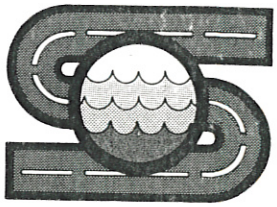
BICYCLE/PEDESTRIAN PATHWAY PLAN

for the

VILLAGE OF ELM GROVE



R. A. Smith
& Assoc. Inc.

Municipal, Industrial,
Sanitary and Civil Engineers —
Planners — Surveyors

17400 W. North Avenue
Brookfield, WI 53005

(414)786-1777

NOVEMBER 13, 1989

Engineering driven by vision.
17400 West North Avenue
Brookfield, Wisconsin 53005-4396
414-786-1777 Fax: 414-786-0826

Richard A. Smith, M.S., P.E., President
Paul A. Johnson, P.E.
James W. Nicholson, P.E.
George F. Glocka, R.L.S.
Donald A. Yecke, M.A.
Steven R. Berg, P.E.
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John C. Mills, P.E.
Gregory A. Kunz, R.L.S.

R. A. Smith & Assoc., Inc.
Engineers ■ Planners ■ Surveyors ■ Inspectors

November 13, 1989

Trustee William F. Eagan, Chairman
Public Works Committee
Village of Elm Grove
13600 Juneau Blvd.
Elm Grove, WI 53122

Re: Bicycle/Pedestrian Pathway Plan

Dear Trustee Eagan:

We are pleased to submit twenty (20) copies of the Bicycle/Pedestrian Pathway Plan for the Village of Elm Grove. This report was adopted by the Village Board of Trustees on Monday, November 13, 1989.

This plan serves as a reference point for the community, identifying an overall pathway network with the downtown and village grounds as central destinations.

It should be noted that each segment of the proposed system should be evaluated on its own merits in light of changing village priorities and conditions. In addition, prior to implementation of any segment, detailed field surveying and preparation of construction plans should be undertaken to determine optimum location and to update costs. We would be happy to work with the Village on providing these services.

We appreciate this opportunity to have provided professional services to the Village on this project. We also offer our thanks for the excellent cooperation of the Village personnel with special recognition to the Public Works Committee and Mr. Edmund M. Henschel, Village Manager, for their work and assistance in completing this plan.

We look forward to working with the Village on the implementation of this plan.

Sincerely,

R. A. SMITH & ASSOC., INC.
ENGINEERS - PLANNERS - SURVEYORS

Michael L. Theis, M.U.P.
Associate Planner

R. A. SMITH & ASSOC., INC.
CORPORATE SEAL
WISCONSIN

R. A. SMITH & ASSOC., INC.
ENGINEERS - PLANNERS -SURVEYORS

Richard A. Smith, M.S., P.E.
President

ktm:88100-0-943-943

BICYCLE/PEDESTRIAN PATHWAY PLAN FOR THE VILLAGE OF ELM GROVE

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PREPARED FOR:

ELM GROVE PUBLIC WORKS COMMITTEE

William F. Eagan, Chairman
Randall A. Burr, Village President
Mary J. Inden, Trustee
Michael Mamayek
Andrew Azpell
AND
Edmund M. Henschel, Village Manager
Kenneth R. Blaedow, Director of Public Works

INTRODUCTION

Throughout the summer and fall of 1989, the consulting firm of R. A. SMITH & ASSOC., INC. worked with the Elm Grove Public Works Committee developing the Bicycle/Pedestrian Pathway Plan for the Village of Elm Grove. Preparation of the plan was prompted by a growing concern for the safety and accommodation of pedestrians and bicyclists in the Village. The basis for the study was generated via such specific documents as the 1985 Blue Ribbon Report on municipal capital improvements, correspondence from the Principal of Tonawanda Elementary School, and the results of a 1987 Public Survey regarding pathway construction conducted by the Village.

The plan took shape through a process of open meetings with the Public Works Committee and participating residents. Initial pathway networks were presented by the Consultant, as well as alternate pathway types and the safety concerns inherent in each as well as when associated with various types of users. Plan development culminated with the Public Hearing held September 7, 1989, at Tonowanda School. Plan review and revision after the public hearing resulted in the final pathway plan summarized herein.

PURPOSE

The purpose of the Bicycle/Pedestrian Pathway Plan is threefold. Based upon the Village's pre-identified destination center of the Village grounds/commercial district:

1. Map the selected opportunities to increase bicyclist and pedestrian access from the Village periphery to the identified destination center.

