Transportation Project Report

Pedestrian Safety Corridor Evaluation

June 2019

Niagara Falls Boulevard
Project Identification Number (PIN): SESS.17.121

Towns of Amherst and Tonawanda
Erie County
# Contents

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Abbreviations
ADA .................................................................................. Americans with Disabilities Act
APS ................................................................................ Accessible Pedestrian Signal
CME .................................................................................. Creighton Manning Engineering
DOH .................................................................................. Department of Health
FHWA ............................................................................. Federal Highway Administration
GTSC ................................................................................ Governor’s Traffic Safety Committee
HAWK ............................................................................ High-intensity Activated crossWalk Beacon
HCM ................................................................................ Highway Capacity Manual
HSIP ................................................................................ Highways Safety Improvement Program
LPI ....................................................................................... Leading Pedestrian Interval
MUTCD ........................................................................... Manual on Uniform Traffic Control Devices
NFTA ................................................................................ Niagara Frontier Transportation Authority
NTOR ................................................................................ No Turn on Red
NYSDOT .......................................................................... New York State Department of Transportation
PSAP ................................................................................ Pedestrian Safety Action Plan
RDSA ................................................................................ Regional Design Services Agreement
RRFB ................................................................................. Rectangular Rapid Flash Beacon
RSA ................................................................................... Road Safety Audit
Three E's ........................................................................... Education, Enforcement, and Engineering
TMC .................................................................................... Turning Movement Count
USLIMITS2 ................................................................. Software for determining appropriate speed limit
VHB ................................................................................ Vanasse Hangen Brustlin
Executive Summary
As part of the continued focus on pedestrian safety and effort to reduce fatal and serious injury crashes, the New York State Department of Transportation (NYSDOT) initiated a study of pedestrian safety along Niagara Falls Boulevard to analyze pedestrian related crashes, including an assessment of existing pedestrian infrastructure, and develop planning level recommendations that will help to improve pedestrian safety along this corridor. The corridor is located in the Towns of Amherst and Tonawanda in Erie County and extends from Kenmore Avenue in the south to the Erie County/Niagara County Line at Tonawanda Creek in the north. As a result of the study, a comprehensive pedestrian safety plan has been developed for the Niagara Falls Boulevard corridor through a combination of the “Three E’s”, which stand for Education, Enforcement, and Engineering. The corridor wide approach consistent with the PSAP and is a cooperative effort with local municipal partners, local law enforcement, the Governor’s Traffic Safety Committee, and the New York State Department of Health. This report was prepared for NYSDOT by VHB.

Crash Evaluation and Existing Conditions
Review of a five year crash history (May 1, 2013 to May 12, 2018), an evaluation of the existing conditions in the corridor through a road safety audit, and general observations resulted in a number of findings:

Crash History
- 31 pedestrian crashes occurred during the five year data period
- Five of the 31 crashes resulted in pedestrian fatalities
- The contributing factors in the pedestrian crashes were attributed to both drivers and pedestrians
- There is no specific “hot spot” for pedestrian crashes

Existing Conditions
- Sidewalks are generally present in the corridor with the exception of a few short gaps and a 1.35-mile segment on the west side of the road from Sheridan Drive to Green Acres Boulevard
- The presence of stop bars, marked crosswalks, ramps, and detectible warning at unsignalized intersections varies and marked crosswalks are often missing on the side street approaches to Niagara Falls Boulevard
- The long cycle lengths at signalized intersections in the corridor create long wait times for pedestrians crossing the street
- Pedestrian equipment in the corridor is inconsistent at the signalized intersections; especially relating to pushbuttons which range from pushbuttons that do not interact with the signal system to accessible pedestrian signals with immediate feedback for users
- The condition of the pedestrian accommodations in the corridor varied with some in good condition and some in poor condition. For example, there are some brand new curb ramps with ADA detectable warning fields and some uneven sidewalks in disrepair.
- Very few intersection signs and no vehicle turning restrictions are present at the signalized intersections increasing the potential for vehicle/pedestrian conflicts
- No specific accommodations are present for transit users such as concrete pads, benches, or shelters
Pedestrian Observations

- Crossing at midblock locations, some in areas where signalized intersections with accommodations were nearby
- Crossing at signalized intersections using the available pushbuttons and indicators
- Crossing at signalized intersections, pushing the pushbuttons and then not waiting for the crossing indicators
- Crossing at signalized intersections not using the available pushbuttons and indicators
- Waiting for transit in the corridor
- Walking along the corridor on sidewalks
- Walking in parking lots in the area where sidewalks do not exist

Recommended Countermeasures

Many of the recommendations included in the study are relatively low cost, systemic countermeasures. The countermeasures are intended to increase driver awareness of pedestrian activity and presence, standardize the type of available pedestrian accommodations, and reduce the potential for driver and pedestrian error. The following recommendations are consistent with the New York State Pedestrian Safety Action Plan and are summarized by the Three E’s.

Education

- Distribute pedestrian safety information to businesses in or adjacent to the corridor and at schools, community centers, and places of worship.
- Continue to use media to distribute pedestrian safety messages to reach a larger and more diverse population through websites, billboards, public access television, newspapers, social media, and radio.
- Provide culturally sensitive versions of the “See! Be Seen!” campaign material in other languages.
- Identify resources and events where local agencies (police, transportation agencies, local community organizations, etc.) can conduct pedestrian safety education programs.
- Pursue state safety grants to support ongoing and enhanced pedestrian safety education efforts from the NYSDOH and GTSC.
- Conduct focused educational outreach efforts in conjunction with infrastructure improvement projects.
- Coordinate with the Niagara Frontier Transportation Authority to distribute educational material to riders and post “See! Be Seen!” material on busses (internal and/or external).
- Consider pedestrian safety events at bus stop locations in the corridor where educators can hand out material and verbally remind pedestrians about safety.
- Sponsor pedestrian safety events with local education centers to promote long-term changes to pedestrian and driver behavior with additional emphasis on primary and secondary school age students.

Enforcement

- The Town of Tonawanda Police Department is participating in the GTSC Pedestrian Safety Enforcement Mobilization Operation “See! Be Seen!” campaign from June 14-27, 2019. The effort includes two billboards in the corridor.
Participate in an annual high visibility targeted enforcement campaign in the corridor with a goal of modifying pedestrian and driver behavior to improve pedestrian safety by issuing warnings and citations to both pedestrians and motorists who are in violation of the law.

- Involve the local court system in targeted initiative so that tickets are not unknowingly dismissed as this would defeat the goal of working towards modifying behaviors.
- Provide local law enforcement officers specialized training in pedestrian safety to ensure familiarity with the laws governing pedestrian/automobile interaction and appropriate enforcement strategies.
- Provide law enforcement with pedestrian safety educational materials to distribute with warnings or citations to promote the educational components of pedestrian safety during any enforcement activity.
- Identify resources for local law enforcement to support pedestrian safety targeted enforcements, officer training, and community outreach. NYSDOH and GTSC should be used as resources for funding opportunities (www.safeny.ny.gov).

**Engineering**

Throughout the study process, several items were identified for immediate implementation. The table below summarizes those tasks and their status.

### Items for Immediate Implementation

<table>
<thead>
<tr>
<th>Task</th>
<th>Emphasis Approach</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>See! Be Seen! Billboards</td>
<td>Education</td>
<td>Yes</td>
</tr>
<tr>
<td>Check pushbutton operation at the Sheridan Drive intersection</td>
<td>Engineering</td>
<td>Yes</td>
</tr>
<tr>
<td>Review pedestrian crossing times from Sheridan Drive to Niagara County line</td>
<td>Engineering</td>
<td>Yes</td>
</tr>
<tr>
<td>Adjust pedestrian crossing times at Ridge Lea Road/Koenig Road, Home Depot driveway, and Vinson Avenue/Edward White Drive</td>
<td>Engineering</td>
<td>Yes</td>
</tr>
<tr>
<td>Clear sight distance obstruction looking right from Kenilworth Avenue</td>
<td>Engineering</td>
<td>No – private property</td>
</tr>
<tr>
<td>Clear sight distance obstruction looking right from Oxford Avenue</td>
<td>Engineering</td>
<td>No – private property</td>
</tr>
<tr>
<td>Install stop bar on Decatur Road at Niagara Falls Boulevard</td>
<td>Engineering</td>
<td>No</td>
</tr>
<tr>
<td>Repair uneven sidewalk</td>
<td>Engineering</td>
<td>Yes</td>
</tr>
</tbody>
</table>

In addition to the items for immediate implementation, a number of engineering countermeasures were reviewed to determine the appropriate tools to implement in the Niagara Falls Boulevard corridor. The engineering countermeasures include a mix of traffic signal features, signing, striping, and roadway infrastructure. Several of the countermeasures have been identified by the Federal Highway Administration as Proven Safety Countermeasures. These Proven Safety Countermeasures have been chosen by the Federal Highway Administration based on proven effectiveness and benefits to reduce fatalities and serious injury crashes. The countermeasures are designed and installed based on the standards and guidelines presented in the National Manual on Uniform Traffic Control Devices and the New York State Supplement to the Manual on Uniform Traffic Control Devices. Several of these
countermeasures are also included in the PSAP. The recommendations are identified for short-term and long-term implementation. The detailed evaluations and recommendations are included in the body of the report and in the document appendices.

**Short-term**
The detailed discussion in the report identifies specific locations and preliminary cost estimates for each of the following recommendations. Two million dollars is available for construction of the short-term recommendations.

- Provide pedestrian indicators, countdown timers, and pushbuttons at all traffic signals
- Upgrade existing pushbuttons to Accessible Pedestrian Signals and pushbuttons
- Update pedestrian clearance intervals based on current standards
- Provide leading pedestrian intervals at select locations
- Update yellow change and red clearance intervals based on current standards
- Install yield to pedestrian signs at select locations
- Install no turn on red signs at select locations
- Install stop bars
- Install high visibility crosswalks
- Reduce the speed limit in the northern end of the corridor
- Construct sidewalks where missing
- Provide sidewalk ramps with ADA detectible warning units on all crossings
- Add marked crossings with all pedestrian equipment at existing traffic signals at select locations
- Upgrade the Kenilworth Avenue traffic signal to provide a controlled crossing for pedestrians across Niagara Falls Boulevard
- Provide pedestrian warning signs and median refuge islands on Niagara Falls Boulevard near Ford Avenue and Harrison Avenue and relocate bus stops to improved pedestrian crossing location
- Narrow Niagara Falls Boulevard at Willow Ridge Drive to five lanes by relocating the curb north and south of the intersection
- Provide a raised island on the eastbound Ellicott Creek Road approach to Niagara Falls Boulevard
- Determine whether a road diet is the preferred vision for the corridor
- Consider creating a signing plan directing bicyclists to the adjacent parallel neighborhood street system

**Long-term**
There is no funding currently allocated for construction of the long-term recommendations. These recommendations are included for future consideration as funding becomes available for additional improvements in the corridor.

- Provide leading pedestrian intervals at all of the traffic signal controlled intersections in the corridor
- Replace ground mounted signs with overhead signs with upgrading of traffic signal systems
- Consider construction of a pedestrian hybrid beacon near Classics V Banquet facility if warranted
- Construct a sidewalk with ramps, detectable warnings, and marked crosswalks on the west side of Niagara Falls Boulevard from Sheridan Drive to Green Acres Road
• Determine the desirability of providing specific accommodations for bicyclists on the corridor
• Partner with the towns to investigate the potential to install lighting under I-290
• Partner with the towns to develop an access management policy for the corridor
• If the road diet is determined to be a vision for the corridor, complete additional analyses and conceptual design to confirm feasibility
I. Introduction – The Three E’s

The New York State Department of Transportation (NYSDOT) initiated a study of pedestrian safety along Niagara Falls Boulevard (US Route 62 and NY Route 950K) as part of the Regional Design Services Agreement (RDSA) (D031151, PIN SESS 17.121). The corridor is located in the Towns of Amherst and Tonawanda in Erie County and extends from Kenmore Avenue in the south to the Erie County/Niagara County Line at Tonawanda Creek in the north. The purpose of the study is to analyze pedestrian related crashes, including an assessment of existing pedestrian infrastructure, and develop planning level recommendations that will help to improve pedestrian safety along this corridor. As part of the study a comprehensive pedestrian safety plan has been developed for the Niagara Falls Boulevard corridor through a combination of the “Three E’s”, which stand for Education, Enforcement, and Engineering. The Education and Enforcement components support the Engineering analysis and suggested countermeasures discussed in this study. The corridor wide approach is a cooperative effort with the local municipal partners, local law enforcement, the Governor’s Traffic Safety Committee (GTSC), and the New York State Department of Health (NYSDOH) and analyzes the issues in the corridor from a comprehensive perspective by identifying crash patterns and identifying countermeasures to be implemented corridor wide.

While not specifically a New York State Pedestrian Safety Action Plan (NYS PSAP, June 20, 2016) project, this Niagara Falls Boulevard Pedestrian Safety Corridor Evaluation will follow the PSAP process and incorporates the Three E’s approach and recommends proven countermeasures identified in the PSAP plan. The PSAP, located here: https://www.ny.gov/programs/pedestrian-safety-action-plan, was developed to identify current safety conditions and provide recommended engineering, education, and enforcement countermeasures to improve pedestrian safety on roadways in New York State. The PSAP was put in place as a method to implement pedestrian safety over a five-year period using Highway Safety Improvement Program (HSIP) funding and other state and local funding sources.

Education efforts are led by the NYSDOH and include public information and education materials, public service announcements, and outreach to communities. One example is the “See! Be Seen!” campaign located here: https://www.ny.gov/pedestrian-safety/three-es under the education tab.

Enforcement efforts are led by the NYS Governor’s Traffic Safety Committee (GTSC) and include law enforcement training, funding of dedicated enforcement activities, and recruiting grant partners. One example of GTSC initiatives are requiring two-week enforcement efforts during which pedestrian safety patrols are run. More information on GSTC can be found here: http://www.safeny.ny.gov/.

Engineering efforts are led by the NYSDOT and are therefore the primary focus of this study initiated by the Department. Current initiatives by NYSDOT include coordination of the PSAP throughout the state. Engineering countermeasures could include, but are not limited to, traffic signal timing changes, signal enhancements, turn restrictions, sidewalk improvements, and traffic calming measures.
II. Education and Enforcement

While this document has primarily focused on the Engineering component of the Three E’s, Education and Enforcement are just as critical. The PSAP identifies four specific education and enforcement actions:

- Raise both driver and pedestrian awareness of the pedestrian safety issue and promote behavior change in order to reduce pedestrian safety injuries and fatalities statewide.
- Conduct a statewide Public Information and Education Campaign.
- Increase knowledge among law enforcement regarding pedestrian safety and increase enforcement through targeted “Operation SEE! BE SEEN!” pedestrian safety mobilization efforts.
- Conduct dedicated enforcement details to address pedestrian safety.

Materials, programs, and grant funding are available through the NYSDOH and the GTSC, but implementation of these opportunities requires local municipal government, county agencies, and law enforcement partnerships.

A. Education

Education plays an important role in safety by improving people’s awareness about their legal rights and responsibilities as motor vehicle drivers, pedestrians, and bicyclists. Education serves to improve all road users’ awareness of safe practices with a goal to reduce the number of crashes.

As discussed in detail in Chapter III, the primary contributing factor for the pedestrian crashes in the corridor was “pedestrian error or confusion”. The second highest contributing factor was “failure to yield to the right of way”, which could be an error by either the pedestrian or motorist. Both of these contributing factors can be improved through education.

