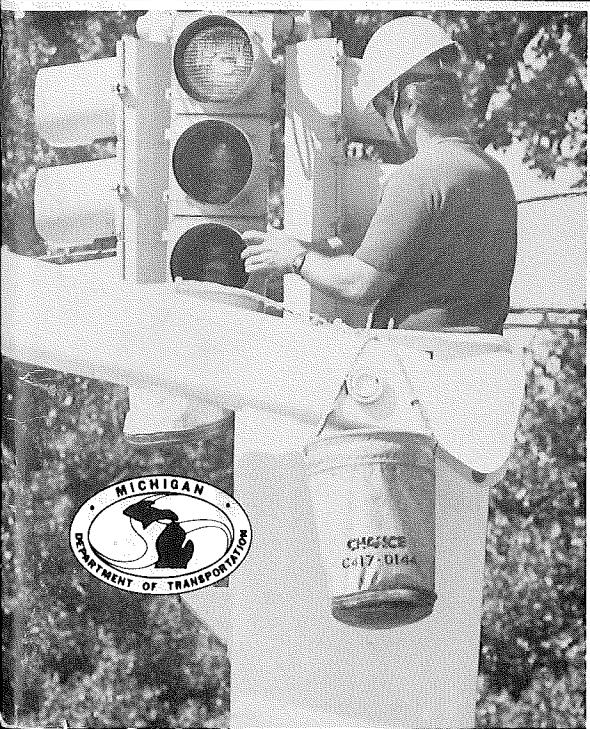
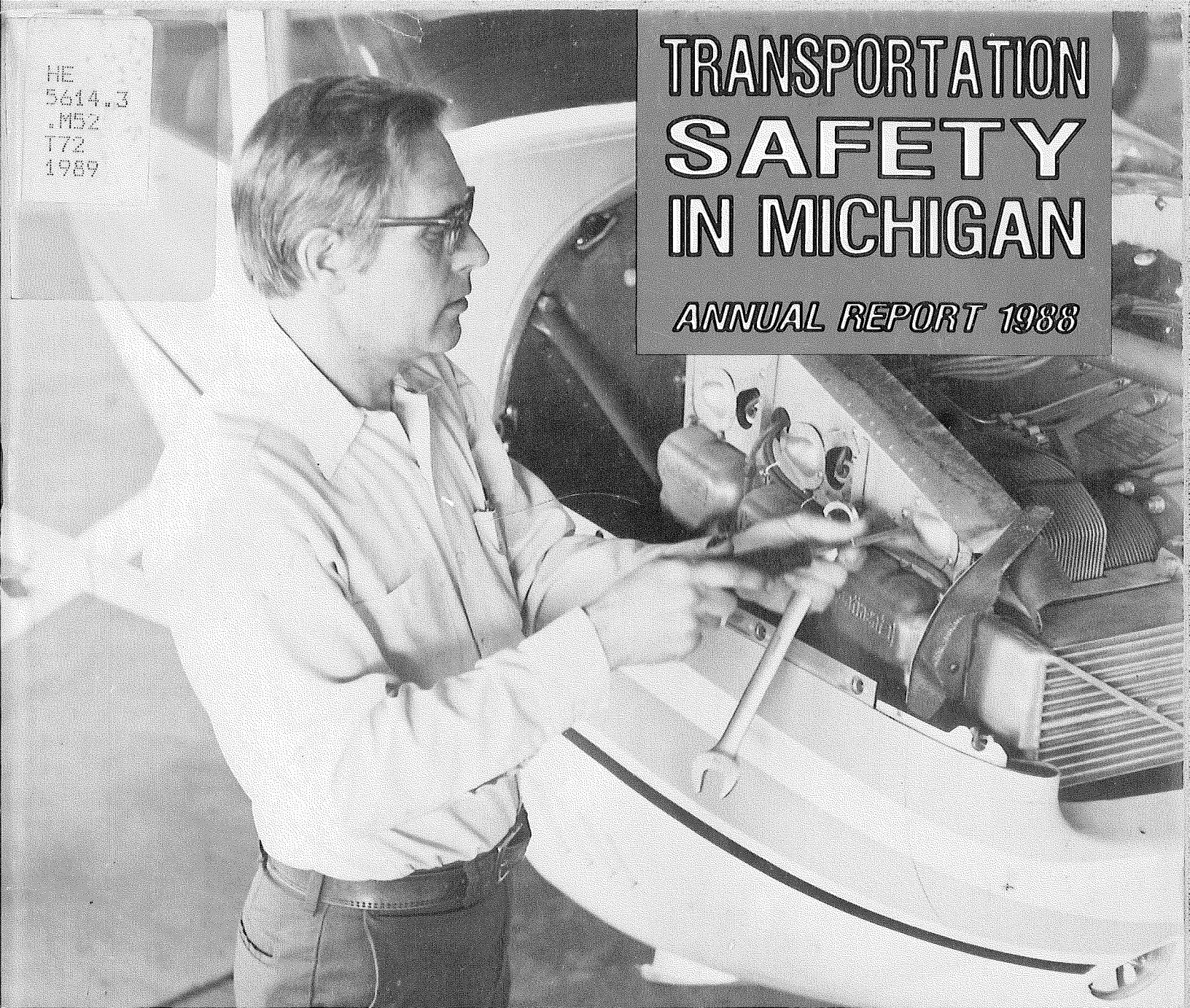


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TRANSPORTATION SAFETY IN MICHIGAN

ANNUAL REPORT 1988



TRANSPORTATION SAFETY IN MICHIGAN

1988

MICHIGAN DEPARTMENT OF TRANSPORTATION

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April 1989

TRANSPORTATION SAFETY IN MICHIGAN

1988

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*Report prepared by
Traffic and Safety Division
Bureau of Highways*

EXECUTIVE SUMMARY

This Transportation Safety report is published in response to Transportation Commission policy 1100.77

The report addresses the safety implications of various transportation modes for which the Department of Transportation is responsible.

Highway Safety

The state highway system carried about 41 billion vehicle miles of travel in 1988, almost half of the statewide total.

During 1988, 1,697 persons died in traffic accidents on Michigan highways. The provisional death rate for 1988 of 2.16 deaths per 100 million vehicle miles of travel decreased 2.7 percent over 1987.

The Department of Transportation's Bureau of Highways assures the safety of the state highway system through awareness of its importance in all phases of the design, construction, maintenance and operation of its roadways.

During fiscal year 1987-88, \$22.7 million dollars were spent for various safety improvements, including traffic control devices (signs, signals and pavement markings) and construction improvements.

Truck Safety

Truck related accidents increased by 66 percent from 1982 to 1987 while truck traffic increased by only 25 percent. Total truck accidents for ten months of 1988 was down 1.1 percent over the same 1987 period.

The Michigan Department of Transportation is concerned with the increase in truck accidents and has taken a leadership role in organizing efforts to deal with the problem. One of the first steps was the establishment of the Interagency Truck Committee to better coordinate state level activities. An action plan with 19 recommendations was ultimately developed and approved by the State Transportation Commission in March 1987.

A comprehensive legislative package was introduced in early 1988 which dealt with many of the 19 recommendations. These bills passed the state legislature and were signed by the Governor in late 1988.

