestrian-scale lighting
- Build a multiuse trail along the Smithville Road
- Install sidewalks in heavy pedestrian areas
- Realign the roadway at the Smith Mansion to create space for a sidewalk, and to calm traffic
- Place a mid-corridor median to calm traffic and create a pedestrian refuge

FIGURE 23: SMITHVILLE ROAD - EXISTING CONDITIONS

This set of before and after images was used to illustrate suggested improvements for a stretch of Smithville Road just south of Railroad Avenue. A planted gateway median and roadway edge treatments are distinctive elements that can enhance Smithville Park's sense of identity, while calming traffic.

FIGURE 24: SMITHVILLE ROAD - SIMULATION

CASE STUDY

Chester Pike

Sharon Hill, PA

Location: Sharon Hill Borough, Delaware County, PA

Street Name: Chester Pike/US Route 13

Extents: Cherry Street and Folcroft Avenue

Functional Class: Minor Arterial/Principal Arterial/ Urban Collector

Speed Limit: 45 MPH

AADT: 15,978

Publication Number: 06040

Date Published: September 2006

Case for Study

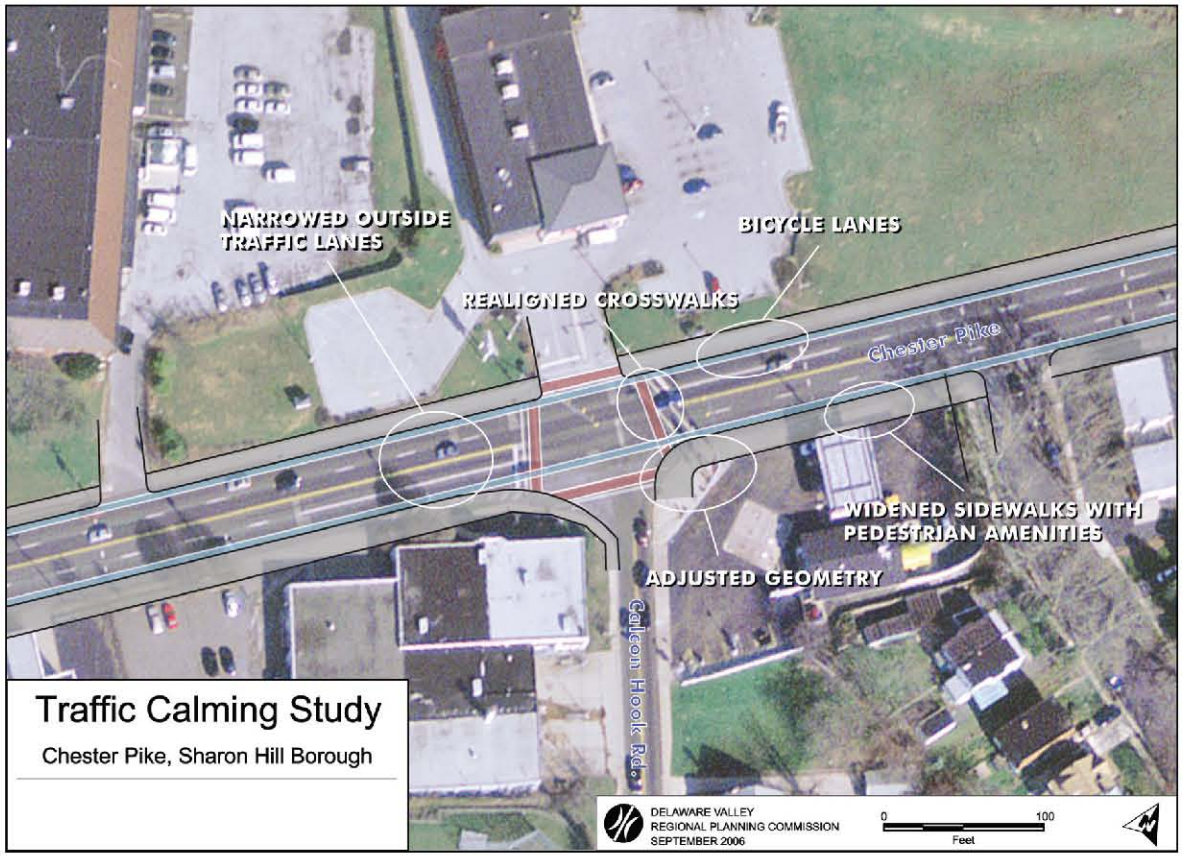
Chester Pike is a principal arterial road that runs through Delaware County, connecting Chester City with Philadelphia. Chester Pike also serves as a local connector, joining Sharon Hill Borough to the neighboring boroughs of Norwood, Glenolden, and Darby. It is located close to Interstate 95, as well as major industrial facilities to the south, which results in substantial truck traffic.