The NYSDOH in cooperation with the NYSDOT and the GTSC launched an educational campaign in September of 2014 titled “See! Be Seen!” The “See! Be Seen!” educational campaign focuses on pedestrian safety and makes available public announcements and other pedestrian safety materials in the form of clings, posters, and tip cards. The “See!” component of the safety campaign is focused on driver awareness and the “Be Seen!” component of the safety campaign is focused on pedestrian behavior and awareness. During this project, Region 5, proactively initiated an educational campaign which included posting the “See! Be Seen!” material on six billboards for the period from January 14, 2019 to February 10, 2019 (see following photographs). Two of the billboards were located on Niagara Falls Boulevard, one on Kenmore Avenue, one on the Kensington Expressway, one on I-290, and one on I-190. In addition, the Region placed portable variable message sign (PVMS) boards at four locations along Niagara Falls Boulevard with the messages alternating between “WATCH FOR PEDESTRIAN” and “STAY ALERT” for the period from December 20, 2018 through December 31, 2018. The signs were placed in the northbound direction in the vicinity of Betina Avenue and at Green Haven Terrace and in the southbound direction in the vicinity of E Robinson Road and Green Acres Road.
It is recommended that the education campaign in the Niagara Falls Boulevard corridor continue with the following:

- Distribution of pedestrian safety information to businesses in or adjacent to the corridor and at schools, community centers, and places of worship. The Ken-Ton Chamber of Commerce has begun and will continue to distribute See! Be Seen! Materials to businesses in the Niagara Falls Boulevard corridor.
- Continue to utilize media as a means to distribute pedestrian safety messages to reach a larger and more diverse population through websites, billboards, public access television, newspapers, social media, and radio. It is recommended that the Erie County DOH work with the NYSDOH and other local partners such as the Towns of Amherst and Tonawanda, Erie County Department of Social Services, and the University of Buffalo to determine the need to provide culturally sensitive versions of the “See! Be Seen!” campaign material in other languages.
- Identify resources for local agencies (police, transportation agencies, local community organizations, etc.) to conduct pedestrian safety education programs. Based on Stakeholder input, the following local community organizations and events were identified as candidates for distribution of pedestrian safety materials and/or education sessions. The list includes partner opportunities where they were specifically discussed in the Stakeholder conversations.
  - Erie County Fair held in August (Erie County partner)
  - Ride for Roswell in June (Town of Amherst Police Department partner)
  - Community Day and Business Showcase in May (Ken-Ton Chamber of Commerce partner)
  - Citizens for Regional Transit quarterly meetings-speaking opportunities
  - Citizens for Regional Transit newsletter-articles and/or advertisement opportunities
  - Elmwood Art Festival in August (Citizens for Regional Transit partner)
  - Party for the Planet in June (Citizens for Regional Transit partner)
  - Town of Tonawanda 4th of July Celebration
  - GObike Buffalo Sky Ride in May
  - University at Buffalo events on the Green
- The Erie County DOH, along with the Towns of Amherst and Tonawanda, should continue to pursue state safety grants to support ongoing and enhanced pedestrian safety education efforts from the NYSDOH and GTSC (www.safeny.ny.gov, www.health.ny.gov/funding). Erie County and the Town of Tonawanda currently have safety grants that are being used to help with the pedestrian safety initiatives in the Niagara Falls Boulevard corridor.
• Conduct focused educational outreach efforts in conjunction with infrastructure improvement projects. As NYSDOT implements infrastructure improvement projects, such as installing new pedestrian equipment, it is recommended that focused education outreach efforts be conducted simultaneously centered on the correct use of the new equipment.

• Work with the Niagara Frontier Transportation Authority (NFTA) to distribute educational material to riders and post “See! Be Seen!” material on busses (internal and/or external). It is also recommended that pedestrian safety events be considered on the Niagara Falls Boulevard corridor at bus stop locations in the corridor where educators can hand out material and verbally remind pedestrians about safety.

• Sponsor pedestrian safety events with local education centers to promote long-term changes to pedestrian and driver behavior. In an effort to focus on educating children at a young age, it is recommended that the Erie County DOH and local law enforcement partners coordinate with public and private schools to organize and implement pedestrian safety events for primary and secondary school age students. There may be potential to utilize school festivals and assemblies as a forum for pedestrian education. The Erie County DOH, along with the local school district and law enforcement should continue to pursue state safety grants (www.safe.ny.gov, www.health.ny.gov/funding).

B. Enforcement

Enforcement plays an important role in safety by imposing the traffic laws on both pedestrians and motorists.

As noted in Chapter III, the primary contributing factors for the pedestrian crashes in the corridor were “pedestrian error or confusion” and “failure to yield to the right of way”. Both of these factors, along with other pedestrian crashes in the corridor with contributing factors such as “improper turning” and “traffic control disregarded” could be reduced or eliminated with an increase in enforcement through the Niagara Falls Boulevard corridor. Enforcement of traffic laws can encourage both pedestrian and driver compliance and improve safety.

It is recommended that an enforcement campaign be initiated in the Niagara Falls Boulevard corridor to include the following:

• The Towns of Amherst and Tonawanda, in cooperation with the GTSC, should consider implementing and/or participating in an annual high visibility targeted enforcement campaign in the corridor with a goal of modifying pedestrian and driver behavior to improve pedestrian safety. The Town of Tonawanda Police Department is participating in the GTSC Pedestrian Safety Enforcement Mobilization Operation “See! Be Seen!” campaign from June 14-27, 2019. The effort includes two billboards in the corridor. During the enforcement campaign, local law enforcement would issue warnings and citations to both pedestrians and motorists who are in violation of the law. It is important to involve the local court system in the initiative so that tickets are not unknowingly dismissed as this would defeat the goal of working towards modifying behaviors. The Town of Tonawanda currently has a GTSC safety grant and has committed to participating in the pedestrian safety week in June (two weeks with one week of warnings and a second week with stronger enforcement) and would like to utilize the funding to have a second pedestrian safety week at a later time. The Niagara Falls Boulevard corridor will be included in the pedestrian safety week. Although the
Town of Amherst does not have a safety grant, they have expressed their interest in supporting the Town of Tonawanda in this effort on Niagara Falls Boulevard. The Town of Amherst Police Department has already increased their patrolling presence in the Niagara Falls Boulevard corridor due to the high volume of crash incidents, both pedestrian and non-pedestrian related.

- Provide local law enforcement officers specialized training in pedestrian safety to ensure familiarity with the laws governing pedestrian/automobile interaction and appropriate enforcement strategies. It is recommended that the local law enforcement coordinate with the GTSC regarding available training workshops specific to pedestrian safety (http://www.safeny.ny.gov/PedTraining/).
- Provide law enforcement with pedestrian safety educational materials to distribute along with warnings or citations to continue to push the educational components of pedestrian safety during any enforcement activity.
- Identify resources for local law enforcement to help support pedestrian safety targeted enforcements, officer training, and community outreach. NYSDOH and GTSC should be used as resources for funding opportunities (www.safeny.ny.gov). Police agencies may consider applying for funding to support dedicated and targeted traffic enforcement operations through the GTSC’s Police Traffic Services (PTS) grant program.
III. Existing Conditions Inventory, Data Collection & Crash History

A. Existing Conditions

The 6.5-mile Niagara Falls Boulevard study corridor is located in Erie County and extends from Kenmore Avenue in the south to the Erie County/Niagara County Line at Tonawanda Creek in the north. Five miles of the 6.5-mile study corridor (between Kenmore Avenue and Creekside Drive) serves as the municipal boundary between the Town of Amherst on the east side of the roadway and the Town of Tonawanda on the west side of the roadway. Niagara Falls Boulevard is designated NY Route 950K from Kenmore Avenue (reference marker (RM) 950K 5303 1000) to Sheridan Drive (RM 950K 5303 1016) and is designated as US Route 62 from Sheridan Drive (RM 62 5303 4019) to the county line (RM 62 5303 4068). US Route 62 is a Designated Qualifying Access Highway, meaning larger heavy vehicles are allowed to use the highway based on the Surface Transportation Assistance Act (STAA) of 1982. The study corridor is highlighted below in Figure 1.

![Figure 1: Niagara Falls Boulevard Project Limit Map](image)

1. Niagara Falls Boulevard Corridor Profile

Niagara Falls Boulevard in the study corridor is a north-south roadway classified as an urban principal arterial other. The study corridor between Kenmore Avenue and the Erie County/Niagara County line includes 24 signalized intersections and numerous unsignalized intersections and residential and commercial driveways, 32 of which are reviewed in detail as part of the study. The character and cross section of Niagara Falls Boulevard changes throughout the study corridor as summarized in Table 1.
Sidewalks are generally provided throughout the corridor though there are no sidewalks on the west side of Niagara Falls Boulevard for the 1.35-mile segment between Sheridan Drive and Green Acres Road, which is the most densely commercial segment of the corridor. There is also a section without sidewalk (0.25 miles) on the east side of the roadway from north of Braxmar Road to Romney Road. There are many large curb cuts providing access to commercial parcels along the corridor that result in long crossing distances for pedestrians increasing their exposure to vehicle traffic. Curbing is provided on both sides of the roadway through the corridor with narrow striped shoulders provided on both sides of the roadway north of the Koenig Road/Ridge Lea Road intersection, just south of the Interstate-290 (I-290) interchange. There are no striped shoulders south of Ridge Lea Road along the corridor.

Transit service on Niagara Falls Boulevard is provided by the Niagara Frontier Transportation Authority (NFTA). Route #34 – Niagara Falls Boulevard operates between University Metro Rail Station and Creekside Park & Ride and Amherst Development Park via Boulevard Mall. Route #64 – Lockport Express, Route #35 – Sheridan, and Route #5 – Niagara-Kenmore cross Niagara Falls Boulevard but do not travel along the corridor. Information provided by the NFTA shows that there are 31 bus stops in the northbound direction and 29 bus stops in the southbound direction in the study corridor. The bus stops are marked with signs and no benches or shelters are provided. Field review indicated that signs for four stops in the northbound direction (near Sheridan Drive, Pep Boys Auto Parts, Boulevard Mall Driveway,

---

Table 1 – Niagara Falls Boulevard Roadway Character

<table>
<thead>
<tr>
<th>Segment Extents</th>
<th>Length (miles)</th>
<th># of Primary Lanes</th>
<th>Posted Speed Limit</th>
<th>AADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenmore Ave to Cambridge Blvd</td>
<td>0.4</td>
<td>4</td>
<td>35 mph</td>
<td>19,580³</td>
</tr>
<tr>
<td>Cambridge Blvd to Eggert Rd</td>
<td>1.1</td>
<td>5</td>
<td>35 mph</td>
<td>19,580³</td>
</tr>
<tr>
<td>Eggert Rd to I-290 WB Ramps</td>
<td>1.75</td>
<td>6</td>
<td>40 mph</td>
<td>31,850⁴</td>
</tr>
<tr>
<td>I-290 WB Ramps to Willow Ridge Dr</td>
<td>0.5</td>
<td>7</td>
<td>45 mph</td>
<td>43,290⁴</td>
</tr>
<tr>
<td>Willow Ridge Dr to Admirals Walk</td>
<td>2.6</td>
<td>5</td>
<td>45 mph</td>
<td>36,000³</td>
</tr>
<tr>
<td>Admirals Walk to Erie County line</td>
<td>0.15</td>
<td>4</td>
<td>45 mph</td>
<td>36,000³</td>
</tr>
</tbody>
</table>

¹ Primary travel lanes includes mainline through travel lanes and center two-way left-turn medians, but not turn lanes at intersections
² Average annual daily traffic
³ Data collected by Consultant team for project
⁴ Traffic volume data available from NYSDOT

Photograph 3: No sidewalk on the west side of NFB south of Rochelle Pl
and the Target Driveway) and one stop in the southbound direction (near Irvington Drive) are missing.

General ridership information provided by NFTA indicates that the busiest bus stop on a weekday is the southbound stop at the unsignalized Rochelle Place/Almeda Avenue intersection with Niagara Falls Boulevard with 50 boardings and 8 alightings. This is also the busiest bus stop on the weekends with 54 boardings and 9 alightings on a Saturday and 37 boardings and 5 alightings on a Sunday.

Land use along the corridor changes from primarily residential with some very small-scale commercial in the south end of the corridor to large-scale commercial in the central section of the corridor and a transition back to smaller-scale commercial and open space at the north end of the corridor. Residential neighborhoods surround the Niagara Falls Boulevard corridor on both sides of the roadway throughout. Saint Christopher School is located on the west side of Niagara Falls Boulevard just north of Ellicott Creek and numerous other schools are located within blocks of Niagara Falls Boulevard (Willow Ridge Elementary School, Windermere Boulevard Elementary School, Glendale Elementary School, Stanley G. Falk School, Ben Franklin Middle School, and Kenmore East Senior High School). The study corridor includes or is surrounded by a number of churches and community services like fire stations and parks. The length of the corridor combined with the ample transit service and varied land uses on both sides of Niagara Falls Boulevard create a desire for pedestrians and bicyclists to travel along and across the roadway.

B. Data Collection
To gain a better understanding of the corridor a data collection plan was completed. The data collection plan included completion of a road safety audit, collection of pedestrian and vehicle data, general pedestrian observations, vehicle gap studies, and vehicle speed studies. Below is a summary of the collected data.

1. Inventory and Assessment of Existing Pedestrian Facilities
This study inventoried and assessed existing pedestrian and bicycle facilities and collected and analyzed vehicular, pedestrian, and bicyclist data to help identify opportunities to improve pedestrian and bicyclist safety. A Road Safety Audit (RSA) was completed by the Consultant team (VHB and CME) on October 30 and October 31, 2018 to review the existing conditions in the corridor. Existing pedestrian facilities that were inventoried included sidewalks, curb ramps, pedestrian signal equipment, traffic signal equipment as it relates to pedestrian operations, marked crosswalks, and corridor signing. General lighting conditions were also observed. The project team reviewed available data in the corridor and supplemented the data with the completion of intersection turning movement counts at seven intersections, hourly traffic volume data at three locations, travel speed data at three locations, and gap data at four locations. It is noted that in June of 2018 the Towns of Tonawanda and Amherst completed a Pedestrian RSA for the section of Niagara Falls Boulevard between Ridge Lea Road to East Robinson Road. A copy of the Town’s Pedestrian Road Safety Audit is included in Appendix A.

A review of the Town’s Pedestrian Road Safety Audit indicated the following:

- The Engineering Departments in the Towns of Tonawanda and Amherst conducted a Pedestrian Road Safety Audit (RSA) on June 25, 2018 in response to the sixth fatal pedestrian crash within a 5-year period. The RSA was conducted along Niagara Falls Boulevard for approximately 2.4-miles and extended from Ridge Lea Road/Koeing Road to East Robinson Road.
• The report summarizes the corridor background, planned improvements, general roadway characteristics and other existing pedestrian deficiencies. The study noted the street lighting project that is anticipated on Niagara Falls Boulevard from Inn Keepers Lane to the north boundary line of Amherst and Niagara County in 2019. Aside from planned improvements, general characteristics of the study area were documented to include the posted speed, number of lanes, pavement width, number of driveways, and the average length between each segment in the study area.

• The Road Safety Audit describes the pedestrian experience through the study area and was broken up into eight segments associated with different land uses characteristics through the corridor. Generally, pedestrian deficiencies in the corridor were noted to include crossing intervals that do not meet the minimum crossing time, ADA accessible ramp and signal pushbutton deficiencies, pedestrian connectivity, bus stop accommodations, and observed pedestrian and bicyclist behavior through the corridor.

• The behavior of pedestrians, bicyclists, and vehicles in the corridor were noted during the RSA. Pedestrians were observed crossing outside of marked crosswalks, bicyclists were observed using the sidewalks, and vehicles were observed not yielding to pedestrians in the crosswalk.

The RSA completed by the Consultant Team (VHB and CME) as part of this project resulted in similar findings of the existing conditions as identified by the Towns in their study. There were no specific recommendations identified in the Town’s plan to compare to the recommendations made in this study.

Pedestrian features and conditions assessment maps, as shown in the following sample, were generated from the field data collected as part of the RSA on October 30 and 31, 2018. The complete set of pedestrian feature inventory and condition assessment maps for the study area corridor can be found in Appendix B.
It is noted that some of the conditions in the corridor do not meet the current design standards and guidelines for pedestrian accommodations and ADA compliance; however, may have met standards that were in place at the time of their construction. The purpose of the existing conditions inventory was to document the presence and condition of features and not to compare to current standards and ADA compliance.

