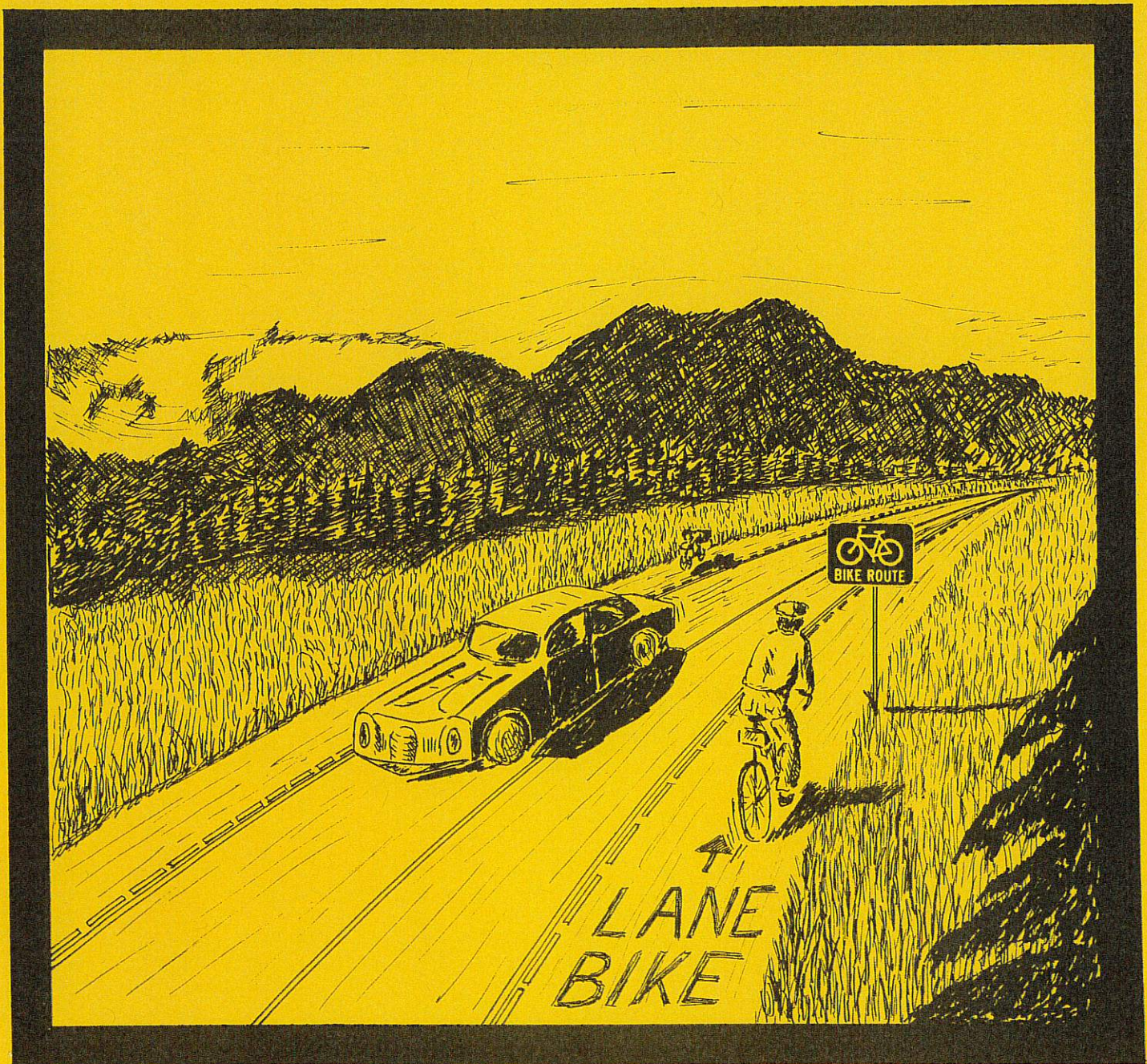


DURHAM BIKEWAY STUDY

FINAL REPORT



Prepared by: STRAFFORD REGIONAL PLANNING COMMISSION

90 Washington Street, Dover, New Hampshire 03820

1976

DURHAM BIKEWAY STUDY

FINAL REPORT

This report was prepared under the auspices of the Strafford Rockingham Regional Council by The Strafford Regional Planning Commission. It was financed in part through a comprehensive planning grant from the Department of Housing and Urban Development, the Office of Comprehensive Planning, State of New Hampshire, and contributions from member municipalities.

OCTOBER 1976

STRAFFORD REGIONAL PLANNING COMMISSION

90 WASHINGTON STREET

DOVER, NEW HAMPSHIRE 03820

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The following information was obtained from the records of the Department of the Interior, Bureau of Land Management, regarding the land owned by the United States in the State of California, as of January 1, 1944.

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CONTENTS

	Page
ABSTRACT	ii
COMMISSION MEMBERS & STAFF	iii
ACKNOWLEDGEMENTS	iv
BIKEWAY STUDY: Federal funds and community interest, Durham's decision-making--a case study.	1
THE PLAN: Durham considers safety, cost, users' needs, and construction standards important elements in bikeway planning.	2
CHRONOLOGY: A year and a half of Durham Bikeway Planning.	11
APPENDICES	15
BIBLIOGRAPHY	34

ABSTRACT

TITLE: Durham Bikeway Study: Final Report

AUTHOR: Strafford Regional Planning Commission

SUBJECT: Report on bikeway planning efforts and results in the Town of Durham, New Hampshire.

DATE: October 1976

LOCAL PLANNING AGENCY: Strafford Regional Planning Commission

SOURCES OF COPIES: Clearinghouse for Federal Scientific and Technical Information
Springfield, Virginia 22151

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Dover, New Hampshire 03820

Strafford-Rockingham Regional Council
99 Water Street
Exeter, New Hampshire 03833

HUD PROJECT NO: CPA-NH-01-00-1004

NUMBER OF PAGES: 37

ABSTRACT: This report presents bikeway planning efforts and results in the Town of Durham, New Hampshire. It discusses data collected, the chronology of events leading up to the adoption of a bikeway plan, the adopted plan and rejected proposals, and the present course of action.

STRAFFORD REGIONAL PLANNING COMMISSION

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ACKNOWLEDGEMENTS

David Chadbourne of the Strafford Regional Planning Commission, assisted by Anne Garretson, a student at the University of New Hampshire, collected the data, presented the information to the Durham Planning Board, and prepared this final report. David Littlefield, Planning Assistant for the Town of Durham assisted in researching right-of-way information. George Crombie, Durham Public Works Director, and the Planning and Economics Division of the New Hampshire Department of Public Works and Highways assisted in the development of preliminary cost estimates for bike-way construction. Rebecca Fee drafted the maps and designed the cover. Valerie Sawyer was instrumental in typing and editing the final copy of this report. Nina Brown was primarily responsible for the layout and final draft of this report.

Bikeway Study:

Federal funds and community interest.

Durham's decision-making — a case study.

At the 1976 Town Meeting, Durham voters approved a seven-year bikeway plan prepared by the Planning Board with assistance from the Regional Planning Commission and appropriated \$10,000 to conduct preliminary engineering studies for Phase I of the plan. This bikeway plan was developed in response to a 1975 Town Meeting vote which directed the Board of Selectmen and the Planning Board to make appropriate plans for the construction of bikeways on future town roads, and wherever feasible, on existing town roads.

At this same 1976 Town Meeting, Durham citizens voted not to participate in the federal Bikeway Demonstration Program and not to appropriate \$45,000 as Durham's 20 percent matching share in the project. A sizable proportion of the townspeople had doubts about the federal program and the substantial initial outlay of money for the match. They preferred to foot the bill themselves over a long period of time and were willing to accept delayed completion of their bikeway system. Other communities might have made a different choice.

The Bikeway Demonstration Program was established by the U.S. Department of Transportation's Federal Highway Administration under the Federal-aid Highway Amendments of the 1974 Act. A one-time appropriation of \$6 million was available to state and local communities. These funds were for the construction of bicycle facilities and could have been used to supplement funds already available for bicycle projects under the regular Federal-aid Highway Act. Funds were provided on an 80 percent federal and 20 percent state or local matching basis. The purpose of the program is to promote bicycling as a viable surface transportation alternative.

The Strafford Regional Planning Commission offers Durham's experience as a case study for bikeway planners in other communities. The availability of federal funds for the construction of bicycle facilities and the growing interest in alternative forms of transportation make the subject matter especially timely. Interested citizens and town and city officials can find information about construction standards, planning procedures, and town politics within these pages.