2. Identify general pathway types and minimum standards associated with the location of proposed pathways.

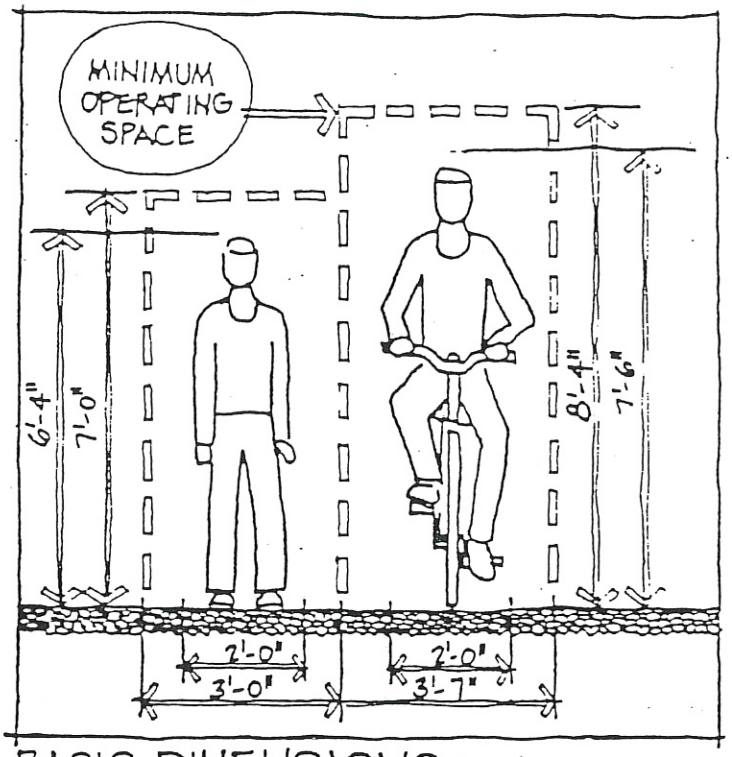
3. Prepare probable engineering design/construction cost estimates for the improvements proposed.

The aforementioned elements are contained in the PATHWAY PLAN section of this report. Beyond these elements, the Village Public Works Committee has gained experience and insight into the body of knowledge comprising bicycle/pedestrian pathway planning.

This experience will prove beneficial in coming years as the plan is dynamic in nature and will likely be implemented in changing attitudinal environments.

PLANNING CONSIDERATIONS

Many variables affect the ability of a roadway to support bicycle and pedestrian traffic. The most critical variable is sufficient width of paved surface as it delimits the bicyclists' or pedestrians' operating space (Figure 2). Whether in the form of widened roadways or separate parallel pathways, facilities should have sufficient width to allow alternative modes to share highway facilities without compromising service or safety.



BASIC DIMENSIONS
(FIGURE 2)

Source: Planning Guide For Development Of Pedestrian And Bicycle Facilities, State of Wisconsin

As represented in Figure 2, the minimum operating space for a bicyclist is greater than that for a pedestrian. The same is true regarding the physical laws of motion applied to each. Pedestrians can comfortably utilize pathways designed to bikeway standards. However, because bicycles are subject to the physical laws of wheeled vehicles, one cannot assume a bicycle can safely negotiate a pathway designed to pedestrian standards. As this study was undertaken to account for each type of user, the report will focus on the general design requirements of the bicyclist. Bikeways are one element of an effort to improve bicycling safety and convenience. Education and enforcement are also important elements.

Bikeways fall into three general categories (Figure 3):

Class I - Bike Path
Class II - Bike Lane
Class III - Shared Roadway

The designation of bikeways as Class I, II, or III should not be construed as a hierarchy; that is, that one bikeway is better than another. Rather, each class of bikeway has its appropriate application.

Class I Bikeway - Bike Path

Class I bikeways are facilities with exclusive right-of-way. Motor vehicle cross flows are minimized. Sidewalk facilities are not considered Class I facilities; they are primarily intended to serve pedestrians and generally cannot meet the design standards for Class I bikeways and do not minimize motorist cross flows.

Class II Bikeway - Bike Lane

The Class II bikeway establishes bicycle lanes within the roadway directly adjacent to the outside motor vehicle lane or on the shoulder. They are designated by signs and pavement markings and are intended for the preferential or exclusive use of bicycles.

