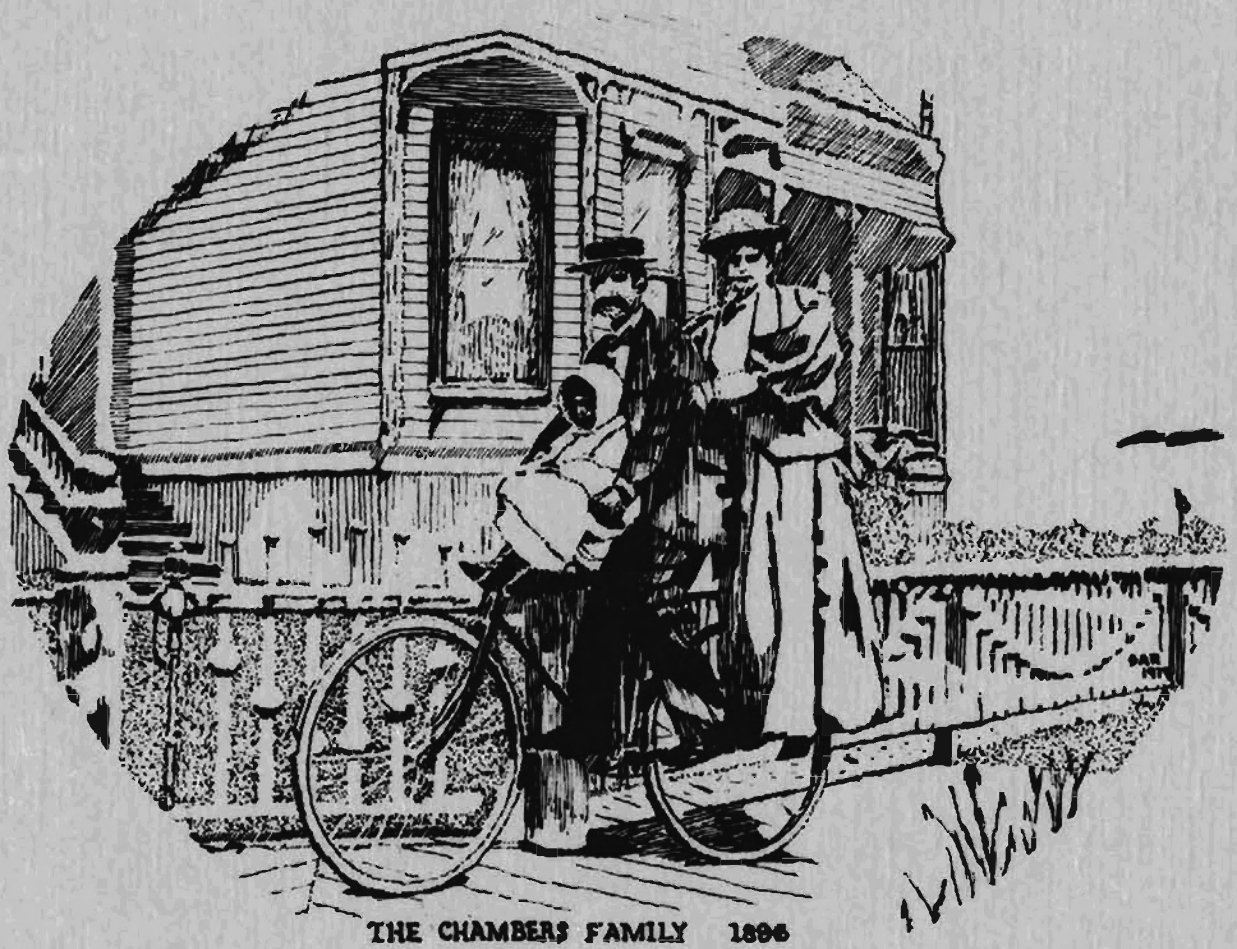
EVALUATION OF THE EUGENE BIKEWAYS MASTER PLAN



THE CHAMBERS FAMILY 1896

CITY OF EUGENE
OREGON 1979

RCI
REGIONAL
CONSULTANTS, INC

Eugene (1979)

EVALUATION

of the

EUGENE BIKEWAYS MASTER PLAN

Prepared for

CITY OF EUGENE, OREGON

July 1979

In Cooperation With

OREGON TRAFFIC SAFETY COMMISSION

and

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

Prepared by

REGIONAL CONSULTANTS, INC.

EUGENE, OREGON

Project No. 1386

Copy No. _____

Regional Consultants, Inc.

Engineering
Surveying
Planning

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July 31, 1979

City of Eugene
Department of Public Works
858 Pearl Street
Eugene, Oregon 97401

Mr. James R. Hanks, Traffic Engineer
Eugene Bicycle Committee

Re: Eugene Bikeways Master Plan Evaluation Project Report

Gentlemen:

We are pleased to submit our project report for the Eugene Bikeways Master Plan Evaluation.

The principal objective of this project was to analyze the relationship between bicycle accidents, and the bikeway system. Specific emphasis included: the measurement of bicycle usage on all bicycle facilities, analysis of all bicycle accidents, determining the level of accident reporting, development of a program to monitor accidents, evaluation of the existing bikeway system, and evaluation of the City's construction standards, maintenance, and implementation process.

All work on the project was accomplished by team effort. The team consisted of personnel from the Public Works, Planning, and Police Departments, in conjunction with Regional Consultants, Inc.'s staff.

All of this work and effort was performed in an effort to minimize bicycle accidents, and make the bicycling and motoring public aware of the factors involved in bicycle accidents.

We sincerely appreciate the opportunity to assist you in this project. We are especially grateful for the willing cooperation and participation of all City staff, and the members of the Bicycle Committee.

Respectfully submitted,

Stephen W. South, A.I.C.P.
Project Manager

SWS/dh

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INTRODUCTION

The following paragraphs describe the purpose, authority, and scope of services for the City of Eugene's Bikeways Master Plan Evaluation. The development of this project, and a brief history of the Eugene Bikeways are also described.

PURPOSE

The Purpose of the City of Eugene Bikeways Master Plan Evaluation is to analyze the relationship between bicycle accidents and the Eugene Bikeway System. Specific emphasis includes the measurement of bicycle usage on all bicycle facilities, analysis of Eugene's bicycle accidents, determination of the level of accident reporting, developing a program to monitor accidents, evaluating the existing bikeway system, and evaluating the City's construction standards, maintenance, and implementation process.

AUTHORITY

The Authority for work on this project is contained in Standards 609, 613, and 614 of the National Highway Safety Act of 1966 (Public Law 89-564) as updated and amended in the 1973 and 1976 Highway Safety Acts. A grant from the Oregon Traffic Safety Commission finances the project. The grant agreement authorized the City to retain the services of Regional Consultants, Inc. to plan, direct and assist in the development and preparation of the Bikeways Master Plan Evaluation. The City has provided "in-kind" services of personnel who have worked directly on the project.

SCOPE OF SERVICES

The Scope of Services is to provide project management and technical assistance for the performance of the necessary data collection tasks, which will provide updated records of bicycle facility usage and bicycle accidents. The scope also includes the analysis of the gathered data for the development of improvement programs and identification of improvement projects. The report details the findings, conclusions and recommendations of the project team.

STATE TRAFFIC SAFETY PROGRAM

The State Traffic Safety Program, administered by the Oregon Traffic Safety Commission, has as its goal the reduction of all traffic accidents and fatalities. The OTSC recognizes that bicycles are an important element of transportation in Oregon, and the reduction of bicycle accidents is an important part of reducing traffic accidents. This project recognizes that accident reduction can best be achieved through local efforts coordinated with regional and state-wide efforts.

PROJECT AREA

The Project Area encompasses the area within the City Limits of Eugene. The bicycle facility inventories included all facilities within the City, and the improvement programs recognize the areas of influence around the City of Eugene.

CITIZEN INVOLVEMENT

Citizen Involvement is essential for the success of any Traffic Safety Improvement Program. The Mayor's Bicycle Committee has provided this essential involvement. During monthly committee meetings and a public hearing, the committee has provided for input from citizens of Eugene. In addition, a survey concerning citizen attitudes toward Eugene's Bikeways and bicycle riding has been distributed with assistance of the Bicycle Committee.

PROJECT DEVELOPMENT AND PROBLEM IDENTIFICATION

During the initial phase of work, a project team was assembled from personnel of the Engineering, Planning, and Police Departments with project management and technical assistance provided by the Consultant. The City of Eugene's Traffic Engineer was the Project Director responsible for project records and reporting to OTSC.

At the beginning of the project, a reconnaissance survey was made of all bicycle facilities to determine and evaluate problem conditions. Records of traffic accidents involving bicycles were reviewed to identify high accident locations and accident causes. The activities of the Public Works, Police, Parks, and Planning Departments as they relate to bicycle operation and safety, were also reviewed. The following conditions were noted:

- Bicycle ridership is significant throughout Eugene, throughout the year
- The City of Eugene and the Mayor's Bicycle Committee are responsive to citizen concerns
- Maintenance of specific problems on bike paths is often delayed because of jurisdiction and communication problems
- The bicycle accident catalog used by the City is difficult to use, not updated, and does not contain all information necessary for accident analysis
- Few bicycle accidents that do not involve a motor vehicle are reported to the Police
- The records of bicycle volumes are limited, particularly prior to the installation of bicycle facilities

RECENT HISTORY OF EUGENE BIKEWAYS

In the fall of 1970, the Eugene City Council established a five-man staff committee to study bicycle use to determine if bicycle paths were necessary in Eugene. Five citizens joined the committee in February 1971 to form the Mayor's Bicycle Committee. This committee determined the necessity of comprehensive bike system planning and sought assistance with the planning. In the fall of 1973, Eugene commissioned an engineering and planning firm to prepare a Bikeways Master Plan for Eugene, Springfield, and the surrounding areas. The Master Plan was completed and accepted by the Eugene City Council in January 1975 and implementation began immediately.

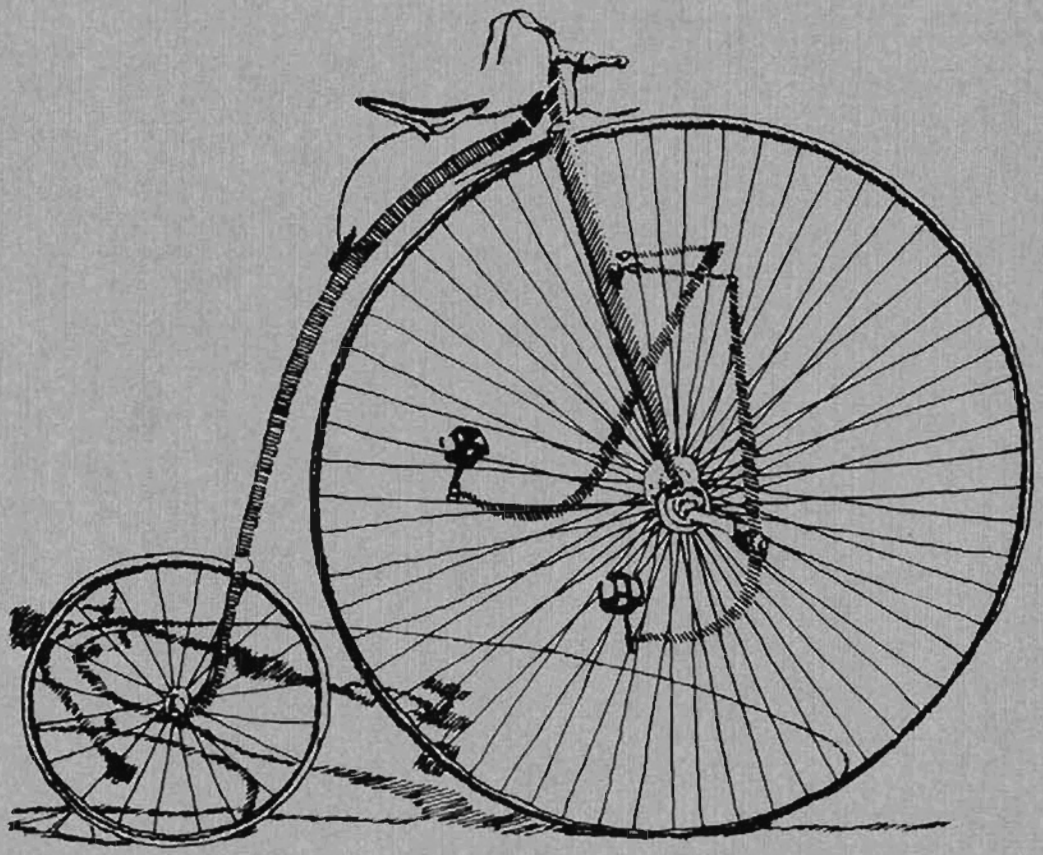
Nearly 50 miles of the proposed 152 mile bikeway system have been completed within the City of Eugene. The completed sections include over 10 miles of separate bike paths, 20 miles of striped bike lanes, 13 miles of signed bikeways on city streets, and over 3 miles of sidewalk bike routes.

Bridges across the Willamette River and Railroad grade separations have been constructed or improved for use of bicyclists and pedestrians.

Most bicycle facilities in Eugene are well used. This Project evaluates the safety, effectiveness, and usage of these existing facilities. The evaluation process has identified well-used and poorly used, safe and unsafe bicycle facilities. Specific pertinent data are now readily available for the continuing evaluation of bicycle facilities and for the annual updating of the Bikeways Master Plan.

ACKNOWLEDGMENTS

We gratefully acknowledge the assistance received from the Oregon Traffic Safety Commission, Oregon State Highway Division and Lane County. The input and assistance provided by Eugene's City Administration, Public Works, Engineering, Parks, Planning, and Police Departments have enhanced the value of this project. The dedicated assistance of the Mayor's Bicycle Committee has been most valuable. Enthusiastic and motivating input for this project has come from the citizens of Eugene. We sincerely appreciate all of these efforts and the opportunity to work with the City of Eugene.



CHAPTER I
PROJECT SUMMARY

CHAPTER I

PROJECT SUMMARY

This Project Summary recaps the principal achievements in the "Evaluation of the Eugene Bikeways Master Plan". The primary objectives of the evaluation process are to analyze the relationship between bicycle accidents and the Eugene bikeway system, measure and evaluate bikeway usage, provide bicycle safety improvement programs, and to recommend improvements to and expansion of the bikeway system.

Details of the evaluation process, conclusions and recommendations are described in the respective chapters of this Project Report. A summary of this project is presented in the following sections.

- o Eugene's Bikeway System
- o Bikeway System Usage
- o Bicycle Accidents
- o Bicycle Accident Reporting and Monitoring
- o Public Involvement and Input
- o Bikeway System Improvements
- o Evaluating and Updating the Bikeways Master Plan

EUGENE'S BIKEWAY SYSTEM

The completed one-third (50 miles of 152 miles) of the Eugene Bikeway System effectively serves Eugene's population. A survey indicated that the existing bike routes serve over one-half of the trip lengths for 60 percent of the city's bicycle commuters. Completed bikeways include "street oriented" bike routes and "park oriented" bike paths.

Street oriented bike routes include:

- o Signed routes along existing streets
- o Striped routes on both sides of two-way streets
- o Striped routes on one-way streets
- o Striped routes on both sides of one-way streets with a "contra flow" lane for bicyclists
- o Sidewalk bike routes

Park oriented bike paths include:

- o Streets converted to bicycle use only
- o Separate paths for bicyclists and pedestrians only

Each bikeway route was evaluated during the course of this project. The evaluations included: measuring the usage, studying the accidents, riding each route, and noting areas for improvements or revisions.

BIKEWAY SYSTEM USAGE

Chapter II describes bikeway system usage. Most bicycle routes throughout the City of Eugene are used significantly, while the University and downtown area routes are the heavier used routes. A Bicycle Volume Map (see Figure II-3) shows the recorded 1978 bicycle counts on the existing bicycle routes in the bikeway system.

Route usage was determined by 24-hour machine counters, and 8-hour manual counts factored to 24-hour counts. The 1978 bicycle counts indicate a 76 percent average increase over similar counts taken in 1971. Count stations are identified in Figure II-3, and an annual bicycle count program is planned to measure, record, and analyze annual usage variations on the bikeway system. (see also Chapter VII-Evaluating and Updating the Bikeways Master Plan).

A permanent recording station (installed by the OSHD on the North Bank Bicycle Path) was used to measure seasonal variations in ridership. Bikeway usage data from this station was noted to triple between winter and summer months.

Weekly machine counts on bicycle routes in Eugene were taken to measure daily usage variations. Significant numbers of bicycles were recorded during each day of the week. A daily usage variation pattern was not apparent during this survey, as the data was fairly constant.

Bikeway usage factors are used to determine the rate of occurrences of bicycle accidents. (see Chapter III-Bicycle Accidents).

Recommendations:

1. Install and monitor permanent bicycle traffic counters at selected locations on bicycle paths. Use this data to improve usage variation and accident rate determinations.

2. The Bicycle Volume Map should be updated annually, as new bikeway data becomes available from the machine counts.

BICYCLE ACCIDENTS

Chapter III describes the analysis of the 391 bicycle accidents reported to the police in the five-year period of 1974 through 1978. Accident types, accident locations, and accident causes were identified.

The annual frequency of occurrence of accidents (Table III-1) nearly doubled in the five-year study period. Of the accidents reported, 92% involved injuries to the bicyclist.

The accidents were classified into 32 accident types (Table III-2). Motorists turning right or left across the path of bicyclists traveling on a parallel path, and motorists driving from a driveway or signed intersection into a bicyclists' path are the most frequently occurring accident types. There were only two reported accidents of bicyclists striking open car doors.

Accidents along specific routes were also studied (Table III-3). Bike lane striping has reduced accidents on Agate, Alder, and 11th Street. Problems related to striping are identified on Pearl Street and Harlow Road. Signing streets as bike routes does not reduce bicycle accidents. Accidents have occurred more often on 15th Street, since the street was signed; however, bicycle volumes have increased appreciably to account for the increase. Provisions for bicycling on sidewalks has increased bicycle accidents on Willamette Street and Coburg Road.

The rate of occurrence of bicycle accidents has been determined for striped lanes (Table III-4), signed streets (Table III-5), and sidewalk routes. However, accident rates were not determined for the separate paths, because there were no accidents reported.

For this project, the rate of occurrence of bicycle accidents is defined as the number of accidents per 100,000 bicycle miles per year. Average accident rates of 0.7, 0.6, and 1.8 accidents per 100,000 bicycle miles were identified for striped lanes, signed streets, and sidewalk routes respectively. The accident rate on sidewalks was nearly three times the rate for striped lanes and signed streets.

Table III-6 identifies intersections with bicycle accident problems.

Bicycle operator error was the primary cause of two-thirds of the bicycle traffic accidents (See Table III-7). Improper passing and sidewalk riding are the most common causes of bicycle accidents.

Recommendations:

1. Improvements for problem routes and intersections are listed in Bikeway Improvement Chapter VI.

2. It is recommended that the information about the most common types and causes of accidents be used for education programs to improve bicycling skills.

BICYCLE ACCIDENT REPORTING AND MONITORING

The level of reporting and monitoring of bicycle accidents is described in Chapter IV.

Almost all bicycle injury accidents not involving a motor vehicle go unreported, while 25% of the accidents involving a motor vehicle are also unreported. Injured bicyclists will provide a description of their accident if it is convenient to do so.

Most injured bicyclists are treated in the emergency rooms at Sacred Heart Hospital, Eugene Hospital and Clinic, and University of Oregon Student Health Center. Bicycle accident injuries usually require the immediate treatment available at these locations.

The accident descriptions volunteered by bicyclists identified many of the isolated problem locations. This information was used to prepare the bikeway system improvement program.

An effective bicycle accident recording system (Figure IV-2) has been implemented, and the 1974-1978 accident data has been transferred to this new system. Accidents are listed by the street on which the bicyclist was riding.

The new card filing system of accidents is useful for determining accident rates along bikeways and for evaluating bikeway system improvements. The format used for this evaluation is shown in Figure IV-4.

Recommendations:

1. It is recommended that the voluntary bicycle accident survey be continued. A descriptive reporting form is proposed for this continuing reporting program (Figure IV-3).

2. It is recommended that bicycle accident records be updated monthly, and route evaluations conducted annually.

PUBLIC INVOLVEMENT AND INPUT

Chapter V describes a public hearing, and the citizen questionnaire used to learn of citizens' concerns about Eugene's bikeway system.

Many improvements suggested by the public are included in the Bikeway System Improvement Chapter. There has been increased citizen concern for improving: bicycle education, traffic law enforcement, and bicycle facility maintenance.

The citizen questionnaire established effective ways to encourage bicyclists to ride more often. The effective ways included the following:

- o provide more bicycle routes
- o provide lighting on the separated bikeway facilities
- o allow bicyclist to "yield" at STOP signs
- o provide more covered secure parking
- o improve the maintenance and sweeping of the bike paths

The exercise and convenience of bicycling, and the increasing cost of using an automobile, are the most important reasons why bicyclist's ride in Eugene. Bicyclists estimated their average transportation cost savings over $400 per year.

BIKEWAY SYSTEM IMPROVEMENTS

Chapter VI lists recommendations for the bikeway system designed to improve safety and increase ridership.

Specific recommendations are listed for 23 routes and 6 intersections. Bikeway System Improvements include: eliminating the sidewalk bicycle routes, striping or restriping bicycle routes, removing fixed object hazards, improved signing, improved surfacing, and the installation of grade separated crossings.

Routes important for improving safety, ridership and continuity of the bikeway system have also been identified.

The maintenance concerns expressed are specific problems. In general, overall maintenance of the bikeway system is fair. Improving communications about the specific problem conditions to the Public Works Department will improve the bikeway maintenance program.

Efforts to provide lighting along the bike paths will improve nighttime riding conditions, and a corresponding increase in ridership. Bikeway illumination standards are listed in Table VI-1.

Recommendations:

1. The recommended improvements for specific routes and intersections should be made as soon as possible. The addition of new bicycle routes to continue and expand the bikeway system should also receive priority. Continuing efforts to improve bikeway maintenance and lighting should be stressed.

EVALUATING AND UPDATING THE BIKEWAYS MASTER PLAN

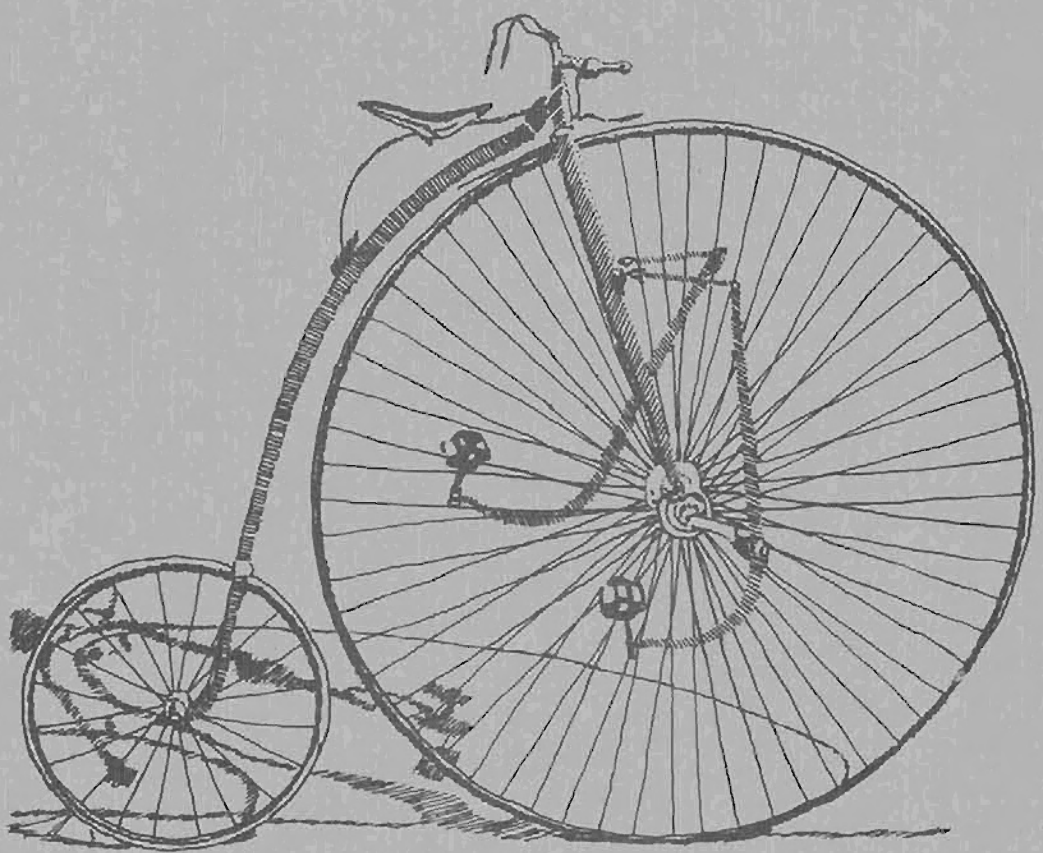
Chapter VII describes the process for continued evaluation of the bikeway system, and for annual updating of the Eugene Bikeways Master Plan.

