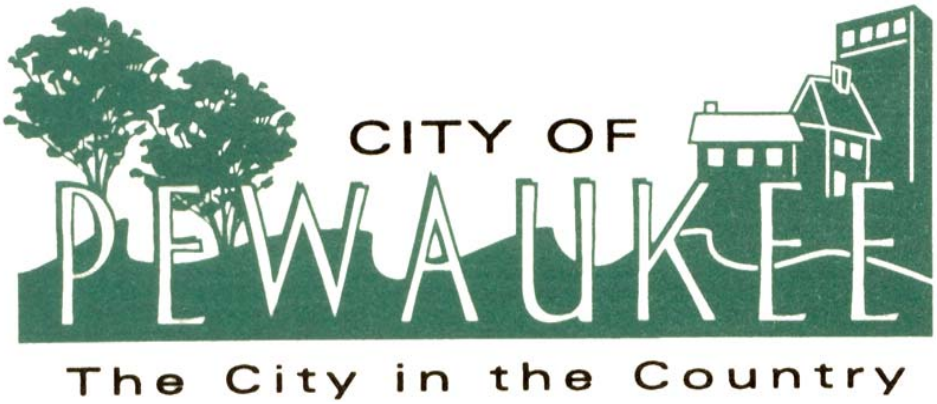

2003 Bicycle and Pedestrian Facility Plan with 2019 Plan Updates

raSmith
CREATIVITY BEYOND ENGINEERING

March 11, 2019

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INTRODUCTION

In its 160 years of history, the City of Pewaukee has grown from a small town based on a sawmill on then Snail Lake to the rapidly growing community on eastern Pewaukee Lake that it is today. With the continued migration of people from the core metropolitan Milwaukee area, Pewaukee will continue to attract new residents with its rural community setting boasting urban conveniences. Contributing to Pewaukee's welcoming atmosphere are the tree lined streets, rural scenes, welcoming parks, open subdivisions, and, of course, Pewaukee Lake.

The City's growth has been characterized by subdivisions scattered in the northern, eastern, and Lake adjacent areas of the city. Most of the subdivisions are bordered and connected on at least one side by scenic roads that were once quiet town roads. As more and more people move to the City, those quiet town roads are becoming collector and arterial roads. Increasing traffic volumes will indefinitely stimulate the need for defined bicycle and pedestrian facilities. As a result, a bicycle and pedestrian plan has been developed in order to address the alternative transportation needs for the City of Pewaukee.

When followed, a good plan will promote public confidence, convenience, and safety for pedestrians, bicyclists, and motorists alike. An overlooked quality of a bicycle plan is that it is more than a map. Rather, it is a reference tool that guides the community in planning and improvement engineering. It defines goals, design considerations, and facility planning concepts. The overall purpose of this document is to provide a plan by which the City can improve the quality of life for its residents through improved bicycle and pedestrian facilities.

PLAN GOALS

The following goals were established as a guideline in evaluating existing and proposed routes, as well as a measure to determine if the stated purpose is met.

- Develop safe bicycle routes that can be enjoyed by riders of all age, skill, and confidence levels.
- Link existing and planned pedestrian/bicycle facilities of the surrounding communities to the City of Pewaukee plan.
- Develop a Bike Plan map for use in short term and long-term transportation and land use planning as well as route information for bicycle users.
- Provide recommendations for street improvements.
- Develop design criteria for bicycle facilities for use by the City Engineering Department.
- Keep Swan, Lindsay, and Green Roads as rustic as possible.
- Develop a recommended route around Pewaukee Lake with the Town of Delafield.
- Connect subdivisions, parks, open spaces, other trails and routes and places of interest where possible.

DEFINITIONS

AASHTO: American Association of State Highway and Transportation Officials.

BICYCLE: Every vehicle propelled by the feet acting upon pedals and having wheels, any two of which are greater than 16 inches in diameter.

BICYCLE USER: Type A-Adult, advanced, experienced rider: capable of operating under most traffic conditions. Type B-Casual, novice adult, teenage or preteen bicyclists who ride on local residential streets with low vehicle speeds and volumes and require access to schools, recreational facilities and neighborhood shopping areas.

BICYCLE FACILITIES: A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling, including parking and storage facilities, mapping all bikeways, and shared roadways not specifically designated for bicycle use. (Source: AASHTO)

BICYCLE LANE: Bicycle ways provided on streets and designated by striping, signing and other pavement markings. (Source: SERWRPC Planning Report #43)

BICYCLE PATH: Bicycle ways physically separated from motorized vehicles by open space or barriers. May be located within right-of-way of a street, or an easement, utility corridor, or abandoned railroad right-of-way. (Source: SEWRPC Planning Report #43)

BICYCLE ROUTE: A bicycle way designated with directional and information markers and may consist of any combination of paths, lanes, and bikeways. (Source: SEWRPC Planning Report #43)

BICYCLE WAYS: Any roadway, pathway, or other ways that is specifically designated for bicycle travel including facilities that are shared with other travel modes. (Source: SEWRPC Planning Report #43)

MUTCD: Manual on Uniform Traffic Control Devices.

ROADWAY: That portion of a street or highway, including shoulders, for vehicle use. (Source: AASHTO)

SHARED ROADWAYS: A roadway which is not officially designated and marked as a bicycle route, but which is open to both bicycle and motor vehicle travel. This may be an existing roadway, street with wide curb lanes, or a road with paved shoulders. (Source: Wisconsin Bicycle Transportation Plan 2020).

SIDEPATH: A bicycle/pedestrian path separated from the roadway and constructed with asphaltic cement pavement.

STREET/HIGHWAY: A general term denoting a public way for purposes of vehicular travel, including the entire area within the roadway.

DESIGN

TRIP GENERATION

Biking and walking are two of the simplest forms of transportation. Besides being available to almost everyone, they also propose personal, social, and economic advantages to their users. People who get some sort of regular exercise have better aerobic capacity, muscle definition, coordination, and flexibility. These people are also generally happier and are more socially aware of what is going on in their communities. The last advantage benefits everyone, even the people who choose not to use bicycle and pedestrian facilities. Decreased motor vehicle trips reduce traffic congestion, air and noise pollution, wear and tear on roads, and the need for oversized roads and parking facilities. While biking and walking may not be an option for long trips and cargo conveying trips, they are practical for:

- Trips to Schools
- Trips to Parks
- Trips to Work
- Trips to Church
- Small Errands
- Recreation/Fitness
- Visiting with friends and relatives
- Appointments
- Connector to public transit

Specific Trip Generators in the City of Pewaukee include:

- Balmer Park
- South Park
- Springdale Park
- Nettesheim Park
- Wagner Park
- Pewaukee Sports Complex
- Ryan Park
- Pewaukee Lake
- City Hall/Police Department
- WCTC
- Lake Country Trail
- Fox River Trail Lake Pewaukee Parkway
- Subdivisions

SAFETY CONSIDERATIONS

Year 2001 Safety Information (from the 2003 Bicycle and Pedestrian Facility Plan)

Bicycle facilities are designed to convey bicycle travel in the safest manner possible. The ultimate goal is to increase the volume of bicycle and pedestrian traffic and reduce the number of crashes.

In 2001, there were 1,216 bicycle crashes in the State of Wisconsin. Of those, 43% involved children between the ages of 5 and 14, 25% were between 15 and 24, and another 19% came from bicyclists between ages 25 to 44. Crashes involving children bicyclists are usually the fault of the child bicyclist, whereas crashes involving adult bicyclists are usually the fault of the motorist. The most common types of crashes are:

- Motorist fails to yield
- Motorist turn/merge into path of bicyclist
- Bicyclist mid-block ride-out

(Ride-out refers to a bicyclist riding perpendicularly into the path of a motor vehicle)

- Bicyclist intersection ride-out
- Bicyclist turn/merge into path of vehicle.

Other characteristics of crashes include:

- More crashes occur on a weekday than weekend
- Bicycle crashes peak between 3 pm and 7 pm
- Most crashes occurred in daylight
- Close to half of all fatal crashes occur at night
- In Wisconsin, around 3% of all crashes occur on county trunk highways, but 24% of fatal crashes occur on county highways.

Year 2016 Safety Information (from Wisconsin DOT):

There were 916 crashes involving bicyclists in 2016.

22% were between the ages of 5 and 14
29% were between the ages of 15 and 24
22% were between the ages of 25 and 44
21% were between the ages of 45 and 64
6% were older than 65

Since 1996, the number of injuries has steadily declined (decreased by 42%)

Since 1996, fatalities have fluctuated year to year, but have remained somewhere between 10 and 15 per year.

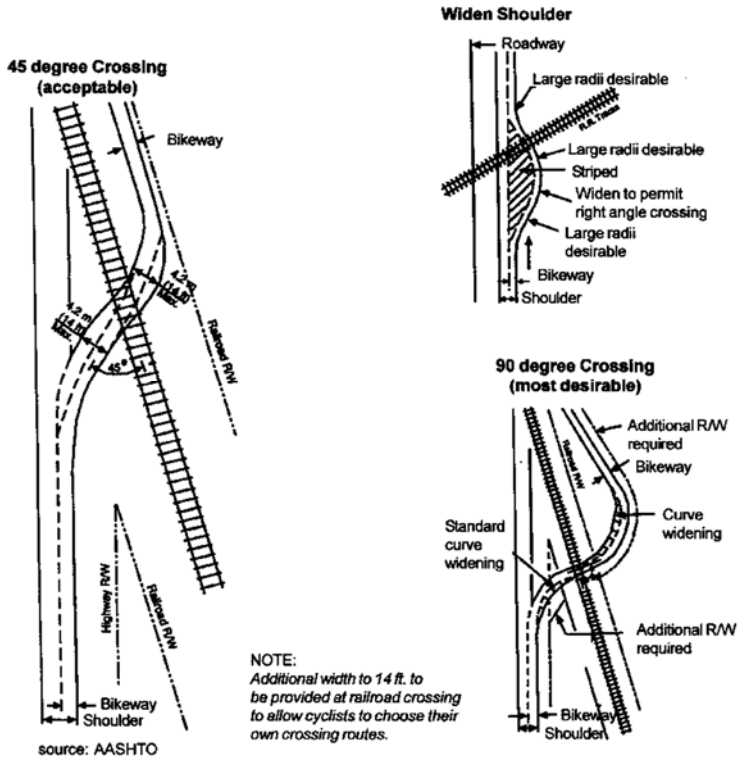
SUMMARY OF RELAVENT STATE REGULATIONS

- Bicycle laws are in WI Stats., Chapter 340.
- A bicycle is defined as a vehicle. The operator of a vehicle is granted the same rights and subject to the same duties as the driver of any other vehicle.
- Rules of the road apply to bicyclists.
- When a vehicle passes a bicycle, there shall be a clear, safe distance of 3 feet between the vehicle and bicycle.
- No bicycles are allowed on expressways or freeways if official signs stating such have been erected.
- When bicyclists or pedestrians cross at a marked or unmarked crosswalk, vehicles shall yield the right-of-way to them if the bicyclist/pedestrians are using the crosswalk on a manner consistent with the safe use of the crosswalk.
- Bicyclists shall use hand signals for turning movements from the proper position on the road.
- Bicyclists shall obey all traffic control signs.
- Bicyclists shall make turning movements from the proper position on the road
- If local authorities permit bicycles on sidewalks or hiking trails, every bicyclist shall yield to the right-of-way to pedestrians.
- Bicyclists shall not ride at night unless the bike is equipped with the correct, functioning lamps and reflectors.
- The government body can designate bike lanes, bikeways, and sidewalks for bicycle use, or prohibit the use of bicycles on a roadway.