Railroad Safety

Highway grade crossing accidents continue to decrease. Deaths resulting from vehicle-train collisions numbered only 21 in 1987, down from the recent 1985 high of 35. All track mileage within the state is inspected at least twice a year. In addition, all railroad/highway grade crossings are reviewed at least once every two years. Projects identified and selected based on that evaluation are implemented primarily using federal aid railroad safety funds of approximately \$5 million per year.

Air Safety

There were 53 aviation accidents in Michigan during 1988. Seven of them involved fatalities. Analysis of 1988 accidents indicate pilot error as the causal factor in 28 of the 53 total accidents.

The Bureau of Aeronautics impacts aviation safety through sponsorship of pilot safety seminars, monitoring of air shows, tours, races, Dawn Patrols and individual counseling of pilots.

AERO also sponsors an annual super safety seminar with the FAA for pilots, mechanics, aviation operators and flight instructors, publishes Michigan Aviation, the Michigan Aeronautical Chart and the Michigan Airport Directory, and operates seven classified Very High Frequency Omni-directional Radio Range (VOR)/Distance Measuring Equipment (DME) stations and three Microwave Landing Systems (MLS) in Michigan.

Public Transit Safety

During fiscal 1988, over 91 million rides were provided to the general public with 2,287 buses on 14 urban transit systems, 47 specialized service systems, and 55 non-urban local systems.

Transit agencies rely on federal and state funds for general operating expenses. MDOT uses federal and state funds to provide and conduct safety training in driving, maintenance and accident prevention.

Intercity Bus Safety

During 1988, 4,818 privately owned and operated buses provided transportation throughout this state for tours, charters and regular scheduled service.

All buses operating in Michigan are required to be safety inspected annually. In addition, the department conducts random, unannounced safety inspections around the state without interfering with the traveling public.

Safety is inherent in all MDOT programs such as maintaining consistent standards for sign and pavement marking installation.



INTRODUCTION

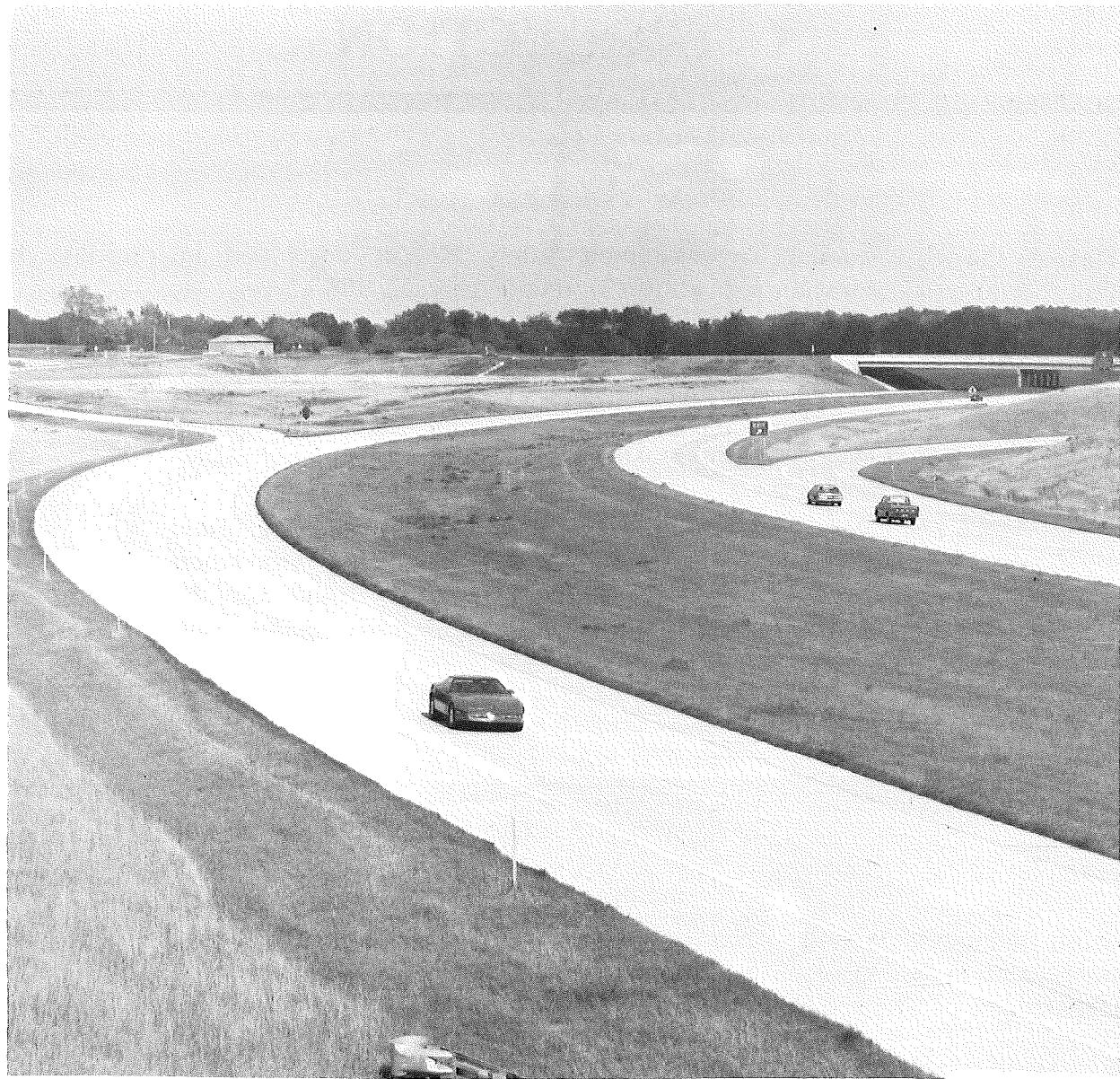
This is the first annual Transportation Safety Report developed in response to Transportation Commission policy 1100.77, dated April 22, 1987:

"All transportation modes under the authority of the State Transportation Commission or the Department should be regularly monitored to identify problems and facilitate operational safety.

The Department shall prepare and submit to the State Transportation Commission an annual report on transportation safety programs and activities. This report shall also be distributed to other agencies and organizations dealing with transportation safety."

Safety is inherent in all Michigan Department of Transportation (MDOT) programs. Planning, design, construction, maintenance, traffic operations, and research are several examples of MDOT activities which impact transportation safety.

Safety cannot be defined in terms of individual programs, projects or activities. A safe transportation system requires the awareness, commitment, and cooperation of the entire Department of Transportation.



Each governmental agency in Michigan is responsible for safe and convenient travel.

HIGHWAY SAFETY

Responsibility

The Michigan Department of Transportation, under the direction of the Michigan Transportation Commission, is responsible for a number of safety programs, including monitoring and responding to accidents on the state highway system in Michigan. Responsibility and authority for this activity is mandated and detailed in state law, federal regulations and Department of Transportation policies, procedures and operating instructions. Michigan Compiled Laws 691.1420 states, in part:

"Each governmental agency having jurisdiction over any highway shall maintain the highway in reasonable repair so that it is reasonably safe and convenient for public travel."

Applicable federal regulations are outlined in United States Highway and Transportation Acts of 1966, 1973, 1978, and 1982, as defined in United States Code Title 23. Further state authority for highway system safety is defined by Michigan Transportation Commission Policy 1100.12 which provides for the safe operation of the state trunkline system, and Commission Policy 1100.17, which directs the department to provide an annual safety report to the Transportation Commission.

