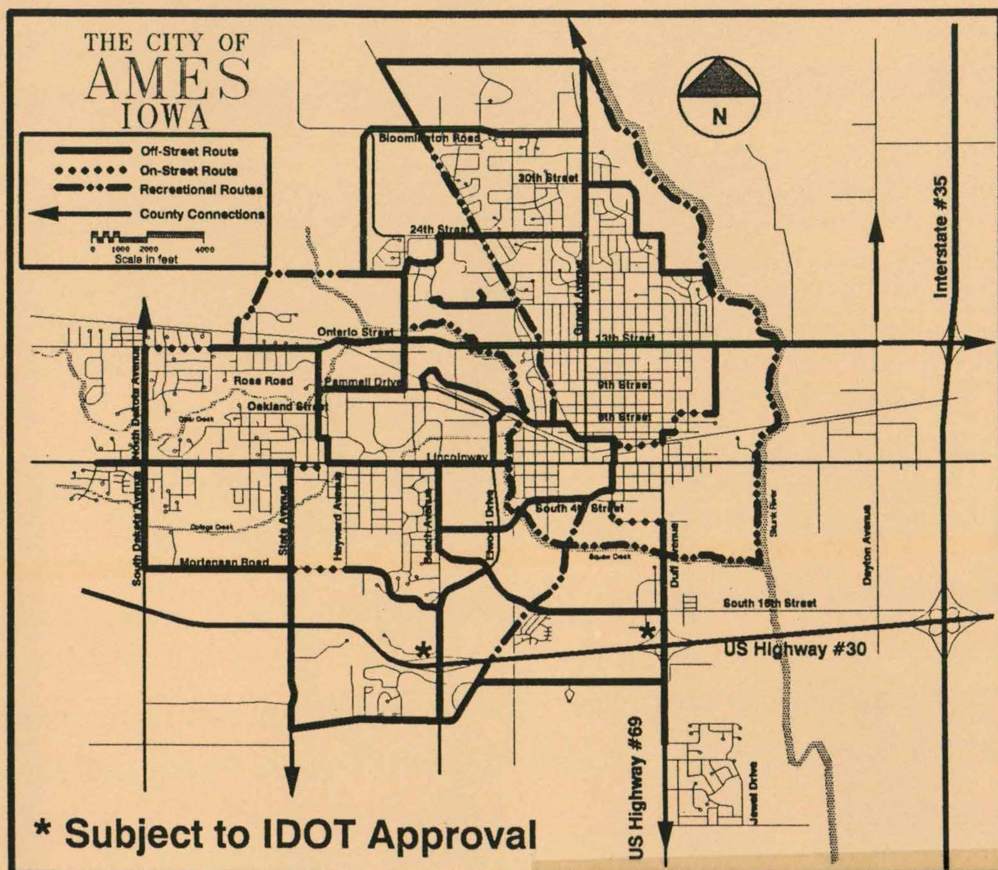
City of Ames Bicycle Route Master Plan



August 1990

Planning & Housing Department
Public Works Department

City Of Ames

Bicycle Master Plan Report

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Introduction

In January, 1990, City staff began working on a Bicycle Route Master Plan to review routes established in the late 70's. The main purpose for this plan was to develop routes that were the safest and best means for bicycle travel. Review of the former routes was necessary because many designated routes were no longer being recognized as routes by riders and were being decommisioned by the ISU/Ames bicycle committee. Also some designated on-street routes along heavily traveled arterial were deemed hazardous for the riders

The primary objective of the Master Plan was to develop a bikeway system responsive to the user's demand. In the city of Ames there are many destination points used by bicylists including the Iowa State University, business districts, schools, parks, and employment centers. It was concluded in this plan that since the ISU student population is consolidated in a relatively small areas, linkages from these high density districts to the university would serve the largest demand on the system.

By planning these routes, the City is developing a system which further encourages bicycling as an alternate form of transportation that will reduce parking demands in many parts of the city. Bicycling in Ames has long been recognized as a widely used form of recreation and commuter travel. According to bicycle registrations records, there are more than 6,000 bicyclists in the City of Ames. Moreover, this doesn't reflect the vast number of students and residents riding unregistered bicycles.

The Master Plan will be divided into four chapters. Chapter One will discuss the objectives and goals of the City's bicycle routes. Chapter Two will discuss the planning approach and present the bicycle route master plan. Chapter Three will provide standard bicycle path concepts. Chapter Four will provide the recommended bike routes, schedules, and funding guidelines for future implementation.

DEFINITIONS

To reduce repetitive explanation of frequently used words and terms while at the same time insuring singular understanding of them, the following definitions are listed.

Bicycle Facility - Any and all devices, travelways, shelters or any other construction designated for bicycling use.

Bikeway- Any trail, path, part of a highway or shoulder, sidewalk, or any other travelway specifically signed and/or marked for bicycle travel. Clearance, Lateral - Width required for safe passage of a bicycle as measured in a horizontal plane.

Clearance, Vertical - Height necessary for the safe passage of a bicycle as measured in a vertical plane.

Design Speed - A speed determined for design and correlation of physical features of a bikeway that influence bicycle operation. It is the maximum safe speed that can be maintained over a specified section of bikeway when conditions are so favorable that design features of the bikeway govern.

Geometrics - As related to bikeways, it is the proportional measurement of materials and land use which comprises the physical design of the facility.

Grade Separation - Vertical isolation of travelways through use of a structure so that traffic crosses without interference.

Locational Criteria - Relative predetermined standards selected for use in selecting and weighting bikeway corridors

Normal Highway Practice - Procedural treatment of a situation considered acceptable or standaridized by AASHTO.

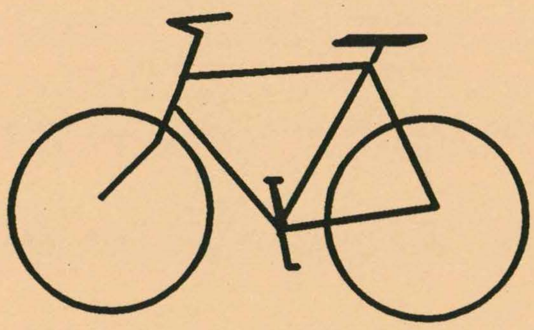
Pavement Marking - Painted or applied line(s) or legend placed on any bikeway surface for regulating, guiding or warning traffic.

Pedestrian - A person whose mode of transportation is on foot.

Recreational Cyclists- An individual(s) who uses a bicycle for trip itself. Ultimate destination is of secondary importance.

Right-of-way - A term denoting land, property, or interest therein, usually in a strip, publically acquired for or devoted to transportation purposes.

Travelway - Any way, path, road or other travel facility used by any and all forms of transportation.



Chapter One
Goals and Objectives

City of Ames

Bicycle Route Master Plan

Planning & Housing Department
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CHAPTER 1 - GOALS AND OBJECTIVES

Early in the planning process, Planning and Public Works staff drafted proposed goals and objectives of future bicycle routes. These goals and objectives were presented to the Iowa State University/Ames bicycle committee and were approved. These are generally stated inwhich further explanations follows for each item.

Goals and Objectives

1. **System of continuity in recreational/commuting bike route.**

    1.1 Local streets will serve as a passive bike facility

    1.2 Route system should be for both bicyclists and pedestrians

    1.3 Prioritize system for bike route construction

    1.4 Link areas of higher density to destination points

    1.5 Develop a system that links residental areas to schools.

    1.6 Develop a system that links City bike routes to County/State bike routes

    1.7 Establish a standard for route spacing

    1.8 Link residential areas to neighborhood parks

2. **System must create safety and security for bikes and other multi-modal forms**

    2.1 No bike lane designation on any street where the speed of traffic on streets exceeds 30 MPH or has a threshold volume over 3,000 vehicles per day

    2.2 Integrate bike route with areas of natural resource attractions

    2.3 Establish consistent standards for bike route construction

    2.4 Establish consistent standards for bike route signage/marking

    2.5 System should ensure that there is enough bike parking at points of destination

3. **Establish a mechanism for bike route development and expansion**

3.1 Identify a mechanism for funding construction and maintenance

3.2 Bike system must anticipate growth areas of the City

3.3 When construction of streets occur, widen street to allow for bike lanes

3.4 When development is reviewed and construction projects occur bike routes should be programmed in.

Explanations of the Objectives and Goals

1.1 Local streets will serve as a passive bike facility

It was decided in the review that almost all residential streets can be used for bicycling. Safe bicycling can be achieved due to the traffic characteristics attributed to residential streets including low speeds and volumes. This is an important concept since the proposed bicycle routes will connect most all residential streets to the system.

1.2 Route system should be for both pedestrians and bicyclists

Bicycle routes should be constructed to accommodate both pedestrian and bicycle traffic. These paths would serve both purposes since each have similar origin and destination points. Design features for these paths must include adequate widths for providing space for both modes where possible.

1.3 Priortized system for bike route construction

Scheduling new bicycle path extensions should be based on a rating system. Potential bicycle routes should be evaluated by factors such as costs, funding, type, connectivity, service, etc. These factors and the rating system are outlined in Chapter 3.

1.4 Link areas of higher density to destination points

One of the main purposes of a bike system is to provide paths to serve the highest number of users. Bicycle path origins from the high density districts such as the university dormitories, student apartment dwellings, and large apartment complexes should optimize the number of users of the system.

1.5 Develop a system that link residential areas to schools.

Another function of a bike path system is to provide safe routes to and from area schools. School trips have the most probability of being served by bicycle travel. This is because students below mid-high school grades generally do not have the option to travel by motor vehicle.

1.6 Develop a system that links City bike routes to County/State Routes

Routes are currently being planned by State and County authorities which could be linked to the city system. Linkage of these routes would satisfy recreational needs for a vast number of bicyclists.

1.7 Establish a standard for spacing of routes

Routes in the system should be spaced an adequate distance from each other to optimize their use. Appropriately spaced routes would maximize cycling benefits for funds appropriated for paths.

1.8 Link residential areas to neighborhood parks

Recreational riding to parks is another essential function which should be provided by the path system. Routes in the system could be extended into the park areas for leisure riding through green areas.

2.1 No bike lane designation on any street where the speed of traffic on streets exceeds 30 MPH or has a threshold volume over 5,000 vehicles per day

Arterial streets which have this volume or vehicular speeds are deemed too hazardous for on-street bicycle travel. With these street conditions, the potential for accidents and injury are much greater. A separated bicycle facility would be much safer for the cyclists especially since they frequently make sudden movements due to poor surface conditions, inlet grates, bumps, ect. Also cyclists are endangered on streets with higher motorists speeds due to the speed differential caused by lower speed cyclists.

2.2 Integrate Bike routes with areas of natural resource attractions

Many benefits can be accrued by locating bike routes in these areas. Residents can use these routes for recreation which will also make these areas accessable. These two facilities are very compatiable due to the nature of bike travel.

2.3 Establish consistent standards for bike path construction.

Bicycle routes should be developed using design standards which extends it's life, minimize maintenance, and provide safe conditions for cycling. These standards are presented in Chapter Three inwhich pavement thickness, widths, and path surfaces are specified.

2.4 Establish consistent standards for bike signage/markings

Signage for bike routes should be uniformly located to provide adequate guidance to cyclists and also alert motorist of the route. Sign and marking standards are established by Federal guidelines based on the "Manual on Uniform Traffic Control Devices". These are given in Chapter Three.

2.5 System should ensure that there is enough bike parking at points of destination.

Cyclists must be reasonably assured that safe and adequate parking is available at both trip origin and destination points. Being small, light and valuable, bicycles are exposed to increasing theft and vandalism. Several factors might be considered in determining the need for bicycle parking facilities which are outlined in Chapter Three.

3.1 Identify a mechanism for funding construction and maintenance

Bike path construction is costly because of the grading, pavement, and other associated work involved with their placement. The typical cost for constructing an eight foot path is $55,000 per mile. Funding sources are available from state and federal agencies.

3.2 Bike systems must anticipate growth areas of the City

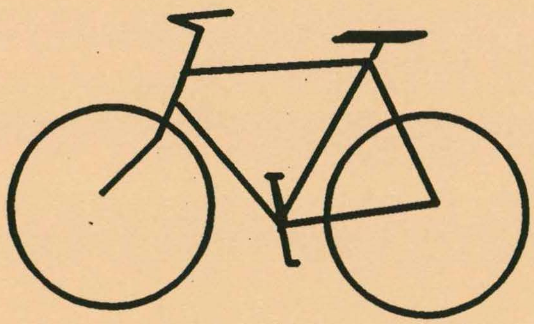
Systems must be planned for surrounding areas of the city to serve future bicycling demand. These path extensions are the easiest to design and construct at the time of developement because many physical barriers are non-existent.

3.3 When construction of streets occur, widen streets to allow for bike lanes.

Another simple measure to construct paths is to design bicycle paths into street improvement projects. Typical physical barriers such as utility poles, hydrants, signal poles, ect. can be easily relocated to accommodate bike path facilities.

3.4 When development is reviewed and construction projects occur, bike routes should be programmed in.

This is the most desirable means of developing routes. Developers should include these paths in their projects to provide services to future users. By establishing a bicycle plan for these areas, it will enable city officials to set requirements for placing paths in developments.



Chapter Two
Planning Approach

City of Ames

Bicycle Route Master Plan

Planning & Housing Department
Public Works Department

CHAPTER TWO. BICYCLE ROUTE PLANNING

The master plan for this bicycle system resulted from extensive planning inwhich many factors were reviewed. These included evaluating existing path segments, physical barriers, major origin and destination points, safety, accessiblity, continuity, route purpose, and directness.

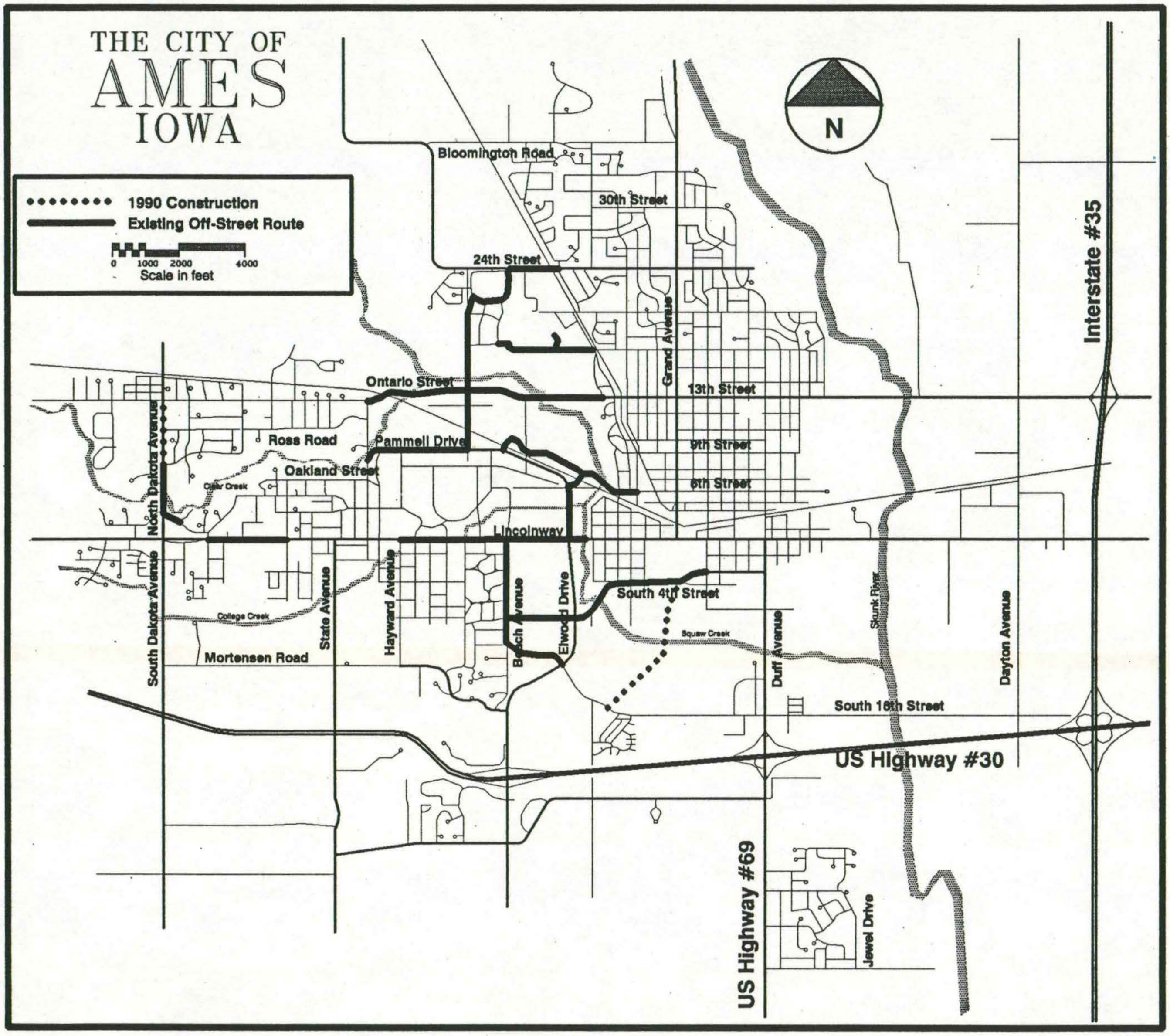
Staff developed the master plan's path system in three general planning stages. The planning began with identifying the existing off-street routes and the major origin and destination points. Then preliminary route systems were reviewed inwhich a system network was developed . Finally, alternate paths were analyzed in this system network which resulted in a final route plan. These planning stages and the reviewed information are discussed in the following report.

Identification of Existing Paths, Origin, and Destination Points

The city has many existing off-street bicycle paths that are well utilized by cyclists and motorists. Most of these routes are along side major arterial streets and extend to many origin and destination points. Most off-street bicycle paths are still in good condition. These bicycle paths must be relatively smooth with no sudden bumps or drops to provide ridablity and safety. Most paths have good design characteristics including adequate widths, grades, ect. to still meet path criteria for designation as a bicycle route. However, most of these paths are more than ten years old and will need some reconstruction in ten to twenty years.

Shown on the next page is the existing off-street paths which are located in the central part of the city. Most emulate from the university and serve off-campus student housing. These paths are along Stange Road, S.4th Street, 13th Street and Lincoln Way. Other paths serve the high school, parks, and residential areas in West Ames.