An evaluation of this project is used to illustrate the evaluation procedure. In addition, a format is included for future evaluation to measure safety and economic benefits of Bikeway System Improvements (Figure VII-1).

An Annual Work Program for Bikeways Master Plan evaluation and updating is presented in Table VII-1. The Work Program lists specific tasks to be performed during certain times of the year, and estimates the number of man-hours needed to complete each task.

Recommendations:

1. Continue to evaluate bicycle facilities, and continually direct efforts to improve safety and increase ridership on Eugene's bikeways.



CHAPTER II
BIKEWAY SYSTEM USAGE

CHAPTER II

BIKEWAY SYSTEM USAGE

The measurement of bicycle usage on the Eugene Bikeway System is an important part of this evaluation project. The number of bicycles, time of day, day of week, and month of year were recorded on certain bicycle routes in order to determine:

- o Bikeway route usage counts
- o Bikeway usage variations
- o Bicycle accident rates

An engineering reconnaissance survey of the complete system was also conducted, in order to observe usage conditions and identify bikeway problems and hazards.

BIKEWAY ROUTE USAGE COUNTS

The bicycle volume count survey covered manual and machine bicycle counts. Manual counts were made by a person counting the numbers of bicyclists at specific intersections. Machine counts recorded bicyclists crossing specific locations on a bicycle route.

Figure II-3 at the end of this chapter records graphically the results of the bicycle count survey. Line width indicates the number of bicycles using each bicycle route on the Eugene Bikeway System. Bicycle count station locations are identified on this "Bicycle Volume Map". Detailed records of the bicycle count survey are available in the Bicycle Count Notebook in the City Hall office of the Eugene Bicycle Coordinator.

MANUAL COUNTS

Manual counts are used to determine intersection movement characteristics, measure usage where machine counters cannot be applied, and to count two bicycle routes simultaneously where the routes intersect. The 24-hour manual counts are impractical. The time period for the manual counts was limited to 8-hours. In order to determine the factor for expanding the 8-hour manual counts to 24-hour volume, a machine count was conducted simultaneously at an appropriate nearby location. For this project, manual counts have been typically measured between 10 AM and 6 PM. The average of all the expansion factors used was 1.83, and varied between 1.34 and 2.29. On an average, 55% of the bicycles were observed during the 8-hour count period.

MACHINE COUNTS

Machine counts are taken at strategic locations where motor vehicle traffic is unlikely to be counted, and nearly all of the bicycle traffic can be counted. Machine counters used on this project could not distinguish between a bicycle and a car. The counters are particularly useful on bicycle paths separate from streets; however, the City of Eugene has successfully used the machine counters along on-street striped bicycle lanes. It was observed that inaccuracies created by the motor vehicle drivers who occasionally drift into the bicycle lanes are offset by the bicycle drivers who are not within the bicycle lane as they pass the counter location. By carefully selecting mid-block locations, where motor vehicles are not likely to cross the bike lane and bicycle drivers are not likely to leave the bike lane, inaccuracies are minimized. Investigations by the City of Eugene have shown that the use of a heavy surgical tubing, with the air-pulse detecting machine counters, is suitable for measuring bicycles. All counts were measured with automatic recording counters which recorded the number of bicycles that passed the counter location each hour.

PERMANENT COUNTERS

A permanent counter is a machine counter installed to count continuously during the period of installation. The installation is usually planned to last several years; thus, wire loops are installed in the pavement to detect bicycles.

Bicycle counts have been monitored in one permanent counter location in Eugene by the Oregon State Highway Division. This information was used for determining monthly variations in bicycle volumes. A number of permanent recorder stations for bicycle paths, similar to the permanent recorder stations used for cars, should be installed and operated by the City. The information will be useful for improved determinations of usage variation and accident rates.

BIKEWAY USAGE VARIATION

Annual, monthly, and daily bikeway facility usage variations have been investigated.

ANNUAL VARIATION

Bicycle volume counts are used to determine changes in the number of bicycle users from year to year. Prior to this project, various bicycle counting projects had been conducted, particularly near the University area. Typically, these counts have been conducted for random short intervals with no efforts made to expand the data to a 24-hour count. The usefulness of such counts is limited. In 1971, several 5-hour bicycle counts were taken at intersections near the University during the first week in August (while summer school was in session). The results of these counts were expressed as the number of bicycles entering the intersection per hour. In the first week of August 1978, the 1971 counts were repeated with 8-hour counts that included the time period during which the 1971 5-hour counts were taken. A 76% average increase was measured for the intersections over the seven-year period. The results of the two sets of bicycle counts are given below:

INTERSECTION LOCATION	AVERAGE ENTERING BICYCLES PER HOUR		PERCENT CHANGE
	1971*	1978**	
Agate at 13th	34	66	+ 94
Agate at 14th	31	87	+181
Agate at 15th	35	77	+120
Alder at 21st	61	79	+ 30
Kincaid at 13th	217	221	+ 2
Patterson at 11th	39	32	- 21
		Average	75

* 8-9 AM, 11:30-1:30, 3:30-5:30 PM, 5 hours total

** 8-10 AM, 11-2 PM, 3-6 PM, 8 hours total

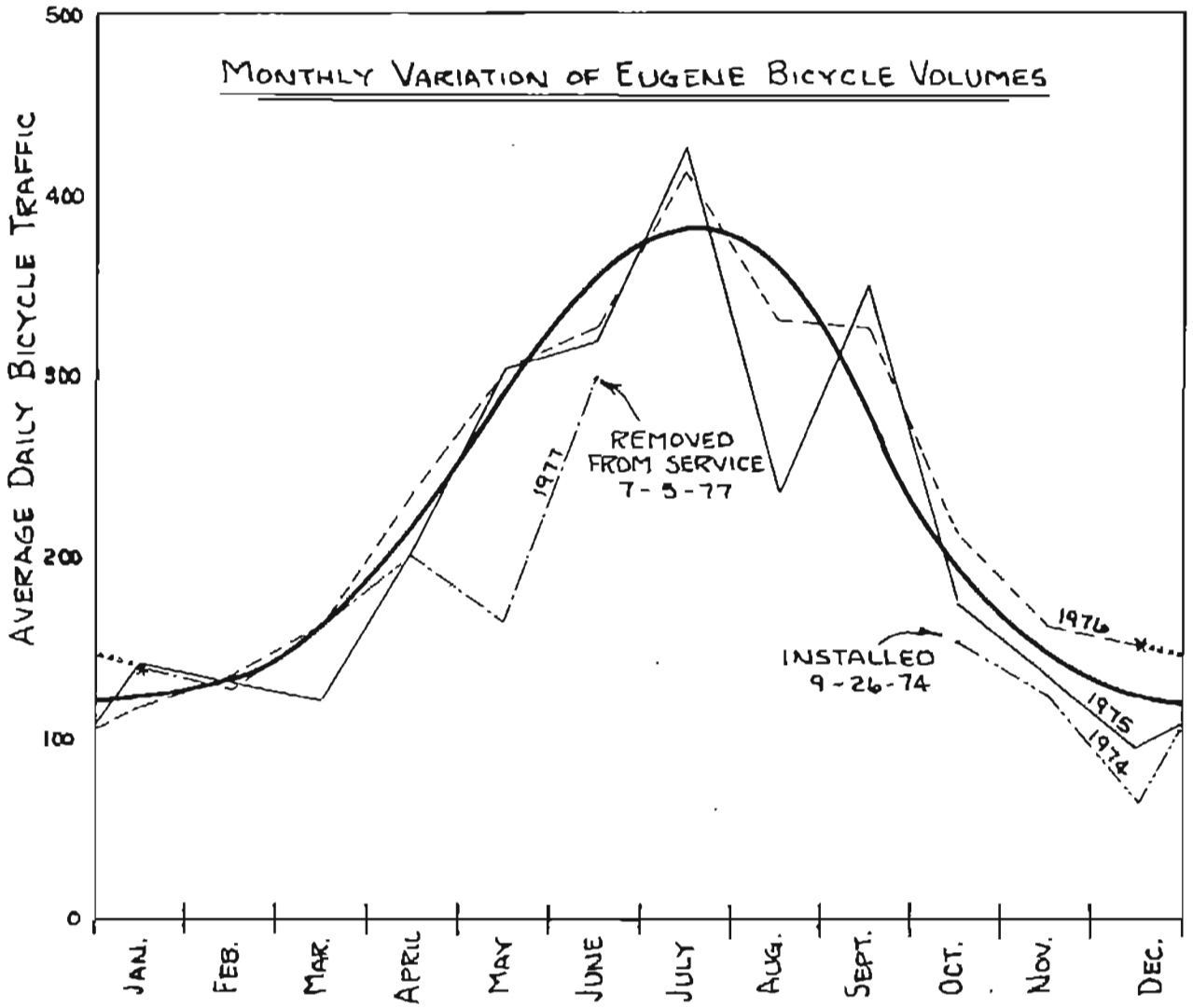
The 1978 data collected throughout Eugene will be useful for improving the measurement of annual changes of bicycle ridership. It is recommended that the City conduct annual bicycle volume counts in specific locations throughout the City, to establish accurate annual variation statistics. This information will be a useful supplement to "permanent recorder station" information when the City installs such equipment.

MONTHLY VARIATION

The monthly variation of bicycle usage provides a measure of the effects of seasonal variations on bicycle ridership. Because of the considerable daily variation in bicycle usage, which is discussed in the following section, it is not appropriate to measure monthly variations using a one-day sample for each month. "Permanent recorder" measurements of bicycle volumes provide volume information for each day of the month, as well as each month of the year. Average daily bicycle traffic can be established for each month.

The Oregon State Highway Division installed and monitored a permanent recorder on the North Bank Bicycle Trail, west of the Ferry Street Bridge. The recorder was installed on September 26, 1974, and removed from service on July 5, 1977. The average daily bicycle traffic for each month during which the counter was operative are plotted below.

FIGURE II-1



····· COUNTER WAS INOPERATIVE

BASED ON DATA FROM O.S.H.D.
PERMINENT COUNTER AT NORTH BANK BICYCLE TRAIL WEST OF FERRY ST. BRIDGE

The heavy dark line describes the seasonal variations of the bicycle volumes. Bicycle ridership nearly tripled from the winter months to the summer months. Bicycle ridership is lowest in December and January, and increases gradually through March and April, until it peaks out in July or August. The bicycle ridership steadily increases to a peak in the longer days of the summer months, and then gradually decreases steadily until December.

There was a significant number of bicycle riders at all times during the year. There is a permanent counter station located along the river trail, which is parallel to both the Willamette River and Interstate 105, and connects the Valley River Center and the Ferry Street Bridge. The Greenway Bike Bridge was not installed during the period in which the volume data were collected; thus, it can be reasonably projected that the majority of the trips on this route were recreational and shopping trips. Commuting or school trips are not likely to have made up a large portion of the trips. There is evidence that the seasonal variations for school or work commuting will be different from recreation and shopping trips. The Citizen Survey conducted as part of this project determined that 91% of the commuting bicycle drivers use their bicycles in the rain. A Campus Bicycle Survey*, independently conducted in 1976, determined that 78% of the bicycle drivers rode to campus in bad weather.

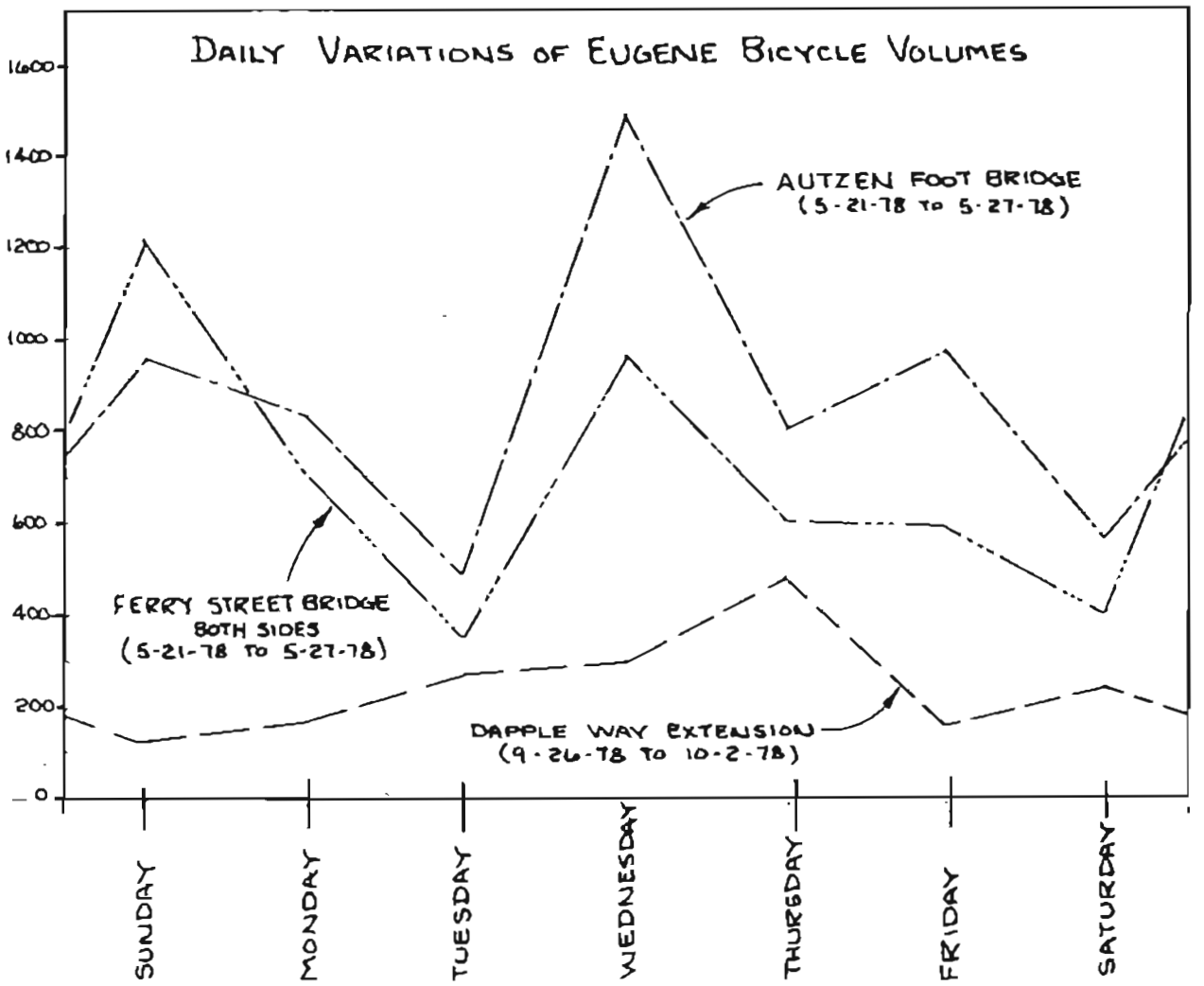
It is apparent that the effects of seasonal variations for different trip purposes will be different. The results described in Figure II-1 are representative for shopping and recreational trips. Further data should be collected along other bicycle paths to establish the effects of seasonal variations on bicycle ridership in other parts of Eugene.

DAILY VARIATIONS

Seven-day motor vehicle traffic measurements are used to establish the pattern of traffic movement variation on different days of the week. To determine the variation of bicycle usage on different days of the week, several weekly machine counts were taken and analyzed along bikeways in Eugene. Figure II-2 on the following page, records the data from bicycle counts from three route locations.

* Campus Bicycle Survey conducted by Bruce Walker, SEARCH Instructor, University of Oregon

FIGURE II-2



DATA COLLECTED BY CITY OF EUGENE, TRAFFIC DEPARTMENT.

Unlike motor vehicles, the daily variation of bicycle usage does not occur regularly on specific days of the week. High and low bicycle counts were observed to occur throughout the week. The Tuesday and Thursday dip in volumes noted above, would suggest that classes were on a Monday, Wednesday and Friday schedule. Significant numbers were noted on each day of the week; however, a usage pattern was not apparent.

BICYCLE ACCIDENT RATES

The number of accidents on a particular route is not an adequate measure of the relative safety of that facility, because the usage of each facility varies considerably. For the 1978 data collected, usage of different facilities varied between 2 bicycles per day and 2,665 bicycles per day. For this project, the accident rate of occurrence is defined as the number of accidents per 100,000 bicycle miles per year. This measure has been used to compare the relative safety of all bicycle facilities in the project area.

To determine bicycle miles driven on a facility, both the length of the facility and the average number of users on the facility must be known. Accident rates determined for this study are based on single measurements taken in August and September 1978. Future measurements for specific locations and permanent counter station measurements will help to refine the accident rate determinations. The methods used for accident rate determinations and the results for Eugene facilities, are described in the next chapter of this report.

RECONNAISSANCE SURVEY

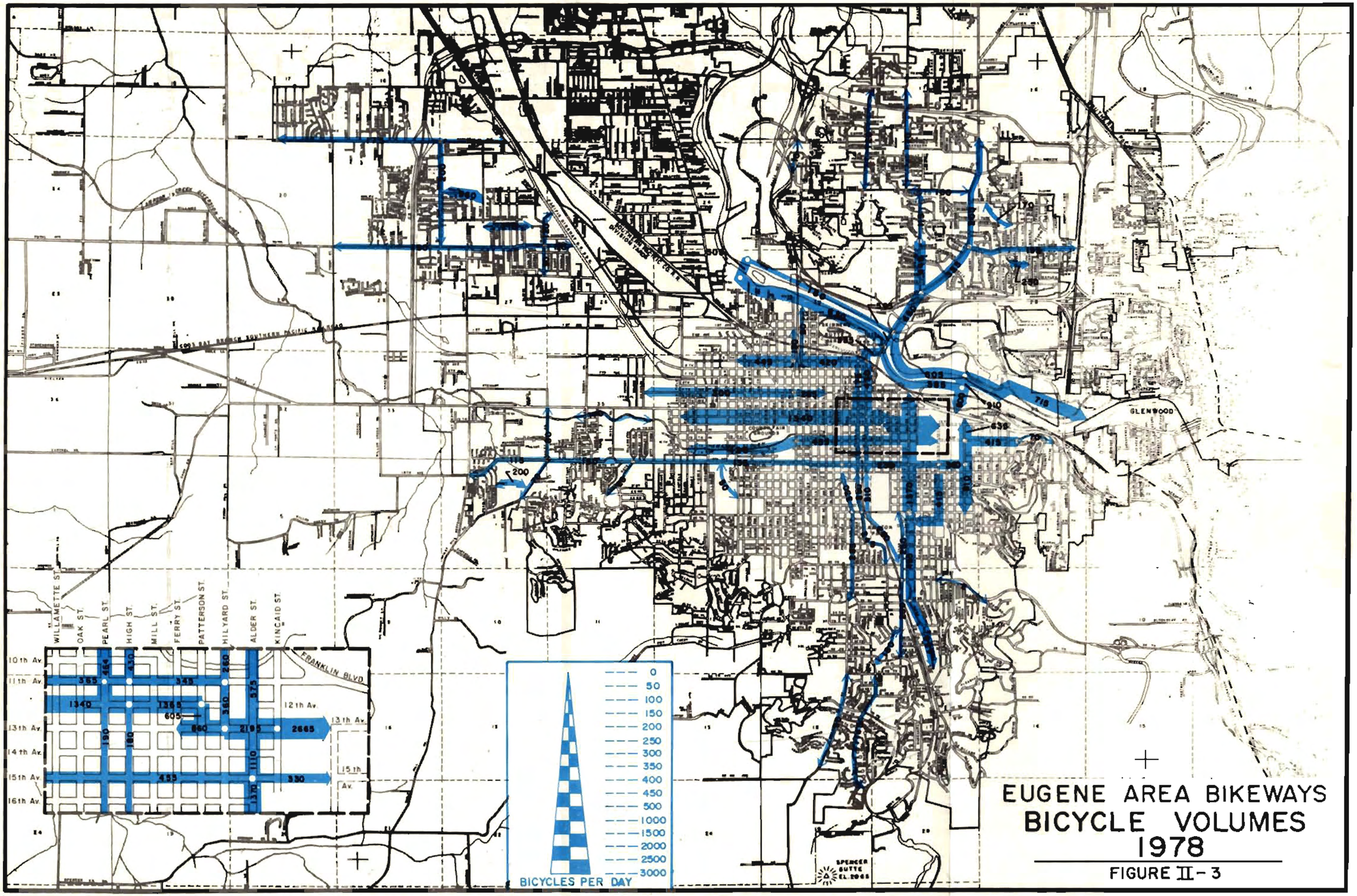
A reconnaissance survey of all Eugene bicycle facilities was conducted during the initial phase of the project. All bicycle facilities were ridden to observe how the bicycle facilities and traffic control devices affect the safe and efficient movement of bicycle, motor vehicle, and pedestrian traffic.

In addition to the Reconnaissance Survey, each of the routes or paths were ridden to locate hazards and evaluate ridability. Specific bicycle facility improvements and recommendations for general improvements of the bikeway system are covered in Chapter VI. With the exception of the sidewalk routes along arterial streets, the routes were generally found to be well designed, in good condition, and pleasant to ride.

SUMMARY

Data from manual counts, machine counts, and permanent counter counts show that bicycle traffic increased an average of 75 percent from 1971 to 1978, that bicycle traffic is highest during the summer months and lowest during the winter months, and that there is no definite pattern in daily variations of traffic as there is for motor vehicles.

