

TAMING TRAFFIC



Context-Sensitive Solutions in the DVRPC Region:

*Auburn Avenue/CR 551:
Swedesboro Borough, Gloucester County, NJ*

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EXECUTIVE SUMMARY

When we think of the negative effects of traffic, congestion and pollution typically come to mind first. However, there is also growing concern about the impact of increased traffic and traffic speeds through our neighborhoods and how this affects quality of life. These negative impacts can often discourage us from walking or biking in a place where these modes of travel could be a perfectly reasonable alternative to driving. Addressing this issue is one of the goals of context-sensitive solutions (CSS) and traffic calming.

CSS is a set of planning methods that looks “beyond the pavement” to the way that a road interacts with its environment, and seeks to enhance the community and natural features of a setting. CSS methods are meant to visually indicate to drivers that they are passing through a special type of area, and need to drive with greater awareness. Traffic calming is one of these strategies. Both the New Jersey and Pennsylvania departments of transportation have developed programs that support traffic calming, and DVRPC has also endorsed CSS in its planning studies. DVRPC’s Long-Range Plan for the Region, *Connections: The Regional Plan for a Sustainable Future* (Publication Number 09047D) explains “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.”

This installment of the Taming Traffic study focuses on a corridor in Swedesboro, Gloucester County, New Jersey. A diverse group of public officials, local stakeholders, and planning partners worked with the DVRPC study team to identify issues and reasonable improvement strategies regarding a one half-mile section of Auburn Avenue/CR 551. The study corridor parallels Kings Highway/CR 605, and the two roads meet at a signalized intersection at the southern end of the Swedesboro business district.

One lane in each direction, Auburn Avenue connects more rural portions of the Borough to downtown Swedesboro. Transitioning from the more rural setting in the south, where higher speeds are appropriate, to the commercial business district in the north, where lower speeds are needed, is one of the main issues addressed by the study team. Transition areas such as Auburn Avenue can benefit from changes in context that signify to drivers that an adjustment in

driving behavior is necessary, especially where pedestrians and bicyclists are more likely to be encountered. Unfortunately, very few cues currently exist to help signify this change in context.

Stakeholders helped the study team identify six corridor-wide issues and four focus areas that could be addressed through context-sensitive solutions. Intermittent sidewalks, the absence of bicyclist accommodations, multiple driveways, and an indeterminate sense of place were among the corridor-wide concerns. Although many of these issues have localized solutions, this study presents a series of comprehensive recommendations designed to help generate the desired change in context.

Additionally, the study area was divided into four focus areas based on land use and transportation characteristics: 1) High Hill Road Intersection, 2) High Hill Road to Locke Avenue, 3) Locke Avenue Intersection, and 4) Locke Avenue to Grant Avenue. The study team has developed specific recommendations for each of these focus areas.

One location explored in detail is the intersection of Locke Avenue and Auburn Avenue, originally identified in a 2007 DVRPC study *Managing Change Along US 322 Corridor: Land Use and Transportation Issues, Policies and Recommendations* (Publication Number 07004). A major concern here is the compromised sight distance for traffic entering Auburn Avenue, which results from the skewed intersection geometry. The *Managing Change* study also discusses the future volume of traffic this intersection will experience if residential development continues within Woolwich and areas south of US 322. Also at issue here is the especially wide crossing for pedestrians, which is commonly used by people en route to the sports fields located on the west side of Auburn Avenue.

The recommendations for this focus area address sight distance issues, inadequate pedestrian infrastructure, and the need for traffic calming, all issues of concern throughout the study corridor. In addition to detailed maps depicting focus area issues and improvements, there are two photo simulations included to help readers visualize a more context-sensitive Auburn Avenue corridor. The combination of traffic calming, pedestrian improvements, and the creation of a distinct sense of place together can help match the roadway to its present and future land-use context.



SECTION 1: CONTEXT-SENSITIVE SOLUTIONS



INTRODUCTION

Context-sensitive solutions (CSS) describes an approach to transportation planning that attempts to enhance communities and natural environments, while balancing the competing needs of all modes of travel. While CSS is widely accepted today, the first significant step toward context-sensitive planning came in 1969 with the National Environmental Policy Act, requiring transportation agencies to consider the impact of projects on the surrounding environment.

Over the next two decades, policy continued to evolve, and local context became an increasingly important part of transportation planning. Another major step forward occurred in 1998, when the Maryland Department of Transportation, in partnership with the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA), conducted Thinking Beyond the Pavement: National Workshop on Integrating Highway Development with Communities and the Environment While Maintaining Safety and Performance.

FHWA continued to promote the CSS approach in its planning documents and incorporated language about CSS into the current federal surface transportation act, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Today, the FHWA is an advocate for CSS, and it is endorsed by many state departments of transportation, including the Pennsylvania Department of Transportation (PennDOT) and the New Jersey Department of Transportation (NJDOT).

An important component of a CSS approach is that it links driving behavior with the perception of the surrounding context. Traffic calming techniques are often implemented as a component of a complete CSS strategy. 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. Although this approach originated in Europe, it was adopted in the United States starting in the 1940s and 1950s, when the cities of Montclair, New Jersey, and Grand Rapids, Michigan, installed street closures and traffic diverters. In the decades to follow, other U.S. cities began implementing traffic calming into traffic management plans and programs.

This study focuses on a full range of CSS approaches, incorporating traditional traffic calming techniques when appropriate. The aim of this comprehensive approach is to change the look and feel of a roadway that is currently out of context with its surroundings. These changes may, in turn, alter driver behavior and make passing motorists more aware of the conditions and roadway activities beyond the edge of pavement. The recommendations in this report show how value can be added to traditional engineering approaches by also including streetscaping elements, such as street vegetation, signage, significant sidewalks, unique textures, and other techniques to create a sense of place along the corridor.

The study site in this report focuses on an area between Swedesboro's downtown and an area of new residential and commercial development in Woolwich Township. Some of the strategies proposed for the corridor attempt to address the potential traffic impacts of recent and planned growth while maintaining the local character. Other improvements attempt to enhance the multi-modal character of Auburn Avenue through provisions for pedestrians and bicyclists.

This study was conducted through a collaborative process that involved a local study advisory committee composed of the mayor, law enforcement, municipal and county planners, transit agency staff, and community activists. A list of the participants can be found at the end of the report.



WHAT ARE CONTEXT-SENSITIVE SOLUTIONS (CSS)?

As an approach to transportation planning, CSS has spread rapidly since the late 1990s. This planning method 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. Most notably, CSS involves a commitment to collaboration with community stakeholders to respond to local needs and values while accommodating the safe movement of motor vehicles.

The primary goal of CSS is to balance the competing needs of all modes of travel with a flexible application of design controls, guidelines, and standards to create roadway facilities that complement the local context, maintain a distinct sense of place, and are safe for all users. As driving behavior is often linked to a motorist’s perception of the surrounding context, changes to the environment help to modify driver behavior. As seen in both local and international examples, destinations that exhibit a sense of place and multi-modal activity foster slower speeds and heightened caution among drivers, thus reducing the negative impacts of traffic. An effective CSS approach to transportation planning and project development should include the following key elements:

- An evaluation of the “context” of the area
- Interdisciplinary stakeholder involvement throughout the project
- Attention to community values and qualities, including environmental, scenic, aesthetic, historic, and natural resources, as well as safety and mobility
- Evaluation of the effects of transportation action on a community
- Objective evaluation of a full range of alternatives, including flexible engineering and policy principles

To implement CSS along a corridor, a variety of techniques can be packaged into a comprehensive improvement strategy. Unlike other approaches to transportation planning, CSS strategies will not only include typical engineering improvements, but may also incorporate less common components to create a highly functioning roadway environment.

Elements of CSS, such as community involvement, flexible engineering techniques, and attention to the surrounding environment, are also prominent in other planning methods. Traffic calming is one such prevalent planning technique that values a comprehensive approach to transportation solutions. 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 non-motorized street users.” Traditional traffic calming solutions involve both engineering and policy modifications and include an education component.

ITE provides a set of engineering-focused traffic calming techniques that are accepted nationally. However, there are several other techniques that can be used to complement traditional traffic calming measures by building a sense of place and changing the context of the surrounding physical environment. These techniques include streetscaping elements, such as street trees and plantings, street furniture, pedestrian-scale lighting, signage, and vibrant textural treatments. Companion improvements, such as widening sidewalks, adding bike lanes, and creating median islands, improve the bicycle and pedestrian environment and are likely to draw more nonmotorized users to the roadway. Like all traffic calming elements, these techniques must be customized to appropriately match the location and function of the roadway. These complementary elements, which effectively change the context of the roadway, contribute to a more comprehensive improvement strategy when implemented in conjunction with conventional calming measures. In this way, traffic calming principles are not only consistent with CSS principles, but also Smart Growth values, which support the creation of walkable communities that provide a range of transportation choices.



REGIONAL PERSPECTIVE

CSS and traffic calming strategies are common internationally and are becoming increasingly widespread throughout the Delaware Valley region. Although many examples of traffic calming can be found throughout the region, few have been implemented as the result of a comprehensive study.

During the winter of 2004–2005, Haddonfield Borough in Camden County, New Jersey, conducted a comprehensive traffic calming study. Led by a state-funded consultant, the study examined qualitative and quantitative data from five areas in the municipality that could benefit from traffic calming, and offered “initial improvement concepts” for each. The first area where improvements were implemented, Lincoln Avenue, was given priority due to high levels of cut-through traffic and proximity to a school. Measures thus far consist of raised intersections and curb extensions. An active citizens committee called the Borough of Haddonfield Transportation and Pedestrian Safety Committee (TAPS) identified the five target areas and was the driving force in getting local political support for the traffic calming study and securing state funds. TAPS also participated in a walkable places audit and organized a “Drive 25” campaign that has become an annual event in Haddonfield. The Haddonfield study was successful because it had support from municipal, county, and state governments, as well as from residents.

At a 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.”

In January 2001, the Pennsylvania Department of Transportation (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 jurisdiction. Several years ago, PennDOT began re-evaluating 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.

The New Jersey Department of Transportation (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 Smart Growth, and other state agencies to tackle the root causes of congestion by fostering strengthened connections between transportation and land use. For example, instead of building a bypass, the Borough of Flemington is implementing a new parkway boulevard with extensive connectivity to the local street grid. 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.

NJDOT and PennDOT, in conjunction with DVRPC, released a joint publication in spring 2008 titled *Smart Transportation Solutions 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.



CSS STRATEGIES

Placemaking Elements

Features, such as decorative lighting, landscaping, and public art, give a roadway a distinct character. CSS encourages these features to be created with materials that reflect the architectural style and urban fabric of the surrounding community. These elements may be placed along the sides of the roadway or introduced in the cartway by way of engineering techniques like bulb-outs or center medians/islands.

Consistent placement and appearance of necessary directional signage along a corridor contributes to the sense of place. It also reduces confusion associated with visual clutter and leads to more predictable travel movements.



Collingswood, NJ utilized decorative lighting, plantings, patterned crosswalks, banners, and other placemaking elements to give Haddon Avenue its distinctive character. Source: DVRPC

Pedestrian/Bicycle/Transit Amenities

Sidewalks, visually bold and texturally distinct crosswalks, median islands, and pedestrian signal heads and push buttons create a safe environment 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.



A multiuse pathway in New York City keeps pedestrian and bicycle traffic safely buffered from vehicular traffic. Source: DVRPC



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.”

