

BICYCLE TRANSPORTATION FOR ENERGY CONSERVATION

April 1980

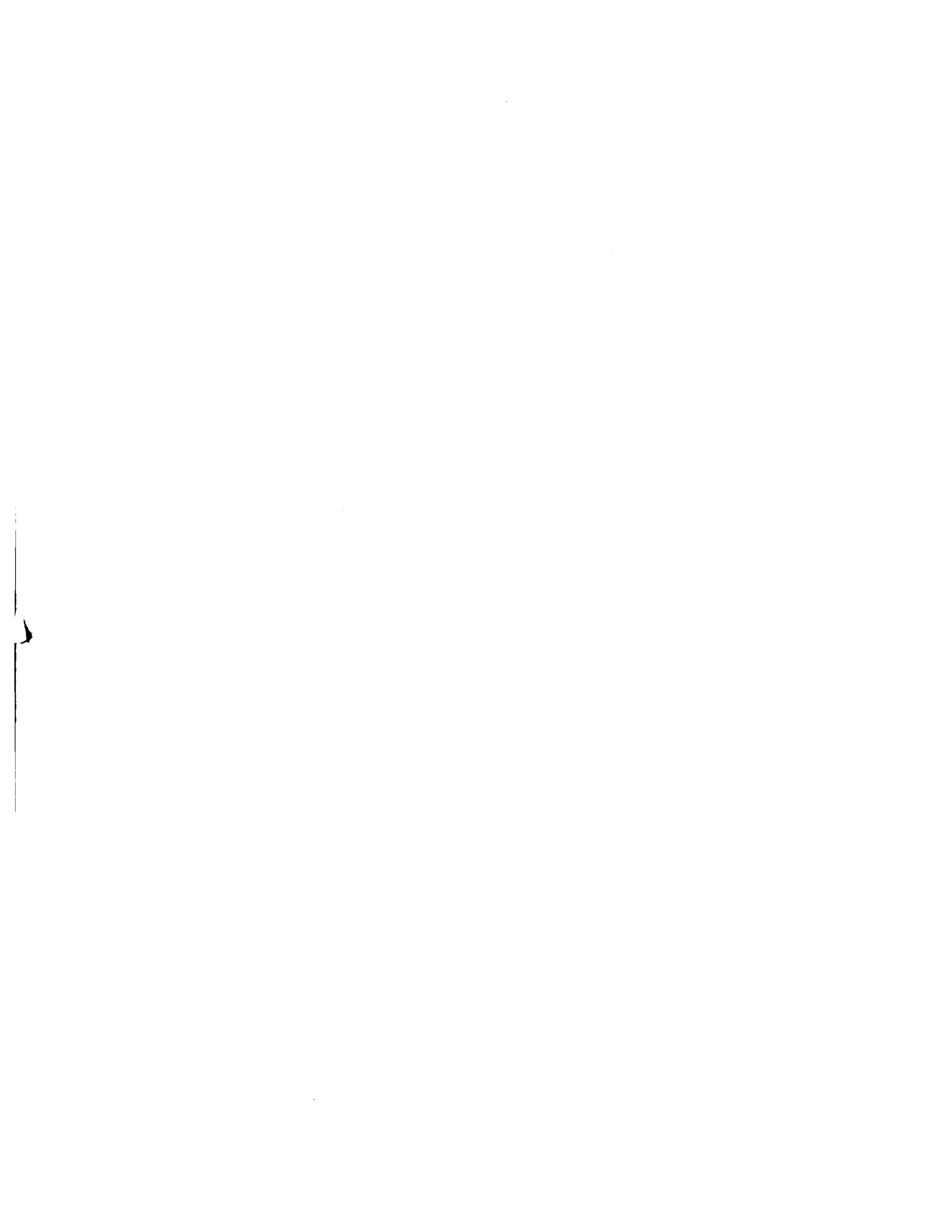


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Secretary of Transportation
and the Congress pursuant
to the National Energy

Conservation Policy Act of 1978

U.S. DEPARTMENT OF TRANSPORTATION
Office of the Secretary
Washington, D.C.
20590





THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

April 22, 1980

The President
The White House
Washington, D.C. 20500

Dear Mr. President:

I am pleased to submit to you a report on "Bicycle Transportation for Energy Conservation", prepared pursuant to the requirements of Section 682 of the National Energy Conservation Policy Act of 1978 (P.L. 95-619).

This report on bicycle transportation:

- o identifies a series of obstacles, both personal and institutional, to increase bicycle use,
- o describes a Comprehensive Bicycle Transportation Program designed to increase bicycle use,
- o proposes a target goal of approximately 1,500,000 - 2,500,000 bicycle commuters by 1985,
- o estimates that the energy savings from bicycle use in 1985, if the goals for both commuting and other bicycle transportation uses are achieved, would be 16.4 - 23.5 million barrels per year (or 55,000 - 77,000 barrels per day), and
- o details the actions planned by the Department of Transportation to implement the Comprehensive Bicycle Transportation Program.

Implementation of the Comprehensive Bicycle Transportation Program will not only result in substantial benefits in terms of energy conservation from increased use of bicycles for transportation, but also increased transportation system efficiency, air quality improvements, and enhanced individual health and fitness.

Respectfully,

A handwritten signature in black ink, which appears to read "Neil Goldschmidt", is written over the typed name.

Neil Goldschmidt

BICYCLE TRANSPORTATION FOR ENERGY CONSERVATION

Including

A Comprehensive Bicycle Transportation Program

A report of the Secretary of Transportation
to the President and the Congress pursuant to Section 682
of the National Energy Conservation Policy Act (P.L. 95-619).

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BICYCLE TRANSPORTATION FOR ENERGY CONSERVATION

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INTRODUCTION AND SUMMARY

A. Background

This study is submitted to the Congress and the President pursuant to the requirements of Section 682 of the National Energy Conservation Policy Act of 1978 (PL 95-619). Section 682 reads as follows:

Section 682. Bicycle Study

"(a) The Congress recognizes that bicycles are the most efficient means of transportation, represent a viable commuting alternative to many people, offer mobility at speeds as fast as that of cars in urban areas, provide health benefits through daily exercise, reduce noise and air pollution, are relatively inexpensive, and deserve consideration in a comprehensive national energy plan."

"(b) Not more than one year after the date of enactment of the Act, the Secretary of Transportation shall complete a study of the energy conservation of potential bicycle transportation, determine institutional, legal, physical, and personal obstacles to increased bicycle use, establish a target for bicycle use in commuting, and develop a comprehensive program to meet these goals. In developing the program, consideration should be given to educational programs, federal demonstrations, planning grants, and construction grants. The Secretary of Transportation shall submit a report to the President and to Congress containing the results of such a study."

The program and policy recommendations presented here are based on an analysis of the best information that was available or could be developed during the period of the study. Sources of information included existing literature, the 1975 Travel-to-Work Supplement to the Annual Housing Survey conducted by the Bureau of the Census, correspondence with state and local bicycle program specialists, a request for information and Public Comment issue by the Department of Transportation in the Federal Register,¹ and an assessment process involving transportation planners and private and public sector representatives.

¹DOT Notice #79-1, Federal Register, Vol. 44, No. 114, July 12, 1979

B. Findings and Conclusions

1. Obstacles. All obstacles or constraints can be organized into two main categories - those that prevent or discourage a person from choosing to ride a bicycle for transportation, and those that constrain an institution from becoming effectively involved in bicycle transportation. The primary obstacles to increased bicycle use for transportation are as follows:

Personal

- o Low level of awareness and acceptance of bicycle transportation (by potential cyclists and motorists),
- o Inability to bicycle safely and efficiently,
- o Lack of provisions for bicycle use (on existing streets, special bicycle facilities, bicycle parking availability), and
- o Other disincentives (e.g., lack of knowledge about good routes).

Institutional

- o Low level of awareness and acceptance of bicycle transportation,
- o Lack of skills and knowledge relative to bicycle transportation,
- o Inadequate funds, and
- o Lack of communication and coordination.

2. Potential Use. Bureau of the Census figures show that an average of 470,000 people commuted to work by bicycle on any given day in 1975. This amounted to approximately 0.6 percent of all commuters. The 1975 data on commuting was analyzed to determine how many people might shift to bicycles for their trip to work if the identified obstacles were reduced or eliminated. When factors such as distance, time, auto dependency, physical limitations and environmental conditions are considered, it is estimated that 3.8 million workers could have commuted by bicycle in 1975 compared to the 470,000 who actually did commute by bicycle.

3. Target Goal and Energy Conservation Potential. In view of the foregoing, a target goal of 1,500,000 to 2,500,000 bicycle commuters by 1985 is proposed. Further, it is estimated that, if this goal is achieved, the use of bicycles for other transportation purposes (e.g., shopping) could increase by 50 to 100 percent. The potential reduction in automobile use due to this shift to bicycle travel is estimated to result in fuel savings in the range of approximately 7.9 - 15.0 million barrels per year (or 26,300 - 50,000 barrels per day). The total energy savings from bicycle use in 1985 could be 16.4 - 23.5 million barrels per year (or 55,000 - 77,000 barrels per day).