In general, the following was noted from the Consultant Team RSA:

- Sidewalks are generally present in the corridor with the exception of a few short gaps and a 1.35-mile segment on the west side of the road from Sheridan Drive to Green Acres Boulevard
- The presence of stop bars, crosswalks, ramps, and detectable warning at unsignalized intersections varies and marked crosswalks are often missing on the side street approaches to Niagara Falls Boulevard
- The long cycle lengths at signalized intersections in the corridor create long wait times for pedestrians crossing the street
- Pedestrian equipment in the corridor is inconsistent at the signalized intersections; especially relating to pushbuttons which range from pushbuttons that do not depress when pushed and therefore do not affect the operation of the signal system to accessible pedestrian signals with immediate feedback for users
- The condition of the pedestrian accommodations in the corridor varied with some in good condition and some in poor condition. For example, there are some brand new curb ramps with ADA detectable warning fields and some sidewalks in disrepair with uneven surfaces.
• Very few intersection signs and no vehicle turning restrictions are present at the signalized intersections increasing the potential for vehicle/pedestrian conflicts
• No specific accommodations are present for transit users such as concrete pads, benches, or shelters

While a detailed night-time lighting evaluation was not completed, traveling through the corridor at night showed that in the north end of the corridor the corridor felt dark. Through the central and southern sections of the corridor, the available lighting felt sufficient. It is noted that a lighting study was completed by the Town of Amherst as part of a locally administered federal aid project for the section of Niagara Falls Boulevard from the I-290 ramps to the Erie/Niagara County Line. Refer to Section D. Planned & Potential Corridor Changes for additional details on the lighting study.

2. Peak Hour Pedestrian & Vehicle Volumes
Pedestrian activity and traffic volume information at 27 study area intersections is included in Appendix C and includes a mix of previously available data and new data collected in October 2018. The weekday AM, midday, and PM peak hour traffic volumes, intersection turning movement count data sheets, and the pedestrian crossing information are included in the appendix. Peak hour intersection turning movement count data from June and July of 2016 was provided to the Consultant team by the NYSDOT. Turning movement counts were conducted by CME in October of 2018 at six locations to supplement the 2016 data.

Table 2 identifies the locations and traffic control of the available intersection data. For consistency, the intersection number corresponds to the field data sheet key for the RSA, the crash summary, and signing inventory. The table also shows the number of pedestrian crossings that occurred during each peak hour at the study intersections and the total combined number of mainline crossings observed during the three peak hours.
<table>
<thead>
<tr>
<th>No.</th>
<th>Intersection with Niagara Falls Boulevard</th>
<th>Control</th>
<th>Intersection Peak Hour Pedestrian Crossings</th>
<th>Total Combined Peak Hour Mainline Pedestrian Crossings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>AM</td>
<td>Midday</td>
</tr>
<tr>
<td>2</td>
<td>Kenmore Avenue</td>
<td>Signal</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>21</td>
<td>Longmeadow Road</td>
<td>Signal</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>Eggert Road</td>
<td>Signal</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>31</td>
<td>Sheridan Drive (NY Rt 324)</td>
<td>Signal</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>35</td>
<td>Briarhurst Drive</td>
<td>Unsignalized</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>43</td>
<td>Maple Road/Brighton Road</td>
<td>Signal</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>45</td>
<td>Meyer Road</td>
<td>Unsignalized</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>46</td>
<td>Braxmar Road</td>
<td>Unsignalized</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>50</td>
<td>Glenalby Road/Romney Road</td>
<td>Signal</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>54</td>
<td>Green Acres Rd/plaza driveway</td>
<td>Unsignalized</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>56</td>
<td>Ridge Lea Road/Koenig Road</td>
<td>Signal</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>69</td>
<td>Inn Keepers Lane</td>
<td>Unsignalized</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>71</td>
<td>Greenhaven Terrace</td>
<td>Signal</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>75</td>
<td>Dexter Terrace</td>
<td>Unsignalized</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>77</td>
<td>Willow Ridge Drive</td>
<td>Signal</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>79</td>
<td>Draden Lane/Farragut Avenue</td>
<td>Unsignalized</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>81</td>
<td>Edward White Drive/Vinson Avenue</td>
<td>Signal</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>83</td>
<td>Roger Chaffee Drive/Thistle Avenue</td>
<td>Unsignalized</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>85</td>
<td>Forbes Avenue/Classic V driveway</td>
<td>Unsignalized</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>87</td>
<td>S Elicott Creek Rd/Elicott Creek Rd</td>
<td>Signal</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>89</td>
<td>N Elicott Creek Road/Park Road</td>
<td>Signal</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>91</td>
<td>Irwin Place</td>
<td>Unsignalized</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>93</td>
<td>Irvington Drive</td>
<td>Signal</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>97</td>
<td>Creekside Drive</td>
<td>Signal</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>99</td>
<td>N French Road</td>
<td>Unsignalized</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>101</td>
<td>East Robinson Road</td>
<td>Signal</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>107</td>
<td>Tonawanda Creek Road</td>
<td>Signal</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

1 Intersection number corresponding to field data sheets for the RSA

Based on the available traffic count data, the weekday morning peak period is from 7:00 to 10:00 AM with the peak generally occurring from 7:30 to 8:30 AM, the midday peak period is from 12:00 to 2:00 PM with the peak hour generally occurring from 12:00 to 1:00 PM, and the afternoon peak period is from 3:45 to 6:00 PM with the peak hour generally occurring from 4:30 to 5:30 PM. The study area intersections with turning movement count (TMC) data are shown on Figure 3.
As shown on the figure, new counts were conducted at seven locations and existing data was compiled at 20 locations. As noted, the detailed pedestrian and vehicle volumes can be found in Appendix C. The data was used to assess existing and future operational conditions.

### 3. Daily Traffic Volumes

In addition to the intersection data, continuous hourly traffic volume data was collected at three locations in the corridor in September and October of 2018. The data is included in Appendix D. Continuous hourly traffic volume data was collected for five days beginning Monday, September 24, 2018 at three locations in the corridor. Table 3 summarizes the average annual daily traffic and the design hour volume (highest one-hour volume).

<table>
<thead>
<tr>
<th>Segment</th>
<th>AADT$^1$</th>
<th>DHV$^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paige Avenue to Oxford Avenue</td>
<td>19,580</td>
<td>1,770</td>
</tr>
<tr>
<td>Braxmar Road to Yorkshire Road</td>
<td>31,850</td>
<td>2,890</td>
</tr>
<tr>
<td>Dexter Terrace to Willow Ridge Road</td>
<td>43,290</td>
<td>3,570</td>
</tr>
</tbody>
</table>

1Average Annual Daily Traffic  
2 Design hour volumes- highest two directional one-hour volume during the day

As shown, daily volumes in the corridor range from 19,580 vehicles to 43,290 vehicles and volumes continue to increase from the south end of the study corridor to the north.
4. **Gap Study**

Gap studies were performed on four midblock segments in the study corridor. The data was collected by CME for a six-hour period from 12:00 to 6:00 PM on either Monday, September 24, 2018, Tuesday, September 25, 2018, or Thursday, October 11, 2018. The purpose of the gap study was to identify the number of critical gaps, gaps that would be sufficient for a pedestrian to cross the street when not at a signalized intersection, that occur at midblock locations in the corridor on a typical weekday. Table 4 summarizes the data which is included in Appendix E.

Table 4 – Gap Study Summary - Combined Northbound and Southbound

<table>
<thead>
<tr>
<th>Segment</th>
<th>Number of Critical Gaps</th>
<th>Total Number of Gaps(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paige Avenue to Oxford Avenue</td>
<td>9</td>
<td>2,203</td>
</tr>
<tr>
<td>Braxmar Road to Yorkshire Road</td>
<td>1</td>
<td>2,407</td>
</tr>
<tr>
<td>Dexter Terrace to Willow Ridge Road</td>
<td>0</td>
<td>1,771</td>
</tr>
<tr>
<td>Creekside Drive to N French Road</td>
<td>24</td>
<td>2,903</td>
</tr>
</tbody>
</table>

\(^1\) Gaps of sufficient length for a pedestrian to cross the street based on crossing distance and a pedestrian walking speed of 3.5 feet per second

\(^2\) Total number of simultaneous northbound and southbound gaps of sufficient length for a pedestrian to cross at each location

The gap data illustrates that there are very few gaps in the vehicular traffic of sufficient length for a pedestrian to cross the roadway. The data in Appendix E also summarized the number of sufficient gaps for pedestrians directionally, gaps that would be sufficient for a pedestrian to cross either northbound or southbound, but not the entire roadway in a single gap.

5. **Vehicle Speed Study**

Spot speed studies were performed on Tuesday, September 25, 2018 at four segments in the study corridor. The studies included 100 speed recording in each direction using a radar gun. The segments and speed data are summarized in Table 5. Copies of the full data sets are included in Appendix F.

Table 5 – Travel Speed Summary

<table>
<thead>
<tr>
<th>Segment</th>
<th>Posted Speed Limit</th>
<th>Average Speed</th>
<th>85(^{th}) Percentile Speed(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paige Avenue to Oxford Avenue</td>
<td>35 mph</td>
<td>38 mph</td>
<td>42 mph</td>
</tr>
<tr>
<td>Braxmar Road to Yorkshire Road</td>
<td>40 mph</td>
<td>39 mph</td>
<td>43 mph</td>
</tr>
<tr>
<td>Home Depot driveway to Dexter Terrace</td>
<td>45 mph</td>
<td>41 mph</td>
<td>46 mph</td>
</tr>
<tr>
<td>Creekside Drive to N French Road</td>
<td>45 mph</td>
<td>37 mph</td>
<td>43 mph</td>
</tr>
</tbody>
</table>

\(^1\) The speed at which 85% of the vehicles are traveling at or less

The data shows that the 85\(^{th}\) percentile travel speed on the segment between Paige Avenue and Oxford Avenue is 7 mph higher than the posted 35 mph speed limit. The other three roadway segments were documented to be operating with 85\(^{th}\) percentile speeds that were within 1 to 3 mph of the posted speed limit.

6. **Pedestrian Behavioral Observations**

During the RSA on October 30 and 31, 2018, observations were noted regarding overall pedestrian behavior in the corridor. The following general pedestrian observations were made:
• Crossing at midblock locations, some in areas where signalized intersections with accommodations were nearby
• Crossing at signalized intersections using the available pushbuttons and indicators
• Crossing at signalized intersections, pushing the pushbuttons and then not waiting for the crossing indicators
• Crossing at signalized intersections not using the available pushbuttons and indicators
• Waiting for transit in the corridor
• Walking along the corridor on sidewalks
• Walking in parking lots in the area where sidewalks do not exist

In addition to pedestrian behavior, bicyclists were observed. There are no separately designated bicycle facilities, such as shared travel lanes or bike lanes in the corridor. Most bicyclists were observed travelling on the sidewalks. Based on this observed behavior, it appears as though most bicyclists are not comfortable sharing the roadway with vehicles. The only bicyclist observed traveling on the roadway was a sport rider dressed in bicycle gear indicating that he was an avid rider. The following photos show some typically observed pedestrian and bicyclist behaviors.

C. Crash History
Crash data for the approximate five-year period from May 1, 2013 through May 12, 2018 was evaluated in the study corridor. The data was summarized and reviewed to identify any patterns of pedestrian crashes. Although the PSAP process is intended to address pedestrian safety and this study has a pedestrian focus, information concerning crashes involving bicyclists was summarized and reviewed in detail. As noted, most bicyclists observed in the corridor were travelling in the pedestrian environment on the sidewalk. Crash details such as location, motor vehicle actions, pedestrian action, crash severity, day of the week, time of day, month of year and light conditions were reviewed.

During the study period, there were a total of 1,559 crashes recorded on Niagara Falls Boulevard with 31 (2.0%) that involved a pedestrian and 29 (1.9%) that involved a bicyclist. Five of the pedestrian crashes resulted in fatalities, while 26 of the pedestrian crashes resulted in injuries. There were no fatal bicycle crashes, 23 of the bicycle crashes resulted in injuries, one resulted in property damage, and five were
considered non-reportable (indicating no injury and property damage less than $1,000). Approximately half of the pedestrian and bicyclist crashes indicated contributing factors related to pedestrian or bicyclist error, while more than half of the crashes also indicated improper driving by the vehicle operator. The following text provides details on each of the five pedestrian fatalities and a general summary of the pedestrian injury crashes.

One pedestrian fatality occurred on May 12, 2018 at 12:43 AM approximately 1,000 feet south of Willow Ridge Road. The crash involved one vehicle traveling northbound on Niagara Falls Boulevard that struck a pedestrian crossing the roadway midblock in the eastbound direction. The crash documentation noted that the pedestrian appeared to be stumbling while crossing the southbound lanes, walked north a short distance in the center median and then turned east to cross the northbound lanes. The crash occurred midblock and no marked crosswalk was present. The documented contributing factor for the crash was a failure to yield the right-of-way by the pedestrian. Niagara Falls Boulevard at this location is straight and level, the weather was clear, the roadway surface was dry, and the roadway was dark and unlighted.

One pedestrian fatality occurred on August 9, 2013 at 5:10 AM at the Willow Ridge Road intersection. The crash involved one vehicle traveling southbound on Niagara Falls Boulevard that struck a pedestrian in the curb lane in the crosswalk at the Willow Ridge Road intersection. The documented contributing factors for the crash were pedestrian error/confusion and traffic control disregarded by the pedestrian, as well as view obstructed/limited for the vehicle. Niagara Falls Boulevard at Willow Ridge Road is straight and level, the weather was rainy, the roadway surface was wet, and the roadway was dark and unlighted.

One pedestrian fatality occurred on September 29, 2016 at 6:41 AM at Willow Ridge Road. The crash involved one vehicle traveling southbound on Niagara Falls Boulevard that struck a pedestrian crossing the roadway in the westbound direction at the Willow Ridge Road intersection. It is noted that although the pedestrian was utilizing a marked crosswalk to cross the roadway, they were crossing against the signal. The documented contributing factors for the crash were pedestrian error/confusion and a failure to yield the right-of-way by the pedestrian. Niagara Falls Boulevard at Willow Ridge Road is straight and level, the weather was rainy, the roadway surface was wet, and the roadway was dark and unlighted.

One pedestrian fatality occurred on August 30, 2016 at 5:43 AM at the unsignalized Roger Chaffee Drive intersection. The crash involved one vehicle traveling northbound on Niagara Falls Boulevard that struck a pedestrian using a three-sided walker with an oxygen tank crossing Niagara Falls Boulevard in the westbound direction. The pedestrian stopped in the travel lane and was crossing the roadway without a signal or crosswalk. The documented contributing factor for the crash was pedestrian error/confusion. Niagara Falls Boulevard at Roger Chaffee Drive is straight and level, the weather was clear, the roadway surface was dry, and the roadway was dark and lighted.

One pedestrian fatality occurred on February 12, 2014 at 8:55 PM approximately 100 feet south of East Robinson Road. The crash involved two vehicles and one pedestrian. Vehicle #1 traveling northbound on Niagara Falls Boulevard was cut off by Vehicle #2 turning left from a driveway into the northbound travel lane who failed to yield the right-of-way. Vehicle #1 northbound applied the brakes to avoid striking Vehicle #2 but then struck a pedestrian dressed in dark clothing crossing Niagara Falls Boulevard in the westbound direction. It is noted that crash occurred midblock where a marked crosswalk was not
The documented contributing factors for the crash was a failure to yield the right-of-way by Vehicle #2, as well as pedestrian error/confusion and traffic control disregarded by the pedestrian. Niagara Falls Boulevard near East Robinson Road is straight and level, the weather was clear, the roadway surface was dry, and the roadway was dark and lighted.