OVERCOMING BARRIERS

Freeways, Rivers, and Railroads

Build bridges to accommodate all modes of transportation: existing and planned bridges must include the appropriate bicycle and pedestrian facilities. For security reasons, these are preferable to separate bicycle-pedestrian bridges. If bicycle-pedestrian bridges are needed, they should be located so they are visible, accessible from the existing roadway network and close to areas with high potential use, such as residential and commercial areas, schools or parks. The following are some examples of at-grade railroad crossings suggested by AASHTO:



Environmental Corridors

Wetland and conservancies can be some of the most challenging features to overcome. Interest in protecting these lands can be from the local and county level as well as the Wisconsin Department of Natural Resources and the U.S. Army Corps of Engineers. Permitting is often difficult, but not impossible. Support from local, county, and state planning agencies can sometimes facilitate the permitting process. Many projects are forced to incorporate wetland mitigation and wetland banking into their projects as conditions of their accepted permits.

Wide Streets

Use pedestrian crossing treatments, such as raised median islands and curb extensions.

Intersections

Use special treatments such as refuge islands, smaller radius corners and through painted bike lanes.

At-Grade Railroad Crossings

Maintain existing crossings in safe condition for bicyclists and pedestrians.

Heavy Motor Vehicle Traffic Volumes

Provide well-designed bicycle and pedestrian facilities that will attract hardy users. More timid users, who perceive that they are no longer alone, will also be attracted to heavy traffic streets. Transportation Demand Management practices and traffic calming can help reduce traffic volumes and speeds at peak hours.

GRADES AND SIGHT DISTANCES

The AASHTO guide for development of bicycle facilities outlines the maximum grades for shared use paths. When facilities are being added to a roadway, the roadway grades usually control over the bicycle facilities. In instances where the facility is a separated path, the recommended grades and grade lengths can be accommodated.

Just like roads and streets, bicycle facilities should be designed with proper sight distances in order to provide bicyclists with enough time to react to danger. Sight distances are determined from several variables such as reaction time, bicycle speed, coefficient of friction, and bicycle braking capacity.

Refer to the appendix for general grade, curve, and sight distance design guidelines.

BICYCLE FACILITY TYPES AND COSTS

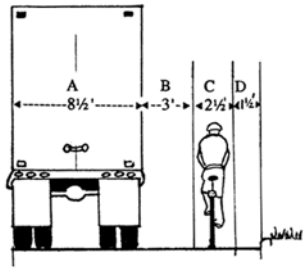
Shared Roadway

On a shared roadway, bicyclists and motorists are sometimes accommodated in the same travel lane or because of narrow widths or parked vehicles; motorists may find it necessary to overtake bicyclists by switching into the oncoming travel lane. Shared roadway facilities are common on city street systems, narrow town roads, and county trunk highways. This facility type will continue to provide a very common form of bicycle accommodation. Because of the low volume of traffic, most of these roadways are currently suitable for bicycling with no additional improvements necessary.

There is no cost to accommodate bicycles in a shared roadway.

Wide Curb Lanes

Wide curb lanes are normally used on multi-lane arterials and collectors, which have high traffic volumes. The right (curb) lane is used to accommodate bicycles and vehicles, therefore, a lane wider than the typical 12 feet is provided. The extra width allows for safe bicycle traffic and allows vehicles to pass bicycles without changing lanes. The lanes also act to minimize the real and perceived conflicts between bicycles and motor vehicles.



Minimum Cross Section

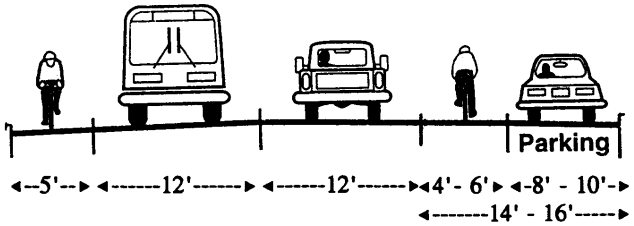
AASHTO guidelines consider a lane with 14 feet of usable width as being minimum. Usable width is considered that distance which is between the left-hand lane line and the curb flange line. AASHTO does not consider the gutter section of a road usable due to the many joints and the location of storm water inlets. A typical cross section is shown above. Note that a 3-foot separation between vehicles and bicyclists is required by State law.

When wide curb lanes are used, the road design should include bicycle safe storm inlet grates and elimination of the longitudinal joint, which runs between the gutter and the roadway.

Assuming that width is available, costs of retrofitting bicycle accommodations on arterial streets can be between $20,000 and $65,000 per mile.

Bike Lanes

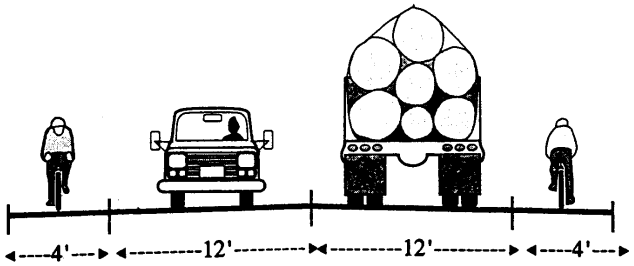
Bike lanes are normally found on urban arterials and collectors. Bike lanes are characterized by painted lines and roadway markings and are one-way facilities that handle bicycle traffic that is moving in the same direction as adjacent motor vehicle traffic. Bicycle lanes allow for more predictable movements by bicyclists, thereby giving the bicyclist more confidence in using them and it allows a comfort level for all longitudinal joints.



Costs of providing bike lanes range from $20,000 to $133,000 (for both sides of roadway) depending on the surface type and the provision of a 5 or 6-foot width. In some cases, pavement marking can be used to re-define vehicle lane widths, reducing them to 11 feet wide to provide additional space and reduce the cost.

Paved Shoulders

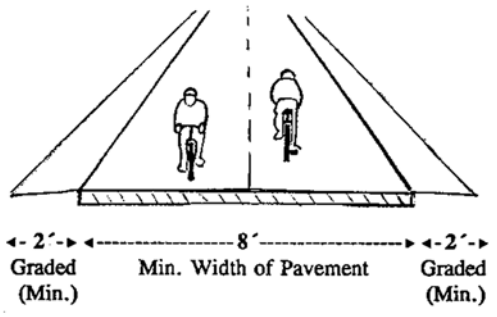
Wide curb lanes and bike lanes are typically used for urban cross sections. In many communities, including Pewaukee, roads have rural cross sections (no curbs), therefore, bicyclists must use road shoulders to get to their destinations. In cases where a bicyclist must ride on a shoulder, smooth, paved shoulders should be provided and maintained. The shoulder width should be a minimum of 4 feet, with 5 or 6 feet being desirable. If the facility will be used primarily by experienced adult bicyclists, an 18 to 24 inch paved shoulder may be sufficient. On many County and State highways, the highways contain "rumble" strips to alert motorists when they are off the travel lane. Though it is an effective safety tool for motorists, it does not provide a safe environment for bicyclists. One option to accommodate a smooth ride for bicyclists, yet maintain rumble strips is to provide a one foot smooth section on the center of the rumble strip to allow for safe passage.



Costs of paving a 5 ft. wide shoulder is $78,000 - $147,000 per side per mile when a suitable gravel base is provided. Where there is minimal or no shoulder, the cost may go up substantially due to re-ditching, tree removal and additional material needed to provide a solid base.

Shared Use Path

A shared use path is characterized as an off road paved path that can accommodate two-way bicycle traffic as well as other types of users (strollers, walkers, runners, etc.). A shared use path could be separated from a roadway by a narrow section of open space or it could be through open lands. Shared use paths can provide mobility along rivers, greenways, rail lines, and between subdivisions. Shared use paths are best used where there are minimal street and driveway crossings because they limit the number of conflict points with motor vehicles.



According to AASHTO Bicycle Guidelines and the WisDOT, the recommended width for a two-way bike path is 10 feet, though 8 feet is the minimum width. For one-way traffic, the minimum width is 5 feet. The width to be used may depend on the expected volume of bicycle usage as well as pedestrians, skate boarders, skaters and people walking their pets. One way paths should be clearly marked to discourage two-way traffic.

The cross section for a two-way path should include a 2 feet wide clear zone on both sides of the path. The clear zone should be void of trees, poles, walls, fences, signs, and guardrails. The vertical clearance should be 8 feet unless maintenance vehicles need to traverse the path.

Bike paths have the highest variance in cost. Typical paths found on abandoned railroad rights-of-way cost approximately $65,000 per mile for a crushed limestone surface. Urban multi-modal paths with appropriate intersection treatment, 12 feet width, asphalt surface, lighting and landscaping can be as much as $500,000 per mile, not including right-of-way acquisition.

Summary

Challenges in the City of Pewaukee include the narrow local roadway corridors, number of County and State Highways and speed on those highways. In narrow road corridors, bicycle improvement projects may be more costly due to the amount of grading and ditching that is necessary to widen the pavement and add a bicycle/pedestrian facility. The County and State highways tend to have higher speed limits which compromises the use of bike lanes.

In general, separated pathways are preferred to on-road facilities and should be pursued wherever possible to move pedestrians and bicyclists away from danger. If a separated path is not possible along a roadway, consider widening the roadway to include either paved shoulders or wide curb lanes and reducing the speed limit. Make sure road and railroad crossings are signed according to MUTCD regulation and incorporate signalized crossings whenever available.

INVENTORY

EXISTING CONDITIONS

The City of Pewaukee encircles the east end of Pewaukee Lake and the Village of Pewaukee. Before incorporating in 1999, the City was the Town of Pewaukee. Pewaukee's neighbors include the Town of Lisbon to the north, the Town of Delafield to the west, City of Brookfield to the east and the City of Waukesha to the south. There are approximately 92 miles of local roads, 31 miles of state and county highways, and 15 miles of freeway in the City.

