FACILITIES AND SERVICES NEEDED TO SUPPORT BICYCLE COMMUTING INTO CENTER CITY PHILADELPHIA

A report by the Philadelphia Bicycle Coalition
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R.B.H.

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FINDINGS AND RECOMMENDATIONS

(1) Since 1970 there has been a marked increase in injuries caused by collisions between bicyclists and motor vehicles in Philadelphia. The overall increase is 61% between 1970 and 1972; but for youth (ages 15-19) the increase is 121%, and for adults (20 and over) it is an alarming 260%.

(2) Among the factors which inhibit them from using the bicycle for commuting, motorists surveyed in Center City cited three as the most important: lack of safety in traffic, adverse weather conditions, and excessively long travel time. Two other factors were cited somewhat less frequently: lack of secure bike parking at the destination, and the need for excessive effort (cited chiefly by older respondents).

(3) In the survey of Center City motorists, 33% of the entire group said they are bicycle owners. Bike ownership tends to be correlated with youth: of those respondents under age 25, 50% own bicycles; between ages 25 and 34, the rate was 36%. Of the bicycles owned, 79% have three or more speeds. These figures accord well with recent national estimates that more than 70 million bicycles are now in use throughout the country.

(4) Of the bike owners in the survey, 38% said they were likely to use their bicycles for commuting if safe bikeways and secure bike parking were available. Of the non-owners, 17% said they would buy bikes and use them for commuting if there were bikeways and bike parking. In both groups, the positive response was significantly higher among the younger respondents.

(5) A review of the Weather Service's records for the past ten years shows that in Philadelphia it is feasible to use a bicycle on 85% to 88% of the days during the year (assuming that 1/2 inch or more of rain in a 24 hour period, or any amount of snow or ice, will make biking infeasible on that day).

(6) Experience with bike lanes and other bikeways elsewhere suggests that cyclists tend to prefer the shorter more direct routes, even if these are more heavily traveled, to the longer more circuitous routes.

(7) Experience in other countries suggests that the safest conditions for heavy bicycle traffic are created by a complete separation, so far as possible, between bicycles and motor vehicles. However, with certain exceptions such a solution is not feasible in a built-up area like Philadelphia. The most feasible solution here is likely to consist of a system that combines on-street lanes reserved for bikes, some minor streets reserved for bikes during specified hours, the conversion of some park roads to bicycle traffic, and the education of both motorists and bicyclists to be more careful, mutually considerate, and law-abiding in sharing roads and streets.

(8) The use of sidewalks for bicycling causes potential conflict between bikers and pedestrians and is generally to be avoided. (It is now illegal under the Philadelphia Code.) However, in some special areas, where a right-of-way cannot safely be shared by autos and bikes, a sidewalk may be converted into a bikeway with appropriate markings, ramps, and so on.

(9) Three methods of bicycle parking are promising for Center City use. One is the bike locker, similar to a baggage locker, for which a rental charge would be made. A second is the hitching post, with a built-in heavy duty chain, in garages or outdoors. A third is the provision of bike parking in basements or utility spaces of Center City buildings for cyclists who work in those buildings.

(10) According to the 1970 Census, 44% of those who work in Center City live within 6 miles of City Hall. Six miles over flat terrain is considered easy bicycling distance and can be covered by the average cyclist in 30 minutes or less, exclusive of stops for traffic signals. The heaviest concentrations of Center City commuters within the 6 mile radius are in West Philadelphia and in Northwest Philadelphia. Large concentrations are also to be found in the mile-wide band centering on South Broad Street and North Broad Street.

(11) With modest provisions for bicycle lanes and bike parking, an estimated 5% to 10% of all those who now commute to Center City by auto can be diverted to bicycle commuting. This estimate is conservative; it assumes that only those commuters residing within 6 miles of City Hall can be diverted. If a small percentage of those auto commuters living beyond 6 miles can also be diverted to biking, the total percentage reduction in auto commuting will be markedly higher.

(12) A modest network of on-street bikelanes to provide safe access to Center City for bicyclists who live within 6 miles of City Hall would require the designation of bikelanes in approximately 600 blocks, in some ten transportation corridors leading into Center City. The network of bikelanes would need to be complemented by the provision of from 3,500 to 9,000 bike parking spaces distributed throughout Center City.

(13) The City's zoning code should be amended to require bicycle parking in or ancillary to all new buildings - office, institutional, and commercial buildings - to be built in Center City, and designs for such buildings should be reviewed to insure that bike parking is provided, easily accessible and clearly marked.

(14) All major new projects, in Center City, private or public, should be designed to incorporate safe bikeways as part of their circulation systems, and to provide adequate and secure bike parking for residents, shoppers, and workers. Franklin Town and Market Street East, in particular, because of their size and pivotal role, should set a precedent in this respect.

(15) A detailed study to determine the best ways of incorporating bicycle traffic into the entire circulation pattern in Center City should be undertaken as soon as possible.

(16) The Pennsylvania Department of Transportation should be asked to include in its motor vehicle operator's examination several questions dealing with the driver's relationship to the bicyclist. Particular attention should be given to the situations in which autos and bicycles share the same right-of-way (as on city streets) or meet at intersections.

(17) The Philadelphia Police Department should be encouraged to enforce the provisions of the City Code with regard to bicycles, especially those which prohibit riding against the direction of traffic. However, some provisions ought to be changed, such as the one requiring cyclists to ride single file on streets. A detailed review of the Code's Chapter 12-800 should be undertaken by City Council.

CENTER CITY COMMUTERS:

WHERE THEY LIVE AND HOW THEY GET TO WORK

Estimates differ as to the actual number of people who work in Center City. The Delaware Valley Regional Planning Commission uses a figure of 320,000; however, not all of these are within the CBD limits as defined by the Census Bureau (South Street to Vine Street, river to river). According to the 1970 Census, approximately 110,000 people who live within the Philadelphia standard Metropolitan Statistical Area* work in Center City, but this figure is known to be too low, as the Census does not identify the work location as being within the CBD if the respondent fails to give the precise street address. A reasonable estimate probably is that there are between 240,000 and 300,000 persons regularly working in Center City.

The transportation modes used by Center City workers also are subject to varying estimates. One figure often cited is that 40% use the auto and 60% use mass transportation; however, that estimate ignores those who use other modes. For example, the Census figures show that a considerable number of workers walk to work; of the 23,896 working persons who live in Center City, 10,750 said they walk to work. It is not known how many of these pedestrian commuters work in Center City, but it would be reasonable to assume that many of them do. As the distance from Center City increases, the proportion of those walking to work goes down sharply; for the Center City workers who live from 4 to 6 miles from City Hall, the estimate of a modal split approaching 40/60 is probably reasonable.

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* The Philadelphia SMSA includes Bucks, Chester, Delaware, Montgomery, and Philadelphia counties in Pennsylvania, and Burlington, Camden, and Gloucester counties in New Jersey.

BUT WILL THEY COMMUTE BY BICYCLE?

The notion of commuting by bicycle appears to be attractive to many people. The bicycle is inexpensive, reasonably fast, provides door-to door service (at least potentially), offers the opportunity of regular exercise, and helps to protect the air. Yet only a relative handful, perhaps a few hundred, of the workers who daily flock into Center City use the bicycle as their vehicle.

What deters people from bike commuting? The theoretical model that guided our inquiry was that for most people a number of factors act jointly as deterrents, some in greater measure, some in lesser. We also hypothesized that if enough of these deterrents could be eliminated or reduced, a significant proportion of people who now use the auto for commuting would be induced to switch to the bicycle instead.

To determine what these deterrent factors are, the Philadelphia Bicycle Coalition carried out a survey of motorists parked throughout Center City on 11 and 12 January 1973. Of the 500 questionnaires distributed, 44% were returned, an unusually high rate which gave us considerable confidence in the validity of the findings.

Among the respondents, 77% said they were in Center City to work, 7% to shop, 3% to attend classes, and the rest for a variety of other reasons. Their usual mode of coming to Center City was overwhelmingly by car: 72% used only the auto, 12% a combination of modes, 8% commuter rail. Of the total, 42% lived in Philadelphia, 41% elsewhere in Pennsylvania, 15% in New Jersey.

Their usual commuting time, by auto, was under 30 minutes for about 60% of the Philadelphians. About 50% of the other Pennsylvanians and about 75% of the New Jerseyites said they made the trip in under 40 minutes.

We found that 33% of the respondents own bicycles. Of the bicycles, 79% were multi-speed models suitable for touring or commuting; three-speed models were the most common, at 50%.

We asked about the factors that tend to deter the bike-owning respondents from using their bikes for commuting. The answers fell into three groups: most frequently cited were bad weather, lack of safety in traffic, and excessively long travel time. Somewhat less frequently cited were lack of parking and too much effort (the latter chiefly among older respondents). Inability to carry packages, and social pressure, were not found to be important deterrents.

