# Downtown Appleton Mobility Plan – DRAFT

August 2016

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# Introduction

City centers across the nation are experiencing revival and renaissance. Demographic and market studies consistently show that in a 21st century economy, people want livable, walkable neighborhoods.   A combination of transportation strategies is needed to accommodate these shifting attitudes.

## Study Area

The study area is bound by the following streets:

- WIS 47 (Richmond Street / Memorial Drive) to the west
- Atlantic Street to the north
- Lawe Street to the east
- Fox River to the south

This area is approximately 0.92 miles wide and 0.7. miles high, resulting in an overall study area of approximately 0.64 square miles.  For a larger map of the study area, see Exhibit 1.

## Purpose of the Study

The purpose of the Downtown Appleton Mobility Study is to determine and evaluate strategies that would improve multi-modal mobility and traffic circulation in downtown Appleton.  The study included an evaluation and analysis of existing and projected conditions, an evaluation of alternative transportation modes (bicycle, pedestrian) and recommendations for future projects.

The results of the study, documented in this Mobility Plan, are intended to set the stage for reconfiguring the transportation network in downtown Appleton.  The proposed transportation network provides convenient access to valuable community resources such as employment centers, parks, the Fox River, cultural and entertainment attractions and civic uses.  A well-designed multi-modal transportation network supports community health and well-being and promotes a strong economy.

Mobility is about more than just vehicular traffic. One-third of the population does not drive.

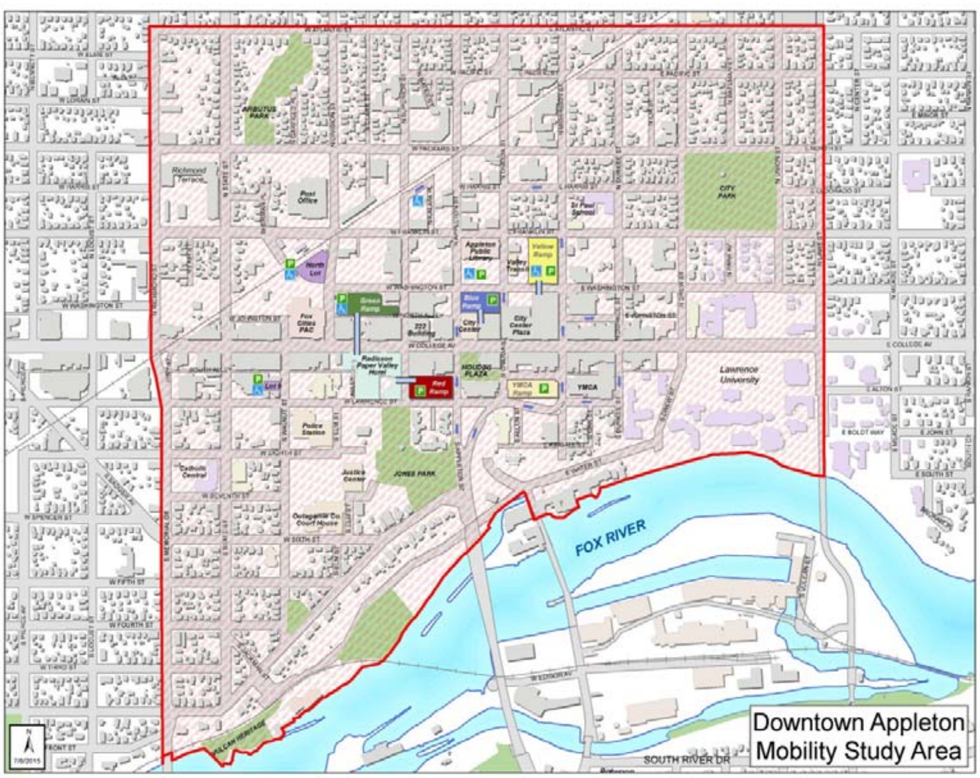


**Figure 1:  Study Area**

# Existing Conditions

Traffic flows well through downtown Appleton, even during peak hours. The study area is also already generally a pleasant place to bike and walk.

## Vehicles

Traffic operations were analyzed for existing conditions (2015) and projected year 2036 no-build conditions. The 2036 no-build analysis looks at traffic operations in 2036 with no changes to the transportation system other than signal timing improvements.

### *Average Daily Traffic*

Average Annual Daily Traffic (AADT) data was provided by the City of Appleton. The data included AADT counts from 2010 – 2015 along major routes within the study limits. Additional AADT data available from the Wisconsin Department of Transportation (WisDOT) for major routes (College Avenue, Richmond Street, etc.) in the study area was also referenced. See Exhibit 2 for a map of AADT in the study area.

### *Intersection Turning Movement Counts*

The City of Appleton provided turning movement counts for six intersections in the study area. To supplement this data, turning movement traffic counts were conducted in November and December 2015. The counts were completed for the PM peak period from 3-6 PM. The PM peak hour was determined to be the controlling period for traffic operations by city staff. For a list of all intersections where traffic counts were conducted, see Appendix A.

### *Traffic Forecasting*

The 2036 traffic forecasts were based on the AADT and intersection turning movement count data described previously. This information was provided to the East Central Wisconsin Regional Planning Commission (ECWRPC). ECWRPC used the regional travel demand model to predict future traffic growth. For additional information on the traffic forecasting process, see Appendix B.

### *Traffic Operations*

Traffic operations for existing conditions and 2036 future conditions were analyzed using the Highway Capacity Manual (HCM) method in Synchro traffic modeling software for all stop-controlled intersections and Synchro methodology for all signalized intersections. The intersection Level of Service (LOS) of all analyzed intersections can be seen on Exhibit 3. If any specific movement at any of the intersections operates at LOS E or worse, it is noted on the exhibit. Traffic modeling results for the existing conditions analysis and 2036 no-build analysis can be found in Appendix C.

LOS is based on the average control delay per vehicle. Control delay is the increased time of travel for a vehicle approaching and passing through a controlled intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection. This delay is made up of a number of factors that relate to control, geometrics, and traffic flow. LOS is an indicator of driver discomfort, frustration, fuel consumption, and increased travel time.

Traffic congestion is minimal in downtown Appleton. Vehicles typically experience less than 20 seconds of delay at the majority of intersections during the PM peak hour.

LOS is assigned a letter “grade” from A through F. LOS A indicates operations with very low control delay while LOS F describes operations with extremely high average control delay. The LOS criteria for stop controlled (unsignalized) intersections is shown in Table 1 and the LOS for signalized intersections is shown in Table 2.

**Table 1: Unsignalized Intersection Level of Service Criteria**

| Level of Service | Average Control Delay (sec/veh) |
|---|---|
| A | 0-10 |
| B | > 10 - 15 |
| C | > 15 - 25 |
| D | > 25 - 35 |
| E | > 35 - 50 |
| F | > 50 |

*Source: Highway Capacity Manual*

**Table 2: Signalized Intersection Level of Service Criteria**

| Level of Service | Average Control Delay (sec/veh) |
|---|---|
| A | 0-10 |
| B | > 10 - 20 |
| C | > 20 - 35 |
| D | > 35 - 55 |
| E | > 55 - 80 |
| F | > 80 |

*Source: Highway Capacity Manual*

## Pedestrians

### Every trip begins and ends with walking.

To reach your vehicle, bike, or transit stop, one must walk. Pedestrian comfort and safety is critical to achieving a balanced, multi-modal transportation system.

The majority of the streets within the study area include continuous sidewalks on both sides. See Exhibit 4 for a map showing gaps in the sidewalk system. Where sidewalks do exist, some are aging and are in need of maintenance and repair. For those in wheelchairs or pushing strollers, most intersections within the study area include curb ramps. However, many of the existing curb ramps do not meet the current requirements of the Americans with Disabilities Accessibility (ADA) Guidelines. For example, detectable warnings are not present at many intersections.

Portions of the study area have terraces between the sidewalk and the curb, often including mature street trees. These areas are the places where walking is the most pleasant. Pedestrians have physical separation from moving traffic and have the benefit of shade. In other parts of the study area, the sidewalk is immediately adjacent to the curb. This creates a less appealing walking environment, particularly on the streets with heavier traffic volumes, such as Richmond Street.

### The most significant pedestrian safety problems are at intersections.

With a nearly continuous sidewalk network, Downtown Appleton's most significant pedestrian safety problems are at intersections. Pedestrian crossings are most difficult on busier streets such as Richmond Street, particularly in locations where there are no traffic signals. In locations with more than one lane in the same direction, such as the midblock crosswalk located on Appleton Street between Lawrence Street and College Avenue, pedestrians are exposed to the multiple-threat condition. This is when a car in one lane stops for a pedestrian, and the vehicle in the adjacent lane does not stop. This is a high-risk condition for pedestrians, particularly if vehicles stop close to the pedestrian, blocking the traffic in the adjacent lane from the pedestrian's view.

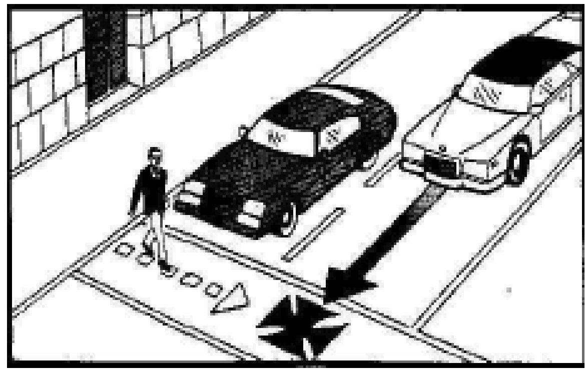

**Figure 2: Multiple Threat Condition**
A multiple-threat condition exists when a car in one lane stops for a pedestrian but a vehicle in the adjacent lane does not.