Over the approximate five-year crash study period, there were twenty-six pedestrian injury crashes. Based on the crash documentation, of the twenty-six crashes, fifteen involved pedestrians crossing or walking outside of marked crosswalks. Of those fifteen crashes, twelve were attributed to pedestrians failing to yield the right-of-way to vehicles as well as pedestrian error/confusion. The remaining three crashed were attributed to driver inattention/distraction and vehicles failing to yield the pedestrian right-of-way. Eleven of the twenty-six injury crashes involved pedestrians crossing in a marked crosswalk. Of the eleven crashes within a crosswalk, six were attributed to vehicles primarily failing to yield the right-of-way to the pedestrians and the remaining five crashes were attributed to pedestrian error/confusion. Of the 26 pedestrian injury crashes, 17 were attributed to pedestrian error (65%) and 9 were attributed to vehicular error (35%). It is noted that 10 of the 26 total injury crashes (38%) occurred north of Interstate 290, four of which were recorded with dark/lighted conditions and two with dark/unlighted conditions. The remaining four crashes occurred under either daylight or dawn conditions. Sixteen of the 26 total pedestrian injury crashes (62%) occurred south of Interstate 290, eight of which were recorded with dark/lighted conditions, seven with daylight conditions, and one under dusk conditions. Figure 4 summarizes the location and number of pedestrian crashes in the study corridor.
Collision diagrams, which also include an inventory of existing signage in the corridor, were prepared to locate each crash and are included in Appendix G. The MV-104 detailed police accident reports were reviewed to document the details of each crash. The character and trends of the pedestrian crashes are summarized in the following charts. Crash summary sheets for the pedestrian and bicycle crashes in the corridor are also included in Appendix G. Review of the crash data shows that 23 of the 31 pedestrian crashes (almost 75%) occurred at intersections rather than midblock segments. The maximum number of crashes occurring at a single location was three, which occurred at the intersections of Brighton Road, Willow Ridge Drive, and East Robinson Road. Three pedestrian crashes also occurred on the roadway segment between Brighton Road and Meyer Road. The five fatal pedestrian crashes all occurred north of the I-290 interchange.
As shown in the previous charts, more than half of the pedestrian crashes occurred during the non-winter months and more than 60% occurred at night. A higher percent of the night crashes occurred under lighted roadway conditions versus a dark unlighted road condition. Review of the detailed MV-104 reports also identifies the primary contributing factors for each crash. It is noted that more than one contributing factor can be attributed to each crash resulting in totals greater than 31. Chart 3 shows that the primary factor for the pedestrian crashes is “Pedestrian Error/Confusion” followed by “Failure to Yield Right-of-Way”. The contributing factor data was obtained by a detailed review of the crash reports.
Additional review of the contributing factor information for each crash shows that the Failure to Yield the Right-of-Way was attributed to the driver 7 times and attributed to the pedestrian 6 times.

A review of the existing conditions and results of the data analysis, along with the information collected from stakeholder committee members, guided the development of the study goals, objectives and recommendation of countermeasures to improve pedestrian safety.

D. Planned and Potential Corridor Changes

1. Light Rail Study

The NFTA has been evaluating the Metro Rail Expansion Project for several years for the purpose of connecting activity centers in Buffalo and Amherst through high quality transit service. Through the evaluation process, the NFTA has identified a Locally Preferred Alternative for light rail that would travel along Niagara Falls Boulevard from Kenmore Avenue to the Brighton Road/Maple Road intersection. Figure 5 (Figure 17 from the NFTA report) illustrates one potential option for accommodating light rail along Niagara Falls Boulevard from the Metro Rail Expansion LPA Refinement Technical Report. Since implementation of light rail along Niagara Falls Boulevard is a long-term goal, these plans should be considered during planning, design and implementation of any long-term recommendations identified in this study.
2. Zoning Changes
The Town of Amherst is currently updating their zoning in the Town some of which will affect parcels located along Niagara Falls Boulevard. Review of the Comprehensive Plan shows that the 4.6 mile segment from Longmeadow Road to the northern Wegmans Driveway will be designated for Suburban Center and Suburban Corridor. As defined on Figure 6-A, the parcels along Niagara Falls Boulevard are identified as:

- Wegmans
- Walgreens
- Ellicott Creek Strip
- Home Depot
- Inkeepers Lane
- Consumer Square/Ridge Lea
- Boulevard Mall
- Northtown Plaza
- NFB Strip

The comprehensive plan notes that features should be included in the suburban development areas to provide a more pedestrian friendly environment including safe sidewalk connections through parking lots and from adjacent sidewalks to the front door of developments. Development in suburban centers should also ensure walkability within the sites and they are developed or redeveloped.
3. Lighting
Lighting installation and enhancements can be used to improve pedestrian safety in areas where night time crashes are occurring. A lighting study was recently completed by the Town of Amherst as part of a locally administered federal aid project for the section of Niagara Falls Boulevard from the I-290 ramps north to the Erie/Niagara County Line. The lighting plans were reviewed by the project team as part of this project to ensure the proposed lighting would not conflict with the goals and objectives of the subject project. The lighting project is scheduled for construction in spring/summer 2019 resulting in improved lighting conditions in this area of the corridor. A review of the pedestrian crash documentation in the corridor indicated that five of the 31 pedestrian crashes, three of which were fatalities, occurred in dark-road unlighted conditions and were all located on Niagara Falls Boulevard north of I-290. Implementation of street lighting on the northern segment of the corridor will help to mitigate this condition. As noted, street lighting currently exists in the corridor south of the I-290 ramps to Kenmore Avenue. With the implementation of the planned lighting in the corridor north of I-290 this spring, roadway street lighting will exist through the majority of the study corridor, except at the I-290 ramps.

4. Department Projects
A number of projects are being progressed in the Niagara Falls Boulevard Corridor by the Department or with Department approval. They include:

- **Niagara Falls Boulevard/Almeda Drive/Rochelle Place** – This location is currently in construction under D263743. The contract will be adding Americans with Disabilities Act (ADA) compliant detectable warning fields on the Almeda Drive crossing and transverse crosswalks (parallel lines) on both the Almeda Drive and Rochelle Place approaches.

- **Niagara Falls Boulevard/Boulevard Mall Driveway** – This location is currently in construction under D263743. The contract will be adding Accessible Pedestrian Signals (APS), updating ADA ramps, and installing high visibility crosswalks at the southbound and westbound crossings.

- **Niagara Falls Boulevard/Target Driveway** – This location is currently in construction under D263743. The contract will be adding APS and updating ADA ramps in the northwest quadrant of the intersection. The work also includes removal of the inaccessible pedestrian signals crossing the Pier 1 Imports driveway.

- **Niagara Falls Boulevard/Menne Nursery Driveway/Kohl’s Driveway** – The traffic signal is scheduled to be replaced as part of a Highway Work Permit associated with re-development of the Menne Nursery with a Delta Sonic Carwash. The plan includes high visibility crosswalks on all approaches with pedestrian indicators, countdown timers, and APS pushbuttons. A southbound right-turn lane and new sidewalk along the project frontage will also be constructed.

- **Niagara Falls Boulevard/Tonawanda Creek Road** – The traffic signal is scheduled to receive APS buttons on all approaches as part of the Empire State Trail project.

- **Traffic Signal Coordination** – The Niagara Falls Boulevard corridor will be undergoing analysis for detailed signal connections, with consideration of LPIs, as part of a future project. The evaluation will extend from Sheridan Drive to Tonawanda Creek Road.
IV. Countermeasures/Strategies/Tools

A number of engineering countermeasures were reviewed to determine the appropriate tools to implement in the Niagara Falls Boulevard corridor. The engineering countermeasures are described below in this section. Several of the countermeasures have been identified by the Federal Highway Administration (FHWA) as Proven Safety Countermeasures. These Proven Safety Countermeasures have been chosen by the FHWA based on proven effectiveness and benefits to reduce fatalities and serious injury crashes. The countermeasures are designed and installed based on the standards and guidelines presented in the National Manual on Uniform Traffic Control Devices (MUTCD) and the New York State Supplement to the MUTCD. Several of these countermeasures are also included in the New York State Pedestrian Safety Action Plan (PSAP). The PSAP includes systemic countermeasure packages for enhanced pedestrian safety (Appendix A and B of the PSAP https://www.ny.gov/pedestrian-safety-action-plan/pedestrian-safety-action-plan).

A. Traffic Signal Equipment, Phasing, and Timing

1. Pedestrian Signal Upgrades

Pedestrian signal upgrades include pedestrian pushbuttons, indicators, and countdown timers. Implementation of these features at all traffic signals in the Niagara Falls Boulevard corridor will create a consistent network of pedestrian accommodations. Accommodations should be designed and installed in accordance with standard and guidelines contained in the MUTCD or other related New York State design specifications.

2. Accessible Pedestrian Signals and Pedestrian Pushbutton

Accessible Pedestrian Signals (APS) provide audible and/or vibrotactile information in addition to the visual indications. The primary functions of the APS pushbuttons are to identify the presence and location of the pushbutton, beginning of the walk interval, and the direction of the crosswalk and location of the destination curb. While the audible and vibrotactile functions are intended to aid vision and hearing impaired pedestrians, the APS pushbuttons also integrate features for sighted pedestrians like directional signing and an LED that lights up with activation of the pushbutton. The LED is an important feature because it indicates to the pedestrian that the walk phase has been called. Without that feature, pedestrians may not trust that the pushbutton is working and maybe become impatient and cross against the signal especially at intersections with long signal cycles. The APS pedestrian pushbuttons should be designed as actuated signals so that the pedestrian must press the button at each intersection to activate the pedestrian walk phase. Requiring pedestrians to push the buttons at each location will create a system that provides consistent and uniform function throughout the corridor.

3. Pedestrian Clearance Interval

Properly timed pedestrian clearance intervals allow a pedestrian leaving the sidewalk enough time to cross the roadway when travelling at 3.5 feet per second. The pedestrian clearance intervals are

Source: RSA
calculated based on standards provided in the MUTCD. The MUTCD also allows flexibility as to when in the signal cycle the pedestrian clearance interval ends. The Department policy states that the pedestrian clearance interval should not extend into the corresponding vehicle clearance interval (yellow change and red clearance). This standard should be applied to each traffic signal controlled intersection. Due to the width of Niagara Falls Boulevard and some of the intersecting roadways in the corridor, the pedestrian clearance times are relatively long.

4. **Leading Pedestrian Intervals**

Leading Pedestrian Intervals (LPIs) allow a pedestrian a three to seven second “head start” crossing the roadway when all vehicle traffic is stopped. LPIs are a FHWA Proven Safety Countermeasure and based on information published by the FHWA increase the visibility of crossing pedestrians, reduce conflicts between pedestrians and vehicles, increase the likelihood of motorists yielding to pedestrians, and enhance safety for pedestrians who may be slower to enter the intersection. LPIs are the preferred treatment when there may be a large number of turning vehicles that conflict with a concurrent pedestrian crossing movement. It is also beneficial to install static or dynamic “No Turn On Red” signs (see description in Signing and Striping) with implementation of LPIs to deter drivers from turning when the pedestrian has priority. Based on the FHWA documentation, LPI’s can help to reduce pedestrian crashes at signalized intersections by 60%.

5. **Exclusive Pedestrian Phase**

Exclusive Pedestrian Phases allow a pedestrian to cross the roadway when all vehicle traffic is stopped eliminating conflicts between pedestrians and vehicles. In order to provide complete protection for pedestrians, dynamic or static “No Turn On Red” signs (see description in Signing and Striping) are installed on all approaches to the exclusive pedestrian phase.

6. **Pedestrian Hybrid Beacon**

A pedestrian hybrid beacon, often called a Hawk, is a controlled pedestrian crossing designed to help pedestrians cross higher-speed roadways midblock and at uncontrolled locations. The pedestrian hybrid beacon is a FHWA Proven Safety Countermeasure and is an intermediate option between a flashing beacon and a three-color signal because it stops traffic when activated, but generally vehicular traffic progresses uninterrupted otherwise. Guidelines in the MUTCD generally indicate that a minimum of 20 pedestrians per hour should be crossing the major street prior to installation. As noted by the FHWA, since the use of pedestrian hybrid beacons is not widespread, agencies should consider education and outreach with installation. Based on the FHWA documentation, pedestrian hybrid beacons can help to reduce pedestrian crashes by 69%.
7. **Traffic Signal Yellow Change and Red Clearance Intervals**

The purpose of the yellow change interval is to warn drivers that the red light is coming soon and the red clearance interval, often called the “all red”, is intended as a safety measure for any driver who entered the intersection legally during the yellow change interval to clear the intersection prior to traffic releasing from a conflicting approach. A properly timed yellow change interval has been identified by FHWA as a Proven Safety Countermeasure. Information published by FHWA shows that red-light running is a leading cause of severe crashes at intersections and a traffic signal with properly timed yellow change intervals reduces red-light running. The yellow change and red clearance intervals at traffic signals should be reviewed periodically to ensure that the correct times are provided for the current conditions and best practices. Based on the FHWA documentation, proper yellow change intervals can help to reduce total crashes by 8 to 14%.

8. **Retroreflective Backplates**

Backplates with retroreflective borders have been identified by the FHWA as a Proven Safety Countermeasure. The retroreflective border surrounding the traffic signal head provides better visibility of the traffic signal during day and night conditions by enhancing traffic signal visibility, conspicuity, and orientation. The backplates are also helpful during power outages when a signal would be dark by providing a visible cue for motorists. Backplates are required for the new installation of traffic signal faces on roadway approaches with posted speed limits or 85th percentile travel speeds of 45-mph or higher and are recommended on approaches with posted speed or 85th percentile travel speeds of less than 45-mph. Based on the FHWA documentation, retroreflective backplates can help to reduce total crashes at signalized intersections by 15%. Retroreflective backplates increase the load on a signal and require the signal to be tethered or a mast arm system is needed. Due to the additional load on the traffic signal system, retrofitting backplates on older signals may not be feasible.

B. **Striping and Signing**

1. **Yield to Pedestrian Signs**

Turning Vehicles Yield to Pedestrian signs (MUTCD R10-15) are intended for use where there is a clear potential for right-turning vehicles to come into conflict with pedestrians. Since Niagara Falls Boulevard does not have any turn restrictions at the traffic signal-controlled intersections, any intersection with a right-turn only lane or a relatively high right-turn volume has an increased potential for right-turning vehicles to conflict with pedestrians. Consistent with other pedestrian related signing in the corridor, the R10-15 sign should be installed with the fluorescent yellow-green section rather than yellow. In-street ‘Yield to Pedestrian’ signs are shown to provide better compliance than ground mounted signs on the side of the pavement or overhead signs; however, in-street signs are not feasible on the Niagara Falls Boulevard corridor. For better conspicuity, VHB recommends ‘Yield to Pedestrian’ signs be placed on the overhead span wire. Ground mounted signs may be installed on the side of the pavement when the span wire and signal poles cannot support additional weight.
An evaluation of existing signal poles should be conducted to determine if yield to pedestrian signs can be installed on the existing overhead span wires. Installation of overhead signs may become a longer-term improvement if the signal system cannot accommodate the additional weight and signal modifications are required. Ground mounted signs may be recommended in the interim.

2. No Turn on Red Signs

Guidance in the MUTCD states that a No Turn on Red sign should be considered when there is inadequate sight distance to approaching vehicles, geometric or operational characteristics may result in unexpected conflicts, an exclusive pedestrian phase is provided, there are an unacceptable number of pedestrian conflicts with right-turn-on-red maneuvers, more than three right-turn-on-red crashes occurred in a 12-month period, or the intersection skew creates difficulty for drivers to see approaching traffic. The MUTCD also states that “consideration should be given to prohibiting turns across the crosswalk during the leading pedestrian interval”; therefore, to provide the best treatment for pedestrians, No Turn on Red signs should be installed when there is an LPI. In addition to the static No Turn on Red Sign (MUTCD R10-11) there is a dynamic No Turn on Red sign that is active only with the pedestrian phase has been activated which results in fewer delays to vehicle traffic.

An evaluation of existing signal poles must be conducted to determine if yield to pedestrian signs can be installed on the overhead span wires. If it is determined that the existing signal poles cannot accommodate additional weight from the proposed signs, then the static signs can be ground mounted on the approach. Installation of overhead signs may become a long-term improvement if the signal system cannot accommodate the additional weight and signal modifications are required. In addition to the pole strength, the capabilities of the traffic signal controller should be reviewed to determine whether the dynamic No Turn on Red sign can be installed.