The Plan:

Durham considers safety, cost, users' needs, and construction standards important elements in bikeway planning.

The Durham Planning Board presented a seven-year bikeway plan based on the data and studies of the Strafford Regional Planning Commission and the Citizens for Alternative Transportation to the Board of Selectmen on January 15, 1976. It recommended the preparation of the warrant articles required to implement the plan.

The SRPC summarizes here the issues and information considered during the planning process. The map and two charts at the end of this section show the roads within the Durham Bikeway System and explain the development schedule and the construction costs.

BICYCLE SAFETY

The proposed bikeways, will enable safe travel by both motor vehicles and bicycles. The designation of a bicycle lane does not guarantee safety. Drivers and cyclists are responsible for safe travel. People in Durham felt that a commitment to a serious bicycle safety program should accompany bikeway construction and bicycle registration. For example, the town should emphasize that bicycles are subject to the same traffic laws as motor vehicles on one-way streets and at stop signs.

BIKE LANES INSTEAD OF BIKE TRAILS

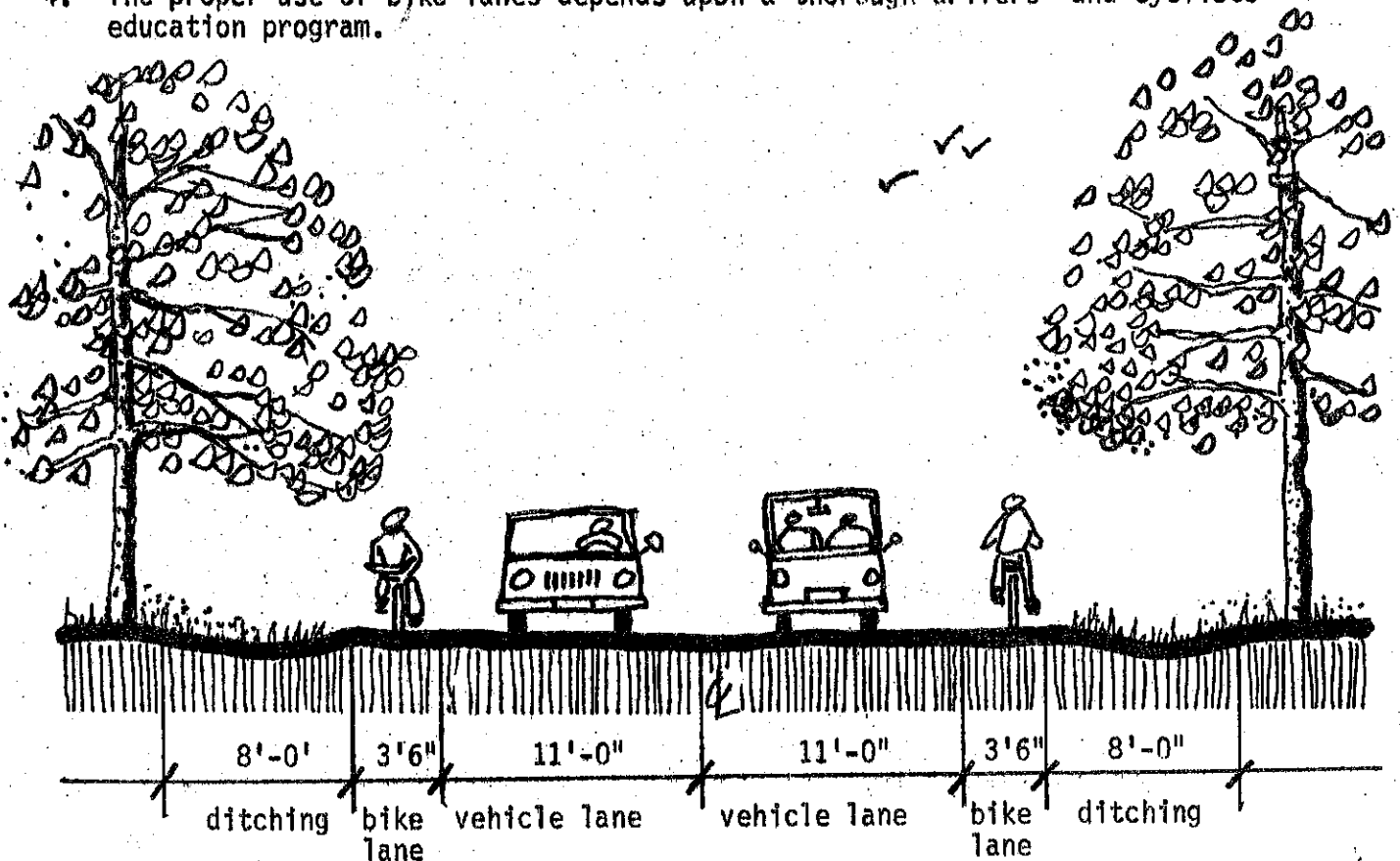
In Durham, bike lanes are more economically feasible than bike trails. They involve paved lanes for exclusive or semi-exclusive bicycle use within the town's highway right-of-ways. Sidewalks can be widened to provide space on the same level for both bicycle and pedestrian lanes. Bikes, vehicles, and pedestrians can be separated in several ways. A painted stripe is the most economical method.

ADVANTAGES OF BIKE LANES

1. They separate cars from bikes even when space is tight.
2. Bike lanes cost less than separated bike trails.
3. They enable safe bicycle access to busy downtown streets.
4. They are easier to maintain and police than bike trails.
5. They usually use existing rights-of-way.

DISADVANTAGES OF BIKE LANES

1. Bike lanes may require prohibiting parking on one or both sides of narrower streets.
2. Bike lanes could be blocked by people confused by parking regulations.
3. Bike lanes are exposed to emissions from cars and trucks.
4. The proper use of bike lanes depends upon a thorough drivers' and cyclists' education program.



BIKEWAY ° TYPICAL SECTION

STANDARDS FOR BIKE LANE CONSTRUCTION

State regulations require a 22'0" minimum distance from the center line on each side of the road.

	<u>Minimum</u>	<u>More Desirable</u>
Vehicle Lane	11'0"	12'0"
Bicycle Lane	3'6"	4'0"
Pitching, Drainage	8'0"	8'0"
	<u>22'6"</u>	<u>24'0"</u>

BIKEWAY CONSTRUCTION COSTS

Based on an average bicycle lane width of 3.5', unit costs were developed for the following items: bituminous concrete surface (2" depth); aggregate sub-base (6" depth); excavation; fine grading; ledge removal; striping; and landscaping. Please note that these estimates were based on average bid prices for work involving these items done by private contractors during 1974 for the New Hampshire Department of Public Works and Highways (see Appendix C).

According to the above minimum standards:

Without ledge removal - \$6.59/Linear Foot (\$12.97/L.F. both sides)
With ledge removal - \$8.11/Linear Foot (\$16.01/L.F. both sides)

The Durham Planning Board estimated that the engineering and design studies for each of the major phases of the Durham Bikeway System would cost approximately \$27,000 and construction would cost between \$197,000 - \$325,000. Therefore, the entire bikeway project would cost between \$225,000 and \$350,000, if built over a period of seven years. Appendix C includes a breakdown of the construction cost estimates in the Planning Board's proposal.

The New Hampshire Department of Public Works and Highways also prepared cost estimates for the entire portion of the Durham Bikeway System included in Federal Aid Urban (FAU) areas. These estimates are somewhat higher than those of the Planning Board because a few additional roads were considered. Also, note that these estimates are based on the assumption that all bikeway construction would be undertaken at one time under a Bikeway Demonstration grant and not over a seven-year period. The estimates are listed below:

1. BIKEWAY DEMONSTRATION PROJECT

Total Town of Durham Roads	7.0 mi.	\$403,000	
Town of Durham (20% share)			\$80,600
UNH Roads	0.7 mi.	\$ 100	
UNH (20% share)			20
Total Bikeway Demonstration Project	7.7 mi.	\$403,100	\$80,620

2. DURHAM RURAL BICYCLE ROUTES

Town of Durham	0.9 mi.		\$57,000
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PRIORITIES FOR BIKE LANE CONSTRUCTION

The Planning Board based the following priorities for bike lane construction on the results of a community opinion survey of road traffic and hazards (see Appendix A):

1. bicycling for schoolchildren to and from school and recreation areas
2. bicycling for commuters to and from the University of New Hampshire and to and from various places of business
3. recreational bicycling

The Board inventoried existing conditions along the roads in Durham intended for future bike lane construction.

