INTRODUCTION

The Mt. Lebanon Comprehensive Plan Update includes the goals of elevating connectivity for pedestrians and cyclists with the following two objectives: To ensure that pedestrians have safe and efficient routes throughout the municipality, and to enhance bicycle safety.

The 2000 Mt. Lebanon comprehensive plan documented existing transportation conditions in the municipality including all modes of transportation. Mt. Lebanon's commitment to improving the municipality's was documented in the Walkable Community Program assessment. Additionally, the Mt. Lebanon School District conducted a walking assessment of pedestrian access to their middle schools, documenting many of the "missing links" of the pedestrian system within the municipality. These assessments determined a need to develop a strategy to identify specific pedestrian and bicycle safety improvements to promote a walking and biking community in Mt. Lebanon.

To address these concerns, road safety audits/assessments (RSAs) were conducted at the ten (10) most critical intersections or roadway segments in Mt. Lebanon. Refer to Table 1 for the summary of these intersections.

A road safety audit / assessment (RSA) is a formal safety performance examination of an existing or future road or intersection by an independent, multi-disciplinary RSA team. It qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in safety for all road users. While all RSAs should include a review of pedestrian safety, RSAs may also be conducted to improve an identified pedestrian or bicyclist safety problem.

This document serves as the formal report for the RSAs conducted at the ten (10) locations in the Municipality of Mt. Lebanon. Mitigation strategies identified in this report serve to improve and enhance pedestrian and bicycle safety. The strategies are to be included in the comprehensive plan.

RSA TEAM

An independent, multi-disciplinary team conducted the RSA. The team was made up of the following engineers from PennDOT District 11-0 and Trans Associates, Inc., transportation planners from the Southwestern Pennsylvania Commission, and officers from the Mt. Lebanon Police Department:

- Kathryn Power, PennDOT District 11-0
- Mark Magalotti, P.E., Trans Associates, Inc.
- Mike McMurtrie (8/21/12) / James Hughes (8/22/12), Mt. Lebanon Police Department
- Sara Walfoort, Southwestern Pennsylvania Commission
- Todd Wilson, P.E., Trans Associates, Inc.

DETERMINATION OF STUDY INTERSECTIONS

Ten (10) critical intersections or segments were determined through a review of crash records provided by the Mt. Lebanon Police Department. Crash records from the past 5 years (2007 – early 2012) were used in the review. Intersections that experienced multiple pedestrian or cyclist crashes and intersections that experienced a fatality were reviewed.

This review determined that three of the intersections experiencing multiple crashes were located in the Washington Road Business District. Since similar recommendations could improve all three intersections, the intersections were grouped into one roadway segment.

Since separate improvement projects have been planned or are currently being implemented for the intersection of Bower Hill Road and Segar Road / Greenhurst Drive and for the intersection of Washington Road and Beadling Road, RSAs were not conducted for these intersections. Multiple pedestrian crashes were reported at the intersection of Bower Hill Road and Segar Road / Greenhurst Drive, and a fatality occurred at the intersection of Washington Road and Beadling Road. Crashes at the intersection of Washington Road and Gilkeson Road, Cochran Road and Giant Eagle Driveway, and at a midblock location on Colonial Drive were all caused by improper pedestrian behavior therefore they were not included because mitigation actions could not be determined. Though the incident on Colonial Drive resulted in a fatality, it was caused by deliberate actions. Therefore these intersections were also eliminated from consideration for the RSA.

RSAs were conducted at all other intersections that experienced multiple crashes involving pedestrians or cyclists in Mt. Lebanon. These ten (10) locations are listed below: Refer to Figure 1 (below) for a map of crash locations and to Table 1 for a summary of these intersections.

- Washington Road in the Mt. Lebanon Business District (Central Square, Cedar Boulevard, Shady Drive)
- Washington Road and Bower Hill Road
- Washington Road and McFarland Road
- Washington Road and Woodhaven Drive / Longuevue Drive
- Washington Road and Cochran Road
- Cochran Road and Cedar Boulevard
- Cochran Road and Altoona Place
- Cochran Road and Scrubgrass Road
- Cochran Road and Bower Hill Road
- Bower Hill Road and Kenmont Avenue

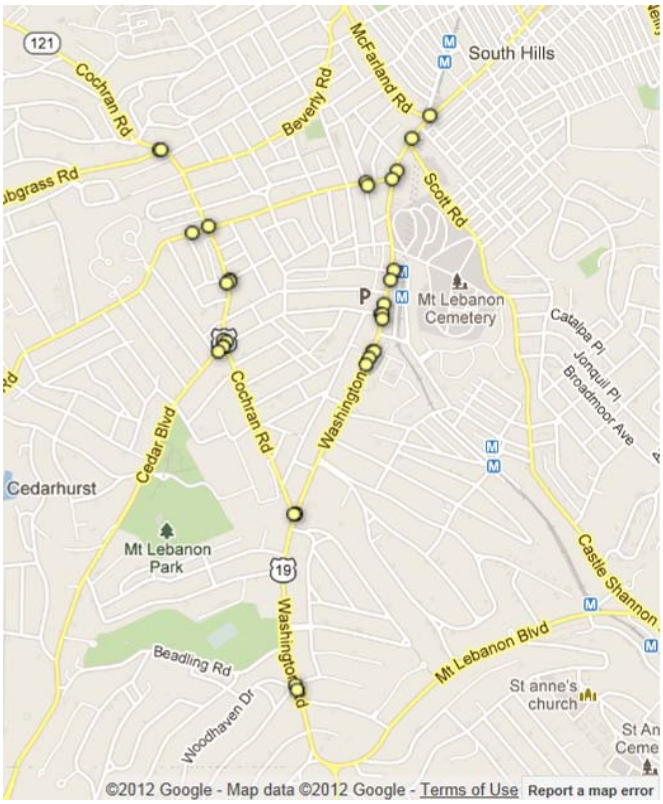

Figure 1 – Crash Locations

FIELD REVIEWS

Field reviews were conducted on August 21, 2012, for all intersections along Washington Road and the intersection of Bower Hill Road and Kenmont Avenue. Field reviews were conducted on August 22, 2012, for the remaining intersections along Cochran Road. Site observations are summarized in the *Intersection Pedestrian and Bicycle Safety Analysis* section of the report.

The following photographs document some of the deficiencies at the study intersections:

Figure 2 – Pedestrian Crossing Behind a Planter (Washington Road near Cedar Boulevard)

Figure 3 – Pedestrian Crossing at a Midblock Location (Washington Road near Cedar Boulevard)

Figure 4 – Crosswalk Markings not Visible (Washington Road at Cedar Boulevard)

Figure 5 – Obstructed, Non-ADA Compliant Push Button (Washington Road at Central Square)

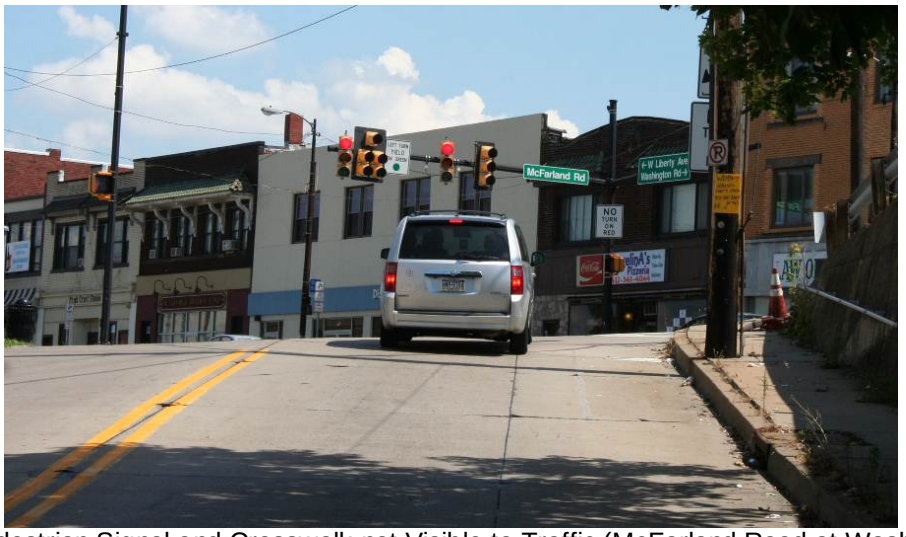

Figure 6 – Pedestrian Signal and Crosswalk not Visible to Traffic (McFarland Road at Washington Road)

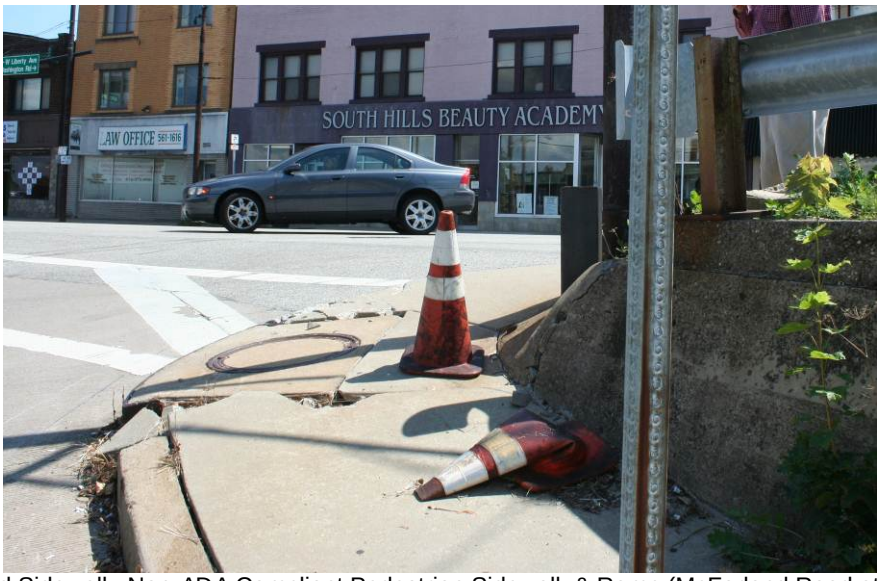

Figure 7 – Damaged Sidewalk, Non-ADA Compliant Pedestrian Sidewalk & Ramp (McFarland Road at Washington Road)

Figure 8 – Lack of Defined Sidewalk at Driveway Crossings (Cochran Road at Cedar Boulevard)

Figure 9 – Non-Bicycle Safe Grate (Cedar Boulevard at Cochran Road)

Figure 10 – Obstructed Traffic Signals and Mountable Curb (Cedar Boulevard at Cochran Road)

Figure 11 – Overgrown Vegetation (Bower Hill Road at Cochran Road)

INTERSECTION PEDESTRIAN AND BICYLE SAFETY ANALYSIS

The sections below summarize the RSA for each intersection, investigating site characteristics, pedestrian/cyclist accommodations, traffic data, crash history, and mitigation. Refer to Table 2 for a summary of crashes and mitigation at each intersection.