Existing Off-Street Bicycle Routes



All of these paths will be included in the master bicycle plan. These paths have good characteristics including functionablilty, connectivity, useage, and are safely designed for bicycle travel.

Origins

The origin of most bicycle travel is in the residential neighborhoods and university housing areas in Ames. This would account for nearly all trip origins for riding to work, school, business, shopping, and recreational areas. The trip origins in the residential areas are more dispersed than in the university housing areas. The university students reside in more condensed areas where many live in residence halls, apartment complexes, fraternities, and sororities. According to Iowa State University figures, there are approximately 9,000 students living in the Richardson Court, Towers, and Union residence halls. Other student housing in the campus area is also concentrated which is shown in the Ames's district populations discussed below.

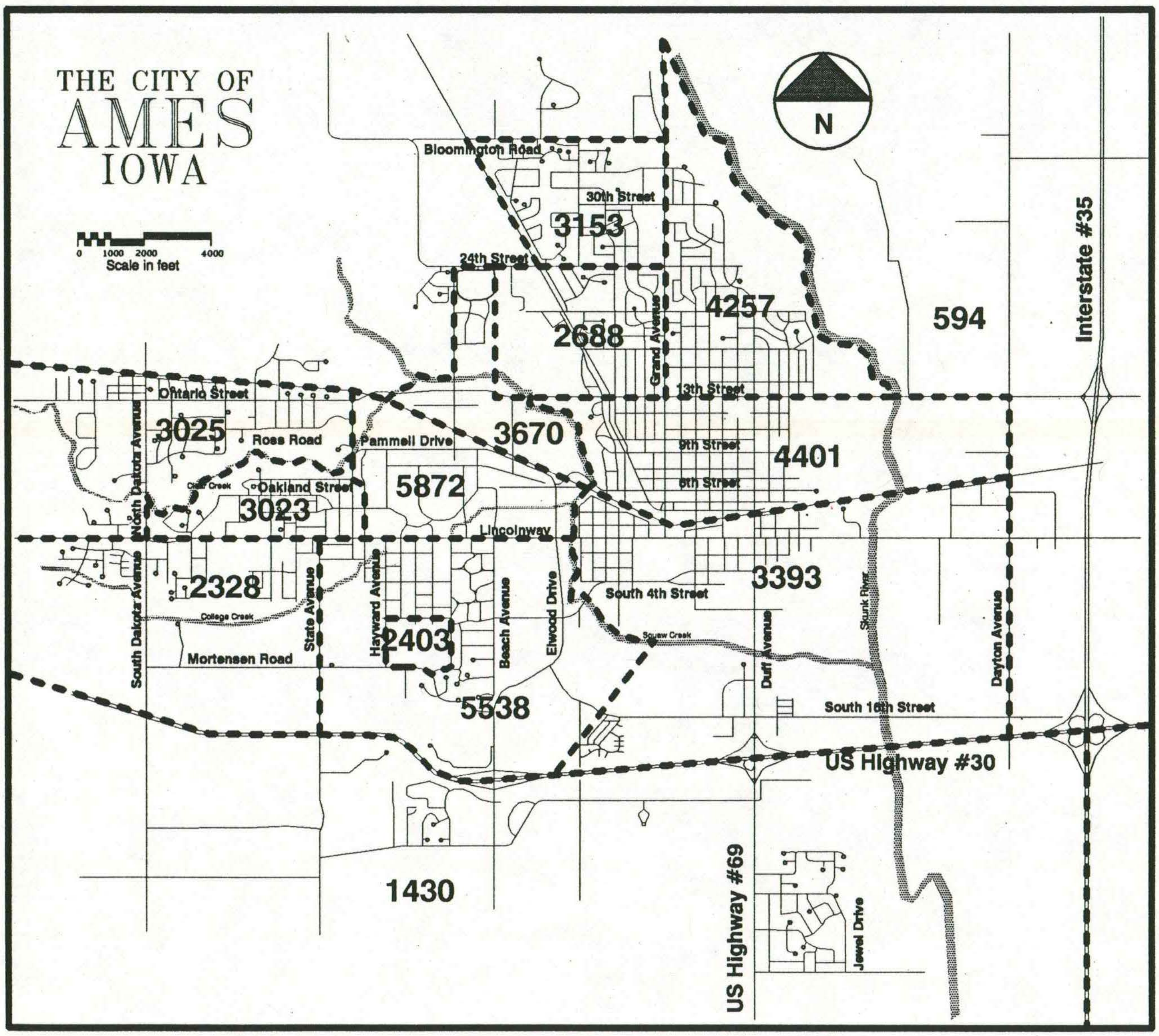
The number of bicycle trip origins from areas was approximated from the 1980 census inwhich projections of bicycle use was based on the population's age. According to a Barton-Ashman's 1975 study, "Bicycling in Pennsyvaia, age was found to be the demographic charactersitic with the most direct relationship to frequency of bicycle use. Over one-quarter of all persons under age six are bicyclist. Given that one, two and three year olds may not physicaly be able to ride a bicycle, it may be expected that four and five year olds have a participation rate as high as 50 percent. The study found that bicycling participation peaks sharply in years six through 15 where as much as 90 percent of the population bicycled. The study indicated that bicycling participation then drops off sharply between ages 16-19 to 59 percent of the group's population. The decline is associated with this age group's increased access to the automobile. Participation continues to drop off gradually from ages 20 through 40 with the average ridership being 40 percent. After age 45, another pronounced drop in bicycling participation occurs, generally reflecting this age group's lesser overall participation in pysical activities. Shown in the table below is the projections of bicycle use based on the group's age.

Estimated Bicycle Users by Age Group

Age Group	Pct Users
0-14	70%
15-19	60%
20-24	60%
25-45	40%
46+	10%

The 1980 US census divided the population in Ames into fourteen districts. The survey then performed demographics inwhich district populations and populations for each age group were determined. According to these divisions, the population center is close to the northeastern portion of the university's main campus. Shown below are the district's population and the table establishing the population center.

City Population by District

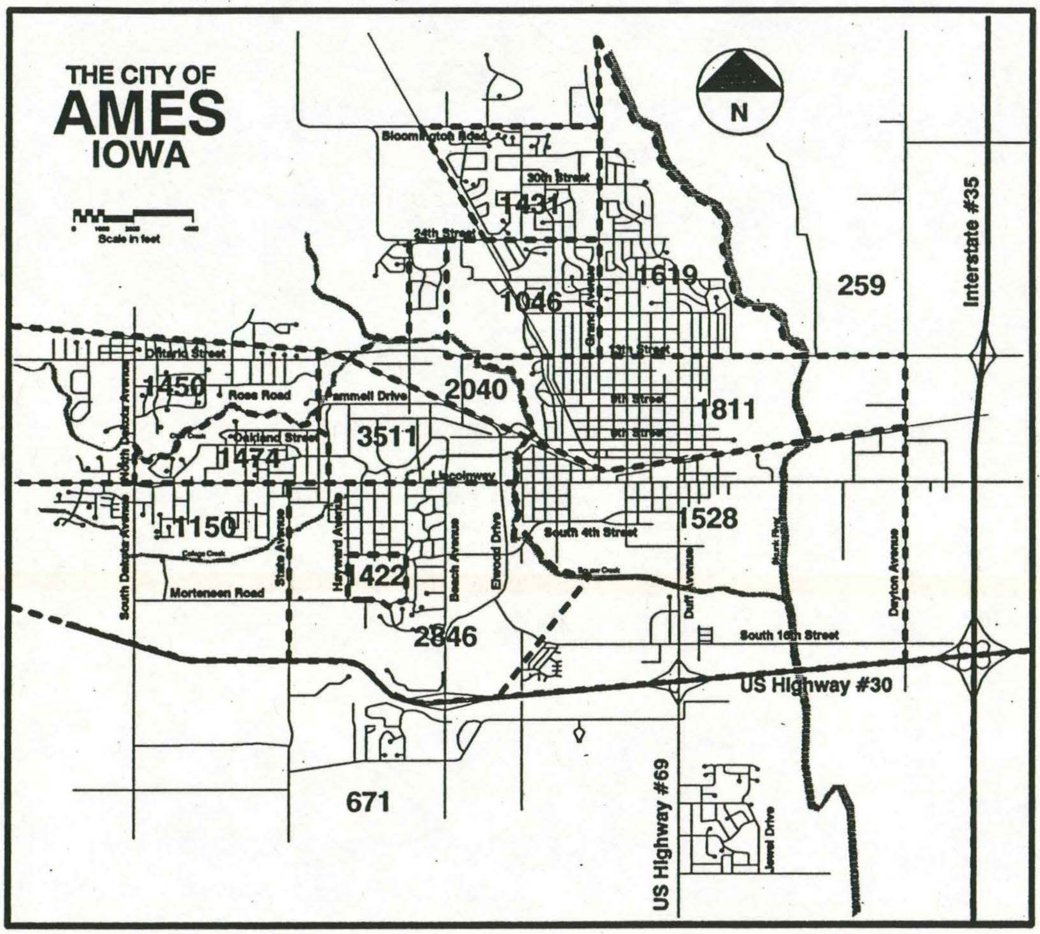


Estimated Bicycle Users by District and Age Group

District #	Age 0-14			Age 15-19			Age 20-24			Age 25-45			Age 46-00			Total Population	Total Bicycle Users
	#	% Users	# Users	#	% Users	# Users	#	% Users	# Users	#	% Users	# Users	#	% Users	# Users		
1	141	70	99	40	60	24	67	60	40	206	40	82	140	10	14	594	259
2	775	70	543	379	60	227	415	60	249	1105	40	442	1583	10	158	4257	1619
3	843	70	590	246	60	148	278	60	167	1159	40	464	627	10	63	3153	1431
4	573	70	401	261	60	157	174	60	104	719	40	288	961	10	96	2688	1046
5	756	70	529	172	60	103	1567	60	940	1166	40	466	9	10	1	3670	2040
6	669	70	468	241	60	145	629	60	377	1037	40	415	449	10	45	3025	1450
7	186	70	130	300	60	180	1427	60	856	656	40	262	454	10	45	3023	1474
8	7	70	5	2802	60	1681	3004	60	1802	56	40	22	3	10	0	5872	3511
9	710	70	497	313	60	188	734	60	440	1405	40	562	1239	10	124	4401	1811
10	435	70	305	199	60	119	1013	60	608	1074	40	430	672	10	67	3393	1528
11	293	70	205	997	60	598	2685	60	1611	918	40	367	645	10	65	5538	2846
12	10	70	7	1245	60	747	1079	60	647	44	40	18	25	10	3	2403	1422
131	331	70	232	143	60	86	815	60	489	799	40	320	240	10	24	2328	1150
132	342	70	239	117	60	70	202	60	121	545	40	218	224	10	22	1430	671
Totals	6071		4250	7455		4473	14089		8453	10889		4356	7271		727	45775	22259

The projected bicycle trip origins also centered by the university. Trip origins in the below table are based on the district's population of each age group and the projected bicycle use by age. Shown on the city map on the next page is the projected bicycle users in each district.

Estimated Bicycle Users by District



The use of this origin information was instrumental in developing the phasing for the bicycle routes. This population data shows that the main population is in the central part of the city. Also this information shows that most areas of the city have origins for bicycle travel which should be served. The bicycle route plan encompasses most areas for residents to travel by bicycle to various destinations. .

Destinations

Bicycle travel in Ames is madeup of work, school, recreational, shopping and other trips. The largest trip generators in the city are the public schools and the Iowa State University. However, there are a vast number of recreation trips being made to the parks and other recreational areas. The discussion below outlines the characteristics of each trip.

Work Trips

Work trip generators in the city include the business districts, Iowa State University, and industrial areas. Work trips are very sensitive to travel time. Consideration of trip length and relative travel time is a prime facor in identifying which could be served by bikeways. Bikeways of five to six miles in areas of intense urban activity are competitive with motor vehicles in travel time. Work trips to employment centers within three to four mile are also potential candidates for cycling.

School Trips

School trips have the most probability of being served by bicycle travel. Many school trips are within easy bicycling range. In addition, students below mid-high school grades generally do not have the option to travel by motor vehicle. On college campuses the bicycle is a particularly attractive mode, not only because it eliminates the need to compete for scarce and expensive parking spaces, but also because it is useful for getting directly from one place to another on campus.

For elementary school children riding a bicycle to shcool is a positive status symbol. For college students it is at least neutral. Only among junior high and high school age groups is riding a bicycle for transportation perceived as a negative status symbol although this is diminishing.

Shopping Trips

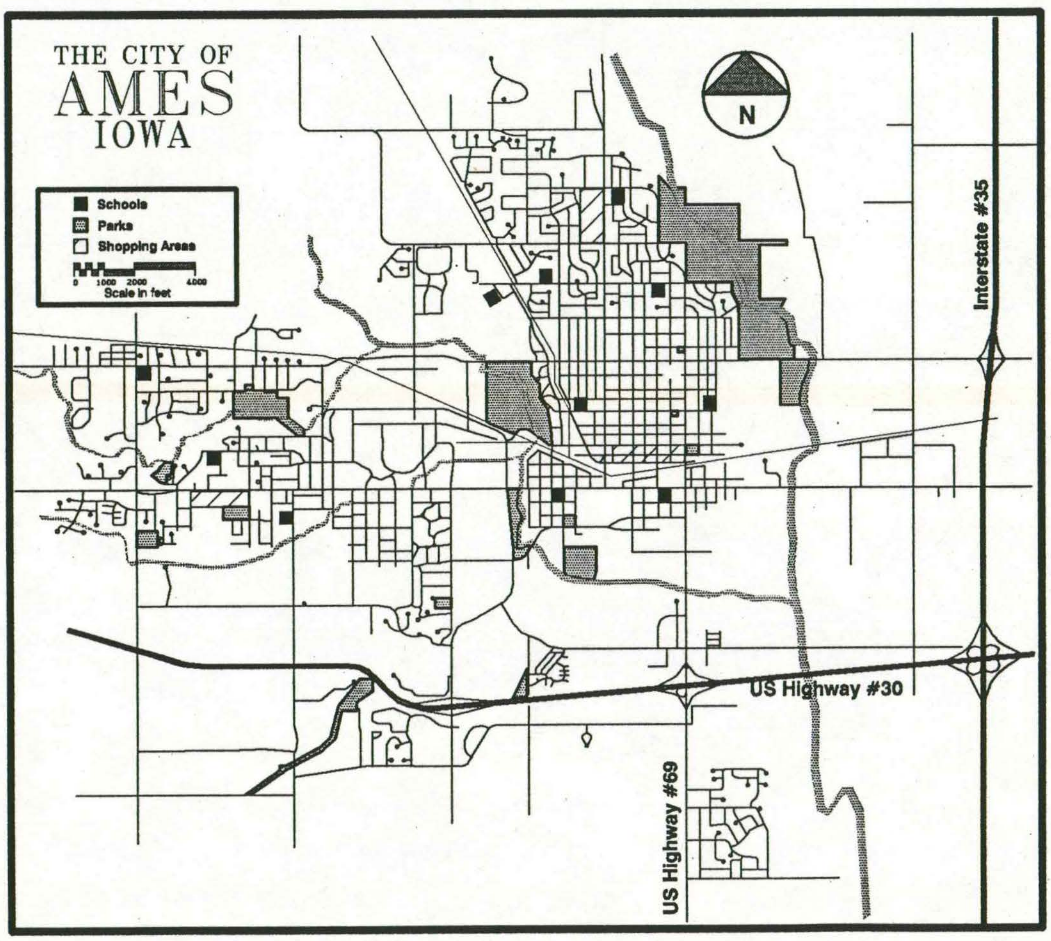
Shopping trips pose mixed potential for bikeway activity. A relatively few "convenience" type trips involving the purchase of a few small items are apt to be made by bicycle.

Recreational

There are many areas in Ames inwhich recreational trips can be generated. These include the University's recreational areas, fitness centers, parks, county recreation facilities, and other areas. Some grades or indirect routing will be accepted by cyclists using recreation centers wheras on trips to school or employment the rider is sensitive to any situation causing an expenditure of time or effort.

The large work, shopping, school, and recreational generators are shown on this city map.

Bicycle Trip Generators

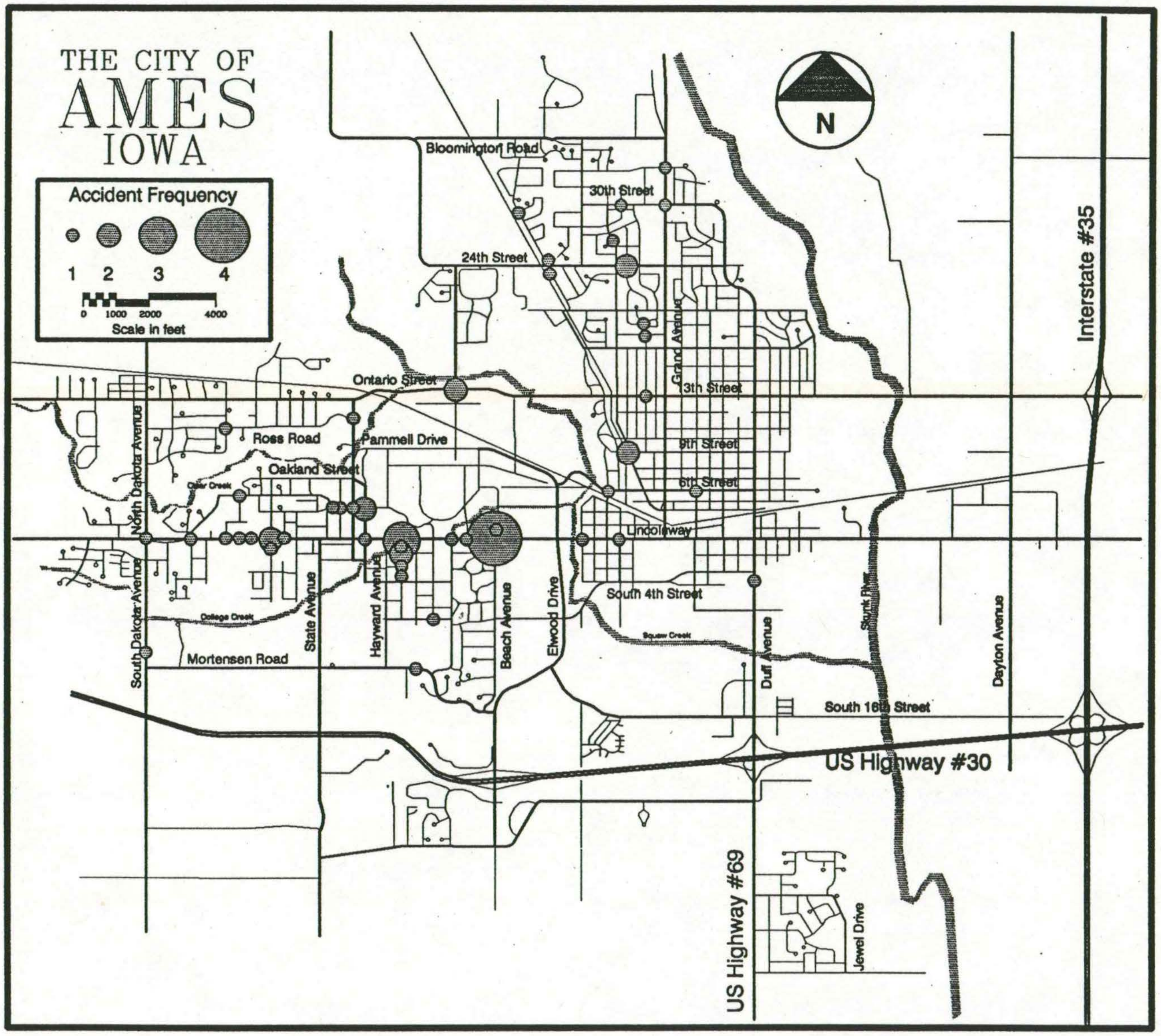


This information was used in developing routes in the Master Plan. Most destination points will be served by bicycle paths. However, many destinations points will not be linked due the spacing criteria used in the path development.