The study area has many unmarked crosswalks. Marked crosswalks are helpful in indicating preferred pedestrian crossing locations, to alert drivers to often-used pedestrian crossings, and to designate crosswalks on school walking routes. For the marked crosswalks that do exist, many are between six and ten feet in width. Wider crosswalks of ten to fifteen feet are more easily seen by drivers. Further, where marked crosswalks do exist, most consist of two parallel lines rather than high visibility crosswalks with transverse stripes, even in locations near schools where there is an increased need to draw driver's attention to the need to watch out for pedestrians.

The intersections of Lawrence and Morrison Streets and Lawrence and Oneida Streets have been observed to be problematic to pedestrians. Both are areas where there is high pedestrian demand and where the intersection geometry is complex.

There are also a number of existing plans and policies that address pedestrian and bicycle transportation in downtown Appleton. For a summary of these plans and their applicability to multi-modal mobility, see Appendix D.

## Bicycles

### Many streets in the study area are good for bicycling. However, they rarely have destinations people want to go to.

For the most part, downtown Appleton is a pleasant place to bike even though there are few designated bicycle facilities within the study area. See Exhibit 5 for a map of existing bicycle facilities in the study area. The street network is generally gridded, offering multiple route options. Major challenges in the study area include:

- College Avenue, where many destinations are located, is suitable only for enthused and confident bicyclists.

- Bicyclists are frequently observed riding on sidewalks in the study area, even when it is not allowed (College Avenue).
- Connections to the Fox River are lacking.
- There are few bicycle parking racks in the study area.

A Level of Traffic Stress analysis was performed to categorize study area streets based on how attractive they were to different categories of bicycle riders. A summary of this analysis can be found in Appendix E. The majority of the streets within the study area are comfortable for biking. While these streets do not contain many of the destinations people bike to, they do contain schools and homes. Efforts to make Appleton more bikeable will be made easier by the large number of streets already suited for most bicyclists.

# Safety

Crash data for the five year period from 2010 through 2014 was reviewed to determine locations where vehicle, pedestrian or bicycle crashes occurred in downtown Appleton. Data was obtained from the Wisconsin Traffic Operations and Safety (TOPS) Laboratory.

## *Vehicles*

Crash diagrams (see Appendix F) were prepared if an intersection had more than 20 crashes in the five year analysis period or if the intersection crash rate was greater than 1.0 crash per million entering vehicles. The following four intersections met these criteria:

- College Avenue and Appleton Street
- College Avenue and Drew Street
- Franklin Street and Superior Street
- Franklin Street and Morrison Street

## *Bicycles and Pedestrians*

There were 70 pedestrian and bicycle crashes in downtown Appleton between 2010 and 2014. See Appendix F for more information. The following trends were noted:

- The intersection of College Avenue and Richmond Street has the highest number of crashes for both bicyclists and pedestrians.
- There were many pedestrian and bicycle crashes on College Avenue.
- Drew Street was the location of several bicycle and pedestrian crashes.
- The intersection of Richmond Street and Franklin Street was the location of several bicycle crashes.
- There was roughly the same number of bicycle and pedestrian crashes in the study area between 2010 and 2014.

# Issues

## The main issue in the study area is confusing northbound routing.

Identifying mobility issues in the study area was one of the first steps in the study. The issues identified and described below form the basis for the need for the study. The identification of issues was a joint effort between the study team, city staff, stakeholders and the public.

## Northbound Routing

The existing northbound route through downtown Appleton requires misdirection for motorists and can be confusing. See Exhibit 6 for a map of the existing northbound route. In 1987, The City Center Plaza (originally the Avenue Mall) opened in downtown Appleton on the north side of College Avenue between Appleton Street and Morrison Street. Construction of the mall effectively severed a piece of the grid roadway network in downtown Appleton by removing a one-block portion of Oneida Street between College Avenue and Washington Street. Instead of a grid of two-way streets, northbound and southbound traffic through the middle of downtown Appleton was re-routed onto one-way streets.


**Figure 3: Northbound Route**
The route northbound traffic coming from the Oneida Street bridge takes to / through downtown Appleton is indirect and confusing.

Northbound traffic experienced the greatest traffic disruption. One of the main routes into downtown Appleton from the south is via the Oneida Skyline bridge over the Fox River. Currently, drivers proceed over the bridge and are then routed east along Lawrence Street before turning north along Morrison Street. North of College Avenue, the routing becomes more confusing. In the past, a splitter island at the Morrison Street and Harris Street intersection directed traffic west on Harris Street and then north on Oneida Street out of the downtown area. The splitter island was removed several years ago and traffic now follows whichever route it chooses, though Harris Street is still the marked route. This is confusing to drivers and leads traffic through residential neighborhoods north of downtown.

Southbound traffic follows Appleton Street through the downtown area. North of downtown, southbound traffic generally approaches from Oneida Street and is then redirected to Appleton Street just north of Pacific Street. Appleton Street transitions to a one-way street south of Washington Street.

### Confusing Intersections

Several intersections in the downtown area were identified by city staff as confusing and/or unconventional.

## Six of the seven intersections identified as confusing intersections are located on the city's one-way northbound route.

Field reviews of each intersection were completed and vehicular, bicycle and pedestrian issues were noted. The unconventional intersections include:

1. Oneida Street and Lawrence Street
2. Morrison Street and Lawrence Street
3. Morrison Street and Harris Street
4. Oneida Street and Harris Street
5. Oneida Street and North Street
6. Oneida Street and Pacific Street
7. State Street and Jackman Street

Details on each intersection can be found in Appendix G.


**Figure 4: Oneida Street and Lawrence Street Intersection**
The Oneida Street and Lawrence Street intersection is one of the most confusing in downtown Appleton.

## Railroad Crossings

As part of an agreement with Canadian National Railroad, the City must close one public at-grade railroad crossing somewhere within the city limits. Through a separate study, the City has identified two potential at-grade crossings located in the downtown study area which are being considered for closure. The crossing locations, which are described in more detail in Appendix H, are located at Oneida Street and Morrison Street.


**Figure 5: Oneida Street Railroad Crossing**


**Figure 6: Morrison Street Railroad Crossing**

## Truck Routing

Existing truck routes through the downtown area are shown on Exhibit 7. Contrary to driver expectancy, the signed truck routes do not take drivers down College Avenue, instead redirecting eastbound/westbound traffic to Lawrence Street and Washington Street. Northbound and southbound routing is also confusing with truck routes that abruptly end and no truck route entering or exiting the downtown area to the north.

## Loading Zones

The location and availability of loading zones is a very important issue to business owners in the downtown area. The marked loading zones noted on Exhibit 7 were noted during a December 2015 field review.

## Abundance of On-street Parking

A Downtown Parking Study was completed by Walker Parking Consultants in February 2015. The plan analyzed existing parking conditions and proposed recommendations for changing parking facilities and policy in the future. The Blue Ramp (City Center ramp) will be removed from service within 5 years. The Soldier Square Ramp, operated by the YMCA and not city owned, is nearing the end of its useful life.

Current weekday peak parking conditions at 11 AM are 65% occupancy. Weekday evening parking conditions at 7 PM are 33% occupancy. On-street occupancy was measured at 42%. The study projects future parking supply given a variety of scenarios.

In each scenario, even with a new expo center, new library and other organic growth, an oversupply of parking is projected.

This oversupply also assumes closure of the Blue Ramp and the Soldier Square/YMCA ramp.

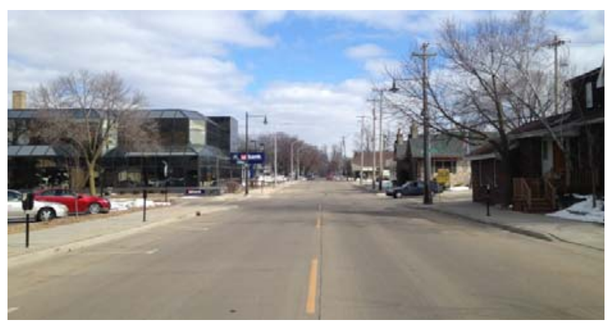

**Figure 7: Washington Street Parking**
Unoccupied on-street parking on Washington Street on a Saturday afternoon.

The parking oversupply is relevant to the mobility study for the following reasons:

- In order to provide bicycle facilities on some downtown streets, it may be necessary to reconfigure on-street parking in select locations. The oversupply of parking indicates that this is feasible from a parking utilization perspective.
- In order to encourage use of municipal and private parking ramps, it is necessary to have good pedestrian connections from those ramps to destinations throughout downtown. Parking in a ramp and walking a few blocks to a nearby destination should not be a significant inconvenience for users.

## Unwarranted Traffic Signals

There are two traffic signals in the study area that do not meet traffic signal warrants.

There is not enough vehicular traffic or pedestrians passing through the intersection to justify the traffic signal from an engineering perspective.

The signals are located at the following intersections:

- Franklin Street and Superior Street
- Franklin Street and Oneida Street

See Appendix I for more information.


**Figure 8: Franklin Street and Oneida Street Intersection**
The existing traffic signal at the Franklin Street and Oneida Street intersection is not warranted.

## Low Levels of Traffic Congestion

Most communities would consider low levels of traffic congestion to be a positive attribute. While this is true, very low levels of traffic congestion in a downtown area can also be an indicator of a lower level of economic activity. Existing traffic congestion in downtown Appleton, especially off College Avenue, is low and is predicted to remain that way through 2036 under the no-build scenario.

A well designed transportation system is needed to shape transportation demand and serve the economic future.

## Access to the Fox River

One of the major challenges in downtown Appleton for vehicles, pedestrians and bicyclists is connecting to the Fox River. Close to the river, the streets stray from the grid pattern characteristic of most of the study area. In part due to topography challenges, relatively few streets connect to the river. Pedestrian desire lines have been trampled into the ground in some locations, indicating demand for more connections to the water. Vehicular access to the river is limited to Water Street which can only be accessed from two points in the downtown area – Drew Street and Jackman Street.