The City has many high volume State and County Roads that pass through it. Running north and south through the City are County Highways F, G, T, JJ, M and State Highways 16, 164, and 74. State Highway 190 and Interstate Highway 94 both run east and west through the city. The Canadian National railroad runs north-south along the east side of the City and the CP Rail System bisects the north and south halves of the City.

The Pewaukee River begins at the east end of Pewaukee Lake and meanders to the southeast where it empties into the Fox River. The Fox River cuts off the southeast corner of the City and continues on into the City of Waukesha.

The streets in the city tend to be narrow two lane roads in wide right-of-ways with little or no shoulder and generally medium to deep ditches. As the city has grown, so has the volume of traffic. Roads that were once generally rural two-way roads are now becoming collectors and arterials moving residents to and from the newer unconnected subdivisions to the parks and other trip generators that, too, were once on low volume roads.

EXISTING AREA BICYCLE PLANS

An important and sometime challenging goal of facility planning is maintaining continuity where different communities border each other. Good neighbor relations and similar design standards facilitate these connections.

The Southeast Wisconsin Regional Planning Commission 2010 Bicycle and Pedestrian Facilities System Plan selects many of the county roads within the city as proposed bicycle routes. Also depicted are the Pewaukee River Parkway, the Fox River Trail, and a general connection to each from the city.

The proposed Waukesha Greenway Plan moderately affects the City. Included in the plan are the proposed corridors for the Fox River Trail in the City's southeast corner and the Pewaukee River Parkway, which runs north to south through the city. The plan will outline the design criteria used for selecting the corridor in the Parkway.

The only connection between the City of Brookfield Greenway Plan and Pewaukee is the Fox River Trail coming into the eastern edge of the City on an abandoned railroad corridor.

The Town of Delafield Comprehensive Outdoor Recreation Plan does not connect with Pewaukee other than the Lake Country Trail, which is maintained by Waukesha County.

The bicycle and pedestrian plan with the most connections is the Village of Pewaukee Bicycle Plan. Many of the connections have been extended into the City of Pewaukee.

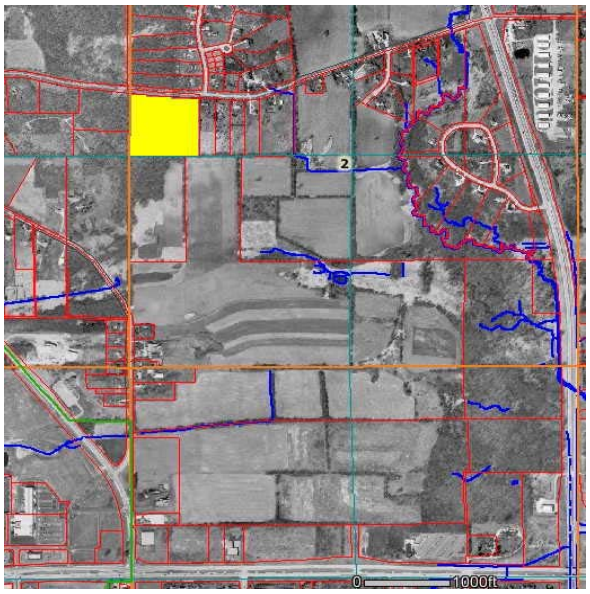
Refer to the exhibits section for the Bike Plan Map showing existing and proposed bicycle/pedestrian ways.

BICYCLE/PEDESTRIAN ROUTE LOCATIONS

The following pages include specific information regarding each segment proposed for facility improvement by the City of Pewaukee Bike Plan. Included for each segment are the existing conditions, notes regarding attributes that might affect facility implementation and design, and the recommended facility type and/or improvement.

BALMER PARK TO CAPITOL DRIVE (STH 190)

Location: Through land south of Balmer Park to Capitol Drive



Looking south from Balmer Park

Existing Conditions:

Segment Type:	URBAN MINOR/COLLECTOR STREET (FUTURE)
Speed Limit:	NA
Pavement Width:	NA
Ditch Depth & Location/ Curb B to B:	NA
Existing Bike Facility:	NA
On Street Parking:	NA

Notes:

Recommendations:

Since the land is undeveloped, there are several options to connect Capitol Drive to Balmer Park. For bicyclists, incorporating a wide curb lane would suffice. For pedestrian traffic a designated sidewalk or side path would provide the safest method for pedestrian traffic.

CAPITOL DRIVE (CTH JJ)

Location: West Village limits to west City limits

Existing Conditions:

Segment Type:	RURAL ARTERIAL
Speed Limit:	35 MPH
Pavement Width:	24'
Ditch Depth & Location/ Curb B to B:	2.0+' DEEP ON SOUTH SIDE, 1.0' DEEP ON NORTH SIDE / 12' FROM EDGE OF ROAD
Existing Bike Facility:	NONE
On Street Parking:	NONE

Notes:
Gravel shoulders vary in width
Route is designated in the SEWRPC Plan
Probable wetland issues if grading new shoulder and ditches

Recommendations:
The addition of paved shoulders and appropriate signage would facilitate bicycle travel; ditches will need to be moved out away from the road

CAPITOL DRIVE (STH 190)

Location: Pewaukee Road to Springdale Road

Looking west from STH 164

Looking east from STH 164

Existing Conditions:

Segment Type:	URBAN ARTERIAL
Speed Limit:	VARIES
Pavement Width:	50'
Ditch Depth & Location/ Curb B to B:	
Existing Bike Facility:	NONE
On Street Parking:	NONE

Notes:

High traffic speeds and volumes
Roadway overpasses STH 74 and Duplainville Road
South side of right-of-way more open and constructible than north side

Recommendations:

Construct side path on the south side of the road.

DUPLAINVILLE ROAD

Location: Weyer Road to Green Road

Weyer Road to Lindsay Road

Looking north from Green Road

Looking south from Overhill Lane

Looking north from Overhill Lane

Existing Conditions:

Segment Type:	RURAL ARTERIAL
Speed Limit:	35-45 MPH
Pavement Width:	24'
Ditch Depth & Location/ Curb B to B:	3-5' DEEP/ 18' FROM EDGE OF ROAD
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:
Deep ditches in some areas
Narrow areas near the subdivisions north of the Capitol Drive overpass

Recommendations:
Construct side path on the west side of the road.

EAST FIELDHACK DRIVE TO THE LAKE COUNTRY TRAIL

Location: From southernmost part of Fieldhack Drive to the Lake Country Trail

View from East Fieldhack Drive

Existing Conditions:

Segment Type:	NA
Speed Limit:	NA
Pavement Width:	NA
Ditch Depth & Location/ Curb B to B:	NA
Existing Bike Facility:	NA
On Street Parking:	NA

Notes:

Short segment, less than 150 LF

Must cross over stream, wetland and PEC to get to trail, use culvert or boardwalk, DNR permits required; tree/brush remo

Recommendations:

Two options to consider:

Construct shared path to connect Fieldhack Drive to the Lake Country Trail

GLACIER ROAD

Location: West Village limits to west City limits

Looking west from Ryan Street

Looking east from City limits

Existing Conditions:

Segment Type:	RURAL ARTERIAL
Speed Limit:	25 MPH
Pavement Width:	28'
Ditch Depth & Location/ Curb B to B:	1-2.5' DEEP / 5.5' FROM PAVEMENT EDGE
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:

Route should not be recommended for inexperienced riders.
Challenging hilly terrain

Recommendations:

Construct paved shoulders along both side of the road

GREEN ROAD

Location: Pewaukee Road to Wagner Park

Looking east from Pewaukee Road

Looking west from Duplainville Road

Existing Conditions:

Segment Type:	RURAL/URBAN ARTERIAL
Speed Limit:	35 MPH
Pavement Width:	24' / 3' GRAVEL SHOULDER
Ditch Depth & Location/ Curb B to B:	1' DEEP / AT 7' FROM SOUTH PAVEMENT EDGE
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:

City wants to keep the roadway rustic

North side of road open between edge of pavement and existing right-of-way for the entire stretch

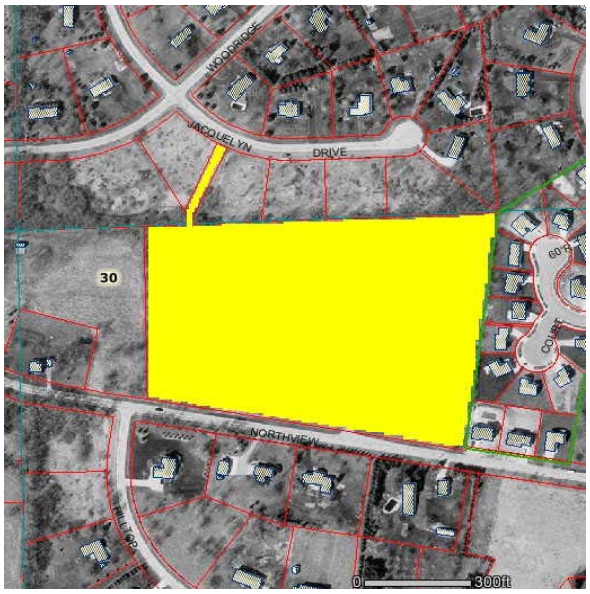
Some tree trimming on north side may be necessary to allow bike/pedestrian access and accommodate sight lines

Recommendations:

Construct side path on north side of road

JACQUELYN DRIVE TO SOUTH PARK

Location: Through easement from Jacquelyn Drive to South Park



View from Jacquelyn Drive to park

Existing Conditions:

Segment Type:	PEDESTRIAN RIGHT-OF-WAY
Speed Limit:	NA
Pavement Width:	NA
Ditch Depth & Location/ Curb B to B:	NA
Existing Bike Facility:	NA
On Street Parking:	NA

Notes:
Easement for path already exists
Project already in construction phase through City Engineering Department

Recommendations:
No further action needed

LINDSAY ROAD

Location: Swan Road to Duplainville Road

West or Balmer Park

East of Balmer Park

East of STH 164

Existing Conditions:

Segment Type:	RURAL ARTERIAL
Speed Limit:	45 MPH
Pavement Width:	24'
Ditch Depth & Location/ Curb B to B:	1.5' DEEP / 5.0' FROM PAVEMENT EDGE
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:

City wants to keep the roadway rustic

West of Balmer Park Lindsay Rd is narrow with pronounced ditches and trees close to road

Right-of-way along Lindsay Rd east of Balmer Park have open areas and minimal ditches

Recommendations:

Construct two way path on south side of road from Swan Road to Duplainville Rd, may require pedestrian signalization of intersection at STH 74 in order to safely cross the highway.