3. Stop Bars

Providing stop bars and signalized and unsignalized locations shows drivers on where to stop at the intersection. The stop bar is placed prior to the crosswalk (when approaching the intersection) and provides a minimum of four-feet between the stop bar and the crosswalk providing adequate separation between a vehicle and a crossing pedestrian.
4. **Pedestrian Warning Signs**

Pedestrian Warning Signs (MUTCD W11-2) with supplemental downward pointing arrow plague (MUTCD W16-7P) are intended for use at marked crossings at uncontrolled locations. Consistent with recommendations in the PSAP, retroreflective sign posts should be used on the signs posted at the crossing and in advance of the crossing.

The addition of retroreflective sign posts is a simple and relatively inexpensive way to increase the amount of reflective surface on warning and regulatory signs. As noted in NYSDOT’s Traffic Safety & Mobility Instruction 16-03, personnel are authorized and encouraged to use strips of retroreflective material where engineering judgment indicates a need to draw attention the sign. In addition, the PSAP requires reflective strips for pedestrian warning signs placed in advance of the crosswalk and at midblock crossings.

In some locations, advance yield marks (sharks teeth) may also be used at midblock locations to further enhance a pedestrian crossing location. Yield lines are used at midblock locations to indicate the point behind where vehicles are required to yield to pedestrians. Advance yield marks are used in conjunction with a Yield Here to Pedestrian sign (MUTCD R1-5).

5. **Rectangular Rapid Flashing Beacon**

A Rectangular Rapid Flashing Beacons (RRFB) is a flashing actuated amber light supplementing pedestrian crossing signs at midblock and unsignalized crossings. RRFBs are a low-cost alternative to traffic signals and pedestrian hybrid beacons. The RRFB can be passively engaged with a sensor or actively engaged with a pushbutton. Studies have shown that the presence of RRFBs increases driver yielding behavior significantly. RRFBs should be used in conjunction with high visibility crosswalks, pedestrian warning signs with a fluorescent yellow-green background, and retroreflective sign posts.
6. **High-Visibility Crosswalks**

High-visibility crosswalks improve the visibility of the crosswalk during daytime and nighttime conditions. The latest guidance, Traffic Safety & Mobility Instruction TSMI 16-05, states that the preferred style for crosswalk design in New York State is the “ladder” style crosswalk. The PSAP also identifies high-visibility crosswalks as a preferred systemic treatment for pedestrian safety.

7. **Speed Limit Signs**

As identified by the FHWA, “USLIMITS2 is a web-based tool designed to help practitioners set credible, consistent, and enforceable speed limits.” Use of the USLIMITS2 program to establish safe speed limits on a roadway is an FHWA Proven Safety Countermeasure and was utilized in the Niagara Falls Boulevard study area corridor. The program utilizes criteria such as 85th percentile operating speed, roadway characteristics, traffic volumes, and crash rates to identify the appropriate speed limit. On Niagara Falls Boulevard, the program was run for the segments of the roadway based on the existing posted speed limits; from Kenmore Avenue to Eggert Road, Eggert Road to I-290 Eastbound ramps, the I-290 Eastbound ramps to Willow Ridge Drive, and Willow Ridge Drive to the Erie County/Niagara County Line.

8. **Driver-Feedback Signs**

Driver feedback signs can be used to monitor speed and reinforce the existing speed limit. Speed monitoring techniques are not a substitute for enforcement; however, they can enhance enforcement efforts through public education and awareness. Some driver feedback signs can also collect time of day data to target enforcement to specific hours.
C. Infrastructure

1. Raised Medians and Pedestrian Crossing Islands
   Raised medians and pedestrian crossing islands are located between opposing traffic lanes at intersections or midblock locations and allow pedestrians to cross a single direction of traffic at a time by providing a space for pedestrians to wait when crossing the roadway. Raised medians and pedestrian crossing islands have been identified by the FHWA as a Proven Safety Countermeasure. The FHWA documentation states that mid-block areas, approaches to multi-lane intersections, and areas near transit stops or other pedestrian-focused sites may benefit from this treatment. Based on the FHWA documentation, raised medians and pedestrian crossing islands can help to reduce pedestrian crashes by 46% to 56%. Raised medians and pedestrian crossing islands can impede snow removal by plows on the roadway and require snow clearing by the local municipalities in the winter.

2. Sidewalks
   Sidewalks are walkways that are paved and separated from the roadway, usually by a curb and gutter. Walkways which include any type of space or pathway designed for use by a person travelling by foot or in a wheelchair and are identified by FHWA as a Proven Safety Countermeasure. Construction of sidewalks results in a 65 to 89% reduction in crashes involving pedestrians walking along roadways based on FHWA data. In colder climates, snow removal by the local municipalities is required during inclement weather.

3. Ramps and ADA Detectible Warnings
   Sidewalk ramps and Americans with Disabilities Act (ADA) compliant detectible warnings are used to provide users of varying abilities safe access to and notification about intersection crossings. These features are required as part of the ADA which is a civil rights legislation that prohibits discrimination and guarantees that people with disabilities have the same opportunities and access to participate in all facets of daily life.

4. Road Diet
   A road diet reduces the number of travel lanes resulting in a narrower roadway section to improve safety by shortening the pedestrian crossing distances and/or reclaiming space for other improvements such as sidewalks, bike lanes, transit stops, and on-street parking. A road diet conversion from four to three lanes has been identified by the FHWA as a Proven Safety Countermeasure. The potential for a “road diet” has been evaluated between Eggert Road and Willow Ridge Drive in the Niagara Falls Boulevard corridor. While this conversion would be from seven to five lanes, many of the same benefits noticed with the four to three conversion are obtained.
D. Transit

Bus stop upgrades or modifications can be made to improve pedestrian accommodations for transit users in the corridor. There are 60 bus stops located throughout the study corridor marked with a sign and no additional accommodations such as concrete pads, benches, or shelters.
V. Engineering Analysis and Recommendations

The Engineering recommendations are divided into Immediate, Short-term, and Long-term implementation timeframes. The immediate recommendations are those that the Department has implemented throughout the study process, the short-term recommendations will be implemented with the $2 million of pedestrian safety funding available for the corridor, and the long-term recommendations do not have a funding source but have undergone preliminary evaluation to prioritize these measures for potential future additional analysis and implementation. Table 6 identifies several tasks that have been completed and also notes two tasks for completion. Most of the tasks identified for immediate implementation are addressed during routine maintenance but are important for providing good pedestrian conditions in the corridor.

Table 6 – Items for Immediate Implementation

<table>
<thead>
<tr>
<th>Task</th>
<th>Emphasis Approach</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>See! Be Seen! Billboards</td>
<td>Education</td>
<td>Yes</td>
</tr>
<tr>
<td>Check pushbutton operation at the Sheridan Drive intersection</td>
<td>Engineering</td>
<td>Yes</td>
</tr>
<tr>
<td>Review pedestrian crossing times from Sheridan Drive to Niagara</td>
<td>Engineering</td>
<td>Yes</td>
</tr>
<tr>
<td>County line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjust pedestrian crossing times at Ridge Lea Road/Koenig Road,</td>
<td>Engineering</td>
<td>Yes</td>
</tr>
<tr>
<td>Home Depot driveway, and Vinson Avenue/Edward White Drive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear sight distance obstruction looking right from Kenilworth</td>
<td>Engineering</td>
<td>No – private</td>
</tr>
<tr>
<td>Avenue</td>
<td></td>
<td>property</td>
</tr>
<tr>
<td>Clear sight distance obstruction looking right from Oxford Avenue</td>
<td>Engineering</td>
<td>No – private</td>
</tr>
<tr>
<td></td>
<td></td>
<td>property</td>
</tr>
<tr>
<td>Install stop bar on Decatur Road at Niagara Falls Boulevard</td>
<td>Engineering</td>
<td>No</td>
</tr>
<tr>
<td>Repair uneven sidewalk</td>
<td>Engineering</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Many of the safety countermeasures identified in Chapter IV that will be implemented in the short-term or long-term have little or no impact to vehicle traffic on Niagara Falls Boulevard. However, there are some countermeasures like implementation of a leading pedestrian interval or right-turn on red restriction that may impact operations. This chapter identifies the potential noticeable impacts associated with these types of countermeasures that may impact vehicle operations in the corridor. Based on the traffic analysis and a review of best practices and proven safety countermeasures, recommendations for the corridor are identified for either short-term or long-term implementation. Recommendations are also included for countermeasures that do not have an impact on noticeable operations but will improve safety conditions in the corridor.

A. Pedestrian Priority Signal Timing and Signing

To identify potential impacts associated with providing pedestrian priority at intersections through traffic signal phasing, signing, and timing, the corridor was broken into three segments and a representative intersection for each segment was identified:

- Southern Segment – Kenmore Avenue to Eggert Road; Kenmore Avenue intersection
• Middle Segment – Eggert Road to Greenhaven Terrace; Glenalby Road/Romney Drive intersection
• Northern Segment – Greenhaven Terrace to Tonawanda Creek Road; Willow Ridge Drive/commercial driveway intersection

The representative intersections were chosen since they all operate under traffic signal control and generally have higher pedestrian crossing volumes than the other traffic signal-controlled intersections in the segment. Therefore, potential impacts identified at these representative intersections can be expected to be conservative when compared to the other intersections operating under traffic signal control in each roadway segment.

1. **Leading Pedestrian Interval (LPI)**

The three representative intersections were analyzed using Highway Capacity Manual (HCM) 2000 methodology to determine typical impacts of implementation of a seven second LPI. When adding an LPI, protected turn phases must be lagging, else they conflict with the pedestrian phase; therefore, to isolate the impacts of the LPI, the existing conditions model converted the existing leading left-turn phases into lagging phases. The results of the LPI model assumed that the LPI is called on all crossings each cycle; therefore, a weighted average was taken based on pedestrian activity at each intersection to estimate the variable impacts of the LPI during the AM and PM peak hours. The detailed analysis of the LPI implementation is included in Appendix H and the results are summarized below:

- **Southern Segment – Niagara Falls Boulevard/Kenmore Avenue** – Based on observed pedestrian activity and cycle length, it is assumed that the LPI will be called half the time; therefore, addition of an LPI will result in an overall increase in vehicle delay of approximately six seconds during both peak hours.
- **Middle Segment – Niagara Falls Boulevard/Glenalby Road/Romney Drive** – Based on observed pedestrian activity, it is assumed that the LPI will be called approximately 10% of cycles during the AM peak hour and during each cycle of the PM peak hour. The addition of the LPI will have minimal impact to overall vehicle delay during the AM peak hour and will increase average delay by 11 seconds during the PM peak hour.
- **Northern Segment – Niagara Falls Boulevard/Willow Ridge Drive/Driveway** – Based on observed pedestrian activity, it is assumed that the LPI will be called 35% of cycles, which will result in a weighted average increase in vehicle delay of approximately seven seconds during the AM peak hour and 11 seconds during the PM peak hour.

The analysis indicates that adding LPIs to the corridor will generally result in five to ten additional seconds of overall average vehicle delay at each intersection as a tradeoff for improved pedestrian safety. It is noted that when an LPI is called at a traffic signal that is part of a coordinated signal system, it can knock the traffic signal out of the coordinated system for several cycles until the subject signal has a chance to “catch up” to the coordination plan if the traffic signal timing plan does not account for the additional pedestrian time. At intersections that are not part of a coordinated signal system, being knocked-out of coordination is not a concern. Based on a review of the traffic signal operations at the representative intersections in the corridor and an understanding of the benefits associated with this countermeasure, LPIs should be implemented in the Niagara Falls Boulevard Corridor. Although detailed analysis was conducted, which determined that LPI’s are feasible, the analysis should be confirmed.
during the design phase to further document specific intersection and corridor impacts associated with implementation of the LPIs.

**Recommendations**

*Short-term:* Based on a review of the crossing distances and crash history in the corridor, LPIs should be considered for implementation at the Niagara Falls Boulevard intersections with Sheridan Drive, Brighton Road/Maple Road, Willow Ridge Drive, and E Robinson Road.

*Long-term:* Provide LPIs at the remainder of the traffic signal-controlled intersections in the corridor to create consistent user expectations.

2. **Exclusive Pedestrian Phase**

The three representative intersections were analyzed using HCM 2000 methodology to determine typical impacts of an exclusive pedestrian phase. The detailed analysis of the exclusive pedestrian phase implementation is included in Appendix H and the results are summarized below:

- **Southern Segment** – Niagara Falls Boulevard/Kenmore Avenue – The addition of an exclusive pedestrian phase will result in an average increase in overall delay of approximately 8 to 12 seconds and overall LOS C operations during both peak hours.
- **Middle Segment** – Niagara Falls Boulevard/Glenalby Road/Romney Drive – The addition of an exclusive pedestrian phase will increase average overall delay by approximately 20 seconds during the AM peak hour and 30 seconds during the PM peak hour.
- **Northern Segment** – Niagara Falls Boulevard/Willow Ridge Drive/Driveway – The addition of an exclusive pedestrian phase will result in an average increase in delay of 12 seconds during the AM peak hour and six seconds during the PM peak hour.

The analysis indicates that adding exclusive pedestrian phases to the corridor will generally result in six to 30 additional seconds of overall average vehicle delay at each intersection as a tradeoff for improved pedestrian safety. It is noted that when an exclusive pedestrian phase is called it can knock the traffic signal out of the coordinated system for several cycles until the subject signal has a chance to “catch up” to the coordination plan if the traffic signal timing plan does not account for the additional pedestrian time. Further, vehicles that are idling while waiting for a pedestrian to cross the roadway during an exclusive pedestrian phase may affect air quality. Based on a review of the traffic signal operations at the representative intersections in the corridor, the number of pedestrian crossings at signalized intersections in the corridor, and an understanding of the benefits associated with this countermeasure, exclusive pedestrian phases should only be implemented where crash data review and engineering judgment identify a specific need. Based on a review of the existing conditions and crash history in the corridor implementation of an exclusive pedestrian phase is not currently recommended by the consultant team.
3. Pedestrian-Vehicle Conflict Signing

To reduce the potential for turning traffic to conflict with pedestrian crossings and to remind drivers that pedestrian crossings are occurring, specific signs can be installed on the traffic signal span wire or post mounted adjacent to the roadway. If leading pedestrian intervals or exclusive pedestrian phases are implemented at a traffic signal, then either a Turning Vehicles Yield to Pedestrian sign or a No Turn on Red sign should be installed overhead at the traffic signal. If the signal span cannot accommodate an overhead sign, ground mounted signs can be used. The No Turn on Red sign can be either a static or blank out sign. Installation of a blank out sign requires a hard-wired connection between the sign and the traffic signal controller. Information provided by the Department indicates that blank out No Turn on Red signs have been unreliable in the Region. The Region will need to determine whether the reduced impact to vehicles outweighs the potential maintenance concerns associated with the blank-out signs.

An evaluation of existing signal poles was completed for intersections in the corridor where record plans were available and consistent with field conditions. The preliminary span wire calculations show that placement of overhead signs on the span wire appears feasible at the following intersections:

- Niagara Falls Boulevard/Longmeadow Road
- Niagara Falls Boulevard/Sheridan Drive (southwest to northeast span)
- Niagara Falls Boulevard/Brighton Road/Maple Road

The strength of the signal poles at the other traffic signals in the corridor were unable to be analyzed due to lack of information or the results of the span wire calculations showed that the signal poles were not strong enough to handle the additional load associated with the overhead signs.

a) No Turn on Red Sign

The three representative intersections were analyzed using HCM 6th edition methodology to determine typical impacts of restricting right-turn on red maneuvers on all approaches to the evaluated intersections. The detailed analysis of the turn restrictions is included in Appendix H. Review of the analysis shows that overall average vehicle delays increase by less than one second at each intersection during both peak hours with implementation of right-turn on red restrictions.