The 1978 count data, expanded to uniform 24-hour counts, are shown on the Bicycle Volume Map


WILLAMETTE ST.
OAK ST.
PEARL ST.
HIGH ST.
MILL ST.
FERRY ST.
PATTERSON ST.
HILYARD ST.
ALDER ST.
KINCAID ST.
10th Av.
11th Av.
12th Av.
13th Av.
14th Av.
15th Av.
16th Av.
FRANKLIN BLVD.
GLENWOOD
SPENCER BUTTE EL. 2065
BICYCLES PER DAY
0
50
100
150
200
250
300
350
400
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500
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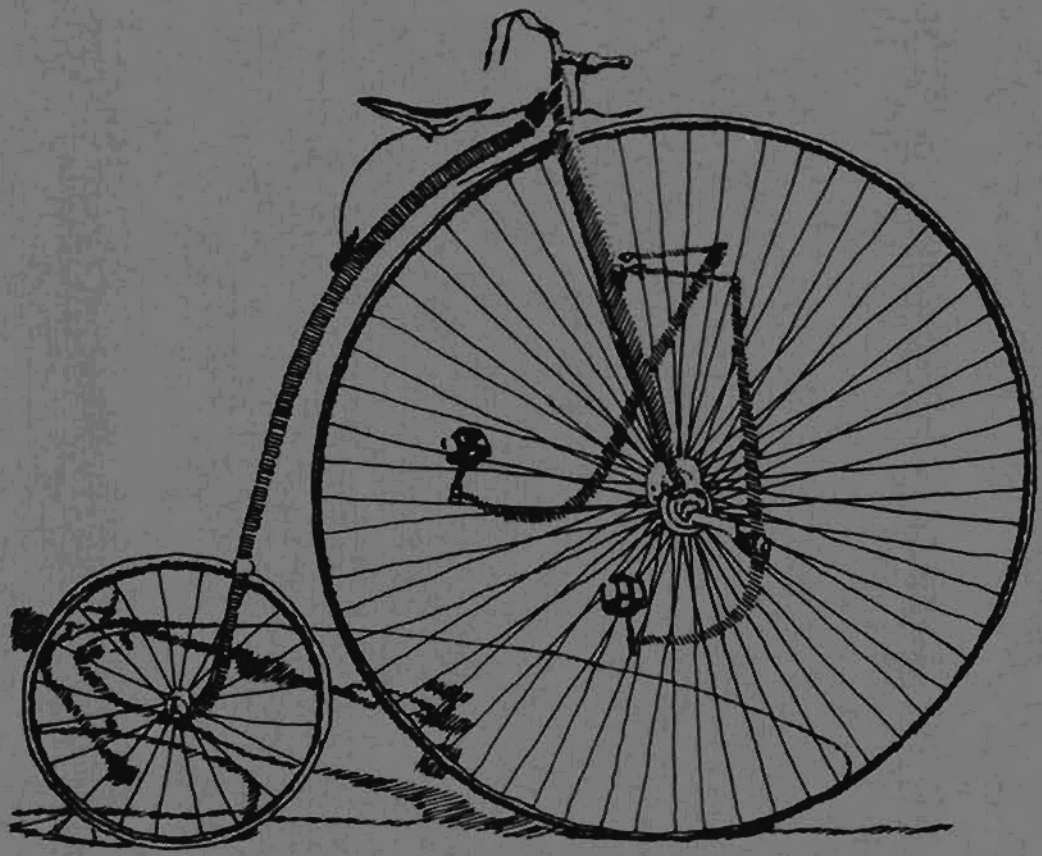
2000
2500
3000
EUGENE AREA BIKEWAYS
BICYCLE VOLUMES
1978
FIGURE II-3



CHAPTER III
BICYCLE ACCIDENTS

CHAPTER III

BICYCLE ACCIDENTS

The purpose of this study is to analyze the relationship between bicycle accidents and the Eugene Bikeway System. The analysis of bicycle accident records is an important part of this evaluation project. The City of Eugene Police Department Accident Records, involving bicycles for a five-year period from 1974 and through 1978 have been analyzed for this purpose.

Bicycle accidents reported to the Police Department are described on standard Traffic Accident Report forms. These forms are completed by officers investigating the accident.

The bicycle accident analysis has been summarized under the following sections:

- Annual Summary of Bicycle Accidents
- Bicycle Accident Types
- Corridor Bicycle Accidents
- Intersection Bicycle Accidents
- Bicycle Accident Causes

ANNUAL SUMMARY OF BICYCLE ACCIDENTS

During the five-year period of 1974 through 1978, 391 bicycle accidents were reported. Table III-1 lists the total accidents and the injury classifications of the accidents reported. There were no fatalities related to bicycle accidents; however, 71% of the bicycle accidents resulted in major or severe injuries to the bicycle driver. Accidents are summarized as follows:

- 18% Severe incapacitating injury
- 53% Major non-incapacitating injury
- 21% Minor injury
- 8% Non apparent injuries

TABLE III-1

NUMBER BICYCLE ACCIDENTS BY SEVERITY OF INJURIES

EUGENE, OREGON

1974-1978

YEAR	TOTAL ACCIDENTS	SEVERE (INCAPACITATING) INJURY ACCIDENTS	MAJOR (NON-INCAPACITATING) INJURY ACCIDENTS	MINOR INJURY ACCIDENTS	NO APPARENT INJURY ACCIDENTS
1978	99	16	49	23	11
1977	78	9	39	24	6
1976	83	20	40	17	6
1975	78	15	44	12	7
1974	53	9	35	7	2
Total	391	69 (18%)	207 (53%)	83 (21%)	32 (8%)

BICYCLE ACCIDENT TYPES

The Traffic Accident Reports for all accidents involving bicycles through the years 1974 to 1978 were used to classify the bicycle accidents. A classification system, similar to the system used by Dr. Ken Cross of Anacapa Sciences, Inc. of Santa Barbara, California for a National Highway Safety Administration Study, was used to classify Eugene Bicycle Accidents. These accidents have been categorized into six accident groups that include 24 accident types. The accident groups are

- Group A - The bicyclist rides into the path of a motor vehicle from a mid-block location
- Group B - The bicyclist rides into the path of a motor vehicle in an intersection of streets
- Group C - The motorist drives into the path of a bicycle at either a mid-block location or an intersection
- Group D - The motorist hits the bicyclist from behind or forces the bicyclist off the road
- Group E - The bicyclist makes an unexpected turn into the path of a motor vehicle
- Group F - The motorist makes an unexpected turn into the path of the bicyclist

Each accident group (as shown in Table III-2) includes several accident types. In addition to accident types within the accident groups described on the previous page, eight accident types are also listed in Table III-2 under "Other Bicycle Accidents". A complete description of each accident group and type will be found in the text following Table III-2.

TABLE III-2

BICYCLE ACCIDENT TYPES

TOTAL NUMBER OF REPORTED BICYCLE ACCIDENTS

by TYPE OF ACCIDENTS

EUGENE, OREGON

1974 - 1978

Type of Accident	Number of Accidents	
Accident Group A: Mid-block Bicycle Rideout		
Type 1 - Driveway/Alley, Pre-crash path perpendicular to roadway	28	
Type 2 - Bicycle Path, Pre-crash path perpendicular to roadway	1	
Type 3 - Driveway/Alley Apron, Pre-crash path parallel to roadway	3	
Type 4 - Entry over shoulder or curb	0	
Total Group A		32
Accident Group B: Intersection Bicycle Rideout		
Type 5 - Sign controlled intersection	31	
Type 6 - Signal controlled intersection	15	
Type 7 - Multiple lane signal controlled intersection	3	
Total Group B		49
Accident Group C: Motorist Driveout		
Type 8 - Turn-merge: Driveway/Alley	41	
Type 9 - Turn-merge: Crossing sign controlled intersection	40	
Type 10 - Turn-merge: Intersection controlled by signal	3	
Type 11 - Backing: Driveway/Alley	2	
Type 12 - No-Stop Driveout: Driveway/Intersection	22	
Total Group C		108
Accident Group D: Motorist Overtaking/Overtaking Threat		
Type 13 - Bicyclist not detected	3	
Type 14 - Motor vehicle out of control	3	
Type 15 - Counteractive evasive action	0	
Type 16 - Motorist mistakes space required to pass	0	
Type 17 - Bicyclist's path obstructed	1	
Other/Hit and run	6	
Total Group D		13
Accident Group E: Bicyclist Unexpected Turn/Swerve	11	
Type 18 - Left turn: Parallel paths, same direction	9	
Type 19 - Left turn: Parallel paths, facing approach		
Type 20 - Swerve left: Parallel paths, same direction	3	
Type 21 - Right turn/swerve: Bicyclist riding wrong way	6	
Total Group F		29

TABLE III-2

(continued)

BICYCLE ACCIDENT TYPES

TOTAL NUMBER OF REPORTED BICYCLE ACCIDENTS

by TYPE OF ACCIDENTS

EUGENE, OREGON

1974 - 1978

Type of Accident		Number of Accidents
Accident Group F: Motorist Unexpected Turn		
Type 22 - Left turn: Parallel paths, same direction	13	
Type 23 - Left turn: Parallel paths, facing approach	56	
Type 24 - Right turn: Parallel paths	42	
Total Group F		111
Other Bicycle Accidents		
Type 25 - Bicycle loses control	19	
Type 26 - Fixed object	2	
Type 27 - Parked car	13	
Type 28 - Open car door	2	
Type 29 - Pedestrian	3	
Type 30 - Motor vehicle loses control	3	
Type 31 - Bicycle - bicycle head-on	3	
Type 32 - Bicycle rear ends car	3	
Not identified	1	
Total Other		49
Total Bicycle Accidents		391

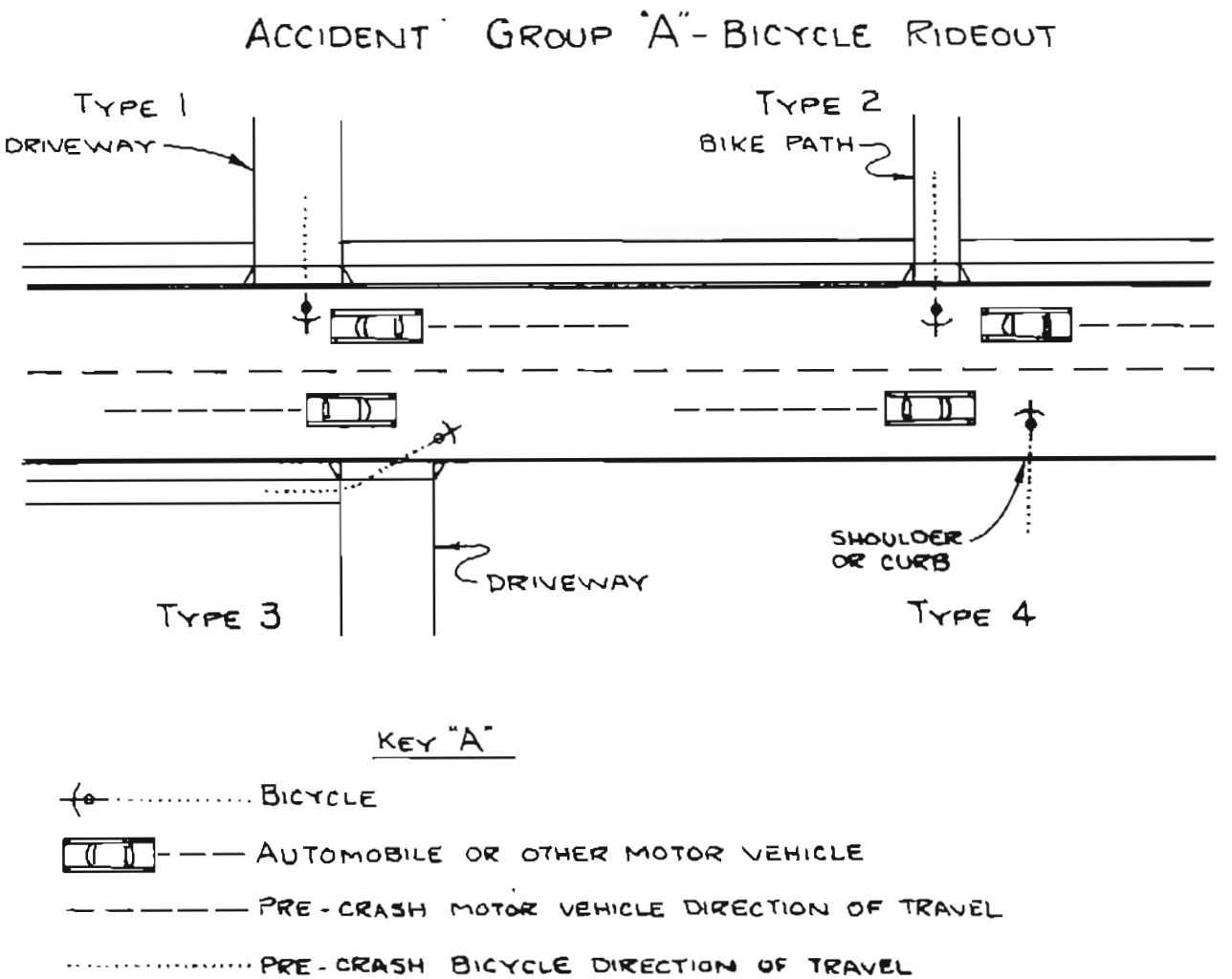
A summary analysis of bicycle accidents by Group classification reveals the following statistics:

Accident Group	Total No.	% of Total
A	32	8.2
B	49	12.5
C	108	27.6
D	13	3.3
E	29	7.5
F	111	28.4
Other	49	12.5
Total	391	100.0

ACCIDENT GROUP A

The bicycle-motor vehicle accidents within Accident Group A, involve a bicycle driver driving from a mid-block location into the path of a motor vehicle. The four accident types illustrated below include:

- Type 1 - A bicycle rider driving from an alley or driveway with a pre-crash path perpendicular to the roadway
- Type 2 - A bicycle rider driving from a bike path onto the road
- Type 3 - A bicycle rider with a pre-crash path parallel to the roadway
- Type 4 - A bicycle rider driving over a curb or shoulder onto the roadway.



The characteristic common to accidents within Group A, is the limited opportunity for the motor vehicle operator to observe the bicyclist and take evasive action. The age groups of the bicycle drivers involved in Group A accidents are described below:

		Bicycle Driver Age Group				
	TOTAL	0-5	6-10	11-15	16-25	26+
Type 1	28	1	10	8	6	3
Type 2	1	0	0	0	1	0
Type 3	3	0	1	0	0	2
Type 4	0	0	0	0	0	0
Total	32	1	11	8	7	5

The young bicycle drivers under the age of 16 were most frequently involved in these accidents.

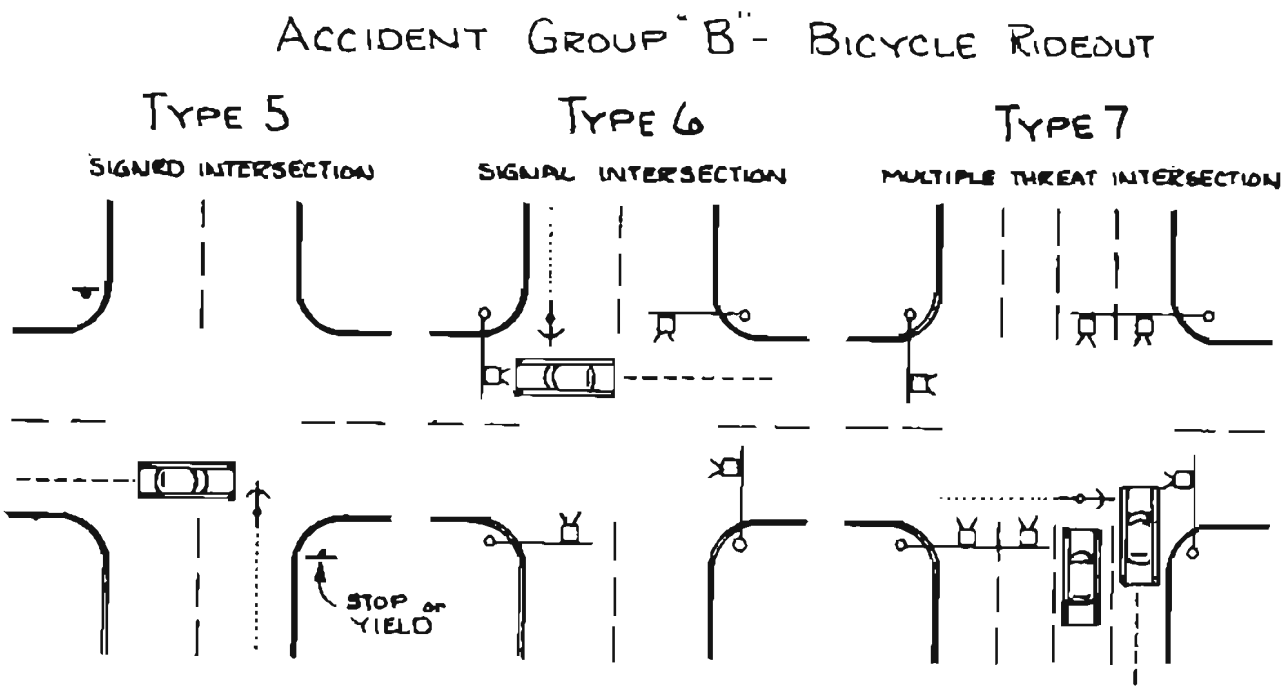
These accidents have occurred throughout the City and have not recurred in specific locations. Engineering countermeasures to this accident group are limited. The location of the only bike path crossing (Type 2) accident has since been reconstructed to eliminate the potential of bicycle-motor vehicle conflicts. The other accidents (Type 1 and 3) have occurred on driveways and alleys throughout Eugene.

The bicycle driver's failure to scan the roadway in the direction of the approaching motor vehicle is a causative factor in each of these accidents. Teaching young bicycle drivers to effectively scan a roadway before entering may help to reduce the frequency of occurrence. Bicycle drivers between the ages of 6 and 10 years are most frequently involved in this accident type, so it is apparent that training should be provided at an early age.

ACCIDENT GROUP B

The bicycle-motor vehicle accidents within Group B involve a bicycle entering an intersection controlled by a sign or signal, and riding into the path of a motor vehicle. These accidents include three types which are illustrated and described below:

- Type 5 - A bicycle driver rides into an intersection controlled by a STOP or YIELD sign, failing to yield the right-of-way to oncoming motor vehicles.
- Type 6 - A bicycle driver disobeys a traffic signal and rides across the path of a motor vehicle.
- Type 7 - A bicycle driver disobeys a traffic signal and rides across the path of two or more oncoming lanes of traffic



In each type of accident, the bicyclist enters the intersection unexpectedly. The age groups of the bicycle drivers involved in the Group B accidents are described below:

	Bicycle Driver Age Group					
	Total	0-5	6-10	11-15	16-25	26+
Type 5	31	1	4	11	8	7
Type 6	15	0	0	3	11	1
Type 7	3	0	1	0	1	1
Total	49	1	5	14	20	9

The young bicycle driver below age 16 were frequently involved in the Type 5 accident. A violation of intersection control is characteristic of the Group B collisions. Three of the Type 5 accidents involved young drivers riding along the wrong side of a street into an intersection. These bicyclists are particularly vulnerable because the motor vehicle driver has reduced sight distance of a bicyclist entering from an unexpected location. In addition, Type 5 accidents does not allow the vehicle driver time to see the bicyclist, and react.

Teaching the young bicycle driver to both scan effectively and ride on the right side of the road, may help to reduce the frequency of occurrences of this type of accident.

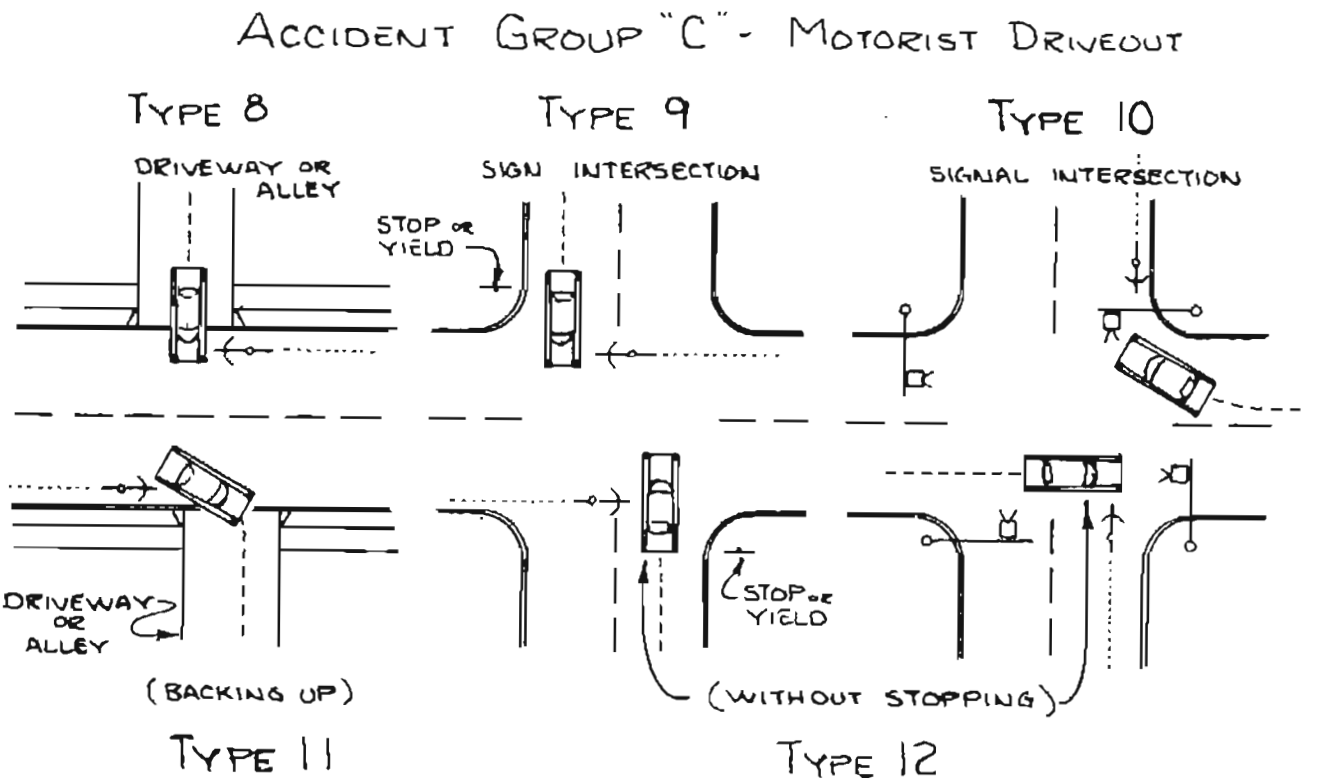
The young adult and adult bicycle driver was most often involved in the Type 5 and 6 collisions. These accidents involved a violation of intersection control, in which the bicycle drivers are usually cited for failing to yield, or for disobeying a traffic signal.

These accidents have occurred throughout Eugene and have not recurred in a specific location. Problems are related to bicycle drivers "running" STOP signs, or trying to "beat" yellow signals. Engineering countermeasures to these types of accidents are limited. Improved education reinforced with enforcement of traffic laws, are likely to be effective in reducing the frequency of Group B accidents.

ACCIDENT GROUP C

The bicycle-motor vehicle accidents within accident Group C involve a motor vehicle driver entering a street into the path of a bicyclist. The five accident types which are illustrated below include:

- Type 8 - A motor vehicle exits a driveway or alley into the path of a bicycle
- Type 9 - A motor vehicle enters an intersection controlled by a STOP or YIELD sign, after stopping or slowing, into the path of a bicycle
- Type 10 - A motor vehicle drives into an intersection controlled by a signal after stopping for the signal. Typically, the motor vehicle is making a right turn on a red signal
- Type 11 - A motor vehicle backs from a driveway or alley into the path of a bicycle
- Type 12 - A motor vehicle fails to stop at an intersection controlled by a sign or signal, and drives into the path of a bicycle



For each accident type, the motor vehicle enters a street, crosses the path of a bicyclist, and fails to see the bicyclist. The age groups of the bicycle drivers involved in the Group C accidents are described below:

		Bicycle Driver Age Group				
	Total	0-5	6-10	11-15	16-25	26+
Type 8	41	0	1	9	23	8
Type 9	40	0	1	6	22	11
Type 10	3	0	1	0	2	0
Type 11	2	0	0	0	2	0
Type 12	22	0	0	3	13	6
Total	108	0	3	18	62	25

The young bicycle driver below age 10 was involved in less than 3% of the Group C accidents, while the young adult bicycle driver (age 16-25) was involved in 56% of the Group C accidents.

Of the forty-one Type 8 accidents involving a motor vehicle exiting a driveway or alley, 71% of the accidents involved wrong way riding or sidewalk riding. Engineering countermeasures for this type of accident are very limited. Education efforts to alert bicyclists concerning the dangers of wrong way and sidewalk riding, are likely to be the most effective way of reducing the Type 8 accidents. The motor vehicle driver is required to yield to sidewalk and oncoming traffic, but the "fast moving" cyclist and "wrong way" cyclist violate the expectancy of the driver. Only ten of these accidents involved bicyclists riding on the right side of a street; one involved a bicyclist riding at night with no lights, and only one involved a bicycle ridden in a bike lane. The Type 8 accident involving a bicyclist riding on the right side of the road is relatively infrequent, and bike lanes reduce the occurrence.