Traditional traffic calming solutions involve both engineering and policy modifications, as well as an education component. The most effective and long-term traffic calming techniques are engineering measures that actually alter the form of the roadway and impact driver behavior. Traffic calming measures can be combined with placemaking elements to create a distinct roadway character and heightened driver perception. See pages 12 and 13 for some engineering traffic calming techniques.



Jenkintown Borough in Montgomery County, PA installed curb bumpouts as a traffic calming measure, forcing traffic to slow down. In addition to the calming benefits, the bumpouts shorten the pedestrian crossings and create contained streetside parking. Source: DVRPC

Smart Growth Development Pattern

Much of a roadway’s character, configuration, and driver behavior are determined by the pattern of development along the corridor. 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.

In contrast, focusing development around concentrated main streets and mixed-use communities may create a different type of roadway character. Smart growth is the term often used to describe this type of development pattern, promoting development that mirrors elements found in traditional small towns. These elements include mixed-use development, main streets and town centers, diversity of housing types, a focus on human-scale and street-level uses, and an overall emphasis on walking and mass transit. Even traditional uses, such as big-box stores, can be adapted to portray more of a town-center type of character, thereby influencing the way drivers use and perceive the adjacent roadway.



Main Street at Exton, in West Whiteland Township, PA is a smart growth development, including several retailers typically found in “big box” stores. The smart growth development pattern changes the character of the shopping corridor and the configuration of the roadway. Source: DVRPC



TRAFFIC TAMING GOALS AND TECHNIQUES

In the most basic terms, traffic calming seeks to modify the behavior of traffic to match its surrounding context. Many of the traffic calming techniques provide solutions to alleviate potentially dangerous conditions, and to improve safety for drivers, pedestrians, and cyclists. The Institute of Transportation Engineers identifies the following goals and objectives.

Traffic Calming Goals:

- Increasing the quality of life
- Incorporating the preferences and requirements of the people using the area (e.g., working, playing, residing) along the street(s), or at intersection(s)
- Creating safe and attractive streets or helping to reduce the negative effects of motor vehicles on the environment (e.g., pollution, sprawl)
- Promoting pedestrian, cycle, and transit use

Traffic Calming Objectives:

- Achieving slow speeds for motor vehicles
- Reducing collision frequency and severity
- Increasing the safety and the perception of safety for nonmotorized users of the street(s)
- Reducing the need for police enforcement
- Enhancing the street environment (e.g., streetscaping)
- Increasing access for all modes of transportation
- Reducing cut-through motor vehicle traffic

Traffic calming techniques are an attempt to enhance traffic and pedestrian safety and preserve neighborhood character and liveability. The primary effects produced by these techniques are speed reduction, traffic volume reduction, increased driver awareness, and increased safety.

There are a variety of ways to organize or categorize traffic calming techniques. For the purposes of this study, the techniques have been organized into four categories: education, engineering, enforcement, and policy. Although a technique from any one of these categories may produce some level of benefit, these techniques work best when used in conjunction with one another.

Education

Education-based traffic calming measures include “programs implemented on a day-to-day basis to regulate, warn, guide, inform, enforce, and educate motorists, bicyclists, and pedestrians,” as described in the *Traffic Calming Toolkit* published by the City of San Jose, California. Many of these techniques can be implemented quickly and at a low cost, providing immediate benefit, whereas engineering techniques may require more extensive planning and design, and, in some cases, right-of-way acquisition, which can be costly and time consuming.

Neighborhood Traffic Safety Campaigns: This education program appeals to local residents to comply with traffic laws. This usually consists of personalized letters or other materials distributed to all residents of a town or neighborhood, typically citing local, state, or national statistics on speeding.

Drive 25 Campaign: This program informs motorists of the benefits of driving at the speed limit and encourages them to be conscious of their speed. The effectiveness of this program can be bolstered by increased police presence and enforcement of the speed limit. The temporary nature of the campaign, and the cost of increased law enforcement, is a downside of the program.



Haddonfield, New Jersey's Drive 25 Campaign is an educational effort using media coverage and promotional materials, such as this window sticker.



Safe Routes to School (SRTS): This federally funded program is designed to make physical improvements that promote safe walking and biking passages to our schools. PennDOT and NJDOT each have their own program that they administer with federal funds. In addition, DVRPC administers the SRTS program that is part of the Transportation Enhancements Program.

Engineering

The most definitive resource on traffic calming is the Institute of Transportation Engineers (ITE) report, *Traffic Calming: State of the Practice*, published in August of 1999. Since that time, the ITE has created an extensive traffic calming web site (www.ite.org/traffic), which provides information and research regarding all aspects of traffic calming. The following descriptions of traffic calming techniques were taken from these sources. Although most traffic calming measures that involve changes to the physical environment have some effect on both volume and speed, they can be classified according to their dominant effect: volume control or speed control.

Not included in this list are regulatory measures, such as modifications to traffic signal timings or the implementation of new stop signs. As stated in *Traffic Calming: State of the Practice*, “Regulatory measures are generally perceived as less effective at calming traffic than are physical measures that by their nature are self-enforcing.” Stop signs and lane markings are considered to be more effective as complementary techniques than as stand-alone techniques. See pages 12 and 13 for examples of engineering techniques.

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 the 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 speeds of motorists passing their homes, record license plate and vehicle information, and submit the information to local law enforcement.

Policy

The policy approach to traffic calming is much more proactive when compared to the techniques described in the education, engineering, and enforcement categories, which are reactive. The policy approach seeks to set standards or performance measures (pedestrians, bicyclists, and motorists) 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 prevent the negative impacts of traffic in a comprehensive manner.

Some tools that may be utilized in a policy approach are the municipal Comprehensive Plan or Master Plan, including an Official Map delineating road rights-of-way, bicycle and pedestrian routes, and multi-purpose shared facilities.



ENGINEERING TRAFFIC CALMING TECHNIQUES

Volume Control Measures

The primary purpose of these techniques is to discourage or eliminate through-traffic.

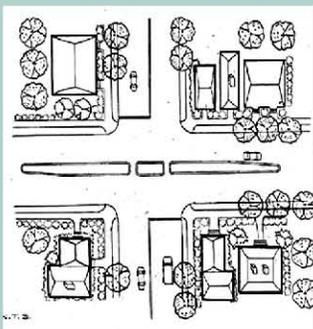
Full Street Closures: Barriers placed across a street to close the street completely to through-traffic, usually leaving only sidewalks or bicycle paths open. The barriers may consist of landscaped islands, walls, gates, side-by-side bollards, or any other obstructions that leave an opening smaller than the width of a passenger car.

Half Street Closures: Barriers that block travel in one direction for a short distance on otherwise two-way streets. When two half closures are placed across from one another at an intersection, the result is a semi-diverter. Half closures are often used in sets to make travel through neighborhoods with grid streets circuitous rather than direct.

Diagonal Diverters: Barriers placed diagonally across an intersection, blocking through-movement. Like half closures, diagonal diverters are usually staggered to create circuitous routes through neighborhoods.

Forced Turn Islands: Raised islands that block certain movements on approaches to an intersection.

Median Barriers: Raised islands located along the centerline of a street and continuing through an intersection so as to block through-movement at a cross street.



Median barrier illustration. Source: Pennsylvania's Traffic Calming Handbook, PennDOT

Speed Control Measures

The primary purpose of these techniques is to slow traffic. Measures are classified as vertical, horizontal, or narrowings.

Vertical Speed Control Measures

Achieve speed reductions by forcing motorists over vertical curves or over road surfaces that have a texture different from the main line.

Speed Humps: Rounded raised areas placed across the road. The Watts profile hump, developed and tested by Britain's Transport Research Laboratory, is the most common speed control measure in the United States.

Speed Tables: Flat-topped speed humps often constructed with brick or other textured materials on the flat section. Their long flat fields, plus ramps that are sometimes more gently sloped than speed humps, give speed tables higher design speeds than humps.

Raised Intersections: Flat raised areas covering entire intersections, with ramps on all approaches and often with brick or other textured materials on the flat section. They make entire intersections-crosswalks and all-pedestrian territory.

Textured Pavements: Roadway surfaces paved with brick, concrete pavers, stamped asphalt, or other surface materials that produce constant small changes in vertical alignment. A noted limitation to textured pavements, such as cobblestone, is that they may present difficulties for pedestrians and bicyclists, particularly in wet conditions.



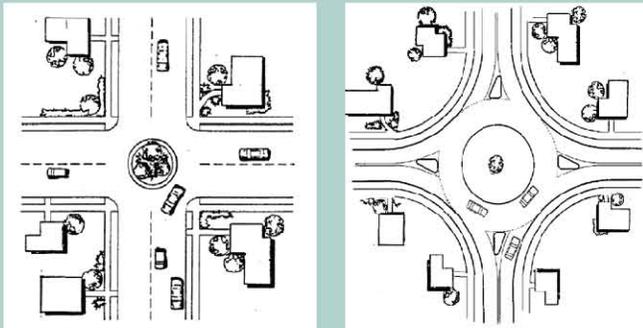
Textured crosswalk and intersection in Camden, NJ. Source: DVRPC



Horizontal Speed Control Measures

Achieve speed reductions by forcing drivers around horizontal curves and by blocking long views of the road ahead.

Roundabouts: Raised islands, placed in intersections, around which traffic circulates. Roundabouts are defined by yield control of all entering traffic, channelized approaches, and appropriate geometric curvature to ensure that travel speeds are less than 30 MPH. Roundabouts should not be confused with the older traffic circles that give priority to entering vehicles and are prone to a high rate of crashes and congestion.



Traffic circle (left) and roundabout (right). Source: Pennsylvania's Traffic Calming Handbook, PennDOT

Chicanes: Curb extensions that alternate from one side of the street to the other, forming S-shaped curves. A chicane-like effect can be achieved, at a fraction of the cost, by alternating on-street parking from one side of the street to the other.

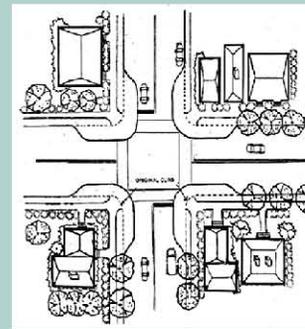
Lateral Shifts: Curb extensions on otherwise straight streets that cause travel lanes to bend one way and then bend back the other way toward the original direction of travel. Lateral shifts are one of the few measures that have been used on roadways where high traffic volumes and high posted speeds preclude more abrupt measures.

Realigned Intersections: Changes in alignment that convert T-intersections with straight approaches into curving streets that meet at right angles.

Narrowings Speed Control Measures

Use roadway narrowing to achieve speed reductions. The addition of on-street parking and/or striped bicycle lanes is another method of narrowing lanes for speed reduction.

Neckdowns/Bulbouts: Curb extensions at intersections that reduce roadway width from curb to curb. Neckdowns are the most common type of street narrowing. Their primary purpose is to "pedestrianize" intersections by shortening crossing distances for pedestrians and drawing attention to pedestrians via raised peninsulas.



Bulbout Diagram and a curb extension in Westmont, NJ. Sources: Pennsylvania's Traffic Calming Handbook, PennDOT and DVRPC

Center Islands: Raised islands located along the centerline of a street that narrow the travel lanes at that location. When placed at the entrance to a neighborhood, they are called gateways.



