

City of Philadelphia North Broad Street Pedestrian Safety Audit

May 2009



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The crash data used in this report was provided by the Pennsylvania Department of Transportation for the Delaware Valley Regional Planning Commission's traffic safety related transportation planning and programming purposes only. The raw data remains the property of the Pennsylvania Department of Transportation and its release to third parties is expressly prohibited without the written consent of the department.

All photographs included in this report were taken by DVRPC staff.

EXECUTIVE SUMMARY

This report provides the follow-up to the DVRPC technical report titled *North Broad Street Pedestrian Crash Study (#08034)*, released in August 2008. The project study area was a four-mile segment of North Broad Street (PA 611) between Lehigh Avenue and Old York Road in Philadelphia. The prior technical report established this corridor as the largest concentration of pedestrian crashes in the Pennsylvania state highway system during the study period, from 2000 to 2006. Presented here are the findings from the subsequent pedestrian safety audit conducted on this corridor.

The audit consisted of analysis and a field view carried out with three objectives: to ascertain possible causes for pedestrian-vehicle conflicts, to identify problem locations, and to recommend improvements. Due to the similarity of roadway conditions, crash patterns, and land use along the corridor, consistent issues were found that warrant common solutions which will improve the overall pedestrian environment.

The audit recommendations are focused on engineering or enforcement efforts and are divided into three groups based on cost and difficulty of implementation.

The first group of recommendations are low-cost projects that would be easy to implement. As such, the following proposals have quick turnaround times and could be acted upon swiftly:

- Stripe and restripe all missing or faded crosswalks, bike lanes, and shoulders.
- Replace unclear or worn signage and/or assess it for clarity and visibility. Road segments that lack adequate signage should also be addressed.
- Enforce driving laws, particularly those pertaining to speeding.

The second group contains recommendations that would be of intermediate cost with mid-range time requirements.

- Narrow excessively wide lanes and shoulders to encourage driver attentiveness and reduce vehicle speeds.
- Install bump-outs in order to reduce crossing distances and again force dynamic lane use to encourage driver attentiveness.
- Resolve inconsistent lane alignment and continuity across intersections (e.g., three lanes becoming two, shoulders becoming travel lanes, etc).

The final group contains long-term recommendations that would involve land-use issues and/or high-cost design and construction to remedy. These recommendations could be extended along the entirety of Broad Street.

- Install islands of sufficient height to block pedestrians in order to confine traffic and control vehicle movements, as well as to prevent pedestrians from jaywalking. These islands can include planters to provide for streetscape improvements as well. Consideration must be given to ensuring that any islands of this magnitude not interfere with automobile turning movements.
- Conduct full-scale traffic calming along Broad Street in order to slow down traffic and enhance pedestrian safety along the corridor.

1.0 BACKGROUND

This report provides the conclusion to the DVRPC technical report titled *North Broad Street Pedestrian Crash Study (#08034)*, released in August 2008. That study, along with this audit, form a project that was conducted through DVRPC's Planning Work Program, in coordination with the PennDOT District 6's Highway Safety Improvement Program (HSIP). As per the federal legislation, known as SAFETEA-LU, PennDOT, in collaboration with DVRPC, developed a Strategic Highway Safety Plan and the related HSIP. Projects listed under the HSIP must be evidence-based and result in measurable solutions. Following these criteria, this project has identified this study area and generated improvement recommendations that will be eligible for dedicated federal funding.

The *North Broad Street Pedestrian Crash Study* presented a descriptive analysis of 210 pedestrian-involved motor vehicle crashes, which occurred along or intersecting a four-mile-long segment of North Broad Street (PA 611) between Diamond and Nedro streets in the City of Philadelphia from 2000 to 2006. Figure 1 on page five presents the crash clusters of which the study area is comprised (circled).

Major findings of the initial study were the following:

- Nearly one-half of all crashes took place in one of nine priority clusters located in the study area. Three-fourths of these crashes took place between Lehigh and Erie Avenues along North Broad Street or on the major intersecting avenues of Lehigh, Allegheny, or Erie.
- Two out of five crashes occurred when a motorist failed to give way to a pedestrian crossing the roadway in either a marked or unmarked crosswalk. The majority of these crashes occurred at night.
- The data shows continuous pedestrian crash activity from early morning until late at night, seven days a week, primarily involving adults as they go about their daily business. Schoolchildren and the elderly are a very small proportion of crash victims within the study area.

Portions of the study area were previously audited under DVRPC's Road Safety Audit program. Reports referenced for this audit include the *Allegheny Avenue Road Safety Audit (#07058)*, and the *Erie Avenue and Olney Avenue Road Safety Audit (#08048)*.

In addition, the City of Philadelphia has a planned capital project that includes significant pedestrian safety improvements along the corridor. A number of high pedestrian volume intersections will be outfitted with pedestrian signal heads with countdown timers and lead intervals, 15-foot-wide crosswalks will be installed, and curbed median refuge islands will be built.

1.1 The Audit

The goal of the Pedestrian Safety Audit was to ascertain suitable countermeasures to address the pedestrian safety issues identified in the crash study. With these findings in mind, the focus of the audit was to identify possible causes for pedestrian-vehicle conflicts. These include pedestrian trip generators encouraging jay-walking, conditions that might contribute to inattentiveness or unawareness in motorists and pedestrians, and roadway design features that are not conducive to a safe pedestrian environment.

North Broad Street Pedestrian Safety Audit

The audit was carried out by a four-person team using the crash data from the technical memorandum as the primary reference. After reviewing this data and discussing corridor issues, the audit team walked the length of the corridor, identifying and documenting pedestrian safety problems. This field view was conducted in November of 2008 and the findings are listed in section 2.0.

The report lists pedestrian safety problems and their corresponding locations. While the crash-cluster locations were the main focus of the auditors' attention, the similarity of conditions along most of the corridor leads to some recommendations that can be applied generally. In this sense, addressing issues that are corridor-wide will not only remedy the specific problem locations, but also improve the pedestrian environment overall.

Findings generated from this audit will become part of the City of Philadelphia's updated bicycle and pedestrian master plan. Both the technical memorandum and this report examining the findings of the audit were carried out in coordination with the Philadelphia City Planning Commission.