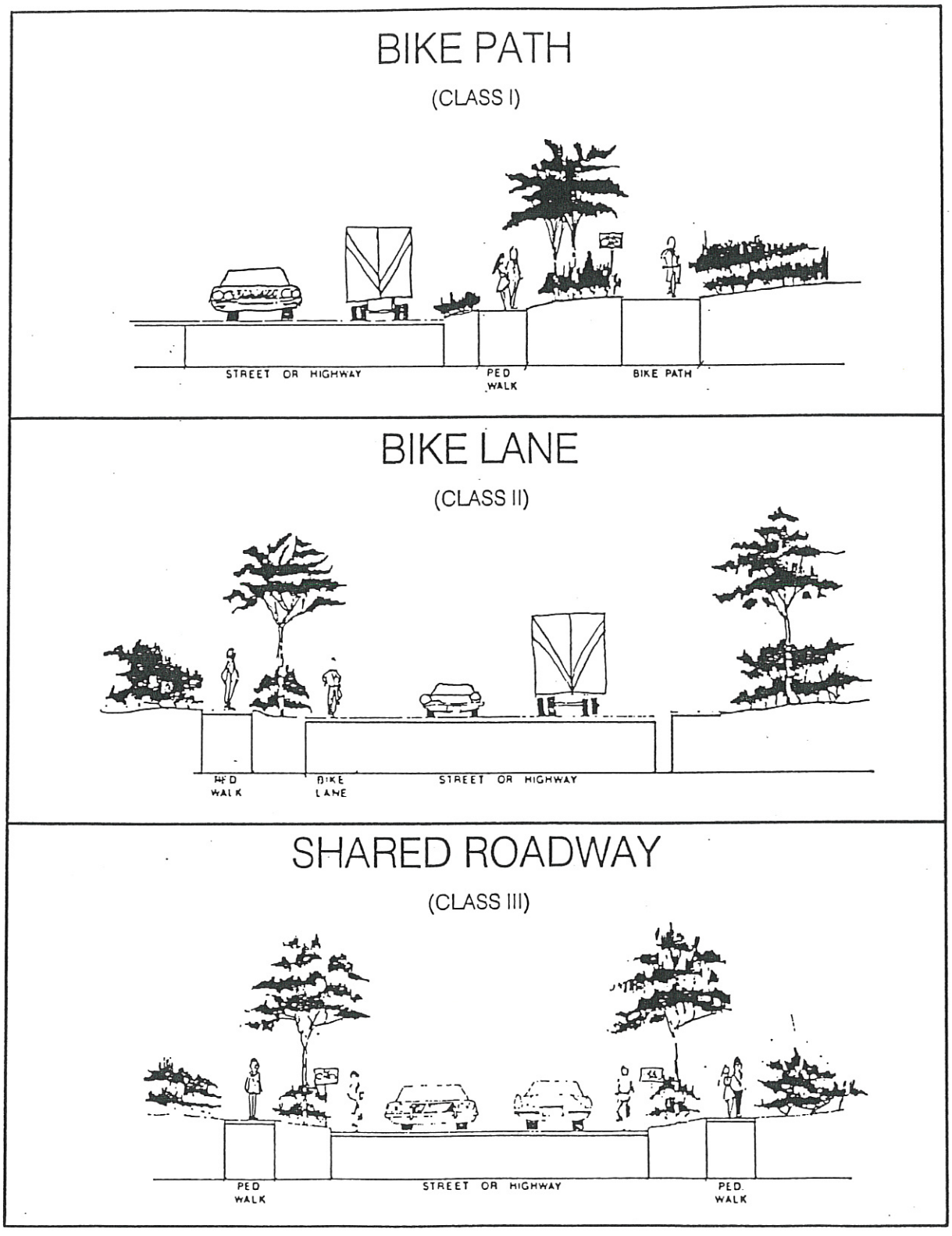
Class III Bikeway - Shared Roadway

Most bicycle travel nationwide now occurs on streets and highways without bikeway designations. Class III bikeways do not set aside a portion of the road for the exclusive use of bicycles. Rather, the roadway is shared with motor vehicles when sufficient width is provided. Signing and striping for bicycle use is optional.

In selecting the proper facility it is important to assure that the proposed facility will not encourage bicyclists or motorists to operate in a manner that is inconsistent with the rules of the road (Figure 4). Alternating segments of Class I, II, or III bikeways along a route is generally discouraged as street crossings by bicyclists are required when the route changes character and wrong-way bicycle travel will occur on the street beyond the ends of bike paths because of the inconvenience of having to cross the street. Bi-directional bikeways (2-way operation on one side of the street) are not recommended because they:

1. Create a potential hazard with bicycles and motor vehicles moving in opposite directions in close proximity on bike lanes.

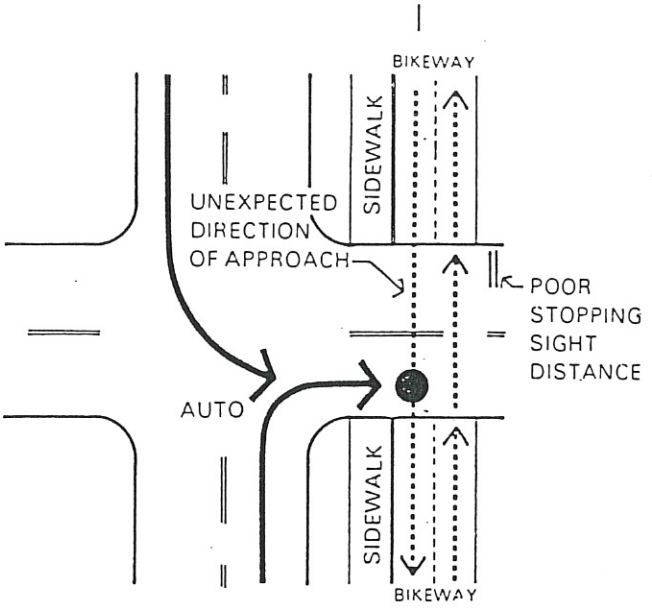
2. Require unconventional turns at intersections.