The locally adopted *Four Borough Comprehensive Plan*, produced by the Delaware County Planning Department, identifies Chester Pike as "the strongest candidate for traffic calming...because of its extreme width." Within Sharon Hill, Chester Pike is an excessively wide road that in several sections lacks shoulders and clearly defined lanes. It is used as a commuter road and provides access to retail destinations and nearby industrial parks. Chester Pike also traverses a number of residential communities. The roadway's width and character as a thoroughfare encourage travel speeds inappropriate for its residential and downtown setting. Additionally, the lack of lane definition and inconsistent roadway configuration, coupled with high average speeds, creates potentially dangerous conditions for pedestrians, bicyclists, and motorists alike.

These concerns were a top priority for the study team, which was comprised of representatives from PennDOT, SEPTA, Delaware County, local police, the Sharon Hill Borough Planning Commission and planning staff members, and the Sharon Hill

Chester Pike near Brainerd Boulevard in Sharon Hill Borough.

FIGURE 25: CHESTER PIKE FOCUS AREA IMPROVEMENTS



Conceptual improvements for Chester Pike near Calcon Hook Road include widening sidewalks, realigning curbs and crosswalks, and adding bicycle lanes.

Borough mayor. Through several meetings and field visits, the study progressed from problem identification to improvement strategy development in an iterative and collaborative manner.

As an area seeking to revitalize its retail base along Chester Pike, the Sharon Hill study team was eager to work on improvements that will complement its economic objectives. The CSS and traffic calming recommendations will address these potential hazards by reducing speeds, improving safety, and increasing the overall attractiveness of the roadway as a local main street and community asset.

Identified Problems

- Underutilized roadway capacity due to excessively wide pavement encourages speeding and makes pedestrian crossings very long
- Variable and unclear lane configurations, especially in the heart of the business district
- Excessively wide, numerous, and undefined business access points create crash conflict points and present hazards to pedestrians
- Pedestrian crossings are too long, and lack proper signing, striping, and countdown signal heads at most locations
- Poorly integrated transit facilities
- Sharon Hill Borough lacks sense of place

Key Recommendations

- Simplify the roadway by making the lane configuration consistent throughout
- Improve the sidewalks by establishing a minimum width and adding street furniture
- Improve the crosswalks by making consistent and adding pedestrian signal heads with countdown timers where they are missing
- Simplify vehicle access points by eliminating duplicates and standardizing driveway width where possible
- Add curb extensions to calm traffic and shorten pedestrian crossings
- Install median islands to narrow the roadway and create a sense of place
- Add a bike lane
- Add gateways to distinguish Sharon Hill Borough from adjoining municipalities
- Modify roadway configuration to better accommodate traffic flow
- Improve the trolley terminal area

FIGURE 26: CHESTER PIKE - EXISTING CONDITIONS

This simulation illustrates how recommended improvements for Chester Pike change the look and feel of the street. Ths study suggests improving access points, adding bike lanes, and installing curb extensions and a planted median island.