1.2 Study Area

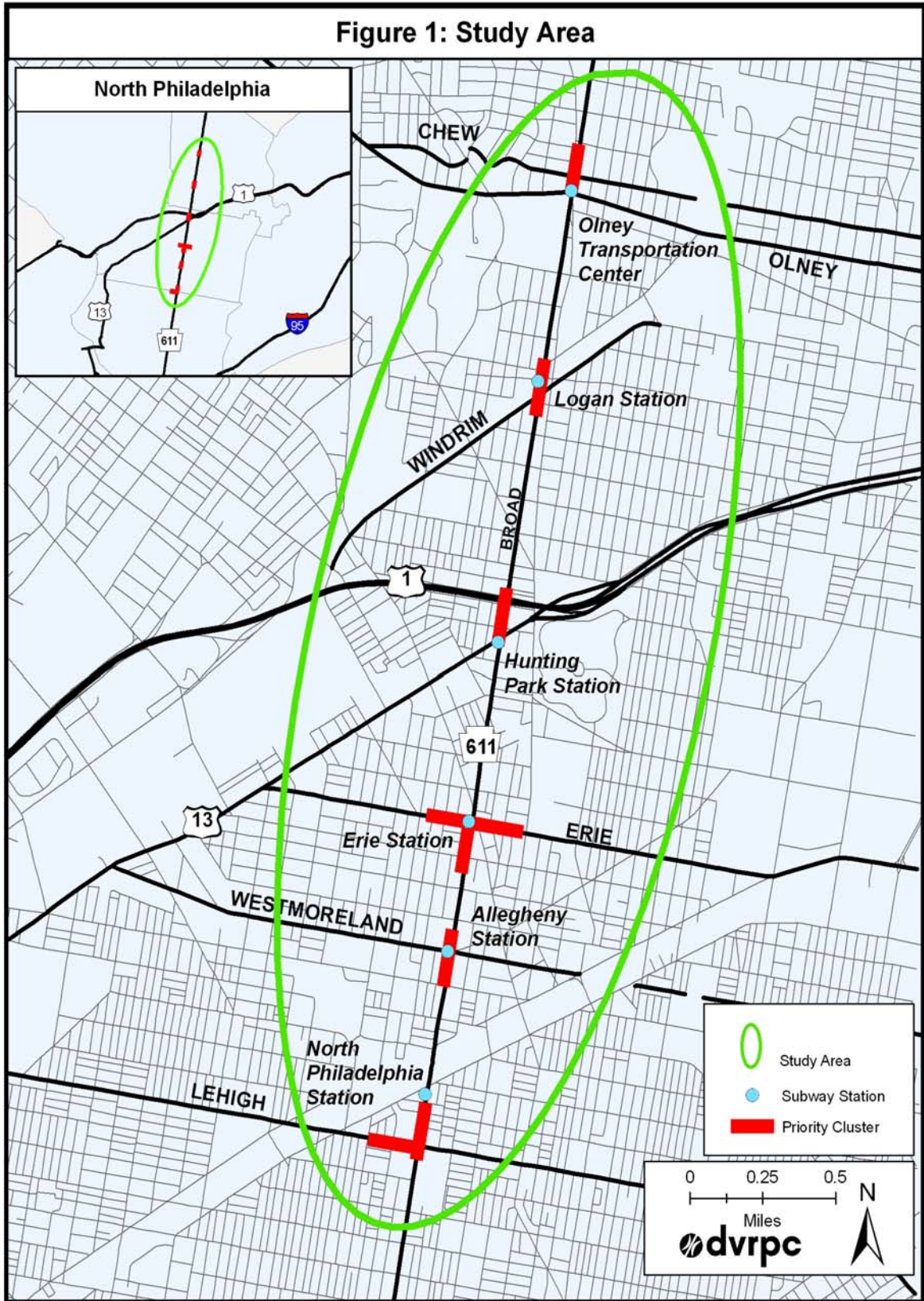
Broad Street is a principal arterial and the city's main north/south thoroughfare, extending from I-95 and the sports complex in South Philadelphia to the Montgomery County Line in the north. The study area lies along North Broad Street between Old York Road in the north and Lehigh Avenue at the south end. Figure 1 depicts the report's study area.

Located within it are 10 station stops of the Broad Street Subway Line. A station level ridership count conducted in 2006 shows that the 10 stations serve almost 48,000 riders daily. The study area traverses three of the City Planning Commission's Planning Areas, which together comprise North Philadelphia. The population of approximately 200,000 residents is overwhelmingly African American. Well over half of the population lives below the poverty line.

Land uses in this corridor are largely commercial, with several large storage facilities and parking lots. Frontage varies between row home residential, storefront retail, large institutions (hospitals), surface parking lots, and vacant or underutilized land. The major employers along the route are hospitals: Temple University, Albert Einstein, and Shriners' Children's. Retail nodes are found at the intersections of Olney and Erie avenues, and Roosevelt Boulevard.

The roadway carries 43,000 vehicles daily, including 2,000 daily bus trips on 12 routes. The Olney Transportation Center at the intersection of North Broad Street and Olney Avenue provides subway riders with many bus connections. SEPTA provides regional rail service at its North Broad (R5 Doylestown and R6 Norristown) and North Philadelphia (R7 Trenton) stations.

The typical roadway section is 69 feet wide, consisting of three lanes in each direction separated by a gore-delineated median the width of a travel lane, which turns into left-turn pockets at major intersections. Traffic lanes average 9.5 feet in width. The curb lanes and occasionally the center median are used for parking during nonpeak hours. The posted speed limit is 25 miles per hour throughout, though few drivers seem to adhere to the speed limit. Roadway alignment is straight and level. Sidewalks are continuous.



2.0 FINDINGS

The audit findings identify pedestrian safety problems along Broad Street starting from the north end of the study area and moving south. The corresponding figures show the numbered problem locations and land parcels along the corridor that contain potentially significant pedestrian trip generators.

