

SIXTH ANNUAL REPORT



Fiscal Year 1972

DEPARTMENT OF TRANSPORTATION



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U.S. DEPARTMENT OF TRANSPORTATION

Washington, D.C.

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Washington, D.C.



THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

December 20, 1972

The President
The White House
Washington, D. C. 20501

Dear Mr. President:

I submit herewith the sixth annual report of the Department of Transportation in compliance with Section 11 of the Department of Transportation Act. The report discusses the accomplishments of the Department during Fiscal Year 1972.

Sincerely,

A handwritten signature in dark ink, appearing to read "James J. Griffin". The signature is fluid and cursive, with a long horizontal stroke extending to the left.

Enclosure

AMERICAN ASSOCIATION OF
UNIVERSITY AND COLLEGE TEACHERS



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SUMMARY

SIXTH ANNUAL REPORT OF THE DEPARTMENT OF TRANSPORTATION

The Department of Transportation is responsible for devising and implementing national transportation policies to assure each citizen a transportation system prepared to move him and his goods conveniently and at low cost without adversely affecting his environment. Now in the maturity of its sixth year, the Department is gaining momentum in its efforts to accomplish that objective. Its 1972 National Transportation Report, and its Highway Needs Report, together with its proposals to Congress for legislation reflect and summarize that charge. Its proposals for an Urban Fund and a Rural Transportation program both emphasize the role of coordinated transportation planning which is one of the most significant of the Department's functions.

Relatedly, a program of intermodal planning in the field aims to further assist States and local authorities to obtain transportation-related Federal funds, providing they prepare unified transportation plans. A majority of the very large metropolitan areas now work under such plans. The Department organized internal intermodal coordinating groups to facilitate response to integrated requests from States and cities. Interagency committees prepare responses to proposals that require action by two or more Federal agencies; DOT and DHUD, for example, cooperate in developing standards and procedures for certifying metropolitan areas to receive grants, and jointly sponsor research projects.

Because some problems affect more than one mode of transportation, the Department's work on them is coordinated in the Office of the Secretary. One such problem area is carriage of hazardous materials, where Department efforts take the form of issuing regulations after research has established the nature of the hazard. Similarly, Pipeline Safety information is collected and analyzed for the use of State and local governments, as well as for DOT in conducting its regulatory functions.

Other intermodal, and thus Departmental, activities include sponsorship of the Transportation Safety Institute, and the establishment of programs of emergency medical service which require coordination of various forms of transportation with the efforts of appropriate health care facilities. Programs relating to pedestrian safety, particularly educational efforts, also are coordinated at the Secretary's level.

Most of the Department's efforts concerned with protecting the environment are monitored by the Office of the Secretary, including, for example, the findings required by section 4(f) of the DOT Act, the National Environmental Policy Act, the Airport and Airways Development Act, the Historic

Preservation Act, and others. Dozens of administrative and legal cases arise from the enforcement of the provisions of those acts and the successful resolution of many significant environmental issues was a genuine accomplishment last year. Development and enforcement of standards to minimize noise effects of transportation is a similar function.

Sound and aggressive research and development programs were initiated to help implement the Department's objectives. Important new areas of emphasis such as pollution control lend themselves to the burgeoning systems analysis and planning activities at the Transportation Systems Center which undertakes investigations for individual operating administrations, two or more of them together, or for the Department as a whole.

For example, a coordinated effort by two Administrations, (FHWA and UMTA), and the Office of the Secretary (TEU) is directed to conduct the Urban Corridor Demonstration Program—an effort intended to utilize existing or slightly modified facilities to relieve traffic jams in corridor cities. Planning was completed last year, and implementation was begun by negotiating agreements with eight cities to conduct the programs. Several elements of the Department are likewise involved in both the construction and the utilization of the High Speed Ground Test Center near Pueblo, Colorado, although it is operated by the Federal Railroad Administration; it will be available to both Government agencies and private companies as a proving ground for their products. Several vehicles of novel design are already under test there.

A highly important focus of Department effort last year was transportation security—both cargo protection, and protection of airline passengers in hijackings. Airlines were required to develop antihijacking security plans and airports were ordered to develop security systems for both airline passengers and cargo. The United States became a signatory of the Convention for the Suppression of Unlawful Seizure of Aircraft, but Congress did not adopt legislation to implement the Convention.

Many of the Department's resources and facilities are well suited to respond to calls for assistance and relief when storms strike or other crises cause disruption of normal civilian life. The Department's plans and efforts are coordinated with the President's Office of Emergency Preparedness. Vast resources were utilized last year to relieve the staggering effects of tropical storm Agnes and the flood in Rapid City, South Dakota. A series of transportation strikes also required utilization of Department resources.

All elements of the Department and a major segment of the transportation industry collaborated last year in producing TRANSPO '72, the most impressive transportation exhibition ever staged. Its hundreds of exhibitors showed and demonstrated a wide range of transportation technology and systems, including four complete personal rapid transit systems.

Additional management effort in the Department was devoted to organization of research and development projects, including a new program of university research, and perfection of a technical information system. With the field structures of the Administrations largely in place and with the appointment of the Secretarial Representative for all ten of the Presidentially designated regions, the Department was able to participate fully in the

President's effort to make Federal programs more responsive to local desires. One approach to that objective was to establish an intermodal planning group (already mentioned) in each of the ten regions designated by the President to further the objective of most rational and advantageous use of Federal funds within the country. Assistance also took the form of training personnel employed by the States to apply for Federal grants most effectively, and having obtained the funds, to use them most advantageously as indicated in the annual work plan to be submitted by each State. Abbreviating the application process, and delegating to regional officials the grant-making authority has greatly simplified Federal-State financial relationships.

Total numbers of people employed by the Department decreased during the year, but the total number of members of minority groups employed increased, as did numbers of minorities in super grade positions. The Department fulfilled its responsibility for assuring the protection of civil rights by its contractors and some elements of the transportation industry. Secretary Volpe strongly emphasized the importance of assuring access to transportation to those who have been denied transportation by economic condition, infirmity, age, or for other reasons. Both research and operational programs have included these people in their planning.

Federal Aviation Administration

Aircraft activity rebounded somewhat in fiscal year 1972 after experiencing a general decline during fiscal year 1971. The number of IFR aircraft handled by FAA's air route traffic control centers was 3 percent greater during this reporting period than in the previous one. Traffic at FAA's airport traffic control towers, however, declined slightly.

Calendar year 1971 was one of the safest years in U.S. air carrier history. U.S. certificated route and supplemental airlines, according to the National Transportation Safety Board, registered the "lowest total accident and fatal accident rates" in the NTSB's entire recordkeeping experience. The fatal-accident rate for each 100,000 aircraft hours flown was 0.097; for each million aircraft miles flown, 0.002. General aviation's fatal-accident rate continued to compare unfavorably with the airlines' rate. Accordingly, on July 1, 1971, FAA implemented a general aviation accident prevention program. The program involved the placing of an accident prevention specialist in each of 84 general aviation and flight standards district offices. Among other things, these specialists conducted pilot-education meetings, held courtesy proficiency checks, and counseled pilots.

The reporting period witnessed the first in a series of aircraft hijackings involving extortion when, on November 24, 1971, a flight from Portland to Seattle was commandeered by a hijacker who demanded—and got—four parachutes and \$200,000 in cash. The hijacker, parachuting over the Northwest, was never apprehended.

This hijacking, followed by a rash of similar incidents, prompted FAA to issue three major antihijacking rules. The first, issued on January 31, 1972, made mandatory the screening of all passengers boarding an aircraft. The second rule—its effective date moved up from April 6 to March 9, at

the direction of President Nixon—required each U.S. scheduled air carrier and certain commercial operators to develop and submit to FAA for approval a comprehensive antihijacking program. The last rule, which became effective on March 18, set down aviation security standards for airports regularly serving scheduled air carriers.

Two important civil air transport types—the McDonnell Douglas DC-10 and the Lockheed L-1011—were type-certificated by FAA during the reporting period. Both of these new jumbo jets have certificated noise levels that are appreciably below Federal requirements for aircraft of their weight class. The Cessna Citation, a business jet also certificated during the reporting period, continued the trend toward quieter engines; this aircraft was found to be the quietest of its kind flying today.

Significant FAA actions during the reporting period in the area of air navigation and air traffic control included:

- Completing the lowering of area positive control from 24,000 to 18,000 feet mean sea level, thus establishing a standard base of area positive control throughout the contiguous 48 States.
- Extending for an additional 12 months—to October 25, 1972—the rule authorizing the establishment of flight quotas at five high density airports.
- Continuing the effort to introduce a semiautomated ATC system at 61 of the Nation's busiest terminal areas; at year's end, 45 ARTS III systems had been delivered to designated terminal locations.
- Continuing the effort to introduce a semiautomated ATC system at 20 air route traffic control centers in the contiguous 48 States; at year's end, 17 ARTCC's had a computerized flight data processing capability.

Legislation recognizing that air traffic control is a stressful occupation was signed into law by President Nixon in May 1972. The new law provides for the early retirement of air traffic controllers at one-half of their high 3-year average salary at age 50 after 20 years of service, or at any age after 25 years of service. It also provides, under certain circumstances, for up to 2 years of retraining.

Federal Highway Administration

At the end of fiscal year 1972, 79 percent of the designated 42,500 miles of the interstate highway system was open to traffic. During the reporting period, FHWA released for obligation approximately \$5 billion in Federal-aid highway funds.

Construction of the \$53 million San Bernardino busway—part of FHWA's continuing effort to improve the mass transit capability of highways—began in January 1972. When completed, the busway will run alongside the San Bernardino Freeway and will consist of in-bound and out-bound express lanes for the exclusive use of highspeed buses. Buses using these lanes are expected to make the trip in about 18 minutes, compared with the 35 to 45 minutes required by automobiles.

A joint study by FHWA and FRA on safety problems at railroad-highway grade crossings was completed during the reporting period. The study

represents the most complete evaluation of the level of need for grade-crossing improvements, and is expected to provide the basis for possible legislative action to increase safety at these locations. Meanwhile, FHWA stepped up its attack on railroad-highway safety by making a special release of highway funds. Approximately \$450 million was obligated for highway safety improvements; of this some \$100 million was earmarked for railroad grade-crossing improvements. This was nearly double the recent average annual expenditure for highway-railroad safety projects.

A broad-gauge attack on other highway safety problems continued. One of the more dramatic spot safety improvements involved locations where wet weather skidding accidents were prevalent. One State in particular achieved a 68 percent reduction in the total number of wet weather accidents at locations where 11 safety projects were specifically aimed at this type of accident.

FHWA took 18 significant rulemaking actions on motor carrier safety involving such matters as driver physical qualifications, safe cargo loading, brake performance, and hours of service.

Natural disasters wreaked havoc on the nation's highways during fiscal year 1972. Highways and bridges constructed with Federal assistance suffered the most extensive single-year damage from such disasters in U.S. history. Tropical Storm Agnes alone caused an estimated \$180 million in damage to Federal-aid highway systems as it swept through Florida, Virginia, Maryland, Pennsylvania, and New York. The total cost of repairing the damage from all disasters is estimated at \$218.8 million.

FHWA approved nearly \$43 million for use by the States in repairing this damage; in addition, \$4.6 million was allocated for the repair or reconstruction of roads and bridges under the jurisdiction of Federal agencies.

As required by the Federal-Aid Highway Act of 1970, FHWA drafted a set of standards establishing noise levels for highways. Though a significant reduction in highway noise will require a combination of approaches, the draft standards concentrated exclusively on noise control through highway planning and design; taking such other approaches as reducing the noise at its source (i.e., the motor vehicle itself) and controlling land use in the vicinity of highways will require additional legislative authority and State and local action.

The 1971 Manual on Uniform Traffic Control Devices for Streets and Highways was approved during this reporting period as the national standard for signs and markings for all highways open to public travel.

Effective January 1, 1972, the FHWA regional field structure was realigned to conform generally with President Nixon's plan for a common pattern of Federal regional boundaries and regional headquarters. Some deviations from the Presidential plan were authorized, however.

Federal Railroad Administration

The number of train accidents in calendar 1971 decreased by 9.8 percent over the previous year. Derailments, comprising 70.2 percent of the total of all reportable train accidents, decreased by 8.4 percent. Collisions decreased by 12.9 percent; other train accidents, 12.6 percent. The number

of fatalities also fell from 2,225 (1970) to 2,010 (1971), a decline of 9.2 percent. The number of accidents involving casualties declined 10.8 percent.

The full-scale 300-m.p.h. Tracked Air Cushion Research Vehicle (TACRV) test bed for vehicle aerodynamics, air cushions, electric propulsion, wayside power, and ride quality was completed in March 1972 at DOT's High Speed Ground Test Center, near Pueblo, Colorado. The TACRV's air cushions and secondary suspension system performed as predicted during tethered levitation tests at the factory. The vehicle arrived at the test center after being displayed at TRANSCO '72 and began undergoing installation of air supply engines, instrumentation, and calibration of sensors. At year's end, static powered tests were expected to begin in early fall 1972.

The 3,750-pound thrust, air-cooled linear induction motor (LIM) on the LIM Research Vehicle was tested up to speeds of 153 m.p.h. This is the highest speed a linear electric motor has ever propelled a vehicle. Data gathered from testing this air-cooled LIM were applied to a 5,000-pound thrust, liquid-cooled LIM designed for the 300-m.p.h. TACRV.

The Metroliner's trip frequency was raised during the reporting period from nine round trips a day to 14. The line's ridership increased 36 percent during the reporting period to just over 1.9 million passengers. Ridership statistics indicated that the Metroliner continued to attract passengers accustomed to using other modes of transportation. The fiscal year also saw Metroliner service extended from Washington (through New York) to New Haven, Connecticut.

The two sets of three-car TurboTrains underwent equipment modifications during the year that resulted in a better ride, acoustical and climate improvements, and increased reliability. Two new cars were added to each train, increasing the seating capacity of each from 144 to 240. The five-car train provides a more economic operating unit for the New York to Boston market. Throughout the reporting period, one round trip a day was maintained between these two points with one or the other of the TurboTrains. One train was sent on a nation-wide tour in order to determine public reaction to the new equipment. The same train made an experimental run between Washington, D.C., and Parkersburg, West Virginia, for a 3-month period.

During the reporting period, DOT asked and received from Congress a 3-year extension of the High Speed Ground Transportation Act. This extension, by removing the annual termination provisions of the act, will enable DOT to engage in more comprehensive long-range planning for high speed ground transportation research, development, and testing.

U.S. Coast Guard

A general increase in United States maritime activities continued in fiscal year 1972. One indicator of the rate of increase is search and rescue statistics over the past 5 years. Total Coast Guard responses to calls for assistance have increased about 7% per year since 1967. Marine activities have generally expanded during these same years. More and more private pleasure boats are being purchased, and more and more potential water and air pollution problems are being generated each year.

Last year Congress enacted the Federal Boating Safety Act (P.L. 92-75) which was signed by the President on August 10, 1971. The law has several significant sections that will enhance boating safety standards for the American public.

The Coast Guard conducted Regional Boating Safety Schools in three locations. Included in the record attendance were 76 State and Federal officials. A permanent National Boating Safety School was also established at the Coast Guard Reserve Training Center, Yorktown, Virginia, in January 1972.

Further, Congress enacted the "Vessel Bridge-to-Bridge Radiotelephone Act," signed on August 4, 1971. This act and the regulations which implement the act will also serve to enhance safety on U.S. waters.

Transportable communications controls were purchased and are in a "ready" status at selected coastal sites. This equipment will provide rapid, on-scene communications for natural disasters and search and rescue incidents.

Three new High Endurance Cutters, *Munro*, *Jarvis* and *Midgett* were accepted into service and are now serving proudly with other Coast Guard Cutters.

Antipollution efforts received a great deal of attention during FY-72. Some of the major events are summarized as follows:

- Contracts were awarded to procure components of the Air Deliverable Anti-Pollution Transfer Systems (ADAPTS). The system will be used to prevent major pollution incidents associated with marine accidents such as tanker groundings.
- National Strike Force teams were organized to provide a quick, professional response for major pollution incidents.
- Two airborne oil sensor systems are being developed or purchased.
- To make pollution containment feasible, high seas oil containment barriers were designed, built, and tested.

Work continued on systems to improve navigation and reduce marine traffic problems in the harbors and coastal areas. This work included development effort on new lightweight buoys and progress toward advanced navigation and vessel traffic management systems for the nation's ports and waterways.

The Surface Effect Rescue Vehicle (SERV) evaluation unit enjoyed success and work continued on efforts to show how such a vehicle can be used to accomplish several Coast Guard missions.

The Office of Merchant Marine Safety at Coast Guard Headquarters received the new Coast Guard Ship Review System in April 1972. The computer-graphics system enables Coast Guard naval architects to review hull characteristics of planned ships very rapidly, to determine whether they conform to safety and other standards established by law.

National Highway Traffic Safety Administration (NHTSA)

Each year sees more drivers and more motor vehicles on highways in the United States; the number of vehicles rose to 166 million in 1971, up from

99 million in 1967, while the number of drivers rose from 103 million to 115 million during the same period. Similarly, until the beginning of the highway safety programs, the number of people killed in highway accidents rose each year—to about 55,000 in 1971, and the total cost of accidents came to about 46 billion dollars per year.

Three major programs have been designed to combat the enormous toll of accidents: (1) Crash survivability, which means measures to allow automobile passengers to live through a collision which might otherwise prove fatal; most such measures involve altering vehicle structures and providing for appropriate management of energy when crashes occur—seat belts and air cushion bags fall in this category. (2) Alcohol countermeasures, involving judicial action, enforcement, rehabilitation, and education of the public concerning the hazards of drunken driving. (3) Construction of experimental safety vehicles—engineering a total safety system on wheels to replace presently available vehicles which were designed without great concern for safety.

Improvement of safety characteristics of vehicles as they are manufactured is accomplished primarily by issuing Federal Motor Vehicle Safety Standards (currently about 50) to require specific features to be designed into vehicles. Techniques for enforcing standards include testing and inspection of vehicles, and assessing civil penalties against manufacturers for violations of standards. Compliance with standards will be assessed at the Compliance Test Facility to be maintained by the Department and the State of Ohio at East Liberty, Ohio, under a contract concluded last year.

When safety defects in vehicles are discovered, manufacturers are required to notify vehicle owners; in some cases manufacturers conduct recall campaigns. Of a total of 1,065 vehicle recall campaigns, 140 were influenced by NHTSA. Another significant enforcement technique employed by the Department is a legal suit to compel a manufacturer to comply with Department regulations. NHTSA is also responsible for programs of Highway Safety in compliance with the Highway Safety Act of 1966. Two new standards—one on pupil transportation and one on accident investigation and reporting—were issued during the year; there were already 14 standards in force.

However appropriate the standards developed by NHTSA, they are ineffective if the State governments lack either money or trained personnel to enforce them. To assist with the training of personnel, the Department sponsored a number of training courses some of which will serve as prototypes for courses to be developed elsewhere. A cost-sharing program with the States has distributed some \$304.7 million to carry out the goals of the Highway Safety Act.

NHTSA has undertaken a broad program of research and development to carry out its missions. One focus of such effort is the technique of accident investigation, since more sophisticated investigation techniques produce information of value to NHTSA. Another is research on appropriate vehicle construction and performance. Tires, brakes, and vehicle handling have

all been investigated or tested by the Agency last year as have passive restraint systems.

To warn motorists of defective construction or other hazardous conditions of their vehicles, NHTSA has developed a series of notifications and consumer information publications which are broadly disseminated.

Internationally, NHTSA has devised cooperative programs of research and development with other countries, perhaps the most spectacular of which are agreements to design and produce a special series of safety vehicles of various sizes.

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Contents

<i>Chapter</i>	<i>Page</i>
Summary, Sixth Annual Report of The Department of Transportation	v
I. Introduction	1
II. Legislation	5
III. Safety and Security	9
Intermodal Programs	9
Cargo Security	9
Hazardous Materials Programs	9
Pipeline Safety	9
Transportation Safety Institute	10
Coordination and Monitoring of Action Taken on NTSB Recommendations	10
Transportation Safety Information System	10
Emergency Medical Service	11
Coordination of Occupational Safety and Health Activities	11
Pedestrian Safety Activities	12
Aviation Safety	12
Air Carrier Safety Record	12
General Aviation Safety	12
General Aviation Accident Prevention Program	13
Automated Advisories	13
Midair Collision Hazard	13
Aircraft Maintenance	14
Aircraft Certification	14
Rules and Regulations	14
Security of Commercial Aviation	15
Hijacking	15
Ransom and Extortion	16
The Administration's Response	16
Improved International Antihijacking Arrangements	17
Auto Safety and Accident Prevention	17
Complexities and Statistics	17
The Cost to the Nation	18
Partial Successes	19
Priority Analysis	20
Priority Program—Crash Survivability	21
Priority Program—Alcohol Countermeasures	23
Experimental Safety Vehicles (ESVs)	23
Motor Vehicle Safety	24
Standards and Regulations	24
Rulemaking—FY 1972	25
Program Plan for Motor Vehicle Safety Standards	25
Compliance Test Facility	26

Contents—Continued

Chapter	Page
Defects Investigation	27
National Motor Vehicle Safety Advisory Council	27
Highway Safety	28
Highway Safety Planning—Annual Work Plan	28
The Standards—Review and Revision	28
New Standards Issued	29
Progress in the States	29
Training the Specialists	30
National Emphasis Programs	30
Selective Traffic Enforcement Program (STEP)	30
YOUTHs Highway Safety Advisory Committee	31
National Highway Safety Advisory Committee	32
Highway Safety Program	32
State Comprehensive Plans	33
Rail-Highway Programs	34
Spot Safety Improvements	34
TOPICS	35
Motor Carrier Safety	35
Regulations	36
Safety Education	37
Accident Investigations	38
Enforcement	39
Maritime Safety Programs	40
Boating Safety	40
Coast Guard Auxiliary	41
Merchant Marine Safety	42
Pipeline Safety	43
Safe Handling of Hazardous Materials	44
Railroad Safety	45
Train Accidents	45
Rail-Highway Grade Crossing Accidents	46
Locomotive Accidents	46
Investigation of Complaints—Safety Appliances	47
Hours of Service Act	47
Medals of Honor Act	47
Signal and Train Control Equipment	47
Engineering and Accident Analysis	48
Hazardous Materials—Inspection and Control	49
Violations of Safety Laws	50
IV. Environmental Improvement	51
Intermodal Programs	51
Air Quality	51
RECAT Study	52
Bicycles for Commuting and Recreation	52
National Urban Growth Policy	52
American Revolution Bicentennial Commission	53
Historic Preservation	53
Transportation Noise Abatement	53
Highway-Related Programs	54
Highway Noise Problems	55

Contents—Continued

Chapter	Page
Highway Air Pollution	55
Soil Erosion	56
Water Pollution Control	56
Waste Materials	56
Environmental Impact Statistics	56
Highway Beautification and Scenic Enhancement	57
Relocation Assistance	57
Marine Programs and Water Pollution	57
Aviation and Environmental Quality	59
V. Planning and Formulation of National Transportation Policy	61
Intermodal Planning	61
Progress in Intermodal Planning	61
Urban Transportation Advisory Council	62
Transportation Energy Panel	62
1972 National Transportation Report	62
Guidelines for Action	64
1974 National Transportation Study	65
Participation in Regulatory Cases	65
1972 National Highway Needs Report	66
1972 Urban Highway Public Transportation Facility Report	67
Aviation Policy	67
Urban Transportation Policy	68
Coast Guard Policy Planning	69
VI. Efforts To Improve Social Conditions	71
Department-Wide Efforts	71
Employment Statistics	71
Allegations of Discrimination	72
Transportation for Transportation-Deprived Citizens	72
Relocation	72
Highlights of Civil Rights Actions	73
Transportation Systems Center	73
Youth Opportunity Program	73
Federal Aviation Administration	74
Federal Highway Administration	75
FHWA Internal Minority Employment	75
FHWA Contract Compliance Program	75
FHWA Training Programs	76
Urban Mass Transportation Administration	77
National Highway Traffic Safety Administration	78
VII. Research and Development	79
Intermodal Programs	79
Environment and Urban Matters	79
National Academy of Engineering Study	79
Urban Corridor Demonstration Program	79
Aviation Cost Allocation Study	80
Hazardous Materials R&D	80
Pipeline Safety	81
National Plan for Navigation	82

Contents—Continued

Chapter	Page
U.S. Coast Guard	82
Domestic Icebreaking and Polar Operations	82
Aids to Navigation	83
Marine Environmental Protection	84
Search and Rescue	85
Recreational Boating Safety	86
Commercial Vessel Safety	86
Aviation Research and Development	87
Area Navigation	87
Backup Emergency Communications	88
All-Weather Landing	88
Microwave Landing System	88
Fog Dispersal	89
Frequency Spectrum Engineering	89
System Performance and Cost Effectiveness Analysis	90
Aircraft Wake Turbulence	90
Offshore Jetport	91
Research Efforts to Limit Hijacking	91
Highway Research and Development	91
Transportation Planning Research	91
Busways	91
Traffic Systems Research	92
Structural Integrity of Bridges	93
Advances in Pavement Analysis	94
Tunnelling	95
Other Highway Research Activities	95
Urban Mass Transportation Administration	96
RD&D Program Structure	96
Bus Transit	97
Bus Technology	97
Bus Traffic Systems and Service Innovations	97
Express Bus on Freeway Projects	97
Bus Priority Systems	97
Automatic Vehicle Monitoring	98
Transit Management and Operation	98
Automated Data	98
Rail Transit	98
Rapid Rail Vehicles and Systems	98
Prototype Cars	99
Advanced Propulsion Systems	99
Dual Powered Cars	99
Light Rail Vehicles and Systems	99
Rail Supporting Technology	99
New Systems	100
Advanced Transit Planning Methods	100
New Systems Development Engineering	100
Personal Rapid Transit (PRT)	101
Morgantown Project	102
Demand-Responsive Transportation Systems	102
Dual Mode Transit System Development	102
Urban Tracked Air Cushion Vehicle	103

Contents—Continued

Chapter	Page
UTACV Systems in FY 1972	103
Experimental Design and Intermodal Integration	104
Planning Research	104
Service Development	105
Railway Research, Development, and Demonstrations	105
High Speed Ground Test Center	105
Advanced Systems	106
Rail Technology	107
Demonstrations	108
Traffic Safety Research and Development	108
Accident Investigation	108
Automotive Research Highlights	109
Driver and Highway Research Highlights	109
National Driver Register	110
VIII. Program Developments	111
Intermodal Programs	111
TRANSPO '72	111
Facilitation Programs	113
Cargo Protection	114
Crime in Transportation	114
Government-Industry Programs	114
DOT Office of Transportation Security	115
Demonstration Projects	115
Aviation Programs	116
Air Traffic Activity	116
Airspace Management	116
National Airspace System Modernization	116
Airport Aid and Planning	117
Other Aviation Program Developments	118
Highway Programs	119
Fringe and Corridor Parking Facilities	119
Progress on the Interstate System	119
Construction Contracts and Prices	119
Other Highway Programs	120
Growth Centers	120
Signing	121
Water Transportation Programs	121
Vessel Traffic Management Systems	121
Technological Advances	121
Regulation of Hazardous Materials	123
Coast Guard Ship Review System	123
Coast Guard Search and Rescue	124
Communications and Electronic Engineering	125
Ship Construction and Modernization	126
Shore Station Construction and Modernization	126
Ocean Engineering Developments	127
Icebreaking	127
Ocean Stations	128
Marine Sciences Activities	128
Bridges	128

Contents—Continued

Chapter	Page
Consumer Protection	128
DOT Office of Consumer Affairs	128
Automobile Insurance and Accident Compensation	129
NHTSA Programs	129
Railroad Programs	131
Legislation	131
Economic Programs	132
The Alaska Railroad	132
Urban Mass Transportation Programs	133
Capital Grants	133
Technical Studies Grants	134
Improvements for Elderly and Handicapped	135
IX. International Transportation Developments	136
International Cooperation	137
International Secretariat	138
International Aviation Activities	138
International Organizations	138
Trade Facilitation	139
Foreign Assistance and Training	139
International Agreements on Air Traffic Control Interchange	139
International Air Fares and Rates	139
Charter Air Services	140
International Maritime Activities	140
Law Enforcement	140
International Ice Patrol	140
Intergovernmental Maritime Consultative Organization	141
NATO Activities	142
Other International Activities	142
International Highway Developments	142
Technical Assistance Activities	142
Foreign Study Programs	143
Meetings and Conferences	144
International Developments in Traffic Safety	144
X. Emergency and National Defense Transportation	147
Departmental Programs	147
Emergency Readiness	147
Continuity of Operations	147
Emergency Resource Management	147
Emergency Organization and Staffing	148
Crisis Management	149
Strike Emergencies	149
Wage-Price Freeze, Phase I	149
Coast Guard Disaster Preparedness and Relief	150
Emergency Assistance	150
Activation Detachment	150
Coast Guard Duty in Vietnam	151
Coast Guard Reserve	151

Contents—Continued

<i>Chapter</i>	<i>Page</i>
FAA Defense Readiness	152
Emergency Preparedness	152
Civil Reserve Air Fleet	152
Aviation War Risk Insurance	152
Federal Highway Administration	153
Emergency Preparedness	153
Emergency Relief	154
Disaster Assistance	155
Defense Access Roads	155
Safeguard Impact Assistance	155
Federal Railroad Administration	156
Crisis Management	156
Urban Mass Transportation Administration	156
National Highway Traffic Safety Administration	157
Continuity of Operations	157
XI. Organization and Administrative Developments	159
Office of the Secretary	159
Management of Research and Development	159
University Research	159
Transportation Safety Institute	159
Coordination and Monitoring of Action on NTSB Recommendations	160
Emergency Medical Service	160
Coordination of Occupational Safety and Health Activities	161
Federal Assistance Review and Management Improvement	161
Federal Aviation Administration	163
Organizational Changes	163
Personnel Administration and Manpower Management	163
Employment	163
Labor Relations	164
Executive Development Program	164
ATC Career Legislation	164
Training	165
Employee Communications	165
Federal Assistance Review Program	165
Federal Highway Administration	166
Education and Training	166
Unified Work Programs	166
Regional Boundary Conversion	167
National Highway Traffic Safety Administration	167
Single Apportionment with FHWA	167
Letter of Credit	167
Urban Mass Transportation Administration	167
UMTA Regional Offices	167
External Audit Coverage	168
Federal Railroad Administration	168

Tables

	<i>Page</i>
Table 1. Federal Aviation Administration certification statistics	169
Table 2. U.S. certificated route air carrier accidents and fatalities—scheduled domestic and international passenger service	170
Table 3. U.S. supplemental air carrier accidents and fatalities—all operations ...	171
Table 4. U.S. general aviation accidents and fatalities	172
Table 5. Hijacking attempts on U.S. registered aircraft	173
Table 6. Hijacking attempts on U.S. registered aircraft in fiscal year 1972	174
Table 7. Worldwide hijacking attempts (1961-1972)	176
Table 8. Air traffic operational trends—calendar years 1963-77	178
Table 9. Aircraft models certificated in fiscal year 1972	179
Table 10. Reduction in aircraft delays—National Airspace System	181
Table 11. FAA National Airspace System Facilities	182
Table 12. The FAA work force	183
Table 13. FAA employment history and forecast	184
Table 14. Federal Aviation Administration statement of financial condition	185
Table 15. Federal Aviation Administration statement of financial resources by appropriation	186
Table 16. Summary of highway and traffic safety authorizations and appropriations, fiscal years 1967-72	187
Table 17. Federal Highway Administration, summary of relocation assistance and payments statistics, fiscal year 1972	188
Table 18. Federal Highway Administration, summary of moving costs payments by State, fiscal year 1972	190
Table 19. Federal Highway Administration, summary of moving costs—owner and tenant replacement housing payments by State unit workload (volume) fiscal year 1972	192
Table 20. Federal Highway Administration, summary of relocation payments—moving costs, replacement housing, incidental and total payments by State, fiscal year 1972	194
Table 21. Coast Guard financial statement, fiscal year 1972	196
Table 22. Summary of merchant marine safety activities	198
Table 23. Railroad accidents and resulting casualties—years ending December 31, 1969, 1970, and 1971	198
Table 24. Railroad-motor vehicle accidents—years ending December 31, 1969, 1970, and 1971	199

Tables—Continued

	<i>Page</i>
Table 25. Accidents and casualties caused by failure of some part or appurtenance of steam locomotives, locomotive units other than steam, and multiple operated electric locomotive units, fiscal years 1967-72	200
Table 26. Accidents and casualties resulting from failure of steam locomotives other than steam, multiple-operated electric locomotive units and their appurtenances, fiscal year 1972	200
Table 27. Reports and inspections—steam locomotives, locomotive units other than steam, and multiple-operated electric locomotive units, fiscal years 1967-72	201
Table 28. Number of freight cars, passenger cars and locomotives inspected; and the number found with defective safety appliances each year for the past 10 years	201
Table 29. Inspections of safety appliances for FY 1968-72	202
Table 30. Enforcement activities—Accident Reports Act, fiscal year 1971-72	202
Table 31. Instances of excess service performed by railroad employees covered by the Hours of Service Act for fiscal year 1972	203
Table 32. Cause of excess service for fiscal years 1968-72	205
Table 33. Applications, block signal	206
Table 34. Causes of false proceed failures reported by carriers for fiscal year 1972	207
Table 35. Serious accidents investigated under the Accident Reports Act (45 U.S.C. 38-43), fiscal years 1968-72	209
Table 36. Federal Highway Administration, Federal-aid highways—statement of operations, July 1971 through June 1972	211
Table 37. Federal Highway Administration, Federal-aid highways—balance sheet at June 30, 1972	212
Table 38. Federal Highway Administration, Federal-aid highway—U.S. Government investment, July 1971 through June 1972	213
Table 39. Federal Highway Administration, Federal-aid highway—statement of application of funds, July 1971 through June 1972	214
Table 40. Federal Highway Administration, Federal-aid highways—change in working capital	215
Table 41. Federal Highway Administration, forest highway program—statement of operations, July 1971 through June 1972	216
Table 42. Federal Highway Administration, forest highway program—balance sheet at June 30, 1972	217
Table 43. Federal Highway Administration, forest highway program, U.S. Government investment, July 1971 through June 1972	218
Table 44. Federal Highway Administration, forest highway program—statement of application of funds, July 1971 through June 1972	218
Table 45. Federal Highway Administration, forest highway program—change in working capital	219
Table 46. Federal Highway Administration, public lands program—statement of operations July 1971 through June 1972	220
Table 47. Federal Highway Administration, public lands program—balance sheet at June 30, 1972	220

Tables—Continued

	<i>Page</i>
Table 48. Federal Highway Administration, public lands program—U.S. Government investment, July 1971 through June 1972	221
Table 49. Federal Highway Administration, public lands program—statement of application of funds, July 1971 through June 1972	221
Table 50. Federal Highway Administration, public lands program—change in working capital	222
Table 51. Federal Highway Administration, highway beautification program—statement of operations, July 1971 through June 1972	223
Table 52. Federal Highway Administration, highway beautification program—balance sheet at June 30, 1972	224
Table 53. Federal Highway Administration, highway beautification program—U.S. Government investment, July 1971 through June 1972	225
Table 54. Federal Highway Administration, highway beautification program—statement of application of funds, July 1971 through June 1972	225
Table 55. Federal Highway Administration, highway beautification program—change in working capital	226

Chapter I

INTRODUCTION

To state the goal of the Department of Transportation is easy; it is to assure the citizens of the United States a "total transportation system" prepared to move people and their goods conveniently, at low cost, without destroying environmental values. Spelling out the methods and the means for providing and improving such a system is the major function of the Department of Transportation. The assignment is complicated and difficult, for in its execution, the Department must manage to double the transportation capability of the United States in 20 years—that is the conclusion of the best studies of the problem. And thus it is the goal adopted by Secretary Volpe.

Doubling the transportation capacity of the United States does not mean merely doubling the mileage of highways or of railroads, nor multiplying the number of vehicles available, whether automobiles, aircraft, trucks or boats. While such a solution of the problem might be relatively easy for engineers and technical experts to achieve, merely increasing the mileage of roads or the number of vehicles could not solve mobility problems because that solution would in turn create a series of social and political problems. For example, would land be available to double the mileage of roads or the size of airports, particularly in the large cities and the suburbs? Or would the additional increments of pollutants created by the new facilities be acceptable to the citizens? Since the answers to these questions would quite probably be negative, the task of the Department becomes in large part one of promoting the kinds of institutional and technological development which will permit the nation to expand the capacity of its existing transportation infra-structure within the limits prescribed by environmental and social constraints. Within this context, the Department should develop appropriate programs at the Federal level while furnishing support to other institutions, whether governmental or private in nature, to assist them in tackling their own problems.

But the urgency of the task and the limitations on available resources have required Secretary Volpe to establish priorities. Thus the Department has not only continued programs that were functioning well, but has concentrated on restoring to viability local and municipal transit resources that had suffered so long from malnutrition and hardening of the transportation arteries in and around cities. Where potentially adequate systems do not exist, the Department must propose and implement laws providing resources and assistance to those areas that do not have sufficient transportation services.

Balanced Transportation. A major task assigned to the Department from its beginning is that of providing a "balanced" transportation system for the United States; that is to say, a set of interrelated transportation facilities that offers a citizen the opportunity to travel or ship his goods by any combination of air, land, or water transportation facilities that will serve his purpose best at the lowest cost. Some of the implications of that concept were spelled out in the 1972 National Highway Needs Report that urged the employment of the Highway Trust Fund to allow urban areas to finance whatever type of transportation facilities they find desirable. Similarly, rural areas would be offered some choice as to how transportation funds would be invested by them or on their behalf. This is the concept of the Single Urban Fund, with its companion Rural General Transportation Fund, both of which the Department recommended to Congress.

The Department believes that offering the localities the opportunity to select the most advantageous capital investments for themselves will do much to achieve the desired balance and make the whole transportation system responsive to demand. Following this concept, an area's choice of transport mode will not be determined or influenced by greater availability of funds for one or another form of transportation facility as it has been in the past by the greater availability of funds for highway construction. Realization of the balanced transportation system contemplated by the law that established the Department will obviously therefore require striking changes in people's ways of thinking about problems of mobility, as well as strenuous efforts on the part of equipment manufacturers to develop new and better forms of transportation and vehicles.

That the Government is dedicated to the effort to ameliorate transport problems of urban areas is attested by the fact that a billion dollars is available for urban assistance in 1973.

As an outgrowth of its comprehensive study of automobile accident compensation, which was completed in March 1971, the Department continued its efforts to encourage meaningful first party, no-fault reparation reform at the State level. To this end, the Department in FY 1972 provided financial support to the National Conference of Commissioners on Uniform State Laws for the purpose of drafting a model no-fault insurance law. No-fault automobile insurance is designed to provide more adequate benefits to all motor vehicle accident victims while reducing the administrative and litigation cost of delivering the benefits themselves.

Even though a major purpose of the Department as it was established by Congress was to enhance the safety performance record of all forms of transportation, the number of actions—grants, research programs, and regulations—designed by the Department to increase the safety margins of individual passengers of automobiles, trains, boats, and aircraft is surprising. A large segment of this document is devoted to reporting just such activities by the Department. Its massive assault on the problem of drivers who drink is a good example of such an activity, as is the effort to require development of effective passive restraint systems for automobiles which automatically protect passengers from harm in the event of crashes. As Secretary Volpe remarked, the Department's effort with respect to automo-

biles is to make them as safe and as "forgiving" as possible; by that he means to develop vehicles that do not necessarily kill or maim their occupants in a crash. A related fundamental initiative of the Department is the development of the experimental safety vehicle, an effort that was initiated by the award of several contracts for a series of experimental vehicles. Successful development of prototype models will facilitate the preparation of standards and regulations for construction of motor vehicles that will not cause as many fatalities in accidents as present day cars do. Contracts were concluded with both American and foreign manufacturers to design and fabricate vehicles engineered primarily for safety. Several such vehicles were completed and exhibited at TRANSPO '72.

The report which follows is organized to show the relationship of the Department's activities to its major purposes as listed in the legislation that established the Department, including promotion of safety, planning and formulation of national transportation policy, efforts to improve social conditions, research and development, and program activities. Within each of these major sections, the Department's achievements are discussed largely according to the modal administration or section of the Secretary's office that accomplished them. Since the St. Lawrence Seaway and the National Transportation Safety Board are required to make individual reports to Congress, the work of those units is not discussed in this document.

Chapter II

LEGISLATION

Congress has continued to approve and support the work of the DOT by providing legislation to accomplish purposes important to the improvement of the transportation system of the United States. Among the items of legislation submitted by the Department last year were:

- *The Vessel Bridge-to-Bridge Radiotelephone.* The act requires specified categories of ships to be equipped with radio telephones to communicate with nearby ships and shore installations. Probably the most important use of such equipment will be in arranging safe passing and adjusting of courses to avoid collisions. These telephones will permit avoidance of such accidents as the collision between two oil tankers at the Golden Gate Bridge last year. The system for marine traffic control in and near harbors being developed by the Coast Guard will depend upon this type of communications.
- *Federal Boating Safety Act.* Standards to promote safety in boating, including requirements for construction, maintenance and equipping of practically all small boats are established in this act; the Coast Guard is responsible to monitor compliance with it.
- *National Capital Transportation Act of 1971 (P.L. 92-349).* The National Capital Transportation Act of 1969 authorized the construction of an adopted Regional System for Transportation. The financial plan in support of that system provided for the realization of \$835 million in revenue bonds supported by the fare box revenues and the balance of the cost, some \$1.7 billion, to be shared by the Federal Government and the eight participating jurisdictions with the Federal Government paying two-thirds of the cost.

The National Capital Transportation Act of 1971 will expedite the sale of Washington Metropolitan Area Transit Authority revenue bonds by authorizing the Secretary of Transportation to guarantee them. This Act will assure the orderly financing of the METRO system and will assist in maintaining a construction schedule designed to complete the system at the earliest possible date at the least cost to the Federal Government and the local participating governments.

- *AMTRAK Amendments (P.L. 92-316).* The Rail Passenger Service Act which capitalized AMTRAK is amended to provide AMTRAK the additional funds needed to continue operation of this system until July 1, 1973. Specifically, the amendments provide, in addition to the \$40 million made available in FY 1971, \$270 million for subsequent fiscal years—such amounts to remain available until expended. They

also increased the number of purposes for which AMTRAK may use Federal grants, by authorizing AMTRAK to use such funds for the purchase of railroad rolling stock and any other corporate purposes. The Secretary of Transportation is authorized to distribute to the National Railroad Passenger Corporation amounts available under this section pursuant to such terms and conditions as he may prescribe.

- *International Air Rates (P.L. 92-259)*. This legislation, though passed in a different form from that which the Department originally proposed, incorporates the basic policy contained in its submission to the Congress. This law amends the Federal Aviation Act of 1958 to empower the Civil Aeronautics Board to suspend, pending a hearing, and eventually to reject unreasonable or discriminatory rates or practices of air carriers in foreign air transportation. These suspensions and hearings, which are subject to Presidential disapproval, may be ordered upon complaint or upon the Board's own initiative, whether the rates or practices in question already exist or have just been proposed.
- *Pipeline Safety Amendments*. These amendments to the Natural Gas Pipeline Safety Act (NGPSA) of 1968 and to the Department of Transportation Act were pending Congressional approval at the end of FY 1972. As enacted by the House of Representatives in 1971, the amendments to the NGPSA of 1968 (H. R. 5065-92nd Cong. 1st sess.) would have extended to August 12, 1972, the time period in which a State agency could submit a certification without having a State statute on monetary sanctions substantially the same as the related provisions of the Act; would have required the Secretary, without discretion, to make payments under the grants-in-aid programs; and would have authorized appropriations not to exceed the amount of \$3.0 million for FY 1972, \$3.8 million for FY 1973, and \$5.0 million for FY 1974.

As enacted by the Senate, the same bill contained the same authorization for appropriations; extended the time period for such certifications through August 12, 1973; and contained other provisions. It would have authorized grants-in-aid for States serving as agents of the Secretary in enforcing Federal safety standards on interstate transmission facilities; would have authorized the Secretary to consult with and make recommendations to a number of Federal/State and local agencies and private individuals to develop and encourage activities to improve State and local pipeline safety programs; would have directed the Secretary to prepare and submit to the President for transmittal to Congress a report covering Federal/State relations under the gas pipeline safety program; and would have amended the Department of Transportation Act by transferring the liquid pipeline safety function from the FRA to the OST. At the end of the fiscal year, the differences between the House and Senate enactments were pending resolution in conference.

- Legislation to amend the Airport and Airway Development Act of 1970 to further clarify the intent of Congress as to priorities for airway modernization and airport development. (Public Law 92-174.)

- Legislation to amend Title 5, United States Code, to provide a career program for, and greater flexibility in management of, air traffic controllers. (Public Law 92-297.)

Draft legislation awaiting action of Congress includes the following significant items:

- Legislation to amend section 1306(a) of the Federal Aviation Act of 1958 to authorize the investment of the Aviation War Risk Insurance fund in securities issued or guaranteed by the United States.
- The Transportation Assistance Bill together with the Transportation Regulatory Modernization Bill were recommended to Congress by the Administration as part of DOT's program to promote the existence of a safe, efficient, and economic surface transportation system—a program which recognizes the vital role of surface transportation in the prosperity and growth of the national economy and seeks the revitalization of a privately-owned transportation system that is also capable of efficient and economical service to its users. In summary, this legislation proposed:
 1. Railroad service improvement by empowering the Secretary of Transportation to assist railroads in acquiring rolling stock and by directing the Secretary to conduct research and development into the design of a national rolling stock scheduling and control system capable of expediting the movement of rolling stock on a national basis.
 2. Prohibiting the establishment of discriminatory assessments and taxes on the property of common and contract carriers of all modes subject to economic regulation by the ICC.
 3. Increased reliance on competitive forces and freedom from unnecessary regulatory constraints.
 4. Greater precision and certainty in the regulatory process: more explicit standards and limitations in the regulatory laws.
 5. Substitution of a more cost-based rate structure, by permitting competitive forces to substitute for rate regulation. A "zone of reasonableness" is established within which individual carriers are permitted to change rates on the presumption that all rates within the zone are just and reasonable.
- *Amendment of the Highway Revenue Act of 1956 (as amended).* This legislation was submitted to the Congress in April 1972, and proposed to extend the life of the Highway Trust Fund for an additional 36 months to provide for completion of the Interstate System. The Bill would also enlarge upon the program authorized to be financed from the Trust Fund to include a new urban transportation program and a new rural general transportation program. Monies would be available to assist the States and local public bodies in the financing of mass transit and certain other transportation capital investment projects as well as highway programs. This proposal is a recognition of both the severity and complexity of urban transportation problems

in metropolitan areas, and on a smaller scale, a need for flexibility for transportation investments in rural areas. Separate legislative proposals regarding the new urban and new rural transportation programs were submitted to the Congress simultaneously with this Amendment to the Highway Revenue Act of 1956, as a comprehensive package.

- *Federal-Aid Highway and Mass Transportation Act of 1972.* This legislation would implement the recommendations contained in the 1972 Highway Needs Report which was submitted to the Congress on March 14, 1972. In summary, this proposal would:

1. Establish a new urban transportation program for financing urban mass transportation and highway projects, at the option of State or local authorities, beginning in FY 1974;
2. Make funds available to the State and local governments for planning future highway and mass transportation projects best suited to meet their specific needs;
3. Establish a rural general transportation program to finance capital investments for surface transportation systems and facilities outside metropolitan areas; and
4. Realign the Federal-aid primary and secondary systems to make those systems conform more closely to their functional use.

Chapter III

SAFETY AND SECURITY

INTERMODAL PROGRAMS

One major purpose underlying the establishment of the DOT was a concern that existing governmental transportation programs were not sufficiently directed toward assuring citizens adequate safety in transportation. The Secretary expressed his concern for this issue by establishing the Office of the Assistant Secretary for Safety and Consumer Affairs, in which the Department's safety programs are coordinated.

Cargo Security. Hijacking of aircraft and theft from air cargo shipments have recently become major problems for the first time. The Department has taken a lead in organizing U.S. Government programs to eliminate both problems if possible. Efforts to prevent hijacking are described elsewhere in this report. As for cargo theft and pilferage, the Department was instructed by the President to coordinate Federal efforts to protect cargo shipments. All administrations of DOT have therefore incorporated cargo security within their regular programs for safety. An Interagency Committee on Transportation Security was inaugurated under the chairmanship of DOT. DOT was also responsible for development of a National Cargo Security Program which the Interagency Committee approved, as did a committee representing the air cargo industry. Activities of the cargo security program are usually cooperative efforts with the local police.

Hazardous Materials Programs. Within the Department there has been developed a computerized system for registering the details of incidents and accidents to transportation of hazardous materials. As the information base is enlarged, it is expected to be of great assistance in reviewing and revising regulations and control systems for the safe transport of such materials. The Department's Office of Hazardous Materials also conducts or participates in numerous training programs in an attempt to reduce the incidence of damage to persons and property during the transport of those materials. Thus the Department aids the industry at several levels—the identification and description of hazardous materials, the development of criteria for shipping containers' performance, the monitoring and investigation of accidents.

Pipeline Safety. Since many States and cities already had programs for safety regulation of natural gas pipelines, the Department has exercised responsibility assigned to it under the Natural Gas Pipeline Safety Act of 1968 largely by encouraging the States to assume regulatory functions for pipelines within their own boundaries, and to participate in rulemaking

with respect to pipelines. The Department has been able to initiate programs to improve communication among State officials responsible for pipeline regulation and has begun to design courses for both regulators and industry personnel to assist them in operating safe pipelines. The Department has also designed an extensive program to monitor the compliance enforcing activities of the States. Review and analysis of pipeline failures particularly by making use of the Automated Leak and Failure Reporting System, laboratory testing, and other procedures, has begun to pinpoint the causes and potential remedies for pipeline failures. The Department has issued appropriate regulations and encouraged State legislative action to eliminate the two major causes of leaks and failures—corrosion and damage by outside forces.

If it is constructed, the Alaska Pipeline will present the Department with numerous problems of regulation and enforcement, therefore, the DOT has been involved in each step of the proposal for the pipeline, even though control of the line itself will be the responsibility of the Department of the Interior.

Transportation Safety Institute. The Transportation Safety Institute was established approximately one year ago at Oklahoma City to foster the development of modal and intermodal transportation safety management and technology by structuring and conducting safety courses and seminars for DOT and its operating administrations.

During this fiscal year, the Institute has developed and taught accident investigation courses for aircraft, railway and motor carrier transportation. It has also developed and taught courses on pipelines, hazardous materials and cargo security. Plans for the next fiscal year include the development of intermodal courses for "risk management" and occupational safety as well as modal courses for marine casualty investigation and advanced accident investigation.

Coordination and Monitoring of Actions Taken on NTSB Recommendations. It was found in discussions between top management of DOT and the National Transportation Safety Board (NTSB) that there is need to improve coordination of DOT responses and follow-up actions on NTSB reports. To achieve this end, the Office of the Assistant Secretary for Safety and Consumer Affairs was designated to undertake coordination; designation of a coordination office serves also to keep the Secretary better informed of Departmental actions resulting from NTSB recommendations.

There is now within the Office of the Secretary active control of actions taken on NTSB recommendations. This has resulted in more rapid modal administration responses to NTSB reports, and additional modal administration activity on implementation of NTSB recommendations.

Transportation Safety Information System. A study of DOT data systems was undertaken in the Office of the Secretary to improve coordination of information between modes and the NTSB.

A common data base for comparison of modes is needed for decision-making by high level managers. The common base is difficult to define because of intermodal differences in baseline rate computation, reporting sources, currency of information, and investigative needs.

A goal has been to develop a Department-wide Transportation Safety Information System (TRANSIS).

Emergency Medical Service. The Surgeon General has estimated that effective emergency medical service (EMS) could save 90,000 lives annually, of which some of 35,000 are victims of heart attacks. Nevertheless, emergency health care and delivery has received less publicity and emphasis than law enforcement and fire fighting, although the needs are equally great. In his 1972 State of the Union message, the President promised additional emphasis upon and improvement in the transportation and medical aspects of emergency medical service.

Emergency Medical Services cuts across modal lines, and involves land, sea, and air transportation. It also involves coordination with the Departments of Labor, HEW, Justice, and Defense, as well as the Federal Communications Commission, Social Security Administration, Office of Civil Defense, and Office of Emergency Preparedness. In the last few years, substantial progress has been made in the transportation, and command and control aspects of emergency medical services; improvements in efficiency have reduced the cost of these life-saving services.

A management review is now underway in OST to determine the best organizational location for the Emergency Medical Service function. In light of its multimodal nature, this function will probably be placed somewhere in the Office of the Secretary which would seem to be the best way to coordinate EMS activities. An effective activity in this area is essential if DOT is to meet its goal of reducing highway and traffic fatalities in 1980 to one-half the 54,700 recorded in 1970.

Coordination of Occupational Safety and Health Activities. Under the Occupational Safety and Health Act of 1970 (P.L. 91-596) the Secretary of Labor is responsible for both promulgating and enforcing job safety and health standards. However, the Act stipulates that its conditions shall not apply to working conditions of employees with respect to which other Federal agencies exercise statutory authority to prescribe or enforce standards or regulations affecting occupational safety or health. The Department of Transportation exercises such statutory authority in all modes of transportation.

A coordination activity has been undertaken to develop working relationships between the Department of Labor's Occupational Safety and Health Administration and DOT's modal administrations (a) to develop clear delineation of the areas in which each Department exercises statutory authority, (b) to avoid inconsistency or duplication in regulations issued by the two Departments, such as for the labeling and handling of hazardous materials in warehouses (under DOL) and in transit (under DOT), (c) to evolve recordkeeping and reporting requirements for occupational injuries and illnesses so as to minimize, to the extent possible, the burden on industry resulting from differences in requirements of each Department, and (d) to establish a continuing communications link between the two Departments to resolve questions which will continue to arise in carrying out their statutory responsibilities, such as questions regarding whose jurisdiction will apply to particular situations.

Pedestrian Safety Activities. In 1970, about 350,000 pedestrians were struck by motor vehicles, and over 170,000 of those struck were injured sufficiently to miss at least one full day's work. Over 10,000 pedestrians were killed. Despite these grim statistics, there appears to be little general appreciation of the immense magnitude of the pedestrian safety problem, or of the fact that pedestrian fatalities represent 20 percent of total motor vehicle fatalities.

The problem of pedestrian safety is particularly acute in urban areas, where over half of total traffic deaths are accounted for by pedestrians. The very young and the very old are the prime victims, with those in the under-15 and over-64 groups accounting for fully half of the total.

A Pedestrian Safety Coordinating Committee was established in DOT in January 1972 to better focus Departmental efforts on the pedestrian safety problem. This committee is chaired by the Office of the Secretary, and includes representatives of the Federal Highway Administration, National Highway Traffic Safety Administration, Urban Mass Transportation Administration, and Federal Railroad Administration. The Committee plans demonstration programs designed to alert the public, particularly school children, to dangers confronting pedestrians, and programs to minimize injury-producing elements on motor vehicles.

AVIATION SAFETY

Air Carrier Safety Record. Calendar year 1971 was a banner safety year for U.S. certificated route and supplemental air carriers, during which they recorded the lowest accident rates in history per 100,000 aircraft hours flown and per million aircraft miles flown—0.757 and 0.018 respectively. Moreover, the 203 fatalities in 1971 represented a 16.18 percent decrease from the 242.2 average over the 5 preceding years.

General Aviation Safety. General aviation (nonairline civil aviation) recorded 4,686 accidents in 1971 with 1,322 fatalities. The fatal accident rate was 2.47 per 100,000 aircraft hours flown, and 0.176 per million aircraft miles flown. Thus aircraft hours flown increased 11.32% and miles flown increased 4.86% respectively in 1971 compared to the base period average. Because of this relatively high accident rate, FAA decided to place greater emphasis on General Aviation Safety matters. For similar reasons the Assistant Secretary for Safety and Consumer Affairs initiated a study of general aviation safety. Issued on September 15, 1971, the study identified many causes for accidents, including: inadequate pilot and flight instructor certification requirements; the lack of periodic pilot and proficiency checks; the inability of flight service stations to meet the flight operation requirements of the general aviation community, especially its need for accurate and current weather data; the lack of standard traffic patterns for uncontrolled airports.

Among the study's recommendations were:

- Biennial proficiency flight reviews of every pilot by a certificated flight instructor. (For airman certification statistics, see Table 1).
- Increased emphasis on the General Aviation Accident Prevention Program.

- Increasing the skill, knowledge, and experience requirements of flight instructors.
- Implementing a proposed flight service station modernization program.
- Improving the reporting of weather information to the general aviation pilot.
- Strengthening concern with general aviation in FAA headquarters.
- Publishing the Federal Aviation Regulations in separate parts rather than the 11-volume format.
- Adopting the standard traffic pattern rule at all uncontrolled airports.

(See tables covering air carrier and general aviation accident statistics, 1961-1971, Tables 2, 3, and 4).

General Aviation Accident Prevention Program. FAA's general aviation accident prevention program was fully implemented on July 1, 1971, and during the fiscal year an accident prevention specialist was placed in each of the 84 General Aviation and Flight Standards District Offices. Eleven regional accident coordinators (excluding the Europe, Middle East, and Africa Region) and a national coordinator (at FAA's Washington headquarters) supplement the program. During calendar year 1971, accident prevention specialists:

- Conducted 3,432 pilot educational meetings with 185,822 attendees.
- Conducted 1,320 courtesy proficiency flight checks.
- Counseled 21,351 pilots.
- Appointed 1,501 industry accident prevention counselors.

In support of the program, the General Aviation Manufacturers Association initiated a national safe pilot program to increase the attendance and participation of all pilots in educational meetings; and the Aircraft Owners and Pilots Association's Air Safety Foundation initiated a Flight Instructor of the Year Award program, which emphasizes the role of the flight instructor in accident prevention.

Automated Advisories. An automated radar advisory service for VFR traffic was developed and under test at year's end at the Knoxville Tower as part of an FAA program to provide more radar assistance to general aviation. Computers will analyze radar returns and provide voiced messages to participating aircraft; controllers will monitor the broadcasts. If successful, the new automated service could offer an expanded VFR service that would not be limited to periods when controllers are not fully occupied with separating IFR traffic, as it is now.

Midair Collision Hazard. A 4-year program seeking to determine the cause of near midair collisions was completed by FAA on December 31, 1971. During calendar years 1968-71, to encourage reporting of near miss accidents, FAA took no enforcement of other adverse action, remedial or disciplinary, against any person who reported to FAA his involvement in a near midair collision. A report was issued in 1969 based upon near misses reported during 1968. Near miss reports received in the subsequent years substantiated the 1968 finding that the greatest danger of midair collision

occurred in congested airspace near large airports having a mix of IFR (instrument flight rules) and VFR (visual flight rules) traffic.

As an outgrowth of the near midair collision study, FAA developed the Terminal Control Area (TCA) concept. For areas under TCA all aircraft are subject to special operating rules and pilot and equipment requirements; airspace within the area is under FAA air traffic control. Effective September 16, 1971, a TCA was established at the New York airport complex and around Los Angeles International Airport. Previously, FAA had established TCA's at Atlanta, Chicago, and Washington, D.C. FAA has proposed TCA's for Boston, Dallas, Miami, and San Francisco.

Aircraft Maintenance. FAA activities during the year concerned with insuring proper maintenance of civil aircraft airworthiness after the aircraft enter service included:

- Preparation of initial maintenance requirements for the McDonnell Douglas DC-10 and Lockheed L-1011 aircraft. The aircraft and engine manufacturers, the airline industry, and the FAA launched a joint program to anticipate possible areas of aircraft malfunction and improve scheduling of specific maintenance tasks to insure continued reliability of the aircraft after it entered airline service.
- Issuance of aviation mechanic guides. The second in a series of handbooks for aviation mechanics, "Airframe and Powerplant Mechanics—Powerplant Handbook," was issued during the reporting period. The general handbook was issued in FY 1971.
- Holding of the seventh annual FAA International Aviation Maintenance Symposium, at Oklahoma City, Oklahoma, December 1971, which had as its theme "Safety Through Effective Maintenance." There were 598 attendees, including 98 foreign delegates representing 27 countries.
- Certification of more aviation maintenance technician schools. At the end of FY 1972, 137 schools had been certificated, as compared to 132 on June 30, 1971.

Aircraft Certification. Principal developments in this activity during the reporting period included:

- *Concorde Supersonic Transport Program.* Special conditions were issued in February 1972 establishing the United States airworthiness performance standards applicable to United States type certification. A joint exercise was held in September 1971 with the French and British airworthiness authorities to apply Concorde flight data to a NASA simulator. FAA expects to evaluate flying qualities of the aircraft using the Concorde prototype early next fiscal year. Meanwhile, the olympus engine special conditions were finalized and issued on April 25, 1972.
- *Airbus.* FAA issued type certificates for the McDonnell Douglas DC-10 on July 29, 1971, and the Lockheed L-1011 on April 14, 1972.

Rules and Regulations. Among the more significant rulemaking actions during FY 1972 were:

- *Emergency locator transmitters.* An FAR amendment effective October 21, 1971, requires the installation of an emergency signaling device on

certain aircraft manufactured or imported into the U.S. after December 30, 1971, and on certain other aircraft after December 30, 1973, to guide searchers if an aircraft disappears during flight. This rulemaking action applies mainly to general aviation aircraft since the following were exempted: turbojet-powered aircraft; aircraft used in scheduled operations (other than charter flights) by domestic or U.S.-flag carriers; aircraft used in training flights conducted within a 20-mile radius of the airport from which the flight began; agricultural aircraft. FAA's rulemaking was a follow-up to Public Law 91-596, enacted December 29, 1970, which required the installation of an emergency locator beacon on certain U.S. civil aircraft.

- *Anticollision light system.* An FAR amendment effective August 11, 1971, requires an anticollision light system (either aviation red or aviation white) for the operation of all powered U.S. civil aircraft at night. (Previously, only certain small aircraft and all large aircraft were required to have this light system). The amendment also expands the color-coordinate range for aviation white, and increases the minimum intensities for anticollision lights on newly certificated aircraft.
- *Crashworthiness and passenger evacuation standards.* An FAR amendment effective May 1, 1972, requires improvement of crashworthiness capabilities, emergency evacuation equipment, and operating procedures for transport category airplanes. The amendment added or upgraded requirements of existing rules relating to: seats, berths, safety belts, and harnesses; stowage compartments; retention of items in the passenger or crew compartments that might cause injury in turbulence or interfere with evacuation; cabin interior fire protection; emergency evacuation; emergency exits and their arrangement, marking, lighting, and access; emergency lighting; briefing passengers before takeoff; landing gear and other structural failure modes that might cause spillage of enough fuel to constitute a fire hazard; a number of detailed design and operating requirements.

SECURITY OF COMMERCIAL AVIATION

Hijacking. The reporting period saw 34 acts of aircraft piracy committed against U.S.-registered aircraft, three more than in fiscal year 1971. Twelve of the 34 attempts were successful; the remaining 22 were either unsuccessful or were incidents in which the hijacker gained temporary control of an aircraft, but was apprehended before he could carry out his intentions. The rate of successful hijackings in FY 1972 was 35 percent, down from 60 percent in FY 1971. The reduction in the success rate is attributable largely to effective cooperation between FAA, pilots, and airline management.

The thrust of the Federal antihijacking effort is to keep armed hijackers off aircraft. This effort is concentrated at 33 key airports where 75 percent of U.S. passengers are enplaned. FAA has air transportation security officers posted at such airports. These security officers are collectively responsible for the security of operations at the 531 airports that have air carrier operations. In addition, they coordinate the law enforcement support activities of the Bureau of Customs and the U.S. Marshals Service.

Highlights of the principal developments in this area during the reporting period follow.