Based on the results of the intersection evaluations and industry guidance, No Turn on Red signs should be installed on all approaches to the Sheridan Drive, Brighton Road/Maple Road, Willow Ridge Drive, and E Robinson Road intersections to support implementation of an LPI at these locations. The span wire analysis showed that only the Brighton Road/Maple Road intersection with Niagara Falls Boulevard has additional the additional capacity to accommodate an overhead sign. Ground mounted signs should be installed at the other three intersections. The ability of the Brighton Road/Maple Road traffic signal system to accommodate the additional load associated with an overhead No Turn on Red sign should be confirmed during the design phase.
**Recommendations**

*Short-term:* Install overhead No Turn on Red signs at Brighton Road/Maple Road and ground mounted No Turn on Red signs at Sheridan Drive, Willow Ridge Drive, and E Robinson Road.

*Long-term:* Replace ground mounted No Turn on Red signs with overhead No Turn on Red signs.

No Turn on Red signs are beneficial at intersections with contributing factors that can increase the potential for crashes including a high volume of turning vehicles, poor sight distances, unexpected conflicts, skewed intersection approaches, etc. Review of existing conditions at signalized intersections in the study corridor identified several locations where installation of No Turn on Red signs will reduce the potential for pedestrian-vehicle crashes.

Based on a review of existing conditions and crash history at the Glenalby Road/Romney Road and Koenig Road/Ridge Lea Road intersections No Turn on Red signs should be installed on the northbound, eastbound, and westbound approaches to the Glenalby Road/Romney Road intersection and on the westbound approach to the Koenig Road/Ridge Lea Road intersection. Based on a review of the span wire analysis, the No Turn on Red signs should be ground mounted.

**Recommendations**

*Short-term:* Install ground mounted No Turn on Red signs on the northbound, eastbound, and westbound approaches to Glenalby Road/Romney Road intersection and on the westbound approach to the Koenig Road/Ridge Lea Road intersection.

*Long-term:* Replace ground mounted No Turn on Red signs with overhead signs as LPIs are implemented at these intersections in the corridor to create consistent user expectations.

b) **Yield to Pedestrians Sign**

Yield to Pedestrian signs can be used at locations where there is a desire to emphasize the awareness of pedestrian crossing maneuvers. Based on a review of existing conditions and crash history at the Kenmore Avenue, Longmeadow Road, Eggert Road, Park Road/N Ellicott Creek Drive, Creekside Drive, and Tonawanda Creek Road intersections, Yield to Pedestrians signs should be installed on all approaches to the intersections. Based on a review of the span wire analysis, the Yield to Pedestrians sign can be placed overhead at the Longmeadow Road intersection and the signs should be ground mounted at all other intersections. The ability of the Longmeadow Road signal system to accommodate the additional load associated with the signs should be confirmed during the design phase.
B. Mid-block and Uncontrolled Crossings

In both the northern and southern segments of the corridor there are long stretches of roadway (up to three quarters of a mile) with no controlled crossing across Niagara Falls Boulevard. There are land uses and bus stops in these areas that make it desirable for pedestrians to cross the roadway; however, it is unlikely for pedestrians to travel up to ¾ mile to cross at a location with traffic signal control. Rather, in these areas of the corridor, pedestrians cross Niagara Falls Boulevard midblock, without traffic stopping, which can be dangerous; especially in the northern end of the corridor where travel speeds exceed 45-mph.

A mid-block crossing assessment (included in Appendix I) was completed to identify locations that may be suitable for construction of a marked mid-block or unsignalized intersection. The MUTCD, PSAP, and New York State Highway Design Manual all provide standards and guidelines for the provision of marked crosswalks at uncontrolled locations. These resources outline the appropriate signing and striping needed to create safe crossings based on existing traffic volumes, travel speeds, and roadway width. Based on the available documentation and a review of existing conditions in the area, enhanced crossings were evaluated at four locations in the corridor.

1. Kenmore Avenue to Eggert Road (Southern Section)

The posted speed limit in the southern section of the corridor is 35-mph with an approximate daily traffic volume of 21,700 vpd and a roadway width ranging from four to five travel lanes. The land uses in this area are primarily residential with individual driveways for each single-family home and some small-scale commercial uses. With construction of the following identified crossing enhancements, the maximum distance a pedestrian would travel in the southern section of the corridor to reach a controlled or enhanced crossing is slightly over ¼ mile.

a) Ford Avenue Pedestrian Crossing Island

There is an opportunity to install a crosswalk with a pedestrian crossing island and all appropriate signing on the south side of Ford Avenue near an existing mini-mart. As noted in the gap evaluation, only nine gaps of sufficient length for a pedestrian to cross both directions (northbound and southbound traffic) of Niagara Falls Boulevard were observed during a six-hour period. By providing the pedestrian crossing island, a pedestrian would cross half the street then wait for a gap to cross the other half of the street. Review of the gap data shows that there were more than 300 gaps of sufficient length in each

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**Recommendations**

**Short-term:** Install overhead Yield to Pedestrian sign on all approaches to Longmeadow Road and ground mounted signs on all approaches to Kenmore Avenue, Eggert Road, Park Road/N Ellicott Creek Drive, Creekside Drive, and Tonawanda Creek Road.

**Long-term:** Replace overhead and ground mounted Yield to Pedestrian signs with overhead No Turn on Red signs as LPIs are implemented at these intersections in the corridor to create consistent user expectations.
direction for a pedestrian to cross the northbound travel lanes and southbound travel lanes during the six-hour period. Placing the crosswalk on the south leg of the intersection eliminates the potential for parking and access impacts at the mini-mart. Constructing the pedestrian crossing island would require a slight narrowing of the through lanes on Niagara Falls Boulevard but would still provide 11-foot lanes in this area. The crossing island would be approximately 6-feet in width. The concept is illustrated in Figure 6 and in Appendix I. Cross only at Crosswalks (MUTCD R9-2) should also be placed at the adjacent unsignalized intersections directing pedestrians to the new crossing. Consideration was given to installing RRFBs at this location, but it was determined that the raised pedestrian refuge island and pedestrian signage would provide sufficient conspicuity for pedestrians crossing at this location. If desired, RRFBs could be added to this crossing during the design phase.

**Figure 6: Ford Avenue Pedestrian Crossing Island**

**Recommendations**

*Short-term: Construct a pedestrian crossing island on the south leg of Niagara Falls Boulevard at Ford Avenue.*
b) **Harrison Avenue to Moore Avenue/Betina Avenue Mid-block Pedestrian Crossing Island**

A second opportunity to install a crosswalk with a pedestrian crossing island and all appropriate signing is between the Harrison Avenue and Moore Avenue/Betina Avenue intersections. This segment of the corridor is 5 lanes wide allowing for a 10-foot wide pedestrian crossing island without reducing the width of the through travel lanes. Land uses on the east and west sides of Niagara Falls Boulevard at this location include small-scale retail, restaurants, and a hotel. The concept is illustrated in Figure 7 and in Appendix I. Similar to the Ford Avenue location, by providing a pedestrian crossing island and creating an opportunity for the pedestrian to cross Niagara Falls Boulevard in two stages, the number of available gaps increases from nine to more than 300 documented gaps in both the northbound and southbound directions during the 6-hour data collection period.

If the pedestrian crossing island is constructed providing a safer crossing for pedestrians, the bus stops to the north of the proposed crossing at the Moore Avenue/Betina Avenue intersection and the bus stops to the south of the proposed crossing at Harrison Avenue should be relocated to the new mid-block pedestrian crossing island. Cross only at Crosswalks (MUTCD R9-2) should also be placed at the adjacent unsignalized intersections directing pedestrians to the new crossing. Consideration was given to installing RRFBs at this location, but it was determined that the raised pedestrian refuge island and pedestrian signing would provide sufficient conspicuity for pedestrians crossing at this location. If desired, RRFBs could be added to this crossing during the design phase.

![Figure 7: Harrison Avenue to Moore Avenue/Betina Avenue Mid-block Pedestrian Crossing Island](image-url)
c) Kenilworth Avenue Traffic Signal Upgrade

The existing traffic signal at the Kenilworth Avenue/Niagara Falls Boulevard intersection currently rests in green on the Niagara Falls Boulevard approaches and operates with flashing red control on the Kenilworth Avenue approach. It is likely that when a fire engine approaches Niagara Falls Boulevard on Kenilworth Avenue from the nearby Kenilworth Fire Hall, the traffic signal switches into pre-emption allowing the fire engine to turn onto Niagara Falls Boulevard when northbound and southbound traffic is stopped. With the addition of pedestrian pushbuttons, indicators, countdown timers, and a marked crosswalk on the south side of the intersection, Kenilworth Avenue could provide a controlled crossing across Niagara Falls Boulevard with minimal impact to through traffic. Flashing beacons could be installed approaching Kenilworth Avenue from the northbound and southbound directions to provide greater emphasis that a pedestrian is crossing and through traffic is stopped since the traffic signal will primarily be resting in green. The concept is illustrated in Figure 8 and Appendix I. The tie-in to the existing traffic signal and the desire for approach beacons should be determined during the design process.

![Figure 8: Kenilworth Avenue Traffic Signal Upgrade](image-url)
2. I-290 to Erie/Niagara County Line (Northern Section)
The posted speed limit in the northern section of the corridor is 40-mph south of Greenhaven Terrace and 45-mph north of Greenhaven Terrace and the average daily traffic ranges from 33,900 to 49,000 vpd. The roadway width ranges from five to seven travel lanes. The land uses in this area are primarily small and large-scale commercial transitioning to residential and open space further north.

a) Classics V Drive Mid-Block Crossing
At the time of this study, a new hotel was under construction across from the Classic V Banquet facility. These complementary land uses are expected to create a desire for pedestrian crossings across Niagara Falls Boulevard. It is also noted the crash data revealed two pedestrian crashes (one fatality) and two bicycle crashes just south at the Thistle Avenue/Roger Chaffee Drive intersection. At times when there is an event at the Classics V, there may be frequent crossings between the banquet facility and the hotel. Due to the higher potential for crossings and the higher speeds in this segment and existing crash history, a crossing with greater control was evaluated.

Review of the PSAP and the MUTCD indicate that due to the higher travel speeds, crash history, and the potential number of potential pedestrian crossings, installation of a pedestrian hybrid beacon may be appropriate at this location. The pedestrian hybrid beacon concept is illustrated in Figure 9 and in Appendix I. With installation of the pedestrian hybrid beacon resulting in a controlled crossing at this location, the bus stops to the north of the proposed crossing at the Forbes Avenue/Classics V Drive intersection and the bus stops to the south of the proposed crossing at Thistle Avenue/Roger Chaffee Drive intersection should be relocated to the new mid-block pedestrian hybrid beacon. Cross only at Crosswalks (MUTCD R9-2) should also be placed at the adjacent unsignalized intersections directing pedestrians to the new crossing.

Recommendations

Short-term: Install pedestrian indicators, APS pushbuttons, countdown timers, ramps, and ADA detectable warning across south leg of Kenilworth Avenue intersection and connect into existing traffic signal.
Due to the uncertainty of the number of pedestrian crossings anticipated with the new hotel and the potential that the number of crossings will not meet the warrant threshold, the Department has determined to not pursue pedestrian hybrid beacon at this time.

**Recommendations**

**Short-term:** Monitor pedestrian crossings in this area

**Long-term:** Consider construction of pedestrian hybrid beacon or similar enhanced pedestrian crossing near if future conditions warrant installation.

b) **Raised Islands**

As noted in the detailed memorandum of mid-block crossings contained in Appendix I, there are some locations where raised median islands could be considered to facilitate two-stage pedestrian crossings without providing a marked crosswalk. This type of treatment is used at locations where pedestrians cross the roadway but where a marked crosswalk is not the best fit for the existing conditions. The raised islands are not intended to attract new users, but are meant to aid the crossing for existing users. The memo identifies seven locations where raised medians could be constructed in the north section of the corridor:

- Between Willow Ridge Drive and Draden Lane
Options in the memo include both shorter and longer raised medians for consideration. Generally, the shorter islands have fewer impacts to parcel access; however, with longer distances between controlled or facilitated crossings, the longer islands may be more beneficial. As noted in the State Best Practice Policy for Medians as part of the FHWA Safety Program, the NYSDOT states that medians that are intended as pedestrian refuge islands must be accessible to all pedestrians, including those with disabilities.

Although not intended to increase pedestrian crossings, the Department is concerned that the raised medians would not comply with ADA requirements and could encourage additional midblock crossings at these uncontrolled locations. The Department is also concerned that the medians may be difficult to see, especially during inclement weather, resulting in a hazard for drivers. Due to the potential for an increase in uncontrolled crossings, potential roadway hazard for drivers, impacts to parcel access, and maintenance concerns, the Department is not pursuing the raised median islands at this time.

3. Traffic Signal Warrant Evaluations

Traffic signal warrant evaluations were completed at the Niagara Falls Boulevard/Almeda Avenue/Rochelle Place and Niagara Falls Boulevard/Thistle Avenue/Roger Chaffee Drive intersections. The existing traffic volume conditions were compared to the criteria contained in the MUTCD for the following:

- Warrant 1 – Eight-Hour Vehicular Volume
- Warrant 2 – Four-Hour Vehicular Volume
- Warrant 3 – Peak Hour
- Warrant 4 – Pedestrian Volume
- Warrant 7 – Crash Experience

The evaluation showed that the conditions at the Almeda Avenue/Rochelle Place intersection with Niagara Falls Boulevard meet the thresholds for the three traffic volume warrants; therefore, a traffic signal could be considered at this location. Due to the uncertainty of the re-development of the Boulevard Mall at this time, it is recommended that the Department continue to monitor land use and traffic operations in this area. Drivers approaching Niagara Falls Boulevard from Almeda Avenue have access to adjacent traffic signals through the Boulevard Mall so installation of a traffic signal and the number of pedestrians crossing Niagara Falls Boulevard during data collection was well below the minimum threshold in the MUTCD. Installation of a traffic signal at this location is not recommended in the short-term. The Department should evaluate installation of a traffic signal with all pedestrian accommodations at this intersection with re-development of the parcel.

The evaluation of the Thistle Avenue/Roger Chaffee Drive intersection with Niagara Falls Boulevard also included a review of Warrant 6 – Coordinated Signal System. In addition to volume and crash history,
the coordinated signal system assesses the need for a traffic signal based on the platooning of traffic in the corridor. A review of the warrant showed that installation of the traffic signal should not result in intersection spacing of less than 1,000 feet. If a traffic signal were installed at the Niagara Falls Boulevard/Thistle Avenue/Roger Chaffee Drive intersection the resulting spacing to the adjacent traffic signal at Vinson Avenue/Edward White Drive would be approximately 700 feet which is less than the guidance. The evaluation showed that the conditions at the intersection do not meet the thresholds for the evaluated warrants; therefore, a traffic signal is not recommended at this location.

C. Roadway Geometry

1. Willow Ridge Drive Intersection

During the stakeholder meetings and the crash data review, the Willow Ridge Drive/commercial driveway intersection with Niagara Falls Boulevard was identified for more detailed study. The intersection operates under traffic signal control with marked crossings and pedestrian indicators and countdown timers on the north and east legs of the intersection. North of the intersection, Niagara Falls Boulevard northbound transitions from three to two travel lanes and south of the intersection the roadway transitions from two to three southbound travel lanes. Due to the lane transitions, Niagara Falls Boulevard is approximately 87-feet wide at the intersection. Review of the intersection data shows that on weekdays there are approximately 15 boardings and alightings at the bus stops, there are approximately 26 pedestrian crossings during the peak hours, and there were three pedestrian crashes (two of which were fatalities) during the five-year data period.

Two options were reviewed to reduce the crossing distance and exposure for pedestrians. The two options are illustrated in the technical memorandum included in Appendix H. Option A proposes to remove the northbound curbside lane, resulting the northbound intersection approach consisting of a through lane and a shared through/right-turn lane. Option B proposes to convert the northbound curbside lane to a right-turn only lane, while maintaining two northbound through lanes.