PROPOSED BIKEWAY SYSTEM*

The following road categories in the Durham Bikeway System require different levels of funding:

1. Existing bicycle lanes	.8 miles
2. Proposed bicycle lanes inside the Federal Aid Urban (FAU) area	7.7 miles
3. Proposed bicycle lanes outside the FAU area	<u>.9 miles</u>
Total mileage for Durham Bikeway System	9.4 miles

A major portion of the proposed system (80% ±) could have been included under the Bikeway Demonstration Project. This portion includes the proposed bicycle lanes within the Federal Aid Urban area.

*See Final Plan and charts covering Phases One through Three on the following pages.

DURHAM, NEW HAMPSHIRE

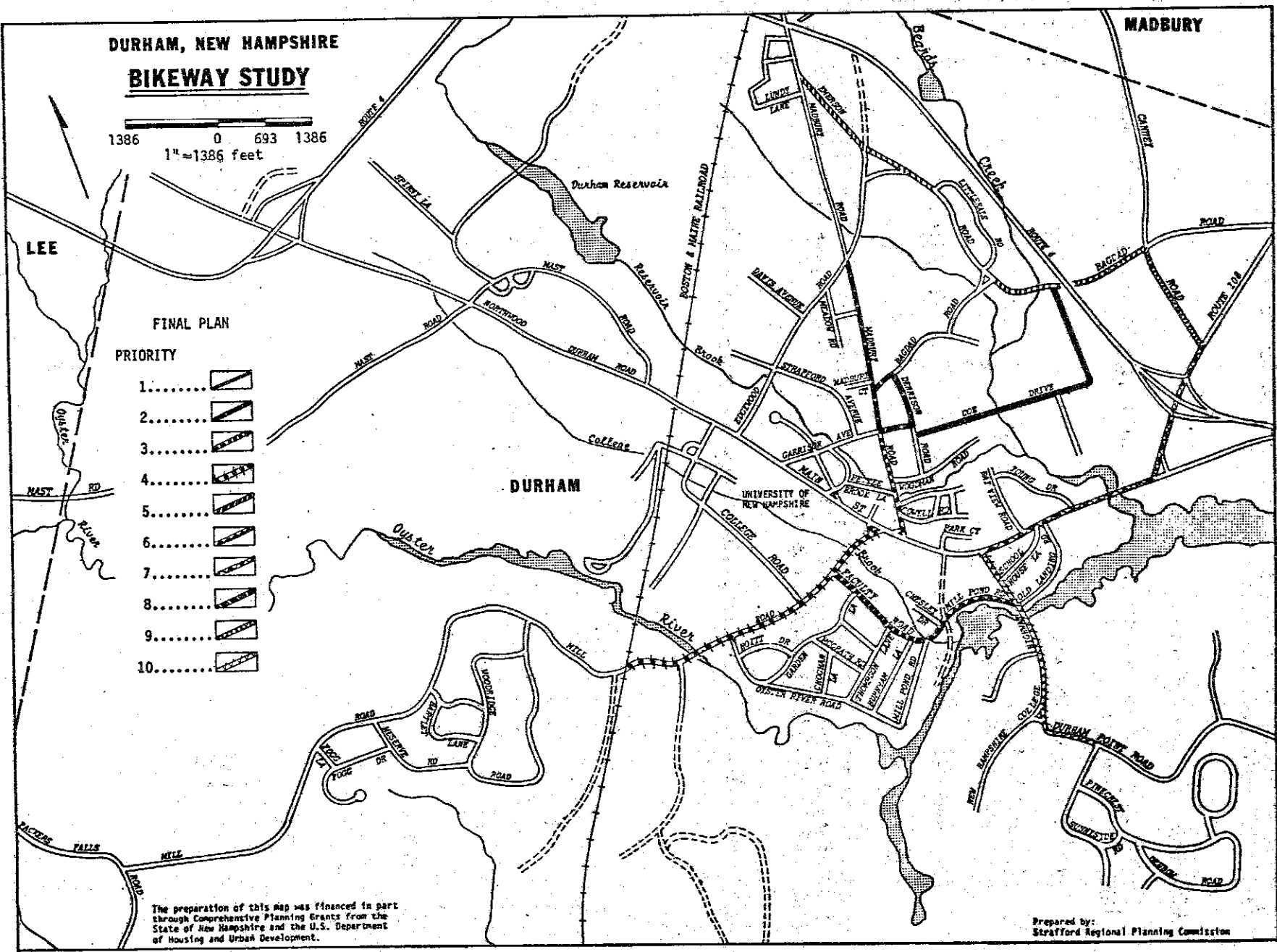
BIKEWAY STUDY

1386 0 693 1386
1" = 1386 feet

FINAL PLAN

PRIORITY

- 1..... [diagonal lines /]
- 2..... [diagonal lines \]
- 3..... [dashed lines]
- 4..... [cross-hatch]
- 5..... [diagonal lines /]
- 6..... [diagonal lines \]
- 7..... [dashed lines]
- 8..... [diagonal lines /]
- 9..... [diagonal lines \]
- 10..... [diagonal lines /]



The preparation of this map was financed in part through Comprehensive Planning Grants from the State of New Hampshire and the U.S. Department of Housing and Urban Development.

Prepared by:
Strafford Regional Planning Commission

DURHAM, NEW HAMPSHIRE: BIKEWAY STUDY

PHASE ONE ** 1977-1979

PRIORITY #1 (1977-78)

<u>Coe Drive:</u>	Dennison Rd. to culvert - No construction: 1100' @ \$.014/LF	\$ 15.40
	Culvert to Bagdad Rd. - Construction needed: 2600' @ \$16.01 -	<u>41,626.00</u>
		SUBTOTAL \$41,641.40

PRIORITY # 2 (1977-78)

<u>Madbury Road:</u>	Edgewood Rd. to Garrison Ave. - No construction: 2350' @ \$.014/LF	\$ 32.90
<u>Garrison Avenue:</u>	Madbury Rd. to Dennison Rd. - No construction: 450' @ \$.014/LF	6.30
<u>Dennison Road:</u>	Garrison Ave. to Woodman Rd. - No construction: 700' @ \$.014/LF	9.80
<u>Woodman Road:</u>	Dennison Rd. to Madbury Rd. - No construction: 450' @ \$.014/LF	<u>6.30</u>
		SUBTOTAL \$ 55.30

PRIORITY # 3 (1977-78)

<u>Madbury Road:</u>	Garrison Ave. to Pettee Brook Ln. - No construction: 1000' @ \$.014/LF	\$ 14.00
----------------------	--	----------

PRIORITY # 4 (1978-79)

<u>Mill Road:</u>	Main St. to Faculty Rd. - No construction: 900' @ .014/LF	\$ 12.60
	Faculty Rd. to RR Bridge - Construction needed: 2500' @ \$16.01/LF -	<u>40,025.00</u>
		SUBTOTAL \$40,037.60

TOTAL PHASE I \$81,748.30

PHASE TWO ** 1979-1981

PRIORITY # 5 (1979-81)

<u>Emerson Road:</u>	Madbury Rd. to Littlehale Rd. - Construction needed: 3800' @ \$16.01/LF -	\$60,838.00
<u>Bagdad Road:</u>	Emerson Rd. to Coe Drive - No construction: 1000' @ \$.014/LF	<u>14.00</u>
	SUBTOTAL	\$60,852.00

PRIORITY # 6 (1980-81)

<u>Mill Pond Road:</u>	Rt. 108 to Faculty Rd. - No construction: 1500' @ \$.014	21.00
	<u>TOTAL PHASE II</u>	<u>\$60,873.00</u>

PHASE THREE •• 1981-1983

PRIORITY # 7 (1981-82)

Faculty Road: Mill Rd. to Mill Pond Rd. - Construction needed: 1625' @ \$16.01/LF - \$26,016.25

PRIORITY # 8 (1981-82)

Dover Road: Police Station to Canney Rd. - No construction: 3500' @ \$.014 \$ 49.00

PRIORITY # 9 (1982-83)

Canney Road: Rt. 108 to Bagdad Rd. - Construction needed: 1600' @ \$16.01/LF - \$25,616.00

Bagdad Road: Canney Rd. to Coe Drive - No construction: 1400' @ \$.014 19.60

SUBTOTAL \$25,635.60

PRIORITY # 10 (1982-83)

Newmarket Road: Police Station to Durham Pt. Rd. - No construction: 2100' @ \$.014 \$ 29.40