Washington Road in the Mt. Lebanon Business District (Central Square, Cedar Boulevard, Shady Drive Intersections)

Site Characteristics and Pedestrian Accommodations

The RSA focused on the signalized intersections within the Mt. Lebanon business district that experienced two or more crashes. The Mt. Lebanon business district is made up of stores, offices, and restaurants lining both sides of the Washington Road. The study intersections along Washington Road are Shady Drive, Cedar Boulevard, and Central Square.

Washington Road (SR 3069) is an urban principal arterial. South of Shady Drive, Washington Road is made up of two 10 foot through lanes and one 8-foot parking lane in each direction. Sidewalks are located on both sides of all roadways. Curb bulb-outs containing planters are located in the parking lane at each intersection. North of Shady Drive, Washington Road consists of a through lane and a parking lane in each direction, though the parking lane becomes an additional through lane during the respective AM and PM peak periods.

Port Authority bus stops are located along Washington Road. The Port Authority's light rail (T) Red Line Mt. Lebanon station is located one block to the east of Washington Road, with pedestrian access approximately 150 feet north of Cedar Blvd.

Central Square intersects Washington Road at a conventional 3-way intersection. Washington Road consists of a shared left / through and a shared right / through lane at each approach, with northbound protected phasing and southbound protected permissive phasing. The Cedar Boulevard approach is on the east side of the intersection. It consists of one left / through / right lane.

Cedar Boulevard intersects Washington Road at a 4-way intersection. Washington Road consists of a shared left / through and a shared right / through lane at each approach, with northbound protected permissive phasing and southbound permissive phasing. The Cedar Boulevard approach is on the

west side of the intersection. It consists of one left / through / right lane. Opposite Cedar Boulevard is a parking garage exit, consisting of an exclusive left and a shared through / right lane with permissive phasing.

Shady Drive, a local residential collector, intersects Washington Road at a 4-way signalized intersection. Washington Road consists of a shared left / through and a shared right / through lane at each approach with permissive phasing. Shady Drive East (westbound) consists of an exclusive left turn lane and a shared right / through lane with permissive phasing. Shady Drive West (eastbound) consists of a shared left / through / right lane with permissive phasing. A fire station is located along Washington Road in the northeast quadrant of the intersection. Emergency signals are located 150 feet north of the Shady Drive controlling southbound Washington Road.

Pedestrian accommodations consisting of sidewalks and pedestrian signals are located at each intersection. All intersections have pedestrian signals that operate concurrently with through traffic. The walk symbol to cross Washington Road is actuated by pedestrian push button. The signals have countdown timers. Advance pedestrian phases are in operation for all intersection approaches, except for Washington Road at Central Square and Washington Road at Cedar Boulevard (where phases with left turn arrows are in operation). Sidewalks are present along all intersection approaches. There are marked crosswalks across each intersection approach. No additional bicycle accommodations were observed.

Traffic Data

Washington Road (SR 3069) is an urban principal arterial carrying an ADT of 15,734. The Port Authority of Allegheny County's Bus Route 38 runs along this stretch of Washington Road. The Port Authority's Light Rail Red Line runs below Washington Road. The speed limit along all roadways is 25 mph. Pedestrians were observed during the site visit, typical of both a road with commuter bus and light rail lines to Pittsburgh and a business district with stores, offices, and restaurants.

Crash Analysis

The Mt. Lebanon Police Department provided pedestrian and bicycle crash summaries from 2007 through the current year (2012). Along this segment, four (4) crashes occurred near the intersection of Central Square, four (4) near the intersection of Cedar Boulevard, and two (2) near the intersection of Shady Drive. This segment had the greatest number of crashes of any area analyzed. The intersections are grouped together due to their close proximity (in the Washington Road Business District), as well as their similar types of crashes. Five (5) of the crashes occurred due to pedestrians or bicyclists crossing outside of crosswalks. Two (2) occurred due to bicyclists or pedestrians failing to obey signals in crosswalks. The remaining three (3) crashes occurred when vehicles turned into pedestrians or bicyclists in crosswalks, though vehicular sight distance was partially obstructed in all three cases. Sight distance obstructions resulted from a fogged windshield, a small child changing direction in a crosswalk, and a bicyclist riding alongside parked cars.

Short Term Mitigation

Based on the crash analysis and field investigation, the following short term mitigation is proposed:

- Install R 9-3 (No Pedestrian Crossing) with R9-3BPL or R9-3BPR (Use Crosswalk) or R9-2 (Cross Only at Crosswalks) signs near the South Garage access and the T Station Access.
- Repaint crosswalks. Use diagonal markings.
- Relocate the trash receptacle on the northwest side of the Central Square intersection, since it blocks wheelchair access to the push button.
- Increase the Flashing Don't Walk time to 15 seconds (use a walking speed of 3 ft/sec for the business district to accommodate older pedestrians).

- Replace pedestrian crossing signs with R10-3 (Push Button for Walking Person Signal) sign or R10-3E (Educational Push Button for Walk Signal with Countdown Timer) signs.
- Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).
- Trim trees to improve visibility for pedestrian signals and for signage.
- Install bike racks adjacent to the bulb outs (where practical) to guide pedestrians to the crosswalks.
- Paint a crosswalk across the North Garage exit.
- Move the Cedar Boulevard stop bar towards the intersection with Washington Road. Place the stop bar according to truck turning template and PennDOT standards. Relocate "Stop Here on Red" sign accordingly.
- Move Shady Drive East right lane stop bar closer to the Washington Road intersection. Add a "Left Lane" plaque over the existing "Stop Here on Red" sign. Place the right lane stop bar in accordance with a truck turning template and with PennDOT standards.
- Install W11-2 and W16-9P (Pedestrian Ahead) signs along Shady Drive, since the intersection grade may not make the crosswalks apparent.

Long Term Mitigation

Based on the crash analysis and field investigation, the following long term mitigation is proposed:

- Upgrade pedestrian accommodations to be compliant with ADA standards. This includes adjusting crosswalks accordingly. Move the crosswalk across Shady Drive East closer to Washington Road.
- Coordinate with PennDOT to explore adjusting the intersection phasing along Washington Road to have an advance pedestrian interval and a lagging left turn phase. If the phasing is changed, conduct a public education campaign.
- Conduct a study to determine the feasibility of implementing a road diet along Washington Road (either in the business district or along the corridor).
- Study lighting levels at the intersections and improve lighting if needed.
- Upgrade pedestrian accommodations to be compliant with ADA standards.
- Extend bulb outs to the edge of the travel lane.
- Study whether or not pickups and drop-offs occur in front of the T station. If few occur, reconfigure to prevent pedestrians from using the bulb-out as a mid-block crosswalk.
- Move pedestrian signals at the northwest corner closer of the intersection of Washington Road and Shady Drive closer to the crosswalks.

Washington Road and Bower Hill Road

Site Characteristics and Pedestrian Accommodations

The intersection of Washington Road (SR 3069) and Bower Hill Road is a three-way T intersection, with Bower Hill Road intersecting Washington Road at an angle. Washington Road consists of two lanes in each direction, and Bower Hill Road consists of one lane in each direction. There are no exclusive left turn lanes at the intersection, and the Washington Road northbound left turn phasing is protected permissive

The Port Authority operates two bus routes at the intersection. There are Port Authority bus stops along all intersection approaches. There is a bus stop and bus shelter immediately south of Bower Hill Road, and there is a bus stop immediately north of Bower Hill Road. The northbound Washington Road bus stop is approximately 100 feet to the north of the intersection, along next to a church (St Bernard) driveway.

Washington Road north of the intersection is designated a school zone for St Bernard Catholic School.

The intersection has pedestrian accommodations consisting of painted crosswalks, curb ramps, push buttons, and pedestrian signal heads with countdown timers. Pedestrians cross during an exclusive pedestrian phase that is called following the Bower Hill Road phase upon push button actuation only. There are no specific bicycle accommodations at the intersection.

Traffic Data

Washington Road (SR 3069) is an urban principal arterial carrying an ADT of 15,734. Bower Hill Road is an urban minor arterial, carrying an ADT of 10,732. The posted speed limit of all roads is 25 The Port Authority Bus Route 41 operates along Bower Hill Road and to the north along Washington Road. The Port Authority operates Route 38 runs along Bower Hill Road and to the south along Washington Road. Pedestrians were observed in the area during the site visit. Due to the St Bernard Catholic School, children are present during school hours.

Crash Analysis

The Mt. Lebanon Police Department provided pedestrian and bicycle crash summaries from 2007 through the current year (2012). The intersection experienced two (2) reportable (and zero non-reportable) crashes involving pedestrians or bicycles since 2007. One (1) crash occurred due to a pedestrian crossing Washington Road at a midblock location outside of a marked crosswalk, and the other crash occurred due a pedestrian crossing without activating the exclusive walk phase.