Bicycle Accidents

One of the main goals of the system is to reduce bicycle accident in the city. In the past five years (1985 - 1990) there has been 57 accidents. These accidents have been predominantly located in the central portion of the city and in areas surround the university campus. The accident locations are shown below with the accident summaries listed in the table on the next page.

Bicycle Accident Frequency (1985-1989)



Bicycle Accidents 1985-1989

DATE	DAY	TIME	LOCATION	PK	PI	VI	ACCIDENT TYPE	LIGHT COND.	WEATHER CONDITIONS	VEH. #1 TYPE	VEH. #1 ACTION	VEH. #2 TYPE	VEH. #2 ACTION	VEH. #3 TYPE	VEH. #3 ACTION
03/12/85	TUE	21:45	30TH and REGENCY COURT DRIVE	0	1	2	Bike Coll.	Dark	Snow	Car	Left turn	Bike	Straight		
04/15/85	MON	12:18	CHAMBERLAIN and WELCH	0	1	1	Bike Coll.	Day	Clear	Bike	Straight	Car	Straight		
06/05/85	WED	19:30	MORTENSEN and WELCH	0	1	2	Bike Coll.	Day	Clear	Car	Right turn	Bike	Straight		
06/12/85	WED	21:46	ROSS and GARFIELD	0	2	2	Bike Coll.	Dark	Clear	Motorcycle	Straight	Bike	Left turn		
06/20/85	THU	16:45	13TH and STANGE	0	1	2	Bike Coll.	Day	Clear	Car	Right turn	Bike	Straight		
06/29/85	SAT	20:31	HUNZIKER and ROOSEVELT	0	1	2	Bike Coll.	Day	Clear	Panel Truck	Straight	Bike	Right turn		
07/13/85	SAT	10:16	LINCOLN WAY and FRANKLIN	0	1	1	Bike Coll.	Day	Clear-Cloudy	Bike	Straight	Car	Right turn		
08/07/85	WED	06:45	WEST and WOODLAND	0	1	2	Bike Coll.	Dusk	Clear	Car	Straight	Bike	Left turn		
08/28/85	WED	15:00	LINCOLN WAY and BEEDLE	0	1	2	Bike Coll.	Day	Clear	Bike	Straight	Car	Right turn		
09/06/85	FRI	16:30	LINCOLN WAY and FRANKLIN	0	1	2	Bike Coll.	Day	Unknown	Pickup.	Left turn	Bike	Straight		
09/13/85	FRI	21:30	CHAMBERLAIN and WELCH	0	1	2	Bike Coll.	Dark	Clear	Pickup	Straight	Bike	Straight		
01/09/86	THU	12:55	WEST and HYLAND	0	1	1	Bike Coll.	Day	Clear	Pickup	Straight	Bike	Straight		
06/11/86	WED	14:35	DUFF - SOUTH 300 BLK	0	1	2	Bike Coll.	Day	Clear	Car	Left turn	Bike	Straight		
06/25/86	WED	17:30	HAYES - 2304	0	1	2	Bike Coll.	Day	Clear	Car	Unknown	Bike	Unknown		
06/28/86	SAT	13:30	LINCOLN WAY and WELCH	0	1	2	Veh. Coll.	Day	Clear	Car	Straight	Bike	Straight		
07/27/86	SUN	16:28	MURRAY and ROOSEVELT	0	1	2	Bike Coll.	Day	Clear-Cloudy	Car	Straight	Bike	Straight		
08/21/86	THU	12:12	LINCOLN WAY - 3600 BLK	0	1	2	Bike Coll.	Day	Clear	Bike	Right turn	Car	Straight		
08/22/86	FRI	13:58	LINCOLN WAY and RIVERSIDE	0	2	3	Veh. Coll.	Day	Clear	Car	Straight	Bike	Straight		
09/02/86	TUE	11:52	WELCH - 100 BLK	0	1	3	Bike Coll.	Day	Cloudy	Pickup	Left turn	Bike	Straight		
09/09/86	TUE	18:00	NORTHWESTERN - 2600 BLK	0	1	2	Veh. Coll.	Day	Clear-Cloudy	Car	Straight	Bike	U-turn		
09/21/86	SUN	18:51	LINCOLN WAY and WALLACE	0	1	2	Obj. Coll.	Day	Clear	Car	Right turn	Bike	Straight		
10/27/86	MON	16:15	LINCOLN WAY and SHELDON	0	1	2	Bike Coll.	Day	Clear	Bike	Merging	Car	Left turn		
10/28/86	TUE	17:34	9TH and NORTHWESTERN	0	1	2	Bike Coll.	Dusk	Cloudy	Car	Straight	Bike	Straight		
11/05/86	WED	16:00	13TH and STANGE	0	1	2	Veh. Coll.	Day	Clear	Car	Right turn	Bike	Straight		
11/10/86	MON	10:04	WEST and SHELDON	0	1	2	Bike Coll.	Day	Clear	Bike	Straight	Car	Straight		
02/20/87	FRI	19:10	6TH and CLARK	0	1	2	Bike Coll.	Day	Clear	Car	Straight	Bike	Straight		
05/12/87	TUE	19:54	13TH and ROOSEVELT	0	2	2	Bike Coll.	Day	Clear	Pickup	Straight	Bike	Straight		
06/03/87	WED	20:42	30TH and GRAND	0	1	2	Bike Coll.	Dusk	Clear	Car	Straight	Bike	Left turn		
06/04/87	THU	18:24	LINCOLN WAY and WELCH	0	1	2	Bike Coll.	Day	Clear	Car	Straight	Bike	Straight		
08/31/87	MON	19:56	LINCOLN WAY and BEACH	0	0	2	Bike Coll.	Dusk	Clear	Car	Left turn	Bike	Straight		
10/07/87	WED	17:35	24TH and MELROSE	0	1	2	Bike Coll.	Day	Clear	Car	Left turn	Bike	Straight		
11/13/87	FRI	16:35	LINCOLN WAY - 3500 BLK	0	1	2	Bike Coll.	Day	Clear	Car	Right turn	Bike	Straight		
11/24/87	TUE	13:54	LINCOLN WAY and BEACH	0	1	2	Bike Coll.	Day	Cloudy	Car	Straight	Bike	Straight		
04/07/88	THU	16:10	PIERCE and HAYES	0	1	2	Bike Coll.	Day	Clear	Car	Left turn	Bike	Left turn		
04/10/88	SUN	18:11	24TH and MELROSE	0	1	1	Veh. Coll.	Day	Clear	Car	Straight	Bike	Straight		
04/19/88	TUE	19:24	LINCOLN WAY and KNOLL	0	1	1	Bike Coll.	Day	Clear	Car	Straight	Bike	Straight		
04/25/88	MON	07:41	ROSS and HYLAND	0	1	2	Veh. Coll.	Day	Clear	Pickup	Left turn	Bike	Straight		
05/07/88	SAT	16:10	EISENHOWER - 2900 BLK	0	1	2	Bike Coll.	Day	Clear	Car	Straight	Bike	Straight		
05/13/88	FRI	16:36	WELCH - 300 BLK	0	1	1	Bike Coll.	Day	Clear	Car	Slow-Stop	Bike	Straight		
05/21/88	SAT	17:32	LINCOLN WAY and MARSHALL	0	1	2	Bike Coll.	Day	Mist	Pickup	Right turn	Bike	Straight		
06/11/88	SAT	12:28	S. DAKOTA - 1100 BLK	0	1	2	Bike Coll.	Day	Clear	Bike	Left turn	Car	Straight		
06/16/88	THU	08:20	9TH and NORTHWESTERN	0	1	2	Bike Coll.	Day	Clear	Bike	Straight	Car	Straight		
07/25/88	MON	17:00	LINCOLN WAY and BEACH	0	1	2	Bike Coll.	Day	Clear	Bike	Straight	Car	Left turn		
09/01/88	THU	15:20	6TH and BROOKRIDGE/HAZEL	0	1	2	Veh. Coll.	Day	Cloudy	Bike	Straight	Panel Truck	Right turn		
09/13/88	TUE	18:30	WOODLAND and WESTWOOD	0	1	2	Bike Coll.	Dusk	Clear-Cloudy	Car	Left turn	Bike	Straight		
10/03/88	MON	15:55	LINCOLN WAY and BEACH	0	1	3	Bike Coll.	Day	Clear-Cloudy	Bike	Straight	Car	Left turn		
10/04/88	TUE	21:50	HUNT and WELCH	0	1	1	Bike Coll.	Dark	Clear	Car	Left turn	Bike	Straight		
10/17/88	MON	08:48	LINCOLN WAY and WELCH	0	1	2	Bike Coll.	Day	Cloudy	Car	Left turn	Bike	Straight		
11/14/88	MON	12:00	LYNN AND STORM	0	1	2	Bike Coll.	Day	Cloudy	Other	Straight	Bike	Left turn		
11/15/88	TUE	17:17	S. FRANKLIN - 100 BLK	0	1	2	Bike Coll.	Dark	Rain	Car	Straight	Bike	Straight		
03/27/89	MON	15:50	LINCOLN WAY AND DAKOTA	0	1	2	Veh. Coll.	Day	Clear	Car	Left turn	Bike	Straight		
04/27/89	THU	12:20	LINCOLN WAY AND ASH	0	1	1	Bike Coll.	Day	Clear-Cloudy	Car	Stopped	Bike	Straight		
06/20/89	TUE	17:00	WEST AND CAMPUS	0	2	3	Bike Coll.	Day	Clear	Car	Straight	Moped	Straight	Bike	Straight
07/21/89	FRI	18:00	LINCOLN WAY AND MAPLE	0	1	1	Bike Coll.	Dusk	Clear	Car	Right turn	Bike	Straight		
08/22/89	TUE	18:25	LINCOLN WAY AND COLORADO	0	1	2	Bike Coll.	Day	Clear	Car	Straight	Bike	Chng lane		
09/19/89	TUE	07:45	WHEELER AND GRAND	0	1	2	Bike Coll.	Day	Clear	Car	Straight	Bike	Straight		
09/21/89	THU	13:00	WEST AND SHELDON	0	1	1	Bike Coll.	Day	Clear	Car	Right turn	Bike	Unknown		

Planning Approach

The Ames bicycle route system consists of many planning approaches used for developing a bicycle path network . These approaches include the grid, penetrator, and selected improvement systems. These are outlined below with the advantages and disadvantages discussed further.

Grid System

The grid system functions for bicycles as it does for motorized vehicles: it allow for the most flexibility in routing between points of origin and destination. There is considerable potential for a shared system within the existing transportation network of arterial, collector and local street in the urban area. Improvements such as the establishment of bike lanes, increased maintenance, improved roadway surface, curb-lane widening and signing may provide a relatively low cost yet efficient commuter bikeway system. The disadvantages in a grid system is that it generally less efficient in terms of a continuous corridor for commuter trips.

Penetrator System

The penetrator bikeway system, unlike the grid system, establishes corridors to a single destination or cluster of destinations. The penetrator system accordingly should radiate from major concentrations of bicycling generators to a point of destination. This system concentrates bicycle facility investments where they are most needed. Unfortuantely, it can also lead bicyclists and motorists to compete for the same roadway space.

Selected Improvemnts

In most instances, economic constraints make it impossible to develop a complete commuter bikeway system. However, bicyclist migh benefit considerably from selected improvements, including 1) linear improvements, 2) spot improvements, 3) barrier removal, and 4) connectors. Each of these improvements is described briefly below.

Linear Improvements:

This partial improvement would concentrate on connecting two prescribed points in a community. An example would be the connection of a college area to the central shopping area. Such an improvement might be located either on-street or off-street.

Spot Improvements:

This type of improvement is similar to a linear improvement, but, rather than affecting an entire street system or corridor, might involve incorporating special bikeways only in portions of a street where bicycling conditions are most hazardous.

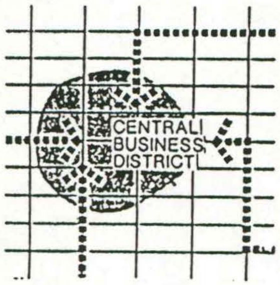
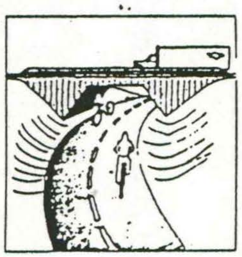
Barrier Removal:

In many cases, the construction of a special structure to permit bicycles to cross major physical barriers such as freeways, railroads, or rivers might be very appropriate. Which these structures may be expensive, a single structure removing a significant barrier to bicycle travel is sometimes more helpful to bicyclists than several miles of special lateral bikeways.

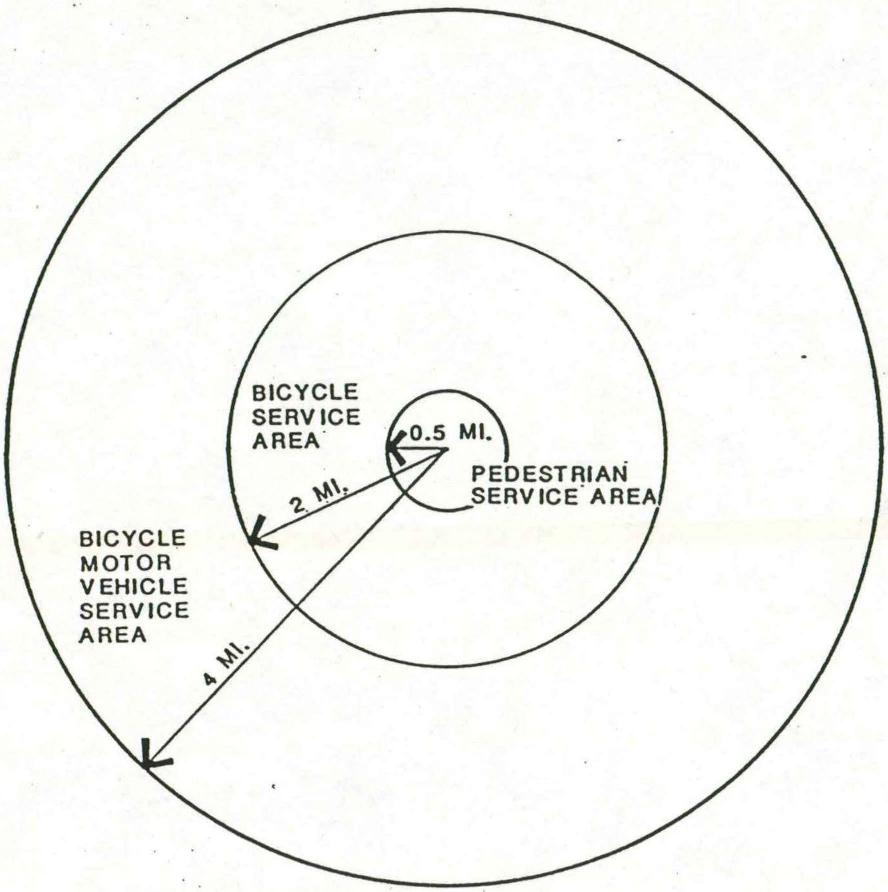
Connectors:

In some areas of the urban area, off-street bikeways may be utilized to connect portions of existing streets (or bikeways) where local streets have relatively little continuity or do not function efficiently or safely in terms of a commuter bikeway system.

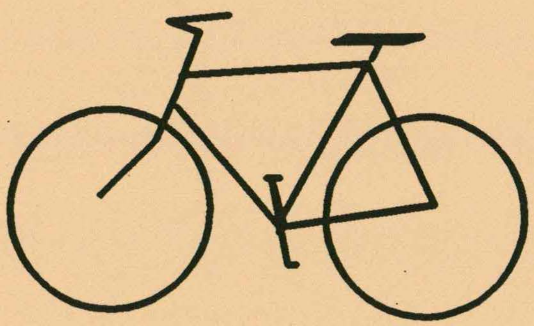
The staff evaluated these various planning approaches and concluded that the grid system would better connect the existing off-street routes with the origins and destinations. The routes are mostly adjacent to major arterial streets and are linked with each other to provide a loop system.