FIGURE 27: CHESTER PIKE - SIMULATION

CASE STUDY

Parkside Neighborhood

Camden, NJ

Location: Parkside neighborhood, Camden, NJ

Project Area: Intersection of Haddon Avenue and Kaighn Avenue

Functional Class: Urban Minor Arterial

Speed Limit: 25 MPH

AADT: N/A

Publication Number: 06002

Date Published: 2005

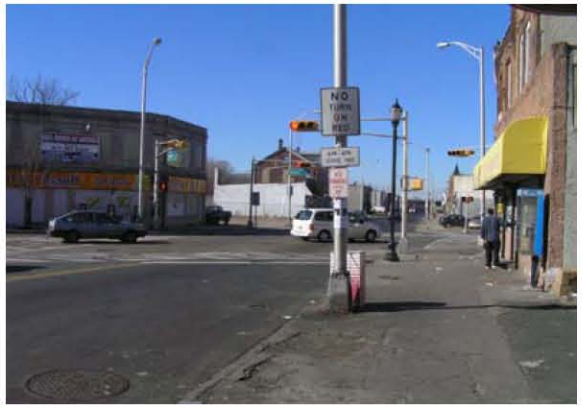
Case for Study

The Parkside neighborhood in central Camden is one of the city's finest neighborhoods, having developed as an early streetcar suburb. Parkside is a predominantly residential neighborhood that is also home to Our Lady of Lourdes Hospital, Martin Luther King Community Center, Farnham Park, and numerous schools, including Camden High School.

Our Lady of Lourdes Hospital is one of the two largest employers in the area (the other is the Campbell Soup Company) and consists of the main hospital building on the east side of Haddon Avenue at Vesper Boulevard, and an ambulatory care center on the west side of Haddon Avenue. Farnham Park is a 70-acre Victorian park created in the early 1900s, along the Cooper River on the eastern edge of the neighborhood. It is a great community asset, but needs to be restored to its original glory to attract more residents to use it.

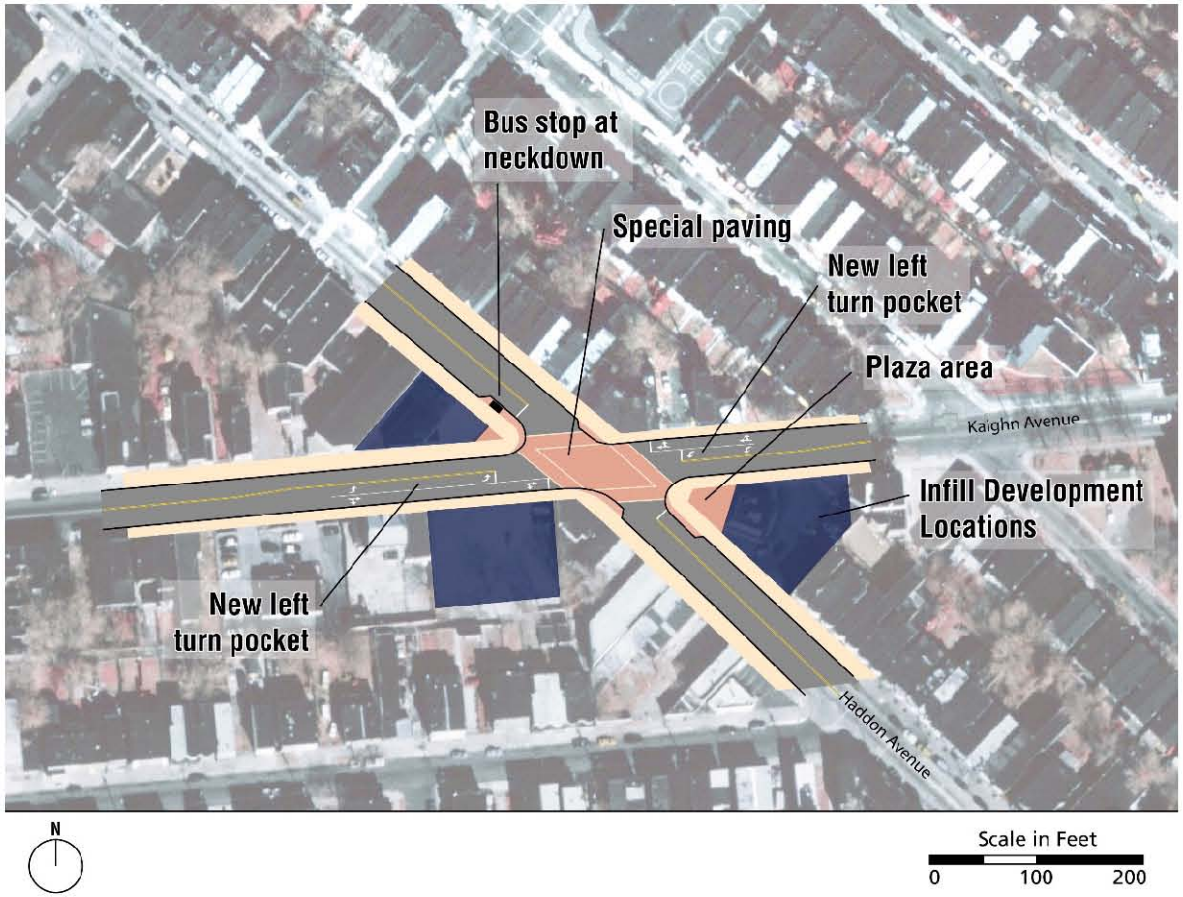
Substantial population loss over the last 20 years, along with urban blight, poverty, crime, and other urban ills, are cause for concern in Parkside. At the heart of the neighborhood is the intersection of Haddon and Kaighn avenues, which experiences recurring peak period congestion. This is predominantly due to the shared-through left-turn approaches of Kaighn Avenue, which causes back-ups as motorists seeking to turn left are forced to wait for gaps in on-coming traffic in order to proceed. This situation frustrates drivers and begets red-light running, as drivers attempt to get through the intersection after waiting an inordinate length of time.