The analysis indicates changing the geometry at the Niagara Falls Boulevard/Willow Ridge Drive/commercial driveway intersection to either Option A or Option B will result in an overall increase in delay of less than five seconds with no changes in levels of service during the AM and PM peak hours. With implementation of Option A, the distance for both the north and south leg crossings would be reduced by approximately 20-feet and a full marked and controlled crosswalk could potentially be installed on the south leg of the intersection at some time in the future, and is therefore the preferred alternative as shown in Figure 10. With the noted upgrades it is also recommended that the signal be upgraded to provide full pedestrian accommodations on the west leg of the intersection.
2. Ellicott Creek Road at Niagara Falls Boulevard
During the stakeholder meetings the Ellicott Creek Road intersection with Niagara Falls boulevard was identified as a potential area of concern due to the recreational uses in the area. Ellicott Creek Road approaches Niagara Falls Boulevard at a skewed angle with a channelized right-turn movement separated from the left-turn and through movements by a painted island and operating stop sign control. Due to this layout, the pedestrian crossing on the west leg of the intersection is approximately 105 feet long and lacks pedestrian equipment.

Two channelization options were developed at the Ellicott Creek Road intersection to improve the pedestrian crossing. Option 1 includes construction of a raised divisional island where the existing painted island exists and installing pedestrian pushbuttons and signals on the north side of the intersection and in the island. The existing right turn slip lane would be signed with standard PSAP warning signs as shown in the detailed memorandum in Appendix I. Option 2 would eliminate the island and bring the right turn movement under signal control. With Option 2 pedestrian pushbuttons and signals would be installed on both sides of the Ellicott Creek Road approach and would protect the entire pedestrian crossing. The two Options result in similar level of service operations; however, input from the Department indicates that Option 1, shown in Figure 11 is preferred.
3. Corridor Road Diet

The RSA, existing conditions review, and stakeholder meetings identified the lack of sidewalk on the west side of Niagara Falls Boulevard from Sheridan Drive to Green Acres Boulevard. In this area, Niagara Falls Boulevard generally provides three travel lanes in each direction and a center raised median, flush median, or left-turn lanes resulting in a very wide (7-lanes) crossings for pedestrians. The land use is in the area is dense commercial with adjacent residential uses creating the desire for pedestrians to cross and travel along the roadway. On the west side of the roadway, the parcels are relatively narrow and generally designed to maximize parking and many of the parking lots have marked stalls with a small maintenance strip separating the parking stalls from the travel way. To create a more pedestrian friendly environment in this section of the corridor a road diet was evaluated that would narrow the roadway section by one lane in each direction. The space acquired by eliminating a travel lane in each direction would allow for construction of a sidewalk on the west side of the roadway and bicycle lanes on both sides of the roadway. The sidewalk would require relocation of the curb on the west side of the roadway which would reduce the pedestrian crossing distance. The feasibility of a road diet between Eggert Road and Willow Ridge Drive was evaluated in more detail in the technical memorandum by Creighton Manning, dated March 21, 2019, included in Appendix H.

The analysis indicates that under existing conditions, the majority of signalized intersections operate adequately during both peak hours with some individual movements operating at LOS E/F. Motorists at several unsignalized intersections likely experience difficulty exiting the side streets. Under the road diet alternative, overall delay at signalized intersections will generally increase by approximately zero to five

**Recommendations**

*Short-term:* Shorten the pedestrian crossing on the west leg of Ellicott Creek Road by providing a raised island where the existing painted island is located in southwest quadrant of the intersection and provide standard PSAP signing for the right-turn slip lane. Movement into signal control. Upgrade the pedestrian crossing with pedestrian pushbuttons, signals, and countdown timers.
It is noted that the analysis for the road diet was based on traffic counts conducted during the AM and PM peak hours; therefore, Saturday traffic patterns may differ. Table 7 compares the weekday AM, weekday PM, and Saturday peak hour traffic volumes at three locations in the corridor. The table shows that the Saturday peak hour traffic volumes are slightly lower than the weekday PM peak hour at two locations and higher than the weekday PM peak hour at the location where the road diet was evaluated.

Table 7 – Peak Hour Traffic Volume Comparison

<table>
<thead>
<tr>
<th>Traffic Count Location</th>
<th>Peak Period</th>
<th>Two-way Traffic Volume (vph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>175 feet south of Oxford Avenue</td>
<td>Weekday 8:00 to 9:00 AM</td>
<td>1,180</td>
</tr>
<tr>
<td></td>
<td>Weekday 5:00 to 6:00 PM</td>
<td>1,570</td>
</tr>
<tr>
<td></td>
<td>Saturday 3:00 to 4:00 PM</td>
<td>1,410</td>
</tr>
<tr>
<td>75 feet north of Braxmar Road</td>
<td>Weekday 8:00 to 9:00 AM</td>
<td>1,380</td>
</tr>
<tr>
<td></td>
<td>Weekday 5:00 to 6:00 PM</td>
<td>2,530</td>
</tr>
<tr>
<td></td>
<td>Saturday 3:00 to 4:00 PM</td>
<td>2,900</td>
</tr>
<tr>
<td>225 feet north of the Home Depot Driveway</td>
<td>Weekday 7:00 to 8:00 AM</td>
<td>2,500</td>
</tr>
<tr>
<td></td>
<td>Weekday 5:00 to 6:00 PM</td>
<td>2,740</td>
</tr>
<tr>
<td></td>
<td>Saturday 12:00 to 1:00 PM</td>
<td>2,580</td>
</tr>
</tbody>
</table>

By constructing a sidewalk on the west side of the roadway and relocating the curb line, a road diet has the benefit of reducing the crossing width of Niagara Falls Boulevard, reducing pedestrian exposure and the pedestrian clearance time. As noted, some intersections and movements will experience increases in vehicle delay. In addition, U-turns, which are possible at intersections separated with medians with the current cross-section, will become more restricted with a narrower roadway cross-section. The StreetPlan image (Figure 12) shows a comparison between a 7-lane section and a potential option for a 5-lane section that provides one option for re-using the two travel outside travel lanes.
Based on the planning level evaluation completed, a road diet is not unfeasible and would make Niagara Falls Boulevard a more complete street by providing specific accommodations for pedestrians and bicyclists. If NYSDOT decides that a road diet is consistent with the long-term vision for the corridor then more detailed traffic analysis, including evaluation of the Saturday peak condition, and conceptual design will need to be completed.

**Recommendations**

*Short-term:* Determine whether a road diet is the preferred vision for the corridor as a means to complete the sidewalk network in the corridor.

*Long-term:* Complete additional traffic analysis and conceptual design to confirm feasibility and impacts.

D. Corridor-wide Recommendations

1. Speed Limit Reduction in Northern Segment

The existing speed limits in the corridor were evaluated using the USLIMITS2 program which uses operating speed, roadway characteristics, traffic volumes, and crash rates to identify the appropriate speed limit. The detailed speed limit evaluations are included in Appendix F. Review of the evaluation
shows that the 45-mph speed limit in the northern end of the corridor should be reduced to a 40-mph posted speed limit. Data from a Federal study completed in the 1990’s showed that the probability of a pedestrian getting killed at a vehicle speeds of 45-mph is 60% and is reduced to 45% at vehicle speeds of 40-mph; therefore, the proposed speed limited reduction will help to minimize pedestrian fatalities in the corridor. To reinforce the speed change, it is recommended that driver feedback signs be installed in conjunction with the reduced speed limit. This is a short-term recommendation.

**Recommendations**

*Short-term: Reduce the speed limit in the northern section of the corridor to 40-mph.*

2. **Ramps and ADA Detectable Warning**

   Sidewalk ramps with detectable warning units should be installed at all intersections where the ramps or detectable warning units are missing. As part of the Americans with Disabilities Act (ADA), all roadway users should be able to access and cross driveways and intersections. The existing conditions inventory contained in Appendix B identifies locations where ramps and detectable warning units may be missing but does not identified ADA compliance. It is recommended that all intersections missing pedestrian ramps and detectable warning units be upgraded to install the recommended features meeting current ADA standards. This should be coordinated with the Department’s current plans for ADA compliance.

**Recommendations**

*Short-term: Install ADA detectable warning units and ramps at all corridor intersections.*

3. **Accessible Pedestrian Signals (APS) with Pushbuttons**

   As a systemic upgrade, all existing pedestrian pushbuttons in the corridor should be upgraded to accessible pedestrian signals which would allow users of varying abilities to navigate the corridor and provide consistency throughout. The recommended APS pushbutton systems are currently installed at the Sheridan Drive intersection.

**Recommendations**

*Short-term: Upgrade all existing pedestrian pushbuttons in the corridor to APS.*

4. **Clearances and Change Intervals**

   A detailed evaluation of yellow change and red clearance intervals was completed for all the signalized intersections in the study corridor. Pedestrian clearance intervals were also reviewed. The analysis shows that the clearance intervals should be reviewed and updated in the field based upon current best practices and standards. The detailed memorandum is included in Appendix J. This change should be coordinated through NYSDOT’s signal maintenance program.
5. High Visibility Crosswalks
During the summer/fall of 2018, the NYSDOT installed high visibility crosswalks at 25 intersections in the study corridor. It is recommended that high visibility crosswalks be installed to “complete the box” at signalized intersections where only some of the crossings are marked. Regional policy states that a concurrent pedestrian phase should not be allowed to operate with a dual left-turn lane. Therefore, some intersections in the corridor will not “complete the box”. The PSAP guidelines, recommends high visibility crosswalks be installed on side streets and driveways with three or more lanes. However, due to the crash history in the corridor, it is recommended by VHB that high visibility crosswalks be installed on all side street and driveway approaches to Niagara Falls Boulevard.

Recommendations
Short-term: Install high visibility crosswalks at recommended locations in the corridor including side streets and driveways with less than three lanes.

6. Sidewalk connections
There is a section of sidewalk (0.25 miles) missing on the east side of the roadway from north of Braxmar Road to Romney Road. Pedestrians in this location are currently directed to use a marked crosswalk/path through the adjacent commercial parking lots and driveways. It is recommended that the existing grass maintenance strip be modified to provide a sidewalk and the commercial driveways be upgraded with ramps, detectable warnings, and marked crosswalks as appropriate. Right of way limitations may limit the width of the potential sidewalk and maintenance strip which will be determined during the design phase.

There are some small gaps in the sidewalk network in the study corridor. As part of the short-term recommendations, these gaps should be constructed to fully connect the existing sidewalk network (for example on the east side of Niagara Falls Boulevard in front of Premier Car Care). In addition, the existing sidewalks adjacent to the on and off ramps to I-290 are flush with the roadway. It is recommended that curb and sidewalk be installed at the ramps to create a more comfortable walking environment approaching the uncontrolled ramp crossing locations. Right of way limitations will be determined during the design phase.

Sidewalks should be constructed on the west side of Niagara Falls Boulevard for a 1.35-mile segment from Sheridan Drive to Green Acres Road. Due to the lack of space and existing narrow commercial parking lots, construction of sidewalk on this segment will require larger geometric changes as discussed above in the road diet evaluation. Completion of a road diet is a long-term recommendation. Right of way will be a critical element of the design and construction feasibility in this area.
The current codes in both Tonawanda and Amherst require property owners to clear sidewalks along their property frontages within 24-hours of a snow event. To ensure the pedestrian travel way is consistently maintained in the corridor, a policy for enforcement of the code should be prioritized. It was also noted in the stakeholder meetings the area near and under I-290, which is owned by NYSDOT, is not regularly cleared. The Department policy requires the local municipalities to provide snow clearing which is then generally passed on to the landowner to handle snow removal. The municipalities may want to revisit the snow removal policy for this area since there is no adjacent land owner under I-290 and snow removal and general maintenance are lacking.

**Recommendations**

*Short-term:* Construct a sidewalk with ramps, detectable warnings, and marked crosswalks where appropriate on the east side of Niagara Falls Boulevard from Braxmar Road to Romney Road.

*Fill in the gaps in the sidewalk system to fully connect the network*

*Provide a raised curb and sidewalk near all of the existing I-290 ramps*

*Review municipal snow removal policy for the area under I-290*

*Long-term:* Construct a sidewalk with ramps, detectable warnings, and marked crosswalks on the west side of Niagara Falls Boulevard for a 1.35 mile segment from Sheridan Drive to Green Acres Road.

7. **Bicycle Accommodations**

Bicyclists have the right to share the travel lanes with motorized vehicles. However, since separate bicycle accommodations or wide travel lanes currently do not exist in the Niagara Falls Boulevard corridor making it difficult for many bicyclists to drive the corridor resulting in many using the sidewalks. There is a potential for bicycle lanes to be added through the busy commercial segment in the corridor in the future with implementation of a road diet; however, as a shorter-term improvement it is recommended that consideration be given to providing signing to encourage bicyclist to use the adjacent parallel neighborhood streets to the extent possible when traversing the corridor. The use of the lesser classified neighborhood streets can also be promoted through education.
8. **Transit**

Bus stop upgrades or modifications can be made to improve pedestrian accommodations for transit users in the corridor. There are 60 bus stops located throughout the study corridor marked with a sign and no additional accommodations such as concrete pads, benches or shelters. According to information provided by the NFTA, they do not have the authority to place amenities like benches and trash cans on property the agency does not own. If amenities like a bench or trash can are desired at a bus stop, the NFTA will work with the municipality and the property owner to identify the proper location and access to the amenities. It is recommended that the Towns coordinate with the NFTA to identify areas that may benefit from bus stop amenities and work with adjacent landowners for implementation.

Bus shelters are not considered a typical amenity and the NFTA first has to identify a need for the shelter based on ridership and land use. The NFTA then coordinates with their engineering department, the municipality, and the land owner to provide safe access for all users. Review of the ridership information and the shelter installation guidelines provided by NFTA shows that the ridership and land use characteristics in the corridor do not currently support the installation of bus shelters. If the light-rail expansion is implemented along Niagara Falls Boulevard, the character of the roadway would change, and transit amenities would be included as part of that project.

**Recommendations**

*Short-term:* Consider creating a signing plan directing bicyclists to the adjacent parallel neighborhood street system.

*Long term:* Determine how to enhance bicycle accommodations on this corridor.

9. **Lighting**

During the RSA, it was noted that the sidewalks under I-290 are unlit and even during daytime conditions are shadowed and dark. While roadway lighting is generally the responsibility of the local municipality, the presence of the I-290 interchange in this area creates the shadowy condition for roadway users. Therefore; since the presence of the NYSDOT owned and maintained I-290 creates the lighting condition, it is recommended that the NYSDOT work with the Towns to investigate the potential to install lighting in this area to provide a more welcoming connection between the two lit areas of the corridor for pedestrians and bicyclists.

**Recommendations**

*Short-term:* Coordination between towns and NFTA to identify areas that may benefit for bus stop amenities.
10. **Access Management**

There are many residential and commercial driveways throughout the Niagara Falls Boulevard corridor including many wide curb cuts providing access to commercial parcels that all result in increased vehicle, pedestrian, and bicycle conflicts and vulnerability to pedestrians and bicyclists when traversing the corridor. A good long-term goal in the corridor would be to reduce the number and width of curb cuts on Niagara Falls Boulevard. It is recommended that the NYSDOT partner with the Towns of Tonawanda and Amherst to develop an access management policy to implement good access management when opportunities arise, such as during site plan approvals. The Town of Amherst Access Management Strategies for Major Corridors is a good starting point.

**Recommendations**

*Long-term: The Department should work with the Towns to investigate the potential to install lighting under I-290.*

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11. **Commercial Driveways**

Field review of the corridor noted that many driveways along Niagara Falls Boulevard are not consistent with the Departments current Policy and Standards for the Design of Entrances to State Highways. The Department and the Towns should work together to ensure that all access points to Niagara Falls Boulevard whether new construction or re-development follow the Department current policy. Use of the policy will ensure that driveways are constructed to current standards and are ADA compliant. The Department should educate the Towns about the reasons for and benefits of the policy.

**Recommendations**

*Long-term: The Department should partner with the Towns of Tonawanda and Amherst to develop an access management policy for the corridor.*

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**Recommendations**

*Short and Long-term: The Department should partner with the Towns of Tonawanda and Amherst to ensure that access to Niagara Falls Boulevard for all new construction and re-development projects is consistent with the current Department policy.*
VI. Costs and Implementation for Recommendations

Preliminary cost estimates have been developed for the short-term and long-term recommendations identified in Chapter V. As noted previously, $2 million is available for construction of pedestrian safety measures along the Niagara Falls Boulevard corridor. The long-term recommendations are unfunded. Table 8 summarizes the short-term recommendations for the corridor and identifies the associated preliminary construction costs. The location number corresponds to the Recommended Actions figures contained in Appendix K. Table 9 summarizes the total cost for the long-term recommendations.