Broad Street from Old York Road to Albert Einstein Drive (Figure 3)

1. Discontinuous bicycle lanes (southbound north of Broad Street, bi-directional south of Broad Street) as well as the fact that bicyclists would have to cross over a busy intersection make bicycling in the area unattractive and dangerous.
2. From Old York Road to Olney Avenue:
Several characteristics of the roadway here encourage inattention, excessive speeds, the disregarding of directions/instructions and a general sense of permissiveness among drivers. Some of these are:
 - Unclear 'No Left Turn' and 'No U Turn' signs
 - Excessively wide lanes and shoulders
 - Inconsistent lane alignment across all intersections
 - No crosswalks available where pedestrians are obviously crossing
 - Poor access management and low curbs
 - Poorly designed traffic islands
3. At Tabor Road:
 - Buses proceeding north maneuver between crowds waiting on the island and at the roadside bus stop
 - Drivers are directed to turn right on Tabor in order to avoid conflict with buses exiting the terminal, but signage is commonly ignored
 - Island lacks clear pedestrian striping and proper walkways
 - Lots of jaywalking to/from the bus island
4. At Albert Einstein Drive:
 - Missing and misaligned ADA ramps opposite Albert Einstein

Figure 2: Photos of Conditions Near Olney Avenue

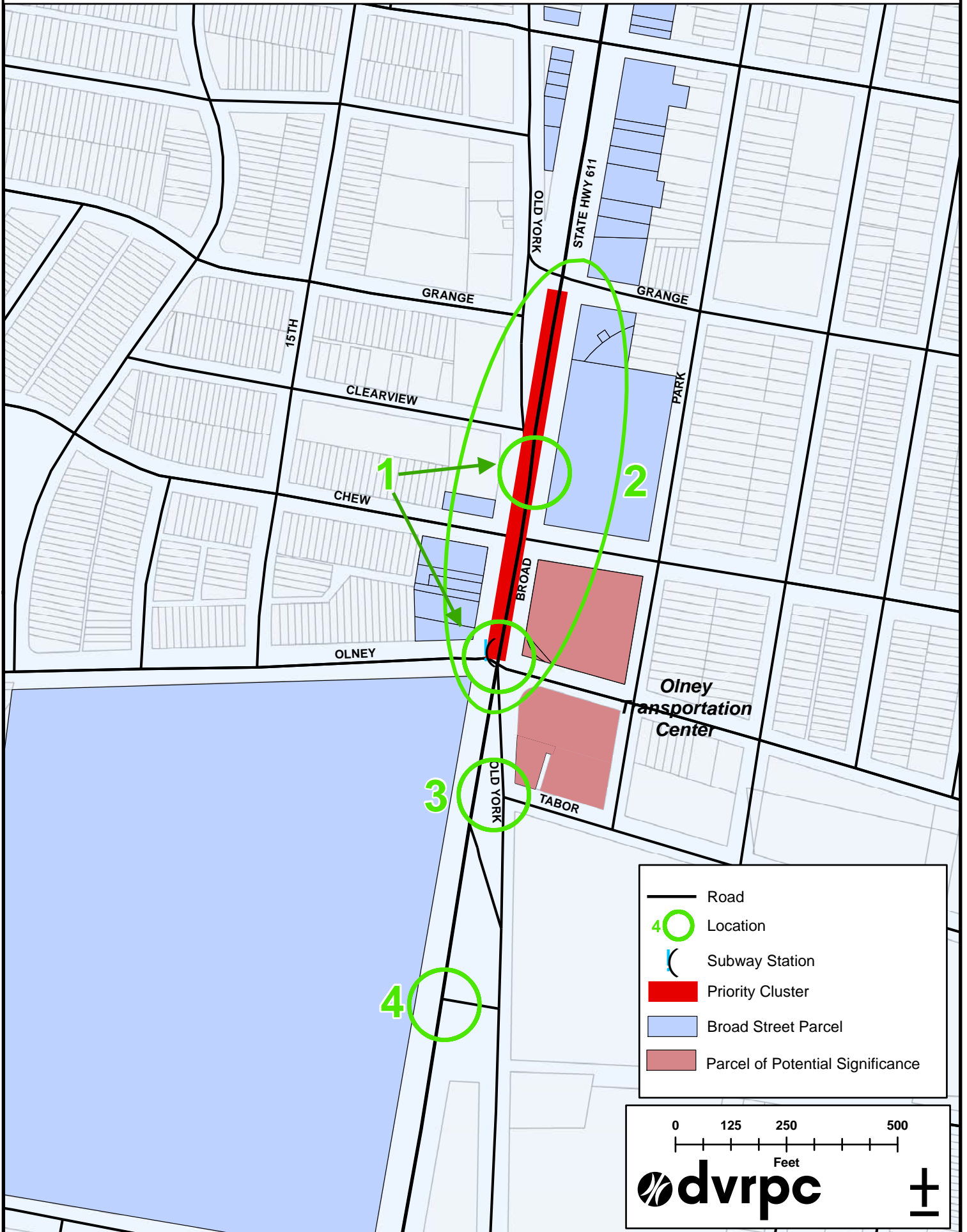


Discontinued bike lane (See location 1)



Jaywalkers conflicting with bus traffic (See location 3)

Figure 3: Old York Road to Albert Einstein Drive



Broad Street from Somerville Avenue to Lindley Avenue (Figure 5)

5. At Somerville Avenue:
 - Striping faded on Somerville Avenue
 - Curb cuts too narrow
 - Need for bus shelter in front of Albert Einstein Medical Center on Broad Street (east side)
6. At Fisher Avenue:
 - Uneven sidewalks
 - Just north of Fisher Avenue there is a section of unfinished pavement currently covered in gravel (east side)
 - SEPTA grates elevated well above sidewalk (west side)
 - Striping is faded on Fisher Avenue and cut outs are too narrow
7. At Duncannon Avenue:
 - Striping faded (west side)
8. At Wagner Avenue:
 - Street lights and traffic signals are in a poor state of repair
 - No ADA ramps at crossings
 - Restriping is required
 - Cars crossing from Lindley to Wagner roll through red light to make right on Wagner Avenue. Recommend this intersection to be labeled as 'no turn on red'
9. At Lindley Avenue:
 - Sunken curb near storm water inlet
 - Faded striping on Lindley avenue
 - Pedestrian signal needs repair (on east side) – signals should be repaired and synchronized
 - Unrealistic, poorly designed pedestrian crossings