Haddon and Kaighn avenues meet at an oblique angle, resulting in a lengthy pedestrian crossing.



This photo of Kaighn Avenue highlights needed sidewalk improvements.

FIGURE 28: PARKSIDE NEIGHBORHOOD FOCUS AREA IMPROVEMENTS



Aerial plan view of suggested improvements for the intersection of Haddon Avenue and Kaighn Avenue. Recommendations include restructuring turning lanes, special paving, and infill development at key locations.

The Parkside Business and Community in Partnership (PBCIP) is the community development corporation most active in Parkside's revitalization and it also played an important role in the *Taming Traffic* study. Dedicated to the vitality of the neighborhood, and armed with two studies featuring Parkside, the Parkside Redevelopment Plan: Developing the Strategy (2003), and the Parkside Neighborhood Strategic Plan (2004), the PBIC played an important role in the *Taming Traffic* study.

Guided by the recommendations of these studies, and influenced by the local needs expressed by the PBIC, the *Taming Traffic* study set out to address the operational deficiencies and insufficient pedestrian amenities with engineering and placemaking improvement strategies. The final set of improvement recommendations was fully endorsed by the study team and included in the final report.

Identified Problems

- Operational deficiencies and insufficient pedestrian amenities at intersection
- The reportedly hostile nature of the PM peak period traffic degrades the pedestrian environment and presents safety issues for vehicular traffic and pedestrians
- Recurring congestion on Kaighn Avenue westbound originating at the Haddon Avenue intersection occurring from late afternoon into the PM peak period
- Traffic turning left from Kaighn Avenue often blocks the through traffic, further exacerbating the congestion

- Drivers on Kaighn Avenue, frustrated by the long wait to get through the intersection, are running the red signal
- Traffic back-ups on Kaighn Avenue are causing cut-through traffic on adjacent streets

Key Recommendations

- Improved intersection operations: *Short Term* Re-stripe the Kaighn Avenue approaches to include a left-turn-only lane, *Long Term* Install protected left-turn signal phase in addition to left-turn-only lane
- Improved pedestrian crossings
- Neckdown Haddon Avenue at the intersection approaches and add bus stops
- Infill unused real estate with new businesses

FIGURE 29: PARKSIDE NEIGHBORHOOD - EXISTING CONDITIONS

The Taming Traffic recommendations seek to improve operations and pedestrian safety at the intersection of Haddon and Kaighn avenues. These before and after images illustrate the cumulative effect of numerous recommendations. In addition to encouraging building rehabilitation and infill development, the study recommends using distictive pavers or stamped concreate to formally designate pedestrian crossings and create a sense of place.