Network Concept	Typical Application	Typical Advantages	Typical Disadvantages
Grid 	Improvements made to selected arterial and collector streets in community	Encourages bicycle travel for a variety of purposes, continous system	Possible loss of space for 1) moving traffic lanes, or 2) parking lanes, may be costly
Penetrator 	Provides access to major generators of bicycle use (schools, central business districts, shopping centers)	Permits concentration of investment to serve greatest number of bicyclists, improves safety on selected streets	Competition with motor vehicle for space at most congested locations in urban areas, is not continuous system
Selected Improvements 	Provides access between selected points; eliminates major safety hazards and barriers to bicycle travel (for example, grade separations, special signing or signalization, channelization, special surface configurations, etc.)	May aid utility of existing street system, may improve safety, may improve access	Some improvements may be costly, may serve single travel purpose, is not continuous

MODE OF TRAVEL	ASSUMED OPERATING SPEED	CAPTURE RADIUS	SERVICE AREA
WALKING	3 M.P.H.	0.5 MI.	0.8 SQ. MI.
BICYCLING	12 M.P.H.	2 MI.	12.6 SQ. MI.
MOTOR VEHICLE	20 M.P.H.	4 MI.	50.2 SQ. MI.



A Comparison of Pedestrian Motor Vehicle and Bicycle Service Areas



Chapter Three
Bicycle Path Standards

City of Ames

Bicycle Route Master Plan

Planning & Housing Department
Public Works Department

BICYCLE PATH DESIGN GUIDELINES

This chapter provides general design guidelines for the system's facilities. Consideration of bicycle facility design is based on two principal needs - safety and convenience. These needs are essential to encourage bicycle riding.

The design guidelines apply generally to the bicycle path facility. Their application must be considered on a case-by-case basis. These should not be considered unilateral or all-encompassing. They are intended to provide sound criteria that will be valuable in attaining good design sensitive to the needs of the bicylist.

Bicycle Path Widths

The consideration of the widths and clearances is probably the most important design element for bicycle paths. The widths governs the levels of service and have a direct effect on bicyclist safety. The space requirements for safe and comfortable bicycle operation are dictated by the following two factors:

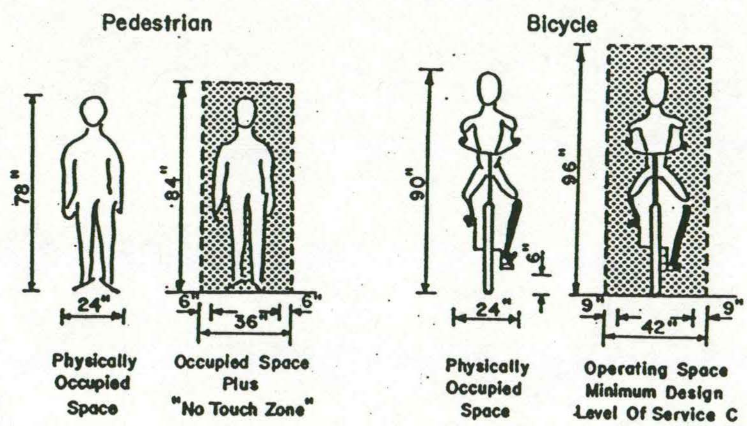
1. Dimensions of the bicyle rider and pedestrians
2. Bicycle clearances

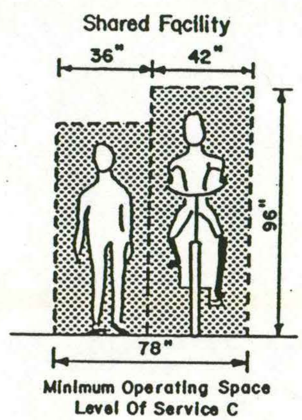
The path design width should be determined by the dimensions of the average adult bicyclist and pedestrian. Shown on the next page are the average height and width of adult bicyclist and pedestrians. These dimensions show that a pedestrian and bicyclist have an average of twenty-four inch dimensions.

Sufficient bicycle clearance is desirable for providing a safe riding environment. Minimum distances from roadway and right-of-way obstructions should be maintained for protecting the bicyclists and pedestians. Minimum and desirable clearance guidelines for safe and comfortable bicycle operation are shown on the table on the next page.

Path widths using the prementioned dimensions are shown on the next page. A one lane facility should have a minimum width of 3.5 feet and a desirable width of four feet based on the width of the bicyle and provision of adequate maneuvering clearances on each side (0.75 to 1 foot)

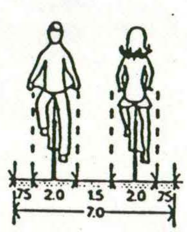
Allowable Lateral and Vertical Bike Path Clearances



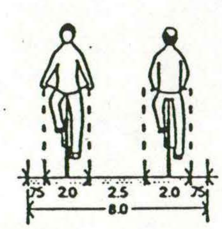


Minimum and Desirable Bike Path Widths

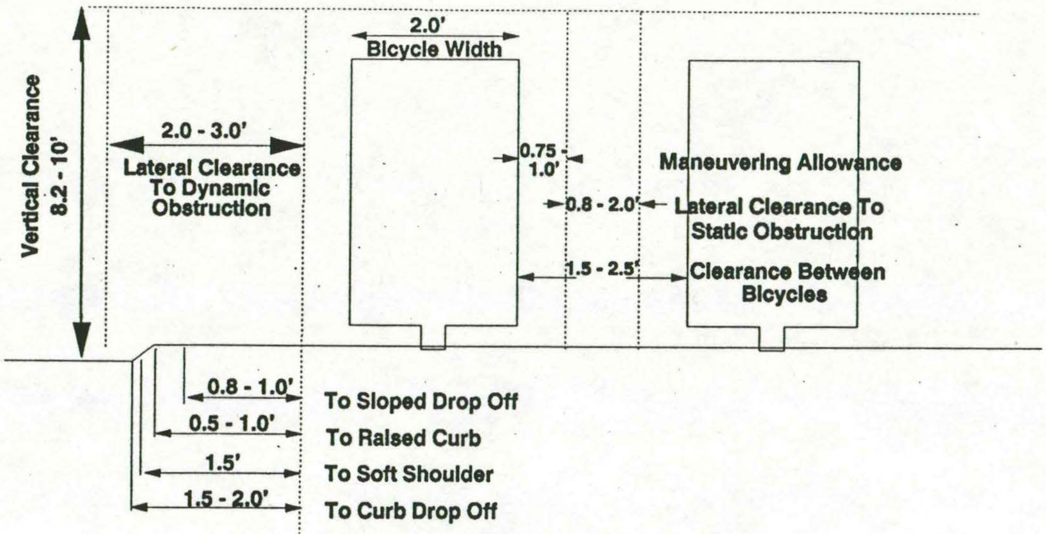
Minimum



Desirable



Bike Path Clearance Standards



Bike Path Clearance Standards

Type of Clearance	Minimum Standard (feet)	Desirable Standard (feet)
Maneuvering Allowances[1]		
- each outside edge	0.75	1.00
- between bicycles, regardless of direction	1.50	2.50
Lateral Clearances to		
Static Obstructions [2,3]		
- utility poles, trees, hydrants, etc.	0.80	2.00
- raised curb	0.50	1.00
- curb drop-off	1.50	2.00
- sloped drop-off	0.80	1.00
- soft shoulder		1.50
Lateral Clearances to		
Dynamic Obstructions[4]		
- parked cars	2.00	3.00
Vertical Clearances to		
Overhead Obstructions	0.80	2.60

[1]Maneuvering allowances should be provided for by additional bikeway paveme... width, as specified.

[2]Lateral clearances can be provided for by either additional bikeway pavement width or separation. It is recommended that these clearances be provided for by simple distance separations, where possible.

[3]In cases where lateral hazards or obstructions are of extreme severity, such as steep drop-offs or heavy vegetation, clearances should be be provided as liberally as possible beyond the minimum standards cited. Some type of additional barrier may also be appropriate depending on the degree of danger.

[4]Includes motor vehicles but desirable clearance will vary dependent upon vehicular speeds. Clearance between bicycles and moving vehicles should be as liberal as possible.

Design Speed

The speed that a bicyclists travels is dependent on several factors including the type and condition of the bicycle, the purpose of the trip, the condition and location of the bicycle path, the speed and direction of the wind, and the physical condition of the bicyclist. Bicycle paths should be designed for a selected speed that is at least as high as the preferred speed of the faster bicyclists. In general, a minimum design speed of 20 mph should be used. However, when the grade exceeds 4 percent, or where strong prevailing tailwinds exist, a design speed of 30 mph is advisable.

On unpaved paths where bicycles tend to ride slower, a lower design speed of 15 mph can be used. Similarly, where the grades or prevailing winds dictate, a higher design speed of 25 mph can be used. Since bicycles have a higher tendency to skid on unpaved surfaces, horizontal curvature design should take into account lower coefficients of friction.

Horizontal Alignment and Superelevaton

In most instances, bikepaths are implemented along street and highway alignments designed for motor vehicles. The horizontal curvature is usually adequate for the bicyclists. When designing bike paths independant of highway alignments, however, horizontal curvature and super-elevation must be provided suitable for the operating characteristics of the bicycle. The minimum radius of curvature negotiable by a bicycle is a function of the superelevation rate of the bicycle path surface, the coefficient of friction between the bicycle tires and the bicycle path surface, and the speed of the bicycle. The minimum design radius of curvature can be derived from the following formula:

$$R = V/15(e+f)$$

Where R = Radius of curvature, ft.
f = Coefficient of friction
(Dry Pavement: use 0.4)
e = Super elevation rate, ft/fr
V = Velocity, mph

The design table below shows radii for various design speeds based on a minimum superelevation rate of 0.02 ft/ft and dry pavement conditions.

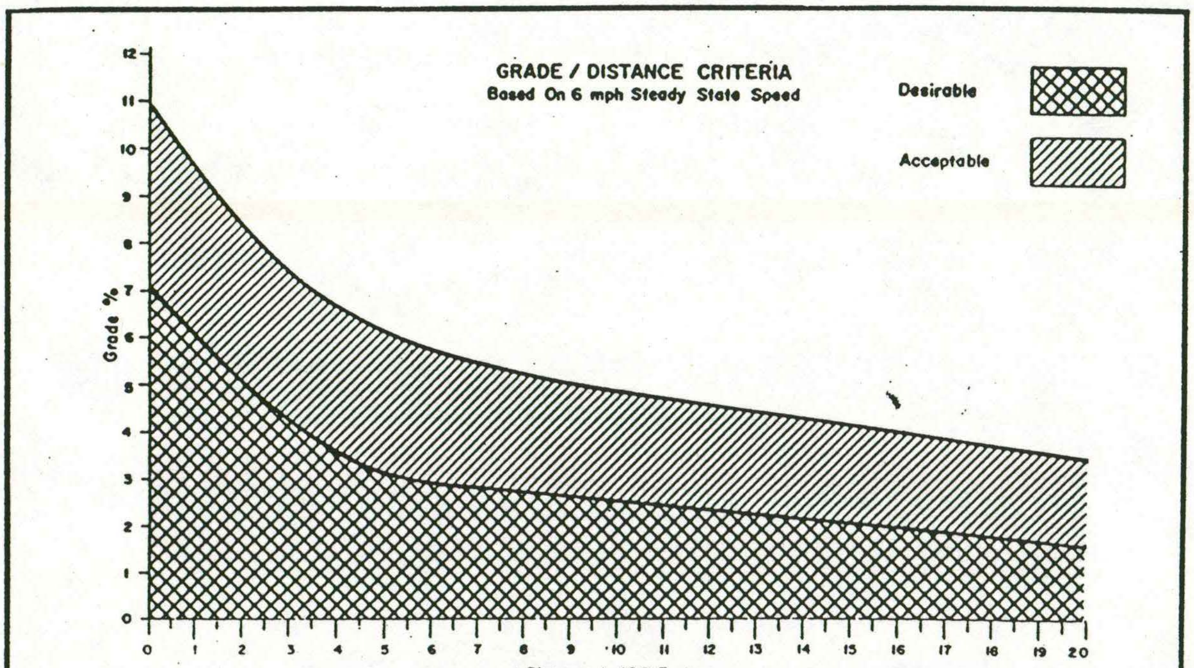
Design Speed (MPH)	Minimum Design Radius (feet)
15	35
20	65
25	100
30	145

To allow additional maneuvering space for bicyclists travelling in opposite directions, curve widening is recommended on curves with radii less than 100 feet. The curve should be widened as a function of the lane width and the anle of the curve. Maximum widening should be limited to four (4) feet. Shown in the table below are the recommended pavement widths relative to the curve radius.

Radius	Additional Pavement Width
0 - 25 feet	4 feet
25 - 50 feet	3 feet
50 - 75 feet	2 feet
75 - 100 feet	1 feet
100+ feet	0 feet

Grades

A level bikeway is preferred by nearly every bicyclist, however because existing terrain, street alignment, or available right-of-way may not be level most bikeways will have grades. Where there is a chance to adjust grade to suit bicyclist, there are some generally accepted guidelines for grades and grade distances. Grades up to about ten percent are considered acceptable for very short distances (less than 100 feet). Grades between 6 and 10 percent are acceptable up to about 500 feet. Grades less than 6 percent have much less effect on a bicyclist, and each decrease in grade of 1 percent adds about 1,000 feet in distance to the acceptable length of grade. The figure below shows desirable and acceptable standards for bike path grades.

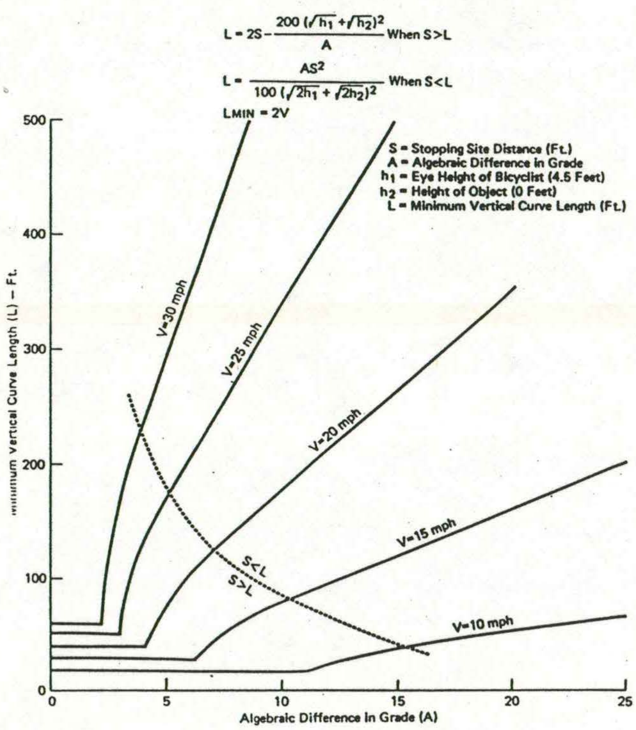


Source: Ref. 1

Bike Path Grade Criteria

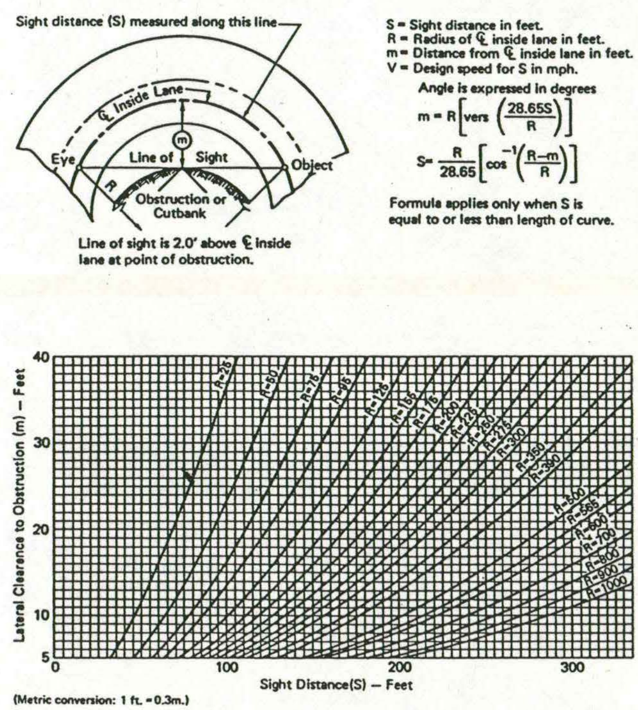
Sight Distance

To provide bicyclists with an opportunity to see and react to the unexpected, a bicycle path should be designed with adequate stopping sight distances. The distance required to bring a bicycle to a full controlled stop is a function of the bicylist's perception and brake reaction time, the initial speed of the bicycle, the coefficient of friction between the tires and the pavement, and the braking ability of the bicycle. The figures below show sight distance formulation for verticle curves and horizontal curves, respectively.