C. DOT Policy and Actions

On the basis of the potential substantial energy saving from bicycle transportation documented by this report and the many other benefits of increased bicycle use, the Department of Transportation intends to expand its bicycle related activities to implement the proposed Comprehensive Bicycle Transportation Program.

i. Department of Transportation Bicycle Policy

- o To promote the safe, increased use of bicycles for transportation,
- o To integrate bicycle transportation into all appropriate Departmental programs and activities, and
- o To require the consideration of bicycle use in all appropriate DOT-funded transportation projects.

Within the Department, responsibility for implementing this policy will be distributed among the administrations as follows:

- o Federal Highway Administration - general promotional activities; all highway and special bicycle facility-related projects and programs,
- o National Highway Traffic Safety Administration - bicycle safety programs; education, training and enforcement programs for motorists and bicyclists,
- o Urban Mass Transportation Administration - bicycle/mass transit interface programs,
- o Office of the Secretary - policy development and overall program coordination, review and evaluation.

2. Program Objectives. In order to overcome the identified obstacles and increase the use of bicycles for transportation the Comprehensive Program will have the following three major objectives:
 - o To improve operator awareness of and competence in bicycle transportation,
 - o To improve institutional and professional responsiveness to bicycle transportation, and
 - o To improve the transportation system relative to bicycling.

3. Comprehensive Bicycle Transportation Program. The Department intends to implement a Comprehensive Bicycle Transportation Program over the next five years. In order to increase bicycle transportation, the program will include the following elements:
 - a. Improve Operator Awareness and Competence
 - o Making comprehensive bicyclist education/training available to interested adults to increase cycling proficiency,
 - o Implementing public awareness programs to acquaint the public with the benefits of cycling and to increase acceptance of the bicycle as a mode of transportation,
 - o implementing motorist information programs to improve drivers' acceptance of cycling, and their ability to share the road with cyclists,
 - o Increasing selective enforcement of traffic laws to improve bicycle safety, and
 - o Providing incentives to increase bicycle use.

 - b. Improve Institutional and Professional Responsiveness
 - o Increasing the availability of funds to expand bicycle program activities,
 - o Developing standards and guidelines to improve the quality of bicycle programs,
 - o Integrating consideration of bicycle transportation into regular planning activities to provide for coordinated development,

- o Improving coordination of bicycle transportation activities to increase effectiveness and efficiency,
- o Increasing the acceptance of bicycle transportation by transportation professionals, and
- o Increasing the knowledge and understanding of bicycling and bicycle programs among transportation and related professionals.
- c. Improve Transportation System
 - o Eliminating roadway surface and design hazards to increase cyclists mobility and safety,
 - o Improving bicyclists' access by mitigating the effects of "bottlenecks" (i.e., bridges), and
 - o Providing bicycle parking facilities to accommodate more widespread use.

D. Organization of the Report

The report is divided into four chapters. Chapter I describes the major obstacles to widespread bicycle use. Chapter II presents the recommended elements of the Comprehensive Bicycle Transportation Program. Chapter III establishes the target goals for increased bicycle use and estimates the energy conservation potential of bicycle transportation. Finally, Chapter IV sets forth the Department of Transportation's bicycle policy and the Appendix details DOT bicycle program activities.

This report summarizes information developed in response to Section 682(b) and presents to the President and the Congress the Department's policy and program for bicycle transportation. Much of the data upon which this report is based was developed by the Mountain Bicyclists' Association of Denver, Colorado, under contract to the Office of Environment and Safety of the U.S. Department of Transportation. A further explanation of the data presented in this report and an expanded description of the actions required to implement the Comprehensive Bicycle Transportation Program will be presented in a subsequent "Technical Report."

I. OBSTACLES TO INCREASED BICYCLE USE

A. Introduction

Section 682 of the National Energy Conservation Policy Act requires the identification of the "institutional, legal, personal and physical obstacles to increased bicycle use."

In the course of the various bicycle-related projects conducted by the Department, numerous problem areas have been identified. These problems have been voiced directly by bicyclists in correspondence, raised by professionals in the field at conferences or seminars, and documented by researchers as a result of their work for the Department. The extent and impact of these problems, however, had not been examined prior to this study.

In fulfillment of the requirement in the Act, the Department analyzed existing bicycle conditions in an effort to determine which of the identified problems serve as obstacles to increased bicycle use. The results of this analysis constitute an exhaustive review of all aspects of bicycling and bicycle programs. This "Overview of Existing Bicycle Conditions" is contained in the contractor's technical report. Conditions which specifically impede bicycle transportation in the United States have been extracted from that report and organized to clarify the nature and interrelationship of the obstacles or constraints identified.

Although the Act specified four specific categories of obstacles (personal, physical, institutional, and legal) it was found that all constraints can be organized into two major categories: those that prevent or discourage a person from choosing to ride a bicycle, and those that constrain an institution² from becoming effectively involved in the field of bicycle transportation. These personal and institutional obstacles are closely related since institutional involvement in bicycling can positively or negatively affect the conditions which influence an individual's decision to ride.

The two remaining categories identified in the Act have not been ignored. Physical obstacles are considered in the personal category since they represent a major factor in an individual's decision to ride and satisfaction with the bicycle mode. Legal obstacles have been subsumed under the institutional category because they represent just one example of the many types of institutional responses which affect bicycling.

In the following sections, the various types of constraints that operate on individuals and institutions will be discussed.

B. Personal Constraints

In order for any mode of transportation to be "successful," a large number of people must regularly choose it over other available modes. With bicycling,

²For the purpose of this report, "institution" shall refer to any agency, organization, legislative body or association in the public or private sector that is responsible for programs, policies, regulations or products which may affect bicycle transportation.

however, the choice is not a one-time decision to ride. Rather, that choice is comprised of a series of analyses and micro-decisions concerning the acceptability of bicycling under a specific set of conditions. This study identified a wide range of constraints which can have a significant impact at each decision-making stage. It is important to recognize that potential and existing bicyclists can be blocked or discouraged at any one of these decision points. The obstacles that exist at each of these points, therefore, are of significance. They will be discussed in some detail in the paragraphs that follow.

Low Level of Awareness and Acceptance of Bicycle Transportation. Unlike mass transit and ride sharing, which have been actively promoted as energy conservation strategies, the bicycle has not received a great deal of publicity as a mode of transportation. Many adults perceive bicycling as an activity that requires enormous physical effort, is only practical for very short distance (i.e., under one mile), is very dangerous, requires expensive equipment and clothing, is limited to only a few months out of the year, and is not in keeping with a "professional image." Related to these perceptions is the strong belief by many people that bicycles do not belong on the street. This belief appears to be the basis for what many cyclists identify as motorist hostility to bicyclists.

Inability to Bicycle Safely and Efficiently. Despite the problem of awareness, there have been many people who have considered bicycling to work or on errands. The problem this group encounters is their own fear of riding in traffic. While many noncyclists contend that this fear is based on the "fact" that bicycling in traffic is dangerous, there is good reason to believe that the fear is related to a lack of confidence in one's ability to operate the bicycle safely and efficiently.³ Because of the well established belief that bicycling is something learned in childhood and never forgotten, few adults recognize or acknowledge the need to obtain some form of training in the operation of a bicycle in traffic before attempting regular commuting. Without proper training, novice cyclists very quickly encounter situations which are beyond their basic skill level. It is at this point that they do not feel capable of handling regular traffic situations.

Ideally, there would be bicyclist training programs readily available in all parts of the country to introduce people to cycling skills in a nonthreatening environment. A novice cyclist, however, would currently find it very difficult to obtain the necessary instruction. The only programs for adults currently available are informal training sessions sponsored by local bicycle clubs and the Effective Cycling Program sponsored by the League of American Wheelmen. Both of these types of training may be too advanced or too technical for the average adult novice cyclist.

³Barton-Aschman Associates, A Study of Demand Incentives for Non-Motorized Transportation, for the U.S. Department of Transportation, Contract No. DOT-OS-60183. This project, which has not yet been completed, consists of a household survey in neighborhoods in five cities, and the development of predictive models of the effects of various incentives to bicycling and walking. The results from the surveys were used in the development of this report.

Another area that causes problems for new cyclists is ignorance about equipment, route selection, maintenance and repair. These are areas that would also need to be addressed in training programs in order to get cyclists over the "skill and knowledge" obstacle.

Lack of Provisions for Bicycle Use. The fear of traffic described above has been responsible for the widespread demand for separate bicycle facilities. Many people responding to the Department's request for comment on bicycle commuting claimed that they would ride their bicycle to work only if there were safe places to ride. By "safe," most respondents implied "separated from automobiles." Existing bicycle facilities, however, have not generally been designed for commuter trips. They do not provide complete access, and may expose the cyclist to hazardous conflicts with automobiles at intersections.⁴ Providing a total separate route system for bicycles comparable to the existing street system is not practical.

The streets of most communities were not originally designed with bicycles in mind, and many hazards (narrow lanes, no shoulders, etc.) and barriers (e.g., the prohibition of bicycles on some bridges) preclude or inhibit the use of existing streets by bicyclists.

