



HARRISBURG AREA TRANSPORTATION STUDY

**> HALIFAX TECHNICAL
MEMO**



HALIFAX

TECHNICAL MEMO



PURPOSE OF THE STUDY

Halifax Borough serves as a critical transportation node in Dauphin County with State Routes 147 and 225 intersecting in the heart of the Borough. This intersection facilitates the movement of several thousand vehicles per day and hundreds of freight movements serving industrial and commercial activity in the region. However, the intersection's existing conditions are increasingly challenging due to rising traffic volumes and freight volumes through the intersection. While SR 147 and SR 225 physically intersect at one intersection, several accompanying intersections that accommodate the routing of the existing State Route alignments through Halifax and provide connections to local streets also pose capacity and safety concerns. Due to the importance of Halifax to the area's transportation network, the Harrisburg Area Transportation Study (HATS) selected Halifax and its SR 147 and SR 225 intersections as one of three locations that warranted a detailed review of existing conditions and the identification of potential remediation concepts, including intersection and regional circulation-focused improvements. The project involved four tasks – gathering and interpreting applicable data, documenting and observing existing conditions, outreach to local and state officials and other stakeholders and local freight/logistics operators, and the development of improvement alternatives/concepts. The results of these efforts as they relate specifically to Halifax are described in the following technical memo.

BACKGROUND/DESCRIPTION OF ISSUES

Halifax is central in Dauphin County's transportation

network, providing important connections for residents and industries to the north, south, and east. While primarily residential, the Borough is also home to some commercial/business activity and local industry (Figure 1). Critical to the quality of life of local residents, the area's economic activity, and the regional transportation network is the intersection of SR 147/Market Street and SR 225/4th Street. Due to the road network design within Halifax, other supplementary intersections also serve a pivotal role in facilitating the traffic flow on SR 147 and SR 225 – these include the SR 225/Armstrong Street and SR 225/4th Street intersection and the SR 147/2nd Street and SR 147/Market Street intersection. Collectively, these three intersections provide access to regional centers of commerce, employment opportunities, and regional highways that provide regional and interstate connections such as U.S. Routes 11/15, 22/322, and 209.

The Halifax intersections serve an important role in the region's freight transportation network and by doing so, they support the area's local economy and business community. Deliveries of forestry, mining, construction, and agricultural commodities in addition to consumer products are frequently routed through and to/from Halifax. These freight movements often involve 48' and 53' trailers which require drivers to cautiously navigate Halifax's intersections. Trucks turning to/from SR 147 and SR 225 are faced with challenging geometry constraints, particularly as trucks turn right from the eastbound approach of SR 147/Market Street onto southbound SR 147/SR 225/4th Street and trucks turning right from the southbound approach of SR 225/4th Street onto westbound SR 147/Market Street (Figure 2 & 3). Similar concerns exist at the SR 225/Armstrong Street and SR 225/4th Street intersection as trucks turning from SR 225/4th Street northbound to SR 225/Armstrong Street eastbound also experience challenging turning

FIGURE 1: Local Land Uses



FIGURE 2: SR 147/Market Street @ SR 225/4th Street - Autoturn Swept Paths



FIGURE 3: SR 147/Market Street @ SR 225/4th Street - Autoturn Swept Paths



FIGURE 4: SR 255/Armstrong Street @ SR 225/4th Street - Autoturn Swept Paths



maneuvers that require encroachment into opposing travel lanes (Figure 4). This intersection is particularly tight geometrically and even creates difficulties for truck drivers turning left from SR 225/Armstrong Street westbound onto SR 225/4th Street northbound. A third physical constraint is the narrow cartway width (28 feet) of the SR 225/4th Street segment which often challenges the ability of large trucks traveling in opposite directions to pass simultaneously.

Motorist and pedestrian safety is also a substantial concern in and around the Halifax intersections as the physical constraints combined with existing traffic patterns and signage/stripping conditions have created a significant hazard. Many crosswalks exhibit worn striping due to the substantial travel volumes and lack proper advance warning signage. At the SR 147/Market Street and SR 225/4th Street intersection, there is no advance warning signage indicating pedestrian crossing activity on the northbound approach of SR 147/SR 225/4th Street – particularly problematic considering northbound traffic is uncontrolled. This approach also has faded crosswalk striping that is nearly unidentifiable based on field view observations. The southbound approach of SR 225/4th Street and the eastbound approach of SR

147/Market Street also have faded crosswalk striping. These conditions create a challenging condition for pedestrians attempting to cross and confusion for motorists unfamiliar with the traffic patterns.

As a result of these existing issues and conditions, congestion is also an issue in Halifax approaching the intersections and along 4th Street. Traffic conditions are particularly aggravated by three nearby Halifax Area School District schools, commuter traffic, and slow truck and bus movements through the area causing congestion on SR 147 and SR 225 in addition to many of the local connecting streets in the Borough.

SUMMARY OF CONDITIONS

TRAFFIC VOLUMES

Based on observations during site visits and stakeholder feedback, the Halifax intersections suffer from geometric constraints that are inadequate to accommodate the existing mix of automobile, bus, heavy truck, and pedestrian traffic. The existing design limitations create capacity issues for motorists traveling through Halifax, particularly during peak hours. Among the three State Route approaches to Halifax, SR 147/SR 225/4th Street serving northbound/southbound traffic on the Southside of Halifax has the highest traffic volumes – an estimated annual average daily traffic (AADT) volume of 14,560. SR 147/Market Street carries the second highest number of vehicles with an estimated AADT volume of 7,138. SR 225/4th Street trails with an estimated AADT volume of 6,619.¹ While this study did not include a detailed operational analysis, these traffic volumes confirm an intersection that may have operational and capacity concerns.

Similar to overall traffic volumes through the intersection, freight volumes are highest to/from Halifax on the SR 147/SR 225/4th Street approach with an estimated annual average daily truck traffic (AADTT) volume of 1,165 or roughly 8% of the total AADT. SR 147/Market Street carries an estimated AADTT volume of 500 – 7% of the total AADT. SR 225 /4th Street sees the smallest number of trucks with an estimated AADTT of 199 or 3% of the total AADT. Reviewing regional travel patterns, these volumes are moderate, but demonstrate Halifax’s regional importance in serving northern Dauphin County with U.S. Route 22 and the Interstates to the south. Local truck volumes and their regional context are represented in Figures 5 & 6.