The forty Type 9 accidents involving a motor vehicle entering an intersection controlled by signing included: sixteen bicyclists riding on the wrong side of the road, riding at night with no light, or riding into the intersection from a sidewalk. Education of bicyclists concerning the dangers of such riding habits, is likely to be an effective countermeasure to such accidents. Twenty-four of the Type 9 accidents involve motor vehicles being driven, after stopping or slowing, into the path of a bicycle ridden on the right side of the road. These accidents warrant special attention. Engineering countermeasures improving sight distance or modifying intersection control may improve problem intersections.

The three Type 10 accidents included: two bicyclists riding on the wrong side of the roadway, and a motor vehicle cutting a corner sharply and hitting a bicyclist. Education of bicyclists of the dangers of wrong way riding is likely to reduce this accident type.

The two Type 11 accidents involved motor vehicle drivers cited for careless driving. Accidents involving motor vehicles backing into the path of a bicyclist occur infrequently, and are not a significant problem along either streets or bike lanes.

Of the Type 12 accidents involving motor vehicle drivers not stopping at intersections controlled by signs or signals, and the single accident involving a motor vehicle exiting a driveway without slowing, 36% were "hit and run". Improving enforcement, and alerting bicycle drivers to scan and prepare for such accidents are likely countermeasures. Locations where such accidents recur are problem locations subject to engineering countermeasures such as: grade separations of bicycle, pedestrian facilities, signal improvements, or intersection improvements.

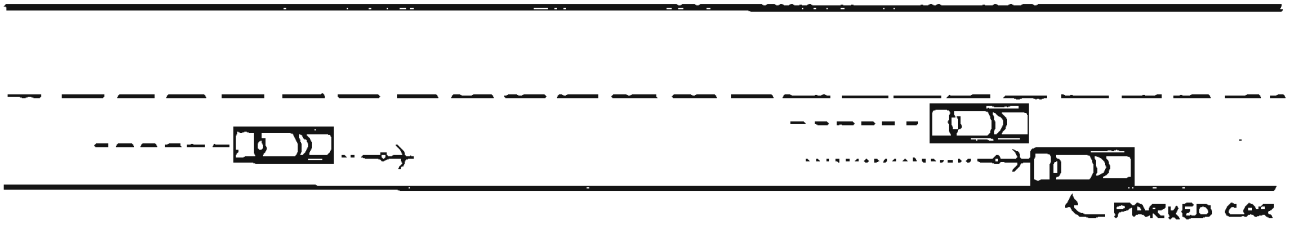
In summary, 41% of the Group C accidents involved bicycles ridden on sidewalks, on the wrong side of the street, or at night without a light; and 18% of the accidents were "hit and run", in which the motor vehicle driver left the scene of the accident. Education and enforcement of traffic laws for both bicycle and motor vehicle drivers are likely to reduce these accidents.

ACCIDENT GROUP D

The bicycle-motor vehicle accidents within Group D involve a motor vehicle overtaking and colliding or threatening to collide with a bicycle. This accident type is perceived as a serious threat by bicyclists and motorists alike. 3% of the bicycle-motor vehicle accidents were Class D accidents. The accident group has been divided into five types based on causative factors including:

- Type 13 - A bicycle driver is not detected by a motor vehicle driver
- Type 14 - A bicycle driver is struck from the rear by a motor vehicle which is out of control
- Type 15 - A bicycle driver makes a counteractive evasive action into the path of a motor vehicle
- Type 16 - A bicycle driver is sideswiped by a motor vehicle driver who misjudged the distance required to pass the bicycle
- Type 17 - A bicycle driver's path is obstructed and the bicycle driver is forced to strike an object to avoid the motor vehicle collision

ACCIDENT GROUP "D" - MOTORIST OVERTAKING



TYPE 13, 14, 15, 16
OVERTAKING COLLISION

TYPE 17
OVERTAKING THREAT AND OBSTRUCTED PATH

The age groups of the bicycle drivers involved in the Group D accidents are described below:

	Bicycle Driver Age Group					
	Total	0-5	6-10	11-15	16-25	26+
Type 13	3	0	0	0	2	1
Type 14	3	0	0	1	2	0
Type 15	0	0	0	0	0	0
Type 16	0	0	0	0	0	0
Type 17	1	0	0	1	0	0
Other	6	0	0	0	3	3
Total	13	0	0	2	7	4

No bicycle drivers were under age 12. The six accidents classified as "other", were hit and run accidents in which the bicycle driver abandoned the roadway without being struck by a motor vehicle.

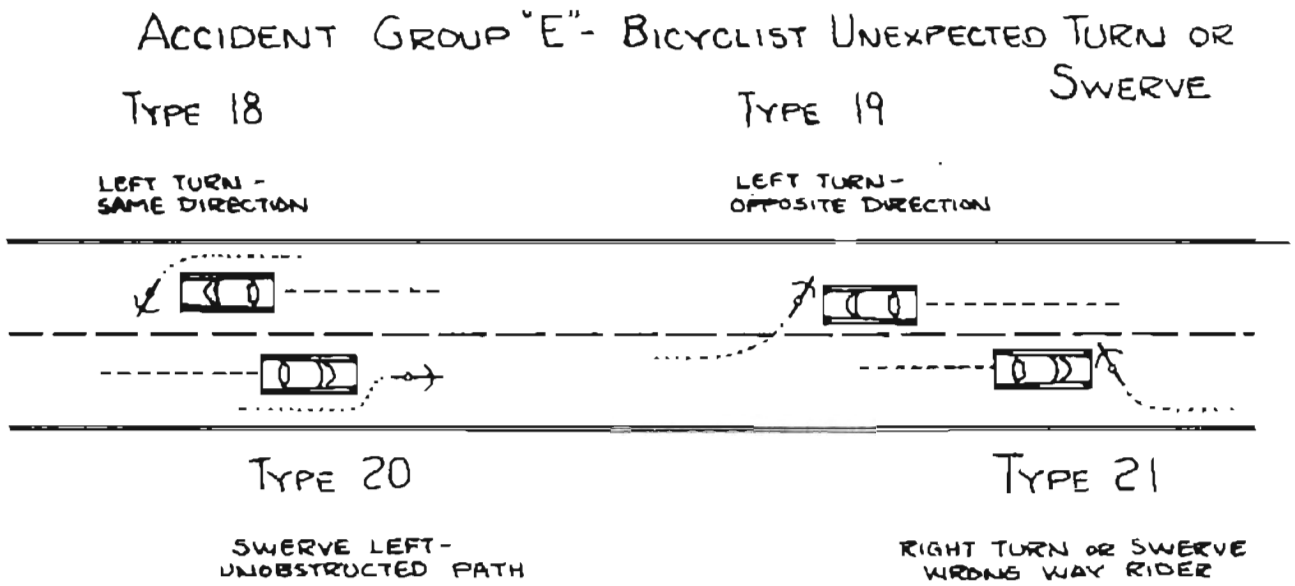
The three Type 13 accidents include two accidents in which the bicyclists were riding at night on a narrow road with no light. A single accident occurred on a bike lane. The three Type 14 accidents included two accidents in which the motor vehicle driver was arrested for driving under the influence of an intoxicant, and a bicycle driver stopped for a traffic signal. The single Type 17 accident involved a bicyclist hitting a parked car.

The Class D accidents can be reduced by engineering countermeasures such as roadway widening, parking removal, and separation of bicycle facilities. Such countermeasures are costly and can be applied only in particular locations.

ACCIDENT GROUP E

The bicycle-motor vehicle accidents with Group E include collisions in which the bicycle driver turns unexpectedly into the path of a motor vehicle. The four types of collisions in Group E illustrated below are:

- Type 18 - A bicycle driver traveling on a path parallel and in the same direction as a motor vehicle, turns left into the path of the motor vehicle
- Type 19 - A bicycle driver traveling towards a motor vehicle on a parallel path, turns left across the path of the oncoming motor vehicle
- Type 20 - A bicycle driver traveling on a path parallel, and in the same direction as a motor vehicle, swerves into the path of the motor vehicle
- Type 21 - A bicyclist traveling on the wrong side of the road towards a motor vehicle, turns right into the path of the motor vehicle



The age groups of the bicycle drivers involved in the Group E accidents are described below:

	Bicycle Driver Age Group					
	Total	0-5	6-10	11-15	16-25	26+
Type 18	11	0	4	5	2	0
Type 19	9	1	0	7	1	0
Type 20	3	0	0	0	2	1
Type 21	6	0	1	2	3	0
Total	29	1	5	14	8	1

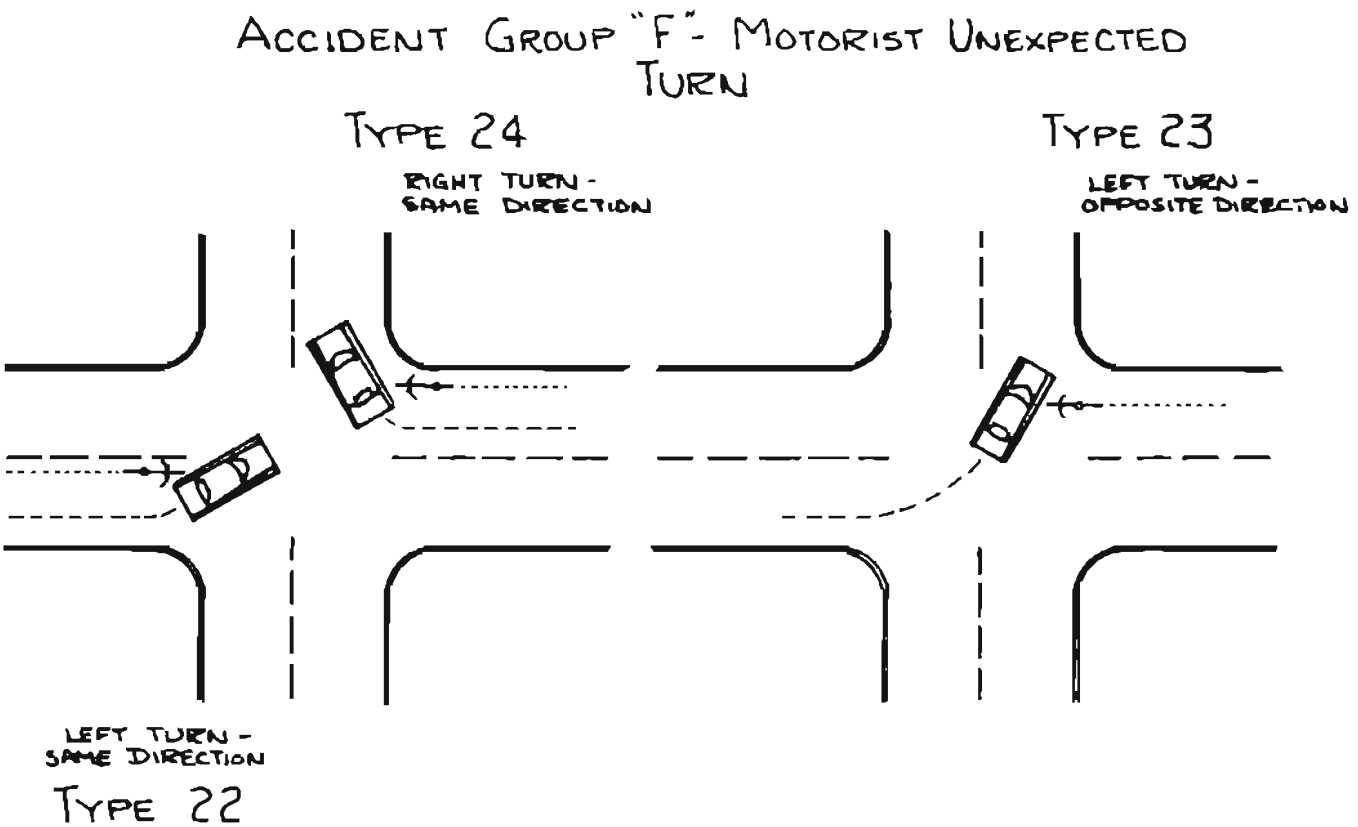
Young bicycle drivers below the age of 16 were frequently involved in the Group E accidents, particularly the Type 18 and 19 accidents.

Each of the Group E accident types involve an unexpected action by the bicyclist, although the bicyclist is observed by the motor vehicle driver. The Group E accidents have not recurred at specific locations. They have recurred along two specific routes, including Harlow Road (five occurrences), and 11th Street (two occurrences). Engineering countermeasures such as shoulder improvements or facility separations may be appropriate in these locations. Education is more important as a countermeasure. Alerting bicyclists to scan for a clear roadway before swerving into a motor vehicle lane, and to signal their intentions, will likely reduce the Group E accidents.

ACCIDENT GROUP F

The bicycle-motor vehicle accidents within Group F include accidents in which a motor vehicle driver turns unexpectedly across the path of a bicycle driver. The three types of accidents illustrated below include:

- Type 22 - A motor vehicle turns left across the path of a bicyclist traveling on a parallel path, and in the same direction as the motorist
- Type 23 - A motor vehicle turns left across the path of an oncoming bicyclist on a parallel path
- Type 24 - A motor vehicle turns right across the path of a bicyclist traveling on a parallel path



The age groups of the bicycle drivers involved in the Group F accidents are described below:

Bicycle Driver Age Group

	Total	0-5	6-10	11-15	16-25	26+
Type 22	13	0	0	1	10	2
Type 23	56	0	1	6	45	4
Type 24	42	0	0	5	23	14
Total	111	0	1	12	78	20

The young adult and adult bicycle drivers were most frequently involved in the Group E accidents.

The Type 22 accidents involve a motor vehicle driver turning left across the path of a bicycle driver traveling in the same direction include: seven collisions with bicyclists in bike lanes, and two collisions with bicyclists on a sidewalk or crosswalk. Six of the bike lane accidents have occurred on Pearl Street. An engineering countermeasure such as: the relocation or elimination of this bike lane, control of driveway access, or parking removal, may be necessary along this route. The collisions which did not occur on sidewalks or bike lanes involved bicycle drivers improperly passing a motor vehicle waiting to turn left, and a bicyclist improperly traveling straight in a left turn lane. Type 22 accidents could be reduced, if the bicycle operator was knowledgeable concerning the Rules of the Road. The Rules of the Road would include: passing and traveling on the left side of a travel lane, on bike lanes, sidewalks, or the roadway.

The Type 23 collisions involve a motor vehicle turning left across the path of an approaching bicycle. This accident type has occurred most frequently in Eugene. Signalized intersections accounted for 43% of the accidents of this type, and the remaining collisions occurred at driveways or sign controlled intersections. Four of the collisions involved bicyclists traveling in bicycle lanes, and two involved bicyclists traveling on sidewalks. Although nine of these accidents involved bicyclists traveling at night with no light, and four of the accidents involved bicyclists traveling straight in a right turn lane, the majority of the accidents involved a motor vehicle driver who failed to observe the oncoming bicyclist. In most accidents, the motor vehicle driver has been cited for failing to yield the right-of-way.

Engineering countermeasures such as improving sight distance, signal or intersection improvements are appropriate in the locations of the Type 23 collisions. The signal improvements noted above refers to separate left turn or split phasing. These accidents have recurred in specific intersections and along specific routes. Alerting bicycle drivers concerning the frequency of such collisions, and the possibility of avoiding such collisions by promoting visibility, scanning oncoming traffic, and taking evasive actions, are likely to reduce the collisions. Alerting the motor vehicle driver of the importance of scanning for bicyclists is also important.

The Type 24 collisions involve a motorist making a right turn across the path of a bicyclist. This type of collision has been nearly as frequent as the Type 23 collision. Of the collisions, 26% have been "hit and run". Five of the accidents involved bicyclists traveling on bike lanes. Six of the accidents involved bicyclists traveling on sidewalks. Two accidents involved bicyclists riding at night without lights. One involved a bicyclist traveling straight in a right turn lane.

The Type 24 accidents involve a bicyclist approaching unexpectedly from the rear of a motor vehicle turning right. Typically, this is considered a violation of the Rules of the Road. Alerting bicycle drivers concerning the precautions and Rules of the Road involved in passing on the right side of a travel lane on bike lanes, sidewalks, or the roadway, are most likely to reduce this accident type. Engineering countermeasures are unlikely to be effective, as the accidents have not recurred in specific locations.

OTHER BICYCLE ACCIDENTS

Many reported accidents were dissimilar from the accidents within the six accident groups described above. Eight additional accident types have been used to classify the bicycle accidents which have recurred in Eugene.

- Type 25 Bicycle driver losing control
- Type 26 Bicycle striking a fixed object
- Type 27 Bicycle striking a parked motor vehicle
- Type 28 Bicycle striking an open car door
- Type 29 Bicycle and pedestrian collision
- Type 30 Motor vehicle not controlled by driver
- Type 31 Bicycle and bicycle head-on collision
- Type 32 Bicycle rear-end collision with a motor vehicle in traveled lane

An age group description of the bicyclists involved in the accident types is given below, and a description of each accident type follows:

	Bicycle Driver Age Group					
	Total	0-5	6-10	11-15	16-25	26+
Type 25	19	0	1	4	5	9
Type 26	2	0	0	1	1	0
Type 27	13	0	0	7	4	2
Type 28	2	0	1	0	0	1
Type 29	3	0	0	0	3	0
Type 30	3	0	0	2	0	1
Type 31	4	0	0	1	2	1
Type 32	3	0	0	1	2	0
Total	49	0	2	16	17	14

The Type 25 accidents involve a bicycle driver losing control, and does not involve other motor vehicles, bicycles, or pedestrians. The older adult rider was most often involved in this accident type. Of the nineteen investigated accidents, eleven involved either a brake failure, a front wheel falling off, riders riding double, excessive speed, or a bicycle wheel jammed with a package. The two bicycle accident reports which involved drivers tangling a wheel in railroad tracks, and a storm drain, provide information for identifying hazardous locations subject to improvement.

The Type 26 and 27 accidents involve a bicycle driver hitting a fixed object or parked car. Parked cars (Type 27 accidents) are a more frequent hazard to bicycle drivers than roadside hazards (Type 26 accidents). None of the collisions of bicyclists with parked cars involved bicycle drivers using bicycle lanes. The bicycle lanes reduce the frequency of occurrence of these type of accidents.

The Type 28 accidents involve a bicyclist striking an open car door. This accident type is perceived as a serious problem by bicycle and motor vehicle drivers alike. During the five-year study period, there were two collisions of this type reported. One of the collisions involved a bicycle driver striking a car door on the sidewalk side.

The Type 29 collisions involve a pedestrian and a bicyclist. For the first four years of the study period there were no reported collisions of this type. Three reported collisions occurred in 1978, and involved severe or major injuries to the bicycle driver and pedestrian. A single collision occurred on a bicycle facility, while the other two collisions occurred at intersections of streets.

The three Type 30 collisions involve a motor vehicle which is not controlled by the driver, crossing paths with a bicyclist. Two of the accidents were head-on collisions, in which the uncontrolled motor vehicle crossed the centerline and struck an oncoming bicycle driver, and one involved a bicyclist striking a motor vehicle which had just rear-ended a parked car. None of these accidents involved bicyclists riding in a bicycle lane.

The three Type 31 collisions involved bicycle drivers striking one another head-on, where at least one of the drivers was seriously injured in each accident. One accident involved riding on a centerline with no lights, and one involved a bicyclist riding on the wrong side of a roadway. Education and enforcement countermeasures are appropriate for such accidents. A third accident involved two bicyclists attempting to pass between the same posts. The posts are used to prevent motor vehicles from entering a bicycle path. The posts restricted the paths of the bicyclists and were a causative factor in the accident. Engineering countermeasures are appropriate in this case. Removal or modification of the posts reduces the possibility of a bicycle head-on collision. These are discussed in the Improvement Projects Chapter (Chapter VI) of this report.

The Type 32 collisions involve bicycle drivers rear-ending a car in the travel lane. One of the three collisions involved an intoxicated bicycle driver. None of these accidents occurred on bicycle facilities.

The forty-eight accident types described above, accounted for 12% of the reported accidents, and included six accident types which did not involve moving motor vehicles. A single reported bicycle accident was not identified because it did not correspond to any of the types of accidents described above. This accident involved a motor vehicle driver who reported hitting a fixed object to avoid hitting a bicyclist.

CORRIDOR BICYCLE ACCIDENTS

Bicycle accidents have been recorded according to the street along which the bicyclist was riding when an accident occurred. This allows for an accident analysis for each route or corridor, and allows a comparison of the relative safety of the routes.

Table III-3 lists the corridors along which five or more bicycle accidents were reported. For routes with improved bicycle facilities, the tabulation indicated the total number of bicycle accidents for the five-year study period, as well as the number of bicycle accidents before and after the improvement was constructed.

Bikeway system usage counts are not available prior to installing the bicycle facilities; therefore, it is not possible to directly compare accident rates. However, the average annual frequency of accidents can be compared. Accident histories are described in this section for existing bicycle facilities and problem streets. The rate of occurrence of accidents are also described.

The 1978 bicycle count measurements on Eugene's bikeways determine bicycle accident rates. The rate of occurrence of bicycle accidents for this evaluation project are expressed as the number of accidents per 100,000 bicycle miles per year.