MEADOWBROOK ROAD/PROSPECT AVE. (CTH G)

Location: Lake Country Trail to north City limits

Existing Conditions:

Segment Type:	RURAL
Speed Limit:	45 MPH
Pavement Width:	24'
Ditch Depth & Location/ Curb B to B:	WEST SIDE 1.5' DEEP / EAST SIDE 0.75' DEEP
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:

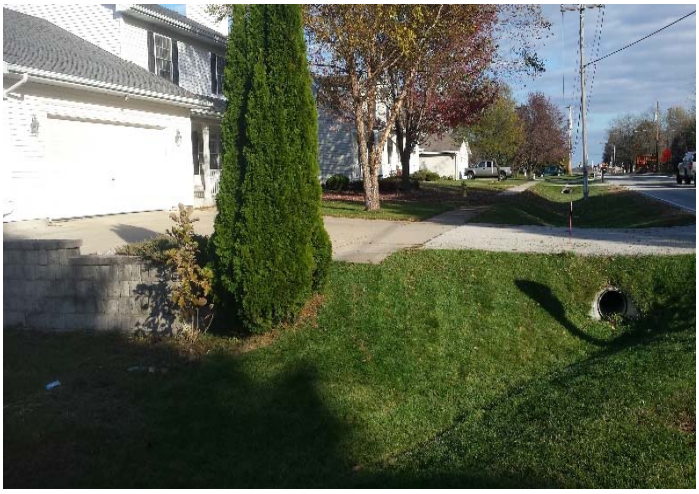
Ditch on west side more pronounced than east side
Power poles on east side
Mostly residential on east side of road
Right-ofway available on easterly side of the road

Recommendations:

Construct boardwalk from Lake Country Trail to a point north of the creek crossing due to wetland and creek
Construct shared path along easterly siode of the road; serpentine the rath around power poles
Tree/brush removal required; line stripe at intersections; regrade ditches if necessary

NORTHVIEW ROAD

Location: Meadowbrook Road to South Park



Looking east from South Park

Looking west from mid-section

Existing Conditions:

Segment Type:	RURAL ARTERIAL
Speed Limit:	35 MPH
Pavement Width:	24'
Ditch Depth & Location/ Curb B to B:	1.25' DEEP / 5' FROM PAVEMENT EDGE
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:

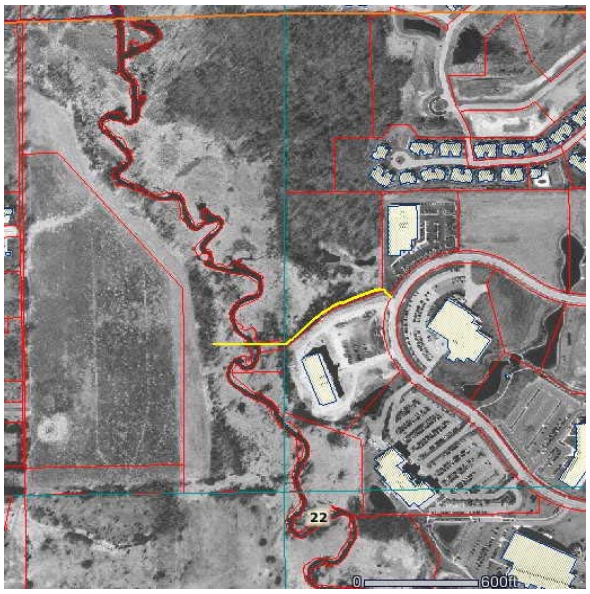
Existing sidewalk extended from Meadowbrook Road past first house on north side
Some clearing and grubbing is required
sidewalk located in front of last three homes directly east of South Park (City of Waukesha)

Recommendations:

Construct sidewalk on north side of road to connect to existing sidewalk

PEWAUKEE RIVER GREENWAY TO RIVERWOOD DRIVE

Location: WEST END OF RIVERWOOD DRIVE TO PEWAUKEE RIVER GREENWAY



Looking west from Riverwood Drive

Existing Conditions:

Segment Type:	NA
Speed Limit:	NA
Pavement Width:	NA
Ditch Depth & Location/ Curb B to B:	NA
Existing Bike Facility:	NA
On Street Parking:	NA

Notes:

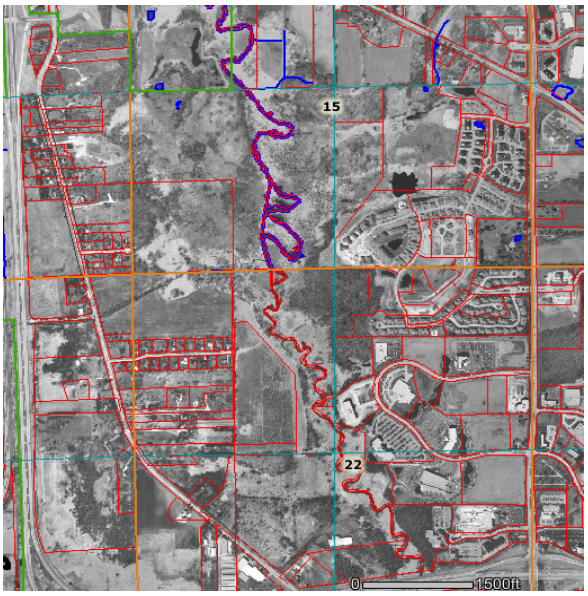
County Parks and Land Use Department supports a connection at this point
Permitting may be extensive in the greenway
Boardwalk may be needed

Recommendations:

Construct two way path to the proposed Pewaukee River Greenway

PEWAUKEE RIVER GREENWAY

Location: South end of Morris Street to proposed Fox River Trail



Looking east from CTH JJ

Existing Conditions:

Segment Type:	NA
Speed Limit:	NA
Pavement Width:	NA
Ditch Depth & Location/ Curb B to B:	NA
Existing Bike Facility:	NA
On Street Parking:	NA

Notes:
Waukesha County Parks and Land Use Department has proposed corridor beginning at Riverside Drive as part of their Greenway Plan

Recommendations:
The trail route proposed by Waukesha County could be intersected at the south end of Morris Street. Extend sidewalk on east side of Morris Street down to the trail and follow the route proposed by Waukesha County

PEWAUKEE ROAD (STH 164)

Location: North Riverwood Drive to Swan Road

Existing Conditions:

Segment Type:	URBAN ARTERIAL
Speed Limit:	45 MPH
Pavement Width:	24' PAVEMENT / 12' GRAVEL SHOULDER
Ditch Depth & Location/ Curb B to B:	1.5' DEEP / 27' FROM CENTERLINE
Existing Bike Facility:	SEPARATED PATH
On Street Parking:	NONE

Notes:

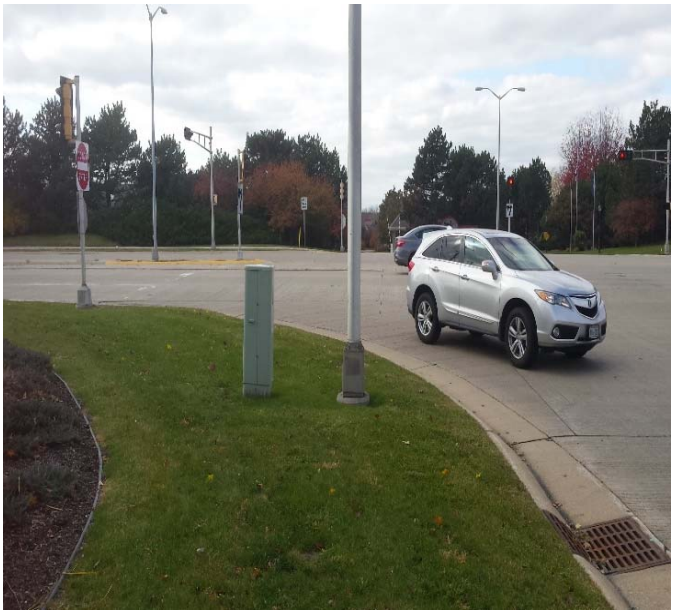
Waukesha County constructed shared path as part of 2004 Reconstruction Project
Path on west side from Riverwood Dr. to Green Road; east side from Green Road to Capitol Drive

Recommendations:

PEWAUKEE ROAD (STH 164)/RIDGEVIEW PARKWAY CROSSING

Location: Pewaukee Road at Ridgeview Parkway

Looking south from NW corner



looking west from SE corner

Existing Conditions:

Segment Type:	URBAN ARTERIAL DIVIDED
Speed Limit:	45 MPH
Pavement Width:	102' (APPROX.)
Ditch Depth & Location/ Curb B to B:	N/A
Existing Bike Facility:	SHARED PATH ON WEST SIDE
On Street Parking:	NONE

Notes:

No sidewalk to pedestrian path on Ridgeview Parkway
No refuge island in STH 164 that meets minimum FHA requirements
Signal timing on STH 164 does not allow for person to cross east/west without holding in the ex. 2' island

Recommendations:

Line striping on south leg of STH 164
Line striping on Ridgeview Parkway
Pedestrian crossing wanring signs on STH 164, north and south approaches
Install Rectangualr Rapid Flashing Beacons (RRFB) and ped signals

PROSPECT AT NETTESHEIM PARK and AT CRESTVIEW DR.

Location: Prospect at Nettesheim Park/Prospect at Crestview Dr.