RANSOM AND EXTORTION. FY 1972 witnessed a wave of bomb threat/extortion hijackings. The 13 efforts to extort money from U.S. airlines followed the detailed reporting by the news media of an incident involving Air Canada on November 13, 1971. The hijacker in that instance demanded money and made known his intent to escape by parachute. Fortunately, he was overpowered by the crew. The incident and modus operandi, however, were widely publicized and less than 2 weeks later a man calling himself D. B. Cooper hijacked a Northwest Airlines flight. Cooper successfully escaped with \$200,000 in cash, parachuting near the Oregon-Washington border. Twelve similar attempts followed. Total ransom payments amounted to \$5,311,800. All but \$503,000 has been recovered. Still missing is the money extorted by D. B. Cooper and \$303,000 missing in Honduras, although the hijacker in the latter case surrendered and is in custody in the United States.

The Administration's Response. These extortion-hijackings, prompted FAA to issue an emergency rule (Part 121.538) effective February 2, 1972, requiring the mandatory screening of all passengers boarding an aircraft. Scheduled U.S. air carriers and certain commercial operators were required to devise an acceptable passenger and baggage screening system to prevent or deter the carriage of weapons or any sabotage device aboard an aircraft.

On February 29, 1972, FAA issued a rule requiring the airlines to develop and implement comprehensive antihijacking security programs, and submit them to FAA for approval by June 5, 1972. This new regulation, effective April 6, 1972, required each U.S. scheduled air carrier and certain intrastate commercial operators engaged in air commerce to:

- Submit their security programs to FAA showing the procedures, facilities, or a combination of the two, that they used or intended to use in the mandatory screening of all passengers. This security program aims to prevent or deter unauthorized access to air carrier aircraft, assuring that baggage is checked in by a carrier agent or representative, and preventing cargo and checked baggage from being loaded aboard the aircraft unless handled according to security procedures.
- Notify the pilot in command of the aircraft upon receiving a bomb or hijacking threat, and conduct a security inspection of the aircraft.
- Notify FAA immediately upon learning of a hijacking or suspected hijacking.

The rash of extortion attempts prompted the President on March 9, 1972, to order immediate implementation of the February 29 rule. The President's action had been immediately preceded by three incidents in which explosive devices were placed aboard three airliners in attempted extortion plots; one device exploded, completely destroying the cockpit area of an empty airplane.

In addition, the President directed the Department of Transportation to expedite final rulemaking action requiring airport operators to adopt and put into use facilities and procedures to prevent or deter unauthorized access

to air operations areas. Thus, on March 16, 1972, FAA issued a new FAR, Part 107, Airport Security, effective March 18. This rule provides aviation security standards for airports regularly serving scheduled air carriers holding certificates of public convenience and necessity issued by the Civil Aeronautics Board and certain commercial operators engaging in intra-state common carriage operating large aircraft other than helicopters. These standards require approved airport security programs in air operations areas, and the identification of persons and ground vehicles authorized access to these areas. Each airport operator was required to submit his security program to FAA by June 16, 1972. (See Tables 5, 6, and 7 for statistics and trends on hijacking.)

IMPROVED INTERNATIONAL ANTIHIJACKING ARRANGEMENTS. Significant steps taken within the international community during the reporting period to combat hijacking included:

- DOT's preparing, and testifying in favor of, legislation implementing the Convention for the Suppression of Unlawful Seizure of Aircraft (the so-called Hague Convention), which went in force among signatory States (including the United States) in October 1971. The implementing legislation was reported out favorably by the Senate Commerce Committee; however, Congress had not acted on it by year's end. The Convention provides that the contracting parties must establish severe penalties for acts of air piracy and must either extradite or bring to trial persons accused of such acts.
- The United States' (and 29 other countries') signing the Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation, on September 23, 1971, at Montreal. Complementing the Hague Convention, this agreement deals with acts of sabotage and armed attacks against international civil aviation and its facilities.
- The ICAO Council's adopting a resolution at the behest of the United States directing the ICAO Legal Committee to draft a multilateral treaty under which contracting States could take joint action to halt air service to any country aiding or abetting air pirates, on June 19, 1972.
- ICAO's publishing a detailed security manual, in December 1971. The document was the work of a five-nation study group under the chairmanship of a Department of Transportation representative. The manual was disseminated to all U.S. scheduled airlines and the 531 airports they serve.

AUTO SAFETY AND ACCIDENT PREVENTION

Complexities and Statistics. In 1966, the chances were 50-50 that every child born in the United States that year would either be killed or seriously injured in a traffic accident during his lifetime. Traffic fatalities rose to 53,000 a year and the injured numbered in the millions. That year the Congress passed two laws, the Highway Safety Act and the National Traffic and Motor Vehicle Safety Act, both of which have reduced the risks of traffic, but the fact remains that by the end of 1972 the two millionth American will die on the highway.

Safer highways are designed and constructed each year. Highway safety commands an increasingly important part of State and local government resources. Safety features are incorporated into new automobiles—some 59 percent of the cars on the road now incorporate the basic safety devices. Since new cars are driven more miles than older ones, they account for slightly more than two-thirds of the mileage.

On the other hand, motor vehicle safety standards affect only 10 percent of the automotive population in a year, and highway safety programs generally are long term; they deal with a complex of human and physical factors that require action and funding at every level of government. There follows a list of only the most important factors in traffic development which collectively continue to threaten the safety of the American motorist:

- There are more motor vehicles, and more drivers, and they are traveling more miles each year:

	1967 (Millions)	1971 (Millions)	Percent change
Number of registered motor vehicles ----	99	116	+17
Number of licensed drivers -----	103	115	+12
Number of miles travelled (100 million)	962	1,183	+23

- The numbers of small cars, trucks, motorcycles, motor scooters, and bicycles are growing at an explosive rate. The greater the disparity in size and weight between colliding vehicles, the more damaging is the collision to the lighter vehicle.
- A larger percentage of drivers is under 25 years of age, and this group suffers a disproportionate ratio of highway fatalities.
- Excessive consumption of alcohol by those who continue to drive accounts for approximately 50 percent of traffic deaths. Within the United States per capita consumption of distilled spirits continues to rise: 40 percent between 1961 and 1971 and nearly 18 percent between 1966 and 1971.
- Speed that increases the severity of highway crashes is increasing—on the average nearly a mile an hour (or $1\frac{1}{2}$ percent) each year.

Highway traffic deaths are far more numerous than those from any other transportation cause. In 1971, when transportation claimed the lives of 58,452 Americans, nearly 55,000 or 94 percent were lost on the highways. Aviation, boating, railroads, and pipelines together accounted for the remaining 6 percent. A further analysis of motor vehicle-related deaths shows that 9,766 dead were pedestrians, 2,695 were motorcyclists, 822 were bicyclists, and 41,717 were occupants of motor vehicles. Of the latter category, 1,356 died at rail-highway crossings.

The Cost to the Nation. The total drain on the social and economic well-being of the country of the 54,700 dead, 3.8 million injured and incidental property damage is an astonishing \$46 billion *annually*, according to a preliminary analysis of economic losses associated with automotive accidents completed by the National Highway Traffic Safety Administration

(NHTSA). It amounts to \$400 per vehicle per year, or \$4,000 to vehicles last an average of about 10 years. It also amounts to \$2 year for every man, woman and child in the nation.

Included in the analysis are losses resulting from fatalities, non-fatal injuries of varying degrees of severity, and accidents resulting in property damage only. There has been no attempt to place a value on human life. The figures reflect only those measurable or calculable costs such as wages lost, medical expenses, legal fees, insurance payments, home and family care. Some costs are controversial, such as pain and suffering, but are included because they represent a loss to society which can be expressed in terms of money as indicated by court awards. To omit them would distort the results. Other items are based on hard economic data. All are translated into dollars to make them useful for analytical purposes and as a measure of the economic magnitude of a social problem. The following table is a summary of the analysis:

	<i>Fatality</i>	<i>Nonfatal injury</i>	<i>Property damage only involvement</i>	<i>Total</i>
Average cost per accident -----	\$201,000	\$ 7,300	\$ 300	
Estimated no. of accidents -----	55,000	3,800,000	24,000,000	
Total cost (\$ billions) -----	\$ 11	\$ 27.6	\$ 7.4	\$46.0
Percent of total cost to society -----	24%	60%	16%	100.0%

Partial Successes. But granting the significance of the statistics just reviewed, some progress has been made. The rate of fatalities per 100 million miles driven has declined steadily since the national highway safety effort was launched. In 1966 it stood at 5.70 and declined gradually to 5.23 in 1969 which was a peak fatality year. The trend has continued downward to a remarkable 4.65 in 1971, the lowest in the automotive history of the United States and probably in the world. What this means to the motorist is that he can drive 1,200 miles today with the same degree of risk he encountered while driving 1,000 miles 5 years ago.

Another indication that the motor vehicle and highway safety programs are working is the fact that on the average the severity of injuries of accident victims has declined significantly even though the number of crashes has remained high. Between 1967 and 1970, the number of days of bed disability due to motor vehicle injuries decreased approximately 40 percent while the number of people injured increased about 5 percent.

The efficacy of motor vehicle safety devices may be illustrated by comparing the occupant death rates of truck and passenger cars, since trucks do not generally have the basic safety devices that were built into automobiles since 1967. Between 1965 and 1970, the truck occupant death rate decreased by 3 percent while that for passenger vehicles declined by 16 percent.

The beneficial influence of the various highway safety programs, however real, is difficult to measure, particularly on a national basis. Two examples are illustrative, however. In Flint, Michigan, after a special selective traffic enforcement program had been in effect for a year, the death toll was 13 instead of 31 as in the previous year, and traffic injuries dropped to 1,398 from 1,857, while total accidents declined by 2,000. A further direct benefit came with the announcement that an automobile insurance group was reducing rates by 14 percent. Another example is the result of those alcohol safety projects which have been operational for a full year—fatal crashes in those areas decreased by 9.7 percent.

Finally an appreciation of the worth of the effort may be gained by considering the number of lives that would have been lost in motor vehicle accidents during FY 1972 had the fatality rate remained at its 1966 level: the fatality total would have been 68,986 instead of the 56,200 who were killed. Thus, for one year alone the equivalent of a community of 12,786 souls owes its continued survival to safety measures instituted since 1966. The cumulative figures are even more impressive.

Many benefits may be anticipated in the future which stem from the motor vehicle and highway safety standards—benefits both human and financial. One example is an announcement that the Insurance Services Office has recommended to its hundreds of affiliated companies a 10 percent reduction in collision insurance on 1973 cars because of improved bumpers.

Priority Analysis. Safety programs are numerous and vary widely, both in cost and in their potential for saving lives and preventing injuries. Some have near-term benefits and others are long-term in nature. They evoke a wide range of economic, sociological, and political consequences which need to be considered.

Therefore, based on projected maximum benefits—lives saved—and available resources, NHTSA is developing advanced analytical techniques to permit the assignment of priorities among the various safety programs.

Some specific applications of these techniques are:

- Estimates of costs versus gains of motor vehicle standards for passenger cars scheduled to become effective between 1972 and 1976, with residual benefits beyond 1980 included:

Total benefits	\$76 billion
Total costs	\$28 billion
Total net benefit	\$48 billion
Benefit-cost ratio	2.7:1

- Evaluation of potential benefits from improved occupant crash protection resulted in a stepped-up program. Net benefits forecast: \$25 billion.
- A similar effort with respect to highway safety programs has not yet yielded valid results due to lack of data. However, techniques are being developed for evaluation. A study performed by the University of Southern California for NHTSA produced a methodology adaptable to all traffic safety programs, especially highway design and traffic control. A computer model designed to isolate circumstances, patterns,

and events associated with traffic accidents and to assign priorities for preventing or reducing their severity will permit analyses which would be impossible if only manual techniques were employed.

- A study of costs versus gains of a bumper system that provides protection in front and rear collisions up to 5 m.p.h. established a net benefit of \$100 over the life of the vehicle in property damage reduction alone.

On these and other bases, NHTSA has identified the principal priority programs and has channeled 72 percent of its contract research budget to their support. They are: Crash Survivability, Alcohol Countermeasures, and Experimental Safety Vehicles.

Priority Program—Crash Survivability. "Crash survivability" is the term used to designate all of the measures designed or under development which will permit motor vehicle occupants or pedestrians to live safely through a collision which might otherwise result in death or serious injury. It encompasses engineering research and testing to demonstrate new vehicle structures and characteristics and to provide supporting data for regulatory action (rulemaking). NHTSA is developing specifications which will permit cars of the 1980's to offer injury-free protection in crashes at or near the legal speed limits without effort on the part of the motorist. The goal is approached in several ways:

- Protection through restraints, padding, and less injurious components (windshields, steering columns, door locks) so as to distribute impact forces in a manner tolerable to the human body and minimize secondary dangers such as fire.
- Improvement of the "crashworthiness" of vehicles so that in a crash the components will collapse in a controlled manner and absorb the impact forces before they endanger the occupants. These include energy-absorbing systems based on the fixed forces principle which can be designed to flex or bend in a predetermined manner and at the same time deflect the engine downward before it can penetrate the passenger compartment.

NHTSA is investigating new and improved restraint systems, and tests using human volunteers are scheduled for the immediate future. Development in the energy management of collapsing automobile structures has progressed to the point where survival may be feasible and practical in a head-on rigid barrier crash at 50 m.p.h. Work is underway to isolate damage to the forward part of the vehicle in less severe crashes, to improve side, rear and rollover safety performance as well as inter-vehicular crash performance. Sources of pedestrian injuries are being investigated as well as techniques for their prevention. Examples of vehicular research are:

- Studies of performance and feasibility of passive restraint systems, air bag and lap/shoulder belting using human subjects in simulated crashes.
- Human simulation studies to develop criteria for reliable and representative dummies and human cross-motion simulators for research and compliance testing.
- Human tolerance studies to determine the force levels which lead to injury and the reasons why injury occurs.

- Structural crashworthiness studies to develop techniques of automobile construction which will permit controlled collapse of vehicle components to absorb impact energy otherwise injurious to the occupants. Tests indicate that it may become possible for occupants to survive a head-on crash at 50 m.p.h. without severe injury.
- Studies are underway to isolate damage to the forward part of the vehicle in less severe crashes, and to improve side, rear, and rollover safety.
- Studies of vehicle front-end construction to devise ways of minimizing pedestrian injuries.

Crashworthiness involves total vehicle design, to make proper use of energy absorbing and deflecting structures (energy management) for both the vehicle-obstacle and occupant-vehicle collisions. The latter category is the "second collision" which takes place when the vehicle has been brought to an abrupt stop and the occupants then impact the interior of the compartment. This is the reason for the importance of occupant restraint systems.

There are systems which require effort on the part of the passenger such as seat belts, and there are "passive" systems which protect the occupant regardless of his actions. It is the conclusion of NHTSA, based on much study, that the present active systems (seat belts) are extremely effective when used, but that they are used by such a small percentage of motorists that they cannot significantly affect the death and injury statistics. Thus, increased interest has focused on passive restraints, which, when perfected can provide a measure of protection for the entire motoring public.

Passive restraint studies are underway for the crash protection of drivers, front-seat occupants, and rear-seat occupants of standard-size cars; the front-seat passengers of compact cars; and the driver and front-seat occupants of subcompact cars. In addition, improved child restraint systems, advanced crash sensors, and improved occupant motion sensors are being developed.

A project has been completed to develop an inflatable passive restraint system for drivers of standard-size automobiles. This is one of a series of programs to provide the technical base in support of an upgrading of FMVSS 208. The performance of the system has been defined through numerous evaluations, including sled tests and full scale vehicle crash tests. The goal is to protect drivers during impacts with velocity changes of up to 40 m.p.h. There is also a program to develop an inflatable restraint system for the front passenger position of standard-size automobiles. An improved multicellular air bag concept is being perfected. Data from this project will be used similarly to support an increase in the level of crash severity for which protection must be provided.

Protection for both drivers and front seat passengers of subcompact cars from frontal and frontal oblique collisions at 40 m.p.h. is the objective of still another program. Passive restraint systems for this category are in the early phases of development and evaluation. Such protective systems for the rear seat occupants of standard-size automobiles are also in an early stage.

Another program was undertaken in FY 1972 to develop and demonstrate test procedures for child restraint systems and to develop improved child restraint systems.

Priority Program—Alcohol Countermeasures. The fact that alcohol is a contributing cause in approximately half of all traffic fatalities is ample justification for the emphasis placed on this safety program, and for the resources allocated to it. It is a fact that of these 27,000 deaths annually, the problem drinker is responsible for about two-thirds, and the social drinker and youths for the remainder. During 1971, five States conducted roadside surveys and found that between the hours of 7 p.m. and 4 a.m. one out of every 25 cars coming down the road was driven by a drunk (Blood Alcohol Content [BAC] of .10 or higher)—not a person who had a cocktail or even two, but a drunk. And in North Carolina post mortem examinations of 677 fatally injured drivers and pedestrians revealed that: (1) 61 percent of drivers killed in single-car accidents had BAC over .10 and another 10 percent had been drinking; (2) 36 percent of drivers killed in multiple vehicle accidents were legally drunk and an additional 10 percent had been drinking; (3) 61 percent of adult pedestrians killed in motor vehicle accidents had BAC's over the .10 limit.

Any program to bring about a significant alleviation of the traffic holocaust must not only make it possible to survive accidents by means of safer vehicles and protection of occupants, but it must find ways to keep alcoholics from driving until they have been rehabilitated.

A comprehensive program to prevent alcoholics from driving has been drawn up and launched. The Federal Government can help, but only the States and local communities can make the program work. Alcohol Safety Action Projects are now underway at 35 locations throughout the country. Of these, eight have been operational long enough to yield measurable results—and those are encouraging:

- The national highway traffic death rate continued at about the same level throughout the year, but in areas where these projects are located it decreased an average of 9.7 percent.
- There was an increase of 72 percent in alcohol-related arrests.
- Court cases increased sharply as the result of the arrests, while conviction rates remained constant.
- Approximately one-half of the presentence investigations showed that the accused were problem drinkers; 95 percent of them were recommended for rehabilitation; and, the courts accepted 92 percent of the recommendations.

Early public education and information efforts have been directed at gaining public support for the Alcohol Safety Action Projects and at informing the professionals working on the projects. Other goals will be to stimulate the general public to help control the problem drinker and to attempt to motivate social drinkers to modify their drinking/driving habits.

Experimental Safety Vehicles (ESV). The purpose of the ESV program is to stimulate and test new automotive safety ideas by sponsoring the development of vehicles with safety as the principal design consideration.

This approach—engineering a total system—is in contrast to the normal piecemeal evolutionary approach—small improvements made from one model-year to the next. A tremendous advance in automotive safety is anticipated; the design will be used to develop improved Federal Motor Vehicle Standards (FMVSS) and possibly international safety standards under the very active international ESV program.

The U.S. ESV program has progressed through the design, development, and fabrication of prototype vehicles to testing for three of the four ESV contractors—General Motors, AMF, Inc., and Fairchild Industries. AMF and Fairchild prototypes were delivered to the Department in December 1971. General Motors has constructed and tested two complete vehicles in high-speed barrier impacts. Design changes are being made, based on information obtained in the tests, and additional test cars are being fabricated. The General Motors official prototypes are scheduled for delivery on October 1972.

The Ford Motor Company is the fourth domestic ESV participant. It is testing structural systems in support of a redesign of the current full-size family sedan to meet the levels of crash protection required by the contract. A prototype is to be delivered in January 1973. Both General Motors and Ford are participating under contracts for a token sum of \$1.00.

The key design criteria are crashworthiness, accident avoidance, pedestrian safety and post-crash factors (occupant protection). The application of total systems engineering is required to achieve the optimum trade-offs between the criteria.

A competitive "drive-off" is being conducted under contract with Dynamic Sciences, between the Fairchild and AMF prototypes to determine the design that has the better overall safety performance. Based on the results, a follow-on contract for additional test vehicles will be awarded to the winning manufacturer.

The international aspects of the ESV program are described in the section on International Transportation Developments.

Motor Vehicle Safety. Improvement in the safety qualities of motor vehicles and motor vehicle equipment is enforced in part by the issuance of Federal Motor Vehicle Safety Standards (FMVSS) expressed in terms of performance requirements which new vehicles must meet. Enforcement is accomplished through inspection and testing for compliance and legal action against violators. Supervision of defect notification procedures is also important to the objective. Basic to the other safety aspects is research to advance motor vehicle safety techniques.

STANDARDS AND REGULATIONS. A total of fifty FMVSS and regulations have been issued. Seven of these were published during this reporting period; they include rules on roof crush resistance, motorcycle brake systems, and controls and displays, warning devices, bus windows, accelerator control systems, and a regulation on manufacturer identification. As new data become available, existing standards frequently require updating and strengthening. As a result, forty-one amendments to the standards were issued during FY 1972.

Rulemaking, FY 1972. Crashworthiness was the goal of two safety standards issued this year. FMVSS No. 216, Roof Crush Resistance—Passenger Cars, establishes strength requirements for the passenger compartment roof in order to reduce deaths and injuries due to roof crush in rollover accidents. FMVSS No. 217, Bus Window Retention and Release, establishes requirements for the retention of windows other than windshields in buses, and establishes operating forces, opening dimensions, and markings for push-out bus windows and other emergency exits. The purpose is to minimize the danger of occupants being thrown from the bus and at the same time to provide for ready emergency egress.

Several studies of motorcycle accidents have established that two-thirds to three-fourths of motorcycle fatalities result from head injuries. An NPRM, issued May 12, 1972, proposes to establish minimum performance requirements for motorcyclists and other motor vehicle users.

Operating Systems rulemaking in FY 1972 included the promulgation of several new standards. FMVSS No. 122 specifies performance requirements for motorcycle brake systems; FMVSS No. 123 stipulates motorcycle controls and displays requirements; FMVSS No. 124 requires fail-safe accelerator control systems for passenger cars, multipurpose passenger vehicles, trucks, and buses; and, FMVSS No. 125 specifies the shape, size and performance requirements of warning devices for stopped or disabled vehicles.

Several standards were upgraded by amendments during this reporting period; control location and identification, motor vehicle lights, passenger car tires and rims, hydraulic brake fluid, and air brake systems.

Notices of Proposed Rulemaking were issued which would establish performance requirements for tires other than those for passenger cars, for a uniform tire quality grading system, and for fields of direct view. NPRMs were also issued to further upgrade existing standards on passenger car tires, motor vehicle lights, hydraulic brake fluids, and controls (location, identification and illumination).

REGULATIONS. One new regulation was adopted raising the total issued to eight. Part 566, Manufacturer Identification, requires manufacturers of motor vehicles or motor vehicle equipment to which a standard applies to submit identifying information and a description of the items they produce (except tires) effective February 1, 1972. This registration, in turn, will enable NHTSA, as well as other interested parties, to contact manufacturers of specific products as these pertain to vehicle safety. More than 1,000 manufacturers have registered with NHTSA in compliance with the new procedure.

Program Plan for Motor Vehicle Safety Standards.* This Plan is an overall guide for management of rulemaking which is deemed attainable at stipulated dates. It has enabled industry to plan for the implementation of future standards. It is invaluable to NHTSA in its coordination efforts leading to incorporation of safety improvements in production vehicles, and to industry in planning for the implementation of future standards.

A second revision of the Plan was released in October 1971. It emphasizes the systems approach to vehicle safety in order that the utmost in occu-

* For sale by the National Technical Information Service, Springfield, Virginia, 22151, PB 196093 \$3.00.

pant protection may be realized. Approval of rulemaking plans is based on a careful analysis of safety returns in lives saved and reduction of injuries versus cost to the consumer. The new Plan diminishes the problems of overlapping standards and redundancy. Performance requirements rather than design-oriented standards are being phased into the program whenever possible without compromise in safety to allow the manufacturer flexibility in meeting the new standard requirements.

Comments and suggestions regarding the latest Plan have been received from the major automobile companies and will be taken into consideration in preparing the next revision. In addition, more attention will be paid to benefit-cost analysis for allocation of resources and to determine whether or not certain proposed regulatory actions should be pursued.

Standards enforcement. FMVSS require manufacturers of motor vehicles and motor vehicle equipment to ensure and to certify levels of safety performance in their products. NHTSA is responsible for monitoring the validity of manufacturers' certification, and for investigating potential areas of noncompliance. During the past year, 31 vehicles have been tested to 107 performance requirements of the standards. In the same period, 4,238 tires and a miscellany of 2,287 other equipment items were tested, including seat belts, lighting equipment, brake hoses, brake fluid, and child restraints. Some 235 investigations were initiated during the reporting period and 193 cases were closed.

As a direct result of the enforcement program, 38 civil penalties totaling over half a million dollars have been imposed since the inception of the program in 1968. Of these, 20 penalties amounting to \$183,000 were imposed during the past year.

Additional investigations entailed the joint regulation (DOT and Treasury) governing the conditional importation of noncomplying motor vehicles and motor vehicle equipment into the U.S. More than 4,000 HS-7 Forms (Customs Declarations) were processed during the period covered by this report and resulted in 1,200 investigations.

The failure rate for all tests conducted since the inception of the program stood at 6.7 percent as of June 30, 1972, down from the 7.3 percent cumulative failure rate as of June 1971. This reduced failure rate is an indication of the influence of surveillance and enforcement testing on safety conformance by industry.

Compliance Test Facility. Public Law 92-74, enacted in August 1971, appropriated funds for the design, construction and equipping of a Compliance Test Facility to be located within the confines of the Ohio Transportation Research Center at East Liberty, Ohio. The facility will furnish NHTSA with the capability to conduct tests in support of standards enforcement and defects investigation programs. It will also permit the development of test procedures and requirements for proposed standards.

The new facility is to be equipped to inspect and instrument vehicles for testing, and to test many vehicle systems, lighting systems, head restraints, seat anchorages, seat belts, and other equipment. The Ohio and DOT facilities will include a test track, crash barrier and skid pad for full vehicle

dynamic testing of brakes, crashworthiness, occupant survival, and vehicle handling.

A lease agreement is being negotiated with the State of Ohio. It is expected to cover a complete facility, without testing equipment, constructed by Ohio to DOT plans and specifications. A contract for design of the facility and equipment selection was awarded in May 1972.

Defects Investigation. The ever-growing numbers of cars produced since the initial FMVSS went into force and the new and revised standards confront NHTSA with an ever-escalating defects investigation workload. NHTSA has initiated a contractor-investigations program to augment its own investigative capability. Automobile clubs are used to carry out investigative projects; field investigations are carried out by contractors to obtain facts on safety-related defects reported by vehicle owners. It is anticipated that the contractor services will appreciably complement and expand the efforts of NHTSA which have been limited by the availability of personnel.

Part 573, Defect Reports Regulation, became effective in October 1971. It requires motor vehicle manufacturers to report quarterly upon the completion status of each safety defect notification (recall campaign) and production figures by make and model. Analysis of these data is important to insure that all potentially defective vehicles are inspected and corrected.

There were 282 safety defect recalls in FY 1972 which involved 14,013,161 vehicles. Between September 1966 and June 30, 1972 some 30,605,000 vehicles had been recalled in 1,067 campaigns, of which 2,601,991 and 232 campaigns involved foreign vehicles. Of all of these campaigns, 140 were influenced by NHTSA in which 15,416,606 vehicles were affected.

Vehicles-in-use. A new vehicle-in-use plan has been developed and will be refined for implementation during FY 1973. The program will determine safety performance criteria for vehicle components where safety pay-off can be demonstrated, i.e., brakes, tires, steering and suspension systems. It will include carefully validated prototype motor vehicle inspection models and procedures. When put into effect, the program will substantially improve inspection in those States which are following the motor vehicle inspection standard and furnish a readily adopted package for those who wish to conform.

National Motor Vehicle Safety Advisory Council. The 22 Council members are a cross section of American participation in safety—air bag experts, crash investigators, industry leaders, consumer advocates, State officials, and representatives of the driving public. The body was created by the National Traffic and Motor Vehicle Safety Act of 1966; its statutory responsibility is to consult with the Secretary of Transportation on proposed Federal vehicle safety standards and programs. It has also been expanding its communications role with industry, States and the general public in an effort to involve people and organizations in motor vehicle safety.

During FY 1972, the Council's review of the motor vehicle safety standards and programs resulted in resolutions which: (1) Made recommendations on the NHTSA 5-year program plan book; (2) called for improved

devices for testing standard's compliance; (3) urged increased research into human tolerance and test dummy development; (4) made a series of recommendations concerning motorcycle safety; (5) suggested that NHTSA proceed cautiously with plans for a polarized lighting demonstration; (6) recommended increased funding for the development of devices to prevent drunks from driving; and (7) repeatedly and strongly recommended massive fleet testing of air-bag-equipped vehicles to bolster public confidence in this life-saving device.

In addition, the Council held its second "Partnership-In-Safety" Conference as part of the Council's continuing effort to involve State officials and consumer groups in the motor vehicle safety program. A meeting with the manufacturers of imported cars to discuss their unique problems was also held during FY 1972.

HIGHWAY SAFETY

Safer cars and better protection for the occupants can satisfy only in part the Congressional goal of reducing accidents on the highways and the deaths, injuries and property damage which result. Of equal importance is the improvement in the driving environment, in the drivers, and in the enforcement system, to name only some of the elements of highway safety. NHTSA is responsible for development, and the carrying out of Federal highway safety standards through State-community programs required in accordance with the Highway Safety Act of 1966. The day-to-day work involves the administration of Federal assistance funds, program planning and evaluation, and the management of special emphasis programs.*

Highway Safety Planning—The Annual Work Plan (AWP). In previous years, each State had completed a satisfactory comprehensive highway safety plan which had been approved by the Secretary of Transportation. Under this concept each highway safety project for which the State desired Federal financial assistance was submitted to NHTSA for approval. During FY 1972, a new procedure was instituted whereby each State submits an Annual Work Plan which describes the goals to be achieved and the work to be done in implementing for one year the comprehensive plans which are long-range and updated periodically covering the States' long-term objectives.

Role of the Regional Administrators. The authority to approve the States' AWP's was delegated to the Regional Administrators of the NHTSA and Federal Highway Administration (FHWA) in 1970, subject to the provision that they be coordinated with headquarters prior to approval. This system was so successful in placing responsibility where the action was, and in creating a close working relationship between State and Regional officials, that in 1971 the approval authority was delegated without the necessity of prior coordination. Approval of Federal funding for the year either accompanies or follows shortly after AWP approval, which is vastly more efficient than the old project-by-project method.

The Standards—Review and Revision. During the current reporting year, a task force has been evaluating and revising the 14-plus program

* See Summary of Authorizations and Appropriations, Table 16.

standards for which NHTSA has primary responsibility. Consolidation and updating of the standards are necessary to strengthen the position of those with official responsibilities for the safe and orderly movement of motor vehicle and pedestrian traffic, and to improve public support and understanding for such action. Also during the year a special effort was made to engage other Federal government departments and agencies in the national program, particularly where there was a strong similarity of interest and objective, as is the case with the alcohol program described under Priority Programs, where both DOT and HEW share and mutually support one another's efforts through careful coordination. Additionally, efforts were initiated to assist other departments and agencies in carrying out that part of the Highway Safety Act which requires that those with road and traffic responsibilities have safety programs based on the national standards.

NEW STANDARDS ISSUED. Following a considerable period of refinement and review, the Department issued two new standards; one on pupil transportation, and the other on accident investigation and reporting.

Progress in the States. At the close of 1971, a special report was prepared which attempted to assess each State's progress in adopting legislative or administrative procedures to carry out a comprehensive program based on the national standards. The report received wide publicity and formed the basis for a variety of speeches, news releases, and editorials that generally urged renewed and expanded effort to improve highway safety.

An earlier "Report Card" and a high fatality record the previous year had indicated that Southeastern States in Region IV were having difficulty in planning and implementing acceptable programs. Consequently, a mid-winter meeting of NHTSA and State and local officials was held to discuss deficiencies, available resources and future plans. A major objective of the conference was to gain wider and stronger support for the highway safety effort. Another was to devote increased attention to improving driver behavior, with special emphasis on drinking drivers.

These evaluations of the progress of the various States in reaching compliance, or near compliance, with the national standards, lead to the realization that the wide differences in the geographic, political and financial realities of the States would not permit full compliance with all aspects of the Standards for many years. In order to encourage the States and at the same time to put the major portion of resources where they would do the most good in minimizing traffic accidents, deaths and injuries, it was decided to concentrate on the larger segments of the traffic safety program which would draw upon several of the standards. These are called National Emphasis Programs; they are discussed in a later section.

A State which initiated its own review is Indiana. In October 1971, Governor Whitcomb requested that an NHTSA task force conduct a thorough examination of the entire Indiana highway safety program, to identify any problems and make recommendations to improve its effectiveness. This was the most thorough review and evaluation made of a State's program thus far, and will serve not only as a guide for Indiana, but as a model for similar examinations elsewhere in the future.

Training the Specialists. Policies and priorities for manpower development were redefined during the period covered by this report. Studies over the years since 1968 provide estimates that 1.3 million personnel will be needed by 1978 to meet traffic safety needs in the States and communities. This is an increase of 500,000 over the staffing levels existing at the time of the studies were initiated. Manuals and curricula have been prepared and distributed covering many of the needed skills. Numerous training courses are held throughout the country, some with Federal assistance and many using State and local finances entirely. These are a few examples:

- A total of 225 State or local personnel attended one of three national instructor training courses. Institutes were conducted by university teacher trainers for the purpose of familiarizing instructor personnel with recently published NHTSA curriculum packages. Specific packages included emergency medical technician-ambulance; driver license examiner; and breath examiner specialist.
- One project points up the value of these training programs: A survey by the Georgia Department of Public Health showed that 160 out of 338 ambulance services had no attendants trained to splint fractures, 113 could not control bleeding, 96 could not dress wounds, 69 could not administer oxygen, and 220 could not handle emergency births. Governor Jimmy Carter recognized the necessity for action to solve the problem. First, regulatory legislation for both ambulance attendant training and ambulance equipment was passed by the 1972 Session of the Georgia General Assembly. A cooperative training plan was initiated between the NHTSA Regional Office, the State Office of Highway Safety, and the Georgia Departments of Health and Education. Instructors are trained nurses or equivalent, and 33 have taken the course. They, in turn, will provide 110 hours of training for some 1,140 ambulance technicians. Eventually, courses will be taught at 25 vocational-technical schools throughout the State, of which eight were operational at the close of the reporting period.
- A unique driver education program for migrant workers is assisting Spanish speaking workers in Illinois and Wisconsin to acquire driving skills sufficient to obtain a driver's license. The courses are taught by bilingual driver education teachers using the latest techniques and procedures.

National Emphasis Programs. In addition to the Alcohol Countermeasures Program which is discussed under the section on Priority Programs, the two receiving emphasis at the present time are the Selective Traffic Enforcement Program (STEP), and the Driver Improvement and Control Program which is about to get underway.

STEP. Saturation police techniques have long been used to solve special traffic problems. However, particular attention has been focused in recent years on the use of selected law enforcement techniques to reduce accidents at locations where traffic law violations are an important contributing cause. At the close of FY 1971, contracts were signed with three cities for prototype projects, now known as STEP: Sacramento, California; El Paso, Texas;

and Chattanooga, Tennessee, in the amount of \$1,530,000 over a period of 3 years. Detailed plans were approved and the projects became operational in January 1972. Early reports are encouraging:

- During the first quarter of 1972, in Sacramento, crashes which entailed injuries were reduced by 12.5 percent and personal injuries dropped by 17.6 percent.
- Four months after the program began in El Paso, there had been a 54 percent reduction in traffic law violations at the site of the project.
- There was a 30 percent reduction in traffic fatalities in Chattanooga during the first 3 months of the life of the project.

Four additional jurisdictions were placed under contract by NHTSA toward the close of FY 1972.¹ The enforcement measures applied under a variety of geographical conditions during these demonstration projects will be analyzed and evaluated to determine the most effective combinations of techniques.

Funding. Since the inception of the Highway Safety Program in 1966 through 1972, the Congress has authorized appropriation of \$502 million for carrying out the goals of the Act, to reduce highway accidents and the resultant deaths and injuries. Of this amount, \$304,740,819 was made available in contract authority for assisting the States on a cost-sharing basis through June 30, 1972. The following table shows the current status of the program authorizations.

*Status of Authorizations Provided
for the State and Community Highway Safety and
Highway Related Grant Program (\$ million)*

Total authorized 1967-1972	\$502.0 ²
Less: Provision for administrative expense	26.6
Net authorization for States	\$475.4
Less amounts lapsed:	
FY 1968 \$ 2.4	
FY 1969 22.9	25.3
Cumulative authorization for period	\$450.1
Total contract authority to 6/30/72	304.7
Balance of authorization available 6/30/72	\$145.4

YOUTHS Highway Safety Advisory Committee. The new 15-member YOUTHS Highway Safety Advisory Committee planned, and directed their first national youth highway safety conference, SURVIVAL '71, with more than 120 delegates representing every State in the Union. The theme and title of the highly successful SURVIVAL '71 Conference was underscored by the National Transportation Safety Board which stated that, "Driving

1. Cities of Tacoma, Washington, and Fort Lauderdale, Florida; the States of North Dakota and West Virginia.

2. Includes authorizations for FY 1972 and FY 1973 for a total of \$235 million administered jointly by NHTSA and FHWA under the State and Community Highway Safety and the Highway Related Grant Programs.

and riding with other young people constitutes the greatest single hazard to survival which American youth must pass successfully to reach adulthood." Highway accidents cause *half* of all deaths among young people between 15 and 24, or an average of 50 killed each day.

Alarmed by these statistics, the SURVIVAL '71 delegates and members of the YOUTHS Committee developed plans for youth action and organization at the State, local, and Federal level, including improving the quality of driver education; more stringent driver licensing; educating young people on the effects of alcohol on driving; and improving crash survivability. Many delegates have maintained a constant interest and drive after returning to their homes. They have organized State youth conferences on highway safety; been selected by their governors to sit on highway safety advisory boards; and initiated a variety of action projects ranging from the elimination of highway hazards to buckle-up campaigns.

The YOUTHS Highway Safety Advisory Committee, charged with the responsibility by members of the Youth Order United Toward Highway Safety (YOUTHS) (the former SURVIVAL '71 delegates) is planning future youth action projects, and providing a communications network with and between the members of the Youth Order to further action by young people to abet highway safety.

National Highway Safety Advisory Committee. The 35 National Highway Safety Advisory Committee members are appointed by the President to advise the Secretary of Transportation on the activities and functions of the Department in its Federal Assistance State and community highway safety program. It was established by the Highway Safety Act of 1966.

Two major meetings held during FY 1972 resulted in a number of resolutions: (1) Administrative adjudication for traffic offenses to relieve clogged traffic courts; (2) comments on the proposed revision of the highway safety standards; and, (3) promotion of highway safety at national meetings of State and local government leaders.

A major project of the Committee was cosponsorship with the Department of Transportation of a Regional Highway Safety Conference to bring influential business, government and political leaders into the effort at the State and local level for improved highway safety. The conference held in Miami for the Southeastern States was so successful that a second conference is planned for early 1973 for the Western States.

Highway Safety Program. The job of improving safety for motorists is divided between those aspects that relate largely to the vehicle and the driver and those aspects that relate more directly to the highway itself. These are the responsibilities of the Federal Highway Administration (FHWA).

One of FHWA's original Highway Safety Program Standards promulgated under authority of the Highway Safety Act of 1966, Standard 13, "Traffic Control Devices," has been revised and reissued this year.

Experience in administering the Standard and a review of the history and development of the Standard strongly indicated that its scope was intended to be considerably broader. The revised Standard expands on other

traffic engineering measures and emphasizes manpower development. It has been titled "Traffic Engineering Services."

Fellowships in Highway Engineering. Highlighted in evaluations of State highway safety programs has been the need for greater traffic engineering capability, especially in local political jurisdictions. In addition to highway safety funding available for certain training activities under Standard 13 during FY 1972, FHWA granted 12 fellowships for the 1972-73 academic year. Because this endeavor is intended to support the highway safety program, each applicant must agree to resume work with his present employer or begin work with a specific prospective employer. The curriculum must be aimed primarily toward highway and street design, traffic engineering, including traffic control devices, safety problems, and other principles of highway and street operation.

To improve the effectiveness of the field organization and to provide the greatest service to the States, FHWA Regional Administrators may assign to division offices those safety program responsibilities which can be carried out more effectively and efficiently at the State level. This decentralization of administration, standardization of procedures, and increased participation by States and local governments is totally responsive to the requirements set forth in the Federal Assistance Review. (See Chapter XI, Administration.)

The FHWA Program Management Guide, issued in FY 1972, was developed to assist regional and division offices in administering the highway oriented Safety Standards and to provide program direction and guidance. In collaboration with the National Highway Traffic Safety Administration, policies and procedures have been and are being developed for use by Governors' representatives in managing the State and Community Highway Safety Program.

STATE COMPREHENSIVE PLANS. Policy and procedures pertaining to the periodic updating of State Comprehensive Plans, which cover a State's multiyear highway safety plan, were undergoing revision by FHWA and NHTSA jointly during the latter part of the fiscal year. It is anticipated that the revised procedures will be issued early in fiscal year 1973.

The transition from individual project applications to the Annual Work Program (AWP) concept, begun in 1969-71, was completed when all 50 States, the District of Columbia, and Puerto Rico received approval for AWP implementation starting with fiscal year 1972.

The AWP management concept treats the various aspects of a State's highway safety problem as a whole. Available data are used in a systems approach to identify major problems. When they are identified, the AWP is structured so that it can, within available funding, alleviate the problems, establish priorities, and achieve goals.

Because of limited State and local resources, total safety program implementation will require years to accomplish. National guidance is needed to insure that emphasis is given to those critical features of the Standards that will produce the greatest results.

National Emphasis Program for Highway Safety. The program is designed to identify problem areas and develop corrective measures for all

streets and highways. It focuses attention on highway features which, within funding limits available, can produce the greatest reduction in traffic deaths, injuries, and property damage in the shortest possible time.

The following five basic elements of the Emphasis Program will furnish the necessary bases on which to develop the specific accident counter-measures needed and provide technical manpower to implement the program.

1. Accurate identification of accident locations
2. Skid accident reduction programs
3. Uniform regulatory and warning signs
4. Pedestrian crossing program
5. Traffic engineering capability

RAIL-HIGHWAY PROGRAMS. An increased attack on the railroad-highway safety problem, nationwide, was made possible by the special release of \$450 million of highway funds during this fiscal year. Of the money obligated for highway safety improvement projects, about \$100 million was earmarked for railroad grade crossing improvements. This nearly doubled the average annual expenditure for railroad-highway safety projects in recent years.

A study of safety problems at railroad-highway grade crossings was completed by the Federal Highway Administration and the Federal Railroad Administration. It is the most complete evaluation of the level of need for grade-crossing improvements ever undertaken. The study will provide the basis for possible legislative action to increase safety at these locations.

Spot Safety Improvements. The Federal Highway Administration has examined regular project procedures to insure that high priority safety improvement projects are given prompt attention. As a result, instructions have been issued to field representatives to determine the applicability of the regular procedures to low cost safety improvements, with particular attention being given to a possible waiver of the (1) clearinghouse requirements, (2) planning requirements, (3) environmental statement requirements, and (4) public hearing requirements.

One of the more dramatic spot safety improvements involves locations where wet weather skidding accidents are prevalent. Before and after studies show that one State has achieved a 68 percent reduction in the total number of wet weather accidents at locations where 11 projects were specifically aimed at the skidding accident. These projects resulted in a benefit-cost ratio of 3.25 (i.e. \$3.25 saved for each \$1 spent on the project). Similar benefits are being achieved in other States. A special emphasis program is being developed to encourage more States to identify and correct skid-prone locations.

The FHWA program to standardize the measurement of pavement skid resistance made significant progress during the year. Operating under an interagency agreement, the National Bureau of Standards developed an interim National Reference Skid Measurement System and began providing national calibration services. A prototype field test and evaluation center, located near College Station, Texas, became operational in June. Proposals

for two additional centers to serve other areas of the Nation are under consideration.

The "Handbook of Highway Safety and Operating Practices," 1968, generated considerable interest and gained wide acceptance. It has again been revised to include updated information and additional subject coverage. This latest revision is expected to be ready for distribution early in FY 1973.

TOPICS. During FY 1972, FHWA initiated an effort to reduce the 10,000 pedestrian fatalities that occur each year. Two parts of the problem under study were the feasibility and cost-effectiveness of separate pedestrian facilities and an evaluation of the effect of highway-related countermeasures on urban pedestrian fatalities. This evaluation study is a joint effort with NHTSA.

The Traffic Operations Program to Increase Capacity and Safety (TOPICS) on urban street systems developed into a continuing program by the State and local communities. FHWA obligated more than \$200 million in TOPICS funds during the 1972 fiscal year. At the start of the year, \$63 million had been obligated to finance TOPICS programs, and there were 325 construction projects underway or completed in 44 States and Puerto Rico. As of June 30, 1972, \$281 million had been obligated and about 1,440 construction projects were underway or completed, with at least one project in each State, the District of Columbia, and Puerto Rico.

The Highway Vehicle Object Simulation Model (HVOSM) is an analytic procedure developed and validated under an FHWA contract, to evaluate a variety of highway design characteristics and determine their effect on the vehicle and its occupants in a single-vehicle accident. To date over 40 organizations use the HVOSM to evaluate geometrics and to develop safe roadside structures and vehicle designs.

MOTOR CARRIER SAFETY

Intergovernmental Activities. At the close of the fiscal year, a total of 68 separate agreements had been negotiated with 50 States and the District of Columbia as authorized by Public Law 89-670 (49 USC 1651) and Public Law 89-170 (49 USC 305). The agreements pledged intergovernmental cooperation and exchange of information, and 31 States adopted, in whole or in part, both the Federal Motor Carrier Safety Regulations and the Hazardous Materials Regulations as their own State regulations. Thus, most States now administer a safety regulatory program identical in part to the Federal program. This has resulted in joint roadside inspections of vehicles and drivers; training assistance to State officials in safety regulatory techniques and hazardous materials transportation practices; and the practice of making available specific information as evidence in particular enforcement actions being undertaken by a State. In FY 1972, the States were provided with instructional assistance on 285 occasions and evidence was forwarded to State authorities on 375 occasions. As a result of these mutual activities, the motor carrier safety program is strengthening the total effort to reduce the risks of highway travel for the public and the transportation industry.

By the end of the year, nearly 8,400 safety fitness reports and the replies to petitions for reconsideration on pending requests for temporary or emergency authority to transport regulated commodities were transmitted to the ICC. In addition, 6,000 other safety fitness reports on requests for other kinds of operating authority were transmitted. Twelve special safety fitness reports were transmitted to the Department of Defense regarding carriers transport explosives or other hazardous materials for that Department. These reports were transmitted pursuant to a working agreement with the DOD.

Regulations. In the last fiscal year the Bureau of Motor Carrier Safety (BMCS) published 18 significant rulemaking actions on motor carrier safety matters in the Federal Register. These actions dealt with:

- Physical qualifications of drivers to meet the minimum hearing requirements with the use of hearing aids.

- More stringent performance requirements for diesel engine fuel tanks.

- Hand axes no longer required on interstate buses.

- Safe cargo loading and protection against shifting or falling cargo.

- Drivers of certain farm-related and light-weight vehicles exempted from some or all of the qualification rules for commercial vehicle drivers in interstate commerce.

- Brake performance requirements dealing with brake systems, warning devices, gauges, and stopping distances.

- Double latched bus windows to decrease the possibilities of occupant ejection in the event of an accident.

- The requirement for commercial motor vehicles to remain in conformity with Federal Motor Vehicle Safety Standards.

- Contract carriers who transport mail under contract to the U.S. Postal Service being subject to the Motor Carrier Safety Regulations. An administrative exemption was proposed for lightweight vehicles engaged exclusively in mail transportation.

- Revised procedures for notification, reporting, and recording of highway accidents involving motor carriers. The proposal would require private carriers to report accidents and redefine an accident by increasing the minimum property damage limits from \$250 to \$1000.

- Revision of the hours of service requirements while operating a motor vehicle under adverse driving conditions.

- Requirements pertaining to driving and parking of motor vehicles transporting hazardous materials.

- Prohibition of transportation of blasting caps in the same motor vehicle with other explosives except under certain stowage conditions.

- Requirements for plastic fuel tanks used on commercial vehicles.

- An apprenticeship and training program to allow persons less than 21 years old to drive commercial vehicles if those persons are enrolled in approved apprenticeship programs.

- Removal of certain exemptions from the labeling requirements for truckload shipments of some hazardous materials.

A change of the basis for determining minimum filling density for inhibited vinyl flouride from a specified quantitative limit to a limit based on performance standards for the cargo tank in which the commodity is transported.

Clarification of the requirements for accessory attachments to certain specification cargo tanks.

The BMCS represents the FHWA on the Hazardous Materials Board of the Department. As such it participates in joint rulemaking activities involving the safe transportation of hazardous materials. Among these were:

Issuance of a rule providing a new quantitative definition for "corrosive materials."

Issuance of new reporting requirements for incidents involving radioactive materials consistent with reporting requirements applicable to other hazardous materials.

Issuance of a proposal to establish a national Hazard Information System intended to provide more adequate communication of hazards of materials in transportation.

Issuance of a proposal to specify a new definition for the class of materials identified as "flammable liquids" and to create and define a new class of materials identified as "combustible liquid."

The Bureau engaged in other actions associated with the development and maintenance of motor carrier safety and hazardous materials regulations.

As part of the United States Delegation to the United Nation's Group of Rapporteurs on Dangerous Goods, participated in developing agreements on international standards for the safe transportation of hazardous materials.

Processed actions on petitions proposing new regulations or amendment to the present Motor Carrier Safety Regulations. Those found to have merit were granted or notices of proposed rulemaking were issued to receive public comment. In many, sufficient justification for the requested rulemaking action was not received, and the petitions were subsequently denied.

Reissued an updated version of the complete set of the Motor Carrier Safety Regulations, current to July 1, 1971, in a revised format that facilitates updating and utilization when new regulations, amendments, or changes are published.

Safety Education. Because of the size of the motor carrier industry, the program to prevent accidents is based on the self-help theory in which voluntary compliance with the regulations is a key factor. The educational activities of the Bureau are designed to inform concerned parties of the intent and benefits of the safe practices set forth in the regulations. During the past year, some activities to acquaint all concerned with the latest safety developments were:

Over 8,300 interstate motor carriers were provided with a copy of the Motor Carrier and Hazardous Materials Regulations during FY 1972.

This is a fundamental step in obtaining voluntary compliance by the carriers.

Approximately 1,800 safety meetings were conducted throughout the country, attended by drivers and other carrier personnel, at which topical safety subjects were covered.

Individual responses were provided to over 56,000 inquiries about motor carrier safety and 16,000 inquiries about the highway transportation of hazardous materials.

A brochure entitled "Truck Driver's Pretrip Check List," designed to provide a safe, sequential, and time saving procedure for pretrip vehicle check, was prepared. Almost three-quarters of a million of these checklists were distributed to carriers and drivers.

In cooperation with the U.S. Department of Agriculture, the Bureau prepared and distributed 100,000 copies of "Important Notice to Operators of Farm Vehicles," a pamphlet informing farmers of certain amendments to the Driver Qualification Regulations.

The brochure "Instructions for Examining Physicians" was revised to assist the medical profession in determining physical fitness of interstate vehicle drivers.

Six "On Guard" safety bulletins alerting carriers and drivers to possible safety hazards and pointing out risk avoidance measures were issued.

Inspection. There are several activities conducted continuously throughout the year by safety investigators to determine to what extent the safety regulations are being carried out. The information obtained from these activities is used to assist in evaluating the effect of the motor carrier safety program and, when unsafe equipment or operating conditions are found, to take remedial action. During the year, the Bureau conducted the following activities:

Safety surveys of carriers	4,647
Roadside inspections	28,835
Hazardous materials surveys of carriers and shippers	1,223

Accident Investigations. The motor carrier safety program, through its accident notification and investigation and reporting procedures, strives to prevent accidents by investigating their causes, by collecting and analyzing statistical data about them, and then developing from these efforts, new or revised safety regulations and new techniques for safety educational activities. The number of carrier accidents and hazardous materials container incidents investigated and reported on were:

General investigations	583
Investigations in depth	329
Hazardous materials container accidents	187
Carrier accident reports reviewed	66,000

Indepth field investigations are conducted on those major accidents involving unusual severity, multiple fatalities, technological significance or

widespread public concern, and official interest. A composite report summarizing the findings of all the indepth investigations for calendar year 1970 was issued in December 1971. Of the 294 accidents given indepth investigations during this fiscal year, 9 were selected for detailed narrative reporting because the findings of the investigation provided illustrative accident prevention material. These detailed published accident reports were publicly distributed to reach as wide an audience as possible.

In fiscal year 1972, the NTSB was given 306 notifications of major accidents and on 6 occasions, NTSB assumed control of the investigation.

The "for hire" motor carriers are required by the Motor Carrier Safety Regulations to report the accidents in which they are involved and to provide prescribed information about each accident. The information listed below compares over a 7-year period, the number of large carriers reporting accidents, the mileage reported for these carriers and their accident frequency rate.

<i>Calendar year</i>	<i>Carriers reporting</i>	<i>Total intercity accidents</i>	<i>Total intercity vehicle miles</i>	<i>Accident rate</i>
1964	3,343	30,267	9,535,579,000	3.2
1965	3,309	24,794	10,862,252,500	2.3
1966	2,975	26,606	10,956,258,200	2.4
1967	2,811	25,981	10,704,604,800	2.4
1968	2,734	29,209	11,704,240,400	2.5
1969	2,753	30,672	12,460,790,500	2.4
1970	2,975	33,203	12,389,872,800	2.7

At the present time the regulations exempt the 90,000 private carriers from the reporting requirement.

During the year, a Notice of Proposed Rulemaking was published to require private carriers to report accidents and to change the definition of an accident by increasing the minimum amount of property damage which makes a nonfatal accident reportable.

Enforcement. In the event of violations of the Motor Carrier Safety Regulations there are several different enforcement actions that may be taken, of which civil forfeiture proceedings and criminal prosecutions are the major ones. In FY 1972 there were 1,585 enforcement investigations undertaken. A total of 784 of these were forwarded to FHWA's legal staff for appropriate disposition. The remaining 801 were administratively closed. During this fiscal year, 95 civil forfeiture proceedings were completed in which settlements amounting to just under \$400,000 were paid to the U.S. Treasury and 213 criminal cases were prosecuted involving \$138,000 in fines.

Other highlights. During the course of the fiscal year, there were several areas in which significant actions were taken.

The Department assigned responsibility for implementing a Cargo Security Program to FHWA. Technical advice on cargo security, theft and pilferage prevention and loss reductions will be given to the

motor carrier industry. After an introductory orientation, BMCS staff members were trained in cargo security principles.

A contract was issued to develop improved visual and auditory tests to establish motor carrier driver qualifications. The tests will screen drivers for visual and auditory deficiencies that could interfere with their safe driving performance.

The FHWA is jointly funding with the National Highway Traffic Safety Administration a contractual study of driver-vehicular stresses leading to degradation of driving performance in trucks, buses and passenger cars. The study will determine the potential decreased safety of operation caused by fatigue generated by vehicular vibration, heat and humidity, high noise level, and seating discomfort.

At the year's end an amendment to the National Driver Register (NDR) provision of the National Traffic and Motor Vehicle Act of 1966 was still pending. The proposal would permit the States to make available to motor carriers information from the NDR on a prospective driver who was previously licensed in other States prior to his being employed. During the year a legislative amendment was proposed to extend the civil forfeiture penalty for violations of any or all parts of the motor carrier safety regulations, not just the violations by "for hire" carriers of the recordkeeping provisions of the regulations.

MARITIME SAFETY PROGRAMS

Boating Safety. The Federal Boat Safety Act of 1971 (Public Law 92-75) was signed on August 10, 1971 by President Nixon. This new milestone in protection of the American boating public has the following significant provisions:

- a. Establishes a 21-member Boating Safety Advisory Council to advise the Commandant of the Coast Guard on major boat safety matters. Normally, the Council is composed of seven members from State boating safety organizations, seven members from industry, and seven members of the general public.
- b. Authorizes the Coast Guard to establish minimum safety standards for boats and associated equipment.
- c. Requires a manufacturer to comply with these standards and to notify first purchasers of any safety related defects.
- d. Requires a manufacturer to correct serious defects at his sole expense.
- e. Preempts any State law or regulation which differs from a Federal regulation setting a standard or requiring safety equipment on boats.
- f. Authorizes the Coast Guard Auxiliary to conduct operational patrols on State waters.
- g. Authorizes Coast Guard Boarding Officers to require immediate correction of certain unsafe conditions.
- h. Protects persons assisting in distress cases from civil liability if they act in a reasonably prudent manner.

- i. Requires the numbering of all powered boats, regardless of horsepower.
- j. Authorizes a 7.5 million dollar annual Federal assistance program to run through FY 1976 to help State boating safety programs.

Policies, plans and initial standards were developed to implement the act. The initial standards are aimed at reducing drownings, the largest single cause of death on the Nation's waterways. Contracts have been awarded for the development of test procedures and accident investigative methodology.

In order to encourage public interest in boating safety, multi-media communications campaigns have been developed. These campaigns are designed to stimulate recreational boatmen to take advantage of boating courses offered by the Coast Guard Auxiliary, the States, power squadrons and the Red Cross. The campaigns also inform the boating public of new boating safety regulations.

Regional Boating Safety Schools were conducted at three locations with a record 221 students attending, including 76 State and Federal officials. A permanent National Boating Safety School was established at the Coast Guard Reserve Training Center, Yorktown, Virginia in January 1972. This new school offers an intensive 6-week curriculum dealing with the boating safety laws, basic law enforcement procedures, public relations, equipment operation and instructor training. In the first two classes 65 students completed the course, including a representative from the Washington, D.C. Harbor Police and the State Boating Law Administrator for Arkansas.

Coast Guard boating safety personnel conducted training for 6,536 Coast Guard, State and local law enforcement personnel in 1971. An estimated 7.5 million persons visited Coast Guard boating safety exhibits and 530,000 persons attended safety lectures. Over 2,000 radio and TV appearances were made by Coast Guard personnel in behalf of boating safety.

Boating Safety Detachments (BOSDETS)—specially trained four-man mobile units with small boats—continued a balanced program of education and enforcement in the 12 Coast Guard Districts. The 54 BOSDETS are also assisted in their endeavor by boating safety specialists from other Federal agencies.

Coast Guard Auxiliary. Achievement of the goals of the Boating Safety Program would be impossible without the support of the Coast Guard Auxiliary, an all-volunteer civilian organization. Auxiliarists are experienced boatman, licensed radio operators, or licensed aircraft pilots. Each is trained by the Coast Guard in seamanship, navigation, weather, and other subjects necessary for proficiency in boating safety. The advanced membership training program also includes correspondence courses from the Coast Guard Institute. Auxiliaries are accorded no law enforcement authority and receive no compensation for their services. Each member must own at least 25% of a boat, aircraft, or radio station, or possess a speciality such as that of a diver, doctor, or teacher. The Auxiliary's contribution to boating safety is accomplished primarily through:

- a. Public presentation of courses in boating safety.
- b. Courtesy examinations for safety equipment on motor boats at request of the owner or operator.

c. Operational activities with regular Coast Guard forces including regatta patrols, safety patrols, and search and rescue missions.

The following statistics are indicative of Auxiliary activity:

	FY 1971	FY 1972
Persons receiving safe boating instruction ----	225,143	283,972
Motorboats examined -----	255,087	276,133
Regatta patrols -----	4,671	3,920
Assistance missions -----	12,118	13,033
Lives saved -----	524	396
Total membership -----	32,363	34,478
Total facilities -----	16,557	16,446

There are currently 1,153 active Auxiliary Flotillas in the United States, Puerto Rico, American Samoa, and the (U.S.) Virgin Islands.

Two full meetings of the Boating Safety Advisory Council were held during the past year which produced beneficial suggestions regarding boating safety standards and regulations. The respect accorded the Council by recreational boatmen virtually eliminates all controversy over regulations which the Council approves.

Merchant Marine Safety. The main objective of the Coast Guard's Merchant Marine Safety Program is to conduct an effective preventive safety program to minimize the number of deaths and injuries and the amount of property damage in marine transportation.

Since Congress passed the first law for "inspectors" of steamboats in 1838, the Federal role in marine safety has been expanded to include the frequent inspection of numerous other classes of vessels, the licensing and certification of their officers and crews, and the investigation of marine casualties and accidents.

The enforcement of the marine safety laws and Federal regulations has been vested in the Coast Guard. Personnel are located throughout the United States and its territories as well as in various major seaports of Europe and Asia in order to insure compliance with the law and to assist merchant mariners in whatever way possible.

Not only do the marine safety laws apply to U.S. flag vessels, but also certain marine safety laws apply to foreign vessels plying to and from U.S. ports. The Coast Guard insures that these foreign freighters and tankers carry hazardous materials only under strict safety conditions and that passenger vessels comply with all applicable international safety regulations prior to allowing these vessels to carry U.S. citizens from American ports.

In the interest of safety and to promote better qualified merchant marine officers and seamen, the Commandant recently approved the curriculum of the Great Lakes Maritime Academy, Traverse City, Michigan, which will qualify students successfully completing the course of instruction to be examined for license as 1st Class Pilot, Great Lakes, or 3rd Assistant Engineer, Motor Vessels.

Pollution abatement questions have been incorporated into examinations for all licensed and unlicensed personnel manning merchant vessels of the United States. The development of the new revised forms of examinations

for the two lower levels of merchant marine licenses has progressed on schedule. A first draft of proposed regulation changes, which would consolidate and simplify the license structure for many limited licenses, has been informally distributed to industry groups and their comments received. These comments are being reviewed and evaluated and will be incorporated in any future Notice of Proposed Rule Making.

A complete revision and updating of the Coast Guard Tankerman's Manual has been undertaken as a joint effort of the Coast Guard and the Maritime Administration. The revised publication will serve as a basic reference book and safety guide as well as a study guide for the questions dealing with pollution which will be phased into all examinations for both licensed and unlicensed merchant marine personnel.

During FY 1972 the Coast Guard investigated 2,052 casualties to personnel on commercial vessels not resulting from a vessel casualty. Also investigated were 2,602 vessel casualties, some of which also resulted in injury or death to personnel. Five major marine casualties, which resulted in a loss of 53 lives, were investigated by Marine Boards of Investigation in FY 1972:

a. In August 1971, a cabin cruiser collided with a towed tank barge in the Ohio River resulting in the death of seven persons aboard the cruiser.

b. In December 1971, the tug *Maryland* sank in Albemarle Sound, causing five deaths.

c. In January 1972, a tank barge, part of the integrated barge-tow *Martha Ingram*, broke in half and sank in Port Jefferson Harbor, Long Island, New York.

d. In February 1972, the tanker *V.A. Fogg* exploded and sank 500 miles off the coast of Texas with a loss of 39 lives.

e. In May 1972, the *Venus*, a Great Lakes tanker, sustained two explosions while anchored in the St. Lawrence Seaway. One death and several injuries resulted.

PIPELINE SAFETY

Under delegation through the Assistant Secretary for Safety and Consumer Affairs, the Office of Pipeline Safety (OPS) administers the Natural Gas Pipeline Safety Act of 1968. During the year the Department's safety program added important regulations to the Federal safety standards for gas pipelines, continued to build strong Federal/State relationships, augmented its compliance program in close coordination with those State agencies cooperating with the Department under the provisions of the Act, and continually informed the State agencies, industry, and the public about the Department's pipeline safety responsibilities and the safety standards in effect since 1970.

Among the three amendments to the Federal pipeline safety standards which were issued or became effective in FY 1972 were requirements for corrosion control on both existing and new gas pipelines. These regulations became effective on August 1, 1971. They specify detailed performance requirements for the protection of gas pipelines from external and internal corrosion. They apply to all metallic pipelines which are subject to corrosive environments. (Basic concepts of these regulations were directed

toward a properly coated pipeline, supplemented with cathodic protection, or what experience has demonstrated to be good corrosion engineering design and maintenance practice.) These regulations are especially significant because although the reports submitted to the OPS indicate that more than one-half of the leaks repaired on gas pipeline systems are attributed to corrosion, previously there did not exist any uniform standards, or even voluntary standards for construction and maintenance of pipelines.