¹ PennDOT, Bureau of Planning and Research, Geographic Information Division, 2017

CRASH DATA

PennDOT crash data reveals 7 crashes have occurred at the Halifax intersections during the five year analysis period (2011-2015). While PennDOT crash data do not have extensive descriptions of all the causes of these incidents, the project team reviewed the available data to determine which incidents may have been partially triggered by existing intersection designs and geometry constraints. Of the 7 crashes, 4 crashes are inferred to be partially attributed to existing intersection design constraints while the remaining 3 are primarily attributed to driver error. Further analysis of the four crashes where design was cited as a contributing factor, including a review of crash narrative(s) is recommended. These four crashes are represented in Figure 7.

At the primary intersection of SR 147/Market Street and SR 225/Armstrong Street, 3 crashes were reported where existing traffic patterns and design constraints were cited as a contributing factor. One incident was a same-direction rear crash involving a northbound automobile slowing at the intersection approach that was struck from behind by another northbound automobile. While further details regarding the crash were not provided

FIGURE 5: Local AADT Truck Volumes

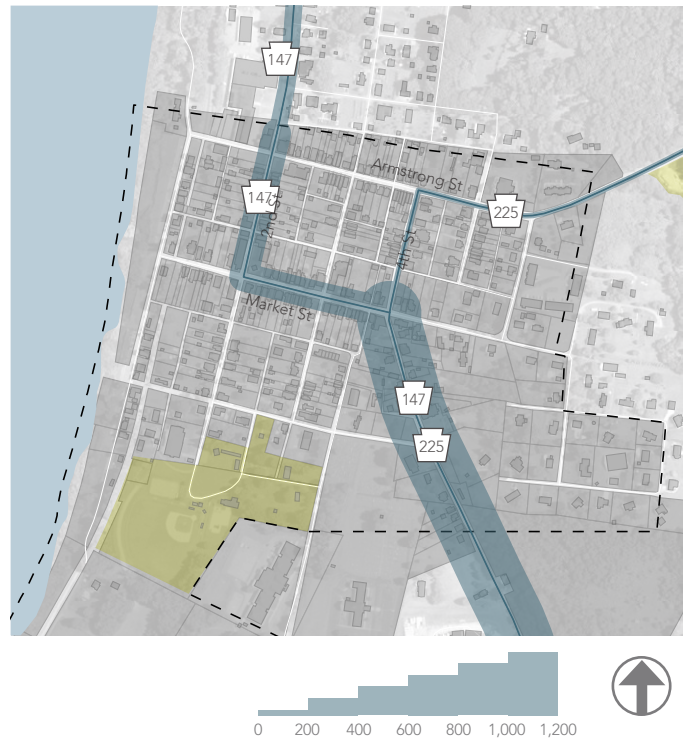
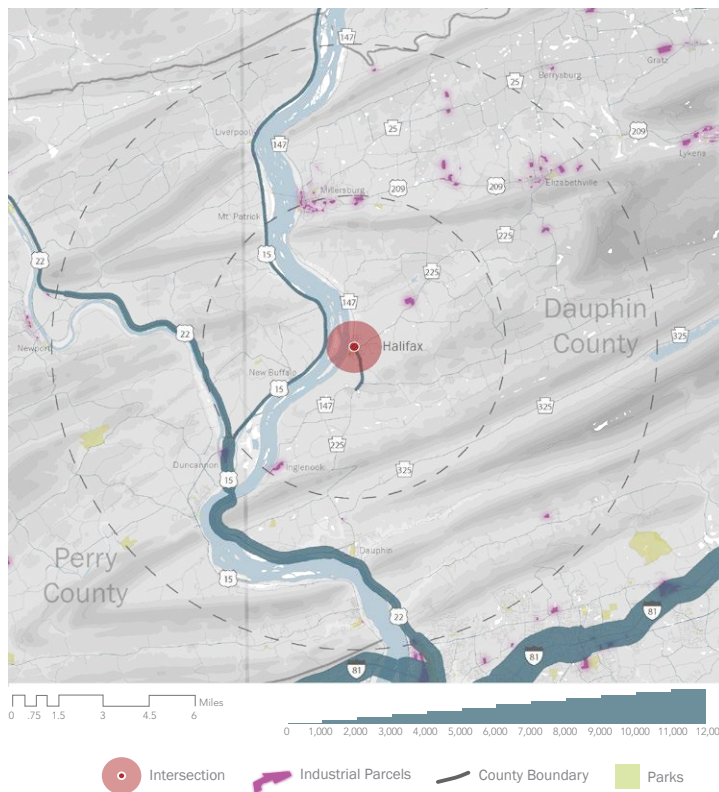


FIGURE 6: Regional Freight Volumes

AADT Truck Volumes



Freight Traffic Proportions (% of total AADT)