**Figure 9: Pedestrian Trail to Water Street**
A pedestrian trail trampled in the grass. The trail leads from the Water Street and Old Oneida Street intersection up the bluff.

## Crosswalks

Downtown Appleton's most significant pedestrian safety problems are at intersections. The study area has many unmarked crosswalks. Marked crosswalks are helpful in indicating preferred pedestrian crossing locations, to alert drivers to often-used pedestrian crossings, and to designate crosswalks on school walking routes. Where marked crosswalks do exist, many are between six and ten feet in width; wider crosswalks of ten to fifteen feet are generally preferred as they are more easily seen by drivers. Further, where marked crosswalks do exist, most consist of two parallel lines rather than high visibility crosswalks with transverse stripes, even in locations near schools where there is an increased need to draw driver's attention to the need to watch out for pedestrians. While marked crosswalks are not necessary everywhere, crosswalk markings and the type of markings used should be carefully near schools, parks, and location where moderate numbers of pedestrians are expected.

**Figure 10: Downtown Area Crosswalk**
Crosswalks in the downtown area lack visibility.

## Bicycle Access to Destinations

Although the majority of the streets in the study area are already comfortable for biking, there are rarely destinations on these streets that people want to get to.  In the study area, a large majority of the destinations are on College Avenue.  Biking is not allowed on College Avenue sidewalks.  This fact, combined with the lack of designated bicycle facilities, amount of traffic on College Avenue, and frequent parking turnover make biking on this road undesirable for most cyclists.

## Bicycle Parking

One of the most common obstacles for people using their bicycles is the lack of secure bicycle parking facilities when they arrive at their destination.  Providing bicycle parking encourages people to use their bicycles and also benefits non-cyclists because bicycles are less likely to be locked to trees, benches, light posts and railings.  This can cause damage to the street furniture and can result in bicycles blocking the sidewalk.

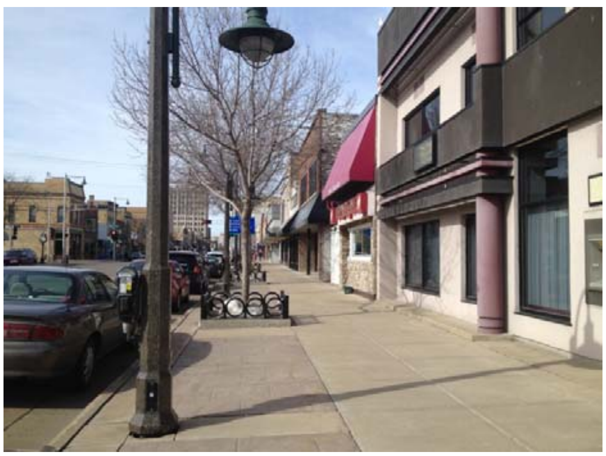

**Figure 11:  College Avenue Terrace**
Bicycle parking is scarce in the study area, especially on College Avenue where there are many destinations.

# Alternatives Considered

All alternatives seek to address the issues identified in the "Issues" section.

## Traffic

Three alternatives were considered to improve traffic operations in downtown Appleton. These alternatives are described in more detail below. A fourth concept, which included a set of one-way pairs using Appleton Street and Oneida Street, was not studied because it necessitated removing a portion of the City Center Plaza and reconnecting Oneida Street. Studying the feasibility of this alternative from a structural standpoint was not supported by the Municipal Services Committee and therefore this concept was not studied.

Bicycle and pedestrian alternatives are described in detail following the description of traffic alternatives.

### Alternative 1: Maintain Northbound Routing

Alternative 1 does not include any changes to northbound routing through downtown Appleton. Traffic entering the study area from the Oneida Street bridge would continue to follow one-way Lawrence Street to Morrison Street. There would be no major changes to the confusing intersections identified along the current northbound route.

This alternative would include the following changes:

- Removal of the traffic signals at the Franklin Street and Superior Street and Franklin Street and Oneida Street intersections. Both intersections would be replaced with two-way stop control on the Superior Street and Oneida Street.
- Updated signal timing at all intersections in the study area to reduce delay.
- Designating College Avenue as a truck route in the study area.

This alternative would provide minimal traffic benefits to downtown Appleton.

### Alternative 2: Two-way Appleton Street

Alternative 2 would convert Appleton Street to two-way traffic throughout the study area and make it the main north/south route into and through downtown.

This alternative would include the following changes:

- Converting the following one-way streets to two-way traffic :
  - Appleton Street between Prospect Avenue and Washington Street
  - Lawrence Street between Appleton Street and Durkee Street

**Figure 12: Two-way Appleton Street**
This rendering depicts the 100 block of Appleton Street between College Avenue and Lawrence Street (looking south towards Lawrence Street) after conversion from one-way southbound traffic to two-way traffic.

- Morrison Street between Lawrence Street and Harris Street
- Harris Street between Oneida Street and Morrison Street
- Durkee Street between Lawrence Street and College Avenue

- Reconstructing the northbound Oneida Street bridge over Jones Park to realign the roadway toward Appleton Street.
- Removing the curved portion of Oneida Street between Prospect Avenue Lawrence Street.
- Removing Allen Street and extending Oneida Street south of Lawrence Street. The land south of Lawrence Street in this area is referred to as the bluff site and has redevelopment potential.
- Designating Appleton Street as the main north/south route to/through downtown
- Removal of the traffic signals at the Franklin Street and Superior Street and Franklin Street and Oneida Street intersections. Both intersections would be replaced with two-way stop control on Superior Street and Oneida Street.
- Removal of the traffic signal at Lawrence Street and Oneida Street. The intersection would be converted to two-way stop control on Oneida Street.
- Removal of the traffic signal at Lawrence Street and Morrison Street. The intersection would be converted to four-way stop control. Four-way stop control is recommended to improve pedestrian safety as this intersection is adjacent to the YMCA.
- Updated signal timing at all intersections in the study area to reduce delay.
- Designating College Avenue as a truck route in the study area.
- Converting the Harris Street and Morrison Street intersection from four-way stop to two-way stop on Harris Street.
- Converting the Harris Street and Oneida Street intersection from three-way stop to two-way stop on Harris Street and reconstructing the southeast quadrant of the intersection to remove the diverter.

This alternative addresses confusing northbound routing and the intersections associated with it. However, it would also increase traffic congestion on Appleton Street and streets that intersect Appleton Street. On-street parking would also be removed on several streets to accommodate bicycle facilities. Consultant staff completed a PM peak hour traffic analysis and sensitivity analysis and City staff completed an AM peak hour traffic analysis and sensitivity analysis. For more details on the PM peak hour traffic analysis performed, see Appendix J.

### Alternative 3: College Avenue Road Diet

A road diet typically involves converting an existing 4-lane, undivided roadway to a 3-lane segment consisting of two through lanes and a center, two-way left turn lane. This configuration, along with bicycle lanes and parking on both sides of the street, is proposed for Alternative 3. Road diets are known to reduce crashes (improve safety) and improve mobility and access for all road users. Road diets are also relatively low cost as they typically do not involve complete roadway reconstruction.

This alternative would not make any changes to northbound routing through downtown Appleton. Traffic entering the study area from the Oneida Street bridge would continue to follow one-way Lawrence Street to Morrison Street. There would be no major changes to the confusing intersections identified along the current northbound route.

The traffic analysis completed for the study showed that a road diet on College Avenue resulted in too much congestion on the roadway, even if Appleton Street was still one-way southbound. Significant queuing occurred at the signalized intersections along College Avenue resulting in very high LOS and near-gridlock conditions during the PM peak hour.

The College Avenue Road Diet alternative was dropped from further consideration due to unacceptable traffic operations on College Avenue.

See Appendix K for more information on the traffic analysis.

**Figure 13: College Avenue Road Diet**
A road diet on College Avenue would reduce the number of through lanes in each direction to provide room for a center two-way left turn lane and bike lanes.

# Pedestrian Facilities

This section provides a brief overview of pedestrian facilities and treatments considered for downtown Appleton.

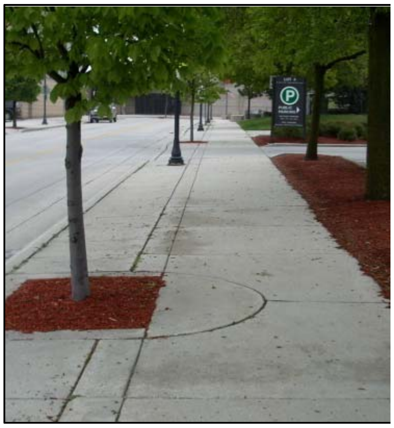

**Figure 14: Sidewalk**
A sidewalk is a dedicated space for pedestrians adjacent to a street. Most streets in Downtown Appleton have sidewalks. A 5-foot sidewalk is typical in residential neighborhoods; in commercial areas, sidewalks can be much wider than 5 feet to accommodate additional pedestrian traffic and street furniture.


**Figure 15: Slow Street**
Slow streets are designed for very low speed use by giving pedestrians and bicyclists priority while limiting motor vehicle speeds. Slow streets are known by a variety of names including play streets, low speed streets, and "woonerfs" after their Dutch name. The streets are generally at sidewalk level, without curbs. Motor vehicles are allowed to use the street to gain access to homes, businesses, or parking, but at very low speeds. Often the street is designed with chicanes or street furniture that forces vehicles to meander and move at a very slow pace. Many European countries have turned other lower volume residential streets into slower streets using a variety of treatments.


**Figure 16: Raised Intersection**
Raised intersections elevate an entire intersection to the level of the curb and sidewalk, essentially creating a large speed table. Like raised crosswalks, raised intersections crosswalks encourage motorists to yield to pedestrians because the raised intersection increases pedestrian visibility and forces motorists to slow down before going over the speed table. The crosswalks on each approach to a raised intersection are also elevated to enable pedestrians to cross the road at the same level as the sidewalk, eliminating the need for curb ramps. Raised intersections may use standard paving materials such as concrete or asphalt, or may use materials such as brick or other pavers to further differentiate the space.