A related problem is the availability of secure bicycle parking facilities. Almost half of those surveyed in five U.S. cities said that they were afraid their bicycle would be stolen if they rode it to work.⁵ A recent Baltimore, Maryland survey of bicyclists found that 25 percent of those polled had had a bicycle stolen and 20 percent of those victims reported that they consequently gave up cycling.⁶ Since the recovery rate for bicycles is only 18 percent, secure bicycle parking seems essential.⁷

⁴Vincent S. Darago, Regional Workshops On Bicycle Safety: Presentations, Participant Problems, Programs and Ideas, and Recommendations, National Highway Traffic Safety Administration, Contract DOT-HS-7-01798, September, 1978.

⁵Barton-Aschman Associates, op. cit.

⁶Baltimore County Bikeways Task Force, Bicycle Parking: A Design Manual

⁷Barton-Aschman Associates, Bicycles in Pennsylvania, for the Commonwealth of Pennsylvania, 1976.

A tremendous opportunity for bicycle transportation that has been largely overlooked is bicycle/mass transit interface. Since bicycle parking is not usually provided at subway and train stations, bicyclists are discouraged from riding their bicycles to the transit station and then completing their journey on the subway, bus, or train. Generally, bicycles are also not allowed on any of these vehicles. The effect of these two situations is a limitation on the range of "bikeable" trips.

Other Disincentives: The other, less important disincentives most frequently cited by those who commented to the Department are: (1) perceived motorist insensitivity; (2) lack of shower facilities at workplaces; (3) difficulty in carrying parcels on bicycles; (4) bottlenecks where bicycle travel becomes inconvenient or awkward; (5) poor directional information for bicycle facilities; (6) limited selection of bicycle designs for comfort, economy, and efficiency; and (7) high volumes of air pollution during peak travel times.

C. Institutional Constraints

Just as the obstacles described above restrict the extent to which an individual will bicycle, there is a similar series of constraints which limit the involvement of appropriate institutions in bicycle transportation. They are as follows:

Low Level of Awareness/Acceptance. The bicycle really has only reemerged as a transportation vehicle in the last decade, and many institutions have been slow to respond to its presence in the transportation system. The first constraint encountered within institutions, therefore, is the general lack of awareness and acceptance of the bicycle as a mode of transportation.

The potential community benefits of increasing bicycling have not been publicized widely. In fact, they frequently have been overlooked. A sampling of research studies, policy analyses and governmental reports dealing with transportation planning, air quality, and energy conservation found that eight out of ten made no mention of bicycle transportation where it logically should have been included. In those cases where the bicycle was mentioned, the references were seldom substantial and frequently were based on erroneous assumptions about bicycle transportation.

Because of this low level of awareness, the bicycle has not been fully integrated into general transportation program planning and development. An example of this can be seen in the implementation of the Department's Transportation System Management (TSM) requirements.⁸ Although the TSM guidelines highlight the need to consider pedestrians and bicyclists in the development of the TSM element of the Transportation Improvement Program, relatively few projects have been implemented for these two non-motorized modes.⁹

The lack of awareness and acceptance of bicycle transportation can be seen also in institutions other than those related to transportation. Enforcement of the rules of the road for bicyclists is very limited because of the reluctance of police officers and administrators to place any priority on bicyclists' violations.¹⁰ Similarly, some court officials have expressed the opinion that the adjudication of bicyclists' violations is a waste of the court's time.

Lack of Skills and Knowledge. Those organizations and individuals that do consider bicycle transportation are often unaware of the state-of-the-art in bicycle program development and implementation. As a result, poor quality facilities and programs are sometimes produced.

One cause of this problem is that most professionals receive no formal training in bicycle transportation. For example, in a recent review of 21 college transportation textbooks, most of which were geared toward civil engineering, 15 of the textbooks contained no mention of modern bicycling transportation. Of the remaining six texts, five gave brief attention to the negative aspects of bicycling that, in the opinion of the authors, prevented it from being a "real" transportation mode.¹¹ Similarly, bicycling is usually not included in the curricula of other involved professionals (police officers, etc.). The few professional, in-service training programs that are currently available cannot provide sufficient information to the large number of professionals that are, or should be, involved in bicycle transportation programs. Finally, there is also a lack of accepted guidelines for selecting the appropriate bicycle facility treatment or program.

⁸"Transportation Improvement Program," Federal Register, Volume 40, No. 181, September 17, 1975. pp. 42976-42984.

⁹Urban Consortium for Technology Initiatives, Institutional Framework for Integrated Transportation Planning, Washington, D.C., October 1978.

¹⁰National Highway Traffic Safety Administration, Pedestrian and Bicycle Safety Study, DOT-HS-801383, March 1975.

¹¹Robert Alexander, "Bicycling Technology in the Transportation Curriculum," a paper presented at the Eighth National Seminar on the Planning, Design, and Implementation of Bicycle, Pedestrian and Moped Facilities, San Diego, California, July 3-6, 1979.

Inadequate Resources. Local agencies and organizations interested in promoting bicycle transportation or improving bicycle safety frequently have a problem in securing adequate funding for program development and implementation. Most bicycle program activities are conducted at the community level and rely primarily on local funds. This differs from most other transportation programs where Federal and state funds provide much of the support.

The Department's approach to bicycle program funding has been through the use of regular Federal-aid highway monies. Bicycle facilities can be included during regular highway construction or can be implemented as an independent project.¹² While some states have taken advantage of this opportunity, to construct bicycle facilities, many have not or have done so to a very limited extent. The actual use of Federal-aid highway funds for bicycle projects under the authority provided by Section 217 (Title 23 U.S.C.) has been less than 10 percent of the allowed limit, and declined in FY 1979 to the lowest level since the program began.

A related resource problem is inadequate staff. A pressing need exists for individuals at all levels of government to be assigned the responsibility of developing and coordinating bicycle related programs. For states and cities this function generally requires the full-time commitment of at least one person. Only about 10 states and 30 cities have established such positions to date.

Lack of Communication and Coordination. In many ways, the field of bicycle transportation can be viewed as being in its infancy. A notable characteristic of this stage of its development is the lack of communication among professionals and the poor coordination of planning and program implementation.

At the DOT/CPSC-sponsored conference on bicycle education (BIKE-Ed 77) and the Regional Workshops on Bicycle Safety, the most often repeated request was for information on what is being done around the country regarding bicycling. Professionals are particularly in need of documentation of successful programs and analyses of the causes of the failures. Many local program specialists are also unaware of the work done by the Federal government because the results of research frequently do not filter down to the local level.

¹²Since 1974, over \$18 million has been spent on independent bicycle and pedestrian projects.

Coordination of bicycle program activities is a problem at all levels of government and within the private sector. At the local level, the police, schools, courts, parks, public works, and planning departments are all responsible for one or more parts of the community's program but often go about their work with little input from any of the other organizational entities. Many opportunities for integration of bicycle transportation into the regular activities of agencies such as public works are missed because there is no one in those agencies to insure that the bicycle is considered. This problem, which can result in overlapping responsibility, duplication of effort, and neglected program areas, appears to have been alleviated somewhat in those communities which have established bicycle advisory committees or permanent bicycle coordinator positions. Coordination between neighboring jurisdictions has also been a problem particularly in the areas of traffic laws, bicycle registration and bicycle route planning.

Similar problems exist at the state level. Again, the establishment of a bicycle coordinator position aids in the integration of bicycle transportation in state government activities.

At the Federal level, a coordination problem results from the variety of agencies involved in different aspects of bicycle transportation. While the majority of programs are administered by the Department of Transportation, at least 11 other Federal agencies are responsible for programs which do or can affect bicycle transportation.¹³ There is currently no formal mechanism for insuring that these programs are coordinated or as consistent with a Federal policy on bicycle transportation.

Some questions have arisen concerning the appropriate delegation of responsibility and authority for certain aspects of the Federal program. One particular question is which agency should regulate bicycle design. Currently, the responsibility for regulation of bicycle design lies with the Consumer Product Safety Commission. Although the Department of Transportation is not aware of any information that would indicate that shifting responsibility for bicycle regulations away from CPSC would enhance bicycle safety, performance standards for all other on-road transportation vehicles are issued by the Department of Transportation. Further, the majority of research on bicycle/motor vehicle accidents has been sponsored by the National Highway Traffic Safety Administration. It is possible that professionals might accept the bicycle as a legitimate mode of transportation more readily if bicycle design regulation was fully integrated with all other transportation programs rather than continuing in the more general category of consumer products. A discussion of this issue will be initiated as part of a general program to improve coordination of Federal activities related to bicycle transportation.

¹³DOE, EPA, GSA, DOI, HUD, HEW, CPSC, USDA, DOL, DOC (EDA) and National Endowment for the Arts.

D. Summary

The obstacles described above represent general categories of constraints which have been identified by cyclists themselves, bicycle program specialists, and government researchers. In the next chapter of this report, these obstacles will serve as the basis for the development of objectives and program elements for the comprehensive program recommended by this Department.

II. COMPREHENSIVE BICYCLE TRANSPORTATION PROGRAM

A. Introduction

Section 682 (b) of the National Energy Conservation Policy Act directs the Department of Transportation to develop a comprehensive program to reach a target goal for bicycle use in commuting. In developing the program, "consideration should be given to educational programs, federal demonstrations, planning grants and construction grants."