Responsibility for safe roads is found in federal, state, department and transportation commission policy.

System Description

Michigan's highway system includes 117,797 miles of state and local roads. Mileage distribution by jurisdiction is: state - 9,532 (8 percent), county - 88,597 (76 percent), city - 19,668 (16 percent).

State trunkline highways carry over half of all state traffic on only 8 percent of the total road mileage.

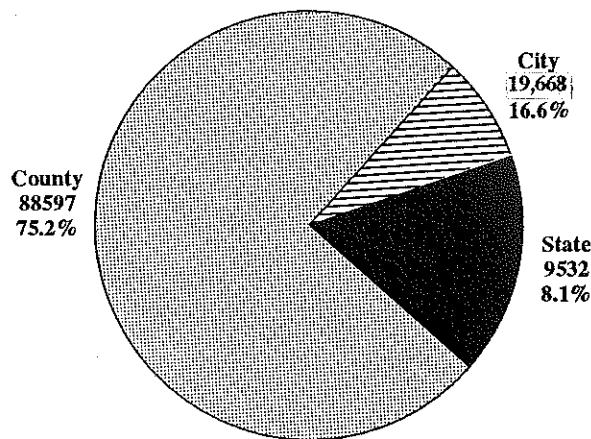
During 1988, over 78 billion miles of travel was carried on Michigan roads, streets, and highways.

The state highway system carried 41 billion vehicle miles of travel, more than half of the statewide total. Eighteen percent of state highways are classified as freeways. They carry about 45 percent of all state highway travel.

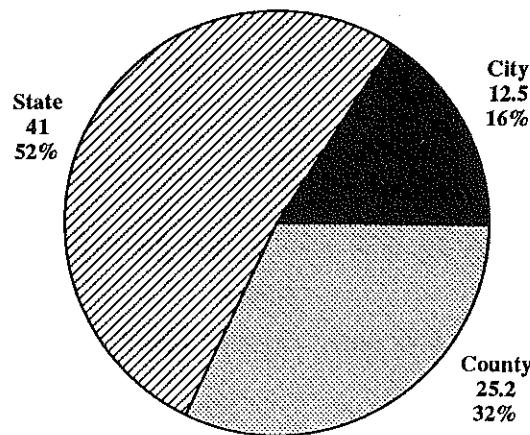
The county road system carried about 25 billion vehicle miles of travel in 1988, approximately one-third of the statewide total. The 19,668 miles of city streets carried 12 billion annual vehicle miles of travel in 1988, 16 percent of the state total.



**MICHIGAN ROAD MILEAGE BY JURISDICTION
1988**
117,797 Total Miles



**MICHIGAN ROAD ANNUAL VMT BY JURISDICTION
1988**
78.7 Billion Total Vehicle-Miles of Travel

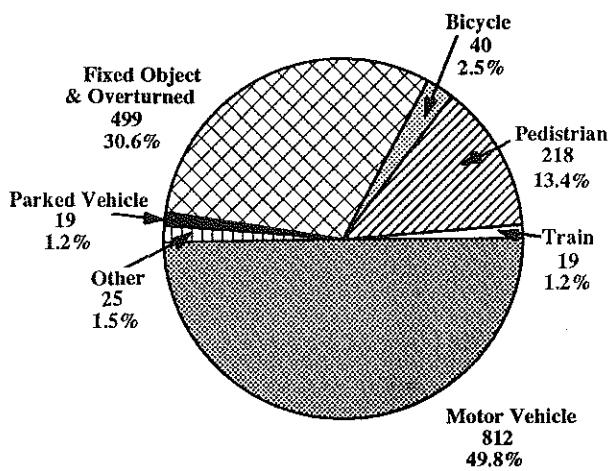


Accident Data

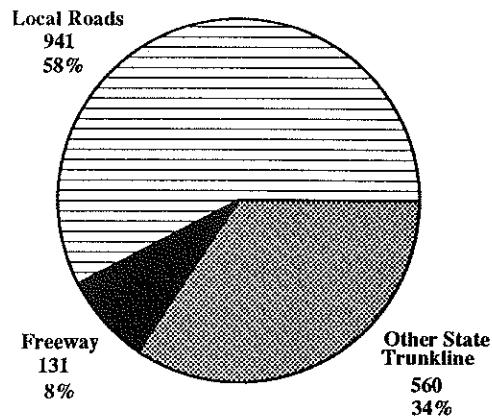
During 1987, 1,632 persons died in traffic accidents on Michigan highways, the same number were killed in 1986. Due to the increase in travel, the death rate decreased 4.3 percent from 1986 to 2.2 deaths per 100 million vehicle miles of travel. Total accidents decreased 0.9 percent from 400,694 to 397,224. Injuries also decreased 1.1 percent from 158,032 in 1986 to 156,318 in 1987.

During 1988, 1697 persons died in highway accidents. This is a Department of State Police provisional total with final numbers pending. Total accidents for 1988, are estimated to be 407,000, with 150,300 occurring on the state highway system. Total injuries for 1988, are estimated at 168,000, with 63,300 occurring on the state highways.