Gateway island in Centreville, DE. Source: DVRPC

Chokers: Curb extensions at midblock that narrow a street by widening the sidewalk or planting strip.



TRAFFIC CALMING ISSUES

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 the Americans with Disabilities Act (ADA) requirements.

Funding

The expense of implementing a comprehensive traffic calming program is a concern for communities. Though rarely significant in cost, without dedicated funding, most local governments must find flexible ways to finance these efforts from their capital or general funds. In Pennsylvania, Liquid Fuels funds may be used for traffic calming measures if a “Traffic Calming Study and Approval Process” has been completed. The appendix of this study also lists several funding sources to help communities implement the recommendations herein.

Problems for Emergency Vehicles 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 0–9 seconds, while roundabouts cause 1 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 from accident reductions 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 or 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. 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 aesthetically pleasing, temporary traffic calming installations allow for a trial run, to see how a particular 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.

The images to the right show temporary traffic calming treatments, simulating a curb bump out (top), and a median island (bottom).

Source: Top — www.flickr.com/photos/drdu/180850619/

Bottom — Chris Knigge, Princeton Borough





TAMING TRAFFIC METHODOLOGY

This report, *Taming Traffic*, is the sixth installment in a series of DVRPC's studies which explore context-sensitive solutions for communities in the Greater Philadelphia area. With the publication of this report, DVRPC has conducted a Taming Traffic study for one community in each of the nine counties that comprise the DVRPC region.

Data Collection and Report Production

DVRPC staff conducted multiple site visits to survey existing conditions within the study area. For this project, DVRPC also created a study advisory committee (SAC) composed of representatives from municipal and county governments, law enforcement, and NJ Transit. An initial meeting was held to introduce the project and discuss local issues that could be addressed with context-sensitive solutions.

Throughout the process, DVRPC staff held several internal meetings to synthesize study area issues and produce a range of recommendations. A document summarizing study area issues was developed and submitted to the study advisory committee. Subsequently, DVRPC staff also presented a series of draft conceptual recommendations for SAC review.

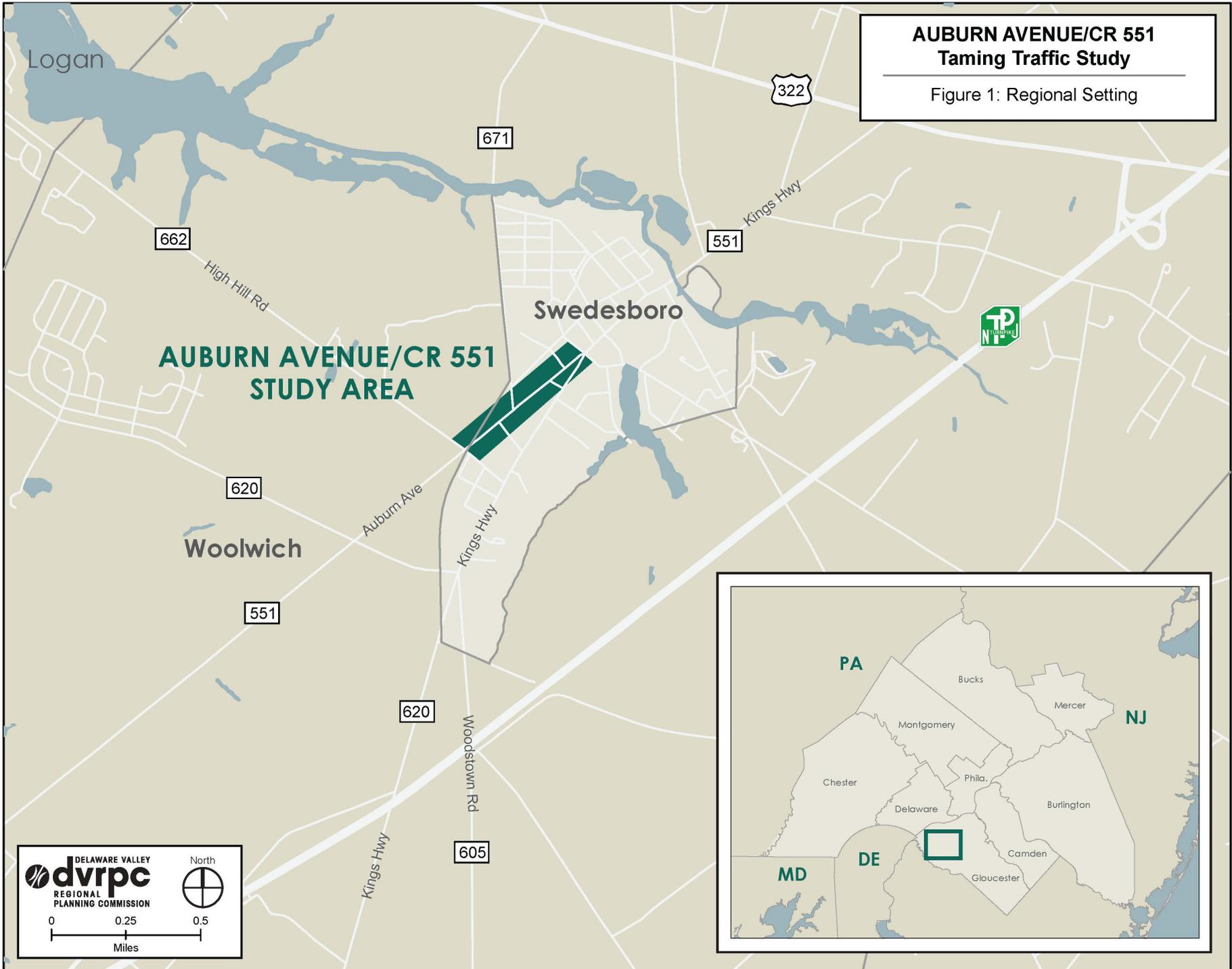
This final report combines the findings of extensive research and fieldwork as well as the local and professional expertise of the study advisory committee and DVRPC staff.



SECTION 2
CASE STUDY: AUBURN AVENUE/CR 551
SWEDESBORO BOROUGH
GLOUCESTER COUNTY, NJ

**AUBURN AVENUE/CR 551
Taming Traffic Study**

Figure 1: Regional Setting

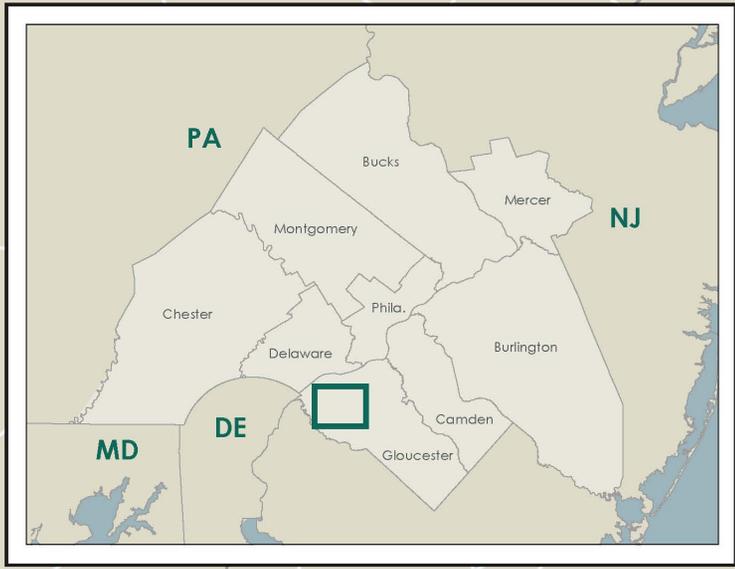


**AUBURN AVENUE/CR 551
STUDY AREA**

DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

North

0 0.25 0.5
Miles





EXISTING CONDITIONS

Street Name: Auburn Avenue/CR 551

Functional Class: Rural Connector

Posted Speed Limit: 35 MPH

AADT: 14,000-15,000

Location

The study area is a half-mile section of Gloucester County Route 551, or Auburn Avenue, in Swedesboro Borough between Grant Avenue and High Hill Road/CR 662. The southern end of the study area is adjacent to the border of Swedesboro and rapidly growing Woolwich Township, and the northern boundary of the study area is adjacent to downtown Swedesboro. Auburn Avenue/CR 551 is a commuter corridor and rural connector road for Woolwich Township and Swedesboro, connecting residents to US 322 in the north and to rural municipalities in Salem County to the south. US 322 is a major commuter corridor that links this part of Gloucester County to the NJ Turnpike and across the Delaware River to I-95 in Pennsylvania. Key intersections along this portion of US 322 include Locke Avenue/CR 671 and Kings Highway/CR 551, both of which are rural county commuter roads that contribute to traffic flows through Swedesboro.

Highway Access

Swedesboro lies between I-295 and the New Jersey Turnpike, and the study area is well connected to both highways. I-295 is accessible via CR 620/ Center Square Road, which connects to Auburn Avenue in Woolwich. US 322 provides access to exit 2 of the New Jersey Turnpike approximately two miles northeast of Swedesboro.



Top: Commercial establishments along Auburn Avenue south of Grant Avenue.

Above: Incomplete sidewalk network along Auburn Avenue north of Locke Avenue.

Source: DVRPC



Transit Access

The study area is not directly served by transit; however, NJ Transit's 401 bus route does run near the site. Route 401 connects Salem, NJ to Center City Philadelphia with service to Swedesboro and other New Jersey destinations, such as Woodbury, Gloucester City, and Camden. The bus runs on CR 551/Kings Highway through downtown Swedesboro and along CR 605/Kings Highway just east of the study area.

Roadway Characteristics

Within the study area limits, Auburn Avenue is approximately 30 feet in width. This section of Auburn Avenue is configured as one travel lane in each direction with a three to four foot shoulder. There are few sidewalks within the study area, and the lack of pedestrian amenities is one of the defining characteristics of the roadway. There is one painted crosswalk located near Poplar Street, which is intended to facilitate children walking to the Clifford School. This stretch of Auburn Avenue is a long straight-away with relatively long sight distances that connects downtown Swedesboro to growing residential areas to the south.

Local Context

The Auburn Avenue study area is located within the established suburb of Swedesboro. Adjacent to the traditional downtown, Auburn Avenue itself contains a mixture of commercial, institutional, and residential development along the roadway. In the northern portion of the study area, between Grant Avenue and Richardson Avenue, a variety of commercial uses, including an appliance and bedding store, a convenience store, and a series of small offices, are located on the western side of the roadway. The east side of this northern segment contains a gas station, an auto repair shop, and a fire station.

Further south, between Richardson Avenue and Locke Avenue, the eastern edge of the roadway is defined by single-family homes, while the western portion includes the Margaret C. Clifford School, a small shopping center, and a few single-family homes. The southernmost portion of the study area,



*The Study Area is located just south of downtown Swedesboro, pictured here.
Source: DVRPC*

between Locke Avenue and High Hill Road, contains a True Value hardware store on the west side of Auburn Avenue as well several single-family homes, a church, and a driveway leading to the Walter Hill School, which fronts onto Kings Highway.

Historic Character

Swedesboro Borough is one of the original settlements founded in the mid-1600s as part of the New Sweden colony along the Delaware River. Later, this area was taken over by Dutch colonists and then by the English, and it eventually became part of the English province of New Jersey. In 1767, this area became Woolwich Township through an act of Royal Charter. The settlement of Swedesboro was officially incorporated as a municipal government of New Jersey in 1902.