We then posed two hypothetical questions. Of the bicycle owners, we asked how likely they would be to use their bikes for commuting if safe bike lanes or bike streets and secure bike parking were available, and we had them reply on a scale from 1 to 5 (where 1 = not at all likely, 5 = very likely). The answers below refer only to the sum of the 3, 4 and 5 values.

Of the bike owners, given the assumption of bike lanes and bike parking, 38% of the entire group said they were likely to use their bikes for commuting. The positive response tended to be correlated with youth: it was 46% for the under 25 and 25-34 groups taken together. The positive response was even more strongly linked with place of residence: 59% of the Philadelphians, but only 18% of the residents of other Pennsylvania counties and 8% of New Jersey residents, said they would commute by bicycle.

For the non-owners of bicycles, we posed the same hypothetical situation of safe bike lanes and secure bike parking, and asked how likely they would then be to buy bicycles and use them for commuting. For the entire group of non-owners, 17% replied positively, with the two youngest age groups again being much higher, at 32%.

Here again there was a marked difference between Philadelphians and others: while only 10% of New Jersey and Pennsylvania residents indicated that they would buy bikes and use them for commuting, 30% of the Philadelphians gave the positive response.

The responses obtained in the survey guided the direction of the remainder of this study. They led to an analysis of Philadelphia's weather over the past ten years to determine how severely it does in fact hamper bicycling. They led to the decision that commuters beyond a six-mile radius from City Hall would not be included in the estimates of those who could be diverted to bike commuting, as their travel time probably would be over 35 or 40 minutes and thus could be considered excessive (although the Philadelphia Bicycle Coalition is aware of regular bike commuters from well beyond six miles).

Given that a substantial proportion of auto commuters in the survey indicated that they could be switched to bicycle commuting if the right conditions were met, what does this imply in terms of actual numbers of commuters, the location of their homes, and their likelihood of becoming bike commuters?

The 1970 Census shows the number of workers, by county and census tract, who live in the Philadelphia standard metropolitan statistical area (SMSA) and give their work location as Center City. An analysis of the census tracts that lie within 2, 4 and 6 miles of Philadelphia's City Hall (on the Pennsylvania side of the Delaware River) indicated that they contain approximately 44% of the 110,000 workers who live in the SMSA and give Center City as their work location.* The distribution by two-mile intervals from City Hall is shown graphically in Figure 1 on the following page.

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* The number of CBD workers as reflected in the Census Bureau's census tract statistics is somewhat less than half of the estimated total of CBD workers. In its publication on the Philadelphia SMSA census tracts, volume PHC (1)-159, page App-7, the Census Bureau has the following note: "In order to be counted as working in the CBC, the respondent had to give the exact address (street name and number) of his place of work. Since

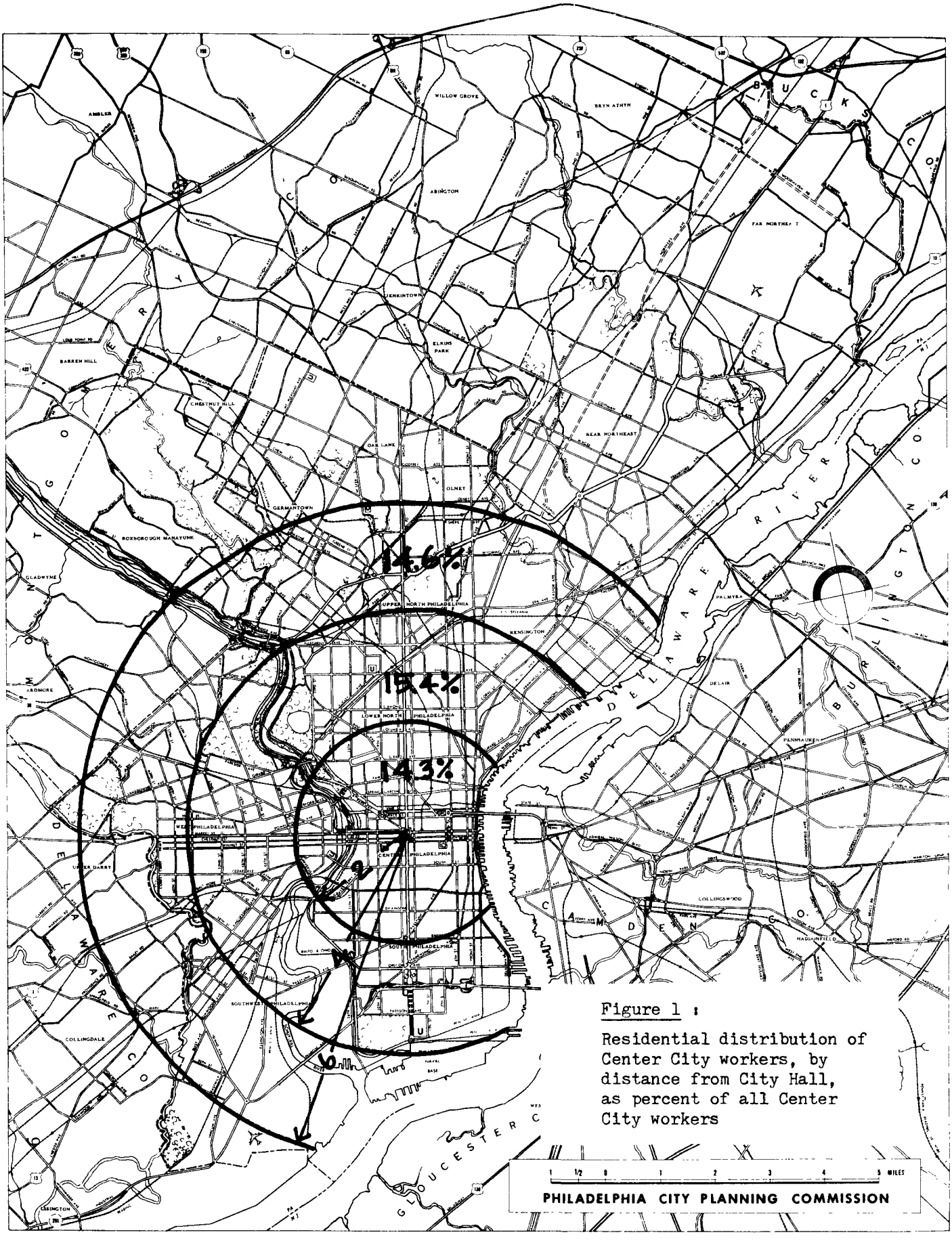

Figure 1 :

Residential distribution of Center City workers, by distance from City Hall, as percent of all Center City workers

The proportion of the entire Center City work force commuting by auto is estimated by the Philadelphia City Planning Commission (PCPC) and the Delaware Valley Regional Planning Commission (DVRPC) to be about 40%. However, it is unrealistic to assume that this modal split would hold equally in each two-mile band. Instead we assumed that the proportion of auto commuters is lower in the central portion and increases with distance from City Hall, as shown in the following table:

Table 1: Distribution of CBD workers, and estimated rate of auto commuting, by distance from City Hall:

	Percent of all CBD workers residing in this ring	Percent of CBD workers estimated to commute by auto	Auto commuters as percent of all CBD commuters
Ring I (0-2 miles)	14.3%	20%	2.8%
Ring II (2-4 miles)	15.4%	30%	4.6%
Ring III (4-6 miles)	14.6%	35%	5.0%

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some respondents did not do this, the number of persons working in the CBD is usually understated by an unknown amount." As we had no reason to believe that there is a systematic bias, i.e. that the residents within the six-mile radius were either more or less likely than those outside that radius to give less than the exact address, we assumed that the residential ratios we computed would hold for the actual number of CBD workers. There is no evidence that would support an alternative hypothesis that a large proportion of CBD workers comes from outside the SMSA.

We then assumed that the propensity to be diverted from auto commuting to bicycle commuting (the divertibility factor) is greatest in the 0-2 and 2-4 mile rings, where the bicycle is able to approximate the travel times of the auto, and that the divertibility factor falls off to one-half that level in the 4-6 mile ring.

We further assumed three levels of expectation regarding the divertibility factor. The high level, 40% (applicable in rings I and II) is derived directly from the findings of our survey, which are reported above; it was obtained by multiplying the proportion of bikeowners, 33%, by the percentage of them (in Philadelphia) willing to switch to the bike-commuting mode, 59%, and adding the proportion of bike non-owners, 66%, multiplied by the percentage of them (in Philadelphia) willing to buy bikes and use them for commuting, 30%. The middle level and the low level of expectation represent a 25% and a 50% reduction from the high level. The following table shows the divertibility for the three rings, at each of the three levels of expectation:

Table 2: Divertibility factors, by distance from City Hall

	Level of expectation		
	High	Middle	Low
Ring I	40%	30%	20%
Ring II	40%	30%	20%
Ring III	20%	15%	10%

For each ring and each level of expectation, we then calculated the proportion of all CBD workers who would be diverted from auto commuting to bike commuting. Each entry in the table below represents the following product: (Percent of all CBD workers in

that ring) x (Percent estimated to commute by auto) x (Divertibility factor).