Durham Point Road: Newmarket Rd. to Pinecrest Ln. - Construction needed: 500' @ \$16.01/LF - 8,005.00

SUBTOTAL \$ 8,034.40

TOTAL PHASE III \$59,735.25

DURHAM, NEW HAMPSHIRE: BIKEWAY STUDY

ACTIVITY PHASING

YEAR	TOWN ACTION	ENGINEERING	CONSTRUCTION	STATE/FEDERAL	SAFETY
1976-77	A. Approve plan. B. Appropriate \$10,000 for Engineering Study. C. Public Information Hearings for completed Engineering Studies.	Perform Phase I Engineering Study.		Request support for plan.	A. Frame & implement bike ordinance, inspection, & license. B. Safety Program.
1977-78	Request appropriation for Phase I, \$75,000 - \$125,000.		Priorities 1 - 3.	Phase I Madbury Rd. Approval.	CONTINUE
1978-79	Approve second engineering study, Approximately \$9,000.	Perform Phase II Engineering Study.	Priority 4	Phase III, Priority 8 - Dover Road - Approval.	
1979-80	Request Phase II appropriation, \$62,000 - \$100,000.		Priority 5 (Partial)		
1980-81	Request third engineering study, Approximately \$8,000	Perform Phase III Engineering Study.	Priorities 5 (complete) and 6	Priority 10, Approval	
1981-82	Request Phase III appropriation, \$60,000 - \$100,000.		Priorities 7 & 8		
1982-83			Priorities 9 & 10		

Chronology:

A year and a half of Durham Bikeway Planning.

FEBRUARY 1975

Representative James Horrigan (D-Durham) submits bill to New Hampshire Legislature which would authorize feasibility study for bicycle paths in the State, with emphasis on Durham area.

Study is to emphasize transportation role of the bicycle, especially in Durham - Dover - Newmarket area.

Unfortunately the bill is defeated in Legislature by substantial margin.

MARCH 1975

The Board of Selectmen approve and include copy of warrant petition pertaining to bikeways in annual town meeting warrant after 50 registered Durham voters sign and submit it.

It passes at town meeting by a substantial margin.

Preparation of the article was conducted by group of interested citizens, spearheaded by Mrs. Cicely Buckley of Durham.

This article for bikeways ran as follows:

To see if the Town will vote to direct the Board of Selectmen and the Planning Board to make appropriate plans for the construction of bicycle paths and lanes on future town roads and construction wherever feasible on existing town roads. Further, to direct the Selectmen to request the State Department of Public Works and Highways to construct bicycle paths and lanes between Durham and Newmarket on Route 108, and between Dover and Durham on Madbury Road, and Route 155, and Route 4 between Durham and Portsmouth, Route 155-A between Dover and Lee, and Route 108 between Durham and Dover.

SPRING 1975

Citizens for Alternative Transportation (CAT) form to promote development of safe bikeways within Durham and surrounding area.

SPRING - SUMMER 1975

Three organizations conduct transportation survey:

- 1) Institute of Natural and Environmental Resources - League of Women Voters surveys 135 UNH commuters and 75 Oyster River High School students.

- 2) Whittemore School of Business surveys 307 UNH commuters (faculty, staff, and students).
- 3) CAT surveys 100 Seacoast area households, with emphasis on Durham.

SEPTEMBER 1975

Durham Planning Board asks Strafford Regional Planning Commission for technical assistance in studying future bikeway needs and preparing a bikeways plan to present at 1976 Town Meeting.

NOVEMBER 2, 1975

CAT organizes Bike-A-Thon to demonstrate need for safe bikeways in and around Durham and to raise funds for bikeway construction.

NOVEMBER 19, 1975

SRPC presents preliminary report on bikeways to Planning Board for review and comment. Four alternative plans for future bikeway construction contained in report, each phased over a number of years, ranging from five to eight years (see Appendix D).

DECEMBER 1975

CAT presents separate report on bikeways to Planning Board outlining their suggestions for bikeway development (see Appendix E).

DECEMBER 31, 1975

Federal Highway Administration (FHWA) of the U.S. Department of Transportation announces Bikeway Demonstration Project to fund construction of bicycle facilities on 80% Federal and 20% State or local matching basis.

JANUARY 15, 1976

Planning Board presents seven-year bikeway plan to the Board of Selectmen with three distinct phases, each preceded by engineering and design study. Plan to be implemented by appropriate town meeting warrant articles.

Sum of \$10,000 to be appropriated for engineering and design study under first year of plan.

FEBRUARY 1976

With establishment of Bikeway Demonstration Program, Durham decides to apply for a demonstration grant to cover practically all bikeway construction outlined in seven-year planning board proposal.

Proposed plan containing estimated costs prepared cooperatively by Durham Public Works Department, SRPC, and N.H. Department of Public Works and Highways.

FEBRUARY 18, 1976

Board of Selectmen holds public hearing on final proposed bikeway plan to be funded in part by federal bikeway demonstration grant.

MARCH 3, 1976

Town meeting votes 184-164 not to apply for a federal bikeway demonstration grant and not to appropriate the town's share of \$45,000. However, it does approve a second article requesting an appropriation of \$10,000 for an engineering and design study separate from the bikeway demonstration program.

MARCH 6, 1976

Town meeting continues for a second day and postpones original plans to take re-vote on bikeway demonstration project appropriation. Board of Selectmen requests permission to hold special town meeting in April or May so that additional information on the Bikeway Demonstration Program can be considered.

APRIL 14, 1976

Board of Selectmen receive permission from Strafford County Superior Court to hold special town meeting on May 4, 1976.

APRIL 15, 1976

Durham Budget Committee holds public hearing on bikeway demonstration grant proposal. Following this, budget committee votes 6 to 3 against appropriating town's share of \$45,000 for the bikeway demonstration program.

MAY 1, 1976

Oyster River High School Bikeways Commission sponsors a second Bike-A-Thon.

MAY 3, 1976

Sum of \$2,100 raised by two Bike-A-Thons is presented to Board of Selectmen for bikeway improvements within Durham.

MAY 4, 1976

In spite of Budget Committee vote and its legal implications, the Special Town Meeting is held. Citizens vote 111 to 92 against applying for bikeway demonstration grant.

JUNE 1, 1976

Deadline for bikeway demonstration grant application to be received by Federal Highway Administration.

FALL 1976

Selectmen submit Durham Bikeway Demonstration grant proposal to Federal Highway Administration without any appropriated funds so that it will be on file in case Durham voters decide to participate at a later date.

THE FUTURE

The selectmen continue discussion of the town's options for bikeway construction. The engineering study approved by the 1976 Town Meeting starts in the immediate future. Its findings will be presented at the 1977 Town Meeting. If the bikeway is to be constructed at one time, the voters will need more information on the Durham bikeway system proposal and its specific costs and benefits as well as on the Bikeway Demonstration grant.

APPENDIX

APPENDIX A

SUMMARY OF RESULTS OF COMMUTER SURVEYS

Present Means of Transportation

Whittemore School Study

Major Means of Transportation

	Faculty %	Staff %	Students %	Weighted Total %
Drive	72.9	83.2	91.7	82.6
Walk	17.9	6.7	0.0	8.1
Public Trans.	1.6	4.2	3.7	3.1
*Bike	4.8	0.0	0.0	1.6
Car pool	.8	4.2	0.0	3.1

Secondary Forms of Transportation

	Faculty %	Staff %	Students %	Weighted Total %
Drive	16.0	6.7	5.6	9.4
Walk	16.0	5.9	2.2	8.0
Public Trans.	4.0	5.0	10.1	6.4
*Bike	16.8	4.2	9.2	10.1
Car pool	2.4	2.5	6.5	3.8
Hitch hike	0.0	0.8	9.2	3.3

INER Study

	Total Responses %
Drive	41
Public Trans.	18
*Bike	17
Hitchhike	22
Motorcycle	2

Use of Alternative Transportation if Available

Whittemore School Study

	Faculty %	Staff %	Students %	Weighted Total %
Public Trans.	40.0	33.3	77.8	50.2
Walk	40.0	44.4	0	28.1
*Bicycle	13.3	0	0	4.4
Drop off	6.7	0	0	2.2
Car pool	----	22.2	22.2	14.8
Sample Base 33	15	9	9	