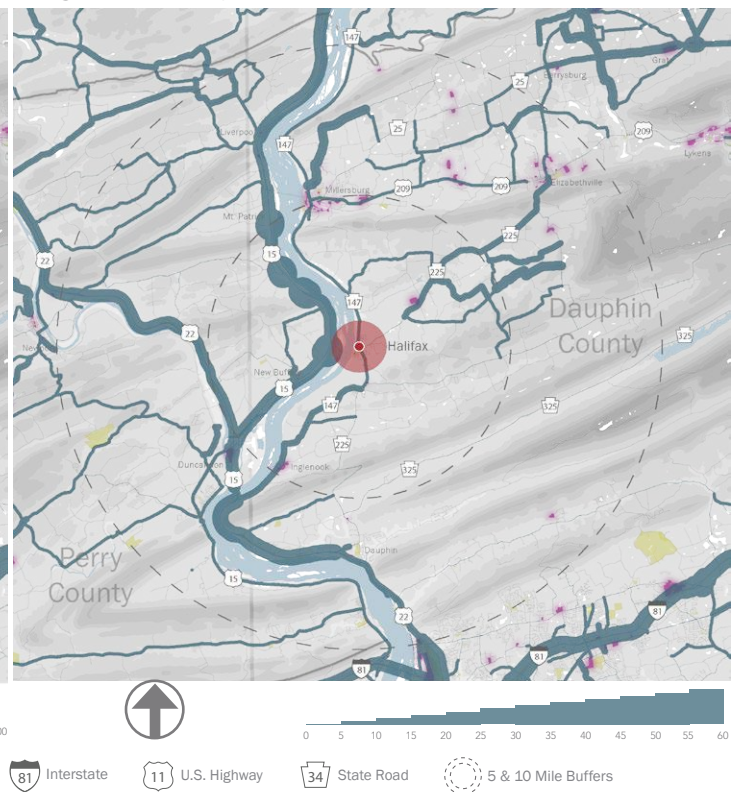
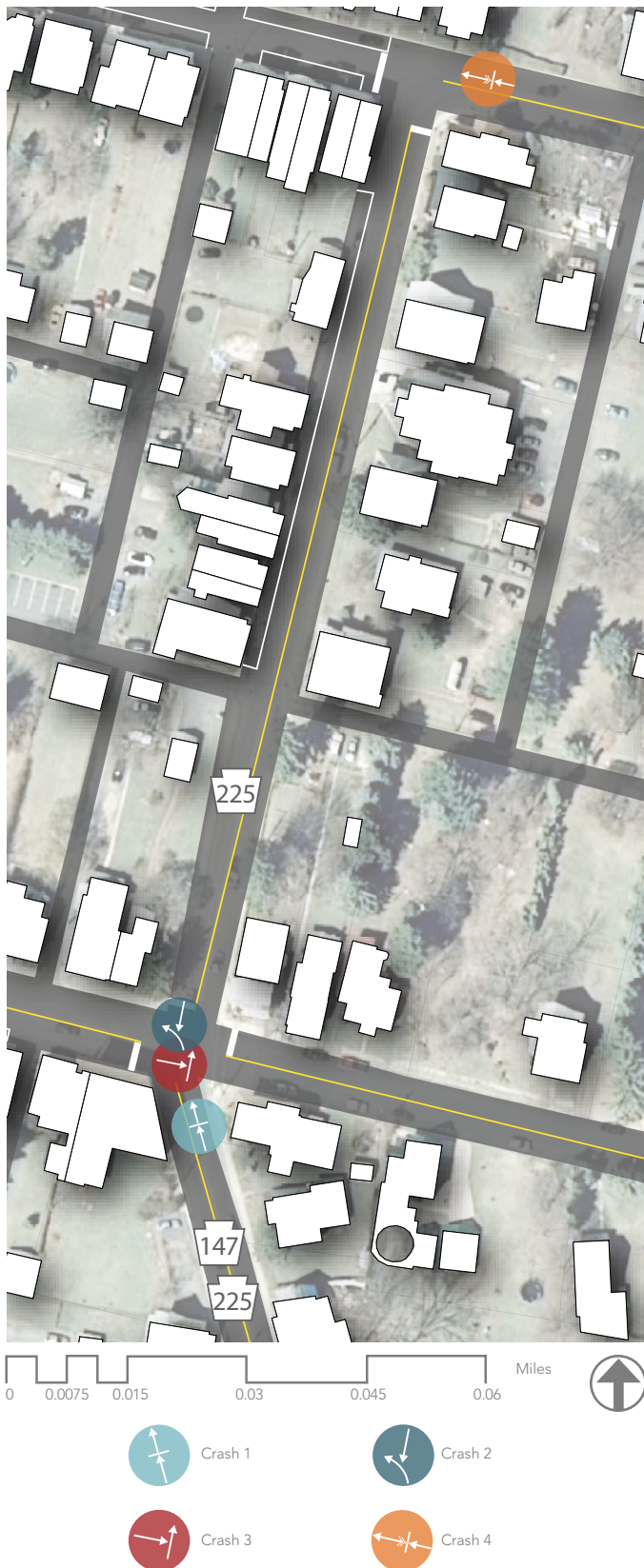


FIGURE 7: Potential Design Induced Crashes



to the project team, it is plausible to presume that the slowing motorist may have been unaware of existing traffic patterns or was attentive to a truck turning right onto Armstrong Street. A second incident was a left-turn collision involving a northbound truck turning left onto SR 147/Market Street being struck by a southbound van traveling straight. This incident is also likely partially attributed to the intersection’s existing traffic patterns and potentially the van driver’s unfamiliarity or inattentiveness of northbound traffic having the right of way. The third incident was a right-angle crash involving a northbound automobile traveling straight through the intersection striking an eastbound automobile traveling straight through the intersection. The eastbound motorist was likely unfamiliar with or distracted from the existing traffic patterns of the northbound motorist having the right of way.

The fourth incident took place at the secondary intersection of SR 225/Armstrong Street and 4th Street and was a backing crash that involved a large truck traveling westbound that reversed into a westbound automobile immediately behind the truck. Realizing the intersection’s existing geometry constraints, it is plausible that the truck operator was attempting to correct their navigational move within the intersection or was reversing to allow another vehicle traveling north on Armstrong Street to turn right onto 4th Street.

While it is possible to infer that these four crash incidents may have been attributed to existing intersection design flaws, there is a possibility the existing intersection conditions did not contribute to drivers’ actions and these crash incidents. However, as a result of field visits and discussions with stakeholders, it is important to realize that these explanations are very real possibilities and thus suggested as crash data inferences. Further analysis of these three crashes, including a review of crash narrative(s) is recommended to confirm or refute these assumptions.