Short Term Mitigation

Based on the crash analysis and field investigation, the following short term mitigation is proposed:

- Add R10-2 (Cross on Walk Symbol Only) signs at all push button locations.
- Coordinate with the Port Authority to adjust bus stops to remove midblock bus stop locations. All bus stops should be at the near side or far side of intersections to encourage safe pedestrian crossing at intersections.
- Change the signal sequencing so the pedestrian walk phase comes up after the Washington Road phase.
- Paint a crosswalk connecting the sidewalk across the church parking lot on east side of Washington Road.
- Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).

Long Term Mitigation

Based on the crash analysis and field investigation, the following long term mitigation is proposed:

- Upgrade pedestrian accommodations to be compliant with ADA standards.
- Improve pedestrian accommodations for the sidewalk crossing the church parking lots on the east side of Washington Road. This may include a pedestrian refuge area between the church driveways.
- Adjust location of pedestrian signal head for the Washington Road Crossing at the northwest side of the intersection.

Bower Hill Road and Kenmont Avenue

Site Characteristics and Pedestrian Accommodations

Bower Hill Road and Kenmont Avenue meet at a four-way unsignalized intersection. The northern Kenmont Avenue intersection approach is one-way in the southbound direction. The approach is one-

lane, narrowed by pavement markings. All other intersection approaches consist of one lane in each direction. Bower Hill Road is free flowing, and Kenmont Avenue is stop-controlled. Kenmont Avenue is used as a neighborhood cut-through street, especially during the PM peak period. The intersection approaches all consist of single through lanes without turn lanes. Port Authority bus stops are along Bower Hill Road. The intersection is in a residential area.

The intersection has sidewalks along all approach roads with non-ADA compliant curb ramps at each corner. The intersection does not have marked crosswalks.

Traffic Data

Bower Hill Road is an urban minor arterial with an ADT of approximately 10,732. Kenmont Road is a local collector. Port Authority bus routes 38 and 41 run along Bower Hill Road. All approach roads have posted speed limits of 25 mph.

Crash Analysis

Two (2) reportable crashes occurred at the intersection of Bower Hill Road and Kenmont Road in the past five (5) years. In both reported crashes, a southbound vehicle on Kenmont Road pulled into the intersection after stopping, causing a collision. In one case, the vehicle pulled into the path of a bicycle. In the other case, the vehicle pulled into the path of an oncoming car. The impact of the collision pushed one of the vehicles onto the sidewalk, striking pedestrians.

Short Term Mitigation

Based on the crash analysis and field investigation, the following short term mitigation is proposed:

- Paint crosswalks and stop bars across Kenmont Avenue at both approaches.
- Trim vegetation within right-of-way. Discuss concerns with homeowners who have vegetation on private property.
- Install W11-2 and W16-9P (Pedestrian Ahead) signs along Kenmont Avenue.

Long Term Mitigation

Based on the crash analysis and field investigation, the following long term mitigation is proposed:

- Upgrade pedestrian accommodations to be compliant with ADA standards.
- Narrow westbound lane of Bower Hill Road away from the curb. Therefore, if vehicles on southbound Kenmont Avenue pull further into the intersection, they will not conflict with cross traffic.

Washington Road / West Liberty Avenue / McFarland Road

Site Characteristics and Pedestrian Accommodations

The intersection of Washington Road (SR 3069) / West Liberty Avenue (SR 3069), McFarland Road, and Raleigh Avenue is a K-shaped intersection, in which Washington Road / West Liberty Avenue is the through street and McFarland Road and Raleigh Avenue intersect at angles. Raleigh Avenue is one-way in the direction away from the intersection and thus does not have a signalized approach. There are no exclusive turn lanes at the intersection. The Washington Road northbound left turn is protected permissive, and all other turns are permissive.

Washington Road / West Liberty Avenue has one through lane and one parking lane in each direction, but the parking lane becomes a second through lane during the respective inbound and outbound

peak periods. There are businesses located along both sides of Washington Road / West Liberty Avenue. The McFarland Road approach consists of one lane in each direction.

The intersection has pedestrian signals with push buttons that operate concurrently with through traffic. The signals have countdown timers. Marked crosswalks cross each intersection approach. Some sidewalks do not have curb ramps at crosswalk locations.

The border of the Municipality of Mt. Lebanon and the Borough of Dormont is along McFarland Road. The traffic signal is Dormont's responsibility. Mt. Lebanon owns the northern half of the intersection. Recommendations involving Dormont are for information only and are not part of the Mt. Lebanon Comprehensive Plan Update.

Traffic Data

Washington Road / West Liberty Avenue (SR 3069) is an urban principal arterial carrying an ADT of 21,266. McFarland Road is an urban principal arterial, carrying an ADT of 9,218. The Port Authority 41 bus route is along Washington Road / West Liberty Avenue. The posted speed on Raleigh Avenue is 20 mph, the posted speed on McFarland Road is 25 mph, and the posted speed along Washington Road / West Liberty Avenue is 35 mph.

Crash Analysis

The Mt. Lebanon Police Department provided pedestrian and bicycle crash summaries from 2007 through the current year (2012). The intersection experienced one (1) reportable and one (1) non-reportable crash involving pedestrians or cyclists since 2007. One (1) crash occurred when a northbound vehicle made a left turn to McFarland Road just after the arrow turned off, striking a pedestrian in the crosswalk across McFarland Road. The other crash occurred due to road rage, in which a driver became upset, unable to pass a cyclist using the full traffic lane on Washington Road.

Short Term Mitigation

Improvements in Dormont are provided for information only, and are not part of the Mt. Lebanon Comprehensive Plan Update. Based on the crash analysis and field investigation, the following short term mitigation is proposed:

- Relocate McFarland Road "Yield to Pedestrians in Crosswalk" sign so it is more visible. Replace it with R10-15R (Turning Traffic Must Yield to Pedestrians Right) sign or W11-2 and W16-9P (Pedestrian Ahead) signs. Place the signs in a visible location.
- Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).
- Repaint the crosswalks.
- Repair the sidewalks.
- Relocate the "Stop Here on Red" and "No Turn on Red" signs to increase visibility along the McFarland Road approach.

Long Term Mitigation

As previously noted, improvements in Dormont are provided for information only, and are not part of the Mt. Lebanon Comprehensive Plan Update. Based on the crash analysis and field investigation, the following long term mitigation is proposed:

- Upgrade the pedestrian accommodations to be compliant with ADA standards, including adding curb ramps at the intersection. This includes adding an ADA complaint crosswalk across Raleigh Avenue.

- Change the orientation of the southern crosswalk across Washington Road to be at an angle (parallel with McFarland Road), so drivers on McFarland Road can more easily see pedestrians in the crosswalk. Relocate the push buttons and pedestrian signal heads accordingly, so both pedestrians and vehicles on McFarland Road can clearly see the pedestrian signal heads. Increase the pedestrian crossing time.

Washington Road and Woodhaven Drive and Longuevue Drive

Site Characteristics and Pedestrian Accommodations

The intersection of Washington Road (SR 0019) with Woodhaven Drive / Crestvue Manor Drive and Longuevue Drive consists of unconventional geometry. Woodhaven Drive lines up with Crestvue Manor Drive forming a cross street. Longuevue Drive is parallel to Woodhaven Drive, separated by a 20 foot wide grassy median. The intersection functions as one signalized intersection. Washington Road consists of two lanes in each direction with permissive left turn movements. Woodhaven Drive, Crestvue Manor Drive, and Longuevue Drive all consist of one lane in each direction. Washington Road consists of two lanes in each direction without exclusive left turn lanes. The intersection is in a residential area, and the Beverly Heights church is located on the east side of the intersection. A residential driveway connects to the intersection at an angle between Washington Road and Woodhaven Drive at the northwest corner of the intersection.

All approach roads have sidewalks along both sides of the street (except along the grassy median). The intersection has pedestrian signals that operate concurrently with through traffic by push button actuation. The signals have countdown timers, and there is no advance pedestrian phase. Sidewalks are present along all intersection approaches. Marked crosswalks cross each intersection approach.

Traffic Data

Washington Road (SR 0019) is an urban principal arterial carrying an ADT of 23,542. Woodhaven Drive, Longuevue Drive, and Crestvue Manor Road are local collectors. There is no bus service along Washington Road. The posted speed limit on Washington Road is 35 mph. The posted speed limit on all other approach roads is 25 mph.

Crash Analysis

Two (2) reportable crashes involving pedestrians or bicycles occurred since 2007. One crash occurred when a northbound vehicle on Washington Road made a left turn onto Woodhaven Drive, striking a pedestrian in the crosswalk. The pedestrian crossed the intersection during a “don’t walk” phase. The other crash occurred when a vehicle making a right on red from Longuevue Drive did not notice a pedestrian crossing directly in front of the vehicle.

Short Term Mitigation

Based on the crash analysis and field investigation, the following short term mitigation is proposed:

- Add "No Turn on Red" signs on Crestvue Manor Drive and Longuevue Drive.
- Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).

Long Term Mitigation

Based on the crash analysis and field investigation, the following long term mitigation is proposed:

- Upgrade pedestrian accommodations to be compliant with ADA standards.
- Replace optically programmed signal heads with newer more visible signal heads.

- Install a pedestrian refuge island, painted island, or flush median between Longuevue Drive and Woodhaven Drive. Adjust the traffic signals and phasing accordingly.
- Study consolidating the Longuevue Drive and Woodhaven Drive approaches to eliminate the long pedestrian crossing.

The intersection is to be upgraded by PennDOT in 2013. Some of the recommended improvements may be included in the PennDOT project.