The Department has interpreted this as a request for a national program to increase the use of the bicycle as a mode of transportation. Responsibility for implementing such a program would be shared among the Federal, state and local levels of government and the private sector. Since it is not possible to prescribe specific actions for each of the many organizations and jurisdictions involved in bicycle transportation programs, the Comprehensive Bicycle Transportation Program is presented as a series of performance guidelines indicating the conditions which must exist by 1985 for there to be a substantial increase in bicycle transportation in this country. Additionally, some suggestions are provided as to how a particular guideline can be implemented and what actors will be involved.

In the sections that follow, the development of the Comprehensive Program is discussed and each of the elements of that program is described.

B. Objectives

The goal of the Comprehensive Bicycle Transportation Program is to increase the use of the bicycle as a mode of transportation.

The framework of personal and institutional obstacles was used as the basis for the development of objectives for the Comprehensive Bicycle Transportation Program. Three major objectives were identified.

- I. To Improve Operator Awareness of and Competence in Bicycle Transportation. This objective is based on the first two personal obstacles—low level of awareness and acceptance of bicycle transportation, and inability to ride safely and efficiently. The words "operator competence" describe the desired end product: (a) individuals who have overcome their negative attitudes and fear about bicycle transportation to become competent bicycle operators, able to handle most, if not all, traffic situations; and (b) motorists who have developed the appropriate attitudes and skills required to share the road safely with bicyclists.

2. To Improve Institutional and Professional Responsiveness to Bicycle Transportation. This objective addresses the entire range of institutional constraints (level of awareness/acceptance of bicycle transportation, skills and knowledge, resources and coordination/communication).
3. To Improve the Transportation System Relative to Bicycling. This objective addresses the obstacles affecting the opportunity to ride and the other personal disincentives. It encompasses all modifications to the actual highway environment, provision of support facilities (parking and showers), expansion of bicycle/mass transit interface opportunities, and distribution of information pertaining to the transportation system.

The objectives listed above are judged to be of equal importance and should be addressed simultaneously. The next section of the report describes Program Elements.

C. Program Elements

The final step in the development of the Comprehensive Bicycle Transportation Program, the identification of program elements, gives the Department the opportunity to organize into a single entity the results of our research and the program experience of state and local agencies in the field of transportation. Specifically, the elements chosen for this program represent a summation and refinement of the ideas presented in: Bike-Ed 77, A Conference Report; Regional Workshops on Bicycle Safety: Final Report; The Bicycling Guide (draft); Bicycle Information Report (draft); a variety of similar studies; correspondence with bicycle transportation professionals; and over 500 letters received by the Department in response to our request for comments published in the Federal Register. The selection of these elements is based on the best available data, and it is the Department's belief that they constitute a reasonable approach to increasing the use of the bicycle for transportation.

What follows is a general discussion of the Department's recommendation for a Comprehensive Bicycle Transportation Program to increase bicycle use substantially by 1985. The elements are organized according to the program objective which they address and are presented in order of importance.

To Improve Operator Awareness/Competence

The following five elements address the issue of operator competence.

Making comprehensive bicyclist education/training available to adults. Both introductory and in-depth education programs should be made available to interested adults. The program would attempt to correct cyclists' styles of operation, particularly concerning compliance with traffic laws. The program would include on-bike training in traffic skills and bicycle handling, and classroom instruction in "road sense", route selection, rules of the road, and equipment choice and maintenance. This program could be made available in condensed form to employees at their work sites, in full-length version to high school and college students through physical education programs, and in varying lengths to interested adults through community adult education, service organizations, and other programs. The program could be developed by the private sector and its implementation financed in part by private industry, the Federal government, and state and local agencies.

Implementing public information/awareness programs. The Department and other appropriate institutions should seek to acquaint the public with the benefits of cycling and increase acceptance of the bicycle as a legitimate mode of transportation. The public should be encouraged to consider using bicycles for transportation. It should be made clear that bicycling is a viable mode of transportation, rather than an unusual activity.

Implementing motorist information programs. While motorists would be affected by a broad-based public awareness program, they have special information needs that must be addressed in a more targeted program. The delivery of information to motorists should begin when they prepare to obtain licenses and should continue throughout their driving careers.

Information related to bicycle operation and road-sharing techniques should be included in drivers' education curricula and in state-issued drivers' manuals. Licensing written exams should have questions related to motorist-bicyclist interaction. Behind-the-wheel training should include practice in scanning for bicycles, evaluating bicyclists' behavior, and sharing the road with a variety of vehicles.

An ongoing campaign to provide all motorists with information related to bicyclists' use of the roadway should be initiated. Such information could be distributed through flyers enclosed with license renewal and vehicle registration letters, and through media campaigns directed specifically to motorists

Increasing selective enforcement of traffic laws. Local police departments should conduct regular enforcement campaigns targeted at the most critical violations (in terms of car/bicycle accident causation) by both bicyclists and motorists. This type of program could concentrate on bicyclists riding against traffic, disregarding traffic signals and stop signs, and not lighting bicycles at night, and motorists failing to yield to bicyclists at intersections. This would educate both motorists and bicyclists in the rules of the road and could reduce unsafe operation. Such a program should be accompanied by the development of appropriate fines and penalties for adult cyclists. The major burden of responsibility for this element will lie with local jurisdictions with appropriate support provided by state and Federal agencies.

Providing incentives. The objective for incentive programs is to provide bicyclists with at least the same level of benefits enjoyed by automobile commuters to make it easier for people to ride their bicycles to work, to school, and on errands. Incentives could include widespread adoption of flexi-time, reimbursement for use of bicycles for official business, subsidized or free, high - security bicycle parking, purchase of company bicycle fleets for use on local business errands, life and automobile insurance premium discounts for regular bicycle commuters (as is now done for non-smokers), and the provision of showers and lockers for employees who bicycle, walk long distances, or run to work.

To Improve Institutional and Professional Responsiveness to Bicycle Transportation

The following six elements relate to institutional and professional responsiveness.

Increasing the availability of funds. Increased funding is a prerequisite to expanding efforts to increase bicycle transportation. The availability of funds to support bicycle program activities is viewed by many as the primary determinant of program success. Because of the great interest in and significance of the funding issue, and, specifically, the attention that has been focused on the availability and use of Federal-aid highway monies for bicycle projects, a detailed discussion of the Department's current and proposed funding programs is presented below.

For many years, Federal-aid highways funds have been authorized for bicycle facilities developed as integral elements of ongoing highway projects. Additionally, in 1973, the Congress extended support of bicycle transportation by providing authority for bicycle and pedestrian facilities developed independent of any ongoing highway project. Section 217 (Title 23, USC) authorizes each state to use up to \$2.5 million per year (not to exceed a total of \$45 million per year nationally) of its regular Federal-aid apportionment for construction of such independent bicycle and pedestrian projects. The Federal share for such projects is 75%. The actual use of Federal-aid monies for bicycle projects under the authority provided by Section 217 has been less than 10% of the allowed limit, and declined in FY 1979 to the lowest level since the program began.

Section 141 of the Surface Transportation Assistance Act of 1978 (P.L. 95-599) authorizes a new "Bicycle Program." Section 141 was enacted by the Congress to respond to problems perceived in the above described existing authority for funding bicycle programs. The three major problems which the Congress sought to remedy with Section 141 are:

1. Existing authority provides only for construction projects — non-construction activities and programs are not eligible. Further, construction projects must be associated with a Federal-aid system highway.
2. Local governments (as distinguished from state governments) are not eligible to apply for and receive funds directly.
3. Bicycle projects have received very little funding, since they compete for funds at the state level on an equal basis with all other highway projects.

Section 141 addresses these problems by authorizing funds for both construction and non-construction projects which would enhance the use and safety of bicycles, providing for grants to state and local governments, and authorizing \$20 million per year for fiscal years 1979-82 for this purpose. The Congress has appropriated \$4 million for Section 141 for FY 1980, and the Federal Highway Administration is currently implementing the program.

The findings presented in this report add support to the concerns which the Congress sought to remedy by enacting Section 141. Greater flexibility in the use of Federal-aid highway funds in terms of eligible activities and grantees is essential to make the most effective and efficient use of these funds to encourage bicycle transportation and realize significant near-term energy conservation benefits at low cost. Also, the Department of Transportation shares with the Congress the belief that Federal funds should be used to a greater extent to provide for bicycle use as an important element of any comprehensive transportation program.

The Department has received numerous requests that it seek appropriations for the full \$20 million per year authorized by Section 141. This option was given serious consideration in the course of this study. However, it is the general policy of the Administration to discourage the creation, and avoid the use of single purpose, narrowly focused categorical programs. Rather, current Federal policy is to utilize broader purpose grant programs intended to achieve general program objectives, while allowing state and local governments substantial flexibility as to the choice of specific means to these ends. Therefore, while the Department of Transportation recognizes benefits in the Section 141 program, it does not believe that the categorical grant approach is appropriate. On the other hand, it is apparent that some program changes are needed if Federal-aid highway funds are to play a significant role in implementing the Comprehensive Bicycle Transportation Program.