Travel Route Usage

Whittemore School Study

	Faculty %	Staff %	Students %	Weighted Total %
Madbury Rd.	16.8	23.3	16.5	18.0
108 Dover	11.9	14.6	21.4	18.9
108 Newmarket	7.9	13.6	22.3	18.9
Old Route 4	10.9	10.7	16.5	14.6
Mill Road	14.9	5.8	0.0	2.8
155-A	4.0	2.9	1.9	2.4
155	5.0	7.8	6.8	6.8
College Road	13.9	1.9	0.0	1.8
Edgewood Road	4.0	1.9	1.0	1.5
Sample Base 307	101	103	103	

INER STUDY (Bicyclists Only)

	Total Responses %
Madbury Rd.	37
108 Dover	28
108 Newmarket	22
Mill Rd.	12

Hazardous Road Conditions

INER Study

	No. Responses	%
Rt. 108 Dover	40	90
Rt. 108 Newmarket	76	85.5
Rt. 4 Portsmouth	53	66
Packers Falls/ Mill Rd.	30	26.6

Bikeways Improvements Needed

INER Study

78% feel adequate bikeways not provided, especially along the following roads:

	No. Responses	%
Main Street	40	22
Mill Road	30	17
Madbury Road	28	15
College Road	27	15
Garrison Ave.	21	12
Pettee Brook Lane	20	11
Edgewood Road	16	9

Funding Methods

INER Study

91% favor State highway funds being made available for the planning and construction of bikeways in the biennial state budget to match existing federal funds.

85% willing to pay higher registration fee for bikes if needed to aid in matching funds for bikeway construction (52% would pay \$3.00, 41%-\$5.00, 6%-\$10.00)/

SUMMARY OF RESULTS OF HIGH SCHOOL STUDENT SURVEYS

Usual Transportation To School

	%
Drive	10
Walk	28
Bus	37
Bike	25

Travel Route Usage

	No. Responses	%
Mill Road	19	13.5
108 (Dover/Nmkt.)	18	12.8
Madbury Road	17	12.1
Faculty Road	15	10.6

Rt. 4	11	7.8
Durham Point Road	11	7.8
Rt. 155	7	5.0
Mill Pond Road	6	4.3
Bennett Road	5	3.5
Main Street (Downtown)	32	22.7

Hazardous Road/Intersection Conditions

	No. Responses	%
108 & Main At Police Station	10	17.9
108 (Dover or Nmkt.)	9	16.1
Mill & Main	5	8.9
Madbury & Main	8	14.3
Route 4	10	17.9
Madbury Road	9	16.1
Durham Point Road	5	8.9

Bikeway Improvements Needed

	No. Responses	%
Route 4	32	26.5
Rt. 108 (Dover or Nmkt.)	29	24.0
Rt. 155	24	19.8
Madbury Road	20	16.5
Durham Point Road	16	13.2
Others Mentioned:		
Bagdad Road		
Mill Road		
Mill Pond Road		
Emerson Road		
Edgewood Road		

Funding Methods

67% would pay increased bicycle registration fee of \$3.00.

Local and federal funds and donations were also suggested.

ALTERNATE TRANSPORTATION SURVEY

Adult survey respondent: Age _____ Sex _____ Town of Residence _____
 No. of household members 18 or over _____ Under _____ Under 18 _____

1) How many in your household bike a) commuting to work or school _____
 b) shopping _____
 c) for recreation _____

2) Rank 1 to 5 present road conditions for cycling on roads you take to work (1 is tension-free, 3 safe, 5 hazardous) 1 2 3 4 5
 Town of departure _____ Destination _____
 Via roads _____

3) What percent of time is your transport to work or school from April thru Oct, in fair weather:
 Walking _____
 Hitchhiking _____
 Bicycle _____
 Public Transport _____
 Private vehicle _____

4) If roads were safer, what % would you bike to work or school, April thru Oct. in fair weather: _____

5) Specify roads where bikelanes or bikepaths are most needed:
 In your town _____
 State roads _____

6) Should bikeways be restricted to non-motorized use? (motorbikes and skimobiles prohibited) Yes No

7) Is public transport conveniently available to work? Yes No
 Would you use inexpensive public transport if available? Yes No

8) Do you favor using a percent of state highway funds to match existing federal funds for bikeways? Yes No
 If yes, waht percent? 1% 2% 5% 10%

LEISURE AND RECREATIONAL OPPORTUNITIES:

Check those you feel are now INADEQUATE in your town

- | | |
|---|--|
| <input type="checkbox"/> bikepaths or bikelanes | <input type="checkbox"/> community center |
| <input type="checkbox"/> walking or ski trails | <input type="checkbox"/> craft center |
| <input type="checkbox"/> tennis courts | <input type="checkbox"/> reading & periodical room |
| <input type="checkbox"/> parks or nature study area | <input type="checkbox"/> music listening & chess room |
| <input type="checkbox"/> public swimming (freshwater) | <input type="checkbox"/> coffee house (indoor and outdoor) |
| <input type="checkbox"/> other (specify) _____ | <input type="checkbox"/> other _____ |

Please add your name and address to join CAT to help us be heard! If you wish to help further, please include phone.

 Street Town/Zip Phone

4) If roads were safer, what percent would you bike to work or school, April thru Oct. in fair weather:

<u>0-25%</u>	<u>26-50</u>	<u>51-75</u>	<u>over 76%</u>	
16	7	23	20	66

5) Specify roads where bikelanes or bikepaths are most needed:

In your town: Main St. - 27 (22.5%); Madbury Road - 15 (12.5%);
 Mill Road - 8 (6.6%)
 State roads: 108 Newmarket - 22 (18.3%); Rte 4 - 20 (16.7%);
 Route 155 & 155A - 16 (13.3%)

6) Should bikeways be restricted to non-motorized use? Yes No
 (motorbikes and skimobiles prohibited) 89 0

7) Is public transport conveniently available to work? Yes - 5 No - 87
 Would you use inexpensive public transport if available? Yes - 67 No - 23

8) Do you favor using a percent of state highway funds to Yes - 92 No - 2
 match existing federal funds for bikeways? 1% 2% 5% 10%
 If yes, what percent? 18 22 21 35

LEISURE AND RECREATIONAL OPPORTUNITIES:

Check those you feel are now **INADEQUATE** in your town.

- | | |
|--|---|
| <u>83</u> bikepaths or bikelanes | <u>30</u> community center |
| <u>34</u> walking or ski trails | <u>20</u> craft center |
| <u>31</u> tennis courts | <u>5</u> reading & periodical room |
| <u>28</u> parks or nature study area | <u>8</u> music listening & chess room |
| <u>22</u> public swimming (freshwater) | <u>18</u> coffee house (indoor and outdoor) |
| <u>4</u> other (specify) _____ | <u> </u> other _____ |

Please add your name and address to join CAT to help us be heard! If you wish to help further, please include phone.

Name	Street	Town/Zip	Phone
------	--------	----------	-------

This survey is supported by the Durham League of Women Voters. Your check towards postage and further efforts may be sent to LWV BIKING COMMITTEE.

APPENDIX B

INVENTORY OF ROADS INCLUDED IN BIKEWAY STUDY

ROAD	NO. LINEAR FT. OF POTENTIAL BIKEWAY	RIGHT-OF-WAY	SIDEWALK WIDTH	PAVEMENT CONDITION	OBSTACLES
Mill	8338'	42'(ave.)	6'	Fair	5-10 trees; utility poles, fire hydrant; guard rails, limited width over 2 bridges
Faculty	1625'	50'	6'	Fair/Poor	Fences, hedges, etc. bordering private property; utility poles & fire hydrants
Oyster River	2700'	50'		Fair	
Chesley		50'		Poor	Street Extension Required
Mill Pond	1500'	50'		Poor	Boulders, guard rails, hydrant on pond side
Woodman	450'	45'	6'	Good	Parking lane between Dennison and Madbury Roads
Dennison	1600'	50'	6'	Good	Parking lane between sidewalk and street; one hydrant
Garrison	1875'	40'	6-8'	Good	Trees, utility poles, and parking lane between sidewalk and st.
Bagdad	2300'	45'	6'	Excellent	Fences, hydrants, etc. bordering property
Coe	3700'	50'	4'	Fair	Utility Poles; limited width over creek
Emerson	5000'	38'(ave.)		Good	
Edgewood	4384'	66'		Excellent	
Durham Point	750'	56'(ave.)		Good	
Madbury	3350'	60'	6'	Fair	Parking on both sides between Garrison Ave. & Pettee Brook Ln.