Table 3: Estimated percentage of all CBD workers diverted from auto to bicycle commuting, by distance from City Hall and by level of expectation

	Level of expectation		
	High	Middle	Low
Ring I	1.14	.86	.57
Ring II	1.85	1.39	.92
Ring III	1.02	.77	.51
Total	4.01%	3.02%	2.00%

The percentages above show the proportion of all CBD commuters who would be diverted from auto to bike commuting. Inasmuch as the auto mode is estimated to constitute only 40% of all CBD commuting, the totals represent, respectively, 10%, 7.5%, and 5% of all auto commuting into Center City.

What does this imply in terms of the actual number of auto trips that could be substituted for by bicycle trips? As noted earlier, reliable data on the number of trips are not available (for example, the Transportation Control Strategies document of March 23, 1973, prepared by the Pennsylvania Department of Environmental Resources, laments in Appendix I the "lack of accurate and valid trip origin-destination data, traffic data, modal split, extent of thru traffic, etc.") A rough estimate is possible, however. We have estimated that there are between 240,000 and 300,000 workers in Center City. If 40% of them arrive by auto, this would imply between 96,000 and 120,000 auto commuters. With an assumed average of 1.3

persons per car, this would mean that between 75,000 and 90,000 autos daily come into Center City carrying commuters. The following table shows the number of autos replaced by bicycles under the assumptions set forth in table 3, and the number of bicycles needed to carry the same number of persons.

Table 4: Estimated number of autos replaced by bicycles for Center City commuting, by level of expectation

	Level of expectation:		
	High	Middle	Low
Autos replaced (assuming daily volume of 75,000)	7,500	5,675	3,750
Autos replaced (assuming daily volume of 90,000)	9,000	6,750	4,500
Bicycles required to carry an equal number of commuters (assuming daily volume of 75,000 cars, 96,000 persons)	9,600	7,200	4,800
Bicycles required (assuming 90,000 cars, 120,000 persons)	12,000	9,000	6,000

These estimates of course do not include commuters other than those who go to work in Center City by auto. Among the groups that need also to be considered are those who drive to Center City for other purposes, those who use other modes to go there, and those who commute out of Center City (reverse commuters).

Clearly the provision of facilities that will divert a significant number of auto commuters to biking will also attract commuters in these other categories. No overall estimate of the numbers of the latter who could be diverted to biking has been attempted as part of this study. However, in planning bicycle facilities for specific areas, some estimates in these other categories will be useful to guide decisions as to the required capacities. This question will be discussed briefly in a later section.

THE WEATHER AND BICYCLE COMMUTING

Among the various deterrents to bicycling cited by the respondents to the Bicycle Coalition's survey, the weather is the only one that practically speaking cannot be controlled. But weather is composed of many different conditions, with greatly varying effects on the performance of the bicycle and the safety and comfort of the cyclist. What aspects of the weather need to be considered?

If one is thinking of the bicycle as a recreational vehicle, favorable weather is almost essential to make biking a pleasurable experience. However, as the focus of this study was on the bicycle as a transportation mode, safety was selected as the important criterion. Thus heat and cold as such were not considered as significant, since by themselves they do not constitute a threat to the biker's safety, at least in a relatively moderate climate such as Philadelphia's. Rain, ice, and snow, on the other hand, do constitute a safety hazard to bikers and therefore were selected as the basis for a detailed examination of Philadelphia's weather.

The National Weather Service's records for 1962 through 1972 were reviewed in light of the following criteria. Any measurable amount of ice or snow on the ground would disqualify the entire day as being unsafe for cycling, in view of the uncertain traction that most bicycle tires have on ice or snow-covered surfaces. Any day (i.e. 24-hour period) on which one-half inch or more of rain fell would be disqualified, in view of the marked reduction in performance when wet that is typical of the caliper-type brakes found on virtually all modern lightweight bikes. (Although it is possible to cycle in much heavier rain, one-half inch was taken as the

cut-off point because it constitutes both a moderate safety hazard and a considerable level of discomfort.)

The weather records showed the following patterns. The number of days per year on which there was a measurable amount of ice or snow on the ground (at 7 a.m.) ranged from a low of 6 to a high of 29, with a median of 17. The number of days per year with 0.5 inches or more of rain during a 24-hour period ranged from a low of 15 to a high of 32, with a median of 24. Thus the median number of days unsafe for bicycling, by our definition, was 41; the high number of unsafe days was 53. Table 5 below shows the actual figures by year of occurrence.

Table 5: Number of days with weather conditions hazardous to bicycle safety, Philadelphia, 1962 to 1972

YEAR	(Column A) NUMBER OF DAYS WITH ONE-HALF INCH OR MORE OF RAIN	(Column B) NUMBER OF DAYS WITH MORE THAN TRACE OF ICE OR SNOW	NUMBER OF DAYS UNSAFE FOR BIKING (A + B)
1972	32	12	44
1971	23	6	29
1970	27	17	44
1969	24	17	41
1968	22	16	38
1967	28	17	45
1966	24	29	53
1965	15	18	33
1964	22	18	40
1963	21	20	41
1962	28	18	46

Source: U. S. Department of Commerce, National Oceanic and Atmospheric Administration. Local climatological data, Philadelphia, Pa., for 1962 - 1972 (Columns A and B)

In the median year, the number of "unsafe bicycling days" was 41, which is approximately 11% of the total of 365 days; in the high year, the percentage was about 15%.

While safety was the principal criterion which guided our review of the weather, it is clear that comfort does play a part in people's choice of a transportation mode. The question then is, how can the bicycle commuter be reasonably comfortable in less than ideal weather?

In light to moderate rain, a nylon jacket or anorak, plus a rain hat, will offer fair protection, and a poncho offers excellent protection. A good serviceable plastic poncho, selling for about $12, folds into a small package which can easily be carried on the bicycle's carrier or in a modest-sized tool bag.

In cold weather, warm (but not bulky) clothing is recommended; to guard against excessive heat loss, gloves and a cap, preferably one with ear-flaps, are essential. In the coldest weather, which in Philadelphia may be encountered on perhaps 1% to 2% of the days each year, a knitted ski mask -- popular in Scandinavia -- which covers the nose, cheeks and chin will guard the biker against frost bite. On such days an extra vest or sweater will be useful.

On hot days, light loosely fitting clothing is best. For those who can change their clothes when they get to the place of work, the problem is an easy one. For those who cannot, the kind of solution adopted by Dr. Robert Petersen, who daily commutes five miles by bicycle to his office at Washington's National Institutes of Health, is recommended.

> By making maximum use of the wide range of gears of the modern lightweight bicycle it's possible to choose ratios that are minimally likely to overheat your personal radiator.

See page 433 of reference 11

> I usually leave off my tie and suit jacket in warm weather, unbutton an extra button on my shirt, and can count on being sufficiently "air-conditioned" to arrive at work without needing a shower. Since I can shower after returning home, I often make the return trip a more active one. I place my tie in my suit jacket pocket and carefully fold the jacket inside out -- as you might for packing it in a suitcase. I then place the jacket on the luggage carrier secured by an elastic band or so-called shock cord (this can easily be obtained from your local cycle dealer). As a result my jacket and tie arrive as unruffled as I do.

There appears to be a general trend in our society toward simpler and more informal dress, and this tendency seems more marked among young people. This trend is clearly compatible with a greater reliance on the bicycle as a transportation mode. The biker will not be ostracized or penalized if he does dress more informally than some of his colleagues. Indeed, his example might even encourage some of them to select clothes to suit the weather rather than the dictates of status or ostentation.

SAFETY IN BICYCLING

Like all transportation modes, bicycling has its hazards, and various statistics are available regarding bicycle accidents. In the context of this study, two questions must be asked: what is the trend in bicycle accidents, especially those related to motor vehicles, and what are the effects of providing some separation between bicycle and motor vehicle traffic?

Nationwide, bicycle accidents are estimated to cause approximately 1,019,300 injuries treated in emergency rooms per year, according to 1972 reports of the National Electronic Injury Surveillance System of the U.S. Department of Health, Education, and Welfare. Bicycle-related fatalities have been rising steadily and were estimated by the National Transportation Safety Board to total 1,100 in 1972.

In Philadelphia there has been a marked rise in recent years in injuries resulting from bicycle/motor vehicle collisions, as Table 6 below shows. Especially significant is the very sharp increase in injuries to youth and adults, the age groups likely to use bicycles for commuting.

Suburban accident rates are rising also; see reference 2.

The experience in the United States in separating bicycle and motor vehicle traffic is too limited so far to be very useful. A number of European studies offer some guidance, though conditions vary considerably and the findings are not directly transferable to the situation in Philadelphia. In the new town of Stevenage, England, which has an extensive system of bikeways and an estimated volume of 20,000 daily journeys on the system, bicycle accidents during the period from 1959 to 1964 were estimated to have occurred at the rate of 3.1 per million vehicle miles on bikeways, compared to 13.2 on roads without any separation.