**Figure 17: Crosswalk: Marked**
Marked crosswalks emphasize and designate the part of an intersection where drivers can expect pedestrians to cross. They also define the pedestrian crossing area where they otherwise would not exist such as a mid-block crossing. Motorists must always yield the right of way to pedestrians in any crosswalk except at a signalized intersection where pedestrians follow the appropriate signal. Crosswalks may be marked with two parallel lines ("standard") or with wide bars that run in the direction of traffic ("continental," shown here). Continental crosswalks are more visible to motorists than standard crosswalks.

**Figure 18: Crosswalk: Unmarked**
In Wisconsin, unmarked crosswalks are the continuation from a sidewalk on one side of the street to the other side of the street. Motorist must always yield the right of way to pedestrians in any unmarked or marked crosswalk except at a signalized intersection where pedestrians follow the appropriate signal.

**Figure 19: Pedestrian Hybrid Beacon ("HAWK")**
A pedestrian hybrid beacon is an overhead warning device, used at locations that are unusually hazardous or where pedestrians or bicyclists should be expected to cross throughout the day or where pedestrian crossing activity would not be readily apparent. The beacon is dark until activated by a pedestrian or bicyclist. When activated, the beacon displays a yellow signal followed by a red signal to drivers and a "walk" signal to pedestrians. Criteria for installation are available in the MUTCD.

**Figure 20: Rectangular Rapid Flashing Beacons (RRFBs)**
Rectangular Rapid Flashing Beacons (RRFBs) are attached to pedestrian crossing warning signs (mounted street-side as shown), or are overhead, and are pedestrian activated or automated by sensors. The beacon remains dark until activated by a pedestrian; when activated, the beacon flashes yellow strobe lights to indicate to drivers that a pedestrian is present and they should yield to the pedestrian.

**Figure 21: Median Refuge Island**
A median refuge island is a protected area in the center of a street that allows pedestrians to cross one direction of traffic at a time. This makes finding gaps in traffic easier on busy two-way streets.

**Figure 22: Pedestrian Bump-out / Curb Extension**
Curb extensions reduce the effective street crossing distance for pedestrians by narrowing the streets. They also have a minor impact on reducing traffic speeds by narrowing the street. Curb extensions can also provide space for bicycle racks, benches, or other amenities.

**Figure 23: Raised Crosswalk**
Raised crosswalks are elevated from the street level, typically to the level of the curb and sidewalk. Raised crosswalks are essentially speed tables with a flat top that is wide enough for a crosswalk. Raised crosswalks encourage motorists to yield to pedestrians because the raised crosswalk increases pedestrian visibility and forces motorists to slow down before going over the speed table. Raised crosswalks may eliminate the need for pedestrian ramps at intersections. Street drainage must be carefully considered when retrofitting raised crosswalks.

**Figure 24: Wayfinding Signs**
Wayfinding signs and maps can help pedestrians navigate areas with lots of major activity centers. Wayfinding signs can be placed at key intersections and decision points.

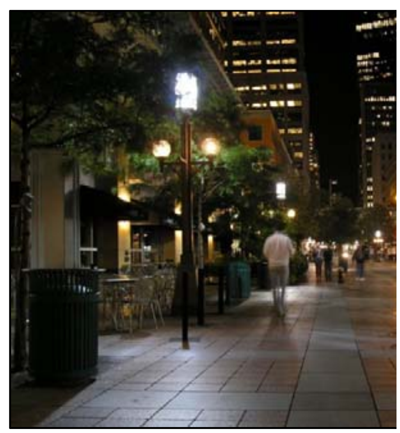

**Figure 25: Pedestrian Lighting**
Standard street lights often do not provide adequate lighting of pedestrian areas including sidewalks. In areas with significant pedestrian use, anticipated pedestrian use, or concerns about safety, pedestrian-scale lighting should be installed. Pedestrian-scale lighting focuses light on pedestrian areas including sidewalks and shared use paths, often using light fixtures that are lower to the ground than traditional street lights. Pedestrian-scale lighting often uses decorative poles that can enhance the aesthetics of a street, or provide a historic appearance in historic areas.

Photo source: NACTO

**Figure 26: Street Furniture and Amenities**
Street furniture such as benches or other seating platforms should be considered in areas of high pedestrian activity, or where such activity is desirable. Providing spaces for pedestrians to gather and socialize can add significantly to the appeal and vitality of a streetscape. In addition to benches, items including water fountains, trash and recycling receptacles and public art should be considered.

The study area includes numerous land uses: residential streets, commercial and retail areas, and Lawrence University. Pedestrian access is critical in all of these areas to allow people access to businesses and homes, to transit, and to provide transportation and recreation options. In general, downtown Appleton has a complete pedestrian network. However, there are gaps in the pedestrian system, and areas in which pedestrian accommodations could be enhanced.

## Bicycle Facilities

This section provides a brief overview of bicycle facilities and treatments considered for downtown Appleton.

**Figure 27: Bike Lane – Standard**
Standard bike lanes are signed and marked with pavement markings to designate space for bicyclists outside of the travel lanes to minimize conflicts on busier streets. Bike lanes typically operate in the same direction as motor vehicle traffic. Bike lanes are best suited for two-way arterial and collector streets where there is enough width to accommodate a bike lane in both directions. On one-way streets, they may be located on either the right or the left side of the roadway.
**Preferred Width:** 5 feet plus gutter pan; 6 feet with integral curb and gutter; 6+ feet next to parking
**Minimum Width**: 4 feet plus gutter pan; 5 feet with integral curb and gutter; 5+ feet next to parking

**Figure 28: Bike Lane – Buffered**
Buffered bike lanes are standard bike lanes that include a painted buffer on one or both sides of the bike lane. This buffer provides increased separation between a bike lane and a motor vehicle travel lane or a parking lane. A typical bike lane and buffer combination is a 5 foot bike lane and a 2-3 foot buffer. A buffer next to travel lane ensures that motorists give bicyclists the minimum 3-feet clearance when passing. A buffer next to parked cars helps to keep bicyclists from riding in an area where car doors may open into their paths.

**Figure 29: Bike Lane – Separated**
Separated bike lanes, sometimes called “cycle tracks” or “protected bike lanes,” separate the bike lane from travel lanes with a vertical element such as curbs, bollards, pavement elevation, parked cars, or planters. While separated bike lanes increase bicyclists’ sense of comfort, they still have conflict points at intersections and driveways, where turning traffic crosses them. Separated bike lanes may be placed at street level, sidewalk level, or an intermediate level, and may include vertical or rolled curbs.
**Preferred Width**: 6.5 feet plus gutter pan (one way); 10+ feet plus gutter pan (two-way)
**Minimum Width**: 5 feet plus gutter pan (one-way); 8 feet plus gutter pan (two-way)

**Figure 30: Bike Lane – Climbing**
A climbing lane provides a bicycle lane or buffered bicycle lane in the uphill direction on a hill, and shared lane markings in the downhill direction. This is often done where there is not room to fit a bicycle lane on each side of the street; providing a bicycle lane uphill allows slow moving bicyclists to move out of the travel lane. Bicyclists traveling downhill are often moving much closer to the speed of motor vehicles, and shared lane markings help position bicyclists in the most appropriate location to ride while also providing a visual cue to motorists that bicyclists have a right to use the street.

**Figure 31: Bike Lane – Contraflow**
Counter-flow bike lanes are signed and marked lanes that accommodate bicycle travel on one-way streets in the opposite direction of motor vehicle traffic. Counter-flow bike lanes may be conventional bike lanes, buffered bike lanes, or fully separated bike lanes.

**Figure 32: Bike Lane – Advisory**
Many lower-traffic roads are too narrow to provide exclusive space for two standard-width bicycle lanes and two standard-width travel lanes. For lower volume, lower speed roads, advisory bike lanes (ABLs) have been developed as an alternative to a shared lane marking treatment to separate bicyclists from automobile traffic. These roads are marked to provide two separate standard width bicycle lanes on either side of a single shared (un-laned) motor vehicle travel space essentially creating a three-lane cross section. Roadway centerlines are not present. Parking lanes may be provided outside the advisory bike lanes.

**Figure 33: Bicycle Boulevard (Neighborhood Greenway)**
A bicycle boulevard is a street with low motorized traffic volumes and speeds designated to provide priority to bicyclists and neighborhood motor vehicle traffic. Bicycle boulevards may simply have signs and shared lane markings, or may include traffic calming elements including speed humps, traffic circles, chicanes, or traffic diverters. Bicycle boulevards benefit neighborhoods by reducing cut-through traffic and speeding without limiting access by residents. Recommendations for bicycle boulevards in this plan do not include guidance for specific treatments.

**Figure 34: Shared Lane Marking (Sharrow)**
Shared lane markings, sometimes called sharrows, are used on streets where bicyclists and motor vehicles share the same travel lane. The sharrow helps position bicyclists in the most appropriate location to ride. It also provides a visual cue to motorists that bicyclists have a right to use the street.

Shared lane markings are suitable for low-volume local and collector streets where there is insufficient right-of-way for bike lanes or where traffic volumes and speeds are low enough that a bike lane is not warranted. Shared lane markings should not be considered a replacement for bicycle lanes. The “Bicycles May Use Full Lane” sign (MUTCD R4-11) is commonly used in conjunction with shared lane markings and is recommended for the City of Appleton.

**Figure 35: Shared-Use Path**
A shared use path is an off-street bicycle and pedestrian facility that is physically separated from motor vehicle traffic. Typically shared use paths are located in an independent right-of-way such as in a park, stream valley greenway, along a utility corridor, or an abandoned railroad corridor. Shared-use paths are used by other non-motorized users including pedestrians, skaters, wheelchair users, joggers, and sometimes equestrians.