Washington Road and Cochran Road

Site Characteristics and Pedestrian Accommodations

The intersection of Washington Road (SR 3069 north of the intersection, SR 0019 south of the intersection) and Cochran Road (SR 0019) is a three-way T intersection, with Cochran Road intersecting Washington Road at an angle. Washington Road consists of two lanes in each direction, and Cochran Road consists of one lane in each direction with left turn lanes. There are no exclusive left turn lanes at the intersection along Washington Road. There is an exclusive left turn lane along the Cochran Road intersection approach. The Washington Road northbound left turn is protected permissive, and it operates concurrently with the eastbound Cochran Road right turn overlap. All other turns are permissive. The intersection is 120 feet north of the Washington Road / Lebanon Hills Drive signalized intersection. While two separate intersections, signals at the intersections operate under a single signal plan.

There are no bus routes at the intersection. The intersection is located in a residential area, with sidewalks along both sides of all approach roads. Mt. Lebanon High School is located along Cochran Road to the west of the intersection. The Mt. Lebanon United Lutheran Church is located to the east of the intersection. An enter-only church driveway connects to the intersection, opposite Cochran Road.

The intersection experiences a high volume of pedestrians at the start and end of the school day. The intersection has an exclusive pedestrian phase to accommodate the pedestrian volume. The pedestrian phase is called by push button actuation, and the phase follows the Cochran Road phase. Crosswalks and curb ramps cross each intersection approach. Pedestrian signals have countdown timers. There are no additional bicycle accommodations at the intersection.

Traffic Data

Washington Road (SR 3069) north of the intersection is an urban principal arterial carrying an ADT of 17,178. Washington Road (SR 0019) south of the intersection is an urban principal arterial carrying an ADT of 23,542. Cochran Road (SR 0019) is an urban principal arterial carrying an ADT of 11,173. There is no public bus service at the intersection. The posted speed limit along all approach roads is 35 mph. There is a 15 mph school zone speed limit on the Cochran Road approach. Pedestrians and cyclists use the intersection, especially at the start and end of the school day.

Crash Analysis

The intersection of Washington Road and Cochran Road experienced three (3) reportable crashes involving pedestrians or bicycles since 2007. All crashes occurred at night when pedestrians crossing Cochran Road were struck by vehicles turning left from Washington Road. The pedestrians crossed with a green signal indication / “Don’t Walk” pedestrian signal indication during all cases.

Short Term Mitigation

Based on the crash analysis and field investigation, the following short term mitigation is proposed:

- Add R10-2 (Cross on Walk Symbol Only) signs at all push button locations at the intersection.
- Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).
- Add a “Do Not Enter” sign to supplement the existing signage to prevent vehicles from exiting from the church entrance.
- Trim vegetation to improve visibility of sight lines, signs, and pedestrian signals.
- Adjust the mounting of the pedestrian signal on the southeast side so it is not obstructed by its support pole.
- Stagger the Cochran Road stop bars so the right lane stop bar is closer to the crosswalk and the left lane stop bar is further back. Add R10-6-1 and R10-6AR "Left Lane Stop Here on Red" signs.
- Place “No Turn on Red” signs closer to the signal heads.

Long Term Mitigation

Based on the crash analysis and field investigation, the following long term mitigation is proposed:

- Upgrade pedestrian accommodations to be compliant with ADA standards. This includes adding new push button locations near each crosswalk. This recommendation also includes adding APS (Accessible Pedestrian Signals), so pedestrians know when they have activated the push button.
- Replace the span wires with mast arms.
- Study lighting levels at the intersection, and install a luminaire to light the northern crosswalk across Cochran Road if warranted.

The intersection is to be upgraded by PennDOT in 2013. Some of the recommended improvements may be included in the PennDOT project.

Cochran Road and Cedar Boulevard

Site Characteristics and Pedestrian Accommodations

Cochran Road (SR 0019) and Cedar Boulevard intersect at a four-way signalized intersection. All intersection approaches are at varying angles. The Cochran Road approaches and the Cedar Boulevard eastbound approach have exclusive left turn lanes. All left turns are permissive.

Bus stops are present along Cochran Road north of the intersection and along Cedar Boulevard west of the intersection. Free standing businesses with parking lots are located along Cochran Road to the north of the intersection. All other intersection approaches are in residential areas. The intersection is located four blocks (approximately 1350 feet) to the north of the Mt. Lebanon High School. All intersection approaches have sidewalks on both sides of the roadway.

The intersection experiences a high volume of pedestrians at the start and end of the school day. The intersection has pedestrian signals that operate concurrently with through traffic, actuated by push button. Pedestrian signals have countdown timers, and phasing includes an advance pedestrian phase across Cedar Boulevard.

Traffic Data

Cochran Road (SR 0019) is an urban principal arterial carrying an ADT of 11,173. Cedar Boulevard south of the intersection is an urban minor arterial, carrying an ADT of 12,784. Cedar Boulevard north of the intersection has an ADT of approximately 6,383. The Port Authority Bus Route 36 runs through the intersection, operating along the Cochran Road north of the intersection and Cedar Boulevard west of the intersection. Cochran Road has a posted speed of 35 mph and Cedar Boulevard has a

posted speed of 25 mph. Pedestrians and cyclists use the intersection, especially at the start and end of the school day.

Crash Analysis

The intersection experienced four (4) reportable crashes and one (1) non-reportable crash involving pedestrians or bicycles since 2007. The intersection experienced the highest number of collisions as compared to any other intersection studied. Two (2) crashes occurred when turning vehicles struck pedestrians in crosswalks. One crash occurred when a vehicle exited the Mt. Lebanon Auto driveway at the northwest corner of the intersection, striking a pedestrian on the sidewalk. One of the crashes was due to a pedestrian exiting a car stopped in the Cedar Boulevard northbound intersection queue and running across the street. The other crash was due to an improperly maintained vehicle losing control.

Short Term Mitigation

Based on the crash analysis and field investigation, the following short term mitigation is proposed:

- Remove the bus stop on the westbound Cedar Boulevard approach. The sign lists the 36A and 41C routes, which appear to have been discontinued. Also remove the 36A Bus Stop south of the intersection.
- Remove school sign from the intersection and replace at a more appropriate, less cluttered location. Replace with a PennDOT Publication 236 compliant sign.
- Trim vegetation and clear brush at intersection. Some signs along northbound Cochran Road are obscured.
- Enlarge the southbound “No Turn on Red” sign.
- Add a near-side “No Turn on Red” sign on southbound Cochran Road.
- Replace catch basin grates with ones that have a bicycle safe design.
- Add signs to the left and right of the service station exit instructing drivers to look for pedestrians. Add R10-15 L and R (Turning Traffic Must Yield to Pedestrians (Left) and (Right)) signs.
- Increase enforcement to catch red light runners.
- Repaint the crosswalks, and add diagonal markings.
- Adjust the traffic signal controller so the advance pedestrian interval is working on the south side of the intersection across Cochran Road.
- Install additional “No Parking” signs along the westbound Cedar Boulevard approach to define the eastern limit of the no parking area.
- Replace the southbound Cochran Road overhead lane use control signs with ones that accurately match the intersection geometry.
- Adjust the spacing of far side signals for the eastbound Cedar Boulevard approach so they do not obstruct visibility of the signals for the westbound Cedar Boulevard approach.
- Move the Cochran Road southbound right lane stop bar closer to the crosswalk.
- Remove the double yellow lines beyond stop bars. The lines should be dotted, as shown in the traffic signal plans.
- Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).

Long Term Mitigation

Based on the crash analysis and field investigation, the following long term mitigation is proposed:

- Upgrade pedestrian accommodations to be compliant with ADA standards. This includes maintaining a 4-foot wide path clear of obstructions on sidewalks. Increase Flashing Don’t Walk times based on a walking speed of 3.5 feet per second.
- Replace the mountable curb with barrier curb at the intersection.

- Move the west side Cochran Road crosswalk across Cedar Boulevard closer to Cochran Road. Angle the crosswalk to maximize visibility for right turning vehicles. Adjust push button locations and pedestrian signals accordingly.
- Move the south side crosswalk across Cochran Road closer to the intersection to increase pedestrian visibility.
- Reconfigure the service station (Mt. Lebanon Auto) exit. Narrow the exit to give a clear crossing point.

Cochran Road and Altoona Place

Site Characteristics and Pedestrian Accommodations

Cochran Road (SR 0019) and Altoona Place meet at a four-way signalized intersection. Both Cochran Road approaches have exclusive left turn lanes. All turns are permissive. Port Authority bus stops are located along Cochran Road. Free standing businesses with parking lots are located along the intersection approaches.

Since Mt. Lebanon High School is on Cochran Road, students walk along Cochran Road to get to and from school. The intersection has pedestrian signals that operate concurrently with through traffic. The walk symbol is called across Cochran Road by push button actuation only. Pedestrian signals have countdown timers, and phasing includes an advance pedestrian phase for all crossings. Sidewalks are present along all intersection approaches.

Traffic Data

Cochran Road (SR 0019) is an urban principal arterial carrying an ADT of 11,173. Altoona Place is a local collector. The Port Authority Bus Route 36 operates along Cochran Road. Cochran Road has a posted speed of 35 mph and Altoona Place has a posted speed of 25 mph. Pedestrians and cyclists use the intersection, especially at the start and end of the school day.

Crash Analysis

The intersection experienced three (3) reportable crashes and one (1) non-reportable crash involving pedestrians or bicycles since 2007. In all four cases, pedestrians were struck in crosswalks. Two cases involved vehicles making left turns, one involved a vehicle attempting to make a right turn on red, and the other involved a vehicle attempting to proceed straight through a red signal after stopping.

Short Term Mitigation

Based on the crash analysis and field investigation, the following short term mitigation is proposed:

- Repaint crosswalks.
- Move lane use control signs away from stop bars along Cochran Road, or only have one sign per approach.
- Repaint roadway markings to elongate the Cochran Road southbound left turn lane.
- Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).
- Adjust the angle of the pedestrian signal head to improve visibility for the northbound Altoona Place crossing along the east side of Cochran Road.