FATALITIES - 1987
STATEWIDE

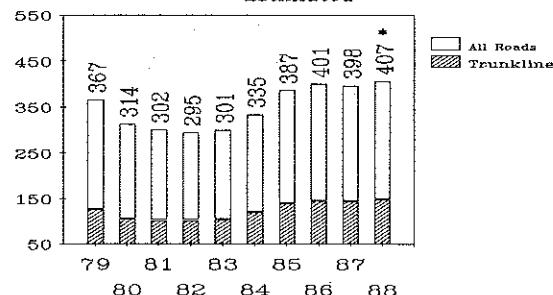


FATALITIES - 1987
ROADWAY TYPE



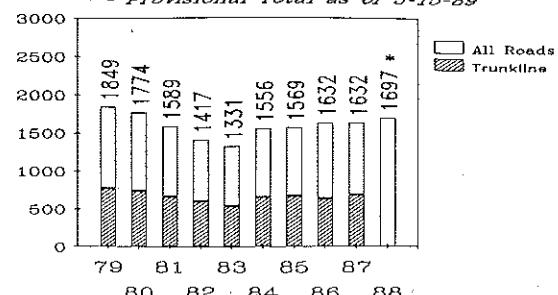
TOTAL ACCIDENTS

Thousands of Accidents
* - Estimated



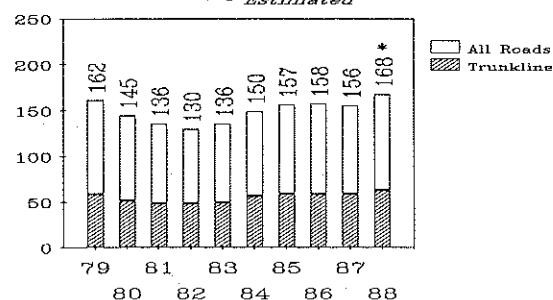
FATALITIES

Number of Fatalities
* - Provisional Total as of 3-15-89



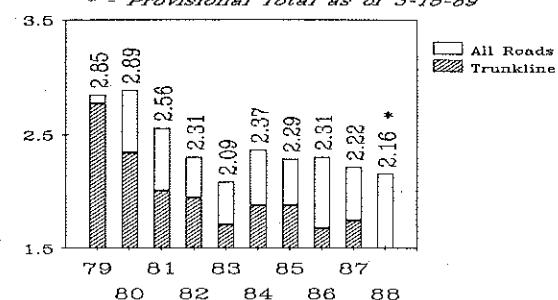
INJURIES

Thousands of Injuries
* - Estimated



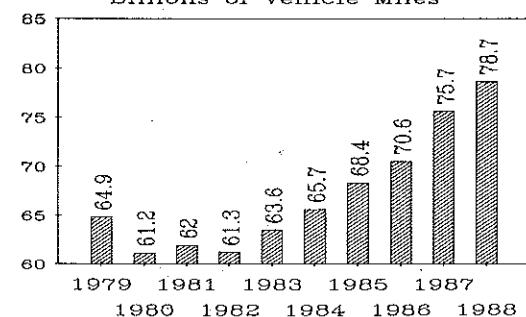
FATALITY RATE

Deaths/100 Million Vehicle Miles
* - Provisional Total as of 3-15-89



ANNUAL MILES OF TRAVEL

Billions of Vehicle Miles



Highway Safety Programs

The Department of Transportation's Bureau of Highways manages a number of programs designed to assure the safety of the state highway system under its jurisdiction.

New Roadways

MDOT uses the most modern standards when building new highways.

All new roadways are constructed in accord with the most modern design standards, including the roadside environment where flat side slopes, clear recovery areas, breakaway sign supports, state-of-the-art guardrail, crash cushions, and other features are provided to minimize injury to the occupants of out of control motor vehicles.

Reconstruction of Existing Roadways

MDOT's rehabilitation program involves reviewing projects for safety improvements.

The department is engaged in aggressive reconstruction, resurfacing restoration, and rehabilitation (3R/4R program) of about 500 miles of state highways each year.

All federal aid 3R/4R projects are reviewed by the Traffic and Safety Division to assure that any developing concentrations of accidents are identified and all appropriate safety enhancements are included as part of the projects.

Last year, nearly 200 project plan reviews were completed involving 105 bridges and approximately 450 miles of roadway. A significant quantity of guardrail, guardrail end sections, and bridge rail were upgraded to current design standards in conjunction with this activity.

Statewide Accident Surveillance

MDOT's Accident Surveillance program investigates and corrects high accident locations.

In addition to incorporating safety into all phases of the department's annual \$300 million construction program, the Traffic and Safety Division manages an accident surveillance program which identifies and corrects developing accident patterns on the state highway system, and on some local roads utilizing a federal traffic engineering assistance grant.

This system uses computer programs to isolate intersections and roadway sections with developing accident patterns.

The accident data is then analyzed further and justified corrective countermeasures identified and implemented. If construction is required, projects are programmed using federal Hazard Elimination Safety (HES) or State (M) funds.

The statewide accident surveillance program relies on several other sources of data, in addition to accident records. These include pavement friction test data provided by the Materials and Technology Division, traffic volume and speed surveys conducted by the Bureau of Transportation Planning, and the photolog, traffic signal inventories, sign plans, and other data maintained in the Traffic and Safety Division and other divisions in the Bureau of Highways.

Guardrail Improvement Program

In addition to guardrail upgrading accomplished in conjunction with other construction activities, the department currently manages two other specific guardrail improvement programs.

1. A five-year program currently funded up to \$700,000 per year to replace deteriorated wood posts on Types B, C, and T guardrail.
2. A ten-year, \$500,000-per-year program to upgrade cable and Type A guardrail.

Two specific programs address guardrail upgrading.

As an option, guardrail can be eliminated under any of these programs where it would be more cost-effective to modify the element protected by the guardrail, such as fill to flatten steep side slopes adjacent to the highway.

Additional guardrail is routinely upgraded by work authorization to department maintenance forces or to contract counties.

Interchange Upgrading Program

The Michigan Department of Transportation includes interchange improvements as part of its overall capital outlay program.

Freeway interchange improvements are part of MDOT's capital outlay program.

The Traffic and Safety Division manages a program which identifies interchanges with concentrations of various accident types. Each location is reviewed with district personnel to determine those factors contributing to the accidents. Corrective, cost-justified counter-measures are then recommended for implementation.

Traffic Control Devices

The Traffic and Safety Division is responsible for authorizing all traffic control devices (signs, signals, and pavement markings) on the state highway system. These devices are installed in accord with criteria and standards detailed in the Michigan Manual of Uniform Traffic Control Devices.

Traffic controls are installed in compliance with state and national standards.



Highway Safety Program Funding

Safety is an integral part of all department activities, including its capital outlay construction program, which last year totaled \$372 million.

Management of the specific capital outlay safety programs previously discussed is largely the responsibility of the Traffic and Safety Division. Funding of those programs and projects is initiated by the Traffic and Safety Division as part of the department's annual "Call for Projects" process. The table below summarizes the division's "Call for Projects" submittal for fiscal years 1988 through 1990:

<u>Signing</u>	FY88 (Mil)	FY89 (Mil)	FY90 (Mil)
Interstate Freeway Signing Contract	\$ 2.0	\$ 2.0	\$ 2.0
Non Interstate Freeway Signing Contract	1.0	1.0	1.0
Non Freeway Signing Contract	2.0	2.0	2.0
Work Authorizations (all systems)	<u>1.0</u>	<u>1.0</u>	<u>1.7</u>
Subtotal	6.0	6.0	6.7
<u>Pavement Markings</u>	5.2	5.2	5.6
<u>Signals</u>			
Signal Installation	2.0	1.5	1.7
Installation by Work Authorizations	1.0	1.5	1.5
Signalized Intersection Improvement	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>
Subtotal	4.0	4.0	4.2
<u>Safety Programs</u>			
HES (All Federal)	3.5	3.41	3.4
Non-Federal Safety Improvements (MS)	1.5	1.35	1.6
Safety Work Authorizations	0.5	0.4	0.4
Guardrail Improvements	0.5	0.5	0.5
Interchange Improvements	<u>1.5</u>	<u>2.0</u>	<u>2.0</u>
Subtotal	7.5	7.66	7.9
TOTAL	\$ 22.7	\$ 22.86	\$ 24.4

Other Actions Required to Improve Safety and Future Safety Activities

Governor's Safety Conference

This past year the Governor's Safety Conference developed recommendations for the future direction of highway safety. The Department of Transportation actively participated in this conference. The recommendations covered issues affecting both the driver and roadway and included:

MDOT participated in the recent governor's safety conference.

- Increased penalties for violation of passenger restraint requirements.
- Increased penalties for impaired driving and walking.
- Increased commitment to roadway improvements and traffic control.
- More stringent commercial vehicle operator qualifications.
- Improved coordination and planning among highway safety agencies.
- Improved data resource management between highway and accident information agencies.
- Improved public education and marketing of highway safety.

Safety Commission

MDOT is a member of many inter-departmental safety committees and councils.

MDOT is a member of the State Safety Commission. The commission meets monthly to discuss significant safety issues. MDOT is also represented on the Steering Committee and Information Council of the commission. The Steering Committee identifies specific safety issues for review by the commission and the Information Council develops and disseminates public information and educational materials.