Consideration should be given to providing a smooth path surface for users. When concrete is used, joints should be saw cut. Asphalt is also an acceptable surface material.

***Intersection Treatments and Bicycle Signage***

**Figure 36: Colored Pavement**
Green colored pavement may be used to increase the visibility of bicycle facilities. Colored pavement may be used to highlight an entire bicycle corridor, but is most useful to highlight bicycle facilities in conflict areas – through intersections, across driveways, or crossing highway ramps.

**Figure 37: Bike Box**
A bike box is a designated area at the front of a traffic lane at a signalized intersection. Bike boxes provide bicyclists with a location to wait for a green signal that puts them in a location visible to motor vehicle traffic also stopped at the intersection. Bike boxes can facilitate left turns for bicyclists and can reduce the likelihood of "right-hook" crashes with turning vehicles. Bike boxes can also benefit pedestrians as they reduce vehicle encroachment in crosswalks. Installation of bike boxes also requires installation of "No Turn on Red" signs.

**Figure 38: Bike Signal**
Bicycle signals are traffic signals that govern bicycle movements at an intersection. Bicycle signals may be used when bicycles, pedestrians, and motor vehicles have different movement cycles.


**Figure 39: Wayfinding Signs**
Wayfinding signs indicate the direction and distance to specific destinations for bicyclists. Wayfinding signs can be used to enhance bicycle facilities including bike lanes, bike boulevards, and shared use paths. Signs can help bicyclists navigate the bicycle network and can be placed at key intersections to guide users to specific destinations. They can include the distance to those locations and approximate travel time as well.

## For bicycle facility design guidance, refer to:

- AASHTO Guide for the Development of Bicycle Facilities, 4th Edition (https://bookstore.transportation.org/)
- Manual on Uniform Traffic Control Devices (http://mutcd.fhwa.dot.gov/)
- NACTO Urban Bikeway Design Guide (http://nacto.org/publication/urban-bikeway-design-guide/)
- Wisconsin Bicycle Facility Design Guide (http://wisconsindot.gov/Documents/projects/multimodal/bike/facility.pdf)

# Stakeholder / Public Involvement

The study team sought input from the community through a stakeholders group, public meetings, social media and meetings with key stakeholders.

Throughout the planning process, community involvement played a critical role in shaping the overall project approach and vision of the Mobility Plan. Interested persons were provided the opportunity to participate in a variety of involvement activities including a stakeholders group, public meetings, reading and commenting on social media, and attending city government meetings. This section provides a summary of each activity.

## Stakeholder Group

A stakeholders group, consisting of representatives from various organizations / entities in the study area, was formed in January 2016. This group met three times during the study to provide input and ideas to the study team. A list of groups / individuals who participated in the stakeholders meetings can be seen in Table 3.

A list of meeting dates and the purpose of each meeting is noted below. A copy of the minutes, which include the comments submitted by each stakeholder, can be found in Appendix L.

- **February 3, 2016 – Meeting 1**
  - The purpose of the meeting was to educate the stakeholders on the purpose and need for the study and the issues identified by the study team. Feedback was sought on existing mobility issues and ideas for improvements.
- **March 21, 2016 – Meeting 2**
  - The purpose of the meeting was to gather feedback on traffic, bicycle and pedestrian improvement ideas.
- **July 6, 2016 – Meeting 3**
  - The purpose of the meeting was to review the draft recommended improvements prior to the July 12, 2016 Municipal Services Committee meeting.

**Table 3: Stakeholders Meeting Attendees**

| Organization | Representative |
|---|---|
| History Museum | Nicholas Hoffman |
| Valley Transit | Dan Sandmeier |
| Appleton Mayor's Office | Chad Doran |
| Lawrence University | Jake Woodford |
| YMCA | Danielle Englebert |
| Appleton Community and Economic Development | Monica Stage |
| Appleton Police Department | Todd Freeman, Larry Potter |
| Appleton Library | Colleen Rortvedt, Jessica Brittnacher |
| Appleton Downtown, Inc. | Jennifer Stephany, John Peterson |
| Appleton Mayor's Office | Tim Hanna |
| Appleton Area School District | Joe Sargent |
| Alderperson – District 4 | Joe Martin |
| Alderperson – District 2 | Vered Meltzer |
| Alderperson – District 11 | Patti Coenen |
| Appleton Health Department | Kurt Eggebrecht |
| League of Women Voters | Jeanne Roberts, Penny Robinson |
| East Central Wisconsin Regional Planning Commission | Melissa Kraemer Badtke |
| Alderperson – District 1 | William Siebers |

*All entities listed attended at least one meeting.*

## Public Involvement Meeting

A public involvement meeting was held on Thursday, April 7, 2016. The purpose of the meeting was to educate the public on the purpose of the study, the issues identified by the project team, and gather their thoughts on traffic, bicycle and pedestrian improvement alternative ideas. The meeting included a formal presentation, a question / answer session, and time for attendees to speak individually with members of the project team.

Sixty people in addition to the study team signed in at the public meeting.

Three news media outlets, FOX, CBS and ABC, featured stories about the public meeting and the study on their newscasts. For more information, see the meeting minutes in Appendix M.

**Figure 40: April 7, 2016 Public Meeting**

Twenty people submitted comment forms at the meeting. A few representative comments are shown below.

- ✓ Like the idea of 2-way Appleton Street, but concerned about loss of on-street parking.
- ✓ Too much emphasis on bicycle accommodations.
- ✓ Like staircase from bluff site to Water St.
- ✓ 2-way Appleton solves northbound routing problem.

## Social Media

The public involvement meeting was advertised using social media via the Appleton City Hall Facebook page. Prior to the meeting, four separate posts about the study were posted to the page. Each post contained a link to an article about the study. For a copy of each article, see Appendix N.

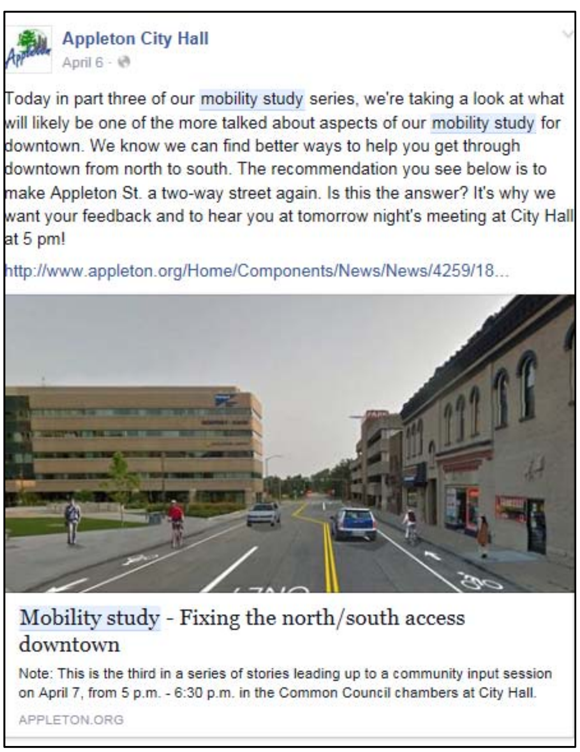


**Figure 41: Facebook post discussing the study**

The outreach via Facebook was very successful. Four days of posts reached approximately 20,400 people and resulted in 2, 246 clicks to the website stories from Facebook. The posts received 589 likes/shares.

In addition to Facebook, city staff live-tweeted updates from the public involvement meeting via Twitter.

# Municipal Services Committee Meetings

The mobility study was discussed at the Municipal Services Committee meeting on July 12, 2016. The meeting included a lengthy presentation about the study and a map showing draft improvement recommendations in the core downtown area.

This meeting was open to the public. Approximately 25 people attended the meeting and 18 people provided verbal comments following the presentation.

## Most attendees were supportive of the draft recommendations.

Key concerns included:

- Need for loading zone in the 100 block (near Houdini Plaza) of Appleton Street.
- Concern over the recommendation for bike lanes on Lawe Street and conflicts with vehicles and truck traffic.
- Need for education for bicyclists and drivers.

For more information, see the meeting minutes in Appendix O.

# Other Meetings

Members of the study team also held separate meetings with representatives from the following organizations:

- YMCA – Tuesday, June 28, 2016
- Appleton Downtown, Inc. – Tuesday, June 28, 2016

# Recommended Improvements

The recommendations improve northbound routing by eliminating one-way streets in the downtown area. A significant number of bicycle and pedestrian improvements help to improve mobility for multiple transportation modes.

Recommended improvements in the core downtown area bound by Superior Street to the west, Washington Street to the north, Drew Street to the east and Water Street to the south are shown on the Recommended Improvements Map in Exhibit 8. The map should be printed full size (36" x 48") for maximum readability.

## Traffic Recommendations

### Alternative 2: Two-way Appleton Street is recommended.

This alternative is recommended because it:

- Creates a direct northbound route to/through downtown Appleton by converting Appleton Street from one-way to two-way traffic. Appleton Street is already two-way north of Washington Street.
- Improves several confusing intersections by eliminating one-way streets.
- Provides an opportunity for additional economic development on the bluff site by creating a larger redevelopment parcel west of Trinity Church through the removal of Oneida Street south of Lawrence Street.
- Removes unwarranted traffic signals on Franklin Street to reduce delay.
- Creates direct truck routes through the study area.
- Best utilizes the existing right of way to improve mobility for all modes of transportation by including numerous bicycle facilities.

The specific changes recommended as part of this alternative are described in detail on the next several pages.