APPENDIX C

ESTIMATED BICYCLE LANE CONSTRUCTION COSTS

Unit Costs: (Based on 3.5 foot bicycle lane)

Bituminous Concrete Surface (2")

\$2.50/ sq. yd. (\$5.00 at 2" depth)
 $\$5.00 \div 9 = \$.5555/\text{sq. ft.}$
 $\$.5555 \times 43,560 \text{ sq. ft.} = \$24,197.58/\text{AC.}$
 $43,560 \text{ sq. ft.} \div 3.5' = 12,445.7 \text{ L.F./AC.}$
 $\$1.94/\text{L.F.}$ (\$3.88/L.F. for both sides)

Aggregate Sub-Base (6")

\$1.00/sq.yd. (\$6.00 at 6" Depth)
 $\$.6666/\text{sq. ft.}$ 12,445.7 L.F./AC.
 $\$29,040/\text{AC.}$
 $\$2.44/\text{L.F.}$ (\$4.66/L.F. both sides)

Excavation

\$3.50/ cu. yd.
 Use 500 cu. yds. of excavation required / $\frac{1}{2}$ mile
 Section of road as an ave. amount; approx. 6' wide
 Area 6" deep
 500 cu. yds./2640 L.F. ($\frac{1}{2}$ mile)
 .189 w. yds./L.F.
 $\$.66/\text{L.F.}$ (\$1.32/L.F. both sides)

Fine Grading

\$.50/sq.yd.
 $\$.0555/\text{sq. ft.}$
 $\$24.20/\text{AC.}$ 12,445.7 L.F./AC.
 $\$.19/\text{L.F.}$ (.38/L.F. both sides)

Ledge Removal

Use \$20.00/cu. yd. as an ave. cost in Durham;
 Use 200 cu. yds. of ledge removal required/ $\frac{1}{2}$ mile
 section of road in Durham as an ave. amount
 200 cu. yds./2640 L.F. ($\frac{1}{2}$ mile)
 .76 cu, yds./L.F.
 $\$1.52/\text{L.F.}$ (\$3.04/L.F. both sides)

Striping

\$.014/L.F. (\$0.028/L.F. both sides)

Landscaping costs:

Tark seed \$.09/L.F.
 Lime .05/L.F.
 Fert .05/LF.
 Loam 1.16/L.F.
 $\$1.35/\text{L.F.}$ (\$2.70/L.F. both sides)
 (8' horizontal drainage ditch area)

Total Cost:

Without ledge removal: \$6.59/L.F. (\$12.97/L.F. both sides)
 With ledge removal: \$8.11/L.F. (\$16.01/L.F. both sides)

APPENDIX D

STRAFFORD REGIONAL PLANNING COMMISSION PROPOSALS

ALTERNATIVE BICYCLE LANE CONSTRUCTION SCHEDULES

Alternative 1 (Approx. 7,000 ft. per year)

<u>Year</u>		<u># feet</u>
1	Garrison (Main to Mad.)	1500
	Mill (Main to Faculty)	900
	Madbury (Pettee to Garrison)	1000
	Coe (all)	3700
		<u>7100</u>
2	Garrison (Madbury to Dennison)	375
	Mill (to R.R.)	3400
	Madbury (to Edgewood)	2300
	Dennison (Garrison to Woodman)	700
	Woodman (to Dennison)	450
	<u>7275</u>	
3	Mill (to Meserve)	3250
	Faculty	1600
	Mill Pond	1500
	<u>6300</u>	
4	Dennison (Garr. to Bagdad)	900
	Bagdad (all)	2300
	Emerson (Edgewood to Coe)	3800
	<u>7000</u>	
5	Emerson (Madbury to Edgewood)	1200
	Edgewood ext.	1500
	Oyster River	2700
	Durham Point (to Sunnyside)	750
	<u>6150</u>	

DURHAM, NEW HAMPSHIRE

BIKEWAY STUDY

1386 0 693 1386
1" = 1386 feet

ALTERNATIVE 1

YEAR

- 1..... [diagonal line pattern]
- 2..... [diagonal line pattern]
- 3..... [dotted pattern]
- 4..... [dotted pattern]
- 5..... [diagonal line pattern]

MADBURY

LEE

DURHAM

UNIVERSITY OF
NEW HAMPSHIRE

The preparation of this map was financed in part through Comprehensive Planning Grants from the State of New Hampshire and the U.S. Department of Housing and Urban Development.

Prepared by:
Strafford Regional Planning Commission

Alternative 2 (<6000 ft. per year)

<u>Year</u>		<u># feet</u>
1	Garrison (all) Mill (to Oyster River)	1875 2700 <u>4575</u>
2	Mill (to R.R.) Madbury (to Bagdad) Dennison (all) Woodman (to Dennison)	1600 1550 1600 450 <u>5200</u>
3	Mill (to Meserve) Madbury (to Edgewood)	4050 1800 <u>5850</u>
4	Bagdad (all) Mill Pond (all) Faculty (all)	2300 1500 1625 <u>5425</u>
5	Coe Emerson (Bagdad to Coe) Durham Point	3700 1000 750 <u>5450</u>
6	Emerson (Madbury to Bagdad) Edgewood ext.	4000 1550 <u>5550</u>
7	Oyster River	2700

DURHAM, NEW HAMPSHIRE

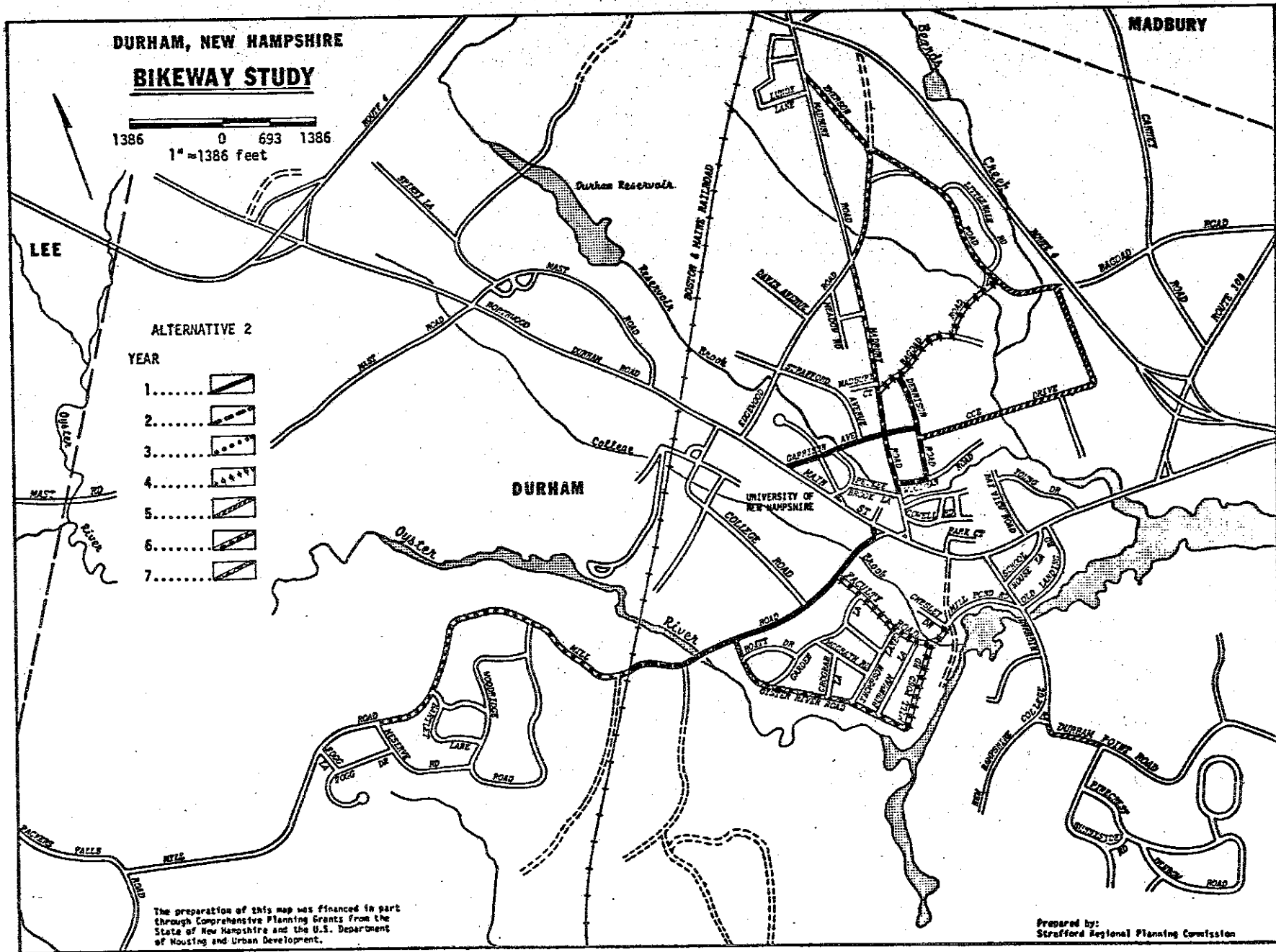
BIKEWAY STUDY

1386 0 693 1386
1" = 1386 feet

ALTERNATIVE 2

YEAR

- 1..... [diagonal lines]
- 2..... [dashed line]
- 3..... [dotted line]
- 4..... [cross-hatch]
- 5..... [diagonal lines]
- 6..... [diagonal lines]
- 7..... [diagonal lines]



The preparation of this map was financed in part through Comprehensive Planning Grants from the State of New Hampshire and the U.S. Department of Housing and Urban Development.