Long Term Mitigation

Based on the crash analysis and field investigation, the following long term mitigation is proposed:

- Replace deteriorated sidewalks and repave crosswalks.
- Upgrade pedestrian accommodations to be compliant with ADA standards. This includes adjusting the crosswalk location so it does not cross the metal manhole cover, or applying anti-slip material to the manhole cover.
- Work with the property owner to modify the parking lot in the northeast corner (Mt. Lebanon Vision Center / Hometown Mail) to reduce conflict points to the sidewalk. This may include changing the parking layout or requiring back-in parking.
- Replace mountable curb with barrier curb.
- Investigate adding protected left turn arrows to reduce conflicts.

Cochran Road and Bower Hill Road

Site Characteristics and Pedestrian Accommodations

Cochran Road (SR 0019) and Bower Hill Road meet at a four-way signalized intersection. All approaches have exclusive left turn lanes. The Bower Hill Road northbound approach consists of two lanes in each direction; the left lane becomes an exclusive left turn lane. All other approach roadways have one through lane in each direction. Left turns from Bower Hill Road are protected permissive. Left turns from Cochran Road are fully protected. Port Authority bus stops are located along all approach roads. There is a bus shelter along Bower Hill Road at the southwest corner of the intersection. The intersection is in a residential area, though apartments and free-standing businesses are located south of the intersection along Cochran Road. Shuttle buses stopping in front of an apartment building were observed to block the Cochran Road southbound lane. There is an enter-only residential driveway between Bower Hill Road and Cochran Road at the northwest corner of the intersection.

The intersection has pedestrian signals that operate concurrently with through traffic. The walk symbol is called by push button actuation. The signals do not have countdown timers, and there is no advance pedestrian phase. Sidewalks are present along all intersection approaches. Marked crosswalks cross each intersection approach.

Traffic Data

Cochran Road (SR 0019) is an urban principal arterial carrying an ADT of 11,173. Bower Hill Road is an urban minor arterial with an ADT of approximately 10,732. The Port Authority Bus Route 36 runs along Cochran Road. Bus Route 41 runs along Bower Hill Road. Bus Route 38 runs along Cochran Road to the north of the intersection and along Bower Hill road to the east of the intersection. Cochran Road and Bower Hill Road south of the intersection have a posted speed of 35 mph and Bower Hill Road north of the intersection has a posted speed of 25 mph.

Crash Analysis

The intersection experienced two (2) reportable and no (0) non-reportable crashes involving pedestrians or bicycles since 2007. One collision occurred when a vehicle was turning left from eastbound Bower Hill Road to northbound Cochran Road and struck a pedestrian crossing Cochran Road in the crosswalk. The other collision occurred when a pedestrian was struck walking along Bower Hill Road. The sidewalk was impassable due to snow and ice accumulation.

Short Term Mitigation

Based on the crash analysis and field investigation, the following short term mitigation is proposed:

- Replace intersection lane use control signing. Add “Left Lane Must Turn Left” signs along the eastbound Bower Hill Approach. Add or maintain lane use control signs with a left arrow and a shared through / right arrow on all other approaches. Remove non-conforming signs.
- Add diagonal markings in crosswalks.
- Trim trees and other vegetation to improve the visibility sight lines and of signage, especially along eastbound Bower Hill Road.
- Coordinate with the property owner of the apartment building south of the intersection along Cochran Road to direct vehicles to the parking lot for loading and unloading. Place no stopping or standing signs where needed in front of the apartment building.
- Replace the End Speed Limit 35 mph sign on the Bower Hill Road eastbound intersection approach with a Begin Speed Limit 25 mph sign.
- Replace faded overhead lane use control signs over the Bower Hill Road eastbound approach.
- Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).

Long Term Mitigation

Based on the crash analysis and field investigation, the following long term mitigation is proposed:

- Upgrade pedestrian accommodations to be compliant with ADA standards.
- Add countdown pedestrian signals.
- Examine changing the phasing to consist of lagging left arrows to allow for a pedestrian advance phase.
- Extend the left turn bay along westbound Bower Hill Road.
- Coordinate with the apartment building owner south of the intersection to create a dedicated pull-off for vehicles.

Cochran Road and Scrubgrass Road

Site Characteristics and Pedestrian Accommodations

Cochran Road (SR 0121) and Scrubgrass Road meet at an unsignalized T intersection, with Scubgrass Road forming the intersecting street. Scrubgrass Road is stop-controlled and Cochran Road is free-flowing. Northbound Cochran Road consists of a through lane and a left turn lane. Southbound Cochran Road consists of a single through lane. Scrubgrass Road consists of a single lane in each direction. The Scrubgrass Road intersection approach is wide enough that vehicles occasionally pull next to each other for left and right turns. There are Port Authority bus stops along Cochran Road. The intersection is in a residential area with single-family houses.

Sidewalks are present along both sides of Cochran Road and the north side of Scrubgrass Road. There are non-ADA compliant curb ramps across Scrubgrass Road. There are no marked crosswalks at the intersection.

Traffic Data

Cochran Road (SR 0121) is an urban principal arterial carrying an ADT of 18,189. Scrubgrass Road is a local collector with an ADT of approximately 3,844. The Port Authority Bus Route 38 operates along Cochran Road. Cochran Road has a posted speed of 35 mph and Scrubgrass Road has a posted speed of 25 mph.

Crash Analysis

The intersection experienced one (1) reportable and one (1) non-reportable crashes involving pedestrians or bicycles since 2007. In both cases, pedestrians were struck crossing Scrubgrass Road in an unmarked crosswalk by vehicles turning onto Cochran Road.

Short Term Mitigation

Based on the crash analysis and field investigation, the following short term mitigation is proposed:

- Add R10-15R (Turning Traffic Must Yield to Pedestrians (Right)) sign on the Scrubgrass Road approach.
- Paint a crosswalk across Scrubgrass Road with diagonal pavement markings.
- Paint a stop bar and adjust the location of the stop sign on Scrubgrass Road.
- Trim trees to improve the visibility of sight lines and of signage.
- Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).
- Narrow the Scrubgrass Road approach lane with pavement markings, so vehicles exiting Scrubgrass Road have a single lane approach so southbound vehicles making a sharp right turn onto Scrubgrass Road have more room to maneuver.
- Install W11-2 and W16-9P (Pedestrian Ahead) signs along Scrubgrass Road.

Long Term Mitigation

Based on the crash analysis and field investigation, the following long term mitigation is proposed:

- Upgrade pedestrian accommodations to be compliant with ADA standards. This involves replacing the curb ramps.

GENERAL RECOMMENDATIONS

Several short term and long term strategies are applicable to many of the intersections evaluated. These strategies may be applicable to other intersections in the municipality, and may be incorporated into future maintenance or improvement projects in the municipality to elevate pedestrian and cyclist safety:

Short Term Improvements

- Trim trees and shrubs to improve sight distance and visibility.
- Install bicycle safe inlet grates.
- Install signs and pavement markings to inform drivers to share the road with bicycles. Pavement markings typically consist of Shared-Lane Markings. Signs typically consist of R4-11, (Bicycles May Use Full Lane). The W16-101 (Share the Road) sign may also be used, though it is more appropriately used when bike lanes end and for dedicated bicycle routes.
- Review and consolidate bus stop locations.
- Install “Cross on Walk Symbol” signs at intersections with exclusive pedestrian phases.
- Use “Educational Push Button for Walk Signal with Countdown Timer” signs at intersections with concurrent pedestrian phases.
- Install or relocate “No Turn on Red” signs to be near signal heads.
- Move right lane stop bars closer to crosswalks; add “Left Lane Stop Here on Red” signs.
- Install “Turning Traffic Must Yield to Pedestrians” and/or “Pedestrian Crossing Ahead” signs.
- Adjust pedestrian signal head mountings to maximize visibility to both pedestrians and drivers.
- Reduce sign clutter and improve sign visibility at intersections.
- Repaint pavement markings.
- Add diagonal crosswalk markings.
- Paint stop bars and crosswalks across side streets at unsignalized intersections.
- Install “No Pedestrian Crossing” and “Use Crosswalk” signs to encourage safe, appropriate crosswalk use.
- Keep push buttons clear from obstructions.
- Conduct proper maintenance and testing to verify pedestrian equipment is operating properly.

Long Term Improvements

- Upgrade intersections with ADA-compliant handicapped curb ramps.
- Upgrade pedestrian signal equipment.
- Relocate pedestrian signals to be aligned with crosswalks.
- Upgrade roadway lighting at dark intersections.
- Angle crosswalks to be parallel with approach roadways to improve visibility. Relocate corresponding handicap ramps and pedestrian signals and push buttons.

CONCLUSIONS

RSAs were conducted at the 10 most critical intersections or roadway segments in the Municipality of Mt. Lebanon experiencing crashes involving cyclists and pedestrians. Refer to Table 1 for the determination of study intersections and to Table 2 for the summary of the crashes and recommended mitigation. These assessments were conducted to fulfill the objectives of the Comprehensive Plan Update—to improve conditions for pedestrians and bicyclists and enhance safe and efficient routes throughout the municipality. While the Municipality of Mt. Lebanon already provides many pedestrian accommodations, the assessments identify additional mitigation strategies to further enhance safety. Also, many of the recommendations, while specific to intersections studied can be applied to future roadway maintenance and reconstruction projects throughout the municipality.

Collisions involving pedestrians and cyclists are infrequent in the Municipality of Mt. Lebanon and in other communities with substantial pedestrian and bicycle activity. When evaluating all of the intersections with pedestrian and bicycle crashes, crash frequencies averaged from one per year to one every three years. Many intersections experienced crashes as a result of improper pedestrian or driver behavior, regardless of overall intersection safety. Because of this low frequency of collisions, the success of the pedestrian and bicycle enhancements may not be measured solely on the reduction in the number of crashes at individual intersections. Since crashes involving pedestrians and cyclists often have a moderate to severe risk of injury, any reduction in the frequency of crashes has important benefits. Furthermore, when safer intersections for pedestrians and cyclists are provided they encourage residents to choose walking or biking over driving, enhancing Mt. Lebanon as a walking and biking community.