Regulations requiring the reporting of leaks and failures that occur on gas pipelines were in effect throughout the year. An amendment issued January 21, 1972, relieved the operators of petroleum gas systems serving less than 100 customers from the requirement of submitting a 1971 annual report to OPS.

In addition, the Department issued seven notices of proposed rulemaking which were under active consideration during the year and held four public hearings on notices during FY 1972.

Regulations issued by the Department require each gas system operator to report leaks and failures in annual summaries beginning in 1970, as well as to report individual leak and failure incidents. Summaries of data reported under these regulations for 1970 and 1971 were included in the annual reports to Congress.

A review of the 1,287 failures reported to OPS in 1971 revealed that 575 of those on distribution systems and 213 of the transmission failures were attributed to damage by outside forces. These 788 incidents on gas systems caused 14 deaths and 152 injuries in 1971. The 1970 data were comparable to those of 1971. Damage to pipelines from outside forces appears to be the most serious single pipeline safety problem to come to the Department's attention. The Natural Gas Pipeline Safety Act gives the Department authority over only the operator of the gas pipeline who quite often may be only a "passive" cause of the damage incident. Recognizing this authority limitation and the seriousness of the problem, the OPS last year developed a Model Statute for the protection of underground pipelines and utilities. In January, the Office of Pipeline Safety mailed copies of the statute to almost 100 officials of organizations of State and local governments, pipeline, gas, and other utility associations; contractors; professional engineering societies; labor unions; State regulatory utility commissions; the press; and other public groups.

In a letter accompanying the Model Statute, the Office of Pipeline Safety requested the cooperation of both the operators of gas pipeline facilities and of other pipelines; operators of underground electric, telephone (and other communications) systems, water, subway, and sewage systems. Responses to the Model Statute were most encouraging, and the Department continues to devote attention to all appropriate efforts at the Federal, State, and local level (including the enactment of effective laws and ordinances) to eliminate hazards to pipelines from outside force damage.

SAFE HANDLING OF HAZARDOUS MATERIALS

The Office of Hazardous Materials under the Assistant Secretary for Safety and Consumer Affairs is responsible for departmental programs

concerned with the safe transportation of hazardous materials, as provided for by the Hazardous Materials Transportation Control Act of 1970. Projects carried out to advance safe transport of these materials include:

1. Supporting safety school programs at the Transportation Safety Institute; conducting seminars with State and local organizations and special interest groups; and participation in regional hazardous materials safety meetings.

2. Conducting surveillance and inspections of packaging manufacturers and shippers of hazardous materials.

3. Operating a centralized reporting system for hazardous materials incidents which utilizes a data processing system for processing the hazardous materials incident reports.

4. Developing a Hazard Information System designed to provide immediate information to police, firefighting, and other emergency personnel in order that they may make better informed judgments in their handling of hazardous materials transportation emergencies. Included in the System are modifications to shipping documentation, package labels, and transport vehicle identification placards.

5. Updating and modernizing regulations and issuing special permits to embrace new technologies pending rule change. The Hazardous Materials Regulations Board is continuing its efforts to reduce the number of outstanding special permits issued under 49 CFR 170.13. At the beginning of FY 1972 there were 1,738 special permits outstanding. Due primarily to the effects of regulatory action, 632 permits were cancelled. One hundred fifty three new permits were issued during the same period; therefore, there were 953 special permits in effect at the beginning of FY 1973.

6. Developing new definitions and classifications for all materials that present hazards in transportation.

7. Developing standards for packagings of hazardous materials that are performance oriented and are based on tests that simulate environmental conditions.

RAILROAD SAFETY

The number of train accidents in 1971 decreased by 9.8 percent over the previous year. Derailments, comprising 70.2 percent of the total of all reportable train accidents decreased by 8.4 percent. Collisions decreased by 12.6 percent when compared with 1970.

Casualties resulting from all reportable train, train-service, and non-train accidents decreased by a corresponding 10.9 percent.

Train Accidents. Table 23 lists the number and types of train accidents, and the resulting casualties from accidents of all types during the calendar year 1971 and the two preceding years. In 1971, 7,304 train accidents were reported, a decrease of 791 accidents or 9.8 percent fewer than those reported in 1970, and a decrease of 1,239 or 14.5 percent fewer than those in 1969. There were 5,131 derailments reported, a decrease of 471 or 8.4 percent fewer than those reported in 1970, and a decrease of 829 or 13.9 percent fewer than those in 1969. 1970 data indicate an improvement in

the rail carriers' maintenance and inspection of track structures and equipment running gear, the main contributing factors to derailments.

Rail-Highway Grade-Crossing Accidents. (See table 24 for statistics.) During 1971, a total of 3,392 train and train-service rail-highway grade-crossing accidents were reported, a decrease of 167 accidents or 4.7 percent compared with the previous year.* A total of 1,356 deaths and 3,332 injuries resulted from these accidents, representing a decrease of 5.8 percent in deaths and decrease of 0.1 percent in injuries compared with 1970.

Collisions at grade-crossings involving trains and motor vehicles during 1971 totaled 3,224 and resulted in 1,267 deaths and 3,253 injuries—a decrease of 153 accidents and 95 deaths. There was an increase of 16 injuries compared to 1970.

Included in the total number of accidents involving motor vehicles were 62 derailments and 205 miscellaneous train accidents accounting for 120 deaths and 169 injuries.

Also included in the total casualties at rail-highway grade-crossings were one fatality and 100 injuries to employees on duty.

Information concerning these accidents is summarized in Tables 24, 25, and 26.

Locomotive Accidents. The Office of Safety's Locomotive Branch investigated 80 accidents during FY 1972. Failure of locomotive equipment contributed to 51 of these accidents and resulted in 51 injuries. There were no fatalities (see Tables 25 and 26). Predominant causes of these accidents were defective windows and doors, defective cab seats, contact with electrically energized parts, electrical shorts, unsafe cab floors, steps, and passageways, crank case or air-box explosions or defective exhaust or cooling systems on diesel engines, and contact with unguarded moving parts.

During FY 1972, the Locomotive Branch inspected 87,124 locomotives, an increase of 4,825 over the number of units inspected in the previous fiscal year (see Table 27). Of the total units inspected, 11,424 or 13.1 percent were reported as defective. The percentage of defective locomotives increased 0.2 percent over last year.

Equipment and operations. The percentage of defective equipment in use increased from 8.5 to 9.3 percent during the year. The operation of trains which had not been given proper train brake tests increased from 17.2 percent observed in FY 1971 to 21.3 percent in FY 1972.

Inspection activities. Tables 27 and 28 show the number of freight cars, passenger-train cars, and locomotives inspected; the number found with defective safety appliances; the percentage defective, and data for comparison with the preceding year.

Of the 821,132 freight cars inspected, 82,063 or 10.0 percent had defective safety appliances, as did 11.7 percent of passenger cars and 2.4 percent of locomotives inspected.

Table 30 lists the results of field agents' activities related to enforcement under the Accident Reports Act.

* In addition, there were 16 non-train grade-crossing accidents during 1971 which resulted in 19 injuries.

Investigation of Complaints—Safety Appliances. During the year, 269 complaints were investigated, compared with 216 complaints for the preceding year. Seventy-six involved power brakes, 50 safety appliances and 81 both power brakes and safety appliances. Another 62 involved miscellaneous matters. In 122 of these investigations, evidence of violation of the law was obtained and prosecution on 1,077 counts was instituted. In many other instances, FRA's investigations resulted in the correction of unsatisfactory conditions.

In addition, another 124 special inspections of new equipment were made by field inspectors and members of the Washington staff in response to carrier, shipper, and builder requests to ensure compliance with safety standards and regulations.

Hours of Service Act. During the year, hours of service reports were filed by 93 railroads reporting 4,885 instances of all classes of excess service. (Table 31.) The reports covered 2,873 instances of excess service by operators, train dispatchers and other employees subject to the 9-hour and 12-hour provisions of the law. A breakdown of this total is shown in Table 32. The reports also covered 2,012 cases of excess service performed by train and engine employees subject to the 14-hour provision of the law.

Effective December 26, 1972, the Hours of Service Act as amended by Public Law 91-169, provides for a further reduction of the hours of duty of train and engine employees from 14 hours to 12 hours.

Medals of Honor Act. Under the Medals of Honor Act of February 23, 1905, as amended (49 U.S.C. 1201-1203), applications are considered for award of life-saving medals to persons, who by extreme daring risk their own lives in saving or endeavoring to save lives in any wreck, disaster, or grave accident, or preventing or endeavoring to prevent such a wreck upon any railroad within the United States or involving any motor vehicle on the public highways. At the beginning of the year, there were two pending applications involving railroads and six were received during the fiscal year; one is pending, four were denied.

Since enactment of the Medals of Honor Act in 1905, 137 applications have been received for the Award, 81 were awarded, 55 denied, and one is pending.

Signal and Train Control Equipment. During the year, 159 applications for approval of proposed modifications of block signal system, interlockings, train stop, train control, and cab signal systems were filed by the carriers. At the beginning of the year, action was pending on 37 applications previously filed. Of the total, 144 applications were acted upon during the year and action is pending on 52.

Twenty-nine applications were filed requesting relief from the requirements of the FRA's Rules, Standards and Instructions governing signaling systems. At the beginning of the year, action was pending on five applications. Of the total, 26 were acted upon and action is pending on five.

During the year, 79 complaints were received regarding alleged violation of the Rules, Standards and Instructions as compared with 53 complaints filed the preceding year. Investigations were completed on 52 complaints

resulting in the correction of many unsafe signal conditions and recommendations for legal action under the Claims Collection Act.

As a result of inspection activities and investigation of complaints, 8 cases involving violations of the Signal Inspection Act (49 U.S.C. 26) were forwarded to the Chief Counsel for consideration compared with 25 cases during the previous year.

Table 33 shows for a 5-year period, the number of applications for approval of modifications of block signal systems and interlocking, as well as applications for relief from or modifications of the Rules, Standards and Instructions for Railroad Signal Systems as prescribed by the Federal Railroad Administration, and the number of inspections and the devices inspected during the year.

Information on the methods of train operation, number of interlockings and control points, and train control systems is available upon request from the Associate Administrator, Office of Safety Federal Railroad Administration.

Signal System reporting requirements were revised and reissued under 49 CFR Part 233 effective May 15, 1972. Annual reports were simplified by replacing three separate forms with a single form report. In addition, false proceed signal failures are now required to be reported to FRA within 5 days of the failure instead of 30 days after the month in which the failure occurred. Statistical information on false proceed failures appears in Table 34.

The signal inspection activities resulted in bringing to the attention of railroad management a number of unsafe conditions requiring immediate corrective action. Meetings were held with carrier officials to discuss the need for improved maintenance and operation of signaling systems. All supervisors and inspectors attended a school at Pittsburgh, Pennsylvania, on the development of new signal equipment and signaling systems.

Engineering and Accident Analysis. The Office of Safety's Engineering and Accident Analysis Division participates in all technical projects relevant to conventional railroad operation and equipment.

The Division participated in the following projects during FY 1972:

1. Initiated implementation of new track safety standards under the Federal Railroad Safety Act of 1970.
2. Established criteria for States desiring certification under the Safety Act.
3. Developed a track manual for inspection and enforcement procedures for the guidance of Federal and State inspectors in the administration of the track safety standards.
4. Participated in the testing and evaluation of two fire tests on $\frac{1}{8}$ -scale tank cars. This is in conjunction with an ongoing contract awarded in 1971 to the U.S. Naval Laboratory at White Oak, Maryland, to investigate and evaluate methods for fire protection of railroad tank cars carrying hazardous materials.
5. Developed and tested a simplified reporting system for locomotive inspection for industry and the FRA which will substantially reduce the carriers' reporting burden and the internal processing by the Office of Safety.

6. Development of FRA "Engineman Medical Standards and Certification" and "Alcohol and Drug Regulations."

7. Implementation of a revision to FRA recordkeeping requirements for carriers in relation to hours of service of railroad employees. The revision allows carriers flexibility in meeting the recordkeeping requirements and thus reduces the reporting burden formerly imposed by the prescribed Federal forms.

8. Monitoring of a contract awarded to the National Bureau of Standards to develop and test devices for increasing conspicuousness of locomotives and freight cars at grade crossings.

9. An ongoing project to automate reporting and recording procedures to provide a data base that will facilitate the Office of Safety's analysis, evaluation and management of FRA's safety program.

10. Initial development of a compatible personal injury reporting system between the U.S. Department of Labor's Bureau of Labor Statistics and the FRA requirements relative to compliance with the Occupational Safety and Health Act of 1970.

11. Evaluation of proposals for a Rail Hazardous Material Tank Car Design study and a study to perform analysis of Railroad Car Truck and Wheel Fatigue.

12. Division personnel engaged in the investigation and inspection of railroad operations and facilities relative to complaints received from Congress, labor organizations, municipal and State governments, and the general public. Various special studies relative to railroad operation and accident investigation were initiated.

During FY 1972 accident analysis personnel undertook investigations of 120 train accidents involving 30 fatalities and 764 injuries. In six additional accidents, the National Transportation Safety Board took jurisdiction and preempted the FRA investigation. However, at the request of the Board, FRA personnel performed the field work necessary on five of the accidents for the Board to determine the "Probable Cause" and to prepare a public report on the circumstances involved.

FRA published public reports for 24 train accidents during FY 1972.

Table 35 gives accident investigations for FY 1968 through 1972.

Hazardous Materials—Inspection and Control. The Hazardous Materials Inspectors and the Safety Inspectors assigned throughout the eight regions made 1,223 inspections of the movement of hazardous commodities by railroad. Deficiencies noted consisted primarily of the improper placarding of freight and tank cars, improper location of such cars in trains, and the improper documentation of hazardous shipments at point of origin. In many cases, the inspectors were able to take corrective action with shipper and carrier personnel at the time of inspection to prevent a recurrence.

Complaints and allegations of improper or unsafe handling of dangerous commodities while in transit were cited in 32 letters received during the year. The letters came from other governmental agencies, labor unions, and individual citizens. The complaints were forwarded to the appropriate Regional Directors for investigation, report of findings and corrective action

with the parties involved. Ten of the complaints were found to have sufficient basis for possible prosecution in the courts, and were forwarded to the Chief Counsel for consideration.

During the fiscal year, 279 Pipeline Carrier Accident Reports (FRA Form F-39) were filed with the Administrator, and reviewed in the Office of Safety. The principal causes of the accidents so reported were corrosion of pipe and rupture of pipe by mobile excavating equipment. One accident was declared a "major accident" by the National Transportation Safety Board. Field personnel of FRA provided on-site investigative support to NTSB in determination of cause.

A total of 78 Special Permits, allowing movement of hazardous commodities under conditions not specifically covered by the Hazardous Materials Regulations, were approved for rail transportation.

Violations of Safety Laws. The Office of Chief Counsel of the Federal Railroad Administration negotiated settlements totaling \$825,987 with 81 civil penalty violations of the railroad safety laws, thus greatly reducing the backlog of pending cases. United States District Courts assessed additional penalties of \$24,289.42 for violations of the Hours of Service Act, the Safety Appliance Act, the Accident Reports Act and the Department's Hazardous Materials Regulations. The Federal Claims Collection Act and its implementing regulations provide that suits will be instituted only if the FRA is unable to obtain a reasonable settlement utilizing Claims Collection Act procedures. Since violations of the Accident Reports Act and the Department's Hazardous Materials Regulations are criminal in nature, they are not subject to Claims Collection Act procedures.

On October 20, 1971, the FRA issued a final rule establishing initial Track Safety Standards under the Railroad Safety Act of 1970. During this period the Chief Counsel also assisted in the drafting of Railroad Freight Car Safety Standards under a law which will be proposed during FY 1973. In addition, the office drafted and prepared for Federal Register publication a Notice of Proposed Rulemaking to prescribe power brake inspections and tests for run-through and unit run-through trains. The Notice of Proposed Rulemaking was published in the Federal Register on October 13, 1972, and FRA issued a Final Rule on June 15, 1972.

Chapter IV

ENVIRONMENTAL IMPROVEMENT

INTERMODAL PROGRAMS

Since 1969, at the direction of Secretary Volpe, major responsibilities for Departmental environmental matters have been assigned to the Assistant Secretary for Environment and Urban Systems (TEU). The Assistant Secretary provides guidance and monitors the implementation throughout the Department of the specific environmental responsibilities derived from section 4(f) of the DOT Act, section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969, section 16 of the Airport and Airways Development Act of 1970, section 14 of the Urban Mass Transportation Act, and section 106 of the Historic Preservation Act. This legislation gives the Secretary of Transportation major responsibility for ensuring that environmental factors are considered in planning the Department's program.

During FY 1978, the Department sponsored significant improvements in substance and processing in the implementation of the NEP Act; both Departmental and modal implementation instructions were revised. The Office of Environment and Urban Systems reviewed 1,800 draft Environmental Impact Statements on transportation projects in response to section 102(2)(C) of the NEP Act, and 150 statements from other Federal agencies. Many of these also incorporated statements responding to the provisions of section 4(f) of the DOT Act.

In an environmentally significant transportation action, the Department took a lead role in the search for an environmentally compatible site for a proposed new jetport in South Florida. (A critical balance of wildlife and water resources was at stake and necessitated a study of all alternative locations for the site.) The Miami Jetport will be located north of the existing Miami Airport near the Dade-Browder County line in Dade County.

Using the Environmental Impact Statement process, the Secretary supported significant improvements in many proposed transportation facilities. One example is I-75, crossing Allatoona Lake near Atlanta, Georgia, where Secretary Volpe requested the State of Georgia to consider alternatives to its original proposal, resulting in the selection of a route for the Interstate Highway which will minimize impact on the major recreational and wildlife resources of the Allatoona Lake area. In other cases, it has been necessary to withhold approval of a project altogether, because of its potentially significant adverse impacts. One such project was the Southern Bay Crossing Bridge proposed for San Francisco Bay.

Air Quality. In many urban areas, emissions from motor vehicles produce a large portion of the air pollution. Accordingly, the Department has

given major emphasis to means of reducing noxious vehicle emissions. (The 1970 Clean Air Act required the Environmental Protection Agency to establish national ambient air quality standards. It further required each State to develop an implementation plan which explains how the State plans to achieve the air quality standards.) The Department has assisted EPA in its review of these plans by commenting on those parts of the State Implementation Plans which deal with transportation. The Department has also prepared a preliminary analysis of the relative costs and effectiveness of various transportation alternatives for the reduction of air pollution. The analysis was a joint effort with the Environmental Protection Agency, in which DOT examined the alternatives of improvements in public transit, the highway system, motor vehicle restraints, work schedule changes, and land use controls, while EPA examined vehicle inspection, retrofit and fuel conversion. The Department also sponsored a major study to analyze the social and economic costs of the development of several alternate advanced vehicle propulsion systems, and another study to estimate the comparative air quality benefits of alternative transportation systems in the Washington, D.C. metropolitan area.

RECAT. Staff members of the Department participated in a ground breaking study of the "Cumulative Regulatory Effects on the Costs of Automotive Transportation" (RECAT), sponsored by the President's Office of Science and Technology. It made a careful examination of the costs and benefits to the motoring public of various safety and emission control regulations applicable to the automobile, concluding that safety regulations implemented to date, while adding to the initial cost of the car, have overall benefits in excess of the costs.

Bicycles for Commuting and Recreation. The Departmental program to promote the bicycle as a component of the transportation system initiated two contracts of which the one with the San Francisco Bay Area Rapid Transit System will plan for bicycle access to transit stations and access by transit to recreation areas. The other contract in conjunction with NHTSA and UMTA, provides for developing a manual to aid communities in planning for bicycle traffic. In addition, a booklet, "Bicycling for Recreation and Commuting," was published jointly by the Departments of Transportation and Interior to inform and assist individuals and communities in the promotion of this popular form of transportation. Plans have been formulated in conjunction with the Transportation Systems Center to hold a national symposium on bicycles in May 1973.

National Urban Growth Policy. The Department participated during the past year in the Federal Government's plans to develop a national urban growth policy through an inter-agency task force chaired by HUD. The resulting "Report on National Growth, 1972" was submitted by the task force to the Domestic Council.

Closely related to a national urban growth policy is the work being done by the Department on land use planning with the Council on Environmental Quality, especially on the development of the Administration's new Land Use Bill. A proposed legislative initiative would increase the Depart-

ment's capability to ameliorate adverse impacts of transportation through land use policies and other actions within the impact zone.

American Revolution Bicentennial Commission. The Secretary is represented on the Commission which is charged with the responsibility for planning and coordinating the nation's 200th anniversary celebration, a year-long festival in 1976. Among the many transportation proposals under study by the Department are: improving rail service in a corridor connecting the 13 original colonies, the establishment of a series of Bicentennial Parks in the 50 States, a Bicentennial Freedom Train to tour the country, and development of other regional and State transportation components as part of larger Bicentennial activities. The Department recommended support for Philadelphia's proposal for an international exposition in 1976 which was not adopted by the full Commission.

Historic Preservation. As a member of the Advisory Council on Historic Preservation, the Department reviewed a number of transportation proposals to determine their impact on historic areas. Also, in order to aid in the planning of transportation facilities which will be related to the concerns of interested public and private groups, the Department contracted with the National Trust for Historic Preservation to produce a handbook on Transportation Planning in Historic Areas.

Transportation Noise Abatement. Noise is an unwelcome intruder into citizens' daily lives; in urban areas, transportation facilities account for a large proportion of noise. During the year, elements of the Department participated in developing the noise standards and procedures required by section 136(b) of the 1970 Federal Aid Highway Act, as well as those for control of aircraft noise.

The Department in conducting its noise abatement assignment:

- Developed a program of positive guidance to truck tire manufacturers enabling quieter tread designs to be introduced rapidly. Quieter tires will decrease significantly one of the prime sources of noise on the highway.
- Supported the FHWA in establishing noise level standards for Federal-aid highway projects.
- Published the Third Federal Aircraft Noise Abatement Plan outlining Federal and industry research and development efforts in noise abatement and sonic boom.
- Published a Transportation Noise Bulletin compiled by the Transportation Noise Research and Information Service. This Bulletin provides abstracts of reports and resumes of research projects dealing with transportation noise.
- Initiated an interagency program to measure all community noise in the United States and to relate the measurements to human response. The results will be used to reduce noise and improve statutes and standards for enforcement.
- Developed a program to evaluate costs and effectiveness of aircraft retrofit programs and guide the expenditures of research dollars for this purpose.

TSC personnel furnished technical support to the Federal Highway Administration in developing and promulgating highway noise level standards for compatible land use near Federal-aid highways, and developed and published a "Highway Noise Prediction Manual" for use in connection with those standards.

Results of a 3-month noise survey of Medford, Massachusetts, were published, and these results analyzed extensively to develop optimum schemes for monitoring community noise.

Noise exposure contours were completed for seven international airports, as part of an ICAO cost/effectiveness study to determine the desirability of international retrofit programs for commercial airliners to reduce aircraft engine noise.

Noise levels were measured in a wide variety of locations, including the Florida Everglades, New York City subways, subway cars at the DOT High Speed Test Facility at Pueblo, helicopter flyovers in open terrain and in city-center locations, the Metroliner, Turbotrain, and new Quincy-line subway in Boston, aircraft flyovers near Logan Airport, highway noise characteristics for a variety of topographical situations, and others.

HIGHWAY-RELATED PROGRAMS

Section 136(b) of the 1970 Federal-Aid Highway Act directed the Secretary to prepare guidelines to deal with environmental impacts and a set of standards for noise effects of highway development.

The guidelines, designed to assure that possible adverse economic, social, and environmental effects relating to proposed highway projects are considered and that final decisions on projects are made in the best overall public interest, have been prepared in two parts—Process Guidelines and Guidelines for Consideration of Economic, Social and Environmental Effects.

The Process Guidelines will influence the methods by which Federal-aid highway projects are developed, rather than by attempting detailed control of plans. Under the Process Guidelines, each highway agency is asked to develop an Action Plan to describe the organizational arrangement, the assignment of responsibilities, the procedures to be followed, and the coordination with other agencies in project development.

The Guidelines for Consideration of Economic, Social and Environmental Effects consolidate lists of factors from an existing FHWA Policy and Procedure Memorandum with the similar list in the 1970 act. They provide for consideration of these effects in developing Federal-aid highway projects.

FHWA has continued staff research and analysis of the social, economic, and environmental consequences of highways. The major findings of this examination were discussed in the 1972 National Highway Needs Report to the Congress. Also, staff efforts focused on the transportation needs and problems of specific groups, such as the handicapped, the young, and the elderly. Participation in the White House Conference on the Elderly resulted in a paper analyzing the potential use of taxicabs by the elderly. Other areas of interest, such as the development of effective methods for community participation, are now being investigated.

Highway Noise Problems. Section 136(b) also required that the Secretary develop highway noise level standards. A draft of the noise standards has been developed after consultation with Federal, State, and local officials, and experts in the field of noise abatement and control. The standards establish noise "design levels" for various land uses. These are to be compared with estimated future noise levels expected from new highway projects to determine the need for noise abatement measures and the extent to which such measures can be effective. Application of the noise standards will reduce vehicle-generated noise significantly on many sections of future highways and, in many instances, will reduce the ambient noise level within communities.

The standards point out that a three-part approach is needed to attack the traffic noise problem adequately: (1) Reduce the sound at the source, the motor vehicle; (2) control the use of land in the vicinity of highways; and (3) control noise through the planning and design of highway projects. The standards cover only the last element of the necessary three-part approach. Legislation and action by other Federal agencies and by State and local governments will be needed to achieve comparable controls in the first two categories.

The Texas Highway Department is involved in a study on urban highway traffic noise reduction to evaluate:

- (1) Human tolerance to traffic noise and make recommendations for both maximum noise levels for vehicles and acceptable noise levels for various land uses.

- (2) The problem of highway noise complaints, and set up procedures for estimating the noise levels from existing facilities so that a basis for corrective engineering design can be established.

- (3) Several theoretical methods of estimating the magnitude of noise reduction by barrier walls.

A study of alternative solutions to the urban highway noise problems provides highway engineers with a computerized mathematical model of highway noise generated by vehicles. The model is particularly useful as a research tool because of the many variables it can consider. The study also provides preliminary information describing the relative cost-effectiveness of various highway design alternatives as a means of alleviating the highway noise problem.

Highway Air Pollution. Significant advances were made in the control of two major sources of air pollution occurring during the construction of highway projects—burning debris from clearing operations and drier stack emissions from hot-mix bituminous concrete production.

The practice of burning debris in huge, open piles fed with waste oil or old tires has become unacceptable. Acceptable alternatives include burial, either on or off the project; use of logs and brush to form silt barriers at the toe of fills; and chipping woody debris to produce wood chip mulch. Where burning is determined to be the most feasible solution, the use of forced draft pit-burning under an air curtain is gaining acceptance as a means of controlling smoke and ash discharge.

Dust collectors on aggregate driers in hot-mix bituminous plans have been used for many years. As concern for air quality mounted, improved designs for collectors appeared and many plants are now equipped with sophisticated and expensive systems. However, one of the most promising developments is the mixing of the bitumen with the aggregate *in the drier* as the aggregate is being heated and dried to assure that practically no dust is discharged to the atmosphere. FHWA is working with several highway departments in trial uses of this technique in order to perfect it.

Soil Erosion. The Federal Highway Administration continued the efforts to minimize soil erosion during construction of Federal-aid highway projects. A 35 mm. slide presentation with a taped narration has been prepared to show erosion and sedimentation control techniques being used in all parts of the country. In addition, several field offices have assembled similar presentations based on conditions unique to their areas. The Highway Administration (FHWA) is gathering all data on erosion and sediment control measures which may prove successful for use in highway construction projects.

Water Pollution Control. A report, "Recharged Basins for Disposal of Highway Storm Drainage," prepared under a New York State highway planning and research study, was distributed to all regional and division offices. The report presents a complete design method for using recharge basins where soil conditions permit, thus providing not only disposal of storm water runoff, but replenishment of ground water supply. The method can be useful in water resources planning and management.

Waste Materials. Research in the use of waste products in highway construction resulted in the development of a new paving material consisting primarily of waste sulfates from the chemical industry, fly ash from electric power plants, and hydrated lime. This new material was demonstrated in a parking area constructed for TRANSPO '72. Plans for evaluating the usefulness of a product derived from incinerator residues as a synthetic aggregate (stone) are well advanced, and construction of a pilot plant is contemplated for FY 1973.

Environmental Impact Statistics. The National Environmental Policy Act of 1969 directs each Federal agency to prepare a detailed statement of the environmental impact of any proposed major action. Between January 1, 1971, and March 31, 1972, FHWA received 1,356 draft environmental statements on proposed highway sections. Of these, 184 included submissions required by section 4(f) of the DOT Act as amended, which protects park, recreation and refuge lands, and historic sites. During the same period, 557 final environmental statements were filed with the Council on Environmental Quality.

In the past year, 37 new right-of-way and environmental lawsuits were filed in connection with FHWA programs or projects, making a total of approximately 65 active cases. Most of these concerned the application of environmental requirements, such as 23 U.S.C. 138 (popularly known as section 4(f) and section 102 of the National Environmental Policy Act of 1969 to Federally assisted highway projects. Generally, these cases have

served to define the applicability of environmental and other requirements to projects that were begun before the requirements were imposed.

FHWA also developed guidelines and procedures to provide for functional replacement of publicly owned park lands and facilities when such lands are needed adequately to complete a highway facility and the functional replacement is in the overall public interest. These guidelines require that a statement be submitted with the section 4(f) environmental impact statement supporting the need for such replacement.

An environmental design course was held in November 1971 to increase knowledge and understanding in four highway environment areas—noise, esthetics, ecology, and air quality. Additional workshops were held in regional offices to inform FHWA field personnel and State highway departments about methods of preparing and coordinating environmental and section 4(f) statements.

Highway Beautification and Scenic Enhancement. Since the passage of the Federal-Aid Highway Act of 1970, outstanding progress has been made in obtaining State compliance with the outdoor advertising control provisions of the Highway Beautification Act of 1965. There were 15 administrative hearings held during this fiscal year. In each case the Secretary determined that the State had not fully complied and that additional legislation was necessary to enable it to implement the beautification program. As of May 6, 1972, all States except South Dakota had complied. As of June 30, approximately \$16.3 million had been obligated by the States for outdoor advertising control. Cost schedules were also developed to expedite payment for nonconforming signs and sites.

The act also requires the States to pass legislation for junkyard control. As of May 6, 1972, all States except Arizona and Wisconsin had complied.

Relocation Assistance. FHWA pressed throughout the year for State compliance with Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. In accordance with the provisions of the Act, as of July 1, 1972, all States had obtained effective legislative compliance so that no Federal funds will be held up. During calendar year 1971, a total of 52,343 persons, 627 farms, 2,768 businesses, and 113 nonprofit organizations were displaced. The grand total of all relocation payments for the year was \$43,742,970. The national summary of payments and the State-by-State payments are shown in Table 20.

MARINE PROGRAMS AND WATER POLLUTION

The Coast Guard assisted in the preparation, evaluation and modification of pollution prevention regulations and has reviewed equipment to be used for the treatment of shipboard wastes. In addition, it attended and provided technical assistance for meetings at the national and international levels dealing with pollution prevention. Some developments are:

a. *National Strike Force.* The Strike Force teams of the east and west coast were staffed and equipped for responses to oil spills in accordance with the National Contingency Plan.

b. *Aircraft Sensor Systems.* Systems have been purchased for seven aircraft and six aircraft equipped with sensors will be used for regular sur-

veillance patrols beginning in November. An advanced sensor system has been purchased for evaluation and optimization for all-weather surveillance.

c. *Air Deliverable Anti-Pollution Transfer System (ADAPTS)*. This system was completed and tested and procurement contracts for operational systems were initiated.

d. *High Seas Oil Containment Barrier*. A prototype barrier was designed, built, and tested satisfactorily.

e. *National Response Center*. The National Response Center at DOT Headquarters has been equipped to coordinate responses to oil spills on a limited basis.

f. *Arctic Oil Spills*. A research program on Arctic oil spills was initiated to provide an interim response capability in the Arctic.

g. *Pollution Fund*. This revolving fund, which is available for cleanup of pollution due to oil or other hazardous substances on the navigable waters of the United States, was used to clean up about 80 spills. \$281,739 was expended from the fund; \$273,109 in fines and penalties were deposited in the fund.

h. *Pollution Incident Report Systems (PIRS)*. This system to assemble data on oil spills on the navigable waters of the U.S. was initiated at DOT Headquarters. Information on approximately 10,000 spills were included in the system.

i. *Chemical Hazards Reporting Information System (CHRIS)*. Efforts continued to develop a system to assemble information about properties of chemicals to be available for those whose duty involved cleaning up spills or taking other action with respect to the chemicals.

j. *Transportation Induced Pollutants (TIPS)*. Efforts to assemble and analyze data on the environmental effects of transportation continued in 1972. Studies of coastal and oceanic pollution were made by the Offices of Operations and Research and Development.

k. *National Contingency Plan*. The procedures under the National Contingency Plan published pursuant to section 11, FWPCA, were carefully reviewed and evaluated by the agencies involved in response activities. The National Response Team reviewed recommendations from the various agencies and drafted a comprehensive revision to the plan. This revision was published in August 1971.

l. *Preventive Regulations*. The Coast Guard has conducted an extensive review of regulations concerned with oil pollution from vessels and marine terminals. Comprehensive regulations, drafted with the assistance of the affected industries, were considered at a public hearing in February 1972. The regulations will be promulgated under the authority of the Federal Water Pollution Control Act.

m. *In-House Abatement*. Coast Guard activity to comply with the requirements of Executive Order 11507, the Federal Water Pollution Control Act, and the Air Pollution Control Act continued. Abatement equipment was installed on 48 vessels at a cost of \$3.2 million and in 170 shore facilities at a cost of \$2.6 million.

n. *Training*. The new, specialized demands of pollution control activity highlighted the need for trained, qualified personnel. In response to this

requirement, a 2-week Environmental Protection Course was developed for Coast Guard officers and enlisted personnel involved in pollution control activities. The course was initiated in February and approximately 100 personnel completed the course during FY 1972.

AVIATION AND ENVIRONMENTAL QUALITY

"We are . . . determined to prove wrong the contention . . . that the airplane is hopelessly at odds with our environment," FAA Administrator John H. Shaffer declared at an airport dedication ceremony late in the fiscal year. This determination, on the part of both the Government and the aviation industry, had manifested itself during this reporting period on a number of fronts—the certification of quieter aircraft, the retrofitting of JT8D engines with smoke-reducing combustors, and the continuation of a program looking to the retrofitting of existing jet aircraft with devices to suppress engine noise.

The enactment of Public Law 90-411 in July 1968, vesting in the FAA Administrator the authority to prescribe rules and regulations for the control and abatement of aircraft engine noise and the adoption of an FAA rule (FAR 36) in December 1969 establishing noise-level limitations as part of the criteria for aircraft type-certification paved the way for the eventual substantial reduction of annoying aircraft-engine noise in and around airports.

Both the jumbo jets certificated last year—the McDonnell-Douglas DC-10 and the Lockheed L-1011—have certificated noise levels that are appreciably below Federal requirements established by FAR 36 for aircraft of their size. During this reporting period, the Boeing 747-200 also met the standards specified in FAR 36. (Because application for its type certification was submitted before January 1, 1967, the earlier 747-100 is not required to conform to the engine-noise standard.) Among business jets certificated, the Cessna Citation was found to have noise levels significantly below the minimum Federal standards; this aircraft now stands out as the quietest of its kind.

In another development, FAA awarded two contracts to study the feasibility of retrofitting jet engines with noise-suppression devices. One contract concerns itself exclusively with the JT8D engine, the other with the JT3D. The contractors will consider the effectiveness of the acoustic devices as noise suppressors; they will also consider the impact these devices will have on airworthiness safety standards and aircraft economics. Both contracts call for the fabrication, ground testing, and economic analysis of engine-nacelle design configurations capable of meeting certification standards when installed on the Boeing 707 and 727 airplanes.

In conjunction with its policy of keeping aircraft as high as flight safety permits and engine noise as low as possible in the terminal areas, FAA raised the approach-to-landing glideslopes for all new installations of instrument landing systems to a uniform standard of 3 degrees. The agency also continued to conduct programs seeking to determine optimum operational flight techniques and procedures during approach and departure. Modified procedures that showed promise of noise reduction during controlled tests

were evaluated during live day-to-day operations. This kind of "on-line" evaluation is essential to insure that these procedures are safe, practical, and compatible with the air traffic control system in high density terminal areas. The programs have been coordinated with other Government agencies and the industry at large and have had the support and cooperation of many air carriers.

U.S. air carriers continued their voluntary program to retrofit JT8D engines on 727's, and DC-9's with smoke-reducing combustors. At year's end, this program was 83 percent complete.

The impact of high-flying aircraft on the climate was also of concern to the Department during the reporting period. In late 1971, Congress created the climatic impact passenger program to assess what climate changes might result (by 1990) from the world's high-altitude aircraft fleet releasing propulsion effluents into the upper atmosphere. Nearly \$7 million was appropriated for the study, which will run through calendar 1974. During the reporting period, DOT engaged the services of more than 56 laboratories to carry out particular tasks. In addition, the support and collaboration of scientists in the United Kingdom, France, Belgium, India, Australia, Canada, and Japan were enlisted.

Fiscal 1972 accomplishments included:

- Developing a laboratory prototype instrument for measuring atmospheric nitric oxide concentrations.
- Correlating particular measurements as determined by in-site observation and ground-based LIDAR (light detection and ranging).
- Using balloon observation to measure particulates, water vapor, and ozone from pole to pole.
- Measuring emissions from SST-type engines under simulated cruise conditions.
- Observing water vapor, particulates, and ozone injected into the stratosphere by thunderstorms.

Chapter V

PLANNING AND FORMULATION OF NATIONAL TRANSPORTATION POLICY

INTERMODAL PLANNING

The Office of the Assistant Secretary for Policy and International Affairs is a staff arm for the Secretary in determining the Department's policy directions, and for the conduct and coordination of research supportive of policy initiatives by other DOT components. There emerged during FY 1972 a strong awareness of the need for thoughtful planning and contemplation of the Department's long-range objectives, and an examination of its means for identifying and attaining those goals. The Assistant Secretary for Policy and International Affairs also established a new inter-modal policy planning center. This is intended as a major step toward the integration of all DOT planning, and particularly for the development of long-range policy planning.

Progress in Intermodal Planning. Several significant planning actions took place in FY 1972 to further the Department's goals of intermodal and comprehensive transportation planning:

(1) Recognizing that each of the three DOT planning programs has direct impact upon urban transportation development and that all programs require close and effective coordination, Secretary Volpe, in August 1971, implemented a Trial Program of Intermodal Planning in the Field. The objective of this program is to facilitate the delivery of services and to integrate the modal planning programs at the urban level. Specific goals of the Trial Program are: recognition of a single recipient agency in each city for transportation planning grants; preparation of a single unified transportation planning work program in each city; development of short-term transportation capital improvements; and joint funding of comprehensive program by the cooperating DOT operating administrations and other Federal agencies. >

During FY 1972, significant accomplishments in implementing the goals of this program have been: (a) Many metropolitan areas have identified single recipient agencies for planning funds; (b) 36 urban areas, including the 25 largest metropolitan areas, have prepared and will submit unified work programs for FY 1973 funding and implementation; and (c) there are numerous metropolitan areas already performing transportation systems planning under a unified work program which is jointly funded by two or more transportation planning programs.

Plans are currently under development to continue this program in FY 1973 as a more permanent program, but with largely the same goals for intermodal planning.

(2) In November 1971, Secretary Volpe, realizing the need for a policy group at headquarters to resolve conflicts and policy issues inhibiting the true unification of transportation planning at the local level, established the Departmental Transportation Planning Committee (DTPC). The DTPC has thus far addressed itself to policies related to unified transportation planning work programs, uniform planning criteria and certification of the urban transportation planning process. The DTPC will continue as the headquarters focal point for intermodal planning policy.

(3) The Office of Transportation Planning Assistance was formed in January as a constituent unit of the Office of the Assistant Secretary for Environment and Urban Systems in a reorganization of that Office, to assure that a unified and effective approach is followed in applying for, carrying out, and meeting requirements for intermodal planning through programs. During FY 1972, the three programs were totally funded at about \$110 million. This Office has also served as the principal DOT liaison with State, metropolitan area and local planning officials and with other Federal agencies in fostering and assisting in the integration of transportation planning with land use, social, environmental and economic planning.

(4) Increased cooperation between DOT and the Department of Housing and Urban Development (DHUD) was realized during the last year and continues in the following areas: (a) In developing standards and procedures for consistent and effective certification of metropolitan areas; (b) in clarifying each Department's roles in urban transportation; (c) in sponsoring jointly developed research studies.

The Urban Transportation Advisory Council. As a part of its role in assisting the Secretary in the development of a national urban transportation policy, the council is working through three of its subcommittees to effect: (a) Improvements in the transportation system for elderly and the handicapped, (b) low-capital methods of improving the capacity of existing transportation facilities, and (c) a consolidated multi-modal transportation system planning grant program to ensure that alternative modal systems are considered in areawide goals. The council's recommendations, developed from the subcommittees' findings will be incorporated into reports to the Secretary and the Department.

Transportation Energy Panel. During the latter half of FY 1972, in response to a request from the President's Office of Science and Technology (OST), the Department established an interagency panel to identify potentially significant technologies that would reduce the relative energy requirements of the transportation sector. The panel was sponsored by the Assistant Secretary for Systems Development and Technology and has participation from DOD, EPA, NASA, OST, and the operating administrations of the DOT, and was chaired by a member of the Transportation System Center. The prospect of a three-fold increase in petroleum imports with its attendant adverse implications for the U.S. trade balance is the most significant single factor likely to affect the usage of petroleum by the transportation sector.

The 1972 National Transportation Report. In FY 1972 the Department completed its first National Transportation Report—a major milestone in national transportation planning. It discusses all modes of transportation

and projects 20 years into the future. All 50 States and the private sector of transportation activity participated with the Department to provide the most comprehensive report to date of the National Transportation System and alternatives planned by Federal, State and local governments for improving the system.

The report provides the Administration and the Congress with previously unavailable information needed for purposes of policy development and the planning of future Federal expenditure programs in transportation. The National Transportation Study which led to this report was supported by an extensive survey of transportation capital investment needs and program priorities as developed by the States, working in cooperation with metropolitan planning groups and local governments.

One of the principal findings of the report is the need for increased flexibility in Federal-aid programs. For example, State and local elected officials should be allowed to use funds previously earmarked only for highways on defined Federal-aid systems to support public transportation capital investments or, in rural areas, for highways not on the Federal-aid system and other forms of surface transportation.

The Department plans to continue the cooperative arrangements through which the report was completed because the process enabled State governments, many for the first time, to develop coordinated intermodal transportation plans and was therefore valuable both to the States and to the Department. Each State Governor cooperated by providing estimates of investment needs and priorities within his State, as developed by State planning agencies, transportation departments, highway departments, aviation commissions, transit authorities, metropolitan planning groups and local government officials. In addition, the major industry associations related to transportation were consulted by DOT and provided estimates of future capital investments.

The comprehensive report contains the first full description of the existing transportation system and its place in the national economy, projections of the future demand for transportation services, and a delineation of current and emerging problems. Another section describes the transportation needs and capital improvement programs as seen and reported by the States and investment needs reported by private industry. A third section presents the analysis of selected key issues in urban and intercity transportation prepared by the Department staff. There is a final section devoted to "Guidelines for Future Action" in which the implications of the investment surveys, programs and analysis are developed for which actions can be taken by Federal, State or local governments.

Highlights. Some of the highlights of the survey of State and local government transportation needs and programs are:

- If the investment "needs" were actually implemented during the period up to 1990, public investment in transportation as a percentage of GNP would double.
- The largest portion by far of the stated needs and capital improvement programs was for highways (some 85 percent of needs and 79 percent

of programs)—reflecting the automobile orientation of American society.

- The States and urban areas identified \$63 billion in public transit needs (about 70 percent of this in the rail mode) up to 1990, an estimate much larger than previous estimates.
- The States were asked to outline their programs under several alternative assumptions, one assuming that Federal programs would continue essentially unchanged, and another assuming that funding amounts would continue but that the State and local governments could allocate the funds to meet their own transportation priorities. Individual States and urban areas were found to make some significant shifts of funding in comparing the two assumptions. Public transit funding increased by 12% under the flexible program and some individual urban areas such as New York and San Francisco increased transit funding by large amounts—up to \$2 billion in New York. An even larger percentage increase in public expenditures in intercity transportation terminals was reported. With these exceptions the nationwide expenditures were reported not to change much despite the significant changes proposed by individual States and areas.

GUIDELINES FOR ACTION. Some of the highlights in the Report's conclusions and guidelines for action are:

- A number of actions can be taken to make more efficient use of *existing* systems without additional large capital investments, such as:
 1. Instituting preferential treatment of high occupancy vehicles, car pooling, traffic engineering and operational techniques, improved transit service, and changing certain local regulatory practices which adversely affect the efficiency of public transit.
 2. Making more efficient use of existing airport capacity, including spreading out takeoff and landing "peaks" and the use of "reliever" airports, instead of high density commercial airports, for planes carrying smaller numbers of people.
- While priority should be given to the densely populated Northeast Corridor, there are other areas of the country where higher-speed rail passenger service or short-haul air transportation systems using other than the major high-density airports may be warranted after further study of detailed questions for individual areas.
- In the private sector of transportation, the report underscores the importance of the railroad system in the movement of intercity freight and analyzes benefits to be gained by consolidating rail lines and thereby providing more efficient service. The Transportation Assistance Act and the Regulatory Modernization Act already proposed by the Department would enable the railroads, and other modes, to make the changes needed to compete more effectively.
- Adequate transportation for handicapped and disadvantaged citizens should get special attention.
- A large number of States expressed concern about the decline of public transportation service in rural areas. The Department is giving the problem further study and attention.

- The report recommends that planning for transportation at all levels of government should give consideration to all modes within the same process and that the State and local transportation planning be used as inputs to Federal policy planning through the periodic reporting system of which the 1972 Report is the first part.

The report contains additional conclusions regarding urban and intercity transportation systems and includes in its thousand pages a detailed description of the supporting analysis and data. An appendix to the report contains a description of each of the State inputs to the national study.

The 1974 National Transportation Study. This second in the series of National Transportation Studies was formally initiated during FY '72. The emphasis in the second study is on the *performance* of the National Transportation System and local transportation systems throughout the country. In effect, the Department will obtain information regarding the physical and operating characteristics of the present system by State and urban area, including the service which the transportation system offers to its users. In addition, information will be obtained on proposed transportation systems, their performance, and total costs. This information and other data will be analyzed to determine, among other things, the effects of alternative expenditure patterns on the level of transportation service in the future as compared to the present.

The 1974 study, like the 1972 version, is being conducted through the Governor's office of each State and will involve State and local planning officials as well as political officials. Also as in the 1972 study, the transportation industry, both shippers and carriers, will be asked to provide certain information regarding their long range plans. The 1974 study will rely in part on the new field resources of the Department, including the Regional Representatives of the Secretary and the Intermodal Planning Groups of each region.

Congress appropriated \$2.5 million for use in the conduct of this study in FY 1972. The Department has requested an additional \$2.5 million appropriation in FY 1973. These funds are distributed to the States for their use in developing information describing their plans and programs and in reporting the results to the Department of Transportation. The results of the 1972 study are also being returned to the States for their use in helping to prepare the 1974 information.

During FY 1972 the States were provided with the General Instruction Manual and guidelines for preparing long range plans and shorter range transportation programs. They have since that time been engaged in preparing work programs for the rest of the study and have established organizations for the planning effort that include representatives of the principal State planning agencies, and of metropolitan planning agencies and officials of local government. The reports of the States and private industry will be incorporated with the Department's analysis to produce the 1974 National Transportation Report.

Participation in Regulatory Cases. As in previous years, the Department participated in a number of cases before the transportation regulatory

agencies—the Interstate Commerce Commission (ICC), the Civil Aeronautics Board (CAB), and the Federal Maritime Commission (FMC). This participation was limited to cases of major policy significance affecting broad spectrums of the transportation industry, shippers, and the interests of consumers. These appearances are one way in which the Department can publicize and implement national transportation policy. Generally, the Department appeared in cases involving the economic efficiency of the carriers, the impacts of costs and pricing policies on the economy served by transportation, and new departures in regulation which affect producers and consumers.

During 1972, the Department was active in carrier organization matters before the CAB. Guided by the Executive Branch Criteria for Domestic Airline Merger Proposals developed in consultation with the Department of Justice, the Department participated in merger cases involving American and Western Airlines, Northwest and National Airlines, Mohawk and Alleghany Airlines, and Delta and Northeast Airlines. The Department also participated actively in cases involving railroads in reorganization, cooperating with the Department of Justice and other agencies in these proceedings.

In the cost, rate, and fare area, FY 1972 was a most active year. The Department's extensive effort in the Domestic Passenger Fare Investigation bore fruit in several favorable decisions adopting various proposals establishing an economic basis for airline pricing. A position was taken before the CAB that youth fares should be compensatory and nondiscriminatory. Work also proceeded on two important cases before the ICC—Ex Parte 270, a general investigation of the railroad freight rate structure, and Ex Parte 271, a study of criteria to assess revenue needs in the railroad industry. Early in the fiscal year, the Commission issued new regulations on criteria governing motor carrier revenue needs, following closely the position of the Department in Ex Parte MC-82. The Department has also become involved in a case of great significance for the future of regulation, Docket 34013, a proceeding to establish new bases for cost determination in the surface transportation industry.

The Department has continued to maintain an interest in the improvement of consumer protection in the movement of household goods, and the ICC has issued revised regulations for the protection of the public. In another proceeding, the Commission has adopted far reaching rules governing the determination of freight loss and damage and the payment of claims. A similar proceeding is underway in the CAB.

The Department has appeared before the FMC in the North Atlantic Pool, FMC Agreement No. 10,000 filed by the container steamship operators in the North Atlantic Trades. The decision of the FMC in this proceeding will set an important precedent in the area of industrial self-regulation by member lines participating in container trades.

Many of the Department's policies have been adopted or considered favorably in these proceedings.

1972 NATIONAL HIGHWAY NEEDS REPORT

Early in FY 1972, the Department completed the third in a series of biennial reports on the future highway needs of the nation. Based primarily

on information supplied by the 50 States, the District of Columbia, and Puerto Rico, this report is the most comprehensive of the series yet prepared. The report provides the current status of all highways, roads, and streets and anticipated needs to serve projected travel demands through 1990. In addition to the future highway needs, the report includes the findings of special studies considering the effects of highway improvements on the national economy, land use, social and environmental impacts.

These studies and a number of other correlative studies of highway finance and taxation were used to: (1) Evaluate alternative highway investment programs, (2) weigh the effects of alternative growth policies on highway transportation, and (3) formulate alternative programs for achieving national transportation goals.

1972 URBAN HIGHWAY PUBLIC TRANSPORTATION FACILITY REPORT

During FY 1972, the study, "An Analysis of Urban Highway Public Transportation Facility Needs," was completed. The work was undertaken in an "open forum" procedure where biweekly meetings were held with all interested agencies and the consultants during the entire course of the contracts. These groups included FHWA, UMTA, other DOT headquarters offices, and the American Transit Association. The American Association of State Highway Officials was also invited to participate and a representative of the Office of Management and Budget attended many of the meetings. The completed report was transmitted to Congress in April 1972.

The transit study indicated that during the next 20 years there would be approximately \$6 billion in highway-related public transportation needs in urban areas of over 50,000 population. This figure reflects the assumption that planned new rail systems in seven cities (Atlanta, Baltimore, Buffalo, Los Angeles, Miami, Minneapolis, and Pittsburgh) would be constructed. Approximately 60 percent of the total estimated costs were for busway-type facilities, with 30 percent for fringe parking and terminal facilities, and 10 percent for operational or traffic engineering needs. Bus vehicle needs were not included in this estimate. Both the Highway Needs Report and the Urban Highway Public Transportation Facility Needs Report were prepared as detailed studies in conjunction with the National Transportation Report.

AVIATION POLICY

National Aviation System Planning Review Conference. This conference, the fourth in a continuing annual series, was held during May 1972 in Washington, D.C. Built on the theme "Partnership—Key to Progress," the conference stressed the interdependence of the various segments of the aviation community, and the need to develop strong working relationships between them. Specific topics discussed during the session included: (1) The growth and development of general aviation, (2) present and future air traffic control systems, (3) environmental policy and programs, (4) the U.S. role in international aviation, (5) short-haul air transportation, and (6) airport planning and development. Proposals made at the conference by some of the more than 1,000 attendees are part of the input going into FAA planning, from which will emerge the annual 10-year National Avia-

tion System Plan, a document providing long-range planning guidance for the agency and the aviation community.

National Aviation System Ten-Year Plan and Policy Summary, 1973-1982. The orderly development of an adequate national aviation system is essential to meet the demands of the rapidly growing U.S. aviation industry. The 1972 editions of the Policy Summary and Ten-Year Plan, published in March 1972, are FAA's official long-range plans for that development. They are the products of a consultative partnership between FAA and the aviation community, whose comments and suggestions constitute a vital contribution to the planning. The 1972 plan calls for, among other things: (1) Completing the semi-automation of en route and radar-equipped terminal air traffic control facilities; (2) introducing a microwave landing system; (3) investigating the feasibility of satellite technology for air traffic control; (4) planning for the development of landing and other facilities for V/STOL aircraft; (5) providing assistance for airport planning, construction, and improvement; (6) achieving maximum compatibility between aviation operations and the needs and interests of the general community.

URBAN TRANSPORTATION POLICY

In FY 1972, the Secretary further strengthened the urban role of the Department when he reorganized the Office of the Assistant Secretary for Environment and Urban Systems (TEU) in January and established the Office of Urban Transportation Systems as a constituent unit of TEU. The role of that office is to recommend, develop, and evaluate urban transportation policies. Some examples of the office's activities during the year are as follows:

Highway Transit Bill. The office participated in formulating Single Urban Fund provisions of the Administration's proposed Federal-Aid Highway and Mass Transportation Act of 1972. Also, the office helped to develop the provisions encouraging the establishment of metropolitan consortia to plan and program surface transportation facilities in urban areas.

Urban Goods Movements. The office has begun to develop policy recommendations concerning the movement of goods in urban areas, the improvement of the modal planning processes to take account of goods movements, and the support of research to improve understanding of goods movement.

New Towns. The office has begun to acquire a better understanding of the interrelationships between transportation and new communities. In particular, the Department may be able to utilize its transportation programs and funds to support HUD's new towns program and policy.

Transit Capital Grant Criteria. The office has assisted the Urban Mass Transportation Administration in developing goals and criteria for the capital grant program administered by UMTA.

National Transportation Study. The office served the primary liaison between the Department of Transportation and metropolitan and local agencies engaged in providing inputs to the study.

External Costs. The office has developed an approach to examining the external costs, such as promotion, noise, and congestion of alternative modes of transportation.

COAST GUARD POLICY PLANNING

The Coast Guard conducted a number of policy analyses in 1972 in support of its overall strategic planning. The tone for these efforts was set by the *Long Range View*, a document which communicates to managers a system of major objectives and policies, thus providing a forward look at what kind of organization the Coast Guard will be during the next decade and beyond. In addition, the *Long Range View* contains projections of the Coast Guard's operating environment for the next 10 years. The synthesis of major objectives, policies, and projections into a single framework provides Coast Guard management with a common basis for planning. The result has been a more clearly defined set of policies which improve responsiveness to the marine community.

The traditional role of providing search and rescue (SAR) services to the marine community was analyzed in-depth. As a result, the SAR Criteria and Force Analysis provides management with decisionmaking tools through simulation techniques and a forecast of marine activities through 1980. Significant improvements have been made in the allocation of resources to the SAR mission, made possible by the application of the tools developed in the analysis.

An extensive study of the Ocean Station Program has provided the basis for major policy decision with regard to this multinational activity. The information developed in the study provided an important input to the U.S. position at the North Atlantic Ocean Station (NAOS) Conference, held in the Spring of 1972, where the need for services to transoceanic air and ship traffic was thorough analyzed. As a result, a major reorientation of the Ocean Station Program may take place at the next NAOS Conference in 1974.

Recent technological advances in the design of ships caused the Coast Guard to conduct an evaluation of the manpower and skills required to operate and maintain modern, technologically advanced cargo vessels. One of the results of the analysis showed a mismatch between skills available in ships crews and the functional requirements of modern cargo vessels. Guidelines were developed which can lead to major improvements in the required personnel manning levels and hardware maintenance programs for cargo ships.

Timely weather information for the recreational boater is important since smaller boats are extremely vulnerable to sudden and violent changes in weather conditions. In order to provide a basis for policy recommendations, the Coast Guard examined existing and projected systems for disseminating weather and other environmental information to marine users. Subsequently, a program of regularly scheduled marine weather broadcasts through commercial stations was initiated. Also, efforts have increased to educate the boating public regarding nature and availability of marine weather data.

The first stage of the reform was the reform of the rural system. This was done by the introduction of the household responsibility system. This system allowed farmers to lease land from the collective and to keep the surplus after paying a fixed amount to the collective. This system was introduced in 1978 and it was a great success. It led to a rapid increase in agricultural production and it was a major step towards the reform of the rural system.

The second stage of the reform was the reform of the urban system. This was done by the introduction of the reform of the urban system. This reform was introduced in 1978 and it was a great success. It led to a rapid increase in urban production and it was a major step towards the reform of the urban system.

The third stage of the reform was the reform of the foreign trade system. This was done by the introduction of the reform of the foreign trade system. This reform was introduced in 1978 and it was a great success. It led to a rapid increase in foreign trade and it was a major step towards the reform of the foreign trade system.

The fourth stage of the reform was the reform of the financial system. This was done by the introduction of the reform of the financial system. This reform was introduced in 1978 and it was a great success. It led to a rapid increase in financial production and it was a major step towards the reform of the financial system.

The fifth stage of the reform was the reform of the legal system. This was done by the introduction of the reform of the legal system. This reform was introduced in 1978 and it was a great success. It led to a rapid increase in legal production and it was a major step towards the reform of the legal system.

The sixth stage of the reform was the reform of the education system. This was done by the introduction of the reform of the education system. This reform was introduced in 1978 and it was a great success. It led to a rapid increase in education production and it was a major step towards the reform of the education system.

Chapter VI

EFFORTS TO IMPROVE SOCIAL CONDITIONS

DEPARTMENT-WIDE EFFORTS

Secretary Volpe's special concern for the status of minorities, of women, of transportation-deprived segments of the population, of the aged and handicapped, and his efforts to improve the lot of the less privileged members of society achieved some notable successes during the year. He was able not only to assure that in the Department positive efforts were made to improve these social conditions, but also to use the weight and influence of the Department to further that objective throughout the country.

The number of minority employees in the Department continued to increase during the year. Although total civilian and military employment between May 1971 and May 1972 decreased by 386 from 104,270 to 103,884, minority employment, civilian and military, increased by 537 from 9,448 (or 9.1 percent of total employment) to 9,985 (or 9.6 percent of total employment). Minority civilian employment increased by 309, from 6,063 to 6,372. The numbers of minorities in the military increased by 187, from 3,426 to 3,613. In addition, the number of minorities holding supergrade level jobs (GS-16 and above) went from 19 in May 1971 to 21 in May 1972. Included in the supergrade group was the Departmental Director of Civil Rights who speaks and acts for the Secretary in all matters affecting civil rights. The number of minorities in the next lower group, GS-14 and 15, increased from 157 in 1971 to 215 in 1972.

These changes reflect the affirmative action taken by the various operating elements in accordance with the Departmental Action Plan issued at the beginning of the fiscal year. The department-wide plan serves as a model for plans developed by the individual operating elements.

Employment Statistics. In addition to the Action Plan, the Goals and Timetables Program initiated in FY 1971 was continued during FY 1972. That program requires that each operating unit and its subordinate components set goals for the recruitment, training and promotion of minority and female employees during each half of the fiscal year. The program's effectiveness is shown by the following figures: In FY 1972 minorities constituted 22.5 percent of the civilian new hires as compared with 18.6 percent in FY 1971; minorities received 13.0 percent of the promotions during FY 1972 as compared to 9.7 percent in FY 1971.

The Department continued to focus on improving the status of its female employees. As part of the Federal Women's Program, noon meetings were held monthly to which all interested employees were invited to hear speakers on topics of interest to female Federal employees. These meetings were

sponsored by the DOT and Operating Administration Coordinators of the Federal Women's Program. As of May 1972, females represented 16.2 percent of the Department's Classification Act employees.

Other highlight items which reflect activities in the civil rights area would include the action taken by Secretary Volpe in August 1971; during that month, the Secretary wrote to the Governor of each State encouraging support for his program to increase the utilization of minority persons in relocation management. The Secretary became concerned about the lack of minority involvement in the relocation program when he learned that only 60 of 1,114 State relocation employees were members of minorities. As a result of this effort, minority employment in relocation positions with State agencies dealing with the highway program increased from 5.3 percent to almost 8 percent at the close of FY 1972. Even more significant is the increase of minority employment to 46 percent among subcontractors who perform relocation services for the various States.

Allegations of Discrimination. Complaints of discrimination were generated from among the 103,884 military and civilian members of the DOT work force, from persons outside the Department who are directly or indirectly affected by DOT programs such as highway construction, aid to airports, mass transportation assistance and similar grant programs, and from employees of those businesses and industries in the private sector for which DOT has compliance responsibility.

During FY 1972, DOT received a total of 139 complaints of discrimination, 74 of which were filed by employees within the Department and 65 filed against DOT by grant-in-aid recipients and contractors for whom DOT has compliance responsibility. Sixty-two of the total of 139 were investigated during the fiscal year and eight hearings were requested by complainants. Eleven of the complaints received alleged discrimination based on sex, two on religion, and fifteen on national origin. The remainder of 111 complaints contained allegations of discrimination based on race.

Transportation for Transportation-Deprived Citizens. Today while the mobility of the many who own and drive automobiles is increasing, the mobility of other large segments of the population is becoming increasingly constricted. The Department of Transportation recognizes this problem and, under the direction of the Assistant Secretary for Environment and Urban Systems, is seeking ways to improve transportation opportunities for the elderly, the young, the handicapped and the poor—groups which have been described as the “transportation disadvantaged.”

The Department has continued research on travel barriers to the elderly and the handicapped by sponsoring a study of the Washington, D.C. transportation system. The report recommends ways to improve access to the District area's transportation system by these people.

Relocation. Recognizing that social environmental effects are often major factors in a redevelopment project's total impact, the Department has taken an active interest in area relocation of households and businesses displaced by transportation projects. Part of this effort has been to develop guidelines on the kinds of consideration and analysis the subject of relocation should receive in the transportation project development, and its documentation

in the Environmental Impact Statement. (See Table 17 for relocation statistics.)

Highlights of Civil Rights Action.

- An entire Secretarial staff meeting was devoted to civil rights—assessing the progress that had been made, and the problems that exist. Those in attendance included the Secretary, the Under Secretary, the Administrators of the operating administrations and the other top executives of the Department.
- A series of meetings were held with representatives of the operating administrations on plans of action, statistical data and organization.
- Statistical data on minority employment was compiled and published.
- Department personnel attended seven conventions sponsored by predominantly minority organizations, including the G. I. Forum, League for United Latin American Citizens, the National Urban League and the NAACP. Attendance at these conventions, including a departmental exhibit, was coordinated with the Office of Public Affairs and the operating administrations.
- Under the auspices of the Department, 1,000 Washington inner city school children were able to witness and enjoy a spectacular event when they were taken by bus to spend a day at TRANSPO '72.

Transportation Systems Center.

EQUAL OPPORTUNITY AND CIVIL RIGHTS DEVELOPMENT. As of the end of FY 1972, TSC counted 46 members of minorities among its 500 full-time permanent employees. Women employees represented 23.5 percent of the total permanent work force at the end of the fiscal year, a 1.5 percent increase over the July 1, 1971 level. There are two Public Service Career employees at TSC both of whom are minorities. Seven handicapped employees are presently working at TSC.