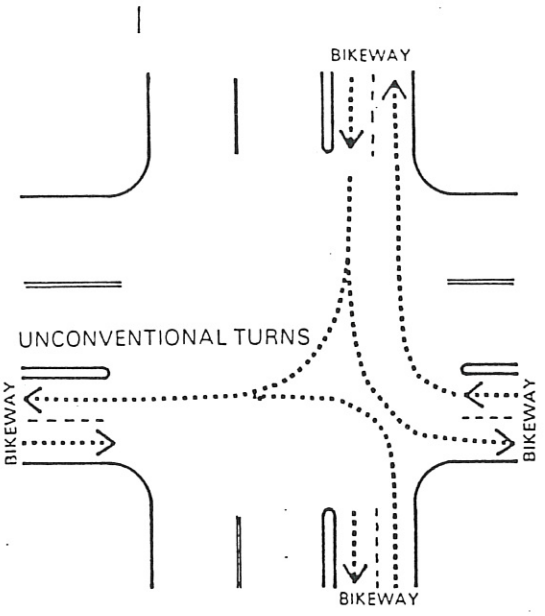
(FIGURE 3)

Source: Guidelines For Urban Major Street Design, Institute of Transportation Engineers

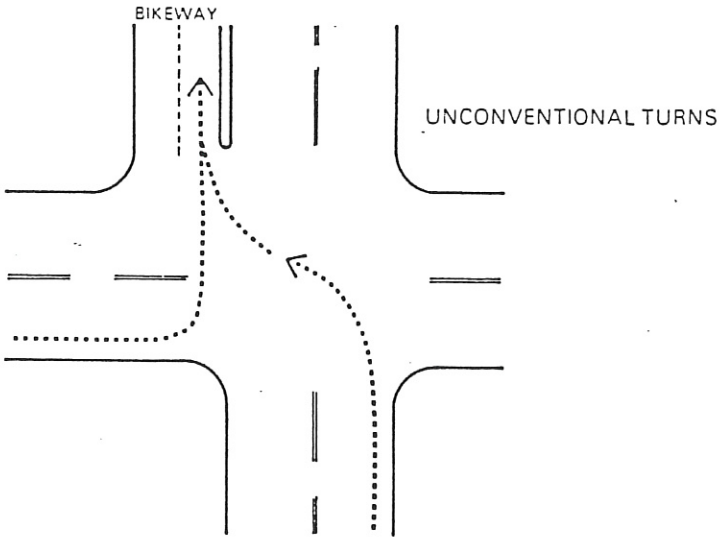
PROBLEMS ASSOCIATED WITH 2-WAY BIKEWAY OPERATIONS



A. TWO-WAY OFF-STREET BIKEWAY



B. TWO-WAY ON-STREET BIKEWAY



C TRANSITION AT THE BEGINNING
OR END OF A TWO-WAY
ON-STREET BIKEWAY

(FIGURE 4)

Source: Bicycling In Tennessee, Tennessee Department of Conservation and Transportation

3. Create unexpected directions of approach.

4. Provide poor sight stopping distances.

Physical aspects affecting bikeway placement and design include:

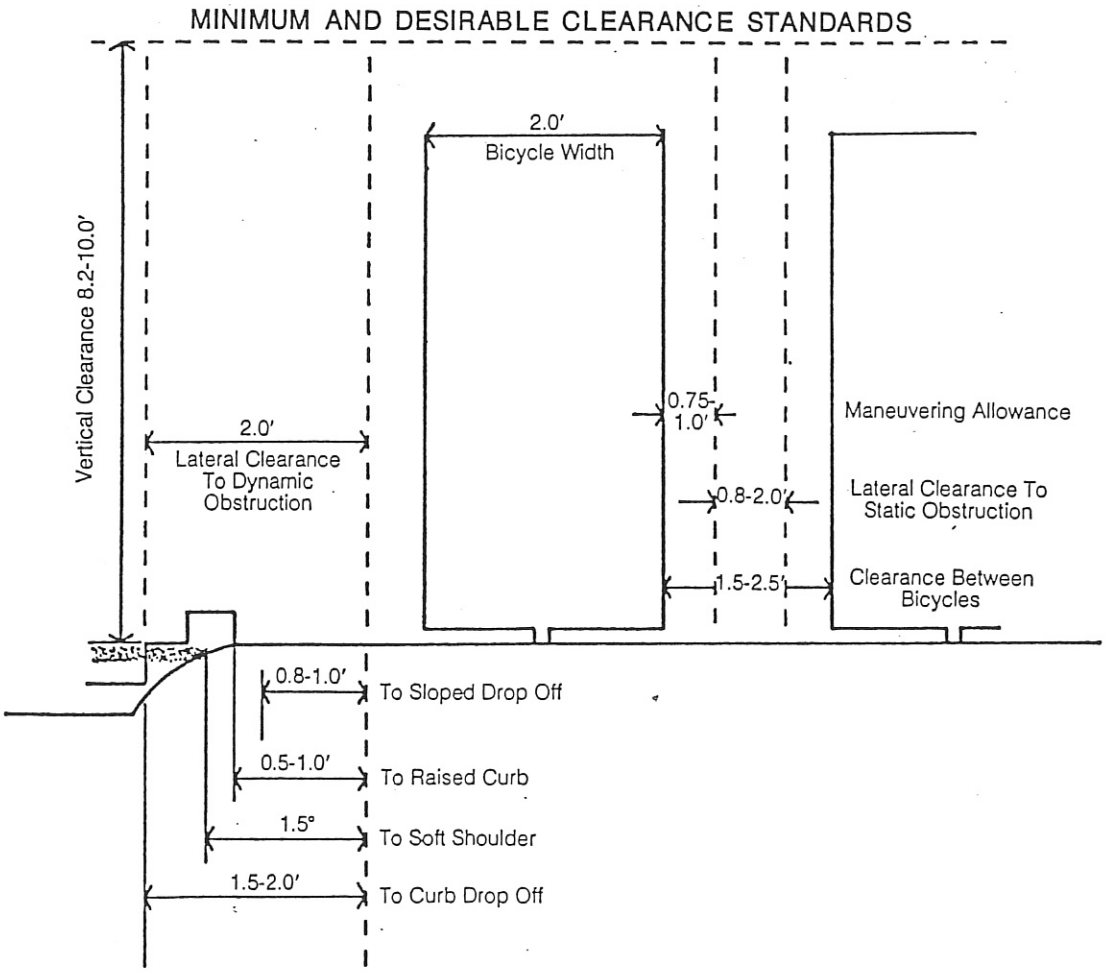
1. Lateral/Horizontal Clearance.

2. Pathway Width.

3. Stopping Sight Distances.

4. Pathway Curvature.

Figures 5, 6, and 7 illustrate design components associated with these elements.



(FIGURE 5)

Source: Bicycling In Tennessee, Tennessee Department of Conservation and Transportation

DESIGN STOPPING SIGHT DISTANCES FOR BICYCLES

Design Speed (MPH)	Stopping Sight Distances (in ft) for Downhill Gradients of:			
	0%	5%	10%	15%
10	50	50	60	70
15	85	90	100	130
20	130	140	160	200
25	175	200	230	300

(FIGURE 6)

Source: Guidelines For Urban Major Street Design, Institute of Transportation Engineers

BIKEWAY CURVATURE DESIGN RADII

Design Speed (MPH)	Minimum Radius (ft)
10	15
15	36
20	65
25	100

(FIGURE 7)

Source: Guidelines For Urban Major Street Design, Institute of Transportation Engineers

PATHWAY PLAN

Recommended pathway locations and types throughout the Village were developed over a period of seven months during the planning process. (Initial Concept Plans appear in the Appendix.) Merits and detractions of alternative routes and approaches were evaluated during meetings of the Public Works Committee as well as a public hearing addressing pathways. Final pathways proposed and recommendations are presented on the Bicycle/Pedestrian Pathway Plan Map (Figure 8).

Pathway locations were evaluated based upon their ability to satisfy the primary goal of the study: increase accessibility for bicyclists and pedestrians to the Village grounds and commercial district. Pathway types were strongly influenced by the planning considerations in this report, as well as warrants developed by the Wisconsin Department of Transportation and Wisconsin Department of Natural Resources.

Those warrants, formulated for urban and rural conditions (see Figures 9 and 10), were used as facility guidelines.

RURAL BIKE ROUTE WARRANTS

SPEED LIMIT	<40	≥40	50	>50		
A. SPEED FACTOR	0.7	0.8	0.9	1.0		
MOTOR VEHICLE VOLUME (MVV)						
CURRENT AVERAGE DAILY TRAFFIC (ADT)	<1500	>1500	>2000	>2500	>3000	>3500
CURRENT MAXIMUM HOURLY VOLUME (HV)			<350	<425	>500	>575
B. MVV FACTOR	1.0	1.5	2.0	2.5	3.0	3.5
BICYCLE VOLUME (BV)						
AVERAGE DAILY TRAFFIC (ADT)		<100	<150	<200	<250	>250
MAXIMUM HOURLY VOLUME (HV)				<30	<40	>40
C. BV FACTOR		1.0	1.5	2.0	2.5	3.0
TRAFFIC LANE WIDTH		<11	11	>11		
D. LANE FACTOR		1.2	1.1	1.0		
HIGHWAY VISION (SSD)		≤300	400	500	≥600	
E. STOPPING SIGHT DISTANCE FACTOR		1.3	1.2	1.1	1.0	
TRUCK VOLUME (TV)		<10%	10%	>10%		
F. TV FACTOR		0.9	1.0	1.1		