TABLE 1
SUMMARY OF INTERSECTIONS WITH FATALITIES OR MULTIPLE CRASH OCCURANCES
Mt. Lebanon Municipal Comprehensive Plan Update
Elevating Connectivity for Pedestrians and Cyclists
Municipality of Mt. Lebanon, Allegheny County, Pennsylvania

Int. Number	Intersection / Segment	Number of Collisions				Recommended for RSA Audit?
		Pedestrian (Injury)	Pedestrian (Fatality)	Bicycle (Injury)	Total	
1	Washington Rd Business District	8		2	10	Yes
2	Washington Rd & Bower Hill Rd	2			2	Yes
3	Bower Hill Rd & Kenmont Rd	1		1	2	Yes
4	Washington Rd & McFarland Rd	1		1	2	Yes
5	Washington Rd & Woodhaven Dr / Longuevue Dr	2			2	Yes
6	Washington Rd & Cochran Rd	3			3	Yes
7	Cochran Rd & Cedar Blvd	5			5	Yes
8	Cochran Rd & Altoona Pl	4			4	Yes
9	Cochran Rd & Bower Hill Rd	2			2	Yes
10	Cochran Rd & Scrubgrass Rd	2			2	Yes
	Bower Hill Rd & Segar Rd / Greenhurst Drive	1		1	2	No - Intersection to be improved as a separate project.
	Washington Rd & Gilkeson Rd	2			2	No - Both crashes resulted from improper pedestrian crossings.
	Cochran Rd & Giant Eagle Driveway	2			2	No - Crashes occurred at a private parking lot. No major injuries sustained.
	Washington Rd & Beading Rd		1		1	No - Intersection to be improved as a separate project.
	Colonial Drive		1		1	No - Crash caused by deliberate actions, not related to roadway conditions.

TABLE 2
ROAD SAFETY AUDIT STUDY INTERSECTION MITIGATION
Mt. Lebanon Municipal Comprehensive Plan Update, Elevating Connectivity for Pedestrians and Cyclists
Municipality of Mt. Lebanon, Allegheny County, Pennsylvania

Intersection					Crash Information				Accident Report			Summary			Corrective Actions	
No.	Primary Street	Side Street(s)	Address	Crossing Guard?	Injured	Units	Killed	Time	Report No.	Violation	Reportable	Description	Ped at Fault?	Type	Short-Term Mitigation	Long-Term Mitigation
1	Washington Rd	Business Dist. (Near Central Sq)	714	No	1	2	0	11:15 Day	20100389	Pedestrian crossing at other than intersection	Yes	Pedestrian crossed Washington Rd at mid block location near the Post Office. Pedestrian attempted to cross in front of a truck stopped in the right lane and was struck by a southbound vehicle in the left lane.	Yes	Ped	- Install R 9-3 (No Pedestrian Crossing) with R9-3BPL or R9-3BPR (Use Crosswalk) or R9-2 (Cross Only at Crosswalks) signs near the garage access. - Repaint crosswalks. Use diagonal markings. - Relocate trash receptacle on northwest side, since it blocks wheelchair access to the push button. - Increase Flashing Don't Walk time to 15 seconds (use a walking speed of 3 ft/sec for the business district). - Replace pedestrian crossing signs with R10-3 (Push Button for Walking Person Signal) sign or R10-3E (Educational Push Button for Walk Signal with Countdown Timer) signs. - Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane). - Trim trees to improve visibility for pedestrian signals and for signage. - Install bike racks adjacent to the bulb outs (where practical) to guide pedestrians to the crosswalks.	- Upgrade pedestrian accommodations to be compliant with ADA standards. - Coordinate with PennDOT to explore adjusting the intersection phasing along Washington Road to have an advance pedestrian interval and a lagging left turn phase. If the phasing is changed, conduct a public education campaign. - Conduct a study to determine the feasibility of implementing a road diet along Washington Road (either in the business district or along the corridor). - Study lighting levels at the intersection and improve lighting if needed.
		Business Dist. (Near Central Sq)	719	No	1	2	0	17:53 Night	20091508	Pedestrian crossing at other than intersection	Yes	Pedestrian ran across Washington Rd (from east to west) at mid block in line with the parking garage driveway's north sidewalk. The pedestrian did not look before crossing, narrowly missed a vehicle heading in the northbound direction, and was struck by a vehicle heading in the southbound direction.	Yes	Ped		
		Business Dist. (Central Sq)		No	1	2	0	11:55 Day	20100506	Pedestrian struck in crosswalk	Yes	Vehicle on southbound Washington Rd stopped in the left lane to wait for pedestrians to cross Central Square prior to making turn. The turning vehicle struck a 3 year old, who had turned around in the crosswalk to pick up a dropped toy.	No	Ped		
		Business Dist. (Central Sq)		No	1	2	0	14:08 Day	20070985	Obedience of pedestrian in crosswalk	Yes	Pedestrian ran across Washington Road in the southern crosswalk (west to east) on a red light, attempting to outrun oncoming traffic. The pedestrian was struck in the crosswalk.	Yes	Ped		
		Business Dist. (Cedar Blvd)		Yes	1	2	0	13:09 Day	20070812	Failure to yield right of way to bike	Yes	Northbound vehicle along Washington Road turning left onto Cedar Blvd did not notice a bicycle heading southbound on Washington Road along parked cars. The vehicle turned left in front of the bicycle which could not stop in time.	No	Bike	- Install R9-3 (No Pedestrian Crossing) with R9-3BPL or R9-3BPR (Use Crosswalk) or R9-2 (Cross Only at Crosswalks) signs near the T station access. - Paint a crosswalk across the garage exit, and repaint the other crosswalks. Use diagonal markings. - Increase Flashing Don't Walk time to 15 seconds (use a walking speed of 3 ft/sec for the business district). - Replace pedestrian crossing signs with R10-3 (Push Button for Walking Person Signal) sign or R10-3E (Educational Push Button for Walk Signal with Countdown Timer) signs. - Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane). - Trim trees to improve visibility for pedestrian signals and for signage. - Move the Cedar Boulevard stop bar towards the intersection. Place stop bar according to truck turning template and PennDOT standards. Relocate "Stop Here on Red" sign accordingly. - Install bike racks adjacent to the bulb outs (where practical) to guide pedestrians to the crosswalks.	- Upgrade pedestrian accommodations to be compliant with ADA standards. - Coordinate with PennDOT to explore adjusting the intersection phasing along Washington Road to have an advance pedestrian interval and a lagging left turn phase. If the phasing is changed, conduct a public education campaign. - Study whether or not pickups and drop-offs occur in front of the T station. If few occur, reconfigure to prevent pedestrians from using the bulb-out as a mid-block crosswalk. - Conduct a study to determine the feasibility of implementing a road diet along Washington Road (either in the business district or along the corridor). - Study lighting levels at the intersection and improve lighting if needed.
		Business Dist. (Cedar Blvd)	650	Yes	1	2	0	18:03 Night	20101846	Pedestrian crossing at other than intersection	Yes	Pedestrian crossed Washington Rd south of the parking garage exit from the east to the west at a diagonal from the crosswalk to go around a concrete planter. The pedestrian was struck by a left turning vehicle exiting the parking garage.	Yes	Ped		
		Business Dist. (Cedar Blvd)		Yes	1	2	0	2:16 Night	20070474	Pedestrian struck in crosswalk; fogged	Yes	Vehicle making a left turn from northbound Washington Road to westbound Cedar Blvd struck a pedestrian crossing Cedar Blvd. The vehicle's windshield was reportedly foggy.	No	Ped		
		Business Dist. (Near Cedar)		Yes	1	2	0	21:42 Night	20071364	Pedestrian crossing at other than intersection	Yes	Pedestrian attempted to cross Washington Rd from west to east midway between the intersections of Cedar Blvd and Academy Ave. The pedestrian stepped out between parked cars and was struck by a southbound vehicle, who's driver was on a cell phone.	Yes	Ped		

TABLE 2
ROAD SAFETY AUDIT STUDY INTERSECTION MITIGATION
Mt. Lebanon Municipal Comprehensive Plan Update, Elevating Connectivity for Pedestrians and Cyclists
Municipality of Mt. Lebanon, Allegheny County, Pennsylvania