OBSERVED DEFICIENCIES

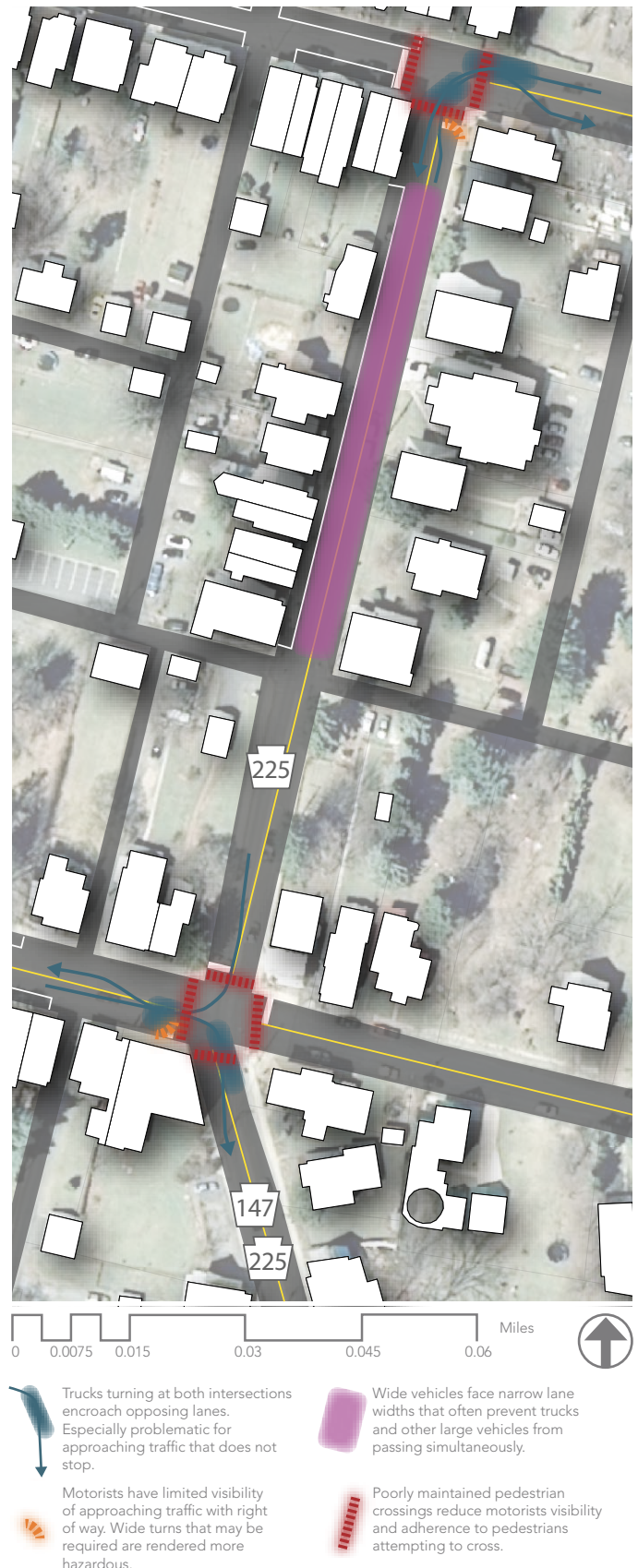
The project team conducted a field view and visit with local officials on Wednesday, February 1, 2017 at the intersections. This investigation included members from the project team, the Halifax Borough Council, and PennDOT District 8-0 to discuss the deficiencies of the Halifax intersections and explore possible solutions to alleviate the identified deficiencies. The identified issues below are a compilation of the project team’s observed deficiencies during the field view and deficiencies cited by the stakeholders during the field observations. These deficiencies are represented in figure 8.

FIGURE 8: SR 147 & SR 225 Deficiencies

The primary intersection of SR 147/Market Street and SR 225/4th Street poses significant geometry challenges for large vehicle movements – particularly turning maneuvers which are the majority of truck moves through the intersection. For eastbound vehicles approaching the intersection on SR 147/Market Street, visibility of northbound traffic approaching the intersection on SR 147/SR 225/4th Street is restricted which is of particular concern for large vehicles turning right to travel south, continuing on SR 147 (where it becomes concurrent with SR 225)/4th Street. This maneuver requires substantial encroachment into the opposing lane of SR 147/SR 225/4th Street northbound to accommodate the right turn, thereby causing challenging interactions/conflicts with oncoming traffic. Exacerbating this concern is the intersection’s existing traffic pattern which prioritizes the flow of this approach (the uncontrolled northbound movement on SR 147/SR 225/4th Street) creating hazardous conditions as large vehicles make right turns from SR 147/Market Street onto SR 147/SR 225/4th Street. Southbound vehicles turning right onto SR 147/Market Street at this intersection face similar challenges as large vehicles encroach into the eastbound SR 147/Market Street lane. Vehicles making this turn are likely destined for SR 147 northbound and are forced to make two challenging movements (including the left turn from Armstrong Street westbound onto 4th Street southbound) due to the one-way (westbound) configuration of Armstrong Street.

The existing traffic pattern can also be challenging for pedestrian crossings as incoming northbound traffic often does not yield to crossing pedestrians. The lack of striping, signage, and curb cuts representing pedestrian crossings on this approach and the other three intersection approaches exacerbate these conditions. The absence of curb cuts at the northwest corner of the intersection also inhibits safe pedestrian crossings, especially as it relates to pedestrians with limited mobility.

Similar to the primary intersection’s deficiencies, the intersection of SR 225/Armstrong Street and SR 225/4th Street has similar geometry challenges and safety negligence. Northbound motorists approaching the intersection on SR 225/4th Street have limited visibility of westbound approaching traffic on SR 225/ Armstrong Street due to the close proximity of existing homes to the curblines as well as the topography at the intersection. Northbound large vehicles turning right onto SR 225/Armstrong Street eastbound encroach into the approaching westbound traffic lane, a significant



safety hazard considering this westbound movement is uncontrolled through the intersection and is not required to stop. The requirement of all motorists approaching the intersection westbound on SR 225/Armstrong Street to turn left onto SR 225/4th Street creates difficulties for large vehicles, particularly when other vehicles are present at the northbound approach stop bar. Additionally, the existing traffic patterns that permit the free flow of westbound approach traffic through the intersection can be confusing for unfamiliar motorists. This traffic pattern also obscures the pedestrian crossing at this approach. Like the SR 147 and SR 225 intersection, all of the pedestrian crossings are in need of new striping and additional signage treatments to better define their presence. Curb cuts and other ADA accessibility modifications are also needed at all four corners of the intersection.

