Contents

List of Maps

Introduction 1

Project Background
Cornell Ad Hoc Bicycle Committee (May 1990-May 1991) 2
Ad Hoc Committee Recommendations 3
Cornell Bikeway Project (June 1991-February 1992) 4

The Current Situation
Careless riders on pedestrian paths 6
Obstruction of traffic flow along campus avenues 7
Locking of bicycles to inappropriate facilities 7
High risk locations 7
Lack of enforcement 8
No place to ride 8

Options
Ban bicycles on campus 9
Maintain current situation 9
Establish a bikeway system 9
  Physical infrastructure
  Regulations and enforcement
  Promotion and safety education
Toward a Master Plan

Process 11
Defining the physical structure of a bikeway 11
Directness
Traffic generators
Frequency of road use
Selecting appropriate facilities 15
Traffic volumes and speeds
Safety
Rider experience
Physical constraints
Secondary routes
Interior campus locations 19
Class I “Bike Paths”
Dismount/caution zones
Conclusions 21

Improvements to Recommended Bicycle Routes

Tower Road and the Orchards 23
Tower Road
Orchards
East Avenue 25
North Campus 26
Triphammer/Wait/Thurston
Sisson Bikeway
Fuertes Bikeway
Sisson/Fuertes Common Segment
Campus Road between Stewart Avenue and Hoy Road 31
Stewart Avenue to Central Avenue
Central Avenue to East Avenue
East Avenue to Hoy Road
Central Avenue and Collegetown
Central Avenue
Collegetown

Recommendations for Bicycle Parking Facilities
- Short-term bicycle parking
- Protected bicycle parking
  - Parking deficit chart
  - Parking facilities construction details

Future Actions
- Rules and regulations
  - Parking
  - Operation
  - Registration
- Promotion and safety education
- Physical design, planning, and maintenance
- Future actions time line

Conclusions

Endnotes

Appendix A - Definitions

Appendix B - The Cornell Bicycle Survey
# List of Maps

## Toward a Master Plan

<table>
<thead>
<tr>
<th>Map #</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map #1</td>
<td>Traffic Generators</td>
<td>12</td>
</tr>
<tr>
<td>Map #2</td>
<td>North Campus/East Campus Links</td>
<td>13</td>
</tr>
<tr>
<td>Map #3</td>
<td>Support Services/Collegetown Links</td>
<td>13</td>
</tr>
<tr>
<td>Map #4</td>
<td>The Proposed Route System</td>
<td>14</td>
</tr>
<tr>
<td>Map #5</td>
<td>Proposed Dismount/Caution Zones</td>
<td>22</td>
</tr>
<tr>
<td>Map #6</td>
<td>North Campus Bikeways</td>
<td>27</td>
</tr>
<tr>
<td>Map #7</td>
<td>Proposed Additional Agricultural Quadrangle Parking</td>
<td>34</td>
</tr>
</tbody>
</table>

## Future Actions

<table>
<thead>
<tr>
<th>Map #</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map #8</td>
<td>Implementation Phases</td>
<td>43</td>
</tr>
<tr>
<td>Map #9</td>
<td>Cornell University</td>
<td>46</td>
</tr>
<tr>
<td>Map #10</td>
<td>Popular Bicycle Approach Routes to Campus</td>
<td>47</td>
</tr>
<tr>
<td>Map #11</td>
<td>City/University Bike Routes</td>
<td>48</td>
</tr>
</tbody>
</table>

## Appendix B Cornell Bicycle Survey

<table>
<thead>
<tr>
<th>Map #</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map #12</td>
<td>Frequency of Road Use</td>
<td>68</td>
</tr>
<tr>
<td>Map #13</td>
<td>Perceived Hazardous Locations</td>
<td>69</td>
</tr>
<tr>
<td>Map #14</td>
<td>Frequency of District Use</td>
<td>70</td>
</tr>
</tbody>
</table>
Introduction

A diverse and intricate collage of architecture and space constitutes the physical environment of Cornell University. Woven into this tapestry is a complex web of transportation infrastructure, a network that supports a population of approximately thirty thousand people each day. Until recently, this infrastructure was designed primarily to accommodate the buses, automobiles and pedestrians that circulate throughout the campus. Today, an opportunity exists to include within this framework the premier alternative people-mover—the bicycle.

The bicycle has become a significant means of travel at Cornell. Many students, faculty and staff have chosen to commute by bicycle to reach their offices or classes. Bicycles provide door to door travel with greater accessibility to all parts of campus; require minimal space for parking with free lock-up facilities; and are clean, quiet, and efficient. In addition, they offer a way to improve personal health while saving money and the environment.

In the United States, a growing list of cities, municipalities, and campuses have implemented innovative bicycle plans. Among these are the City of Boulder, Colorado and the University of Colorado at Boulder, the University of California at Davis, and the University of Oregon at Eugene. The countries of northern Europe have actively planned for the bicycle, and its acceptance has increased dramatically. In Denmark and the Netherlands, where bicycle travel constitutes 20 to 30 percent of all urban trips\(^1\), densely populated regions have been cleared of significant volumes of motor vehicle traffic. At Cornell, a significant percentage of faculty, staff, and students have expressed a desire to commute to campus by bicycle (Cornell Bicycle Survey), but are reluctant to do so until the infrastructure, policies, and regulations—necessary to elevate bicycling to a position where it truly is a viable alternative to the automobile or bus—are in place.

This report addresses many of the issues pertaining to biking on the Cornell campus and offers recommendations for constructing an initial framework upon which a complete system can be founded. After a brief project history, the report identifies some of the problems with the present bicycling situation. Possible solutions for these problems are discussed, and the components of a bikeway system are explored. An analysis aimed at defining a bikeway structure is followed by the selection of appropriate facilities along specific roadways, and the designation of certain pedestrian areas as dismount zones.
Project Background

Cornell Ad Hoc Bicycle Committee²
The Ad Hoc Bicycle Committee was appointed in May 1990 by then vice-president for Campus Affairs, William D. Gurowitz. As stated in the appointment letter, the committee was formed "to ensure that cyclists', motorists' and pedestrians' interests are accommodated safely on the Cornell campus, now and in the future. A large and growing part of the Cornell community uses bicycles to travel to and around campus, and it is important that the university responds to this trend in its operational policies and physical planning."

The charge of the committee was to gather information and identify issues pertinent to bicycling on campus, to analyze existing campus policies, and recommend "improved bicycle policies and services for the campus."

The appointment letter expressed a desire for the recommendations to be prioritized and cited specific issues needing attention:

- Safety — how can bicycles and motor vehicles safely share roads?
- Should there be bicycle routes on campus? If so, where?
- What is the best way to provide parking for bicycles?

Another aspect of the committee's mission was to take into account constraints such as cost, practicality, existing laws and regulations, and timeliness.

In addressing its charge, the committee met regularly during most of the 1990-91 academic year. Several additional questions arose during this period. The Office of Transportation Services coordinated the efforts of the committee and provided staff support.
Ad Hoc Committee Recommendations

The Ad Hoc Bicycle Committee established goals and objectives for each component of the proposed bikeway system, i.e., physical planning, design, and maintenance; regulations and enforcement; and promotion and safety education. This report focuses on the physical elements of a bikeway; the specification of the type (class I, II, or III) and location of the routes that will be provided for bicyclists; the designation of certain areas as dismount and caution zones; and the design, supply, and location of bike parking facilities. The Ad Hoc Committee agreed to the following criteria for these elements:

- The plan should encompass and serve the entire campus.
- The proposed routes should connect with any routes proposed by surrounding communities.
- The plan should maximize the safety of bicyclists, motorists, and pedestrians.
- The plan should contribute to the goal of bicycling becoming a legitimate and efficient mode of transportation; a viable alternative to the automobile or public transit.
Cornell Bikeway Project

To begin implementation of the Ad Hoc Committee's recommendations, the Office of Transportation Services hired two landscape architects in May of 1991. These two professionals—with support from in-house planning and design staff from the Office of Transportation Services, Facilities Engineering, and Campus Planning—formed the Cornell Bikeway Project team. Work was conducted under the auspices of the Office of Transportation Services.

The project included among its stated intentions:

- Analysis and documentation of existing bicycle transportation patterns, major corridors, and conflict areas on campus;
- Survey and documentation of bicycle parking facility utilization on campus; and
- Compilation and analysis of the Cornell Bicycle Survey conducted in the Fall of 1990.

The team began with an informal bicycle tour of the campus to gain a bicyclist's perspective of the campus cycling environment. Riding behavior, once dismissed as inconsequential, was reassessed to determine why cyclists behave the way they do in specific situations. Why do they prefer one road to another, even if the latter offered a shorter distance to the destination? Why are they tempted into risky bicycling situations such as riding through stop signs and red lights? And, what roles do Cornell's unique conditions such as steep slopes and gorges play in overall traffic patterns?

Many of these and similar questions were raised and answered in an exhaustive search through reference materials. Other questions emerged and were respondsed to in the course of tabulating and documenting the Cornell Bicycle Survey. Once equipped with the information and insights from the reference material and survey, a systematic field inspection of the campus was initiated. Concentrating on the existing road infrastructure, all road segments were examined to determine if, and how, each could accommodate a Class II or Class III bikeway (for definitions, see page 16). The most significant campus open spaces were analyzed to assess the severity of bicycle and pedestrian conflicts. In addition, a second field survey was conducted to provide information on the bicycle parking situation.

After thoroughly documenting the existing conditions on each of the important campus corridors, specific bikeway recommendations were tailored to the unique set of factors particular to each road. These recommendations were
summarized, and a pattern of opportunities began to suggest a bicycle master plan for the campus. Finally—after analyzing information from the reference material, the survey, and the field inspection—a preliminary plan was constructed which would fit into the existing transportation system and be sensitive to the needs of cyclists.

The project extended from June 1991 through February 1992. Many of the initial developments were completed during the summer months. This particular window into the academic year had both positive and negative implications. While the campus population tends to bicycle more in the summer months, the total number of students, faculty, and staff on campus during the summer represents only a fraction of the typical semester population. Use patterns are no doubt different in the fall, winter, and spring than in the summer. Nevertheless, many facets of the project, such as the field survey work through which the campus road infrastructure was examined, were unaffected and even facilitated by summer conditions.

This report demonstrates that Cornell already possesses the skeleton of a bikeway. With careful modification, the campus can become a safer and more efficient environment for bicyclists. We hope to encourage more people to leave their cars at home for longer periods of the year. The project, therefore, is not just an effort at accommodating bicyclists, but one which carries implications for the overall transportation demand management plan (TDMP). Working closely with bicycle planners from the City of Ithaca, Town of Ithaca, Tompkins County Planning Department, State Department of Parks and Recreation, and with local community groups, the Cornell Bikeway Project team sought to integrate this study with other local bicycle planning efforts. This has led to the creation of the Tompkins Coalition for Bicycle Transportation, of which Cornell is a member. With bicyclists accommodated in the campus transportation picture, the Cornell Bikeway Project will have contributed to a less-congested, more user-friendly campus atmosphere for all.
The Current Situation

Reasons for bicycle riding vary significantly depending on the needs and abilities of the cyclist. Some prefer recreational trips for exercising or exploring the scenic regions around campus. Others use their bicycles as an alternative to the automobile or public transit, hoping to reach specific destinations quickly with few interruptions. At Cornell, bicycle movement occurred between on-campus origins and destinations, and between the main campus and off-campus locations. Requests for increased bicycle parking facilities at certain buildings, and evidence of bicycles chained to almost any stationary object helps support these findings (Figure 1). Recently, over one hundred twenty bicycles were counted in the Clark Hall courtyard and overpass areas. Forty of these bicycles were locked to inappropriate facilities due to a shortage of proper devices.