Traffic Records

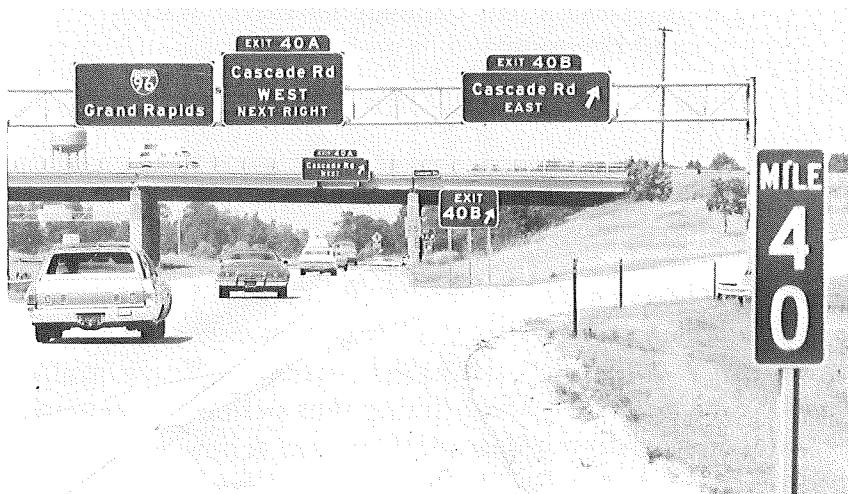
The department is extensively involved as part of the Michigan Traffic Accident Records System (MTARS) committee. Work group tasks include determining the direction and character of improvements to the state's accident records system. We are involved in defining needs, processing/output, and systems development. This committee is unique in that it crosses department lines and has focused attention on a records system which will meet the needs of all users of accident records, in both public and private agencies, for years to come.

MDOT participates with other state agencies in improving the existing accident reporting system.

Other Safety Related Activities

Safety is inherent in all Department of Transportation programs. Managing the safety of traffic through construction zones, winter snow and ice removal, the development of new products and techniques, the administration of federal aid funds to the local road system, and long range planning of roadway improvements are several examples of other activities which the Department of Transportation manages which have a significant impact on highway safety.

The commitment, cooperation, and awareness of all Department of Transportation staff is required to assure the safety of all users of the highway system in Michigan.



Safety is inherent in all MDOT activities.

TRUCK SAFETY

Responsibility

MDOT cooperates with other departments to monitor and control trucking.

The Michigan Department of Transportation has basic responsibility for design, construction, operation, and maintenance of the state highway system. This system, along with municipal streets and county roads, is used by the motor carrier industry for the movement of goods and commerce. It is the department's responsibility to assure that the highway system is built to adequate standards to allow safe and efficient use by trucks and other large vehicles. The department is also responsible for the issuance of overweight and oversize permits based on review of highway system capability. Additional truck safety activities are the responsibility of other state agencies. These include:

- Motor Carrier Division of the Department of State Police, which is responsible for driver safety and weight enforcement.
- Michigan Public Service Commission of the Department of Commerce, which is responsible for route and rate authority based, in part, on safety considerations.
- Michigan Department of State which is responsible for commercial driver testing and licensing.

Truck Accident Data

1987 truck accidents represent the first reduction since 1982.

Truck accidents have increased in recent years. The following tables indicate that truck related accidents increased by 66 percent in the 1982-1987 period. Truck traffic increased by only 25 percent during that period. In general, increases in Michigan truck accidents are following regional and national trends. The causes are not completely

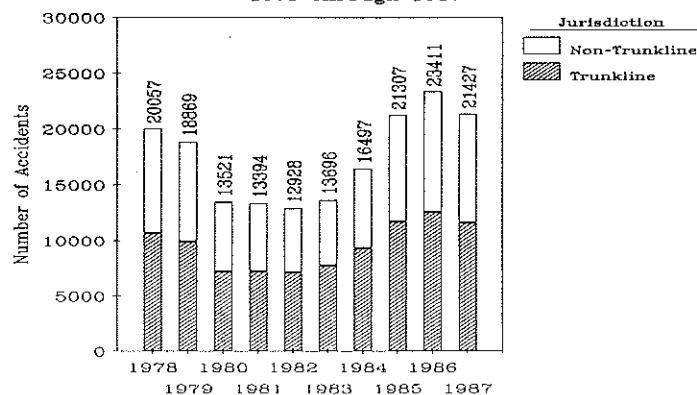
understood, although the competitive pressures of deregulation are commonly assumed to be a major factor. Data for 1987 show a reduction in truck related accidents compared to 1986. This represents the first reduction since 1982.

Also summarized in the following tables are accidents by truck type; that is, single or combination units.

Total truck involved accidents for ten months of 1988 are 17,196 with 9,212 of these occurring on the trunkline. This represents a 1.1 percent decrease over the same period in 1987.

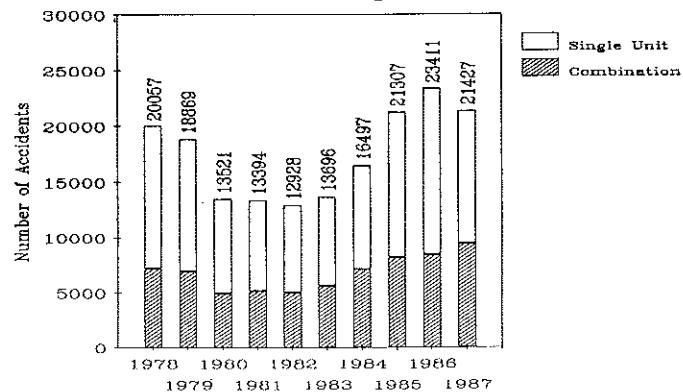
MICHIGAN TRUCK-INVOLVED ACCIDENTS

1978 Through 1987



MICHIGAN TRUCK-INVOLVED ACCIDENTS

1978 Through 1987





MDOT and the Transportation Commission are concerned with increasing numbers of truck accidents.

Truck Safety Programs

The Michigan Department of Transportation and the State Transportation Commission are concerned with increasing truck accidents and have taken a leadership role in organizing efforts to deal with the problem. One of the first steps was establishment of the Interagency Truck Committee to better coordinate state level activities. This committee includes all state agencies having motor carrier responsibilities. Committee members, in addition to MDOT, include the Department of State Police Motor Carrier Division and Office of Highway Safety Planning, Michigan Public Service Commission, Department of State, and Department of Treasury. Meetings were organized with AAA Michigan, the Michigan Motor Carrier Advisory Board, Michigan Trucking Association, University of Michigan Transportation Research Institute, and others to solicit input on what could be done. An action plan with 19 recommendations was ultimately developed and approved by the State Transportation Commission.

MDOT and the Commission helped establish the Interagency Truck Committee

The department continued its leadership role to assure implementation of the recommendations. A comprehensive legislative package was introduced in early 1988 which dealt with many of the 19 recommendations. This package passed the state legislature and was signed by the Governor in late 1988. Key components of the package include:

- Restriction of trucks to two right hand lanes on freeways with three or more lanes in each direction.
- Improved truck identification.
- Covering all loads to prevent spillage.
- Increases in truck registration fees to \$15 per truck to be deposited in a Truck Safety Fund for education and enforcement.
- Increases in overweight fines by 50 percent and civil fines from a maximum of \$100 to \$250.

MDOT leads efforts to implement the 1988 truck safety legislation.

- Requirement for annual inspection of equipment used to transport flammable or combustible liquids.