FIGURE 30: PARKSIDE NEIGHBORHOOD - SIMULATION

CASE STUDY

Newtown Borough & Newton Township

Bucks County, PA

Location: Newtown Borough and Newton Township, Bucks County, PA

Project Area: Area surrounding the Newton Bypass

Functional Class: Multiple types

Speed Limit: 35/45 MPH

AADT: 13,000-16,000

Publication Number: 06002

Date Published: 2005

Case for Study

Newtown Borough and Newtown Township are historic communities that date back to 1683, originally part of the William Penn land grant. With an active retail district along State Street, a charming mix of colonial buildings in the borough and newer homes in the township, this vibrant community is home to about 2,300 borough residents and almost 20,000 in the continually-expanding township.

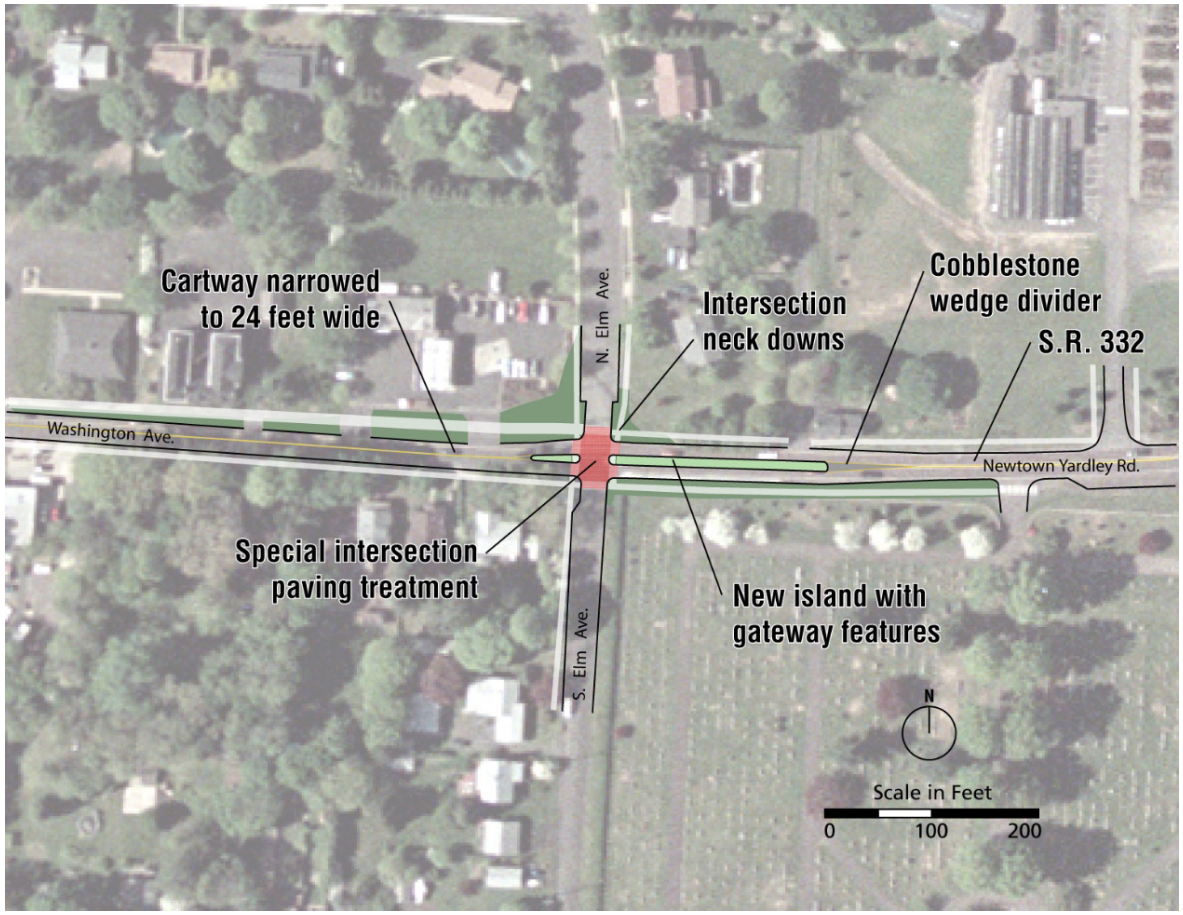
The Newtown Bypass (PA 332/PA 413) consists of a four-lane divided controlled access facility from Durham Road (PA 413) south and east to Newtown Yardley Road (PA 332), with a speed limit of 55 miles per hour. The bypass provides an alternative route around the borough, and through traffic volumes on the local Washington Avenue and State Street was reduced after its construction in 1999, even though overall traffic continued to increase. Back-ups on the bypass impede traffic flow, prompting some drivers to use Washington Avenue and a combination of local streets as a cut-through route, which also backs up during rush hours. Newtown Borough wants to maximize the effectiveness of the bypass as the primary mover of large volumes of through traffic, enabling local retail and residential streets to retain a high quality of life.