Fig. 1 Bikes locked to railing outside Morrill Hall

Many articles pertaining to bicycling at Cornell have been published in the campus newspaper (Figure 2), indicating an increased presence of bicycles. These articles have also pointed out numerous problems associated with the increased popularity of bicycle commuting. Problems include:

Letters to The Sun

Stop the Zooming Mounting Bikes

To the Editor:

It is with growing concern that I have watched the increase of mountain bikes on campus.

Many a time I have been walking on the Arts Quad or near the Straight, only to have someone zoom by me on a mountain bike pumping away as fast as he can. The campus seems to have become a raceway for these people.

It has come to a point where I am afraid to walk on the pathways, for if I should decide to change lanes or wander out into the middle of a pathway, I might be hit in the back with 200 pounds of metal and flesh, going 20 miles an hour.

I personally have had about 20 close calls in the past two years, and just the other night we got a note "Look out!" from a bike zooming past my girl friend who happened to move out into the pathway to read the chalk on the ground by the campus store.

I am especially concerned about the downhill roadway between the libraries and the Straight which mountain bikers seem to use as a roadway for zooming off into the road.

They do this at all hours of the day and night, not realizing that it is not safe and in general is not and should not be on the look out for them.

I strongly recommend that Cornell place SPEED BUMPS on the pathway from the libraries to the Straight; this would go a long way to curbing the reckless endangerment of life and limb and spinal cord.

Homer Wilson Smith ‘73

Fig. 2 Article from the campus newspaper

Careless riders on pedestrian paths. Some cyclists do not exercise courtesy while riding on the interior pedestrian pathways. These riders, whether improperly educated or generally disrespectful, interfere with the normal flow of sidewalk traffic and cause anxiety among pedestrians.
Obstruction of traffic flow along campus avenues. There has been an increase in bicycle and automobile traffic along campus routes that were not designed to accommodate both. This has led to an impeded flow of traffic and dangerous passing situations which often result in confrontations, ill feelings, and sometimes personal injury (Figure 3). Add in endless flows of pedestrians; and conflicts, confusion, and congestion result.

Locking bicycles to inappropriate facilities. Bicycles can be found locked to almost any stationary object on campus. Emergency access is impeded when bicycles are locked to stair railings. Bicycles secured to handicap ramps can be insurmountable obstacles to those who are confined to wheelchairs. Trees and shrubs can be damaged by pedals or chain-locks. However, a lack of adequate parking facilities leaves cyclists with few choices.

High risk locations. Numerous accidents have been reported to occur at various locations such as Campus Road near West Avenue (Figure 4). The area around the Thurston Avenue bridge has been the scene of at least fourteen reported accidents since 1986.

Poor visibility or poor design of certain roadways and intersections, and a lack of proper equipment on bicycles (such as front and rear lights at night) exacerbate these unfavorable conditions. In addition, inappropriate cyclist behavior, such as riding through red lights or knowingly riding against one way traffic, can increase the number of accidents.
Lack of enforcement. The cyclist wants the best of both worlds: safe high speed travel with door-to-door, straight-line access in a situation in which rules and regulations are unenforced. Some problem areas, such as the foot bridge crossing the Beebe Lake dam, have drawn a reflexive response from bicycle riders; i.e., the posted regulations are only followed when a public safety officer is present. One reason many cyclists disregard enforcement efforts is that citations are usually dismissed by the judicial system.

No place to ride. Currently cyclists exist in limbo between motorists and pedestrians, each seemingly unwilling to share their domain. The generally accepted rules for biking on streets are insufficient to safely integrate the current traffic volumes. In addition, the campus walkways are heavily used by pedestrians. Where then, is it safe and acceptable for a cyclist to ride?

Fig. 4 Dangerous intersection at Campus Ave. and West Ave.
Options

There are several ways to cope with the present bicycling situation on campus. These include:

- Banning bicycles on campus;
- Leaving the situation as it is, making minor changes as needed;
- Defining and establishing a bikeway system.

**Banning bicycles from campus.**

Banning bicycles from campus will alleviate all the present difficulties listed above. However, not to mention an unfavorable public response, this solution would be counterproductive to the goals of the university.

While bicyclists improve their health by cycling, they also help protect the environment by leaving their automobiles at home. A study conducted in Boulder, Colorado revealed that motor vehicle emissions, as opposed to industrial sources were their chief cause of air pollution. Though the cities of Boulder and Ithaca are different sizes, it is fair to assume that automobiles contribute heavily to air pollution in this region.

**Establish a bikeway system.**

Establishing a complete bikeway system will require time, money, and careful planning. It will also require a thorough understanding of bikeways, existing campus conditions, and general patterns of bicycle movement within the existing transportation system. One way to think of a bikeway system is in terms of the following three components:

1. Physical infrastructure, i.e., routes, signage, and parking facilities.

2. Regulations and enforcement.


In addition, a committee charged with the responsibility of monitoring and maintaining this system should be established to accommodate its changing needs. A bikeway system for Cornell could provide the framework needed to define the role of bicycles and establish
room for the bicycle within the campus' transportation corridors. It could also improve the motor vehicle and pedestrian systems by decreasing cyclists' dependence on shared road and path space.

![Bikeway Sign](image)

Fig. 5 Bikeway sign graphics used by Boulder, Colorado.

PHYSICAL INFRASTRUCTURE
Bicycle routes and ways, including signage (Figure 5) and striping, could clearly identify space which has been specifically designed to accommodate cyclists traveling to and about the university. Physical maintenance would ensure that the system remained in good working condition and that changes in the patterns of use and other needs are responded to appropriately. Parking facility management would ensure the proper use of these facilities, monitor the need for more facilities, and protect the campus grounds from abuse.

REGULATIONS AND ENFORCEMENT
Effective regulations and enforcement could bring order to the system. Dangerous situations which currently result from a disregard for regulations, or the absence of regulations, would be reduced. Penalties for violations must be backed by the judicial system or the regulations will be rendered meaningless.

PROMOTION AND SAFETY EDUCATION
Education and promotion would instruct cyclists, motorists, and pedestrians on how to safely use the system and what to expect when using it.
Toward a Master Plan

Process
A number of steps were taken before it was possible to define a bikeway structure. The first step involved a review of written material pertinent to the definition and construction of bikeway systems. One such reference was the American Association of State Highway and Transportation Officials’ (AASHTO) Guide for the Development of New Bicycle Facilities.

Next, the community was probed for information on preferred routes, origins and destinations, and perceived difficulties to campus biking. The Office of Campus Planning conducted a survey in the Fall of 1990 (Appendix B) which provided much of this information. This information directed the Cornell Bikeway Project team’s efforts toward the most critical issues and provided guidance in the determination of the physical bikeway layout.

Finally, the physical conditions of the transportation infrastructure were inventoried to expose the physical constraints and opportunities inherent within the system. A field survey conducted during the summer of 1991 recorded information on road and corridor width, surface condition, traffic volume, roadside parking, lighting, slope, and scenic value for all of the major corridors on campus. This information was used to recommend specific improvements to various roadways and to select appropriate bikeway facilities for the chosen bike routes.

Defining the Physical Structure of a Bikeway
Once the necessary information was collected, it was sorted and systematically analyzed to produce a set of logical, well-founded recommendations that serve as the Cornell Bikeway Master Plan.

The Ad Hoc Committee proposed making every route on campus safe for bicycles. However, there are varying degrees of safety, and the point at which a particular route is considered to be “safe” is subjective and open to debate. Also, certain roads deserve a higher priority. They warrant more expensive measures than other roads, by virtue of the fact that they are key links between various parts of campus. As a basis for recommending differing levels of treatment (Class II, or III) for each road, a hierarchical classification system was devised which reflects the prominence of roads in existing and projected bicycle transportation patterns. The process by which this hierarchical system was arrived at is outlined below, and is based on principles extracted from various bikeway planning manuals.

DIRECTNESS
The AASHTO Guide discusses the concept of “directness”, and its importance when designating a bicycle route: "For utilitarian bicycle trips, facilities should connect traffic generators and should be located along a direct line convenient for users.”
Planners and engineers in Eugene, Oregon learned about this the hard way. After implementing a somewhat unsuccessful first leg of their bikeway, they realized that “bikeways that work best go where the bicyclists go.” (Since then, Eugene’s bikeways have grown to enjoy notable success.)

TRAFFIC GENERATORS
By improving the most traveled bicycle routes between areas that generate bicycle traffic, it will be possible to accommodate the greatest number of commuters. The Cornell Bicycle Survey furnished the team with information about the most frequently traveled routes and cyclist destinations. **Map #1** shows the campus divided into seven traffic-generating regions; North Campus, East Campus, West Campus, Central Campus, Support Services, Collegetown, and the Orchards. Central Campus, as the name implies, is the hub of the university; the center from which most traffic lines emanate. Conversely, the peripheral regions feed bicycle traffic back into Central Campus. According to AASHTO recommendations, direct routes should be chosen between the peripheral regions and Central Campus.

**FREQUENCY OF ROAD USE**
The primary links serving each region are revealed by comparing the most frequently traveled through-streets on campus with the regional traffic generators. **Map #2** displays the three most heavily bicycled routes on campus. One is able to see that the most direct routes chosen by bicyclists from North Campus and East Campus to Central Campus are East Avenue and Tower Road respectively. These routes are the primary bikeway links serving these areas.
The most popular routes from Support Services and Collegetown are added on Map #3. These routes, Hoy Road and short segments of Campus Road and Central Avenue, become two more primary links to the system. In addition, the southern end of East Avenue establishes a major connection between North Campus and Collegetown. These two areas generate the largest volumes of bicycle traffic that feed into Central Campus.

The remaining link is one that will serve West Campus. Of the two routes that access this region, Campus Road and University Avenue, it is Campus Road that carries more significant volumes of bicycle traffic. In addition, the City of Ithaca indicates a proposed bike route leading to the university along this road, which would establish a desirable link to Cornell's bikeway system. Although this route supports the greatest number of cyclists, it also has four dangerous intersections at Stewart Avenue, West Avenue, Central Avenue and East Avenue. Special care must be taken when designing improvements along this route.

Having uncovered the primary links to the various regions of campus, it is now possible to construct a map detailing a system of roads that will evolve into the Cornell Bikeway network (Map #4). In addition to satisfying the overall campus needs, this network connects with the proposed City of Ithaca routes indi-
Map #4  The Bikeway Proposal.

**LEGEND**
- Cornell Routes
- City Routes
- Town Routes
1988-91 Accident Data Relationship to Proposed Bikeway Routes

Selecting Appropriate Facilities

Now that the primary routes have been identified, the appropriate class of facilities for a unified system must be selected. Currently, three distinct classes of bikeways have been defined as shown in Figures 7-9 (page 16). For improvements along roadways this report focuses on the use of Class II and III facilities. Criteria used to determine the appropriate class for installation includes traffic volumes and speeds, safety, rider experience, physical constraints and secondary routes.

TRAFFIC VOLUMES AND SPEEDS

The AASHTO Guide specifies:

"For facilities on roadways, traffic volumes and speeds must be considered along with the roadway width. Commuting bicyclists frequently use arterial streets because they minimize delay and offer continuity for trips of several miles. It can be more desirable to improve heavily-traveled high-speed streets than adjacent streets, if adequate width for all vehicles is available in the more heavily-traveled street."