The segment of SR 225/4th Street between the SR 225/Armstrong Street intersection and SR 147/Market Street intersection is also an existing network deficiency that poses challenges for the movement of large vehicles through Halifax. Much of this segment consists of two travel lanes and one southbound parking lane that imposed narrow travel lane widths for through traffic. This is particularly problematic for large, wide vehicles traveling between the two intersections as horizontal clearances are limited and can be insufficient to accommodate two large vehicles traveling in opposite directions to pass simultaneously.

Anecdotal information provided by the stakeholder team during the field visit reveals peak traffic volumes overwhelm the existing intersection designs and roadway configurations in the Borough. During morning and afternoon peak hours, stakeholders explained that the existing design deficiencies aggravate the high traffic volumes that traverse Halifax and cause significant backups approaching the intersections. As a result, many motorists will attempt to avoid congestion by using local residential streets that provide alternative connections between the State Roads. This causes unsafe conditions as many of these roads are not designed for through traffic volumes and motorists often speed to recover time spent in congestion.

OUTREACH SUMMARY

Supplementing the local official engagement that occurred during the local field views, the project team contacted local stakeholders and local freight industry personnel to gather information on Halifax's intersection challenges and obtain information on specific large vehicle moves that travel through the Borough. Of the

nine local freight stakeholders the project team sought contact with, seven stakeholders responded to our efforts representing diverse industry and community interests – the Halifax Area School District, Harman Stove Factory, Kiner's Auto Salon, Inc., Meckley's Limestone Products, New Enterprise Stone & Lime Company, Rohrer Bus Company, and Valley Ag & Turf.

Each stakeholder that provided feedback to the project team expressed the importance of the SR 147 and SR 225 intersections in Halifax for Dauphin County motorists and for the movement of freight in the region. The importance of Halifax was attributed to the natural geography of the area – with the Susquehanna River and surrounding topography of the Susquehanna Valley creating natural barriers on traffic flows and goods movement – and the connectivity SR 147 and SR 225 provide between the major highways to the south and the many boroughs and economic centers further north in the Susquehanna Valley. With Halifax having satellite locations of many large corporate entities such as Dollar General, Giant Food Stores, and Sheetz, several municipalities to the north also enjoy similar amenities in addition to industrial activities that collectively drive the local economy. Access to Halifax and many of the other economic centers in northern Dauphin County and Susquehanna Valley are enabled by the regional and interregional freight movements that use SR 147 and SR 225 through Halifax.

For many of the stakeholders contacted, the Halifax intersections directly serve their diverse transport needs – ranging from the transportation of children to and from school to delivering farm equipment to customers around the region. Six of the seven stakeholders expressed frequent use of the Halifax intersections, particularly as it relates to the north-south connections they facilitate between U.S. Highways 15 and 22, and various locations north of Halifax.

The primary physical issues identified by stakeholders were the right-of-way constraints of the SR 225/Armstrong Street and 4th Street intersection and the SR 147/Market Street and SR 147/SR 225/4th Street intersection in addition to the narrow widths of the travel lanes on 4th Street. The primary intersection of SR 147/Market Street and SR 147/SR 225/4th Street was described as being hazardous for large vehicles turning right onto 4th Street southbound from Market Street eastbound due to the limited visibility of 4th Street to the south where approaching vehicles have the right of way. Stakeholders indicated that trucks and buses often encroach into the opposing lane when making this right turn, forcing northbound 4th Street drivers to be

attentive and heed to these lane conflicts. Similar safety hazards were expressed at the SR 225/Armstrong Street and SR 225/4th Street intersection. Northbound drivers approaching the intersection have limited visibility of approaching westbound drivers that have the right of way through the intersection. Stakeholders indicated northbound trucks and buses often swing wide to turn right onto Armstrong Street and continue on SR 225 causing westbound SR 225/Armstrong Street traffic to accommodate opposing lane conflicts. Stakeholders noted that these complications are exacerbated when two large vehicles meet at the intersection requiring a careful movement and maneuvering on behalf of the operators to avoid collisions and damage to adjacent infrastructure. The SR 225/4th Street corridor is the third and final physical constraint identified by stakeholders as the narrow widths of the existing travel lanes cause significant challenges for large vehicles traveling in opposing directions to pass simultaneously.

As a result of the physical challenges within the intersections and along 4th Street, stakeholders indicated congestion as a significant concern, particularly during morning and afternoon peak hours which were approximated as 6:30 AM – 7:45 AM and 3:30 PM – 5:00 PM. It is during these times high traffic volumes are faced with traffic flow deficiencies which exacerbate congestion in the area. Stakeholders indicated traffic congestion occurs on westbound/southbound SR 225 approaching the 4th Street intersection and on northbound SR 147 and SR 225 approaching the Market Street intersection. Stakeholders estimated these segments to back up 0.2 to 0.5 miles regularly from their respective interchanges during peak hours. In the cases of crash incidents during peak hours, stopped traffic can queue as far as 1.5 miles from the intersections stretching to Bunker Hill Road along SR 225 to the northeast and to the SR 147 and SR 225 split to the south. Due to the congestion in and around Halifax, motorists often attempt to circumvent congestion on the State Routes in Halifax by using many local residential streets that are often narrow and inadequate to handle diverted traffic. This has created concerns for the Halifax Area School District as school bus stops are difficult to site considering the existing challenging traffic conditions on many streets in the Borough.

Lastly, the project team asked each of the stakeholders for suggested improvements that would address the identified issues. Recognizing the safety hazards and traffic flow deficiencies through Halifax and the complexity of the area's geographic constraints, stakeholders recommended a variety of improvements

that would address some of these existing issues. To address the narrow travel lane widths on 4th Street, several stakeholders believed the removal of the southbound parking lane would enable trucks and other large vehicles to pass without interferences. However, stakeholders recognized the removal of residential parking spaces as the suggestion's primary flaw. While rear parking may be available for residents off Union Street, there is a possibility some residents may lose the ability to park adjacent to their property.