There were several studies either completed or underway that the *Taming Traffic* effort was able to build upon, including: Newtown Borough 1999 Comprehensive Plan, Newtown Borough Pedestrian Circulation Study, DVRPC's Bucks County Regional Traffic Study, and the Newtown Bus Rapid Transit and Pedestrian Trail Concept Study.

The intersection of Washington and Lincoln avenues.

Newton-Yardley Road becomes Washington Avenue as one enters Newtown Borough from the east.

FIGURE 31: NEWTON FOCUS AREA IMPROVEMENTS



Aerial view of context-sensitive solutions suggested for the intersection of Washington Avenue/Newtown Yardley Road. Improvement strategies include narrowing the cartway from 28 feet to 24 feet, curb extensions, paving treatments, and a new island with gateway features.

Themes common to these efforts include the desire to strengthen multi-modal opportunities, enhance existing walking and bicycling rights-of-way, preserve sense of place, and change driver behavior to match the borough's small town context.

Recognizing the need to retain the high level of access provided by the grid network, the study team focused on its main gateway to the east where Washington Avenue crosses from the township into the borough. This gateway area became the main focal point for several improvement recommendations aimed at slowing traffic, announcing entry into the borough, preserving and enhancing the local historical features, and improving pedestrian access. The improvement details—covered in depth in the final report and depicted here on the following pages—were fully supported by the study team.

Identified Problems

- Speeding on the Washington Avenue entry into the borough
- Back up of traffic at Washington Avenue and State Street
- Difficult to enter Washington Avenue from side streets
- Traffic cuts through borough rather than using Newtown Bypass
- Newtown Bypass does not capture enough through traffic

Key Recommendations

- Change of the speed limit to 25 mph on Washington Avenue and implement a "Drive 25" campaign
- Install median choker, narrow the cartway, investigate special intersection paving treatment, install cobblestone wedge divider, and improve sidewalks at the Washington Avenue entry into the borough
- The borough could adopt an official map showing all public streets and facilities
- Education about the benefits of using the bypass
- Recommendations specific to decreasing through traffic and increasing use of Newtown Bypass include:
    1. Changing the direction of streets, such as making Jefferson one-way rather than two-way
    2. "Completing the grid" by providing another route besides Jefferson or Washington for traffic that wants to travel eastbound through Newtown Borough
    3. Install signage that says "Traffic Calmed Neighborhood"
    4. Borough should require developers to prepare traffic impact analyses and implement access management
    5. Signal warrant study could be conducted on Newtown Bypass

FIGURE 32: NEWTON - EXISTING CONDITIONS

These images show the existing conditions and a photo-simulation of Washington Avenue near Elm Street. The proposed Washington Avenue gateway includes a new landscaped median with trees, a welcome sign, and a stone border that complements the local context.