Intersection					Crash Information				Accident Report			Summary			Corrective Actions	
No.	Primary Street	Side Street(s)	Address	Crossing Guard?	Injured	Units	Killed	Time	Report No.	Violation	Reportable	Description	Ped at Fault?	Type	Short-Term Mitigation	Long-Term Mitigation
1 (Cont.)	Washington Rd	Business Dist. (Shady Dr)	603	Yes	1	2	0	15:59 Day	20070332	Pedestrian crossing other than walk	Yes	Pedestrian (child) entered northbound Washington Road from the east between parked cars (one parking space south of East Shady Drive) and was struck by a northbound vehicle. The pedestrian (child) apparently ran away from his father.	Yes	Ped	- Repaint crosswalks with diagonal lines. - Increase Flashing Don't Walk time to 15 seconds (use a walking speed of 3 ft/sec for the business district). - Replace pedestrian crossing signs with R10-3 (Push Button for Walking Person Signal) sign or R10-3E (Educational Push Button for Walk Signal with Countdown Timer) signs. - Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane). - Move Shady Drive E right lane stop bar closer to the intersection. Add a "Left Lane" plaque over the existing "Stop Here on Red" sign. Place the right lane stop bar in accordance with a truck turning template and with PennDOT standards. - Trim trees to improve pedestrian visibility. - Install W11-2 and W16-9P (Pedestrian Ahead) signs along Shady Drive, since the intersection grade may not make the crosswalks apparent. - Install bike racks behind planters (as applicable).	- Upgrade pedestrian accommodations to be compliant with ADA standards. Move the crosswalk across Shady Drive East closer to Washington Road. - Conduct a study to determine the feasibility of implementing a road diet along Washington Road (either in the business district or along the corridor). - Study lighting levels at the intersection and improve lighting if needed. - Move pedestrian signals at the northwest corner closer to the crosswalks. - Coordinate with PennDOT to explore adjusting the intersection phasing along Washington Road to have an advance pedestrian interval and a lagging left turn phase. If the phasing is changed, conduct a public education campaign.
		Business Dist. (Shady Dr)		Yes	1	2	0	18:45 Day	20080933	Obedience of bicyclist at intersection	Yes	Bicycle heading southbound along the east sidewalk on Washington Road ran a red light and was struck by a vehicle on Shady Drive East heading westbound.	Yes	Bike		
2	Washington Rd	Bower Hill Rd	312	No	1	2	0	6:33 Night	20080066	Pedestrian crossing at other than intersection	Yes	Pedestrian crossed Washington Rd (west to east) in line with the south side of the church driveway to make a direct crossing to the bus stop. Pedestrian struck by northbound vehicle on Washington Rd that originated from Bower Hill Rd. Collision happened during period of rain and poor visibility.	Yes	Ped	- Add R10-2 (Cross on Walk Symbol Only) signs at all push button locations at the intersection. - Coordinate with the Port Authority to adjust bus stops to locations at the near side or far side of intersections. - Change the signal sequencing, so the pedestrian walk phase comes up after the Washington Road phase. - Paint crosswalk across church parking lot on east side of Washington Road.	- Upgrade pedestrian accommodations to be compliant with ADA standards. - Improve pedestrian accommodations (including a refuge area) for the crossing on the east side of Washington Road across the church parking lots. - Adjust location of pedestrian signal head for the Washington Road Crossing at the northwest side of the intersection.
		Bower Hill Rd		No	1	2	0	15:40 Day	20111889	Obedience of pedestrian in crosswalk	Yes	Pedestrian heading south on Washington Road on the west sidewalk crossed Bower Hill Rd without pressing the button to activate the walk phase. The pedestrian was struck by a vehicle traveling from northbound Washington Road to westbound Bower Hill Road.	Yes	Ped		
3	Bower Hill Rd	Kenmont Ave		No	3	4	0	18:17 Day	20091092	Vehicular collision	Yes	A vehicle traveling south on Kenmont Ave proceeded into intersection after stopping and was struck by vehicle heading east on Bower Hill Rd. The collision caused the vehicle on Kenmont Ave to jump the curb and strike pedestrians standing on the sidewalk at the southeast quadrant.	No	Ped	- Paint crosswalks and stop bars across Kenmont Avenue at both approaches. - Trim vegetation within right-of-way. Discuss concerns with homeowners who have vegetation on private property. - Install W11-2 and W16-9P (Pedestrian Ahead) signs along Kenmont Avenue.	- Upgrade pedestrian accommodations to be compliant with ADA standards. - Narrow westbound lane of Bower Hill Road away from the curb. Therefore, if vehicles on southbound Kenmont Avenue pull further into the intersection, they will not conflict with cross traffic. - Relocate utility pole at the northeast corner of the intersection.
	Bower Hill Rd	Kenmont Ave		No	1	2	0	17:55 Night	20082004	Failure to yield right of way to bike	Yes	A vehicle heading south on Kenmont Ave stopped at the stop sign and proceeded into intersection, pulling into the path of a bicycle heading westbound on Bower Hill Rd.	No	Bike		

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Municipality of Mt. Lebanon, Allegheny County, Pennsylvania

Intersection					Crash Information				Accident Report			Summary			Corrective Actions	
No.	Primary Street	Side Street(s)	Address	Crossing Guard?	Injured	Units	Killed	Time	Report No.	Violation	Reportable	Description	Ped at Fault?	Type	Short-Term Mitigation	Long-Term Mitigation
4	Washington Rd	McFarland Rd		No	0	2	0	12:50 Day	20120866	Road rage	No	Vehicle intentionally rear ended bicyclist travelling southbound on Washington Road. The vehicle was unable to pass the bicycle due to a queue in the left turn lane and honked at the bicyclist to get out of her way. The bicyclist confronted the driver, resulting in the driver intentionally bumping and then running over the bike. The driver claimed she thought bicycles were to be used on the sidewalk.	No	Bike	- Relocate McFarland Road "Yield to Pedestrians in Crosswalk" sign so it is more visible. Replace with R10-15R (Turning Traffic Must Yield to Pedestrians Right) sign or W11-2 and W16-9P (Pedestrian Ahead) signs, and place the signs in a visible location. - Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane). - Repaint crosswalks. - Repair sidewalks. - Relocate "Stop Here on Red" and "No Turn on Red" signs to increase visibility along the McFarland Road approach. It is noted that this traffic signal is the responsibility of Dormont. These recommendations are provided for information only and are not part of the Mt. Lebanon Comprehensive Plan.	- Upgrade pedestrian accommodations to be compliant with ADA standards, including adding curb ramps at the intersection. This includes adding an ADA complaint Crossing across Raleigh Avenue. - Change the orientation of the southern crosswalk across Washington Road to be at an angle, so drivers on Washington Road can more easily see pedestrians in the crosswalk. Relocate the push buttons and pedestrian signal heads accordingly, so both pedestrians and vehicles on McFarland Road can clearly see the pedestrian signal heads. Increase the pedestrian crossing time. **It is noted that this traffic signal is the responsibility of Dormont. These recommendations are provided for information only and are not part of the Mt. Lebanon Comprehensive Plan.**
		McFarland Rd		No	1	2	0	7:04 Dawn	20101567	Pedestrian struck in crosswalk	Yes	Vehicle traveling northbound on Washington Road made a left turn onto McFarland Road a few seconds after the left turn arrow turned off. The vehicle struck a pedestrian crossing McFarland Road in the crosswalk.	No	Ped		
5	Washington Rd	Woodhaven Dr Longuevue Dr		Yes	1	2	0	17:51 Night	20070159	Pedestrian struck in crosswalk	Yes	The pedestrian was crossing Woodhaven Dr along the west side of Washington Road in a marked crosswalk. The pedestrian was struck by a northbound vehicle making a left from Washington Rd to Woodhaven Dr. The pedestrian crossed during a green signal indication, though the pedestrian signal indicated "Don't Walk." The pedestrian did not press the button to activate a walk interval. Left turns at the signal are permissive only.	Yes	Ped	- Add "No Turn on Red" signs on Crestvue Manor Dr and Longuevue Dr. - Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).	- Upgrade pedestrian accommodations to be compliant with ADA standards - Install pedestrian refuge island, painted island, or flush median between Longuevue Drive and Woodhaven Drive. - Replace optically programmed heads. - Study consolidating Longuevue Dr and Woodhaven Dr approaches.
		Woodhaven Dr Longuevue Dr		Yes	1	2	0	15:19 Day	20101280	Pedestrian struck in crosswalk	Yes	Vehicle approached Washington Road from eastbound Longuevue Drive. The vehicle was inching into the intersection as the driver was looking to see if any traffic was approaching on southbound Washington Road in an attempt to make a right on red. The driver failed to see a pedestrian in the crosswalk, striking her. The pedestrian had a walk signal.	No	Ped		

TABLE 2
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Municipality of Mt. Lebanon, Allegheny County, Pennsylvania