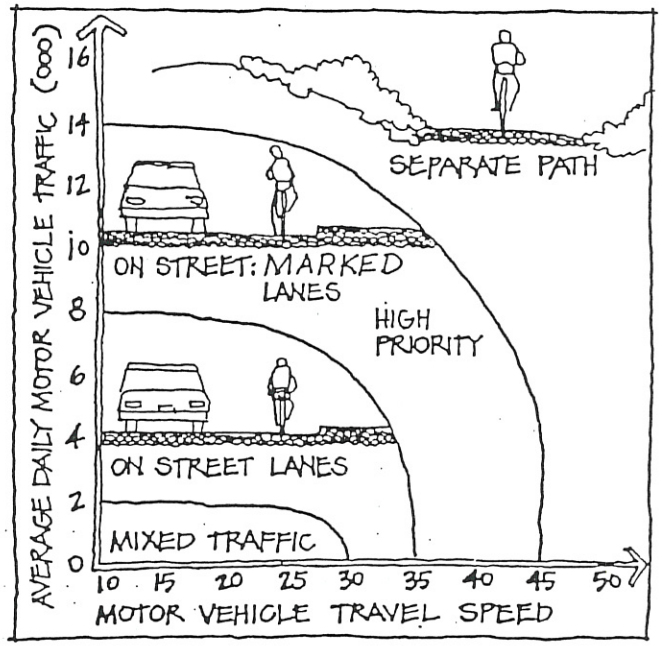
A x B x C x D x E x F	= <2 Shared Roadway
	= ≥2 Bicycle Way (Shoulder)
	= ≥7 Bike Path

< = Less than
> = Greater than
≤ = Less than or equal to
≥ = Greater than or equal to

(FIGURE 9)

Source: Guidelines For Developing Rural Bike Routes, Wisconsin DNR/DOT

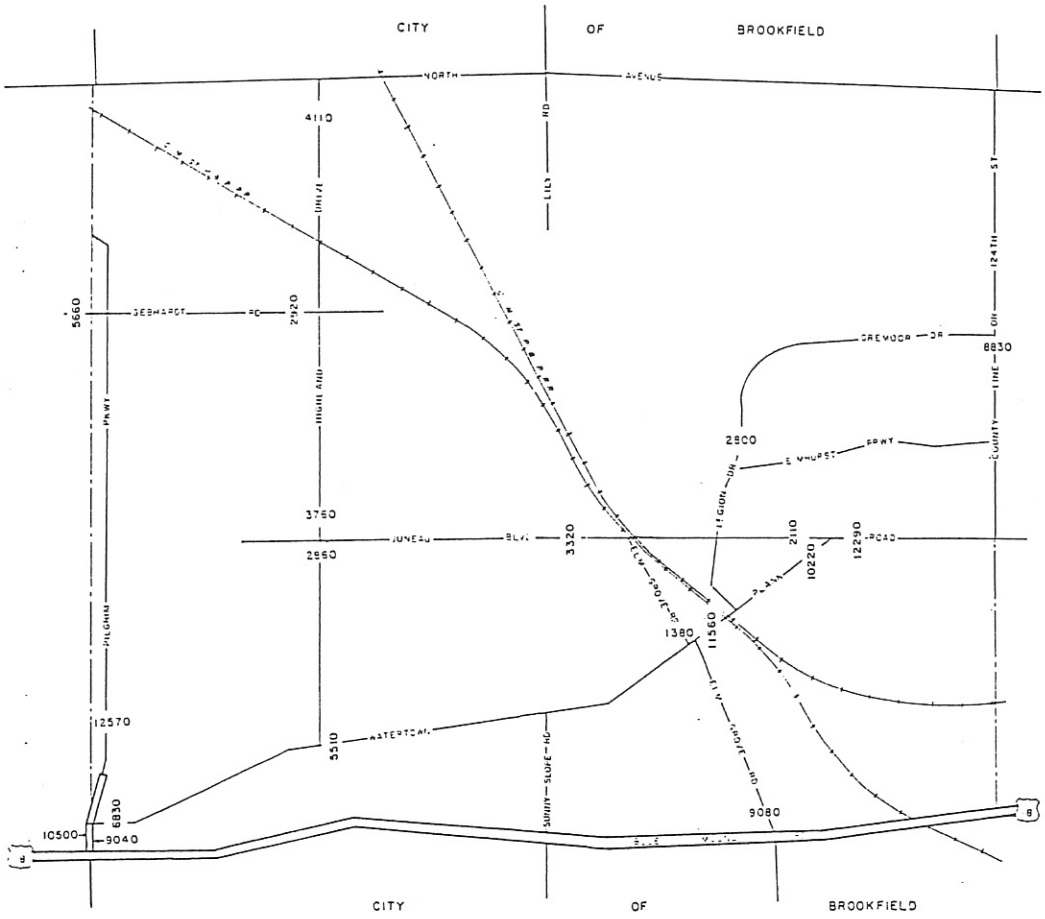
URBAN BICYCLE FACILITY WARRANTS



(FIGURE 10)