TRANSPORTATION FOR THE HANDICAPPED AND ELDERLY. Office of the Assistant Secretary for Systems Development and Technology began several research projects this year on transportation for the handicapped and elderly. The objectives of these studies were:

- To determine transportation needs of the handicapped and elderly as a function of their location, socio-economic characteristics, the nature and extent of disabilities.
- To identify present or future urban transportation systems or mixes of systems, which effectively meet the needs of the handicapped or elderly and to estimate the community impacts, cost and performance of such system mixes.
- To identify those short-haul intercity passenger systems which satisfy the travel needs of the handicapped and elderly, and to estimate the potential costs and impacts of removing travel barriers in these systems.
- To estimate the potential costs and impacts of removing travel barriers in the long haul passenger systems.

These studies will continue in FY 1973.

YOUTH OPPORTUNITY PROGRAM. TSC has actively engaged in programs that focus on the employment of youths: Stay-In-School—17 employees,

7 of whom are minorities; College Work Study—63 employees, 20 of whom are minorities; Cooperative Education—15 employees, 8 of whom are minorities. College Work Study agreements have been negotiated with 14 local colleges or universities, and cooperative agreements are currently in force with 15 colleges or universities.

Plans for the new program of university research and the opportunities it presents talented youth were conveyed to the White House Conference on Youth and were reflected in its report.

FEDERAL AVIATION ADMINISTRATION

Accomplishments during the reporting period in the area of civil rights and equal employment opportunity included:

- Appointing the first black person to serve on the Women's Advisory Committee on Aviation.
- Allocating matching funds for the construction of a 5,000-foot runway, taxiway, and parking apron at Moten Field, Tuskegee, Alabama.
- Maintaining a rate of more than 80 percent participation of minority group members in the "150 Program"—a training program in the air traffic controller and electronic technician fields for vocationally disadvantaged people from all segments of the population. During this reporting period, the "150 Program" training cycle for ATC was shortened from 24 to 17 weeks without damage to the program.
- Filling a substantial number of vacancies occurring throughout the agency with a member of a minority group.
- Encouraging minority firm participation in FAA procurement and contracting needs.
- Approving and distributing throughout the agency the EEO outreach plan covering the filling of positions by minorities and women between GS-7 and GS-15 levels.
- Renewing emphasis in the upward mobility program by placing more women in ATC jobs and providing career development opportunities to employees in low-grade jobs who have the potential and desire to learn ATC work.
- Setting a goal to employ 65 women at the GS-13 level or above, including two supergrade positions. At year's end, 59 percent of the goal had been reached (not including any supergrades).
- Producing an award-winning film "BROTHER"—describing career opportunities in aviation for minority youth (awards included: U.S. Industrial Film Festival, San Francisco; International Film Festival, Greater Columbus Film Council; National Visual Communications Association.)
- Effecting an agreement between the Alaskan Region and the Bureau of Indian Affairs (BIA) for training of Alaskan Indians for entry into the FAA Academy as general facilities and equipment technician trainees—with the goal of their returning to jobs in Alaska. Classes began in August at a BIA school in California; the Rocky Mountain Region was planning a similar program with the BIA in North Dakota.

FEDERAL HIGHWAY ADMINISTRATION

The Federal Highway Administration has developed a balanced civil rights program based on the Federal-aid highway acts, civil rights legislation, Presidential Executive Orders, and implementing regulations.

A pamphlet entitled "68 Questions and Answers" is a revised and updated version of a booklet which presents facts about FHWA's civil rights program. The pamphlet provides basic information to those interested in or affected by FHWA internal or external programs.

Measurable gains in minority internal and external training and hiring are evident.

FHWA Internal Minority Employment. Because of reduced employment ceilings in FY 1972, total FHWA employment in full-time permanent positions decreased from a net of 5,009 to 4,758. However, the number of minorities in full-time permanent positions during this period decreased by only a net of 6 (608 to 602).

Although minorities comprised 12 percent of the FHWA work force during FY 1972, 128 of the 606 promotions, or 21 percent, went to minorities. Minority recruitment during FY 1972 was 30 percent of a total of 241 recruitments, while minority participation in training programs was 11 percent of 792 trainees.

FHWA FEDERAL WOMEN'S PROGRAM. The position of Federal Women's Program Coordinator (FWPC) was made full-time. Consequently, considerable gains are expected for female recruitment, promotion, and training for FY 1973.

The number of female employees in full-time permanent positions decreased from 1,188 to 1,090. While the majority of full-time permanent female employees were in secretarial or clerical positions, breakthroughs were made by hiring women in the technical, administrative, and professional fields.

Of the 606 promotions, 27 percent (162) went to women, although they were 23 percent of the total FHWA work force during FY 1972. Female recruitment during the fiscal year was 45 percent of a total of 241 recruitments. Female participation in training programs was 8 percent of 792 trainees.

FHWA SUMMER EMPLOYMENT. During the summer of 1971, 338 persons were employed under the FHWA Summer Employment Program. Of these, 188 were minority group members.

The FHWA stay-in-school program is an extension of the agency's summer hiring effort; it provides employment on a year-round part-time basis for students between the ages of 16 and 22 who are in need of economic assistance to remain in school. Thirty-one of 67 of those hired for this Program in 1971 were minorities.

FHWA Contract Compliance Program. The FHWA contract compliance review program resulted in the completion of 1,588 comprehensive reviews during FY 1972. Contractors' policies and practices were found to be satisfactory in 1,347 of the 1,588 reviews. Of the satisfactory reviews, 133 were the result of completion of followup action by contractors to correct

EEO program deficiencies indicated in previous reports. At present, there are 241 deficient reviews awaiting further followup action.

Presently, FHWA's contract compliance program is being strengthened by procedures which give specific guidance to field personnel on selection and scheduling of contracts, conduct of compliance reviews, basis for compliance determinations, and corrective action.

The Office of Federal Contract Compliance (OFCC) has approved or imposed plans which contain goals and timetables to increase minority participation in skilled crafts in areas of high minority population and unemployment. Contractors are required to exert good faith efforts to attain these minority employment objectives.

Some area plans have training provisions which enhance minority employability by providing formal skill training. In plan areas with no training agreement, contracts containing training provisions give contractors an excellent opportunity to meet minority employment goals while providing skill training.

Presently, there are 53 OFCC approved or imposed plans. FHWA has 276 active contracts in 25 of these plan areas.

FHWA Training Programs. Under FHWA Order 7-2(2), approximately 8,400 on-the-job training slots were established on selected highway construction contracts. Attainment of 84 percent of the States' suggested minimum annual goal of 10,000 is considered a successful effort and indicative of future success. During the fiscal year, 42 percent of the States had attained or exceeded their goals.

Highway projects on which States specified trainees totaled approximately \$4.3 billion. A total of 1,857 contracts were involved, with an average of 4.5 trainees specified per contract, or one trainee per \$511,904 of contract work. Minorities accounted for 55 percent of the total number of trainees under 7-2(2) programs. The contractor is paid for the training on the basis of 80 cents for each hour of training he gives up to a maximum of \$800 per trainee per contract.

A total of \$4 million was provided for FY 1972 for purposes of carrying out the provisions of Section 110 of the Federal-Aid Highway Act of 1970 for developing, conducting, and administering highway construction training including skill improvement programs.

Of the \$4 million, \$2.5 million was allotted to the States to provide individual and multi-State supportive services contracts to increase the effectiveness of approved training programs. The remaining \$1.5 million is being administered directly by FHWA.

Forty-five States are participating in the Section 110 program, and of the 44 contracts awarded, 18 went to minority contractors. Minority contractors and subcontractors have contracts totaling approximately \$1.3 million and nonminority contractors have contracts totaling approximately \$1.8 million.

SPECIAL PROGRAMS.

Title VI of the 1964 Civil Rights Act. Indepth reviews of each State highway department are being conducted by top level regional FHWA officials.

These reviews are addressed to State highway department programs to assure nondiscrimination in the following areas: (1) Contract award procedures, (2) right-of-way acquisition, (3) relocation assistance, (4) long-range highway planning.

Minority Business Enterprise. Through its Minority Business Enterprise Program, the Federal-aid highway program continues to provide a basis for minority contractor participation in Federal and federally assisted programs. During the first three quarters of FY 1972, 320 contracts, amounting to \$91,907,794 were awarded to minorities. The 320 contract awards include 119 contracts, amounting to \$61,815,281 awarded in Hawaii.

1971 External Youth Opportunity Program. During its 1971 External Youth Opportunity program, FHWA reported close to 40,000 youths hired by contractors, State highway departments, and others. State highway departments provided 62 percent of the jobs and contractors provided 38 percent. Fifty-two percent of the total number of jobs went to disadvantaged youth.

URBAN MASS TRANSPORTATION ADMINISTRATION

Division of Internal Programs. During FY 1972, a continued effort was made by the Division of Internal Programs to increase minority and female representation in UMTA professional job categories. As of the end of FY 1972, 35% of the UMTA staff was representative of minority groups, and 40% of the staff was female. Forty-one percent (41%) of all minorities were in professional job categories and 26% of all females were in professional job categories.

Division of External Programs. The Division of External Programs conducted 54 reviews of UMTA projects under Executive Order 11246; 270 contract compliance reviews of UMTA contractors and subcontractors; and 140 Title VI reviews of project sponsors. Seven investigations were prompted by complaints of discrimination. Through efforts to persuade grantees and contractors to appoint minority group members to transit boards, a black transit board member was appointed to the New Castle Area Transit Authority in New Castle, Pennsylvania.

Division of Special Programs. Pre-award civil rights requirements have been established. Each proposed UMTA project is reviewed for civil rights impact, including planning, citizen participation, and delivery of service.

Division of Service Development. The Division of Service Development administers a research and demonstration program to develop innovative systems which provide transportation for transit-dependent user groups, including the elderly, handicapped, poor, unemployed, and youth. Seventeen projects costing \$2.5 million were funded in FY 1972. These projects include a demonstration on the Fort Berthold Indian Reservation linking isolated communities of the Reservation to urban shopping facilities, health and social services and employment in New Town, North Dakota; and a demonstration in Salem, Oregon utilizing school buses, in off-peak hours, to transport the elderly and handicapped.

The Division of Service Development sponsored two conferences which focused upon the needs of transit-dependent user groups. Thirty-three minority transit board members participated in a conference on "Transit Mobility and Urban Minorities" held at Howard University. A second conference on "Transportation and Human Needs in the 1970's—the Second Phase" was held at American University.

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Accomplishments in the field of civil rights during FY 1972 included:

- Promotion of one of the NHTSA minority supergrade employees to GS-17, which brings the total to two minority members each in grades 16 and 17.
- Establishment of an employee Equal Employment Opportunity Committee to serve as a sounding board for discussion of EEO problems; to suggest methods for improving the employment environment; to examine employment practices; and, to review proposed directives.
- Four contracts concluded for provision of services by minority businesses.
- Workshops and seminars held with Regional staffs and Governors' Safety Representatives to clarify EEO responsibilities at projects financed in whole or in part with Federal (FHWA) funds.

Chapter VII

RESEARCH AND DEVELOPMENT

INTERMODAL PROGRAMS

Since major objectives of the Congress in establishing the Department of Transportation were to "stimulate technological advances in transportation" and to provide leadership in the "identification and solution of transportation problems," and then, on the basis of information developed to recommend to the President and the Congress "national transportation policies and program," the Secretary's Office is not only the coordinator of the Department's research programs, but it is also the sponsor of many of them. The following are descriptions of some of the programs initiated by the Office of the Secretary:

Environment and Urban Matters. Key research program work was directed to enhancing environmental quality, improving urban transportation systems, and achieving intermodal urban transportation planning. For example, one project is studying the economic and social ramifications of mass production of advanced low and non-polluting automotive power systems. Another project is investigating more efficient ways to use existing urban transportation system plant, facilities, and manpower at little or no cost. A third major project is the study of the many broad impacts of the new Bay Area Rapid Transit System (BART) in San Francisco. Since BART is the major new rail rapid transit system in the nation, the Department has commissioned studies to determine whether any lessons learned in constructing BART may have application elsewhere.

National Academy of Engineering Study. The first report of the Academy's Committee on Transportation submitted to the Department on April 5, 1972, recommended: (1) That Federal urban transportation programs should try to provide better quality urban life, not just better transportation; (2) that better understanding of the interrelationships between urban transportation systems and the functions of urban areas is needed; (3) that improvement of urban transportation investment requires increased support for social science thinking and analysis; (4) that improvement of the Department's research, development, and demonstration programs requires strengthened professional capability both within the Department and outside it.

The Urban Corridor Demonstration Program (UCDP). As the costs of improving urban transportation systems continue to rise, the Department is giving particular attention to the development of non-capital-intensive methods for achieving significant improvements in urban transportation. An overall approach to this objective is the Urban Corridor Demonstration

Program (UCDP). This program, the planning phase of which began in 1970, is a joint effort of the Urban Mass Transportation Administration and the Federal Highway Administration, under the coordination of the Assistant Secretary for Environment and Urban Systems. Its purpose is to test and demonstrate the concerted use of the available programs of these two modal administrations in relieving peak hour traffic congestion in corridors leading to and from central business districts. During FY 1972, the planning phase of the program was completed. Each of the eleven original participating cities submitted its proposed program for reducing peak hour traffic congestion in its UCDP corridor. Included in these programs were proposed projects for staggering work hours, expanding "park and ride" facilities, priority access to freeways for buses, bus shelters, reserved bus lanes on freeways and city streets, traffic signal preemption for buses, and upgrading transit stations. The Department is currently negotiating with the eight cities which are expected to receive another \$6.8 million in special 100 percent UCDP implementation funds.

Aviation Cost Allocation Study. The Airport and Airway Development and Revenue Acts of 1970 require the Secretary to conduct a cost allocation study of the Airport and Airway System.

During the year the study has accomplished the following:

1. Developed an Airport and Airway Cost Base which includes expenditures by the Federal Aviation Administration (FAA), Department of Defense (DOD), Department of State (DOS), National Aeronautics and Space Administration (NASA) and Department of Transportation (DOT).
2. Identified the various classes of users and beneficiaries of the system and estimated measures of use and benefits of the system.
3. Developed various allocation estimates using several alternative methods.
4. Projected the revenue contributions of the present user tax structure to the Airport and Airway Trust Fund.
5. Analyzed the present structure of user taxes, considering the adequacy of the yield, equity, administrative feasibility and the effect of the user taxes on the affected parties' prices and outputs as well as impacts on the general income distribution.

It is anticipated that the Secretary will report the results of the study and recommendations to Congress in February 1973.

Hazardous Materials R&D. The Office of Hazardous Materials continued to provide functional and consulting support and expertise to the other DOT elements, the private sector, United Nations Organizations, International Atomic Energy Agency and other Federal organizations as well as State and local authorities. These activities included development of regulations and safety criteria, accident reporting, investigation and analysis, specific problems and questions regarding hazardous materials transportation, and the dissemination of technical information.

A start was made on systematizing the classification system for hazardous materials by utilizing preliminary results from research studies. Informa-

tion obtained from these R&D efforts was utilized in the development of an approach for an emergency response information system, improved placarding and labeling, container acceptance test criteria and inspection procedures. These technical efforts, in addition to supporting the longer range objectives—regulations development, surveillance and enforcement—assisted in the solution of day-to-day problems.

The Office of Hazardous Materials continued to be the focal point for efforts concerned with safety in transportation of hazardous materials. During the year, members of the staff participated at a joint meeting of experts appointed by RID Safety Committee (rail) and the ECE Group of Experts on Explosives; a meeting of the United Nations Group of Rapporteurs on Packing of Dangerous Goods; the International Atomic Energy Agency final review panel to consider 1972 revisions to IAEA "Regulations for the Safe Transport of Radioactive Materials;" and the meeting of the International Maritime Consultative Organization's Subcommittee on the Carriage of Dangerous Goods.

Pipeline Safety. The Office of Pipeline Safety (OPS) sponsored several activities during the year to collect information relative to pipeline safety. Data from these studies are being circulated to State agencies, industry, and the concerned public further to promote technological progress in pipeline safety.

The Department renewed a contract to develop more fully a data system to process the leak and test failure reports received by the OPS. This system is being developed to provide guides to Government, user groups, industry, and the public and to assess the effectiveness of Federal and State pipeline safety regulations. Information from the data system has been offered to State agencies, industry, professional groups, the press, and the general public. Continuing development of this program is being directed toward making the outputs from the program more accessible and useful to all of these groups.

A study contracted by the Department to determine the current state-of-the-art concerning corrosion of steel and iron pipelines was concluded. A report presenting the results of that extensive literature survey, direct questionnaire, and personal contacts with authorities in the field was published by the OPS and was distributed to the several hundred experts who supplied data and to other interested persons on request.

The Department contracted with the National Bureau of Standards (NBS), Metallurgy Division, to provide to the Office of Pipeline Safety the services of inspection, testing and analysis of pipeline specimens and other pipeline component parts to assist in the determination of the probable causes of pipeline failures. Written reports being provided to the Department by NBS at the completion of each project include photographs, analyses of the failed specimens, and technical recommendations that NBS may suggest for the prevention of such failures in the future. NBS services under this contract were utilized by the Office of Pipeline Safety in eight investigations during the year.

Compliance activity and safety information dissemination were emphasized in FY 1972 to make certain that the Federal safety standards obtain

results. Additional safety standards will be issued to solve specific problems identified in the future, but the framework of the Federal pipeline safety standards is essentially complete. OPS has added compliance personnel to the staff. With the safety standards as a foundation and with the utilization of the inspection and maintenance plans submitted by the operators, the compliance program was accelerated in August 1971.

To assist operators in understanding the detailed requirements of the Federal safety standards and to provide them useful technical and regulatory pipeline safety information, the OPS initiated publication of a monthly Advisory Bulletin in September 1971. The bulletin is distributed to more than 4,000 addressees involved in pipeline safety activity, such as State agencies, industry, engineers, contractors, professional groups, the press, and the general public.

National Plan for Navigation. Most modes of transportation now rely to some degree on telecommunications for accurate navigation or traffic control, and the likelihood is that in the future the dependence of transportation on telecommunications will increase. At present all modes of transportation have projections of systems of traffic control or navigation based upon satellite communications. To the extent that these systems are multimodal, the Office of the Secretary coordinates and sponsors their development.

The Department's National Plan for Navigation completed in April 1972 is one product of that effort of the Office of the Secretary. It deals primarily with development and utilization of navigational aids in support of civil air and marine modes of transport, discussing currently available technology and setting forth a development strategy for new navigation aids for both modes.

U.S. COAST GUARD

Coast Guard research and development is devoted to investigating, testing and evaluating new concepts in marine technology which can be adapted to Coast Guard missions and to the accomplishment of Department of Transportation and national objectives.

Domestic Icebreaking and Polar Operations. The R&D objective for these two program areas is to develop equipment and techniques which will be useful in extending the navigation season and increasing the availability of waterways to maritime transportation in icebound regions. Specific projects have been devised to:

- (1) Develop advanced icebreaking concepts for clearing icebound channels. These concepts will have marked application in the upper Mississippi River area and the Great Lakes.
- (2) Develop new concepts and methods for improving the icebreaking effectiveness of present and future ships.
- (3) Develop techniques for measuring sea ice characteristics from reconnaissance aircraft.
- (4) Develop techniques to evaluate how ice characteristics such as thickness and strength affect ship design and operations.

Fiscal year 1972 accomplishments can be summarized as follows:

- Models of advanced river and ocean icebreakers were constructed and tested.
- Ice measurement and target identification experiments were conducted with side-looking-airborne-radar (SLAR).
- A hull flushing system was installed and tested on Coast Guard Cutter *Raritan*.
- An ice thickness measuring penetrometer was developed and work was started on the development of shear wave ice thickness measurement technique.
- An air bubbler system to prevent ice formation to be installed on Coast Guard Cutter *Sundew* was designed, and tested.

Aids to Navigation. The R&D objective for this program area is to develop systems, hardware, and procedures that will facilitate safe and expeditious passage of marine traffic on the nation's waterways, and provide precise position fixing information to the mariner. Specific projects have been devised to:

- (1) Develop a Vessel Traffic System which uses the latest radar, computer processing, communications technology, and latest marine traffic management techniques.
- (2) Develop an all-weather river and harbor precision navigation system for which the user can obtain economical and accurate position-fixing equipment.
- (3) Develop improved audio-visual and fog detection devices.
- (4) Develop lightweight, easily maintained buoys which can be serviced by fewer and smaller vessels.
- (5) Develop long-life navigation aid subsystems which include non-polluting and efficient power sources, lamps, sound signals, colorants, coatings, and moorings.

Fiscal year 1972 accomplishments can be summarized as follows:

- Radars, radar displays, microwave links and computer displays were procured for the Harbor Advisory Radar System.
- An operations center and a remote radar site were designed and work was begun on computer programs for use in collision alerts, buoy drift, target tracking, lane stray analysis, and traffic congestion alerts.
- Theoretical and experimental investigations of optical detection and sound recognition were conducted.
- Theoretical and field investigations of fog bank detection were conducted.
- Contracts were awarded for the investigation and validation of parameters for precision river and harbor navigation systems.
- An experimental "follow the wire" sub-system for the Vessel Traffic System was tested.
- Procurement of first generation, prototype, exposed water buoy was begun.

- Explosive embedment buoy anchors were partially developed and evaluated.
- Buoy motion sensing instrumentation design and construction was begun.
- A permanent buoy anchor development project was initiated.
- Procurement of experimental solar cells for marine use was initiated.
- Three experimental ice buoys were designed and procurement was initiated for anchors with high holding strength.

Marine Environmental Protection. The objective of this research is to develop systems hardware and procedures that will minimize the effects of spills of oil and hazardous substances, improve capabilities for detecting spills, determining their effects, and determining the effectiveness of clean-up procedures. A related objective is to reduce or eliminate water and air pollution from Coast Guard facilities. Specific projects have been undertaken to:

(1) Develop containment, dispersal, and removal systems capable of being deployed rapidly and operated under various environmental conditions.

(2) Develop means for detecting, identifying, and quantifying discharges of oil and hazardous pollutants in all weather conditions.

(3) Provide scientific data for the development of analytical techniques to determine the impact of pollutants; and devices to determine the effectiveness of clean-up operations.

(4) Develop waste water treatment and solid waste management systems for Coast Guard facilities.

(5) Develop exhaust gas control and monitoring devices for Coast Guard facilities.

Fiscal year 1972 accomplishments can be summarized as follows:

- The Air Deliverable Anti-Pollution Transfer System (ADAPTS) development project was completed.
- Oil containment boom survival tests were conducted.
- Sorbents and sinking agents for dissipating spilled oil were tested.
- System definition and preliminary design were completed for software components for the Chemical Hazardous Research Information System (CHRIS).
- A prototype airborne oil detection system project was initiated.
- Oil slick identification techniques were investigated.
- Research on oil slick thickness measurement techniques was initiated.
- An evaluation of satellite surveillance capabilities was begun.
- Design and construction of surface oil slick samplers was initiated.
- Studies of the fate and behavior of oil in the marine environment were begun.
- Feasibility studies were completed of 50-man shipboard sanitary systems and construction of full scale prototypes was initiated.
- A survey of air pollution from Coast Guard ships was completed.

- Joint CG-Navy-Maritime Administration (MARAD) studies were initiated to evaluate concepts for separating oil from a ship's discharge water.

Search and Rescue. The R&D objective for this program area is to develop systems hardware and procedures that will assist Coast Guard forces to render aid to persons and property in distress on and under the nation's waterways and the high seas. Specific projects include the following:

- (1) Develop satellite communications equipment for Coast Guard forces.
- (2) Develop a real time alerting system that will allow persons in distress to notify the Coast Guard of their identity, the nature of their problem, and their location.
- (3) Develop airborne detection devices that will facilitate the sighting and rescue of persons in distress.
- (4) Combine operations research technology with computerization to provide quick and accurate solutions to search planning problems.
- (5) Conduct oceanographic experiments to improve data and criteria used in search planning and operations.
- (6) Develop better illumination devices for airborne search units.
- (7) Improve ship-helicopter joint operations.
- (8) Evaluate experimental high performance boats and small vessels to determine their suitability for Coast Guard missions such as Search and Rescue, Law Enforcement, Environmental Protection, and Aid to Navigation.

Fiscal year 1972 accomplishments can be summarized as follows:

- An internal shipboard command and control system for Coast Guard High Endurance Cutters was completed through the design development stage. This computerized system should prove useful in Search and Rescue operations.
- Several design reports and equipment designs were completed as work began on a 5-year maritime communications satellites program.
- A contract was awarded for an experimental Distress Alerting and Location System (DALs) designed for use by the boating public to signal real time distress information to rescue forces.
- Interim Computer Assisted Search Planning (CASP) programs were developed and debugged.
- Airborne current measurement equipment and techniques were developed.
- Preliminary operational evaluations were completed for small boat emergency flotation bags.
- Search and rescue night vision devices and crew protective suits were tested.
- Field tests were conducted to determine small craft leeway drift factors. The test results will be used to develop a more accurate predictive model for wind and current effects on boats and rafts.
- An experimental 26-foot motor Rescue Boat (MRBX) was constructed and tested.

- Under a contract with the Center for Naval Analysis, operation research was conducted to evaluate the cost effectiveness of various high performance watercraft compared with presently used Coast Guard craft and vessels for Search and Rescue, Aids to Navigation, and Law Enforcement. Field tests were conducted using the USN PC42 hydrofoil *Tucumcari* to check her performance for advantages predicted from the operations research.

Recreational Boating Safety. Engineering research is being employed to support the development of performance standards for recreational boats. These standards are used in prescribing preventive measures to minimize loss of life, personal injury and property damage associated with the use of recreational boats. Specific projects have been devised to:

- (1) Develop standards based on boat performance tests.
- (2) Develop test procedures and design guidelines for new standards.
- (3) Develop new systems and devices to demonstrate boating safety features.

Fiscal year 1972 accomplishments are summarized as follows:

- Preliminary R&D plans were developed to provide Test Procedures and Design Guidelines for 15 boat performance standards.
- Test Procedures and Design Guidelines for safe loading based on engineering analysis and full-scale tests were developed for a wide variety of hull shapes.
- An analytic computer program for evaluating small craft loading capacity was developed.
- An indepth study of small boat accidents was initiated.

Commercial Vessel Safety. Research projects helped the Coast Guard develop a body of knowledge which will support regulations and preventive measures designed to minimize loss of life, personal injury, and property loss or damage associated with facilities engaged in commercial, scientific, or exploratory activity in the marine environment. Such projects include:

(1) Identifying risks associated with the marine transportation of hazardous cargoes.

(2) Providing knowledge to support regulations concerning the strength, stability, maneuverability, and fire safety of vessels, and also to assure crew and passenger survival.

(3) Developing technical knowledge to support design, construction, and operational regulations for civil undersea vehicles, habitats, and equipment. Research in this program has been given special emphasis by the passage of the Ports and Waterway Safety Act of 1972. The following achievements were attributable to this effort last year:

- An approach for spill risk analysis was developed.
- A feasibility study was completed on an impermeable membrane cargo/ballast isolation system.
- Laboratory tests were conducted to determine hazards associated with underwater spills of chlorine gas.

- Analytical and experimental research was begun on hazards associated with spilling large quantities of liquid anhydrous ammonia on water.
- Mathematical ship maneuvering equations and a computerized Vessel Safety Model were developed.
- A tanker structural analysis study for limited collision situations was completed.
- A full season of structural response testing was completed on an ore ship.
- High expansion foams for fire fighting were tested.
- Research was conducted on containership and barge stability.

The Coast Guard cooperated with other agencies on research and development projects as follows:

- (a) Environmental Protection Agency—pollution standards.
- (b) U.S. Army Corps of Engineers—domestic icebreaking.
- (c) U.S. Navy—ship pollution control research.
- (d) National Aeronautics and Space Administration—oil spill surveillance and identification.
- (e) National Science Foundation—polluting substances other than oil.
- (f) Ship Structures Committee—ship strength and stability.
- (g) International Maritime Consultative Organization—tanker design.
- (h) Maritime Administration—pollution prevention through ships design.
- (i) Maritime Administration—development of transportation satellite communications for the aeronautic and maritime services.

AVIATION RESEARCH AND DEVELOPMENT

Area Navigation. Working with the Radio Technical Commission for Aeronautics (RTCA), FAA continued its effort to investigate hardware and software techniques to exploit area navigation in the National Airspace System. Comprehensive flight tests and simulation experiments were being performed by the University of Illinois Institute of Aviation to define the effect of area navigation display characteristics on flight technical error and pilot workload. In addition, Champlain Technology and Anacapa Sciences Corp. were investigating information content requirements for area navigation map displays. The benefits of these efforts in coordination with other navigation programs are expected to increase substantially the utilization of the U.S. standard short-range navigation system, increase system capacity, and result in a decreased workload for air traffic controllers and pilots.

In January 1972, FAA sponsored an international symposium on area navigation. The first of its kind, the symposium explored a wide range of questions bearing on the use of this system and the early realization of its full potential. Analysis of the views expressed at the symposium indicated that there was a need to examine FAA's area navigation program more fully. Consequently, a task force composed of FAA and airspace-user representatives was established to advise and assist FAA in the further application of area navigation in the National Airspace System. Specifically, the task force was charged with conducting an in-depth study of how area

navigation should be implemented in an orderly fashion, and identifying the system's payoff to both the air traffic control system and its users. To improve understanding of the Area Navigation concept and its impact on system accuracy, FAA produced a film "Area Navigation" that won acclaim and an award from the Greater Columbus Film Council.

Backup Emergency Communications (BUEC). To improve emergency communication capability, FAA decided to provide all air route traffic control centers with a reserve emergency communications system. The backup system ultimately developed includes UHF and VHF transceivers located at remote sites, and fast response processors, status boards, control stations, and audio transfer panels at air route traffic control centers. An individual controller would have access to at least two (and up to 10) transceivers capable of operating on his frequency. If the first transceiver selected were inoperative, the system would automatically switch to another transceiver. A sufficient number of radios would also be available to backup a complete remote communications air/ground site.

In September 1971, FAA's contractor began initial delivery of production equipment. By April 1972, the first complete emergency system had been installed, tested, and evaluated at the Oakland, Calif., ARTCC; the following month, the Chicago ARTCC was equipped with a system with a limited backup capability. While undergoing evaluation at Oakland, the backup system was actually brought into regular use during periods of failure of the primary communications system.

All-Weather Landing. FAA continued its efforts to develop an instrument landing system that would permit safe landing under all weather conditions. Currently, most air carrier aircraft are capable of landing under Category I minimums—i.e., with a decision height down to 200 feet and a runway visual range of at least 2,400 feet; a smaller number of air carrier aircraft are capable of landing at certain airports under Category II minimums—i.e., a decision height down to 100 feet and a runway visual range of at least 1,200 feet. Fiscal year 1972 highlights included:

- Installing at Dulles International Airport, Washington, D.C., a British-made STAN 37/38 ILS that allows qualified crews flying properly-equipped aircraft to land under runway visibility minimums down to 700 feet. No specific decision height is required. The system, on loan from the United Kingdom, was undergoing operational evaluation at year's end.
- Flight testing an automatic airborne system augmented with inertially derived signals, using the CV 880 all-weather landing test-bed aircraft and the Boeing 727.
- Making ready for the installation at NAFEC of an instrument landing system based on nuclear technology. The system's potential as an independent landing monitor that can be used as a backup to an existing conventional ILS will be investigated.

Microwave Landing System (MLS). This development program, which had been recommended during 1970 by DOT's Air Traffic Control Advisory Committee and a special committee of the Radio Technical Commission for

Aeronautics, passed a number of milestones during this reporting period. This system will provide guidance signals so that closely spaced parallel runways may be used to accommodate high density air traffic, and reduce siting problems due to terrain for all-weather landing. In July 1971, a national plan for developing and implementing this new, common civil-military MLS was issued jointly by the Department of Transportation, the Department of Defense, and the National Aeronautics and Space Administration. The plan outlines two interdependent and complementary efforts: (1) an industry program designed to produce prototype equipment at the earliest possible date; (2) a series of Government programs concerned with, among other things, validation, the investigation of subsystem concepts and techniques, and the application of the MLS to civil-military aircraft operations. The plan designated FAA as the agency to manage industry's development effort. Other milestones included (1) awarding six contracts by FAA for technical, program, and cost data in support of design approaches (technique analysis and contract definition phase); (2) forming an interdepartmental advisory group composed of DOT, NASA, and Defense Department representatives; and (3) establishing a program management office within FAA.

Contracts for the development of a feasibility model were expected to be awarded in January 1973.

Fog Dispersal and Prevention. Continuing its efforts to discover operational ground-based fog dispersal system(s) that are economically viable, FAA completed (1) studies of the potential dollar benefits to accrue through dispersal of fog at major passenger handling airports projects to 1981; (2) studies of various meteorological parameters such as wind speed, wind direction and temperature stratified according to various fog visibility values; (3) the first phase testing of biodegradable chemicals such as glycerine, as fog dispersal agents; and (4) a field project to measure and evaluate the effectiveness of the fog dispersal activities sponsored by the airlines and airport authorities at Seattle-Tacoma and Spokane Airports during the 1971-72 winter fog season.

Frequency Spectrum Engineering. Because of aviation's dependence on radio communication and its almost exclusive reliance on radio-frequency-dependent navigation equipment, FAA is a major user of the radio spectrum; it employs more transmitting equipment than any other Federal civilian agency. As aviation growth and the development of new systems continue to place increasingly greater demands on this already overloaded spectrum, FAA has no choice but to seek improved ways of employing the limited radio frequencies allocated to aviation. Progress in frequency spectrum analysis, planning, engineering, and development during this reporting period included:

- Awarding a contract to study the effects of new building construction and other physical obstructions on airport surveillance radar, air route surveillance radar, microwave communication, and other new systems and facilities in the vicinity of airports. The contractor will also develop a computer model capable of predicting the effects of proposed construction.

- Securing approval of the Interdepartment Radio Advisory Committee to reserve, in the U.S. Table of Frequency Allocations, the bands 5.0-5.25 GHz and 15.4-15.7 GHz for the microwave landing system.
- Issuing an FAA order establishing agency policy for procuring communications equipment for use in the VHF aeronautical mobile band on 25 kHz spaced channels in preparation for implementation of 25 kHz channel spacing in 1976.
- Inaugurating a program for split channel operation in the VOR/ILS TACAN/DME Frequency Bands scheduled for initial implementation in 1973 for both military and civil users.
- Developing a computer model capable of simulating the Air Traffic Control Radar Beacon System (ATCRBS) for use in analyzing interference and system problems.
- Inaugurating a computer program to enable optimum automated selection of VHF and UHF communication frequencies, including detection and prediction of intermodulation and cross modulation interference problems, and identifying, classifying, and rating the various solutions available for correction of the problem.
- Commencing development of a joint DOD/FAA plan for converting UHF air/ground communications to 50 kHz spaced channels in 1975 with an ultimate capability for introducing 25 kHz spaced channels by the end of the decade.

System Performance and Cost-Effectiveness Analysis. FAA completed during the reporting period the following system-performance and cost-effectiveness studies in support of development products or proposals:

- Expansion of an airport airside mathematical/computer model for computing aircraft time-in-system for airport surveillance radars.
- Analysis of the costs and effectiveness of airport surveillance radars.
- Investigation of the cost-effectiveness of automatic position reporting.
- Examination of some estimating techniques for traffic count at nontower airports.
- Development of a method to predict the impact of automation on system capacity.

Aircraft Wake Turbulence. The goal of this program is to minimize or eliminate the effects of aircraft wake turbulence as an impediment to the flow of air traffic. Efforts are underway to develop an airport wake vortex avoidance system.

Progress was made in pressure transducer and acoustic radar vortex sensor development to track and measure the intensity of aircraft wake vortices. Field tests were made at NAFEC using an instrumented tower to measure vortex intensities of C-5A, C-141, DC-7, CV-880, B-747, L-1011, and DC-9 aircraft and to support sensor development.

An aircraft simulator program was developed, under Transportation Systems Center guidance, to provide the capability to evaluate the severity of aircraft encounters with wake vortices. This information is necessary to develop both optimum air traffic control procedures in the airport area and the wake vortex avoidance system.

Offshore Jetport. The first phase of a feasibility study of a close-in, offshore jetport to serve the New York City area was completed in December 1971. This phase of the study, conducted by a contractor, focused on the technical, social, and economic feasibility of constructing such an airport on Long Island Sound or on the Atlantic Ocean south of Long Island. The contractor found that an area in the Atlantic Ocean some 4 miles off Atlantic Beach would provide an economically, technically, and socially acceptable site. A second study phase, to be conducted by FAA, will deal with financial, legal, and construction questions.

Research Efforts to Limit Hijacking. The Transportation Systems Center (TSC) expanded its facilities for evaluating weapon and explosive detection devices. New technology was explored; several items of commercial equipment were evaluated; the state-of-the-art of new developments was studied. Significant progress in these efforts included:

- *Evaluation of Metal Detectors.* Information on the quality and source of metal detectors tested and evaluated by TSC was provided to representatives of 76 governments and eight international organizations, as well as U.S. airport managers and officials of major U.S. airlines. The equipment ranged from inexpensive, simple hand-held devices to a highly sophisticated computer-aided weapon detector capable of discriminating between guns and other metal objects. Six of these devices were deployed to acquire operational data. At the same time, TSC explored the potential advantages of such novel metal detection techniques as infrared, radar, and electroluminescence.
- *X-ray Weapon Detectors.* TSC carried out a comprehensive evaluation program on a number of X-ray units to determine their capability to detect bombs and other weapons in baggage or cargo. A check-in counter was designed and built as an X-ray systems test-bed for screening of hand luggage or checked baggage. In addition, TSC developed plans for the design of an economical X-ray system that would be attractive to the airline industry.
- *Explosive Detectors.* TSC tested commercial ion detectors (or "sniffers") and developed a technique for calibrating such systems for sensitivity. TSC also experimented with a novel sniffer that could lower the cost of existing systems because of the simplicity of its design.

HIGHWAY RESEARCH AND DEVELOPMENT

Transportation Planning Research

BUSWAYS. The search for ways to improve mass transit use of highways continued. For example, construction of the San Bernardino busway was started in January 1972; it includes exclusive express lanes for high-speed bus travel both inbound and outbound, alongside and in the median of the San Bernardino Freeway. Cost of the busway is budgeted at \$53 million for right-of-way, construction, and equipment, including the purchase of 100 new buses. Another example is the expanded priority lane on the San Francisco-Oakland Bay Bridge in operation since December 1971. This plan includes: (1) Extension of reserved bus lanes on both sides of the toll plaza; (2) three reserved toll booths; (3) the admission of carpools with

three or more occupants to the reserved bus lanes; and (4) the elimination of tolls for carpools in the reserved lanes.

Additional projects, many funded jointly by FHWA and UMTA, continued their successful operations. These include:

1. Shirley Highway—Northern Virginia—Washington, D.C.
2. Blue Streak Demonstration Project—Seattle, Washington
3. I-495 Approach to Lincoln Tunnel—New Jersey
4. Reverse Direction Bus Lanes—San Juan, Puerto Rico

Planning and groundwork for these additional projects were initiated:

1. Bus and Carpool Lane—Miami, Florida
2. Bus and Carpool Lane—Detroit, Michigan
3. Reverse Direction Bus Lane—Approach to Golden Gate Bridge, San Francisco, California

A high interest in increased highway public transportation remains, with inquiries from many different areas.

During FY 1972, the first three reports documenting the analysis and findings of the Nationwide Personal Transportation Study were released. This survey was designed to obtain current information regarding national patterns of travel. Data were collected by the Bureau of the Census with FHWA doing the analysis and preparing the report. The initial reports are oriented to various characteristics of automobile travel and use, including car occupancy, seasonal variation and annual miles driven related to income, year model, and household automobile ownership. Work is currently in progress on several additional reports including one describing home-to-work trips and travel.

A Nationwide Truck Commodity Flow Study was designed to collect information during FY 1973 on origins and destinations of truck trips and on commodities carried. At the present time, there is no source of information on the total extent of commodity movements by truck. This study will be accomplished by a mail survey collected from a national sample of about 150,000 truck registrations.

The Transportation Resource Allocation Study (TRANS) completed the development of analytical procedures which can assess the consequences of alternative levels of expenditure on various types of transportation improvements. Work has begun to adapt the TRANS procedures for use by the urban transportation planning studies.

Traffic Systems Research. An extensive state-of-the-art FHWA report on urban freeway surveillance and control systems was completed during FY 1972; it provides comprehensive information on selecting, designing, implementing, operating and evaluating urban freeway control systems. The report examines freeway problems that are subject to solution by surveillance and control techniques. Methods for documenting operational problems, criteria for evaluating the types of surveillance and control systems available for alleviating freeway problems, and descriptions of hardware requirements, are included. The report also reviews existing freeway ramp control projects and provides a benefit-cost analysis of their effectiveness.

A computer simulation model to represent urban traffic, named UTCS-1, has been developed. The results obtained with this model compared favorably with equivalent traffic data collected in Washington, D.C. The model can be used to test new traffic control strategies and traffic engineering improvements in the computer and evaluate their usefulness before they are tried on city streets.

The Systems Development Corporation has developed for FHWA a new fixed-time control methodology to assist traffic engineers in the determination of the proper traffic signal settings at diamond interchanges. Field evaluations in Los Angeles, California, showed a 20 to 30 percent reduction in the average vehicle delay with the signal timing plan developed from the new procedures.

DOT's Transportation Systems Center designed a portable electronic vehicle detector station for use on the Maine Facility—an electronically instrumented 15 miles of two-lane rural highway. The facility is being developed, in cooperation with the Maine Department of Transportation, to produce implementable solutions to traffic safety and operational problems on two-lane highways. Research efforts on the facility will commence in FY 1973.

Structural Integrity of Bridges. Section 204 of the Federal-Aid Highway Act of 1970 provided for a special bridge replacement program, and \$250 million was authorized for replacement of a limited number of deficient bridges during fiscal years 1972 and 1973. Subsequently, 60 bridges in 50 states and Puerto Rico were approved for replacement.

Two instructions were issued to the States: "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges," and the "National Bridge Inspection Standard." The latter included a requirement that all Federal-aid highway system bridges over waterways and other topographical barriers eligible for funding under the provisions of section 204 be inventoried by July 1, 1972. Final instructions were issued on March 30, 1972, on how the collected data was to be organized, card punched, and submitted by August 15, 1972. A computer program is being prepared to process the data so that a national priority system of replacement can be established.

Research is continuing on fatigue life studies of steel beams to determine the effect of yield hinges on the life expectancy of highway bridges. In connection with this work, efforts are being made to perfect methods to detect cracks in the bridges' steel, and to measure their growth.

The Federal Highway Administration initiated a research study to provide a prototype working model of a field bridge inspection instrument for detecting flaws in steel bridge members. The instrument utilizes recognized nondestruction testing methods, adapting them to make a simple, effective inspection tool whose use requires only a minimum of training.

The first phase of research to determine the stress corrosion susceptibility of highway bridge steels resulted in a complete survey of the type and extent of bridge steel usage by all State highway departments and assurance that in the ordinary bridge environment, there is no danger of stress corrosion cracking in the most commonly used bridge steel.

A research program is underway to evaluate a new bridge vibration absorber through full-scale field tests to measure the "before" and "after" vibration characteristics of an in-service bridge.

Abstracts of 27 computer programs for bridge analysis and design were distributed to all the bridge design offices in the State highway departments. Requests for computer programs were made by 48 States and ranged from one to all 27 programs. The average number of programs requested by each State was four. A substantial savings in computer program development was realized as a result of this effort.

A computerized bridge design system, developed by Wyoming with State funds, was made available to FHWA and was evaluated. It was recommended that the system be nationally implemented. Efforts have been initiated to make several improvements to the system, including a bridge load rating capability, before releasing the system to the States.

A program was begun to study alternative methods of eliminating premature deterioration of bridge decks due to chloride-induced corrosion of the reinforcing steel. Research is being coordinated with that being conducted by other government and private agencies. It is concentrated on developing nonmetallic coatings for reinforcing steel, making concrete impermeable, and neutralizing the effect of chlorides that are already in the concrete. Preliminary results of this research are very promising; some should be ready for implementation by mid-1973.

A promising method was developed for alleviating the damaging effects of deicing salts on reinforcing steel in bridge decks. Tests have shown that cement paste impregnated with methyl methacrylate polymer is more resistant to the penetration of deicing salts than unimpregnated cement paste by a factor of 50. Further research to develop procedures for obtaining proper impregnation of the actual concrete in both existing and newly constructed bridge decks is now being conducted.

Advances in Pavement Analyses. A half-mile of prestressed concrete pavement was built at the Dulles Airport in December. It was opened to traffic in March and was subjected to exceptionally heavy construction traffic prior to TRANSPO, and it is continuing to serve passenger and freight traffic. It is considered an unqualified success and other agencies are being encouraged to promote other experimental installations. Projected costs for longer sections are competitive with costs for regular portland cement concrete pavements. The design and construction techniques used on this project were adequate, but numerous changes are being devised to further reduce costs.

Measurements of stresses, strains, deflections, and movements are continuing. The FAA and the Army Corps of Engineers are participating in making measurements of pavement reaction to heavy truck and aircraft loadings. Measurements of skid and roughness will be taken periodically to determine wear.

The major problem currently associated with bituminous concrete pavements is premature failure in the form of cracking. Progress has been made, using fracture mechanics concepts, toward establishing usable relationships between mixture properties and crack susceptibility. The influence

that asphalt content, aggregate type and gradation, and environmental temperature have on fracture toughness has been delineated. The effect that load application sequence has on the rate of cracking in asphaltic beams resting on an elastic foundation has been found to be significant, whereas rest period and frequency of loading are not major factors. Field verification of these fracture mechanics concepts are underway.

Modification and evaluation of the prototype nuclear cement content gauge was essentially completed during the past year and it will be ready for production by the fall of 1972. The gauge can be used to determine the cement content of any wet concrete mix to provide concrete inspectors with a valuable tool in the control and acceptance of concrete construction.

A method has been developed for chemical analysis of portland cement by atomic absorption spectrophotometry. By this method, amounts of the six most important elements in the cement can be determined in approximately 1½ hours. Almost completed precision studies on the variability of analytical results for the atomic absorption method indicate that the method is either equivalent or superior to methods currently being used.

Tunneling. Cost of tunneling is a major element in the construction of ground transportation. FY 1972 marked a more formal implementation of a coordinated tunneling research and development program for the Department of Transportation. This program will be coordinated by the Systems Development and Technology staff and will involve the Federal Railway, Federal Highway, and Urban Mass Transportation Administrations. A substantial effort is planned, extending over several years; its goals include a 30 percent reduction in tunneling costs while increasing the speed of the work. Savings are expected to occur on construction begun during FY 1976.

The tunnel is considered to be one of the most attractive alternatives for urban transportation routing because of its social and environmental advantages. Achievement of the goals of the program will help to assure optimum use of tunnels by future planners of transportation systems.

Technical programs currently underway include investigations of novel excavation techniques of which the laser and water cannon are representative, studies of new support and lining systems, including a slip-form (continuous) liner; and an examination of geophysical exploration methods to develop means of obtaining more accurate data about ground conditions at the tunneling site.

During FY 1972, members of the Department of Transportation staff have continued to play an active role in tunneling research and development in both national and international organizations.

Other Highway Research Activities. Scrap tires fastened together in modular bundles are being investigated as energy absorbing devices used in a manner similar to the crash cushions constructed from used oil drums. These devices are placed at bridge piers, bridge abutments, median piers, elevated gores, and other areas on the highway where immovable objects require protective barriers. Research is being conducted also on waste aluminum for use as crash cushions to reduce damage from accidents.

A complete highway communication system, including roadside and in-vehicular equipment, has been tested. The system uses a communications

repeater technique and it was demonstrated that most highway services (including mobile radio roadside callbox, variable message signs, vehicle detectors, etc.) can be accommodated using only two frequencies nationwide. The technique proved feasible, but large-scale testing will be required to evaluate all of the operating modes.

Automated Road Design, a long pursued goal, has now become a reality through FHWA sponsored R&D work with State highway departments. The computerized roadway design system is being evaluated in California, Texas, and Oklahoma and is expected to show significant return on investment through:

1. Improved and optimized designs resulting from the ability to make more design trials with the same personnel.
2. Shorter time to completion in various design phases.
3. Reduced cost of the design phase.
4. Lower construction costs achieved through optimization.

URBAN MASS TRANSPORTATION ADMINISTRATION

Research, Development and Demonstration Program Structure. The purpose of UMTA's Research, Development and Demonstration (RD&D) program is to provide information about a wide spectrum of possible improvements to urban mass transportation systems which communities can use in selecting the best way to deal with their particular transportation requirements. The information is intended to provide guidance to communities in tailoring requests for capital grants to suit local needs and should enable local authorities to achieve improvements in transit service through direct local action.

UMTA's program primarily affects the daily lives of four groups: the transit passenger, the transit operator, the urban community and the transit manufacturing industry, and related commercial enterprises. UMTA plans and monitors its program according to the manner in which each group is affected by activity for which UMTA is responsible.

UMTA's objective in Research, Development and Demonstration are improvements that will benefit these impact groups by:

- Improving accessibility of public transportation.
- Providing higher quality transportation service to passengers.
- Improving economic performance of public transportation systems.
- Minimizing adverse impacts of public transportation on the urban environment.

UMTA's RD&D effort addresses key problems common to many cities in such a way that the solutions developed may be adapted to unique local circumstances; UMTA supports RD&D in both hardware and software; in conventional modes of urban mass transportation (bus and rail) as well as in unconventional new systems; in intermodal integration projects that will tie together transportation facilities and related institutional arrangements into one coordinated system; in systems analysis and planning to guide the RD&D effort and UMTA policy; and in service development to find ways to meet the special needs of transportation dependent groups.

UMTA manages its RD&D projects according to the mode of urban mass transportation involved—bus transit, rail transit, new systems, intermodal integration—with additional efforts in related systems analysis, planning research, or service development.

Bus Transit. UMTA's RD&D in bus transit involves both vehicles and operating methods. The principal approach has been to test, demonstrate and evaluate new transit bus prototypes. Data concerning selected aspects of the programs follow:

With UMTA capital grant assistance, many cities are buying new buses to replace aging fleets and to extend public transportation service, while at the same time reducing pollution by relying heavily on bus transportation to replace autos.

BUS TECHNOLOGY. UMTA's bus technology program produces improvements for incorporation in existing buses, consolidates available technology in a modern 50-passenger transit bus, and defines major advances for buses of the future. Such improvements include:

- (1) Reduction of smoke, odor, noise and vibration.
- (2) Improved passenger comfort and convenience.
- (3) Accommodations to permit wider use by the elderly and handicapped.
- (4) Lower maintenance and operating costs, and
- (5) Flexibility and adaptability to varied needs of urban areas.

UMTA continues work toward improvements of the diesel propulsion systems used on most city buses: their noise, vibration, odor, and noxious fumes. Environmental Improvement (EIP) kits for bus diesel engines, which address all of the above problems, have been tested and are available for support under UMTA's capital grants program.

BUS TRAFFIC SYSTEMS AND SERVICE INNOVATIONS. UMTA's RD&D in Bus Traffic Systems and Service Innovations includes three main areas of concern:

- a. Bus Service Innovations;
- b. Automatic Vehicle Monitoring (AVM) Systems; and
- c. Bus Priority Systems.

The basic objective of bus service innovations is to develop and demonstrate innovations involving the local streets, arterial highways, and expressways on which buses operate to give preferential treatment to buses, both in line-haul and downtown circulation operations as well as innovations in the institutional framework within which bus transit systems operate.

EXPRESS BUS ON FREEWAY PROJECTS. In the Shirley Highway (Northern Virginia to Washington, D.C.) express bus on freeway project, two expansions of service and the addition of 60 new buses have attracted 4,000 new transit users—the capacity of the entire bus fleet. In Seattle, UMTA's "Blue Streak" demonstration project, which involves express bus service from a park-ride lot, has produced a 30 percent increase in transit usage. Detailed planning for future demonstrations emphasizing improved downtown circulation and coordination of transit operations has progressed as well, and initiation of demonstrations is planned for FY 1973.

BUS PRIORITY SYSTEMS. The goal of UMTA's bus priority systems (BPS) is to improve travel speed of urban buses without removing them from the general traffic flow by developing and demonstrating innovative modifications to the existing traffic signal system so as to provide preferential treatment to buses at signalized intersections. Such bus priority systems may reduce bus travel times by as much as 30 percent for buses in "local" service and 20 percent for buses in "express" line-haul operations. The intended end result is to increase the efficiency of transit operations by prompting better utilization of labor and equipment and to increase transit patronage by attracting new riders through reduced trip time.

AUTOMATIC VEHICLE MONITORING (AVM). UMTA's work with automatic vehicle monitoring (AVM) systems progressed strongly in FY 1972. AVM provides transit operations for the first time with a true command and control system. Subsystems for vehicle locations, schedule monitoring, and real time information can furnish a central dispatcher with continuous knowledge of location, status, and schedule adherence of every vehicle in the fleet, disciplined two-way voice communications, emergency "silent alarms" to summon immediate aid in case of threatened criminal action, and automatic collection of ridership data through passenger counters linked to the data transmission center.

Transit Management and Operations. UMTA's transit management and operation projects develop, test and demonstrate modernized operating procedures and management methods for transit properties. Problem areas to be addressed include maintenance of operating equipment, obsolete inventories, bunching and delays in bus operations, outdated accounting practices, underutilized capacity, safety, crime and vandalism prevention and manpower selection and training.

AUTOMATED DATA. Automated service and maintenance information systems have been set in operation in Dallas and Oakland; initial experience has indicated their value (e.g., at least three bus engines which were about to fail were identified by the system in time to permit corrective action) but has also suggested revisions which are currently underway.

Other automated systems have been designed for assignment of drivers, counting of passengers, and standardized accounting.

RAIL TRANSIT

Rapid Rail Vehicles and Systems. Currently, there are seven U.S. cities which have rapid rail systems in operation or under construction. These systems carry the bulk of mass transit passengers in those cities. Together with commuter railroads, urban rail systems carry over two billion passengers annually, or one-third of all mass transit riders. There is a widespread and growing interest in upgrading and extending existing rapid rail systems, and several cities are planning new systems. Replacing old or acquiring new rolling stock offers opportunities to apply advanced technology in producing them. Design and hardware specifications for new cars will be given to the cities for use in acquiring rolling stock.

By providing rail car builders and transit operators with tested and proved prototypes, UMTA will make available to the riders more comfortable and

more esthetically pleasing cars to complement new routes and services now being planned.

Prototype Cars. The practical experience gained from the UMTA-sponsored Prototype Car Program for the San Francisco Bay Area Rapid Transit System (BART) will be valuable for every transit property purchasing new vehicles.

UMTA is utilizing the services of a systems managing contractor to develop advanced cars. Both the BART car and a full scale mock-up of UMTA's state-of-the-art car were exhibited at TRANSPO where visitors' attitudes toward the car were surveyed.

Advanced Propulsion Systems. Advanced propulsion systems are already under development and test as a part of the rapid rail RD&D program; they are used on Cleveland Transit System "Airporter" cars equipped with a new AC motor propulsion and control system as a part of a demonstration project. The new car also has been restyled to reflect the latest in passenger amenities.

Commuter Rail Vehicles and Systems. The Department has given strong impetus to commuter rail systems that have exhibited their ability to attract, retain, and increase the number of passengers carried with improvements in service and equipment.

If the effort succeeds, the results should be: (1) Increased patronage on commuter rail systems; (2) better service to the public; (3) better equipment for the operator and the public; and (4) maximum use of existing facilities.

DUAL-POWER CARS. In several cities, commuter rail service is provided over lines that are only partially electrified so that passengers must transfer from one train to another. To solve this problem, UMTA is assisting in the development of dual-power—gas turbine/electric (GT/E)—commuter cars.

Light Rail Vehicles and Systems. The light rail area also presents a challenge to UMTA and the transit industry where there has been no development in technology since 1935. Because of the limited size of the market, it is to the operators', manufacturers' and UMTA's advantage to produce as nearly standard a vehicle as possible while simultaneously utilizing advances in technology which have been made elsewhere. The basis for the new vehicle will be the specifications developed for the San Francisco Municipal Railway and modified for use in Boston. Additional systems whose requirements will be considered include the Southeastern Pennsylvania Transportation Authority, Shaker Heights (a suburb of Cleveland, Ohio), Pittsburgh, and the State of New Jersey (Newark). Interest has also been expressed by the Canadian Government.

Rail Supporting Technology. In order systematically to study and advance supporting technology for all kinds of transit systems, the Department of Transportation is building the High Speed Ground Test Center near Pueblo, Colorado. This center will facilitate testing of all types of track-guided vehicles under precise, controlled conditions. UMTA and the Federal Railroad Administration are cooperating in the construction of test track facilities and laboratories for the testing of track, structures, and vehicles.

The Pueblo site will have a 9-mile electrified transit test track, the first portion of which was opened in August 1971. The remainder of the basic oval will be completed early in the summer of 1972.

The track will be used for the development of a standard vehicle acceptance program and also to test new vehicles such as the State-of-the-Art Cars (SOAC) and Advanced Concept Train (ACT-I), as well as new vehicle innovations such as the Energy Storage Propulsion System.

New Systems. The Department characterizes as "new systems" all unconventional modes of urban mass transportation, ranging from personal rapid transit systems, which are intended to provide convenient point-to-point service to small groups of passengers traversing the system network, to high-speed line-haul systems, such as the urban tracked air cushion vehicle, which will be particularly well suited for airport access.

UMTA's RD&D effort in new systems includes the following: Advanced Transit Planning Methods; Demand Responsive Transit Systems; Dual-Mode Transit Systems; Morgantown Personal Rapid Transit Demonstration; and urban Tracked Air-Cushion Vehicle.

Advanced Transit Planning Methods. UMTA is building computer-based tools for transit planning for two pilot cities. After the demonstration, the tools will be disseminated to local planning agencies to permit systematic evaluation of multimodal transportation alternatives. Specific key elements are:

- (1) Study of socio-economic factors relating to transit.
- (2) Design and implementation of software.
- (3) Demonstration of all software in two urban areas.
- (4) Generalization of demonstration results to other urban areas.
- (5) Distribution and continued support of software and methodology.

While transportation planning expertise is presently highway oriented, these new tools will dramatically improve transportation planning by facilitating examination of urban transportation needs, cost and community impacts. They will aid applicants in generating and evaluating capital grant requests as local agencies will be better prepared to justify the preferred solution. These tools will give DOT a new capability to determine equitable balances in modal decisions. This program will result in improved decisionmaking and shorten the path to solving urban transportation crises.

New Systems Development Engineering. The intent of this program is to provide continued support of promising new technology to stimulate small, innovative groups who otherwise could not afford to concentrate on mass transit system component development. Work in this area is primarily applicable to personal rapid transit (PRT) systems, discussed below. In FY 1972, the program progressed at an accelerating rate. Four contracts were awarded for the following work:

- (1) Development by Uniflo Corporation of a PRT system featuring a passive vehicle (i.e., without an on-board command and control system). This two-phase effort will produce a limited demonstration system that will support a passive-vehicle PRT system. This system will be evaluated

in comparison with the four PRT systems exhibited and tested at Dulles Airport beginning during TRANSPO '72.

(2) Development of a short headway, computerized PRT safety monitoring system. These systems, because of briefer intervals between vehicles, have much greater passenger carrying potential per lane of dedicated guideway.

(3) Development of a quiet wheel and a passive switch by Pullman Standard. Two limits on the application of steel rail technology to PRT's are the present moving-table switches, which are very slow, and the noise caused by wheels slipping around curves. It is expected that both these problems will be solved.

(4) Development of a novel propulsion-transmission system for PRT vehicles which uses a new, innovative clutch and is simple and efficient.

All the above developments fit into an orderly, sequenced development plan designed to advance the state-of-the-art.

Personal Rapid Transit (PRT). PRT is a public transportation system which enables a large number of relatively small vehicles to travel on a dedicated guideway network spanning an urban area.

Widespread adoption of PRT will hinge on its economic and social viability compared to alternate transportation choices. Economic success will be assured by developing technologies which reduce cost per passenger mile and at the same time employ new command and control capability.

PRT AT TRANSPO. UMTA introduced PRT to the public by carrying a total of 83,000 passengers on four systems during TRANSPO '72 without a single accident of any kind. Clearly, the fact that four sophisticated PRT systems were designed, fabricated, tested and put into public service in 10 months is proof of the feasibility and practicability of the technology.

The significant accomplishments in 1972 in this program were:

- (1) Four PRT systems were developed and tested.
- (2) Eight vehicles were fabricated and tested.
- (3) Four different command and control systems were demonstrated.
- (4) Different types of vehicle were demonstrated: (a) air cushion, (b) rubber wheeled, (c) suspended monorail.
- (5) A fast acting monorail switch was demonstrated.
- (6) A single-sided Linear Induction Motor (LIM) was demonstrated.

The systems are currently undergoing extensive tests on the site at Dulles International Airport to accumulate engineering data that are essential to develop a specification for a deployable PRT.

PRT TECHNOLOGY DEVELOPMENT. Studies underway in FY 1972 at the Applied Physics Laboratory of Johns Hopkins University have extended knowledge of applicable command and control technology but further development is still required.

Planned technology development for PRT includes studies in the areas of: (1) Command and control (automation); (2) failures analysis and correction; (3) guideway and station engineering and site integration; and (4) technology development for high capacity PRT.

MORGANTOWN PROJECT. The Morgantown, West Virginia Project is developing a fully automated personal rapid transit system (PRT) with the following objectives:

(1) To test characteristics such as short headways (distance between vehicles) of 7.5 to 15 seconds and rubber tired vehicles with conventional electric propulsion and on-board switching on a mechanically inert guideway.

(2) To conduct a full-scale demonstration as the first step toward a fully operational system and establish its economic and operational system and establish its economic and operations feasibility.

(3) To qualify the system for UMTA capital grants and make it available to all qualified applicants on a non-proprietary basis.

The Morgantown project will provide a reasonably priced and attractive alternative to the use of the private automobile in urban areas and a replacement for bus systems where justified by traffic density. Facilities at Morgantown were more than 50 percent complete at the end of June 1972. It is planned to monitor the completed system's performance so that problem areas can be identified and corrected prior to its installation in other urban environments as a public transit system.

Demand Responsive Transportation Systems. UMTA is funding a Dial-A-Ride service as a market test to determine costs, ridership, revenues, and other benefits of driver operated, door-to-door urban transportation systems which rely upon adaptable routing and scheduling to improve their responsiveness to the needs of urban transportation users.

A demonstration of manually-dispatched Dial-A-Ride service was put into operation in Haddonfield, N.J. in FY 1972. Significant mid-day, off peak, and Saturday usage of the Dial-A-Ride system was experienced immediately after service began.

A computer-dispatched system will be placed in operation as soon as the baseline performance for a manually dispatched system is established.

Dual-Mode Transit System Development. This program will develop and demonstrate the technology of a new transportation mode which retains the best features of personal rapid transit (PRT) systems and those of conventional and demand-responsive systems. This new system will provide comprehensive origin-to-destination service at minimum cost through the use of automatic vehicle control to permit the vehicle to operate on guideways in high-density areas and under manual control on city streets in those areas where ridership does not justify the installation of fixed guideways.

The convenience and level of service will be increased; there will be a reduction of travel time between starting points and destinations. This system will provide a highly flexible means of transportation which will be offered as an attractive, viable alternative to the automobile, resulting in less congestion in downtown areas.

A feasibility study was completed during FY 1972 and a three-phase program was drawn up for implementation beginning in FY 1973. Phase I consists of five systems studies, each of which analyzes all the elements of a discrete system, such as guideway, vehicle, command and control, station,

access and egress, architecture, planning, and economics. Phase II will transform two of the studies into hardware including test guideways on which complete engineering evaluation of the systems will be conducted. Phase III will be the construction and operation of a dual-mode system in a city. The long-range objective of the dual-mode program is to develop and demonstrate the system and to qualify it for capital grants.

Urban Tracked Air Cushion Vehicle. The urban tracked air cushion vehicle (UTACV) program will provide a completely tested state-of-the-art passenger carrying prototype vehicle system ready for installation in revenue service and the initial procurement of an advanced concept vehicle. The state-of-the-art system can be employed for:

- Airport access from the central business district.
- Airport-to-airport interchange.
- New communities development.
- Travel between contiguous complexes.