The key words here are “adequate width for all vehicles.” Cornell’s through-streets carry substantial volumes of traffic, particularly during the morning and afternoon rush hours. Cyclists traveling...
**Class I Bike Path** - A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way.

**Class II Bike Lane** - A portion of a roadway which has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists.

**Class III Wide Curb Lanes** - A segment of a system of bikeways designated, by the jurisdiction having authority, with appropriate directional and informational markers, with or without a specific bicycle route number.

---

Fig. 7 Class I Bike Path

Fig. 8 Class II Bike Lanes

Fig. 9 Class III Wide Curb Lanes
these routes require adequate width for safe maneuvering. Currently, no space has been provided for the bicyclists, forcing them to share busy roadways or sidewalks. Class II bike lanes implemented along the selected routes would allow room for bicyclists to travel safely apart from lines of automobile traffic. AASHTO describes some of the benefits of bike lanes:

“Bicycle lanes, together with signs and pavement markings, can improve conditions in corridors where there is significant or potential bicycle demand, by delineating the intended or preferred path of travel and by encouraging the separation of bicycles and motor vehicles. Bicycle lanes also help to increase the total capacities of highways carrying mixed bicycle and motor vehicle traffic.”

Discussions with officials in other municipalities revealed that bike lanes work best if sufficient bicycle and motor vehicle traffic is present to claim the space delineated for each. In this way, they will be less likely to wander into the other’s lane of travel. Class III wide curb lanes, on the other hand, would continue to force cyclists to share lane space with motor vehicles which, along a busy roadway, could lead to automobile/bicycle conflicts.

SAFETY
A report from Clark County, Washington indicates:

“accident statistics reported by the National Transportation Safety Board, show that automobile traffic, particularly in urban areas, poses the greatest hazard to the bicyclist.”

In fact, greater than fifty percent of bicycle accidents reported to Cornell’s Department of Public Safety involved an automobile (Figure 10). Bike lanes would provide the extra width and separation needed to insulate cyclists from both vehicles and pedestrians thereby reducing the risk of mid-block collisions.
Regardless of which type of facility is chosen for a particular roadway, more work is needed to enhance cyclists' safety at intersections: the general location at which most automobile/bicycle accidents are occurring in Ithaca (NYS Department of Motor Vehicles statistics, Ithaca 1988-90). Current studies are aimed toward identifying common accident types. These types should reveal weaknesses in the design of intersections and indicate where law enforcement policies, and educational programs are needed.

RIDER EXPERIENCE
Bike lanes may attract those cyclists who had considered biking to campus but did not feel safe riding in traffic. Many cyclists have cited danger from vehicles as the biggest obstacle to biking on campus (Cornell Bicycle Survey). Installing separate bike lanes along the most heavily traveled roads could boost the confidence of those unwilling to ride in automobile traffic. AASHTO explains:

"Bicycle lanes can be considered when it is desirable to delineate available road space for preferential use by bicyclists and motorists, and to provide for more predictable movements by each. Bicycle lane markings can increase a bicyclist's confidence in motorists not straying into his or her path of travel. Likewise, passing motorists are less likely to swerve to the left, out of their lane, to avoid bicyclists on their right."

Some experienced riders have developed survival tactics for avoiding conflicts with buses and automobiles. For instance, they might move into the center of a travel lane to prevent an overtaking motorist from passing when traveling around a dangerous corner or a threatening object in the road. Many cyclists, however, may never reach this level of confidence. Instead they might rely on a motorist's judgement to protect their safety or choose to ride on the sidewalk. Some may simply choose not to ride at all, as they perceive the risks to be too great.

The intention of constructing a commuter bikeway for Cornell is to encourage the use of bicycles as an alternative mode of transportation, and to improve bicycling conditions for cyclists of all experience levels. Bike lanes may encourage less-experienced cyclists to begin riding bicycles.

PHYSICAL CONSTRAINTS
Many physical aspects of the Cornell campus preclude the installation of bike lanes. For example, Hoy Road, which extends along the face of a gorge wall, cannot be expanded to the minimum road width for bike lanes without performing elaborate and expensive earthwork. In situations where bike lanes cannot be constructed along a selected primary route, appropriate cautionary measures, such as erecting bicycle route signs and constructing Class III wide curb lanes, should be taken.

SECONDARY ROUTES
In areas where traffic volumes are less substantial, traffic speeds are slower, or where physical conditions make bike
lane installation impractical, Class III wide curb lanes should be implemented to maximize safety conditions by reducing automobile/bicycle conflicts. AASHTO states the following about wide curb lanes:

“In many areas where there is a wide curb lane, motorists will not need to change lanes to pass a bicyclist. In general, a lane width of 14 feet (4.3m) of usable pavement width is desired. Usable pavement width would normally be from curb face to lane stripe, or from edge line to lane stripe, but adjustments need to be made for drainage grates, parking . . .”

A minimum road width standard of Class III wide curb lanes dimension should be adopted by the university for use on all roadways as they are reconstructed. This would yield a campus-wide bicycle safe environment gradually, with minimal expense.

**Interior Campus Locations**

Having established a primary route system and determined the appropriate class of facilities to construct upon them, some thought must now be given to the campus interior. One of the advantages of cycling is off-road accessibility. For that reason, a comprehensive bikeway system cannot be limited to roadway improvements alone. The most visible issue facing the use of campus interiors for cycling is that of rider courtesy. Some bicyclists can disrupt an otherwise harmonious system of shared mobility by riding at excessive speeds past unsuspecting pedestrians. Measures must be taken to ensure the safety of everyone who uses the transportation system; this includes pedestrians along walkways. Presently two possible solutions have been identified: the installation of Class I bike paths and the delineation of “dismount” and “caution zones”.

**CLASS I BIKE PATHS**

The construction of Class I bike paths along routes which accommodate high concentrations of bicycle and pedestrian traffic could enhance traveling conditions for both. AASHTO describes the dimensional requirements of bike paths where pedestrians also expect to travel.

“Under certain conditions it may be necessary or desirable to increase the width of a bicycle path to 12 feet (3.7m); for example, because of substantial bicycle volumes, probable shared use with joggers and other pedestrians, use by large maintenance vehicles, steep grades . . .”

Considering the abundance of bicyclists and pedestrians at Cornell, many instances might require a more advanced bike path/pedestrian walkway solution which separates the two rather than sharing the space. Such a system could separate a two way pedestrian walk (at a minimum width of six feet) from a two way bike path (at a minimum width of eight feet) using directional markers and a lane stripe painted directly upon the pavement. However, problems may ensue along these routes where cross
traffic is likely to interrupt the normal flow. In these areas, a dismount or caution zone may be required.

DISMOUNT AND CAUTION ZONES

In situations where space is not available for bike paths, or where the dispersal of cyclists in many directions might render the bike paths ineffective, an alternative solution must be found. At Boulder, Colorado, the University of Colorado Parking Management Office has set up a system of zones, based on the intensity of bicycle and pedestrian use, which ameliorate these situations. The zones are classified as:

**Dismount Zones** - Include all areas of university property posted for no bicycle riding. Such areas are marked with signs and/or pavement graphics. Dismount is defined as walking beside the bicycle with both feet off the pedals at the same time.

**Caution Zones** - Cyclists are asked to exercise added caution when riding through these areas.

Adopting these zone classifications for such areas as the Arts Quadrangle, the area between Willard Straight and the libraries (Figure 11) and other congested areas would reduce danger to pedestrians. At times when pedestrian volumes are expected to decrease (i.e. 6pm - 7am) a dismount zone might step down to caution zone status.

**Determining Dismount Zones**

Unfortunately, the task of delineating boundaries for such zones is not always clear. Criteria for determining which areas should be classified as dismount or caution zones is difficult to find. Officials at other campuses report that a somewhat reactive approach was followed to determine these zones—based in part on various complaints to the campus security office, or articles appearing in the campus newspaper. Other schools, with much smaller campuses but with similar student populations, have declared all interior regions off-limits to bicycles. Whichever approach is adopted at Cornell, strong education and enforcement programs must be established to promote the rules and regulations.
Regulations
In addition to clearly posting these zones on the campus grounds, a number of written policies describing the bicycle regulations, violations, and penalties to govern the use of these areas should be adopted and enforced. The University of Colorado has pioneered this aspect of bikeway planning. Their regulations and enforcement policies are printed on the reverse side of their campus bicycle map along with safety tips, parking locations, and typical bikeway signage.

Suggested Areas
Some of the campus areas that would benefit from the use of dismount and caution zones include:

- All pathways in the vicinity of Willard Straight Hall from Barnes Hall to the Arts Quad.

- From Uris Library to Day Hall.

- All pathways between East Avenue and the Arts Quad, with emphasis on the areas near Rand Hall, and the north and south sides of Goldwin Smith Hall (not including the Lincoln Hall service drive).

- The pedestrian bridges near the Beebe Lake dam and at Oak Avenue near the Collegetown Bridge.

- The underpass between Mann Library and Plant Science.

- All walkways adjacent to designated bicycle routes.

Other areas may be added to this list as the need arises.

Conclusions
In this growing university, we must conclude that commuter traffic volumes will only increase in the future, furthering cyclists' needs for additional room along the campus roads. Constructing bike lanes (where physical conditions permit) along the selected primary traffic routes would accommodate the greatest number of cyclists and provide more favorable conditions for all commuters.

Further, it is recommended that the university consider adopting a standard minimum road width of wide-curb-lanes dimensions for use on all newly constructed campus roads that do not require bike lanes. This action will eventually lead to a comprehensive system of bicycle-safe roadways along the existing transportation network.

Interior campus regions should be monitored closely through accident, complaint, and enforcement statistics to determine whether an area should accommodate a bicycle path, dismount zone, or caution zone.

Map #5 reveals the basic outline for a system of bikeways and interior zone classifications. Included in this map are North Campus routes which are described in the next chapter. When supported by education, enforcement, and maintenance programs, this system should evolve into a network of commuter bikeways designed to safely accommodate cyclists of all experience levels.
Improvements to Recommended Bike Routes

Overview
The chosen bikeway network meets the criteria set forth by the Ad Hoc bicycle Committee (page 3). However, attention must be given to addressing the difficulties encountered along each roadway segment and integrating the ends of these routes into the surrounding neighborhoods. Hoy Road (which has been recently re-constructed to Class III wide-curbs-lanes specifications) links central campus to support services and meets with a proposed city route at its intersection with Route 366. Little more than a coordinated signage effort between the city and university bikeway planning groups is necessary to complete this branch of the system. The remaining bikeway links warrant a more in depth investigation.

Tower Road and the Orchards

TOWER ROAD

Existing Conditions - Tower Road is a principal component of the Cornell bikeway master plan. Stretching from Route 366 in the east to East Avenue in the west, this tree lined corridor connects the Orchards with Central Campus. Traffic on Judd Falls Road and Garden Avenue feeds into the corridor's midsection at two locations, increasing the overall traffic volume along this route and establishing its role as a major campus artery. Eight of ten bus stops, located between the Veterinary College and Uris Hall, are not designed with pull-over lanes. Motorists and cyclists must either wait, or cross into the opposing lane to pass buses at these locations. Perpendicular parking, which exists on the southern edge between Corson Hall and Wing Drive (Figure 12), interrupts the regular flow of traffic in both directions. At the intersection with Wing Drive, a traffic booth pinches the 30 foot wide roadway to 24 feet, dangerously forcing bicycle traffic to

Figure 12 Perpendicular parking along Tower Road is hazardous.
merge with buses and automobiles. High concentrations of pedestrians cross the road at the Garden Avenue and East Avenue intersections, especially between classes. It should be noted that seven reported bicycle accidents have occurred along Tower Road since 1987.