Another short-term suggestion was the modification of Armstrong Street's traffic patterns between 3rd Street and 4th Street to allow for two-way traffic which would allow trucks traveling from SR 225 southbound to continue onto SR 147 northbound to avoid the three turn movements required to navigate through Halifax. However, this recommendation would also require the removal of one or both parking lanes on Armstrong Street to adequately accommodate larger vehicles.

A third stakeholder recommendation focused on the geometrically constrained intersection of SR 225/Armstrong Street and 4th Street proposing the acquisition of adjacent ROW to enlarge the footprint of the intersection to better accommodate large truck and bus turns through the intersection. An identified challenge with this plan was the expense and residential displacement of acquiring one or two adjacent homes to make way for intersection improvements.

A fourth stakeholder suggestion was to construct a bypass to divert SR 147 through traffic away from the Market Street and 4th Street intersection and the Market Street and 2nd Street intersection. The recommended alignment would connect 2nd Street to School Road adjacent to Halifax Elementary School and run behind the middle/high school complex before rejoining the existing SR 147 ROW near the Dollar General. The recognized challenge of this recommendation would be the substantial ROW acquisition required, the diversion of heavy truck traffic through a large school complex, and the high capital costs involved with new roadway construction.

PROPOSED ALTERNATIVES

Based on a review of existing conditions, right-of-way constraints and feedback from stakeholders, the project team developed several potential alternatives concepts aimed at addressing each intersection's existing deficiencies.

ALTERNATIVE ROUTES

A review of alternative routes was performed with the intention of diverting large trucks to routes that avoid the existing intersection and roadway challenges, thereby potentially maintaining existing intersection and roadway designs.

Halifax has many physical constraints that create significant network challenges in establishing an alternative route sufficient for large vehicles. The immediate vicinity of Halifax Borough has rolling topographic features that pose significant design challenges, particularly the siting of an appropriate route that would serve regional traffic traveling through Halifax, connecting SR 147 and SR 225. Therefore, siting alternative routes for regional traffic is difficult and would require a substantial funding commitment to acquire necessary ROW and conform the route to PennDOT's design standards.

Initially suggested during the stakeholder outreach efforts, a southern alternative route would use a mix of existing local roads and new roadway alignments to divert large vehicles away from the SR 147/Market Street and SR 147/SR 225/4th Street intersections. This would involve converting 2nd Street from Market Street to Park Drive and School Street between Halifax Elementary/Middle School and Halifax Area High School into the alternative SR 147 alignment with new roadway alignments connecting 2nd Street to School Street and School Street to SR 147/SR 225. However, diverting regional traffic on this proposed alternative alignment poses several challenges. 2nd Street between Market Street and Park Drive is narrow and inadequate for high volume regional traffic. Similarly, School Street is intended to serve local traffic traveling to and from Halifax's three schools. Therefore, modifying these two existing streets to accommodate heavy truck movements would be both costly and hazardous considering the existing residential nature of 2nd Street and School Street's proximity to Halifax's schools. Additionally, the acquisition of sufficient ROW to connect 2nd Street and School Street and School Street and SR 147 would also be difficult and costly considering the alignment would

traverse Halifax Borough Park and other properties owned by private landowners.

Another alternative route identified by the project team would connect SR 147 to SR 225 north of Halifax, providing a northern alternative route for regional traffic and large trucks. The open space north of residences on Locust Street presents an opportunity to connect SR 147 to the existing Fuhrman Drive to the east. An upgrade and paving of Fuhrman Drive to provide the remaining connection so SR 225 would be necessary in addition to proper intersection treatments with the existing SR 147 and SR 225 at each end. This alternative route would enable large trucks to avoid the two difficult maneuvers in Halifax that are necessary to travel between SR 147 and SR 225 to and from the north side of Halifax. However, this improvement would require a substantial investment given the need to construct a new road within challenging topographic conditions.

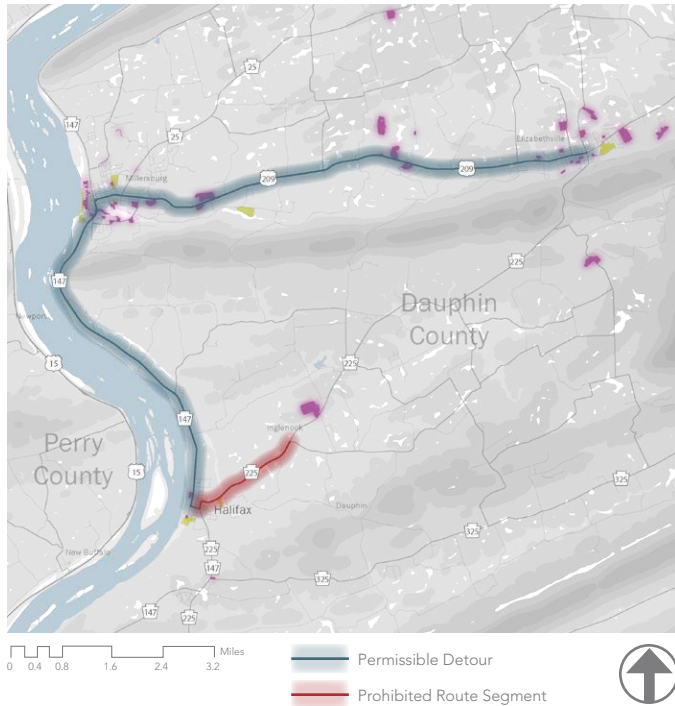
IMMEDIATE IMPROVEMENTS

While existing traffic flows are constrained by intersection and roadway designs, some near-term improvements are suggested due to their quick and easy implementation and their immediate benefits to traffic flow and safety

Alternative 1 - Improved Intersection Visibility/Signage

The project team recommends investing in advance warning signage (MUTCD W11-2 and W16-9P) notifying motorists of pedestrian crossings at the SR 147/Market Street and SR 147/SR 225/4th Street intersection and SR 225/Armstrong Street and SR 225/4th Street intersection in Halifax Borough. This would include the restriping of all crosswalks at the four intersections in Halifax to improve visibility, particularly the striping that traverses the inbound approaches that do not require vehicles to stop. It is also recommended that these free-flowing approaches supplement restriped crosswalks with advance warning pedestrian crossing signage to better notify motorists of the potential for crossing pedestrians. Advance warning signage notifying motorists of possible wide encroaching truck turns at the northbound approach to the SR 147/SR 225/4th Street and SR 147/Market Street intersection and westbound approach to the SR 225/Armstrong Street and SR 225/4th Street intersection is recommended to improve safety and familiarize motorists with potential intersection hazards.