Existing Conditions:

Segment Type:	RURAL ARTERIAL
Speed Limit:	35 MPH
Pavement Width:	24'
Ditch Depth & Location/ Curb B to B:	1-2 FEET
Existing Bike Facility:	NONE
On Street Parking:	NONE

Notes: Nettesheim Park
Oak Street is offset approx. 35 feet south leg vs. north leg
Site distance from south leg to west does not meet stopping site requirements
Site distance substnatially imporves if crossing is at north leg
If extended south from north leg; path to park would need to be constructed for access

Recommendations: Nettesheim Park
Install crosswalk location from east side of Oak Street north leg directoy south
Install path from crosswalk to park entrance
Install warning signs on east and west apporaches to the intersection
Install Rectangualr Rapid Flashing Beacon (RRFB) at crosswalk with push button

Notes: Crestview Drive
Crestview Drive is offset approx. 70 feet from peterson drive (north)
Site distance is adequate in northeast/southwest direction
Proposed path on Meadowbrook Road to be on south side
Most direct route from Peterson Road to path is perpendicular to Prospect Avenue

Recommendations: Crestview Drive
Install crosswalk location from west side of Peterson Dr. perpendicuar to Prospect Ave.
Install warning signs on northeast and southwest apporaches to the intersections
Install Rectangualr Rapid Flashing Beacon (RRFB) at crosswalk with push button
Add warning sign on Crestview to warn right turning vehicles of the crossing

PROSPECT AVENUE (CTH G)

Location: Maple Street to College Avenue

Existing Conditions:

Segment Type:	RURAL/URBAN ARTERIAL
Speed Limit:	35 MPH
Pavement Width:	24' WITH 1.0' PAVED SHOULDER ON THE NW SIDE OF STREET
Ditch Depth & Location/ Curb B to B:	1.5' DEEP / 3' FROM ROAD EDGE
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:
Very narrow road and rural section
Developed trees predominately on east side of road, near pavement

Recommendations:
Construct paved shoulders and signage. May require re-grading of ditches and tree removal
Reduce speed limit to 30 MPH in this segment for safety

RYAN ROAD (CTH KF)

Location: STH 16 to proposed Ryan Park

Existing Conditions:

Segment Type:	RURAL ARTERIAL
Speed Limit:	45 MPH
Pavement Width:	24' WIDE / 12' GRAVEL SHOULDER
Ditch Depth & Location/ Curb B to B:	1' DEEP / 12' FROM EDGE OF SHOULDER
Existing Bike Facility:	NONE
On Street Parking:	NONE

Notes:
Existing sidewalk on east side of bridge over STH 16
Proposed Ryan Park on east side of road to be developed by County

Recommendations:
Construct two-way side path from STH 16 to Ryan Park on east side of road

SPRINGDALE ROAD

Location: Capitol Drive to north leg of Glenwood Lane

Looking north from Glenwood Lane

Looking south at Green Road

Looking south from Capitol Drive

Existing Conditions:

Segment Type:	RURAL/URBAN ARTERIAL
Speed Limit:	35 MPH
Pavement Width:	30'
Ditch Depth & Location/ Curb B to B:	1' DEEP / 7.5 FROM PAVEMENT EDGE
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:

Nice paved shoulder on the west side of the road
East side shoulder is narrower

Recommendations:

Construct side path on west side of road

SWAN ROAD

Location: Pewaukee Road to Lindsay Road

Existing Conditions:

Segment Type:	RURAL COLLECTOR
Speed Limit:	35 MPH
Pavement Width:	24'
Ditch Depth & Location/ Curb B to B:	1.5'-2.0' DEEP / 4.0' FEET FROM PAVEMENT EDGE
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:
City wants to keep the roadway rustic
Narrow section with pronounced ditches

Recommendations:
Construct two-way side path on east side of road from Pewaukee Road to Lindsay Road

Consideration should be given to purchasing additional right-of-way and move the path to the outside of the trees in order to maintain the rustic character of the road. The path may have to swing out to the road as a paved shoulder where constraints do not allow it to be separated from the road

WATERTOWN ROAD (CTH M)

Location: Pewaukee Road to the Fox River Trail

Existing Conditions:

Segment Type:	RURAL/URBAN ARTERIAL
Speed Limit:	45 MPH
Pavement Width:	25'
Ditch Depth & Location/ Curb B to B:	2.0 FEET DEEP / 25' FROM ROAD CENTERLINE
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:

Waukesha County will construct short segments on north side of road at STH 164 as part of 2004 Reconstruction Project

Relocation of utility poles may be necessary to construct path on north side of road

Recommendations:

Construct two-way path from Pewaukee Road southeasterly to proposed Fox River Trail on north side of Watertown Road with crossings to the proposed residential development and/or Pewaukee River Parkway which are south of Watertown Road.

WATERTOWN ROAD (CTH M)

Location: Pewaukee Road to Forest Grove Drive

Existing Conditions:

Segment Type:	RURAL ARTERIAL
Speed Limit:	35 MPH
Pavement Width:	25'
Ditch Depth & Location/ Curb B to B:	2.0 FEET DEEP / 25' FROM ROAD CENTERLINE
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:

Relocation of some utility poles may be necessary to construct path on south side of road
Trees/shrubs adjacent to residential subdivisionswill have to be partially cleared
Substantial tree removal at west end of segment - heavy tree/brush growth close to the road pavement

Recommendations:

Construct shared path from Pewaukee Road northwesterly to Forest Grove Drive on south side of Watertown Road.

WEYER ROAD

Location: Duplainville Road to east City Limits

Looking east towards City Limits

Looking west towards Duplainville Road

Existing Conditions:

Segment Type:	RURAL/URBAN ARTERIAL
Speed Limit:	45 MPH
Pavement Width:	22
Ditch Depth & Location/ Curb B to B:	1-2' DEEP / 7' FROM PAVEMENT EDGE
Existing Bike Facility:	SHARED ROADWAY
On Street Parking:	NONE

Notes:

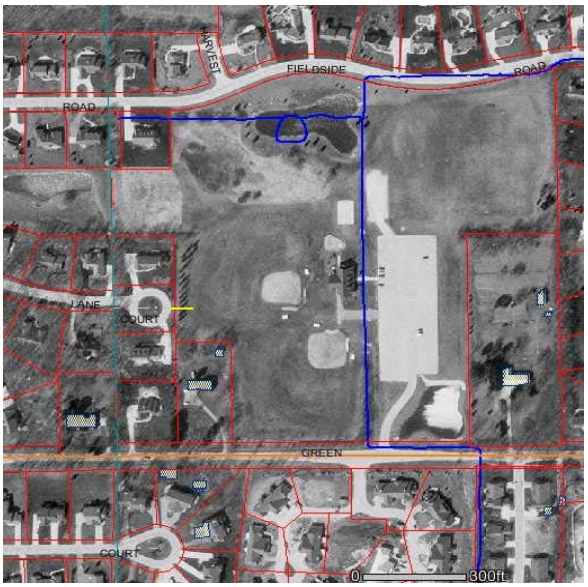
Some clearing and grubbing necessary for side path
Road is primarily open and constructible except for immediate area off of Duplainville Road
Road has rustic qualities near Duplainville Road
Railroad will oppose a pedestrian/bicycle crossing over the tracks parallel to Duplainville Road on east side

Recommendations:

Construct a two-way path on the south side of the road

Woodstream Ct cul-de-sac to Wagner Park

Location: EAST END OF CUL-DE-SAC THROUGH BERM TO PARK



Looking east from Woodstream Court

Looking west from Wagner Park

Existing Conditions:

Segment Type:	NA
Speed Limit:	NA
Pavement Width:	NA
Ditch Depth & Location/ Curb B to B:	NA
Existing Bike Facility:	NA
On Street Parking:	NA

Notes:

Evidence of walking trail worn into existing berm between park and subdivision

Recommendations:

Construct short two way path from east end of Woodstream Court cul-de-sac into the park

The Park and Recreation Committee should consider adding paths within the park to the pavilion and to Northview Rd

RECOMMENDATIONS

2019 ROUTE EVALUATIONS/RECOMMENDATIONS

#1. East Fieldhack Drive to the Lake Country Trail

The shortest connector trail between East Fieldhack Drive and the Lake Country Trail would be near the driveway into W26637 East Fieldhack Drive, west of the development pool and tennis activity area. There is no existing man-made trail that is used for residents to get from east Fieldhack Drive to the trail. Part of the reason is that there is a vertical face curb along the south side of Fieldhack Drive and an elevation drop of seven (7) feet immediately south of the curb. The land between east Fieldhack Drive and the Lake Country Trail contains environmental corridor, wetland, floodplain and We Energies high tension power lines.

Options to install an accessible trail between East Fieldhack Drive and the Lake Country Trail include filling the area land to create a base for an asphalt trail or constructing a boardwalk between the two access points.

Filling Option: Improvements would include creating a curb cut and detectable warning field for access from East Fieldhack Drive, placing fill in an environmental corridor, wetland and floodplain, substantial tree/brush removal, wetland delineation, substantial floodplain modeling, WDNR and US Army Corps of Engineers (USACOE) permitting, access permission from the Spice Creek Condominium at Meadowbrook Farms homeowners, and permission to install improvements through a likely American Transmission Company easement for high tension wires and poles, as well as We Energies. Estimate of probable construction cost is $22,000.

Boardwalk Option: Improvements would include creating a curb cut and detectable warning field for access from East Fieldhack Drive, construction of a boardwalk for approximately 150 feet between the two access points, fill to create the required handicap accessible access, permitting from WDNR, USACOE, floodplain analysis, minimal tree/brush removal, access permission from the Spice Creek Condominium at Meadowbrook Farms homeowners, and permission to install improvements through a likely American Transmission Company easement for high tension wires and poles, as well as We Energies. Estimate of probable construction cost is $188,000.

Considerations: Although this segment is short and makes sense to connect the Lake Country Trail to the residential development, there will be a substantial amount of effort needed to gain the approval of the condominium property owners and to apply for and receive environmental permits after preparing a design, without a guarantee that permits would be issued. For wetland disturbance, the WDNR requires an alternatives analysis which may show that an alternative route (such as the trail along Meadowbrook Road, CTH G), may prove to have less impact on the environment and may be more feasible.

#2. Meadowbrook Road, Lake Country Trail to City/Village boundary
(approx. 8,800 lineal feet)

This proposed trail would be a connector between the Lake Country Trail and Pewaukee school lands. It will serve a substantial number of existing residential properties along the way and provide a safe and efficient access for pedestrians and bicyclists to get to the Lake Country Trail. After consideration of improvements, and right-of-way availability on both sides of Meadowbrook Road, We suggest that an off road path be placed on the easterly side of Meadowbrook Road for the entire length. Design recommendations and challenges by section are noted as follows:

Lake Country Trail to E. Fieldhack Drive: It appears that vehicles have parked on the east side of Meadowbrook Road and have created a wide gravel shoulder. Beyond the gravel shoulder, the land drops off into what is likely a wetland. To minimize wetland filling, a paved shoulder, clearly marked with pavement markings are suggested. There is a creek that crossed under Meadowbrook Road. The creek flows under Meadowbrook Road via a large (60") culvert. There is a stone headwall located approximately 13 feet off the travel lane (white line). North of the creek, the side slope off the road to the east drops off approximately 5 feet in 13 feet. It is suggested that the headwall be increased in height and extended north in order to install a paved shoulder. Some type of railing or barrier system would be required to maintain safety along this portion of the path.

As an alternate to the paved shoulder/bike lane, a boardwalk between the Lake Country Trail and the north side of the creek should be considered. The boardwalk would be placed adjacent to the wetlands north of the Lake Country Trail and then span the creek. Wetland disturbance would be minimized, but extensive permitting may be required for the creek crossing.

E. Fieldhack Drive to Accent Court: The right-of way along this section of the path is approximately 50 feet east of the centerline of Meadowbrook Road. The land east of the roadway is open except for some trees, power poles and utility boxes. A gentle curvature of the path could be employed to avoid conflicts and provide the user with some variety. The path should be set back off the road so that the ditch adjacent to the road can be maintained. There is a section of wooded/brush area that acts as a buffer to the rear of the lots on Shooting Star Road. Selective tree cutting could be required to minimize the visual impact to those residents.