Rapid advances in levitated vehicle technology require continuing developmental efforts to insure that the Department makes available the most advanced operational UTACV system for urban application. An advanced concept vehicle will include such innovations as a single-sided linear motor for propulsion, solid state variable frequency control, and new means of levitation to make the UTACV system more efficient, quieter, and less polluting than the state-of-the-art system.

With the greatest population growth occurring on the fringes of metropolitan areas, travel distances to central business districts or other centers of activity are becoming greater. New systems, such as UTACV, must be developed to cover these greater distances in reduced times to complement and influence urban growth for both existing and new communities.

The technical expertise of the DOT Transportation Systems Center has been utilized and will continue to be employed to monitor the technical performance of the UTACV contractors. These new technology developments will result in quieter, smoother riding, and more efficient vehicles.

The UTACV Program in FY 1972. During FY 1972 UMTA laid solid groundwork for a four-phase program designed to make available for revenue service by the end of 1974 a state-of-the-art Urban Tracked Air Cushion Vehicle (UTACV) system.

Phase I—engineering design—conducted in the latter half of 1971 and completed in January 1972, provided for the engineering design of a state-of-the-art 60-passenger prototype vehicle propelled by a linear electric motor and the design of site-independent aspects of facilities for a complete system, including guideway, wayside power distribution, wayside control system, passenger and baggage handling facilities, and a vehicle maintenance facility. Also included was the fabrication of a full-scale mockup of this vehicle. Parallel contracts were awarded to Rohr Industries, Inc., and Vought Aeronautics Company.

SYSTEMS ANALYSIS AND EVALUATION. Included in the category of systems analysis are contract and UMTA analytical efforts related to experimental design and evaluation of RD&D projects, review of unsolicited technical

proposals, review and critique of draft final reports on UMTA RD&D projects, analytical and technical support for individual projects, and detailed analysis and planning related to proposed demonstrations of intermodal integration—that is, interconnectivity of urban mass transportation systems with themselves or with intercity services such as airports and railroad stations.

UMTA's efforts in systems analysis include the following:

Experimental Design, and Intermodal Integration. UMTA's experimental design program entails setting specific project objectives, developing a statistical analysis framework for the experiment, identifying appropriate measures, monitoring the project data collection, and analyzing the results in such a manner as to derive information transferable to other urban areas.

INTERMODAL INTEGRATION. UMTA is assessing the potential for establishment of coordinated, comprehensive, and reliable intermodal transit service throughout a single urban area. Specific improvements sought include:

(1) *Institutional integration* wherein the managements of the individual transportation properties agree to integrated operation of their respective properties.

(2) *Operational integration* of individual operators into a single system with joint fares, coordinated schedules, a system-wide information service, and deletion of wasteful duplication of services.

(3) *Physical integration* of separate systems and modes wherein standardization of vehicles and fare collection, joint utilization of rolling stock, joint construction of intermodal terminals, transfer points, interchanges and multilevel facilities capable of effecting the efficient and pleasant transfer of passengers has been provided.

PLANNING RESEARCH

The Planning Research component of the UMTA Research, Development and Demonstration program supports special research concerning major program and policy issues—usually relatively short-term, one-time studies—such as the three data collection and analysis contracts that assisted in the development of the Department's report on the feasibility of Federal assistance for mass transit operating costs.

The following are examples of studies either DOT or jointly funded, completed, or currently underway:

- A review and evaluation of local transit regulation and regulatory agencies, including consideration of regulatory means to stimulate transit innovation and improve service.
- An assessment of the relationship between transportation planning and comprehensive planning at the local level.
- Ways to organize a continuing transportation planning process at the local level.
- The feasibility of, and study designs for, systematic analysis of the effects of urban transportation investments.

- A work program for developing urban transportation indicators for use in program development and evaluation.
- Field work and analytic support for the Department's study of the feasibility of Federal operating subsidies for urban mass transportation.

Service Development. The Urban Mass Transportation's Office of Research Development and Demonstrations (URD) is undertaking projects to design a research and development program to eliminate barriers to mobility on public mass transportation encountered by 10 million handicapped and 20 million elderly persons. In the meantime, much can be done more immediately to alleviate or eliminate many of the problems which deprive the elderly, handicapped, poor, unemployed, and youth of means of getting about in cities. Whereas the instrument of the fundamental study is research and development, the medium of the Service Development Program is demonstration.

Section 16 of the UMTA Act has generated a heightened awareness and interest in improved mobility for the handicapped and elderly. Recommendations made at the White House Conference on the Aging and subsequent conferences held at the local level have produced a quantum jump in applications for transit demonstrations for the elderly and handicapped.

RAILWAY RESEARCH, DEVELOPMENT, AND DEMONSTRATION

High Speed Ground Test Center. The DOT High Speed Ground Test Center, located northeast of Pueblo, Colorado, will help to fulfill DOT objectives of advancing ground transportation technology and developing cost and performance data on potential systems for intercity and intracity transportation. Since the Center's inauguration on a 9-by-5½-mile site, it has constructed initial test facilities and is now constructing new laboratories and guideways.

The planning and development of the Test Center is a cooperative Departmental effort under the management of FRA's Office of Research, Development and Demonstrations and receiving the assistance of the Federal Highway Administration in construction engineering and construction contract administration. The Test Center is available to other Government agencies and private industry.

The 6.2-mile portion of the Linear Induction Motor (LIM) test track, completed in April 1971, has been used for LIM suspension, and rail/wheel interaction testing by the Linear Induction Motor Research Vehicle (LIMRV) at speeds up to 153 m.p.h. During the winter of 1971, however, extreme low temperatures pulled apart several LIM reaction rail welded joints due to weld porosity. This temporarily halted the test program and brought about a reevaluation of both rail anchoring and welding procedures.

Results from buckling experiments by the National Aeronautics and Space Administration's Langley Research Center revealed lower prestressing of the reaction rail was possible. A new welding technique produced better quality welds. The reaction rail was rewelded, reinstalled, and the test program has continued on a step-by-step increase into the 100-200 m.p.h. speed range.

Final design for the first mile and a half of what will finally be a 22-mile oval with a U-shaped guideway for the 300 m.p.h. TACRV has been completed. It will be located on the southern portion of the east tangent of the guideway. Design specifications were slightly relaxed during procurement in order to bring the cost in line with the available program funds. The first quarter-mile is expected to be finished in the late fall of 1972 in time to start TACRV low-speed testing.

The design has also been completed for about 11 miles of a 20-mile conventional rail test track complex. Construction has started on a 6.5-mile test rail section for train dynamics and impact tests with completion expected early in calendar year 1973. Additional sections will complete the impact test track and a high speed, 160 m.p.h. test loop.

Construction is nearly completed on the last 6.7 miles of the UMTA 9.1-mile closed oval transit track of which the original 2.4 miles has been used for testing two New York subway cars with instrumentation for ride-quality, noise, track geometry and track dynamics.

Under a joint FRA/UMTA program, design for the Rail Dynamics Laboratory building was completed and a construction contract awarded. The laboratory is expected to begin operations in the fall of 1973 and will be used to test full-scale rail vehicles under a wide range of track conditions. The Program Management Building, used also for administrative office space, was completed in February 1972.

Other accomplishments during the year include: development of the electrification master plan; signing of a utility contract for electrical power; completion of an overpass over the guideways into the building complex area; design and contract award for the water system; completion of a preliminary communications plan; procurement of portable communications radios for operations, safety and control between the various activities; the award of an operations and maintenance contract; and awards for design and construction of additional service roads.

Advanced Systems. As contributing part of subsystem technology for the Tracked Air Cushion Vehicle (TACV) program, studies during the past year included continued research in fluid suspensions with the development of a mathematical model for the heave motion of flexible-skirted air cushions, and experiments with scale models of aerodynamically supported vehicles with a ram air cushion.

The full scale 300 m.p.h. TACRV test bed for vehicle aerodynamics, air cushions, electric propulsion, wayside power, and ride quality was completed in March 1972. The vehicle's air cushions and secondary suspension system performed as predicted during tethered levitation tests at the factory. The TACRV arrived at the Test Center after being displayed at TRANSPO '72 and is undergoing installation of air supply engines, instrumentation and calibration of sensors. Static powered tests are expected to start in early fall of 1972, with moving tests on a 1.4 mile of guideway late in the year. The TACRV project will establish design guidelines for passenger-carrying commercial vehicles and will extend the technology level to 300 m.p.h.

Although research on it began later, the Magnetic Levitated Vehicle System (MLVS) is now a serious and promising competitor to air cushion

vehicles, with scale model levitation testing being conducted and a full scale developmental program expected in the near future.

Design of a 150 m.p.h. UMTA Urban Tracked Air Cushion Vehicle (UTACV) was completed in January 1972, and a single 60-passenger prototype is being fabricated to be ready for testing at the High Speed Ground Test Center in the spring of 1973. The all-electric UTACV will be powered by a French Linear Induction Motor (LIM). This LIM will be controlled by varying the voltage supplied to the motor—a different approach from the variable frequency control used in the TACRV LIM.

The 3,750-pound thrust, air-cooled LIM on the LIM Research Vehicle was tested to speeds up to 153 m.p.h. with measured thrust equal to that predicted. This is also the highest speed at which a linear electric motor has ever propelled a vehicle.

Electric power collection for the 300 m.p.h. TACRV created a challenge. Tests of power rails and collector aerodynamics were successfully conducted on a rocket sled. Before testing the collector on the TACRV, mechanical dynamic tests will be completed on the rocket sled.

An economically attractive alternative to wayside power that is under investigation is power generated on-board by closed gas-cycle external combustion engines. Current studies of U.S. and foreign experience indicate that of the propulsion candidates, the Stirling and semi-closed Brayton cycle engines show the best promise of meeting the present goals and future potentials.

RAIL TECHNOLOGY

In keeping with FRA Office of Research, Development and Demonstrations objectives, advanced systems are being pursued, as well as passenger and freight rail technology both at the High Speed Ground Test Center and also on operating railroads. One of these projects is the Conventional Test Tracks at the Test Center which will provide Government and industry with the facilities for testing total train dynamics, equipment rock and roll characteristics, impact effects on equipment and lading, and the nature of vehicle-track interactions throughout a wide range of speeds. Another research project is a straight section of revenue service track located in Kansas, of which eight different instrumented track structure sections and one control section are nearly complete. This project is directed at reducing maintenance costs and improving safety through increased stability of the roadbed.

Another rail technology research tool is the wheel/rail dynamics simulator in the High Speed Ground Test Center Rail Dynamics Laboratory, jointly funded by FRA and UMTA, on which full-scale wheeled vehicles can be placed on matching rollers and be driven or drive the flywheels with dynamically excited rail simulation response conditions. During FY 1972 specifications were prepared and requests for proposals were issued for several of the major components of the simulator which consists of: drive trains, track modules, carriage assembly, excitation system, control system, and instrumental system.

Safety ranks very high in FRA project priorities and during the year several grade crossing protection systems were explored, including telemetry warning and microwave radar systems, as well as further tests of train

reflectivity and supplemental visibility devices. Another device that will provide lower maintenance costs is the non-rubbing hydrodynamic brake. Technical feasibility was shown in FY 1971 and in FY 1972 a design was completed and fabrication started with a series of laboratory tests expected in FY 1973. The major advantage of this braking is the reduction of thermal loads from the train wheels. At the high speeds envisioned for freight and passenger trains of the future, thermal loads pose a threat to wheel integrity and, consequently, train safety. In the tank car improvement program, thermal coatings were tested that could offer fire protection to tank cars involved in derailments. Also, a study was initiated in FY 1972 on hazardous material tank car safety to provide practical and economical improvements in tank car design and train handling techniques.

DEMONSTRATIONS

In 3½ years of scheduled service, the Metroliners in New York to Washington service and the Turbo Trains in the Boston to New York service and various public tours have demonstrated that there is a continuing market for rail passenger service. Travelers will respond with increases in rail patronage when given service improvements or price incentives.

Technical problems that have held down reliability on the fleet of 49 Metroliners have been identified and an extensive improvement program is being conducted on several Metroliners for service tests. After these tests, most of the remaining fleet of cars will also be modified. The improved reliability will reduce maintenance costs. In spite of the problems affecting service reliability, Metroliner frequency during the year was raised from 9 round trips a day to 14, and service from Washington through New York to New Haven has been added. Metroliner increased 36 percent in FY 1972 to just over 1.9 million passengers and ridership statistics showed that the Metroliners continued to attract passengers from other travel modes in the corridor.

The two leased, three-car DOT Turbo Trains have undergone equipment modifications resulting in a better ride, acoustical and climate improvements, equipment changes to simplify components for increased reliability, and the addition of two new cars each. The added cars increased seating capacity on each train from 144 to 240 and will provide a more economical operating unit for the New York to Boston market.

Station experiments have continued to play a vital role in encouraging additional ridership. The Capital Beltway Station at Lanham, Maryland, which opened for the use of Metropolitan Washington corridor passengers on March 16, 1970, with DOT as a co-sponsor, attracted more than twice as many rail passengers in FY 1972 as in FY 1971 with almost 93,000 passengers using the suburban located park-and-ride facility in FY 1972. Another station, Metropark in Woodbridge, New Jersey, that was opened during FY 1972 has also continued to provide a convenient park-and-ride facility for Metroliner riders.

TRAFFIC SAFETY RESEARCH AND DEVELOPMENT

Accident Investigation. A scientific system of accident investigation, reporting, and analysis is essential to a real understanding of accident and

injury causes, and to an assessment of the efficacy of the safety measures presently being applied. The system must generate and analyze data on the performance and interaction of motor vehicles, of drivers, and of the highways and surrounding environment involved in traffic accidents. The Department's National Highway Traffic Safety Administration (NHTSA) utilizes three levels of accident reporting:

- Routine police/driver accident reports.
- Intermediate or bilevel investigation studies.
- Multidisciplinary detailed investigation reports.

The third and most sophisticated kind of investigation is performed by multidisciplinary accident investigation teams who carry out on-the-scene detailed investigations of selected kinds of collisions.

Working collectively in a single geographic area, these three investigation techniques provide answers to many questions on accident and injury causation which cannot be obtained through the analysis of one investigative level.

AUTOMOTIVE RESEARCH HIGHLIGHTS

In addition to the vehicle research entailed in advancing the crash survivability characteristics of automobiles (described in the section on Priority Programs), the year's research was centered on vehicle handling, tires, brakes, fleet tests, and vehicle-in-use.

Study of vehicle handling is continuing along established lines, namely vehicle performance in obstacle avoidance, lane changing, and combined steering and braking. In addition, NHTSA has completed its first study of articulated trucks. A special bus stability program also is underway. Major findings indicate that tire types as well as wear patterns affect vehicle handling performance, and a major research effort in tire performance is planned.

During 1972, work continued on uniform quality grading of tires. The results soon will be available to the public through a proposed regulation. Implementation of the regulation will enable a tire purchaser to select a tire suitable for the kind of use he envisages.

Research on braking systems is presently focused on obtaining the technical data for a standard regulating replacement brake lining.

Fleet tests of passive restraints were initiated during 1972 with the purchase of 125 new vehicles equipped with air bags which are assigned to the General Services Administration fleets for evaluation of restraint systems' effectiveness and maintainability under actual traffic conditions. Automotive crash recorders were developed for the fleet vehicles to obtain crash decelerations and pre-crash data such as vehicle speed, brake line pressure and steering angle.

DRIVER AND HIGHWAY RESEARCH HIGHLIGHTS

Research centered on alcohol (see Priority Programs), driver education improvement, driver licensing, driver alertness, and pedestrian safety.

Research in support of the Alcohol Countermeasures program concerned: (1) Portable breath testing devices to aid police in pre-arrest screening and

(2) alcohol safety interlocks to prevent operation of vehicles by intoxicated drivers. Presently available interlock units are suitable only for certain limited applications.

NHTSA and the Coast Guard are cooperating in an experiment to determine the effectiveness of driver education and improvement programs.

Research goals in driver licensing are two-fold: (1) To develop improved tests of medical status, physical capacity, driving skill and knowledge; and (2) to develop effective and uniform licensing enforcement practices. There are research projects on driver license data requirements; enforcement of driver license denials or revocations; visual requirements for licensing; and, knowledge, decisionmaking, and test requirements for vehicle handling. Research will concentrate on diagnostic test procedures to detect performance deficiencies that should be corrected and innovative methods for correcting such deficiencies.

Because of accidents caused by inattention or drowsiness, research in driver alertness tests the effects of time, noise, and traffic on the driver's ability to respond.

THE NATIONAL DRIVER REGISTER

The National Driver Register is a Federal-State cooperative license record exchange service which provides State licensing officials with a single source of data on problem drivers. The file now contains more than 3.2 million records (some more than 7 years old) and some 3,400 accessions are added every day. More than 65,000 inquiries are processed each 24 hours.

Chapter VIII

PROGRAM DEVELOPMENTS

INTERMODAL PROGRAMS

TRANSPO '72. A significant effort of the Department during the year was the production of TRANSPO '72, a multimodal transportation exhibition held at Dulles Airport between May 27 and June 4, 1972. Utilizing over 300 acres of land, it was the largest exhibition of its kind ever presented. Though it was initially proposed as an aviation show—a sort of counterpart of the Paris Air Show—its concept was quickly broadened so that the exhibition would include all modes of transportation and related technologies.

At TRANSPO was a vast trade show featuring the products of manufacturers of equipment both from the U.S. and from other countries; in a sense, TRANSPO was intended largely as a sales showcase for such equipment. But it was also a transportation exhibition featuring thousands of artifacts ranging in size from a small valve to a C-130 transport plane. To attract public attendance, an air show was staged each day by skilled pilots, both military and private, and demonstrations of craft and equipment were presented for both specialized buyers and members of the general public who attended the exhibition.

Construction of the exhibition on the Dulles Airport site proved unexpectedly to be a problem of vast proportions because grading of the site and completion of the many buildings and vast acres of parking space had to be completed while the area was receiving more rainfall than it had received in any previous year on record—three times the normal fall, for example, during the crucial month of October 1971.

In those circumstances, consolidation of the soil sufficiently to permit installation of numbers of buildings and temporary parking surfaces proved to be a herculean task that was accomplished only just on the eve of the exhibition.

By opening day, however, despite all the problems and difficulties, some 400 exhibitors had arranged their display areas so that the show could begin.

A theme area at the entrance to TRANSPO was devoted to both pictorial and three-dimensional representation of the history of transportation, including as examples numerous artifacts of high significance in transportation history, such as early aircraft and trains.

Each mode of transportation, both past and projected for the future, was well represented. Displays included four personal rapid transit systems designed to shuttle people and goods around the center of a city, all of which remained in place after the exhibition to allow further experiments with their capabilities, and in addition, examples of all known types of transportation vehicles and facilities.

During the TRANSPO period, 20 transportation symposia of varying kinds were conducted in Washington with DOT cooperation. These included meetings of international and domestic organizations and conferences, some of which were technical in character while others were trade associations or other groups of people interested in one or another aspect of transportation.

A major purpose of TRANSPO, of course, was to give United States manufacturers an opportunity to display and sell transportation-related merchandise. While major sales of equipment on the spot had not been anticipated by the exhibitors, many of them reported significant actual sales; exhibitors reported excellent follow-up business. Many foreign exhibitors presented their products at TRANSPO, including large numbers from Canada, Great Britain, and West Germany.

Evidence of the success of TRANSPO was the shift in the attitude of the press and other media. While initially they were almost uniformly critical and predicted disaster for the show, ultimately all media joined in praise of the accomplishment of the exhibition.

The Department's success in staging so impressive a program with relatively limited resources is attributable in good part to the magnificent cooperation TRANSPO received from all segments of the Department, and from almost all other government agencies, many of which made major contributions of material and talent for TRANSPO. Contributions from other Departments ranged from lending a talented designer for a short term to providing a completely equipped flying team to appear in the afternoon air shows. Tribute must also be paid to the many individuals and groups who participated personally or supplied effort or materials to enhance the quality of the show. Volunteer effort was highly significant. Similarly effective contributions were made by the British Government and other governments that supplied major components of the air show.

Other intermodal programs. The first annual report on the implementation of national transportation policy required by the Airport and Airways Development Act of 1970 provided a good opportunity for the Department to report the many other new initiatives it had undertaken to improve the status of transportation in the United States and thus fulfill some of the requirements of the law which established the Department. While the overwhelming majority of activities of that type were undertaken by the administrations, there were some significant programs that derived from initiatives within the Office of the Secretary. Mention of some of these will indicate the character of programs that for one reason or another are better sponsored at the Secretary's level.

Among urban programs, the urban corridor demonstration program proposes intermodal solutions to problems resulting from high urban density and peak hour congestion; because the programs are intermodal, most are conducted from the Office of the Secretary. Last year planning was undertaken by all 11 urban corridor demonstration areas for projects to relieve their own problems, and some \$7 million was provided to begin implementation of the projects.

Numerous efforts relating to the control of excess noise generated by transportation were also undertaken. One of the older programs attempts to control aircraft noise by either altering characteristics of the aircraft, or by changing its environment, while a new program attempts to reduce noise generated by trucks on highways, by modification of their mufflers and tires. Several projects are also concerned with reducing noise levels in subways.

Aircraft flying at high altitudes, particularly when such high-flying aircraft number in the thousands, will probably have meteorological effects, the character of which is now unknown. DOT joined with the Atomic Energy Commission, the Department of Commerce, the Department of Defense, the Environmental Protection Agency, NASA, the National Science Foundation and others in a program coordinated through an Interdepartmental Committee for Atmospheric Sciences to foresee and then prevent ill effects of transportation facilities, or to prevent the deployment and use of a new system if its bad effects cannot be prevented.

Facilitation Programs. This Program provides the means for the Department "to facilitate the development and improvement of coordinated transportation services, to be provided by private enterprise to the maximum extent feasible . . ." This assignment is being fulfilled through facilitation programs to help develop and implement policies, practices, and procedures to expedite, to the maximum degree consistent with the public interest, the flow of domestic and international commerce.

Activities during FY 1972 included:

Documentation Management—Joint DOT/NCITD Study. Most of the 28 study recommendations made by the DOT/National Committee on International Trade Documentation are in various stages of implementation. These include standardization, simplification or elimination of costly international trade documents and procedures. Complete implementation of these 28 recommendations will reduce U.S. shipping costs by \$3 billion.

Documentation Management—Commodity Descriptions and Codes. Development of second phase of a standard descriptions and codes system with industry. This system will establish a common language for identifying commodities, simplify determination and application of freight tariffs, reduce the multiple rewriting of cargo descriptions, eliminate errors and misclassification of commodities, facilitate the use of ADP and rapid data transmission, and expedite adoption of the U.S. Standard Master format. Transportation overhead costs will be reduced by \$1.2 billion when this system is implemented.

Passenger Facilitation—Domestic Travel Service. Completion of an extensive research study analyzing service problems confronting the average traveler who utilizes domestic intercity air, bus, and rail transportation is an important step toward a balanced transportation system designed to facilitate the movement of goods and people through better coordination between modes and increased consistency in standards and procedures within each mode.

Facilitation Education—National Transportation Facilitation Forum. Institution of the National Transportation Facilitation Education Program to keep all interested parties informed about on-going technological and procedural facilitation developments. In addition, a new bulletin-type publication, entitled *FAL FACTS*, was begun to highlight important facilitation information for transport uses.

Transportation Systems Management—Interchange and Pooling of Containers. Attainment of a uniform agreement for the intermodal interchange of containers and related equipment within the surface transportation industry by a joint DOT/Department of Commerce task force.

Transportation Systems Management—Transportation Facilitation Center (TFC). Completion of a study of the concept of Transportation Facilitation Centers. These Centers are conceived as having highly efficient transportation facilitation loading and distribution center capability, especially for small shipments.

Efficient Government Procedures—Passenger Inspection Procedures. Continuation of support for passenger inspection procedures at U.S. international arrival terminals to alleviate airline passenger congestion. The Office of Management and Budget conducted a thorough review of the preclearance facilitation practice in use for 17 years and supported the DOT position to improve and expand existing inspection facilities and techniques, support technological efforts to provide improved electronic devices for personal search practices applicable to departing passengers, urge improved scheduling practices during peak-hour periods, and work for expedited baggage delivery.

Cargo Protection.

NEWLY PUBLICIZED PROBLEM—CRIME IN TRANSPORTATION. Theft in the cargo industry costs every man, woman and child in the United States \$5-\$12 a year—an estimated total of \$1 to \$2.5 billion annually. The Select Committee on Small Business of the House of Representatives, in focusing public attention on the extent of cargo theft, cited a 1970 case of a recreation vehicle manufacturer who could not replace a \$30,000 truckload of wheels hijacked on the way to his factory in time to meet his production schedule. As a result of that one theft, the manufacturer lost a seasonal market and was forced to close down his production line. He lost customers, his employees lost their jobs, and other parts suppliers lost business. The net consequences of such chain reactions are not among the tabulated costs of cargo theft—no “claims” are made for such losses—but they exist and are numerous.

GOVERNMENT/INDUSTRY PROGRAMS. The concern of the Federal Government about cargo theft was indicated in June 1971 when Secretary Volpe declared a cargo security crisis and announced that the Department of Transportation would lead in pulling together the fragmented functions of a number of Federal agencies into a coordinated effort aimed at a common target—cargo theft. To assure coordinated Federal effort, the Secretary

formed the Interagency Committee on Transportation Security (ICOTS) and designated the Assistant Secretary for Safety and Consumer Affairs to serve as chairman. Committee membership includes key policy level officials from the Departments of Treasury, Justice, Defense, Commerce, State, and Labor; the General Services Administration, the Interstate Commerce Commission, the Federal Maritime Commission, the U.S. Atomic Energy Commission, the Civil Aeronautics Board, the Small Business Administration, and the U.S. Postal Service.

Government/industry cooperation continued, developing the following 11-point program to attack the problem of theft-related cargo losses:

- (1) Cargo Loss Reporting.
- (2) Cargo Accountability and Documentation.
- (3) Packaging and Unitization, Marking, and Sealing of Cargo Shipments.
- (4) Carrier Liability, Insurance and Loss Claims.
- (5) Physical and Procedural Security Measures.
- (6) Personnel Security Measures.
- (7) Coordination of State and Local Government Programs.
- (8) Law Enforcement and Criminal Procedures.
- (9) Pilot Projects to test feasible ideas quickly in field environments.
- (10) Security Research and Dissemination of Technical Data.
- (11) Shipper and Consumer Activities.

During FY 1972, this program produced such accomplishments as:

DOT Office of Transportation Security. The new office has three major elements: (1) A Civil Aviation Security Division responsible for both aircraft and passengers; (2) a Cargo Security Division; and (3) a Program Development Division which will concentrate on systems and procedures for assuring the application of the most modern technology in solving these problems.

NEW CARGO SECURITY MISSION WITHIN DOT. Secretary Volpe requested the major operating administrations of DOT—Aviation, Highway, Railroad, and the U.S. Coast Guard—to incorporate cargo security within their established safety inspection responsibilities. Initial security surveys have already been conducted and more are scheduled. A series of reports and guides on cargo security were issued by the Department.

DEMONSTRATION PROJECTS. The Office of Transportation Security initiated several projects for testing and measuring the effectiveness of security procedures and equipment which include: a model security program for a New Jersey pier; a device for railcars to issue an alert in the event of tampering or break in; truck top markings for visual interception of hijacked trucks by police helicopters; and a simple locking device for railroad cars. The pilot projects are cooperative efforts by the Federal Government and the private sector and include participation by local and State law enforcement organizations as appropriate.

AVIATION PROGRAMS

Air Traffic Activity. Air traffic activity rebounded somewhat in fiscal year 1972 after showing a general decline the previous fiscal year. The increase in traffic was accompanied by a general upsurge in the U.S. economy.

FAA's air route traffic control centers (ARTCC's) handled 22,021,126 aircraft flying under instrument flying rules, exceeding the fiscal year 1971 total of 21,326,439 by 3 percent. Traffic at FAA's airport traffic control towers (ATCT's), however, declined slightly. The ATCT's handled 53,620,690 takeoffs and landings, 1 percent below the fiscal year 1971 total of 54,235,450. (See Table 8.)

Airspace Management. Significant developments in airspace management occurred in the following areas:

- **Area Positive Control.** FAA completed during this reporting period the lowering of area positive control from 24,000 to 18,000 feet m.s.l., thus establishing a standard base of area positive control throughout the contiguous 48 States.
- **Schedule Restrictions.** During the year, FAA extended for an additional 12 months—to October 25, 1972—the rule authorizing the establishment of flight quotas at five high density airports; however, because of a steady drop in the number of aircraft delays, the number of hours the flight quotas were to be imposed at John F. Kennedy International and O'Hare International Airports was reduced. At both these airports the quotas were revised to be in effect only between the peak-activity hours of 3 p.m. and 8 p.m. The original quotas imposed on Washington National and La Guardia Airports remained unchanged; the Newark Airport quota had been suspended in October 1970. (See Table 10 for reduction in delays.)
- Issued separate notices of proposed rulemaking to (1) establish standard traffic patterns at airports without control tower service, (2) prohibit noninstrument rated pilots from conducting special VFR (visual flight rules) operations in airport control zones at night, and (3) require aircraft to carry an automatic altitude reporting radar transponder in certain controlled airspace and in a number of designated terminal areas. The agency also issued an advance notice of proposed rulemaking soliciting comments on the adequacy of existing regulations on visibility and freedom from cloud requirements for VFR operations below 10,000 feet.

National Airspace System Modernization. FAA continued to introduce semiautomation into the air traffic control subsystem of the National Airspace System (NAS) by implementing its Automated Radar Terminal System (ARTS) III at terminal areas and its NAS En Route Stage A program at its air route traffic control centers.

FY 1972 highlights included:

- **ARTS III.** FAA reached a significant milestone in its effort to introduce a semiautomated ATC system at 61 of the nation's busiest terminal areas. At year's end, 45 ARTS III systems had been delivered to desig-

nated terminal locations. Twenty of these systems were in full operational use at the end of the reporting period; another 15 had been checked out and accepted from the contractor for personnel proficiency development and final operational testing. The remainder were awaiting installation. At the same time, a terminal automation test facility was established at NAFEC with the installation of an ARTS III system at that location; this facility will test and evaluate any increases in the capability of the basic system.

- **NAS En Route Stage A.** Unlike ARTS III, which is going operational as a complete system at each site, NAS En Route Stage A is being installed and implemented in two phases at 20 ARTCC's in the contiguous 48 States. The first phase provides automated flight data processing; the second, radar data processing. FAA is currently implementing the first phase and developing the second. At year's end, 17 ARTCC's had a computerized flight data processing capability. Of these, 16 utilized NAS En Route Stage A hardware; the New York center employed pre-NAS En Route Stage A equipment. All 17 centers were using computer updating equipment, which facilitates communication between the controller and the automated system. With respect to software, 11 centers operated with a version of the NAS En Route Stage A program. Two centers—Albuquerque and Salt Lake City—employed an interim NAS En Route Stage A program designed for use with a single computer; four centers—Chicago, Cleveland, New York, and Washington—used locally developed software programs. At year's end, conversion from local to national computer programs was scheduled at these four centers for FY 1973.
- Three ARTCC's located outside the contiguous U.S. (San Juan, Honolulu, and Anchorage) will receive semi-automated systems without on-line capability, thus requiring sophisticated hardware and software. Systems planning underway at year's end included flight data and radar data processing capabilities, as well as interfacing with terminal air traffic control facilities within their areas of jurisdiction.

Airport Aid and Planning. Significant developments during the reporting period in planning, expanding, and improving the nation's airport system included:

- **National Airport System Plan (NASP).** FAA continued to gather data for the first edition of NASP. Because the airport planning grant program has been underway for a relatively short time, the first NASP will receive scant input from this source; accordingly, FAA is placing a great deal of reliance on forecasting as a tool for determining when and where new airport development and expansion should take place. During the reporting period, FAA forecasted the levels of aircraft and passenger activity over the next 10 years at approximately 1,000 major airports. The requirements for developing NASP necessitates the annual reporting of operations at each airport listed in the plan. Since more than 90 percent of the airports considered to be essential to the plan are nontower airports, FAA let a contract to develop improved methods for measuring traffic at such airports.

- *Airport Planning and Planning Grants.* The Airport and Airway Development Act of 1970, in order to insure the development of an adequate NASP and promote the effective location and development of airports, authorizes the Secretary of Transportation to make grants for airport system planning and airport master planning. For FY 1972, Congress appropriated \$15 million for this purpose. By year's end, FAA had approved 181 planning projects in 40 States valued at \$9.06 million. Of these, 31 grants (valued at \$3.97 million) were for State-wide or regional airport system plans.
- *Airport Development Aid Program (ADAP).* FY 1972, the second full year of operation under ADAP, was a record high year for Federal airport assistance. The year saw FAA enter into 465 grant agreements totalling \$285.9 million. Thirty-four of these agreements were for developing new airports.
- *Airport Property Conveyance.* Under the Surplus Property Act of 1944 (as amended), FAA transferred during the reporting period 12 parcels of land to eligible public grantees for airport purposes. The value of this land amounted to \$44.3 million.
- *Airport Certification.* The Airport and Airway Development Act of 1970, which required all airports serving air carriers certificated by the Civil Aeronautics Board to possess an operating certificate from FAA by May 21, 1972, was amended by Congress to extend the mandatory date for certification to May 21, 1973.

Other Aviation Program Developments. Other significant developments in the aviation program area included:

- *Power Reliability.* FAA's continuing efforts to upgrade its power reliability were reflected by (1) a \$10 million contract awarded for 21 power control systems to be installed at FAA's ARTCC's and the FAA Academy capable of accepting commercial or auxiliary power or, in the absence of both, power from their own batteries and delivering it to critical automation equipment in a stable, continuous fashion; (2) the award of 26 contracts totaling approximately \$6 million for engine generators, cable, and miscellaneous electrical equipment to establish and modernize power systems at various NAS facilities.
- *Prefabricated Airport Traffic Control Towers.* A \$12,986,645 contract was awarded to build and erect 64 prefabricated airport traffic control towers. These towers will be installed at low-and medium-activity non-radar airports in 33 States and the Commonwealth of Puerto Rico. The utilization of a turnkey method of contracting and a high degree of in-plant prefabrication will yield considerable cost savings to the Government; it will also provide a greater measure of quality control than might ordinarily be available from conventional field-construction methods.
- *Air Traffic Control Systems Command Center.* New operating quarters for this center, which operates the Central Flow Control Facility 16 hours a day, 7 days a week, were commissioned on February 22, 1972. The facility has the capability of converting to a command-post posture immediately in the event a situation develops that would seriously degrade the overall air traffic control system capability.

HIGHWAY PROGRAMS

Fringe and Corridor Parking Facilities. During FY 1972, several States either constructed, or took steps to construct, fringe parking facilities under the authority contained in the Federal-Aid Highway Act of 1970. This authority used in conjunction with that contained in the Urban Mass Transportation Assistance Act—to assist in the acquisition of transit vehicles and their servicing facilities—provides an excellent instrument of intermodal cooperation in moving more people in fewer vehicles in urban areas.

Progress on the program accelerated when policy was amended to permit projects on the Federal-aid primary, secondary and Interstate Systems to serve either or both bus and rail mass transportation. This greater flexibility expanded interest in the program and permitted consideration of interstate financing of three BART commuter lots in the San Francisco Bay Area, several other fringe parking lots in the Chicago area, and the expansion of the "Blue Streak" parking lot in Seattle, Washington. As part of the Urban Corridor Demonstration Program, several "Joint Use Park-and-Ride Facilities" are being used or planned to convert automobile drivers to bus passengers.

Highway Program Funding. Federal-aid highway funds authorized by the Federal-Aid Highway Act of 1970 and prior legislation which were apportioned to the States through FY 1972 amounted to \$5.469 billion.

About \$5.0 billion was released for obligation during FY 1972. The President's budget for FY 1973 provides for program obligations of \$4.4 billion. Obligation authority in this amount was distributed to the States as of July 1, 1972.

Progress on the Interstate System. At the close of FY 1972, 79 percent of the designated 42,500 miles of Interstate System was open to traffic. This brought the total mileage in use up to 33,522, an increase of 1,496 miles from the previous year. Sections completed to full design standards increased by 1,759 miles, or approximately 5 miles of full standard Interstate highway were completed daily during the fiscal year. In addition, 79 percent of the System's total rural mileage and 79 percent of the total urban mileage were in use.

In addition to the sections in use, 3,776 miles were under construction at the end of the fiscal year, and engineering and right-of-way acquisition was completed or underway on 3,778 miles. Altogether, work was completed or underway on 96.6 percent of the total 42,500-mile system.

Construction Contracts and Prices. The Federal-aid highway construction program is accomplished through competitive bidding for contracts awarded by the various State highway departments. Competitive bidding during FY 1972 averaged 4.9 bids per contract in the Federal-aid primary and Interstate programs.

During the year, 5,244 Federal-aid highway construction contracts with a total value of \$5.2 billion were awarded, of which 1,708 were on the Interstate System, 2,008 were on the Federal-aid primary system (exclusive of Interstate), and 1,528 were on the Federal-aid secondary system. Contracts for urban work are included in these figures. The average size of contracts

during the year was approximately \$1,600,000 and 79 percent of the contracts were for less than \$1 million.

Contract prices on Federal-aid primary highway construction, including Interstate, increased at an annual rate of about 7 percent from the end of FY 1968 to the end of FY 1972. The composite indexes of contract prices (1967 calendar year=100) for the four quarters of fiscal year 1972 were 135.5, 133.5, 135.5, and 133.7, respectively.

The composite index for the fourth quarter of FY 1971 was 133.4. From July 1968 through June 1972, highway construction prices in urban areas were 35 percent higher than in rural areas.

The costs of labor and materials and supplies during the fiscal year amounted to 26 percent and 45 percent, respectively, of the Federal-aid primary highway construction cost (excluding costs of right-of-way and engineering). The remaining 29 percent was for equipment expenses (excluding operators' wages), overhead, and profit.

Average hourly earnings of labor on Federal-aid primary highway construction increased 5.8 percent during FY 1972. There was very little increase in labor productivity, and consequently, the cost of labor increased 5.7 percent. The cost of highway construction materials increased 6.8 percent during this period and equipment expenses rose 3.1 percent. The weighted composite increase of Federal-aid highway construction labor, materials, and equipment costs during FY 1972 was 5.9 percent.

Other Highway Programs. In addition to activities relative to the Interstate and ABC Systems, the Federal Highway Administration, is also engaged in road construction activities, either for its own programs or in cooperation with other Federal, State, and local agencies. Sometimes FHWA acts on behalf of those other agencies.

Under the direct supervision of the Federal Highway Administration during FY 1972, work was completed on 66 projects with a total length of 225.1 miles and involving Federal funds totaling \$39.7 million. Eighty-five new projects were awarded for construction on 276.7 miles for a total amount of \$38.8 million.

At the close of the year, 98 projects were under contract with an obligation of \$65.2 million for construction on 396.4 miles. Additional work on 178.4 miles, estimated to cost \$38.7 million, was either in the programmed, plans-approved, or advertised stage.

GROWTH CENTERS. The Economic Growth Center Demonstration Program was enacted by Congress to determine under which conditions development highway projects related to designated growth centers would contribute to the economic and social development of the centers and rural areas served by these centers. Supplementary grants of \$50 million for FY 1972 and 1973 were authorized to provide an additional 20 percent of the cost of Federal-aid primary projects tied to approved growth centers.

Criteria for growth center selection were developed in conjunction with the Secretary of Commerce, the Title V Regional Economic Development Commissions, and the Appalachian Regional Commission. Growth center recommendations of State Governors were reviewed by a panel of represen-

tatives from these agencies and staff members of the Department of Transportation.

One hundred five small cities in 49 States and Puerto Rico were approved as growth centers under the program. Populations of the growth centers range from 76,215 in Pittsfield-North Adams, Massachusetts, to 1,140 in Palmer, Alaska. The average population size is 23,275.

To emphasize the demonstration nature of the program, centers were approved in as many geographic and economic settings as possible. Two of the 105 approved centers are new towns; 31 are cities already designated as growth centers by the Economic Development Administration; 20 are in growth areas designated by the Appalachian Regional Development Commission and two by the New England Regional Development Commission; while 15 are recognized as growth centers by other Title V Regional Commissions.

As of April 30, 1972, study, preliminary engineering, or construction projects were in progress in 27 States.

SIGNING. The 1971 Manual on Uniform Traffic Control Devices for Streets and Highways was approved as the national standard for signs and markings for all highways open to public travel.

As widespread changes in various traffic signs and markings during the next few years will affect every American motorist and pedestrian, an extensive national public education program was launched under the direction of the FHWA. Both governmental and private groups are participating. To help accomplish this educational objective, FHWA prepared and published a booklet, "The New Look in Traffic Signs and Markings" which was widely distributed. This program has been successful in reaching millions of motorists.

A research program on diagrammatic signing is nearing completion. It was designed to measure the effects of diagrammatic signing on a variety of both common and unusual highway geometrics and on different traffic conditions. A comprehensive evaluation is being made through the use of laboratory and field studies.

WATER TRANSPORTATION PROGRAM

Vessel Traffic Management Systems. FY 1972 saw a major new initiative undertaken by the Coast Guard to develop vessel traffic management systems for the nation's ports and waterways. The primary objectives of such systems are to save lives and property, protect the environment and facilitate marine commerce.

Development of vessel traffic control systems in the major ports in the United States has heretofore been minimal. Some few systems were devised; for example, the Long Beach pilots have continuously utilized a radar in their operations center since 1949. The Los Angeles pilots followed suit in 1951. There have also been two experimental projects in the Port of New York. A Harbor Advisory Radar experiment was conducted by the New York Port Authority in 1951 and 1952 but the technique was not employed again until 1962 when the Coast Guard in cooperation with the New York Port Authority began a 3-year experiment using radar in conjunction with

a TV display. That system came to be known as "RATAN" (Radio and Television Aid to Navigation). The experiment was terminated due to technical problems and lack of funding support.

However, the need for improved traffic management was still recognized. In 1969 the Coast Guard began another experimental project using shore based radars in San Francisco Bay. An experimental Harbor Advisory Radar (HAR) was placed in service in January 1970. Participation was purely voluntary. San Francisco Bay had an established voluntary "Vessel Movement Reporting System" operated by the marine exchange on Pier 45 and an existing well-developed communication system, both of which were utilized in the projects.

The disastrous collision between two tankers under the Golden Gate Bridge in January 1971 with the resultant spill of 800,000 gallons of oil into San Francisco Bay once again strongly emphasized the need for vessel traffic control in major ports. FY 1972 saw greatly increased activity by the Coast Guard to meet this demand. Research and development efforts were expedited and expanded. A Marine Traffic Management Branch was established in the new office, Office of Marine Environment and Systems. A vessel traffic system for Puget Sound was planned, designed, and implemented. Trial operations began in June 1972 with full operation to begin early in FY 1973. Final plans for a vessel traffic system for the Houston Ship Channel are nearing completion. Construction will begin early in FY 1973. Preliminary planning for vessel traffic systems in New York Harbor; the lower Mississippi River; Valdez, Alaska; Chesapeake Bay; Boston Harbor and San Pedro Bay in California has begun. A contract for a study was let in June 1972 to provide outside assistance in determining the needs and level of needs in these and other ports.

The whole vessel traffic system program is being examined in depth by a special in-house study begun by the Coast Guard in February 1972. The study will be completed in January 1973.

Technological Advances. The advances in the technology of design and construction of surface effect ships have been followed closely by the Coast Guard as part of their involvement in a continuing program of developing international safety standards for these craft. Many areas with mass transportation difficulties are interested in surface effect ships as part of a new concept in public transportation. The Coast Guard is trying to encourage this new transportation mode and is looking for more involvement by U.S. manufacturers.

A proposal has been made to locate nuclear electric power plants several miles offshore from population centers. Offshore Power Systems is working with the U.S. Coast Guard and the A.E.C. to design a floating power plant that can be type approved and mass produced. Volume production, site availability and the ocean as a heat sink make the concept economically feasible. The Coast Guard is now reviewing major areas of concern including manning, hull design, the steam system, the electrical system, and the hazards to man and the environment from a floating nuclear power plant.

There has been increased Coast Guard activity that relates to newly developed techniques of drilling for oil on the Continental Shelf; equipment

used must have Coast Guard approval. There are now ten column stabilized drilling units under technical review; these are the first to be certificated by the United States since 1968. The American Bureau of Shipping's Special Committee on Offshore Mobile Drilling Units was reconvened in March 1972 to revise the existing Rules for Offshore Drilling Units; the Coast Guard is an active member of the Committee. The inspection program for self-elevating and submersible drilling units is being pursued on a regulatory level.

Regulation of Hazardous Materials. Hazardous materials transportation safety continues to be a vital element of Coast Guard programs such as Commercial Vessel Safety, Port Safety, and Marine Environmental Protection. Regulatory activity proceeded at a high level both nationally and internationally as indicated by the following significant events:

- A code for bulk chemical ships which was developed under Coast Guard leadership was adopted as a worldwide recommendation by the International Maritime Consultative Organization (IMCO).
- The Chemical Transportation Industry Advisory Committee has been restructured to provide the Coast Guard with broad industry assistance in developing regulations for hazardous vessels and personnel and for hazardous materials waterfront facilities.
- Because of the unique low temperature properties (-260° E.) and extreme flammability of liquefied natural gas (LNG) and its pending massive importation in very large tankers, special efforts were made to obtain a good understanding of its hazards. To provide an overview of the current state of knowledge of LNG hazards, the NAS Committee on Hazardous Materials, on behalf of the Coast Guard, held an international conference in which 130 of the world's leading technical experts reviewed on-going studies and current information on LNG properties and behavior while being transported by ships.
- The transportation of dangerous liquids in portable tanks has continued to be of major concern to the Coast Guard. Reports from the traveling inspector staff have revealed potentially dangerous conditions which were not anticipated by existing regulations or when existing designs were accepted for service. There has been active participation with industry to write new regulations encompassing these new designs and shipping concepts.
- The Coast Guard has also taken a leading role in the development of an international recommendation for portable tanks carrying dangerous materials which became effective in October 1970. Additional international work is going on to expand these recommendations to cover more types of tanks. The Coast Guard has also acted in an advisory capacity to the American National Standards Institute in developing an international standard for portable tank containers, expected to become effective in 1972.

Coast Guard Ship Review System. The Office of Merchant Marine Safety received the Coast Guard Ship Review System on April 21, 1972 and is currently conducting acceptance trails on this interactive computer graph-

ics system. The Coast Guard Ship Review System (CGSRS) is the first low-cost interactive computer graphics system.

This prototype graphics system provides ship's offsets as input data to the U.S. Navy's Ships Hull Characteristics Program (SHCP), which is available on the Coast Guard's computer. This multipurpose computer program calculates the parameters that a naval architect requires to analyze ship characteristics; such as, subdivision, hydrostatic properties, limiting drafts, floodable length, strength, trim lines, intact stability and damaged stability. This interactive computer-graphics system enables a Coast Guard naval architect to input a ship's offsets to the computer and review the resulting hull characteristics in less than 2 hours. Presently this review procedure takes as long as 2 weeks since the ship's offsets must be manually digitized and then faired using a computer with plotter output.

Besides being extremely time consuming for the reviewing naval architect, the former procedure required vast quantities of computer power, which can now be used for other purposes. The Coast Guard Ship Review System will also enable the Merchant Marine Technical field offices themselves to calculate vessel characteristics using the SHCP program, on the computer, directly through their remote user's terminal.

Coast Guard Search and Rescue. Title 14, USC sec. 88 gives the Coast Guard statutory authority and responsibility for rendering aid to "distressed persons, vessels, and aircraft on and under the high seas and on and under the waters over which the United States has jurisdiction . . . (and) to persons and property imperiled by flood."

The National Search and Rescue Plan designates the Coast Guard as the Regional Search and Rescue (SAR) Coordinator for the Maritime Region. In general, the Maritime Region comprises the Gulf of Mexico, Caribbean Sea, and large portions of the Atlantic, Pacific, and Arctic Oceans.

Coast Guard vessels perform numerous duties in support of missions other than SAR, including those related to: aids to navigation, law enforcement, icebreaking, and environmental protection. However, to fulfill SAR mission responsibilities *alone*, Coast Guard vessels were employed during FY 1972 as follows:

<i>Class Vessel</i>	<i>Number of Vessels</i>	<i>Average Hours Per Year Vessel on SAR Alert</i>	<i>Average Hours Per Year Vessel on SAR Operation</i>
High Endurance Cutters	33	36	130
Medium Endurance Cutters	23	2,348	552
Patrol Craft	79	5,044	642
Icebreakers	8	147	122
Oceanographic Vessel	1	—	43
Buoy Tenders (seagoing)	36	40	3
Buoy Tenders (coastal)	13	160	25
Buoy Tenders (inland, large)	10	10	13
Harbor Tugs (medium)	13	189	34
Harbor Tugs (small)	15	164	5

Coast Guard aircraft, operating from 24 air stations, also undertake duties in support of Coast Guard missions. Search and Rescue alone accounted for aircraft time as follows:

<i>Type Aircraft</i>	<i>Number of Aircraft</i>	<i>Average Hours Per Year Aircraft on SAR Alert</i>	<i>Average Hours Per Year Aircraft on SAR Operations</i>
Helicopter (short range)	69	2,964	486
Helicopter (medium range)	20	2,665	680
Fixed Wing (medium range)	34	2,135	565
Fixed Wing (long range)	14	2,224	622

Coast Guard small boats, assigned to many different types of shore units throughout the United States, were used in 50,324 SAR sorties which required 111,304 operating hours.

The Coast Guard responded to more than 55,000 calls for assistance in FY 1972, about two-thirds of which involved giving assistance to pleasure boats. The remaining third involved commercial vessels, and civilian and military aircraft. Through this effort, about 2,500 lives were saved, more than 125,000 persons were otherwise assisted, and property worth more than one billion dollars was saved.

Communications and Electronics Engineering. During FY 1972 the Coast Guard installed 60 VHF-FM communications sites to improve the distress communications system to provide a capability to receive the transmissions from a 1-watt transceiver located 20 miles at sea. The Coast Guard also planned and procured 50 additional sites. These 110 sites will provide 70 percent of the equipment required to cover 100 percent of the coast lines of the contiguous United States.

The Coast Guard procured three Transportable Communications Centrals to hold in readiness at selected coastal sites. These communications centrals are equipped with all modes of communications equipment and are available for deployment to any location where on-scene communications capability for natural disasters or search and rescue incidents must be quickly available.

Construction of a new radio station at San Francisco was essentially completed during FY 1972 and is being accepted. The station is designed to provide total HF coverage of the Eastern Pacific Maritime Region, local MF coverage and support for the Data Buoy Program. The radio equipment and configuration are the most modern in existence.

A new type of high frequency (HF) single sideband (SSB) single frequency receiver was distributed to all Coast Guard shore stations to improve HF SSB and distress frequency capabilities.

The modernization of the electronics equipment utilized by the Coast Guard has led to an ever increasing use of more complex systems with high density packaging and modular construction. The modular construction provides an opportunity to offset maintenance problems through new approaches to electronic systems. A staff has been authorized to develop interim repair capability and to design and establish specially equipped facilities to provide high reliability for systems which cannot be maintained at field activities.

Two additional radar beacons have been installed, one in New Orleans and one in Alaska, to provide short range aids to navigation in those areas. During this past winter, six of the existing radar beacons were used on the Great Lakes and two in New England with favorable response.

Ship Construction and Modernization. During FY 1972 the following vessels were accepted and placed in service:

- a. Three 378-ft. High Endurance Cutters: *Munro*, *Jarvis*, and *Midgett*.
- b. One 157-ft. Coastal Buoy Tender: *Red Oak*.

A contract was awarded for the construction of the first of a new class of polar icebreakers. The 400-ft. *Polar Star*, scheduled for delivery in 1974, is the first addition to the U.S. icebreaker fleet since 1954 and will be the most powerful icebreaker in the world.

Plans, specifications and equipment purchase descriptions were completed for:

- a. Oceanographic conversion and habitability improvements for the CGC *Evergreen*.
- b. The "austere" renovation program for twelve 180-ft. buoy tenders.
- c. A machinery modernization program for "Wind" class icebreakers. Major habitability improvements have been made to CGC *Storis*, *Papaw*, *Blackthorn* and *Buttonwood*.

Major ship modernizations were accomplished as follows:

- a. Installed ships under water search (SOS 38) sonar equipment on CGC's *Dallas*, *Munro*, *Jarvis*, *Boutwell* and *Midgett*.
- b. Improvements to propulsion machinery were made on CGC *Hornbeam*, *Papaw* and *Firebush*.
- c. CGC *Acushnet* converted to an oceanographic cutter.
- d. Major over-all improvements to icebreaker CGC *Glacier*.

Shore Station Construction and Modernization. The execution of Coast Guard's FY 1972 shore construction program has been one of the best to date. Out of a total of 43 major projects, 39 are under contract. Of the four remaining, the major portion of two are under contract and the other two projects will be under contract in the near future. In most cases, these projects are for the modernization or rebuilding of the aging physical plant.

Investigation of new procedures for the acquisition of family housing and the revision of Coast Guard family housing standards to more closely parallel those of FHA has been undertaken this year.

The present Shore Station Pollution Control Program was initiated in FY 1970 to fulfill the requirements of Executive Order 11507. The program in FY 1972 was the largest since its inception, with a total expenditure for special pollution projects of \$2.7 million. Major projects included installation of dockside vessel sewage receiving facilities, new and improved Coast Guard sewage treatment plants and new connections to municipal sewage treatment facilities.

To provide for the reasonable needs of navigation and in accordance with the provisions of the Truman-Hobbs Act, reconstruction of four bridges over

navigable waters is in progress and authority to award construction contracts for four additional bridges is scheduled for July 1972.

The first construction phase of the new Mediterranean Long Range Aids to Navigation station on Lampedusa Island, Italy, is underway, with August 1972 the target operational date.

Ocean Engineering Developments. The Lighthouse Automation and Modernization Program (LAMP), now ending its fifth year, has seen a total of 16 stations automated; ten automations were completed during FY 1972. Six large navigational buoys (LNB) are presently operational with the seventh serving as an east coast spare.

In pursuit of the approved recommendations of a management study of Short Range Aids to Navigation, small plastic lighted buoys were procured and are presently undergoing on-station operational testing. Small unlighted plastic buoys have been purchased and distributed to the field for operational use. Additionally, a medium sized unlighted plastic buoy has been designed.

Airborne remote sensing systems using an infrared/ultraviolet scanner to detect and photograph oil on water has been designed. The system will be installed on Coast Guard aircraft in Cape Cod, Miami, Corpus Christi, Traverse City, and San Francisco.

A contract has been awarded to procure Air Deliverable Anti-Pollution Transfer Systems (ADAPTS), pumping subsystems suitably equipped for air delivery by HC-130 and HH-3 aircraft. Delivery of production systems is expected to commence in the spring of 1973. Specifications for Air Deliverable Transfer and Storage Containers have been prepared. A contract is expected to be awarded by the end of 1972 with delivery of production systems to commence in the summer of 1973.

Specifications for an oil containment system for use in open waters are being completed. A contract for production equipment is expected to be awarded early in 1973. A contract has been awarded for the production of oil containment systems suitable for use in protected waters. Delivery of production systems is expected to begin in the fall of 1972. A contract was awarded for the purchase of 28,000 feet of oil containment boom. The boom will be distributed throughout the Coast Guard for use in ports and harbor areas.

In order to implement new instructions to extend the relief period of steel buoys from 3 years for lighted and 5 years for unlighted buoys to at least 6 years for both, procedures were developed for significant improvements to the physical construction of the buoys. Additionally, improved buoy overhaul specifications and buoy tender maintenance guidelines have been prepared.

Icebreaking. Coast Guard icebreakers continued to serve this nation's interests in the Arctic and Antarctic during FY 1972. In the Eastern Arctic two ships facilitated the annual resupply of U.S. defense installations and supported various scientific investigations benefitting such activities as the International Ice Patrol and U.S. Navy defense oriented research. Three icebreakers deployed to the Western Arctic in the summer months and one

in the winter to conduct such diverse investigations as ecological research, geological surveys and defense-oriented research. Three icebreakers continued the annual 5-month deployment to the Antarctic in support of the National Science Foundation research program in that part of the world.

Ocean Stations. The Coast Guard continued its operation of multi-mission Ocean Station Vessel Program in both the North Atlantic and North Pacific, albeit at a reduced level resulting from the discontinuance of Ocean Station *Victor* in the Pacific early in 1972.

The four mid-Atlantic ocean stations constitute the United States' input to a 16 nation effort under the aegis of the International Civil Aviation Organization (ICAO).

The ocean station vessels perform essential meteorological services plus ancillary navigational, communications and rescue services for air and marine commerce. The Coast Guard cutters also collect a variety of scientific data while engaged on ocean station patrols.

Marine Sciences Activities. At the end of fiscal year 1972, the Coast Guard had more than 40 vessels capable of significant levels of marine science activity. These vessels were engaged in a variety of Coast Guard and cooperative programs. During FY 1972, 2,000 samplings of water mass properties were taken by cutters on ocean stations and enroute to the stations. Among the cooperative projects in which the Coast Guard took part were: support of the Navy environmental buoy program; Western Beaufort Sea Ecological Survey; West Greenland Glacier Survey; International Field Year on the Great Lakes; and water mass studies in conjunction with International Commission for the Northwest Atlantic Fisheries (ICNAF).

Major emphasis during 1972 was placed on utilization of Coast Guard marine science capability and expertise in support of internal mission requirements, specifically in areas of marine environmental protection and improvement of search and rescue techniques.

Bridges. The increase in highway traffic is putting a major strain on existing drawbridges over navigable waters of the United States. At the same time, the increase in pleasure boating and commercial shipping on these same navigable waters requires frequent openings of drawbridges, so that competition for bridge use between marine transportation and highway transportation is becoming increasingly aggravated. This will require local and State highway departments to place emphasis on high level fixed bridges in their future building and replacement plans.

The increase in volume and changes in the nature of marine navigation in many waterways are causing many existing bridges to become unreasonable obstructions to navigation. When this occurs, the Commandant of the Coast Guard is required by the Truman-Hobbs Act to order these bridges to be altered. The Federal Government is required by the same act to participate in the funding of the alteration.

CONSUMER PROTECTION

DOT Office of Consumer Affairs. Recognizing the importance of consumers' views to the formulation of transportation policy, the newly created

Office of Consumer Affairs gave priority to creating and improving communications between the Department and the users of transportation systems.

During the year, consumer public hearings were held in eleven cities in eight States throughout the nation. The purpose of these hearings is to give people the opportunity to express their views on all aspects of the several modes of transportation. The results are used in helping to determine how well the Department programs are meeting consumer needs and in program planning directed toward solutions for problems. The hearings serve to keep top management abreast of public concerns and to assist management in decisionmaking.

In April the first issue of "Transportation Topics for Consumers" was circulated to 3,000 consumers, consumer organizations, community action agencies, and a variety of interested organizations at the State and local level. This quarterly publication is designed to educate consumers and keep them informed on the latest events and issues within the Department.

From the hearings held thus far, the indications are that consumers are interested in: greater emphasis on mass transit; free fares, or subsidized transportation; regulation of auto repair and warranty services; stricter enforcement of traffic laws; improved auto inspection and driver testing; more emergency phones and better signs on roads; improved services at terminals for all travelers and a long list of similar projects.

The Citizens' Advisory Committee on Transportation Quality (21 members appointed by the Secretary) completed a report on community and citizen participation in highway planning for the Secretary. This report includes policy recommendations pertaining to legislation, research, operations and training, all of which are designed to make citizen participation more effective. The report will be distributed to more than 500 highway and urban planning offices throughout the country.

Automobile Insurance and Accident Compensation. During the past year, the Department continued to support State reform of the existing automobile insurance and accident compensation system. The Department has urged the States to shift to a first-party no-fault system of insured accident compensation as a result of its recent study which found that the existing system badly serves the accident victim, the motoring public, and society at large. In FY 1972, the Department provided partial funding to the National Conference of Commissioners on Uniform State Laws for its effort to draft a model no-fault bill for implementation by the States.

NHTSA Programs. The NHTSA program for consumer protection has numerous facets. There is a standards enforcement program (includes compliance investigation and defect recalls), coupled with legal action where warranted, which is discussed in the section on motor vehicle safety. There are several publications issued regularly which inform the consumer of the motor vehicle safety standards, and the relative performance of various late model cars with respect to them.

New in FY 1972 is a service whereby NHTSA responds to all consumer inquiries, complaints and submissions of safety information. Each complaint is sent to the manufacturer together with a request for an action report to the Administration. The customer is then informed of what

NHTSA has done and of the manufacturer's office from which a report has been requested. The system has proven most successful, with a record of satisfactory conclusion in between 65 and 80 percent of the cases. This aspect of the consumer protection program is growing rapidly.

When a defect is sufficiently hazardous, NHTSA takes the initiative by warning consumers of the danger. There are two kinds of alert notices used to inform the public about motor vehicle defects. One is the Consumer Protection Bulletin which is given the widest possible circulation through the news media and other channels of communication. It is used only in instances where in the course of the NHTSA investigations, a special hazard has been identified by vehicle make and model, and a remedy can be suggested. The other is the Public Advisory which is issued when dangers are present in general categories of vehicle equipment.

NHTSA also issues Fact Sheets which are brief layman's digests of information necessary to safe use, or intelligent purchase of vehicles or equipment, or problems normally encountered in the area of highway safety. They may be prepared in connection with any vehicle or component in general use which "surfaces" as a consistent source of injury or accident. They have proven very popular and many more are planned.

The list of these FY 1972 consumer information publications follows:

Public Advisories

"Dangerous Corrosion and Rusting Which May Be Present in Chassis Frames of Automobiles"

"Safety Tips on Minibike Use"

"Choosing a Safety Motorcycle Helmet"

Consumer Protection Bulletins

"Potential Risks in GM Cars—Motor Mounts"

"Mack Truck Recall"

"V. W. Windshield Wipers"

Fact Sheets

"Minibikes—What Every Parent Should Know"

"Studded Tires—What Every Motorist Should Know"

"The Hazards of 'Mixing' Tire Types"

"Safety Tips on the Purchase and Use of Hydraulic Brake Fluids"

"Safety Belts in '72—A Step Closer to Automatic Crash-Survival"

"Facts to Know About Importing a Foreign Car"

Others

"What to Buy in Child Seating Restraints"

"Consumer Aid Series—Tires"

"Consumer Aid Series—Brakes"

"Performance Data—New 1972 Passenger Cars and Motorcycles"

The Department and NHTSA employ all of the usual techniques and media to keep the public informed, through press releases, radio and TV spot announcements, films, and booklets for mass distribution. Here are some of them:

Films

"To Save Your Life," (highlights work in crash survivability).

"Ladies and Gentlemen of the Jury," (a dramatic treatment of the

problem drinker and highway safety).

"The Drinking Driver," (aimed at an informed audience with special interest in the problem of alcohol and driving).

Publications

"Read Before Driving," (periodically updated pocket-sized booklet, inserted in the glove compartments of new cars by some manufacturers).

"Highway Safety Literature," (an announcement of recent acquisitions).

"Federal Motor Vehicle Standards and Regulations."

"Highway Safety Program Standards."

"Motor Vehicle Safety Defect Recall Campaigns."

RAILROAD PROGRAMS

Legislation. The Office of Policy and Plans, in cooperation with the Office of Economics, played a major role in developing the Transportation Regulatory Modernization Act and the Transportation Assistance Act, which the Department proposed to the Congress. The underlying basis for the Transportation Regulatory Modernization Act is the existence of pervasive regulation of intermodal competition in the industry. The bill seeks to restructure the existing regulatory mechanism so as to substitute marketplace determinations for unnecessary economic regulatory constraint in the inter-related areas of rate determination, rail branch line abandonment, and entry of new firms into the motor and water carrier business. Additionally, the Transportation Assistance Act seeks to eliminate the perennial freight car shortage problem by providing low interest loan guarantees to railroads for use in acquiring needed rolling stock. The Assistance Act also seeks a \$35 million authorization needed to design and implement a national rolling stock information and control system which is essential to achieve improved freight car utilization.