Recommendations - This road segment carries the second largest volume of bicycle traffic on campus. Equally substantial volumes of motor vehicles travel this route, impeded by bicycles traveling slowly, automobiles turning into parking places, and buses unloading passengers. Class II bike lanes could remove bicycles from the path of motor vehicle traffic and encourage more timid cyclists to abandon their use of sidewalks. Bus pull-over lanes could smooth the overall flow of traffic and allow automobiles and bicycles to pass within their own space (Figure 13). The elimination of perpendicular parking would increase cyclists' and motorists' safety, improve growing conditions for the historic oak trees, and enhance the roadway's visual character. However, parallel parking adjacent to bike lanes can be acceptable, according to AASHTO. The area around the traffic booth (at the intersection of Tower Road and Wing Drive) will require a different design solution. Additional measures should be taken to reduce the number of locations where pedestrians may cross the road, especially

Fig. 13
A full pull-over lane might allow bicycle and automobile traffic to proceed cautiously while the bus unloads passengers.

A partial pull-over lane would force cyclists to merge with automobile traffic when passing a stopped bus.

No pull-over lane forces all traffic to stop or cross into the opposing lane to pass a stopped bus.
system via Tower Road, at its intersection with Route 366. Possible connections to the East Ithaca Bikeway, East Hill Plaza, and the eastern end of the plantations are being explored.

**East Avenue**

**Existing Conditions**

More than just an important link between North Campus and Central Campus, East Avenue has emerged as a crucial north/south bikeway component. Tower Road, the major east/west component, bisects East Avenue at Day Hall completing the skeletal structure of the bicycle transportation infrastructure. Automobiles and bicyclists form a stream of continuously flowing traffic interrupted by pedestrian cross traffic (Figure 14) at five key locations; the traffic light at the Thurston Avenue bridge, Clark Hall driveway, Tower Road, the plaza south of Uris Hall, and Campus Road. Four central campus bus stops along this route have not been designed with pull-over space. Instead, buses must idle in the street, obstructing traffic while adding to the flow of pedestrians. Difficult slopes are present at two locations; a 6.5 percent slope up from the Thurston Avenue bridge, and a 7.5 percent slope up to Tower Road from the south. A slope greater than 5 percent frequently results in bicyclists weaving as they struggle to ascend a hill. This can be hazardous to cyclists and frustrating to motorists and bus drivers if passing space is limited. Nine bicycle accidents have occurred along East Avenue since 1986 reflecting the need for improved road conditions for cyclists along this segment.

**Recommendations** - East Avenue carries the largest volume of bicycle traffic on campus. Equally large volumes of
bus, auto, and pedestrian traffic are also present. Class II bike lanes could remove bicycles from the path of motor vehicle traffic and provide sufficient room along the roadway to encourage the more timid cyclists to abandon their use of sidewalks. Bus stop pull-overs could help smooth the overall flow of traffic and allow automobiles and bicycles to pass within their own designated space. Painted crosswalks and chain fences (similar to those along the road near Sage Hall) could help restrict pedestrian crossings to specific locations. The northern most intersection (adjacent to Rand Hall) and the nearby information booth should be studied in detail to determine how they might be redesigned to accommodate bicycles more safely. When possible, handicapped ramps should be located in such a way as to inhibit their use as bicycle access points onto pedestrian pathways.

**North Campus**

**Existing Conditions**

Following East Avenue into North Campus, over the Thurston Avenue bridge, one enters perhaps the most hazardous location for bicyclists on campus (Figure #15). In the past three years, fourteen bicycle accidents were reported in the Thurston Avenue area south of Balch Hall, nine of which involved an automobile (at least five of these involved personal injury). For this reason, it is necessary to assess circulation patterns in this area before moving on to specific bikeway recommendations.

![Fig. 15 South Balch Drive and Thurston Avenue where fourteen reported accidents have occurred in the last three years.](26)
tions of traffic, including pedestrians, buses, automobiles, and bicycles, which enter and leave Central Campus from this northern access point. Random pedestrian road crossings, resulting from the unstructured system of walkways, add to the confusion existing between the Thurston Avenue bridge and the intersection at Wait Avenue. Also, the Y-forked entrance to South Balch Drive interrupts the normal traffic flow in two places along this segment. The southern fork, which is used by many cyclists pedaling south toward campus, has been designated one way going north and originates in a span of asphalt 70 feet wide. Seven of the fourteen accidents along Thurston Avenue occurred at this location. Finally, an unimpeded view up the Balch Hall lawn tempts the motorists eye to wander dangerously from a roadway that curves abruptly in the opposite direction.

Recommendations
The numerous distractions can tax a motorist’s ability to concentrate and cause confusion. Three general recommendations aimed toward reducing these adverse conditions are:

- Limit South Balch Drive to a single intersection with Thurston Avenue.
- Restructure the pedestrian pathways with the goal of reducing roadway crossing points.
- Partially screen the view up the Balch Hall lawn in an effort to strengthen the edge of the roadway (e.g., plant street trees, hedges)

With these suggestions in place the following recommendations would complete the bikeway structure of North Campus. This structure consists of four branches (Triphammer/Wait/Thurston,
Sisson Bikeway, Fuertes Bikeway, and Sisson/Fuertes common segment) which converge into one main branch before leading into Central Campus.

TRIPHAMMER/WAIT/THURSTON

Existing Conditions - Although only 25 feet wide, Triphammer Road offers smooth surface conditions and generally favorable conditions for cycling. However, after the intersection at Jessup Road, the road narrows to 24 feet, overall visibility decreases, and the road surface buckles and breaks (particularly hazardous are the concrete/gutter curb constructions). At Triphammer Road and Wait Avenue, an area difficult for cyclists to negotiate, northbound motorists turning onto Triphammer Road frequently attempt to maintain a maximum speed while rounding the corner. From there to Thurston Avenue, the roadbed remains narrow while following a moderate slope (for cycling). Thurston Avenue itself, although currently wide enough to accept bike lanes, was the location of fourteen accidents between 1988 and 1991. Finally, this road narrows to 26 feet as it approaches the bridge leading to Central Campus.

Recommendations - A disjointed network of road segments comprise this branch of the North Campus bikeway system. In light of physical constraints to bikeway improvements along various segments of this branch and a desire to maintain a somewhat consistent class treatment throughout its length, the recommendation is divided into two segments. The first, extending from the intersection of Triphammer Road and Jessup Road to the intersection of Wait Avenue and Thurston Avenue, is best suited to receive Class III wide curb lanes. Bike lanes, which would increase the road width by 10 feet, are impractical considering the surrounding topography and the private residences abutting the roadway. However, an AASHTO recommended 28 feet of road width would allow enough room for motor vehicles to maneuver safely around bicycles without crossing into opposing traffic. This treatment would also provide a smooth transition between the existing roadway leading down from the north and the proposed improved roadway while terminating logically at Thurston Avenue. At the Triphammer Road intersection with Wait Avenue, an all-way stop could slow the speed of north bound traffic and ameliorate hazardous conditions, not only for cyclists, but for the many pedestrians that must travel this way.

The second segment, Thurston Avenue from Wait Avenue to the bridge leading to Central Campus, currently maintains a width of 36 feet. No additional road width is necessary for the implementation of Class II bike lanes. These bike lanes are a logical continuation of the Class II facilities recommended for East Avenue. They could serve to protect cyclists along the most dangerous stretch of campus roadway and require only signage, striping, and additional lighting at intersections to complete the infrastructural improvements. Terminating the bike lanes at Wait Avenue would still allow protection along the most critical area.
SISSON BIKEWAY
Existing Conditions and Recommendations
The second branch of the proposed North Campus bikeway would originate at the intersection of Jessup and Pleasant Grove Roads. The considerable width of Jessup Road at this point would enable its functioning as a Class III facility. The shoulders, although poorly defined and decaying, contain sufficient width to accommodate future edge-improvements. Leading west on Jessup Road, the bikeway would turn left onto Sisson Place and wrap around the North Campus Low-Rise complex. As a miniature "beltway", Sisson Place has the potential to function as a principal collector of bicycle traffic generated by the residence halls and Pleasant Grove and Hasbrouck Apartments.

Directly south of the Low-Rise complex, Sisson Place intersects with a pedestrian way (Figure 16), linking North Campus to a system of pathways which lead to Central Campus. The bikeway would follow along the southeast edge of this pathway (to avoid unnecessary pedestrian crossings) across the Helen Newman Fields, and bear left near the rear of Balch Halls to join with the Fuertes Bikeway at the entrance to the Newman parking lot. The path, which is approximately ten feet wide, is in relatively good condition, has a gentle gradient of about 2.5 percent, and exhibits a graceful alignment as it crosses the green. The expansive scale of the fields will absorb the visual impact of the four feet of extra asphalt needed for a combined Class I bike path (eight feet minimum) and pedestrian walkway (six feet minimum).

Figure 16 A North Campus pedestrian pathway frequently traveled by bicycles to reach central campus.

FUERTES BIKEWAY
Existing Conditions and Recommendations
Field observations revealed a constant flow of bicycle traffic from Pleasant Grove and Hasbrouck Apartments. An attractive but neglected segment of road leading from Pleasant Grove Road toward the Fuertes Observatory would serve well as a Class III component in this bikeway. The pavement on this road is in an advanced state of decay,
with considerable rubble and gravel. However, once resurfaced, the gentle gradient and virtual lack of automobile traffic will provide excellent cycling conditions.

At the end of this roadway, near Fuertes Observatory, the bikeway would turn to the right. From this point onward, it would exist as a Class I bike path sharing the alignment of an existing pedestrian walkway (Figure 17) that extends west past the tennis courts to the Helen Newman parking lot. The eight foot wide asphalt path could easily be widened to the desired 14 feet. A group of plantings sited at the exercise track (near the tennis courts) could help reduce the visual expanse of the combined paths. Upon reaching Helen Newman Hall, the bikeway would utilize the parking lot before continuing south along Balch drive to Thurston Avenue.

FUERTES/SISSON (Common Segment)
Existing Conditions
Both components join at the entrance to Helen Newman parking lot. From here to Thurston Avenue a complicated sequence of curb cuts, loading bays, drop-offs and metered parking spaces clutter the edges of South Balch Drive (Figure 18). These obstacles, combined with a 4-10 percent slope, create difficult conditions for cyclists.

Recommendations
A Class II facility here would involve expanding the pavement to a minimum width of 34 feet. Since there is adequate room on the north side for this added width, the metered parking on the south side would not need to be removed. Another possible option would be to use Class III wide curblanes at 28 feet, but only if the edge of the road was freed of the clutter described above. The road should be designed to terminate at Thurston Avenue in only one place. Removing the one way portion and widening the other fork to a dimension consistent with the rest of the road would be an adequate solution. The new design should dis-

Figure 17 Proposed Fuertes bikeway, a popular route from Hasbrouck Apartments.
to other bikeway components differs along its length. For this reason, three distinct segments, extending from Stewart Avenue to Central Avenue, Central Avenue to East Avenue, and East Avenue to Hoy Road, are discussed separately. It should be noted that since 1987, at least eight reported accidents occurred along this route (including the old alignment along the present Hoy Road).