Crash Summary

A cursory analysis of reportable crashes was performed in an effort to identify crash safety problems and areas of crash concentrations related to the operation of the Auburn Avenue study corridor. The crash analysis study limits are identical to the project limits: milepost 15.15 to milepost 15.70.

DVRPC maintains a database and GIS files of New Jersey's crashes, which were obtained via the New Jersey Department of Transportation's (NJDOT) Bureau of Safety Programs Web page. DVRPC also utilizes Plan4Safety, NJDOT's crash analysis Web application. Only reportable crashes were considered in this analysis. A crash is considered reportable when it is determined that a minimum of \$500 worth of property damage has occurred, or someone is injured or killed. Non-reportable crashes were not considered in this analysis. The data analyzed in this report involves crashes coded to Auburn Avenue/CR 551 during years 2006, 2007, and 2008.

Corridor Crash Statistics

A total of nineteen crashes occurred on the study corridor during the three-year analysis period, of which there were fourteen property damage only, five injury crashes, and no fatalities. The majority of the crashes occurred during daylight conditions (89%) and on dry surface conditions (84%).

Figure 2 depicts the crash frequency and collision type distribution by location along the study corridor. One noteworthy trend is that 16 crashes happened at intersections and only three at between-intersection locations.

An examination of crash distribution by milepost reveals that 12 crashes occurred at the northern end of the study corridor (milepost 15.7), where Auburn Avenue intersects Kings Highway and Grant Avenue/Lake Avenue, representing 63 percent of the study area total. There were eight right angle crashes here. During the study kick-off meeting, local officials explained that geometric changes were implemented at this location during the analysis period intended to address safety issues and improve traffic flow. Specifically,



The True Value hardware store located just south of Locke Avenue. Source: DVRPC

the problematic right turn slip lane was removed, forcing southbound traffic enroute to Auburn Avenue to pass through the signal. A review of these 12 crashes identified a drop in crash frequency between 2007 and 2008, demonstrating the effectiveness of this improvement.

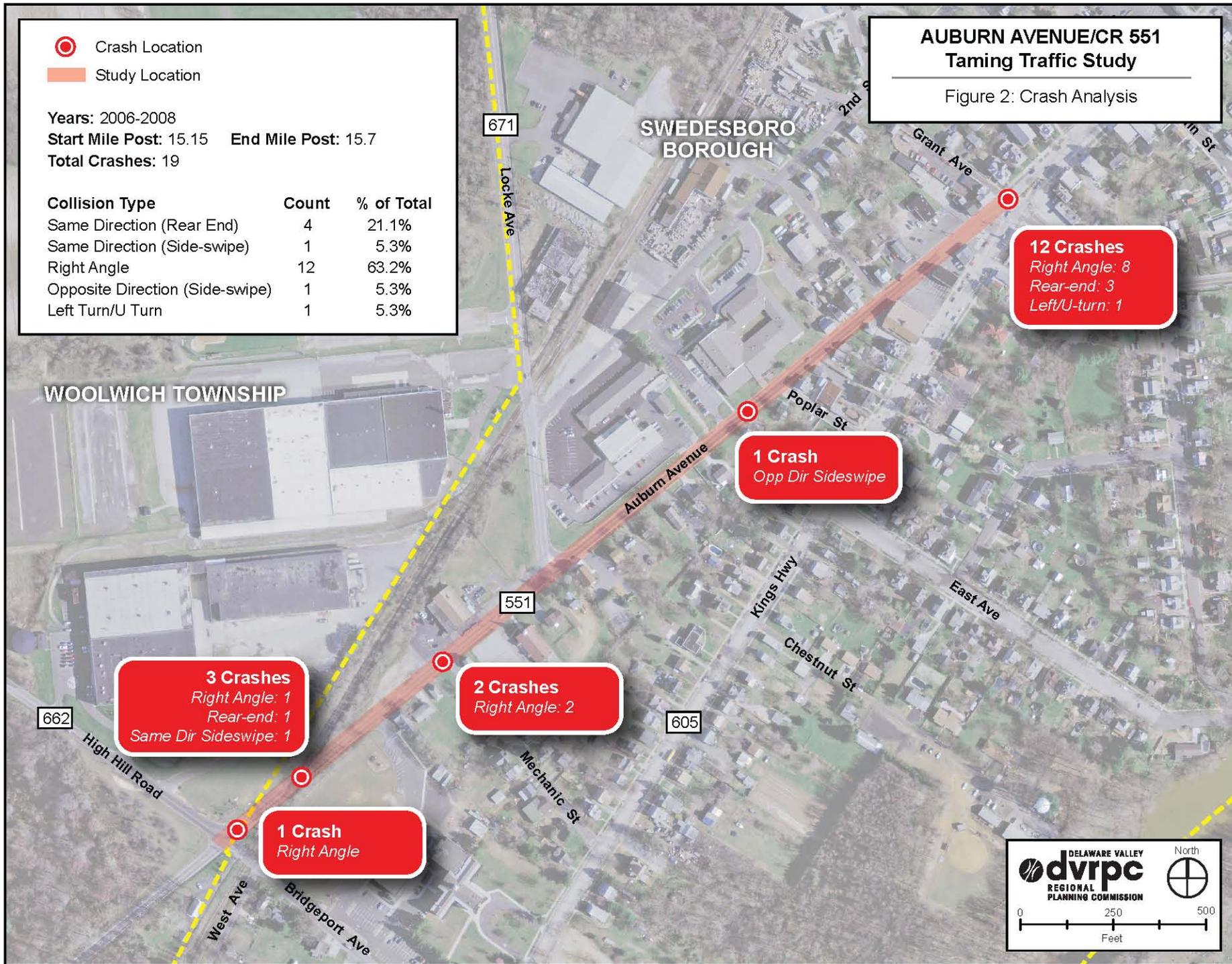
Removing these crashes from the corridor total leaves seven crashes remaining to analyze in the study section. The remaining crashes have little in common with each other except for the three crashes that took place at mile post 15.24, where the train tracks cross the roadway, though this is too few crashes to constitute a correctable trend. Also, a problem at this location was not identified in the field or indicated by the study team. It should be noted that the recommendations of the Taming Traffic study do have supplementary safety benefits.

 Crash Location
 Study Location

Years: 2006-2008
 Start Mile Post: 15.15 End Mile Post: 15.7
 Total Crashes: 19

Collision Type	Count	% of Total
Same Direction (Rear End)	4	21.1%
Same Direction (Side-swipe)	1	5.3%
Right Angle	12	63.2%
Opposite Direction (Side-swipe)	1	5.3%
Left Turn/U Turn	1	5.3%

AUBURN AVENUE/CR 551
Taming Traffic Study
 Figure 2: Crash Analysis



12 Crashes
 Right Angle: 8
 Rear-end: 3
 Left/U-turn: 1

1 Crash
 Opp Dir Sideswipe

3 Crashes
 Right Angle: 1
 Rear-end: 1
 Same Dir Sideswipe: 1

2 Crashes
 Right Angle: 2

1 Crash
 Right Angle

DELAWARE VALLEY

 REGIONAL
 PLANNING COMMISSION

North

 0 250 500
 Feet



Existing Plans and Studies

Although the Taming Traffic study area has not been the subject of a recent study, a few planning studies have been undertaken in the general vicinity in recent years. In 2007, DVRPC produced *Managing Change Along US 322 Corridor: Land Use and Transportation Issues, Policies, and Recommendations* (Publication Number 07004). Several area municipalities participated in this study, which analyzed conditions along the US 322 corridor in Gloucester County. Recommendations specific to the Taming Traffic study area included realigning Locke Avenue so that it meets Auburn Avenue at a right angle in order to improve the sight distance of drivers traveling east on Locke Avenue. Traffic calming measures were also suggested for Lake Avenue just north of the study area as a way of minimizing the impact of through traffic on nearby residential neighborhoods.

In 2009, Federici & Akin conducted a parking study for the Borough that explored opportunities for additional public parking to support downtown Swedesboro. The *Analysis of Parking Facilities in Central Business District* study considered six alternatives and ultimately recommended the creation of a parking lot accommodating 64 cars in the area behind Swedes Inn.

Finally, the *Gloucester County Transportation Needs Study* (Publication Number 09059) was recently completed by DVRPC. This study was prepared for the Gloucester County Planning Division to be included as the transportation element of the County's Master Plan Update. The study reinforces the importance of older downtown areas throughout the county and identifies Swedesboro's central business district as a priority location for community revitalization and transportation investment that supports multimodal options.

Case for Study

The Auburn Avenue study area represents an important transitional area between the more dense, mixed-use village character of downtown Swedesboro and the surrounding rural and rapidly suburbanizing area. However, the existing roadway characteristics create an unbalanced environment in which walking and bicycling are discouraged and even dangerous. Through this Taming Traffic study, the DVRPC study team recognizes the opportunity to provide context-sensitive solutions to build on the study area's existing assets, improve streetscape design, and enhance the vehicle and bicycle mobility while continuing to safely accommodate vehicles.



PROBLEM IDENTIFICATION

Based on site visits and one meeting of the study advisory committee (SAC), the DVRPC study team compiled the following list of issues affecting the study area. Context-sensitive solutions are suggested for these problems later in the document.

1. Lack of Walkability and Pedestrian Amenities

The lack of continuous sidewalks and the absence of safe crosswalks contributes to the corridor's poor pedestrian environment. The area's incomplete pedestrian infrastructure makes walking along and crossing Auburn Avenue difficult and potentially dangerous in some locations. Accordingly, travel to and from study area destinations such as schools, shops, and churches largely requires traveling by car. Aside from making the corridor more pedestrian-friendly, a complete network of sidewalks and crosswalks can make the study area a critical pedestrian link between downtown and recent and planned residential and commercial development in Woolwich Township.



Incomplete sidewalks making walking along Auburn Avenue unappealing and potentially dangerous. Source: DVRPC

2. Excessive Vehicle Speed

The Study Advisory Committee reported that average vehicle speeds along Auburn Avenue in the study area exceed the posted speed limit of 35 MPH. Although the DVRPC study team does not have speed data to document this observation, the corridor's location and roadway design may explain some speeding behavior. Drivers entering the study area from downtown Swedesboro, with its slower speeds and variety of traffic calming treatments, receive few contextual cues to slow down as they travel south along Auburn Avenue, a straight road with long sight distances. South of 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.



Auburn Avenue's straight alignment and 'in-between' context contribute to excessive vehicle speeds. Source: DVRPC



3. Lack of Bicycle Amenities

Difficult to walk, the lack of “share the road” signage and pavement markings also make the corridor inhospitable to bicyclists. The proximity of residential neighborhoods to corridor and Borough destinations suggests that bicycle travel could be a viable mode of transportation for area residents if Auburn Avenue were to become more bicycle-friendly. Bicycle accommodations along Auburn Avenue can help Swedesboro achieve its goal of promoting multi-modal transportation options on select roads.



Auburn Avenue could become an effective bicycle corridor that connects residential areas to downtown. Source: DVRPC

4. Access Management

Large curb cuts and poorly defined vehicular access points increase conflicts between motorists and pedestrians in various study area locations. In the northern portion of the study area, the Heritage’s Dairy Store property contains three large curb cuts, which present duplicative access points and disrupt the sidewalk. To the south, parking for the hardware store is accessed via a single large curb cut that runs the length of the property. Refining these access points can make vehicular movements more predictable and enhance pedestrian safety.