Figure 4: Photos of Conditions Near Lindley Avenue

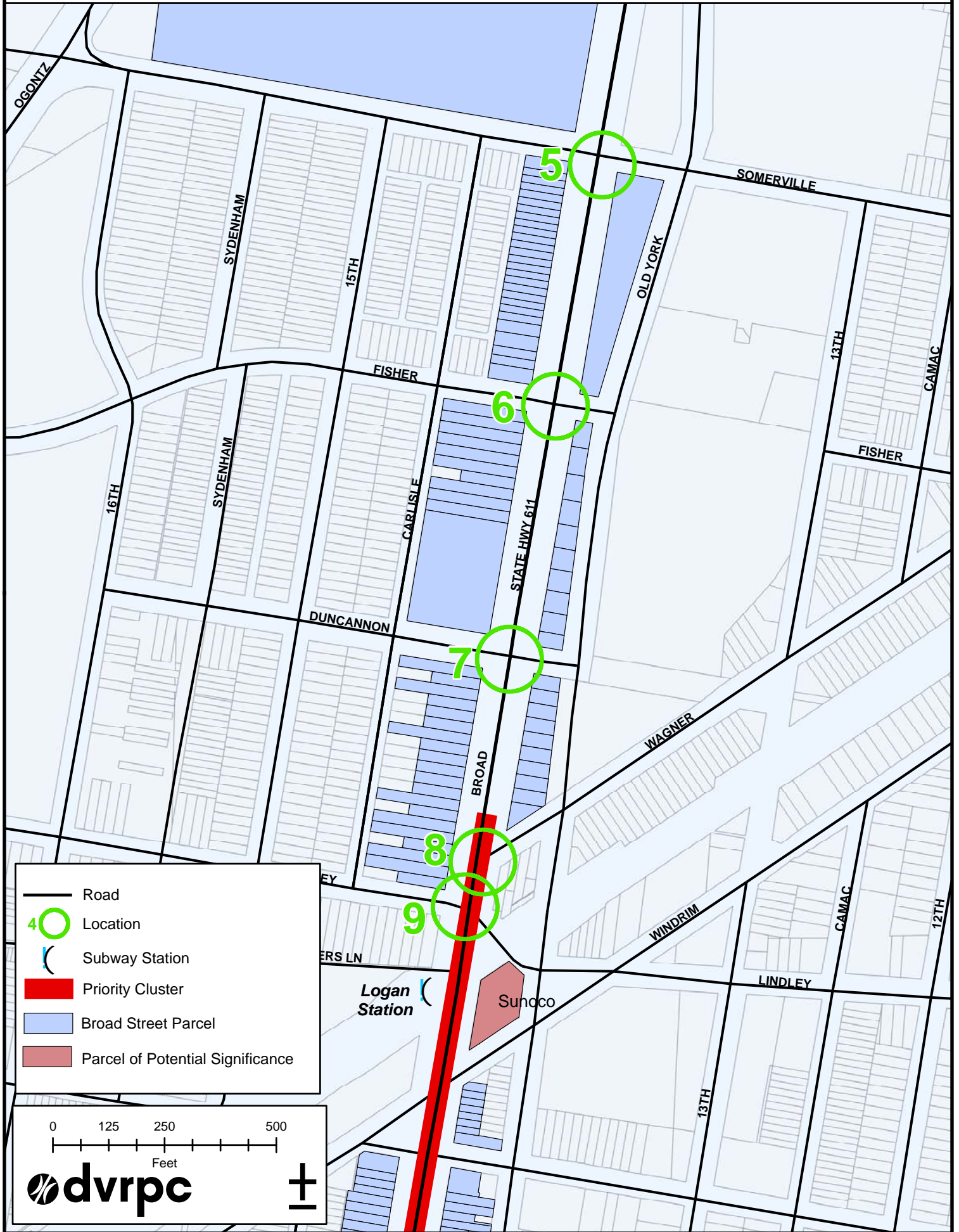


Poor pedestrian accommodation at Lindley Avenue
(See location 9)



Unsafe pedestrian environment beneath underpass at Fishers Lane
(See locations 9 and 10)

Figure 5: Somerville Avenue to Lindley Avenue



Broad Street from Fishers Lane to Wyoming Avenue (Figure 7)

10. At Fishers Lane:

- Sunken sidewalk and poor drainage
- Lack of illumination under rail tracks near SEPTA Logan Station (west side)
- Overpass supports severely hinder visibility

11. At Windrim Avenue:

- Uncontrolled access to these businesses encourages all road users to travel without regard for standards of use or the expectations of others (parking and driving on sidewalk, quick turns into Sunoco lot)
- Uncontrolled use of the center lane by drivers both entering and exiting Broad Street causes conflicts over right-of-way
- Excessive jaywalkers add to the sense of disorder and unruliness
- No pedestrian signals, striping, or any regulation of movement
- Uneven sidewalks and missing striping (west side)

12. At Ruscomb Street:

- The intersection is an atypical configuration where pedestrians are unaware of which crosswalk has a green light or where traffic should be coming from. Drivers may also be unsure of how far their right-of-way extends as they leave one signal and travel through another
- Long blocks with residential and commercial attractors contributing to considerable midblock jaywalking
- Missing striping on Ruscomb Street (west side)

13. From Rockland Street to Wyoming Avenue

- Faded/missing striping on intersections (west side)
- Severe puddling at curb cut-outs (west side)