**Recommendations** - Although enough traffic exists to recommend the implementation of bike lanes, topographical constraints below the Gannett Center Parking lot would turn an increased road width of ten feet into a costly exercise of “cut & fill” and bank stabilization. Instead, Class III wide curb lanes, at 28 feet curb to curb, should be implemented with striping located to favor more room in the uphill direction. The Y-forked intersection at West Avenue should, as recommended for the intersection of Thurston Avenue and South Balch Drive, utilize one access fork only to reduce potential points of conflict. Lighting facilities along this curve should be increased and a sign acknowledging the intersection hazard should

---

**Figure 18** Cluttered edge along South Balch Drive.
be installed along the east bound lane of Campus Road. All crosswalks should be clearly striped to increase awareness of pedestrians at critical points.

CENTRAL AVENUE TO EAST AVENUE

Existing Conditions - This relatively short segment of roadway connects two peripheral traffic generators, Collegetown and West Campus, to East Avenue, one of the spines of the Central Campus bikeway. In addition to carrying substantial volumes of automobile and bus traffic, it registers as the third most frequently traveled bicycle route on campus. The present solution to traffic patterns at the Central Avenue intersection seems to favor automobiles over bicycles or pedestrians, leaving the latter two with a heightened sense of vulnerability. While measuring a narrow 24 feet for most of its length, this section of Campus Road ascends at a ten percent slope, which is a difficult climb for all but the most fit cyclists, especially in the midst of buses and automobiles.

Recommendations
The continuous flow of bicycle and automobile traffic along this route, particularly during peak hours, and the difficulties of traversing a ten percent grade, indicate the need for increased width for safer accommodation of all vehicles. Installation of Class II facilities would, in addition to connecting with the Class II bike lanes proposed for Central Avenue and East Avenue, serve as protected maneuvering space for cyclists away from a steady stream of buses and automobiles. Circulation patterns at the Central Avenue intersection, including the traffic booth in front of Carpenter Hall, require a more detailed study to develop a circulation plan that safely accommodates all modes of traffic passing through this segment of Campus Road.

EAST AVENUE TO HOY ROAD

Existing Conditions
With a seven percent slope and 24-foot width, this very short segment of roadway squeezes between Phillips Hall and Statler Hall, connecting the Support Services link to the main bikeway network.

Recommendations
Although bike lanes could not be implemented here without significant modifications to the abutting architecture, enough room does exist for the construction of Class III wide curb lanes. The most notable problem existing at this point is identified through complaints of cyclists who ignore the four-way stop signs. Compliance will only be achieved through strong educational and enforcement programs.

Central Avenue to Collegetown

Central Avenue serves as a critical link between Central Campus and Collegetown. With numerous entertainment, dining, and retail opportunities, as well as a large residential population, Collegetown plays an important role in Cornell life. Central Avenue, the artery which handles the majority of traffic
between the two traffic generators, is a short but intensely used corridor. South, beyond the bridge, Central Avenue continues through Collegetown as College Avenue.

CENTRAL AVENUE
Existing Conditions
Central Avenue exhibits pronounced changes in grade and road alignment. Its eight percent slope into Collegetown encourages higher speeds among both motorists and bicyclists. Combined with a curvilinear form, this section of Central Avenue presents dangerous conditions between the Law Library addition and Snee Hall. At this point the curve of the road conceals pedestrians and bicyclists from view (Figure 19). The steep slope on the final stretch before the bridge contributes to high speeds of traffic entering the bottleneck of the Collegetown bridge/Performing Arts Center area. Public Safety reports four accidents have occurred along this roadway in the last five years.

Recommendations
The combined hazards of steep slope, substantial traffic volume, and reduced visibility indicate the need for Class II bike lane installation. Bus stops should be constructed with full pull-over space to reduce the chance of conflicts (see figure 13).

COLLEGETOWN
Existing Conditions
Presently, no other routes have been designated which lead into Collegetown from the surrounding environs. As an important residential and commercial center, this region deserves to be studied in greater detail for its potential as a collector of bicycle traffic.

Recommendations
Perhaps the university and city bicycle groups could cooperate in conducting a future study to solve Collegetown bikeway issues.

Figure 19 Central Avenue sloping at 8% before entering campus.
Recommendations for Bicycle Parking Facilities

Short-term bicycle parking
Bicycle parking facilities are an essential concern of any bikeway design. Poorly placed racks and "lollipops", or a general lack of bicycle facilities, present cyclists with little choice but to lock their bicycles to trees, stair railings, and other inappropriate facilities. To alleviate this problem, the bicycle project team recommends three basic steps:

1. Inventory existing facilities.
2. Monitor the bicycle parking situation continuously to determine when and where new facilities are needed
3. Implement new facilities.

Step one has been completed. This report includes a general inventory of existing campus facilities. Areas with inadequate bicycle parking were noted during the inventory process, and new facilities are recommended for these areas (see page 36).

Monitoring could be accomplished by various departments (Public Safety, Life Safety, Grounds, Transportation Services). Any inappropriately parked bicycles should be tagged with a warning/information tag similar to the one shown on page 40. Safety issues such as blocking stairways, handicapped accessways, doors, fire hydrants, etc., should be the only criterion for impounding bicycles. A file of locations where bicycles have been tagged,
should be kept and reviewed on a periodic basis. A high occurrence of tagging in one location will indicate the need for the implementation of new facilities. A request for design and implementation of the new facilities will then be sent to the appropriate department or committee for budgetary prioritization and implementation. Care should be taken to insure that new facilities do not detract from the visual qualities of the surrounding campus environment or impede grounds maintenance.

**Protected Bicycle Parking**

In addition to short term lock-up facilities, more secure, long-term facilities are needed for those who spend the bulk of their time in one area of campus or for those who drive to campus and wish to store their bicycle at an overnight parking facility. It is generally recommended that building managers allow full-time building occupants to store their bicycles inside their offices. If no room is available inside the building, a request for secure parking facilities should be made for implementation within a reasonable distance from an entrance to the building. These requests should be sent to an appointed department or committee for budgetary prioritization and implementation. When a sufficient number of requests has accumulated within an area of three or four proximal buildings, then the design and implementation of the new facilities should be considered. These facilities could be, for instance, bicycle lockers located in areas with ample lighting. Some suggested standards are on file at the Office of Facilities Engineering.
## Buildings in Need of Bike Parking - Summer 1991

<table>
<thead>
<tr>
<th>Rank</th>
<th>Building</th>
<th>Existing</th>
<th>Additional Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RPU</td>
<td>0</td>
<td>70 spaces</td>
</tr>
<tr>
<td>2</td>
<td>Clark Hall</td>
<td>28</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>Helen Newman/Dickson</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>Knight Lab/Phillips Hall</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>Roberts Hall</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>Schurman Hall</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>Willard Straight Hall</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>Mann Library</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>9</td>
<td>Morrill Hall</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>Sibley Hall</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>11</td>
<td>Teagle Hall</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>12</td>
<td>Upson Hall</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>13</td>
<td>Uris Hall</td>
<td>31</td>
<td>15</td>
</tr>
<tr>
<td>14</td>
<td>Kennedy Hall</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>15</td>
<td>Trillium Dining Hall</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>16</td>
<td>Town Houses</td>
<td>0</td>
<td>10/building</td>
</tr>
<tr>
<td>17</td>
<td>Bard/Kimball/Thurston</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>18</td>
<td>Biotech Building</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>19</td>
<td>Campus Store</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>Carpenter Hall</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>21</td>
<td>Hollister Hall</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>22</td>
<td>Insectary/Post Lab</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>23</td>
<td>Ives Hall</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>24</td>
<td>Malott Hall</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>25</td>
<td>McGraw Hall</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>26</td>
<td>Mudd/Corson Halls</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>27</td>
<td>Olin Hall</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>28</td>
<td>Sage Hall</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>29</td>
<td>Stocking Hall</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>30</td>
<td>Vet Research Tower</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>31</td>
<td>White Hall</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>32</td>
<td>Rockefeller Hall</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>33</td>
<td>Wilson Synchrotron</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>34</td>
<td>Bradfield Hall</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>35</td>
<td>Africana Studies</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>36</td>
<td>Alberding Field House</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>37</td>
<td>Anabel Taylor Hall</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>38</td>
<td>Boyce Thompson Institute</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>39</td>
<td>Comstock Hall</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>40</td>
<td>Federal Nutrition Lab</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>41</td>
<td>Fernow Hall</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>42</td>
<td>Gannett Health Center</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>43</td>
<td>Hughes Hall</td>
<td>32</td>
<td>5</td>
</tr>
<tr>
<td>44</td>
<td>Low Rise Eight</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>45</td>
<td>Morrison Hall</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>46</td>
<td>Myron Taylor Hall</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>47</td>
<td>Olin Library</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>48</td>
<td>Space Sciences Building</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>49</td>
<td>Tennis Bubble</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>50</td>
<td>Theory Center</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>51</td>
<td>Tobin Fieldhouse</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>52</td>
<td>Toxic Chemical Laboratory</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>53</td>
<td>Wing Hall</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>54</td>
<td>Emerson Hall</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>55</td>
<td>Warren Hall</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>56</td>
<td>Baker/Olin Hall</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>57</td>
<td>Plant Science Building</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>58</td>
<td>AD White House</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>59</td>
<td>Bailey Hall</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>60</td>
<td>Balch Hall</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
**Bicycle Parking**

**BACKGROUND**
Approximately half of Cornell's resident students own bicycles, requiring facilities for temporary parking near buildings, overnight secure storage near living units, and long-term storage for wintering over.

"Lollipop" bike rack—the accepted Cornell standard.

**DESIGN CONSIDERATIONS**
The standard fixture used in central campus is the "Lollipop" bicycle hitching post. These can be fabricated according to the illustrated detail or obtained commercially from the vendor listed on the following page. Non-standard rack styles relating to a particular building—Snee Hall, for example—are acceptable only in a material which will not require painting. Galvanized fixtures should be avoided because paint doesn't adhere to them.

Placement and orientation of bicycle racks should take into account their presence as a piece of architecture connected to a building. Racks should be placed to complement balance, symmetry and views to the buildings they serve. To avoid obstructing existing open areas, parking fixtures should be located to take advantage of underutilized or leftover spaces.

Opportunities for increasing parking include providing racks under the cover of building overhangs and designing fences so that bicycles can be conveniently secured to them. Visible, well-lit areas adjacent to activity nodes are especially appropriate locations.

Bicycle racks or hitching posts should be surrounded by mulch or hard surfacing and spaced at 30 inch intervals in groups of five or more.

Lollipop hitching posts should be painted "Yarnell Brown" to unify with other street furniture on campus.

**LONG-TERM STORAGE CONSIDERATIONS**
For long-term storage, bicycles require protection from the weather and more security from theft. New dormitory construction should program special space for a bicycle storage room. Present solutions involving outdoor storage in lockers are generally undesirable because lockers consume substantial ground area and become maintenance and security problems themselves. However, fresh designs addressing all related concerns are possible. Highly recommended is vertical storage in well designed units located either at the edges of existing spaces or enclosing new usable spaces.

Moveable bike racks are discouraged.

Non-standard racks that require painting cannot be recommended.
Bicycle Parking

LOLLIPOP BICYCLE RACK INSTALLATION DETAILS

Proper installation techniques are critical. Although well located, these racks near Schoellkopf Field show signs of incorrect fabrication and installation.

Because these racks at Biotechnology were not installed perpendicular to the wall, they are awkward to use.