See pages 154-155 of reference 10.

Table 6: Injuries resulting from bicycle/motor vehicle collisions in Philadelphia, by age group, 1970 - 1972

Age group	1970	1971	1972	Percent increase 1970 - 1972
Children* (ages 0 - 14)	176	165	222	26%
Youth (ages 15 - 19)	42	87	93	121%
Adults (ages 20 and over)	20	47	72	260%
Age not stated	8	3	9	
Total (all ages)	246	302	396	61%

* includes tricycle riders

Source: Office of the Traffic Safety Engineer, Philadelphia Department of Streets

Two studies in the Netherlands showed a marked reduction in bicycle/motor vehicle accidents along country roads when bicycle paths were provided to separate the two modes. A French study of national roads with and without bikeways showed a decrease of 45% in accidents involving automobiles and two-wheeled vehicles (bicycles and mopeds, which are motorized bicycles under 50cc displacement). However, accidents between bicycles and mopeds increased where these two shared the bikeway. There was also a slight increase in collisions associated with a right turn by autos across the bikeway.

See pages 49-51 of reference 15 (background)

See page 46 of reference 5

Traffic conditions rather similar to Philadelphia's were examined in a Danish study reported in 1969. Accident patterns for arterial streets in Copenhagen with and without bikeways were compared over a three-year period. (The bikeways generally are separated from the roadway by a low

See page 45 of reference 5

curb, which ends at intersections.) Personal injury bicycle accidents per 10,000 bicycle-kilometers were found to be 60% lower on the streets with bikeways. The accident rate at intersections was negligibly (less than 1%) higher on the streets with bikeways; the percentage of intersection accidents involving left-turning motorists was lower on bikeway streets, that involving right-turning motorists higher.

The general conclusions regarding the safety of bikeways are that they do provide greater protection for bikers overall, but that the intersections may pose problems. The angle of interception between bicycle and motor traffic, and the design and location of the merging area, appear to be important factors in affecting the safety of intersections.

WHAT FACILITIES DOES THE BIKER NEED?

How can bicycle traffic be safely accommodated on city streets? Generally speaking, there is little conflict between motor vehicles and adult bicyclists on those streets where traffic volumes and speeds are low. (The proportion of all bicycle/auto collisions occurring on such streets actually is high, but many of these accidents appear to involve bike-riding children who flagrantly disregard safety rules; the number of adult bikers involved there tends to be low.)

The conflict is heightened on collector and arterial streets, where the volumes of auto traffic are higher and the effective speed may be 30 to 40 miles per hour (although a speed limit of 25 MPH may be posted). Although some bikers use such streets, they are at a considerable disadvantage in terms of speed (their top speed being somewhat below the posted -- and hence usually minimum -- speed of the motorists); visibility; braking capacity; and vulnerability in case of collision. Because this disadvantage is correctly perceived by potential bikers, many of them simply do not venture out on these streets, or do so only on Sundays when the normal traffic volume is greatly reduced.

A number of possible solutions are available to separate bicycles from motor vehicles. These include special paths reserved exclusively for bicycles (bikepaths); routing of bikers along streets little traveled by autos; use of sidewalks; streets reserved for bikers at designated times; and the designation of on-street lanes reserved for bicycles on a full-time or part-time basis. Each of these solutions will be briefly discussed below.

Bikepaths offer the greatest degree of physical separation. Where the right-of-way is available, they can be constructed to provide amenity as well as safety, so that cycling can be a pleasant experience as well as an efficient one. This is

the most expensive alternative and takes the longest time to develop. However, planners should be on the lookout for opportunities to create bikepaths; such rights-of-way as railroad abandonments, utility easements, and flood plains can be developed into bikepaths at relatively low expense.

See pages 95 - 107 of reference 12

Low-volume streets provide a fairly safe biking environment. However, the reason that motor vehicle traffic on them is low usually is the same reason that bikers find them unacceptable: they offer only circuitous and inconvenient access to the desired destinations. Attempts in other cities to detour bikers more than a very short distance generally have failed, and have resulted in the bikers ignoring the low-volume streets in favor of the more heavily traveled but more direct routes.

See reference 8

Sidewalks offer a ready-made physical separation from motor vehicles but lead to conflict between bikers and pedestrians. The four- to five-fold difference between biking and walking speeds makes for serious incompatibilities, and frequently pedestrians object to what they regard as a grave safety hazard. Bikers traveling at 15 to 20 MPH, a normal cruising speed for an experienced cyclist, will have insufficient time to avoid children darting out of doorways or autos pulling out of driveways. The sidewalk expedient should be considered only as a last resort, and only in places where any other solution is infeasible.

Reserved streets in certain areas can provide a ready-made network for biking if vehicular access is prohibited during specified hours. This solution imposes high costs (in terms of inconvenience) on residential, commercial, and institutional activities on those streets and thus may be hard to justify except as part of a more general plan to exclude motor vehicle traffic from an area in order to improve the environment.

Bikelanes give a substantial amount of space to bikers without imposing excessive costs on adjoining land uses. Generally they will require the conversion of a traffic lane or a parking lane, although in some places it may be possible to rearrange lanes so as to fit in a bikelane without losing a motor vehicle lane.

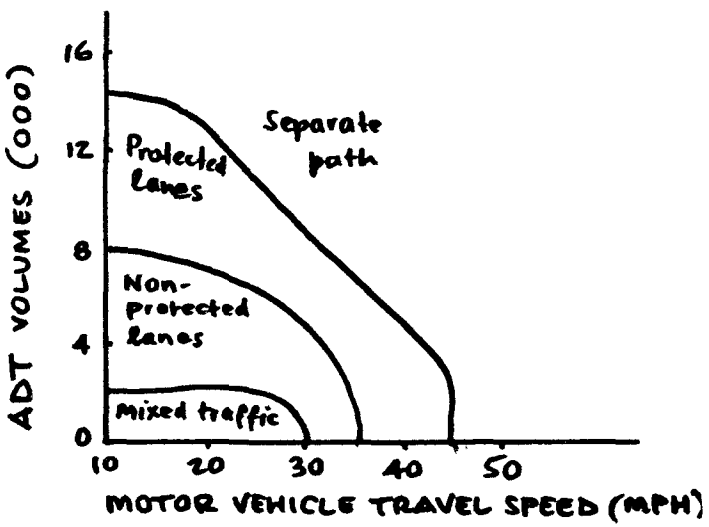
In a thoroughly built-up urban area, the bikelane provides the best general solution to the problem of providing adequate protection to bikers at an acceptable cost. However, a number of important questions must be answered. How much traffic will justify the creation of bikelanes, how wide should they be, should they be one-way or two-way, what is their preferred location in relation to the motor vehicle lanes, should they be exclusively or only partly for bikes, and how should the two types of traffic be separated? For the purpose of this study, it will be sufficient to discuss these questions only briefly, giving general conclusions applicable to Philadelphia and referring the reader who requires more detail to the thorough discussion in the report of the ITTE-UCLA study.

Volumes and speeds

At present there are no warrants which specify the traffic volumes, speeds, and other parameters that justify the construction of bikeways of various types. Volume criteria from a German source suggest that in urban areas a separate bikeway should be considered when motor traffic volume exceeds 2,000 vehicles per day and bike volume exceeds 500, or when motor vehicles exceed 3,000 and bikes 200.*

An Arizona Highway Department study suggests the volume-speed relationships shown in the graph at right. However, it notes that in addition to those two variables, several others play a part: street and right-of-way widths, landscaping, presence of parking, amount of cross-traffic, and other factors.

* See page 39 of reference 5



Cited on page III.3 of reference 15 (Preliminary plan)

In Philadelphia, the motor vehicle volume criteria will be met on many major streets; the estimated bicycle volume criteria from the German study will be met in each "traffic corridor," a concept introduced and discussed in the next chapter.

One-way or two-way?

For on-street lanes the one-way solution is greatly preferable. A two-way bikeway on a street would require one lane of bikers to be riding against the direction of the traffic in the adjoining motor vehicle lane, a solution that makes for hazardous turns at intersections.

Width and capacity of bikeways

According to German specifications, the width required for a single lane of bicycle traffic is one meter (3.3 feet); for two lanes, 5.3 feet, and for three lanes, 8.5 feet. The ITTE-UCLA study has reviewed these specifications and suggests a more liberal width in order to provide a "comfortable maneuvering allowance": two lanes, 6.4 feet, and three lanes, 10.9 feet.

See page 27 of reference 5

The capacity of one-way bikeways is variously estimated in European studies: one lane from 1,700 to 2,530 bikes per hour; two lanes from 2,000 to 4,300; and three lanes, 3,500. However, a bikeway only one lane (i.e. 3 feet or so) wide does not provide for passing.

See page 37 of reference 5

For the situation in Philadelphia, a one-lane bikeway probably would offer an inadequate level of service; passing would require the faster cyclist to veer into the motor vehicle lane if there were no physical separation between the lanes.