Large curb cuts, like this one near the True Value hardware store, detract from the pedestrian environment along Auburn Avenue. Source: DVRPC



5. Locke Avenue Intersection

Locke Avenue/CR 671 will become an increasingly important connection between US 322 and Auburn Avenue as development in Woolwich Township continues. Currently the angle of the Locke Avenue/Auburn Avenue limits the sight distance of motorists turning onto Auburn Avenue. Reconfiguring this intersection so that Locke Avenue meets Auburn Avenue at a right angle will improve safety and help the roadway accommodate future growth.



The intersection of Locke Avenue and Auburn Avenue as it exists today.
Source: DVRPC

6. Indeterminate Sense of Place

The study area sits between a well-defined downtown and a free-flowing stretch of road that functions as a highway. The study corridor itself contains a mix of somewhat contradictory elements from each of the adjoining environments, which contributes to its poorly defined sense of place. With relatively shallow building setbacks, the project area relates to downtown Swedesboro, yet the lack of pedestrian amenities and placemaking elements, such as street trees and consistent signage, encourage motorists to travel through the area as quickly as possible. Efforts to extend some elements of downtown branding may improve the identity of the study area while helping to calm traffic.



The study area represents an important transition area between downtown Swedesboro and rapidly growing residential areas to the south.
Source: DVRPC



CORRIDOR-WIDE IMPROVEMENTS

1. Shared Lane Markings (“Sharrows”)

Improvement: *Install shared lane markings (also known as sharrows) throughout the corridor to improve safety for cyclists and motorists.*

Although limited bicycle activity was observed on the corridor during separate site visits, the Study Advisory Committee described resident interest in improving bicycle access throughout Swedesboro. In addition, the new residential development south of the study area will likely increase bicycle usage along Auburn Avenue because it represents a direct route between new homes and downtown Swedesboro.

While Auburn Avenue cannot accommodate dedicated bicycle lanes due to limited pavement width, it can accommodate shared lane markings to raise driver awareness and enhance the safety of cyclists. Shared lane markings play the same role as share-the-road signage, but are more visible to motorists. Shared lane markings are included in the newest version of the Federal Highway Administration’s *Manual on Uniform Traffic Control Devices* (MUTCD) as a way to assist bicyclists with lateral positioning in a shared lane and encourage safe passing of bicyclists by motorists. If Swedesboro wishes to implement this recommendation, they should work closely with the County and State officials to evaluate the designs and dimensions that are most appropriate for Auburn Avenue.

2. Placemaking Elements

Improvement: *Explore a variety of placemaking treatments, such as streetscaping, pedestrian lighting, and high visibility crosswalks, to enhance the identity of this gateway corridor.*

When properly combined, placemaking elements can help establish a unique visual identity for a community. Placemaking strategies may involve “streetscaping” elements, such as banners, pedestrian-oriented street lamps, trees, distinctive pavers, and benches. Placemaking may also include adoption of consistent colors, materials, and textures for sidewalks, crosswalks, and wayfinding signage.



*Shared lane marking or “sharrow” on a roadway in Asheville, NC.
Source: www.pedbikeimages.org/LyubovZuyeva*

Some placemaking elements also provide safety benefits by improving pedestrian crosswalks and street lighting. In some cases, placemaking elements have also been shown to have a traffic calming effect. Although streetscaping features placed along the sides of the roadway do not force a change in driver behavior, they do signify a change in context through visual cues that encourage motorists to drive more slowly.

Downtown Swedesboro is an example of an area in which a robust combination of placemaking elements has been used to create a distinctive sense of place. A similar combination of elements is inappropriate for the study area because Auburn Avenue does not contain the same density of businesses and pedestrian activity. However, because the study area does serve a critical gateway to downtown, some placemaking techniques can be used to enhance the look and feel of the corridor while also supporting traffic calming. Regularly spaced street trees, high visibility crosswalks, and decorative banners may be effective in extending some of the feel of downtown south along Auburn Avenue. Some of these elements are incorporated into photosimulations in this document.



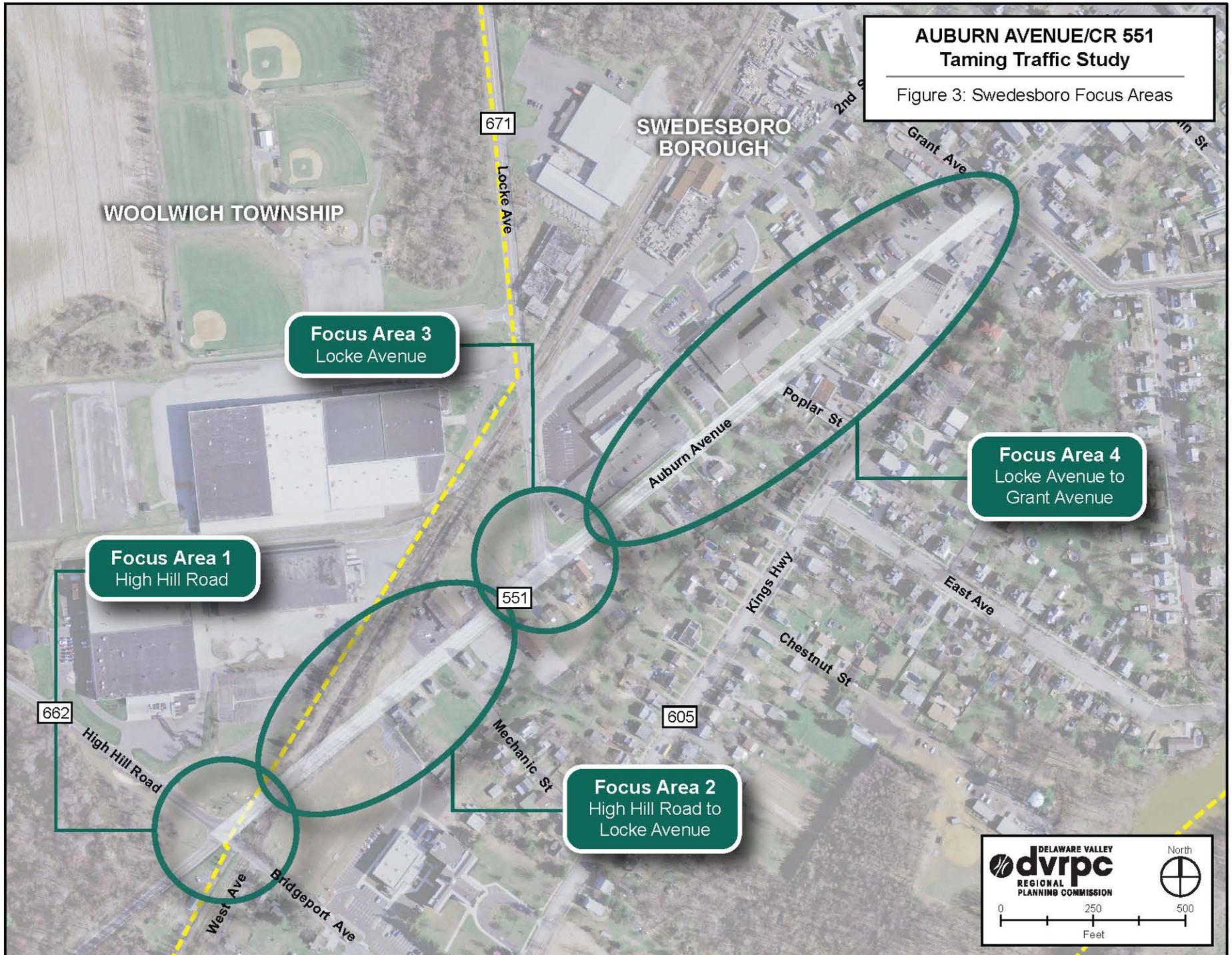
SITE-SPECIFIC IMPROVEMENTS

In addition to the corridor-wide improvements discussed on the previous page, the Project Team has prescribed a series of site-specific recommendations for the corridor. For the purposes of the study, the corridor has been divided into four focus areas based on land use and roadway context. The extent of each focus area is illustrated in Figure 3: Swedesboro Focus Areas. Focus Area 1 centers on the intersection of Auburn Avenue and CR 662/High Hill Road. Focus Area 2 is composed of the area of Auburn Avenue between CR 662/High Hill Road and CR 671/Locke Avenue. Focus Area 3 contains the intersection of Auburn Avenue and CR 671/Locke Avenue. Finally, Focus Area 4 extends along Auburn Avenue from Locke Avenue north to Grant Avenue.

A series of context-sensitive solutions for each focus area is presented on the following pages.

**AUBURN AVENUE/CR 551
Taming Traffic Study**

Figure 3: Swedesboro Focus Areas





Focus Area 1: High Hill Road

The intersection of Auburn Avenue and High Hill Road lies partly in neighboring Woolwich Township and represents an important point of entry into Swedesboro. Currently, the intersection functions reasonably well for vehicular traffic but the lack of continuous sidewalk and safe crossings inhibits pedestrian travel.

The recommended improvements in this area are intended to enhance pedestrian access and safety. This study recommends installing new sidewalks along southbound Auburn Avenue wherever they currently do not exist. The southbound side of the street was selected for shorter-term pedestrian improvements due to its relatively flat terrain and lack of impediments when compared to the northbound side. Installing these sidewalks and a new high-visibility crosswalk with ADA-approved curb ramps across High Hill Road will improve pedestrian safety and effectively connect the study area to the recently installed multi-use trail which currently runs from High Hill Road south to CR 620/Center Square Road.

A stop bar is recommended for Bridgeport Road at Auburn Avenue to encourage vehicles to fully stop before turning onto Auburn Avenue or continuing onto High Hill Road.