RESOURCES

For more information on bicycle parking at Cornell, contact:

Department of Public Safety ......................... 255-1111

Lollipop bicycle racks can be purchased from:

Bicycle Parking Systems
P.O. Box 64, 6 N 310 Neva Terrace, Itasca, IL 60143
Phone (312) 773-9344 Type: Cycle-Gaard #100
Future Actions

This plan is merely the first step in the creation of a comprehensive bikeway system. It focuses on one of the previously mentioned three elements of a complete system (see page 9): physical planning and design. Many issues still need to be resolved, and many decisions will have to be made before the bikeway system can progress from its current embryonic state to full implementation. What follows is a brief introduction to the most pressing issues associated with the other two elements (rules and regulations, and safety education and promotion), as well as an outline of the next phase of the physical planning and design program.

Rules and Regulations

Rules and regulations can be subdivided into three categories; those that govern the parking of bicycles, those that address the operation of bicycles, and, finally, rules and regulations pertaining to the registration of bicycles.

PARKING

Definition

- There is a need to clearly communicate to the bicycling community where bicycles may be parked. For example, there is some question as to whether bicycles should be allowed inside buildings.

- At present, several departments share responsibility for bicycle parking, and this frequently results in different interpretations of what is legal. The Office of Transportation Services is responsible for all matters pertaining to parking for motor vehicles, and seems to be the ideal candidate to assume a similar role for bicycle parking.

- There is a need to establish a fine structure for infractions, similar to the one that currently exists for automobile parking violators.

Enforcement

- At present, the Department of Life Safety Services is responsible for the enforcement of bicycle parking violations (bicycles secured to trees, stair railings, or other inappropriate devices). However, the Office of Transportation Services is responsible for the enforcement of automobile parking regulations on campus, and is involved in this type of procedure to a much greater extent than Life Safety. It might be more efficient to house this operation under one department. (See proposed hang-tag on page 40).
NOTICE

Your bike is parked in an inappropriate location and may be subject to removal.

Cornell is committed to providing a

Safer,
Healthier
Environment.

Please do your part by:

1. Locking your bike to appropriate facilities
2. Observing the rules of the road (and campus)
3. Being courteous to pedestrians, motorists, and other bicyclists

A Bikeway system is being installed on the Cornell campus. It will take some time for implementation to be completed. If you would like to learn more about the Cornell Bikeway, biking in general, or would like to register your bike, ride on over to:

Department of Public Safety
G-18 Barton Hall
8:00 a.m. - 3:30 p.m.

Please indicate the location of parking deficiency and return this tag via Campus Mail.
Appeals
• There is a need for an appeals process, similar to the one that exists for automobile parking violators.

OPERATION
Definition
• Whereas everyone who drives an automobile in the state of New York has had to pass both a written examination and a driving test in order to obtain a license, no such examinations are required for those who wish to ride a bicycle. As a consequence, people frequently ride in ways that endanger both themselves and others.

• There is very little in the campus code of conduct dealing with the operation of bicycles on campus. There is a great need for clear definitions. For instance, should bicyclists be allowed to ride on sidewalks, or should they be required to dismount?

Enforcement
• The agency responsible for enforcing moving violations on campus needs to be determined. Likely candidates are the Department of Public Safety, and the Office of Transportation Services.

Adjudication
• A formal process needs to be established for dealing with the determination of fines and penalties for various infractions, and the hearing of infractions before a university committee or board instilled with the authority to pass judgement. This might be handled by the Office of the Judicial Administrator.

REGISTRATION
Definition
• Some determination needs to be made as to whether a formal registration process should be established. If yes, should the university and the three municipalities (City of Ithaca, Town of Ithaca, and Village of Cayuga Heights), within whose boundaries the university resides, establish a common procedure?
- Is the lollipop design an adequate bicycle parking facility, or should a new standard be created?
- In what ways can construction materials and grade changes be utilized to demarcate bike lanes from automobile lanes?

The one other issue pertaining to physical infrastructure that needs immediate attention is the determination of which department at Cornell is to be responsible for maintaining the bicycle network. The Grounds Department maintains most of the existing physical infrastructure on campus, and appears to be the most likely candidate to take care of bicycle facilities.
Proper installation techniques are critical. Although well located, these racks near Schoolkop Field show signs of incorrect fabrication and installation.

Because these racks at Biotechnology were not installed perpendicular to the wall, they are awkward to use.

RESOURCES
For more information on bicycle parking at Cornell, contact:

Department of Public Safety: 255-1111
Lollipop bicycle racks can be purchased from:
Bicycle Parking Systems
P.O. Box 64, 6 N 310
Neva Terrace, Itasca, IL 60143
Phone (312) 773-9344
Type Cycle-Gaard #100

FILE NO. 301
Future Actions

This plan is merely the first step in the creation of a comprehensive bikeway system. It focuses on one of the previously mentioned three elements of a complete system (see page 9): physical planning and design. Many issues still need to be resolved, and many decisions will have to be made before the bikeway system can progress from its current embryonic state to full implementation. What follows is a brief introduction to the most pressing issues associated with the other two elements (rules and regulations, and safety education and promotion), as well as an outline of the next phase of the physical planning and design program.

Rules and Regulations

Rules and regulations can be subdivided into three categories; those that govern the parking of bicycles, those that address the operation of bicycles, and, finally, rules and regulations pertaining to the registration of bicycles.

PARKING

Definition

- There is a need to clearly communicate to the bicycling community where bicycles may be parked. For example, there is some question as to whether bicycles should be allowed inside buildings.

- At present, several departments share responsibility for bicycle parking, and this frequently results in different interpretations of what is legal. The Office of Transportation Services is responsible for all matters pertaining to parking for motor vehicles, and seems to be the ideal candidate to assume a similar role for bicycle parking.

- There is a need to establish a fine structure for infractions, similar to the one that currently exists for automobile parking violators.

Enforcement

- At present, the Department of Life Safety Services is responsible for the enforcement of bicycle parking violations (bicycles secured to trees, stair railings, or other inappropriate devices). However, the Office of Transportation Services is responsible for the enforcement of automobile parking regulations on campus, and is involved in this type of procedure to a much greater extent than Life Safety. It might be more efficient to house this operation under one department. (See proposed hang-tag on page 40).
NOTICE

Your bike is parked in an inappropriate location and may be subject to removal.

Cornell is committed to providing a

Safer,
Healthier
Environment.

Please do your part by:

1. Locking your bike to appropriate facilities
2. Observing the rules of the road (and campus)
3. Being courteous to pedestrians, motorists, and other bicyclists

A Bikeway system is being installed on the Cornell campus. It will take some time for implementation to be completed. If you would like to learn more about the Cornell Bikeway, biking in general, or would like to register your bike, ride on over to:

Department of Public Safety
G-18 Barton Hall
8:00 a.m. - 3:30 p.m.

Please indicate the location of parking deficiency and return this tag via Campus Mail.
Appeals
- There is a need for an appeals process, similar to the one that exists for automobile parking violators.

OPERATION
Definition
- Whereas everyone who drives an automobile in the state of New York has had to pass both a written examination and a driving test in order to obtain a license, no such examinations are required for those who wish to ride a bicycle. As a consequence, people frequently ride in ways that endanger both themselves and others.

- There is very little in the campus code of conduct dealing with the operation of bicycles on campus. There is a great need for clear definitions. For instance, should bicyclists be allowed to ride on sidewalks, or should they be required to dismount?

Enforcement
- The agency responsible for enforcing moving violations on campus needs to be determined. Likely candidates are the Department of Public Safety, and the Office of Transportation Services.

Adjudication
- A formal process needs to be established for dealing with the determination of fines and penalties for various infractions, and the hearing of infractions before a university committee or board instilled with the authority to pass judgement. This might be handled by the Office of the Judicial Administrator.

REGISTRATION
Definition
- Some determination needs to be made as to whether a formal registration process should be established. If yes, should the university and the three municipalities (City of Ithaca, Town of Ithaca, and Village of Cayuga Heights), within whose boundaries the university resides, establish a common procedure?
Promotion and Safety Education
In terms of safety education and promotion, the immediate goal involves the collection and communication of information.

- Information to be disseminated to the Cornell community will consist of the yet-to-be established rules and regulations mentioned above, as well as safe riding procedures, the locations of designated bicycle routes and bicycle parking, and promotional literature encouraging bicycle riding. One possible vehicle for the dissemination of this information would be a folding map, with text on the reverse side. Such a map could be distributed to all incoming students, and faculty and staff.

- Information targeted at specific audiences who interact with bicyclists on a professional basis, such as bus drivers and public safety officers, will be intended to increase their awareness of the presence of bicyclists, and to provide solutions to common, everyday problems involving bicyclists. This information could be communicated in training sessions.

- Information that needs to be collected includes improved accident report data. If accurate information is available, it will be possible to determine what roles various factors, such as physical design, signage, rules and regulations, or weather, played in the accident. With this knowledge, changes could be made to ameliorate hazardous situations.

Physical Design, Planning, and Maintenance
The physical component of the bikeway system is at a much more advanced stage of development than either of the other two components (rules and regulations, or safety education and promotion). In fact, approximately 60 percent (measured in linear feet) of the proposed bicycle network is either already constructed or in design phase (see map #8 on page 43). Because of this, the issues that need to be resolved in this area tend to be site specific design details. For instance:

- What are the lighting requirements for bikeways?
- What, if any, kind of roadside parking (perpendicular, parallel) can be placed next to bike lanes?
- What signage is necessary, and to what graphic specifications does signage need to adhere?
- What are the criteria for dismount zones? For caution zones?
• Is the lollipop design an adequate bicycle parking facility, or should a new standard be created?

• In what ways can construction materials and grade changes be utilized to demarcate bike lanes from automobile lanes?

The one other issue pertaining to physical infrastructure that needs immediate attention is the determination of which department at Cornell is to be responsible for maintaining the bicycle network. The Grounds Department maintains most of the existing physical infrastructure on campus, and appears to be the most likely candidate to take care of bicycle facilities.
## Future Actions Time Line

These start and end times are approximate.

<table>
<thead>
<tr>
<th>Physical Planning &amp; Design</th>
<th>1992</th>
<th>1993</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAST AVENUE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOWER ROAD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PARKING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Rules & Regulations

- Definition
- Committee Approval
- Implementation

### Education & Promotion

- Map with Bike Routes & Regulations
- Fall Registration
- Bus Driver Training
Conclusion

Although this plan is specific to Cornell University, the procedure that was followed, and the issues that were addressed, are germane to any university or small municipality embarking upon the bicycle planning process. In retrospect, several valuable lessons were gleaned from this experience.

First, perhaps the most important phase in the planning of the physical network is the initial one: data collection. The importance of finding out what is “out there” in terms of existing infrastructure, popular bicycling routes, accident types and locations, and the needs and wants of the population being planned for, cannot be over emphasized.

Second, every effort should be made to contact and work with organizations that are creating bicycle plans for adjacent areas. There are several bicycle planning groups which are focusing on the area surrounding and beyond the Cornell campus. The Tompkins Coalition for Bicycle Transportation was formed to insure that the Cornell Bicycle Project team and the other groups would meet on a regular basis. The ultimate objective is a unified and cohesive bicycle network that encompasses the aggregate area of all the groups.

Finally, the physical component of a comprehensive bicycle network is not a solution in and of itself. Rules and regulations, and safety education and promotion, although only alluded to in this report, play an equally vital role.