Figure 6: Photos of Conditions Near Windrim Avenue

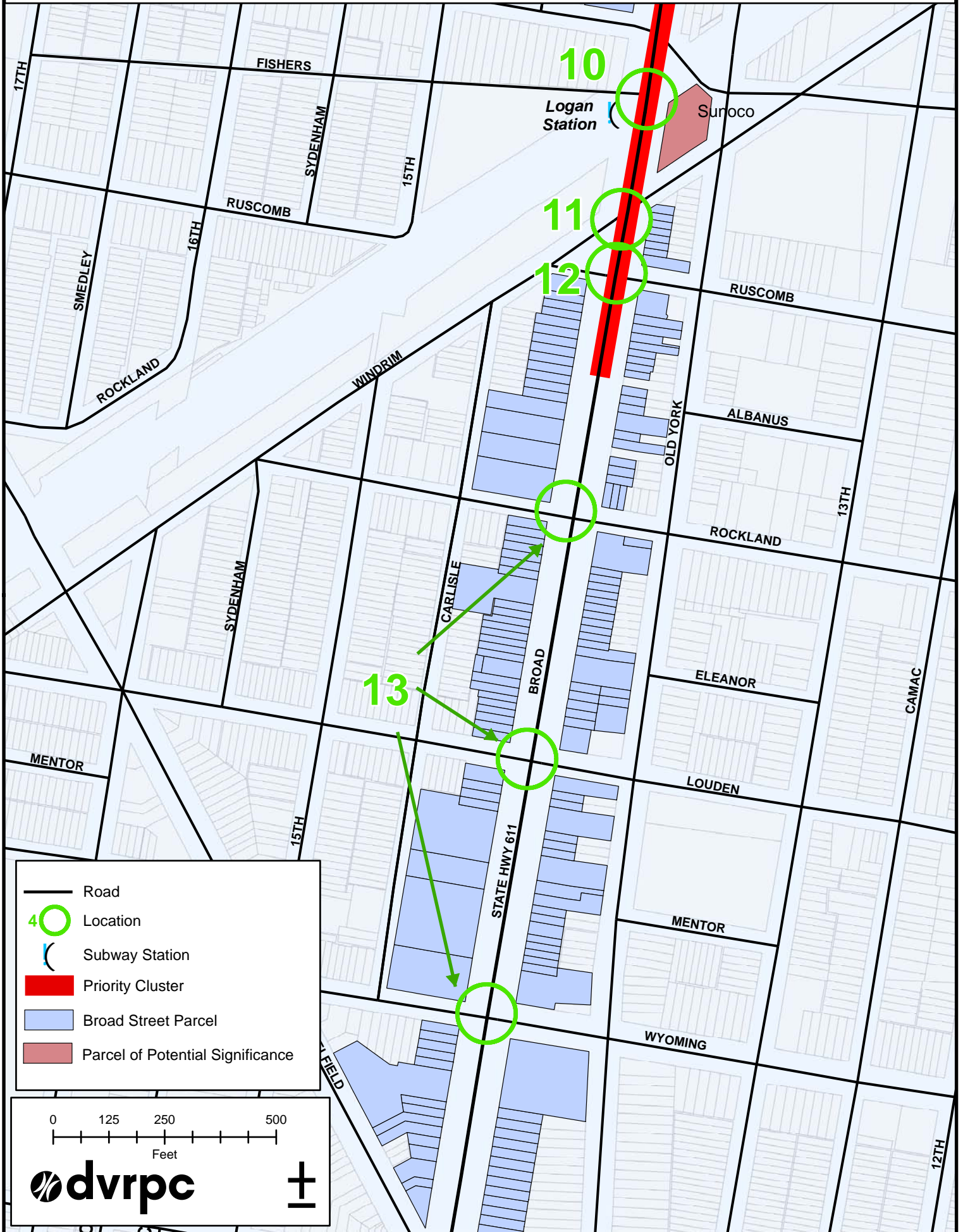


Poor access management (See location 11)



Pedestrian green signal in conflict with vehicle traffic (See location 12)

Figure 7: Fishers Lane to Wyoming Avenue



Broad Street from Belfield Avenue to Hunting Park Avenue (Figure 9)

14. At Belfield Avenue and Courtland Street

- Sunken curb cuts
- Lack of signage makes for wide-open and uncontrolled environment
- Lack of proper pedestrian signals and unrealistic crossing locations
- The direction of oncoming traffic is unclear

15. At Wingohocking Street

- Sidewalk is buckling at curb, sunken and deteriorating

16. At Blavis Street

- Striping missing on Blavis Street
- No obvious crossing point to supermarket on west side of Broad Street
- Uncontrolled access to the grocery store on west side creates a traffic free-for-all

17. At Cayuga Street

- Ramp to U.S. 1 and Roosevelt lacks proper signage to warn motorists of pedestrian crossing
- Cars turning right from Broad Street onto Roosevelt Boulevard do not stop at red light – speed through intersection

18. At Hunting Park Avenue

- The McDonald's on east side of Broad Street is a major attractor – people coming out of subway dash across street to McDonald's and vice versa
- Poorly striped and inadequate pedestrian signals
- The land use mixes pedestrians and automobiles poorly – open access for cars but unclear access for pedestrians