Source: Planning Guide For Development Of Pedestrian And Bicycle Facilities, State of Wisconsin

Warrants utilize various information combinations generally focusing on motor vehicle speed and average daily motor vehicle traffic volumes; but can include additional factors such as bicycle volume, traffic lane width, stopping sight distance, and truck volume to determine the type of pathway appropriate. In the instance of Elm Grove, utilizing the aforementioned warrants (Figures 9 and 10) in conjunction with 1988 Average Weekday Traffic Volume (Figure 11) developed by the Wisconsin Department of Transportation, one arrives at the conclusion that specially marked bike lanes or separate bike paths are not necessary. Rather, given the evaluation criteria, shoulders or shared lanes should satisfy the Village's bikeway needs. Alternative pathway types and minimum widths are depicted in Figures 12 and 13.

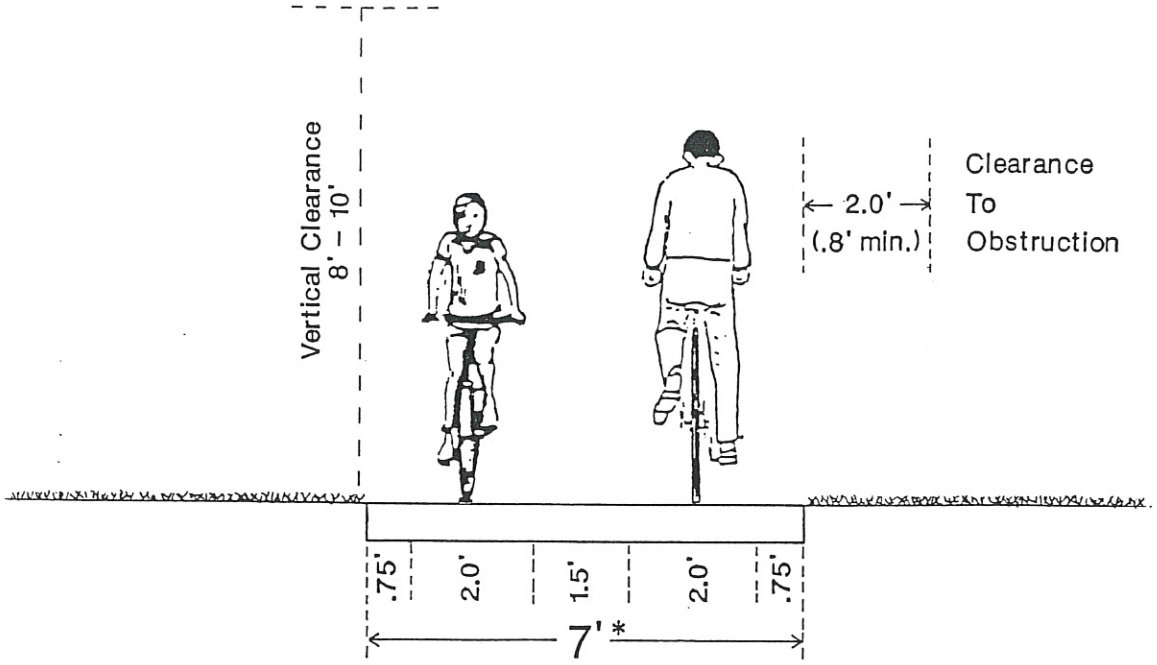


(FIGURE 11)