It is hoped that the experience gained by the Cornell Bikeway Project team can benefit other universities, and that this document can serve as a model. To further this purpose, it will be made available to all interested parties upon request.
Bicycle Access to Cornell University

Popular current approaches
Roadways/intersections requiring further examination
Map #10
Endnotes

2 The following passage was taken from the preface to the Ad Hoc Bicycle Committee - Final Report, 1991.
3 Cornell Ad Hoc Bicycle Committee Policy and Recommendations, Section IV: Recommendations.
5 These regions follow the same boundaries as the campus zones established in the Campus Development Guidelines -Cornell University, published by the Cornell Campus Planning Office, 1985.
6 This map indicates roads traveled by greater than 30 percent of survey respondents. Information on road use is provided in the Cornell Bicycle Survey.
7 The roads on this map were traveled by greater than 20 percent of survey respondents. Information on road use is provided in the Cornell Bicycle Survey.
8 See Cornell Field Survey and Bikeway Recommendations for a detailed report on road corridor conditions.
9 Although this segment of bikeway follows Ithaca city streets, it is recognized as a principal route leading to campus from the north. The Cornell Bikeway Project team has therefore included it within the scope of its study with the hope that it may generate discussion amongst members of the Tompkins Coalition for Bicycle Transportation.

BICYCLE - A vehicle having two tandem wheels, propelled solely by human power, upon which any person or persons may ride.

BICYCLE FACILITIES - A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling, including parking facilities, maps of bikeways, and shared roadways not specifically designated for bicycle use.

BICYCLE LANE (BIKE LANE) - A portion of a roadway which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

BICYCLE PATH (BIKE PATH) - A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way.

BICYCLE ROUTE (BIKE ROUTE) - A segment of a system of bikeways designated, by the jurisdiction having authority, with appropriate directional and informational markers, with or without a specific bicycle route number.

BIKEWAY - Any road, path, or way which in some specific manner is specifically designated as being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

BIKEWAY SYSTEM - A network of bikeways and parking facilities complete with policies pertaining to regulations and enforcement; education and promotion; system management; and physical maintenance.

HIGHWAY - A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.
RIGHT-OF-WAY - 1. A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to transportation purposes. 2. The right of one vehicle or pedestrian to proceed in a lawful manner in preference to another vehicle or pedestrian.

ROADWAY - The portion of the highway, including shoulders, for vehicular use.

SHARED ROADWAY - Any roadway upon which a bicycle lane is not designated, and which may be legally used by bicycles, regardless of whether such facility is specifically designated as a bikeway.

SIDEWALK - The portion of a highway designed for preferential or exclusive use by pedestrians.
APPENDIX B
Overview

The first phase of the Cornell Bikeway Project involved a careful assessment of the Cornell Bicycle Survey, which was conducted in the Fall of 1990. The Cornell Ad Hoc Bicycle Committee designed the survey to explore bicycling conditions on the Cornell campus. Although the survey does not strictly adhere to rigorous scientific procedures, it provides a wealth of data about the preferences and behavior of cyclists on campus. The survey was distributed to a broad cross section of the campus population. Of the 3000 surveys distributed, 402 were returned (a return rate of 13.4 percent). Insights gleaned from the data provided direction for the Cornell Bikeway Project, and a basis for the project team's recommendations.

Interpreting the Survey

The procedure divided tabulation into three parts:

1. Tabulation of the multiple-choice questions.
2. Analysis of the two “rank questions,” those which required the respondent to place, in order of importance, a sequence of items.
3. An assessment of the “mapped questions,” where the respondent was required to indicate his or her most frequently traveled route and destinations, and the most significant perceived hazards.

In addition, many individuals chose to comment on certain bicycle-related issues, the survey's format, particular questions, and on the bicycling situation in general. These remarks are included at the end of this appendix.

Survey Results

The results of the multiple-choice questions were quantified by the percentage of respondents answering the question, and, secondly, according to the relative responses to each choice. The ranking questions were evaluated by tabulating the number of times that respondents chose an item for “number one” status. These results are displayed graphically.

1. Are you a(n)?

   
   89 / 402  22.1% Undergraduate
   187 / 402  46.5% Graduate
   54 / 402  13.4% Faculty
   72 / 402  17.9% Staff

   Rate of Response to Question: 100%
Bicycle and Pedestrian Survey
January 1991

The Cornell Ad Hoc Bicycle Committee is gathering information and making recommendations to the Cornell administration about bicycling on campus. Please help us make sound recommendations for a more bicycle-friendly community. Even if you do not bicycle, your comments as a pedestrian are helpful. Please prioritize your response (if you check more than one box) and we invite you to add comments as needed. Please return the survey and map to the Campus Planning Office by Campus Mall.

Are you an:
- Undergraduate
- Graduate Student
- Faculty
- Staff

Are you a bicyclist on the Cornell Campus? (Check all that apply):
- No, I am not interested in bicycling.
- No, but I have thought about it.
- Yes, I live on campus and use a bike to get around campus.
- Yes, I live in the Ithaca area and travel by bike to and from campus.
- Yes, I bike my bike in an automobile and travel by bike around campus.
- Yes, I bike on campus, but take mass transit to and from campus.
- Other (please explain)

Have you been involved in a bike-related accident?
- Yes
- No

If yes, check all that apply.
- was a:
- Cyclist
- Pedestrian
- Motorist

The accident involved a:
- Pedestrian
- Motor Vehicle
- Cyclist
- Myself

Required:
- Minimal medical attention
- Emergency room treatment
- Hospital admission

Was reported to:
- Campus/Town, City Safety or Police Department
- Cause of accident or other comments:

As a bicyclist, do you obey traffic laws?
- Yes
- No

How often do you bicycle? (Check all that apply):
- Daily
- Weekly
- Monthly
- Yearly

I bicycle during the following seasons:
- Summer
- Fall
- Winter

Is your bike registered with either Campus Public Safety or the City of Ithaca?
- Yes
- No

Do you wear a bicycle helmet?
- Yes
- No

What do you consider the major obstacles to bicycling on campus? Rank in priority, number 1 being the highest and 6 being the lowest:
- Danger from vehicles
- Inadequate infrastructure (i.e., poor road surfacing, no bike storage, routing problems, ...)
- Conflicts with pedestrians
- Weather conditions
- Hilly Topography
- Inconvenience (please explain)

Which of the following would improve the bicycling environment on campus? Rank in priority, number 1 being the highest and 6 being the lowest:
- Improve roadway conditions
- Provide bike lanes on roads.
- Provide bike-only paths.
- Limit some walkways to pedestrians only.
- Enforce existing laws for motorists and bicyclists.
- More bike parking facilities near major destination points.
- More weather protected parking facilities near student dorms.
- Access to shower facilities.
- Provide maps and education for bicyclists and motorists

Would you be interested in protected bike storage on campus?
- Yes
- No

If yes, would you be willing to pay a rental fee?
- $20/semester
- $50/semester
- $100/semester
- Other

On the map please mark:
- Where you live
- Where you work or school
- Where you go most frequently
- Where your most frequent destination (screw in pen to mark point)
- Where you park your bike
- Where accidents have occurred
- Areas where you feel unsafe

Draw a line on the route you travel most often. Where do you feel safest and least safe? Why?

57
2. Are you a bicyclist on the Cornell campus?
   23 / 402  05.7% No, I am not interested ...
   80 / 402  20.0% No, but I have thought ...
   47 / 402  12.0% Yes, I live on campus ...
   231 / 402  57.5% Yes, I live in the Ithaca ...
   19 / 402  04.7% Yes, I bring my bike ...
   6 / 402  01.5% Yes, I bike on campus ...
   29 / 402  07.2% Other
Rate of Response to Question: 100%

3. Have you been involved in a bike-related accident?
   106 / 400  26.5% Yes
   294 / 400  73.5% No
Rate of Response to Question: 99.5%
(This question referred to any accident, not just those which may have occurred at Cornell.)

4. If "Y":
   I was a:
   94 / 98  95.9% Cyclist
   4 / 98  04.1% Pedestrian
   0 / 98  00.0% Motorist
Rate of Response to Question: 92.5%

   The accident involved a:
   9 / 79  11.4% Pedestrian
   4 / 79  05.1% Motor vehicle
   15 / 79  19.0% Cyclist
   51 / 79  64.6% Self
Rate of Response to Question: 74.5%

   Required:
   72 / 94  76.6% Minimal medical
   19 / 94  20.2% Emergency room
   3 / 94  03.2% Hospital admission
Rate of Response to Question: 88.7%
Was reported to:
22 / 71  31.0%  Campus, town/city . . .
49 / 71  69.0%  Cause of accident/comments
Rate of Response to Question: 67.0%

5. As a bicyclist, do you obey traffic laws?
315 / 353  89.2%  Yes
38 / 353  11.0%  No
Rate of Response to Question: 88.0%

6. How often do you bicycle?
199 / 374  53.2%  Daily
105 / 374  28.1%  Weekly
70 / 374  19.0%  Monthly
Rate of Response to Question: 93.0%

7. I bicycle during the following seasons
317 / 375  84.5%  Spring
329 / 375  87.7%  Summer
320 / 375  85.3%  Fall
109 / 375  29.1%  Winter
Rate of Response to Question: 93.3%

8. Is your bike registered with Public Safety or the City of Ithaca?
68 / 359  19.0%  Yes
291 / 359  81.1%  No
Rate of Response to Question: 89.3%

9. Do you wear a bicycle helmet?
207 / 358  58.0%  Yes
151 / 358  42.2%  No
Rate of Response to Question: 89.1%
10. Major obstacles to biking on campus
Percentage of times each line was ranked number one:

- 30% Vehicles
- 28% Inadequate infrastructure
- 10% Pedestrians
- 17% Weather
- 11% Hills
- 4% Inconvenience

Rate of Response to Question: 88.0%

Ranking of Major Obstacles to Bicycling

- Danger from Vehicles
- Inadequate Infrastructure
- Conflicts with Pedestrians
- Weather Conditions
- Hilly Topography
- Inconvenience

Number of "Rank One" Responses
11. Ranking of bicycling environment improvements
Percentage of times each line was ranked number one:

- 13% Improve roads
- 45% Provide lanes
- 20% Provide paths
- 2% Limit some walks to pedestrians only
- 5% Enforce bike/auto laws
- 10% More bike parking
- 2% More weather protected parking
- 1% Shower access
- 1% Provide maps and education

Rate of Response to Question: 93.0%
12. Would you be interested in weather-protected bike storage?
   228 / 377  60.5%  Yes
   149 / 377  39.5%  No
   Rate of Response to Question: 94.0%

13. If yes, would you be willing to pay a rental fee?
   106 / 216  49.1%  $20/semester
   0 / 216    00.0%  $50/semester
   110 / 216  50.9%  Other
   Rate of Response to Question: 53.7%
**Respondent Mapping Questions**

The survey asked the respondents to indicate their most frequently traveled campus routes, most visited destinations, and the most hazardous campus areas. To facilitate this evaluation, each segment of the campus road network was given an alphabetical designation: R (road)A, RB, RC, RAA, RBB (see Map 12). The respondent's routes were processed by marking each segment that the route incorporated, producing a tally of usage. A similar method was used for the hazard areas and destinations. Once the information had been collected, a bar-graph was produced to display the results graphically. The usage levels of the road segments were color-coded and transferred to a map of the campus (Map 12); likewise, the hazard areas ranked according to the frequency of occurrence were color-coded (Map 13). Viewing the data, presented in this way, one can immediately assess some important factors that will influence bikeway planning at Cornell.

**Frequency of Road Use**

The following bar graphs indicate the level of road use for each segment. The most heavily traveled campus roads are obvious when compared to the other routes. This information is crucial when deciding on bikeway improvements and
primary routes between regional traffic generators. A color-coded map (Map 12) labeling the various routes may be found at the end of this section. A brief review of the color code reveals an emerging pattern. The roadways exhibiting the most consistent patterns of use (in red) recorded a frequency rate greater than 24 percent. They radiate from Central Campus out to the Veterinary College, North Campus, and Collegetown.