Sight Distance for

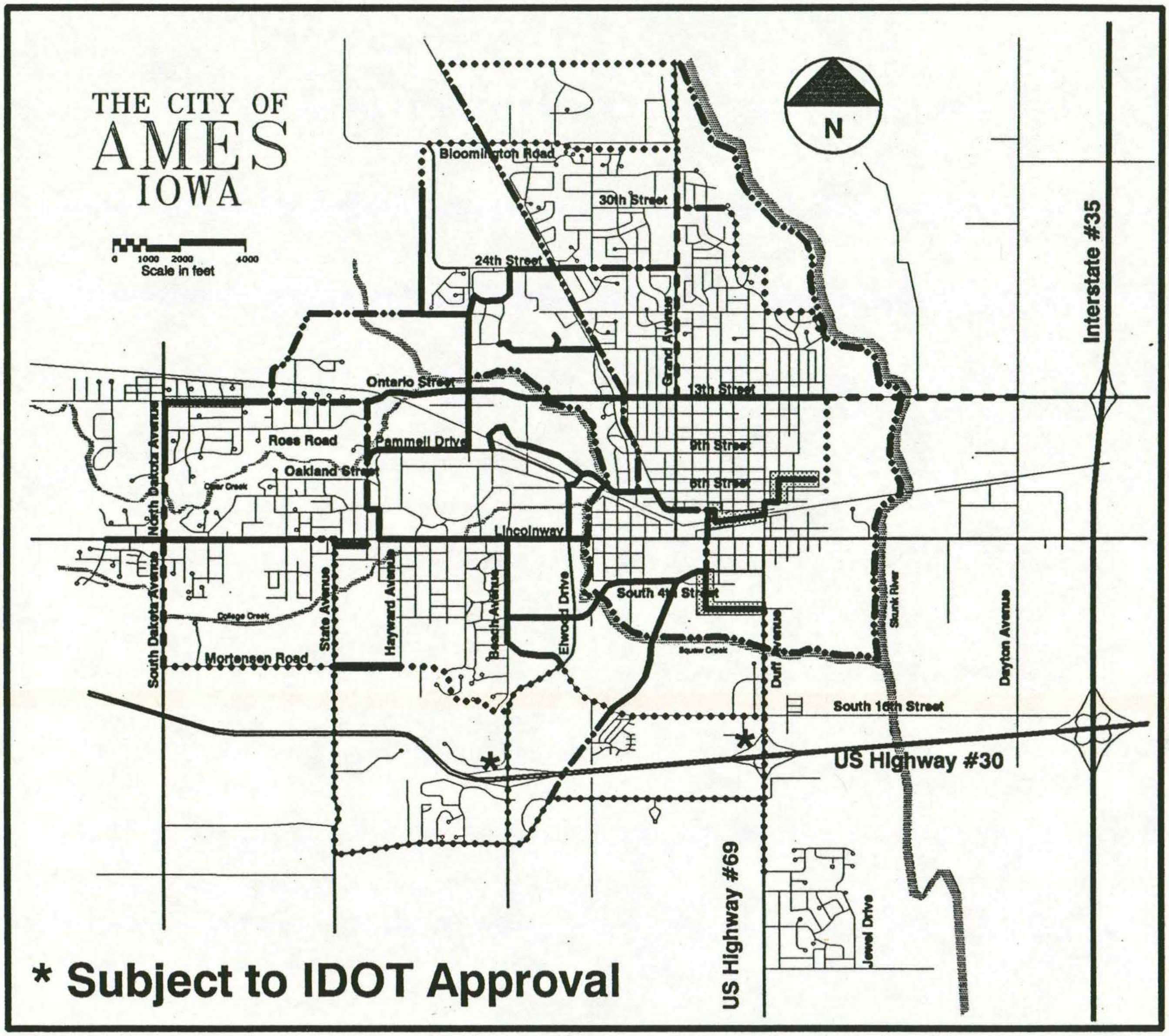
Crest Vertical Curves



Lateral Clearances

On Horizontal Curves

Bicycle Route Master Plan
Surface Material



Legend

- 5 inch Asphalt
- Composite
- Limestone
- Concrete (Sidewalk Extension)
- Existing
- Existing (On Road)

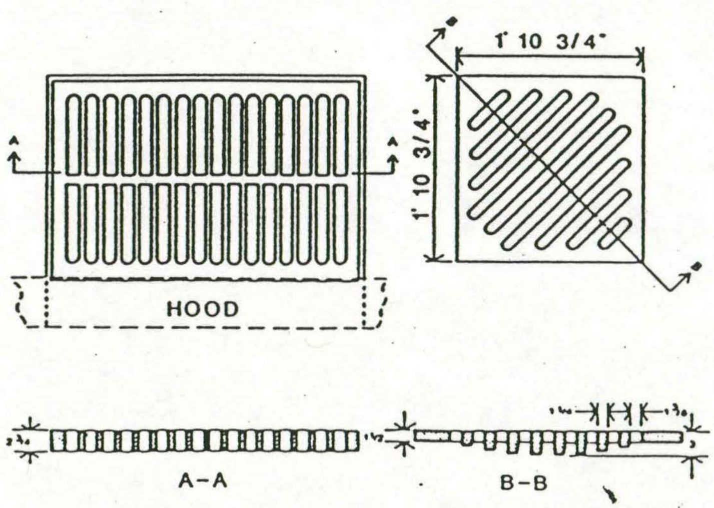
Intersections

Intersection are the most common location of bicyle/motor vehicle accidents. Therefore, intersection design may be especially effective in reducing bicycle/motor vehicle accidents. The design consideration at intersections are similar to those for motor vehicles. Basic right of way and channelization principles apply. Sight distance and reduced areas of potiential conflict are very important.

Drainage

A frequent safety problem facing the bicyclist is the drainage grate with longitudinal openings. The spacing between bars in these parallel bar grate inlets is often wide enough to trap the front wheel of a bicyle causing damage to the bicycle and/or injury to the bicylist. Any hazardous grate within the bike path system should be altered or replaced with a grate which bicycles can safely traverse. The replacement design should accept surface water and debris almost as efficiently as paralleled bar grates.

Drainage should be provided for all bike paths. Paths should be cross-sloped or crowned 0.02 feet to 0.03 feet per foot.



Typical Drainage Grade Specifications

At-Grade Railroad Crossing

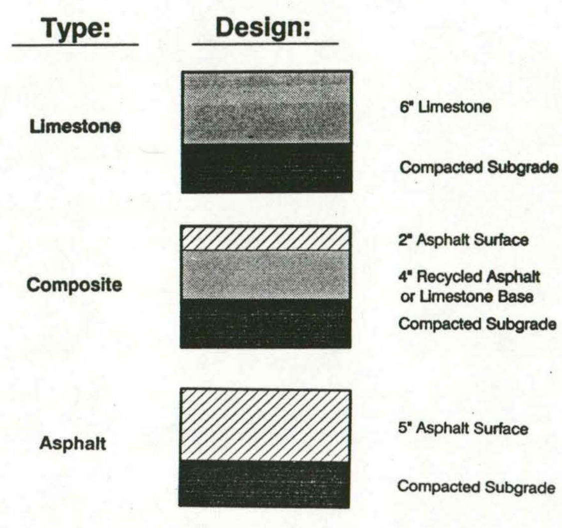
Whenever it is necessary to cross railroad tracks with a bike path, special care must be taken to assure that the safety of bicyclists is protected. The bike path crossing should be a least as wide as the approaches of the path. Whenever possible, the crossing should be straight, and at right angles to the rails. Pavement should be maintained, so ridge build-up does not occur next to the rails. Appropriate signs should be installed to warn bicyclist of the crossing and any dangers or hazards.

Surface

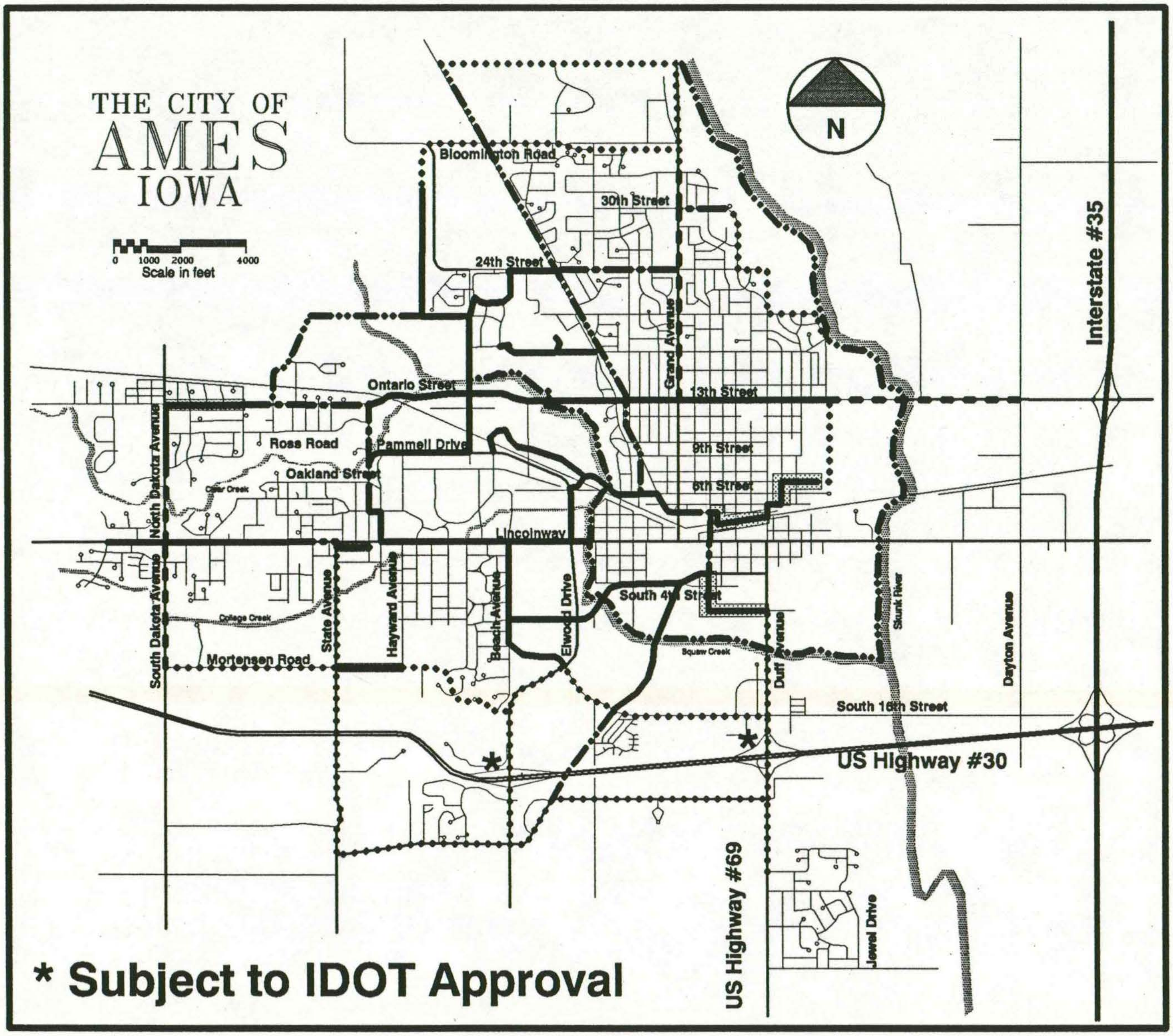
A smooth bicycle path surface is required for efficiency, comfort, and safety. Since bicycles have no suspension system, shocks are transmitted directly from the surface to the rider.

Several factors influence the pavement design. One of the factors is the multiple use of the bike path by maintenance vehicles, pedestrians and traversing traffic. If vehicles use the facility a thicker section is required: if pedestrians use the facility a portland cement concrete or bituminous surface is required. Bicycle path construction, in general, should conform to the design crosssection as shown below. For most applications, an optimum bituminous surface should be considered for high maintenance and high traffic areas. On intercity bicycle paths that don't require winter maintenance, a bituminous surface can be applied on top of limestone. Limestone surfaces can be used for paths generally identified as recreational or as surfaces for lightly travelled paths located by the outermost residential areas. The type of path surfaces designated for each route is illustrated on the next page.

Bicycle Route Surface Designs



Bicycle Route Master Plan
Surface Material



Legend

- 5 inch Asphalt
- Composite
- Limestone
- Concrete (Sidewalk Extension)
- Existing
- Existing (On Road)

Signs and Markings

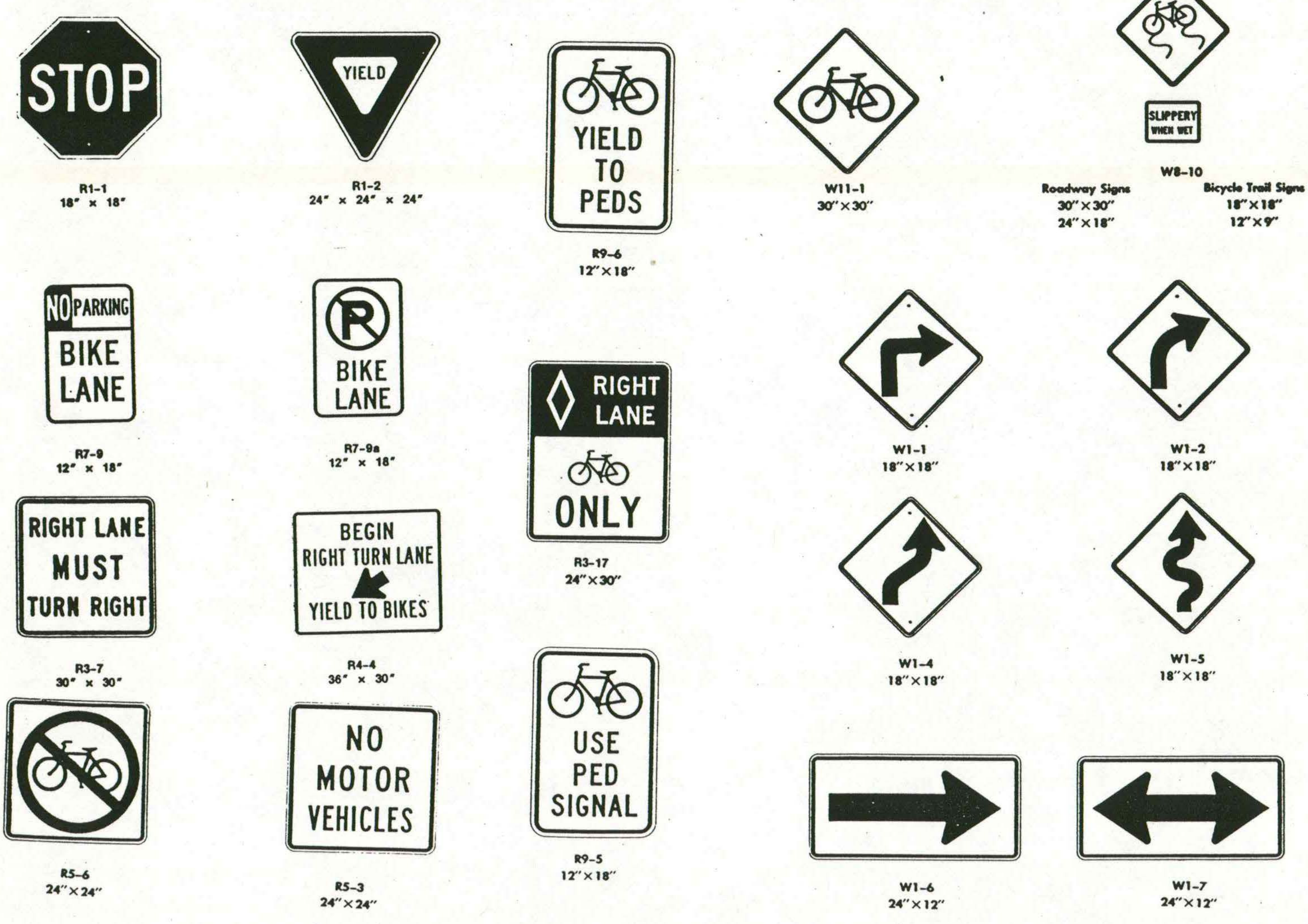
The Federal Department of Transportation's "Manual on Uniform Control Devices" (MUTCD) presents both standard and special applications of signs and markings to be used on bike paths. The principal emphasis is to alert bicyclists to potential hazards and to convey regulatory messages to both bicyclists and motorists at street intersections.

On all on-street bike paths, proper street markings should be placed to direct bicyclists and also alert motorists of the lane. These markings are illustrated in Chapter IX of the the MUTCD. Some of the common signs and markings are shown below and on the next page.

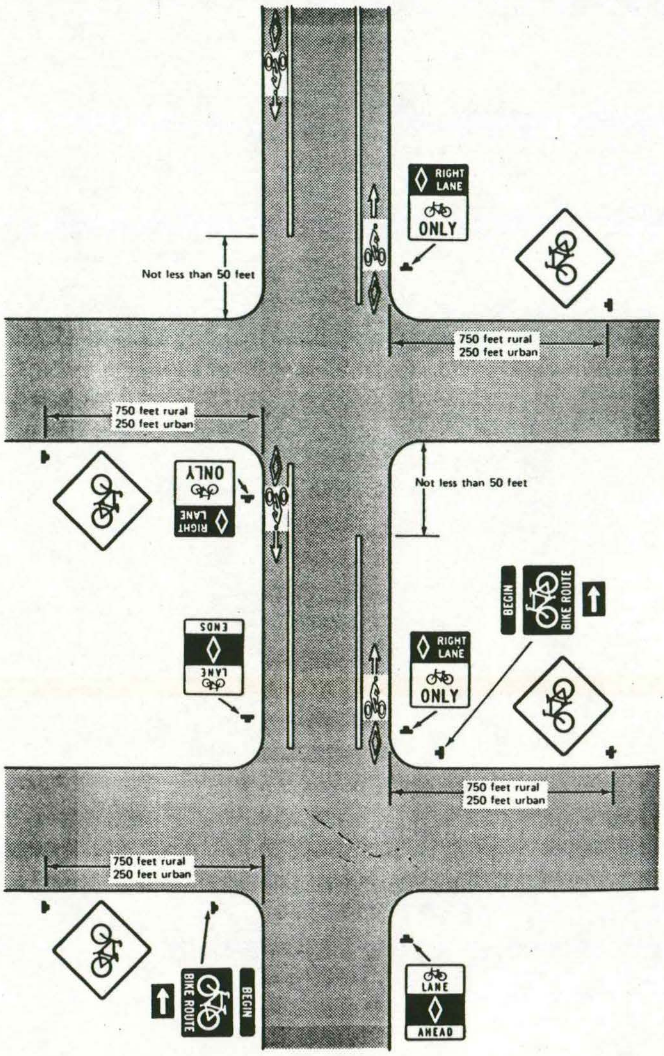
Bicycle Path Signage

Regulatory Signs

Warning Signs

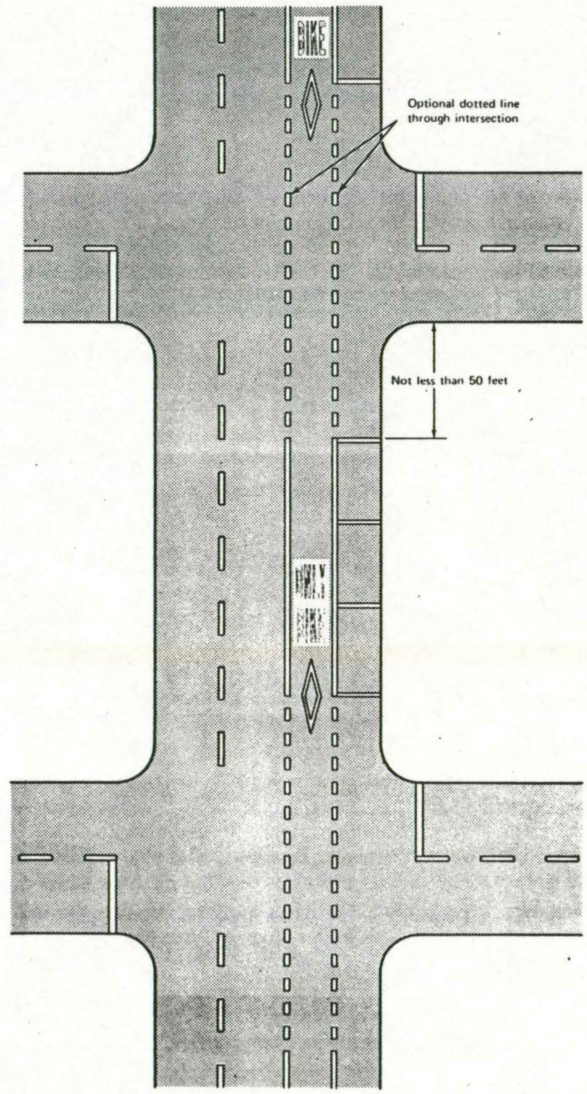


Bicycle Lane Marking

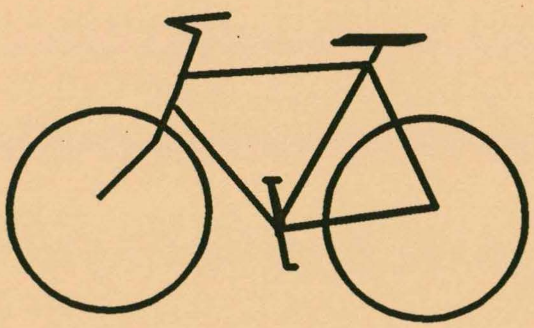


Typical Signing for

Beginning and Ending Routes



Typical Pavement Markings



Chapter Four
Implementation

City of Ames

Bicycle Route Master Plan

Planning & Housing Department
Public Works Department

Bikepath System Implementation Costs

This chapter discusses the cost and funding mechanisms for implementing and maintaining the bikepath network. There is a total of 52.8 miles of path included in this plan inwhich 11 miles are currently existing. This section contains bicycle path development costs, route phasing, summer and winter maintenance costs , and the available funding sources.