Accent Court to College Avenue (CTH SS): The right-of way along this section of the path is approximately 50 feet east of the centerline of Meadowbrook Road; however, the parcels along this section front onto Meadowbrook Road. The path would be placed within the right-of-way and be placed such that existing improvements are not damaged. The path should match driveway grades. As the proposed path approaches College Avenue, the road pavement appears to shift to the east and the available right-of-way on the east side narrows such that there is very limited room in the right-of-way for an off-road path. A paved shoulder could be employed along the existing pavement; however, bicyclists may be in conflict with right turning vehicles. The use of a designated bike lane through the intersection should be considered.

Prospect Avenue (CTH G) to northerly end of Galilee Lutheran Church: The path would continue on the northeasterly side of the roadway. The right of way along CTH G, directly northeast of Prospect Avenue appears to be 33 feet in width. The acceleration lanes appear to take up a substantial amount of the right-of-way; therefore, easements will have to be acquired. The potential easement area includes a ditch and wooded/ brush areas. The path should be set back off the road as far as possible to allow the roadside ditch to function as it does presently. Selective tree and brush removal will be necessary for this section.

Northerly end of Galilee Lutheran Church and City/Village Limits (Pewaukee School Grounds): There are three homes that front along this section of the path. Two that are located north of the church property where there are substantial sized trees along the east side, a ditch a few feet off the pavement and the land rises towards the front property line. Lands along the Steeplepoint subdivision also have the tree/brush buffer, with a minimal ditch depth very close to the road. To construct an off road path along this section, substantial tree removal is required along with grading in the right-of-way (I note that one property has not dedicated right-of-way in the front, so the path may need to shift towards the road to stay within the prescribed right-of-way). The third house is located southwest of the City/Village limits and has very limited right-of-way (25 feet) east of the centerline of the road and the house is located approximately 34 feet east of the right-of-way line. The path would likely require the removal of a couple of trees in their front yard.
Estimate of probable construction cost is $737,000.

#3. Northview Road, from west end of sidewalk to South Park

The sidewalk on CTH TT was extended west, on the north side of Northview Road to the driveway at the property address N4 W27050 Northview Road. There is also sidewalk in front of homes between 3308 Northview Road and 3316 Northview Road (City of Waukesha properties). The intent of this section is to connect the walk located west of CTH TT with the existing walk in front of said homes and then connect to South Park parking lot. The right-of-way along this section is a consistent 40 feet north of the centerline of the road. The land north of the pavement gently slopes down into an 18-inch deep ditch and back up, all in about 25 feet. The sidewalk installed to the east, was installed behind the curb, so there is no ditch. The existing sidewalk to the west on City of Waukesha properties is located behind the ditches, approximately 1 foot off the property line. The City has a several options: 1. A sidewalk could be installed at 1 foot off the property line, which would likely require removal or trimming of trees and landscape plantings on some properties, but would avoid power pole guy wires and utility boxes. 2. Install a path that meanders through the right-of-way that would avoid trees, power pole guy wires and utility boxes, or 3. Require the utility companies to relocate their poles, guys and utility boxes and place the path at the back of the ditch, within the right-of-way, but not as far back as the right of way. This option would require regrading of the ditches and would result in steeper side slopes in the ditches (not always desired by property owners that use riding mowers to cut their grass). Also, the City will likely have to pay for the utilities to relocate their facilities to accommodate the sidewalk location.
Estimate of probable construction cost is $40,000.

#4. Pedestrian Crossing at STH 164 (Pewaukee Road) and Ridgeview Parkway

Pewaukee Road contains a path along the west side of the road. Desired access is from the east side of Pewaukee Road to the west side, although there are no walks or paths in Ridgeview Parkway at this time. This intersection is a signal controlled intersection. Due to the number of lanes in STH 164, and the current timing of the signals, elements of a safe crossing cannot be accomplished. Traffic in Ridgeview Parkway does not allow for enough time to cross the entire Pewaukee Road. The only refuge island is at the location of the signal heads and light poles which are very narrow (2'+/-). (Federal Highway Administration guideline is a minimum of 4 foot wide raised island, preferably 8 feet).

Since physical changes to the median refuge width may not be easily accomplished, an option would be to install pedestrian push-button capabilities on the existing signals which would allow the retiming of the signals for pedestrian crossing. Along with this additional pavement markings and signage would be desired.

Since the improvements would affect a state highway, the City would be required to acquire permission and permits from WisDOT. Furthermore, the traffic signals are maintained by Waukesha County, so permits would be required from the County. Estimate of probable construction cost is $57,000 (RRFB, striping, signs)

#5. Watertown Road/CTH M

(approx. 5,400 lineal feet)

The land uses along the north side of Watertown Road between STH 164 and Forest Grove Drive appear to be vacant lands that include wetlands up to the road pavement and business/light industrial. The land uses along the south side of Watertown Road include residential development, a bar/restaurant and agricultural lands. The anticipated need for a bicycle/pedestrian path would best serve the residential property along the south side of Watertown Road. The evaluation of this section assumes that the path will be placed on the south side of Watertown Road. All considerations for improvements along this segment of bicycle and pedestrian facilities will be in Waukesha County right of way, which means all work will require review and permits from Waukesha County staff.

Beginning at STH 164 and working west, it is noted that the right-of-way along the south side of Watertown Road is located approximately 10 feet south of the road pavement. There are also power poles along the south side of the road close to the right-of-way line. Outside of the right-of-way, the land slopes down at a 3:1 slope to a roadside swale that takes water westerly to an existing pond. The pond is located on private property and is surrounded by a chain link fence. Since there is no turn lane at this point, there is approximately 22 feet of land between the pavement edge and right-of-way line to install a path and meet the clear zone for the power poles and fence. Lands to the west of the pond have a 50 foot right-of-way south of the centerline of Watertown Road. There are four residences that front onto Watertown Road that have various amounts of trees and vegetation requiring that the path be designed to meander through the properties to minimize disturbance to the trees and vegetation.

The 50 foot wide half right-of-way continues westerly along the Creekside Preserve and Creekside Preserve North subdivisions. There is both open lands that would be ideal for a path within the right of way and a section between Creekside Drive and Single Tree Drive where there is an existing heavy tree/brush buffer between the rear yards of homes along Single Tree Court and Watertown Road. West of the subdivisions, there is a bar/restaurant which has minimal trees and utilities, which the path can meander through.

Continuing west, the road pavement shifts to the south resulting in a right-of-way that is only 31 feet off the pavement. Power poles are located 15 feet off the pavement. There is room to construct a path through the agricultural field behind the power poles. West of the agricultural fields, there are a few more residential properties that front on Watertown Road, some with thick vegetation, especially as one approaches Forest Grove Drive.

The intersection of Watertown Road at Forest Grove Drive is not controlled by a multiple stop intersection. At Forest Grove Drive, there is no stop controlled intersection except on the north leg (southbound traffic). The Village of Pewaukee does not have any sidewalks or paths along Forest Grove Drive. Access from the path on the south side of Watertown Road to the north side should include pavement markings, pedestrian crossing ahead signs and possibly a rapid repeating sign with additional signage.

Consideration to install a path on the north side of Watertown Road is not recommended for the following reasons: Near the east end, there are wetlands that encroach out close to the existing pavement edge, which would require wetland disturbance and permitting and special construction for structural stability; there are numerous commercial driveways that may present a safety hazard for path users; the Village of Pewaukee appears to control the right-of-way starting at 1343 E. Wisconsin Avenue and west of said address; switching from the south side of Watertown Road to the north side of Watertown Road mid- block introduces safety concerns for non-experienced users and vehicles that are not expecting pedestrians and bicyclists to cross. Speed limits are 45 mph from STH 164 to Creekside Dr. and 35 mph from Creekside Drive to Forest Grove Road.
Estimate of probable construction cost is $485,000.

#6. Recreational Crossing at:

A. Nettesheim Park and Prospect Ave. (CTH SS)

B. Crestview Drive at Prospect Ave. (CTH G.)

A. Nettesheim Park and Prospect Ave. (CTH SS)

The proposed pedestrian crossing at Oak Street and Prospect Avenue (CTH SS), presents several challenges. The intersection is located on a curve, the approach from the west is uphill, the Oak Street approaches from the north and south are offset and the entrance to the park is along the southerly leg of Oak Street. If a crossing is placed from the southeast corner of Oak Street and Prospect Avenue to the northwest corner of Oak Street and Prospect Avenue, the walking distance is 80 feet (at 4 feet per second that would require 20 seconds to cross the street). The site distance for that crosswalk location looking west is very short due to the uphill grade and the presence of vegetation. A crossing located from the northeast corner of Oak Street and Prospect Avenue, at a 90 degree angle across

the road, to the south side of Prospect Avenue would be approximately 55 feet and take about 14 seconds to cross. The site distance from the south side to the north side of this option is approximately 400 feet, which would be adequate for stopping site distance. Since the entrance to the park is west of the second option, and there is a fence along the north side of the park, an additional walking path from the crossing point to the intersection would be required. The crossing should be enhanced using pedestrian crossing ahead signs and/or a rapid repeating flashing signal at the crossing, along with clear pavement markings. I note that there is already a street light at that intersection. Estimate of probable construction cost is $67,000.

B. Crestview Drive and Prospect Ave. (CTH G)

The purpose of this proposed crossing is to safely move people from the northwesterly side of Prospect Avenue (CTH G) to the south side of Prospect Avenue (CTH G) and to Crestview Drive (which is offset 70 feet from Peterson Drive). This report provides a recommendation to install a shared path along the west east and southeasterly side of Meadowbrook Road (CTH G) from the Lake Country Trail to the northerly limits of the City. If the Meadowbrook section is not in place prior to the construction of this crossing, a short path segment between the crossing and Crestview Drive would have to be constructed. Assuming that the proposed Meadowbrook Road path has been completed, the most direct crossing route would be a crossing that is perpendicular to Prospect Avenue (CTH G). Since people want to use the most direct route, it is most likely that a crossing from the southwest corner of Peterson Drive to the proposed path would be the one most used. Site distance in both directions is adequate. Vehicles turning right from Crestwood Dr. to Prospect Ave (CTH G) should be warned of potential pedestrian crossing. The crossing should be enhanced using pedestrian crossing ahead signs, signs at the crossing and clear pavement markings.
Estimate of probable construction cost is $52,000.

Bicycle and pedestrian facilities for other routes in the City can be found on the next section, including a routing along Prospect Avenue (CTH SS).