TABLE III-3
SUMMARY OF BICYCLE ACCIDENTS BY CORRIDOR AND YEAR
EUGENE, OREGON
1974-1978

NUMBER OF ACCIDENTS

CORRIDOR	1974	1975	1976	1977	1978	TOTAL	AVERAGE PER YEAR	OTHERS	CORRIDOR LENGTH (MILES)	AVERAGE BICYCLES PER DAY	ACCIDENTS PER 100,000 BICYCLE MILES
18th Avenue -- Total	9	11	9	6	8	43	8.6	5	4.7	205	2.4
Pre-Lane Striping (Bailey Hill to Willamette)	9	8	7	4	4	32	6.7	5	2.8	145	4.5
Lanes Striped 10/78					2	2	**		2.8	***	**
Willamette -- Total	2	5	2	7	6	22	4.4	1	4.0	***	
Pre-Sidewalk Lanes (20th to 32nd)	1	1				2	1.3		1.1	***	
Post Installation 7/75		2		3	4	9	2.6	1	1.1	320	2.0
Pre-Lane Striping			1	1		2			1.8	***	
Post Striping (33rd to 40th) 7/78						0	**		0.7	***	**
Post Striping (40th to City Limits) 8/76						0	0		1.1	90	0
Coburg Road -- Total	3	2	2	7	6	20	4.0	3	2.2	***	
Lanes Striped 11/76	3	2	2			7	2.4	1	2.2	***	
Post Striping				4	4	8	3.8	2	1.7	250	1.8
Sidewalk Section (S. Bd. Harlow to Club)				3	2	5	2.4		1.0	350	1.9
Alder Street -- Total	3	6	3	2	3	17	3.4	2	2.5	765	0.5
Pre-Lane Striping (11th to 18th)	3	4	1			8	2.8	1	0.4	***	
Post Lane Striping 10/76			1		1	2	0.9		0.4	1085	0.6
Pearl Street -- Total		2	8	3	2	15	3.0	1	1.1	***	
Pre-Lane Striping (6th to 19th)		1				1	0.6		1.1	***	
Post Striping 8/75		1	8	3	2	14	4.20	1	1.1	276	3.2
11th Street -- Total	1	2	2	7	3	15	3.0		5.6	***	
Pre-Lane Striping (Kincaid to Willamette)	1	1		4		6	1.6		0.3	***	
Post Lane Striping 10/77					1	1	0.9		0.3	330	2.4
13th Street -- Total	2	2	4	3	2	13	2.6	4	3.0	1550	0.2
Pre-Lane Striping (Patterson to Kincaid)			1			1	0.4		0.2	***	
Post Lane Striping 10/76				1		1	0.5		0.2	2040	0.3
15th Street -- Total	1	1	3	2	3	10	2.0	2	2.3	***	
Pre-Signing (Fairgrounds to Kincaid)	1					1	0.5		1.2	***	
Post Signing 12/75			2	2	3	7	2.2		1.2	440	1.0

** - Short Sample Period
*** - Unknown

TABLE III-3
SUMMARY OF BICYCLE ACCIDENTS BY CORRIDOR AND YEAR
EUGENE, OREGON
1974-1978
(continued)

CORRIDOR	NUMBER OF ACCIDENTS 1974	1975	1976	1977	1978	TOTAL	AVERAGE PER YEAR	OTHERS	CORRIDOR LENGTH (MILES)	AVERAGE BICYCLES PER DAY	ACCIDENTS PER 100,000 BICYCLE MILES
24th Street -- Total	1	1		3	5	10	2.0	3	2.5	***	
Olive to Columbia (Striping Proposed)	1			3	4	8	1.6	3	1.2	180	2.0
High Street -- Total	2		2	1	5	10	2.0	2	1.3	435	0.7
Pre-Striping (5th to 19th)	1					1	0.6	1	1.1	***	
Post Striping 8/75			1	1	2	4	1.2	1	1.1	460	0.3
Hilyard Street -- Total	3	2	1	1	3	10	2.0	2	2.6	***	
Pre-Striping (E. Broadway to 13th)						0	0		0.4	***	
Post Striping 10/76						0	0		0.4	310	
Pre-Sidewalk Route (24th to 39th)	2					2	1.4		1.3	***	
Post Installation 7/75		1	1	1	1	4	1.1	2	1.3	250	0.9
12th Street -- Total	1	1	2	3	2	9	1.8		2.1	965	0.2
Note Signed 6/73											
5th Street -- Total	1		1	2	3	7	1.4		1.6	265	0.9
Pre-Striping (Jefferson to High)	1		1			2	0.8	1	0.7	***	
Post Striping 5/76				1	2	3	1.2	1	0.7	285	1.6
Agate Street -- Total	2	2	1	1		6	1.2		1.1	485	0.6
Pre-Striping (13th to 19th)	1					1	2.0		0.4	***	
Post Striping 6/74		2		1		3	0.7		0.4	725	0.7
Charnelton		3			3	6	1.2		1.8	***	
Harlow Road -- Total	1	1		4		6	1.2		0.9	***	
Pre-Striping (Lydick to Garden Way)	1	1				2	0.8		0.9	***	
Post Striping 6/76				4		4	1.6		0.9	195	2.5
19th Street	2	1	2		1	6	1.2		2.4	***	
29th Street	1			1	4	6	1.2		1.1	***	
Chambers	2	1		2		5	1.0		2.6	***	
Monroe	2		2	1		5	1.0		2.0	***	
Oakway Road (striped 9/78)			2	2	1	5	1.0	1	0.9	***	
17th Street	2	1		1	1	5	1.0		1.7	***	

** - Short Sample Period
** - Unknown

BICYCLE FACILITIES

Table III-3 contains examples of bicycle facilities that have: 1) reduced the accident frequencies per year, 2) have not changed the accident frequencies per year, and 3) have increased the accident frequencies per year. Examples of each group follow:

Reduced Accident Frequencies

Four streets experienced lower average annual frequencies of bicycle accidents after facilities for bicycles were installed. The "After Installation" frequencies are in parentheses.

Agate Street...2.0 (0.7)	Hilyard Street...1.4 (1.1)
Alder Street...2.8 (0.9)	11th Street... 1.6 (0.9)

Agate, Alder, and 11th Streets have striped bicycle lanes. Each facility is well used by bicyclists and motor vehicle drivers. These striped lanes have channelized bicycle traffic in an expected manner, and promote riding consistent with the Rules of the Road.

The Hilyard Street sidewalk bicycle facility is a section that is not heavily used, and has few motor vehicle conflicts across the sidewalk. In this situation a sidewalk can be successfully used for bicycle movement, as long as the pedestrian volume is low.

Unchanged Accident Frequencies

Five streets experienced no significant change in frequency of bicycle accidents after facilities for bicycles were installed. The "After Installation" rates are in parentheses.

High Street...0.6 (1.2)	13th Street...0.4 (0.5)
5th Street... 0.8 (1.2)	18th Street...6.7 (N.A.)
12th Street...N.A. (1.8)	

The increased accident frequency of the High Street facility results from a sidewalk bicyclist hitting a parked car, bicyclists riding double, and tipping over. The increased accident frequency of the 5th Street facility results from a bicyclist tangling a backpack in a wheel. These accidents are not related to the striped bicycle lanes along either street. The sensitivity of the comparisons is demonstrated by the two routes.

The 12th Street facility has existed for the duration of the evaluation project period, while the 18th street facility was recently completed. The average annual frequency of bicycle accidents was very high along 18th Street prior to striping.

The average annual frequency of bicycle accidents along 13th Street are not significantly different before and after the bicycle lane striping was installed.

Increased Accident Frequencies

Five streets experienced an increase in the frequency of accidents after the installation of bicycle facilities. Because bicycle usage of the streets was not measured before the facilities were installed, the effects of increasing ridership along the routes cannot be evaluated.

	*	**		*	**
Coburg Road...	2.4	(6.5)	Willamette Street...	1.3	(2.6)
Harlow Road...	0.8	(1.6)	15th Street...	0.5	(2.0)
Pearl Street...	0.6	(4.2)			

The Coburg Road accidents include: seven sidewalk collisions, two wrong way riding in the bike lane collisions, and two collisions involving bicyclists properly riding in the bicycle lanes. The sidewalk portion of the bike lanes along Coburg Road are a problem.

The Willamette Street sidewalk bike lanes extend from 19th to 32nd Streets. Each accident along this section involved a bicyclist riding on the sidewalk, or in the wrong direction on Willamette Street.

The sidewalk bicycle facilities result in unexpected bicycle-motor vehicle conflicts. The sidewalk facilities also promote improper riding through intersections and along bike lanes. The unexpected conflicts and improper riding are a primary cause of the accidents along Coburg Road and Willamette Street.

Each of the four collisions along the Harlow Road bike lanes, involved a young bicycle driver turning unexpectedly across the motor vehicle lane. The average age of the young drivers involved in the accidents was thirteen.

The accidents along Pearl Street include seven collisions of bicyclist and left-turning cars, which occurred between 7th and 13th Streets. This bike lane is on the left side of a one-way street. Off-street parking, on-street parking, bus stations, and intersecting streets create conflicts of left-turning motor vehicles and through bicycles. Consideration was given to relocating the facility to the west side of the street. However, turning conflicts with vehicles would still occur, with no real benefit to the bicyclist. The problem is specific to the location. A similar bike lane on High Street does not have this problem.

The 15th Street bicycle facility has no striped lanes along the route. The increased average annual frequency of bicycle accidents is probably related to increased ridership, rather than the installation of the bicycle route signs. Five of the accidents involved motor vehicle drivers violating the right-of-way of the bicyclists. The other two accidents did not involve moving motor vehicles.

* Average Accidents/year prior to bicycle facilities
** Average Accidents/year after bicycle facilities installed

PROBLEM STREETS

The following streets had five or more bicycle accidents during the evaluation project period. These streets are on the Eugene Bikeways Master Plan, but do not have installed bicycle route facilities:

Street	Total Accidents
24th Street	10
Charnelton Street	6
19th Street	6
29th Street	6
Chambers Street	5
Monroe Street	5
Oakway Road	5
17th Street	5

The Master Bikeways Plan includes bicycle facilities on or near each of these facilities. Oakway Road was striped for bicycle traffic late in 1978. Bicycle lane striping is proposed for Chambers, 18th, 24th, and 29th Streets. Bike lane striping on 18th Street will attract bicyclists from the problem sections of 17th and 19th Streets. Also proposed is bike lane striping of Lincoln, Lawrence and Friendly Streets. These streets will provide north-south connections to attract bicyclists from the problem sections of Monroe and Charnelton Streets.

The proposed striping projects channelize bicycle traffic in an expected manner, and allow riding consistent with the Rules of the Road. These projects should improve bicycle safety, as demonstrated by the Alder, Agate, and 11th Street bicycle facilities.

BICYCLE ROUTE ACCIDENT RATES

This section compares the bicycle accident rates on existing bicycle routes in the Eugene bikeway system. Bicycle facilities are summarized below under

- Striped bicycle lanes
- Signed bicycle routes
- Sidewalk bicycle routes

Bicycle accident rates have been determined from 1978 bicycle counts on the bikeway system, and using Police Reports of Bicycle Accidents. Accident rates on "Separate Bicycle Facilities" are not appropriate for this evaluation project, as there were no bicycle-motor vehicle collisions on Eugene's separate bikeways. The accident reporting study described in the next chapter determined that the bicycle accidents which do not involve motor vehicles are seldom reported to the City.

Striped Bicycle Lanes

Table III-4 below lists the accident rates for striped bicycle lanes which have been in use for a year or more, and have available bicycle usage measurements.

The bicycle accident rates for the streets with striped bicycle lanes vary from 0.0 to 5.7 accidents per 100,000 bicycle miles per year. The average rate for the 27 streets is 0.7. For a short low usage section, for example Cal Young Road and 11th Street, the accident rate determinations are sensitive to a single accident occurrence.

TABLE III-4

BICYCLE ACCIDENT RATES ON STRIPED BICYCLE ROUTES
EUGENE, OREGON
1978

Striped Lane Location	Date of Implementation	Bicycle Volume*	Length (miles)	Total Reported Accidents	Accident Rate**
Agate (13th to 24th)	6/74	725	0.8	2	0.2
Alder (11th to 18th)	10/76	1085	0.4	2	0.3
Amazon Parkway (19th to 29th)	7/73	250	1.0	1	0.2
Bailey Hill (11th to City Limits)	9/74	75	1.3	1	0.7
Barger (Ohio to Highway 99N)	11/75	115	2.0	0	0.0
Cal Young (Coburg to Norkenzie)	7/76	100	0.8	1	1.4
Coburg (Centennial to Beltline)	11/76	500	2.2	13	1.5
Echo Hollow (Barger to Royal)	9/73	200	1.0	0	0.0
Fox Hollow (43rd to W. Amazon)	5/75	115	0.3	0	0.0
Gilham (Crescent to Cal Young)	3/77	70	1.0	0	0.0
Harlow (Lydick to Garden Way)	6/76	195	0.9	4	2.5

TABLE III-4 (continued)

Striped Lane Location	Date of Implementation	Bicycle Volume*	Length (miles)	Total Reported Accidents	Accident Rate**
Hawkins Heights (18th to Highland Oaks)	9/76	25	0.5	0	0.0
High Street (5th to 19th)	8/75	460	1.1	4	0.6
Hilyard Street (East Broadway to 13th)	10/76	310	0.1	0	0.0
Jefferson (1st to 5th)	4/75	130	0.3	0	0.0
Kincaid (11th to 13th)	10/76	340	0.1	0	0.0
Norkenzie (Linda to Cal Young)	10/73	120	0.7	1	0.7
Patterson (12th to 13th)	10/76	570	0.1	0	0.0
Pearl Street (6th to 19th)	8/75	276	1.1	14	3.2
Royal (Highway 99N to Royal Oaks)	7/76	135	2.4	1	0.3
Willamette (Stonewood to 33rd)	8/76	90	1.1	0	0.0
4th Avenue (High to Coburg)	8/75		0.2	0	0.0
5th Avenue (Jefferson to High)	5/76	285	0.7	3	1.6
11th Avenue (Kincaid to Willamette)	10/77	330	0.3	1	2.4
13th Avenue (Patterson to Kincaid)	10/76	2040	0.2	1	0.3
18th Avenue (City Limits to Bailey Hill)	7/76	115	0.7	0	0.0
19th Avenue (Pearl to High)	8/75		0.1	0	0.0

* Average bicycles per day measured in 1978
** Accidents per 100,000 bicycle miles per year

Signed Bicycle Routes

Table III-5 lists the accident rates for bicycle routes with no paint striping or streets with traffic diverters.

The bicycle accident rates for the streets with bicycle route signing, vary between 0.0 and 3.3 accidents per 100,000 bicycle miles per year, with the average rate of the 19 streets at 0.6. Accident rate determinations for a short street section with low usage, such as High Street, is sensitive to a single accident occurrence.

TABLE III-5

BICYCLE ACCIDENT RATES ON SIGNED BICYCLE ROUTES

EUGENE, OREGON

1978

Location	Date of Implementation	Bicycle Volume*	Length (miles)	Total Reported Accidents	Accident Rate**
Alder Street (18th to 24th)	6/71	1570	0.4	3	0.3
Alder Street (24th to 35th)	5/76	1350	1.4	3	0.2
Broadway (McKinley to Charnelton)	10/76	295	1.7	1	0.3
Donald (40th to Fox Hollow)	11/76	140	1.3	1	0.7
Fairfield (Highway 99N to Elmira)	11/76	105	0.6	0	0.0
High Street (4th to 5th)	11/76	400	0.1	1	3.3
Kincaid (13th to 15th)	1/77	855	0.2	2	1.7
Kincaid (35th to 38th)	7/71		0.3	0	0.0
Queens Way (Cal Young to Schoolgrounds)	8/76		0.1	0	0.0
Taney (Barger to Marshall)	7/76		0.7	0	0.0
University (18th to 25th)	6/71	415	0.5	1	0.3

TABLE III-5

BICYCLE ACCIDENT RATES ON SIGNED BICYCLE ROUTES

EUGENE, OREGON

1978

(continued)

Location	Date of Implementation	Bicycle Volume*	Length (miles)	Total Reported Accidents	Accident Rate**
Willhi (Echo Hollow to East)	7/76	360	0.2	0	0.0
5th Avenue (Polk to Jefferson)	10/75	445	0.4	0	0.0
12th Avenue (Arthur to Hilyard)	6/73	965	2.1	9	0.2
15th Avenue (Agate to Fairmount)	8/76	245	0.6	2	1.6
15th Avenue (Fairgrounds to Kincaid	12/75	440	1.2	7	1.2
16th Avenue (Van Buren to Friendly)	7/73	420	0.4	0	0.0
17th Avenue (Chambers to Arthur)	5/74	245	0.3	1	0.8
25th Avenue (Alder to University)	6/71		0.2	0	0.0

* Average bicycles per day measured in 1978
** Accidents per 100,000 bicycle miles per year

Sidewalk Bicycle Routes

The accident rates for the sidewalk routes along Hilyard, Coburg, and Willamette Streets are 1.5, 1.9 and 2.0 accidents per 100,000 bicycle miles per year respectively.

The average accident rate for these three sidewalk bicycle route sections is 1.8 accidents per 100,000 bicycle miles per year. This is nearly three times the average for the signed lanes or striped lanes. These facilities are significantly more hazardous for bicycle-motor vehicle accidents.

Summary of Corridor Accidents

Bicycle lanes have been successfully used to reduce bicycle accidents. There are, however, a few locations that continue to have conflicts between bicycles and cars. Streets signed as bike routes have not reduced accidents. Bicycle routes on sidewalks have an accident rate three times higher than the rates for the striped lanes and signed routes.

INTERSECTION BICYCLE ACCIDENTS

Problem intersection locations are listed in Table III-6. The tabulation identifies intersections with three or more bicycle accidents during the five-year evaluation project period. Accidents are listed by the accident groups as described earlier in this chapter. Specific bicycle facility improvements are described in Chapter VI.

TABLE III-6

BICYCLE ACCIDENTS AT INTERSECTIONS

by ACCIDENT GROUP

EUGENE, OREGON

1974 - 1978

Intersection	Total Bicycle Accidents	Accident Group* B	C	D	E	F
Franklin and Onyx	6	3	3			
Willamette and 29th	6		1		2	3
11th and Alder	4	1	1			2
11th and Patterson	4			1	1	2
18th and Chambers	4		2			2
Harlow and Coburg	3		2			1
Franklin and Agate	3					3

* Group B - The bicyclist rides into the path of a motor vehicle in an intersection of streets
Group C - The motorist drives into the path of a bicycle at an intersection of streets
Group D - The motorist hits the bicyclist from behind
Group E - The bicyclist makes an unexpected turn into the path of a motor vehicle
Group F - The motorist makes an unexpected turn into the path of the bicycle

BICYCLE ACCIDENT CAUSES

The majority of the bicycle accidents in Eugene can be related directly to an error made by the bicyclist. Identified bicycle driver errors are listed in the table below.

TABLE III-7

NUMBER OF BICYCLE ACCIDENTS

RESULTING FROM ERRORS BY BICYCLE DRIVERS

EUGENE, OREGON

1974 - 1978

Bicycle Driver Error	Number of Accidents
Improper passing	43
Improper sidewalk riding	37
Bicycle rideout from driveway or alley	32
Unexpected turn or swerve	29
Sign violation	28
Wrong way riding	23
Riding without lights	19
Signal violation	18
Striking parked car	12
Driving straight through a turn lane	6
Intoxicated bicycle driver	4
Striking pedestrian	3
Wheel fell off	3
Brake failure	2
Total	259

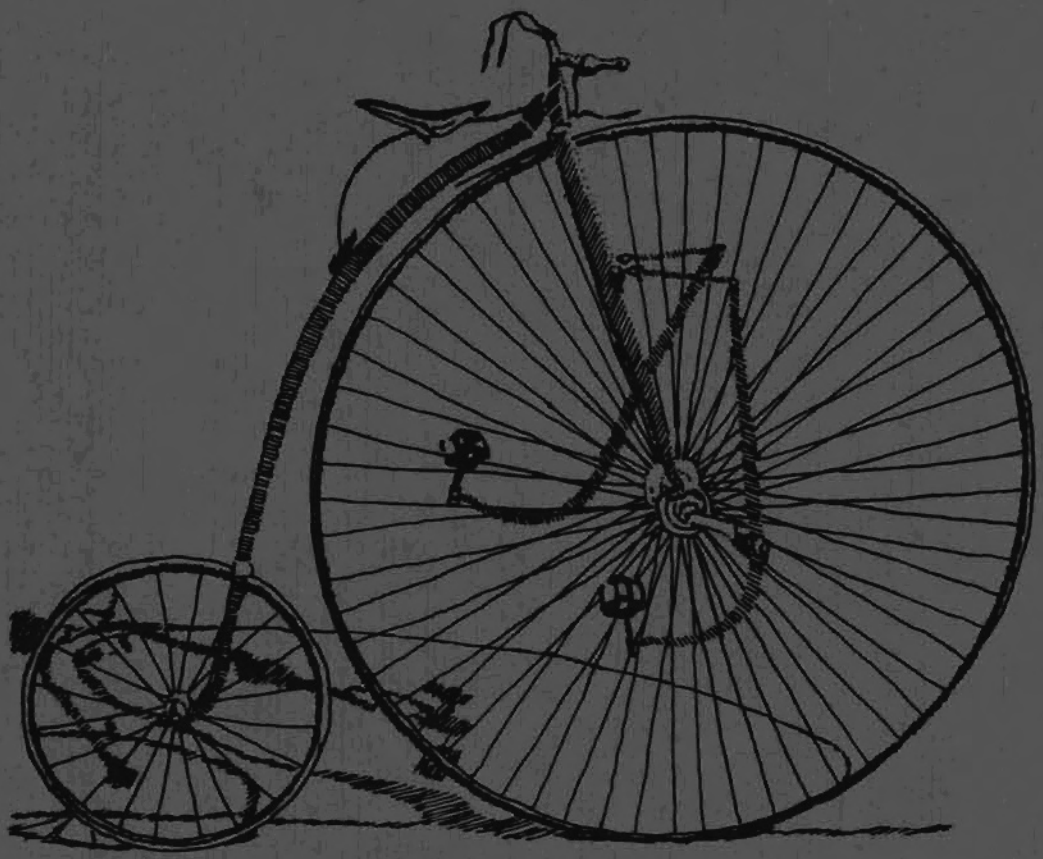
As illustrated above, out of the 391 bicycle accidents, 259 or two-thirds of the total bicycle accidents were related to bicycle driver errors. Alerting bicycle drivers of the hazards of passing turning vehicles, sidewalk riding, riding out of driveways and alleys, turning and swerving unexpectedly, violating signs and signals, riding on the wrong side of a road, riding at night without a light, etc., may help to reduce bicycle-motor vehicles accidents. Providing this information to educators will improve educational programs developed to reduce bicycle accidents.

Bicycle riders must know and obey the Rules of the Road, except those which cannot apply to bicycles. (See Oregon Driver's Manual, 1978-1979, Oregon Motor Vehicles Division, Pages 48 and 49). Almost all of the 259 bicycle driver error accidents noted previously could have been prevented, had the bicyclist applied his or her knowledge of the law. The terms "Improper Riding" and "Improper Passing" are seen throughout the report. In order to clarify their meaning, the following examples are given. Improper riding refers to: Running stop signs, mid-block or intersection rideout without yielding right-of-way, riding on the wrong side of the road, riding the wrong way on a one-way street, etc. Improper passing refers to: Passing on the left at intersections, and passing on the right (same rules as for motor vehicles).

The Eugene Bikeways Master Plan recommended utilizing existing programs in schools, supplemented with publications of bicycle riding education materials, a speaker's bureau and maintenance workshops. Teachers are provided with general materials for traffic safety education by the Oregon Department of Education. Specific information about the problems of bicyclists in Eugene has not been provided. It is recommended that the information concerning Eugene's bicycle accidents be provided to the teachers responsible for teaching bicycle safety.

Bicycle driver errors were not identified in one-third of the bicycle-motor vehicle accidents. A defensive bicycle driver can often avoid a collision. Existing bicycle education programs including driver education classes could be improved by providing training of hazard recognition, risk assessment, and evasive techniques, as well as information concerning laws, riding techniques, coordination skills, and bicycle maintenance.

It is recommended that the City of Eugene cooperate with Eugene's schools, to improve bicycle riding education by providing information necessary to improve education programs. Helping teachers to understand the importance of bicycle riding skills and the primary causes of bicycle accidents, will assist the teachers to teach bicycle safety.



CHAPTER IV

BICYCLE ACCIDENT REPORTING AND MONITORING

CHAPTER IV

BICYCLE ACCIDENT REPORTING AND MONITORING

The study of reported bicycle accidents has been valuable for evaluating the bikeways. This chapter describes the nature and level of the bicycle accident reporting in Eugene, and presents a revised system for monitoring bicycle accidents.

NATURE AND LEVEL OF BICYCLE ACCIDENT REPORTING

An accident reporting survey was conducted to evaluate the extent of reporting injury accidents involving bicycles. The survey is summarized under the following sections:

- o Voluntary reporting form
- o Sample period
- o Bicycle-Motor vehicle accidents
- o Bicycle only accidents
- o Summary

VOLUNTARY REPORTING FORM

A form, (Figure IV-1) was provided in local hospital emergency rooms and clinics. The form was voluntarily filled out by individuals who had sustained injuries while riding bicycles. The information obtained was used to determine what type of bicycle accidents are and are not reported to the Police.

The voluntary reporting forms were made available by

- o Dr. A. Long, in the Student Health Center, University of Oregon
- o Dr. T. Gerow, in the Emergency Room, Sacred Heart Hospital
- o Dr. C. Koch, in the Emergency Room, Eugene Hospital & Clinic
- o Dr. K. Fergusson, in the Westmoreland Medical Clinic
- o Dr. O. Byerly, in the River Road Medical Group Clinic
- o Dr. C. Bremiller, in his Family Practice Office
- o Dr. P. Cary, in her Family Practice Office
- o Dr. S. Hendrickson, in her Family Practice Office

(A special thanks belongs to each of these individuals, along with those who have helped them to conduct this survey.)

FIGURE IV-1

VOLUNTARY ACCIDENT REPORTING FORM

HELLO! SORRY ABOUT YOUR BICYCLE ACCIDENT. WE WOULD LIKE TO PLAN WAYS TO MAKE BICYCLING SAFER IN EUGENE. WILL YOU HELP BY FILLING OUT THIS SHEET? THE MAYOR'S BICYCLE COMMITTEE THANKS YOU.