Implementation costs

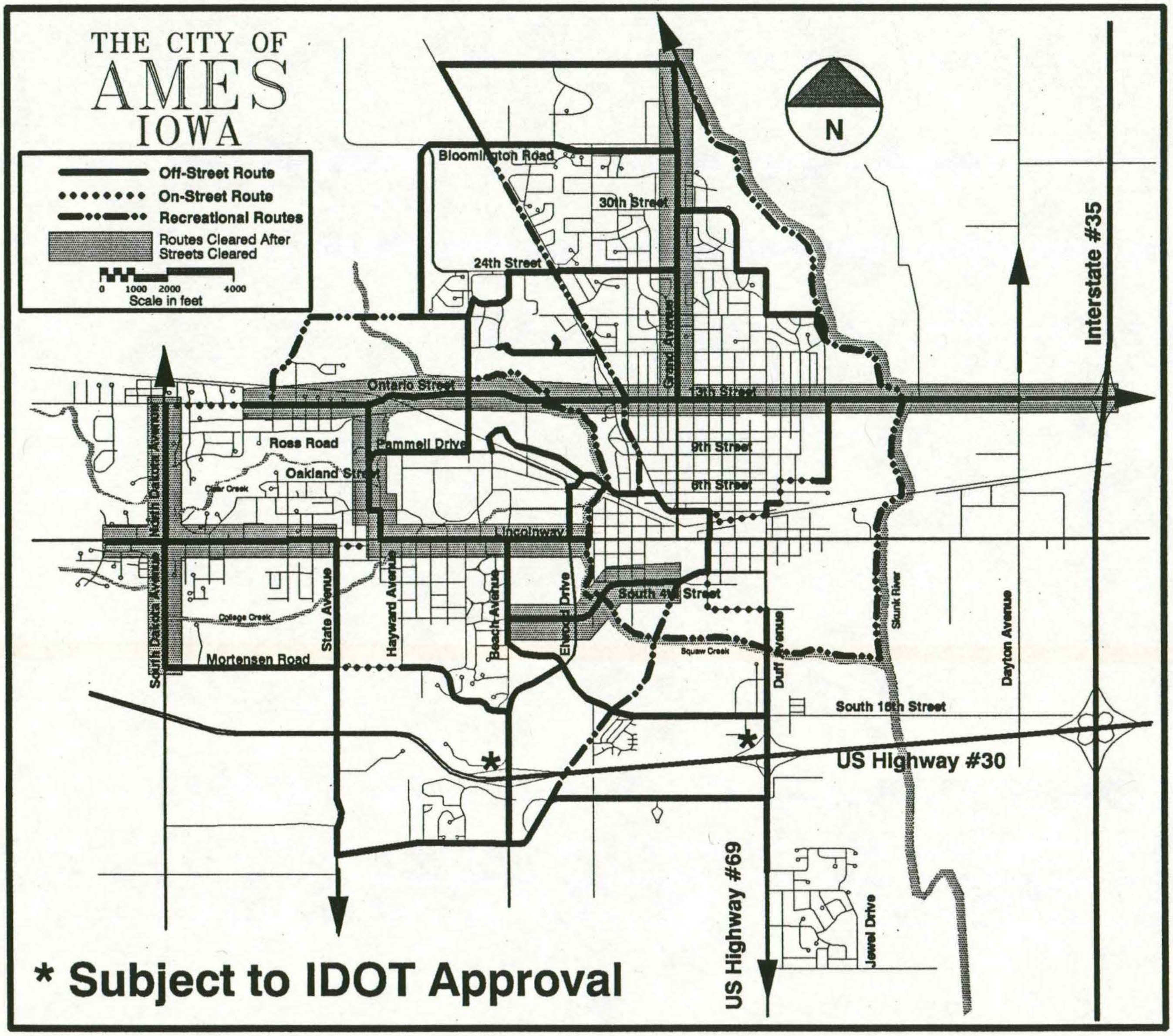
Bike path development costs vary according to the materials and labor necessary to construct the route. Each proposed route was surveyed for the number of utility relocations, curb removals, drive-way reconstructions, and other miscellanious work needed for placing a bicycle path. Cost estimates for the bike path were determined from this survey and by using estimated construction costs.

The primary cost of a bike path segment is for the path surface material. The different path's material cost vary significantly depending if it's asphalt, limestone, or concrete. There are three types of path surfaces proposed for routes in this plan including full-depth concrete/asphalt, composite limestone/asphalt, and full-depth asphalt surfaces. Each type will be used according to the type of maintenance and usage intended for the route. The bike paths that are required to be cleared of snow during the winter months will have a sturdy full depth asphalt or concrete surface. These paths must support heavy vehicles and stand up to continuous use. If a four (4) foot sidewalk is existing along the route, a four (4) feet concrete extension would be added to the sidewalks width. Recreational paths will not be opened during winter months and will have a full depth limestone surface. Other paths in the plan will have a combination limestone base and asphalt surface. Shown on the next page is the bike path segments which will be opened during winter months and have a full depth asphalt/concrete surface. The type of path construction planned for each route segment is shown on the next page. The below table shows the combined lengths of the undeveloped bicycle path surfaces and their associated costs.

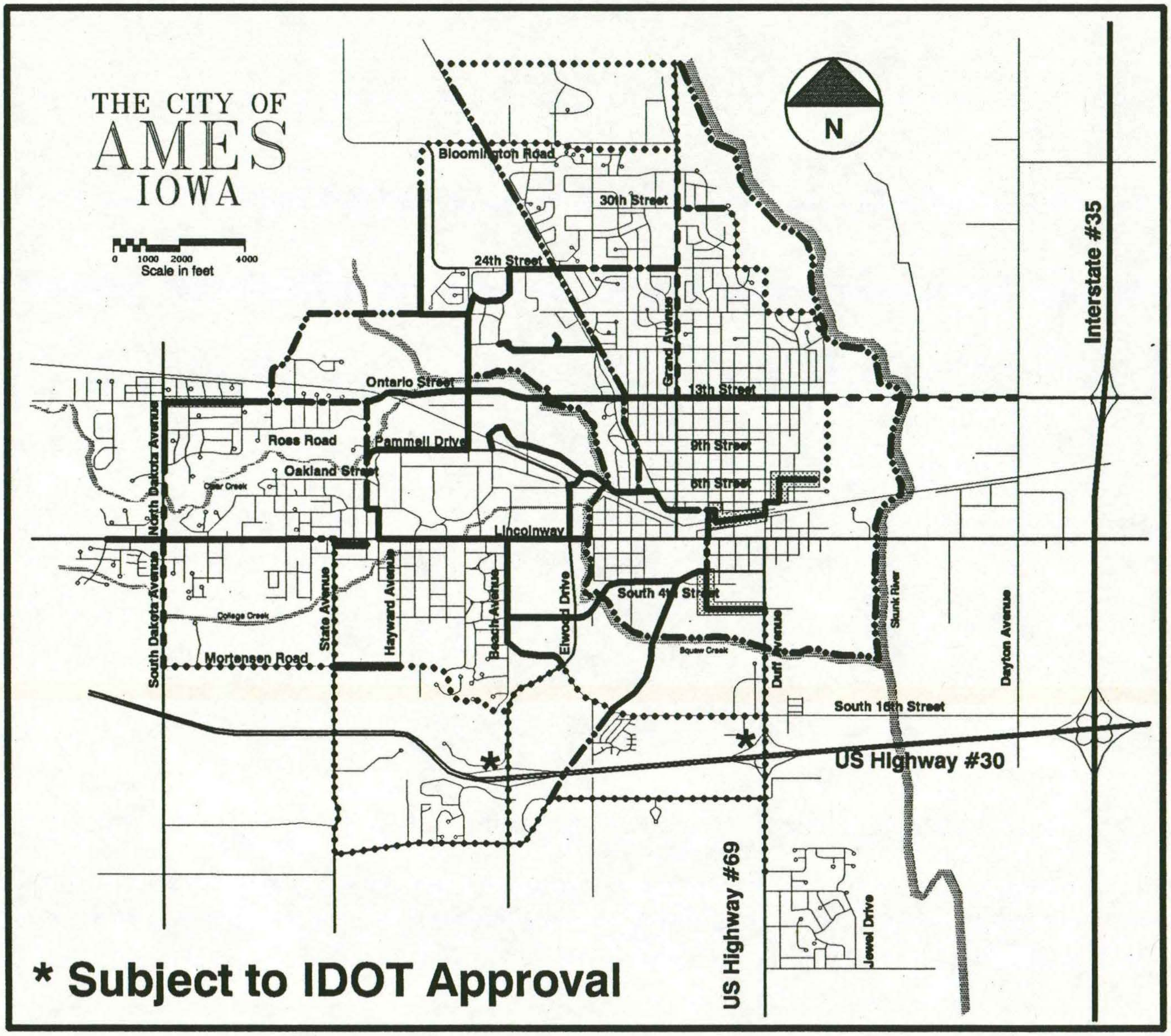
Type	Surface Material	Length	Cost
On-Street	Pavement Markings	2.3 Miles	$ 200/Mile
Off-Street	Sidewalk Extensions	4.7 Miles	$63,000/Mile
Off-Street	Full-Depth Asphalt	4.1 Miles	$55,000/Mile
Off-Street	Composite (Asphalt/Limestone)	16.1 Miles	$35,000/Mile
Off-Street	Full Depth Limestone	14.6 Miles	$20,000/Mile

Bicycle Route Master Plan

Snow and Ice Removal



Bicycle Route Master Plan
Surface Material



Legend

- 5 inch Asphalt
- Composite
- Limestone
- Concrete (Sidewalk Extension)
- Existing
- Existing (On Road)

Other costs used in estimating bike path construction are listed below.

Bicycle Path Cost Estimates

Items	Unit Costs
Paving - Asphalt (full-depth)	$1.05/lin.ft./ft.width
Paving - Concrete	$3.00/lin.ft./ft.width
Paving - Limestone/Asphalt	$0.53/lin.ft./ft.width
Paving - Limestone	$0.17/lin.ft./ft.width
Tree Removal	$40/trunk dia.(in)
Driveway Reconstruction	$3.00/lin.ft./ft.width
Sidewalk Ramp/Curb Cut	$750 ea.
Retaining Walls	$50/lin.ft
Grading	$0.30/lin.ft./ft.width
Street Markings	$0.40/lin.ft
Utility Relocations	$1,000 ea.
Underpasses	$200,000 ea.

The estimate for each bike path segment is included in the table shown on the next two pages. Each segment has an itemized estimate of relocation, paint, grading, land, and paving costs.

BICYCLE PATH COST ESTIMATE DATABASE
CITY OF AMES TRAFFIC DEPARTMENT
OCTOBER 1990

Phs	Sgmt	Street Name	From/To	Path Width (FT)	Side	Const. Length (FT)	Type	Surface	ROW Costs	Paint Costs	Relocation Costs	Grading Costs	Paving Costs	Total Costs
1	1	Hyland	West/Oakland	7	West	940	Off	PCC		$0	$4,198	$846	$8,460	$13,504
1	2	Hyland	Oakland/Ross	7	West	1865	Off	PCC		$0	$0	$1,679	$16,785	$18,464
1	3	Lincolnway	Franklin/State	6	South	1430	Off	PCC		$0	$10,000	$858	$8,580	$19,438
1	4	Wood	Hyland/State	8		920	On			$37	$0	$0	$0	$37
1	5	North Dakota	Westbend/Lincolnway	8	East	590	Off	ACC		$0	$96	$1,416	$4,956	$6,468
1	6	Walnut	Lincolnway/S. 3rd	8	West	760	Off	PCC		$0	$7,250	$912	$9,120	$17,282
1	6	Clark	RR Track/Lincolnway	6	West	200	Off	PCC		$0	$3,500	$120	$1,200	$4,820
1	6	Clark	Depot Parking Lot/Past RR T	7	West	290	Off	PCC		$0	$2,900	$87	$870	$3,857
1	7	Ontario	Hyland/Garfield	8	South	3855	Off	PCC		$0	$14,820	$4,626	$46,260	$65,706
1	8	Ontario	Garfield/North Dakota	8	South	2415	On			$97	$0	$0	$0	$97
1	9	RR Tracks	6th/9th	8	West	1300	Off	Limestone	$4,200	$0	$0	$3,120	$1,768	$9,088
1	10	RR Tracks	13th/9th	8	West	1750	Off	Limestone	$5,600	$0	$0	$4,200	$2,380	$12,180
1	11	RR Tracks	16th/13th	8	East	1550	Off	Limestone	$5,000	$0	$2,000	$3,720	$2,108	$12,828
1	12	RR Tracks	20th/16th	8	West	1600	Off	Limestone	$5,200	$0	$0	$3,840	$2,176	$11,216
1	12	RR Tracks	24th/20th	8	West	1750	Off	Limestone	$5,600	$0	$4,800	$4,200	$2,380	$16,980
2	13	24th Street	E of Prairie View/W of Prai	8	South	365	Off	PCC		$0	$2,000	$438	$4,380	$6,818
2	13	24th Street	Hayes/Grand	7	South	3342	Off	PCC		$0	$13,554	$3,008	$30,078	$46,640
2	14	Grand	24th/20th	8	West	1290	Off	ACC		$0	$750	$3,096	$10,836	$14,682
2	14	Grand	20th/Murray	8	West	1000	Off	ACC		$0	$3,560	$2,400	$8,400	$14,360
2	14	Grand	Murray/16th	7	West	300	Off	PCC		$0	$3,500	$270	$2,700	$6,470
2	14	Grand	16th/13th	6	West	1340	Off	PCC		$0	$3,680	$1,005	$10,050	$14,735
2	15	13th Street	Grand/Northwestern	7	South	1260	Off	PCC		$0	$750	$1,134	$11,340	$13,224
2	15	13th Street	Northwestern/ISU W of Ridge	7	South	905	Off	PCC		$0	$5,096	$815	$8,145	$14,056
2	16	Grand	30th/24th	8	West	2715	Off	ACC		$0	$6,728	$6,516	$22,806	$36,050
2	17	S. 16th Stree	Elwood/Old RR Tracks	8	North	1980	Off	Limestone		$0	$0	$4,752	$2,693	$7,445
2	17	Elwood	Mortensen/South 16th	8	West	1920	Off	Composite		$0	$3,000	$4,608	$8,141	$15,749
2	17	Mortensen	240′ E of Ash/Elwood	8	South	2465	Off	Composite		$0	$2,500	$5,916	$10,452	$18,868
2	17	Mortensen	Ash/240′ East	8	South	240	Off	Composite		$0	$0	$216	$382	$598
2	17	Mortensen	Gateway/Ash	8	South	690	Off	Composite		$0	$2,250	$1,656	$2,926	$6,832
2	17	Mortensen	ISU Property/Gateway	7	South	225	Off	Composite		$0	$2,750	$473	$835	$4,057
2	17	Mortensen	Hayward/ISU Property	8	South	350	On			$14	$0	$0	$0	$14
2	17	Mortensen	State/Hayward	8	South	1900	On			$76	$0	$0	$0	$76
2	18	State	Mortensen/Arbor	8	East	3250	Off	Composite		$0	$0	$7,800	$13,780	$21,580
2	18	State	Lincolnway/Arbor	8	East	615	Off	Composite		$0	$3,750	$738	$1,304	$5,792
2	19	13th Street	Grand/Duff	6	North	2425	Off	PCC		$0	$19,000	$1,455	$14,550	$35,005
2	19	13th Street	Duff/Carroll	7	North	420	Off	PCC		$0	$2,500	$378	$3,780	$6,658
2	19	13th Street	Carroll/Meadowlane	7	North	1275	Off	PCC		$0	$10,250	$1,148	$11,475	$22,873
2	20	Parking Lot	Clark/Duff	8		1615	On			$65	$0	$0	$0	$65
2	20	Duff	Parking Lot/5th	8	East	290	Off	PCC		$0	$0	$348	$3,480	$3,828
2	20	5th Street	Duff/Carroll	8	North	370	Off	PCC		$0	$0	$444	$4,440	$4,884
2	20	Carroll	5th/7th	8	East	585	On			$23	$0	$0	$0	$23
2	20	7th Street	Carroll/Cemetary	8	South	775	On			$31	$0	$0	$0	$31
2	20	Cemetary	13th/7th	8		3100	Off	Composite		$0	$0	$7,440	$13,144	$20,584
2	21	13th Street	Meadowlane/Skunk River	8	North	2430	Off	ACC		$0	$0	$5,832	$20,412	$26,244
2	22	Skunk River	13th/Meadowlane	8	West	3960	Off	Limestone		$0	$0	$9,504	$5,386	$14,890
2	23	Meadowlane	730′ N of Park/Park Entranc	8	East	730	Off	Composite		$0	$1,200	$1,752	$3,095	$6,047