The Department proposes to use the Auto-Use Management Program, which was proposed in legislation submitted by the Department on September 19, 1979, as its principal strategy for increasing funds for bicycle transportation. The primary purpose of this program is to increase the use of Federal-aid highway funds for energy conservation related projects — including bicycle projects under Section 217. This objective would be achieved by using funds authorized under one component of this program to increase the Federal share from 75% to 90% for eligible energy conservation projects. This increased Federal share will provide a significant financial incentive for state and local governments to select eligible projects over other regular highway construction projects. This approach should benefit bicycle and related programs and at the same time avoid the problems inherent in categorical programs. It is estimated that over \$1 billion per year in combined Federal/state/local funds could be "leveraged" in this way for eligible energy conservation projects.

A second component of the proposed Auto-Use Management Program would provide the Secretary with authority to make discretionary grants directly to states, counties, local and regional governments and private entities for a wide range of transportation energy conservation activities.

Finally, DOT intends to seek legislative changes to expand the current definition of eligible bicycle projects under section 217 to include non-construction programs such as those recommended by this study as an essential part of the Comprehensive Bicycle Transportation Program to increase bicycle use.

The combination of expanding the range of eligible bicycle program activities and recipients and implementing the proposed Auto-Use Management Program to channel more funds to such energy conservation projects provides a sound approach to integrating bicycle activities into the Federal-aid highway program and meeting the Department of Transportation's goals of:

- o making the full range of bicycle projects eligible for such funding,
- o making local governments eligible grant recipients, and
- o increasing the use of Federal-aid highway funds for bicycle projects.

As implementation of the Comprehensive Bicycle Transportation Program proceeds, the progress in achieving these goals will be assessed, and other alternatives considered as needs require.

Developing standards and guidelines. Because of the relatively recent interest in the development of bicycle facilities and other bicycle programs, many projects are planned/designed by individuals with little or no prior experience in such activities. It is critical, therefore, that clear, up-to-date standards or guidelines, reflecting the best state-of-the-art, be available to guide these efforts. The Federal Highway Administration currently is preparing standards for bicycle facilities. Other aspects of bicycle programs should also be addressed. This can best be accomplished as a cooperative effort of Federal, state and local governments, bicycle program specialists, and the various professional associations with an interest in this area.

Also, policies, standards and guidelines for transportation system planning and facility design and construction should include explicit consideration and appropriate integration of provisions for the needs and requirements of cyclists. This would apply to such things as FHWA's consideration of the American Association of State Highway and Transportation Officials' forthcoming "Policy on Geometric Design of Highways and Streets."

Integrating consideration of bicycle transportation into planning activities. If improved funding is the key to implementing bicycle transportation programs, then the full integration of bicycling into all governmental planning processes is the key to initiating and sustaining them. This will involve: (1) adding of bicycle transportation to governmental policy agendas; (2) establishing guidelines for the treatment of bicycles in Federal, state, and local planning efforts (i.e., transportation, air quality, energy conservation, highway safety, urban development); (3) monitoring these activities through program/policy review; and (4) recommendations by appropriate associations (such as the Institute of Transportation Engineers, American Society of Civil Engineers, American Association of State Highway and Transportation Officials, National League of Cities, and the National Association of Counties) that bicycles be given serious consideration in such program planning, design and implementation.

Two points deserve specific mention. First, the level of response to the Transportation System Management requirement that pedestrians and bicycles be considered in transportation plans must be increased if the 1985 goal for bicycle transportation is to be attained. Every effort must be made to insure, through rigorous program review, that bicycles are given more thorough consideration. Second, integration of bicycle considerations must entail more than simply adding a "bikeway plan" to the Transportation Improvement Program. Full integration of bicycle transportation necessitates, for example, an assessment of the positive and negative impacts of any proposed transportation project on bicycle use and bicyclists' safety. This distinction between a bicycle "add-on" approach and full integration is important. Full integration will open the door to a wide range of opportunities for incidental improvements for bicycling that might not be considered if bicycle transportation activities are conducted independent of other modal planning and programs.

Improving coordination of bicycle transportation activities. A major institutional problem which has been identified is the poor coordination of bicycle transportation programs at all levels of government. Within various agencies, there is frequently no individual responsible for coordinating the programs that are or should be taking place. Individuals and even agencies, operating in isolation, may respond to bicyclists' needs on a project-by-project basis, but often lack the authority to develop a comprehensive plan for integrating the bicycle into their program area. On a broader scale, there is usually no individual or agency in a position to oversee an entire jurisdiction's response to bicycle transportation. The result can be a duplication of effort, wasted program funds, and situations where programs are developed and implemented by inappropriate agencies.

Therefore, a framework for coordinating the development and implementation of bicycle programs should be established at each level of government. This arrangement could include: (1) a bicycle coordinator in appropriate agencies; (2) an inter-agency bicycle task force; and (3) bicycle advisory groups, representing the interests of all cyclists, to assist in the identification of problem areas and the development of program solutions.

Increasing the acceptance of bicycle transportation by transportation professionals. Just as it is necessary to improve the public's perception of bicycling, organizations and professionals involved in bicycling programs need to be encouraged to consider bicycle transportation a legitimate and important area of responsibility. This involves a change in attitudes or perceptions that can be brought about through: (1) the inclusion of bicycle-related material in professional training curricula; (2) the publication of bicycle-related articles in professional journals; and (3) the acknowledgement by professional associations of the importance of bicycle program specialists.

Increasing the knowledge and understanding of bicycle programs among transportation and related professionals. Related to the improvement of attitudes is an increase in knowledge through the dissemination of information on bicycling needs, program options, technical resources and funding opportunities to professionals who are or should be involved in bicycle transportation. The first step in this process should occur in undergraduate and graduate professional training. Information related to the value to bicyclists of wide curb lanes or paved shoulders, for example, should be included in traffic engineering curricula and texts. This early orientation to bicycle considerations will not only provide technical information, but will also help establish the bicycle as a mode of transportation in the eyes of new professionals.

In-service training keyed to bicycle programs should be made available to all program specialists. A professional journal dedicated exclusively to bicycle programs to maintain regular lines of communication among the professional community should be supported by all levels of government.¹⁴

To Improve the Transportation System

Three program elements have been developed to improve the transportation system relative to bicycling.

Eliminating roadway surface and design hazards. While bicyclist training programs should prepare cyclists to recognize and avoid hazards, bicycle commuting will not increase significantly until the transportation system is made more hospitable and hazard-free for the bicyclist. Removing hazards, such as wheel-trapping drainage grates, can be accomplished by local governments with technical assistance and financial support from state and Federal agencies.

Top priority should be given to providing funds and establishing guidelines for improvements to existing streets. When serious hazards on an existing street cannot be reduced or eliminated and when no suitable alternate route exists, a separate bicycle facility to bypass the hazards should be considered. However, the provision of such a facility should usually occur only when less costly, more efficient options are not available. (It is important to note that we are addressing improvements for bicycle transportation, not recreational cycling.)

Regular maintenance is important since the bicycle is more vulnerable to surface irregularities and debris than the automobile. Maintenance of separate facilities must be included in normal maintenance schedules. This requirement also should be considered in the initial design of separate bicycle facilities so that the surface and clearance provided will accommodate maintenance vehicles.

Improving bicyclists' access. Good bicycle access is essential to a bicycle commuting program. Routes should be reasonably direct, free from frequent delays, and devoid of bottlenecks that adversely affect convenience or safety.

As with hazard elimination, improving access is primarily a local responsibility. It begins with a thorough analysis of the transportation system with regard to bicycle service. Particular attention must be paid to: (1) natural or man-made barriers (rivers, expressways, tunnels); (2) interrupted bicycle routes; (3) awkward intersections; (4) traffic activated signals that do not respond to bicycles; (5) the accommodation of bicycles at mass transit stations; (6) the current suitability of major streets for bicycling (lane width, shoulder condition, traffic volume, speed limit); and (7) the quality/adequacy of existing separate bicycle facilities. Once the current situation has been assessed, steps can be taken to improve the existing conditions in order to provide full, convenient access for bicyclists.

¹⁴The Bicycle Forum, a publication on bicycle programs, produced by a non-profit corporation, is designed to fill this need.

Some access problems will not be solved by improving the existing roadway system. In such cases, it may be desirable to provide a separate bicycle facility to bypass the obstacle or to connect two major system segments. Separate facility construction may also be useful to provide safe shortcuts for cyclists. However, because of the high cost and the increased potential for intersection conflicts, separate facilities should be considered as the exception rather than the rule in a comprehensive bicycle transportation system.

All highway construction projects should be examined to assure that bicycle access is not reduced or eliminated. Federal and state project requirements and funding policies can be used for this purpose.

Multi-modal opportunities (bicycle/bus, bicycle/rail) offer potential for both reducing the number of short automobile trips (home to the station) and increasing the potential range of bicycle trips. Unfortunately, these opportunities are currently limited by the lack of secure bicycle parking at many transit stations and by the inability of most mass transit vehicles to accommodate bicycles. Funding policies and design guidelines should be adopted to encourage this type of service. In particular, secure, adequate bicycle parking should be provided and consideration should be given to the possibility of carrying bicycles on mass transit, at least along certain routes or at certain hours.