Intersection					Crash Information				Accident Report			Summary			Corrective Actions	
No.	Primary Street	Side Street(s)	Address	Crossing Guard?	Injured	Units	Killed	Time	Report No.	Violation	Reportable	Description	Ped at Fault?	Type	Short-Term Mitigation	Long-Term Mitigation
6	Washington Rd	Cochran Rd		No	1	2	0	20:42 Night	20100440	Obedience of pedestrian in crosswalk	Yes	Vehicle was traveling northbound on Washington Road and made a left turn onto Cochran Road, striking a pedestrian in the west side crosswalk. The pedestrian entered the crosswalk during a "Don't Walk" phase, the signal was green.	Yes	Ped	- Add R10-2 (Cross on Walk Symbol Only) signs at all push button locations at the intersection. - Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane). - Add a “Do Not Enter” sign to supplement the existing signage to prevent vehicles from exiting from the church entrance. - Trim vegetation to improve visibility of sight lines, signs, and pedestrian signals. - Adjust the mounting of the pedestrian signal on the southeast side so it is not obstructed by its support pole. - Stagger the Cochran Road stop bars so the right lane stop bar is closer to the crosswalk and the left lane stop bar is further back. Add R10-6-1 and R10-6AR "Left Lane Stop Here on Red" signs. - Place “No Turn on Red” signs closer to the signal heads.	- Upgrade pedestrian accommodations to be compliant with ADA standards. This includes adding new push button locations near each crosswalk. This recommendation also includes adding APS (Accessible Pedestrian Signals), so pedestrians know when they have activated the push button. - Replace the span wires with mast arms. - Install a luminaire to light the northern crosswalk across Cochran Road.
		Cochran Rd		No	1	2	0	21:10 Night	20111170	Obedience of pedestrian in crosswalk	Yes	Vehicle heading northbound on Washington Road made a left turn to head west on Cochran Road, striking a pedestrian crossing Cochran Road. The pedestrian entered during "Don't Walk" phase, the signal was green.	Yes	Ped		
		Cochran Rd		No	1	2	0	20:22 Night	20110264	Obedience of pedestrian in crosswalk	Yes	Vehicle heading northbound on Washington Road made a left turn to head west on Cochran Road, striking a pedestrian crossing Cochran Road. The pedestrian entered during "Don't Walk" phase, the signal was green.	Yes	Ped		
7	Cochran Rd	Cedar Blvd		No	1	2	0	17:16 Night	20082051	Pedestrian struck in crosswalk	Yes	Vehicle heading southbound on Cochran Road made a right turn onto Cedar Blvd to head west, striking a pedestrian in the crosswalk crossing Cedar Blvd. The driver of the vehicle was elderly.	No	Ped	- Remove the bus stop on the westbound Cedar Boulevard approach. The sign lists the 36A and 41C routes, which appear to have been discontinued. Also remove the 36A Bus Stop south of the intersection. - Remove school sign from the intersection and replace at a more appropriate location. Replace with a Pub. 236 compliant sign. - Trim vegetation and clear brush at intersection. Some signs along northbound Cochran Road are obscured. - Enlarge the southbound “No Turn on Red” sign. - Add near-side “No Turn on Red” on southbound Cochran Road. - Replace catch basin grates to a bicycle friendly design. - Add signs to the left and right of the service station exit instructing drivers to look for pedestrians. Add R10-15 L and R (Turning Traffic Must Yield to Pedestrians (Left) and (Right)) signs. - Increase enforcement to catch red light runners. - Repaint crosswalks and add diagonal markings. - Adjust controller so the advance pedestrian interval is working on the south side of the intersection across Cochran Road. - Install additional “No Parking” signs along the westbound Cedar Boulevard approach to define the eastern limit of the no parking area. - Replace the southbound Cochran Road overhead lane use control signs with ones that accurately match the intersection geometry. - Adjust the spacing of far side signals for the eastbound Cedar Boulevard approach so they do not obstruct visibility of the westbound signals. - Replace the “No Turn on Red” signs with larger versions. - Move the Cochran Road southbound right lane stop bar closer to the crosswalk. - Remove double yellow lines beyond stop bars. The lines should be dotted. - Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).	- Upgrade pedestrian accommodations to be compliant with ADA standards. This includes maintaining a 4-foot wide path clear of obstructions on sidewalks. Increase Flashing Don’t Walk times based on a walking speed of 3.5 feet per second. - Replace the mountable curb with barrier curb. - Move the west side Cochran Road crosswalk across Cedar Boulevard closer to Cochran Road. Angle the crosswalk to maximize visibility for right turning vehicles. Adjust push button locations and pedestrian signals accordingly. - Move the south side crosswalk across Cochran Road closer to the intersection to increase pedestrian visibility. - Reconfigure service station exit. Narrow the exit to give cars a clear crossing point.
		Cedar Blvd		No	4	3	0	16:18 Day	20081694	Careless driving, improperly maintained vehicle.	Yes	Vehicle heading north on Cochran Rd had problems with its alignment and bald tires. The vehicle drifted to the right in the intersection with Cedar Blvd, striking the curb at the northeast quadrant. The vehicle then struck two pedestrians on the sidewalk and then a utility pole.	No	Ped		
		Cedar Blvd	300	No	1	2	0	15:15 Day	20070026	Pedestrians crossing at other than intersection	Yes	Pedestrian exited car stopped in the queue for the signal in the left lane of eastbound Cedar Blvd. The pedestrian crossed between cars in the queue and was struck by a vehicle heading westbound on Cedar Blvd.	Yes	Ped		
		Cedar Blvd	300	No	0	2	0	9:00 Day	20101751	Pedestrian struck in crosswalk	No	Pedestrian struck in crosswalk.	Unk.	Ped		
		Cedar Blvd		No	1	2	0	9:32 Day	20101331	Pedestrian struck on sidewalk	Yes	Vehicle making a right turn out of the driveway of 301 Cochran Rd (Mt. Lebanon Auto) to head south along Cochran Rd into the intersection struck a pedestrian on sidewalk.	No	Ped		

TABLE 2
ROAD SAFETY AUDIT STUDY INTERSECTION MITIGATION
Mt. Lebanon Municipal Comprehensive Plan Update, Elevating Connectivity for Pedestrians and Cyclists
Municipality of Mt. Lebanon, Allegheny County, Pennsylvania

Intersection					Crash Information				Accident Report			Summary			Corrective Actions	
No.	Primary Street	Side Street(s)	Address	Crossing Guard?	Injured	Units	Killed	Time	Report No.	Violation	Reportable	Description	Ped at Fault?	Type	Short-Term Mitigation	Long-Term Mitigation
8	Cochran Rd	Altoona Pl		No	1	2	0	10:22 Day	20081994	Pedestrian struck in crosswalk	Yes	Vehicle travelling southbound on Cochran Road made a left turn to Altoona Pl, striking the pedestrian crossing Altoona Pl.	No	Ped	- Repaint crosswalks. - Move lane use control signs away from stop bars, or only have one sign per approach. - Repaint roadway markings to elongate the Cochran Road southbound left turn lane. - Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane). - Adjust the angle of the pedestrian signal head to improve visibility for the northbound Altoona Place crossing along the east side of Cochran Road.	- Replace deteriorated sidewalks and repave crosswalks. - Upgrade pedestrian accommodations to be compliant with ADA standards. This includes adjusting the crosswalk location so it does not cross the metal manhole cover, or applying anti-slip material to the manhole cover. - Work with the property owner to modify the parking lot in the northeast corner (Mt. Lebanon Vision Center / Hometown Mail) to reduce conflict points to the sidewalk. This may include changing the parking layout or requiring back-in parking. - Replace mountable curb with barrier curb. - Investigate adding protected left turn arrows to reduce conflicts.
		Altoona Pl		No	1	2	0	6:30 Night	20070528	Pedestrian struck in crosswalk, distracted	Yes	Driver dialing cell phone heading westbound on Altoona Pl made right turn on red to Cochran Rd northbound, striking pedestrian in crosswalk crossing Altoona Pl.	No	Ped		
		Altoona Pl		No	1	2	0	11:06 Day	20100439	Pedestrian struck in crosswalk	Yes	Vehicle turning left from westbound Altoona Pl to southbound Cochran Rd was struck in the crosswalk crossing Cochran Rd.	No	Ped		
		Altoona Pl		No	1	2	0	7:35 Dawn	20101022	Pedestrian struck in crosswalk	No (Victim advised to file report)	Vehicle stopped on westbound Altoona Pl inched forward into the intersection, bumping a pedestrian crossing Altoona Pl in the crosswalk. The vehicle proceeded to run the red light, driving straight through the intersection, continuing west on Altoona Pl.	No	Ped		
9	Cochran Rd	Bower Hill Rd		Yes	1	2	0	6:15 Night	20090129	Pedestrian walking on roadway	Yes	Vehicle heading westbound on Bower Hill Rd three houses west of Cochran Rd struck pedestrian walking westbound on the north side of Bower Hill Rd. The pedestrian was walking along the side of the road due to snow accumulation on the sidewalk was struck from behind by a vehicle's mirror. The incident occurred during snowy conditions.	Yes	Ped	- Replace intersection lane use control signing. Add "Left Lane Must Turn Left" signs along the eastbound Bower Hill Approach. Add or maintain lane use control signs with a left arrow and a shared through / right arrow on all other approaches. Remove non-conforming signs. - Add diagonal markings in crosswalks. - Trim trees and other vegetation to improve the visibility sight lines and of signage, especially along eastbound Bower Hill Road. - Coordinate with the property owner of the apartment building south of the intersection along Cochran Road to direct vehicles to the parking lot for loading and unloading. Place no stopping or standing signs where needed in front of the apartment building. - Replace the End Speed Limit 35 mph sign on the Bower Hill Road eastbound intersection approach with a Begin Speed Limit 25 mph sign. - Replace faded overhead lane use control signs over the Bower Hill Road eastbound approach. - Add bicycle signage and pavement markings, such as R4-11, (Bicycles May Use Full Lane).	- Upgrade pedestrian accommodations to be compliant with ADA standards. - Add countdown pedestrian signals. - Examine changing the phasing to consist of lagging left arrows to allow for a pedestrian advance phase. - Extend the left turn bay along westbound Bower Hill Road. - Coordinate with the apartment building owner south of the intersection to create a dedicated pull off for vehicles.
	Cochran Rd	Bower Hill Rd		Yes	1	2	0	6:36 Night	20112011	Pedestrian struck in crosswalk	Yes	Vehicle making a left turn from eastbound Bower Hill Rd to northbound Cochran Rd struck a pedestrian crossing Cochran Road in the crosswalk. Pedestrian wearing dark colors during the pre-dawn hours.	No	Ped		
10	Cochran Rd	Scrubgrass Rd		No	1	2	0	11:20 Day	20120085	Pedestrian struck in unmarked crosswalk	Yes	Pedestrian along the west side of Cochran Road was crossing Scrubgrass Road in an unmarked crosswalk. The pedestrian was struck by a vehicle turning from Scrubgrass Road onto Cochran Road.	No	Ped	- Add R10-15R (Turning Traffic Must Yield to Pedestrians (Right)) sign on the Scrubgrass Road approach. - Paint a crosswalk across Scrubgrass Road with diagonal pavement markings. - Paint a stop bar and adjust the location of the stop sign on Scrubgrass Road. - Trim trees to improve the visibility of sight lines and of signage. - Narrow the Scrubgrass Road approach lane with pavement markings, so vehicles exiting Scrubgrass Road have a single lane approach, so southbound vehicles making a sharp right turn onto Scrubgrass Road have more room to maneuver. - Install W11-2 and W16-9P (Pedestrian Ahead) signs along Scrubgrass Road.	- Upgrade pedestrian accommodations to be compliant with ADA standards. This involves replacing the curb ramps.
	Cochran Rd	Scrubgrass Rd		No	0	2	0	7:20 Night	20120106	Pedestrian struck in unmarked crosswalk	No	Pedestrian along the west side of Cochran Road crossed Scrubgrass Road in front of a vehicle stopped at the stop sign. The driver did not notice the pedestrian, bumping the pedestrian when turning right to southbound Cochran Rd. The vehicle proceeded to make a left to Arden Rd.	No	Ped		