Other Actions to Improve Safety and Future Safety Activities

In addition to the legislative initiatives outlined above, MDOT is also:

- Analyzing locations with concentrations of truck accidents. Corrective actions are implemented, where appropriate.
- Providing funding for State Police Motor Carrier Division (MCD) enforcement. This amounts to about \$4 million annually - 50% of MCD's budget.
- Construction and maintenance of 19 scale houses and numerous rest areas, which are the location for state police truck enforcement activities.
- Working with the Department of State Police to improve the truck accident data base.
- Assisting the National Governor's Association Motor Carrier Task Force efforts to promote uniformity of registration and taxation procedures.

MDOT is working on truck safety beyond the recent legislation.

RAILROAD SAFETY

Responsibility

Railroad Inspections and Regulation

By Executive Orders 1975-10 and 1982-7, certain railroad regulation functions were transferred from the Michigan Public Service Commission to the Michigan Department of Transportation. The Railroad Safety and Tariffs Division is responsible for discharging the department's duties and responsibilities, as prescribed by Michigan statutes, in regulation of common carrier railroad companies. Responsibilities include public safety at grade crossings, track structural safety, other safety factors, qualification of certain railroad employees, railroad services and rates, tariffs and contractual agreements. The division also functions as part of the Federal Railroad Administration's State Participation Program, as authorized by Section 206 of the Federal Railroad Safety Act of 1970.

Federal and state statutes define MDOT's responsibility to inspect and regulate crossings, track, rates and tariffs.

Highway Grade Crossings

Federal and state grade crossing improvement funding programs are administered jointly by MDOT's Engineering Services and Local Services Divisions. MDOT Design Division, Traffic and Safety Division and district offices cooperate and assist in this effort.

The Engineering Services Division administers funding for state highway railroad crossings. The division is a liaison between the department and the railroad industry. The staff conducts field reviews, data collection and analysis in addition to administering the state highway portion of federal and state railroad safety improvement programs. This requires coordination of crossing improvements with MDOT's construction and maintenance programs. The Local Services Division administers federal and state railroad crossing improvement funding programs on behalf of cities and counties for projects on their roadways.

MDOT administers federal grade crossing funds for both trunkline and local roads.

MDOT acquires, maintains and rehabilitates state owned railroad rights-of-way.

State Owned Railroads

Act 295, as amended, provides legislative authority for the department to acquire, rehabilitate, and/or improve railroad facilities, and to financially assist improvements in the railroad infrastructure.

MDOT assists in rail passenger safety.

Intercity Rail Passenger

The Rail Passenger Section of the Intercity Division of UPTRAN is responsible for developing, monitoring, and analyzing rail passenger service in Michigan. The section has no specific safety responsibilities when viewed from a regulatory standpoint, but is involved in a variety of safety related undertakings.



Railroad System Description

Private & Public Owned Railroads

There are approximately 4,700 miles of active railroad right-of-way in Michigan. This includes 2,510 miles of class I railroads and 1,537 miles of regional and shortline operations.

Of the 4700 miles of track in Michigan, the state owns 872 miles.

The state owns 872 miles of railroad right-of-way. MDOT has service agreements with five railroad companies to operate over 715 miles; the remaining 157 miles of state-owned right-of-way is not in operation.

Highway Grade Crossings

There are 6,837 public at-grade railroad crossings in the State of Michigan. There are 415 crossings on the state trunkline system and 685 crossings on state owned railroad right-of-way.

Intercity Rail Passenger

Working closely with Amtrak, the Rail Passenger Section oversees three Michigan routes. The Chicago-Detroit-Toledo route is 337 miles long and connects the Midwest's two largest urban centers. The "Pere Marquette" route, which provides daily service between Grand Rapids/West Michigan and Chicago, is 175 miles in length. The "International" route, which provides daily service between nine Michigan communities, Chicago and Toronto, is 495 miles in length. There are 19 rail passenger stations within the state that serve approximately 500,000 passengers annually.

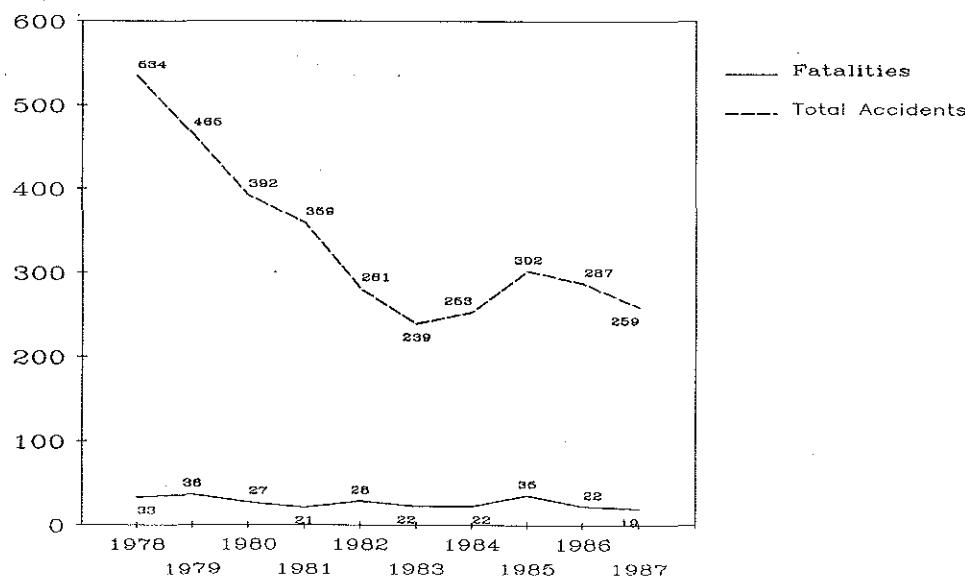
There are three major rail passenger corridors serving Michigan.

Railroad Accidents

Highway Grade Crossings

Highway grade crossing accidents continue to show a downward trend in all categories (see graph). During 1985 accidents rose but have been decreasing since that time. As with motor vehicle accidents, the year with the lowest number of reported accidents was 1983. Automobile travel in that year was also low.

PUBLIC RAILROAD CROSSING ACCIDENTS



Intercity Rail Passenger

Michigan's Amtrak services have accumulated an enviable safety record, having served approximately eight million Michigan users since 1971 with not one passenger fatality occurring during this nearly 18-year period.

Railroad Safety Programs

Railroad Inspections and Regulation

The Safety and Tariffs Division is responsible for:

- Administering the department's railroad safety and service program and coordinating this program with the Federal Railroad Administration, Interstate Commerce Commission, road authorities, other government agencies, the public, school officials, commercial industry, and railroads. These duties and responsibilities are carried out by the administrative staff and personnel of four sections -- Safety Section, Track Safety Section, Compliance Section, and Administrative Support Section.
- Investigation of safety conditions affecting employees.
- Investigation, approval, or denial of requests for maintenance of less-than-standard clearances adjacent to or over railroad tracks.
- Inspection of railroad trackage and identification of defects especially on passenger train lines or track carrying high tonnage and hazardous materials.
- Investigation and determination of need for, feasibility of location, and safety requirements at all public highway railroad grade crossings.
- Responsibility for rates, tariffs, and contractual agreements for intrastate commerce.
- Investigation of service complaints of shippers and the general public.

MDOT's Safety and Tariffs Division investigate grade crossings, track, employee working conditions, requests for substandard clearances and tariffs.