FIGURE 33: NEWTON - SIMULATION

Taming Traffic Progress

DVRPC conducted a survey of project communities to assess the progress that has been made toward the goals outlined in previous *Taming Traffic* studies. Despite being well received, the majority of recommendations contained in the studies have yet to be implemented. In some cases, the studies were simply too new to have translated into physical improvements, which can take years to evolve from conceptual ideas to engineered solutions. In other cases, the lack of implementation can be attributed to inadequate funding sources and general fiscal constraints which have impacted local governments over the last several years. Aside from funding issues, the survey results suggested that public, political, or agency concerns about a project can be an obstacle when attempting to implement CSS. Additionally, some strategies recommended by DVRPC may require additional study to be implemented which can be a challenge for municipalities that lack specific technical expertise.

When asked to identify additional support or resources needed to develop and implement CSS in their community, the most common response was assistance identifying and pursuing funding opportunities. Other responses included developing educational materials for citizens and public officials as well as technical design and engineering assistance. Despite the obstacles noted here, several municipalities reported considering and implementing more context-sensitive designs in other locations within their community. Enhanced crosswalks, pedestrian refuge islands, street trees, pedestrian-scale lighting, and various traffic calming techniques were all cited as elements consistent with CSS goals.

Overall, our follow-up work with project communities reinforces the importance of collaboration and communication throughout a CSS process. By effectively engaging local stakeholders, transportation professionals can ensure that they establish a consensus vision for a facility that reflects not only transportation needs but also environmental and community values.

SECTION 3

CSS RESOURCES

CSS Support

CSS has become an important component of effective transportation and land use planning. Accordingly, a number of valuable resources have been developed to help municipal officials, planners, and members of the public learn more about CSS and its application. The following pages include a selection of websites and publications dealing with CSS and traffic calming. Additionally, a list of potential funding sources for these types of projects is provided. For a full list of funding opportunities, please see DVRPC's *Municipal Resource Guide* (Publication Number 09061).

Selected Online Resources

Federal Highway Administration and Context Sensitive Solutions
http://contextsensitivesolutions.org
http://www.fhwa.dot.gov/context

Institute of Transportation Engineers Context Sensitive Solutions Website
http://www.ite.org/css

Institute of Transportation Engineers (ITE) Traffic Calming Library
http://ite.org/traffic

National Complete Streets Coaltion
http://www.completestreets.org

Pedestrian and Bicycle Information Center
http://www.walkinginfo.org

Selected Publications

Context Sensitive Solutions in Designing Major Urban Thoroughfares, An ITE Proposed Recommended Practice. (2006)
Institute of Transportation Engineers

Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, An ITE Recommended Practice (2010)
Institute of Transportation Engineers

A Guide for Achieving Flexibility in Highway Design (2004)
American Association of State Highway and Transportation Officials (AASHTO)

Smart Transportation Guidebook (2008)
New Jersey Department of Transportation and Pennsylvania Department of Transportation

Traffic Calming Handbook (2001)
Pennsylvania Department of Transportation

Traffic Calming: State of the Practice (1999)
Institute of Transportation Engineers and Federal Highway Administration

U.S. Traffic Calming Manual (2009)
Reid Ewing and Steven J. Brown, published by the American Planning Association

Potential Funding Sources

BIKES BELONG COALITION

Eligibility: Federal, state, regional, county, and municipal agencies; and nonprofits or organizations whose mission is expressly related to bicycle advocacy. Public agencies are encouraged to align with a local bicycle advocacy group to develop and implement the grant activities.
Purpose: Funds bicycle facilities and paths that encourage facility, education, and capacity building
Terms: $10,000 or less
Deadline: Applications accepted quarterly
Contact: Bikes Belong Coalition
Phone: 617-734-2111
Website: wwww.bikesbelong.org/grants

COMMUNITY REVITALIZATION PROGRAM

Eligibility: Pennsylvania local governments, redevelopment authorities, industrial development agencies, and nonprofits
Purpose: To support local initiatives that promote the stability of communities
Terms: Grants of $5,000-$25,000
Deadline: Three funding rounds during fiscal year
Contact: Pennsylvania Department of Community and Economic Development
Phone: 866-GO-NEWPA (866-466-3972)
Website: www.newpa.com