**Frequency of District Use**
The following bar graphs indicate relative levels of district and bridge use within the campus vicinity. Any length of travel occurring within the boundaries of the district was counted. Any length of travel occurring along the roads bordering the district was not counted. This information helped the project team focus on specific areas which may require additional facilities for bike parking or may suffer internal pedestrian/bicycle conflicts. All recommendations regarding dismount and cautionary zones are based, in part, on the relative numbers in each district. A color-coded map labeling the various districts has been provided at the end of this chapter (Map 14).

**Hazardous Campus Areas**
Information retrieved on hazardous campus areas was graphed as well.
These graphs include the names of streets and buildings located closest to the hazardous position and the number of times each spot was marked. These numbers are also indicated on the color-coded map at the end of this chapter (Map 13). This map reveals patterns that require closer attention. For example, Triphammer Road, East Avenue, and Campus Road exhibit high levels of marked hazards along extended distances while Judd Falls Road indicates specific intersections only. This indicates a need to further explore the conditions along the entire route in the first case, or at the specific intersections in the second. An overlay of the hazards occurring along entire routes on the most frequently traveled routes shows some of the patterns coinciding.

**Traffic Generators**

The survey asked respondents to mark their residences and most frequent destinations. To process this information, the campus was divided into regions. Each mark occurring within a given region was counted. Totals were converted into graph form. Clearly, Central Campus generates the majority of campus bicycling traffic. If we compare this information with the frequency of road use data, we see Central Campus as a hub—the center from which traffic lines radiate. To assess the peripheral
traffic generators relative to each other, a separate graph was produced. Again, this information becomes valuable in deciding specific routes for bikeway improvements. For instance, those leading from North Campus and Collegetown carry the greatest numbers of cyclists.

Role of the Survey
The Cornell Bicycle Survey helped direct the project team's attention to the high bicycle traffic concentration and hazardous location areas on campus. It also revealed the toughest problems facing cyclists in the campus environment. This information enabled the Cornell Bicycle Project team to take an informed approach to determining the specific road segments and districts which deserve primary examination. Future, more extensive, bikeway planning efforts can also use this information to focus on the balance of the campus transportation infrastructure.
Bike Survey Comments

The following are unsolicited comments written on the back of the survey form:

- Tower Road needs a bike lane!
- Extend the Ithaca Recreation Way beyond the backyard of the building into which it dead ends.
- Poor road condition, i.e. potholes and cracks, force bicyclists to become unpredictable in their maneuvers.
- Very inadequate bike parking on campus.
- Bicycles on pedestrian walkways are a major hazard to pedestrians and a possible source of liability for the University.
- Provide weather-protected bike parking facilities near major destinations.
- Involved in an accident requiring emergency room treatment due to enormous pothole on Tower Road.
- If you're trying to encourage bicycle use on campus, charging for bike storage would be counterproductive.
- Bikes are too prone to vandalism if they must be locked outside.
- Bicycles should not be allowed on sidewalks, especially on Libe Slope.
- My experience with bike lanes in other cities has been that they are primarily designed to keep bikes off the roads, for the benefit of motorists.
- Most bike-commuters have a bike-racer mentality and irritate a lot of motorists as well as endanger themselves.
- Loop/Lollipop bike locking devices are poorly designed: loop is too wide to get certain locks around it, and they scratch the paint.
- Involved in accident (emergency room) with automobile due to narrow roads on campus.
- Poor drainage on roads makes riding along shoulders difficult.
- Involved in accident where left-turning motorist failed to see oncoming bike. Bike hit side of car, rider "did a 'superman' . . . over the hood of his car."
- Bikes do not have any suspension; therefore, potholes are very dangerous. One of the worst sections on campus is Sisson Place, which would "make any competent civil engineer weep tears."
- Section of road between Balch Hall and Entrepot has large potholes, poor drainage; needs new surface.
- Would be willing to pay a rental fee for weather-protected bike storage if it were located adjacent to the Arts Quad.
- Cornell should ban all parking (except service and handicap) and get cars off campus.
- Involved in an accident where slippage was caused by wet “smooth” concrete.
- Tower road is terrible.
- I caution you on over-enforcement of traffic laws against bicyclists; bicyclists typically ride under a set of rules to maximize their safety, not obey the law.
- Certain types of drainage grates are dangerous.
- The greatest hazards for people riding their bikes to Cornell are the approach roads: Warren Road, Route 366, Judd Falls Road, Dryden. This is due to higher speeds and less room on the shoulders (especially Dryden Road, Judd Falls Road, and Warren Road).
- Thanks for seeking input from the community... it's very unusual for Cornell to be concerned with real peoples' needs.
- Bookstore needs a bike rack.
- Map on survey form totally unreadable.
- I am very interested in this project; traffic volume must be reduced on campus for both environmental and safety reasons. As a member of UAW/GAO, however, I worry that any findings here could be used by the administration to justify their current regressive parking policies. Cornell should reduce the amount of local (student/faculty) auto traffic by encouraging cycling and mass transit. The bulk of staff personnel, due to Cornell’s criminally low wage scale, live out of town and need their cars and parking spaces.
- It's safer to ride on sidewalks, even though illegal. A particularly bad area is the stretch on Campus Road near Anabel Taylor Hall; very tight.
- Road behind Libe Slope behind Willard Straight narrow and heavily congested.
- Puddles on Tower Road are particularly bad.
- Campus needs better storage and safer routing.
- Need more facilities for locking bikes, especially near library.
- Surveys such as this should have come out years ago.
- A major problem is the lack of obedience on the part of cyclists regarding rules of the road.
- Find it hard to believe that Cornell/Ithaca offers no bike trails, and is characterized by narrow roads, and poor shoulder conditions.
- I consider safety of pedestrians in crosswalks a major issue.
- Need lockup facilities at Alberding Fieldhouse.
- Place ramps alongside staircases so that bicyclists can walk their bikes up; has been implemented with success at Wesleyan University.

- Cars frequently do not yield right-of-way to bikes; many drivers do not consider bikes legitimate vehicles.

- Bikes must be allowed on sidewalks as long as safety on the roads is lacking.

- The campus is poorly accessible to the physically handicapped. There are stairs where a ramp could have been used. Changing this situation will also improve bike-ability.

- I ride on sidewalks because it is safer than narrow, crowded streets.

- I’d be happy to lock my bike to something that is not a railing.

- Thanks for finally asking; hope something happens now!

- Pedestrians do not watch out for bikes when traversing traffic lanes.

- Bikes are vehicles and belong on roads; only ignorant cyclists are on sidewalks.

- More weather-protected bike storage is needed; perhaps convince Public Safety that storing bikes under stair wells is not a fire hazard, as they maintain. This is wasted space.

- My Least Favorite Hazards:
  - Section of road in front of Entrepot; supposed to be one-way. Many motorists and cyclists ignore this, creating a head-on collision hazard.
  - Intersection of Judd Falls Road and Plantations Road (at overpass/underpass): poor pavement conditions, steep slope, narrow road width. “Washboard” condition on Judd Falls Road as it crosses over Plantations Road.
  - Bikes zipping across Arts Quad, not checking cross traffic at intersections.
  - Sisson Place; in horrible shape.

- Students/staff need to be educated regarding bicycle use and operation; there is no excuse for riding against traffic, through red lights, and on walkways.

- Repair the edges of roads; a bicyclist cannot ride safely on decayed road shoulders/edges.

- If bicyclists obeyed the law, cars and pedestrians would know what to expect from them.

- The lollipop bike lockups are a stupid idea; they scrape all the paint off the frame.

- I shower at Teagle; this seems to work fine.

- Since moving to Ithaca I have ceased using my bike. Most of the roads on campus have no bike lanes and are relatively narrow. I used to ride between 10 and 125 miles a week.
• Improve road shoulders, at least on the major funnel points, i.e. Judd Falls Road from East Hill Plaza to Route 366.

• As a pedestrian, I have almost been run down many times by bicyclists, especially on the walkway between Olin Library and Willard Straight Hall. I hope you pass/enforce a rule that bicyclists must walk their bikes in heavily traveled pedestrian areas.

• Pave road edges better.

• More bike racks are needed.

• Enact and enforce a local ordinance requiring front and rear lights on bikes after dark; as a motorist, I have come close to hitting unlighted bikes at night.

• I ride on the widest side of the road, whether or not it is the proper side. If the road is too dangerous, I ride on the sidewalk.

• Auto traffic on campus frequently exceeds posted/safe speed limits, especially on downhill sections. This, as well as narrow roads and high curbs make bicycling very hazardous.

• Lighting for bicycles is inadequate on many campus roads.

• Getting a bike up the staircases leading across the suspension bridge is a nightmare.

• A rental fee for protected bike storage is unreasonable; as a biker, I am doing a service to the community and the environment. I should not be asked to pay for this. Bike riding should be encouraged on campus.

• I usually walk, but when I'm feeling particularly masochistic, I bike to campus.

• The biggest problem for me is the lack of bike paths off-campus, specifically on Routes 366 and 13. Bicycling anywhere near cars in the dark or in poor weather is just too dangerous.

• Poor road-edge surface on Garden Avenue near Barton Hall and ILR.

• Cars parked too close to corners make visibility of oncoming traffic extremely difficult (i.e. at the intersection of Thurston and Fall Creek Road).

• Narrow roads cause problems for all vehicles.

• To much on-campus traffic.

• Exhaust and noise from campus buses is terrible.

• Clear gravel and debris off shoulders.

• Enforce existing laws for cyclists.

• It is much more pleasant to walk on campus, given the current conditions.

• Motorists parking along College Avenue open their doors without looking; pedestrians cross College Avenue without regard to bikes.
The intersection of Judd Falls Road and Route 366 is impossible to deal with safely on a bicycle.

Steel bridge grates are extremely dangerous for cyclists.

Responsible cyclists and pedestrians can co-exist together on any path. I will not obey any of Cornell’s “No Bicycle” designations.

In good weather, there is insufficient parking in the courtyard between Clark Hall and Baker Lab.

No room for bikes on Warren Road as it approaches Forest Home and Fall Creek.

Warren Road lacks a good shoulder.

Pavement at Triphammer/Thurston intersection is in poor condition.

Problems:
- the edges of Tower Road
- bus exhaust/noise
- intersection of Judd Falls Road and Plantations Road

Suggestions:
- use signs indicating bikeway, bicycle priority
- painted bike lane markers are very helpful psychologically

Emissions from CU Transit buses are horrible.

I’d like to see all of central campus rid of automobiles. The recent construction has proven that we can get along without cars on East Avenue; let’s keep it that way.

Protected bike parking should be well-distributed, not just one central facility.

More racks!

Roads too narrow.

Poor parking/storage facilities.

The largest danger to bikers on campus are the bikers. If there were more (public transportation) shuttles, we wouldn’t need our own wheels. Bikes on campus use pedestrian walkways, which is against the law. Cars ignore bikers, who ignore them, and so do the pedestrians. Need bike-designated paths on campus. Ban private motor vehicles and set up small shuttles or bike-powered rickshaws.

If the bicycling environment in Ithaca were more “user-friendly”, I would cycle to work for a larger part of the year.

Need bike routes on Warren Road.

Principal inconvenience arises from having to learn where bikes can get through and the locations of stairs to avoid.

Thanks for this survey—a great effort.