#### Convert One-way Streets to Two-way Streets

The following streets are proposed to be converted from one-way streets to two-way streets:

- Appleton Street between Prospect Avenue and Washington Street
  - The typical section north of Lawrence Street should include one through lane in each direction, left turn lanes at intersections and bike lanes. Lane widths vary depending on the available right of way.
  - South of Lawrence Street, two through lanes approach the intersection from the Oneida Street bridge. One lane should be designated as a right turn only lane at Lawrence Street and the other as a through lane to Appleton Street.
  - Restrict left turns at the following locations to maintain traffic flow or improve safety:
    - Left turns out of the private parking ramp in the northeast quadrant of the Appleton Street and Lawrence Street intersection. This ramp currently only has access to southbound Appleton Street. This modification would switch access to northbound Appleton Street.
    - Northbound left turns into the Red Ramp from Appleton Street.
    - Northbound left turns into the alley north of College Avenue from Appleton Street.
    - Left turns from the City Center Alley.
    - Left turns from the alley north of College Avenue.
  - When the Blue Ramp is removed, remove access to Appleton Street at this location and create a loading/parking zone.
- Lawrence Street between Appleton Street and Durkee Street
  - This section of Lawrence Street would need to be reconstructed to achieve the desired configuration. Additional right of way is proposed to be acquired from the south side of the street to provide one through lane in each direction, bike lanes, parking and a median.

- Morrison Street between Lawrence Street and Harris Street
  - The typical section should include one through lane in each direction, bike lanes and parking on one side of the street. A loading zone is provided near the YMCA.
- Harris Street between Oneida Street and Morrison Street
  - The typical section should include one through lane in each direction and parking on one side of the street. See Exhibit 9 for more details.
- Durkee Street between Lawrence Street and College Avenue
  - The typical section should include one through lane in each direction, bike lanes and parking on one side of the street. To achieve this configuration within the existing right of way, the existing terrace on the east side of the street would be removed.

See Exhibit 8 for a detailed map of improvements and the recommended typical section for each street. With regard to the prioritization of traffic improvements, reconstruction of the Oneida Street bridge and conversion of Appleton Street from one-way to two-way traffic south of Washington Street should be the first priority. This project is the impetus for the other one-way to two-way conversions and the entire downtown mobility plan.

## Reconstruct the Oneida Street Bridge

The northbound Oneida Street bridge over Jones Park would need to be reconstructed and realigned to provide a direct connection to Appleton Street. The bridge was constructed in 1980 and rehabilitated in 2009. In 2014, the bridge had a sufficiency rating of 85.5, meaning it is still in good condition. It should be noted that construction of a new bridge would likely impact Jones Park, a Section 4(f) resource.

After the bridge is reconstructed, the portion of Oneida Street between Prospect Avenue and Lawrence Street should be removed. Removing this portion of Oneida Street creates a large parcel of land for potential future development.

## Remove Traffic Signals

**Four traffic signals would be removed to decrease delay and improve mobility.**

Remove traffic signals at the following intersections:

- Franklin Street and Superior Street. Install two-way stop control on Superior Street. Consider pedestrian refuge islands on Franklin Street as described in Appendix P.
- Franklin Street and Oneida Street. Install two-way stop control on Oneida Street. Consider pedestrian refuge islands on Franklin Street as described in Appendix P.
- Lawrence Street and Oneida Street. Install two-way stop control on Oneida Street. If a south leg of Oneida Street is not constructed in conjunction with potential redevelopment on the bluff site, stop control would be one-way on Oneida Street.
- Lawrence Street and Morrison Street. Install four-way stop control and create a raised intersection. This configuration would promote a safe environment for pedestrians adjacent to the entrance to the YMCA.

## Reconstruct Lawrence Street

As noted previously, Lawrence Street would be reconstructed to accommodate 2-way traffic. Lawrence Street should also be realigned between Oneida Street and Morrison Street to remove the existing curve. Any significant redevelopment of the bluff site should remove Allen Street and extend Oneida Street south of Lawrence Street.

Additional right of way is proposed to be acquired to provide one through lane in each direction, bike lanes, parking and a median. Raised intersections are

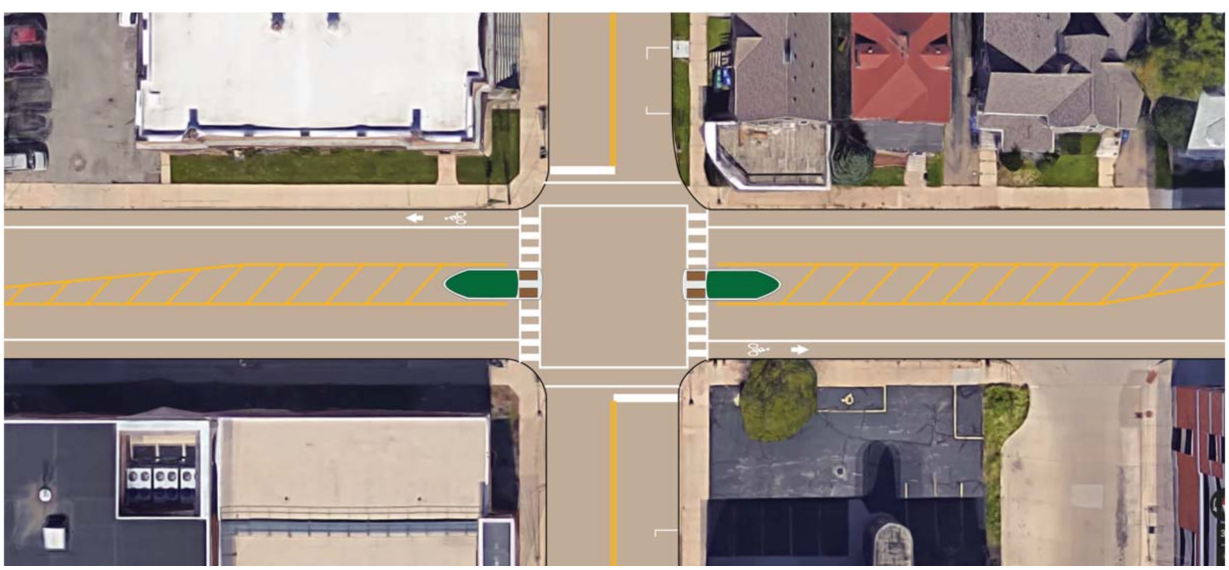

**Figure 42: Franklin Street and Oneida Street Intersection**
Conceptual image showing pedestrian refuge islands on Franklin Street.

recommended at the Morrison Street and Durkee Street intersections to promote pedestrian safety in the area surrounding the YMCA.

### Modify Truck Routes

Truck routes through the downtown study area should be designated as follows:

- College Avenue between Richmond Street and Lawe Street
- Franklin Street between Richmond Street and Appleton Street
- Appleton Street between Lawrence Street and Franklin Street
- Oneida Street between the Fox River and Lawrence Street

## Designate College Avenue a truck route.

This designation removes truck routes from the following locations:

- Lawrence Street between Memorial Drive and Morrison Street
- Morrison Street between Lawrence Street and Washington Street
- Washington Street between Division Street and Morrison Street.
- Division Street between Washington Street and Franklin Street

See Exhibit 7 for a map of existing truck routes and Exhibit 10 for a map of proposed truck routes. It should be noted that due to roadway right of way limitations, truck turns to/from College Avenue to Appleton Street would be very difficult and should only be attempted during off peak hours. Large vehicles would need the entire intersection area to complete turning movements.

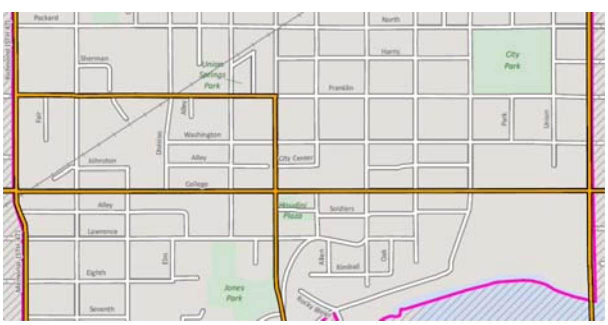

**Figure 43: Proposed Truck Routes**
Proposed truck routes on College Avenue, Appleton Street and Franklin Street.

### Maintain Oneida Street Railroad Crossing

The Oneida Street railroad crossing is important for mobility in the study area and should not be removed.

- Oneida Street provides access to a large senior/low income apartment building immediately north of the railroad tracks. A Salvation Army building is located south of the railroad tracks on North Street. If the railroad crossing was removed, it would require residents living in the apartment building who visit the Salvation Army to take a longer route, which may be difficult for seniors or those with limited mobility.
- Valley Transit uses Oneida Street for Route 5. This route includes a stop across the street from the senior/low income apartment building.
- The dead-end streets created by closing the railroad crossing would make access to the multiple commercial businesses in this area difficult.
- Oneida Street between Washington Avenue and Pacific Street is an alternate, parallel route to Appleton Street. Maintaining this link would improve mobility and reduce congestion on Appleton Street.

### Reconstruct the Appleton Street / Oneida Street / Pacific Street Intersection

Designating Appleton Street as the main northbound route to/through downtown Appleton would increase traffic on Appleton Street. The existing intersection of Appleton Street / Oneida Street / Pacific Street was identified as a confusing intersection. Oneida Street access to Pacific Street is one way northbound and controlled with a yield sign, however vehicles typically do not yield as they should. An increase in traffic on Appleton Street would decrease the number of gaps for vehicles entering from Oneida Street which could become a safety issued. If a safety or operations issue develops, this intersection should be reconstructed to address this issue. City staff have created concept sketches for potential improvements to this intersection (see Exhibit 11).

## Pedestrian Recommendations

Every street is intended to provide for comfortable and safe pedestrian travel. This section contains recommendations related to pedestrian facilities in downtown Appleton, although most of the policy-related recommendations are applicable citywide and not just in the study area.