BICYCLE/PEDESTRIAN ROUTE LOCATION RECOMMENDATIONS

(See chart next page)

BICYCLE/PEDESTRIAN ROUTE LOCATION RECOMMENDATIONS

Street Name	Location	Existing Features	Recommended Facility Type	Improvements Required	Remarks
Swan Road	Pewaukee Road to Lindsay Road	Narrow rural cross section, defined ditches close to road edge	Shared use path on east side of road	Right of way acquisition, extensive clearing and grubbing, ditch grading or enclosure, and signage	City wants to keep Swan Road as rustic as possible
Lindsay Road	Swan Road to Duplainville Road	Swan Rd to Balmer Park- narrow rural cross section; Balmer Park to Duplainville Rd slightly more open, more possibility for improvements	Shared use path on south side of road	Right of way acquisition, extensive clearing and grubbing, ditch grading or enclosure, and signage	City wants to keep Swan Road as rustic as possible
Pewaukee Road (STH 164)	N. Riverwood Drive to Swan Road	Two lane rural cross section	Shared use path according to agreement with Waukesha County	Extensive grading and shaping, possible bridge modifications, push button signalization at crossings, and signage	Project already in design phase with Waukesha County
Green Rd	Pewaukee Road to Springdale Road	Moderately open rural cross section	Shared use path on north side of road	Tree trimming and signage	City wants to keep Green Road as rustic as possible
Watertown Road (CTH M)	Pewaukee Road to Fox River Trail	Open rural cross section with deep ditches	Shared use path on south side of road	Ditch grading, possible power pole relocation in select locations	
Watertown Road (CTH M)	Pewaukee Road to Forest Grove Drive	Two-lane rural cross section; some ag an open lands	Shared use path on south side of road	clearing and tree rmoval, possible power pole removal, ditching	
Meadowbrook Road/Prospect Ave. (CTH G)	lake coutry trail to north City limits	Partly open rural cross section with deep ditches	Shared use path on east side of road	Avoid poles on east side, re-grade ditch as needed; tree and brush removal	Boardwalk from creek to Lake Country Trail
Northview Road	Meadowbrook Road to South Park	Open rural cross section with moderately deep ditches	Sidewalk on north side of road	Utility pole relocation and moderate grading	
Prospect Avenue (CTH SS)	Meadowbrook Road west to the Lake Country Trail	Narrow rural cross section with deep ditches	Construct paved shoulders	Extensive grading and shaping, possible bridge modifications, ditch re-grading or enclosure, signage and striping	Some segments not bad, segments closer to Lake will be difficult with residences close to roadway.
College Avenue (CTH SS)	Prospect Avenue to Main Street	Wide paved shoulders already exists	Shared path on south side of road	Grading and shaping of ditches, signage	Side path due to high speed limit along route
Capitol Drive (CTH JJ)	West Village limits to west City limits	Narrow rural cross section with deep ditches	Paved shoulders	Extensive grading or enclosure of ditches, signage and striping	Low, wetland area on both sides of road, DNR issues, SEWRPC suggested
Glacier Road	West Village limits to west City limits	Narrow rural cross section with deep ditches	Paved shoulders	Extensive grading or enclosure of ditches, signage, and striping	Not recommended for inexperienced bicyclists
Capitol Drive	Pewaukee Road to Springdale Road	Four Lane divided highway	Shared use path on south side of road	Moderate grading and clearing required	Intersections may require push-button signals
Springdale Road	Capitol Drive to north leg of Glenwood Lane	Rural cross section with paved shoulders	Shared use path on west side of road	Extensive grading, clearing and grubbing	
Ryan Road (CTH KF)	STH 16 to Ryan Park	Open rural cross section road, poor sight distances due to grades and horizontal curves	Shared use path on east side of road	Ditch grading and signage	Proposed Ryan Park on east side of road
Duplainville Road	Weyer Road to Green Road	Open rural cross section with moderately deep ditches	Shared use path on west side of road	Move or enclose ditches, possible tree clearing, signage and striping	Two areas become very narrow with deep ditches. Construction under overpass could be difficult.
Weyer Road	Duplainville Road to east City limits	Rural cross section with moderately deep ditches	Shared use path on south side of road	Clearing and grubbing with extensive grading	Some rustic quality to road at east end.

Off Road Paths	Location	Existing Features	Recommended Facility Type	Improvements Required	Remarks
	Balmer Park south to STH 190	Undeveloped property	Bicycle-wide curb lane; pedestrian side path	easement acquisition, construction	Many options
	Woodstream Ct cul-de-sac east to Wagner Park	City park land	Shared use path	easement acquisition, construction	
Pewaukee River Pkwy	Morris St thru Pkwy to River Lane	DNR Conservancy	Shared use path	easement acquisition, construction	In planning phase
	Pewaukee River Pkwy to Riverwood Dr.	DNR Conservancy	Shared use path	easement acquisition, construction	Waukesha County supports connection
	Jacquelyn Dr to South Park	City park land	Shared use path	easement acquisition, construction	In construction phase
	East Fieldhack Dr south to Lake Country Trail	Waukesha County right-of-way	Shared use path or boardwalk	easement acquisition, construction	May be difficult due to creek crossing and wetland involved

OPERATION AND MAINTENANCE

Poorly maintained facilities discourage use and become an eyesore. When planning a new facility, responsibility for that facility should be designated, and maintenance budgets considered. The following maintenance measures should be considered.

Sweeping

Surfaces used by bicyclists that are full of stones and debris presents a hazard to bicyclists. Small rocks can deflect a wheel; sand and glass can cause tire slippage. If facilities are not kept clean, bicyclists will not use the facility. A routine sweeping plan and emergency sweeping plan should both be considered. Routine sweeping should be done at least twice a year.

Surface Repairs

Defects that seem like a nuisance in a vehicle can be dangerous to a bicycle rider. Wherever possible, a smooth surface, free of cracks, potholes, bumps, and other physical problems should be provided. As with regular utility repairs, longitudinal joints should be avoided and asphalt patched should match into existing pavement.

Pavement Overlays

Pavement overlays offer the best opportunity to improve bicycling conditions. Wherever possible, milling the existing pavement to remove surface irregularities that would reflect through the new pavement should be considered. The overlay material should extend to the existing pavement edge so that gravel there is not a drop off.

Vegetation

Vegetation encroaching onto bicycle facilities can cause problems for both the surface and the operation. Roots from trees and other vegetation planted too close to bicycle facilities can grow under the pavement and cause heaving and break ups. Vegetation can also obstruct sight distance. Vegetation should be planted to minimize maintenance and maximize sight lines.

Drainage

In many cases, bicycle facilities are designed so that storm water drainage facilities do not affect bicycle travel. Drainage grates can pose a serious problem for bicycles. In cases where drainage grates need to be placed in or near bicycle facilities, it is important to consider the following:

- If possible, install narrower grates that do not protrude into bike lanes.
- Install grates with veins or with the openings perpendicular to the water flow path.
- Provide white markings around grates to warn bicyclists of the potential problem.
- Be sure to install grates flush with the adjacent pavement.

Adopt A Path

Modeled after the Adopt A Highway program. Volunteer groups could be given the task of keeping pathways free of rubbish and litter in exchange for the chance to place a sign along the pathway.

FUNDING

Communities that are bicycle and pedestrian friendly are so because of a local commitment to funding projects. Bicycle facilities desired by the City should be included in the overall Capital Improvement Budget and be evaluated along with other capital projects. Construction of bicycle facilities should also be tied to planned roadway improvements and recreation improvements. Local funds for the planning and construction of bicycle facilities may be supplemented with state and federal money, as outlined below. Demand for these funds is great and funds are limited, so the City should not depend on these programs exclusively for implementing the recommendations of the plan.

The attached chart outlines the pertinent funding opportunities available at the State and Federal levels, application deadlines, and funding limits available.

Funding Options

TEA-21 (1998)						
Program	**Purpose**	**Funding Details**	**Application Date**	**Notes**	**Administering Agency**	**Contact**
Congestion Mitigation/Air Quality (CMAQ)	Improve air quality and reduce congestion in the state's air quality non-attainment zones	12,500,000 per year statewide; 20% local match required	April of odd numbered years	Construction projects must be over $50,000; other projects must be over $20,000	WDOT	John Duffe (608) 264-8723
Local Transportation Enhancements	Enhance highway projects that go "above and beyond" and promote multimodal use	6,250,000 per year statewide; 20% local match required	April of even numbered years	Construction projects must be over $50,000; other projects must be over $20,000	WDOT	John Duffe (608) 264-8723
Surface Transportation Program-Discretionary	Foster alternatives to single occupant vehicles	2,720,000 per year statewide; 20% local match required	April of even numbered years	Construction projects must be over $50,000; other projects must be over $20,000	WDOT	John Duffe (608) 264-8723

Wisconsin DNR Stewardship						
Aids for the Acquisition & Development of Local Parks (ADLP)	To acquire land, rights in land, and develop public outdoor recreation areas for nature based outdoor recreation purposes.	$4,000,000 per year statewide; up to 50% matching grants.	May 1 annually	projects must be nature based and be part of a an approved Comprehensive Outdoor Recreation Plan.	WDNR	Leslie Gauberti (608) 267-0497
Urban Green Space Program	Provide open natural space in proximity to urban development	$1,600,000 per year statewide; up to 50% matching grants.	May 1 annually	Land acquisitions necessary for the project; project must be approved by a Comprehensive Outdoor Recreation Plan.	WDNR	Leslie Gauberti (608) 267-0497
Urban Rivers Program (URGP)	Projects improving the quality of urban waterways through preservation, restoration, or enhancement.	$1,600,000 per year statewide; up to 50% matching grants.	May 1 annually	Projects must fulfill the purpose and be part of an approved Outdoor Recreation Plan.	WDNR	Leslie Gauberti (608) 267-0497

REFERENCES

AASHTO “Guide for the Development of Bicycle Facilities,” 1999, 2012.

Wisconsin Department of Transportation “Wisconsin Bicycle Planning Guidance 2020”, September 1993. Updated 2003

SEWRPC Planning Report No. 43 “A Regional Bicycle and Pedestrian System Plan for Southeastern Wisconsin: 2010”.

SEWRPC “A Development Plan For Waukesha County Wisconsin” Community Assistance Planning Report No. 209, August 1996.

Wisconsin Department of Transportation “Wisconsin Bicycle Transportation Plan”, December, 1998.

Waukesha County “Park and Open Space Plan,” (2018).

City of Brookfield “Greenway Corridor Recreational Trail Plan”, July 2002.

Town of Delafield “Comprehensive Outdoor Recreation Plan”, Rev. March 1999.

Village of Pewaukee “Bike Plan”, January 26, 1999.