Prepared by:
Strafford Regional Planning Commission

Alternative 3 (<6000 ft. per year)

<u>Year</u>		<u># feet</u>
1	Garrison (Main to Madbury) Mill (Main to Faculty) Madbury (to Garrison)	1500 900 1000 <u>3400</u>
2	Garrison (Madbury to Dennison) Mill (Faculty to R.R.) Madbury (Garrison to Bagdad)	375 3400 550 <u>4325</u>
3	Mill (R.R. to Woodridge) Madbury (Bagdad to Edgewood) Dennison (all) Woodman (to Dennison)	1388 1800 1600 450 <u>5238</u>
4	Mill (to Meserve) Faculty (all) Mill Pond (all)	2650 1625 1500 <u>5775</u>
5	Coe (all) Emerson (Bagdad to Coe)	3700 1000 <u>4700</u>
6	Emerson (Madbury to Bagdad) Edgewood ext.	4000 1550 <u>5550</u>
7	Oyster River Bagdad Durham Point	2700 2300 750 <u>5750</u>

DURHAM, NEW HAMPSHIRE

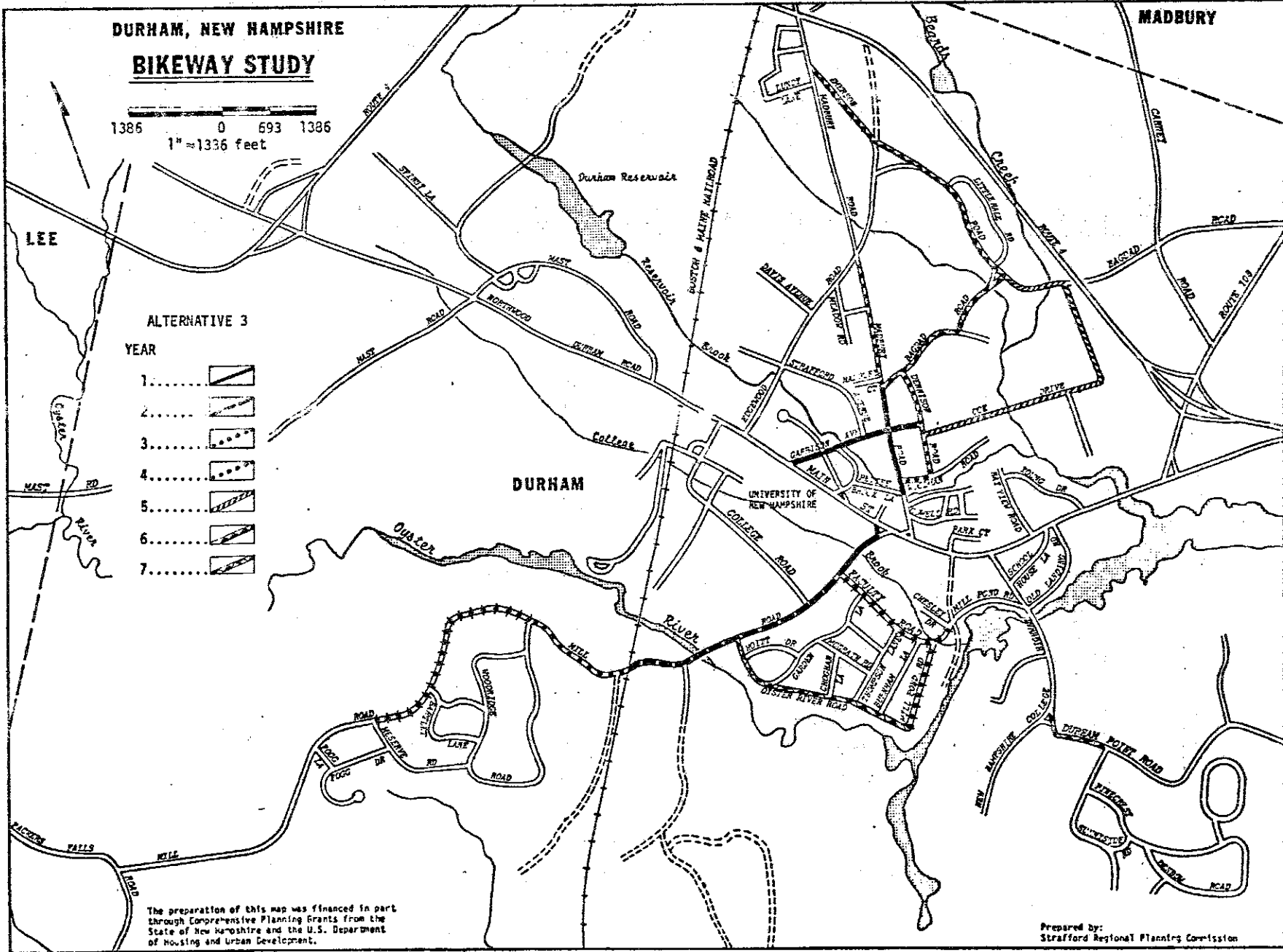
BIKEWAY STUDY

1386 0 693 1386
1" = 1336 feet

ALTERNATIVE 3

YEAR

- 1..... [diagonal line pattern]
- 2..... [dotted pattern]
- 3..... [dotted pattern]
- 4..... [dotted pattern]
- 5..... [dotted pattern]
- 6..... [dotted pattern]
- 7..... [dotted pattern]