### Sidewalks

- Add sidewalks along any streets without sidewalks when they are next reconstructed; if reconstruction is more than ten years away, consider installing sidewalks as a standalone project. Dead-end streets may only require installation of a sidewalk on one side of the street, although sidewalks on both sides are recommended if buildings front on both sides of the street. Streets without sidewalks are displayed on Exhibit 4. The following streets should be a priority for sidewalk installation:
  - North Street between Oneida Street and Morrison Street
  - Fourth Street between State Street and Walnut Street
  - Prospect Avenue between State Street and Sixth Street

### Lighting

- Ensure that adequate pedestrian lighting exists throughout the study area. Pedestrians do not feel comfortable walking in poorly lit areas, and often will choose to avoid these areas. Pedestrian lighting should be present in all commercial areas of the study area, and along other corridors where pedestrians are expected or desired.

- Pedestrian lighting improves the visibility of pedestrians walking along and across the street and enhances security. Pedestrian scaled street lighting is directed toward the sidewalk, positioned lower than roadway lighting (luminaires are mounted 12 to 14 feet above the sidewalk), and is more closely spaced than roadway lighting. Pedestrian lighting can be used alone or in combination with roadway-scale lighting in high activity areas to encourage nighttime use. Pedestrian lighting can be located on the same pole as roadway lighting to reduce the number of poles within the landscape/furniture zone.
- Pedestrian lighting should be prioritized in commercial areas, on transit routes, in areas of moderate pedestrian use, and in areas where personal security is an issue. Pedestrian ways not adjacent to streets may require lighting as determined by City staff.
- Intersection street lighting should be placed downstream of the curb ramps, perpendicular to the curb. Following FHWA guidance, luminaires should be located at least 10 feet from the crosswalk and positioned to light the side of the pedestrian facing the approaching vehicle. Where feasible, lighting should be placed on the approach side of a mid-block pedestrian crossing (near side) to enhance visibility of pedestrians.

## Crosswalks and Curb Ramps

- Crosswalks should be wider and marked with higher visibility markings than has traditionally been used in the study area. The following guidance should be used:
    - Crosswalks in the study area should be a minimum of eight feet wide.
    - High visibility continental or ladder markings should be used at stop controlled or uncontrolled crossings of collector and arterial streets (such as Appleton Street and College Avenue). Continental or ladder markings should be used at all intersections near schools, the library, the transit center, the YMCA, Lawrence University, parking ramps and other areas with significant pedestrian volumes. The Federal Highway Administration document *Designing Sidewalks and Trails for Access* recommends continental markings for all crosswalks due to the increased visibility of the markings.
    - Where transverse lines are used to mark crosswalks, each line should be a minimum of 12 inches wide.

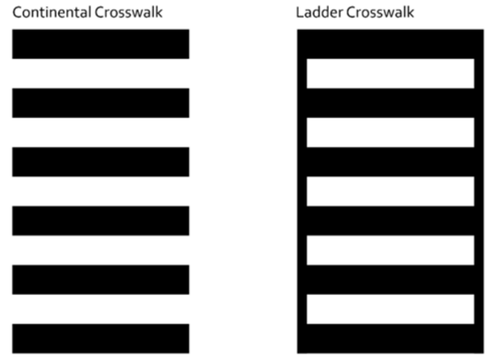


**Figure 44: Typical Crosswalk Marking Styles**

- Continue to ensure that ADA-compliant curb ramps are provided at all crosswalks (marked and unmarked). In general, this can be accomplished when the adjacent roadway is being resurfaced or reconstructed, although curb ramp retrofits may be warranted at select locations.

## Pathways and Access to the River

- Provide a grand staircase or walkway from the corner of Olde Oneida Street and Water Street up the bluff to Kimball Street (currently the Fox Banquets property). Such a staircase could serve as a significant attraction downtown with lookouts or terraces cut into the hillside. This staircase should be integrated with any redevelopment of the Trinity Lutheran Church / Fox Banquets properties and should be clearly and easily accessible from Soldiers Square and College Avenue. The staircase should including a bike runnel—a small ramp at the edge of the stairway that allows bicyclists to wheel their bicycles up and down the stairs. The final design should meet Americans with Disabilities Act (ADA) requirements by including a path; the path location should be proximate to the staircase itself. It may be desirable from a grade perspective to provide the path from the west end of Kimball Street to Rocky Bleier Run; this path would provide an accessible route as well as bicycle access to the riverfront.

**Figure 45: Existing Conditions – Location of Proposed Staircase**

**Figure 46: Conceptual Rendering of Staircase (Actual design to be determined – ADA accessibility should be considered)**

- Provide a wide shared use path from Lawrence Street through Jones Park to Rocky Bleier Run. This path should be ADA compliant, and should integrate with any redevelopment of the park.
- Consider providing a ramp in the existing City easement/property from Prospect Avenue to Water Street approximately where Elm Street intersects with Prospect Avenue. The ramp should comply with ADA requirements and should include lighting and regular landings for resting points. It may be feasible for the ramp to bridge over Water Street to provide a direct connection to the park on the south side of the street.

# Bicycle Recommendations

The City adopted the City of Appleton On-Street Bike Lane Plan in September 2010. This document presents many recommendations for the study area, as well as the rest of the city. This document builds upon those recommendations, but this document is not intended to fully supplant the 2010 Plan. The 2010 Plan should be consulted for connections outside of the study area, as well as specific bicycle parking recommendations.

The proposed bicycle facilities create a comprehensive bicycle network for downtown Appleton. It is recognized that some projects may require years or even decades of planning, community discussion, and financial preparation before they can be realized. Many of these projects are also driven by opportunities; when a street is resurfaced or reconstructed, a much greater opportunity exists for incorporating a bikeway at a modest cost, but the bikeway improvement must be delayed for the roadway work. However, some projects represent very minor changes to existing infrastructure and can be implemented quickly and at little cost. It is also important to recognize that some network links are more critical than others. To this end, recommendations have been categorized into short, medium, and long term projects. See Appendix Q for a list of improvements included in each category and a map showing the location of each recommended improvement. An ultimate buildout map can also be seen in Exhibit 12.

- Short Term Improvements (0-3 years)
  - The timeframe for short term projects is roughly 0–3 years. These recommendations are typically expected to be less intrusive and less expensive such as adding shared lane markings to a street, or adding bicycle lanes with minimal impacts on parking. A few short term projects present some challenges and may be more expensive, but have been included because of the importance of the connection they create in the network.
- Medium Term Improvements (4-10 years)
  - The medium term includes projects that would be expected to be completed within 4–10 years. These projects tend to be more challenging than short term projects and likely require further study and more significant funding.
- Long Term Improvements (10+ years)
  - Projects in the long term category constitute useful connections in the bicycle network but are not likely candidates for implementation for ten years or more. The majority of these projects require significant reconstruction of a street or bridge in order to be achieved.

**Figure 47: Bike Lanes**

Regardless of the time horizon, these recommendations are meant to inform future decision making by the City. Any discussions of specific transportation investments ought to include consideration of cycling facilities, whether they appear as a recommendation in this plan or not. Such decisions should be informed by the contents of this plan but not restricted by it.

Table 4 displays the total centerline mileage of each type of recommended facility (i.e. bike lanes on both sides of a two-way street are only counted as one mile in Table 4). This table does not reflect facilities recommended in previous plans including the shared use paths near the riverfront.

**Table 4: Centerline Miles of Recommended Bicycle Facilities by Facility Type**

| Facility Type | Miles |
|---|---|
| Bicycle Boulevard | 1.42 |
| Buffered Bike Lane | 0.42 |
| Bike Lane | 5.26 |
| Climbing Lane | 0.32 |
| Shared Lane Marking | 2.20 |
| Slow Street | 0.07 |
| Signed Route | 0.43 |
| Shared Use Path | 0.62 |
| **Grand Total** | **10.74** |

## Ultimate Buildout

The full bicycle facility recommendations are displayed on the Exhibit 11. This map reflects the ultimate buildout of facilities, and displays facilities that are recommended in previous plans. The facilities shown on this map should not be considered a limiting factor to adding bicycle facilities. Every time a street is resurfaced or reconstructed within the study area, the City should consider if it is appropriate and feasible to add a bicycle facility or treatment; this is particularly true further in the future as the conditions considered for this study change.

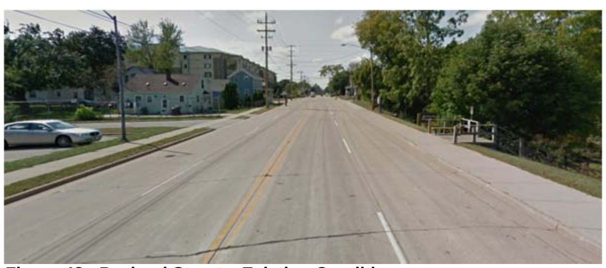

**Figure 48: Packard Street – Existing Conditions**

**Figure 49: Packard Street – Proposed Buffered Bike Lane**

## Bicycle Detection at Traffic Signals

Some traffic signals in the study area are not capable of detecting bicycles. It is recommended that city staff continue to upgrade signal detection systems to include detection for bicyclists and look for opportunities to install push buttons if automated means are not feasible. For more information, refer to page 99 of the Second Edition of the National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide.

## Minimum Width Facilities

Design guidance for streets and bicycle facilities generally includes minimum recommended widths for driving, bicycle, and parking lanes. While it is acceptable to use minimum width facilities, using a minimum width facility adjacent to another minimum width facility can be problematic. For example, a 10 foot wide driving lane may be desirable to provide space for other uses such as bicycling or parking, and to calm traffic speeds. However, providing a 10 foot travel lane adjacent to a minimum width bike lane (four feet, not including gutter pan), can result in very uncomfortable situations for bicyclists, particularly if on-street parking is also provided. Whenever possible, bicycle lanes wider than the minimum should be provided; in particular, the combined minimum width of a bicycle lane plus an on-street parking lane should be 14.5 feet. This helps prevent "dooring" crashes in which parked motorists open their car door into a bicyclist in a bike lane.