Alternative 2 - SR 225 Truck Prohibition



Another immediate improvement would be prohibiting all trucks with trailers 40' or greater in length on SR 225 between SR 147 and SR 4004 (Rutter Road). Through signage and enforcement, all trucks with trailers 40' or greater in length would be rerouted an additional 5.1 miles onto SR 147 and US 209 through Millersburg. This would require a traffic study to investigate the number of trucks that may be impacted by a truck prohibition. Coordination with local police would be required for enforcement of any truck prohibition. This would avoid large truck maneuvering conflicts experienced at the SR 225/Armstrong Street and SR 225/4th Street intersection and eliminate some of the large vehicle passing conflicts on SR 225/4th Street between the intersections with SR 225/Armstrong Street and SR 147/Market Street. This would, however, not remove large truck maneuvering conflicts/encroachment for vehicles traveling southbound on SR 147 turning right onto SR 147/SR 225 at 4th Street.

Alternative 2 may be implemented concurrently with Alternative 1 to provide additional operations and safety benefits to the Borough.

MEDIUM-TERM IMPROVEMENTS

Reviewing the observations and feedback collected over the course of the study, the project team recognize that Halifax's intersections and State Route alignments have design deficiencies that require significant investment to improve existing conditions. Therefore, the project team proposes a design-specific improvement that is sensitive to these existing realities and the physical constraints of Halifax Borough's topography and existing development. While the proposed design alternative is short-term in nature, a subsequent traffic study is necessary to inform the final roadway configuration and design, classifying this recommendation as a medium-term improvement.

Alternative 3 - Partial One-Way Loop

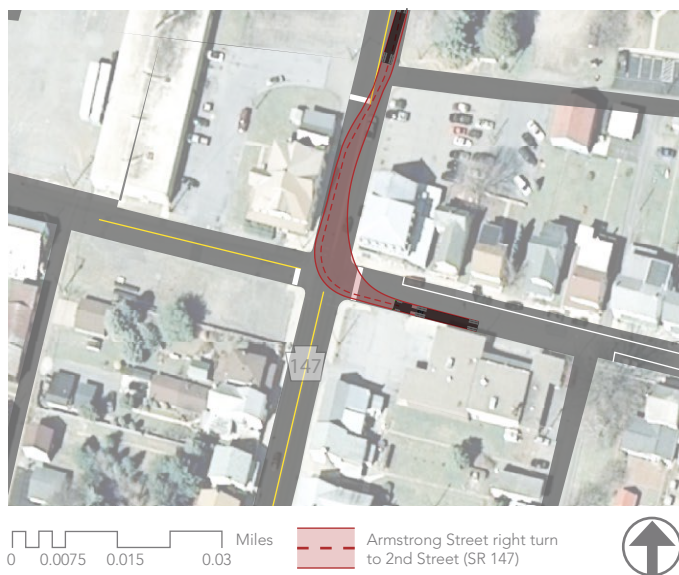


The project team proposes the conversion of SR 225/4th Street and Armstrong Street to one-way northbound and westbound, respectively. This would improve safety by simplifying traffic patterns and eliminating some difficult truck maneuvers and intersection encroachment issues. Right turns from SR 225/4th Street to SR 147/Market Street would be eliminated, avoiding existing encroachment issues caused by left turning trucks from

eastbound SR 147/Market Street to northbound SR 225/4th Street. The conversion of 4th Street to one-way northbound also eliminates the narrow travel lane clearances that currently pose operational problems. The elimination of westbound SR 225/Armstrong Street truck turns to southbound SR 225/4th Street reduces interferences with right turning trucks from northbound SR 225/4th Street to SR 225/Armstrong Street.

To adequately accommodate the proposed changes and more safely accommodate existing traffic, several intersection improvements are necessary based on analyses of existing turning moves (Figures 2-4) and the analysis of new turning moves that would result from the new design (Figures 9 & 10). Westbound SR 225/ Armstrong Street traffic approaching SR 225/4th Street would be subject to a signalized intersection that would accommodate the large swept paths of trucks through the intersection without encroaching on opposing travel lanes. This would require the placement of a stop bar set back several hundred feet from the physical intersection. Similarly, northbound SR 147/SR 225/4th Street traffic approaching SR 147/Market Street would be subject to a signalized intersection with a stop bar that adequately accommodates the swept paths of right turning trucks from SR 147/Market Street to SR 147/SR 225/4th Street.

FIGURE 9: Armstrong Street @ SR 147/2nd Street Autoturn Swept Path - New Turning Movement



Southbound traffic on SR 147/2nd Street approaching Armstrong Street would also adhere to a stop bar set back a substantial distance from the proposed signalized intersection to accommodate right turning trucks from westbound Armstrong Street to northbound SR 147/2nd Street.

By routing state road traffic onto Armstrong Street, PennDOT would have the ability to adopt the street as a state highway. This would entail PennDOT taking over ownership and responsibility of the road and its maintenance, relieving Halifax Borough of the additional maintenance costs and upkeep currently required.

A substantial concern with any alternative that involves signalization of intersections in Halifax is the fact that these intersections will likely not meet any MUTCD signal warrant, given existing traffic volumes, pedestrian activity, and crash history. Therefore discussions with PennDOT will be required to identify locations within Pennsylvania where similar conditions have required the signalization of an intersection that does not otherwise meet signal warrants.