Another critical factor in access is the cyclist's awareness of good bicycle routes. A concern of local communities therefore should be: (1) the development of system-wide maps that identify recommended streets, separate facilities, and bike lanes, and help in route selection by locating hazardous intersections and steep grades; and (2) the provision of functional directional signing for cyclists.

Providing bicycle parking facilities. Secure bicycle parking is necessary for a commuter or shopper to consider bicycling as a viable transportation mode. Bicycle parking should be provided at all employment centers, shopping centers, downtown business districts, and mass transit stations.

This can be accomplished at the local level by passing ordinances that require bicycle parking facilities to be provided in conjunction with all new construction projects. Municipal "parking lots" for bicycles can be established in downtown locations, while local retailers and industry can be encouraged to provide bicycle parking for their employees and customers.

At the state and Federal levels, standards for the design and location of bicycle parking facilities can be established. Mass transit bicycle parking facilities can be mandated by requiring that all Federally funded projects include such features. Pending national legislation requiring the provision of secure parking facilities at all Federal installations should be passed, and Federal employees should be encouraged to commute by bicycle.

D. Summary

The Comprehensive Bicycle Transportation Program with the goal of increasing the use of bicycles for transportation is designed to accomplish the following objectives:

1. To improve operator awareness of and competence in bicycle transportation,
2. To improve institutional and professional responsiveness to bicycle transportation, and
3. To improve the transportation system relative to bicycling.

The following elements are included in this program:

Improve Operator Awareness and Competence (Bicyclists and Motorists)

- o Making comprehensive bicyclist education/training available to adults.
- o Implementing public awareness/information programs.
- o Implementing motorist information programs.
- o Increasing selective enforcement of traffic laws.
- o Providing incentives.

Improve Institutional and Professional Responsiveness

- o Increasing the availability of funds.
- o Developing standards and guidelines.
- o Integrating consideration of bicycle transportation into government planning activities.
- o Improving coordination of bicycle transportation activities.
- o Increasing the acceptance of bicycle transportation by transportation professionals.
- o Increasing the knowledge of bicycle programs among transportation and related professionals.

Improve Transportation System

- o Eliminating roadway surface and design hazards.
- o Improving bicyclists' access.
- o Providing bicycle parking facilities.

We believe that the implementation of this program nationwide, with the full support of the agencies and organizations involved at the national, state and local levels, will result in a substantial increase in the use of bicycles for transportation. Our estimates concerning potential bicycle use and energy conservation benefits are described in the following chapter.

III. POTENTIAL USE

A. Introduction

Section 682 of the National Energy Conservation Policy Act requires in part that the Department of Transportation "...establish a target for bicycle use in commuting." The Department has expanded this to address potential levels of bicycle use for all transportation trips. The reasons for this expansion is that the Comprehensive Bicycle Transportation Program, described in Chapter II of this report, can be expected to result in an increase in the use of the bicycle for shopping, personal business, social, and recreational trips, as well as for commuting trips. Any diversion from automobiles to bicycles for these trips can also be expected to result in gasoline savings.

The following discussion addresses the development of the Department's estimate of the potential level of bicycle use in 1985, and the determination of the effect of this increase on gasoline consumption.¹⁵

B. Current Use

The establishment of a target goal for bicycle use requires the identification of a reliable baseline from which to measure progress. For this study, the Department used the 1975 Travel-to-Work Supplement to the Annual Housing Survey conducted by the Bureau of the Census and several regional bicycle use studies¹⁶ to determine the 1975 levels of bicycle use. Although there are indications that bicycle use has increased since 1975, there are no data sources comparable to the Census study on which to base an updated figure.

According to the Census Study, the bicycle is reported as the principal mode of transportation to work for 0.6% of all commuters. The 470,000 commuters who use a bicycle account for 940,000 bicycle commuting trips per day.¹⁷ The one-way average trip length reported in the Census data for bicycle commuters is 1.4 miles. It is interesting to note that the level of bicycle commuting varies according to region of the country. In the Western region, 1.2% of all commuters use a bicycle—twice the national average.

¹⁵1985 was chosen as the target year because it is believed that it will take five years to fully implement the Comprehensive Program.

¹⁶Edwards and Kelsey, Inc., Manhattan Commuter Bicycle System Study, 1975; Barton-Aschman Associates, Bicycles in Pennsylvania, 1976; Barton-Aschman Associates, Bicycling in Tennessee, 1974; Deleuw, Cather and Company, Washington, D.C. Regional Bikeway Study, 1977.

¹⁷Several limitations of the Census data should be noted at this point. The survey included respondents 14 years and older, resulting in the inclusion of some school trips in the total estimate of commute trips. The Census data does not include people living in dormitories or barracks, thus eliminating a potentially large segment of the bicycling population—college students.

Combining these figures with data on other bicycle trip purposes obtained from regional and local bicycle studies, the Department estimates 1975 levels of bicycle use to be as follows:

Table III-1

Average Daily Bicycle Trips in the U.S. (1975)¹⁸

<u>Trip Purpose</u>	<u>% of All Bike Trips</u>	<u>No. of Trips (millions)</u>	<u>Average Trip Length (miles)</u>	<u>Miles Traveled millions</u>
Work	5	0.940	1.4	1.3
School	15	2.820	2.3	6.5
Personal Business	17	3.196	1.5	4.8
Social	17	3.196	1.5	4.8
Recreation	18	3.384	2.5	8.5
Neighborhood	28	5.264	1.5	7.9
Total	100	18.800		33.8

C. Potential Commuter Use

The major potential markets for achieving any shift to the bicycle for work trips are the current automobile users and mass transit users. In order to determine the probable number of these commuters who could switch to a bicycle for their work trip, several factors which place limitations on bicycle commuting were considered:

- o The characteristics of the commuting trip,
- o The need for an automobile during the day,
- o The physical limitations of the potential cyclists, and
- o The environmental conditions in the regions where the commuting trips will be made.

¹⁸"Daily" refers to a year-round weekday average.

The following paragraphs describe the effects of these factors on the number of commuters that might switch to the bicycle from other modes.

Trip Characteristics. The Census Travel-to-Work data indicate that only 10% of bicyclists commute at speeds above 15 mph, and only 4% travel further than six miles one way from home to work. It was assumed therefore that any increase in bicycle commuters will come primarily from those auto and mass transit users who are presently travelling six miles or less at speeds of 15 mph or less. Table III-2 shows the percentage of users of each of these modes who fall into that category.

Table III-2

Commuters With Trips Within Bicycling Range¹⁹
Distance \leq 6 miles and speed \leq 15 mph

<u>Mode</u>	<u>% of Total Mode Users</u>	<u># of Individuals (millions)</u>
Automobile	18.8	11.6
Mass Transit	41.3	<u>1.9</u>
		13.5

Automobile Dependency. Various types of employment require the use of an automobile. In the absence of a reliable estimate of the number of commuters who are in need of an automobile during the day, the Department has accepted as a surrogate measure the number of people who have no fixed place of work, and therefore can be considered to have a significant need for an automobile. In the 1975 Travel to Work Survey, this number was reported as being eight percent of all commuters.

Physical Limitations. It is possible to synthesize an estimate of the effect of physical limitations on the potential number of new bicycle commuters by defining the target group of bicycle commuters as those individuals between 19 and 45 years of age. Nineteen is the lower limit to reflect the definition of work trips as opposed to school trips. While it is recognized that many individuals older than 45 are capable of regular bicycle usage, this age ceiling was established to take into consideration those under 45 who are physically handicapped or otherwise unable to ride a bicycle. The group within this age category constitutes 60% of the commuter population, according to the 1975 Census figures, leaving 40% who will not be able to ride due to physical limitations.

¹⁹Based on Travel-to-Work Supplement to the Census Bureau's Annual Housing Survey for 1975.

Environmental Conditions. The effect of environmental conditions, such as climate and terrain, can be estimated by analyzing the regional variations in bicycle commuting reported in the 1975 Census data. The West exhibited the highest percentage of regular bicycle commuting (1.2% of all commute trips or twice the national average). If the West is used as a baseline (i.e., assuming that it represents the best general environmental conditions for bicycling in the United States), the effect of environmental conditions in the rest of the country can be estimated by comparing the 1975 reported level of bicycle commuting in each region to that baseline. Using this process, it was determined that environmental conditions would result in a net reduction of 50% in the number of commuters who could switch to a bicycle.

Estimated Potential Use. As summarized in Table III-3 below, applying each of these factors in sequence to the estimated potential market of 13.5 million automobile and transit commuters (calculating for auto and transit users separately), leaves an estimated target group of 3.8 million potential bicycle commuters (3.2 million automobile users and 0.6 million transit users).