## Bicycle Parking

One of the most common obstacles for people using their bicycles is the lack of secure bicycle parking facilities when they arrive at their destination. Providing bicycle parking encourages people to use their bicycles for transportation, but it also benefits non-cyclists:

- Bicycle parking is good for business. Economic development studies have found that people on bikes are more likely to make repeat trips to their local businesses, and to spend more money per month than those who drive.[1]
- Bicycle parking is much more space-efficient than automobile parking. Every customer arriving on a bike leaves a car parking space free for someone else.
- Providing bicycle parking gives a more orderly appearance to the streetscape. When bike racks are not present, people will lock their bikes to trees, benches, light posts, and railings. This causes damage to the street furniture and can result in bicycles blocking the sidewalk. Well-designed bicycle parking keeps bikes upright and out of the pedestrian right-of-way.

For additional bicycle parking recommendations, including information on acceptable bicycle racks for short and long term storage and policy recommendations, see Appendix R.

**Figure 50: Saris brand Circle Dock Bike Rack**

[1] Darren Flusche, "Bicycling Means Business: The Economic Benefits of Bicycle Infrastructure," (Advocacy Advance, 2012)

# Other Considerations

## Transit

Given the proposed changes to the transportation network in downtown Appleton, there would be impacts to existing Valley Transit routes. Many of the changes would be beneficial to transit riders as cities with grid systems and an abundance of 2-way streets offer the most options for routes and riders.


**Figure 51: Valley Transit bus with bike racks**

There are no transit stops shown on the proposed improvements map in Exhibit 8. This study did not include coordination with Valley Transit to determine where stops are needed and the type of accommodation desired. City staff should work with Valley Transit to determine the best way to incorporate transit routes and stops in to the proposed transportation network.

A method for improving transit operations is Transit Signal Priority (TSP). TSP works by allowing individual buses to communicate with the traffic signal controller at an intersection it's approaching. If intersection conditions allow, the traffic signal phasing can be altered to prioritize the bus movement by extending the bus phase or shortening conflicting phases to bring up the bus phase sooner.

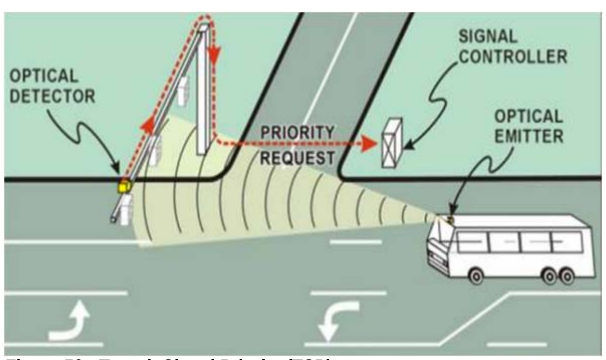


**Figure 52: Transit Signal Priority (TSP)**
Photo source: Streetsblog.org

The positive aspects of implementing TSP include reduction in bus travel times and improvement of on-time reliability. The negative aspect of TSP is the benefit is marginal for corridors with low traffic signal density and minimal recurring congestion. The College Avenue corridor has high signal density. While some recurring congestion is present, it's not to a degree where TSP would have a sizeable benefit. If the City wishes to pursue TSP, additional study to explore costs and benefits is recommended.

## Loading Zones

The presence and availability of loading zones is very important to downtown business owners. Of particular concern during the study was the removal of parking and loading zones from the 100 (near Houdini Plaza) and 200 (near the Blue Ramp) blocks of Appleton Street. New loading zones are proposed on Oneida Street and in the 100 and 200 blocks of Appleton Street. Additional parking areas are proposed on Lawrence Street where none currently exist to help mitigate this concern. The Appleton Street loading zone in the 200 block (near existing Blue Ramp) and portions of the Oneida Street loading zone would not be available until after the Blue Ramp and YMCA ramp were removed. Following the July Municipal Services Committee meeting, a loading zone on the west edge of Houdini Plaza in the 100 block of Appleton Street was added to the proposed improvement plan. It should be noted that Houdini Plaza may be considered a Section 4(f) resource.

## Development / Land Use Changes in the Study Area

Many portions of the study area are poised for redevelopment. Anticipated changes include a new expo center on Lawrence Street, a new library (location unknown), potential redevelopment of the bluff site and other organic growth. These changes were considered as part of the study and a traffic modeling sensitivity analysis was done to reflect potential build conditions with 20 percent more traffic. The proposed improvements, which create a 2-way grid system for the majority of the downtown area, would also help alleviate congestion due to the availability of alternate routes.

If significant redevelopment is proposed for a specific site downtown, a traffic impact analysis (TIA) should be completed once details about the development are known. Given the limited right of way available in the downtown area, it is likely any development would need to use the existing or planned roadway system.

# Cost Estimates

These planning-level costs should only be used as very rough figures for long-range budgeting for projects – actual budgets should be developed based on specific project scopes, engineering plans, and competitive bids.

## Roadway Cost Estimates

Planning level roadway cost estimates will be developed for the reconstruction of Appleton Street (south of Washington Street) and the Oneida Street bridge prior to the final report submittal. This area was selected because it is most likely the first major section to be constructed and the impetus for construction on surrounding streets.

## Bicycle Facility Cost Estimates

Developing accurate cost estimates for bikeways included in a plan is challenging for a number of reasons. Estimating costs for any project is a challenge, until the actual project is scoped and designed. Estimating bikeway costs that are part of a roadway project is especially vexing since it often is impossible to estimate what portion of the total cost of a larger roadway project should be attributed to bicycling when the bikeway is incidental to the overall project. Often that requires comparing the cost of the same project without a bikeway with the additional cost to add the bikeway. In most cases, that marginal cost for the bikeway is small since the fixed costs are already associated with the larger project and adding more to a project takes advantage of the economies of scale of the larger roadway project.

This plan provides planning-level cost estimates as a range for the recommended bikeway types to provide an order of magnitude for the potential costs involved. These planning-level costs should only be used as very rough figures for long-range budgeting for projects – actual budgets should be developed based on specific project scopes, engineering plans, and competitive bids. The cost assumptions are based on regional and national-level data for bikeway construction projects. Table 5 provides a range of facility costs for the recommended bikeways for this plan while Table 6 provides the recommended system mileage and a computation of the costs based on the per mile costs and the mileage.

**Table 5: Planning Level Cost Estimates for Bicycle Facilities (per mile)**

| Facility Type (Action) | Low Estimate per Mile | High Estimate per Mile |
|---|---|---|
| Signed Route (Add Signs) | $3,000 | $5,000 |
| Shared Lane Marking (Add Markings and Signs) | $10,000 | $15,000 |
| Bike Lane – Paint (Add Striping and Signs) | $10,000 | $20,000 |
| Bike Lane – Thermoplastic (Add Striping and Signs) | $20,000 | $40,000 |
| Bike Lane (Widen Road and Add Signs) | $200,000 | $350,000 |
| Climbing Lane – Paint (Add Striping and Signs) | $10,000 | $20,000 |
| Buffered Bike Lane | $30,000 | $40,000 |
| Bicycle Boulevard (Add traffic calming, Markings and Signs) | $5,000 | $100,000 |
| Shared Use Path (Construct New) | $300,000 | $500,000 |

**Table 6: Total Planning Level Estimated Costs by Facility Type**

| Facility Type | Miles | Low Estimate | High Estimate |
|---|---|---|---|
| Signed Route | 0.43 | $2,000 | $3,000 |
| Shared Lane Marking | 2.20 | $15,000 | $22,000 |
| Bike Lane | 5.26 | $43,000 | $64,000 |
| Climbing Lane | 0.32 | $4,000 | $7,000 |
| Buffered Bike Lane | 0.42 | $13,000 | $17,000 |
| Bicycle Boulevard | 1.42 | $8,000 | $142,000 |
| Slow Street* | 0.07 | $100,000 | $200,000 |
| Shared Use Path | 0.62 | $61,000 | $101,000 |
| **Total** | **10.74** | **$388,000** | **$791,000** |

*Notes: The cost for building a Slow Street is approximately the same as a standard street reconstruction. A single cost for providing bike lanes is provided regardless of if street widening would be required or not.*

Washington St.
Superior St.
Appleton St.
Oneida St.
Valley Transit
Library
Yellow Ramp
Morrison St.
Green Ramp
Blue Ramp
Remove access when Blue Ramp is demolished
Loading zone and Parking
No left turn from North Alley
No left turn from City Center Alley
No left turn into north alley
Convert to 2-way traffic when Blue Ramp is removed
Bike and pedestrian connection to be determined
City Center Plaza
Durkee St.
Drew St.
Expand existing roadway
College Ave.
Radisson Paper Valley Hotel
Houdini Plaza
15 Minute loading zone
No left turn into red ramp
Loading zone
Red Ramp
No left turn out of private parking ramp
YMCA Ramp
YMCA
Loading zone and Parking
Signed bike route
Lawrence St.
Raised intersection
Reconstruct bridge to accommodate widened Drew St. Bridge should be minimum of 16' wide.
Climbing lane for bicycles traveling uphill. Requires expansion.
Expand existing roadway
New south leg of Oneida St.
Remove roadway
Allen St.
Remove roadway and realign with Oneida St.
Shared use path (ADA accessible): route to be determined
Reconstruct bridge
Kimball St.
Grand staircase (consider ADA accessibility)
Potential entrance to new development on bluff
Jones Park
Rocky Bleier Run
Water St.
Fox River
Back-in angle parking
Realign Rocky Bleier Run to improve intersection sight distance.
Reconstruct bridge to accommodate bike lanes
Prospect Ave.
Olde Oneida St.
Recommended Improvements
Ultimate Build Out
July 2016
SCALE, FT 0 100 200
Appleton
Downtown Appleton Mobility Study
AECOM Project No. 60445894