1. DID YOUR ACCIDENT HAPPEN ON:
   _/ STREET INTERSECTION _/ STREET BETWEEN INTERSECTIONS
   _/ DRIVEWAY _/ SIDEWALK
   _/ BIKE PATH _/ PRIVATE PROPERTY
   _/ OTHER_____
2. WHAT KIND OF ACCIDENT?
   _/ BICYCLE HIT CAR _/ CAR HIT BICYCLE
   _/ BICYCLE HIT BICYCLE _/ BICYCLE HIT FIXED OBJECT
   _/ FALL _/ OTHER_____
3. WHAT WAS THE PURPOSE OF THE TRIP YOU WERE MAKING AT THE TIME OF YOUR ACCIDENT?
   _/ ERRAND _/ SCHOOL _/ GOING TO FRIEND'S
   _/ PLAYING A GAME _/ RECREATION _/ WORK
4. WHAT WERE THE LIGHTING CONDITIONS?
   _/ LIGHT _/ DARK
5. WHAT WAS THE WEATHER?
   _/ CLEAR, DRY _/ OVERCAST _/ RAINING
6. WHEN DID THE ACCIDENT HAPPEN?
   _____MONTH _____DAY _____YEAR
7. WHERE DID THE ACCIDENT HAPPEN?
   _____
8. HOW OLD ARE YOU?
9. SEX: MALE_____ FEMALE_____
10. HOW MANY YEARS HAVE YOU BEEN RIDING A BICYCLE? _____
11. PLEASE DESCRIBE WHAT HAPPENED:

12. DO YOU PLAN TO FILE A REPORT OF YOUR ACCIDENT WITH THE POLICE?
    _/ YES _/ NO

SAMPLE PERIOD

A three-month sample period (September 1 to November 30, 1978) was used for this survey, with the forms available in each of the locations shown on Page IV-1. A summary of the results is presented in Table IV-1 on the following page. The accidents have been divided into two groups: accidents involving motor vehicles, and accidents not involving motor vehicles. The numbers of the Voluntary Reports, Police Reports, and accidents for which both reports were completed, are shown in the table.

TABLE IV-1

SUMMARY OF INJURY BICYCLE ACCIDENT REPORTS

EUGENE, OREGON

September 1978 -- November 1978

Bicycle-Motor Vehicle Accidents		Police Report Completed	Voluntary Reports Completed	Both Reports Completed
Accident Class A				
Bicyclist Rideout: Mid-block location		2		
Accident Class B				
Bicyclist Rideout: Intersection Location		2		
Accident Class C				
Motorist Driveout		5	2	7
Accident Class D				
Motorist Overtaking		1		
Accident Class E				
Bicyclist Unexpected Turn		2		
Accident Class F				
Motorist Unexpected Turn		5	2	7
Other				
Bicyclist Hits Car Door			2	
Bicyclist Hits Parked Car		2	1	
Unknown			3	
Sub-total	43	19*	10	14**
Bicycle Only Accidents				
Bicyclist Loses Control		1	49***	
Bicyclist Hits Fixed Object			4	
Bicycle-Bicycle Collision			6****	
Bicycle-Pedestrian Collision			1	
Sub-total	61	1	60	
GRAND TOTAL	104	20	70	14

* 7 accidents clearly the fault of the bicycle driver
** 9 accidents described the motor vehicle driver at fault
*** 11 accidents involved bicyclists on bicycle facilities
**** 4 accidents involved bicyclists on bicycle facilities

BICYCLE MOTOR VEHICLE ACCIDENTS

During the three-month sample period (September 1 to November 30, 1979), the Eugene Police Department reported twenty-nine accidents involving bicycles. Only one did not involve a motor vehicle. During the same time period, twenty accidents involving bicycles and motor vehicles were reported in the Voluntary Report survey. Of the twenty-nine Police Reports and nineteen Voluntary Reports, nine were duplicates. The total number of bicycle-motor vehicle accidents reported for the time period was thirty-nine, one-fourth of which were not reported to the Police.

There are several reasons for the nineteen accidents described in Police Reports, but not in Voluntary Reports. For each of the nine accidents in which both reports were completed, the motor vehicle driver was apparently at fault.

The accidents in which only Police Reports were filed, included accidents in which the bicycle driver was at fault (sidewalk riding collisions and parked car collisions). The individuals involved in these accidents may have been reluctant to complete a Voluntary Report of the accident.

Accidents described in some Police Reports involved severe injuries, where it was not likely that a Voluntary Report would be completed. Also, voluntary report forms may not have been available to every person treated for a bicycle-related injury.

The ten injury accidents involving bicycles and motor vehicles for which only a Voluntary Report was filed, included:

- o three accidents for which no description was volunteered
- o two open car door collisions, and
- o one parked car collision.

Although the Oregon Department of Transportation requires that a report of any traffic accident in which a bodily injury was sustained or damages exceed $200.00 be filed, the bicycle driver is often reluctant to file a report and possibly assume liability. In other cases, the bicycle driver may not be aware of the responsibilities of drivers involved in a traffic accident. For this survey, the respondents to the Voluntary Questionnaire remained anonymous. No instructions concerning driver responsibilities were provided on the questionnaire.

BICYCLE ONLY ACCIDENTS

A single bicycle accident which did not involve a motor vehicle was described in the Police Reports. Sixty bicycle accidents which did not involve a motor vehicle were described in the Voluntary Reports. Thus, it is apparent from the survey results, that although 61% of bicycle injury accidents do not involve motor vehicles, less than 2% of these accidents are described in Police Reports.

The bicycle accidents which did not involve motor vehicles included:

- Forty-nine accidents in which the bicyclist lost control
- Six collisions between bicycles
- Four accidents in which a bicycle struck a fixed object
- One collision of a bicycle and a pedestrian

The bicycle accidents involving bicyclists losing control included:

- Two bicycle drivers catching a wheel in railroad tracks
- One bicycle driver losing control after striking a speed bump
- One bicycle catching a wheel in the centerline joint of a concrete pavement
- Several bicyclists sliding on loose gravel

Bicycle accident reports and descriptions of bicycle accidents not involving motor vehicles, are necessary to plan effective countermeasure improvements. Such improvements as described in Chapter VI include sight distance, fixed objects, and other hazardous conditions, pedestrian-bicycle conflicts and poor or improper bikeway maintenance.

Summary

The injury accident survey has shown that nearly three-fourths of all injury bicycle accidents are not reported. About one-fourth of the bicycle-motor vehicle accidents are unreported. Nearly all injury bicycle accidents that do not involve a motor vehicle go unreported.

For this survey, report forms were made available in local hospitals and clinics. Bicycle injury accidents usually required timely treatment available in hospital emergency rooms, and 97% of the reports were received there.

The information from the voluntary reports is useful to the City. Problems are identified and improvements are recommended using these survey reports. The reports listed locations of unpainted traffic islands, problem railroad tracks, large sidewalk cracks, blind corners, and gravel on bike trails.

MONITORING BICYCLE ACCIDENTS

Monitoring bicycle accidents provides the information necessary to identify hazards and to plan improvements. Chapter III demonstrates how accident records can be used to identify sections of existing bicycle facilities and streets, which have proven hazardous to bicyclists. Accident records reveal locations where accident rates and frequencies are high. Classifying the bicycle accidents reveals the most frequent accident types and appropriate countermeasures.

The injury accident survey determined that 70% of all injury bicycle accidents are unreported. Locations where improvements can make bicycling safer were revealed by the survey.

Monitoring policies and practices are summarized under the following sections

- o Bicycle accident records
- o Voluntary accident survey
- o Bicycle route evaluations

Bicycle Accident Records

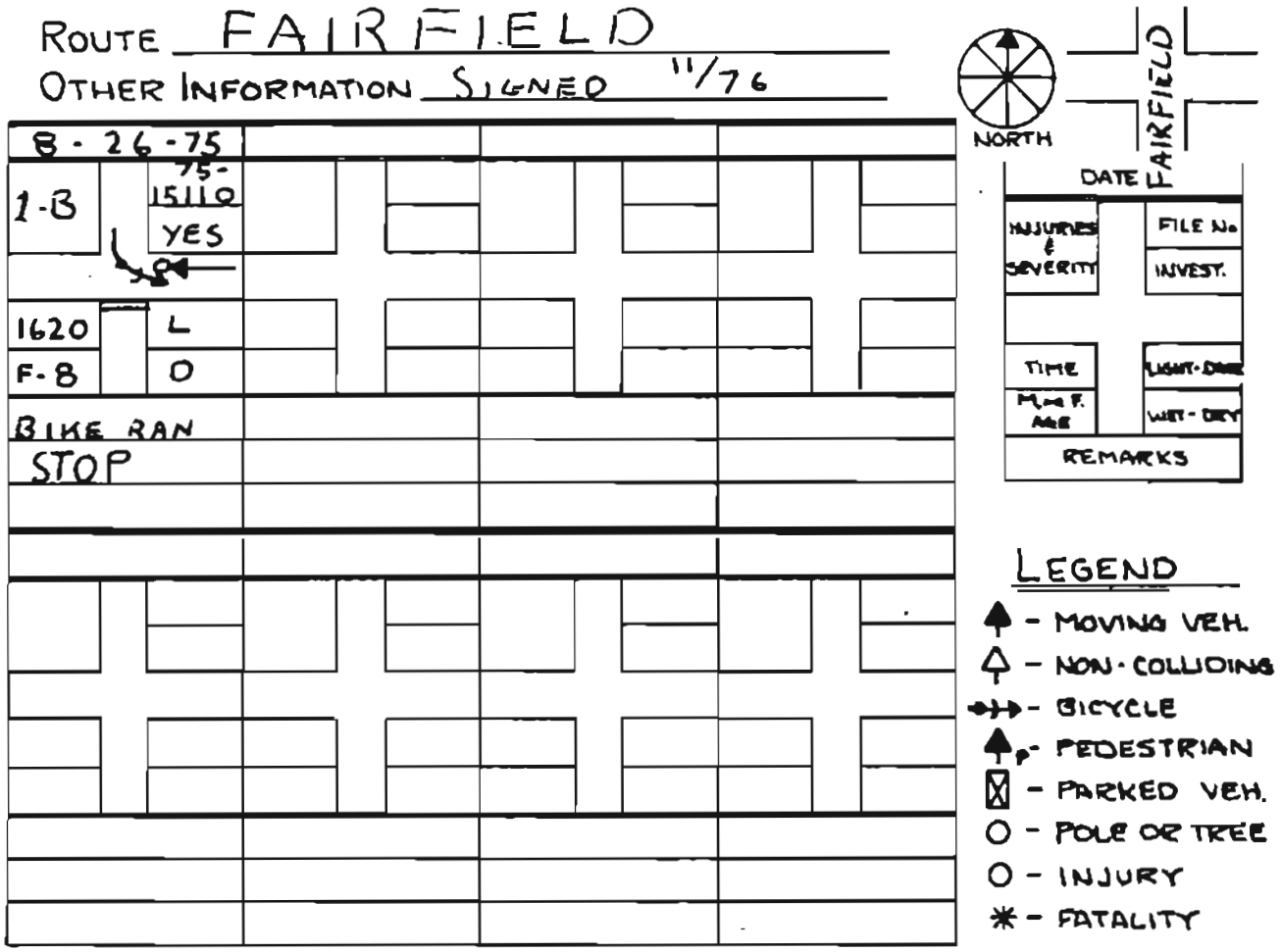
A revised manual card record system for bicycle accidents was implemented during this project. The original card record listed only the location, date and time, vehicle travel directions, number of injuries and violations. All information was written on a single card line. Rather than cataloging according to the street which the bicyclist was riding, accidents were cataloged alphabetically according to the word names of the nearest intersection. Accidents on numbered streets were cataloged on the nearest intersecting named street. Classifying accidents and determining the number of accidents along a specific route was difficult. The system was not useful for cataloging accidents that did not have a corresponding Police Report. The short written description of the accidents were difficult to decipher.

The card used for the revised card record system is shown in Figure IV-2. A small diagram of the collision provides a description of the accident and location without a written description. The date, time, severity of injury, age and sex of the bicyclist, light conditions and pavement conditions are also included on the card. The cards are filled out and filed by staff personnel in the Traffic Engineer's office.

FIGURE IV-2

SAMPLE - REVISED BICYCLE

ACCIDENT REPORT



This sample from the revised report system, describes an accident in which an 8 year old female bicycle driver rode past a STOP sign at the southern end of Fairfield Road. As the bicyclist was turning left onto Elmira Road, she was struck and injured by a vehicle traveling west on Elmira Road. The injury was major but non-incapacitating (Injury Code B, as described on the Police Traffic Accident Report Form). The description of the investigated accident is on Report Number 75-15110. The accident occurred at 4:20 PM, on August 26, 1975, under light and dry conditions. The accident was caused by the bicyclist ignoring the STOP sign.

It is recommended that this new card system be maintained by the City of Eugene. All bicycle accidents reported between January 1974 and December 1978, have been successfully cataloged on the cards. This card system should be updated monthly including both the Police Reported Accidents and the appropriate Voluntary Reports. As the accidents are cataloged, improvements should be identified and efforts begun to implement the identified improvements.

Voluntary Accident Survey

Descriptions of many of the accidents which go unreported, could provide useful information for problem identification. It is recommended that the City distribute Voluntary Bicycle Accident Report forms to the Emergency Rooms of Sacred Heart Hospital, the Eugene Hospital and Clinic, and the University of Oregon Student Health Center. This 5" x 8" card form shown below, should be made available and monitored monthly in these locations. The location and dates of the accidents provide a ready cross-reference to the Police Accident Reports. The information collected during the original survey has proven valuable, and the City should continue to collect this information.

FIGURE IV-3

PROPOSED VOLUNTARY ACCIDENT SURVEY CARD

HELLO! SORRY ABOUT YOUR BICYCLE ACCIDENT. WE WOULD LIKE TO PLAN WAYS TO MAKE BICYCLING SAFER IN EUGENE. WILL YOU HELP BY FILLING OUT THIS CARD? THE MAYOR'S BICYCLE COMMITTEE THANKS YOU.

1. DID YOUR ACCIDENT HAPPEN ON:
   _/ STREET OR INTERSECTION _/ PRIVATE PROPERTY
   _/ BIKE PATH _/ SIDEWALK

2. WHAT KIND OF ACCIDENT?
   _/ BICYCLE HIT CAR _/ CAR HIT BICYCLE
   _/ BICYCLE HIT BICYCLE _/ BICYCLE HIT FIXED OBJECT
   _/ FALL _/ OTHER _____

3. WHEN DID THE ACCIDENT HAPPEN?
   _____ MONTH _____ DAY _____ YEAR

4. WHERE DID THE ACCIDENT HAPPEN?

5. PLEASE DESCRIBE WHAT HAPPENED:

Bicycle Route Evaluations

The card record file of bicycle accidents should be analyzed annually to identify problem corridors and evaluate bikeway system improvements. Accident rate determinations provide the information necessary to make comparisons. A format for bike route evaluations is shown in Figure IV-4.

FIGURE IV-4

PROPOSED BICYCLE ROUTE EVALUATION FORMAT

BICYCLE ROUTE EVALUATION

CITY OF EUGENE, OREGON
Date: _____

Bicycle Route _____ Length _____
Type of Improvement _____
_____
_____

Before Conditions
- Number of Bicycle Accidents _____
- Time Period (years) _____
- Average Daily Bicycle Traffic _____
- Bicycle Accident Rate* _____

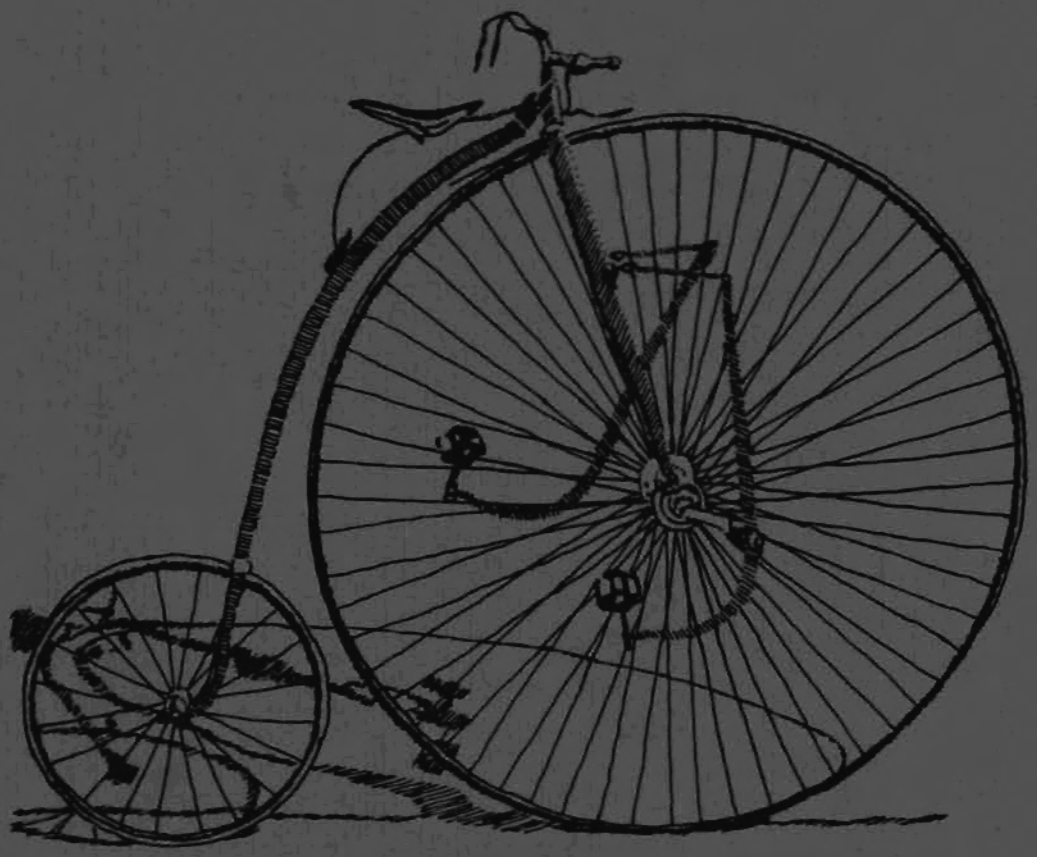
After Conditions
- Number of Bicycle Accidents _____
- Time Period (years) _____
- Average Daily Bicycle Traffic _____
- Bicycle Accident Rate* _____

* Accident Rate = Accidents per 100,000 bicycle miles per year

$$= \frac{(\text{Accidents})}{(\text{Years}) \times (365 \text{ days}) \times (\text{Bicycles}) \times \frac{(\text{Miles})}{(100{,}000 \text{ miles})}}$$

$$\left(\frac{}{\text{year}}\right)\left(\frac{}{\text{day}}\right)$$

The evaluation form provides a project description and comparisons of accident frequencies, bicycle volumes and accident rates. Routes identified as having high or increasing accident rates should be studied and evaluated to identify problems and to plan improvements. Routes which have low or decreased accident rates, are locations where improvements are not necessarily required or have been successfully implemented. Studying the successes as well as the problems, is important for the identification of useful improvements.



CHAPTER V
PUBLIC INVOLVEMENT AND INPUT

CHAPTER V

PUBLIC INVOLVEMENT AND INPUT

The bicycle accident analysis was used to evaluate the performance of bicycle facilities in the City bikeway system. This chapter evaluates the present condition of bicycle facilities, and the increasing usage of the bikeways. Public involvement and input is summarized in the following sections:

- o Public Hearing
- o Citizen Questionnaire
- o City Staff and the Mayor's Bicycle Committee

PUBLIC HEARING

On Tuesday, October 10, 1978, a public hearing was conducted to receive public input concerning the Eugene Bikeway System. The hearing was conducted for the 12-hour period between 10 AM and 10 PM, in order to avoid schedule conflicts for those who testified. The hearing was staffed by representatives of the Mayor's Bicycle Committee, the City of Eugene, and the Consultant. To obtain input from individuals who did not have time to give testimony, or who felt uncomfortable testifying, suggestion forms were provided in the hearing room.

In 1974, a similar public hearing was conducted during the preparation of the original Master Bikeways Plan. There were only a few brief periods when the microphone was not occupied, as was the case with the original hearing. Testimony concerned many aspects of bicycling and the bikeway system. Ideas and constructive criticisms were offered. There were frequent commendations of the Eugene Bicycle Committee, and Eugene Bikeway System. The transcripts of the testimony and suggestion box responses, are contained in a separate volume available in the office of the City of Eugene's Bicycle Coordinator.

The most frequent comments presented in the hearing concerned

- o System Additions
  - More separate paths (17 comments)
  - Improving east/west Connections (4 comments)
- o System Connections
  - Connections to the Bethel Area (14 comments)
  - Connecting the Knickerbocker Bridge (12 comments)
  - Connecting the Fern Ridge Path (11 comments)
  - Improving the 30th & Hilyard Streets intersection (10 comments)
  - Grade separated crossing of Franklin Boulevard (5 comments)
  - Provide Bike Lanes on 18th Street (3 comments)
  - Extension of the river trails (3 comments)
- o System Improvements
  - Lighting along paths (13 comments)
  - Reconstructing River Road (6 comments)
  - 12th Street (4 comments)
  - Ferry Street Bridge (4 comments)

- Bikeway Design
  - Downtown bicycle lanes (10 comments)
  - Traffic Lights (5 comments)
  - Storm drains (4 comments)
  - Curb cuts (4 comments)

- Education and Bicycle Safety (27 comments)

- Improving maintenance of bicycle facilities (38 comments)

- Relaxing laws concerning STOP signs (10 comments)

- Enforcement of laws (21 comments)
  - Personal Safety (13 comments)

- Bicycle Parking (8 comments)

In 1974, 19% of the public hearing comments concerned education, law enforcement, and maintenance. In 1978, 33% of the comments concerned these items. No single item was mentioned by more people, than improvement of maintenance. The public has become more concerned about each of these items over the last four years.

A form provided during the hearing was used to determine which items would encourage the respondent to use a bicycle as a regular form of transportation. The items ranked in priority of importance based on the responses include:

1. More separated, independent paths
2. More striped bike lanes on major paths
3. Lights along existing bikeways
4. Police patrolling of bike paths to increase security
5. Covered secure bicycle parking
6. More bicycle parking
7. Better signing of existing routes
8. Stricter enforcement of bicycle traffic regulations
9. Advertising which points out benefits of bicycling
10. Classes teaching effective bicycling skills
11. A place to shower and change clothes

Five items were frequently added by respondents and these are given below in the descending order of frequency.

1. Improving the maintenance of bikeways
2. Educating motor vehicle drivers to increase awareness of bicycles
3. Improving the licensing system
4. Enforcing automobile laws and right-of-way violations
5. Modifying the STOP sign law for bicycle drivers

This questionnaire demonstrated the public's concern for the improvement of education, law enforcement, and maintenance of Eugene's bikeways.

CITIZEN QUESTIONNAIRE

A Eugene Bicycle Questionnaire was formulated to ask the citizens of Eugene their opinions about bicycling, the Eugene Bikeway System, and how to improve both. The questionnaire was mailed in November 1978 to a random sample of Eugene's population, and 18% of the 398 delivered questionnaires were returned. For purposes of comparison, a second distribution of the same questionnaire was made by attaching the questionnaire to parked bicycles throughout Eugene. Of the 381 attached questionnaires, 35% were returned. The population receiving questionnaires attached to their bicycles is likely to be representative of the commuting bicyclist population.

The returned questionnaires, and a compilation of the responses are available in a noteboook in the office of the City of Eugene's Bicycle Coordinator. The following is a summary of these responses.