BICYCLE PATH COST ESTIMATE DATABASE
CITY OF AMES TRAFFIC DEPARTMENT
OCTOBER 1990

Phs	Sgmt	Street Name	From/To	Path Width (FT)	Side	Const. Length (FT)	Type	Surface	ROW Costs	Paint Costs	Relocation Costs	Grading Costs	Paving Costs	Total Costs
2	23	Meadowlane	730' N of Park/20th	8	East	490	Off	PCC		$0	$0	$588	$5,880	$6,468
2	23	20th Street	Meadowlane/Duff	8	North	1570	Off	Composite		$0	$0	$3,768	$6,657	$10,425
2	24	Duff	20th/Homewood Golf Course	8	North	680	Off	Composite		$0	$0	$1,632	$2,883	$4,515
2	24	Golf Course	Duff Curve/24th	8	East	1580	Off	Composite		$0	$0	$3,792	$6,699	$10,491
2	24	24th Street	Park/Duff	8	North	700	Off	Composite		$0	$0	$1,680	$2,968	$4,648
2	24	Duff	24th/30th	8	East	1790	Off	Composite		$0	$0	$4,296	$7,590	$11,886
2	24	Duff	E of Briggs Circle/Grand	8	North	1535	Off	PCC		$0	$6,000	$1,842	$18,420	$26,262
2	25	RR Tracks	Bloomington/24th	8	West	4470	Off	Limestone	$14,400	$0	$0	$10,728	$6,079	$31,207
2	26	Bloomington	End of Gravel/East of Eisen	8	South	890	On			$36	$0	$0	$0	$36
2	26	Bloomington	East of Eisenhower/Hoover	8	South	1685	On			$67	$0	$0	$0	$67
2	26	Bloomington	Hoover/Grand	8	South	2540	Off	Composite		$0	$750	$6,096	$10,770	$17,616
2	26	Grand	Bloomington/Wheeler	8	West	680	Off	ACC		$0	$0	$1,632	$5,712	$7,344
3	27	Walnut	250' South of S. 3rd/South	8	West	495	Off	PCC		$0	$2,250	$594	$5,940	$8,784
3	27	Walnut	South 4th/N of S. 5th	8	West	425	Off	PCC		$0	$2,230	$1,020	$10,200	$13,450
3	27	S. 5th Street	Walnut/1250' E to 100' W of	8	South	1250	On			$50	$0	$0	$0	$50
3	27	S. 5th Street	1250' E of Walnut/Duff	8	South	490	Off	Composite		$0	$750	$1,176	$2,078	$4,004
3	28	Bloomington	County R-50/End of Gravel	8	South	3030	Off	Composite		$0	$0	$7,272	$12,847	$20,119
3	29	South Dakota	Mortensen/Lincolnway	8	West	3830	Off	ACC		$0	$0	$9,192	$32,172	$41,364
3	30	Mortensen	South Dakota/State	8	South	5300	Off	Composite		$0	$0	$12,720	$22,472	$35,192
3	31	County R-50	Northridge Development/Bloo	8	West	2950	Off	Composite		$0	$0	$7,080	$12,508	$19,588
3	32	RR Tracks	South 16th/Airport Road	8	West	3300	Off	Limestone		$0	$0	$7,920	$4,488	$12,408
3	33	S. 16th Stree	Old RR Tracks/Duff	8	North	5120	Off	Composite		$0	$0	$12,288	$21,709	$33,997
3	34	Airport Road	Duff/Old RR Tracks	8	South	8965	Off	Composite		$0	$0	$21,516	$38,012	$59,528
3	35	Duff	Airport Road/Crystal	8	West	2100	Off	Composite		$0	$0	$5,040	$8,904	$13,944
3	36	Duff	South 16th/South 5th	8	East	3265	Off	Composite		$0	$0	$7,836	$13,844	$21,680
3	37	Airport Road	Old RR Tracks/State	8	South	11465	Off	Composite		$0	$0	$27,516	$48,612	$76,128
3	38	State	Airport Road/Mortensen	8	East	9865	Off	Composite		$0	$0	$23,676	$41,828	$65,504
3	39	13th Street	Skunk River/Dayton	8	North	5965	Off	ACC		$0	$4,500	$14,316	$50,106	$68,922
3	40	Squaw Creek	Stange/6th	8	North	8250	Off	Limestone		$0	$0	$19,800	$11,220	$31,020
3	41	Squaw Creek	6th/S. 4th	8	East	4100	Off	Limestone		$0	$0	$9,840	$5,576	$15,416
3	42	Squaw Creek	S. 4th/Duff	8	North	10000	Off	Limestone		$0	$0	$24,000	$13,600	$37,600
3	43	Squaw Creek	Duff/Skunk River	8	North	4100	Off	Limestone		$0	$0	$9,840	$5,576	$15,416
3	44	Skunk River	Squaw Creek/Lincolnway	8	West	4100	Off	Limestone		$0	$0	$9,840	$5,576	$15,416
3	45	Skunk River	Lincolnway/13th	8	West	4950	Off	Limestone		$0	$0	$11,880	$6,732	$18,612
3	46	Skunk River	Meadowlane/City Limits	8	West	11550	Off	Limestone		$0	$0	$27,720	$15,708	$43,428
3	47	RR Tracks	Bloomington/City Limits	8	West	3500	Off	Limestone		$0	$0	$8,400	$4,760	$13,160
3	48	Quarry Pits	RR Tracks/Grand	8	North	5000	Off	Composite		$0	$0	$12,000	$21,200	$33,200
3	49	Grand	Bloomington/City Limits	8	West	3000	Off	ACC		$0	$0	$7,200	$25,200	$32,400
3	50	Scholl	Ontario/Pinehurst	8	West	5000	Off	Limestone		$0	$0	$12,000	$6,800	$18,800
3	51	Elwood	Mortensen/Airport	8	West	3500	Off	Composite		$0	$0	$8,400	$14,840	$200,000
3	52	Duff	S. 16th/Airport	8	West	2000	Off	Composite		$0	$0	$4,800	$8,480	$200,000
TOTALS						220817			$40,000	$495	$152,862	$463,700	$880,694	$1,901,232

Bicycle Path Phasing

Staff planned the biçycle routes construction in three phases. The bicycle routes were selected in each phase according to the path's potential use, functionablity, connectivity, and cost. The Master Plan has included all the paths in three phasing schemes for general purposes. These routes in each phases have the following purpose.

Phase One

Routes in the first phase were selected because of their connectivity to the existing off-street system. These routes are generally located in the Iowa State University and densely populated areas where demand for bicycle paths are the highest. The routes segments located on the outer boundries lead to residential areas were work trips can be accommodated to the university area and business districts.

Phase Two

The routes in the second phase encompass most of the central residential areas in the city. These routes connect to the preceding phased and existing routes and provide access to a wide city area. The routes in Phase Two serve all local school trips and lead to most city parks.

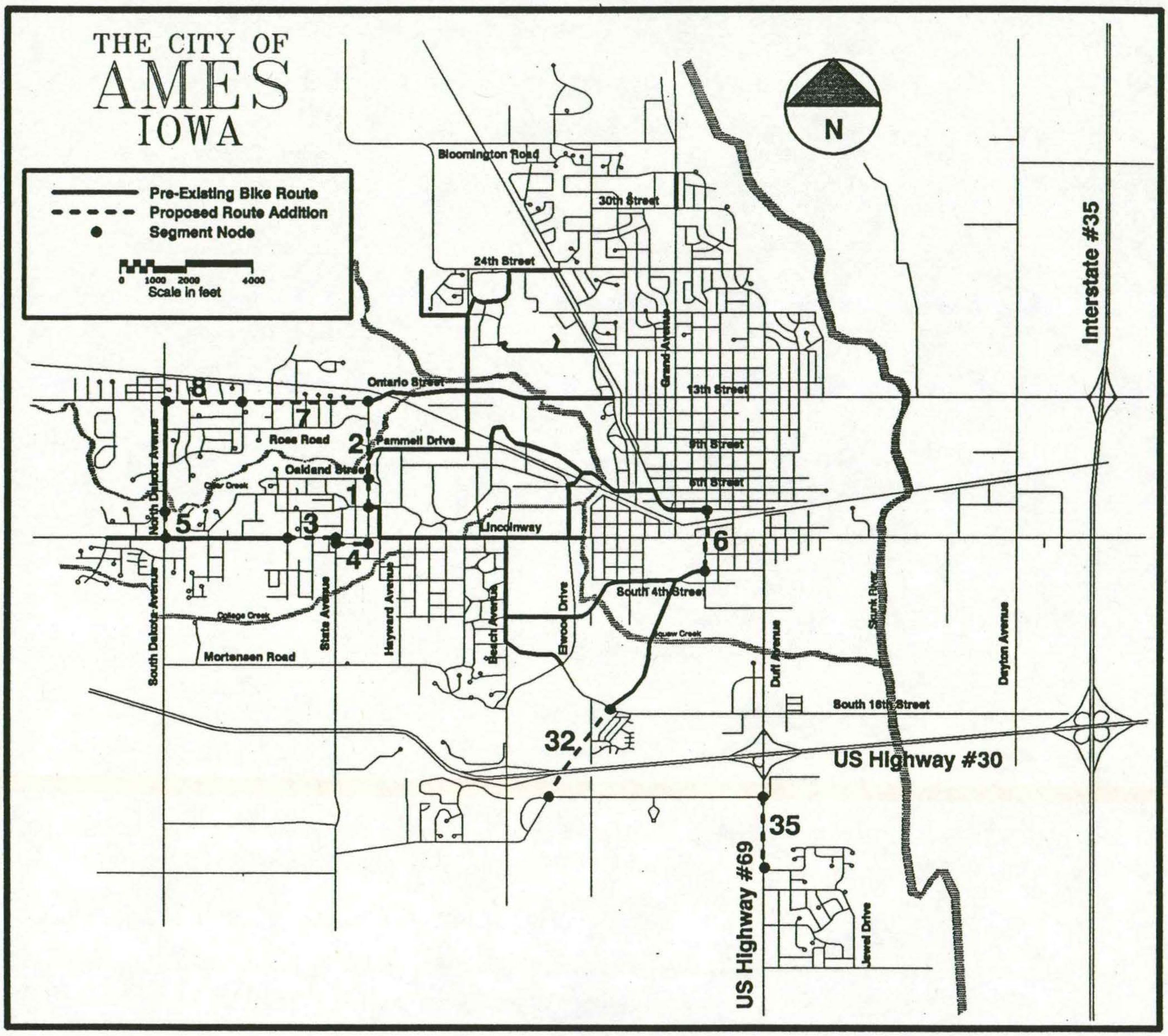
Phase Three

These routes are predominantly recreational paths which connect to county path systems. All outlying residential areas are served by these routes which extend to future developement sites.

In the following report each phase and new bicycle routes are shown. Cost estimates for each route segment in the phase are provided. List are the cost estimates for the three phases and the total cost.

Phase One	- $176,000
Phase Two	- $520,100
Phase Three	-$1,205,200
Total Cost	-$1,901,200

Bicycle Route Phasing Plan

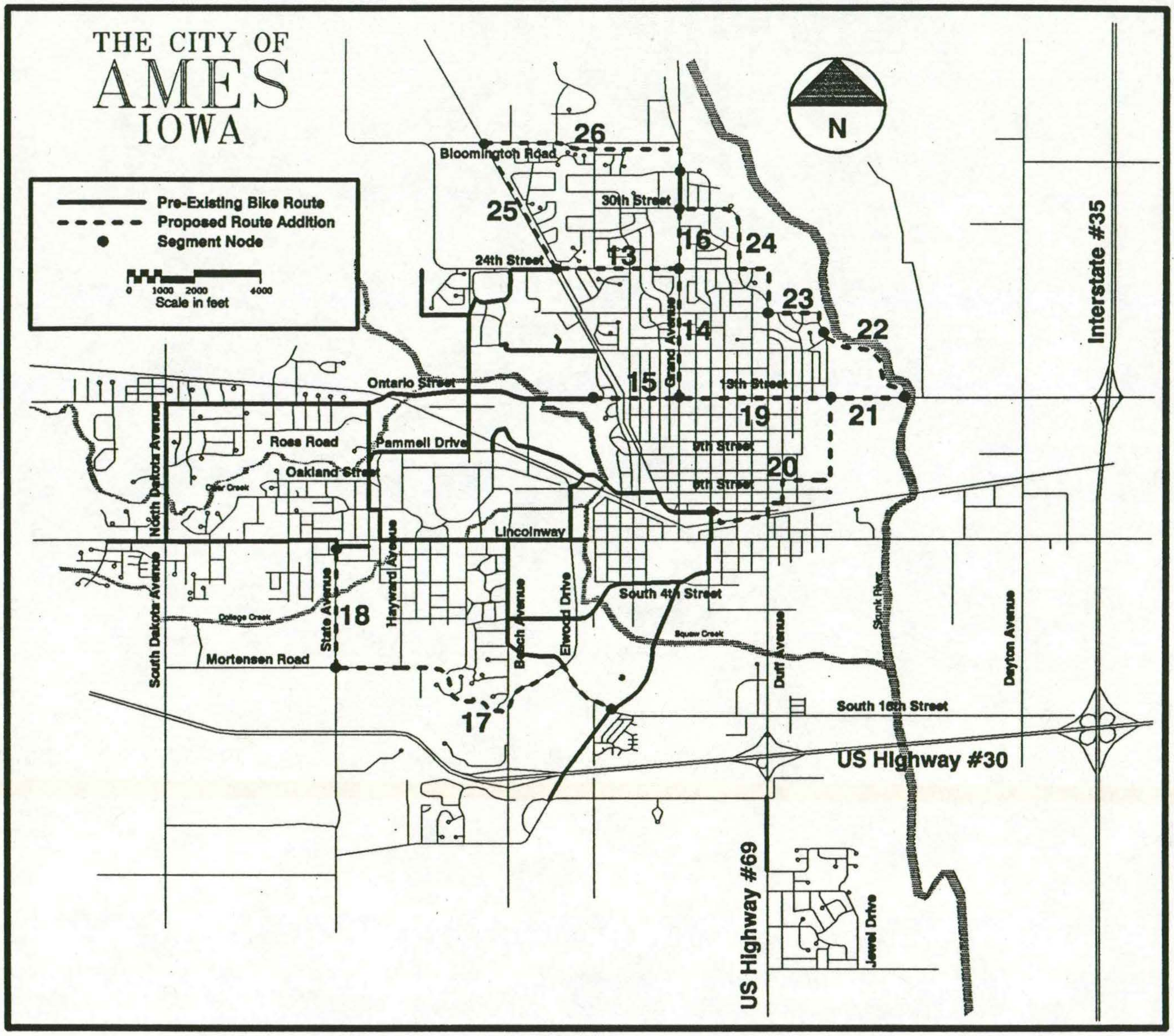


Phase 1

ESTIMATED PHASE 1 SEGMENT COSTS
NOVEMBER 1990

Segment	Street Name	From/To	Side	Const. Length (ft)	Type	Surface	Path Width (ft)	Total Costs	Segment Costs
1	Hyland	West/Oakland	West	940	Off	PCC	7	$13,504	$13,504
2	Hyland	Oakland/Ross	West	1865	Off	PCC	7	$18,464	$18,464
3	Lincolnway	Franklin/State	South	1430	Off	PCC	6	$19,438	$19,438
4	Wood	Hyland/State		920	On		8	$37	$37
5	North Dakota	Westbend/Lincolnway	East	590	Off	ACC	8	$6,468	$6,468
6	Walnut Clark Clark	Lincolnway/S. 3rd RR Track/Lincolnway Depot Parking Lot/Past RR Tracks	West West West	760 200 290	Off Off Off	PCC PCC PCC	8 6 7	$17,282 $4,820 $3,857	$25,959
7	Ontario	Hyland/Garfield	South	3855	Off	PCC	8	$65,706	$65,706
8	Ontario	Garfield/North Dakota	South	2415	On		8	$97	$97
32	RR Tracks	South 16th/Airport Road	West	3300	Off	Limestone	8	$12,408	$12,408
35	Duff	Airport Road/Crystal	West	2100	Off	Composite	8	$13,944	$13,944
						Phase 1 Total Cost			$176,024