Exclusive versus shared bikeways

Generally speaking, the shared bikeway is no bikeway at all. Many references warn against the false sense of security that a bikeway shared by motor vehicles can induce in the biker. However, a complete exclusion of motor vehicles may not be possible in on-street bikelanes.

There are two common situations of shared use. One is that the auto will be allowed to park in the bikelane; in that case, the lane must be wide enough to provide some room for the biker to pass the parked car when the latter's door on the side away from the curb is open; the biker must not be forced to veer into a traffic lane. The second situation is that of movement across the (otherwise exclusive) bikelane by motor vehicles making a turn. For this case, it appears to be best to provide in the bikelane a merging area of adequate length; in the absence of a merging area, the probability of conflict is high between the turning motor vehicle and the biker continuing straight ahead.

Preferred placement of the bikelane

Numerous alternative placements for the bikelane are discussed in the ITTE-UCLA report. For Philadelphia only two alternatives seem clearly relevant, however. On two-way streets, the bikelane will generally have to be on the right, in the curb lane, and may have to be shared with parking and with buses. On one-way streets the preferable location is in the left-hand curb lane, especially if parking can be removed from that lane completely or during peak traffic hours. The left curb lane for bikers provides far better visibility for the driver in the adjoining traffic lane, as the driver sits on the car's left side and usually has an outside rearview mirror on that side. Moreover, in the left lane the conflict with buses -- a considerable hazard to bikers -- is essentially avoided.

Separating the bikelane

Three forms of separation are commonly used between the bikelane and the motor vehicle lane. The cheapest, and the one offering the least protection, is the painted line. The second, and probably the best compromise for Philadelphia's traffic situation, is the painted line reinforced by pavement markers (also called rumble bumpers) which give an audible notice to the motorist when he crosses the line. The third type of separation is a raised curb, either mountable or non-mountable. The non-mountable curb is inadvisable, as it would tend to interfere with the mobility of emergency vehicles. The mountable curb may be used where a higher degree of separation is required than the pavement markers afford.

SELECTING A ROUTE: DEMAND AND OTHER CRITERIA

As our earlier analysis showed, about 44% of Center City workers live within 6 miles of City Hall (on the Pennsylvania side of the Delaware River -- another 2% live within that radius on the New Jersey side, but we are not including them in this discussion). Figure 2, on the next page, shows these CBD commuters arranged in a series of roughly wedge-shaped sectors or transportation corridors. Each corridor is approximately 1 to 1-1/2 miles wide, so that a bikelane established to serve its residents would not require an excessive detour. It should be noted that these particular corridors have been selected not because they necessarily include a good potential bikelane within them but rather because they illustrate the principle by which potential demand for a bikelane can be estimated.

The western central corridor, which according to Figure 2 has 6.4% of the CBD workers in it, thus is estimated to house about 15,360 Center City Commuters. If we assume that 25% of these commute by auto (a proportion lower than that estimated in table 1 above, in view of the high transit access in this particular corridor), we find that this sector contributes nearly 3,900 auto commuters, or about 3,000 vehicles, to the commuter load of Center City. If we assume the high level of divertibility (see table 2 above), we find that 1,300 auto commuters will be diverted to biking from this sector; if we assume the low level, 650. In addition, there will also be some diversion from the perhaps 70% who commute by transit. We have no survey findings to guide us in estimating the diversion rate from transit, but if we assume a rate of only 10% (of approximately 10,750) we will add 1,075 bikers, giving us a total of 1,725 to 2,375 bike commuters from that sector. That set of totals would clearly justify the establishment of a bikelane which could accommodate two to three lanes of bike traffic, according to the criteria outlined in the previous section. In this

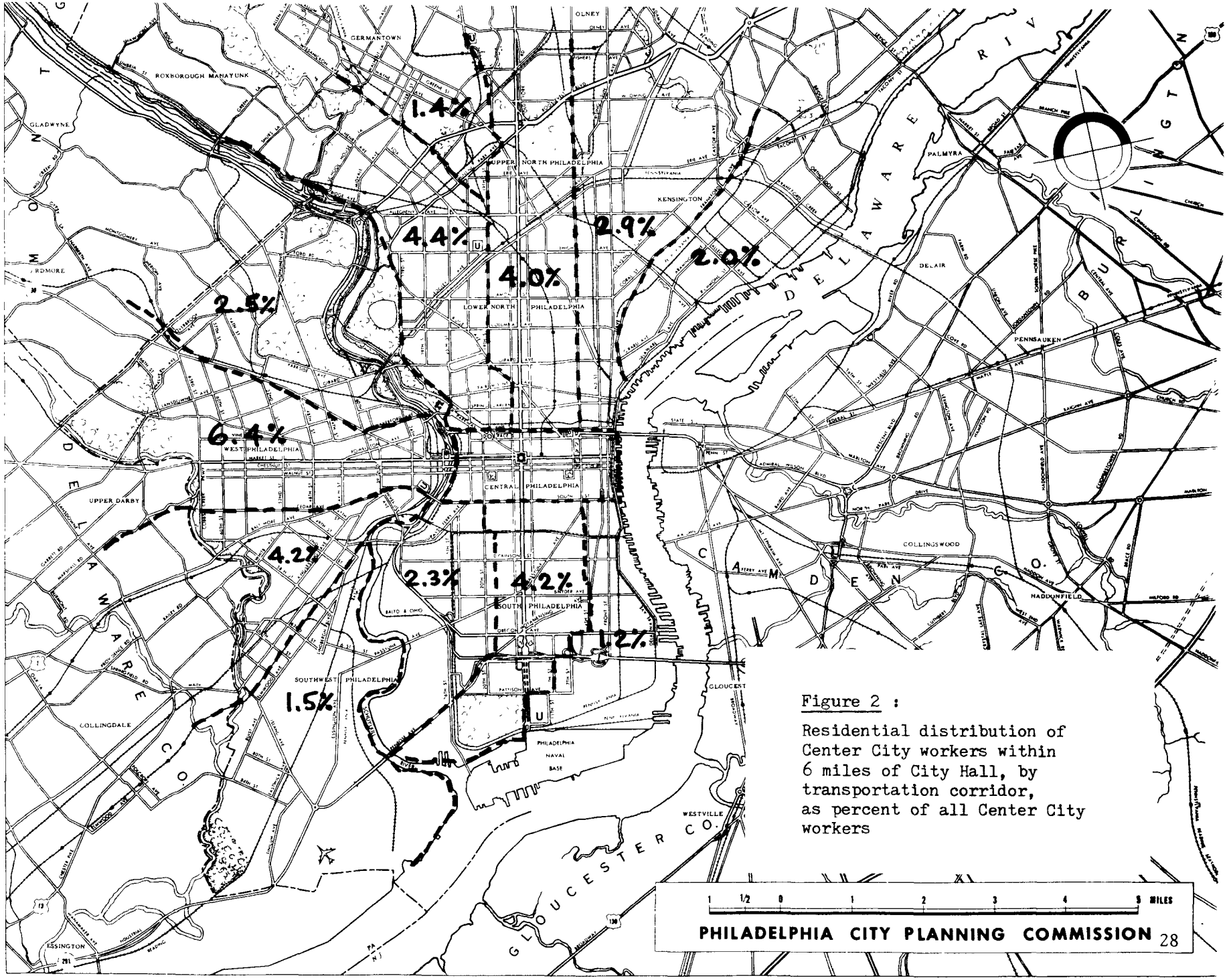


Figure 2 :

Residential distribution of Center City workers within 6 miles of City Hall, by transportation corridor, as percent of all Center City workers

particular corridor a considerable number of reverse commuters, who live in Center City but work in the university and hospital complex in West Philadelphia, could also be provided for.