The Emergency Transportation Facilities Restoration Act was developed in FRA and is pending before the Congress. This legislation would authorize the Secretary to make grants and loans to railroads for use in connection with the restoration and replacement of essential rail facilities and equipment lost or destroyed as the result of natural disasters which occurred during June 1972. The Federal assistance proposed in this legislation is critical to the restoration of essential services provided by rail carriers which, because of serious financial problems, are unable to obtain needed capital from conventional sources.

During FY 1972, the Department requested and received from Congress a 3-year extension of the High Speed Ground Transportation Act. The extension will enable the Department to engage in more comprehensive long-range planning of its high speed ground research, development and demonstration projects.

During the year, the FRA and the Federal Highway Administration completed a two-part report to Congress which (1) described the extent and nature of the safety problem associated with rail-highway grade crossings, and (2) made recommendations for a national program to improve safety

at both public and private crossings. The reports also discussed possible funding alternatives for financing the improvement program.

As a complement to rail-highway grade crossing studies underway, the FRA and FHWA contracted for a 15-month study to identify the relationship of certain railroad facilities to the urban environment and to propose methods for evaluating the economic, environmental, and social consequences of their relocation. The objectives of the study are to determine the magnitude of the problem in terms of type of rail facilities most susceptible to relocation, and an acceptable manner of financing such projects.

Economic Programs. The FRA, together with the 30 railroads using the Chicago gateway, is demonstrating an experimental freight-car information system which is designed to speed up railroad shipments materially and provide further insight into functional aspects of terminal operations. The results of this study will also have wide application to the design of a national rail rolling stock information and control system.

As part of its consideration of all factors which influence the freight car shortage problem, the FRA is conducting a study of the effects demurrage rates (the penalty shippers pay for excessive loading or unloading time) have on the level of freight car utilization.

In order to develop tools for both industry and Government use in improving the national efficiency of rail transportation, background research has been undertaken for several specific projects related to logistics, pricing, costing, and industry structure.

The larger than anticipated deficits incurred by the National Railroad Passenger Corporation during the first 2 years of operation necessitated additional Federal funding. Therefore, the FRA submitted legislation authorizing \$225 million in additional financial assistance required to implement extensive capital investment and service improvement plans through July 1, 1973. The additional appropriation also includes a provision to continue existing service to Mexico and Canada. This funding will permit AMTRAK to explore vigorously and realistically the public demand for high quality rail passenger service through the addition of improved equipment, modern reservation and ticketing systems, convenient and frequent schedules, and innovative improvements on the trains.

The Alaska Railroad. The Alaska Railroad operates 483 miles of single mainline track from Seward and Whittier, both ice-free ports, to the interior of central Alaska through Anchorage and Fairbanks. Freight service is maintained over the entire line. Passenger service is operated from Whittier to Portage and Anchorage, and from Anchorage to Fairbanks.

The Alaska Railroad is under a mandate from Congress to operate within its revenues. The Railroad has not required an appropriation from Congress for *operating expenses* since 1939, nor for capital improvements since FY 1956, with the exception of an appropriation to fund rebuilding necessitated by the earthquake of 1964.

In FY 1972, the Railroad had a small operating gain of \$286,766 in spite of increased labor and other costs. This was offset by write-offs of \$571,313 for losses on excess inventories, expenses associated with the Alaska Trans-

portation Corridor Study, and revised accounting treatment of nonexpendable items valued at \$200 or less per item for a net loss of \$284,547 after depreciation charges of \$2,553,326.

During FY 1972, the Railroad handled 1,606,416 tons of revenue freight for a total of 311,573,000 ton miles, an increase of 45.3 percent resulting in part from the West Coast Dock Strike. During the same period 101,920 revenue passengers were transported for a total of 16,602,766 passenger miles.

The Alaska Transportation Corridor Study in which the Railroad participated has been completed.

The Fairbanks to Fairbanks International Airport spur track of 10.8 miles is under construction.

URBAN MASS TRANSPORTATION PROGRAMS

Capital Grants. During FY 1972, the Urban Mass Transportation Administration approved 66 new capital grant projects and 25 amendments to previously approved projects. This involved a total commitment of \$510 million with new capital grants going to 50 metropolitan areas in 30 States, the District of Columbia, and Puerto Rico. One of the new capital grants approved during the fiscal year was cancelled later in the year.

With the completion of the FY 1972 program, the cumulative net total of Federal fund commitments to capital grant projects by UMTA is now \$1,473,231,768, involving 260 projects in 38 States, the District of Columbia, and Puerto Rico. These grants are classified by mode of transportation as follows:

Rail (52 projects)	\$ 953,342,231	65%
Bus (205 projects)	432,210,839	29%
Ferryboat and other (3 projects)	87,678,698	6%
	<u>\$1,473,231,768</u>	<u>100%</u>

Grants approved in FY 1972 will assist in the purchase of 3,502 new buses and 530 new rail cars. From the beginning of the program through June 30, 1972, purchases of 10,431 new buses and 2,450 new rail cars have been assisted through the capital grant program.

EXAMPLES OF GRANTS. Among the larger, more significant grants for the year were the following:

- The New York City Transit Authority, the arm of the Metropolitan Transportation Authority operating the rapid transit and bus systems in New York City, received two grants. One provided \$63.4 million to assist in the purchase of 320 new subway cars, as part of the plan to replace all remaining pre-World War II subway equipment in the near future. The other, for \$25 million, will enable NYCTA to proceed with the construction of the long delayed Second Avenue subway, an East Side link urgently needed to reduce congestion on the Lexington Avenue line.
- An additional commitment of \$60 million to the Port Authority of Allegheny County in Pittsburgh enables that system to continue with

its "Early Action Program," involving a new rapid transit concept known as Transit Expressway, private bus roads known as "PATways," and rehabilitation of two existing rail lines. The total grant is now \$68.7 million.

- The Chicago Transit Authority's system-wide modernization and improvement program was assisted by a capital grant of \$53.1 million. CTA has purchased 525 new buses, and plans to buy about 100 new rapid transit cars. In addition, numerous improvements are underway to all components of the system's equipment and facilities.
- The Metropolitan Atlanta Rapid Transit District received \$30.2 million to assist in the public acquisition of Atlanta Transit System, Inc., and to buy 490 new buses. This is part of MARTA's transit program which received voter approval in Fulton and De Kalb Counties on November 9, 1971, and under which an extensive rapid transit system is planned.
- The West Suburban Mass Transit District in the Chicago area is planning to modernize the suburban service operated by Burlington Northern, Inc., in the 40-mile Chicago-Aurora corridor. This includes 25 new bilevel cars to supplement the 94 already in service. This growth of \$25.2 million is the first UMTA capital grant involving diesel-powered suburban service.
- Bus replacement capital grants continued at a high level. Large fleets were approved for Atlanta and Chicago as noted above, and also for Twin Cities Area Metropolitan Transit Commission of Minneapolis-St. Paul, Southeastern Pennsylvania Transportation Authority of Philadelphia, and Alameda-Contra Costa Transit District of Oakland, among others. But many small communities also received grants for new buses, including Juneau, Alaska; Muncie, Indiana; Alexandria, Louisiana; and Billings, Montana.
- Capital grants to assist in the purchase of faltering private companies continued to accelerate. In FY 1972 there were 21 such grants, and these were for cities ranging in size from Atlanta to Clearwater, Florida. Several small suburban transit companies in the Los Angeles, Detroit, and Minneapolis-St. Paul areas also were acquired by the already publicly-owned major transit system. One of the most unusual acquisitions involved the Chattanooga, Tennessee system. The famous Lookout Mountain Incline Railway is part of this system, which is being acquired by Chattanooga Area Regional Transportation Authority; it provides transit service as well as being a landmark for tourists in this scenic, historic area.

Technical Studies Grants. Sixty-one new technical study grants were approved, amounting to \$20,683,515, while 12 other previously approved grants were amended, adding \$4,316,485 in Federal funding. Many of the grants involved studies of bus service in smaller communities which are in danger of completely losing bus service. Among such cities are included Manchester, New Hampshire; a number of Pennsylvania cities including Allentown, Bethlehem, Harrisburg, Reading and Wilkes-Barre; and Burling-

ton, Vermont. Also underway is an analysis of bus transportation in the Washington, D.C. area.

Rapid transit planning grants were approved in several cities, including the New York and Los Angeles areas. Amendments to previously approved grants provided additional funding in Honolulu and for the Delaware River Port Authority in the Philadelphia-Southern New Jersey region. A grant was also approved providing funds to the City of Philadelphia for engineering and design work in conjunction with the planned commuter rail tunnel to link the Penn Central and Reading operations.

Studies to enhance coordinated regional planning were approved in the Chicago, Philadelphia, San Francisco, and Twin Cities (Minneapolis-St. Paul) areas.

Among the special technical studies approved during the fiscal year were those to examine the feasibility of a tracked air-cushion vehicle system in the Dallas-Fort Worth region, and to assist the Metropolitan Atlanta Rapid Transit Authority in the preparation of an environmental impact statement which is required as part of its application for capital grant funding of a major new rapid transit system which has already been filed in preliminary form.

The basic reason, of course, for the technical studies grant program is to provide information and data which can be used in actual implementation of planning to be funded subsequently in the UMTA capital grant program. In a number of communities, this process has been carried to fruition—the technical studies results becoming the basis for capital grant approvals. Included are: Tucson, Arizona; Pensacola, Florida; Omaha, Nebraska; and Spokane, Washington. In addition, applications are now on file which involve the construction of new rail and bus rapid transit systems in such major cities as Atlanta, Georgia; Baltimore, Maryland; and Buffalo, New York. Capital grant applications have also been received for extensions and improvements of rail service by the Delaware River Port Authority, and the Port Authority Trans-Hudson Corporation.

Program for Improvements in Mass Transit for the Elderly and Handicapped. A dedicated effort was initiated within UMTA in FY '72 to increase accessibility to urban mass transit systems for the elderly and handicapped; to provide better service on urban mass transit systems for the elderly and handicapped; and as a consequence, to increase use of urban mass transit by those groups.

In the Office of Research, Development and Demonstrations a number of studies and related design efforts were undertaken to evaluate and improve transit equipment for accessibility. These included (1) evaluations of new systems such as Personal Rapid Transit; Urban Tracked Air Cushion Vehicles, and new rail rapid transit cars; (2) preliminary designs of new mass transit buses which will be totally accessible to the elderly and handicapped; and, (3) definition of a program for technology development and demonstration to eliminate barriers to handicapped individuals' access to urban mass transit systems.

In the Service Development Program, eight service demonstration projects were funded which were aimed directly at testing various service improve-

ments for the elderly and handicapped. Project components included demand responsive systems; subscription systems, use of school buses during off-peak hours; and, taxi usage at transit-like fares. Research was also undertaken to define on a national level the need for improvements in transit marketing and information techniques in order to increase use of transit, and on a local level to determine the travel patterns, and use or disuse of urban mass transit systems (buses) by the elderly and handicapped.

In the Office of Program Operations project approval priority has been given to applications for technical studies and capital assistance which address specifically the transportation needs of the elderly and handicapped.

The Administrator of UMTA has appointed a coordinator—who reports directly to him—responsible for continuing surveillance over UMTA programs for the elderly and handicapped.

Chapter IX

INTERNATIONAL TRANSPORTATION DEVELOPMENTS

INTERNATIONAL COOPERATION

The Department's international research cooperation program involves the exchange of information, experts, experience, and joint research undertakings designed to eliminate the wastefulness of duplicative national research efforts. The program continued to expand with such established partners as Germany, France, Japan, and Canada as a result of closer working relationships at the technical level. In the case of France, the three extant memoranda of understanding covering specific projects were made parts of an umbrella research cooperation agreement concluded on February 14, 1972, which provides the basis for expanded cooperation in many aspects of urban transportation and in maritime traffic control systems.

Involvement of the Secretary and other key officials of the Department contributed significantly to progress in research cooperation dialogues with would-be-partners. A cooperation agreement was concluded with the Spanish Ministry of Public Works on November 10, 1971, and an agreement in principle was reached with the Israeli Minister of Transport on December 20, 1971. In addition, the cooperation dialogues with nonpartner countries were substantially advanced. The attendance at TRANSPO '72 of ministerial-level personnel from more than 50 countries provided an excellent opportunity for substantive discussions.

Research cooperation arrangements with the Yugoslavs, Poles, and Romanians are being implemented by working out the details of project activity. At year's end, a DOT delegation was in these countries negotiating project agreements. The project activity in Yugoslavia and Poland will be funded for the most part with excess foreign currencies available to the United States.

The Department continued to exchange documents with the Soviets, Hungarians, Bulgarians, and the Czechs and is continuing dialogues with them. The First Deputy Minister of the Soviet Ministry of Transport Construction visited the United States in October 1971 at the invitation of Secretary Volpe for discussions relating to a research cooperation undertaking. This dialogue, slow to come to fruition, has been accelerated by the agreement concerning scientific and technical cooperation concluded during the President's visit to the Soviet Union. The Department anticipates, therefore, the conclusion of a research cooperation agreement with that Soviet Ministry and others with which it is in dialogue.

Under the US-USSR Cultural Exchange Program, a DOT urban transportation and environmental impact delegation visited the Soviet Union in August of 1971. The negotiation of the 1972-73 program produced three

exchanges for which DOT is responsible: road traffic safety, inland waterways, and (a carryover from the 1970-71 program) high-speed rail and containerization. The Soviet high-speed rail delegation completed its visit in June 1972. The U.S. portion of this exchange is scheduled for September 1972.

During the year, the Department, through the Technical Assistance Division, continued to provide economic technical advisory services to the Agency for International Development (AID) and international organizations. Principal emphasis was on multimodal planning, analyses, review, and appraisals of transport reports and feasibility studies. While responding to many technical inquiries, the Department acted upon such transport problems as (1) an evaluation of Malawi's overall road plan and assistance in the selection of a road project suitable for AID financing; (2) a comprehensive analysis and evaluation of a proposal for a guarantee by the United States of a loan of approximately \$50 million for a truck leasing project involving 23 African countries; (3) a scope-of-work and time schedule for a metropolitan transport planning program for Tegucigalpa, Honduras; (4) an analysis and evaluation of proposed approach roads to Georgetown and Amsterdam in Guyana.

International Secretariat. The International Secretariat in the Office of International Programs supports the Secretary personally and the Office of the Secretary of Transportation by coordinating participation in international activities. During the past year, the Secretariat arranged and prepared appropriate DOT representation on U.S. delegations to 59 international conferences and meetings. Programs and plans were prepared for the reception of 257 official foreign visitors to the Department, 36 of whom were of Ministerial rank and thus required considerable attention. Although several of these Ministers visited the U.S. specifically to attend TRANSPO, the Secretariat was responsible for arranging itineraries for these dignitaries including meetings with the Secretary and other high-level DOT officials and visits to Federal, State, municipal and private transportation facilities and businesses throughout the United States. Similar arrangements were made for a wide variety of DOT officials, including the Secretary, conducting official foreign travel.

INTERNATIONAL AVIATION ACTIVITIES

Participation in International Organizations. On behalf of the United States, OST and/or FAA representatives participated in the following international conferences or meetings:

- Eighteenth Session of the International Civil Aviation Organization (ICAO) Assembly, at Vienna, in June-July 1971. This meeting formulated policy guidance for ICAO activities for the period through the next Assembly meeting, including ICAO's position on environmental issues discussed at the international conference on the human environment, held in Stockholm, in June 1972.
- Diplomatic conference leading to the conclusion of the Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation, at Montreal, in September 1971. (See Chapter III for details.)

- ICAO Seventh Air Navigation Conference, at Montreal, in April 1972. The meeting recommended a number of improvements in avionics, including a microwave landing system, automatic air/ground data link, flight recorders, and secondary radar.
- ICAO Sixth European-Mediterranean Air Navigation Meeting, at Geneva, in November 1971. The meeting reviewed plans for aviation facilities and services in that area, including, for the first time, Soviet territory in Europe.

Trade Facilitation. During the reporting period, FAA instituted a program designed to promote the export of U.S. aeronautical goods and services. The program was in response to a call by U.S. aeronautical manufacturers for the U.S. Government to develop mechanisms that would put the U.S. industry in a better competitive position in world markets in the face of stiffening competition. The program involves two distinct efforts: (1) providing U.S. aeronautical manufacturers with information on export opportunities; (2) formulating plans looking to the eventual revision of U.S. bilateral airworthiness agreements as a way of facilitating U.S. aeronautical exports.

Foreign Assistance and Training. Under reimbursable agreements with the State Department's Agency for International Development (AID), the Defense Department's military assistance program, and other agencies, FAA provides technical assistance in aviation to foreign countries and their nationals. FAA had approximately \$11 million available from all sources for this purpose during FY 1972—up from \$6 million during FY 1971.

At year's end, nine FAA aviation assistance groups with a total authorized staff of 55 employees were operating abroad. These included assistance groups in Bolivia, Brazil, Korea, Vietnam, Taiwan, Iran, Honduras, and the Ryukyu Islands. In addition to staffing permanent residence groups, FAA dispatched 49 technicians in various aviation specialties on short-term assignments to 17 countries.

In the training area, FAA trained 237 foreign nationals from 34 countries in various aviation specialties. AID sponsored 95 of these training participants; ICAO, 62; the rest were sponsored by their own countries.

International Agreements on Automated Air Traffic Control Interchange. Through the efforts of the Department and its Transportation Systems Center, control procedures for their interchange of data between air traffic control computers were developed. These were presented to the December 1971 meetings of the Automatic Data Interchange System Panel of the International Civil Aviation Organization. The panel basically accepted this work and recommend that these procedures be accepted as International Standards. The proposition is currently being studied by ICAO's 120 member States.

Developments in International Air Fares and Rates. During FY 1972, the Office of Policy Review devoted a substantial proportion of its staff resources to the analysis and further development of Department of Transportation policy on the structure of international air fares and the process by which those fares are determined.

As indicated in the President's "Statement of International Air Transportation Policy," the Department continues to accept the International Air Transport Association (IATA) as the machinery for pricing scheduled services. However, the need for enlarging the role of the Civil Aeronautics Board in the setting of fares between the United States and foreign points became critical during the past year.

The inability of the IATA machinery to produce unanimous agreement on a fare structure for the North Atlantic market produced an open rate situation for a brief period, with fare offerings in some sectors of the market that were below the costs incurred in providing the service. This was a potentially serious threat to the financial stability of the U.S. international airlines, which were receiving delivery of new large-capacity aircraft at a time when growth was sagging.

The immediate problem of agreement on a rate structure was resolved by the carriers. However, concern over some inherent weaknesses in the fare-setting process led to development of a legislative proposal to give the CAB power to regulate international rates and fares. The Department also reaffirmed its policy in favor of an overall international fare standard closely related to the standard of carrier costs.

Subsequently, on March 22, 1972, the President signed a bill that provides the CAB with authority to suspend or reject international air rates.

Charter Air Services. The Office of Policy Review is cooperating with the European Civil Aviation Conference (ECAC) in studies of various aspects of charter air services. These activities are expected to enhance the prospects of implementing Departmental policy favoring negotiation of charter bilateral agreements.

INTERNATIONAL MARITIME ACTIVITIES

Law Enforcement. The Coast Guard is responsible to enforce international treaties and domestic laws of the United States in the waters over which it has jurisdiction; to that end it constantly conducts both air and surface patrols. Probably the most important of the laws enforced are those relating to the conservation of natural resources—those that regulate fishing or whaling, for example. But searches for contraband goods, smugglers, or other law-breakers are also important.

Six foreign vessels found fishing or supporting fishing activities in the contiguous fisheries zone (16 U.S.C. 1091-94) were seized and released after payment of penalties totaling \$595,000. Four vessels found fishing in the territorial sea paid \$5,300 in penalties. Patrols and the dissemination of information helped to reduce dissension between U.S. and foreign fishermen desiring to fish in the same areas on the high seas. Through surveillance patrols, information was given to the Department of State concerning whether or not foreign vessels were complying with international agreements affecting waters outside of U.S. jurisdiction. The National Marine Fisheries Service took part in many patrols and obtained information that could be useful in the formulation of conservation policies.

International Ice Patrol. The Coast Guard began the fifty-eighth season of International Ice Patrol service in the North Atlantic Ocean on February

29, 1972. The International Ice Patrol was conceived for the purpose of protecting North Atlantic shipping from the iceberg hazard encountered each year during the spring and early summer. The patrol uses C-130 aircraft and a Coast Guard oceanographic vessel to observe and study iceberg conditions. Predictions as to the iceberg danger, recommendations as to the best action to be taken by shipping to avoid such danger, and scientific data concerning the oceanography of the area and the life cycle of the icebergs encountered are the major products of this service.

International IMCO Activities. The Coast Guard has participated in meetings at the Intergovernmental Maritime Consultative Organization (IMCO) Headquarters in London to prepare draft revisions of the International Regulations for Preventing Collisions at Sea (Rules of the Road). The draft texts of Articles, Rules, and Annexes were completed.

The Coast Guard formed the New England Water Traffic Separation Committee to consider marine traffic separation measures in the approaches to Portland, Maine; Boston, Massachusetts; Buzzards Bay, Massachusetts; and Narragansett Bay, Rhode Island. The Committee's sealane proposals are now being considered at the CG headquarters level and it is anticipated they will be submitted to the Intergovernmental Maritime Consultative Organization (IMCO) for consideration by the Subcommittee on the Safety of Navigation at its next scheduled meeting in December 1972.

During its sixth session, the IMCO Subcommittee on Ship Design and Equipment assigned to the Ad Hoc Working Group, which the Coast Guard chairs, the task of developing standards for gas (LNG) ships. The purpose of this work is to develop a Gas Ship Code which can be adopted internationally to insure the safety of the ports they visit. Assignments have been made to member countries of the Ad Hoc Committee to begin study and development work on the first draft of the proposed code. A special working meeting of the Ad Hoc Committee was held in Washington, D.C. in early May 1972.

The Twelfth Session of IMCO's Subcommittee on Safety of Fishing Vessels was held at IMCO Headquarters, London, England from February 21-25, 1972. During this meeting, the delegations discussed the draft *Code of Safety for Fishermen and Fishing Vessels*, as well as fishing vessel design, operation, and standards. The Subcommittee decided to make Part B of the Code applicable to fishing vessels of 24 meters (or more) in length. This action will be taken at the next session. The United States had previously participated in a special IMCO Fishing Vessel Ad Hoc Group meeting in August 1971 in London, which essentially completed the fourth draft of the *Code of Safety for Fishermen and Fishing Vessels*.

In preparation for the tentative 1976 convention on Safety of Life at Sea (SOLAS), the IMCO Subcommittee on Life Saving Appliances is examining in detail requirements for life saving appliances for new and unusual vessels.

In October 1971, the Marine Safety Committee of IMCO considered at length the question of International Standards of training and certification for mariners. Included also in the consideration were proposals dealing with principles relating to the keeping of a safe navigational watch. Recognizing the complexity of the problem and the urgent need to deal with it in a

manner which would offer an early and effective solution, the Committee decided to establish a new subsidiary body, the Subcommittee on Standards of Training and Watchkeeping. This Subcommittee met in May 1972 in London to prepare a continuing agenda; it will meet periodically until assigned tasks are accomplished. At this first meeting, the Subcommittee developed: (1) Provisional Basic Principles to be observed in keeping a safe navigational watch; (2) Provisional Operational Guidance for officers of the watch; (3) a preliminary draft proposal for mandatory minimum requirements for certification of Master and of officers in charge of a navigational watch.

INTERNATIONAL CONVENTION ON THE TONNAGE MEASUREMENT OF SHIPS 1969. On June 15, 1972, the President transmitted to the Senate the International Convention on Tonnage Measurement of Ships, 1969, with a recommendation that the Senate give its advice and consent to ratification. Since the new system of vessel measurement prescribed by the Convention, if it comes into force, will yield gross tonnages which will, for the first time, provide a reliable index to sizes of vessels engaged in international voyages, it appears logical to adopt a similar system for vessels in domestic trade. Accordingly, the Towing Industry Advisory Committee and the National Offshore Operations Industry Advisory Committee were invited to join with the Coast Guard in a study to consider whether there should be changes in manning, licensing, and safety rules affected by tonnage boundaries which, until now, have been easily avoided by manipulating gross tonnage of certain types of vessels.

NATO Activities. At the 1970 meeting of NATO's Committee on Challenges of Modern Society (CCMS), Secretary Volpe called for an end to the discharge of oil into the sea by 1975. The IMCO Assembly adopted the resulting CCMS resolution essentially as proposed by Secretary Volpe and has called an international diplomatic conference for the fall of 1973 to deal with marine pollution. The United States' positions for the conference are prepared by an ad hoc interagency group chaired by the Coast Guard. The positions are reviewed by the U.S. National Committee for the Prevention of Marine Pollution for which the Coast Guard provides the Chairman and the executive secretariat.

Other International Activities. The Coast Guard's Office of Public and International Affairs coordinated U.S. efforts resulting in the following accomplishments: the sale of an HH-52A helicopter to the Government of Iceland; the transfer of the ex-USCGC *Redbud* to the Government of the Philippines under an existing agreement between the U.S. and the Philippines; protocol functions for 64 foreign visitors to various Coast Guard facilities; establishment of specialized on-the-job training programs for 39 foreign nationals and training for 63 foreign nationals, the transfer of a LORAN station and a number of aids to navigation in the Ryukyu Islands to the Government of Japan for host nation operation.

INTERNATIONAL HIGHWAY DEVELOPMENTS

Technical Assistance Activities. The Federal Highway Administration continued to provide technical assistance to Argentina, Brazil, Costa Rica,

Kuwait, Laos, and Nicaragua during FY 1972. The major work in Bolivia, Guatemala, and Peru was completed during the fiscal year; accordingly, only short-term advisory assistance will continue in these three countries. Short-term advisory services were also provided to Israel, Yugoslavia, and Canada. In Laos, numerous bridges that had been destroyed by Pathet Lao action were replaced.

Fifteen million dollars was appropriated by the Congress in FY 1972 for construction of the 400-kilometer Darien Gap Highway in Central America. This raised to \$20 million the total amount appropriated from the \$100 million authorized by the 1970 Federal-Aid Highway Act. Construction surveys were initiated, plans developed, and one contract awarded for construction of a section between Canitas and the Bayano River. Division offices were staffed in Panama and Columbia, and the Inter-American Highway Regional Office was moved from Costa Rica to the Panama Canal Zone.

Foreign Study Programs. With the cooperation of the State highway departments, counties, cities, and private industry, FHWA arranged over 8,000 man-days of study during FY 1972 for 490 highway officials from 51 countries who came to the United States to study U.S. highway engineering techniques. The majority of the visitors had individual programs arranged to fit their needs; 13 groups (of from four to 45 persons each) observed highway activities. Included in these groups were 25 Japanese highway engineers, 105 Germans, 25 Belgian students, and 12 persons representing 10 countries from the Organization for Economic Cooperation and Development. A one-day seminar was held for 19 International Road Federation fellowship trainees; five of the 19 were U.S. engineers nominated by the American Road Builders' Association to participate in the fellowship tour.

A cooperative project between representatives of the United Kingdom's Road Research Laboratory and the Federal Highway Administration to appraise the benefits of two different methods of centrally controlling traffic signals has yielded results. SIGOP, the American product, and TRANSYT, designed in Great Britain, are off-line computer programs for optimizing traffic signal settings in a grid network. Each is the best that its country has in the current state of the art.

Results from two studies evaluating SIGOP and TRANSYT, carried out in Glasgow, Scotland, and San Jose, California, show that there is not much significant difference between the programs. These findings allow traffic operations personnel and researchers, both in the United States and in Europe, to have a common standard with which to compare future improvements in area traffic control.

Another FHWA cooperative research project with other governments is a study of roadside obstacles and the frequency and severity in which they are involved in accidents. The obstacles have been a major factor in "ran-off-the-road" collisions; however, breakaway signs and frangible supports have dramatically reduced the tragic consequences of single-vehicle accidents. At year's end, an FHWA representative was meeting with German and Dutch engineers to exchange information on progress in this area.

Meetings and Conferences. An International Conference on Highway Sign Symbolology was held June 5-6, 1972 in Washington, D.C., under the sponsorship of the International Road Federation and the Federal Highway Administration. Representatives from Canada, Mexico, Venezuela, Japan, England, Germany, Italy, South Africa, various American governmental levels and the highway industry in the United States attended.

The primary objective of the meeting was to (1) determine which symbols and graphic features have been effective in communicating with vehicle drivers, (2) seek to establish a consensus on the design application, effectiveness, and uniformity of distinctive symbols for highway signs, and (3) identify areas of needed research.

The Japanese delegation to the Fourth Joint Meeting of the U.S.-Japan Panel on Wind and Seismic Effects was given a preconference tour of an FHWA instrumentation installation on the Narragansett Bay (R.I.) suspension bridge. This instrumentation system is the first installation ever to monitor natural wind components and concurrent structural responses on bridges susceptible to aeroelastic action. During the past year, the instrumentation system recorded wind and response data on the bridge during tropical storm Doria, which unleashed winds in excess of 70 m.p.h.

FHWA personnel participated actively in the panel meeting. A paper outlining the FHWA research program for the measurement and analysis of the aerodynamic behavior of suspension bridges was presented.

INTERNATIONAL DEVELOPMENTS IN TRAFFIC SAFETY

International cooperation in traffic safety made good progress during the past year with principal emphasis on the Road Safety Pilot Study, which the United States is leading under the auspices of NATO's Committee on the Challenges of Modern Society (CCMS).

The development of experimental safety vehicles as part of this program is particularly important. During FY 1972, agreements were concluded with France and Sweden for exchange of technology. These countries, as well as Germany, Japan, Italy, and the U.K., which signed experimental safety vehicle (ESV) agreements earlier, are producing ESV's in the 2,000- and 3,000-pound weight classes. DOT is developing ESV's in the 4,000-pound class common in the United States.

Two international conferences were held in FY 1972: one at Stuttgart, Germany in October 1971, and one at Washington, D.C., in June 1972 in connection with TRANSPO. The latter was especially noteworthy in that most ESV developers in the United States and abroad displayed their prototypes in a separate exhibit at Dulles International Airport.

Practically every major automobile manufacturer in the world is participating in this program; the total investment exclusive of U.S. Government funds is estimated at well over \$50 million. Progress to date indicates that it is entirely feasible to develop automobiles in all size categories with far higher levels of safety performance than now exists in production models. The challenge of the next several years is to complete the design, construction, and testing of the ESV's and to incorporate the results in Federal motor vehicle safety standards.

The United States is directing a road safety pilot study and conducting the ESV project on behalf of the CCMS; other CCMS road safety projects are being led by the Netherlands (accident investigation), France (road hazards), Canada (alcohol and highway safety), Italy (emergency medical services) and Belgium (pedestrian safety).

The aim of the accident investigation project is to determine feasibility of using uniform procedures and reporting on accident investigations. About 25 teams are now at work in North America and Europe making scientific studies of about 1,000 crashes. If the study establishes the value of uniform international procedures for investigating crashes, and such procedures are adopted by NATO allies and other countries, far more information will become available on such important matters as the effectiveness of vehicle safety features and the identification of structural design factors responsible for injury and deaths.

The alcohol project involves, among other things, testing the feasibility of several nations conducting roadside surveys in accordance with standardized procedures to determine the number of drunk drivers on the road at any given time. This base-line data is essential in order to compare the magnitude of the drinking-driver problem in different countries and measure the effectiveness of various countermeasures being mounted by many countries. In addition, DOT has developed an effective and inexpensive portable breath tester, which is being offered to other countries for testing under field conditions.

The first of these is the fact that the world is becoming more and more integrated. This is due to a number of factors, including the growth of international trade, the development of international law, and the increasing influence of international organizations.

The second factor is the growth of international law. This is due to the fact that the world is becoming more and more integrated, and the need for a common set of rules and regulations is becoming increasingly apparent.

The third factor is the increasing influence of international organizations. These organizations are becoming more and more powerful, and their influence is becoming increasingly apparent in the world.

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Chapter X

EMERGENCY AND NATIONAL DEFENSE TRANSPORTATION

DEPARTMENTAL PROGRAMS

Emergency Readiness. The responsibility of the Secretary for preparedness matters stems from the Department of Transportation Act (P.L. 89-670, 80 Stat. 931) and from Executive Order 11490. Guidance is given in the National Plan for Emergency Preparedness, the Disaster Relief Act of 1970 (P.L. 91-606, 84 Stat. 1744) and in issuances of the Office of Emergency Preparedness, Executive Office of the President.

The Department has continued its development of plans and procedures for use in a full range of emergencies from national defense emergencies through natural disasters and other crises. During the reporting period, these activities included the development and execution of plans for dealing with the railroad strike of July 1971 and Phase I of the Presidentially declared Wage-Price Freeze, which extended from August 15, 1971 through November 13, 1971. In the wake of Hurricane Agnes in June of 1972, the Department fielded a corps of expert technicians in air, highway, and railroad activities to assist States and local communities in disaster recovery operations.

For national defense emergencies, planning accomplishments for FY 1972 included development and publication of DOT emergency organization standard operating procedure for national headquarters and regional offices, and a revised procedure for claiming resources in support of transportation under emergency conditions.

CONTINUITY OF OPERATIONS. Continuity-of-operations planning continued within the Department in accordance with guidance by the Office of Emergency Preparedness. Seven supporting chapters and an annex to the Continuity of Operations Plan, Department of Transportation (DOTCOOP), remained to be published. All but two of these were in preparation and could be immediately used to meet an operational requirement. Major revisions were under way in all continuity plans to accommodate changed guidance relating to development of alternate headquarters and relocation sites and to revised systems of alerting and call-up of emergency staffs. These changes, initiated in the last quarter of the fiscal year delayed final development of the DOTCOOP, but this was not expected to affect testing and exercising to assure familiarization and to verify feasibility of the several parts.

EMERGENCY RESOURCE MANAGEMENT. The National Plan, related contingency plans and Executive Order 11490 contemplate that, under national defense emergency conditions, the Secretary of Transportation would be

the executive manager of the nation's total transportation resource. As manager, he would be responsible for implementing control systems governing the use of all civil transportation including allocation of its capacity to meet essential civil and military needs and claimancy and subsequent sub-allocation of critical resources allotted by the other resource agencies to the transportation resource. In coordination with all its operating elements and the external transportation operating and support agencies, the Department has prepared a family of related plans and procedures for executing this responsibility when called upon to do so. The principal documents include Emergency Procedures for the Control of Civil Transportation (DOT Order 1940.4), Emergency Procedures for Claiming Supporting Resources for Civil Transportation (DOT Order 1940.1A), Manual Damage Assessment Procedures for Transportation Systems (DOT Order 1940.3), a Glossary of Terms and Abbreviations for Use in Transportation Preparedness Planning (Pamphlet DOT F 1945.1), and the Transportation Annexes to the Limited and General War Plans. These are supported and developed in further detail by special plans of the respective Federal transportation operating and support agencies both within and outside the Department. This family of plans includes but is not limited to—

- *Interstate Commerce Commission.* Transportation Mobilization Orders, TM-1 through TM-13, applying preference and priority to movement of selected classes of passengers and freight and providing for embargoes, rerouting, disposal and other controls over domestic surface traffic.
- *Civil Aeronautics Board.* The war air service program, which provides for essential air routes and services and for the distribution and redistribution of air carrier aircraft among the carriers after withdrawal of Civil Reserve Air Fleet.
- *Maritime Administration.* Plans for control of ocean ports and ocean shipping.
- *Federal Aviation Administration.* State and regional defense airlift plan for control and use of general aviation (other than air carrier); plan for security control of air traffic and navigation aids; air carrier disposal planning guide.
- *Federal Highway Administration.* Emergency highway traffic regulation plan.

In order to implement prompt and effective transportation controls when needed, the Department assembles, on a current basis, data on projected requirements of major claimants for transportation service and on the capabilities of respective modes to provide this service.

EMERGENCY ORGANIZATION AND STAFFING. To assure the capability to implement emergency executive management of the nation's total transportation resource on short notice, an initial organizational structure has been designed providing for a national headquarters and ten or more regional offices. A detailed DOT emergency organization standard operating procedure for Headquarters and Regional Offices (DOT Order 1940.5) was developed and distributed to all Secretarial mobilization designees, National Defense Executive Reservists, and to all transportation operating and support

agencies at the national and regional levels. Designated personnel drawn from the regular Federal establishment and from the National Defense Executive Reserve was being given standby assignments within the organizational structure. A continuing training program is conducted to maximize their readiness and to acquaint the assignees with the interrelationships involved.

Crisis Management

STRIKE EMERGENCIES. Again this past year, the DOT capability to react promptly to crises at both the national and field levels was tested as the Department became deeply involved in monitoring and responding to two major transportation industry strikes. Early in the year, the United Transportation Union (UTU) progressively struck the nation's railroads using legally selective strikes. Two carriers were struck on July 16, two more on July 24, six on July 30, and additional carriers had been publicly identified when a settlement was reached on August 2. A national emergency was thus averted and no Presidential action was necessary.

The International Longshoremen and Warehousemen's Union (ILWU) struck west coast ports on July 1, while the International Longshoremen's Union (ILA) struck east and gulf coast ports on October 1. These strikes, which involved invoking the provision of the Taft-Hartley Act against both unions, were not settled until February, although the threat of a work stoppage continued until May 15, 1972.

Because no national emergencies were declared, it was not necessary for the President to issue any executive orders directing the Secretary to exercise priorities and allocation authority over the remaining forms of transportation. It was necessary, however, for the Secretary to provide immediate and continuing assistance to requests received from many of the major industry sectors of the economy. This assistance was in response to the Secretary's responsibility for all forms of transportation. Coordination between Federal transportation operating agencies was affected by the Secretary's Regional Emergency Transportation Coordinators and their Regional Emergency Interagency Transportation Committees at the local, State, and regional levels while his Office of Emergency Transportation coordinated requirements for service relief between Federal agencies, and with the Office of Emergency Preparedness at the national level.

WAGE-PRICE FREEZE, PHASE I. The Department was called upon by the Office of Emergency Preparedness to assist in Washington, D.C., and in all regions in the implementation of the President's directive to freeze wages and prices on August 15, 1971, for 90 days. During this period, a maximum of 23 persons at all levels were committed to this effort on detached service to the Office of Emergency Preparedness. Because of the nature of its emergency staff organization and procedures, the Office of Emergency Transportation became the focal point for the transportation effort and provided professional staffing to the Office of Emergency Preparedness Operations Center.

INTERNATIONAL REPRESENTATION. The Department, through its Office of Emergency Transportation, was the focal point for, and provided the U.S. representative to NATO and Canadian transportation planning bodies. The

Department provided U.S. representation to a NATO body studying the civil air role of NATO and to the annual Civil Aviation Planning Committee plenary meeting. Additionally, OST continued to provide the co-chairman for U.S.-Canadian emergency transportation planning and coordinate U.S. Federal agencies' efforts to plan cooperatively with Canada for the wartime use of transportation.

COAST GUARD DISASTER PREPAREDNESS AND RELIEF

Emergency Assistance. The Coast Guard is required by Public Law 91-606 (Disaster Relief Act of 1970), when directed by the President through the Office of Emergency Preparedness, to provide disaster assistance to State and local governments in any major disaster.

With or without the authority of P.L. 91-606, the Coast Guard's statutory responsibilities allow utilization of its resources at any time and place they are available and may be effectively utilized for rendering aid to persons and protecting or saving property. Consequently, Coast Guard resources are likely to be involved whenever they are within or near a disaster area. Notable among FY 1972 disasters involving Coast Guard assistance were hurricane/tropical storm Agnes and the Andrus Island, California levee break. This service also helped to avert a disaster when a loose chlorine barge collided with a hydroelectric dam on the Ohio River near Louisville, Kentucky.

When Agnes passed through the Eastern United States, all seven Coast Guard districts east of the Rocky Mountains responded to the emergency with regular, reserve, and auxiliary forces. This assistance was quite varied and is typical of that available in any major disaster. Assistance by the Coast Guard in this emergency included:

- a. Broadcast of weather warnings
- b. Search and rescue (offshore and inland)
- c. Medical evacuation
- d. Logistic sorties (food, medical supplies, emergency and repair personnel, etc.)
- e. Housechecks and precautionary evacuations
- f. Aerial and waterborne surveys
- g. Security patrols in evacuated areas
- h. Firefighting in areas accessible only by water
- i. Manning of civil defense shelters
- j. Recovery of drifting vessels, wharves, barges, etc.
- k. Cleanup of oil and hazardous materials spills
- l. Debris removal
- m. Body search and recovery
- n. Restoration of Coast Guard stations and navigational aids.

Activation Detachment. New cutter construction during the past few years has created large demands for personnel with special training and experience. Making any newly commissioned unit fully operational is a task of major proportions. Consequently, in June 1967, a special Activation Detachment was established at Coast Guard Headquarters. This Detachment facilitates the development of standard administrative practices on

board new cutters and ensures that personnel assigned to such cutters receive all requisite training prior to reporting on board. The cutters *Munro*, *Jarvis*, *Midgett*, and *Red Oak*, commissioned during FY 1972, were direct beneficiaries of this Detachment's activities.

In summer, 1971, the Coast Guard began a comprehensive re-evaluation and redefinition of its wartime responsibilities. The basic thrust of the effort was aimed at identifying capabilities of Coast Guard units assigned to specific tasks, and ensuring that unit capabilities are compatible with assigned tasks. All major war and contingency plans were updated during FY 1972. Particular effort has been directed at the development of plans which would allow for smooth transition and the continuation of all emergency Coast Guard functions in the event of a transfer of the Coast Guard from DOT to DOD, as provided for by Title 14, USC. The main result of these several efforts has been a clarified, more precise definition of the Coast Guard's wartime responsibilities and the dissemination of that knowledge to all levels of command.

Coast Guard Duty in Vietnam. FY 1972 brought an end to Coast Guard involvement in Operation Market Time. Only two high endurance cutters, *Castle Rock* and *Cook Inlet*, were operating in Vietnamese waters at the beginning of the fiscal year. On December 21, 1971, both cutters were turned over to the Navy of the Republic of Vietnam and their crews were returned to the U.S. On January 31, 1972, Coast Guard Squadron Three, to which the cutters had been administratively attached, was decommissioned. Vessels assigned to the Squadron had compiled an outstanding record: more than 1.3 million miles cruised; more than 10,000 junks or sampans boarded or inspected; more than 1,500 gunnery missions fired; more than 6,000 enemy water craft or shore-based strong points damaged or destroyed; and 470 enemy personnel killed or wounded in action. Remarkably, the Squadron suffered no serious casualties.

With the termination of Market Time activities, the service's personnel strength in Vietnam dropped to its lowest point since Coast Guard forces were first deployed to Southeast Asia in summer, 1965. The forces committed to Explosive Loading Supervision and Aids to Navigation advisory work also were reduced in numbers. The Coast Guard continued to operate, at full strength, its two LORAN transmitting stations in Vietnam. A Merchant Marine Detail in Saigon also continued to function.

In March 1972, the cutter *Basswood* completed what presumably was the last deployment of a Coast Guard buoy tender to Vietnam.

Coast Guard Reserve. The function of the Coast Guard Reserve is to provide trained units and qualified persons prepared for active duty with the Coast Guard in time of war or national emergency and at such other times as the national security requires.

The Coast Guard Reserve operates under the same laws which govern all Reserve components. In order to insure maximum uniformity, the Coast Guard has adopted and adheres closely to the regulations, policies, and directives promulgated by the Department of Defense.

The Coast Guard Reserve is composed of the Ready, Standby, and Retired Reserve. The Ready Reserve represents the principal source of trained

units and personnel available for call to active duty to fill the mobilization needs of the Coast Guard.

The Standby Reserve is composed of personnel who are available for active duty in the event of war, national emergency declared by the Congress, or when, pursuant to law, it has been determined that there are not enough of the required types of units or personnel available in the Ready Reserve.

In addition to undertaking classroom and practical training during drills and annual 2-week training duty, Reservists perform a wide variety of tasks which serve a dual purpose of furthering their training and simultaneously providing assistance to the Coast Guard, the public at large, and other Government agencies. Activities of these types included service at lifeboat stations, servicing of aids to navigation, inspections of pier and waterfront facilities, harbor and waterways patrols, vessel boardings and surveillance, investigation and reporting of oil pollution incidents, and a wide variety of other activities. Reservists also provided assistance in search and rescue and law enforcement incidents.

FAA DEFENSE READINESS

Defense Readiness and Emergency Preparedness. Highlighting FAA activities in this area during the fiscal year was the publication of a revised defense readiness and emergency preparedness plan. The plan sets down actions to be taken by FAA in preparation for, and during, defense or other emergencies; it serves as a general guide and reference document for all types of emergency actions. This single document replaces 16 FAA directives that had either served their purpose or were modified and incorporated in the revised plan.

In another development, the Department of Transportation negotiated an agreement with the Civil Aeronautics Board transferring certain emergency preparedness functions from the CAB to FAA. Under this agreement, FAA is responsible for (1) assessing and reporting damage inflicted on air carrier aircraft and facilities by an enemy attack; (2) assisting air carriers in submitting claims to restore and maintain air service deemed essential by the CAB; (3) aiding air carriers after an attack in salvaging, restoring, and replacing supplies and equipment for essential civil air carrier aircraft and services. This agreement also provided for the CAB's co-location with FAA Headquarters at FAA's emergency relocation site in the event of a national emergency.

Civil Reserve Air Fleet. Allocations of air carrier aircraft for emergency use of the Department of Defense were continued in FY 1972 in support of the civil reserve air fleet program. As of June 30, 1972, 62 aircraft had been allocated for domestic/Alaska support and 360 aircraft for short- and long-range support of the military. The remainder of the air carrier fleets, approximately 2,630 aircraft, has been allocated to the CAB war air service program.

Aviation War Risk Insurance. FAA administers an aviation war risk insurance program under Title XIII of the Federal Aviation Act of 1958 (as amended), the Department of Transportation Act of 1966, and a dele-

gation of authority from the Secretary of Transportation. At year's end, there was one claim in litigation for a destroyed aircraft. Under the current program, FAA maintains:

- A standby insurance binder plan making aviation war risk insurance available to U.S. civil aircraft and foreign-flag civil aircraft engaged in operations deemed to be in the interest of national defense or the national economy upon the outbreak of war between any of the four Great Powers. On June 30, 1972, 61 aircraft were covered under such binders, representing a maximum contingent liability of \$4,279,005,400.
- A nonpremium aviation war risk policy insuring U.S. air carrier aircraft under contract to the Defense Department or otherwise committed to the Civil Reserve Air Fleet. At year's end, policies in effect covered 609 aircraft in this category, representing a maximum contingent liability of \$62,998,946,494.
- A nonpremium aviation war risk policy insuring U.S. air carrier aircraft under contract to the Department of State. At the end of the reporting period, 84 aircraft were covered under such policies, representing a maximum contingent liability of \$11,161,720,000.
- A premium hull and liability deductible-coverage policy made available to U.S. flag carriers in 1970 upon determination by the Secretary of Transportation that war risk insurance adequate to the needs of the air commerce of the United States could not be obtained on reasonable terms and conditions. At year's end, eight airlines had applied for coverage under this portion of the program; policies in effect on June 30, 1972 covered 188 aircraft, representing a maximum contingent liability of \$2,204,349,237.

It should be noted that most of the aircraft insured under one plan are also insured under one or more other plans; adding the number of aircraft insured under all plans or the maximum contingent liability under all plans would not produce a true measure of the program's coverage. At the end of the reporting period, the actual number of aircraft insured under this program was 627, representing a maximum contingent liability of \$64,993,644,494.

During FY 1972, the binder and nonpremium plans yielded revenues of \$19,000. Since the introduction of the premium hull and liability deductible-coverage plan in August 1970, premiums totaling \$10,530,757 have been earned; in addition, \$774,784, representing 3 months' premiums, were on deposit with FAA at year's end. At the beginning of the reporting period, retained earnings from all plans stood at \$4,932,065; total revenues realized during the reporting period were \$5,609,528. Net adjusted administrative expenses chargeable to the program came to \$43,342.

FEDERAL HIGHWAY ADMINISTRATION

Emergency Preparedness. During FY 1972, the Federal Highway Administration initiated a series of regional national defense training conferences. The first one of this series was held April 3-4, 1972, at the FHWA Region 3 headquarters in Baltimore, Maryland. The highlight of these conferences was an 8-hour nuclear attack oriented exercise adapted for

regional use from the HIREX-71 strike pattern. During these sessions, the executive reservists participated with key regional staff members in solving typical highway transportation problems expected to occur in the event of a national emergency.

FHWA, in conjunction with the Highway Users Federation for Safety and Mobility, conducted one symposium and planned three others to familiarize highway user personnel with emergency highway traffic regulation plans developed during the past few years. The first symposium was held in Denver, Colorado, on May 3, 1972. The three remaining meetings have been scheduled for Bismarck, North Dakota; Phoenix, Arizona; and Trenton, New Jersey, during FY 1973.

A series of Emergency Standby Orders (ESO's) is currently being issued. These ESO's spell out the necessary authorities, uniform guidelines, and procedures that are needed by the Federal Highway Administrator, Regional Federal Highway Administrators, and division engineers to carry out additional responsibilities that would exist under a large-scale emergency situation. ESO's were issued in FY 1972 for 10 of 14 emergency preparedness areas previously identified. These orders were incorporated in the FHWA Order 10-4 series.

By year's end, agreements had been obtained from 51 to 52 States (including the District of Columbia and Puerto Rico) for implementing the national emergency preparedness program for highway transportation. These agreements provide for the accomplishment of highway-oriented operations that would be necessary under national emergency conditions and for the annual updating of the plans associated with this program.

Recruitment and training activities of the FHWA National Defense Executive Reserve showed considerable progress during this fiscal year. At present, there are 110 designated members; at year's end, eight candidates were being processed for membership.

Emergency Relief. Highways and bridges on the Federal-aid systems suffered the most extensive damage from natural disasters in the Nation's history during FY 1972. The total cost of repairing this damage is estimated at \$218,806,000. The greatest disaster during the fiscal year was tropical storm Agnes, which caused an estimated \$180,000,000 in damage to the Federal-aid highway systems in Florida, Virginia, Maryland, Pennsylvania, and New York. The damage in Pennsylvania alone was \$116,000,000. Other major disasters occurred in Rapid City, South Dakota, where 232 persons died and damage to the Federal-aid systems was estimated at \$14,000,000, and in Buffalo Creek, West Virginia, where 18 persons died and damage to the Federal-aid systems was estimated at \$13,000,000.

During the year, a total of \$42,979,274 was approved for use by the States for the repair or reconstruction of damaged highways and bridges on the Federal-aid systems, and \$4,605,540 was allocated for the repair or reconstruction of roads and bridges under the jurisdiction of other Federal agencies. In addition, \$26,736,369 was allocated for the repair or reconstruction of bridges permanently closed during the period December 31, 1967 through December 31, 1970, because of imminent danger of collapse.

Disaster Assistance. Natural disasters during FY 1972 caused the most devastating damage ever recorded to roads and bridges not on any of the Federal-aid highway systems. A total of 35 disasters in 25 States caused an estimated \$385,000,000 in damages to such roads and bridges. Tropical storm Agnes accounted for an estimated \$345,000,000 in such damage.

FHWA personnel expended approximately 22,600 man-hours in providing assistance to the Office of Emergency Preparedness (OEP) while making preliminary estimates of the damage to non-Federal-aid roads and bridges, detailed estimates of the cost to repair and reconstruct these roads and bridges, and inspections of the necessary construction work. The cost of providing this assistance was approximately \$230,000, which is reimbursable from the Office of Emergency Preparedness.

Defense-Access Roads. The Federal Highway Administration evaluates the access-road needs of installations upon receipt of a request from the Department of Defense or other Federal agency. Improvements necessary to serve military installations that cannot be accomplished under the regular Federal-aid highway programs are constructed under the defense-access, replacement, and maneuver road program when certified as important to the national defense by the Secretary of Defense. Funds for these improvements are transferred to the FHWA by the interested agency. State and local highway agencies usually prepare plans and supervise construction under the procedures used in the regular Federal-aid highway programs.

Approximately \$3.7 million was transferred by agencies of the Department of Defense for such improvements during the year. These and previously transferred funds made it possible for the FHWA to obligate approximately \$2.8 million to defense-access road projects; an additional sum of about \$10.8 million was programmed but not obligated. Included were funds for the continuance of extraordinary snow removal on access roads serving six Minuteman installations.

At the close of the year, 13 certified projects having a total estimated cost of over \$8.1 million awaited financing; an additional five projects, estimated to cost \$0.9 million, were awaiting certification by the Department of Defense. Finally, FHWA was in the process of evaluating the need and feasibility of improving highway access to six other defense installations.

SAFEGUARD IMPACT ASSISTANCE. The Military Authorization Act of 1971 authorizes the Secretary of Defense to assist communities located near the Safeguard installations in Montana and North Dakota in providing facilities necessitated by the construction or operation of the Safeguard ABM System. The Secretary of Transportation, through the Federal Highway Administration, continued to cooperate with the Secretary of Defense in providing Safeguard impact assistance as it concerns the need for the improvement of public streets and highways.

During the 1972 fiscal year, over \$2.2 million was transferred from the Department of Defense and obligated to projects providing for the improvement of 29 miles of road facilities in Montana and North Dakota. In addition, \$1.5 million was approved by the Safeguard System Office for the improvement of 21.5 miles in North Dakota.

FEDERAL RAILROAD ADMINISTRATION

National Defense Planning. FRA personnel from Washington Headquarters and various field offices participated in several National Defense Executive Reserve training conferences during the year. Some of the conferences included officials of other transportation related Federal agencies (as provided for in E.O. 11490).

FRA also provided representation to a meeting of the Interagency Emergency Transportation Committee regional Federal relocation center at Olney, Maryland, in February 1972, and at a meeting of the national level Interagency Emergency Transportation Committee on June 16, 1972.

Continuity of Operations. The FRA Continuity of Operations Plan (FRACOOOP) was officially published in December 1971.

Vital and other records on file at the Departmental relocation site and at the Exercises and Facilities Division of the Office of Emergency Preparedness were updated during the year.

Railroad Resource Management. As a claimant agency, FRA provided data on the Alaska Railroad for use in a Departmental standby order that was published in May 1972. The order outlines procedures for claiming supporting resources for civil transportation in times of national defense emergencies.

Crisis Management. During the railroad strike that started on July 16, 1971, and continued for over 2 weeks, FRA operated a strike information center for the Secretary of Transportation. Information obtained directly from the various railroads, shippers, and other Federal agencies was consolidated into a twice daily report to the Secretary, from which judgments could be made as to the overall strike effect on the economy.

Disaster Assistance. Assistance was provided to the Coast Guard and the Interstate Commerce Commission on surveys of damage to railroad lines in Pennsylvania resulting from unprecedented flooding caused by Tropical Storm Agnes in June 1972.

URBAN MASS TRANSPORTATION ADMINISTRATION

The Urban Mass Transportation Administration has prepared and published a continuity of operations plan for emergency preparedness that will function within the framework of the corresponding Department of Transportation program. Since the Urban Mass Transportation Administration does not have its own specific statutory authority for emergency preparedness planning, its authority is derived from the Secretary of Transportation.

Upon the declaration of an emergency, designated personnel will deploy to a predetermined DOT site to execute assigned emergency missions including:

- Accomplishing essential administration functions and assigned responsibilities.
- Providing support services to the Secretary for the emergency management of urban mass transportation resources.
- Assisting as requested, State, regional, metropolitan, and local governments in planning for coordinated emergency urban mass transportation policies and programs.

Specifically UMTA plans call for:

- Providing guidance to urban communities in their emergency mass transportation planning efforts, either directly or through State, regional, or metropolitan agencies.
- Coordinating such planning effort with Department of Housing and Urban Development to assure compatibility with emergency plans for all other aspects of urban development.
- Maintaining an inventory of urban mass transportation systems.

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Defense Planning. During FY 1972, the National Highway Traffic Safety Administration (NHTSA) was assigned the responsibility for such emergency planning as would insure a capability for developing supporting resource data with respect to the total civilian requirements for privately owned and operated automobiles; i.e., gasoline, tires, and related supplies for their operation and maintenance. In an emergency, when specifically directed by the Department of Transportation Emergency Organization, NHTSA will, in light of criteria to be furnished at that time, develop and forward to the Emergency Organization Headquarters the required supporting data. The DOT Emergency Organization does not formally claim, or subsequently receive, an allocation of resources. Such allocation of resources as may be subsequently made would be through a general rationing program in accordance with criteria established by the Economic Stabilization Administration, an emergency organization under the cognizance of the Office of Emergency Preparedness, or a similar agency responsible for this function.

Continuity of Operations. The NHTSA is in the process of refining its current plan for assuring the continuity of its operations. The Administration is responsible for providing leadership and coordinating a national program to reduce motor vehicle and pedestrian accidents and resultant deaths, injuries, and property damage. In furtherance of this responsibility, the Administration—

- Provides technical and financial assistance to States.
- Develops and promulgates highway safety oriented standards, except for those standards delegated to FHWA.
- Establishes and enforces Federal motor vehicle safety standards to improve safety in operation and performance of motor vehicles and equipment.
- Conducts a research, development, and evaluation program to advance the state of the art in motor vehicle and highway safety and establish the base for standards development.

Specific provisions of the plan include: (1) Succession to office, (2) pre-delegation of emergency authority, (3) safekeeping of essential records, (4) emergency relocation, (5) emergency action steps, (6) alternate headquarters as may be required, and (7) protection of resources. The plan will be revised as required and included in DOT Order 1900.2, the Continuity of Operations Plan of the Department of Transportation.

Chapter XI

ORGANIZATION AND ADMINISTRATION DEVELOPMENTS

OFFICE OF THE SECRETARY

Management of Research and Development. During FY 1972 considerable effort was devoted to the further development and refinement of the Department's overall R&D management system and to the information systems which document and support both the technical work and its management.

All elements of the management system related to budgeting and monitoring of the R&D program have been through their first iteration during FY 1972, providing insight as to how to conduct these operations more efficiently in the future, as well as insights as to how to conduct planning and program evaluation more effectively. These latter two elements of the system will be formalized and tested for the first time in FY 1973. An informal Joint Research Council was initiated late in FY 1972 to coordinate research planning within the Secretarial offices, thus to avoid duplicative efforts, to seek a balance between technological and socioeconomic research, and to identify present and future research needs.

With respect to the technical information system, an initial step was taken toward a national transportation research information network with the sponsorship of a special committee within the National Research Council. The committee was charged with the responsibility for studying the problems and needs of the R&D community in securing the required information and recommending ways and means for increasing the overall effectiveness of information transfer among transportation research workers, paying particular attention to the linkages and networks among existing information centers.

University Research. An investigation early in the year of university research conducted by the Department revealed the annual investment to be about one tenth of one percent of the budget. A substantial increase (\$4 million) was approved for FY 1973. Planning work was undertaken with counsel of university leaders, State and local government officials, trade associations and industrial leaders to determine proper direction to be taken for a new, vigorous and relevant program of interdisciplinary multi-modal research in universities. Plans for the new program were essentially complete on June 30, 1972. The programs, when instituted, will provide a new point of contact between DOT and the academic community and increase the involvement of the nation's universities in the solutions of intermediate and long-range transportation problems.

Transportation Safety Institute. The Transportation Safety Institute was established in May 1971 to foster the development of modal and inter-

modal transportation safety management and technology by developing and conducting safety and security courses and seminars for DOT and its operating administrations.

During this fiscal year, the Institute has developed and taught accident investigation courses for aircraft, railway, motor carrier and marine transportation. It has also developed and taught courses for safety aspects of hazardous materials and cargo security. Plans for the next fiscal year include the development of intermodal courses for "risk management" and occupational safety, as well as modal courses for pipeline safety evaluation and compliance, and advanced aircraft accident investigation.

Coordination and Monitoring of Actions Taken on NTSB Recommendations. It was found in discussions between top management of DOT and the National Transportation Safety Board that there was need to improve coordination of DOT responses and follow-up actions on NTSB reports. To achieve this end, the Assistant Secretary for Safety and Consumer Affairs was designated as the coordinator. Designation of a coordination office also serves to keep the Secretary better informed of Departmental actions resulting from NTSB recommendations.

There is now within the Office of the Secretary active control of actions taken on NTSB recommendations. This has resulted in more rapid modal administration responses to NTSB reports, and additional modal administration activity on implementation of NTSB recommendations.

Transportation Safety Information System. A study of DOT data systems was undertaken in the Office of the Secretary to improve coordination of information between modes and the NTSB.

A common data base for comparison of modes is needed for decision-making by high level managers. The common base is difficult to establish because of intermodal difference in definition, baseline rate computation, reporting sources, currency of information and investigative needs.

A goal has been to develop a Department-wide Transportation Safety Information System (TRANSIS).

Emergency Medical Service. The Surgeon General has estimated that effective emergency medical service (EMS) could annually save the lives of 90,000 people of whom some 35,000 are victims of heart attacks. Nevertheless, emergency health care and its delivery have received less publicity and emphasis than law enforcement and fire fighting, although the needs are equally great. In his 1972 State of the Union message, the President promised additional emphasis upon and improvement in the transportation and medical aspects of Emergency Medical Service. It is noteworthy that EMS has a remarkably high return in lives saved per dollar invested.

Emergency Medical Service cuts across modal lines, and involves land, sea, and air transportation. It also involves coordination with the Departments of Labor, HEW, Justice and Defense, as well as the Federal Communications Commission, Social Security Administration, Office of Civil Defense and Office of Emergency Preparedness. In the last few years, substantial progress has been made in the transportation, communication, and command and control aspects of emergency medical services.

A management review is now underway in DOT to determine the best organizational location for the Emergency Medical Service function. In light of its multi-modal nature, this function will probably be placed somewhere in the Office of the Secretary. This would seem to be the best way to coordinate EMS activities, and thus to expedite bringing to the injured the medical care they need. An effective activity in this area is vital if DOT is to meet its goals of reducing highway and traffic fatalities in 1980 to one-half the 55,000 recorded in 1970.

Coordination of Occupational Safety and Health Activities. Under the Occupational Safety and Health Act of 1970 (P.L. 91-596) the Secretary of Labor is responsible for both promulgating and enforcing job safety and health standards. However, the Act stipulates that its conditions shall not apply to working conditions of employees with respect to which other Federal agencies exercise statutory authority to prescribe or enforce standards or regulations affecting occupational safety or health. The Department of Transportation exercises such statutory authority in all modes of transportation.

A coordination activity has been undertaken to develop working relationships between the Department of Labor's Occupational Safety and Health Administration and DOT's modal administrations (a) to develop clear delineation of the areas in which each Department exercises statutory authority, (b) to avoid inconsistency or duplication in regulations issued by the two Departments, such as those for the labeling and handling of hazardous materials in warehouses (under DOL) and in transit (under DOT), (c) to evolve recordkeeping and reporting requirements for occupational injuries and illnesses so as to minimize, to the extent possible, the burden on industry resulting from differences in requirements of each Department, and (d) to establish a continuing communications link between the two Departments to resolve questions which will continue to arise as they carry out their statutory responsibilities, particularly questions of jurisdiction.

Federal Assistance Review and Management Improvement. Major emphases during President Nixon's first three years in office included departmental reorganization, revenue sharing, and simplification of the grant-in-aid process for both recipients in the local and State governments and also for Federal agencies that made the grants-in-aid. Departmental annual reports for earlier years have indicated the degree to which the Department has been able to conform to the standards established by the President. Thus the grant-making elements of the Department have, for all practical purposes, conformed to the President's ten-region pattern for field organization and have cooperated with the ten Federal Regional Councils. Perhaps more significantly, the Department's administrations have enthusiastically effected the coordination relationships with State and local governments encouraged by the President. As a further important contribution to the process, the Secretary has selected and installed a regional representative in each of the 10 regions whose function it is to listen to local requests, to help meet them by coordinating the assistance that the administrations can offer.