Figure 8: Photos of Conditions at Blavis Street and Hunting Park Avenue

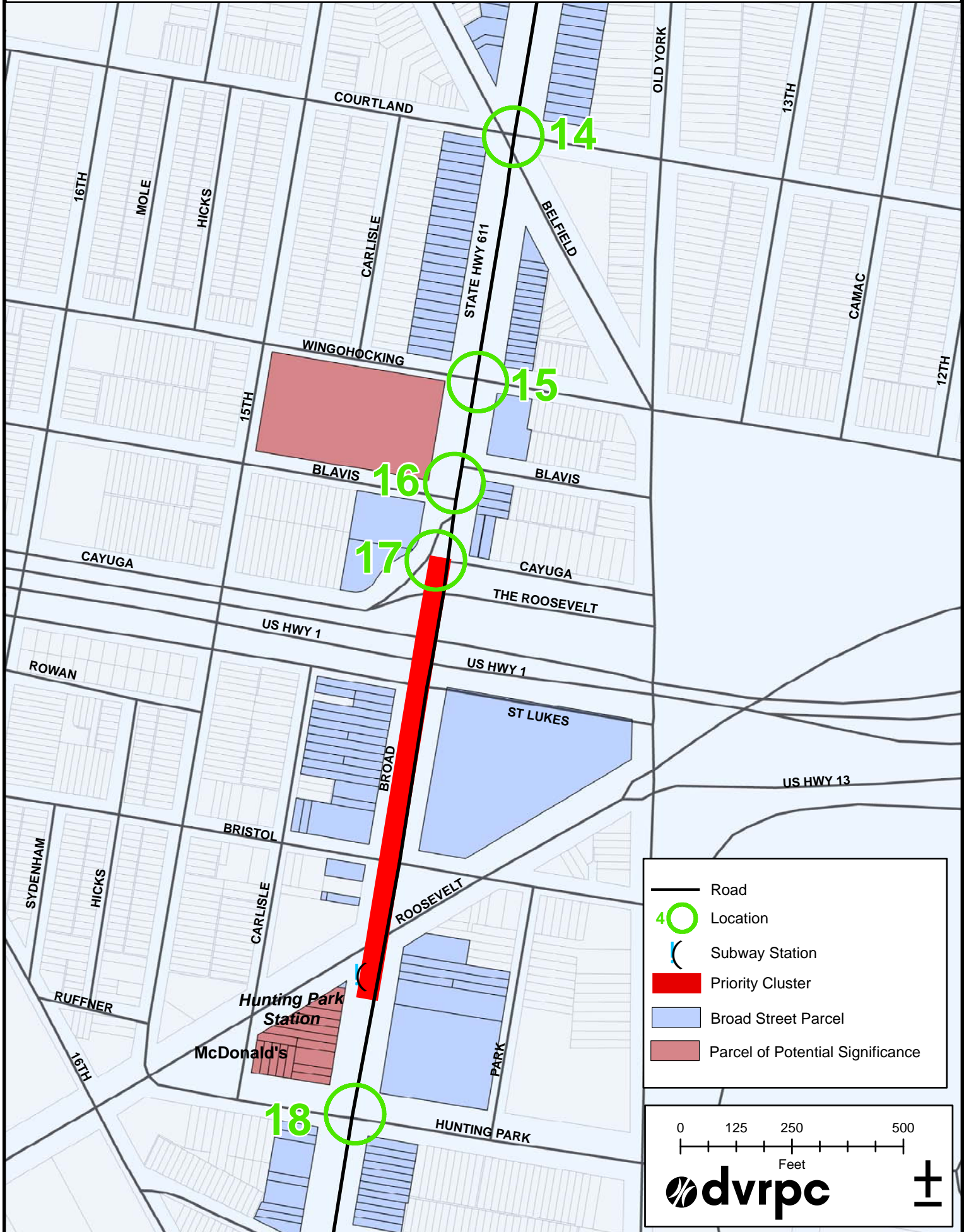


Traffic disorder at entrance to supermarket (See location 16)



Unrestricted pedestrian movements across Broad Street (See location 18)

Figure 9: Belfield Avenue to Hunting Park Avenue



Broad Street from Lycoming Street to Erie Avenue/Germantown Avenue (Figure 11)

19. At Lycoming Street:

- Vans parked in front of the Enterprise Rent-a-Car on west side of Broad Street force pedestrians into street (parking on sidewalk on east side of Broad Street also an issue)

20. From Kerbaugh Street to Pike Street:

- Faded/missing striping
- Missing ADA ramps and striping at Elser Street

21. At Germantown Avenue (west side):

- Faded/missing striping on Germantown Avenue
- Cars parked in crosswalk
- Lacks adequate markings and controls, causing a sense of traffic chaos

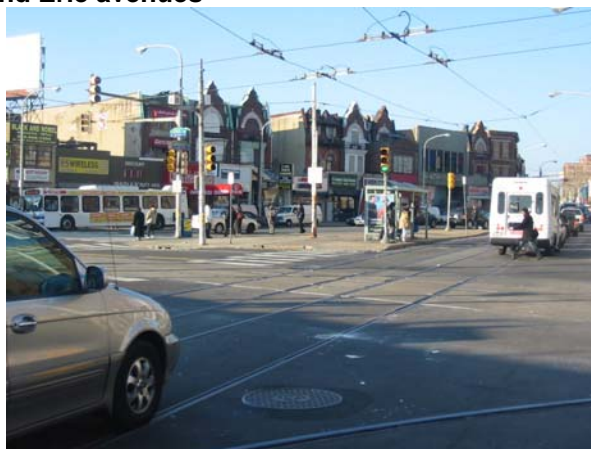
22. At Erie Avenue and Germantown Avenue (east side):

- Sidewalk on east side of Broad Street in state of general disrepair
- Pedestrian crossing over Erie Avenue on eastside of Broad Street is very long and undefined; lane striping faded or missing
- High pedestrian volumes, and movements are erratic; missing pedestrian signal heads; signs missing and/or damaged
- Undefined or inconsistent parking; parked vehicles compromise sight distance
- Nonexistent lane markings on Erie Avenue and Germantown Avenue and inconsistent alignment across the intersection cause disorder