Table III-3

<u>Estimate of Potential Bicycle Commuters (1975 base)</u>		
<u>(in millions)</u>		
	<u>Automobile</u>	<u>Mass Transit</u>
Commuters with trips within bicycling range (per Table III-2)	11.6	1.9
Reductions for:		
. Auto dependency (8%)	$\frac{-0.9}{10.7}$	=
. Physical limitations (40%)	$\frac{-4.3}{6.4}$	$\frac{-0.8}{1.1}$
. Environmental conditions (50%)	$\frac{-3.2}{3.2}$	$\frac{-0.5}{0.6}$
<hr/> <u>Estimated potential bicycle commuters by mode (1975)</u>	3.2	0.6

Target for Bicycle Use in Commuting. Section 682 requires that the Secretary of Transportation "establish a target for bicycle use in commuting." Based on the foregoing analysis, the Department believes that a target goal of 1,500,000 - 2,500,000 bicycle commuters by 1985 is achievable.

D. Potential Use of the Bicycle for Other Trip Purposes

As shown in section B of this chapter, the bicycle is currently being used for transportation by a substantial number of people. Purposeful bicycle trips, other than commuting trips, can also represent fuel savings since some of these trips would likely be made by automobile if the bicycle was not available. It is anticipated that the Comprehensive Bicycle Transportation Program will result in an increase in the number of these non-commuting trips made by bicycle. Data comparable to the Census data are not available to estimate potential use for these other trip purposes. Table III-4 presents estimates for increases in bicycle use by 1985 for various trip purpose. The figures reflect increases in the range of 50 to 100 percent over 1975 levels for non-work, bicycle trips.

E. Potential Energy Savings

If the Department's goal for the Comprehensive Bicycle Transportation Program is achieved, the projected reduction in daily automobile travel of 8.3 to 16.5 million miles by 1985 should result in a substantial gasoline savings. We have conducted the following analysis in order to determine the extent of that potential savings.

The Department of Transportation has established a 27.5 mpg "Corporate Average Fuel Economy Requirement" for 1985. Since nearly two-thirds of all travel is produced by vehicles from the most recent three to four model years,²⁰ it is estimated that the overall average fuel economy for automobiles in service in 1985 will be approximately 22 mpg. However, automobiles are considerably less fuel efficient on short trips, which will be the ones most likely to be diverted to the bicycle. Studies have shown that for the average bicycle trip length of about two miles, the relative fuel economy would be 35% of the overall fleet average.²¹ Applying this factor to the estimated 22 mpg fleet average of 1985 yields an estimate of 7.7 mpg for the auto trips diverted to bicycles in 1985.

²⁰ Alexander French, Transportation Energy Considerations in the Urban Environment, Highway Statistics Division, Federal Highway Administration.

²¹ T. C. Austin and K. H. Hellman, "Passenger Fuel Economy as Influenced by Trip Length," a paper presented at the Automobile Engineering Congress, Detroit, February 1975.

Table III-4^aEstimated Daily Reduction in Automobile Miles Traveled^b

Trip Purpose	New Bicycle Trips ^c (millions)	Prior Mode Auto (%)	Average Trip Length ^d (miles)	Reduction in Miles (millions)
Work	2.0 - 4.0	85	1.4	2.4 - 4.8
School	1.2 - 2.4	40	2.3	1.1 - 2.2
Personal Business	2.6 - 5.2	75	1.5	2.9 - 5.9
Social	1.3 - 2.6	75	1.5	1.5 - 2.9
Recreational	1.4 - 2.8	10	2.5	0.4 - 0.7
Neighborhood	2.2 - 4.4	0	1.5	No auto trips diverted.
Total	10.7 - 21.4	--	--	8.3 - 16.5

^aThese data were developed by the Mountain Bicyclists' Association.

^bBy 1985 (does not include the 1975 base year use).

^cOne-way

^dFor bicycle trips (From Table III-1)

Using this estimate of fuel consumption for those trips likely to be diverted to the bicycle, the Department estimates that implementation of the Comprehensive Bicycle Transportation Program, if it achieves its goal, would result in an increase in gasoline savings of 7.9 to 15.0 million barrels per year.²²

The total contribution of bicycle transportation to energy conservation in 1985 is determined by combining the savings from the anticipated increase in bicycle use and the savings resulting from 1975 bicycle use. This is shown in the following table.

Table III-5

	<u>Energy Savings from Bicycle Use</u>	
	<u>Daily (barrels)</u>	<u>Annual (millions of barrels)</u>
Projected Increase By 1985	26,300 - 50,000	7.9 - 15.0
Total 1985	55,000 - 77,000	16.4 - 23.5

The 1985 energy savings would be approximately 55,000 to 77,000 barrels per day. This figure can be compared to the expected savings of 262,000 barrels per day from ride sharing, and 302,000 barrels per day from the 55 mph speed limit.²³

F. Summary

The Department used the 1975 Travel-to-Work Supplement to the Annual Housing Survey, conducted by the Bureau of the Census, as well as several other regional and local studies, as a basis for the estimation of current and potential bicycle use. Using the 1985 overall fleet average fuel economy estimate of 22 mpg and adjusting it to reflect the reduced fuel efficiency of automobiles on short-distance trips, we estimate that by 1985 the use of bicycles for transportation could result in daily savings of 55,000 to 77,000 barrels of oil if the goal for the Comprehensive Bicycle Transportation Program is achieved.

²² "Annual" or "yearly" data was computed by multiplying the "daily" figures by 300 in order to adjust for weekend variances.

²³ These estimates were taken from Energy Conservation in Transportation, U.S. Department of Transportation, May 1979.

IV. DOT BICYCLE POLICY

A. Introduction

It is clear from the analysis of current levels of bicycle use that the bicycle is a viable mode of transportation for millions of people for certain trips and transportation needs. For some of these individuals, e.g., the young, it may provide the only means of mobility. But the needs of cyclists and potential cyclists are not being fully met at present and bicycling has not reached its full potential as a transportation mode. The full energy conservation benefits of bicycle transportation have therefore not yet been achieved.

This section of the report presents a discussion of the necessary roles of the various actors to be involved in the Comprehensive Bicycle Transportation Program and then describes the Department of Transportation's new policy on bicycle transportation and the distribution of responsibilities for implementing that policy.

B. Actors and Their Roles

The Comprehensive Bicycle Transportation Program provides an outline of what is necessary to increase the use of bicycles for transportation. The next step is to identify the actors involved and their appropriate roles in implementing this program. Each actor is viewed as an essential partner in the overall effort to increase bicycle use.

Federal. The Federal government generally has a more direct impact on programs that enhance bicycle transportation than on bicyclists themselves. The role for the Federal government will be in the areas of:

- o establishing program standards and guidelines,
- o increasing the availability of federal-aid highway funds for state and local programs,
- o identifying national legislation needs,
- o conducting research, demonstration and evaluation projects,
- o providing technical assistance, information dissemination and professional training,
- o developing and implementing public information programs, and
- o encouraging bicycling through official endorsements and positive examples (e.g., by implementing programs to encourage bicycling by Federal employees).

Within the Federal government, the lead role in implementing the proposed Comprehensive Bicycle Transportation Program will be taken by the Department of Transportation. The Department will coordinate its efforts with those of other Federal agencies involved in bicycling, including:

- o Environmental Protection Administration--promoting bicycle transportation as an air quality improvement strategy,
- o Department of Energy--promoting of bicycle transportation as an energy conservation measure,
- o Department of the Interior--encouraging bicycle transportation through recreation activities, and
- o General Services Administration and the Department of Defense --providing secure bicycle parking at all Federal installations.

Additionally, all Federal agencies and institutions have a role in encouraging the use of bicycles for transportation by their employees.

State. State governments will need to maintain an involvement similar to that of the Federal government. State organizations will work in partnership with the Federal government and local governments by:

- o allocating funds to state and local bicycle programs,
- o initiating large-scale statewide programs (e.g., curricula development, public information, bicycle registration, etc.),
- o developing statewide transportation, energy conservation, and air quality plans which include bicycle considerations,
- o enacting bicycle-related traffic laws,
- o designing highway projects to accommodate bicycles,
- o encouraging local bicycle program implementation, and
- o educating motorists on bicyclists' rights, etc.

Local. Local governments will continue to be responsible for the majority of activities which directly affect bicyclists and bicycle transportation. These activities will include:

- o identifying and planning for the needs of bicyclists,

- o enacting and enforcing bicycle-related ordinances (traffic, zoning, etc.),
- o improving and maintaining roadways for cyclists,
- o constructing/installing bicycle facilities (including bicycle parking), and
- o conducting bicycle promotion and education/training programs.

Private. Private sector involvement will range from local bicycle clubs offering cyclists training programs, and private industry providing parking and shower facilities, to professional associations issuing "recommended practices" to their members and the bicycle industry calling greater attention to the bicycle as a transportation vehicle.

All of these actors will have to be mobilized and work together in order to implement the Comprehensive Bicycle Transportation Program. We are preparing specific recommendations for actions by other actors and they will be presented in a subsequent Technical Report. The remainder of this chapter will address the Department of Transportation's role in the implementation of the Comprehensive Bicycle Transportation Program.

C. Department of Transportation Bicycle Policy

On the basis of the potential for substantial energy savings from bicycle transportation documented by this report and the many other benefits of increased bicycle use, the Department of Transportation intends to expand its bicycle related activities and implement the proposed Comprehensive Bicycle Transportation Program.

It is the policy of the Department of Transportation to:

- o promote the safe, increased use of bicycles for transportation,
- o integrate bicycle transportation into all appropriate Departmental programs and activities, and
- o require the consideration of bicycle use in all appropriate DOT-funded transportation projects.