What criteria are appropriate for selecting a specific route on which to create a bikelane? The following guidelines are suggested:

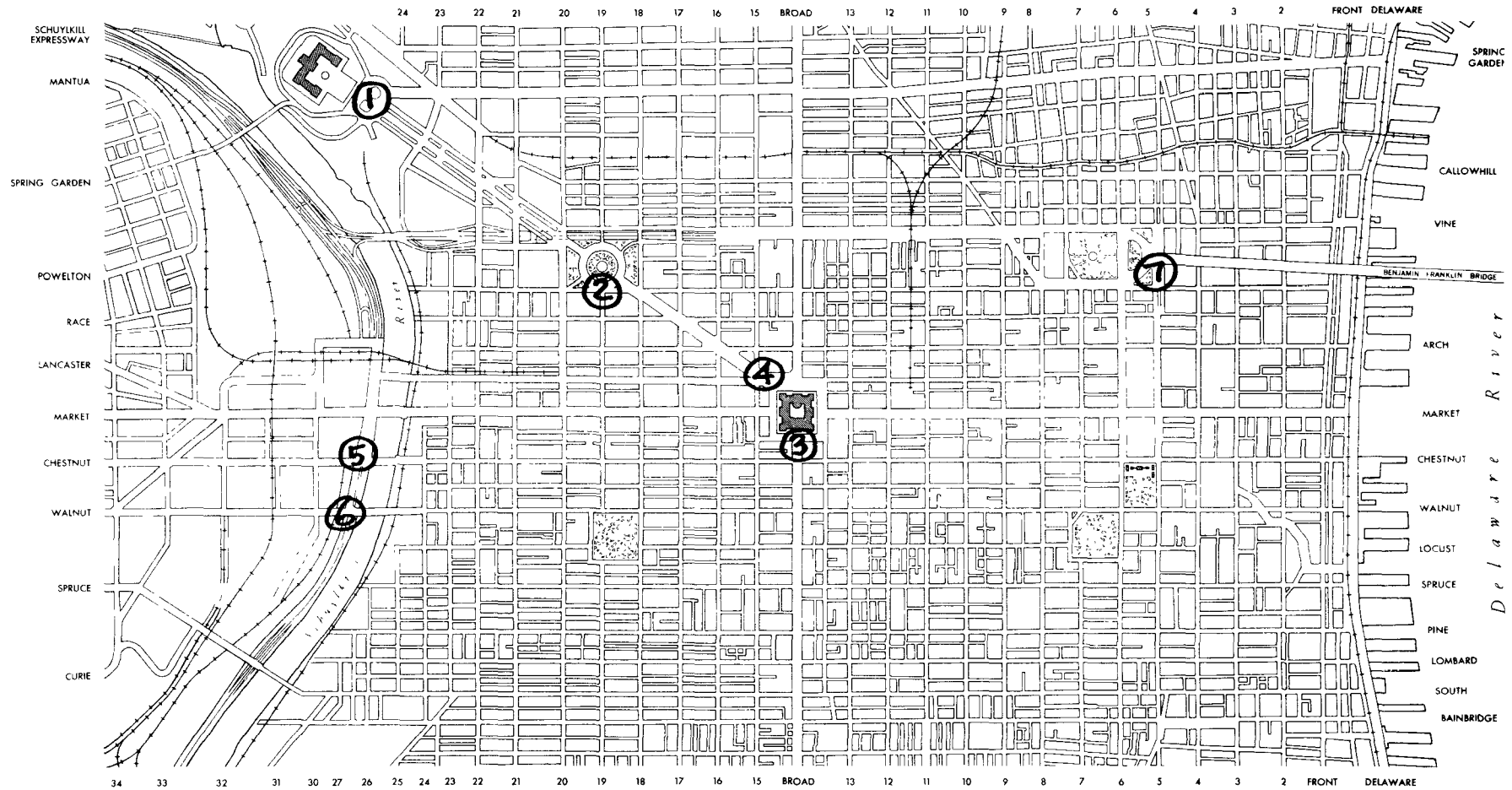
Grade The one-speed or three-speed bicycle has a limited ability to climb grades. For bikers in average condition, a 10% grade is acceptable for short distances (one source suggests 20 meters), 5% for 50 to 80 meters. Ten-speed or 15-speed bicycles are capable of considerably more. Most parts of Philadelphia do not have great altitude differentials, however, so that grades are not a major problem except in portions of Germantown, Chestnut Hill, Mount Airy, and Roxborough.

See page 30 of reference 5

Surface The thin high-pressure tires of modern bicycles offer little protection against irregular road surfaces. Cobbled streets, such as parts of Germantown Avenue and some streets in Society Hill, would be unacceptable as bike routes. Streets with many breaks or potholes also would be disqualified.

Cleanliness Bike tires are vulnerable to pieces of metal and broken glass. An extensive field survey in spring 1973 showed that most Philadelphia streets were clean enough so that they did not represent a major hazard to bikers. Some exceptions were found on several north-south and east-west streets in North Philadelphia, but it could not be determined whether the observed high concentrations of broken glass were due to more breakage, less effective cleaning operations, or a combination of these.

Obstructions to traffic flow Areas in which the traffic flow is changed in direction or speed, where several streams merge, or where the motorist's attention is otherwise distracted by some kind of obstruction, tend to be hazardous to the biker. Figure 3 identifies several such areas in or leading into



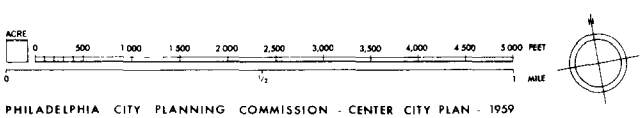


Figure 3: Points of congestion and potential hazard for bicycle traffic in Center City Philadelphia

(1) Art Museum Circle
(2) Logan Circle
(3) City Hall
(4) The Parkway
(5) Expressway ramps at
(6) Chestnut and Walnut Streets
(7) Benjamin Franklin Bridge ramps

Center City. The general rule should be either to avoid such areas by routing the bikeways on other streets, or to provide special signalization that would draw attention to the presence of bikers and separate the timing of their flow from that of the motorized traffic.

WHERE CAN THE BIKER PARK?

The bicycle, like other private vehicles, needs to be parked somewhere when the rider reaches his destination. There are two aspects to parking, related yet somewhat distinct: storage of the physical object, and assuring its security against theft and vandalism. Storing a modern lightweight bicycle is comparatively easy: it is compact and moderately weatherproof, and 12 to 15 bikes can be put in the space used by a single American car. Thus in terms of its space needs the bicycle can be a boon to crowded downtown areas.

The security question is more difficult. A good lightweight bike will cost from $80 to $250, and some sell for much more. High prices and a ready market have made bicycles a tempting target for thieves in recent years. A survey of a dozen cities by the New York Times in August 1972 showed average increases in thefts of over 30% from 1970 to 1971, with a further increase of more than 35% in 1972. In California alone, about 500,000 bikes were stolen in 1971, with an estimated value of nearly $30,000,000.

See reference 6

The most common bike parking device is a rack made of metal tubing into which the front wheel is inserted; that wheel then is locked to the rack with a chain and padlock supplied by the cyclist. Lamp posts, parking meters, fence posts, and other metal objects not specifically designed for that purpose are frequently used for bike parking also. One problem with the parking rack is that typically only the front wheel can be chained; this leaves the rest of the bike, including the frame and the rear wheel, relatively vulnerable to anyone with a wrench. But even when the frame and rear wheel are chained to a sturdy object, the chain and lock carried by most cyclists can be cut by a thief who brings simple tools. Tests carried out at Stanford University on various chains, cables, and locks showed that 11 of the 16 types tested could be cut by 18-inch bolt cutters, and 9

could be cut by wire-cutters. Only two samples could not be cut by 24-inch bolt cutters, but both were quite heavy: without a padlock, a six-foot length of one weighed 4.2 pounds, and of the other, 10 pounds.

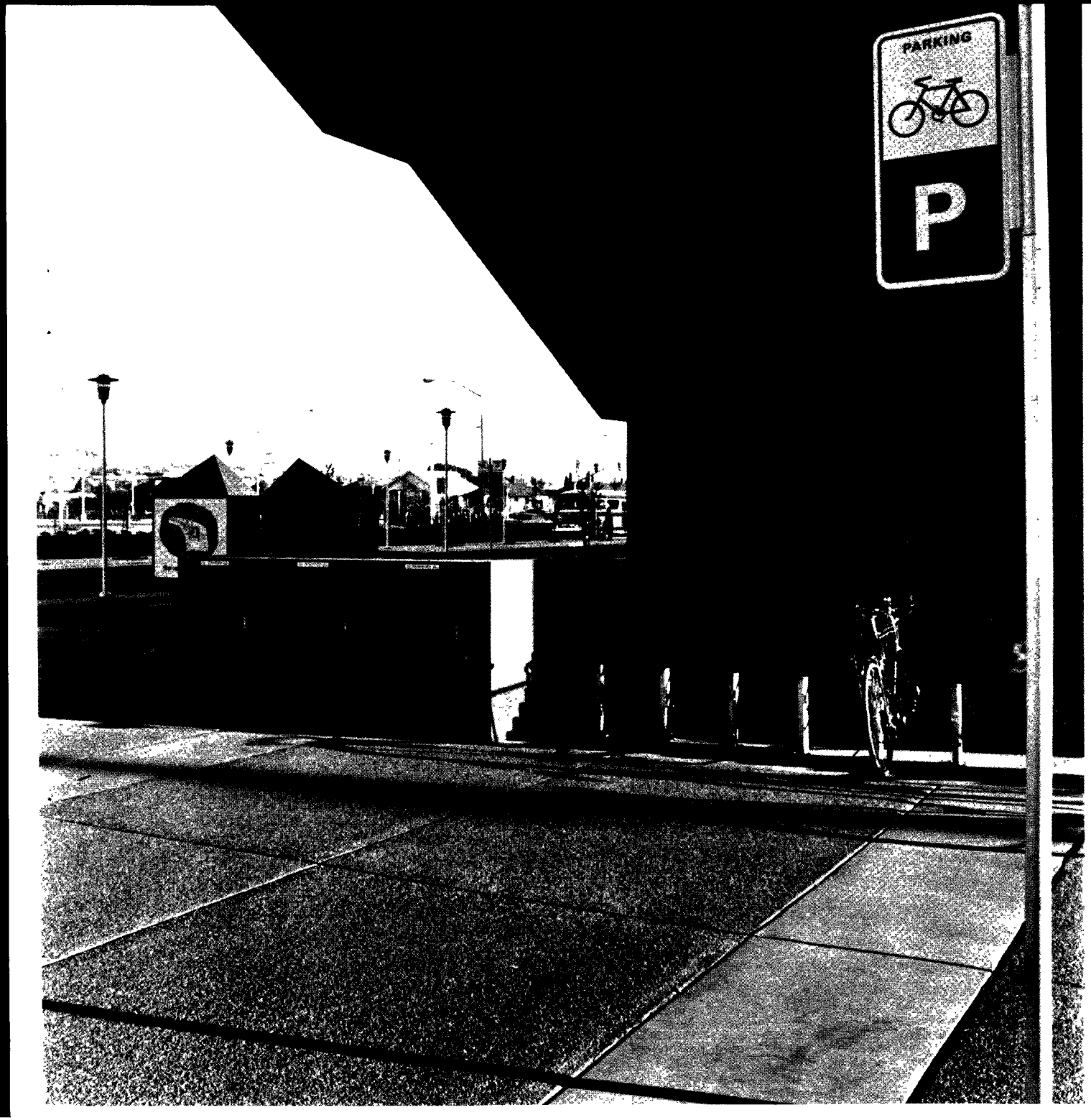
A different and much lighter device for securing a bike consists of a U-shaped steel strip with a lock fitting across the opening; this has been tested in New York and found highly theft-resistant. However, to secure the front wheel it must be removed and locked to the frame and rear wheel, an arrangement that is convenient only when the wheel has a quick-release mechanism.