Bicycle Route Phasing Plan

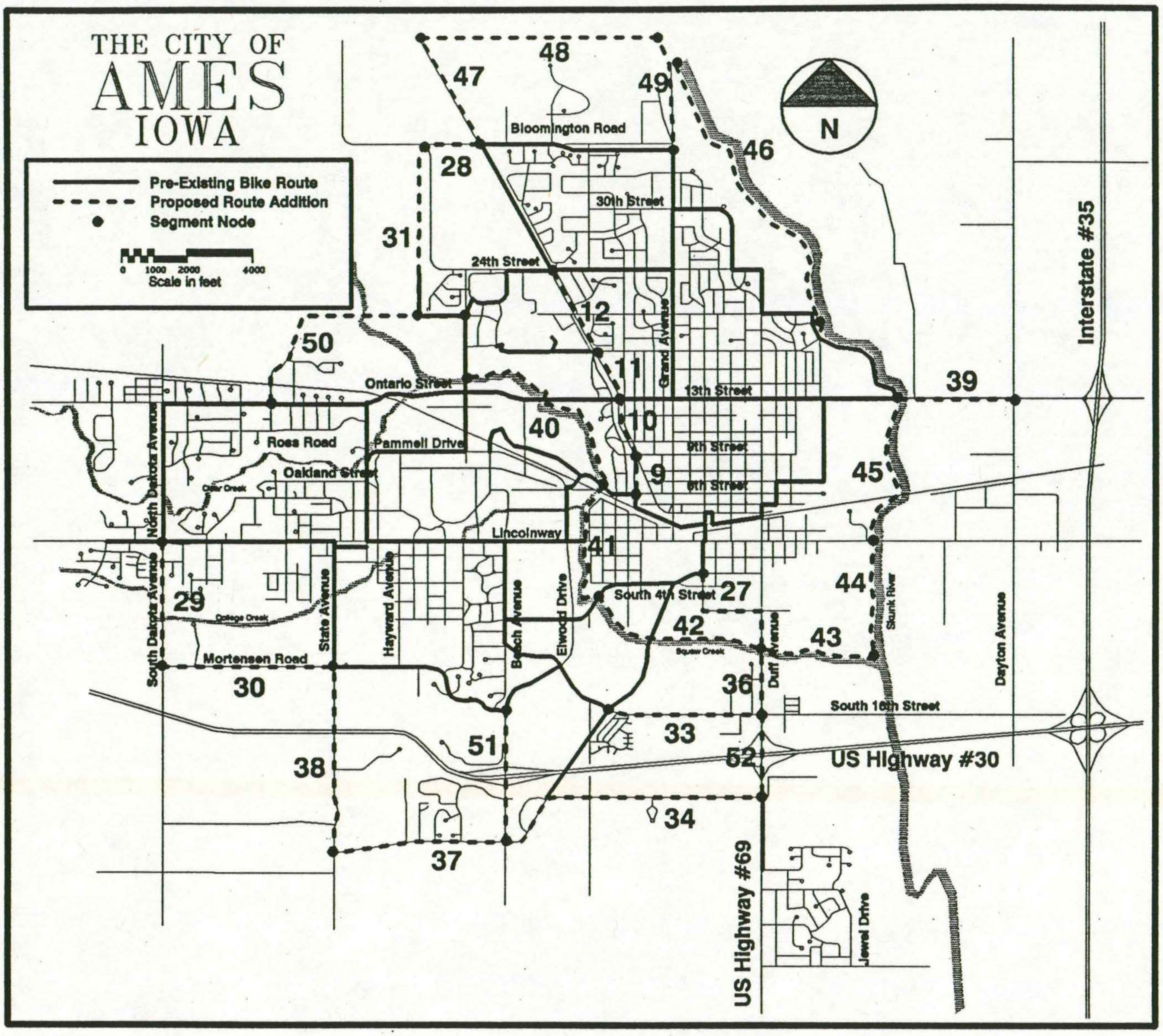


Phase 2

ESTIMATED PHASE 2 SEGMENT COSTS
NOVEMBER 1990

Segment	Street Name	From/To	Side	Const. Length (ft)	Type	Surface	Path Width (ft)	Total Costs	Segment Costs
13	24th Street	E of Prairie View/W of Prairie V	South	365	Off	PCC	8	$6,818	
	24th Street	Hayes/Grand	South	3342	Off	PCC	7	$46,640	$53,458
14	Grand	24th/20th	West	1290	Off	ACC	8	$14,682	
	Grand	20th/Murray	West	1000	Off	ACC	8	$14,360	
	Grand	Murray/16th	West	300	Off	PCC	7	$6,470	
	Grand	16th/13th	West	1340	Off	PCC	6	$14,735	$50,247
15	13th Street	. Grand/Northwestern	South	1260	Off	PCC	7	$13,224	
	13th Street	Northwestern/ISU W of Ridgewood	South	905	Off	PCC	7	$14,056	$27,280
16	Grand	30th/24th	West	2715	Off	ACC	8	$36,050	$36,050
17	S. 16th Street	Elwood/Old RR Tracks	North	1980	Off	Limestone	8	$7,445	
	Elwood	Mortensen/South 16th	West	1920	Off	Composite	8	$15,749	
	Mortensen	240' E of Ash/Elwood	South	2465	Off	Composite	8	$18,868	
	Mortensen	Ash/240' East	South	240	Off	Composite	8	$598	
	Mortensen	Gateway/Ash	South	690	Off	Composite	8	$6,832	
	Mortensen	ISU Property/Gateway	South	225	Off	Composite	7	$4,057	
	Mortensen	Hayward/ISU Property	South	350	On		8	$14	
	Mortensen	State/Hayward	South	1900	On		8	$76	$53,638
18	State	Mortensen/Arbor	East	3250	Off	Composite	8	$21,580	
	State	Lincolnway/Arbor	East	615	Off	Composite	8	$5,792	$27,372
19	13th Street	Grand/Duff	North	2425	Off	PCC	6	$35,005	
	13th Street	Duff/Carroll	North	420	Off	PCC	7	$6,658	
	13th Street	Carroll/Meadowlane	North	1275	Off	PCC	7	$22,873	$64,536
20	Parking Lot	Clark/Duff		1615	On		8	$65	
	Duff	Parking Lot/5th	East	290	Off	PCC	8	$3,828	
	5th Street	Duff/Carroll	North	370	Off	PCC	8	$4,884	
	Carroll	5th/7th	East	585	On		8	$23	
	7th Street	Carroll/Cemetary	South	775	On		8	$31	
	Cemetary	13th/7th		3100	Off	Composite	8	$20,584	$29,415
21	13th Street	Meadowlane/Skunk River	North	2430	Off	ACC	8	$26,244	$26,244
22	Skunk River	13th/Meadowlane	West	3960	Off	Limestone	8	$14,890	$14,890
23	Meadowlane	730' N of Park/Park Entrance	East	730	Off	Composite	8	$6,047	
	Meadowlane	730' N of Park/20th	East	490	Off	PCC	8	$6,468	
	20th Street	Meadowlane/Duff	North	1570	Off	Composite	8	$10,425	$22,940
24	Duff	20th/Homewood Golf Course	North	680	Off	Composite	8	$4,515	
	Golf Course	Duff Curve/24th	East	1580	Off	Composite	8	$10,491	
	24th Street	Park/Duff	North	700	Off	Composite	8	$4,648	
	Duff	24th/30th	East	1790	Off	Composite	8	$11,886	
	Duff	E of Briggs Circle/Grand	North	1535	Off	PCC	8	$26,262	$57,802
25	RR Tracks	Bloomington/24th	West	4470	Off	Limestone	8	$31,207	$31,207
26	Bloomington	End of Gravel/East of Eisenhower	South	890	On		8	$36	
	Bloomington	East of Eisenhower/Hoover	South	1685	On		8	$67	
	Bloomington	Hoover/Grand	South	2540	Off	Composite	8	$17,616	
	Grand	Bloomington/Wheeler	West	680	Off	ACC	8	$7,344	$25,063
						Phase 2 Total Cost			$520,140

Bicycle Route Phasing Plan



Phase 3

ESTIMATED PHASE 3 SEGMENT COSTS
NOVEMBER 1990

Segment	Street Name	From/To	Side	Const. Length (ft)	Type	Surface	Path Width (ft)	Total Costs	Segment Costs
9	RR Tracks	6th/9th	West	1300	Off	Limestone	8	$9,088	$9,088
10	RR Tracks	13th/9th	West	1750	Off	Limestone	8	$12,180	$12,180
11	RR Tracks	16th/13th	East	1550	Off	Limestone	8	$12,828	$12,828
12	RR Tracks	20th/16th	West	1600	Off	Limestone	8	$11,216	
	RR Tracks	24th/20th	West	1750	Off	Limestone	8	$16,980	$28,196
27	Walnut	250' South of S. 3rd/South 4th	West	495	Off	PCC	8	$8,784	
	Walnut	South 4th/N of S. 5th	West	425	Off	PCC	8	$13,450	
	S. 5th Street	Walnut/1250' E to 100' W of Thea	South	1250	On		8	$50	
	S. 5th Street	1250' E of Walnut/Duff	South	490	Off	Composite	8	$4,004	$26,288
28	Bloomington	County R-50/End of Gravel	South	3030	Off	Composite	8	$20,119	$20,119
29	South Dakota	Mortensen/Lincolnway	West	3830	Off	ACC	8	$41,364	$41,364
30	Mortensen	South Dakota/State	South	5300	Off	Composite	8	$35,192	$35,192
31	County R-50	Northridge Development/Bloomingt	West	2950	Off	Composite	8	$19,588	$19,588
33	S. 16th Street	Old RR Tracks/Duff	North	5120	Off	Composite	8	$33,997	$33,997
34	Airport Road	Duff/Old RR Tracks	South	8965	Off	Composite	8	$59,528	$59,528
36	Duff	South 16th/South 5th	East	3265	Off	Composite	8	$21,680	
	Duff	S. 16th/Airport	West	2000	Off	Composite	8	$200,000	
	Elwood	Mortensen/Airport	West	3500	Off	Composite	8	$200,000	$421,680
37	Airport Road	Old RR Tracks/State	South	11465	Off	Composite	8	$76,128	$76,128
38	State	Airport Road/Mortensen	East	9865	Off	Composite	8	$65,504	$65,504
39	13th Street	Skunk River/Dayton	North	5965	Off	ACC	8	$68,922	$68,922
40	Squaw Creek	Stange/6th	North	8250	Off	Limestone	8	$31,020	$31,020
41	Squaw Creek	6th/S. 4th	East	4100	Off	Limestone	8	$15,416	$15,416
42	Squaw Creek	S. 4th/Duff	North	10000	Off	Limestone	8	$37,600	$37,600
43	Squaw Creek	Duff/Skunk River	North	4100	Off	Limestone	8	$15,416	$15,416
44	Skunk River	Squaw Creek/Lincolnway	West	4100	Off	Limestone	8	$15,416	$15,416
45	Skunk River	Lincolnway/13th	West	4950	Off	Limestone	8	$18,612	$18,612
46	Skunk River	Meadowlane/City Limits	West	11550	Off	Limestone	8	$43,428	$43,428
47	RR Tracks	Bloomington/City Limits	West	3500	Off	Limestone	8	$13,160	$13,160
48	Quarry Pits	RR Tracks/Grand	South	5000	Off	Composite	8	$33,200	$33,200
49	Grand	Bloomington/City Limits	West	3000	Off	ACC	8	$32,400	$32,400
50	Scholl	Ontario/Pinehurst	West	5000	Off	Limestone	8	$18,800	$18,800
						Phase 3 Total Cost			$1,205,068

MAINTENANCE COSTS

Winter Maintenance

The selection of routes for winter maintenance was based on the routes location and it's useage. Winter maintenance was selected for routes located in the central portion of the city which would be heavily utilized and lead to employment centers, concentrated housing, and business centers (See page 37).

Snow and ice removal for these paths will be given a lower priority than for maintenance on city streets. The city crews wil began clearing routes after all snow and ice priorities have been completed

Cost estimates for winter maintenance activities are based on a typical seven snow falls during the winter months. The total cost for this operation is approximately $11,000 per year. This includes labor and equipment costs for clearing snow on 10 miles of bicycle paths. The rate at which will be four foot per second with two passes required to adequately clear the entire path width. Efficiency of the operation is estimated to be 80% which accounts for the setup, maneuvering, and time spent travelling to path segments.

Summer Maintenance

The summer maintenance entails periodically sweeping the paths and repairing the roadway surface. This also includes placing a new surface on bicycle paths after a extended period of use.

Sweeping operations on the paths will vary according to the type of path. Hard surfaced asphalt and concrete paths will be swept March to October.

The extended period inwhich the surface requires replacement depends on the type of surface, drainage, grade, and path useage. Given that the limestone paths are more susceptable to deterioration and erosion because of the binder, these surfaces will require replacing earlier. However, this is nearly offset by the lower cost of the limestone material versus the cost of asphalt. Estimates for this cost were based on replacing 1.5 inches of limestone surfaces and asphalt surfaces every ten and twenty years, respectfully.

Estimated Total Annual Maintenance Costs

The projected annual maintenance costs for a completely developed bicycle route system is summarized below.

Annual Maintenance Costs

Annual Winter Maintenance

Equipment (tractor, sweeper brush)	$ 5,000
Labor	$ 6,000
Total Winter Maintenance Costs	$11,000

Annual Summer Maintenance

Path Surface	Length	Cost
Limestone Paths ($ 440/Mile)	14.6 Mi.	$ 6,480
Composite Paths ($ 540/Mile)	16.1 Mi.	$ 8,700
On-Street Paths ($100/Mile)	2.3 Mi.	$ 230
Concrete Paths ($200/Mile)	4.7 Mi.	$ 940
Asphalt Paths ($ 540/Mile)	15.1 Mi.	$ 8,200
Total Summer Maintenance Costs	52.8 Mi.	$24,550

Total Annual Costs	$35,550

BICYCLE PATH FUNDING

This section discusses potential funding mechanisms for bicycle path development. Many funding mechanisms are possible through state and federal agencies and also subdivison development.

Potentially, there are many paths which can be funded by means other than using city funds. Included in this plan is approximately 14.6 miles of recreational paths that are eligible for a share of available state and federal funding. These agencies provide a significant amount of funds for bicycle path construction and favor funding a planned network such as being proposed in this Master Plan.

Also many paths are located in undeveloped areas of the city. These paths would not be constructed prior to development. Developers will have to include these in their plans and costs for providing future access to the network. Included in this plan is approximately 7.6 miles of bicycle paths located in undeveloped areas.

Funding Sources

Federal Participation

Federal Highway Funds

The Federal Highway Administration does allow financing of bike path construction projects with all types of aid funds. Bike path projects may be constructed on completed sections of federal-aid highways. Projects may include the acquistion of land outside the right-of-way, provided the faclity will accommodate traffic which would have normally used a federal-aid highway route. The federal share payable for bicycle paths projects is 100 percent.

U.S. Army Corp of Engineers

The U.S. Army Corps of Engineers, under Code 710, Public Law 8972, will fund up to 50 percent of a bicycle facility. Generally no other federal funds can be used in conjunction with the 50 percent match. However, Federal Urban Funds have been used due to their separate "trust Funds" status. The Corps of Engineers will only fund bike path projects when they have other project in an area.

Federal Land and Water Conservation (LWCF)

LWCF Funds provide project grants for up to half the cost of acquiring and developing basic outdoor recreaton areas and facilities for the public at large. Grants may fund a broad range of acquisition and development outdoor projects including bike paths. Project grants may be used to purchase land and/or to construct facilites. Capital equipment may also be funded initially, but basic operation and maintenance equipment are eligible. Monies in this fund are very limited at this time.

Department of Agricultural, Watershed Protection Program

The U.S. Department of Agricultural administers under authority of the Watershed Protection and Flood Prevention Act of 1954, a 50 percent matching grant program aimed at provideing technical and funding assistance to cities for various water-related conservation projects. These projects have included bike paths and other recreational facilities. Under this program administered by the Soil Conservation Services, localities in need of funds for watershed management purposes may seek grants through local government sponsors, who let contracts for their work or request SCS staff assistance. On-site technical assistance may be attained for incorporating recreation facilities into an overall watershed management proposal (such as soils analysis to determine the type of construction activities most suitable for the area)

The Watershed Protection program is limited by law to small watersheds of 250,000 actres or less and projects must be related in some manner to water conservation objectives, although some flexibility is permitted.

The Soil Conservation Service administers an additional grant program, somewhat broader in focus than the Water Management Program, which was established by the 1970 amendment to the Bankhead Jones Farm Tenant Act (P.L. 91-342). SCS staff assistance was provided for resource conservation and development (RCND) projects to develop economic opportunities and approve the quality of the envornment through the conservation of natural resources. The projects are not restricted to water conservation improvements, and are generally planned and administered on a mult-county level. Projects such as bikeways along beaches or marshland improvements might be considered suitable for SCS funding.

Land and Water Conservation Fund

The National Park Service distributes money to the State Department of Natural Resources under the Land and Water Conservation Fund. The DNR distributes one-half of each year's apportionment to government subdivisions such as county conservation boards and cities for cost share programs. In the past, several multi-use recreational paths have received financing from this fund to acquire land and/or to develop the trail.

Because money form the Land and Water Consercation Fund is actually federal funds from the National Park Service, the money granted could be used as part of the 25 percent local match required for the recreational paths. The Land and Water Conservaton Fund amounts to only $250,000 annually for the State of Iowa, one-half of which is used for state projects.

State Participation

Resource Enhancement and Protection (REAP) Act

In 1989, the Iowa Legislature passed the Resource Enhancement and Protection (REAP) Act. For the 1990 fiscal year, $15 million was set aside for REAP and $20 million has been promised for each fiscal year 1991-2000 with the possibility of additional funding. Cities recieve 15 percent of the REAP funds. These competitive grants fund 100 percent of project costs for projects selected.

The REAP fund is an excellent source for cities and counties to use to finance the construction of trails. REAP funds may be used for both acquisition and development costs. However, the Recreational Trails Program, routine maintennace and operating costs can be secured from REAP's fuds only for those projects which have been bouth and developed with REAP funds.

State Road Use Tax Fund

Each year one million dollars for the Road Use Tax Fund is scheduled to be appropriated for recreational path programs which is administered by the Department of Transportation. State or local government agencies, municipal corporations, counties or non-profit organizations are eligible to apply fo funds to help finance path development.

This funding includes costs for land acquisition, path surfacing, bridge and culvert repair, roadway intersection and interchange improvements, design engineering and construction inspection costs, drainage, utility relocation, and other related items. Generally, most of the costs associated with the construction of the path are eligible for funding.

Local Participations

Inclusion in Future Development

Development of bicycle paths in new developments can be authorized by the developement approval authority of the city. This authority can utilized in three development phases discussed further in these paragraphs.

Subdivision Approval

Prior to the approval of each new subdivision plat, the City will review the proposed plat for conformance with the Bicycle Route Master Plan. The subdivider(s) may be required to construct bicycle paths if the City Council deems it required for the public interest.

Said bicycle paths shall be constructed in accordance with the specifications, and under the supervision, of the Public Works Department and to its satisfaction.

Rezoning

The City Council may impose conditions on a property owner which are in addition to existing regulations if the additional conditions have been agreed to in writing by the property owner before the public hearing, required by law. It may be possible to implement portions of the Bicycle Route Master Plan through the rezoning process.

Site Plan Approval

As part of the site plan approval procedure, each proposed site plan will be analyzed in terms of its conformance with the Bicycle Route Master Plan.

Amendments to the Municipal Code will be necessary before bicycle path construction is required as part of site plan approval.

User Fees

Bicycle license receipts provide the city will approximately $10,200 per year for bicycle path construction. Future increase in revenues is projected due to the current attempts to set up enforcement for displaying bicycle permits.

Volunteer Help

One of the greatest resources for maintenance and operation is volunteer labor. Volunteers from the community can donate their time in helping to construct and maintain the trail. An example is the recent efforts by the Kiwanis Club to install suitable planking on the former railroad bridge to provide a safe facility for bicyclists travelling on the Squaw Creek bicycle trail. Also, an adopt-a-bicycle path program can be established inwhich volunteers would monitor and help maintain the paths free from obstructions.