- Preparation of proposed and final department orders relative to safety improvements and requests for new crossings.
- Development and presentation of the department's case in quasi-judicial and judicial challenges to its railroad orders.

RAILROAD SAFETY AND TARIFFS DIVISION ACTIVITIES

<u>Activities</u>	<u>Number of</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Formal Inspections in response to requests of need as determined by priority improvement program of public grade crossings.	Inspections	130	150	249	127	124
On-site review of grade crossings approximately every two years.	Reviews	4794	3576	3230	5148	3142
Orders issued for improvement in safety condition at crossings and grade separations.	Orders Issued	70	156	63	79	53
Deficiencies identified and sent to railroad companies and road authorities for correction.	Deficiencies Identified	*	*	*	7051	5137
Inspections in response to requests for less-than-standard clearances and employee complaints regarding working conditions.	Inspections	162	48	51	49	30
Inspection of railroad trackage, especially that carrying passenger and hazardous material trains.	Miles	10744	13309	12349	12849	13845
Inspections of track inspection records.	Records	5632	5676	3732	4473	5281
Inspections of turnouts.	Turnouts	5351	5664	7182	6204	7510
Inspections of railroad-to-railroad crossings.	Crossings	*	*	*	*	322
Inspections of derail devices.	Derails	16	3	49	43	72
Defects on trackage identified for correction by carriers.	Defects	3790	3937	5003	2507	3093
Tariffs reviewed and processed.	Tariffs	*	*	*	3900	2911

* - Records not maintained for these activities for these years.

The department functions under a cooperative agreement with the Federal Railroad Administration (FRA) for monitoring and inspecting railroad trackage, roadbed, drainage structures, and carrier inspection records. MDOT and FRA inspects all trackage within the state at least twice a year. These inspections are directed to both state-owned and privately-owned track. More frequent inspections are scheduled for rail lines carrying passenger trains, hazardous materials, or heavy tonnage.

The Railroad Safety Section endeavors to review or inspect each of the state's railroad/highway grade crossings at least once every two years. On the basis of recommendations resulting from these inspections, the Railroad Safety and Tariffs Division pursues actions to install warning devices or other crossing improvements.

Highway Grade Crossings

The Railroad Safety and Tariffs Division initiates grade inspections through:

- a. Complaints regarding the safety of the crossing.
- b. Public or local agencies.
- c. Railroad companies.
- d. Private industries.
- e. Railroad Safety and Tariffs Division.

Grade crossings are inspected by MDOT inspectors.

Formal crossing safety inspections are performed by an inspector from the Railroad Safety Section with representatives of the railroad company, road authority, and other interested local agencies. The Safety and Tariffs Division reviews safety conditions at the crossing and develops recommendations for improvements.

Engineering Services and Local Services Divisions use the hazard index rating (HIR) to assist in determining the order improvement projects are programmed. Additional projects not recognized in the HIR, are also initiated by the Engineering Services Division and local road authorities. Projects include upgrading or modernizing signal devices, eliminating crossings, reducing the number of tracks and reconstruction of crossing surfaces.

A hazard index rating helps establish grade crossing priorities.

The hazard index rating (HIR) used in identifying railroad-highway grade crossing projects is defined as:

$$(HIR) = \text{Average Daily Traffic (A.D.T.)} \times \text{Average 24-hour Train movements} \times \text{Protection Factor}$$

Protection Factors

- 1.00 - reflectorized crossbuck sign
- 0.30 - flashing light signals
- 0.27 - flashing light signals with cantilever arms
- 0.24 - flashing light signals with cantilever arms and half-roadway gates
- 0.11 - flashing light signals with half-roadway gates
- 0.08 - flashing light signals with cantilever arms and half-roadway gates
- 0.05 - flashing light signals with cantilever arms, half-roadway gates and traffic signal interconnection

Projects are identified and selected for funding by the Engineering Services and Local Services Divisions. The Engineering Services Division administers state trunkline projects and the Local Services Division those on the local system.

State Owned Railroads

Track condition, speed and car loadings are track safety indicators.

Three indicators are used to assess the relative safety of track segments. Two of these, "excepted track" miles and "slow ordered" track miles, are indicators of the condition of the track structure. The third indicator, number of annual carloads containing hazardous materials, reflects the potential risks associated with train operations. Indicator ratings are closely reviewed prior to establishing track rehabilitation project priorities.

As with privately-owned rail lines, state-owned rail facilities are inspected by the Safety and Tariff Division to identify and resolve any existing or potential safety hazards.

Intercity Rail Passenger

The Rail Passenger Operating Section is involved in numerous rail passenger safety-related programs including Operation Lifesaver, which promotes grade crossing safety to the motoring public.

In FY 1987-88 the section, in conjunction with other MDOT bureaus, invested in the improvement of crossing protection at 89 crossing locations along the Detroit-Chicago passenger rail corridor.

The department is also providing funds to improve lighting, walkways and waiting room areas at stations in Niles and Durand. The department is also involved in the new station being constructed in Flint. This work includes improved lighting, sidewalks, station platforms and parking facilities.

MDOT is funding the Detroit-Chicago corridor crossing signal improvement program.

Railroad Safety Program Funding

Highway Grade Crossings

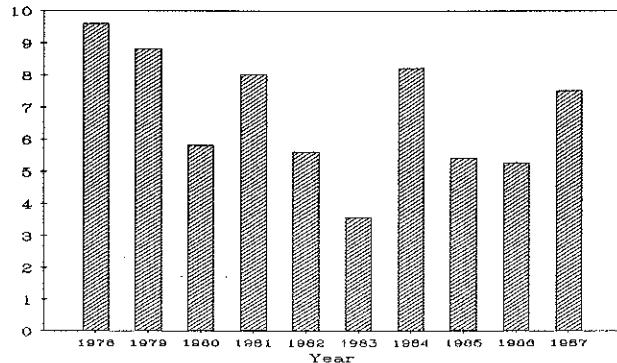
Two funding programs directly impact railroad grade crossing safety. The federal aid railroad safety program has been in effect for many years. This program provides approximately \$5 million per year for a wide variety of safety improvements at railroad highway grade crossings on all road systems. Eligible improvements include installation and improvement of flashing light signals, half roadway gates, signs, pavement marking, crossing surface reconstruction, crossing removals, and intersection realignment. During the past five years, \$29.5 million of such improvements have been implemented through this program. Ninety percent of the cost of these projects is financed by federal funds, and ten percent is the responsibility of the road authority having jurisdiction over the highway. Special projects such as railroad consolidations and separations have also been accomplished with these funds.

Grade crossing improvements use federal and state funds.

In addition to these programs, a special project has been initiated to improve crossing safety and passenger rail operations on the Detroit-Chicago Corridor. This is a

cooperative program between MDOT'S Bureau of Highways and the Bureau of Urban and Public Transportation to utilize \$4.56 Million of CTF monies for this special purpose. A formal agreement between the department, Conrail and the National Railroad Passenger Corporation (Amtrak) has been executed and improvements at 89 locations have been authorized.