The following paragraphs provide a general description of the division of responsibilities among the various elements of the Department for implementing this policy. Specific bicycle program activities to be undertaken as a part of this effort are listed in the Appendix: "DOT Bicycle Program Activities".

- o Office of the Secretary. OST's responsibilities will include: overall coordination and periodic review of the Bicycle Program; managing the various legislative initiatives necessary to implementation of the proposed activities; acting as liaison with other Federal agencies; and developing policies to further define and support the Department's bicycle program.

- o Federal Highway Administration. FHWA's responsibilities will include: general promotion of bicycle transportation (similar to current ride-sharing activities); providing technical assistance and support for state and local bicycle program activities; developing guidelines and standards for bicycle facilities; integrating provisions for and consideration of bicycle use into regular FHWA programs; providing opportunities for professional training related to bicycle programs; and supporting research activities related to bicycle transportation.
- o National Highway Traffic Safety Administration. NHTSA's responsibilities will include: research and development relating to bicyclist safety, education/training and traffic law enforcement; providing related technical assistance to state and local agencies; and encouraging increased bicycle use by promoting adult bicyclist training programs.
- o Urban Mass Transportation Administration. UMTA will be responsible for encouraging increased bicycle use by promoting the use of bicycles in conjunction with transit and by providing for such use by supporting expanded provision of bicycle parking facilities at transit stations and other innovative bicycle/transit interface activities.

D. Summary

The Department has determined that the bicycle has not achieved its full potential as a transportation mode. Bicycle use should be promoted and accommodated in order to realize the full benefits of such non-motorized transportation, particularly energy conservation, air quality and noise reduction benefits. Further, Federal-aid highways monies should be used to a greater extent to support state and local bicycle program activities. The Department of Transportation therefore has revised its policy on bicycle transportation to provide for:

- o the active promotion of the safe, increased use of bicycles for transportation,
- o the integration of bicycle transportation into all appropriate Departmental programs and activities, and
- o the consideration of bicycle use in all appropriate DOT-funded transportation projects.

In keeping with this policy, the Department has identified for itself a major role in the implementation of the Comprehensive Bicycle Transportation Program. The actions to be taken over the next five years focus on the establishment of a more affirmative approach to bicycle transportation nationwide and are intended to achieve a significant increase in bicycle use.

Our analysis show that the bicycle can make a significant contribution to the nation's transportation and energy conservation goals. The investments required to bring the bicycle to its full potential as a transportation mode are no doubt small when compared to the near-term benefits which can be realized both by individuals and by the nation.

APPENDIX

DOT BICYCLE PROGRAM ACTIVITIES

Department of Transportation Bicycle Program Activities

In support of its bicycle policy, the Department will take an active role in the implementation of the proposed Comprehensive Bicycle Transportation Program. The new or expanded activities planned by the Department are outlined below according to the specific program element they address.

1. Making comprehensive bicyclists education/training available to adults.
 - o NHTSA will encourage the use of highway safety funds for bicyclist safety education and training programs.
 - o NHTSA will publish a summary of bicycle accident research findings in a format suitable for the general public.
 - o NHTSA will sponsor research to develop a bicycle operator's task analysis to serve as the basis for the development of bicycle education programs.
 - o The Department will consider the need to issue a highway safety standard for bicyclist safety which could reflect the importance of adult cyclist behavior.
 - o The Department will support the development of a comprehensive adult bicyclist education program, based in part on NHTSA-sponsored bicycle safety research, and encourage its implementation.
 - o The Department will encourage agencies and private organizations to provide commuter cyclist seminars for their employees.
2. Implementing public information/awareness programs.
 - o The Department will encourage the inclusion of specific references to the value of cycling in energy and transportation messages.
 - o The Department will work with the Department of Energy to insure that federally sponsored energy conservation media campaigns call attention to the benefits of cycling.
 - o FHWA will develop model public service announcements encouraging bicycle transportation and make them available to state and local governments for duplication and distribution.

3. Implementing motorist information programs.

- o NHTSA will develop a model driver education curriculum component dealing with bicycle concerns.
- o NHTSA will include guidelines in the Highway Safety Program Manual for driver education on the treatment of bicycling concerns in driver education curricula.
- o NHTSA will develop, as accident data become available, model public service announcements and information mail-outs to alert motorists on how to deal with the increased presence of bicycles on the road.

4. Increasing enforcement of traffic laws.

- o NHTSA will encourage police departments to increase the enforcement of the rules of the road relating to bicycling.
- o NHTSA will seek to improve selective enforcement activities and bicycle accident report data.
- o NHTSA will develop a model bicycle enforcement manual based on bicycle accident research.
- o NHTSA will conduct evaluations of various enforcement program concepts (e.g., bicycle patrols, enforcement crackdowns), and disseminate the results.

5. Providing incentives.

- o Each administration within the Department will designate one cyclist employee as a contact point for employee bicycle transportation concerns.
- o The Department will work with the General Services Administration and the Department of Defense to establish secure, protected bicycle parking for both employees and visitors at all federally owned or leased buildings.

6. Increasing the availability of funds.

- o The Department will seek, through legislation, to expand the scope of eligible projects under Section 217 (Title 23 USC) to include the same range of projects provided for by the Section 141 program.

- o The Department will seek passage of the proposed Auto-Use Management Program to increase the availability of funds for energy conservation activities such as bicycle projects, and to provide authority for grants to local governments.
- o The Department will require that proposals for Federal-aid urban transportation projects include an assessment of the potential impacts on bicycle transportation.
- o The Department will insure that proposed actions not reduce or eliminate bicycle access in making Federal-aid urban transportation project decisions.

7. Developing standards and guidelines.

- o FHWA will insure that the standards for design and construction of bicycle facilities reflect that best state-of-the-art.
- o FHWA will insure that future revisions to the highway design standards incorporate provisions for bicycles in all appropriate highway designs.
- o NHTSA will develop guidelines for bicycle safety program development for use by state and local transportation officials.
- o UMTA will issue guidelines for encouraging bicycle transportation in conjunction with transit improvement projects and programs.

8. Integrating consideration of bicycle transportation into planning activities.

- o FHWA/UMTA will ensure that bicycle provisions are included in Transportation Systems Management plans.
- o DOT will request that all appropriate Federal agencies (DOI, DOE, HUD, EPA) require full consideration of bicyclists' needs in appropriate federally required state and local planning activities.
- o The Office of the Secretary of Transportation will coordinate an ongoing review of DOT policies and programs to determine the extent to which bicycle transportation is considered and/or affected, and will recommend desirable revisions.

9. Improving coordination of bicycle transportation activities.

- o The Department will evaluate with the Consumer Product Safety Commission the possibility of transferring the responsibility for bicycle design standards from CPSC to NHTSA, and confer with appropriate Congressional Committees on this matter.

- o NHTSA, FHWA and UMTA will encourage the establishment of bicycle coordinator positions at the state, regional and local levels and will authorize the use of appropriate Federal funds for the support of these positions.
 - o The Department will seek the cooperation of all appropriate Federal agencies in establishing an inter-agency coordinating committee to promote bicycle transportation, identify new program needs, and recommend processes for monitoring and evaluating current efforts.
10. Increasing acceptance of bicycle transportation by transportation professionals.
- o FHWA will expand its offerings of the course--"Bicycle Considerations in Urban Areas."
 - o FHWA will prepare and distribute to transportation professionals an information package on all aspects of bicycle transportation programs.
11. Increasing the knowledge and understanding of bicycle programs among transportation and related professionals.
- o The Department will issue a comprehensive description of Federal funding opportunities for bicycle programs.
 - o The Department will periodically publish short summaries of research and demonstration projects, and state and local programs which reflect advances in the state-of-the-art in bicycle transportation programs.
 - o The Department will co-sponsor the National Conference of Bicycle Program Specialists in 1980.
 - o NHTSA will consider the need for bicycle-related training programs for highway safety, education and enforcement personnel and take appropriate actions.
12. Eliminating roadway surface and design hazards.
- o FHWA will emphasize the importance of improvements to the existing street system to enhance the environment for cycling.
 - o FHWA will encourage that improvements to enhance the safety and use of bicycles are included in rehabilitation projects (including bridges).
 - o FHWA will publish a guide for bicycle facility development which emphasizes the identification and elimination of hazards to bicycling on existing streets and highways.



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13. Improving bicyclists' access.

- o FHWA will develop a manual for use by state and local governments in the identification and elimination of barriers to bicycle access. This guide would emphasize the mobility of bicyclists, the convenience and directness of bicycle routes, and the necessity of providing directional information to bicyclists through signs and maps.
- o Coast Guard will consider provisions for bicycle access in conjunction with its bridge permit process for the construction of bridges over navigable waters.
- o UMTA will encourage bicycle/mass transit interface activities in appropriate federally funded mass transit projects and programs.

14. Providing bicycle parking facilities.

- o FHWA will develop standards and guidelines for bicycle parking facilities and locking systems. These standards and guidelines will be widely publicized and made available to local governments and private industries.
- o UMTA will actively encourage the provision of bicycle parking facilities at all new transit stations.

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