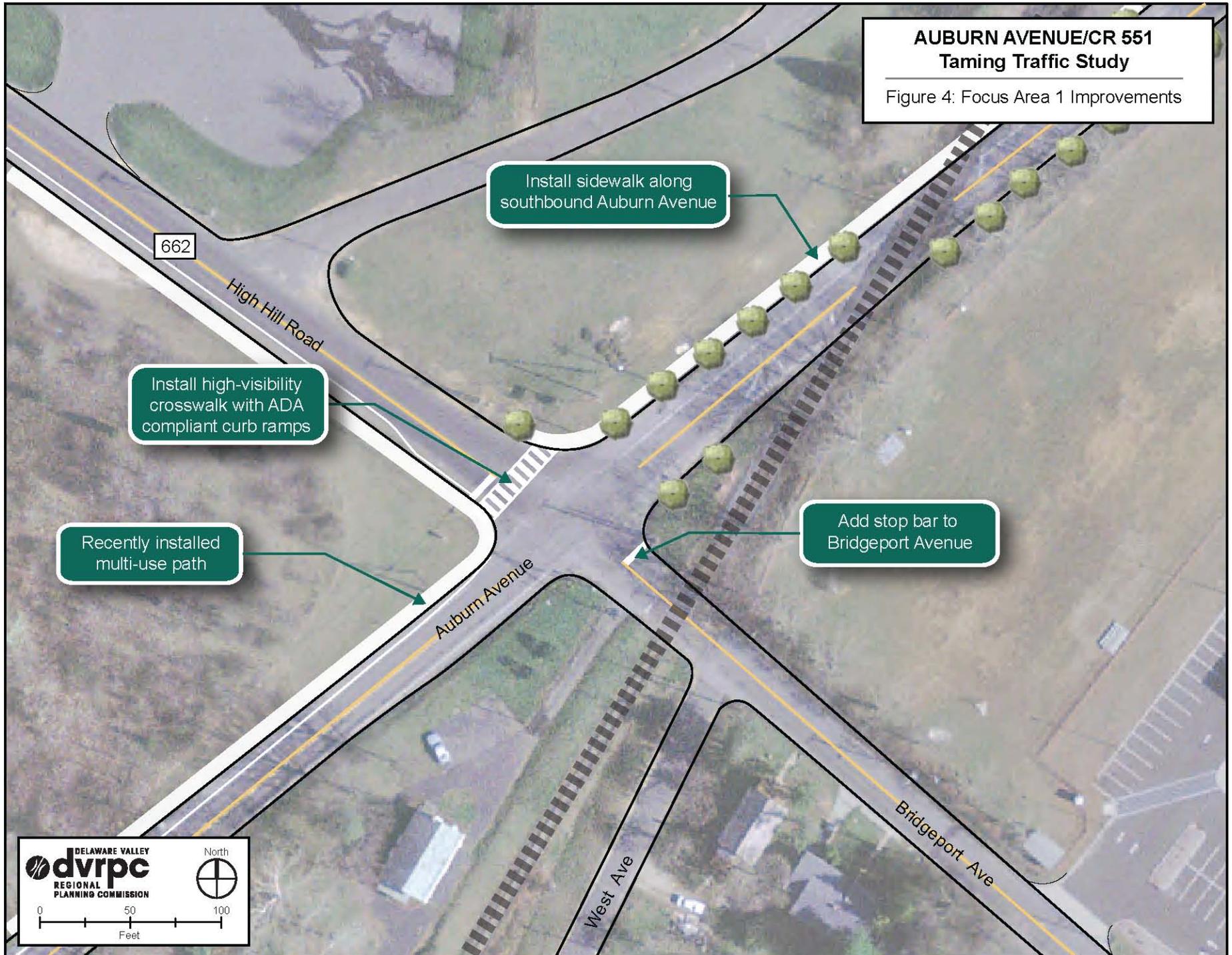
Finally, the planting of regularly spaced street trees in this location and at appropriate locations along the corridor will help establish a more orderly roadway context where drivers are discouraged from speeding.

Focus Area 1 Improvements

1. Install sidewalk along southbound Auburn Avenue
2. Install high-visibility crosswalk over High Hill Road
3. Install ADA-approved curb ramps
4. Add stop bar to Bridgeport Avenue

**AUBURN AVENUE/CR 551
Taming Traffic Study**

Figure 4: Focus Area 1 Improvements





Focus Area 2: High Hill Road to Locke Avenue

The southbound side of Auburn Avenue in this area contains a large industrial/warehousing facility; however, the land immediately adjacent to Auburn Avenue is mostly undeveloped except for a hardware store. The northbound side of Auburn Avenue in this area contains a slightly denser environment, including residences and a church as well as secondary access to the Walter H. Hill Elementary School.

The primary problem identified in this area is the complete lack of pedestrian infrastructure. Installing a sidewalk along the southbound side of Auburn Avenue, where land is available, will greatly enhance pedestrian access along the corridor. A sidewalk can be complemented by changes to the Swedesboro True Value hardware store to improve vehicular access and pedestrian safety. Currently, head-in parking is provided off of Auburn Avenue, and a larger parking lot is located southwest of the store. Both parking areas represent large continuous curb cuts that encumber pedestrian activity and safety. Formalizing distinct ingress and egress points through the use of curbing for the parking lot would enhance pedestrian comfort in the area. Similarly, an alternative parking arrangement for the head-in parking may be necessary to ensure pedestrian comfort on the site.

Adding a sidewalk on the northbound side of Auburn Avenue will be more problematic because of smaller building setbacks and more challenging topography. Nonetheless, enhancing pedestrian access on both sides of Auburn Avenue remains a priority for the Borough. Designing a pedestrian solution for the northbound side of Auburn Avenue will require additional feasibility studies.

The Borough may wish to consider restricting turning movements for vehicles exiting First Baptist Church onto Auburn Avenue. By instituting a right turn only lane at this location, vehicle conflicts created by left turns will be eliminated. Vehicles wishing to travel south on Auburn Avenue would need to use the Mechanic Street exit.

Focus Area 2 Improvements

Short Term

1. Install sidewalk along southbound Auburn Avenue
2. Formalize distinct entry and exit ways for hardware store site
3. Institute a right turn only lane for vehicles exiting First Baptist Church onto Auburn Avenue

Long Term

1. Study feasibility of completing sidewalk network along northbound Auburn Avenue

**AUBURN AVENUE/CR 551
Taming Traffic Study**

Figure 5: Focus Area 2 Improvements

Institute right turn only lane

Formalize distinct entry and exit ways for parking area

Install sidewalk along southbound roadway

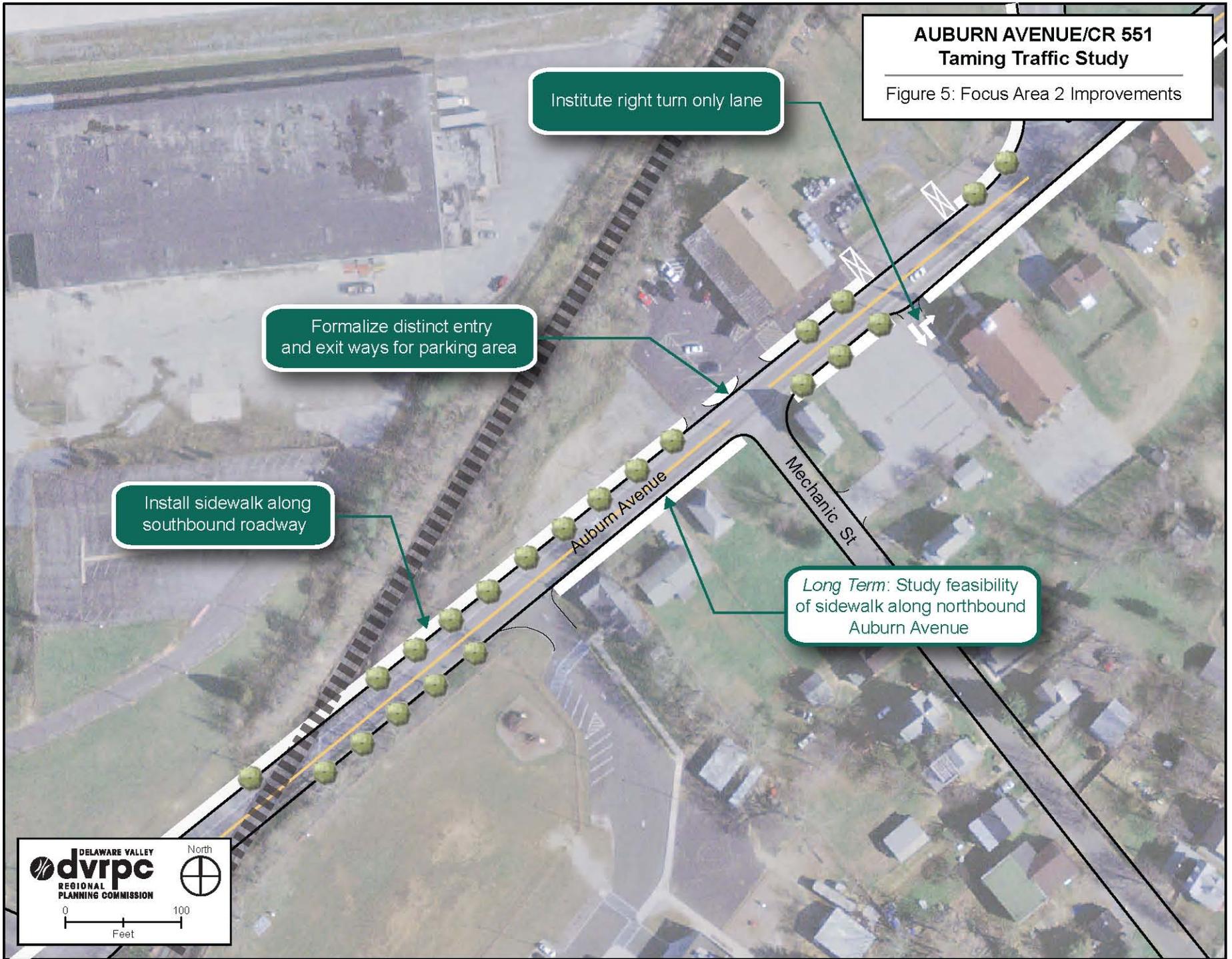
Long Term: Study feasibility of sidewalk along northbound Auburn Avenue

DELAWARE VALLEY
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REGIONAL
PLANNING COMMISSION

North



0 100
Feet





Focus Area 3: Locke Avenue

This location was originally identified in the study titled *Managing Change Along US 322 Corridor: Land Use and Transportation Issues, Policies and Recommendations* (June 2007) and continues to be a priority for Swedesboro. Specifically, the *Managing Change* study discusses the concerns about the future volume of traffic this intersection will experience if residential development continues within Woolwich and areas south of US 322. At issue here is the skewed angle at which Locke Avenue meets Auburn Avenue, resulting in compromised sight distance for traffic entering Auburn Avenue, and an especially wide crossing for pedestrians. The skewed geometry and wide approach lane also encourages speeding for drivers turning left onto Locke Avenue from Auburn Avenue northbound, and turning right onto Auburn southbound from Locke Avenue. The intersection is located about midway between Kings Highway and High Hill Road, marking the contextual transition from rural to suburban. Locke Avenue is an important connector for drivers traveling between Swedesboro and I-295 via US 322. It also serves a major municipal sports complex that is accessible for pedestrians and bicyclists, though accommodations for those modes are lacking.

Recommended improvements at this location address sight distance issues, lacking pedestrian amenities, and the need for traffic calming. First presented in the *Managing Change* study, the realignment of the intersection to a more perpendicular geometry has several benefits, and allows other improvements to follow. The Taming Traffic recommendation strikes a balance between the more intensive concept from that document and the current alignment (see graphic on facing page). The result is better sight distance for drivers entering Auburn Avenue and slower movements between roads as the turning angle is increased. When roads meet each other at a right angle, it makes crossing for pedestrians easier and safer. By adding a sidewalk along southbound Auburn Avenue, upgrading the crosswalk striping, and adding ADA-compliant curb ramps, the pedestrian environment meets the standard set by the downtown area of Swedesboro along Kings Highway.

The simulation in Figure 8 depicts Auburn Avenue just north of Locke Avenue and illustrates how the addition of sidewalk, street trees, and sharrows can improve multi-modal access and safety in the study area.