Wisconsin DOT “Wisconsin Bicycling Safety”, 2016

WisDOT “Wisconsin Bicycle Facility Design Handbook,” January 2004, w/updates 2006, 2009, 2015, 2018

EXHIBIT

Bike Plan Map

CITY OF PEWAUKEE

The City in the Country

City of Pewaukee Bike Plan

- Village of Pewaukee Bike Plan
- SEWRPC 2010 Bike & Pedestrian Plan Off Road Facility
- SEWRPC 2010 Bike & Pedestrian Plan On Road Facility
- Proposed City Of Pewaukee Bike Plan Off Road Facility
- Proposed City Of Pewaukee Bike Plan On Road Facility
- Proposed City Of Pewaukee Bike Plan Alternate
- Proposed Sidewalk
- Proposed Waukesha County Greenway Corridor
- Civic/School Building
- Park/Parkway
- City of Pewaukee
- Adjacent Municipality

0 900 1,800 3,600

Scale in Feet

raSmith

CREATIVITY BEYOND ENGINEERING

Updated March 11, 2019

H:\1180597\GIS\Bike Plan 22x34.mxd

APPENDIX

AASHTO Design Standards

HORIZONTAL ALIGNMENT

For English Units:

$$R = \frac{0.067\ V^2}{\tan \theta}$$

Where:

R = Minimum radius of curvature (ft)

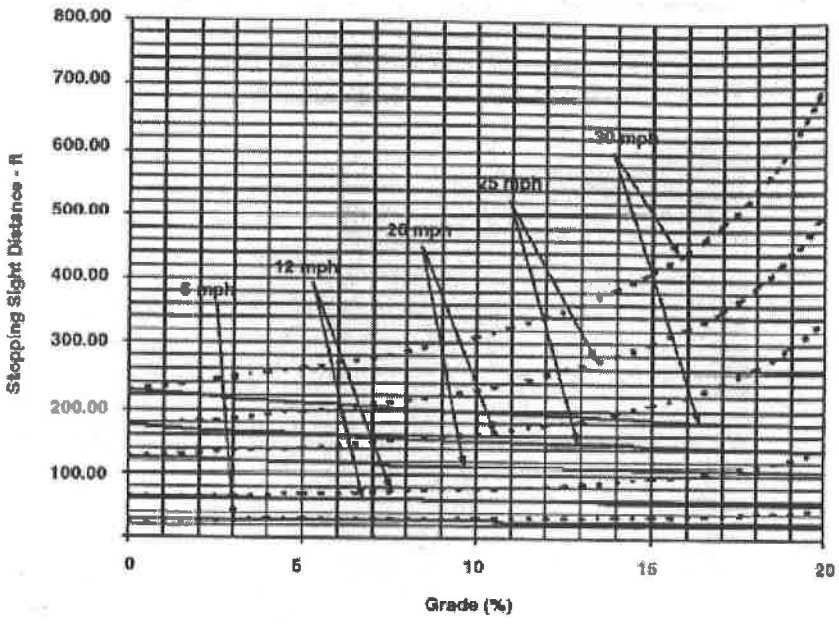
V = Design Speed (mph)

θ = Lean angle from the vertical (degrees)

GRADE

5-6%	for up to 240 m (800 ft)
7%	for up to 120 m (400 ft)
8%	for up to 90 m (300 ft)
9%	for up to 60 m (200 ft)
10%	for up to 30 m (100 ft)
11+%	for up to 15 m (50 ft)

STOPPING SIGHT DISTANCE



Descend ------

Ascend ——

$$S = \frac{V^2}{30\,(f \pm G)} + 3.67V$$

Where: S = stopping sight distance (ft)

V = velocity (mph)

f = coefficient of friction (use 0.25)

G = grade (ft/ft) (rise/run)

Table 3. English Units. Minimum Length of Crest Vertical Curve (L) Based on Stopping Sight Distance

A	S = Stopping Sight Distance (ft)														
(%)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300
2												30	70	110	150
3								20	60	100	140	180	220	260	300
4						15	55	95	135	175	215	256	300	340	400
5					20	60	100	140	180	222	268	320	376	436	500
6				10	50	90	130	171	216	267	323	384	451	523	600
7				31	71	111	152	199	252	311	376	448	526	610	700
8			8	48	88	128	174	228	288	356	430	512	601	697	800
9			20	60	100	144	196	256	324	400	484	576	676	784	900
10			30	70	110	160	218	284	360	444	538	640	751	871	1000
11			38	78	122	176	240	313	396	489	592	704	826	958	1100
12		5	45	85	133	192	261	341	432	533	645	768	901	1045	1200
13		11	51	92	144	208	283	370	468	578	699	832	976	1132	1300
14		16	56	100	156	224	305	398	504	622	753	896	1052	1220	1400
15		20	60	107	167	240	327	427	540	667	807	960	1127	1307	1500
16		24	64	114	178	256	348	455	576	711	860	1024	1202	1394	1600
17		27	68	121	189	272	370	484	612	756	914	1088	1277	1481	1700
18		30	72	128	200	288	392	512	648	800	968	1152	1352	1568	1800
19		33	76	135	211	304	414	540	684	844	1022	1216	1427	1655	1900
20		35	80	142	222	320	436	569	720	889	1076	1280	1502	1742	2000
21		37	84	149	233	336	457	597	756	933	1129	1344	1577	1829	2100
22		39	88	156	244	352	479	626	792	978	1183	1408	1652	1916	2200
23		41	92	164	256	368	501	654	828	1022	1237	1472	1728	2004	2300
24	3	43	96	171	267	384	523	683	864	1067	1291	1536	1803	2091	2400
25	4	44	100	177	278	400	544	711	900	1111	1344	1600	1878	2178	2500

when S > L: $L = 25 - \frac{900}{A}$

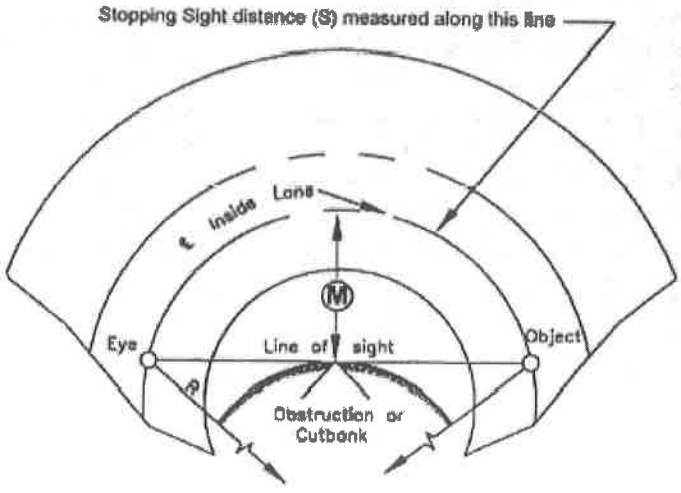
when S < L: $L = \frac{AS^2}{900}$

Height of cyclist's eye – 4 1/2 ft
Height of object – 0 ft

Shaded area represents S = L

L = Minimum Length of Vertical Curve (ft)
A = Algebraic Grade Difference (%)
S = Stopping Sight Distance (ft)

Minimum Length of Vertical Curve = 3 ft.



S = Stopping Sight Distance (m)
R = Radius of centerline of lane (m)
M = Distance from centerline of lane to obstruction (m)

Angle is expressed in degrees

$$M = R\left[1-\cos\left(\frac{28.65S}{R}\right)\right]$$

$$S = \frac{R}{28.65}\left[\cos^{-1}\left(\frac{R-M}{R}\right)\right]$$

Formula applies only when S is equal to or less than length of curve.

Line of sight is 700 mm above centerline of inside lane at point of obstruction.

For Metric Units:

- S = Stopping Sight Distance (m)
- R = Radius of centerline of lane (m)
- M = Distance from centerline of lane to obstruction (m)

For English Units:

- S = Stopping Sight Distance (ft)
- R = Radius of centerline of lane (ft)
- M = Distance from centerline of lane to obstruction (ft)

R (ft)	S = Stopping Sight Distance (ft)														
	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300
25	2.0	7.6	15.9												
50	1.0	3.9	8.7	15.2	23.0	31.9	41.5								
75	0.7	2.7	5.9	10.4	16.1	22.8	30.4	38.8	47.8	57.4	67.2				
95	0.5	2.1	4.7	8.3	12.9	18.3	24.7	31.8	39.5	48.0	56.9	66.3	75.9	85.8	
125	0.4	1.6	3.6	6.3	9.9	14.1	19.1	24.7	31.0	37.9	45.4	53.3	61.7	70.6	79.7
155	0.3	1.3	2.9	5.1	8.0	11.5	15.5	20.2	25.4	31.2	37.4	44.2	51.4	59.1	67.1
175	0.3	1.1	2.6	4.6	7.1	10.2	13.8	18.0	22.6	27.8	33.5	39.6	46.1	53.1	60.5
200	0.3	1.0	2.2	4.0	6.2	8.9	12.1	15.8	19.9	24.5	29.5	34.9	40.8	47.0	53.7
225	0.2	0.9	2.0	3.5	5.5	8.0	10.8	14.1	17.8	21.9	26.4	31.3	36.5	42.2	48.2
250	0.2	0.8	1.8	3.2	5.0	7.2	9.7	12.7	16.0	19.7	23.8	28.3	33.1	38.2	43.7
275	0.2	0.7	1.6	2.9	4.5	6.5	8.9	11.6	14.6	18.0	21.7	25.8	30.2	34.9	39.9
300	0.2	0.7	1.5	2.7	4.2	6.0	8.1	10.6	13.4	16.5	19.9	23.7	27.7	32.1	36.7
350	0.1	0.6	1.3	2.3	3.6	5.1	7.0	9.1	11.5	14.2	17.1	20.4	23.9	27.6	31.7
390	0.1	0.5	1.2	2.1	3.2	4.6	6.3	8.2	10.3	12.8	15.4	18.3	21.5	24.9	28.5
500	0.1	0.4	0.9	1.6	2.5	3.6	4.9	6.4	8.1	10.0	12.1	14.3	16.8	19.5	22.3
565		0.4	0.8	1.4	2.2	3.2	4.3	5.7	7.2	8.8	10.7	12.7	14.9	17.3	19.8
600		0.3	0.8	1.3	2.1	3.0	4.1	5.3	6.7	8.3	10.1	12.0	14.0	16.3	18.7
700		0.3	0.6	1.1	1.8	2.6	3.5	4.6	5.8	7.1	8.6	10.3	12.0	14.0	16.0
800		0.3	0.6	1.0	1.6	2.2	3.1	4.0	5.1	6.2	7.6	9.0	10.5	12.2	14.0
900		0.2	0.5	0.9	1.4	2.0	2.7	3.6	4.5	5.6	6.7	8.0	9.4	10.9	12.5
1000		0.2	0.5	0.8	1.3	1.8	2.4	3.2	4.0	5.0	6.0	7.2	8.4	9.8	11.2

Table 4. English Units. Minimum Lateral Clearance (M) for Horizontal Curves