Two types of storage devices recently developed in California promise a greater degree of security. One is a hitching post with a built-in 6 foot length of hardened, very heavy chain. The other is a coin-operated bike locker, similar to the luggage lockers found in railroad stations and airline terminals, but taller and deeper than most luggage lockers. Both devices are being used at stations of the Bay Area Rapid Transit (BART) system in California and are illustrated in the photograph on the following page. BART provides the hitching posts without charge, but charges a 25¢ per day rental for the lockers.

There is a great deal of potential indoor bike parking space scattered throughout Center City which at present is unavailable because of resistance by individual building operators. In Chicago, the Association of Bicycle Commuters developed a waiver-of-liability form which bikers could sign to hold the building operator blameless in case of bike theft; this form helped to persuade many operators to change their policies so as to permit bike parking in various spaces in the buildings. (See appendix 3 for sample forms.)

An important precedent was set in the District of Columbia in March 1973 by a Zoning Commission decision to require "convenient and secure bicycle parking on the first floor or the first basement for a minimum of 25 bicycles" as a condition for the construction of a new ten-story office building in downtown Washington.

See reference 14



Bicycle lockers and hitching posts at San Leandro station of the Bay Area Rapid Transit system. (Photo courtesy of Bike Locker Company, Walnut Creek, Calif.)

Once the principle of encouraging or requiring the provision of bike parking is established, the opportunities are numerous. Some companies will probably want to use bike parking provisions to deliver a public service message; Girard Bank has pioneered in that respect. Others will find that it is good business to provide free parking for their employees and their customers. For yet others, it will require a combination of pressure from the city government and the bicycling community to change ways of thinking that now link "parking" only to "auto."

The City should offer leadership both by providing bike parking for its employees and the citizens who visit its offices, and by incorporating requirements for bike parking in its redevelopment and other planning proposals and its zoning code as a general practice. In particular, such major new projects as Market Street East and Franklin Town should have bike parking as an integral feature of all private and public buildings, just as their circulation patterns should have explicit provision for the movement of bicycles as a valid and important transportation mode.

ORDINANCES AND ENFORCEMENT

Chapter 12-800 of the Philadelphia Code deals specifically with bicycles. Some of the provisions -- if they were enforced -- would tend to inhibit the use of bicycles as commuter vehicles, especially 12-804, which requires bikers to ride single file, and 12-807, which limits the legal places for bike parking.

The single file requirement would obviously lower the effective capacity of a roadway to handle bicycle traffic. More importantly, it would deprive bikers of the increased visibility that bikers riding abreast have, compared to a single biker. It appears to be aimed at minimizing any inconvenience that bicycles may cause to motorists, and does so at the cost of the biker's safety and the road's capacity.

The limitation of legal parking spaces, which is sufficiently vague in wording so that its enforcement may present some practical problems, may also militate against bike commuting. For example, it is not clear whether under this paragraph it is permissible to lock a bike to a parking meter or a signpost. This ought to be clarified.

Several of the chapter's provisions are sound and ought to be enforced more zealously than they are. The prohibition of bicycles going the wrong way (against the direction of traffic) is sensible, in view of the high percentage of bicycle/auto accidents attributed to that cause in several studies. However, it may be desirable to amend the prohibition so as to exclude specific low-volume one way streets (which would then carry a sign to that effect).

See page 42 of reference 5 and page 54 of reference 15 (background)

The requirement that bikers observe traffic signals is also sound. The unfortunate tendency of many bikers to go through red lights exposes them to unnecessary risks, jeopardizes their chances of recovering damages in case of accidents, and tends to antagonize motorists who resent having to wait for red lights that some bikers run with impunity.

All in all, a more rigorous enforcement of the traffic regulations would probably be conducive to greater safety for bikers, but before such a campaign is undertaken, chapter 12-800 should be re-examined to remove provisions that discriminate against the biker in favor of the motorist.

NOTE: In addition to the specific references cited below, bicycle transportation plans and proposals from approximately 40 cities and towns in the United States were examined in the course of this study, as well as plans of ten cities in Germany, Netherlands, and Scandinavia.

(1) Basil Andrews, "Design for bicycles", Traffic Engineering, August 1972.

(2) Frank Brookhouser, "Increase in bike riders leads to accident rise", Sunday Bulletin (Philadelphia), 1 April 1973.

(3) Denver Planning Office, The Bikeway Plan, City of Denver, Colorado, October 1972.

(4) Vincent R. Desimone, "Planning criteria for bikeways", paper presented at the National Transportation Engineering Meeting, American Society of Civil Engineers, Milwaukee, 17-21 July 1972.

(5) Institute of Transportation and Traffic Engineering, UCLA, Bikeway planning criteria and guidelines, Los Angeles: UCLA, April 1972.

(6) Robert Lindsey, "Thieves follow tracks of U.S. bicycle boom", New York Times, 27 August 1972.

(7) National Transportation Safety Board, Bicycle use as a highway safety problem, Special Study NTSB-HSS-72-1, April 1972.

(8) Ted T. Noguchi, "The urban bicycle route system for the City of Palo Alto", processed, City of Palo Alto, 1972.

(9) Pennsylvania Department of Environmental Resources, Transportation Control Strategies for Southwestern Pennsylvania Interstate Air Quality Control Region and Metropolitan Philadelphia Interstate Air Quality Region, processed, 11 April 1973.

(10) Jean K. Perraton, "Planning for the cyclist in urban areas", Town Planning Review, vol. 39, July 1968, pages 149-162.

(11) Robert Petersen, "Why not bicycle to work?", in The best of BICYCLING!, edited by Harley M. Leete, New York: Pocket Books, 1972.

(12) Proceedings, National symposium on trails, 2-6 June 1971, Washington, D. C., U.S. Government Printing Office, 1971.

(13) Michelle Pruyn, "Bicycling: a major mode of commuting in Philadelphia", processed, Drexel University College of Engineering, May 1973.

(14) Ride On, Washington Area Bicyclist Association, Vol. II, no. 1, April-May 1973.

(15) Tempe Planning Department, Tempe Bikeway Study: Background, (September 1972) and Preliminary Plans and Recommendations, (March 1973), City of Tempe, Arizona.

(16) S. S. Wilson, "Bicycle technology", Scientific American, vol. 228, no. 3, March 1973.

Dear Motorist:

The following questionnaire is intended to gather information which will help in making plans to relieve traffic congestion in Center City. You will find in it some questions about your use of the auto, some questions about mass transit, and several dealing with the bicycle as a mode of transportation. The survey is part of a study being conducted by the Philadelphia Bicycle Coalition and Drexel University's Urban Planning unit, on behalf of the Environmental Protection Agency.

Please be kind enough to take a few minutes to complete the questionnaire TODAY and to mail it in the postpaid envelope. We know that we cannot pay you adequately for your time, but as a token of our appreciation we will be happy to send you 25¢ or a report of the findings; details are at the very bottom of the form.

Many thanks, and we hope that the survey will help to make your future trips to Center City more pleasant.