To further the objective of assisting State and local governments to improve their planning and coordination capabilities, the Department has instituted an intermodal planning group in each of the ten regions. These groups provide the mechanism for urban planning groups to coordinate their requirements both with other groups in their regions and with the segments of the DOT which can make grants for the types of solutions to transportation problems that the local entities find desirable. These groups also cooperate with the HUD planning efforts within their regions. The Department's administrations that actually administer grant programs also provide planning grants to cities and States; examples of this are the FAA grants for airport system planning and UMTA's technical studies grants. About 47 of the 50 largest standard metropolitan areas have received such transit planning grants from UMTA, as have numerous smaller jurisdictions.

Since one of the crucial shortages in local areas was a deficiency in the numbers of people qualified to make the kinds of studies such planning requires, the Department's elements developed programs to assist in training State and local government employees in the needed skills. For example, workers in air traffic control, highway auditing, and ADP systems, among others, have benefited from such training. Cross assignment of people between State and Federal agencies is another technique used to improve the capabilities of employees of both governmental bodies. Such agencies as UMTA and NHTSA also provide technical assistance to their grantees to encourage more advantageous use of grant funds. A most important area of cooperation is in auditing; such agencies as FHWA have arranged to utilize and accept audits conducted for grantees. States have been encouraged to develop annual work plans for highway safety projects so that the 50 plans replace hundreds of individual project authorizations that they formerly had to develop.

Consistent efforts have been made to reduce time spent by States in preparing applications, by Federal agencies in processing applications, and by the grant-making agencies in providing payment of grants processed.

Simplifying and standardizing procedures in numerous ways, a few of which were just described, coupled with decentralizing of grant-making authority by means of suitable delegations to field authorities, have made the Department's intergovernmental relationships simpler, less cumbersome, and far more effective than they had been previously.

Each month has brought improvements in the operations of the Department, especially since it has now been possible to complete the consolidation of the Department in the Nassif building. One of the advantages projected for operation in one building has now been practically achieved—the transfer of the Department printing capability to the Nassif building. While the construction of the plant is not yet complete, it has advanced so well that the move of the plant is imminent; both economies and additional convenience are expected from this shift.

The year just passed has placed great strain on the personnel management facilities of the Department because the amounts of funds allocated for personal services appeared not to be sufficient to retain all of the personnel of the several elements. The Department was able to avoid the dis-

ruptions of a reduction-in-force procedure only by the most careful personnel management.

FEDERAL AVIATION ADMINISTRATION

Organizational Changes. Notable changes in FAA's organizational structure during the reporting period included:

- Abolishing the Bureau of National Capital Airports as a bureau and transferring its functions to the Airports Service, on August 10, 1971.
- Transferring the airmarking and skyway programs from the Facility Installation Service to the Office of General Aviation, on September 14, 1971.
- Establishing the Airway Facilities Service by merging the Systems Maintenance Service with the Facilities Installations Service, on October 1, 1971.
- Abolishing the Office of Supersonic Transport Development, on October 12, 1971. To continue SST engineering and research activities, a Supersonic Transport Office was established under the Associate Administrator for Engineering and Development. An SST Contracts Branch was also established in the Logistics Service to perform the contracting and procurement functions necessary to terminate the SST development contracts.
- Abolishing the North Atlantic Systems Planning Staff and transferring its functions to the International Programs and Policy Division, Office of International Aviation Affairs, on November 18, 1971.
- Consolidating the National Airspace System Program Office with the Systems Research and Development Service, on February 10, 1972.
- Placing the Office of International Aviation Affairs under the executive direction of the Associate Administrator for Plans, on April 17, 1972. This office previously reported directly to the FAA Administrator.
- Transferring the administration of Wake Island to the Department of Defense, on June 24, 1972. This transfer had been preceded by a comprehensive management study of FAA's role on the island. The study indicated that Wake's importance as a fueling stop for civil aircraft had materially lessened and that the principal user of Wake's facilities was the U.S. Air Force. By year's end, FAA had reduced its authorized staffing on the island from 303 to 50. The reduced force would operate the nav aids on the island and provide other ATC services.

Personnel Administration and Manpower Management.

EMPLOYMENT. FAA reversed a recent trend by registering a year-to-year decrease in its personnel employment level. On June 30, 1972, the FAA work force stood at 53,330, a decline of 2.2 percent from the June 30, 1971 figure of 54,550. (The FY 1972 figure includes 752 employees separated after the close of business, June 30, 1972.) ATC specialists, the largest single work force component (46.1 percent), also experienced a decline during the period, dropping from 25,186 (June 30, 1971) to 24,590 (June 30, 1972). Electronic technicians, the next largest component, fell from 8,984 (June 30, 1971) to 8,843 (June 30, 1972). See tables — and — for composition of FAA work force and employment history and forecast.)

LABOR RELATIONS. Significant developments in this area included:

- The number of FAA employees represented by unions continued to grow. The total represented at year's end was approximately 19,000. While the actual number of units of recognition decreased, unit sizes increased.
- The Department of Labor certified the National Association of Air Traffic Specialists (NAATS) as the national exclusive representative for all flight service station specialists, effective June 1, 1972. This recognition, the first nationwide for FAA, covered some 3,000 employees. To implement the agreement, training was given to some 800 FSS supervisors to explain the impact of this new bargaining unit, the provisions of the agreement, and their responsibilities in administering the agreement.
- Professional Air Traffic Controllers Organization (PATCO) requested similar exclusive recognition as the national representative for all air traffic controllers in towers and centers. The unit hearing with the Labor Department was completed in November 1971. If approved, about 15,000 controllers would be involved in this bargaining unit.
- About 25 of the 50 controllers eligible for re-employment by FAA went back to work after their earlier dismissal for their role in the 1970 work stoppage.

Controller Performance Profiles for New Hires. During the reporting period, nearly 1,000 controllers and flight service specialists voluntarily took aptitude and psycho-motor tests that were compared by a private firm to confidential performance profiles drawn up by the controllers' supervisors. The idea was to develop tests that accurately reveal the abilities of people who apply for controller jobs.

Executive Development Program. In January 1972, FAA announced the implementation of an executive development program. This was the first step in establishing a total agency career system for middle managers and executives which would assure that FAA's supervisory, managerial, and executive leadership was both broad gauged and technically proficient. The specific objective of this new program is to select and develop through training and experience candidates from supervisory and managerial positions who have the potential for occupying the agency's 94 top positions. By March, all GS-14 and 15 employees who met the basic criteria for the program were invited to apply. Over 330 applications were received; 86 applicants were designated by the regions, centers, and headquarters as qualified to compete at the national level. From these 86, national interview panels selected 37 to attend an assessment center in Washington, D.C., from which the Executive Personnel Board planned to select 8 to 12 candidates to enter the program. The assembled training for the executive development program was scheduled to begin early next year in Washington. For most selectees, it will involve various regional assignments through the end of May 1973, after which they will be given appropriate developmental assignments.

Air Traffic Controller Career Legislation. On May 16, 1972, President Nixon signed into law (P.L. 92-297), milestone legislation that recognized

the career status of the air traffic controller and provided for early retirement of a controller at one-half of his high 3-year average salary at age 50 after 20 years of service or at any age after 25 years of service. The law also provides for up to 2 years of retraining under certain circumstances.

Training. FY 1972 training efforts produced greater numbers of technicians and controllers at higher levels of skill than in any previous period in FAA's history. During the year, FAA accomplished the following significant training:

- *Drug Awareness.* Special video tape programs were developed for supervisory and nonsupervisory employees alerting them to the seriousness of drug abuse, to various types of drugs, and to the implications of drug abuse for air safety. More than 4,500 supervisors were given this training, and plans were completed by year's end to extend its coverage to all employees and new hires.
- *Supervisory and Middle Management Training.* By year's end, more than 4,100 supervisors and managers had completed the FAA Management Training School course at Cameron College, Lawton, Oklahoma for supervisors and middle managers.
- *Equal Employment Opportunity (EEO) Counselor Effectiveness.* A course was developed to provide EEO counsellors with capability to deal with minority problems and counsel individuals who feel they are victims of discrimination.
- *Air Traffic Training.* Digital radar controller training simulators were installed at the FAA Academy as part of the controller training program. Twenty ARTCC's are scheduled to receive similar devices.

Employee Communications. During the year, extensive efforts were made to improve employee-management communications.

One significant device was the introduction of *VIDICOM*, a monthly videotape program designed to address agency issues in the form of panel discussions, followed by question and answer sessions. Among the topics included were labor relations, drugs, retirement, mobility, and executive development.

An executive digest newsletter was developed for distribution to all supervisors. The newsletter's objectives are to (1) provide guidance on efficient and effective management; (2) enhance the supervisory function by discussing problems, practices, and the principles of the effective use of manpower; (3) develop a closer rapport and liaison between field managers and the Washington Headquarters.

Engineered Staffing Standards for Air Traffic System. During FY 1972, FAA was deeply involved in the development of engineered staffing standards for air route traffic control centers, air traffic control terminals, and flight service stations. These standards will apply to almost half of the agency's work force. Work measurement data were collected on-site from a large number and variety of field facilities. Computers were used extensively for analyzing the data, and computerized models were designed to facilitate future applications of the standards. Though the standards are still under review, they were used in the agency's FY 1974 budget formu-

lation process. The staffing standards resulting from this major effort should provide FAA with a reliable means for determining its manpower requirements; they should serve as a tool for improving management effectiveness within the FAA.

Federal Assistance Review Program. During the year, FAA made important strides in implementing the President's program to streamline, standardize, and simplify procedures for providing grant-in-aid assistance to State and local governments. These included:

- Increased coordination between the FAA field structure and recipients of Federal assistance.
- Assistance to State and local governments in developing improved planning-grant and coordination capabilities.
- Improved liaison with State and local governments and the aviation public.
- Increasing the number of programs with final grant-approval authority delegated to the field. In March 1972, regional directors were delegated authority to approve airport development aid program requests involving Federal funds of up to \$250,000 for general aviation airports, and up to \$2,500,000 for commercial air carrier and reliever airports, thus placing decisionmaking authority for about 90 percent of the projects at the regional director level—excluding those that involved environmental impact statements.

FEDERAL HIGHWAY ADMINISTRATION

Education and Training. The National Highway Institute was established during FY 1972 in the Federal Highway Administration as authorized in the 1970 Federal-Aid Highway Act. The program responsibilities of the Institute have been divided into four principal categories: (a) Federal programs; (b) State and local programs; (c) institutional programs, including colleges, technical institutes and industries; and (d) international programs.

Administrative procedures and regulatory guidelines were developed and issued to all FHWA and State highway department offices. An "Informational Guide" was prepared and distributed that defined the role of the Institute, types of programs, and persons eligible to participate. The Institute's aim is to assist State highway departments in development and presentation of training, regardless of whether States elect to use the Federal-aid funds available to them.

Unified Work Programs. In another effort to further improve inter-jurisdictional and intermodal coordination, FHWA has established a requirement for unified work programs for transportation planning in specific urbanized areas. This is a single document that each of the involved modal Administrations (FHWA, FAA, UMTA) can use to make funding determinations. As a minimum, it should contain planning information on all highway, transit, aviation, and railway activities as well as all of the transportation support activities (e.g., land use, and socioeconomic factors). By July 1, 1973, all urbanized areas receiving funding support for areawide transportation planning from more than one DOT Administration must

submit a unified planning work program as a condition for FHWA participation. The first jointly developed programs have been requested for the 25 largest metropolitan areas in FY 1973.

Regional Boundary Conversion. Effective January 1, 1972, the Federal Highway Administration regional boundaries were realigned to conform generally with the President's plan for standard regional boundaries and headquarters cities. Deviations from the uniform boundaries were authorized so that (1) the territory comprising the Boston and New York standard regions could be administered as a single FHWA region, and (2) the regional headquarters offices of three FHWA regions could remain in the cities in which they were located prior to the realignment, i.e., Delmar, New York (FHWA Region 1), Baltimore, Maryland (FHWA Region 3), and Portland, Oregon (FHWA Region 10).

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Organizational changes. With the exception of minor shifts in a few of the offices of NHTSA, there have been no organizational changes of note either in the headquarters staff, or the regional offices.

Single Apportionment. An innovative funding arrangement was undertaken in FY 1972 which provided for the control of grant funds on a nationwide rather than a State-by-State basis. Taking the form of a joint NHTSA/FHWA apportionment specified in a single document, this approach provides flexibility to the States in applying Federal funds to their individual highway safety priorities, whether in the NHTSA standard areas (driver and vehicle factors) or the FHWA standard areas (physical aspects of the highway). This funding innovation, which was undertaken with the approval and support of the Secretary and the Chairman of the House Public Works Committee, has contributed to successful implementation of the concept of the Statewide Annual Work Program covering both NHTSA and FHWA standards in a single plan (see section on "Highway Safety—A Cooperative Effort"). In view of its success in FY 1972, the single apportionment concept has been adopted for a second year.

Letter of Credit. In an effort to provide advance financing of Federal programs during the quarterly operation of the approved annual highway safety plans, NHTSA is fostering the adoption of the letter of credit concept by the States and local communities. Adoption of letter of credit procedures will reduce the reimbursement delivery cycle, on an average, to one week and 3 days from a previous average of 4 weeks and 3 days.

URBAN MASS TRANSPORTATION ADMINISTRATION

UMTA Regional Offices. Initial steps were taken to establish representation for urban mass transportation programs in each of the ten regions designated by President Nixon. This representation is part of the President's plan to take government programs to the people. Heretofore, the Urban Mass Transportation Administration has had no field representatives, as all employees were stationed in Washington. The presence of representatives in the various regions will increase the understanding, coordination, and effectiveness of urban mass transportation programs throughout the local communities of the nation.

Increasing External Audit Coverage. Because of the rapidly growing UMTA program and the attendant need for timely and accurate program evaluation techniques, external audit coverage of UMTA grants and contracts was significantly increased during FY 1972. This increased coverage was accomplished, while maintaining a current posture with respect to audit requests, by instituting a review procedure to reduce audit time for small grant projects and by developing audit guides for application by many audit entities.

A certification in lieu of audit procedure was applied for certain smaller UMTA grant projects. Moreover, UMTA audit guides were coordinated with the American Institute of Certified Public Accountants, and were applied by auditors from national CPA firms, the Defense Contract Audit Agency, the HEW Audit Agency, the Federal Highway Administration, and the UMTA Program Audit Division. The net result of all these efforts was that UMTA grants, contracts, and proposals amounting to about \$364 million were audited during FY 1972.

FEDERAL RAILROAD ADMINISTRATION

During FY 1972, the Federal Railroad Administration's "Bureau of Railroad Safety," was redesignated as the "Office of Safety." A study was made of the Office of Safety during FY 1972 and a reorganization of the unit will be accomplished during FY 1973. The new organization will accommodate the vastly increased authority and responsibility designated to the Office of Safety under the Federal Railroad Safety Act of 1970.

TABLE 1.—Federal Aviation Administration certification statistics.

Airman Certificates Held December 31, 1971 vs. December 31, 1970

Category	Dec. 31, 1971	Dec. 31, 1970	Percent Change
Total pilots.....	741,009	732,729	+1.1
Student pilots.....	186,428	195,861	-4.8
Private pilots.....	312,656	303,779	+2.0
Commercial pilots.....	192,409	186,821	+3.0
Airline transport pilots.....	35,949	34,430	+4.4
Helicopter pilots.....	7,992	6,677	+19.7
Other pilots.....	5,575	5,161	+8.0
Total nonpilots.....	307,057	289,681	+6.0
Mechanics.....	193,295	184,647	+4.7
Ground instructors.....	46,145	44,176	+4.5
Control tower operators.....	26,450	21,032	+25.8
Flight engrs. & navigators.....	28,848	28,109	+2.6
Other nonpilots.....	12,319	11,717	+5.1
Flight instructors.....	37,760	37,822	-0.2

Certification of Aircraft and Aircraft Components

	Fiscal year 1972	Fiscal year 1971
New aircraft models certificated.....	80	77
New aircraft engine models certificated.....	36	33
New propeller models certificated.....	28	5
Original airworthiness certificates, export certificates, and related approvals issued.....	15,000 estimate	20,600 estimate

TABLE 2.—U.S. certificated route air carrier accidents and fatalities—scheduled domestic and international passenger service.

Calendar year	Accidents		Fatalities				Passengers carried ¹	Passenger- miles flown (000)	Fatality rate per 100 million passenger- miles flown	
	Total	Fatal	Passg.	Crew		Other				Total
1961	58	5	124	11	1	58,411,977	41,701,560	0.298		
1962	43	5	158	25	0	62,548,399	45,853,343	0.264		
1963	49	5	121	24	0	71,437,828	52,703,333	0.230		
1964	53	9	200	26	1	81,761,273	61,022,488	0.261		
1965	63	7	226	27	0	94,662,314	71,796,399	0.315		
1966	53	4	59	13	0	109,390,556	83,142,197	0.071		
1967	51	8	226	24	5	132,088,038	103,381,996	0.219		
1968	53	² 13	305	34	6	150,162,701	119,612,578	0.255		
1969	48	7	132	17	3	159,213,414	132,161,593	0.100		
1970	39	2	2	0	1	171,697,097	139,022,475	0.001		
1971(Prelim.)	39	² 6	174	14	6	* 172,000,000	* 142,000,000	0.122		

¹ Beginning in 1970, carriers were required to report revenue passenger enplanements, whereas prior to 1970 revenue passenger originations were reported.

² Includes midair collisions nonfatal to air carrier occupants.

³ Estimated by CAB.

Note—Passenger deaths occurring in sabotage accidents are included in the passenger fatality column but excluded in the computation of passenger fatality rates (1962-37, 1964-41).

Source: National Transportation Safety Board, Annual Report to Congress, 1971.

TABLE 3.—U.S. supplemental air carrier accidents and fatalities—all operations.

Calendar year	Accidents		Fatalities				Aircraft miles flown (000)	Accident rate per million aircraft miles flown	
	Total	Fatal	Passg.	Crew	Others	Total		Total accidents	Fatal accidents
1961	6	3	151	11	0	162	47,983	0.125	0.062
1962	7	1	0	3	0	3	53,270	0.131	0.019
1963	11	3	1	4	0	5	150,692	0.217	0.059
1964	9	1	2	2	0	4	150,838	0.177	0.020
1965	10	1	0	5	0	5	162,651	0.160	0.016
1966	6	2	78	7	1	86	184,911	0.071	0.024
1967	4	1	0	3	0	3	196,071	0.042	0.010
1968	9	1	1	0	0	1	113,540	0.079	0.009
1969	2	0	0	0	0	0	115,793	0.017	0
1970	6	3	46	15	0	61	192,846	0.065	0.032
1971 (Prelim)	1	0	0	0	0	0	199,000	0.010	0

¹ Nonrevenue miles not reported.² Estimated by CAB.

Source: National Transportation Safety Board, Annual Report to Congress, 1971.

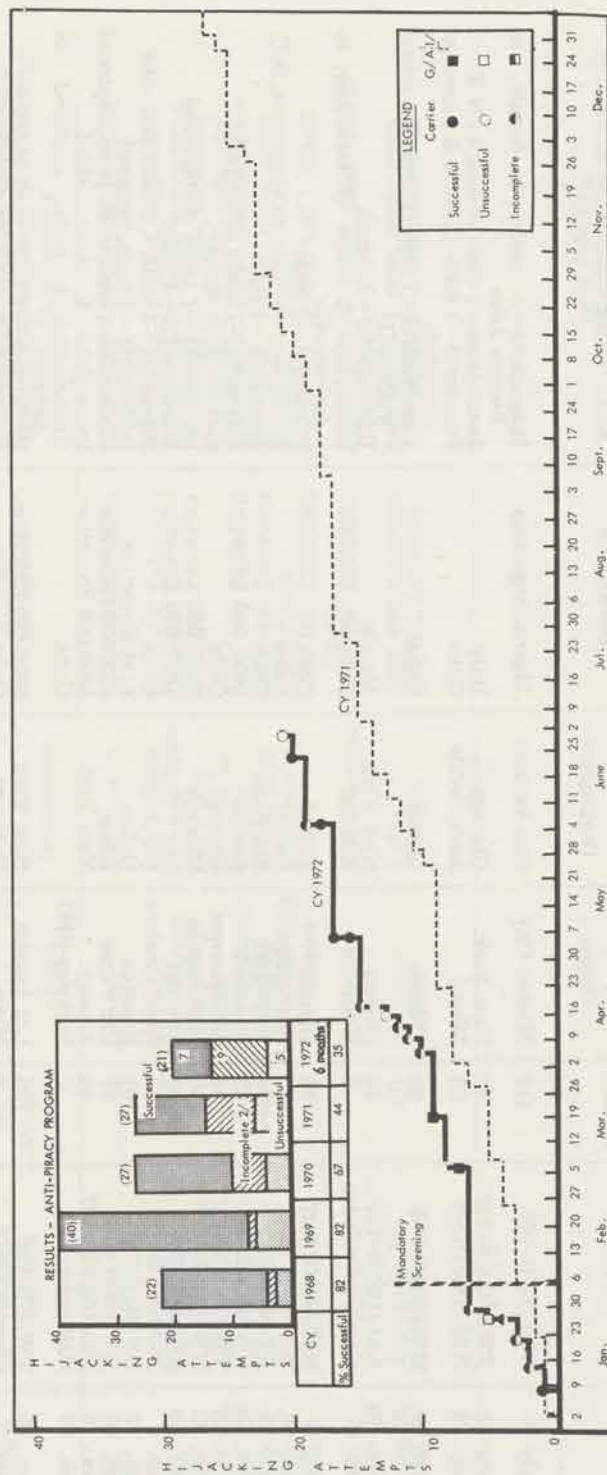
TABLE 4.—U.S. general aviation accidents and fatalities.

Calendar year	Accidents		Fatalities	Aircraft hours flown (000) ¹	Aircraft miles flown (000) ¹	Accident rates			
	Per 100,000 aircraft hours flown					Per million aircraft miles flown			
	Total	Fatal				Total	Fatal	Total	Fatal
1961	4,625	426	761	13,602	1,857,946	34.0	3.13	2.49	0.229
1962	4,840	430	857	14,500	1,964,586	33.4	2.97	2.46	0.219
1963	4,690	432	893	15,106	2,048,574	31.0	3.19	2.29	0.235
1964	5,069	526	1,083	15,738	2,180,818	32.2	3.34	2.32	0.241
1965	5,196	538	1,029	16,733	2,562,380	31.1	3.22	2.03	0.210
1966	5,712	573	² 1,149	21,023	3,336,138	27.2	2.73	1.71	0.172
1967	⁴ 6,115	603	² 1,333	22,153	3,439,964	27.6	2.72	1.78	0.175
1968 ³	⁴ 4,968	⁴ 692	1,399	24,053	3,740,000	20.6	2.86	1.33	0.184
1969	4,767	647	² 1,495	25,351	3,926,461	18.8	2.55	1.21	0.164
1970	4,640	622	1,254	26,000	3,200,000	17.8	2.33	1.45	0.194
1971 (Prelim.)	4,686	651	1,322	26,400 (est.)	3,700,000 (est.)	17.8	2.47	1.27	0.176

¹ Source: FAA² Includes air carrier fatalities (1966-2, 1967-104, 1969-82) when in collision with general aviation aircraft.³ Commencing January 1, 1968, the definition of substantial damage was changed, therefore, fewer accidents were reported. Care should be used in comparing with similar data for prior years.⁴ Three suicide/sabotage accidents included in all computations except rates.

Source: National Transportation Safety Board, Annual Report to Congress, 1971.

TABLE 5.—Hijacking Attempts on U.S. Registered Aircraft—CY 1971 vs 1972 Cumulative



1/ G/A = General Aviation
 2/ Incomplete = Hijacker apprehended/killed during hijacking or as result of "hot pursuit".

TABLE 6.—Hijacking attempts on U.S. registered aircraft in fiscal year 1972

Date	Airline Flight Aircraft	No. Aboard	Flight		Hijacker Destination	Remarks (Incomplete—Hijacker apprehended/ killed during hijacking or as result of "hot pursuit")
			Origin	Destination		
July 2	BNF/14/B-707	110	Mexico City	San Antonio	Algeria/Argentina	Incomplete—1 male, 1 female, to Buenos Aires
July 23	TWA/335/B-727	61	New York	Chicago	Italy	Incomplete—1 male (killed) to N.Y.
July 24	NAL/183/DC-8	83	Miami	Jacksonville	Cuba	Successful—1 male (hostess & passenger wounded)
Sept. 3	EAL/993/DC-9	86	Chicago	Miami	Cuba	Unsuccessful—1 male (hostess & 2 others wounded)
Sept. 24	AAL/124/B-727	76	Detroit	New York	Algeria	Unsuccessful—1 female
Oct. 4	Aero Commander	5	Nashville	Atlanta	Freeport, Bahama	Incomplete—2 males (3 fatalities), to Jacksonville
Oct. 9	EAL/953/B-727	46	Detroit	Miami	Cuba	Successful—1 male
Oct. 18	WC/15/B-737	35	Anchorage	Bethel	Cuba	Incomplete—1 male, to Vancouver, B.C.
Oct. 25	AA/98/B-747	236	New York	San Juan	Cuba	Successful—1 male
Nov. 24	NW/305/B-727	42	Portland	Seattle	\$200,000 Extortion	Successful—1 male, chute jump
Nov. 27	TWA/106/B-727	49	Albuquerque	Chicago	Cuba	Successful—3 males
Dec. 24	NW/734/B-707	40	Minneapolis	Chicago	\$300,000 Extortion	Incomplete—1 male, surrendered
Dec. 26	AA/47/B-707	83	Chicago	San Francisco	\$200,000 Extortion	Unsuccessful—1 male
Jan. 7	PSA/902/B-727	138	San Francisco	Los Angeles	Cuba	Successful—1 male, 1 female and baby
Jan. 12	BN/38/B-727	101	Houston	Dallas	\$1M Extortion	Incomplete—1 male, captured
Jan. 20	RW/800/DC-9	67	Las Vegas	Reno	\$50,000 Extortion	Incomplete—1 male, chute jump, captured
Jan. 26	MO/452/FH-227	45	Albany	New York	\$200,000 Extortion	Incomplete—1 male, killed
Jan. 26	Helicopter/Jet	-	Berkeley-SFO		Cuba	Unsuccessful—1 male, captured at heliport
Jan. 29	TW/2/B-707	100	Los Angeles	New York	\$306,800 Extortion,	Incomplete—1 male, shot, captured
Mar. 7	Charter G-73	8	Miami	Bahamas	Cuba	Successful—2 males, (3 wounded)
Mar. 7	NA/67/B-727	23	Tampa	Melbourne	Sweden	Unsuccessful—1 male, youth surrendered
Mar. 19	Charter Cessna 206	4	Key West	Tortugas Isl.	Cuba	Successful—1 male, 1 female

TABLE 6.—Hijacking attempts on U.S. registered aircraft in fiscal year 1972—Continued

Date	Airline Flight Aircraft	No. Aboard	Flight		Hijacker Destination	Remarks (Incomplete—Hijacker apprehended/ killed during hijacking or as result of "hot pursuit")
			Origin	Destination		
Apr. 7	UA/885/B-727	91	Denver	Los Angeles	\$500,000 Extortion	Incomplete—1 male, chute jump, captured
Apr. 9	PSA/942/B-727	91	Oakland	San Diego	\$500,000 Extortion	Incomplete—1 male, captured
Apr. 13	FL/91/B-737	34	Albuquerque	Phoenix	Mexico	Incomplete—1 male, surrendered
Apr. 16	PQ/179/DH-114	0	Ponce	San Juan	Unknown	Unsuccessful—1 male, captured
Apr. 17	AS/1861/B-727	74	Seattle	Annette Is.	Cairo	Unsuccessful—1 male, captured
Apr. 17	DL/952/CV-880	91	W. Palm Beach	Chicago	\$500,000 Extortion	Incomplete—1 male, surrendered
May 5	EA/175/B-727	57	Allentown	Washington	\$303,000 Extortion	Successful—1 male, chute jump
May 5	WA/407/B-737	81	Salt Lake City	Los Angeles	Hanoi/Cuba	Successful—1 male
June 2	WA/701/B-727	97	Los Angeles	Seattle	\$500,000 Extortion	Successful—1 male and 1 female
June 2	UA/239/B-727	5	Reno	San Francisco	Algeria	Incomplete—1 male, chute jump, captured
June 23	AA/119/B-727	101	St. Louis	Tulsa	\$502,000 Extortion	Successful—1 male, chute jump
June 30	RW/777/DC-9	42	Seattle	Portland	\$50,000 Extortion	Unsuccessful—1 male, captured

TABLE 7.—Worldwide hijacking attempts.

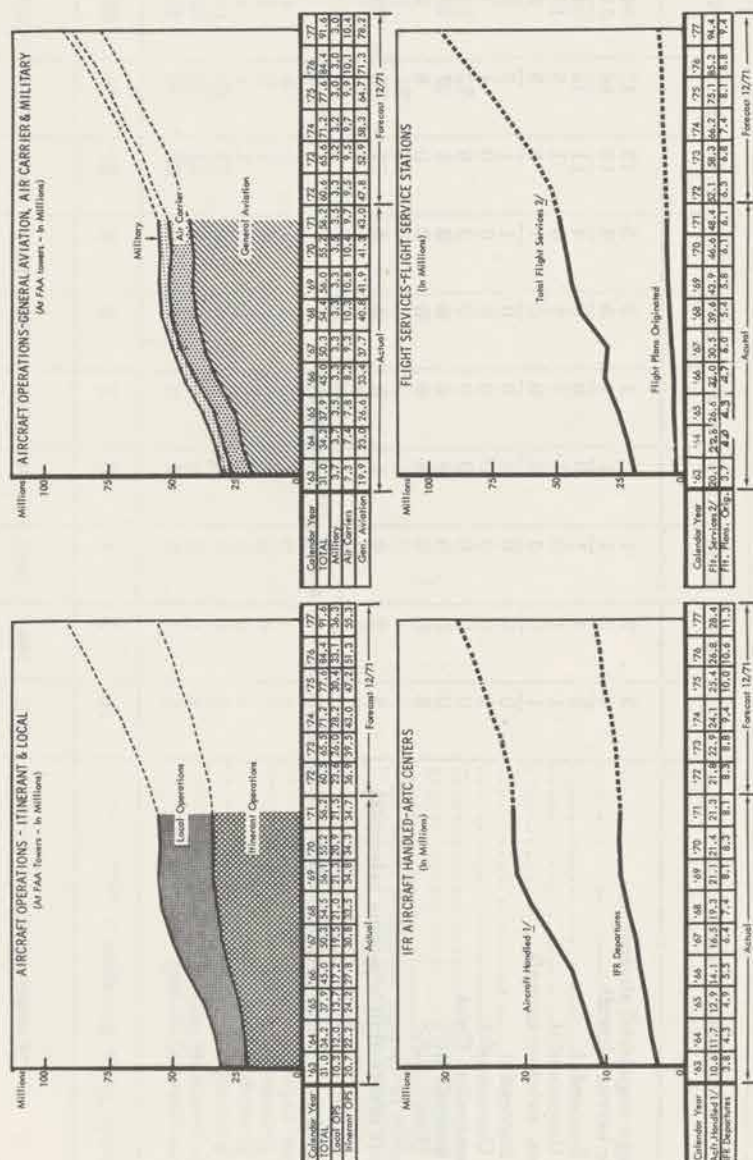
Calendar Year	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 (6 mo.)
Worldwide Total Attempts.....	10	3	1	2	5	5	6	35	87	83	59	37
U.S.-registered aircraft.....	5	1	0	1	4	0	1	22	40	27	27	21
Air carrier aircraft.....	5	0	0	0	4	0	0	17	40	26	25	18
Successful.....	3	0	0	0	1	0	0	13	33	17	11	5
Incomplete*.....	1	0	0	0	1	0	0	1	1	5	8	9
Unsuccessful.....	1	0	0	0	3	0	0	3	6	4	6	4
Gen. aviation aircraft.....	0	1	0	1	0	0	1	5	0	1	2	3
Successful.....	0	1	0	1	0	0	1	5	0	1	1	2
Incomplete*.....	0	0	0	0	0	0	0	0	0	0	1	0
Unsuccessful.....	0	0	0	0	0	0	0	0	0	0	0	1
Destination Cuba.....	4	1	0	1	2	0	1	19	37	15	14	5
Successful.....	3	1	0	1	0	0	1	18	31	14	10	4
Incomplete.....	1	0	0	0	0	0	0	1	1	1	1	0
Unsuccessful.....	0	0	0	0	2	0	0	0	5	0	3	1

TABLE 7.—Worldwide hijacking attempts—Continued

Calendar Year	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 (6 mo.)
Foreign-registered aircraft.....	5	2	1	1	1	5	5	13	47	54	32	16
Air carrier aircraft.....	4	2	1	1	1	5	4	12	44	51	29	14
Successful.....	3	1	1	0	0	3	4	11	35	34	9	5
Unsuccessful.....	1	1	0	1	1	2	0	1	9	17	20	9
Gen. aviation aircraft.....	1	0	0	0	0	0	1	1	3	6	3	2
Successful.....	0	0	0	0	0	0	1	1	2	5	2	2
Unsuccessful.....	1	0	0	0	0	0	0	0	1	1	1	0
Destination, Cuba.....	0	0	0	0	0	0	2	9	33	21	9	2
Successful.....	0	0	0	0	0	0	2	9	27	17	3	1
Unsuccessful.....	0	0	0	0	0	0	0	0	6	4	6	1
Number of foreign countries (with air- craft involved in hijacking attempts).....	4	2	1	1	1	3	4	7	18	30	22	15

* Hijacker apprehended/killed during hijacking or as result of "hot pursuit."

TABLE 8.—Air Traffic Operational Trends—Calendar Year



Data Qualifications:
1/ Obtained by adding IFR enroute & VFR departures.
2/ Obtained by adding aircraft connected, 2X flight plans originated, & 2X pilot briefs.

TABLE 9.—Aircraft models certificated in fiscal year 1972.

Category	Make	Model	Make	Model
TRANSPORT AIRCRAFT	Aerospacelines----- Boeing-----	Boeing 377SGT 747-256B, -244B, -238B, -230F, -1D1 737-205, -219, 242C, -286C, -2B7, -2B1C, -2D6, -2H4C, 2H5	Cessna----- Hawker Siddeley----- Israel----- Lockheed----- McDonnell Douglas-----	500 HS 748 Series 2A 1123 L-1011 DC-10-10
GENERAL AVIATION/ BUSINESS AIRCRAFT	American Aviation----- Beech----- Britten Norman----- Cessna----- Fairchild----- Great Lakes----- Interceptor (Aero Commander-Meyers) Lockheed-----	AA-5 65-490-4, E90, B99 BN-2A MK. III 182P, T337G, U206F, A188B, A188B (Restricted), TU206F, T210L, 188B, 188B (Restrict- ed), 340, 210L C-119G (Restricted) 2T-1A 400 P2V-5F (SP-2E Restricted)	Messerschmitt- Bolkow-Blohm GmbH N. American-Rock- well Aero Commander Partenavia S.p.A. PROCAER Piper Reims Aviation S.A.- Schweizer (Thurston) Weatherly	BO-209-250 FV & RV, -160 FV & RV, -150 FF 685, 690 P68 F15/E PA-28R-200, -31T, -31-350 Cessna F172L, FRA150L TSC-1A1 201B (Restricted)
HELICOPTERS-----	Aerospatiale-----	SA. 315B Alouette III	Sholton-----	Vertol H-21B (Restrict- ed)

TABLE 9.—Aircraft models certificated in fiscal year 1972.—Continued

Category	Make	Model	Make	Model
HELICOPTERS (Con't.)	Aircrane.....	Sikorsky CH-37B (H-37B) (Restricted), CH-37C (HR 25-1) (Restricted) 212 (Transport), 206B, 206B-1, 47G-5A, 47G-3B-2A	Sikorsky	S-58FT, S-58HT, S-58JT, S-58F, S-58H, S-58B/T, S-58D/T, S-58E/T, S-58G, S-58J
	Bell.....			
	Messerschmitt- Bolkow-Blohm GmbH.....	BO-105C		
	Laister..... Let.....	LP-46 (Sailplane) Blanik L-13	Schleicher.....	ASW-15
GLIDERS.....				

TABLE 10.—Reduction in aircraft delays—National Airspace System

	CY 1968		CY 1969		CY 1970		CY 1971	
	No. delays*	Avg. Daily	No. delays*	Avg. Daily	No. delays*	Avg. Daily	No. delays*	Avg. Daily
TOTAL	97,894 (8 mo.)	400	106,348	291	71,959	197	34,335	94
January----	N.A.		10,861	350	4,425	143	3,869	125
February----	N.A.		5,778	206	3,253	114	3,252	16
March----	N.A.		3,989	129	11,465	369	3,484	112
April-----	N.A.		9,568	319	11,271	376	2,090	70
May-----	3,846	124	6,197	200	7,405	239	1,687	54
June-----	10,650	355	18,243	608	10,896	364	2,729	91
July-----	23,759	766	15,635	504	6,209	200	3,004	97
August-----	18,713	604	6,739	217	3,981	128	2,460	79
September--	11,714	390	8,693	290	5,469	182	2,066	68
October-----	7,945	256	7,066	228	2,994	97	3,804	123
November--	9,135	304	8,602	287	2,365	79	2,062	69
December--	12,132	391	4,977	161	2,226	72	3,828	123

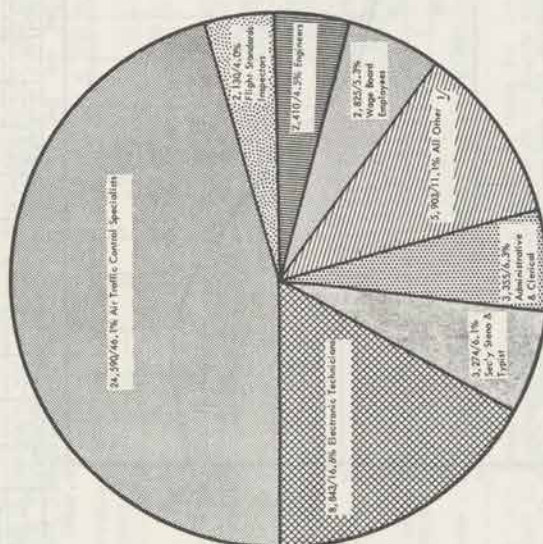
* Includes delays of over 30 min. to general aviation or air carrier aircraft.

TABLE 11.—FAA National Airspace System Facilities

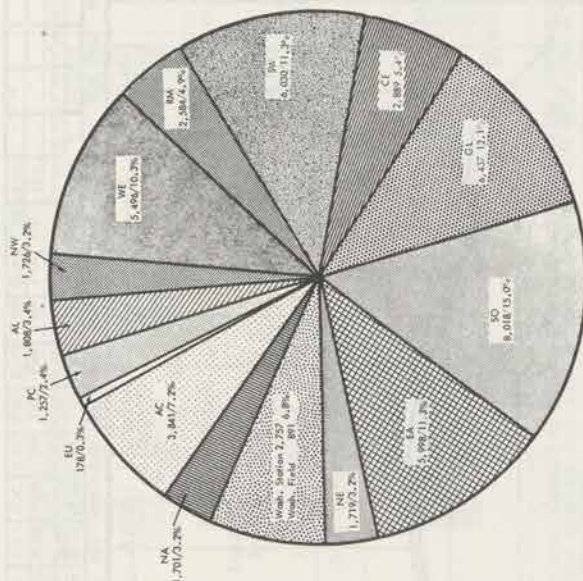
Facilities	Dec. 31, 1968	Dec. 31, 1969	Dec. 31, 1970	Dec. 31, 1971
TOTAL.....	8,523	8,771	8,995	9,400
Air Navigation System				
Aids to Navigation—Subtotal.....	1,688	1,677	1,682	1,776
Nondirectional Navigation Facility.....	106	112	101	92
UHF Tactical Air Navigation Aid.....	561	562	587	688
VHF Omnidirectional Radio Range.....	868	873	881	882
Other.....	153	130	113	114
Landing Aids—Subtotal.....	2,257	2,343	2,489	2,648
Airport Landing System.....	225	227	228	228
Instrument Landing System.....	282	291	309	330
Runway End Identification Light.....	69	72	79	86
Runway Visual Range.....	263	272	277	277
Visual Approach Slope Indicator.....	69	86	105	126
VHF Omnidirectional Radio Range.....	83	84	74	79
Other.....	1,266	1,311	1,417	1,522
Air Traffic Control System				
Enroute Control & Service—Subtotal.....	1,466	1,519	1,542	1,587
Air Route Surveillance Radar.....	91	90	88	92
Air Route Traffic Control Center.....	27	27	27	27
Air Route Remote Air-Ground Facility.....	405	424	444	470
Other.....	943	978	983	998
Terminal Control & Services—Subtotal.....	1,406	1,512	1,530	1,678
Airport Surveillance Radar.....	121	121	120	122
Airport Traffic Control Tower.....	320	328	336	347
Direction Finder.....	89	89	79	79
Radar Approach Control Facility.....	30	30	29	28
Other.....	846	944	966	1,102
Flight Service Facilities—Subtotal.....	1,706	1,720	1,752	1,711
Data Interchange System.....	40	39	37	37
Direction Finder.....	131	143	161	166
Flight Service Station.....	358	358	357	356
Other.....	1,177	1,180	1,197	1,152

TABLE 12.—The FAA Work Force—Full, Part-Time, & Temporary Employees, Reimbursables & Military

EMPLOYMENT BY OCCUPATIONAL GROUPS



EMPLOYMENT BY LOCATION

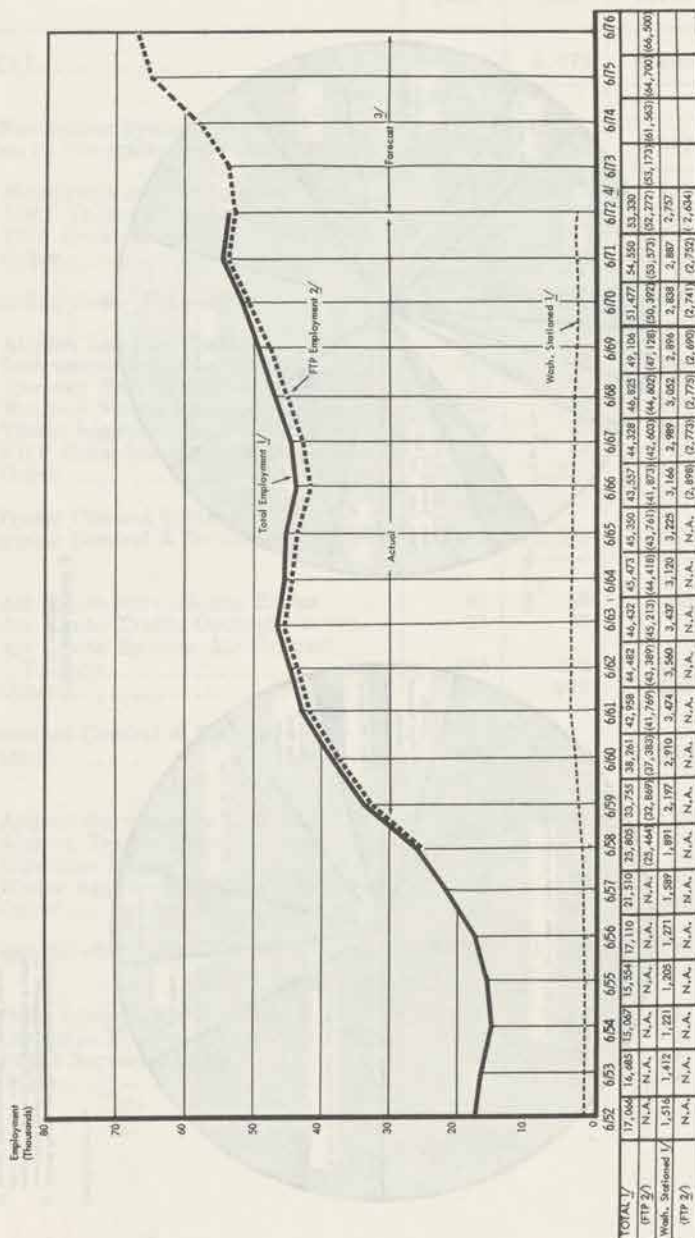


Date: April 1972

TOTAL EMPLOYMENT 2/
53,330/100%

1/ Include aircraft operations, personnel & training, maintenance, and other support functions, including personnel, legal, medical, procurement & supply, military (37), and other.
2/ Includes 764 employees who reported from the agency effective C. O. B. 30 June 1972.

TABLE 13.—Employment History and Forecast—Federal Aviation Administration



Data Classification:

N.A. = Not available

1/ Includes FTP, part-time, & temporary employees.

2/ Reflects numbers of Full-Time Permanent (FTP)

employees included under 1/

3/ Forecast FTP represent authorized position (direct

& reimbursable) based on the National

Aviation System Plan 1972-1981.

4/ 6/72 data includes 732 air playees

who separated on 30 June, 1972.

TABLE 14.—Federal Aviation Administration statement of financial condition
(in thousands of dollars)

Assets	June 30		Liabilities and equity	June 30	
	1972	1971		1972	1971
Cash:			Liabilities:		
On hand and in transit	314	1,010	Accounts payable and accrued liabilities	\$ 150,208	\$ 129,293
Funds in U.S. Treasury	782,516	\$ 867,567	Advances from other agencies	15,989	8,709
Trust, deposit, and general funds	5,247	4,750	Funds held for others	6,043	6,875
Allocations from other agencies	14,278	7,540	Annual leave—employees	80,437	76,834
	\$ 802,355	\$ 880,867	Assets on loan to agency	8,356	11,271
Accounts receivable:			Deferred credits	6	\$
Federal agencies	8,265	\$ 12,236	Lease-purchase contracts	4,504	4,716
Other	14,620	13,968	Total liabilities	\$ 205,543	\$ 237,797
	22,885	26,204			
Inventories:			Equity:		
Operating materiel and facilities equipment	\$ 119,336	\$ 106,445	Invested capital, July 1	\$2,351,372	\$2,674,421
Other inventories	27,326	17,357	Change in invested capital	+34,863	-323,049
	146,662	123,802	Invested capital, June 30	2,446,235	2,351,372
Fixed assets (net):			Total liabilities and equity	\$2,711,778	\$2,589,169
Real property	\$ 564,676	\$ 541,982			
Equipment in-use	754,291	731,092			
	\$1,318,967	\$1,273,084			
Work-in-process	420,105	284,260			
	1,739,072	1,557,344			
Other:					
Intangible assets	804	952	Unapportioned	\$ 575,526	\$ 729,335
Deferred charges	---	---	Unallotted	23,056	124,858
	---	---	Unobligated	97,491	63,380
	---	---	Unliquidated	983,041	771,048
Total assets	\$2,711,778	\$2,589,169		\$1,679,114	\$1,688,621

REMARKS: The above statement includes financial data for the National Capital airports. It excludes the following contingent liabilities: (1) \$80.6 billion in insurance in force and commitments to insure under the aviation war risk insurance program; (2) \$0.3 million in unadjudicated claims; (3) \$835.7 million in undelivered orders and contract commitments.

Inventories at FAA's centralized depot at Oklahoma City have been valued at standard prices; inventories at other locations have been valued at cost.

Unexpended funds as of June 30, 1971 were transferred from general funds to Airport and Airway Trust Fund created by the Airport and Airway Revenue Act of 1970. Fiscal year 1972 operations were funded from this Trust Fund. The 1972 appropriation act, approved August 16, 1971, provided funding from the Trust Fund for purposes authorized by the Airport and Airway Development Act of 1970. Funding for purposes other than those authorized by the Airport and Airway Development Act is derived from general fund appropriations.

TABLE 15.—Federal Aviation Administration statement of financial resources by appropriation
(in millions of dollars)

	Fiscal year 1972			Fiscal year 1971		
	Carryover of unobligated appropriations	Appropriations and obligations	Unobligated balance	Carryover of unobligated appropriations	Appropriations and authorizations	Unobligated balance
International Aeronautical Exposition.....	\$ 2.4	\$ 2.2	\$.2	\$ -----	\$ 2.8	\$ 2.4
Safety Regulation.....	-----	151.0	4.4	-----	1.0	-----
Research & Development ¹	1.2	78.4	.9	-----	69.0	1.2
Operations ¹	-----	998.1	3.4	-----	1,026.1	3.3
Facilities & Equipment ¹	-----	301.8	199.2	-----	238.0	156.8
Operation & Maintenance.....	156.8	-----	-----	167.0	-----	-----
National Capital Airports.....	-----	11.5	-----	-----	11.1	2 .1
Construction, National Capital Airports.....	-----	4.9	8.4	-----	4.0	8.0
Grants-in-aid Airports.....	8.0	15.0	453.3	6.4	850.0	730.0
Civil Supersonic Aircraft.....	730.0	58.5	10.8	51.1	254.8	14.3
	14.3	-----	-----	23.5	-----	-----
Total.....	\$912.7	\$1,621.4	\$680.6	\$248.0	\$2,456.8	\$916.1
Percent of available funds unobligated at June 30.....	-----	-----	26.9%	-----	-----	33.9%

¹ Total financial resources derived from general appropriations and Airport and Airway Trust Fund.

² Return to Treasury Department, not available for carryover.

³ Excludes \$10.6 million aviation war risk insurance in fiscal year 1972; \$4.9 million in fiscal year 1971.

TABLE 16.—Summary of Highway and Traffic Safety authorizations and appropriations, fiscal years 1967-72, (in millions of dollars)

	FY 67	FY 68	FY 69	FY 70	FY 71	FY 72
Traffic Safety						
Authorized ¹ -----	13.9	18.5	24.5	23.0	40.0	40.0
Appropriated-----	5.0	12.5	15.9	17.8	25.9	30.7
Highway Safety						
Authorized ² -----	10.0	20.0	25.0	30.0	37.5	70.0
Appropriated-----	4.3	7.3	10.6	12.4	17.0	38.6
Total Traffic & Highway Safety						
Authorization ³ -----	23.9	38.5	49.5	53.0	77.5	110.0
Appropriation-----	9.3	19.8	26.5	30.2	42.9	69.3
Compliance Test Facility						
Authorized ¹ -----	⁴ 3.0	⁵ 2.3	⁵ 1.1		0	⁴ 9.6
Appropriated-----	.7	1.2	0	0	0	9.6
State & Community Safety Appropriation						
Authorization-----	67.0	100.0	100.0	⁷ 0	⁷ 0	⁸ 75.0
Appropriation ⁶ -----	2.0	25.0	65.0	70.0	75.0	67.1

¹ Authorized under the National Traffic and Motor Vehicle Safety Act.

² Authorized under the Highway Safety Act.

³ The Traffic and Highway Safety Appropriation appropriates funds for programs of both substantive Acts.

⁴ Lump sum authorization to remain available until expended.

⁵ Remaining unappropriated balance.

⁶ Limitations on obligations: Department of Transportation Appropriation Acts of 1968, 1969, 1970 and 1971 limited the amounts that could be obligated during those fiscal years to the amounts shown.

⁷ Total authorization of \$175 million rescinded by PL 91/605.

⁸ Authorization and obligations are for 12½ Standards only. Previous years' totals were for 16 Standards.

TABLE 17.—Federal Highway Administration, national summary of relocation assistance and payments statistics, fiscal year 1972

Number	Total	White (Esti- mates)	% total	Non- white (Esti- mates)	% total	Owners	% total	Tenants	% total	Below \$6,000 value or \$60 rental	% total	\$6,001 to \$15,000 value or \$61 to \$110 rental	% total	Over \$15,000 value or \$110 rental	% total
a. Dwelling units	17,904	14,781	83	3,123	17	8,831	49	9,073	51	4,524	25	7,452	42	5,928	33
b. Furn'ed req'd assist. (units)	8,797	7,229	82	1,568	18	4,060	46	4,737	54	2,653	30	3,906	44	2,238	26
c. Total no. of people	50,717	41,221	81	9,496	19	26,018	51	24,699	49	11,714	23	20,466	40	18,537	37
d. Farms	272	267	98	5	2	216	79	56	21						
e. Businesses	2,752	2,655	96	97	4	1,593	58	1,159	42						
f. Non-profit organizations	117	101	86	16	14	83	71	34	29						

TABLE 17.—Federal Highway Administration, national summary of relocation assistance and payments statistics, fiscal year 1972—Con't.

	Dwelling						Farms			Businesses			Non-Profit Organ.		
	No. of units	No. of people	Amount	Avg. amt. unit	Avg. amt. peo.	Avg. peo. unit	No. of units	Amount	Avg. amt. unit	No. of units	Amount	Avg. amt. unit	No. of units	Amount	Avg. amt. unit
g. Moving payments-----	18,315	51,246	\$6,757,560	\$368	131	2.7	308	\$249,361	\$809	3,262	\$9,817,026	\$3,009	127	\$130,530	\$1027
h. Rep'mnt housing owner occupied-----	7,833	24,709	20,316,634	2,593	822	3.1									
i. Rep'mnt housing rental --	7,544	20,536	8,535,517	1,131	415	2.7									
j. Incidental payments-----	6,418		1,204,395	187			353	11,879	33	620	353,090	569	20	830	41
Total payments			\$36,814,106					\$261,240			\$10,170,116			\$131,360	
Grand Total—All Payments			\$47,376,822												

Source: State Highway Departments

TABLE 18.—Federal Highway Administration, summary of moving costs payments by State, fiscal year 1972.

State	Dwellings			Farms			Business			Non-Profit Organ.		
	No. of units	Amount	Avg. amt. unit	No. of units	Amount	Avg. amount unit	No. of units	Amount	Avg. amt. unit	No. of units	Amount	Avg. amt. unit
Alabama-----	458	\$ 134,830	\$294	4	\$ 776	\$ 194	65	\$ 333,839	\$ 5,136	8	\$ 1,956	\$ 245
Alaska-----	84	25,546	304	0	0	0	22	25,582	1,163	2	19,484	9,742
Arizona-----	594	178,289	300	0	0	0	108	113,855	1,054	1	497	497
Arkansas-----	82	26,174	319	0	0	0	28	26,266	938	0	0	0
California-----	4,190	1,620,242	387	4	9,386	2,347	225	764,831	3,399	9	6,170	686
Colorado-----	84	35,333	421	0	0	0	28	77,012	2,750	0	0	0
Connecticut-----	140	58,118	415	0	0	0	31	382,669	12,344	1	800	800
Delaware-----	72	26,091	362	0	0	0	37	72,433	1,958	1	1,925	1,925
Dist. of Col.-----	4	26,780	195	0	0	0	1	5,000	5,000	0	0	0
Florida-----	528	128,558	243	0	0	0	125	113,309	906	6	3,541	590
Georgia-----	403	95,992	238	2	2,310	1,155	83	52,219	629	4	1,117	279
Hawaii-----	23	9,380	408	1	2,500	2,500	5	4,253	851	1	2,492	2,492
Idaho-----	17	7,740	455	3	2,975	992	7	9,388	1,341	0	0	0
Illinois-----	316	112,695	357	34	29,183	858	58	413,602	7,131	3	2,945	982
Indiana-----	58	28,761	496	2	845	423	53	282,044	5,322	0	0	0
Iowa-----	260	95,581	368	22	33,192	1,509	34	48,999	1,441	2	305	153
Kansas-----	385	173,025	449	3	2,793	901	40	77,797	1,945	2	459	230
Kentucky-----	599	238,505	398	49	17,170	350	155	414,065	2,671	8	2,109	264
Louisiana-----	0	0	0	0	0	0	0	0	0	0	0	0
Maine-----	110	55,115	501	0	0	0	18	23,649	1,314	0	0	0
Maryland-----	311	112,837	363	0	0	0	32	219,882	6,871	3	398	133
Massachusetts-----	138	32,961	239	0	0	0	56	657,919	11,749	0	0	0
Michigan-----	488	213,490	437	10	3,901	390	115	305,089	2,653	5	5,684	1,137
Minnesota-----	255	89,769	352	15	5,031	335	163	180,924	1,110	0	0	0
Mississippi-----	104	30,767	296	0	0	0	11	22,258	2,023	1	150	150
Missouri-----	978	471,875	482	14	7,157	511	49	113,585	2,318	2	585	293
Montana-----	67	25,269	377	7	4,928	704	13	38,125	2,933	3	19,129	6,376

TABLE 18.—Federal Highway Administration, summary of moving costs payments by State, fiscal year 1972—Continued

State	Dwellings			Farms			Business			Non-Profit Organ.		
	No. of units	Amount	Avg. am't. unit	No. of units	Amount	Avg. amount unit	No. of units	Amount	Avg. am't. unit	No. of units	Amount	Avg. am't. unit
Nebraska-----	48	\$ 18,217	\$380	0	\$ 0	\$ 0	2	\$ 4,295	\$ 2,148	2	\$ 1,302	\$ 651
Nevada-----	32	16,034	501	0	0	0	12	25,105	2,092	6	13,340	2,223
New Hamp-----	102	44,422	436	1	400	400	12	20,427	1,702	0	0	0
New Jersey-----	349	103,385	296	0	0	0	27	379,860	14,069	2	8,475	4,238
New Mexico-----	129	43,567	338	0	0	0	23	53,446	2,324	2	1,139	570
New York-----	503	225,403	448	5	1,819	364	134	915,272	6,830	7	7,887	1,127
N. Carolina-----	140	39,183	280	4	1,795	199	58	36,074	622	3	10,455	3,485
N. Dakota-----	3	1,100	367	3	250	83	11	5,424	493	1	1,240	240
Ohio-----	636	266,485	419	8	1,595	199	103	425,004	4,126	5	1,703	341
Oklahoma-----	298	86,399	290	0	0	0	64	52,504	820	0	0	0
Oregon-----	966	401,757	416	2	2,259	1,130	112	182,764	1,632	1	75	75
Pennsylvania-----	812	291,512	359	2	1,115	558	201	994,197	4,946	4	1,050	263
Puerto Rico-----	6	1,485	248	0	0	0	2	1,800	900	0	0	0
Rhode Island-----	1	450	450	0	0	0	19	48,365	2,546	0	0	0
South Carolina-----	142	28,854	203	2	75	38	21	15,667	746	2	225	113
South Dakota-----	5	1,931	386	14	1,233	88	13	6,548	504	0	0	0
Tennessee-----	613	220,153	359	2	36,560	18,280	126	295,910	2,348	3	6,629	2,210
Texas-----	790	252,708	320	4	3,375	844	203	282,293	1,391	5	840	168
Utah-----	85	34,605	407	9	3,405	378	24	47,422	1,976	0	0	0
Vermont-----	68	29,196	429	2	11,595	5,798	22	20,732	942	2	215	108
Virginia-----	510	110,475	217	21	2,115	101	96	242,250	2,523	6	1,088	181
Washington-----	485	210,438	434	10	11,565	1,157	111	286,441	2,581	2	700	350
West Virginia-----	529	218,806	414	42	29,923	712	241	555,698	2,306	10	1,891	189
Wisconsin-----	290	76,119	262	7	19,225	2,746	40	107,033	2,676	2	3,530	1,765
Wyoming-----	25	7,153	286	0	0	0	23	33,901	1,474	0	0	0
Total-----	18,315	\$6,757,560	\$369	308	\$249,361	\$ 810	3,262	\$9,817,026	\$ 3,010	127	\$130,530	\$ 1,028

Source: State Highway Departments.

TABLE 19.—Federal Highway Administration, summary of moving costs—owner and tenant replacement housing payments by State unit work-load (volume), fiscal year 1972

Moving Cost Payments				Replacement Housing—Owner				Replacement Housing—Tenant			
State	No.	Amount	Avg.	State	No.	Amount	Avg.	State	No.	Amount	Avg.
California	4,428	\$2,400,629	\$542	California	2,756	\$4,827,924	\$1,751	California	1,744	\$1,910,785	\$1,095
Oregon	1,081	586,855	542	Missouri	488	1,301,895	2,667	Pennsylvania	402	489,872	1,218
Missouri	1,043	593,202	568	Pennsylvania	327	1,108,807	3,390	Arizona	368	305,938	831
Pennsylvania	1,019	1,287,874	1,263	West Virginia	284	1,007,022	3,540	Missouri	319	470,811	1,475
Texas	1,002	539,216	538	Oregon	270	369,853	1,369	Oregon	317	433,965	1,368
West Virginia	822	806,318	980	Tennessee	253	598,669	2,366	Texas	299	289,006	966
Kentucky	811	671,849	828	Texas	210	466,798	2,222	Ohio	276	422,429	1,530
Ohio	752	694,787	923	Kentucky	205	593,052	2,892	Kentucky	255	448,220	1,757
Tennessee	744	559,252	751	Florida	204	422,493	2,071	Tennessee	249	268,337	1,077
Arizona	703	292,641	416	Ohio	201	764,659	3,804	West Virginia	249	165,744	665
Florida	659	245,408	372	Kansas	199	431,253	2,167	New York	248	268,506	1,082
New York	649	1,150,381	1,772	Washington	197	670,763	3,404	New Jersey	228	283,774	1,244
Virginia	633	355,928	562	Virginia	179	665,743	3,719	Virginia	221	292,410	1,006
Michigan	618	528,164	854	New York	173	594,801	3,438	Oklahoma	204	179,213	878
Washington	608	509,144	837	Michigan	164	665,865	4,060	Georgia	190	168,562	887
Alabama	535	471,401	881	Georgia	134	485,625	3,624	Michigan	186	318,647	1,713
Georgia	492	151,638	308	Massachusetts	129	476,857	3,696	Maryland	165	134,838	817
Minnesota	433	275,724	636	New Jersey	127	439,914	3,463	Washington	159	287,609	1,808
Kansas	430	253,984	590	Illinois	108	266,629	2,468	Massachusetts	155	104,838	676
Illinois	411	558,425	1,358	Wisconsin	107	293,693	2,763	Iowa	127	168,761	1,328
New Jersey	378	491,720	1,300	Arizona	97	308,732	3,182	Kansas	127	79,003	622
Oklahoma	362	138,903	383	Alabama	93	166,509	1,790	Wisconsin	115	107,088	931
Maryland	346	333,117	962	Iowa	93	355,843	3,826	Alabama	106	46,432	438
Wisconsin	339	205,907	607	New Mexico	78	300,764	3,855	Florida	101	111,116	1,100
Iowa	318	178,077	559	Minnesota	68	227,693	3,348	Illinois	100	107,639	1,076
North Carolina	205	86,507	421	Mississippi	62	192,596	3,106	Minnesota	95	123,306	1,297
Massachusetts	194	690,880	3,561	South Carolina	60	186,137	3,102	South Carolina	49	63,391	1,293

TABLE 19.—Federal Highway Administration, summary of moving costs—owner and tenant replacement housing payments by State unit work-load (volume), fiscal year 1972—Continued

Moving Cost Payments				Replacement Housing—Owner				Replacement Housing—Tenant			
State	No.	Amount	Avg.	State	No.	Amount	Avg.	State	No.	Amount	Avg.
Connecticut	172	\$ 441,587	\$2,567	Oklahoma	53	\$ 108,469	\$2,046	Alaska	48	\$ 50,992	\$1,062
South Carolina	167	44,821	268	Maine	52	269,952	5,191	Connecticut	48	58,064	1,209
New Mexico	154	98,152	637	New Hampshire	52	201,443	3,873	New Mexico	44	61,173	1,390
Maine	128	78,764	615	Maryland	51	212,259	4,161	Maine	43	43,237	1,005
Utah	118	85,432	724	North Carolina	44	184,802	4,200	North Carolina	42	52,446	1,248
Mississippi	116	53,175	458	Vermont	41	193,383	4,716	New Hampshire	31	32,583	1,051
New Hampshire	115	65,249	567	Delaware	37	80,525	2,176	Indiana	27	27,114	1,004
Indiana	113	311,650	2,757	Utah	37	117,780	3,183	Utah	26	10,322	397
Colorado	112	112,345	1,003	Arkansas	30	92,062	3,068	Mississippi	25	14,579	583
Arkansas	110	52,440	476	Montana	29	145,010	5,000	Hawaii	24	35,051	1,460
Delaware	110	100,449	913	Nebraska	29	128,040	4,415	Arkansas	21	13,840	659
Alaska	108	70,612	653	Colorado	23	90,718	3,944	Colorado	18	32,509	1,806
Vermont	94	61,738	656	Indiana	22	60,381	2,744	Delaware	17	13,364	786
Montana	90	87,451	971	Connecticut	20	50,079	2,503	Nevada	17	26,252	1,544
Nebraska	52	23,814	457	Alaska	11	88,783	8,071	Nebraska	16	25,525	1,595
Nevada	50	54,479	1,089	Idaho	11	29,413	2,673	Montana	13	16,417	1,262
Wyoming	48	41,054	855	Nevada	10	30,848	3,084	Vermont	13	12,570	966
South Dakota	32	9,712	303	Hawaii	4	13,000	3,250	Dist. of Col.	9	12,481	1,386
Hawaii	30	18,625	620	Puerto Rico	3	10,218	3,406	Idaho	3	6,918	2,306
Idaho	27	20,103	744	Rhode Island	2	2,290	1,145	Wyoming	3	3,860	1,286
Rhode Island	20	48,815	2,440	South Dakota	2	6,506	3,253	North Dakota	1	2,000	2,000
North Dakota	18	7,014	389	Wyoming	2	3,434	1,717	Rhode Island	1	4,000	4,000
Puerto Rico	8	3,285	410	Dist. of Col.	1	2,050	2,050	Louisiana	0	0	0
Dist. of Col.	5	5,780	1,156	North Dakota	1	2,600	2,600	Puerto Rico	0	0	0
Louisiana	0	0	0	Louisiana	0	0	0	South Dakota	0	0	0
Total	22,012	\$16,954,477	\$ 770	Total	7,833	\$20,316,634	\$2,593	Total	7,544	\$8,535,517	\$1,131

Source: State Highway Departments.