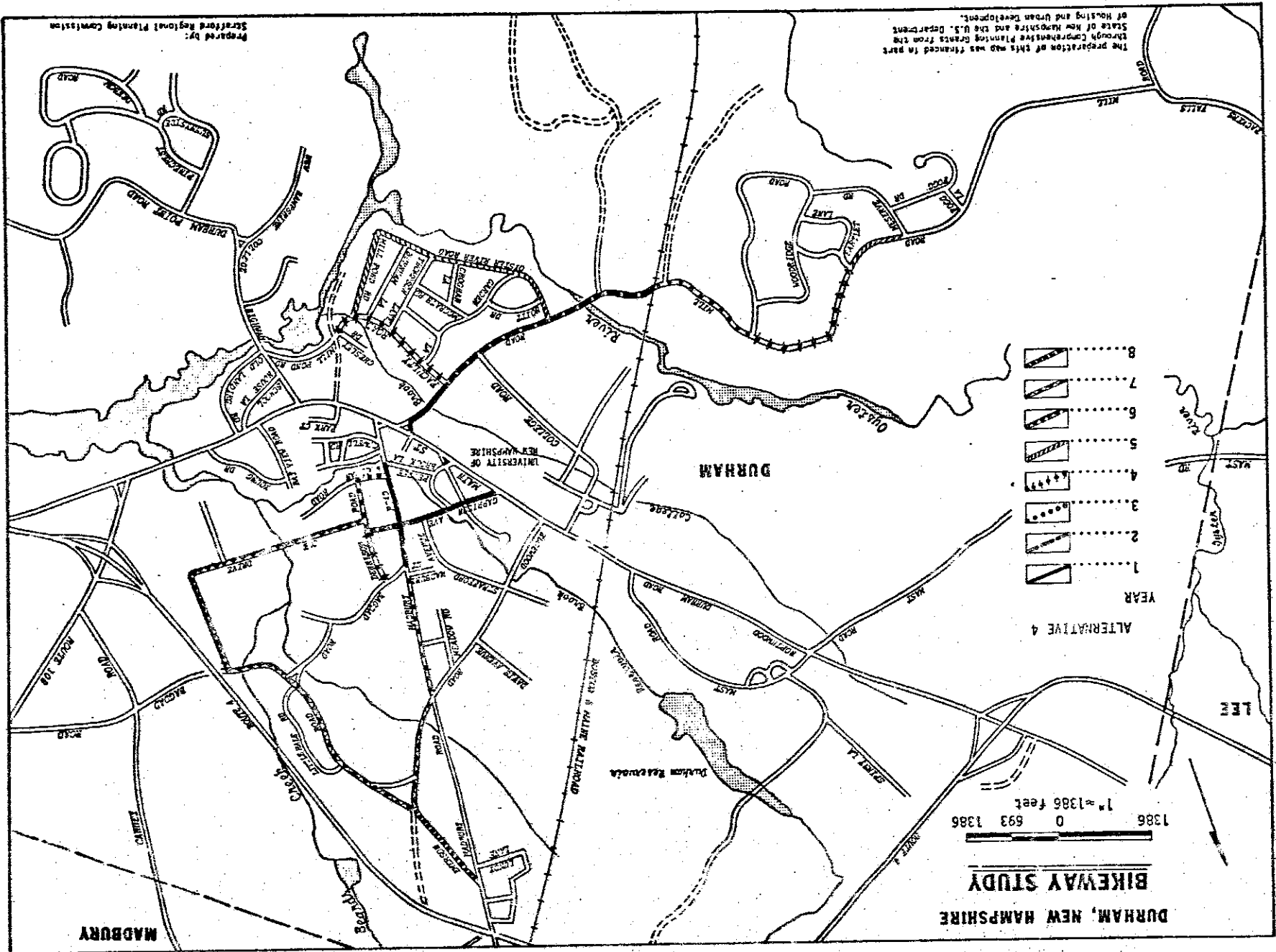


The preparation of this map was financed in part through Comprehensive Planning Grants from the State of New Hampshire and the U.S. Department of Housing and Urban Development.

Prepared by:
Strafford Regional Planning Commission

Alternative 4 (5000 ft. per year)

<u>Year</u>		<u># feet</u>
1	Garrison (Main to Madbury) Mill (Main to Faculty) Madbury (to Garrison)	1500 900 1000 <u>3400</u>
2	Garrison (to Dennison) Mill (to R.R.) Madbury (to Bagdad)	375 3400 550 <u>4325</u>
3	Mill (to Woodridge) Madbury (to Edgewood) Dennison (Garrison to Woodman) Woodman	1388 1800 700 450 <u>4338</u>
4	Mill (to Bartlett) Dennison (Garrison to Bagdad) Mill Pond (Chesley to Faculty) Faculty	1750 900 300 1625 <u>4575</u>
5	Mill (to Meserve) Mill Pond (Faculty to Oyster River) Oyster River	900 1200 2700 <u>4800</u>
6	Coe Emerson (Bagdad to Coe)	3700 1000 <u>4700</u>
7	Emerson (Edgewood ext. to Bagdad) Edgewood ext.	2800 1550 <u>4350</u>
8	Emerson (Madbury to Edgewood) Bagdad Durham Point	1200 2300 750 <u>4250</u>



The preparation of this map was financed in part through Comprehensive Planning Grants from the State of New Hampshire and the U.S. Department of Housing and Urban Development.

Prepared by:
Seaford Regional Planning Commission

APPENDIX E

CAT SUGGESTIONS TO THE PLANNING BOARD

1. A letter from the Selectmen (via the Planning Board) to encourage the State to set aside an annual percentage of the highway funds for bikepaths. Or a percentage of the gas tax or sin taxes. 98% favor this idea in our household survey.
2. Suggest that the Selectmen encourage use of state highway funds (70-30) for Newmarket Road. Most hazardous!!

Look into the possibility of HUD funds for inter-town improvement of existing roads.

Investigate a possible bikepath on the unused B & M railroad bed from Durham to Newmarket and from Durham to Dover. This could be a three town and UNH project using a Federal grant or subsidy. Contact Vince Todd, Director, Physical Plant Development.

3. Perhaps we should not emphasize school transportation but think in terms of school safety and recreational biking. Question one in the household survey asks how many bike for a) commuting to work or school (112 respondents), b) shopping (69), c) recreation (226). An indication that twice as many use bikes for recreation.
4. Consider using one bicycle lane (two-ways with a minimum of 5') where possible. Like Coe Drive between the Middle School and High School. The School Board recently adopted a resolution making Coe Drive the top priority for bicycle paths. A Highway Safety Grant is possible here.
5. Bicycle signs are hard to see on Edgewood at night particularly. I suggest that "BICYCLE PATHS" be painted on the path itself to make it more visible.
6. Ask the Selectmen and Budget Committee if any bicycle funds could be made available from general revenue sharing, capital improvements, general fund appropriation (bicycle registration & dealer registration), or "D" funds.
7. Inquire into the feasibility of underwriting the cost of constructing a network of bicycle paths in the town by issuing long-term bonds, the rationale being that not only the present inhabitants but those of the future will benefit from the construction of these facilities. The availability of funds for immediate construction could also provide some protection against the erosion of inflation.
8. I suggest that time is of the utmost importance in applying for Federal aid NOW. Exeter is in the process of planning for bikeways using Federal money and who knows how many other New Hampshire towns have the same idea. The engineering report necessary for construction can be included in the proposal for matching funds and should be part of the total package. We have all the necessary information to make a proposal to the town and the Federal Groups for matching funds. Other capital expenditures coming up later make it all the more imperative to truly make this the year of the bike. There were six fatal accidents last year and five this year as of several months ago. We've had two fatal accidents and many near fatal

accidents of autos with bikes in District 6 which should testify to the urgency.....let's not wait for more!!!!

Along with several others in attendance at the last meeting, I would like to see an alternate plan that would more nearly complete a bicycle path or lane from one point to another in the same year without hopping all over town. There is also the question of priorities. The following plan would complete a path from Woodridge to the Elementary and Middle School and do the most dangerous section of Madbury in the first year. It would also allow safer commuting from Packers Falls and Newmarket. If the Coe Drive and school areas were considered first priority, the second year plan could be done first. The cost of this proposed plan is based on Mr. Chadbourne's estimates. To perhaps give a clearer picture of the estimates costs involved I have included figures with and without ledge and have suggested striping on one way streets and a two-way path for Coe Drive (although there is a possibility of other funding for that area). If town crews were used for the work there would be an additional saving that the figures do not indicate.

<u>Year</u>	<u>Feet (without ledge)</u>	<u>Cost</u>
1. Mill Road (Main to Meserve)	8338 @ \$12.97/LF	\$108,143.86
Main (Mill to Madbury)	est. 300 Striped @ .014	4.20
Madbury (Main to Garrison)	1000 @ \$12.97	12,970.00
		<u>\$121,118.06</u>
2. Madbury (Garrison to Edgewood)	2350 @ \$12.97	31,479.50
Garrison (Madbury to Dennison)	375 Striped @ .014	5.25
Dennison (all)	1600 " "	22.50
Woodman (all)	450 @ \$12.97	5,836.50
*Coe Drive (all)	3700 @ \$11.12 (2-way)	41,144.00
		<u>\$ 78,486.65</u>
3. Durham Point (to Wedgewood)	750 @ \$12.97	9,727.50
Faculty Road (all)	1625 "	21,076.25
Mill Pond (Chesley to Oyster R.)	1500 "	19,455.00
Oyster River Road (all)	2700 "	35,019.00
		<u>\$ 85,277.75</u>
4. Emerson (all)	5000 "	64,850.00
Edgewood Extension	1500 "	19,455.00
Bagdad (all)	2300 "	29,831.00
		<u>\$114,136.00</u>

5. Main (Police Station to Jackson's Landing)	2250 est. "	29,182.50
Bennett Road (to R.R.)	4460 est. "	57,846.20
Mill (Meserve to Packers Falls)	2640 est. "	34,240.80
		<u>\$121,269.50</u>

Total cost for the first four years as listed.....	\$399,018.46 (without ledge)	
Cost to the town with BOR matching funds.....	\$199,504.23	
Cost to the town with ledge removal @ \$3.04/L.F. and BOR funds -	\$294,391.75	
	Less 10% - 264,952.57	
Total cost for the five year plan as listed.....	\$520,287.96	
Cost to the town with BOR matching funds.....	\$260,143.98	
Cost to the town with ledge removal @ \$3.04/L.F. and BOR funds -	<u>\$383,455.50</u>	
	Less 10% - \$345,109.95	

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