Focus Area 3 Improvements

Short Term

1. Straighten Locke Avenue intersection
2. Install sidewalk along southbound Auburn Avenue
3. Install high-visibility crosswalks
4. Install ADA-approved curb ramps

Long Term

1. Study feasibility of completing sidewalk network along northbound Auburn Avenue

**AUBURN AVENUE/CR 551
Taming Traffic Study**

Figure 6: Focus Area 3 Improvements

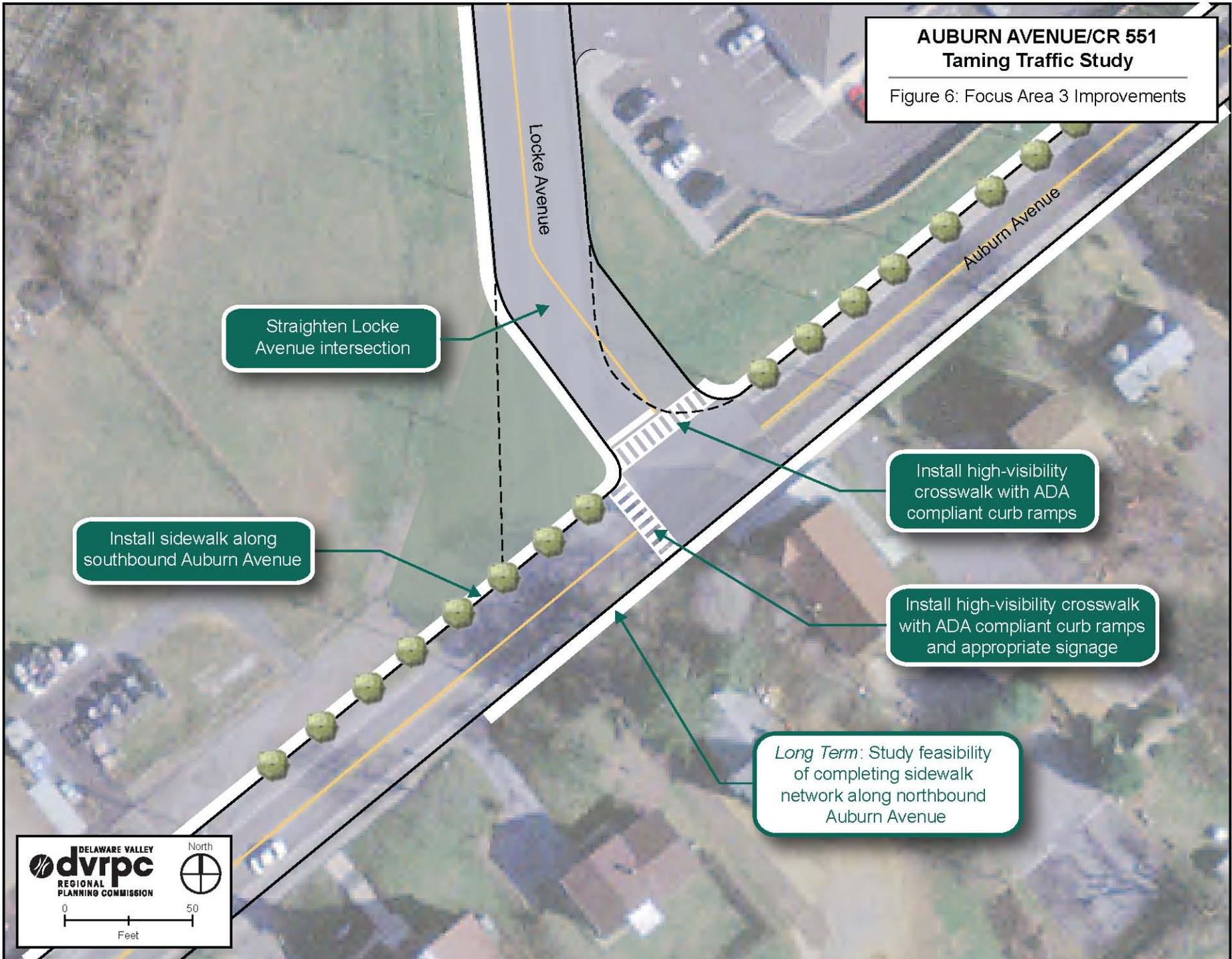




Figure 7: Area North of Locke Avenue Existing Conditions – Photograph of existing conditions along Auburn Avenue looking north toward Grant Avenue. A shopping center and the Clifford School are visible to the left. (Source: DVRPC)



Figure 8: Area North of Locke Avenue Simulation – Photo simulation of proposed improvements along Auburn Avenue. A sidewalk and street trees improve the pedestrian environment, while shared lane markings enhance bicycle circulation. (Source: DVRPC)



Focus Area 4: Locke Avenue to Grant Avenue

The stretch of Auburn Avenue between Locke and Grant Avenues contains a built-out mix of uses along the southbound side and a predominantly single-family residential neighborhood northbound. The proximity of people to services makes for an ideal pedestrian and bicyclist opportunity and a logical extension of the Swedesboro downtown. Currently, automobile traffic has priority here as sidewalks are intermittent, crossings below standard, and bicycling accommodations missing. Destinations found here are a strip mall, a school, a dairy/convenience store, and a few professional offices. Among the concerns expressed by the study committee was the speed of traffic, wide and undefined driveways, lacking pedestrian and bicyclist environment, and incidents of cut-through traffic.

The long-term vision for this stretch of roadway includes a continuous sidewalk along the northbound direction to serve pedestrian circulation and generally improve access for the residential community. Sidewalks are present, though intermittent, and only along the southbound side of Auburn Avenue. Matching accommodations along both sides of the roadway would be ideal. Due to limited space, this improvement requires high levels of coordination and capital. The short-term improvement recommendations are lower-cost and easier to implement, including installing missing small sidewalk pieces along southbound, upgrading the mid-block crossing at Poplar Street, and formalizing wide entry and exit points where necessary.

Focus Area 4 Improvements

Short Term

1. Restripe and improve visibility of mid-block crosswalk
2. Install sidewalk along Auburn Avenue
3. Formalize distinct entry and exit ways for parking area

Long Term

1. Explore opportunities to redesign convenience store site
2. Study feasibility of completing sidewalk network along northbound Auburn Avenue

AUBURN AVENUE/CR 551 Taming Traffic Study

Figure 9: Focus Area 4 Improvements

Long Term: Explore opportunities to redesign convenience store site

Formalize distinct entry and exit ways for parking area

Restripe and improve visibility of crosswalk

Install sidewalk along southbound Auburn Road

Long Term: Study feasibility of completing sidewalk network along northbound Auburn Avenue

DELAWARE VALLEY
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REGIONAL
PLANNING COMMISSION

0 75 150
Feet

North

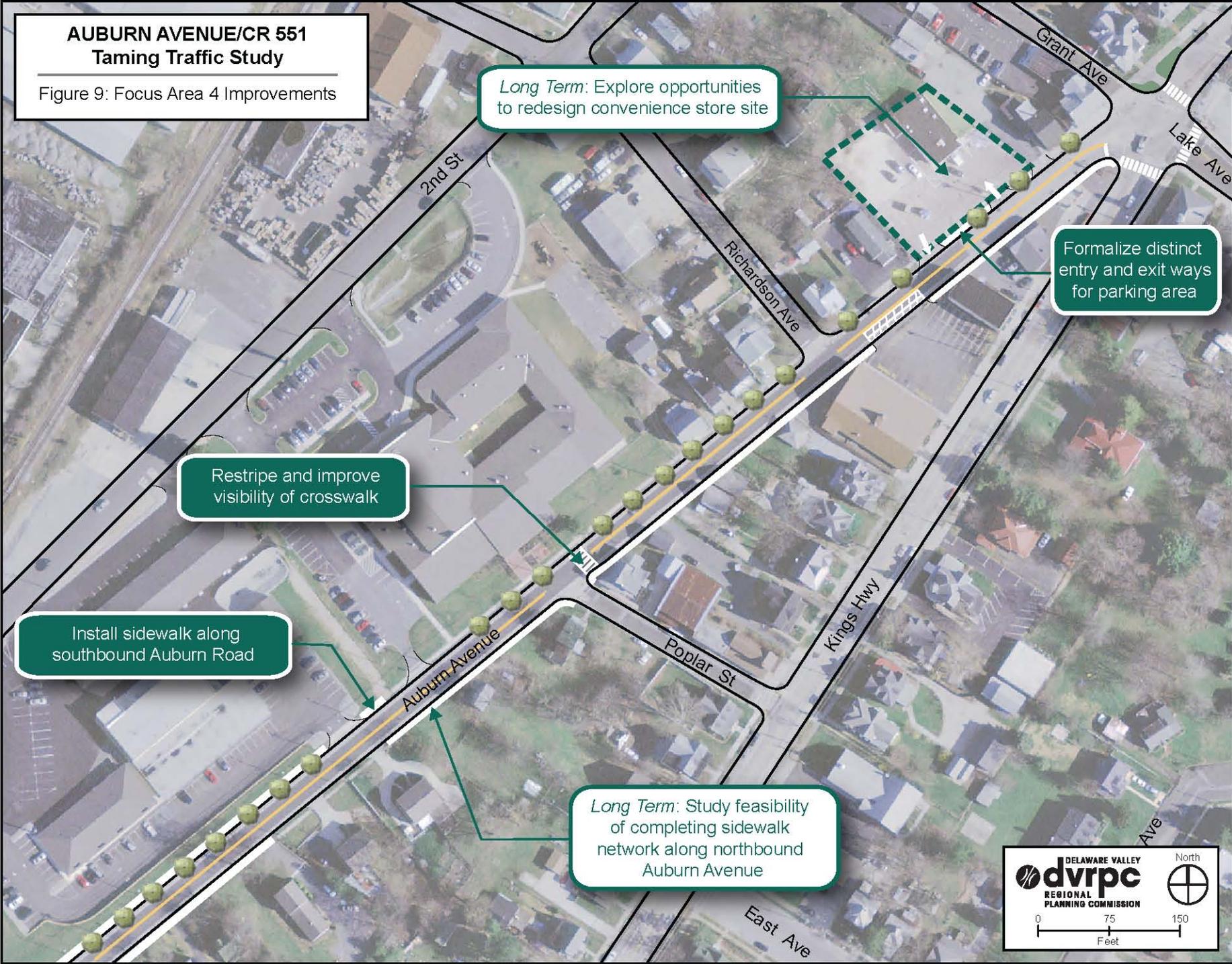




Figure 10: Auburn Avenue and Poplar Street Existing Conditions – Photograph of the existing conditions along Auburn Avenue, looking south toward Poplar Street. This crosswalk links the Clifford School to residential areas east of Auburn Avenue.



Figure 11: Auburn Avenue and Poplar Street Simulation – Photo simulation of proposed improvements near the intersection of Auburn Avenue and Poplar Street. Recommendations include enhanced crosswalk and pedestrian signage, the extension of placemaking elements, and sharrows.



IMPLEMENTATION

The Taming Traffic planning process has resulted in a series of recommendations designed to improve the function and safety of Auburn Avenue for all users. While it is often a challenge for municipalities to transition concepts and recommendations from plan to implementation, Swedesboro's participation in this study is an important first step. It is easiest to move a concept forward when it is developed through a consensus-building process and reflected in planning documents.

The path to implementation should continue to incorporate all stakeholders, leverage resources, and address concerns raised along the way. Auburn Avenue is a county road, and Gloucester County has already taken a strong interest in this roadway and will be an important partner moving forward. County and Borough officials should work together to implement some of the roadway recommendations. The Borough may wish to convene a task force composed of public officials, local residents, and business owners to prioritize the roadway recommendations, analyze the feasibility of the placemaking recommendations, and start to seek funding.

It is important to note that the recommendations presented here are not an all-or-nothing strategy; they can and should be applied in phases to control costs and improve coordination with stakeholders. Where appropriate, shorter- and longer-term distinctions were noted for specific recommendations. For example, the addition of sidewalks along the southbound side of the road, where setbacks are greater, will be easier to implement than the installation of sidewalks along portions of northbound roadway. Furthermore, some recommendations, such as the installation of high-visibility crosswalks and ADA-approved curb ramps are smaller in scale and do not require as much engineering or design consultation as the proposed realignment of Locke Avenue.