TABLE 20.—Federal Highway Administration, summary of relocation payments moving costs, replacement housing, incidental and total payments by State, fiscal year 1972.

State	Moving Cost			Owner Replacement Housing			Tenant Replacement Housing			Incidental Payments			Total Payments
	No. of units	Am't. (000)	Avg. am't. unit	No. of units	Am't. (000)	Avg. am't. unit	No. of units	Am't. (000)	Avg. am't. unit	No. of units	Am't. (000)	Avg. am't. unit	
Alabama.....	535	\$ 471	\$ 881	93	\$ 166	\$ 1,790	106	\$ 46	\$ 438	92	\$ 13	\$ 150	\$ 698,203
Alaska.....	108	70	653	11	88	8,071	48	50	1,062	7	7	1,049	217,734
Arizona.....	703	292	416	97	308	3,182	368	305	831	192	44	230	951,495
Arkansas.....	110	52	476	30	92	3,068	21	13	659	36	5	165	164,302
California.....	4,428	2,400	542	2,756	4,827	1,751	1,744	1,910	1,095	0	0	0	9,139,338
Colorado.....	112	112	1,003	23	90	3,944	18	32	1,806	19	4	220	239,757
Connecticut.....	172	441	2,567	20	50	2,503	48	58	1,209	9	3	366	553,028
Delaware.....	110	100	913	37	80	2,176	17	13	786	10	4	418	198,522
District of Columbia.....	5	5	1,156	1	2	2,050	9	12	1,386	0	0	0	20,311
Florida.....	659	245	372	204	422	2,071	101	111	1,100	270	22	81	801,042
Georgia.....	492	151	308	134	485	3,624	190	168	887	289	35	122	841,095
Hawaii.....	30	18	620	4	13	3,250	24	35	1,460	0	0	0	66,676
Idaho.....	27	20	744	11	29	2,673	3	6	2,306	2	0	9	56,452
Illinois.....	411	558	1,358	108	266	2,468	100	107	1,076	56	7	135	940,290
Indiana.....	113	311	2,757	22	60	2,744	27	27	1,004	0	0	0	399,145
Iowa.....	318	178	559	93	355	3,826	127	169	1,328	64	5	90	708,452
Kansas.....	430	253	590	199	431	2,167	127	79	622	174	24	140	788,660
Kentucky.....	811	671	823	205	593	2,892	255	448	1,757	354	78	222	1,792,058
Louisiana.....	0	0	0	0	0	0	0	0	0	0	0	0	0
Maine.....	128	78	615	52	269	5,191	43	43	1,005	58	13	235	405,617
Maryland.....	346	333	962	51	212	4,161	165	134	817	10	3	398	684,197
Massachusetts.....	194	690	3,561	129	476	3,696	155	104	676	63	44	710	1,317,328
Michigan.....	618	528	854	164	665	4,060	186	318	1,713	482	67	140	1,580,465
Minnesota.....	433	275	636	68	227	3,348	95	123	1,297	351	63	180	689,916
Mississippi.....	116	53	458	62	192	3,106	25	14	583	16	5	364	266,175
Missouri.....	1,043	593	568	488	1,301	2,667	319	470	1,475	236	142	603	2,508,242

TABLE 20.—Federal Highway Administration, summary of relocation payments moving costs, replacement housing, incidental and total payments by State, fiscal year 1972.—Continued

State	Moving Cost			Owner Replacement Housing			Tenant Replacement Housing			Incidental Payments		
	No. of units	Am't. (000)	Avg. am't. unit	No. of units	Am't. (000)	Avg. am't. unit	No. of units	Am't. (000)	Avg. am't. unit	No. of units	Am't. (000)	Avg. am't. unit
Montana-----	90	87	971	29	145	5,000	13	16	1,262	8	3	387
Nebraska-----	52	23	457	29	128	4,415	16	25	1,595	51	3	72
Nevada-----	50	54	1,989	10	30	3,084	17	26	1,544	4	0	210
New Hampshire-----	115	65	567	52	201	3,873	31	32	1,051	58	20	361
New Jersey-----	378	491	1,300	127	439	3,463	228	283	1,244	16	45	2,320
New Mexico-----	154	98	637	78	300	3,855	44	61	1,390	3	0	2,786
New York-----	649	1,150	1,772	173	594	3,438	248	268	1,082	563	135	1,460
North Carolina-----	205	86	421	44	184	4,200	42	52	1,248	194	10	240
North Dakota-----	18	7	389	1	2	2,600	1	2	2,000	6	0	52
Ohio-----	752	694	923	201	764	3,804	276	422	1,530	119	51	64
Oklahoma-----	362	138	383	53	108	2,046	204	179	878	72	7	431
Oregon-----	1,081	586	542	270	369	1,369	317	433	1,368	493	151	104
Pennsylvania-----	1,019	1,287	1,263	327	1,108	3,390	402	489	1,218	759	336	307
Puerto Rico-----	8	3	410	3	10	3,406	0	0	0	0	0	443
Rhode Island-----	20	48	2,440	2	2	1,145	1	4	4,000	6	2	0
South Carolina-----	167	44	268	60	186	3,102	49	63	1,293	0	0	434
South Dakota-----	32	9	303	2	6	3,253	0	0	0	0	0	0
Tennessee-----	744	559	751	253	598	2,366	249	268	1,077	0	0	36
Texas-----	1,002	539	538	210	466	2,222	299	289	966	289	30	105
Utah-----	118	85	724	37	117	3,183	26	10	397	31	5	189
Vermont-----	94	61	656	41	193	4,716	13	12	966	34	12	358
Virginia-----	633	355	562	179	665	3,719	221	222	1,006	1,024	11	10
Washington-----	608	509	837	197	670	3,404	159	287	1,808	386	19	50
West Virginia-----	822	806	980	284	1,007	3,545	249	165	665	425	27	65
Wisconsin-----	339	205	607	107	295	2,763	115	107	931	75	93	1,252
Wyoming-----	48	41	855	2	3	1,717	3	3	1,286	4	0	52
Total-----	22,012	\$16,954	\$ 770	7,833	\$20,316	\$2,593	7,544	\$8,535	\$1,131	7,411	\$1,570	\$ 211
												\$47,376,822

Source: State Highway Departments.

TABLE 21.—Coast Guard financial statement, fiscal year 1972.

	Funds available ¹	Net total obligations	Unobligated balances ²
Appropriated Funds			
Operating expenses.....	\$503,143,105	\$503,097,691	\$ 45,414
Reserve training.....	28,005,000	27,982,538	22,462
Retired pay.....	70,800,000	70,442,121	357,879
Acquisition, construction and improvements.....	171,574,286	143,940,835	27,633,451
Research, development, test and evaluation.....	18,093,718	17,473,002	620,716
Alteration of bridges.....	9,750,000	8,150,000	1,600,000
Oil pollution fund.....	20,063,631	888,700	19,174,931
State boating safety assistance.....	3,000,000	2,476,371	523,629
Total appropriated funds	\$824,429,740	\$774,451,258	\$ 49,978,482
Reimbursements			
Operating expenses.....	\$ 10,634,692	\$ 10,504,670	\$ 130,022
Acquisition, construction and improvements.....	4,956,706	2,513,316	2,443,390
Research, development, test and evaluation.....	101,504	99,806	1,698
Total Reimbursable Funds.....	\$ 15,692,902	\$ 13,117,792	\$ 2,575,110
Trust Fund			
U.S. Coast Guard Gift Fund -	\$ 38,169	\$ 20,748	\$ 17,421
Surcharge collection, sale of commissary provisions.....	85,952	41,381	44,571
U.S. Coast Guard Cadet Fund.....	3,552,894	2,908,862	644,032
Total Trust Fund.....	\$ 3,677,015	\$ 2,970,991	\$ 706,024
GRAND TOTAL.....	\$843,799,657	\$790,540,041	\$ 53,259,616

¹ Funds available include unobligated balances brought forward from prior year appropriations as follows:

Operating Expenses	
Reimbursements.....	\$ 197,065
Acquisition, Construction and Improvements	
Appropriated funds.....	73,892,286
Reimbursements.....	1,789,706
Research, Development, Test and Evaluation	
Appropriated funds.....	3,593,718
Reimbursements.....	1,698
Oil Pollution Fund	
U.S. Coast Guard Gift Fund.....	19,759,420
U.S. Coast Guard Gift Fund.....	18,587
Surcharge Collections, Sale of Commissary Provisions.....	18,745
U.S. Coast Guard Cadet Fund.....	227,725

² Unobligated balance of \$130,022 under Operating Expenses appropriation represents Accounts Receivable for costs of repairs or replacement of Coast Guard property damaged by private parties, proper for credit to fiscal year current at time collections are realized, as authorized in 14 USC 642.

TABLE 21.—Coast Guard financial statement, fiscal year 1972.—Continued

Unobligated balances remain available for obligation in fiscal year 1973 as follows:

Research, Development, Test and Evaluation.....	\$ 620,716
Alteration of Bridges.....	1,600,000
Oil Pollution Fund.....	19,174,931
State Boating Safety Assistance.....	523,629
*Acquisition, Construction and Improvements.....	30,076,841

	Coast Guard Projects	Dept. of Defense Projects
*For projects deferred in fiscal year 1972 to be subsequently accomplished.....	\$ 6,862,000	\$ 745,000
For completion of projects started in fiscal year 1972 and prior years.....	20,771,451	1,698,390
Total.....	\$ 27,633,451	\$ 2,443,390

Expenditures Incurred	Accrued total expenditures	Accrued direct expenditures	Accrued reimbursable expenditures
Operating expenses.....	\$504,498,935	\$494,629,190	\$ 9,869,745
Reserve training.....	27,781,306	27,781,306	0
Retired pay.....	70,438,451	70,438,451	0
Acquisition, construction and improvements.....	82,840,348	81,230,434	1,609,914
Research, development, test and evaluation.....	9,767,584	9,647,473	120,111
Alteration of bridges.....	1,688,217	1,688,217	0
Oil pollution fund.....	351,390	351,390	0
State boating safety assistance.....	2,324,754	2,324,754	0
Sub Total.....	\$699,690,985	\$688,091,215	\$ 11,599,770
Coast Guard Gift Fund.....	25,189	25,189	0
Surcharge collections, sale of commissary provisions.....	41,381	41,381	0
Coast Guard Cadet Fund.....	2,908,862	2,908,862	0
Total.....	\$702,666,417	\$691,066,647	\$ 11,599,770

TABLE 22.—Summary of merchant marine safety activities.

Materiel Safety Activities	FY 1970	FY 1971	FY 1972
Vessels certificated.....	9,341	9,737	
Vessels issued original certificates.....	337	536	
Inspected Vessels-Type			
Cargo and miscellaneous*.....	2,104	2,075	
Tank ships*.....	378	378	
Tank barges.....	3,024	3,129	
Passenger (over 100 gross tons)*.....	153	146	
Small passenger.....	3,682	4,009	
Total.....	9,341	9,737	

*Total number of vessels in these categories over 1,000 gross tons, exclusive of Great Lakes and Public vessels, was 1,391 in 1970, 1,801 in 1971, and 2,237 in 1972.

Marine Personnel Activities	FY 1970	FY 1971	FY 1972
Licenses issued.....	18,451	21,399	
Merchant Mariner's Documents issued.....	23,026	21,343	
Seamen discharged from voyage articles.....	527,953	381,293	
Personnel investigations completed.....	17,527	15,522	
Security checks for employment.....	23,910	23,781	

TABLE 23.—Railroad accidents and resulting casualties—years ending Dec. 31, 1969, 1970, and 1971.

	1969	1970	1971
Number of train accidents:			
Collisions.....	1,810	1,756	1,529
Derailments.....	5,960	5,602	5,131
Other.....	773	737	644
Total train accidents.....	8,543	8,095	7,304
Number of train accidents with casualties.....	489	453	404
Number of casualties ¹			
Trespassers killed.....	627	593	551
Trespassers injured.....	674	646	607
Passengers killed in train accidents.....	5	3	13
Passengers injured in train accidents.....	291	81	184
Passengers killed in train-service accidents.....	1	5	3
Passengers injured in train-service accidents.....	571	408	352
Employees on duty killed.....	178	155	118
Employees on duty injured.....	16,758	15,743	13,644
All other persons killed.....	1,488	1,469	1,325
All other persons injured.....	5,062	4,449	4,185
Total number of persons killed.....	2,299	2,225	2,010
Total number of persons injured.....	23,356	21,327	18,972
Highway grade crossing accidents ²	3,792	3,571	3,406
Persons killed.....	1,492	1,442	1,356
Persons injured.....	3,691	3,351	3,351

¹ Accidents of all types. ² Included in totals above.

TABLE 24.—Railroad-motor vehicle accidents—years ending December 31, 1969, 1970, and 1971.

Accidents and casualties	1968			1969			1970		
	Number of accidents	Number of persons		Number of accidents	Number of persons		Number of accidents	Number of persons	
		Killed	Injured		Killed	Injured		Killed	Injured
Total rail-highway grade crossing accidents and resulting casualties ² -----	3,774	1,490	3,669	3,429	1,440	3,336	3,291	1,356	3,332
Accidents at highway grade crossing involving motor vehicles-----	3,572	1,381	3,578	3,377	1,362	3,237	3,224	1,267	3,253
Derailments of trains at highway grade crossings involving motor vehicles ¹ -----	61	28	49	67	37	48	62	26	81
Miscellaneous other train accidents as a result of collisions between trains and motor vehicles ¹ -----	243	107	108	245	120	113	205	94	88
Railroad casualties ¹ -----									
Passengers-----			1					2	20
Employees on duty-----		6	121		8	98		1	100
Total-----		6	122		8	98		3	120

¹ Included in totals.

² Excludes nontrain.

Source: Highway Grade Bulletin.

TABLE 25.—Accidents and casualties caused by failure of some part or appurtenance of steam locomotives, locomotive units other than steam, and multiple-operated electric locomotive units, fiscal years 1967-72.

Accidents and casualties	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971	FY 1972
Number of accidents.....	121	128	78	66	48	51
Percent increase or decrease from previous year.....	*86.0	*5.8	-39.1	-15.4	-27.3	*6.2
Number of persons killed.....	0	0	0	0	**11	0
Percent increase or decrease from previous year.....	0	0	0	0	*1100	-1100
Number of persons injured.....	140	141	109	72	**215	51
Percent increase or decrease from previous year.....	105.9	0.7	-22.7	-33.9	*198.6	-76.3

* Increase

** 1971 adjusted to include an accident on the IC Railroad at Tonti, Illinois, June 10, 1971, that resulted in 11 deaths and 163 injuries.

TABLE 26.—Accidents and casualties resulting from failure of steam locomotives, tenders, locomotives other than steam, multiple-operated electric locomotive units, and their appurtenances, fiscal year 1972.

Part or appurtenance which caused accident	Accidents	Killed	Injured
Air compressors.....	1	0	1
Air reservoirs, fittings, safety and check valves.....	0	0	0
Air hose coupling, train line.....	1	0	1
Boiler:			
Explosions.....	0	0	0
Fuel explosion in firebox.....	0	0	0
Draft equipment—adjustment.....	0	0	0
Steam valves, piping and blowers.....	0	0	0
Brakes and brake rigging.....	1	0	1
Cabs:			
Doors and windows.....	10	0	10
Seats.....	6	0	6
Control equipment—mechanical, electrical, pneumatic, or electro-pneumatic.....	0	0	0
Couplers, draft and drawgear.....	1	0	1
Electrical equipment:			
Armature journals and bearings.....	0	0	0
Energized electrical parts.....	5	0	5
Insulation, short circuits, or electrical flashes.....	2	0	2
Pantographs, trolleys or third rail shoes.....	0	0	0
Fans and shutters.....	0	0	0
Fires due to liquid fuel or debris.....	1	0	1
Floors, steps, and passageways.....	9	0	9
Handholds.....	0	0	0
Internal combustion engines and turbines:			
Crankcase or air-box explosions.....	4	0	4
Exhaust and cooling systems.....	3	0	3
Fuel injectors and connections.....	0	0	0
Unguarded moving parts.....	3	0	3
Miscellaneous.....	5	0	5
Total.....	52	0	52

TABLE 27.—Reports and inspections—steam locomotives, locomotive units other than steam, and multiple-operated electric locomotive units, fiscal years 1967-72.

	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971	FY 1972
Number of locomotives for which reports were filed-----	33,916	33,475	33,158	33,043	33,011	32,963
Number inspected-----	107,332	103,703	104,281	95,004	82,299	87,124
Number found defective-----	13,243	13,017	13,117	11,988	10,609	11,424
Percent of inspected found defective-----	12.3	12.6	12.6	12.6	12.9	13.1
Number ordered out of service-----	768	755	700	1,672	595	702
Number of defects found-----	42,609	44,918	46,439	44,616	241,612	38,919

¹ Based on estimated totals for the final quarter of the fiscal year. ² Based on estimated totals for the second half of the fiscal year.

TABLE 28.—Number of freight cars, passenger cars, and locomotives inspected; and the number found with defective safety appliances each year for the past 10 years.

Fiscal Year	Inspected ¹	Defective	Percentage defective
1963-----	1,405,624	83,221	5.92
1964-----	1,506,729	96,099	6.37
1965-----	1,495,890	102,707	6.87
1966-----	1,646,299	111,096	6.74
1967-----	1,673,738	113,642	6.78
1968-----	1,307,863	92,579	7.10
1969-----	1,224,483	94,205	7.69
1970-----	998,837	88,110	8.82
1971-----	959,119	81,366	8.48
1972-----	927,684	86,169	9.29

¹ These figures include locomotives which were inspected for defective safety appliances during the year by inspectors of the Locomotive Branch.

TABLE 29.—Inspections of safety appliances for fiscal years 1968 thru 1972.

	FY 1968	FY 1969	FY 1970	FY 1971	FY 1972
Freight cars inspected-----	1, 176, 166	1, 094, 149	1, 883, 164	862, 618	821, 132
Percent defective-----	7.5	8.3	9.6	9.1	10.0
Passenger train cars inspected-----	16, 377	12, 738	10, 855	5, 431	5, 081
Percent defective-----	7.4	7.2	8.1	7.7	11.7
Locomotives inspected ¹ -----	115, 320	117, 596	104, 818	91, 070	81, 146
Percent defective-----	2.4	2.5	2.5	2.9	2.5
Number of defects per 1,000 units inspected-----	81.01	89.16	90.93	101.69	90.08

¹ Includes locomotives which were inspected for defective safety appliances during the year by inspectors of the Locomotive Branch.

TABLE 30.—Enforcement activities—Accident Reports Act, fiscal years 1971-72.

Activities	FY 1971	FY 1972
Number of regular inspections-----	270	236
Accident and casualty cases investigated-----	33, 795	27, 444
Infractions disclosed by regular inspection-----	62	54
Number of complaints investigated-----	10	16
Infractions disclosed by complaints investigated-----	4	7
Violation cases transmitted for prosecution*-----	23	35

* Includes cases pending at close of preceding fiscal year.

TABLE 31.—Instances of excess service performed by railroad employees covered by the Hours of Service Act for the fiscal year 1972.

Name of railroad	Train dispatchers, operators, and levermen	*Train and engine service employees		Total
	On duty more than 9-12 hours	On duty more than 14 hours	Returned to duty without required time off duty	
Akron, Canton & Youngstown	2	1	0	3
Aliquippa and Southern	0	1	0	1
Ann Arbor	10	0	0	10
Apache Railway	0	2	0	2
Atchison, Topeka & Santa Fe	145	64	0	209
Atlanta & St. Andrews Bay	0	3	0	3
Atlanta & West Point Co.	1	0	0	1
Baltimore & Ohio	120	39	1	160
Baltimore & Ohio Chicago Terminal	6	0	0	6
Bangor & Aroostook	0	5	0	5
Belt Railway of Chicago	1	0	1	2
Bessemer and Lake Erie	0	4	0	4
Boston & Maine	13	1	0	14
Boston Terminal	20	2	0	22
Buffalo Creek	13	0	0	13
Butte, Anaconda & Pacific	0	5	0	5
Burlington Northern	70	89	1	160
California Western	0	1	0	1
Camas Prairie	0	12	0	12
Cambria & Indiana	0	2	0	2
Canadian National	0	5	0	5
Canadian Pacific	2	2	0	4
Central of Georgia	2	5	0	7
Central Railroad of New Jersey	143	14	0	157
Chesapeake & Ohio	48	5	1	54
Chicago & Eastern Illinois	18	0	0	18
Chicago & Illinois Midland	1	0	0	1
Chicago & North Western	46	44	3	93
Chicago & Western Indiana	49	0	0	49
Chicago, Milwaukee, St. Paul & Pacific	85	96	1	182
Chicago, Rock Island & Pacific	62	44	0	106
Clinchfield	16	4	0	20
Conemaugh & Black Lick	0	14	0	14
Cuyahoga Valley	0	2	0	2
Davenport, Rhode Island & North Western	1	0	0	1
Dayton Union	2	0	0	2
Delaware & Hudson	2	8	1	11
Denver & Rio Grande Western	6	73	0	79
Detroit, Toledo & Ironton	50	0	0	50
Duluth, Missabe & Iron Range	8	0	1	9
Duluth, Winnipeg & Pacific	2	6	0	8
Elgin, Joliet & Eastern	6	1	0	7
Erie Lackawanna	34	52	0	86
Genesee & Wyoming	0	1	0	1
Georgia Railroad	1	0	0	1
Grand Trunk Western	40	8	0	48
Green Bay & Western	0	1	0	1
Gulf, Mobile & Ohio	40	11	0	51
Houston Belt & Terminal	35	0	0	35

TABLE 31.—Instances of excess service performed by railroad employees covered by the Hours of Service Act for the fiscal year 1972—Continued.

Name of railroad	Train dispatchers, operators, and levermen	*Train and engine service employees		Total
	On duty more than 9-12 hours	On duty more than 14 hours	Returned to duty without required time off duty	
Illinois Central.....	127	0	2	129
Indiana Harbor Belt.....	3	0	0	3
Jacksonville Terminal.....	2	0	0	2
Kansas City Southern.....	9	9	0	18
Lehigh Valley.....	15	0	0	15
Long Island.....	0	30	0	30
Louisiana & Arkansas.....	3	0	0	3
Louisville & Nashville.....	21	19	0	40
Maine Central.....	2	10	0	12
Minneapolis, Northfield & Southern.....	0	0	1	1
Minnesota Transfer.....	1	0	0	1
Missouri Kansas Texas.....	26	14	0	40
Missouri Pacific.....	40	135	7	182
New Orleans Union Passenger Terminal.....	18	0	0	18
New York & Long Branch.....	82	0	0	82
Norfolk & Western.....	204	7	0	211
Norfolk Southern.....	2	7	0	9
Oregon & Northwestern.....	0	1	0	1
Pacific & Arctic.....	0	15	0	15
Patapsco & Back Rivers.....	0	2	0	2
Penn Central.....	506	670	0	1,176
Pennsylvania-Reading Seashore Lines.....	1	0	0	1
Pittsburg & Shawmut.....	1	0	0	1
Port Authority Trans Hudson.....	298	0	0	298
Portland Terminal (Maine).....	2	0	0	2
Reading Company.....	30	24	1	55
Richmond Fredericksburg & Potomac.....	16	33	0	49
Sacramento Northern.....	0	4	0	4
St. Johnsbury & Lamoille County.....	0	3	0	3
St. Louis San Francisco.....	38	28	0	66
St. Louis Southwestern.....	9	12	4	25
Seaboard Coast Line.....	16	37	5	58
Soo Line.....	21	2	5	28
Southern Pacific.....	146	96	4	246
Southern Railway.....	13	0	0	13
Terminal Railroad Association of St. Louis.....	0	0	1	1
Texas & Pacific.....	42	18	0	60
Toledo, Peoria & Western.....	34	0	0	34
Toledo Terminal.....	17	0	0	17
Union Pacific.....	13	104	0	117
Union Railroad Co.....	0	2	3	5
Washington Terminal.....	12	0	1	13
Western Maryland.....	0	7	0	7
Western Pacific.....	3	52	0	55

*The term "instances" as used in the table refers to individual employees. For example, in a case involving two or more members of a train or engine crew, the excess service of each member is classed and counted as a separate instance.

TABLE 32.—Cause of excess service for fiscal years 1968-72

Cause	FY 1968	FY 1969	FY 1970	FY 1971	FY 1972
On duty longer than 14 consecutive hours					
Collisions and derailments.....	134	139	140	400	326
Weather conditions, track defects, floods, obstructions.....	108	278	312	571	749
Congestion of traffic.....	29	40	74	172	263
Mechanical defects, engines and cars.....	56	41	79	120	224
Wrecking and relief service.....	25	53	90	56	124
Miscellaneous.....	83	59	69	134	199
Others					
On duty longer than 14 hours in the aggregate in a 24-hour period.....	115	136	94	41	83
Returned to duty without required 10 hours off duty.....	2	14	0	13	22
Returned to duty without required 8 hours off duty.....	1	1	16	29	22
Total.....	553	761	874	1,536	2,012

During the year, 1,840 counts involving violations of the Hours of Service Law (45 U.S.C. 61-64) were forwarded to the Chief Counsel for consideration.

TABLE 33.—Applications; block signal.

Period	Number	Pending at beginning of year	Acted upon	Pending at close of year
Year 1968-----	197	33	162	68
Year 1969-----	183	68	185	66
Year 1970-----	164	66	194	36
Year 1971-----	139	36	138	37
Year 1972-----	159	37	144	52

Rules, Standards, and Instructions				
Year 1968-----	43	5	36	12
Year 1969-----	48	12	47	13
Year 1970-----	51	13	53	11
Year 1971-----	31	11	37	5
Year 1972-----	29	5	26	8

During the year inspections were made as follows:

	Number of inspections	Signals	Switches	Other appliances	Devices on locomotives	Record of tests
Automatic block signal-----	842	6,933	5,957	2,644	-----	28,926
Interlockings-----	1,897	12,085	8,046	8,511	-----	35,277
Traffic control-----	1,396	10,950	6,888	8,772	-----	47,215
Automatic train stop-----	91	-----	-----	145	271	1,526
Automatic train control-----	97	-----	-----	129	409	2,451
Automatic cab signal-----	223	-----	-----	391	1,053	7,361
Total-----	4,546	29,968	20,891	20,592	1,733	122,756

TABLE 34.—Causes of false proceed failures reported by carriers for fiscal year 1972.

	Sand, rust or other deposits on rails	Failure of relays and similar devices	Circuits open, crossed, or grounded. Foreign current, etc.	Apparatus broken, defective, or out of adjustment, vandalism	Failure of apparatus due to ice, sleet, snow, wet track, weather, or lightning	Failure of apparatus due to obstruction	Errors in making connections or adjustments	Undetermined	Total
Arkansas & Memphis Railway Bridge & Terminal Company	—	—	1	—	—	—	—	—	1
Atchison, Topeka & Santa Fe	—	—	1	3	—	—	3	—	7
Boston & Maine	—	—	1	—	—	—	—	—	1
Burlington Northern	—	2	4	5	—	—	—	—	11
Central Railroad of New Jersey	—	—	1	1	—	—	1	—	3
Chesapeake & Ohio-Baltimore & Ohio, Baltimore & Ohio Chicago Terminal	1	—	—	1	—	—	—	1	3
Chicago & North Western	—	—	3	3	—	—	—	2	8
Chicago, Milwaukee, St. Paul & Pacific	—	—	1	—	—	—	—	1	2
Chicago, Rock Island & Pacific	—	—	2	1	—	—	—	—	3
Erie Lackawanna	—	—	—	1	—	—	—	—	1
Gulf, Mobile & Ohio	—	1	1	1	—	—	—	—	2
Illinois Central	—	—	3	3	—	—	—	—	6
Kansas City Terminal	—	—	—	1	—	—	—	—	1
Lehigh Valley	—	—	—	1	—	—	—	—	1
Long Island	—	—	—	1	—	—	2	—	3
Louisville & Nashville	—	—	2	3	—	—	1	1	7
Missouri Pacific	—	—	—	1	—	—	—	—	1
New Orleans Public Belt	—	—	—	1	—	—	—	—	1

TABLE 34.—Causes of false proceed failures reported by carriers for fiscal year 1972.—Continued

	Sand, rust or other deposits on rails	Failure of relays and similar devices	Circuits open, crossed, or grounded. Foreign current, etc.	Apparatus broken, defective, or out of adjust- ment, vandalism	Failure of apparatus due to ice, sleet, wet snow, track, weather, or lightning	Failure of apparatus due to obstruc- tion	Errors in making connec- tions or adjust- ments	Unde- termined	Total
Norfolk & Western	—	—	4	3	—	—	—	—	7
Path	—	—	—	—	—	—	1	—	1
Penn Central System	—	1	3	3	3	—	2	—	6
Reading	—	—	2	2	—	—	1	—	8
St. Louis-San Francisco	—	—	—	—	—	—	—	—	3
Seaboard Coast Line	—	—	2	1	—	—	2	—	4
Soo Line	—	—	1	1	—	—	—	—	3
Southern System	—	—	1	—	—	—	2	—	3
Southern Pacific	—	—	—	—	—	—	—	—	2
Texas & Pacific	—	—	—	—	—	—	1	—	1
Western Pacific	—	—	—	—	—	—	—	—	1
Total	1	4	32	36	3	0	17	8	101

TABLE 35.—Serious accidents investigated under the Accident Reports Act
(45 U.S.C. 38-43), fiscal years 1968-72.

Fiscal year	Number of accidents investigated				Persons	
	Colli- sions	Derail- ments	Other	Total	Killed	Injured
1968.....	23	22	-----	45	25	428
1969.....	35	22	-----	57	34	874
1970.....	60	55	2	117	67	621
1971.....	52	37	1	90	80	335
1972.....	55	65	-----	120	30	764

NOTES TO THE FEDERAL HIGHWAY ADMINISTRATION FINANCIAL STATEMENTS

1. Title 23, United States Code, Sections 125/320 allows payment for disaster assistance and construction of roadways over Federal Dams prior to appropriation. The unappropriated expenditures for Emergency Relief and Roadways over Dams are \$158,449,129.

2. The fixed assets are stated at cost. Depreciation is taken on Equipment Depot fixed assets. Office furniture and equipment are utilized for administrative operations and are replaced as needed. Office furniture and equipment are not depreciated.

3. The Congress grants contracting authority to the Federal Highway Administration in advance of appropriations in order to permit it and the States to plan highway construction and highway related safety programs. This authority is apportioned to the States and FHWA records the obligations as the States are permitted to proceed. Funds are appropriated by the Congress annually to cover estimated needs for liquidating the obligations maturing within the current fiscal year.

4. The available balance of contracting authority shown in the Statements of Operations includes both obligated and unobligated balances of contracting authority plus unliquidated obligations for administration and research.

5. Funds returned to Treasury are derived from liquidations of obligations in a lesser amount than originally obligated.

6. The Appropriation Act of 1972 provided that funds for Motor Carrier Safety, Limitation on General Expenses and Salaries and Expenses be appropriated in one account "Salaries and Expenses". This necessitated transferring certain assets and liabilities to the administrative appropriation.

TABLE 36.—Federal Highway Administration, Federal-Aid Highways—
statement of operations, July 1971 through June 1972

APPROPRIATIONS			
<i>For Contracting Authority</i>		<i>For Working Capital</i>	
New.....	\$ 5,726,900,000	New.....	\$ 4,697,326,333
From Last Year.....	13,024,185,609	From Last Year.....	65,339,262
Reimbursable Earnings.....	6,117,789	Reimbursable Collections.....	5,764,454
Available.....	\$18,757,203,458	Available.....	\$ 4,768,430,049

OPERATING EXPENSES		
	<i>Payments</i>	<i>Change in Accruals</i>
Federal Aid:		
Primary.....	\$ 496,614,996	\$ +9,933,380
Secondary.....	314,358,216	+10,061,592
Urban.....	291,003,716	+3,897,116
Highway Planning Res.....	80,474,745	-430,042
Interstate.....	3,342,478,161	+22,276,315
Administration.....	85,996,290	+16,717,634
Purchase of Fixed Assets.....	561,916	0
Other Trust Fund Programs.....	7,285,698	+642,421
	\$ 4,618,773,738	\$ +63,098,416
Emergency Relief.....	41,812,007	-3,493,768
Roadway over Dams.....	0	0
Pentagon Road Network.....	0	0
Reimbursables.....	6,180,839	-63,050
Totals.....	\$ 4,666,766,584	\$ +59,541,598
Change in Accruals.....	+59,541,598	
	\$ 4,726,308,182	

<i>Deduct</i>		<i>Deduct</i>	
Accrued Expenses.....	\$ 4,726,308,182	Payments.....	\$ 4,666,766,584
Lapsing Contract Authority...	24,901,594	Advances.....	16,279,253
Used.....	\$ 4,751,209,776	Used.....	\$ 4,683,045,837

AVAILABLE BALANCE AT JUNE 30, 1972			
Contracting Authority ⁴	\$14,005,993,682	In Treasury.....	\$ 85,384,212

TABLE 37.—Federal Highway Administration, Federal-Aid Highways—balance sheet, at June 30, 1972

ASSETS	
Current Assets:	
Available Fund Balance with Treasury ..	\$ 85,384,212
Accounts Receivable:	
Repayments Receivable to Fund	\$ 1,996,230
Emergency Relief ¹	158,449,129
Advances to Travelers	2,325
Other Advances	53,156,468
	213,604,152
Fixed Assets: ²	
Office Furniture and Equipment	113,475
Machinery and Equipment	627,043
Land	316,637
Buildings and Structures	2,736,909
	3,794,064
Contracting Authority ³	\$14,381,383,666
Total Assets	<u>\$14,684,166,094</u>
LIABILITIES AND U.S. GOVERNMENT INVESTMENT	
Current Liabilities:	
Disbursements in Transit	\$ 0
Accounts Payable and Accrued Liabilities for States Completed Work	648,787,396
Accrued Liabilities—Other	25,590,952
	\$ 674,378,348
Accrued Annual Leave of Employees	187,388
U.S. Government Investments:	
Unobligated Contracting Authority—	
Federal-Aid	6,521,807,108
Emergency Relief and Others	265,446,408
	6,787,253,516
Undelivered Orders and Contracts—	
Federal-Aid	7,038,131,676
Emergency Relief and Others	180,608,490
	7,218,740,166
Invested Capital	3,606,676
Total Liabilities and U.S. Government Investment	<u>\$14,684,166,094</u>

TABLE 38.—Federal Highway Administration, Federal-Aid Highways—U.S. Government Investment, July 1971 through June 1972

U.S. Government Investment at July 1, 1971	\$13,027,151,390
Increases:	
Contracting Authority-----	\$ 5,726,900,000
Reimbursable Work-----	6,117,789
Total Increases-----	5,733,017,789
	\$18,760,169,179
Decreases:	
Expenses-----	\$ 4,725,746,266
Property Dispositions (Net) ⁶ -----	5,038,179
Lapsing Contract Authority-----	24,901,594
Change in Leave Accrued (Net) ⁶ -----	-5,117,219
Total Decreases-----	4,750,568,820
U.S. Government Investment at June 30, 1972	\$14,009,600,359

ANALYSIS OF U.S. GOVERNMENT INVESTMENT

Invested Capital-----	\$ 3,606,676
Obligated:	
Federal-Aid-----	\$ 7,038,131,676
Emergency Relief-----	46,365,710
Roadways over Dams-----	0
Pentagon Roadway Network-----	48,966
Right-of-Way Revolving Fund-----	127,217,781
Other Trust Fund Programs-----	6,976,033
Total Obligated-----	7,218,740,166
Unobligated:	
Federal-Aid-----	\$ 136,968,731
Emergency Relief-----	1,984,250
Roadway over Dams-----	0
Pentagon Road Network-----	206,408
Right-of-Way Revolving Fund-----	3,782,219
Other Trust Fund Programs-----	36,892,633
Total Unobligated-----	179,834,241
Reserved—Not Available-----	6,607,419,276
U.S. Government Investment at June 30, 1972	\$14,009,600,359

TABLE 39.—Federal Highway Administration, Federal-Aid Highways—
statement of application of funds, July 1971 through June 1972

Funds Provided by:

Appropriation.....	\$ 4,697,326,333
Repayments to Appropriation.....	6,117,789
Total Funds Provided.....	\$ 4,703,444,122

Funds Applied to:

Federal-Aid.....	\$ 4,575,564,979
Administration and Research.....	103,275,840
Bridges over Dams.....	0
Emergency Relief.....	38,318,239
Reimbursable Work.....	6,117,789
Transfer to Administration.....	1,400,000
Highway Related Safety Grants.....	1,631,334
Total Funds Applied.....	4,726,308,181
Net Decrease in Working Capital...	\$ 22,864,059

TABLE 40.—Federal Highway Administration, Federal-Aid Highways—change in working capital (accounted for as follows)

	June 30, 1972	July 1, 1971	Increase	Decrease
Current Assets:				
Funds with U.S. Treasury-----	\$ 85,384,212	\$ 65,339,262	\$ 20,044,950	
Accounts Receivable:-----				
Repayments to Fund-----	1,996,230	4,304,657		\$ 2,308,427
Advances to Travelers ^a -----	2,325	354,608		352,283
Other Advances-----	53,156,468	36,524,931	16,631,537	
			<u>\$ 36,676,487</u>	<u>\$ 2,660,710</u>
Current Liabilities:				
Disbursements in Transit-----	\$ 0	\$ 4,828	\$ 4,828	
Accounts Payable and Accrued Liability for States Complete Work-----	648,787,396	608,293,111		40,494,285
Other Accrued Liabilities-----	25,590,952	9,200,573		16,390,379
			<u>4,828</u>	<u>56,884,664</u>
Sub-totals-----			\$ 36,681,315	\$ 59,545,374
Decrease in working capital-----			22,864,059	
Totals-----			<u>\$ 59,545,374</u>	<u>\$ 59,545,374</u>

TABLE 41.—Federal Highway Administration, Forest Highway Program—
statement of operations, July 1971 through June 1972

APPROPRIATIONS			
<i>For Contracting Authority</i>		<i>For Working Capital</i>	
New.....	\$ 33,000,000	New.....	\$ 35,000,000
From Last Year.....	97,621,444	From Last Year.....	504,701
Reimbursable Earnings.....	3,443,778	Reimbursable Collections.....	3,443,778
Available.....	\$ 134,065,222	Available.....	\$ 38,948,479

OPERATING EXPENSES			
		<i>Payments</i>	<i>Change in Accruals</i>
Forest Highway Program.....	\$	25,180,987	\$ +980,986
Reimbursables.....		3,443,778	
	\$	28,624,765	\$ +980,986
Increase in Accruals.....		980,986	
	\$	29,605,751	

<i>Deduct</i>		<i>Deduct</i>	
Accrued Expenses	\$ 29,605,751	Payments.....	\$ 28,624,675
Used.....	\$ 29,605,751	Used.....	\$ 28,624,765

AVAILABLE BALANCES AT JUNE 30, 1972			
Contracting Authority ⁴	\$ 104,459,471	In Treasury.....	\$ 10,323,714

TABLE 42.—Federal Highway Administration, Forest Highway Program—
balance sheet, at June 30, 1972

ASSETS	
Current Assets:	
Funds in U.S. Treasury.....	\$ 10,323,714
Accounts Receivable	
Advances to travelers \$	2,150
Other Receivables.....	206,697
	208,847
Repayments to Funds.....	203,804
Materials and Supplies.....	138,138
	\$ 10,874,503
Fixed Assets: ²	
Equipment—Depreciable.....	\$ 6,494,390
Less: Allowance for Depreciation.....	-4,286,898
Equipment—Work-in-Process.....	65,058
	2,272,550
Contracting Authority ³	99,450,000
Total Assets.....	\$ 112,597,053
LIABILITIES AND UNITED STATES GOVERNMENT INVESTMENT	
Current Liabilities:	
Accounts Payable.....	\$ 1,337,474
Accrued Liabilities for Uncompleted Work	4,389,420
	5,726,894
Accrued Annual Leave of Employees.....	-79,184
U.S. Government Investment:	
Unobligated Contracting Authority.....	\$ 84,143,433
Undelivered Orders and Contracts.....	20,316,038
	\$ 104,459,471
Invested Capital.....	\$ 2,546,077
Retained Earnings.....	-56,205
	2,489,872
Total Liabilities and U.S. Government Investment.....	\$ 112,597,053

TABLE 43.—Federal Highway Administration, Forest Highways Program—
U.S. Government investment, July 1971 through June 1972

U.S. Government Investment at July 1, 1971	\$	100,045,563
Increases:		
Contracting Authority	\$	33,000,000
Materials and Supplies		15,145
Change in Leave Accrual (Net)		80,299
Reimbursable Earnings		3,443,778
Total increases		36,539,222
Decreases:		
Expenses	\$	29,605,751
In Fixed Assets		29,691
Total Decreases		29,635,442
U.S. Government Investment at June 30, 1972	\$	106,949,343

ANALYSIS OF UNITED STATES GOVERNMENT INVESTMENT

Invested Capital	\$	2,489,872
Obligated:		
Undelivered Orders and Contracts		20,316,038
Unobligated Contracting Authority		84,143,433
U.S. Government Investment at June 30, 1972	\$	106,949,343

TABLE 44.—Federal Highway Administration, Forest Highways Program—
statement of application of funds, July 1971 through June 1972

Funds Provided By:		
Appropriation	\$	35,000,000
Reimbursable Earnings		3,443,778
Total Funds Provided	\$	38,443,778
Funds Applied To:		
Forest Highway Program		26,161,973
Reimbursable Programs		3,443,778
Total funds applied		29,605,751
Increase in Working Capital	\$	8,838,027

TABLE 45.—Federal Highway Administration, Forest Highways Program—change in working capital (accounted for as follows)

	June 30, 1972	July 1, 1971	Increase	Decrease
Current Assets:				
Funds in U.S. Treasury-----	\$ 10,323,714	\$ 504,701	\$ 9,819,013	
Accounts Receivable:				
Advances to Travelers-----	2,150	1,500	650	
Other-----	206,697	78,748	127,949	
Repayment to Funds-----	203,804	136,999	66,805	
			<u>\$ 10,014,417</u>	
Current Liabilities:				
Accounts Payable and Accrued Liabilities-----	\$ 5,726,895	\$ 4,550,505		\$ 1,175,390
Sub-totals-----			<u>\$ 10,014,417</u>	<u>\$ 1,175,390</u>
Increase in Working Capital-----				<u>8,838,027</u>
Totals-----			<u>\$ 10,014,417</u>	<u>\$ 10,014,417</u>

TABLE 46.—Federal Highway Administration, Public Lands Program—
statement of operations, July 1971 through June 1972

APPROPRIATIONS			
For Contracting Authority		For Working Capital	
New.....	\$ 16,000,000	New.....	\$ 5,000,000
From Last Year.....	58,869,448	From Last Year.....	11,245,042
Available.....	\$ 74,868,448	Available.....	\$ 16,245,042
OPERATING EXPENSES			
		Payments	Change in Accruals
Administration.....	\$	387,488	
Construction.....		9,699,008	\$ +412,966
Total.....	\$	10,086,496	\$ +412,966
Increase in Accruals.....		+412,966	
		\$ 10,499,462	
Deduct		Deduct	
Accrued Expenses.....	\$ 10,499,462	Payments.....	\$ 10,086,496
Lapsing Authority.....	1,023,467		
Used.....	\$ 11,522,929	Used.....	\$ 10,086,496
AVAILABLE BALANCES AT JUNE 30, 1972			
Contracting Authority ¹	\$ 63,345,519	In Treasury.....	\$ 6,158,546

TABLE 47.—Federal Highway Administration, Public Lands Program—
balance sheet, at June 30, 1972

ASSETS	
Current Assets:	
Funds in U.S. Treasury.....	\$ 6,158,546
Contracting Authority ³	58,276,533
Total assets.....	\$ 64,435,079
LIABILITIES AND U.S. GOVERNMENT INVESTMENTS	
Current Liabilities:	
Accrued Liabilities for Uncompleted Work.....	\$ 1,089,560
Accrued Annual Leave of Employees.....	—5,199
U.S. Government Investments	
Unobligated Contracting Authority.....	\$ 48,000,000
Undelivered Orders and Contracts.....	15,345,519
	63,345,519
Invested Capital.....	5,199
Total Liabilities and U.S. Government Investments.....	\$ 64,435,079

TABLE 48.—Federal Highway Administration, Public Lands Program—U.S. Government investment, July 1971 through June 1972

U.S. Government Investment at July 1, 1971	\$	58,868,735
Increases:		
Contracting Authority.....	\$	16,000,000
Change in Leave Accrual (Net).....		4,912
Total Increases.....		16,004,912
Decreases:		
Expenses.....	\$	10,499,462
Lapsing Contract Authority.....		1,023,467
Total Decreases.....		11,522,929
U.S. Government Investment at June 30, 1972	\$	63,350,718

ANALYSIS OF U.S. GOVERNMENT INVESTMENT

Invested Capital.....	\$	5,199
Obligated:		
Undelivered Orders and Contracts.....		15,345,519
Unobligated Contracting Authority.....		48,000,000
U.S. Government Investment at June 30, 1972	\$	63,350,718

TABLE 49.—Federal Highway Administration, Public Lands Program—statement of application of funds, July 1971 through June 1972

Funds Provided by:		
Appropriation.....	\$	5,000,000
Total funds provided.....	\$	5,000,000
Funds Applied to:		
Administration.....		387,488
Construction.....		10,111,974
Total funds applied.....		10,499,462
Decrease in Working Capital.....	\$	5,499,462

TABLE 50.—Federal Highway Administration, Public Lands Program—change in working capital (accounted for as follows)

	June 30, 1972	July 1, 1971	Increase	Decrease
Current Assets:				
Funds with U.S. Treasury-----	\$ 6,158,546	\$ 11,245,042		\$ 5,086,496
				\$ 5,086,496
Current Liabilities:				
Accounts Payable and Accrued Liability for States Completed Work	\$ 1,075,013	\$ 650,238		\$ 424,775
Other Accrued Liabilities-----	14,547	26,356	\$ 11,809	
			11,809	\$ 424,775
			\$ 11,809	\$ 5,511,271
			5,499,462	
			\$ 5,511,271	\$ 5,511,271
Sub-totals-----				
Decrease in Working Capital-----				
Totals-----				

TABLE 51.—Federal Highway Administration, Highway Beautification Program—statement of operations, July 1971 through June 1972

APPROPRIATIONS			
<i>For Contracting Authority</i>		<i>For Working Capital</i>	
New.....	\$ 66,100,000	New.....	\$ 11,100,100
From Last Year.....	98,592,376	From Last Year.....	45,647,235
Available.....	\$ 164,692,376	Available.....	\$ 56,747,235

OPERATING EXPENSES			
		<i>Payments</i>	<i>Change in Accruals</i>
Administration.....	\$	584,827	\$ +17,447
Outdoor Advertising.....		76,920	—513,265
Junkyards.....		295,364	—193,377
Landscaping and Scenic Enhancement.....		10,353,812	—1,143,466
	\$	11,310,923	—1,832,661
Decrease in Accruals.....		—1,832,661	
	\$	9,478,262	

<i>Deduct</i>		<i>Deduct</i>	
Accrued Expenses.....	\$ 9,478,262	Payments.....	\$ 11,310,923
Lapsing Program Authority ¹	4,446,778	Unobligated Funds Returned to Treasury ²	4,446,778
Supplemental Appropriation Act.....	452,000	Supplemental Appropriation Act.....	452,000
Used.....	\$ 14,377,040	Used.....	\$ 16,209,701

AVAILABLE BALANCES AT JUNE 30, 1972			
Contracting Authority.....	\$ 150,315,336	In Treasury.....	\$ 40,537,534

TABLE 52.—Federal Highway Administration, Highway Beautification
Program—balance sheet, at June 30, 1972

ASSETS		
Current Assets:		
Funds in U.S. Treasury.....	\$	40,537,534
Accounts Receivable.....		
Advances to Travelers.....	\$	990
Accounts Receivable—Other.....		39
		1,029
Fixed Assets: *		
Office Furniture and Equipment.....		8,228
Contracting Authority Unfunded *.....		113,500,000
Total Assets.....	\$	154,046,791
LIABILITIES AND U.S. GOVERNMENT INVESTMENTS		
Current Liabilities:		
Accounts Payable.....	\$	50,631
Accrued Liabilities for Uncompleted Work.....		3,672,597
	\$	3,723,228
Accrued Annual Leave of Employees.....		52,552
U.S. Government Investments		
Unobligated Contract Authority.....	\$	92,533,437
Undelivered Orders and Contracts.....		57,781,898
	\$	150,315,335
Invested Capital.....		-44,324
	\$	150,271,011
Total liabilities and U.S. Government investments.....	\$	154,046,791

TABLE 53.—Federal Highway Administration, Highway Beautification Program—U.S. Government investment, July 1971 through June 1972

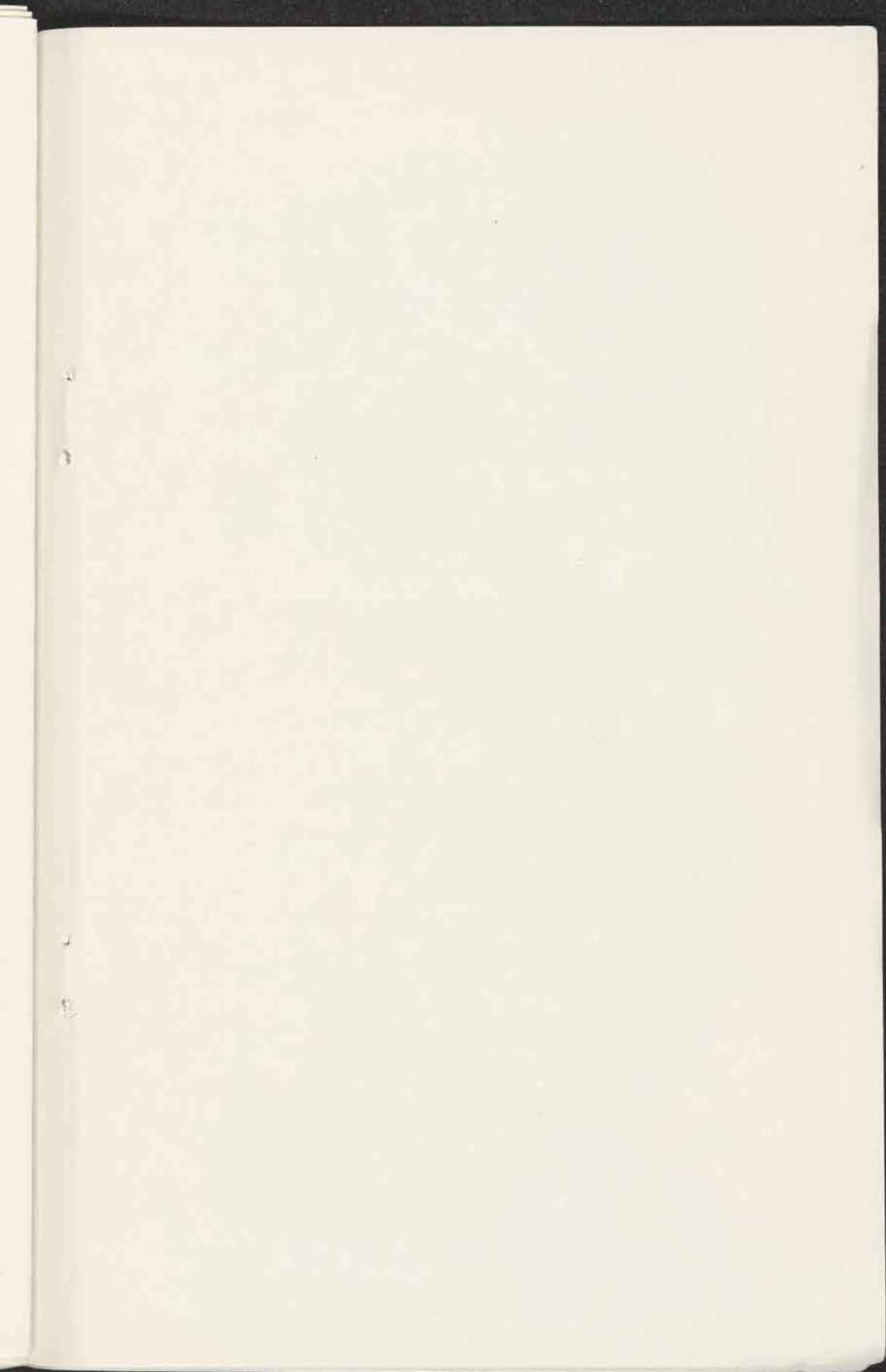
U.S. Government Investment at July 1, 1971	\$	98,551,373
Increases:		
Contracting Authority.....	\$	65,000,000
Increase in Fixed Assets.....		498
Obligational Authority, Administrative.....		1,100,000
Total Increases.....		66,100,498
Decreases:		
Expenses.....	\$	9,478,262
Unobligated Funds Returned to Treasury ^s		4,446,778
Supplemental Appropriation Act.....		452,000
Change in Leave Accrual (Net).....		3,820
Total Decreases.....		14,380,860
U.S. Government Investment at June 30, 1972	\$	150,271,011
ANALYSIS OF U.S. GOVERNMENT INVESTMENT		
Invested Capital.....	\$	-44,324
Unobligated		
Landscaping and Scenic Enhancement....		92,533,437
Undelivered Orders and Contracts:		
Administration.....	\$	5,842
Outdoor Advertising.....		181,807
Junkyards.....		1,994,364
Landscaping and Scenic Enhancement....		55,599,885
		57,781,898
U.S. Government Investment at June 30, 1972	\$	150,271,011

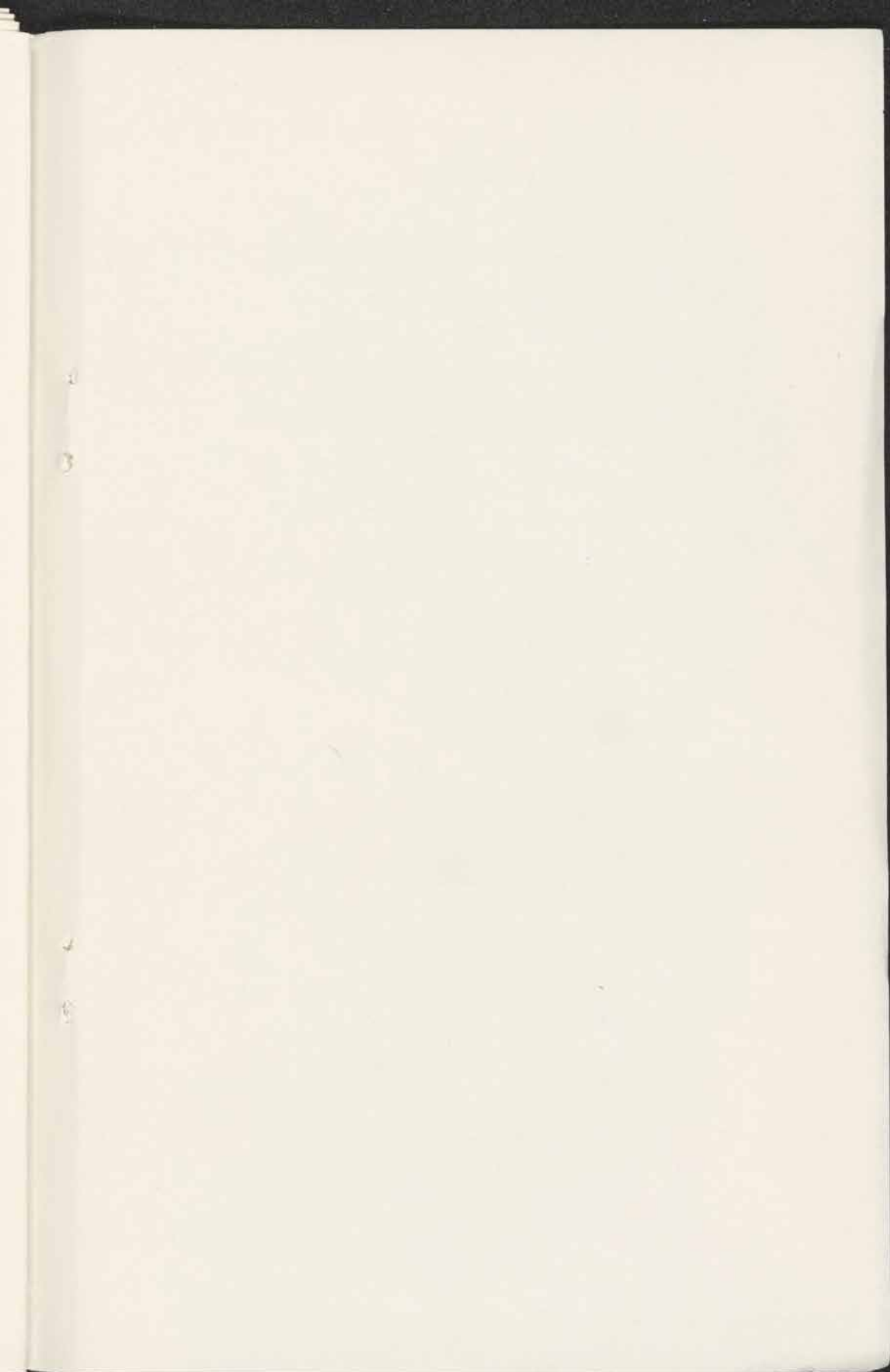
TABLE 54.—Federal Highway Administration, Highway Beautification Program—statement of application of funds, July 1971 through June 1972

Funds Provided by:		
Appropriation.....	\$	11,100,000
Less Unobligated Funds Returned to Treasury June 30, 1972 ^s		-4,446,778
Less Decreases in Supplemental Appropriation Act.....		-452,000
Total funds provided.....	\$	6,201,222
Funds Applied to:		
Administration.....	\$	602,274
Outdoor Advertising.....		-436,345
Junkyards.....		101,987
Landscaping and Scenic Enhancement....		9,210,346
Total Funds Applied.....		9,478,262
Decrease in Working Capital.....	\$	3,277,040

TABLE 55.—Federal Highway Administration, Highway Beautification Program—change in working capital
(accounted for as follows)

	June 30, 1972	July 1, 1971	Increase	Decrease
Current Assets:				
Funds with U.S. Treasury-----	\$ 40,537,534	\$ 45,647,235		\$ 5,109,701
Accounts Receivable-----	39	25	\$ 14	
Advances to Travelers-----	990	1,526		536
			\$ 14	\$ 5,110,237
Current Liabilities:				
Accounts Payable and Accrued Liabilities-----	\$ 3,723,228	\$ 5,556,411	\$ 1,833,183	
			\$ 1,833,183	
Sub-totals-----			\$ 1,833,197	\$ 5,110,237
Decrease in Working Capital-----			3,277,040	
Totals-----			\$ 5,110,237	\$ 5,110,237



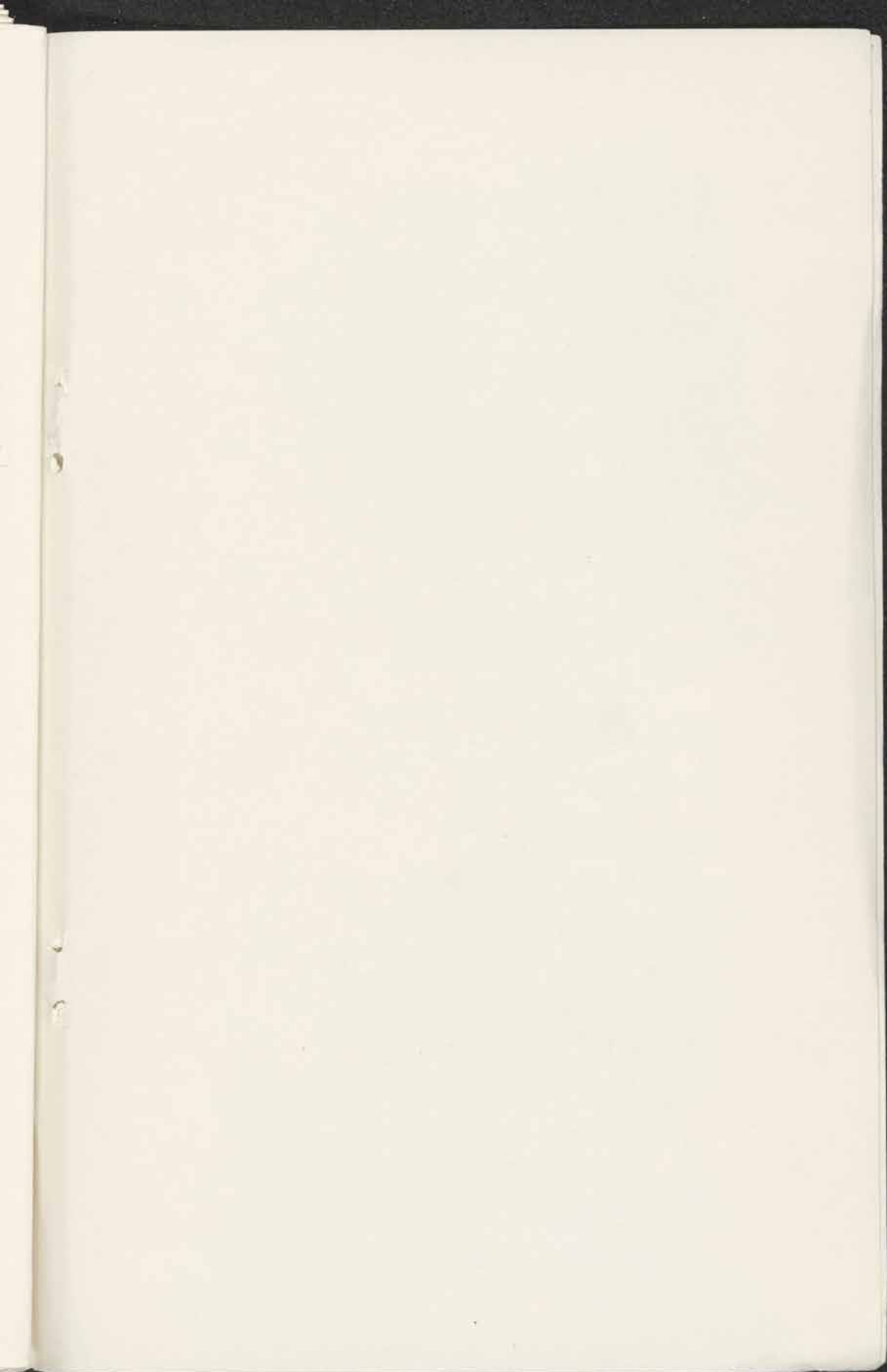


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