1988
VILLAGE OF
ELM GROVE
WAUKESHA COUNTY
SEPTEMBER
AVERAGE WEEKDAY VOLUME

Source: Wisconsin Department Of Transportation

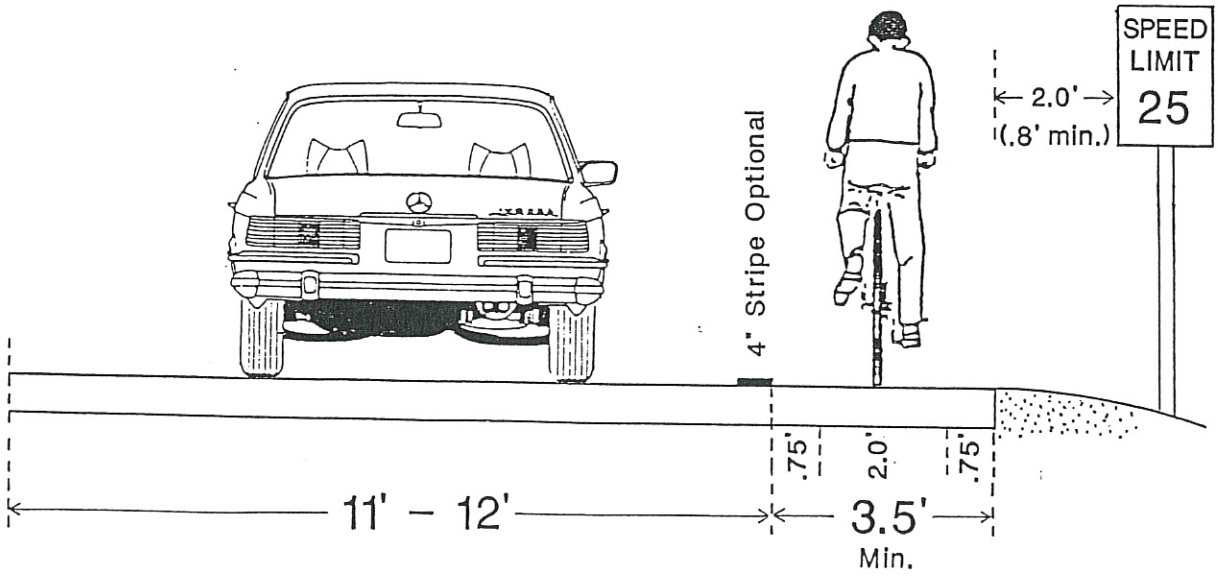
OFF ROAD PATH



* 5' Width In Association With Residential Streets.

(FIGURE 12)

PAVED ROADWAY SHOULDER



(FIGURE 13)

Under ideal situations, bicyclists and pedestrians should be separated, utilizing separate paths. This is a luxury few communities can afford, and thus generally occurs only in high traffic volume corridors. Pedestrians and bicyclists can share common facilities provided the design is based upon the physical criteria affecting bicycles. The pathways proposed in the plan are based upon this concept. At some time in the future, should significant pedestrian/bicyclist conflicts occur, additional separate pedestrian facilities may be considered.

On September 21, 1989, the Public Works Committee met to review comments and letters received regarding the pathway plan presented at the September 7, 1989, public hearings. Final plan elements, construction cost estimate, and pathway priority are as follows:

	PATHWAY	PRIORITY	LOCATION AND TYPE	CONSTRUCTION COST ESTIMATE*
1.	JUNEAU BLVD.	1-a)	Study the cost and aesthetic impact of a 5 ft. off-road path from Legion to Highland Drive	$ 1,500**
2.	JUNEAU BLVD.	1-b)	From Legion Drive to Crescent Drive Both sides 3 1/2 ft. wide Paved shoulders	$ 29,650
3.	LEGION DRIVE	1-c)	Watertown Plank to Juneau Combination on-off road 5 ft. wide	$ 6,800
4.	TONAWANDA SCHOOL	1-d)	1685 Legion to San Fernando West & south of road Off Road - 5 ft. wide	$ 9,400
5.	WATERTOWN PLANK	2-a)	Design and implement an upgrade to the existing system from Highland to the Downtown area	No Estimate
6.	HIGHLAND DRIVE	3-a)	Juneau to North Avenue Both sides 3 1/2 ft. wide Paved shoulders	$ 85,500
7.	BRIDGE (Prefabricated)	3-b)	Across Underwood Creek at foot of San Fernando - 4 ft. wide by 40 ft.	$ 8,000

8.	LEGION DRIVE	3-c)	West side of roadway 1605 through 1685 No. Legion Off road beyond ditch - 5 ft. wide	$ 5,400
9.	ELM GROVE ROAD	4-a)	Watertown Plank to Juneau East side - off road	$ 12,200
10.	GEBHARDT ROAD	4-b)	Pilgrim Parkway to Highland Both sides - 3 1/2 ft. wide Paved shoulders	$ 49,400
11.	HOLLYHOCK LANE	4-c)	Underwood Parkway to North Ave. Both sides (regrade ditches) 3 1/2 ft. wide Paved shoulders	$ 42,800
12.	GREMOOR DRIVE	4-d)	Legion to 124th Street Both sides (regrade ditches) 3 1/2 ft. wide Paved shoulders	$103,700

*Note: These estimated construction costs include culvert replacement in driveways and side streets, drive replacement, manhole adjustment, clearing, grubbing, asphalt, base course and shoulder, grading, new storm sewer, and striping as applicable. The estimates do not reflect engineering fees, cost of land, or right-of-way acquisition, easements necessary for construction, or Village of Elm Grove engineering, administration, or legal costs. Engineering design fees are estimated to range from 6 to 10 percent of construction costs depending on the size and complexity of the project. With construction staking, administration, and inspection, total fees could range from 12 to 18 percent of construction costs.

**Estimate developed by Public Works Committee.

APPENDIX