GENERAL QUESTIONS

All respondents were asked to submit opinions about:

- Bicycling in Eugene
- Improving bicycling
- Travel times
- Available bicycle paths
- Transportation mode preferences
- Seasonal effects on mode preferences

Bicycling in Eugene

Citizens were asked to indicate their agreement with ten statements related to bicycling in Eugene. The opinions of the bicycle riders who responded to the random mailing and questionnaires attached to parked bicycles were similar for all statements. All respondents agreed that:

- Bicycling to work is pleasant because of the surroundings
- Bicycling with motor vehicle traffic is hazardous
- Riding a bicycle gives healthful exercise
- Bicycle parking at work is not a problem
- Bike paths make bicycling safer in Eugene

The bicycle riding and non-bicycle riding respondents did not agree on the statements described below:

Statement	Riders	Non-riders
Worried about being injured when riding their bicycles	Disagreed	Agreed
Bicycle skills are adequate	Agreed	Neutral
Can get to work quickly on a bicycle	Agreed	Disagreed
It is convenient to run errands while traveling to and from work	Agreed	Disagreed
Appearance is unfavorably affected by bicycling	Disagreed	Neutral

It is apparent that respondents who use bicycles for transportation tend to be confident in their skills, not fearing injury while bicycling, and know that bicycle trips are quick, convenient, and do not affect appearance unfavorably. Respondents who do not ride bicycles feel otherwise.

Improving Bicycling

Citizens were asked to indicate items most important for helping them to ride their bicycles more often. The five most frequently mentioned items in all the responses included:

- More bike paths and striped bike lanes
- More lights along existing bikeways
- Relaxing STOP sign laws (bicycles yield at STOP signs)
- More covered secure bicycle parking
- Better sweeping of the bike paths

The respondents who were not regular bicycle riders felt stricter enforcement of traffic rules for bicycles and motor vehicles was one of the most important items for encouraging them to ride their bicycles more often.

Travel Times

Respondents were asked to estimate their door-to-door travel times for walking, bicycling, driving, and riding on a bus. Nearly all respondents rated walking as the slowest means of transportation, with a bus rated as only slightly faster than walking. The comparison of bicycle and car trips was usually dependent on whether the respondent rode a bicycle or not. From the averaging of responses to the random mailout, it was determined that the bicyclists reported their door-to-door trip times were less than car trip times (88% of the total car trip times), and the car drivers thought a bicycle trip would take longer (116% of the total car trip times). The respondents to the questionnaires attached to parked bicycles indicated that their door-to-door trip times for bicycle trips were on an average equal to 68% of their car trip times. It is shown by these results that those who use bicycles find that their bicycle door-to-door trip times are less than the same trip taken by car. Those who have not used bicycles perceive that their bicycle trip times will be longer than car trip times.

Available Bicycle Paths

Citizens were asked what portion of their work trip was served by bicycle paths. Of all the respondents

- o 60% stated more than half
- o 23% stated less than half
- o 11% stated none
- o 6% did not know

Transportation Mode Preference

To evaluate preference of various means of transportation, citizens were asked to recall the number of trips made walking, riding a bicycle, riding a bus, driving a car, or riding in a car. For the evaluation of the random mailout, the respondents who used bicycles regularly were separated from the respondents who did not. It was determined that for the "non-riding" respondents, on an average they used their automobiles for 77% of their trips, buses for 2%, walking for 15%, and bicycles for 5% of their trips. For the bicycle riding respondents, on an average they used their automobiles for 40% of their trips, buses for 3%, walking for 10%, and bicycles for 47% of their trips.

The respondents to the questionnaires attached to parked bicycles indicated that even a larger portion of their trips were made using a bicycle. On an average, the respondents used their automobiles for 23% of their trips, buses for 2%, walking for 13%, and bicycles for 60% of their trips. People who do use bicycles, use bicycles more often than cars.

Seasonal Effects on Mode Preference

Respondents were asked to rank their mode preference among walking, bicycling, bus, or car for the different seasons. Of the respondents to the random mailing, 38% preferred using a car throughout the year, 23% preferred bicycling throughout the year, and 35% preferred bicycling, except during the winter months. Half of the respondents to the questionnaires attached to parked bicycles indicated that they preferred bicycling throughout the year, while half indicated that they preferred using an automobile during the winter season.

BICYCLE RIDER RESPONSE TO QUESTIONNAIRE

Questionnaire respondents who rode bicycles regularly were asked to respond to additional questions related to:

- Bicycle trip purposes
- Reasons for bicycling
- Bicycle parking
- Bicycling in the rain
- Transportation costs
- Cycling classes

The set of questions separated the bicycle driver and non-bicycle driver population. All the respondents to the questionnaires attached to bicycles were regular bicycle drivers, and 58% of the respondents to the random mailing were regular bicycle drivers.

Bicycle Trip Purposes

To determine the purpose of bicycle trips, bicycle riders were asked to recall the number of days in October they rode a bicycle for shopping, for school or work, trips to friends, and for exercise or recreation. The responses averaged for all bicycle riders indicated that 52% of all bicycle trips were to travel to work or school, 16% were to go shopping, 16% of all trips were to visit friends, and 16% of all trips were for exercise or recreation.

Reasons for Bicycling

In order to determine what helped persuade bicycle riders to become bicycle riders, respondents were asked to choose the three most important of nine items which started them riding a bicycle. Exercise, convenience, and the high cost of automobile use were chosen as items most helpful in persuading bicyclists to ride. These three items would be important items to stress in efforts to persuade others to ride bicycles.

Bicycle Parking

Bicycle riders were asked if they would ride their bicycles more often if they had a secure, covered place to park at their destination. The majority of the respondents (54%) replied that they would. Efforts to provide secure covered parking are warranted and should be continued.

Bicycling in the Rain

The majority of the bicycle riding respondents to the random mailout (59%) indicated that they ride their bicycles in the rain. In comparison, 91% of the respondents to the questionnaires attached to parked bicycles ride their bicycles in the rain. This supports the supposition that the population responding to the questionnaires attached to parked bicycles is representative of the commuting bicyclist.

Transportation Costs

Bicycle riders were asked if their bicycle replaced an extra automobile in their household, and to estimate the savings that resulted from using their bicycles. The majority of the respondents (64%) stated that an extra car for the household was not necessary because of bicycles. The average transportation cost savings for all riders were estimated at $34.00 per month or over $400.00 per year.

Cycling Classes

A significant number of people are interested in classes to improve their bicycling skills. Only two bicycle riding respondents felt their bicycling skills were less than adequate; however, 51 respondents noted that they would like an opportunity to improve their skills.

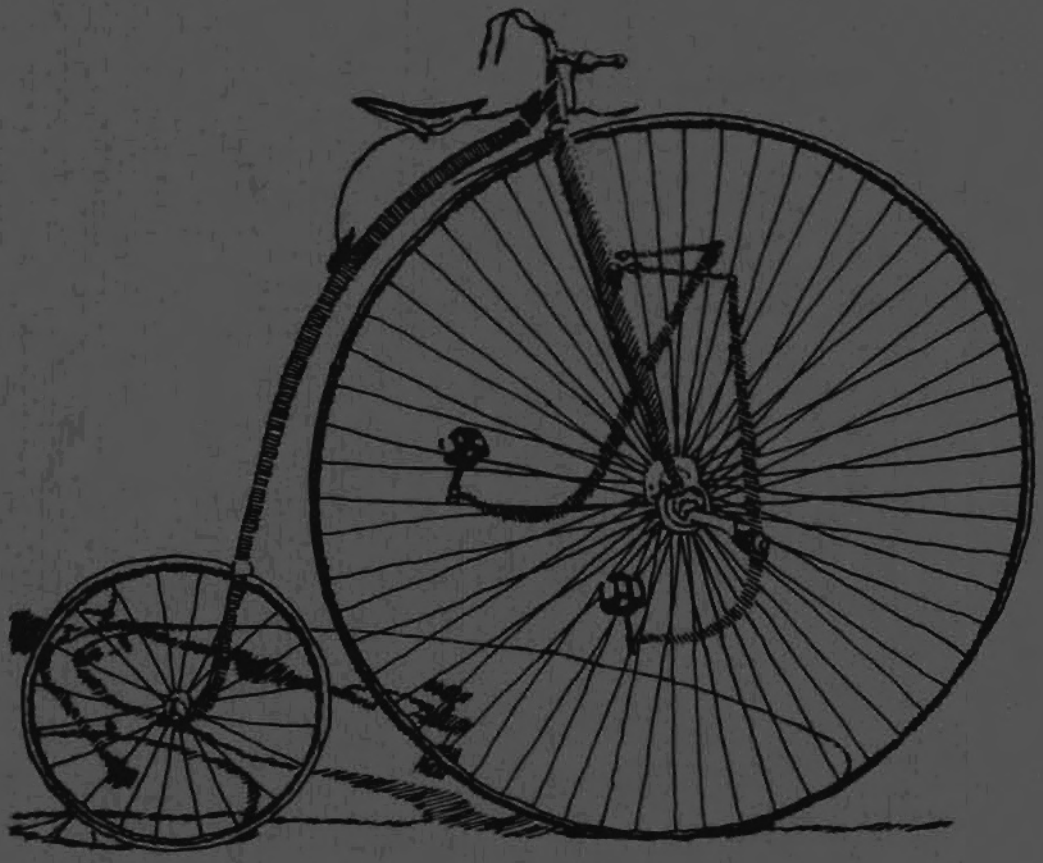
CITY STAFF AND THE MAYOR'S BICYCLE COMMITTEE

The staff of the City of Eugene and the members of the Mayor's Bicycle Committee have provided valuable input for the bikeway evaluation. Assistance provided by the City staff included:

- Project orientation
- Observations of the Bikeways Master Plan
- Providing police accident reports
- Providing records of past improvements
- Conducting manual and machine bicycle counts
- Preparing and distributing the citizen questionnaire
- Conducting the public hearing announcements
- Evaluating proposed improvements

The Mayor's Bicycle Committee has provided assistance with:

- Project orientation
- Identification of specific problems
- Conducting the public hearing
- Preparing and distributing the citizen questionnaire
- Evaluating proposed improvements



CHAPTER VI
BIKEWAY IMPROVEMENTS

CHAPTER VI

BIKEWAY IMPROVEMENTS

The bicycle accident analysis and bikeway evaluation identified the need for certain bikeway improvements. Improvements are planned to improve safety and increase ridership along the bikeways. The improvements are summarized in the following sections:

- o Fixed object hazards
- o Route improvements
- o Intersection improvements
- o Route additions
- o Bicycle facility maintenance
- o Nighttime riding provisions

FIXED OBJECT HAZARDS

Metal posts installed on some of Eugene's separate bicycle paths to prevent cars from driving on bike paths, create a fixed object hazard to bicyclists, particularly at night. The posts restrict the path of bicycle drivers. This restriction was a primary cause of a reported head-on bicycle collision. The majority of the installations do not serve the function of restricting automobiles because a barrier is only across the bicycle path. Driving around the barrier is simple, although seldom reported. There have been no accidents in the past five-years involving motor vehicles operated on a separate bicycle path. There is no evidence that the problem of motor vehicles operated on bike paths is greater on paths not restricted with the metal posts.

The location of the numerous dents and scratches on the metal posts provide visual evidence that the posts are hazards. Dents correspond to the height of the axle of a bicycle, and scratches correspond to pedal heights. There is only one known severe injury accident involving a bicyclist striking one of the metal posts; however, the injury accident survey documented that this type of accident is almost never reported to the City.

The City has developed and successfully used several alternatives to the metal posts. The figure above illustrates a barrier located at the west end of 15th Street (near Jefferson Street). As shown, the bike path branches at the connection to the roadway, and logs block the entrance to motor vehicles. Appropriate signing alerts the unaware motorist that the bike path is for pedestrians and bicycles only. The bike path is level with the roadway surface and does not cross a sidewalk as it joins 15th Street. Trimming the log ends at an angle would improve this barricade design. The five-foot-wide openings in the log barricade are narrow enough that bicyclists riding abreast might strike a pedal against a log end.

The figure above illustrates a barrier located at the east end of 16th Street (near Friendly Street).

The bike path is level with the sidewalk and crosses the sidewalk before joining 16th Street. The bike path branches before it reaches the sidewalk, and the curb along the sidewalk acts as a barrier to most motor vehicles. Signing informs the unaware motorist that the bicycle path is for use by pedestrians and bicycles only. Branching the bike path and providing two, five-foot wide curb cuts, allows two-way bicycle operations. No fixed object hazards are built into this design.

A third design used by the City is located at the intersection of the Amazon Channel Bike Path and 29th Street near Hilyard Street. This design uses a single curb cut, offset from the bike path. The bike path dead ends at the sidewalk, and a nearby curb cut connects the sidewalk to the roadway. The bicyclist is required to make a sharp turn onto the sidewalk, ride along the sidewalk parallel to the roadway, and then make a sharp turn into the roadway. Simultaneously maneuvering these turns and scanning traffic is difficult. The sharp turns were reported in the public hearing as being impossible for bicycles built for two riders. Bicyclists frequently cut corners to avoid these sharp turns. The single, five-foot-wide curb cut is not wide enough for safe two-way operations. These bottleneck the bikeway. Turns by bicyclists from the roadway into the curb cut are difficult because of the immediate sharp turn at the sidewalk. Although this design is an adequate barrier for most motor vehicles and contains no built-in fixed object hazards, there are several built-in problems related to the safe operation of bicycles. This design is useful for low volume bicycle paths intersecting a low volume road. However, when the potential of vehicle conflicts is high, one of the first two designs described is recommended.

Recommendation:

1. It is recommended that the City of Eugene and Lane County remove the metal posts installed across the bicycle paths, and where necessary, install barriers similar to the barriers described above. Locations of the metal posts are described in the route improvement summary in the next section. The hazard of motor vehicle-bicycle conflicts on separate bicycle paths has not proven real, whereas the hazard of the metal posts across the bicycle paths is real. Therefore, the use of the metal posts is not warranted at this time.

RECOMMENDED ROUTE IMPROVEMENTS

Specific route improvements are listed below. The route numbers correspond to the route numbers assigned in the Bikeways Master Plan.

Route Number	Recommended Improvement
152 (Willhi-Taney Connection)	Overlay alligator/cracked and settled pavement sections. * Install a safe motor vehicle barricade* at the east end of Willhi.
156 (Hughes Street)	Install YIELD signs on the bike path at the intersection of Berntzen. *Install a safe motor vehicle barricade* at the southern extension of Hughes near Hawthorne.
159 (Taney Street)	Install a safe motor vehicle barricade* at the extension of Hawthorne near Ellsworth and at the slough crossing. Extend paving to Royal Avenue.
171 (Fairfield Street)	Provide bike route signing at Elmira Road.
200 (Coburg Road)	Eliminate sidewalk conflicts wherever possible.
320 (Fern Ridge Path)	Paint white edge striping. Install a safe motor vehicle barricade at the north end of Quaker and intersections with Acorn Park, Oak Patch and City View. Install YIELD signs on the bike path at the intersections of Oak Patch and City View. Improve shoulders on fill sections to a 6 to 1 slope. Extend route to Arthur.
320-460 (Fern Ridge Path)	Pave Arthur to 13th and 14th from Garfield to Hayes. Provide a safe motor vehicle barricade at Arthur and Garfield connections. Paint white edge striping. Overlay built-in puddle area south of Garfield Street, to level the area out.
350 (18th)	Improve route transitions near parking zones. Install raised reflectors on transitions and curves where motor vehicles frequently travel on the bike lane striping. Extend to Agate.

* Remove metal posts installed across the bike path

Route Number	Recommended Improvement
354 (Kennedy School)	Install safe motor vehicle barricades* at the connections of Bailey Hill and Harvard. Remove metal post in the bike path at the termination in the baseball park. Paint white edge striping.
355 (Bailey Hill)	Pave driveway approaches. Extend shoulder improvements to the south to serve Kennedy Jr. High School.
410 (South Bank Trail)	Provide white edge line striping. Relocate temporary building in the rose garden to improve sight distance.
452 (13th)	Install safe motor vehicle barricades* at Kincaid and University. Install NO RIGHT TURN sign on the signal arm at Alder for westbound bicycles on 13th.
460 (Fern Ridge Path)	Install safe motor vehicle barricades* at intersections of Chambers, Van Buren & Polk.
464 (15th)	Mount BIKE ROUTE sign on a post separate from DEAD END sign at Fairmount. Install left turn refuge striping at 15th and Fairmount to establish right-of-way of westbound traffic on Fairmount.
471 (Agate)	Install parking lane striping between 15th and 19th. Overlay alligator cracked pavement between 13th and 15th.
513 (Willamette)	Eliminate sidewalk bike paths in the future, when bicycle lanes can be provided in street improvements.
519 (Amazon Parkway)	Overlay slumping pavement south of 19th St.
521 (Donald)	Install route signing at north and south ends.
523 (South Amazon Park)	Install safe motor vehicle barricade* and replace miniature bicycle stop sign with a uniform YIELD sign at the Hilyard intersection. Install curb cuts at Donald St.

* Remove metal posts installed across the bike path

Route Number	Recommended Improvement
531 (Amazon Channel)	Provide undercrossing at the Amazon Parkway, and continue the separate path to 34th. Install safe motor vehicle barricades to replace the three sets of metal posts across the bike path between 19th and 24th. Continue the route along the Amazon Channel on the west side of the school parking lot to 19th Street.

INTERSECTION IMPROVEMENTS

The accident analysis revealed several intersection locations with recurring bicycle accidents. Recommended improvements at these intersections are described below:

Intersection	Recommended Improvement
Franklin at Onyx & Agate	Install a pedestrian and bicycle overcrossing, to abut Autzen footbridge.
29th & Willamette	Eliminate sidewalk bikeway.
18th & Chambers	Add left turn phase to existing signal, in order to eliminate left turn - through movement conflicts. Maintain recently installed bike lanes.
Oakway & Coburg	Improve channelization to reduce wrong way riding from sidewalks.

ROUTE ADDITIONS

Citizens have demonstrated particular concern for completion of several routes in the near future. The route numbers listed correspond to the route numbers assigned in the Bikeways Master Plan. These routes include:

- o A railroad overcrossing connection from the Bethel area via Roosevelt Boulevard to the river trails (Route 100)
- o A connection of the south bank trail and the Glenwood area to the Knickerbocker Bridge (Adopted in 1979)
- o Connecting the Fern Ridge path between Hayes and City View (Route 320)
- o Connecting the Amazon Channel path to Hilyard Street near 34th (Route 531)
- o Extending the river bank trails to the north (Routes 125 and 225)
- o Connecting the Westmoreland Park path to the Amazon Channel path with an overcrossing above 18th Avenue (Routes 460 and 367)

Each of the route additions is a location where existing separate routes "dead end", and the bicycle driver is then required to travel on major streets. The proposed route additions provide alternatives to traveling along or crossing River Road, Highway 99E, Franklin Boulevard, 18th Avenue, Garfield Street, Chambers Street, Amazon Parkway, and Hilyard Street. Each would be useful to the commuting bicyclist, due to connections with important destinations. It is recommended that each of these connections be given priority in the implementation process. The single most important item identified by citizens for encouraging them to ride bicycles more often, is the provision of more bicycle lanes and paths. Each of the routes described above, was requested during the public hearing or in the citizen questionnaire.

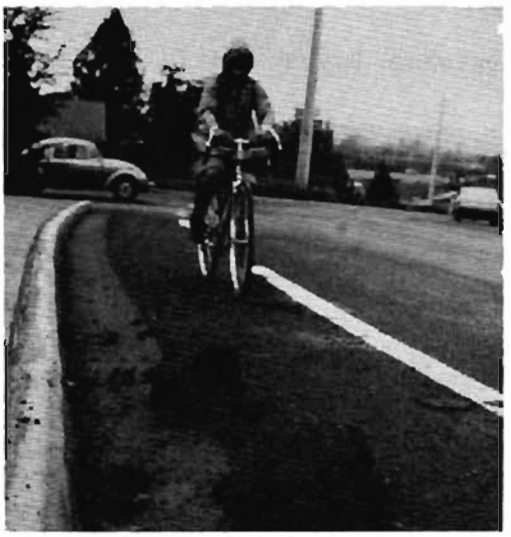
The accident analysis has identified that route additions are necessary in the following locations. The route numbers correspond to the route numbers assigned in the Bikeways Master Plan.

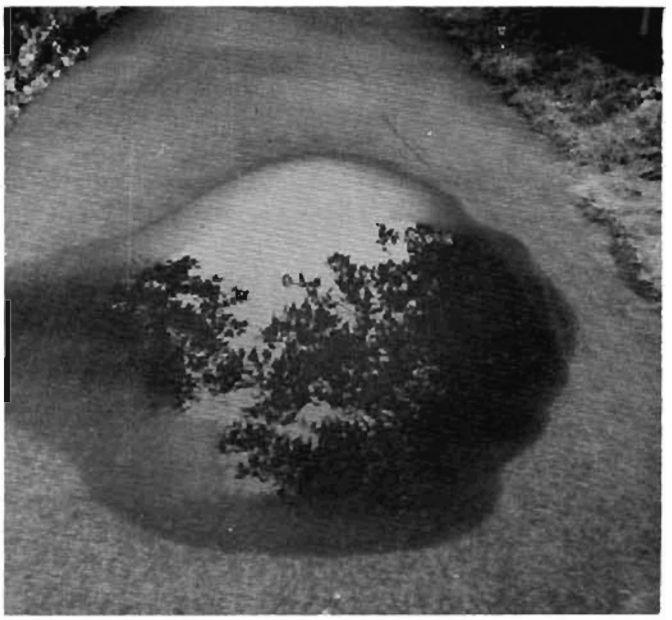
Route No.	Location
365	Chambers Street
385	Friendly Street
435	Lawrence Street
435	Lincoln Street
480	18th Street (Extend)
490	24th Street
520	29th Street

Each route should be striped as recommended in the Bikeways Master Plan. Chambers, 18th, 24th, and 29th Streets are identified as problem corridors. Friendly, Lawrence, and Lincoln Streets are adjacent to problem corridors.

BICYCLE FACILITY MAINTENANCE

Bicycle facility maintenance is important to the bicyclist. During the public hearing, more people described a need for improving maintenance than any other item. In the bicycle questionnaire, bicycle riders described better sweeping of bicycle paths as one of the four most important items that would encourage them to use their bicycle more often. The reconnaissance survey identified maintenance deficiencies throughout Eugene.





Bicycle facility maintenance problems include:

a. Large gravel reducing the bike path's usable width
b. Ponding due to settlement of pavement

The bicycle facilities are maintained regularly by the Public Works and/or Parks Departments of both Lane County and the City of Eugene. The sweeping schedules are adequate to prevent buildup of debris along a path. Specific problems have been the cause of citizen concern, rather than overall maintenance.

The City of Eugene has proposed improving maintenance by providing a "hot line" for informing the City of specific problems. It is recommended that the City implement this proposal, by giving the bicycle coordinator the responsibility of alerting the various maintenance crews of problems described by the citizens. The proposed "hot line" eliminates the citizens frustration of first finding the agency responsible for maintenance. In this manner, the citizens will be better served, and the maintenance agencies will be provided with the specific information that they need.

To assure that citizens can communicate the problems they note, the telephone number of the bicycle coordinator should be included in the telephone directory, and on bicycle maps and brochures distributed by the City. The bicycle coordinator should assume the responsibility of communicating the problem to the appropriate maintenance agency and making sure the problem is corrected.

NIGHTTIME RIDING PROVISIONS

The machine counters recorded bicyclists 24 hours a day, which included the dark hours of a day. A direct correspondence of the seasonal ridership variation shown in Chapter II, and the seasonal variation of available light was also noted. At the public hearing and in the bicycle questionnaire, citizens identified better lighting along the existing bikeways as one of the most important items that would encourage nighttime bicycle usage. Design standards recommended for various types of bicycle facilities and area classifications are shown in Table VI-1. The standards are adapted from the American National Standard Practice for Roadway Lighting, as approved on July 8, 1977, by the Illuminatory Engineering Society of North America. The area classifications include: commercial, intermediate, and residential areas. Commercial areas, such as the Eugene downtown mall, generally attract large numbers of nighttime pedestrians and bicyclists. Intermediate areas are characterized by moderately heavy use by nighttime pedestrians and bicyclists. Residential areas are characterized by low volumes of pedestrians and bicyclists.