COMMUNITY TRANSPORTATION DEVELOPMENT FUND (CTDF)

Eligibility: Nonprofit transit providers, public agencies, local and state governments, and community organizations
Purpose: To promote better transportation options
Terms: Low interest loans of up to $150,000 per recipient and 75% of the total project cost
Deadline: Varies; there are several funding options that require a one time service fee
Contact: Community Transportation Association of America
Phone: 202-661-0210
Website: www.ctaa.org

COUNTY AID PROGRAM

Eligibility: New Jersey counties
Purpose: Provides funds for public road and bridge improvements under county jurisdiction
Terms: Minimum allotment is $300,000 per county
Contact: New Jersey Department of Transportation
Phone: 609-530-2856
Website: www.state.nj.us/transportation

ELM STREET PROGRAM

Eligibility: Pennsylvania local governments, redevelopment authorities, nonprofit economic development organizations
Purpose: Provides grants for planning, technical assistance, and physical improvements to residential and mixed-use areas in proximity to central business districts
Terms: Maximum $50,000 for administrative grants; Maximum $250,000 for development projects and loans
Contact: Pennsylvania Department of Community and Economic Development
Phone: 866-GO-NEWPA (866-466-3972)
Website: www.newpa.com

LOCAL TRANSPORTATION PLANNING ASSISTANCE PROGRAM (LTPA)

Eligibility: New Jersey municipalities
Purpose: Provides municipalities with consultant expertise to address local transportation and quality of life issues.
Terms: Varies
Contact: New Jersey Department of Transportation
Phone: 609-590-2856
Website: www.dvrpc.org/SafeRoutes

LOCALLY INITIATED PEDESTRIAN PROJECTS

Eligibility: New Jersey counties and municipalities
Purpose: Provides funds for municipalities and counties for pedestrian access construction
Terms: Varies
Contact: New Jersey Department of Transportation
Phone: 856-486-6618
Website: www.state.nj.us/transportation

SAFE ROUTES TO SCHOOL

Eligibility: New Jersey municipalities
Purpose: Provides funding for communities seeking to improve the safety of children walking to school
Terms: Varies
Contact: New Jersey Department of Transportation (NJDOT)
Phone: 609-530-6551
Website: www.state.nj.us/transportation/community/srts

SUSTAINABLE LAND USE PLANNING GRANTS

Eligibility: New Jersey municipalities
Purpose: To fund local or regional plans, ordinances, studies, or document reviews
Terms: Maximum of $20,000; matching reimbursement grant
Contact: Association of New Jersey Environmental Commissions (ANJEC)
Phone: 973-539-7547
Website: www.anjec.org/SmartGrowthGrants.htm

TRANSPORTATION AND COMMUNITY DEVELOPMENT INITIATIVE (TCDI)

Eligibility: Eligible municipalities in the DVRPC region
Purpose: Support local planning projects to improve transportation and encourage redevelopment
Terms: Grants up to $150,000; 20 percent local match required.
Deadline: Annual
Contact: Delaware Valley Regional Planning Commission (DVRPC)
Phone: 215-592-1800
Website: www.dvrpc.org/tcdi

TRANSPORTATION ENHANCEMENTS (TE)

Eligibility: Pennsylvania and New Jersey municipalities and counties
Purpose: Provides funds for community-based projects that expand travel choices and enhance the transportation network
Terms: Varies
Deadline: Varies
Contact: Delaware Valley Regional Planning Commission
Phone: 215-238-2881
Website: www.dvrpc.org/te

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Abstract This report provides an overview of context-sensitive solutions (CSS) and their application throughout the DVRPC region. CSS is an approach to roadway planning in which transportation facilities complement the local context and accommodate all users. Section One discusses CSS techniques, including traffic calming, and highlights a series of local and international examples. Section Two summarizes DVRPC's *Taming Traffic* Program. Between 2005 and 2010, DVRPC conducted studies of 10 locations throughout the region, recommending a variety of CSS strategies.

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