(Prof.) Ralph B. Hirsch
Urban Planning, room 4-271
Drexel University
Philadelphia, Pa. 19104

1. Please mark the primary purpose of your trip to Center City today

___ work ___ shopping ___ attend class ___ see doctor or dentist ___ other

2. Your place of residence

If it is IN Philadelphia, write the name of the section and the two streets that form the nearest intersection (e.g. Germantown; Wayne & Chelten Avenue)

Section _____ Street intersection _____

If it is OUTSIDE of Philadelphia, write name of town and state _____

In either case, please write here the ZIP code of your home address _____

3. When you come to Center City, what mode of transportation do you ordinarily use?

___ auto ___ subway ___ bus ___ trolley ___ railroad

___ a combination of the above ___ bicycle ___ walk

4. By auto, how long does it usually take you to drive to Center City from home? _____ minutes

5. Your age ___ under 25 ___ 25 - 34 ___ 35 - 44 ___ 45 - 64 ___ 65 and up

6. Your sex ___ male ___ female

7. To what extent do the following factors inhibit you from regularly using mass transit to come to Center City? (Please circle one number for each factor listed)

	NOT AT ALL				VERY MUCH
Fear of crime on vehicle or in station	1	2	3	4	5
Takes too long	1	2	3	4	5
No stop convenient to home	1	2	3	4	5
Vehicles or stations dirty, smelly, etc.	1	2	3	4	5
Other (please specify: _____)	1	2	3	4	5

8. Do you own a bicycle? ___ yes ___ no

9. How many speeds does it have? ___ one ___ three ___ five ___ ten or more ___ don't know

Please answer questions 10 through 13 only if you do own a bicycle.

10. Have you ridden your bicycle into Center City during the past 12 months? ___ yes ___ no

11. If yes, on what days? ___ weekday only ___ Sunday only __ both weekday and Sunday

12. To what extent do the following factors inhibit you from regularly using your bicycle to go to work, shopping, etc.? (Please circle one number for each factor listed)

	NOT AT ALL				VERY MUCH
Too much physical effort (sweat, etc.)	1	2	3	4	5
Personal safety in traffic	1	2	3	4	5
Lack of bike parking at destination	1	2	3	4	5
Bad weather	1	2	3	4	5
Takes too long	1	2	3	4	5
Social pressure (dress, ridicule, etc.)	1	2	3	4	5
Cannot carry packages	1	2	3	4	5
Other (please specify: _____)	1	2	3	4	5

13. Assume that good safe bike parking is available at your destination, and that bicycle streets or bike lanes have been designated to minimize the conflict between bicycles and other vehicles. How likely would you then be to use your bicycle to come to Center City?

NOT AT ALL				VERY
1	2	3	4	5

Please answer question 14 only if you do NOT own a bicycle.

14. Assume that good safe bike parking is available at your destination, and that bicycle streets or bike lanes have been designated to minimize the conflict between bicycles and other vehicles. How likely would you then be to buy a bicycle and use it for going to work or to shop in Center City?

NOT AT ALL				VERY
1	2	3	4	5

Thanks very much for your cooperation in answering this questionnaire. To show our appreciation, we'll send you a quarter, if you like. (It's not much, but it's all we can afford!) Alternatively, we will mail you a report of the findings of this survey. Please mark the appropriate item below.

___ Please send me the quarter

___ Please send me the survey report instead

___ Thanks, but please use the 25¢ to promote the cause of bicycling in this region

IMPORTANT: If you want the quarter or the survey report, please fill in your name and address below. This will be the mailing label; please PRINT!

NAME _____

STREET ADDRESS _____

CITY, STATE, ZIP _____

Philadelphia Code,
Chapter 12-800:
BICYCLE REGULATIONS AND PENALTIES

§12-801 Persons Riding Bicycles

(1) Every person riding a bicycle upon a highway shall have all the rights and shall be subject to all of the duties applicable to an operator under the provisions of this Title and The Vehicle Code.

§12-802 Obedience to Traffic-control Devices

(1) Whenever signs are erected indicating that no right or left turn is permitted, or that a turn in the opposite direction is permitted only between certain hours, no person operating a bicycle shall disobey the direction of any such signs except where such person dismounts from the bicycle to make such turn, in which event such person shall have the privileges and responsibilities of a pedestrian.

§12-803 Riding on Bicycles

(1) A person operating a bicycle shall not ride other than astride a permanent and regular seat attached thereto.

(2) No bicycle shall be used to carry more persons at one time than the number of seats permanently affixed to such bicycle.

§12-804 Riding on Roadways and Bicycle Paths

(1) Persons riding bicycles upon a roadway shall not ride other than single file except on paths or parts of roadways set aside for the exclusive use of bicycles.

(2) Whenever a useable path for bicycles has been provided adjacent to a roadway bicycle riders shall use such path and shall not use the roadway.

§12-805 Emerging From a Driveway or Building

(1) The operator of a bicycle emerging from a driveway or building shall upon approaching a sidewalk or the sidewalk area extending across any alleyway or driveway, yield the right-of-way to all pedestrians approaching on said sidewalk or sidewalk area, and upon entering the roadway shall yield the right-of-way to all vehicles and street cars approaching on said roadway.

§12-806 Carrying Articles

(1) No person operating a bicycle shall carry any package, bundle, or article which prevents the rider from keeping at least one hand upon the handle bars.

§12-807 Parking

(1) No person shall park a bicycle upon a street other than against the curb or upon the sidewalk in a rack to support the bicycle, or against a building or at the curb, in such a manner as to afford the least obstruction to pedestrian traffic.

§12-808 Riding on Sidewalks

(1) No person shall ride a bicycle upon a sidewalk within a business district, as such district is defined in The Vehicle Code.

(2) No person 12 years of age or more shall ride a bicycle upon any sidewalk in any district.

(3) Whenever any person is riding a bicycle upon a sidewalk, such person shall yield the right-of-way to any pedestrian and shall give audible signal before overtaking and passing such pedestrian.

(4) In areas under the jurisdiction of the Fairmount Park Commission, riding bicycles on sidewalks and foot paths may be permitted when authorized by regulations of the Commission.

§12-809 Warning Devices and Brakes on Bicycles

(1) No person shall operate a bicycle unless it is equipped with a bell or other device capable of giving a signal audible for a distance of at least 100 feet, except that a bicycle shall not be equipped with nor shall any person use upon a bicycle any siren or whistle.

(2) Every bicycle shall be equipped with a brake which will enable the operator to make the braked wheel skid on a dry, level, clean pavement.

§12-810 Bicycle Regulations and Penalties

(1) The parent of any child, the guardian of any ward or any person standing in loco parentis with respect to any child shall not authorize or knowingly permit such child or ward to violate any of the provisions of this Chapter.

§12-811 Penalty

(1) Any person violating any of the provisions of Chapter 12-800 shall, upon summary conviction before a Magistrate, pay a fine of $3.00 together with costs of prosecution, or in default of payment, undergo imprisonment for not more than three (3) days.

WAIVER OF RESPONSIBILITY

BICYCLE PARKING - FEDERAL BUILDING CONSTRUCTION SITE

Agreement Between GSA and _____.

You may park your bicycle on the Federal Building Construction Site subject to the following conditions.

1. Bicycles will be parked in the roped off area on the south-east corner of the parking area.
2. The lot is open from 8:00 a.m. to 5:30 p.m. and access to the area during other hours is prohibited.
3. No one is allowed below the surface area of the Construction Site at any time.
4. Bicycles parked in areas other than designated in No. 1 above will be impounded.
5. In accepting the conditions of this agreement you hold the United States Government and GSA free of liability for damage or theft of your property. You also agree that the U.S. Government and GSA are free of liability in case of injury or death suffered as a result of using this site.
8. Upon notification that the site is to be turned over to the contractor you agree that you will remove your property by the date specified.
9. Anyone parking a bicycle without authorization may be ticketed, have the property impounded or be charged with Trespass.

_____

Serial Number _____

Make of Bicycle _____

Approved by: _____

A bicycle rack has been installed on the Mandel Building loading dock at the South Water Street level for the exclusive use of EB employees.

Sixty spaces are available. These may be reserved by employees in the following manner:

1. Deposit $5.00 at the Cashier's Office (7th Floor) after 9:00 A.M., on Monday, April 5. This deposit, which is completely refundable when the space is relinquished, is required in an effort to restrict reservations to employees who are serious in their intent to make use of the facility.
2. Bring your receipt to Office Services (7th Floor) where you will be asked to sign a waiver of responsibility form.

The sixty spaces will be allocated on a first come first served basis.

WAIVER OF RESPONSIBILITY

I agree that Encyclopaedia Britannica, Inc., shall not be liable for damage to or loss of my bicycle arising in any way out of my use of the bicycle rack located on the loading dock on the ground level of the Mandel Building, 425 N. Michigan Avenue, Chicago, Illinois, and I assume all risk of damage to or loss of my bicycle while parked in that facility.

(Name) (date)