Lighting is not provided on most of Eugene's separate bicycle paths, and the white edge line striping is not provided on many of the paths. The City of Eugene recently initiated efforts to provide lighting along portions of several bike paths. No other data is available at this time.

The recommended standards for illumination given in Table VI-1 represent average maintained levels of horizontal illumination. These represent minimum values, particularly where security, and bicycle or pedestrian identification at a distance is important. In special security areas, the requirements should be increased as indicated. Visual identification is directly related to vertical surface illumination. Consequently, higher pole heights require increased illumination.

The level and uniformity of lighting is an important consideration. The average to minimum uniformity ratio in illuminating bikeways where special security is not essential, should not exceed four to one, except for lanes in residential areas where a ratio of ten to one is acceptable. Where supplemental security lighting is used along a section, the uniformity ratio should not exceed five to one for the bicycle path.

The selection of mounting height, luminaire spacing, luminaire type and distribution is important to provide necessary contrasts without glare. Many luminaire designs suitable for bicycle paths are available to facilitate selection for each particular installation.

Except for the general overall lighting that may be present in commercial areas, store front lighting, private lighting, sign lighting. or reflections from structures on private property should not be considered to reduce the illumination requirements given in Table VI-1.

TABLE VI-1

RECOMMENDED ILLUMINATION FOR BICYCLE PATHS

by TYPE OF BICYCLE FACILITY

EUGENE, OREGON

1979

Type of Bicycle Facility	Minimum Average (1)		Average Levels of Illumination Special Security Areas 9 to 15 foot Mounting Heights (1)		15 to 30 foot Mounting Heights (1)	
	Foot-candles	Lux	Foot-candles	Lux	Foot-candles	Lux
Separate Bike Paths	0.5	5	0.6	6	1.0	11
Bicycle Tunnel	4.0	43	5.0	54	-	-
Bicycle Overpass	0.3	3	0.4	4	-	-
Striped Bicycle Lanes						
Commercial Area	0.9	10	2.0	22	4.0	43
Intermediate Area	0.6	6	1.0	11	2.0	22
Residential Area	0.2	2	0.4	4	0.8	9

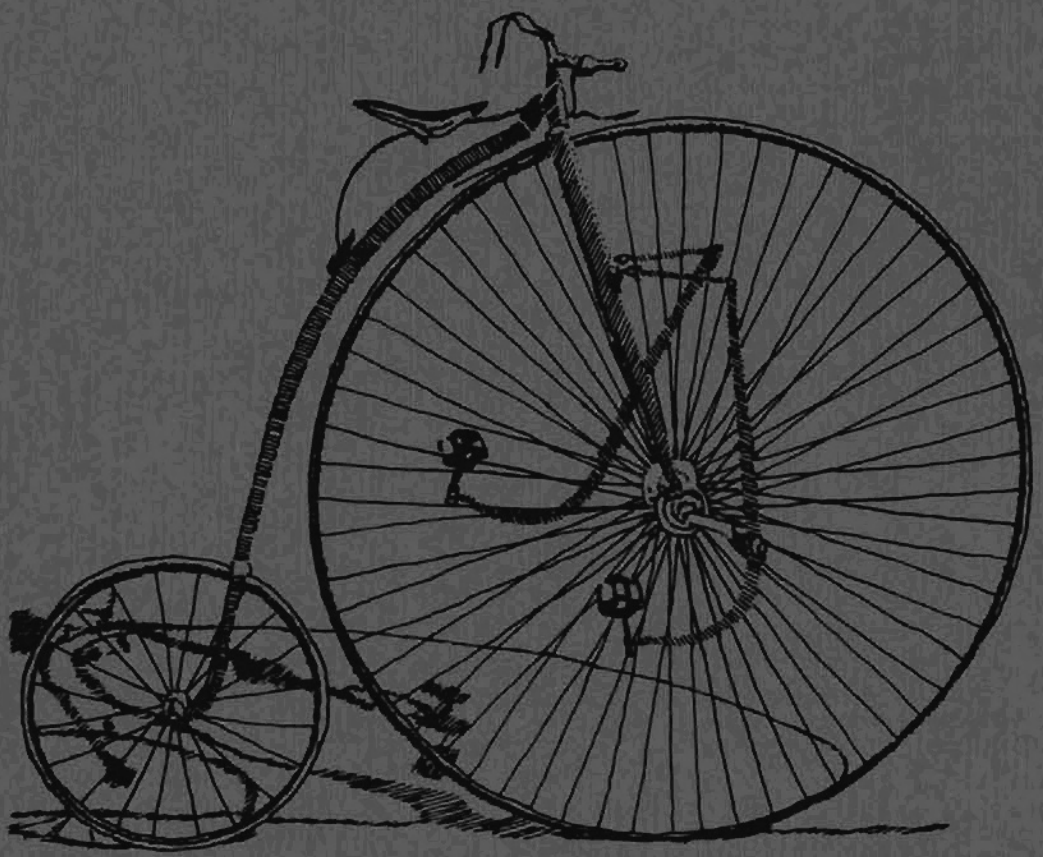
(1) Average maintained horizontal illumination

Recommendations:

1. It is recommended that the City of Eugene continue efforts to provide lighting along bicycle paths. An effective lighting program will remove the obstacle of darkness for many riders, and will add to the safety, security, and comfort of bicyclists and pedestrians.

2. To provide well illuminated surroundings, it is further recommended that the area bordering these bikeways for a width of eight-feet on each side, be lighted to levels of at least one-third of the suggested bikeway standards. This is also applicable to all locations bordering bikeways where personal safety is of utmost concern.

3. In addition to providing lighting along bike paths, it is recommended that all bike paths be painted with white edge line striping. Citizen requests for the striping were made during the public hearing, and the injury accident reports described an accident in which a bicyclist was injured when he ran off the pavement of a bicycle path in the dark. The white edge striping on the bike paths assists the bicycle rider identify the pavement edge when lighting conditions are poor.



CHAPTER VII
EVALUATION AND UPDATING THE BIKEWAY MASTER PLAN

CHAPTER VII

EVALUATING AND UPDATING THE BIKEWAYS MASTER PLAN

The Mayor's Bicycle Committee and City of Eugene staff have updated the Eugene Bikeways Master Plan annually. This project provides the base for evaluation of the Bikeways Master Plan to improve the updating process. The evaluation process has been established to facilitate periodic evaluations prior to the annual update.

The work efforts and guides for evaluating and updating are described in the following sections:

- o Bikeways Master Plan Evaluation
- o Future Evaluations
- o Bikeways Master Plan Update

BIKEWAYS MASTER PLAN EVALUATION

Periodic evaluation will provide for the most efficient utilization of resources to accomplish the stated goals and objectives. The process compares these stated goals and objectives with achievements, and reveals any problems encountered, possible solutions and recommended future action. Refinements to planning and scheduling result from the evaluation. An evaluation format has been tailored to the Eugene Bikeways Master Plan. An outline or report type format is useful for an evaluation and should include

- o Date of evaluation
- o Project evaluated
- o Goals and objectives
- o Accomplishments
- o Problem descriptions, including how they were resolved and recommended future action
- o Recommendations

An example of this format is presented below for the evaluation of this project. The project was developed and prepared to meet the stated goals and objectives of the City of Eugene. The objectives have been formulated to provide specific items to benefit the City.

Date: July 1979

Project: Evaluation of the Eugene Bikeways Master Plan

Goals: The primary goal of the project has been to evaluate the relationship between bicycle accidents and the Eugene Bikeway System. A secondary goal has been to identify ways to increase bicycle ridership in Eugene.

Evaluation: The project team consisting of individuals from Eugene's Public Works, Police, Planning and Parks Departments, and the Mayor's Bicycle Committee working with the Consultant, has reviewed and evaluated bicycle accidents in Eugene and their relationship to the bikeway system. The project team also conducted a public hearing and citizen survey to gather local input for improvement to and usage of the bikeway system. The preparation of this report and completion of the stated objectives indicates that the goals have been met.

Objectives: The objectives which must be accomplished to achieve the project goals include

1. Measuring Bicycle Volumes in Eugene

   Evaluation: Bicycle volumes were measured on all bicycle facilities in Eugene by either manual counts or machine counts. All counts were factored to 24-hour volumes, and a bicycle flow map illustrating daily bicycle usage was prepared. The daily, monthly, and annual variation of bicycle usage was also evaluated. This information is described in Chapter II.

2. Analysis of Bicycle Accidents

   Evaluation: The frequency of occurrence of different bicycle accident types have been identified, and appropriate countermeasures described. The frequency, as well as the rate of occurrence of bicycle accidents have been identified for all bicycle facilities, as well as all streets which were locations of numerous bicycle accidents. Intersection locations of recurring bicycle accidents are identified. A summary of the primary causes of bicycle accidents with identified bicycle driver errors is also presented. This information is presented in Chapter III.

3. Determine the Nature of Level of Accident Reporting

   Evaluation: A survey of individuals treated for bicycle accident injuries was conducted, and the type of bicycle accidents which are, and are not reported was determined. This information is presented in Chapter IV.

4. Develop a Program to Monitor Bicycle Accidents

   Evaluation: A revised catalog system for bicycle accidents has been developed and implemented. A system to improve the reporting of injury bicycle accidents to the Bicycle Coordinator was also developed. This information is presented in Chapter IV.

5. Evaluate the Existing Bikeway System

   Evaluation: A reconnaissance survey of all bicycle facilities was conducted to study operational characteristics, and to identify engineering defects. A public hearing was conducted in order to hear the publics concern about Eugene's bikeways. This information was supplemented with a Citizen Survey to evaluate improvement to the bikeway system to increase ridership. Summaries of this information are described in Chapter V.

6. Evaluate Eugene's Bikeway Improvement Program

   Evaluation: Improvements of the City's bikeway construction standards and practices were identified. Improved standards relating to maintenance, bikeway lighting, and fixed object hazards are presented. Chapter VI also includes recommendations for improvements or additional routes for the bikeway system.

7. Evaluating and Updating the Eugene Bikeways Master Plan

   Evaluation: Chapter VII presents an evaluation of this project in meeting its goals and objectives. Methods of evaluation of implemented projects are presented. The updating of both the Evaluation Process and the Bikeways Master Plan is also described.

Accomplishments:

With the adoption of this "Evaluation of the Eugene Bikeways Master Plan", and the implementation of its recommendations, accomplishments will include:

- o Improvement of identified hazardous sections of the bikeways
- o Improvement of hazardous intersections
- o Improved monitoring of bicycle-motor vehicle accidents
- o Improved monitoring of injury bicycle accidents not involving motor vehicles
- o Identification of frequent accident types and causes for improving educational countermeasures
- o Responsive problem identification of bikeway hazards
- o Elimination of built-in fixed object hazards along bikeways
- o Improved lighting of bike paths to encourage ridership
- o Increased bicycle ridership

Problems Encountered: No significant project development problems were encountered on this project. Problem conditions related to the bikeways have been identified, and recommendations to resolve the problems have been made.

Recommendations: The specific recommendations of this project report should be adopted, and improvements implemented. Action Programs should be continued.

FUTURE EVALUATIONS

Future evaluations will be related to items of work conducted to implement or improve the Eugene Bikeway System. Annual evaluations should be conducted to measure the success of both. Using the following format, work related to the Bikeways Master Plan should be evaluated by, 1) stating the goals and objectives of each project and, 2) measuring the degree of success of actual achievements.

The accident monitoring described in Chapter IV is a necessary part of an evaluation; however, the economic benefits of bikeway facilities must also be evaluated to assure efficient use of monies. A format for economic evaluations of projects is shown in Figure VII-1. The figure contains space for: project description, before and after analysis, comparing volumes, accidents, economic loss, and economic loss per bicyclist. Also included is a comparison of estimated and actual cost, cost per bicycle, economic benefit, and economic benefit per bicycle.

FIGURE VII-1

BIKEWAY IMPROVEMENT EVALUATION FORMAT

CITY OF EUGENE, OREGON
Date: _____

Project Name _____ Route Number _____

Project Description _____

_____

_____

BEFORE CONDITIONS

Bicycle Volumes per Day		(1) _____
Bicycle Accidents		
Persons Killed	_____	
Persons Injured	_____	
Property Damage Only	_____	
Economic Loss		(2) $_____
Economic Loss per Bicyclist (2) (1)		(3) $_____

IMPROVEMENT

Date started	_____	
Date completed	_____	
Estimated Cost	$_____	
Actual Cost		(4) $_____
Cost per bicyclist (4) (2)		(5) $_____

AFTER CONDITIONS

Bicycle volume per day		(6) _____
Bicycle Accidents		
Persons killed	_____	
Persons injured	_____	
Property damage only	_____	
Economic loss		(7) $_____
Economic loss per bicyclist		(8) $_____

BENEFITS

Economic Benefit* (2)-(7)	$_____
Economic Benefit per Bicyclist (3)-(8)	$_____
Total Economic Benefit** (2)-(7)-(4)	$_____
Total Economic Benefit per Bicyclist (3)-(8)-(5)	$_____

* Relates only to benefits
** Relates costs and benefits

The before and after evaluation should be conducted for equal time periods. One-year is a minimum time base for preliminary evaluations. A longer time base will tend to average out random circumstances. Economic losses are determined by multiplying the numbers of the various accident categories by typical costs of accidents. In September 1978, the Oregon Traffic Safety Commission published figures appropriate for economic loss evaluations in Oregon. These figures are given below:

Economic Loss	Category
$287,175	Maximum Severity or Death
192,240	Critical (Survival Uncertain)
86,955	Severe (Life Threatening, Survival Probable)
8,085	Severe (Not Life Threatening)
4,350	Moderate
2,190	Minor

BIKEWAYS MASTER PLAN UPDATE

The Eugene Bikeways Master Plan has been updated annually by the Mayor's Bicycle Committee and Eugene's City staff. The annual update has served to refine and provide continuity to the Master Plan. The committee and staff have done an excellent job of identifying and implementing the top priority bikeways since the Master Plan was adopted in 1975. This evaluation provides an important tool for updating and refining the Master Plan in the years to come. The initial evaluation has identified specific locations that require improvements, and specific locations that are serving bicycles very well. The updating of the Master Plan can take advantage of this initial evaluation.

During the course of this project, bicycle volumes have been measured; bicycle accidents have been cataloged, classified, and analyzed; an improvement program for injury accident monitoring has been identified; and projects for the improvement of the bikeways have been identified. A description of the methods used for each of these tasks is described in this project report.

Table VII-1 lists and schedules a proposed Annual Work Program for the continued evaluation of the Eugene Bikeways. The tasks represent the annual work effort that will be required to update the plan, and provide the results of the evaluation to the educators and enforcers, who need the information. All work activities listed should be conducted annually, and the work program should be updated to meet changing needs. This evaluation will result in the continued improvement of what has become Oregon's Best Bikeway System. The evaluations can also serve other Oregon cities with their efforts to provide bikeways.

TABLE VII-1

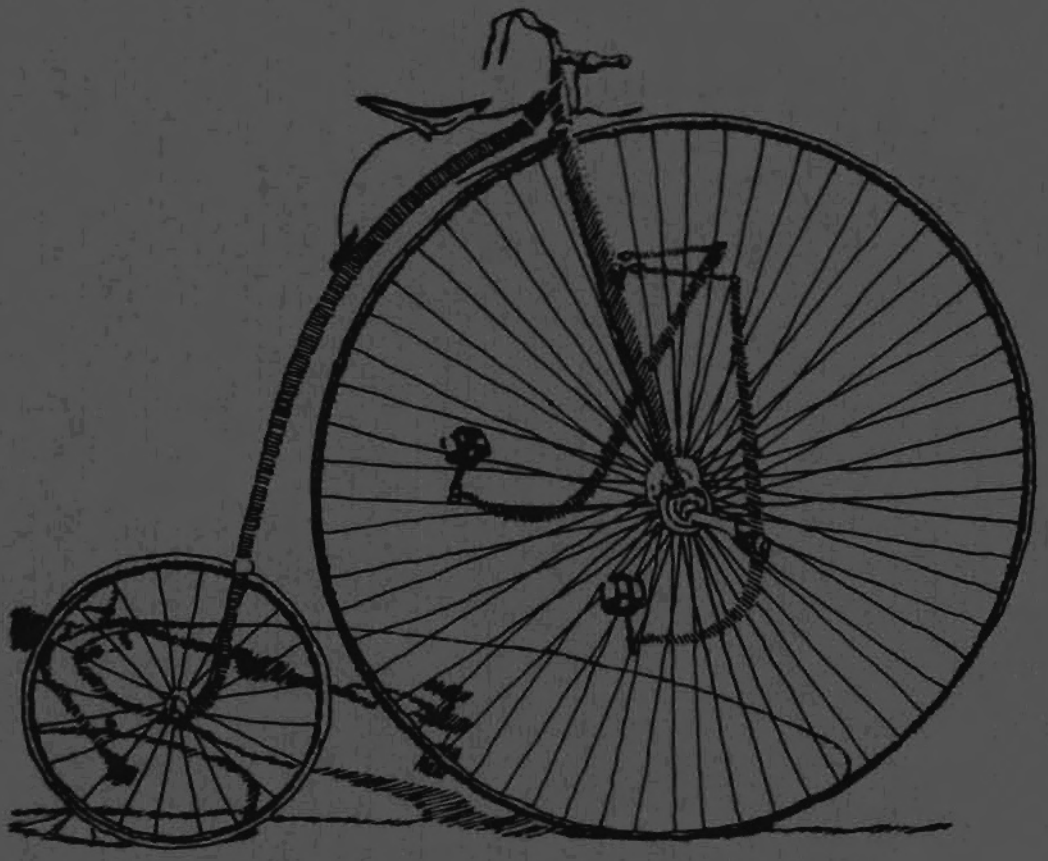
ANNUAL WORK PROGRAM TO EVALUATE AND UPDATE

BIKEWAYS MASTER PLAN

EUGENE, OREGON

1979

Task/Work Activity	Estimated Manhours
January - December (continuing)	
o Staff Mayor's Bicycle Committee Meetings	96
o Conduct semiannual reconnaissance surveys of existing bikeways	48
o Monitor bicycle accidents monthly	96
o Monitor permanent recorder stations	48
January - February - March	
o Evaluate daily, monthly and annual usage variation	16
o Evaluate and update construction program	24
o Prepare Annual Bikeway Improvements Work Program	40
April - May - June	
o Organize bicycle volume measurements for facility evaluations	16
o Coordinate enforcement and education activities by others	40
o Evaluate specific improvement projects	24
July - August - September	
o Prepare work programs and information packets for bicycle safety programs	80
o Conduct volume measurements for specific evaluations	varies
October - November - December	
o Identify improvement projects	16
o Evaluate work program, study work accomplished during the year, evaluate performance and adjust to meet changing needs	16
o Analyze bicycle accidents	24
o Evaluate priority assignment and finance program	16
o Prepare annual update of Bikeways Master Plan	40



APPENDIX

EUGENE BICYCLE QUESTIONNAIRE

1. First, we would like to have some information about yourself.

   Age_____(years) Sex: ( )M ( )F

   Do you have a valid drivers license? ( )Yes ( )No

   How many bicycles are there in your household? _____.

   How many automobiles are there in your household? _____.

   Is your work place or school located less than 6 miles from your home?

   ( )Yes ( )No

2. Please rate the statements below concerning how you would feel about bicycling to work (or school) even if you don't own a bicycle.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Bicycling to work is pleasant because I can enjoy the scenery and surroundings.	( )	( )	( )	( )	( )
Riding a bicycle to work is dangerous because of motor vehicle traffic.	( )	( )	( )	( )	( )
I worry about being injured in an accident when I ride a bicycle to work.	( )	( )	( )	( )	( )
I have adequate biking skills to ride a bicycle to work.	( )	( )	( )	( )	( )
I can get to work quickly when I go by bicycle.	( )	( )	( )	( )	( )
Riding a bicycle to work gives healthful exercise.	( )	( )	( )	( )	( )
It is no problem to park and secure my bicycle at work.	( )	( )	( )	( )	( )
I think that the bicycle paths that have been built make bicycling safer in Eugene.	( )	( )	( )	( )	( )
When biking, it is convenient to stop and do errands on my way to and from work.	( )	( )	( )	( )	( )
Riding a bicycle to work affects my appearance unfavorably.	( )	( )	( )	( )	( )

3. Which of the following would help you become a more regular transportation bicyclist in Eugene? Please check off the four most important items that would help you use a bicycle more often.

   a. ( ) More covered secure bike parking
   b. ( ) More lights along existing bikeways
   c. ( ) More bike paths and striped bike lanes
   d. ( ) A place to shower and change clothes at work
   e. ( ) Classes to improve bicycling skills
   f. ( ) Police patroling of bike paths to increase security
   g. ( ) Stricter enforcement of traffic violations for bikes and cars
   h. ( ) Better signs along the existing bike routes
   i. ( ) Better sweeping of the bike paths
   j. ( ) Relaxing STOP sign laws (Bikes yield at STOP signs)
   k. ( ) Improving bicycle licensing and registration
   l. ( ) Other_____

4. If you were to use the following means of transportation to work, what is your estimate of the time it would take from the moment you left home to the moment you arrived at work?

   Walking_____(minutes) By Car_____(minutes)
   Biking_____(minutes) By Bus_____(minutes)

5. What portion of your trip from home to work is served by bicycle paths or bicycle lanes?

   None_____ More than half_____
   Less than half_____ Don't know_____

6. We would like to know how often you use the following means of transportation for utility trips (trips other than recreational trips). Please estimate the number of times you used each means of travel for the trips during October this year. A trip is a one way journey, for example, from home to work.

   Walk_____(times) Driving a car_____(times)
   Bicycle_____(times) Passenger in a car_____(times)
   Bus_____(times) Other (specify)_____(times)

7. Imagine that only BUS, WALK, BICYCLE, and CAR (driver or passenger) were available for utility trips. These alternatives are listed below. Please indicate your preference by placing a "1" next to the alternative you prefer the most; a "2" next to your second most preferred; a "3" next to your third most preferred alternative; and a "4" next to your least preferred alternative.

WINTER	SPRING	SUMMER	FALL
( ) bus	( ) bus	( ) bus	( ) bus
( ) walk	( ) walk	( ) walk	( ) walk
( ) bicycle	( ) bicycle	( ) bicycle	( ) bicycle
( ) car	( ) car	( ) car	( ) car

The following questions are for regular bicycle riders in Eugene. If you very seldom use a bicycle for transportation, please skip these questions.

- - - - - - - - - -

RIDER QUESTIONS

8. We would like to know how often you use the bicycle for each of the following purposes. Please estimate the number of days you used a bicycle for each purpose during October.

   _____days to work or school _____days to visit friends
   _____days to go shopping _____days for exercise or recreation

9. Please indicate which three items most helped persuade you to start riding a bicycle for utility trips.

   ( ) Exercise ( ) Friends
   ( ) High cost of auto use ( ) Bicycle Paths
   ( ) Enjoyment ( ) It's quicker
   ( ) Convenience ( ) Ecological reasons
   ( ) Ease of parking ( ) Other_____ (please specify)

10. If you had a secure, covered place to park your bicycle, would you ride your bicycle to work more often? ( ) Yes ( ) No

11. Do you ride your bicycle to work in the rain? ( ) Yes ( ) No

12. Does your bicycle take the place of an extra automobile in your household?

    ( ) Yes ( ) No

13. How much do you estimate your monthly transportation savings to be because of bicycling? _____(dollars)

14. Would you like to have an opportunity to take a cycling class to improve your bicycling skills? ( ) Yes ( ) No

- - - - - - - - - -

Thank you for your time and effort. If you have additional comments or ideas for our committee, please use the space below. We are interested in hearing from you. Please drop this in the mail soon so we can be sure to have your input for our efforts to improve bicycling in Eugene.