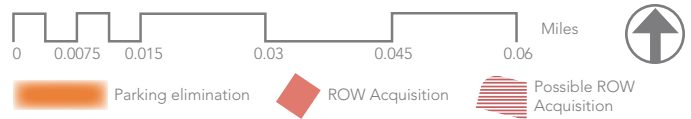
FIGURE 10: SR 225/Armstrong Street @ SR 225/4th Street Autoturn Swept Paths - New Turning Movements



LONG-TERM IMPROVEMENTS

Recognizing the difficulties of the existing cartways and the proximity of properties and buildings adjacent to the project area roadways, the project team presents the following long-term recommendations that expand the footprint of Halifax’s challenging intersections to further improve safety and operations that require significant right-of-way acquisition.

Alternative 4 - ROW Acquisition to Accommodate Existing Flows



Another alternative that would reduce encroachments and improve operations would be the expansion of existing footprints of the SR 147/Market Street and SR 147/SR 225/4th Street intersection and the SR 225/4th Street and SR 225/Armstrong Street intersection. Expanding these intersections and removing street parking on SR 225/4th Street allows the existing traffic patterns and flows to be maintained and eliminate visibility obstructions.

This alternative would require the acquisition of at least five parcels and a possible sixth parcel at the SR 225/4th Street and SR 225/Armstrong Street intersection to improve visibility.

Alternative 5 - ROW Acquisition to Accommodate Modified Traffic Pattern



A second ROW acquisition alternative would modify the existing traffic patterns through Halifax similar to Alternative 3 by implementing a partial one-way loop. Similarly, this proposal would have operational and safety benefits by eliminating opposing turn movements that are often difficult in the existing configuration. Right turns from southbound SR 225/4th Street to westbound SR 147/Market Street would be eliminated, avoiding existing encroachment issues caused by left turning trucks from eastbound SR 147/Market Street to

northbound SR 225/4th Street. The conversion of 4th Street to one-way northbound also eliminates the narrow travel lane clearances that currently pose operational problems. The elimination of westbound SR 225/Armstrong Street truck turns to southbound SR 225/4th Street reduces interferences with right turning trucks from northbound SR 225/4th Street to SR 225/Armstrong Street.

This alternative would require the acquisition of six parcels and a possible seventh parcel at the SR 225/4th Street and SR 225/Armstrong Street intersection to improve visibility.

SUMMARY OF ALTERNATIVES

After reviewing the elements of each of the proposed alternatives, the project team identified the strength and weaknesses of each. The advantages and disadvantages of each alternative are compared in Figure 11.

Alternative 1 - Improved Intersection Visibility/Signage

Strengths

- Low implementation cost
- Increased awareness and improved driver expectations with existing traffic patterns

Weaknesses

- Does not address hazardous truck encroachments at the intersections
- Traffic flows are not improved

Alternative 2 - SR 225 Truck Prohibition

Strengths

- Eliminates hazardous bi-directional truck movements on SR 225/4th Street's narrow lanes
- Eliminates difficult truck turning movements at the SR 225/4th Street and SR 225/Armstrong Street intersection.

Weaknesses

- Does not address the difficult geometry of the SR 147/Market Street and SR 147/SR 225/4th Street intersection
- Requires trucks to detour more than 5 miles through Millersburg
- Does not provide safety improvements for pedestrians

Alternative 3 - Partial One-Way Loop

Strengths

- Eliminates hazardous bi-directional truck movements on 4th Street's narrow lanes
- Better facilitates truck turning movements at 2 intersections by removing opposing moves
- Simplifies traffic patterns through signalization
- Improves pedestrian safety

Weaknesses

- Requires the elimination of some parking

- Signalization construction cost of three intersections
- Signal maintenance costs for the Borough
- Conditions will likely not meet MUTCD signal warrants

Alternative 4 - ROW Acquisition to Accommodate Existing Flows

Strengths

- Increases lane widths to better accommodate bi-directional truck flows on 4th Street
- Reduces truck swept path encroachments at the intersections

Weaknesses

- Eliminates parking
- Requires the acquisition of several properties and demolition of existing structures

Alternative 5 - ROW Acquisition to Accommodate Modified Traffic Pattern

Strengths

- Increases lane widths to better accommodate bi-directional truck flows on 4th Street
- Reduces truck swept path encroachments at the intersections
- Better facilitates truck turning movements at 2 intersections by removing opposing moves

Weaknesses

- Eliminates some parking
- Requires the acquisition of several properties and demolition of existing structures

PREFERRED ALTERNATIVE

Based on a review of the overall operations and impacts of each alternative, Alternative 3 is selected as the preferred alternative to be advanced for further analysis. Alternative 3 improves overall vehicular operations for motorists and large vehicles as many difficult turn movements are avoided and pedestrian safety is improved, simplifies existing traffic patterns, and increases pedestrian safety. The overall benefits of this proposal outweigh the negative effects of this design, including the additional turning maneuvers required for southbound SR 225 to loop around Halifax to continue onto SR 225 and continue to southbound SR 147 and the elimination of parking on Armstrong Street and 4th Street. However, southbound and northbound SR 225 freight traffic northeast of Halifax represents a fraction of the overall freight volumes through the Borough and the conversion of Armstrong Street to one-way westbound

FIGURE 11: Alternatives Comparison



would marginally impact a small number of residents compared to its larger local and regional traffic flow benefits.

NEXT STEPS

This study examined the existing conditions of the Halifax intersections, identified and engaged stakeholders, and provided potential solutions for future planning and engineering investments. To advance the improvements set forth in this memo, the Borough, County, Harrisburg Area Transportation Study Metropolitan Planning Organization (HATS MPO), PennDOT, and others will need to advance the following steps to address the area’s existing challenges and concerns.

- Present this study’s preliminary findings to the Borough, County, and HATS MPO for further input on advancing any of the study’s recommendations
- Identify through the HATS MPO the availability of funding to further develop alternatives to improve traffic and freight flow through the intersections. This may be done through the region’s Transportation

Improvement Program (TIP) or other identified funding sources such as PennDOT’s or DCED’s Multimodal Transportation Fund (MTF) grant program.

- Perform a detailed alternative analysis that more closely examines traffic operations, costs, and impact for each of the proposed alternatives
- Conduct a regional truck origin/destination study to understand the freight flows through the intersection and inform future planning investment decision.