However, despite an emphasis on a phased approach, municipal officials should keep the big picture in mind. Many context-sensitive solutions rely on complementary elements that help alter the overall perception of a roadway. Re-stripping a roadway or adding sharrows may improve safety, but may not

have visually transformative benefits unless combined with streetscaping, new crosswalks, and other placemaking improvements. So while it is important that municipal officials proceed in phases, the long-term vision for Auburn Avenue should guide each individual project.

Finding adequate funding for projects that arise from this study could be a challenge in the current economic climate. However, the mutually agreed-upon goals and objectives described in this study may give Swedesboro an advantage in its search for funds. Funding could come from the county or state, competitive grants from DVRPC and NJDOT, or other sources of revenue available to the Borough. A list of municipal resources that may be useful is contained in the appendix.

SECTION 3

CONCLUSION AND BIBLIOGRAPHY



CONCLUSION

The case study of Auburn Avenue/CR 551 in Swedesboro exhibits how context-sensitive solutions can be applied to an existing roadway and proactively prepare for continued development that could increase traffic. This study proposes a set of recommendations developed by a diverse group of stakeholders to guide the Borough as it seeks to improve one of its most important thoroughfares.

The CSS strategies suggested here are not complex, but together they have the potential to enhance the safety of Auburn Avenue and to build a context just south of the downtown that better accommodates drivers and encourages slower vehicle speeds. Currently, this stretch of Auburn Avenue is difficult to travel on foot or bike and does not provide the visual clues necessary to make drivers aware that they are driving through a distinctive community that includes a mix of residential, commercial, and civic uses. Implementing the recommendations contained in this study will provide residents with the option of walking or cycling to nearby destinations and create a proper gateway transition area into Swedesboro and the Borough's downtown.

Unlike past Taming Traffic studies, this plan contains few engineering traffic calming techniques. Due to Auburn Avenue's 35 MPH speed limit and traffic volume, the use of physical obstacles would be inappropriate. For example, devices such as speed tables often have a design speed of 28 MPH. Instead, many of the recommendations are visual and psychological – transforming the look and feel of the roadway to communicate the surrounding context to drivers. Adding sidewalks and improving the visibility of crosswalks will enhance pedestrian mobility and safety, while streetscape improvements can help extend some of the look and feel of downtown.

Rarely is a problem solved by just one measure alone. By combining a range of context-sensitive solutions, traffic calming, and smart growth principles, Swedesboro can create a safer environment for all roadway users and also enhance the already strong sense of place found within the Borough.



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APPENDIX A

SAMPLE COST ESTIMATES



COSTS OF RECOMMENDED IMPROVEMENTS

Understanding how much an improvement will cost to implement is critical to determining the feasibility of a project. The sample cost estimates given below were derived from recent Pennsylvania Department of Transportation item price histories and should only be used as a guide for general planning purposes.

Pavement Markings

Pavement markings, such as roadway striping and stop bars, vary in cost based on length and the type of materials used. As an example, the shared lane markings (sharrows) described in this study can cost approximately \$200 for materials and installation.

Pedestrian Infrastructure

The report recommends a variety of improvements designed to enhance the pedestrian environment. While some of these improvements may require additional engineering costs, we can estimate that materials and installation costs for each square yard of sidewalk will average \$70, and each linear foot of crosswalk will cost roughly \$5.

Streetscaping Elements

A variety of streetscaping elements could be employed along Auburn Avenue to enhance the corridor's sense of place. Potential improvements include the addition of street trees, banners, and pedestrian-scale lighting. Costs for these items can vary widely. As many of these elements were recently implemented in downtown Swedesboro, the Borough may already have current cost estimates for the types of elements that would complement the existing character.



SAMPLE TRAFFIC CALMING COSTS

The following are sample costs for various traffic calming techniques. They were culled from various sources, including ITE's Traffic Calming State of the Practice, which gathered data from such locations as Sarasota, Florida, Portland, Oregon, and Seattle, Washington. Other sources include traffic calming guidelines created for Ithaca, New York and Bentonville, Arkansas in 2007 and 2009 respectively. Communities may find that actual prices differ based on numerous variables, including materials, project extent, and local economies. These costs include materials and installation, but do not cover expenses for design and engineering.

Technique	Estimated Cost	Additional Comments
Bike Lane	\$5,000 — \$50,000 per mile	
Center Island	\$5,000 — \$15,000	Cost depends on size, curbing, and landscape features.
Chicane	\$8,000 — \$15,000	Chicanes are less expensive when the existing curb is kept and the new curb is precast instead of removing the existing curb and pouring in place the new curb.
Choker	\$7,000 — \$20,000	Asphalt streets are less expensive than concrete streets.
Curb Bulbout	\$5,000 — \$20,000 per corner	Midblock measures may cost less if they are smaller.
Diagonal Diverter	\$15,000 — \$45,000	Costs depend on intersection width, drainage requirements, and landscaping.
Gateway Treatment	\$5,000 — \$50,000+	Cost depends on the design and extent of physical elements used.
Median Barrier	\$15,000 — \$20,000 per 100 linear feet	
Raised Crosswalk	\$4,000 — \$15,000	
Raised Intersection	\$15,000 — \$50,000+	Cost depends on the width of intersecting roadways and drainage requirements.
Speed Hump or Table	\$6,000 — \$10,000	Cost depends on roadway width.
Half Street Closure	\$10,000 — \$25,000	
Full Street Closure	\$30,000 — \$100,000	
Roundabout	\$6,000 — \$45,000+	Roundabouts that fit within existing curbs, gutters, and drains, and have no irrigation for landscaping, are least expensive. Costs increase if right-of-way needs to be acquired or utilities need to be relocated.
Traffic Sign	\$3,000 — \$20,000+	
Traffic Signal	\$15,000 — \$60,000	

APPENDIX B

FUNDING SOURCES



POTENTIAL FUNDING SOURCES FOR SWEDESBORO BOROUGH

BICYCLE/PEDESTRIAN PLANNING ASSISTANCE

Eligibility: New Jersey municipalities
Purpose: Provides municipalities with consultant expertise to develop circulation elements and other transportation related initiatives
Terms: Varies
Contact: New Jersey Department of Transportation
Phone: 609-530-2856
Website: www.state.nj.us/transportation

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: www.bikesbelong.org

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

FUND FOR COMMUNITY ECONOMIC DEVELOPMENT

Eligibility: New Jersey Community Development Organizations, developers
Purpose: Finance feasibility studies or other predevelopment activities
Terms: Low-interest loans up to \$50,000
Contact: New Jersey Economic Development Authority
Phone: 609-777-4898
Website: www.njeda.com

LOCAL DISCRETIONARY AID

Eligibility: New Jersey municipalities, counties
Purpose: Provides funding for emergencies, as well as for pedestrian safety and bicycle projects
Terms: At the discretion of the Commissioner of Transportation
Contact: New Jersey Department of Transportation
Website: www.state.nj.us/transportation

LOCAL LEAD / LOCAL SCOPING

Eligibility: New Jersey municipalities and counties
Purpose: Provides an opportunity for subregions to apply for funding for the design, right-of-way, or construction
Terms: Must meet select criteria; construction costs must be a minimum of \$250,000
Deadline: Varies
Contact: New Jersey Department of Transportation
Website: www.state.nj.us/transportation



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.state.nj.us/transportation

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

LOWE'S HOME IMPROVEMENT

Eligibility: Nonprofits

Purpose: Support of public education, community improvement projects, and home safety initiatives

Terms: \$5,000 to \$25,000 with a total of about \$3 million annually

Deadline: Varies

Contact: Lowe's Companies, Inc.

Phone: n/a

Website: www.lowes.com

MUNICIPAL LOANS

Eligibility: New Jersey municipalities, counties, redevelopment entities, homeowners

Purpose: Returns contaminated and underutilized properties to productive reuse

Terms: Loans: \$1 million per year per site (\$3 million for municipalities) may be borrowed at 2 points below the Federal Rate.

Deadline: Continuous (partnership with NJDEP)

Contact: New Jersey Economic Development Authority, Hazardous Discharge Site Remediation Fund

Phone: 609-777-0990

Website: www.njeda.com

MUNICIPAL LOAN POOL PROGRAM

Eligibility: New Jersey municipalities

Purpose: Funding equipment purchases, capital improvements, or refinance debt

Contact: New Jersey Economic Development Authority

Phone: 609-292-0192

Website: www.njeda.com

SAFE STREETS 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

Phone: 609-530-6551

Website: www.state.nj.us/transportation



SMART FUTURES GRANT

Eligibility: New Jersey local governments, counties, nonprofits
Purpose: Funds projects that balance development and redevelopment with the preservation of open space and environmental resources
Terms: Grants are announced yearly
Contact: Department of Community Affairs, Office of Smart Growth
Phone: 609-292-7156
Website: www.state.nj.us/dca

SMART GROWTH PLANNING GRANTS FOR MUNICIPALITIES

Eligibility: New Jersey municipalities
Purpose: To fund various planning studies
Terms: Maximum of \$20,000
Contact: Association of New Jersey Environmental Commissions (ANJEC)
Phone: 973-539-7547
Website: www.anjec.org

SMART GROWTH PREDEVELOPMENT FUNDING

Eligibility: Developers undertaking mixed-use projects, development of suburban and rural communities.
Purpose: To finance site preparations costs such as demolition, removal of debris, or engineering.
Terms: Low-interest loans and loan guarantees up to \$1 million
Deadline: Varies
Contact: New Jersey Economic Development Authority
Phone: 609-777-4898
Website: www.njeda.com

TRANSPORTATION AND COMMUNITY DEVELOPMENT INITIATIVE (TCDI)

Eligibility: Eligible municipalities
Purpose: Support local planning projects to improve transportation and encourage redevelopment
Terms: Grants up to \$100,000 of total project cost; 20% 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: New Jersey municipalities and counties
Purpose: Provides funds for community-based projects that expand travel choices and enhance the transportation network
Terms: Varies; this is a competitive program
Deadline: Varies
Contact: New Jersey Department of Transportation, Division of Local Aid and Economic Development
Phone: 215-238-2881
Website: www.dvrpc.org/te

APPENDIX C

STUDY ADVISORY COMMITTEE



STUDY ADVISORY COMMITTEE

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TAMING TRAFFIC: CONTEXT-SENSITIVE SOLUTIONS IN THE DVRPC REGION

Publication Number: 09025

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Geographic Area Covered: Nine-County Delaware Valley Region, including the counties of Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey; and specifically Swedesboro Borough in Gloucester County, NJ.

Key Words: Traffic calming, context-sensitive solutions, context-sensitive design, balanced circulation, enforcement, engineering, education, policy, smart growth, placemaking, multi-modal, crosswalk, CR 551, Swedesboro Borough.

Abstract: This report focuses on the application of context-sensitive solutions (CSS) principles and best practices on the case study site of CR 551 in Swedesboro Borough in Gloucester County, NJ. CSS is a means to link land use and transportation planning and implementation. The case study includes a series of recommendations and before and after photo simulations. The study includes an explanation of CSS, traffic calming, and related techniques, as well as a discussion of policy at the state level and in the Delaware Valley region.

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