Figure 10: Photos of Conditions at Germantown and Erie avenues

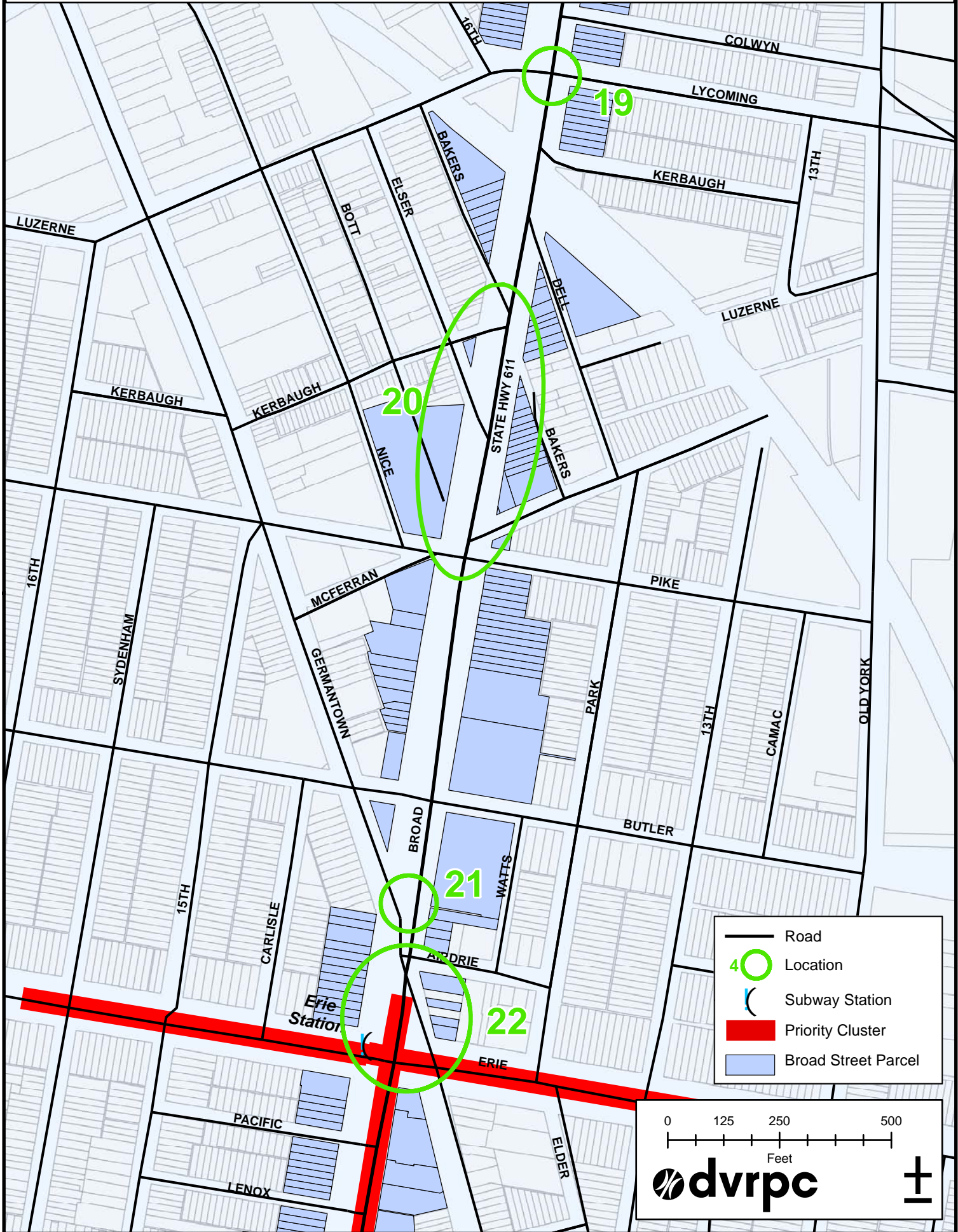


Inadequate lane markings and pedestrian facilities (See location 21)



No pedestrian facilities and poor vehicle guidance (See location 22)

Figure 11: Lycoming Street to Erie Avenue/Germantown Avenue



Broad Street from Allegheny Avenue to Lehigh Avenue (Figure 13)

23. At Allegheny Avenue

- Drivers use center lane for parking
- All crosswalks need restriping
- Lacks sufficient pedestrian controls considering the number of attractors (subway entrance/exits and fast food restaurants)
- Pedestrian refuge needed
- Cars running red lights appear to be an issue at this intersection (on both streets)

24. At Glenwood Avenue:

- All road markings need restriping

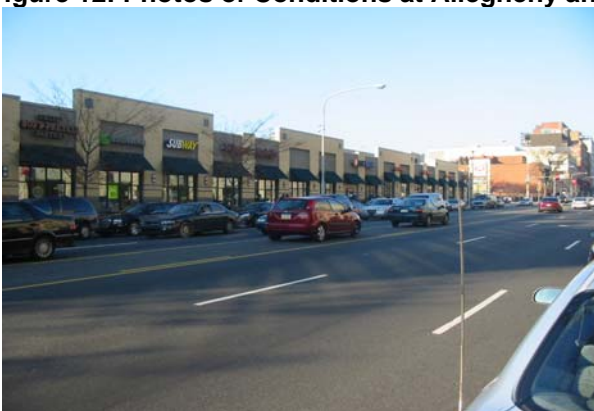
25. At Somerset Avenue:

- All legs of the intersection need restriping

At Lehigh Avenue (not numbered due to inaccessibility during the audit):

- Extensive construction has made this intersection unwalkable. No safety audit was conducted here because the site is in a state of disrepair.

Figure 12: Photos of Conditions at Allegheny and Glenwood avenues



Drivers using center lane for parking (See location 23)



Poor road markings and pedestrian facilities (See location 23)

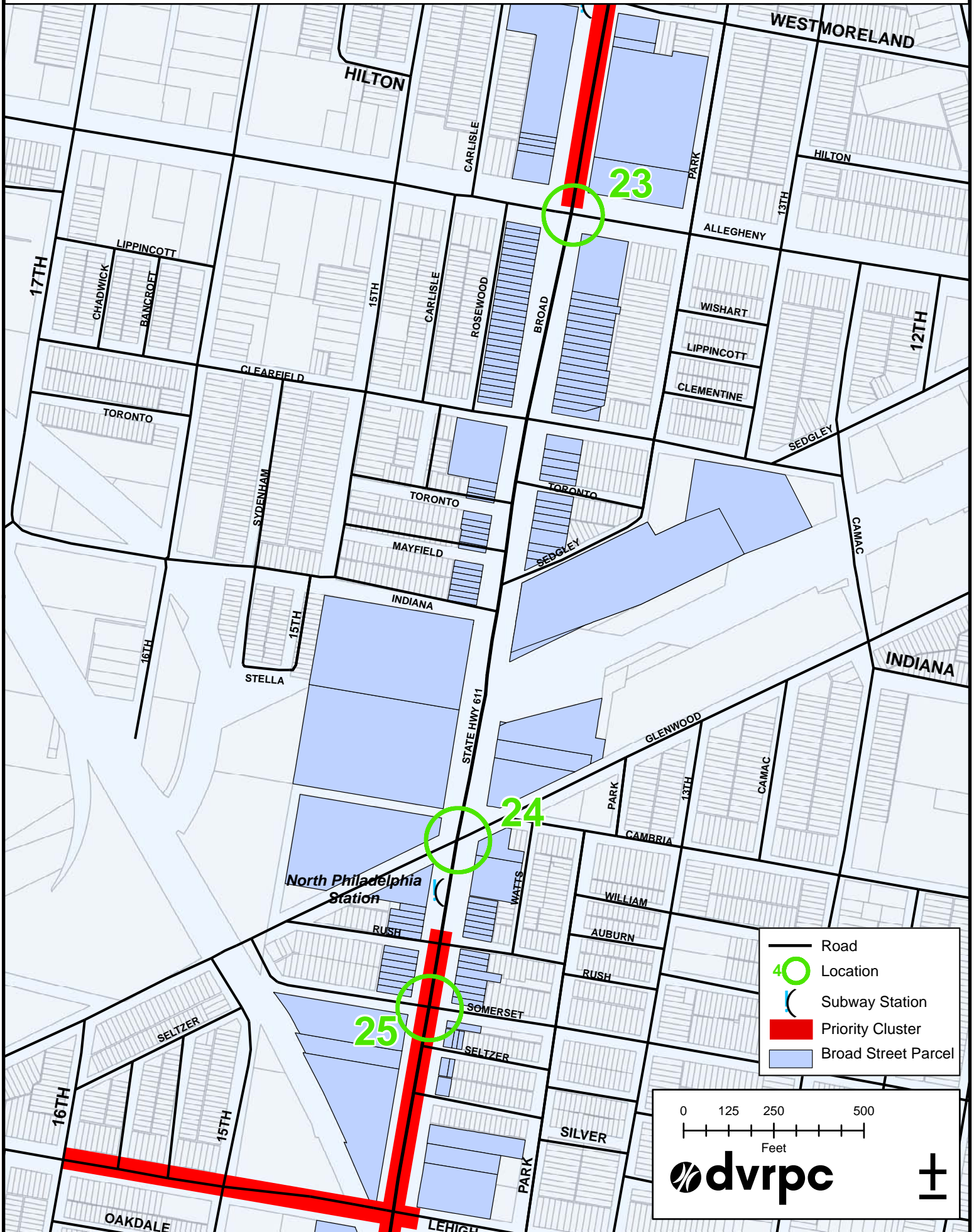


Excessive jaywalking and inadequate pedestrian controls (See location 23)



Inadequate road markings and poor access management (See location 24)

Figure 13: Allegheny Avenue to Lehigh Avenue



3.0 CONCLUSIONS AND RECOMMENDATIONS

As previously described, this Pedestrian Safety Audit was conducted to identify possible causes for pedestrian–vehicle conflicts found on the North Broad Street corridor and to generate improvement recommendations for the pedestrian safety issues. The following summary conveys many improvements that, when applied corridor-wide, will not only remedy the specific problem locations, but also improve the pedestrian environment overall. Philadelphia City Planning Commission may use these audit findings and recommendations as a guide to direct future efforts or expenditures.