Table 8 – Short-term Recommendations Preliminary Construction Costs

<table>
<thead>
<tr>
<th>No.</th>
<th>Recommendation</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>APS pushbuttons and yield to pedestrian signs</td>
<td>$15,400</td>
</tr>
<tr>
<td>2</td>
<td>Signal timing adjustments, pedestrian indicators, countdown timers, APS pushbuttons, crosswalks and ramps for south and west legs</td>
<td>$26,640</td>
</tr>
<tr>
<td>3</td>
<td>High visibility crosswalk</td>
<td>$540</td>
</tr>
<tr>
<td>4</td>
<td>High visibility crosswalk, pedestrian signs, refuge island, ramps and detectable warning</td>
<td>$18,890</td>
</tr>
<tr>
<td>5</td>
<td>High visibility crosswalk</td>
<td>$3,400</td>
</tr>
<tr>
<td>6</td>
<td>High visibility crosswalk</td>
<td>$600</td>
</tr>
<tr>
<td>7</td>
<td>High visibility crosswalk</td>
<td>$600</td>
</tr>
<tr>
<td>8</td>
<td>High visibility crosswalk</td>
<td>$540</td>
</tr>
<tr>
<td>9</td>
<td>APS pushbuttons</td>
<td>$6,000</td>
</tr>
<tr>
<td>10</td>
<td>High visibility crosswalk</td>
<td>$420</td>
</tr>
<tr>
<td>11</td>
<td>High visibility crosswalk</td>
<td>$540</td>
</tr>
<tr>
<td>12</td>
<td>APS pushbuttons and yield to pedestrian signs</td>
<td>$7,700</td>
</tr>
<tr>
<td>13</td>
<td>High visibility crosswalk, cross only and crosswalks signs, and relocate bus stop</td>
<td>$3,890</td>
</tr>
<tr>
<td>14</td>
<td>High visibility crosswalk, pedestrian signs, refuge island, ramps, and detectable warning</td>
<td>$22,740</td>
</tr>
<tr>
<td>15</td>
<td>High visibility crosswalk, cross only and crosswalks signs, and relocate bus stop</td>
<td>$3,890</td>
</tr>
<tr>
<td>16</td>
<td>APS pushbuttons and yield to pedestrian signs</td>
<td>$15,400</td>
</tr>
<tr>
<td>17</td>
<td>NTOR all approaches and implement LPI</td>
<td>$30,000</td>
</tr>
<tr>
<td>18</td>
<td>Upgrade to high visibility crosswalk</td>
<td>$1,200</td>
</tr>
<tr>
<td>19</td>
<td>High visibility crosswalk</td>
<td>$360</td>
</tr>
<tr>
<td>20</td>
<td>APS on EB, WB and SB approaches</td>
<td>$9,000</td>
</tr>
<tr>
<td>21</td>
<td>Remove sidewalk across mall driveway and repair median</td>
<td>$2,750</td>
</tr>
<tr>
<td>22</td>
<td>High visibility crosswalk and detectable warning units</td>
<td>$860</td>
</tr>
<tr>
<td>23</td>
<td>High visibility crosswalks, NTOR on all approaches, LPI, and APS</td>
<td>$42,000</td>
</tr>
<tr>
<td>24</td>
<td>High visibility crosswalk, adjust ramps, and ADA detectable warning</td>
<td>$3,580</td>
</tr>
<tr>
<td>25</td>
<td>High visibility crosswalk</td>
<td>$480</td>
</tr>
<tr>
<td>26</td>
<td>Sidewalk from Braxmar Rd to Glenalby Rd/Romney Rd on east side of street</td>
<td>$77,500</td>
</tr>
<tr>
<td>27</td>
<td>Replace ramps and detectable warning on Yorkshire Rd, high visibility crosswalks, detectable warning units</td>
<td>$2,960</td>
</tr>
<tr>
<td>No.</td>
<td>Recommendation</td>
<td>Cost</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>28</td>
<td>APS pushbuttons, NTOR NB, WB, and EB</td>
<td>$53,980</td>
</tr>
<tr>
<td>29</td>
<td>Separate ped buttons NW corner, ramps, detectable warning, high visibility crosswalk</td>
<td>$12,480</td>
</tr>
<tr>
<td>30</td>
<td>High visibility crosswalks</td>
<td>$1,020</td>
</tr>
<tr>
<td>31</td>
<td>APS pushbuttons, NTOR WB</td>
<td>$19,500</td>
</tr>
<tr>
<td>32</td>
<td>Provide curb on sidewalk approaching crossing</td>
<td>$4,840</td>
</tr>
<tr>
<td>33</td>
<td>APS pushbuttons and provide curb on sidewalk approaching crossing</td>
<td>$13,120</td>
</tr>
<tr>
<td>34</td>
<td>Repair sidewalk on north side of crosswalk, add detectable warning units on both sides of crosswalk, provide curb on sidewalk north approach of crossing</td>
<td>$4,130</td>
</tr>
<tr>
<td>35</td>
<td>Provide curb on sidewalk approaching crossing</td>
<td>$6,380</td>
</tr>
<tr>
<td>36</td>
<td>APS pushbuttons</td>
<td>$3,000</td>
</tr>
<tr>
<td>37</td>
<td>High visibility crosswalk</td>
<td>$780</td>
</tr>
<tr>
<td>38</td>
<td>APS pushbuttons</td>
<td>$6,000</td>
</tr>
<tr>
<td>39</td>
<td>APS pushbuttons</td>
<td>$3,000</td>
</tr>
<tr>
<td>40</td>
<td>High visibility crosswalk</td>
<td>$600</td>
</tr>
<tr>
<td>41</td>
<td>LPI, NTOR all approaches, narrow roadway from 7 to 5 lanes at intersection</td>
<td>$563,000</td>
</tr>
<tr>
<td>42</td>
<td>High visibility crosswalk</td>
<td>$1,500</td>
</tr>
<tr>
<td>43</td>
<td>APS pushbuttons</td>
<td>$12,000</td>
</tr>
<tr>
<td>44</td>
<td>High visibility crosswalk</td>
<td>$1,560</td>
</tr>
<tr>
<td>46</td>
<td>High visibility crosswalk</td>
<td>$1,500</td>
</tr>
<tr>
<td>47</td>
<td>Provide raised island, APS pushbuttons, high visibility crosswalks, PSAP signs</td>
<td>$50,025</td>
</tr>
<tr>
<td>48</td>
<td>APS pushbuttons and yield to pedestrian signs</td>
<td>$16,400</td>
</tr>
<tr>
<td>49</td>
<td>High visibility crosswalk</td>
<td>$720</td>
</tr>
<tr>
<td>50</td>
<td>APS pushbuttons</td>
<td>$12,000</td>
</tr>
<tr>
<td>51</td>
<td>High visibility crosswalk</td>
<td>$660</td>
</tr>
<tr>
<td>52</td>
<td>APS pushbuttons and yield to pedestrian signs</td>
<td>$15,400</td>
</tr>
<tr>
<td>53</td>
<td>High visibility crosswalk</td>
<td>$1,200</td>
</tr>
<tr>
<td>54</td>
<td>LPI, NTOR all approaches, and APS</td>
<td>$42,000</td>
</tr>
<tr>
<td>56</td>
<td>High visibility crosswalk</td>
<td>$1,380</td>
</tr>
<tr>
<td>57</td>
<td>Yield to pedestrian signs</td>
<td>$3,400</td>
</tr>
</tbody>
</table>

The preliminary construction cost estimate of approximately $1,720,000 allows space in the budget for the additional analysis identified in the report. The Department could also choose to implement some of the long-term recommendations like adding new crossings on Niagara Falls Boulevard.
Preliminary construction cost estimates were also prepared for the long-term recommendations and are summarized in Tables 9 and 10. Due to the cost of the road diet, the long-term costs were estimated both with and without the road diet cost.

**Table 9 – Long-term Recommendations Preliminary Construction Cost Without Road Diet**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADA Accessible Curb Ramp</td>
<td>2,025 SF</td>
<td>$20,250</td>
</tr>
<tr>
<td>Reflective Strips for Sign Posts</td>
<td>48 EA</td>
<td>$1,920</td>
</tr>
<tr>
<td>ADA Detectable Warning Unit</td>
<td>280 SF</td>
<td>$11,200</td>
</tr>
<tr>
<td>Cast-in-place concrete curb</td>
<td>685 SF</td>
<td>$30,140</td>
</tr>
<tr>
<td>Turning Vehicles Yield to Pedestrians Sign</td>
<td>27 EA</td>
<td>$22,950</td>
</tr>
<tr>
<td>Pedestrian Crossing Sign</td>
<td>12 EA</td>
<td>$10,800</td>
</tr>
<tr>
<td>Transit Features - Pad, Bench, Shelter</td>
<td>60 EA</td>
<td>$57,000</td>
</tr>
<tr>
<td>Accessible Pedestrian Signal with Pedestrian Pushbutton Unit w/o Post</td>
<td>6 EA</td>
<td>$9,000</td>
</tr>
<tr>
<td>Accessible Pedestrian Signal with Pedestrian Pushbutton Unit w/ Post</td>
<td>22 EA</td>
<td>$44,000</td>
</tr>
<tr>
<td>Pedestrian Signal Pole with Indicator and Countdown Timer - 1 Signal</td>
<td>28 EA</td>
<td>$152,600</td>
</tr>
<tr>
<td>No Turn on Red Sign (Blank-out), with cost to connect into Signal Controller</td>
<td>27 EA</td>
<td>$202,500</td>
</tr>
<tr>
<td>Pedestrian Hybrid Beacon with Mast Arm</td>
<td>1 EA</td>
<td>$100,000</td>
</tr>
</tbody>
</table>

**Construction subtotal** $662,360

| Work zone traffic control, Survey, Mobilization (15%) | $99,354 |
| Subtotal                                              | $761,714 |
| Contingency (30%)                                     | $228,514 |

**Total Cost** $990,228
Table 10 – Long-term Recommendations Preliminary Construction Costs With Road Diet

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Itemized Recommendations from Table 9</td>
<td>$662,360</td>
</tr>
<tr>
<td>Road Diet</td>
<td></td>
</tr>
<tr>
<td>Signal Modifications (12 EA)</td>
<td>$600,000</td>
</tr>
<tr>
<td>Reconstruct ADA Ramps (89 EA)</td>
<td>$400,500</td>
</tr>
<tr>
<td>Asphalt Removal &amp; Turf Establishment (265,265 SF)</td>
<td>$3,185,555</td>
</tr>
<tr>
<td>Granite Curbing (24,630 LF)</td>
<td>$862,050</td>
</tr>
<tr>
<td>Pavement Box-out (73,890 SF)</td>
<td>$591,120</td>
</tr>
<tr>
<td>Concrete Sidewalk (21,195 LF)</td>
<td>$953,775</td>
</tr>
<tr>
<td>Driveway Apron Work (120 EA)</td>
<td>$420,000</td>
</tr>
<tr>
<td>Drainage Structure Relocation (158 EA)</td>
<td>$1,027,000</td>
</tr>
<tr>
<td><strong>Construction subtotal</strong></td>
<td><strong>$8,702,360</strong></td>
</tr>
<tr>
<td>Work zone traffic control, Survey, Mobilization (15%)</td>
<td><strong>$1,305,354</strong></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$10,007,714</strong></td>
</tr>
<tr>
<td>Contingency (30%)</td>
<td><strong>$3,002,314</strong></td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$13,010,028</strong></td>
</tr>
</tbody>
</table>

The preliminary long-term construction cost estimate shows that long-term costs could reach $13,000,000 with construction of a road diet but would be closer to $1,000,000 without considering the road diet.
VII. Public Process

A. Stakeholder Meetings

Stakeholders comprised of state and local officials, community members, and organizations with expertise in the areas of transportation, law enforcement, and public health, met to help assist and provide valuable input in the development of the pedestrian safety study. The Stakeholders met two times between December 2018 and March 2019. A third meeting is scheduled for July 2019 to present this report to the Stakeholders. The Stakeholders were instrumental in providing guidance and input on the inventory of existing conditions and formulation of goals, objectives, and recommendations for improved pedestrian safety within the Niagara Falls Boulevard study area corridor. The details discussed in the Stakeholder meetings can be found in Appendix L. Below is a brief summary of issues that were discussed in the initial Stakeholder meetings:

- The nature of the corridor changes from south to north so there will not be a single solution
- Minimum accommodations at NFTA bus stops (signs only, no pads, benches, or shelters)
- North of I-290
  - Vehicle speed is in excess of 45-mph
  - Lack of street lighting
- Snow maintenance is a concern in the corridor
- Sight lines are a concern at places like Classics V Banquet Facility
- Sidewalks on the bridge over Ellicott Creek feel narrow.
- Willow Ridge Drive has a very wide pedestrian crossing with travel lanes merging both northbound and southbound

It is envisioned that, beyond this study, the Stakeholders will continue to be advocates for pedestrian safety on Niagara Falls Boulevard and work to implement the study recommendations through the construction of engineering improvements and execution of educational and enforcement programs.

In addition to attendance at meetings, the project team reached out to many of the Stakeholders following the first two meetings to gain additional information, updates, and further thoughts on local outreach opportunities. The following was noted in the follow up conversations:

- Erie County currently has a program working to engage law enforcement officers in Erie County to focus on pedestrian safety issuing tickets and/or warnings with an educational component to vehicle drivers and pedestrians. The County is also working on focusing on the demographics of each area in the County to maximize the outreach and to ensure an appropriate plan is put into place in different location to increase the overall level of effectiveness.

- Erie County has a Stop DWI grant that they are partnering with the Town of Tonawanda to help lead the effort. The County believes there are opportunities to focus on pedestrian safety through this grant effort, which will be better defined as the project moves forward.

- The Town of Tonawanda has reached out to the Erie County Department of Health and obtained pedestrian safety material (See! Be Seen!) that will be distributed to the public. They contacted the Ken-Ton Chamber of Commerce who agreed to lead the effort to distribute the See! Be Seen! material to businesses in the Niagara Falls Boulevard corridor. Based on a conversation
with the Chamber, the distribution of material started in the fall and will continue more heavily in the spring and summer with the nicer weather and increase in the pedestrian travel in the corridor.

- The Town of Tonawanda has a GTSC Police traffic safety grant. The Town plans to participate in the annual pedestrian week in June with a week of police presence giving drivers and pedestrians warnings and a week of stronger enforcement activities. A second week is included in the grant, which the Town plans to use for pedestrian focus. The Niagara Falls Boulevard corridor will be a focus corridor for the grant pedestrian activities. The Town also noted their current focus is on cell phones, which relates to distracted driving and indirectly to pedestrian safety in the corridor.

- Although the Town of Amherst Police Department does not have a GTSC Police safety grant, they noted their willingness to participate with the Town of Tonawanda in the pedestrian details in the Niagara Falls Boulevard corridor.

- The Town of Amherst Police Department has made safety educational material available to the school safety education officers in the Town.

- The Ken-Ton Chamber of Commerce is actively looking for more neighborhood groups to partner with to better inform and educate about pedestrian safety in the Niagara Falls Boulevard corridor.

- The Ken-Ton Chamber of Commerce distributed bags that include pedestrian safety material at the Community Day and Business Showcase on Saturday May 18, 2019.

- The Citizens for Regional Transit group has quarterly meetings and a newsletter with over 1,000 people on the distribution list that have opportunities for speakers or articles/advertisements related to pedestrian safety. This group also attends events such as the Elmwood Art Festival in August and Party for the Planet in June that could be used as a forum for a pedestrian safety partnership.

- The Greater Buffalo Niagara Regional Transportation Council (GBNRTC) has public outreach and social media staff that could be used to assist with additional outreach efforts for pedestrian safety on the Niagara Falls Boulevard corridor.