The countermeasures listed here are centered on engineering or enforcement proposals and are divided into three groups based on the difficulty and cost of implementation. The first group consists of recommendations that would be relatively low-cost and easy to implement, therefore providing for quick turnaround. These could be considered maintenance issues that should be implemented to ensure base-level functioning of the corridor roadway. The second group consists of recommendations of intermediate cost and effort that would address some intrinsic design problems with the roadway that would have more long-term effects than those recommendations cited in the first group. The third group of recommended improvements consist of broad, corridor-wide considerations that would have a significant effect on pedestrian safety, but would require the highest amount of resources, making them the most difficult to implement.

Low-cost, Short-term Recommendations

1. The primary cost-effective improvement is striping and restriping of all missing or faded crosswalks, bike lanes, and shoulders.
2. Enhance crossing safety and regulate pedestrian movements more effectively through the following measures:
 - Ensure that walk signal phases are of sufficient length
 - Consider implementing all-red signal phases in some locations
 - Install pedestrian signals that provide dedicated right-of-way to pedestrians
 - Include the provision of refuge islands at intersections with excessive crossing widths and/or high pedestrian volumes
 - Sidewalk and curb repair should be given more attention along the entire corridor
 - Install pedestrian countdown timers at appropriate intersections
3. Pedestrian visibility and access should be given more consideration in the design and enforcement of onstreet parking restrictions and parking in general.
4. Unclear or worn signage or lack of signage should be replaced and/or assessed for clarity and visibility.
5. Uncontrolled use of the center lane by drivers both entering and exiting Broad Street causes conflicts over right-of-way. Access to the center lane should be more regulated, possibly with barriers being installed in high-problem locations.

Intermediate-cost, Mid-term Recommendations

6. The bike lanes on Old York Road are discontinued for approximately one-quarter mile over the portion of Broad Street that is shared by Old York Road as it crosses both Broad Street and Olney Avenue.
 - Due to the lack of north-south bike routes through the city, it is recommended that proper bicycle facilities or accommodations be implemented here. Improving roadway conditions for cyclists will have a positive impact on pedestrian safety by reducing conflict on sidewalks between these two groups.
7. Several roadway characteristics encourage inattention, excessive speeds, the disregarding of directions/instructions and a general sense of permissiveness among drivers. These problems would be remedied by implementing traffic calming measures, such as the following:
 - Excessively wide lanes and shoulders should be narrowed to encourage driver attentiveness and reduce vehicle speeds.
 - Bump-outs should be installed in order to reduce crossing distances and again force dynamic lane use to encourage driver attentiveness.
 - Inconsistent lane alignment and continuity across intersections should be resolved, (e.g., three lanes becoming two, shoulders becoming travel lanes, etc.). This problem can be found at many locations, specifically Olney Avenue and Germantown Avenue.
8. Many crossing locations make unrealistic expectations of pedestrians and do not sufficiently consider their needs. Examples include Tabor Road and Belfield Avenue.
 - Install crossing locations where pedestrians are more likely to use them or are already improvising by jaywalking.
9. Frequently, intersections are of an atypical or skewed configuration, where pedestrians are unaware of which crosswalk has a green light or where traffic should be coming from. Drivers may also be unsure of how far their right-of-way extends as they leave one signal and travel through another. Specific locations include Lindley and Wagner avenues and Ruscomb Street.
 - Improve/adjust signal timings and consider changing some junctions into a single intersection or 'no turn on red.'
10. Poor access management causes conflict between pedestrians and vehicles. Driveways should be firmly defined by lower curbs, crossovers, and well-marked sidewalk boundaries on both the road and property sides.
11. When traffic islands are intended to be used as a refuge, they should be made safer for pedestrians.
 - Substantial curbs, proper crossings, and adequate signage should be installed.
12. Overpass supports severely hinder visibility, most notably at Fishers Lane.
 - Pedestrian access to the cartway should be impaired by installing railing between the supports.

Long-term, High-cost Recommendations

13. There is a lack a coordination between land use and pedestrian facilities. This is commonly seen in two circumstances, on long blocks with residential and commercial attractors but no pedestrian crossings, and in places where subway access is located across Broad Street from high volume pedestrian attractors such as fast food restaurants. This pattern contributes to considerable midblock jaywalking.
 - In planning future development, more consideration should be given to pedestrian travel patterns and their relationship to land use.
 - Access management could be improved by incorporating pedestrian needs into standards and guidelines.
 - Some subway entrances/exits should be redesigned or repositioned to better accommodate pedestrian needs and travel patterns.
- Install islands of sufficient height to block pedestrians in order to confine traffic and control vehicle movements, as well as to prevent pedestrians from jaywalking. These islands can include planters to provide for streetscape improvements as well. Consideration must be given to ensuring that any islands of this magnitude not interfere with automobile turning movements.

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Abstract: This report provides the conclusion to the DVRPC technical report titled *North Broad Street Pedestrian Crash Study (#08034)*, released in August 2008. Presented here are the findings from a Pedestrian Safety Audit conducted on a four-mile segment of North Broad Street (PA 611) between Lehigh Avenue and Old York Road in Philadelphia. The audit consisted of analysis and a field view carried out with three objectives: to ascertain possible causes for pedestrian–vehicle conflicts, to identify problem locations, and to determine improvement recommendations. The report takes the form of a directional list of pedestrian safety problem locations. The recommendations are centered on engineering or enforcement proposals and are divided into three groups based on the difficulty and cost of implementation.

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