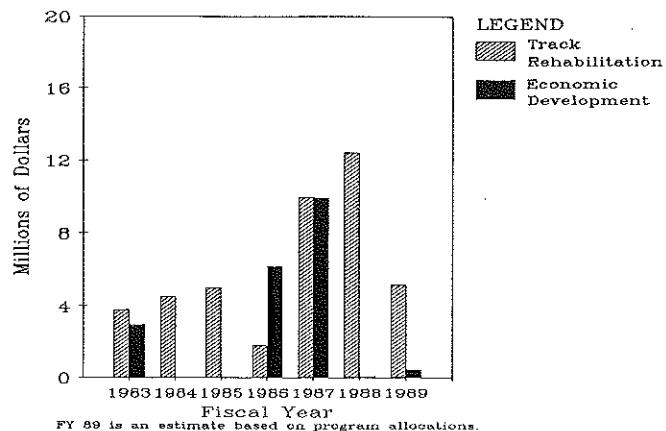
FEDERAL RAIL HIGHWAY FUNDS OBLIGATED
In Millions of Dollars



State Owned Railroads

The department ensures safe, efficient operations over state-owned property through rail rehabilitation and improvement projects funded primarily by the Comprehensive Transportation Fund. The attached table displays funding trends for rehabilitation and economic development projects between 1983 and the programmed amount for 1989.

RAIL FREIGHT PROJECTS
FOR TRACK REHABILITATION
AND ECONOMIC DEVELOPMENT



Other Actions Required to Improve Safety and Future Safety Activities

Highway Grade Crossings

The department recently committed obligational authority equal to the annual total federal apportionment for the federal railroad safety program. An additional \$1 million of obligational authority to utilize carry-forward apportionment will significantly increase the federal aid railroad crossing safety program.

Also, a program has been developed in response to legislation providing for a new state grade crossing account. This program will make available up to \$3 million per year for improvement, installation, and retirement of new or existing safety devices and will provide 65 percent of the cost for eligible projects. Twenty-five percent of project costs are to be borne by the affected railroad company, and 10 percent by the appropriate road authority.

Increased obligational authority and a new state grade crossing account program will provide more money for crossing improvements.

Railroad Grade Crossing Coordinating Committee

The Engineering Services Division chairs a recently established standing committee to coordinate railroad crossing issues between bureaus and divisions (MDOT Railroad Grade Crossing Coordination Committee). This committee also assists in allocating the new \$3 million grade-crossing account and coordinating rail crossing issues with the Federal Railroad Administration and Federal Highway Administration.

Operation Lifesaver

The department continues to support the "Operation Lifesaver" effort sponsored by the Michigan Railroad Association. Department representatives serve on both the general committee and the steering committee. This group promotes grade-crossing safety by educating the general public and law enforcement agencies about hazards at crossings and responsibilities of the driving public.

MDOT supports the Operation Lifesaver Program.

State Owned Railroads

New plans and policies adopted by the commission help direct future state rail activities.

With the State Transportation Commission's adoption of a new Rail Freight Policy and State-Owned Facilities Implementation Plan, the department now has a much clearer focus for an aggressive program to preserve, improve, and expand the rail freight infrastructure. Specific to the plan, lines transporting hazardous commodities are targeted for improvements to increase the operating efficiency and safety of the railroad. As with all state-owned lines, safety is a primary criterion for identifying, programming, and implementing projects.

Intercity Rail Passenger

The department will invest \$ 1.5 - \$2 million to improve the efficiency, reliability, and safety of the passenger railroad infrastructure during FY 1988/89.

MDOT will continue support of grade crossings in passenger corridors and improving passenger services.

Numerous safety improvements to rail passenger service within the state are being considered, such as cab signaling in locomotives, which would enhance the safety of train operations, and Automatic Train Stop (ATS). Additional grade crossing improvements in the state are also likely and improved or new station facilities, with enhanced safety features, are an ongoing priority.

AIR SAFETY

Responsibility

The Bureau of Aeronautics (AERO) manages a number of safety activities in support of general aviation and air carrier service in Michigan. Responsibility for aviation safety is divided between AERO and Federal Aviation Administration (FAA). AERO works closely with the FAA Accident Prevention Program, sponsoring and presenting aviation safety programs throughout Michigan.

*The Bureau of
Aeronautics and the FAA
share the responsibility for
air safety.*

System Description

During 1988, AERO licensed 240 airports, 240 airport managers, 89 assistant managers, inspected and licensed 56 flight schools and 102 aircraft dealers. Four new airports and one heliport were opened while five airports were closed. AERO registered 6,957 airplanes, helicopters, gliders and balloons during 1988. Michigan has over 15,000 pilots. During 1988, 22 million passengers traveled from Michigan's 22 air carrier airports.

Michigan supports 240 airports, 6,957 aircraft and over 15,000 pilots.



Accident Data

AERO supplements data compiled by the FAA and National Transportation Safety Board (NTSB). In addition, AERO receives information pertaining to ultra-light aircraft accidents which are not tabulated by the NTSB or FAA.

Over the past two years fatal accidents were lower than 1985 or 1986.

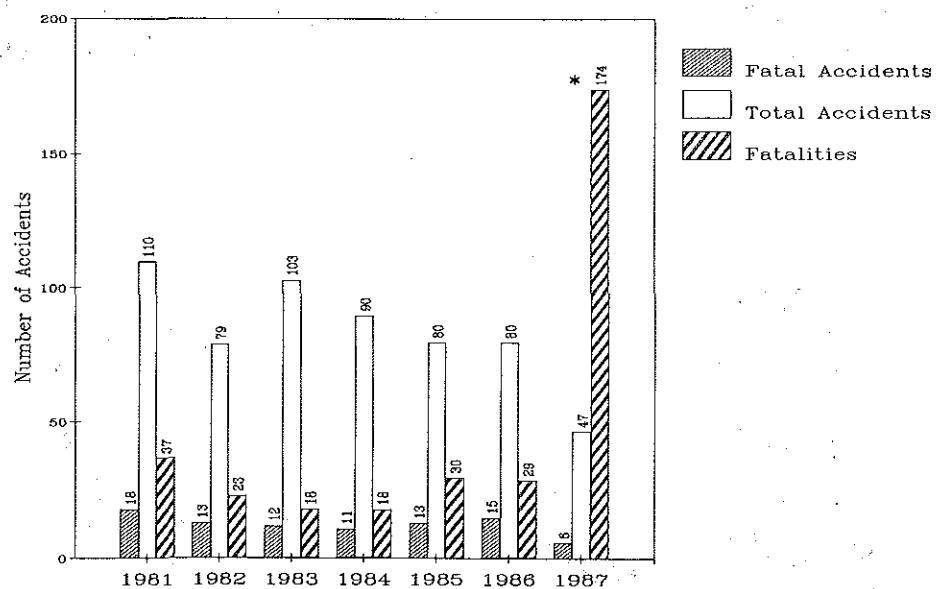
There were seven fatal accidents and 53 total accidents in Michigan during 1988. These totals are an improvement over 1985 and 1986 figures. During 1986, 15 fatal accidents and 80 total accidents occurred. In 1985, 13 fatal accidents and 80 total accidents were reported. Fatalities for 1988 are not yet available.

Analysis of 1988 accidents indicate pilot error as the causal factor in 28 of the 53 total accidents. Pilots were on personal flights during 35 of the 53 accidents and 35 of the mishaps occurred during take-off or landing.

MICHIGAN AIR ACCIDENTS

1981 Through 1987

* Includes 154 fatalities of Northwest Flight # 255



Air Safety Programs

AERO impacts safety through pilot safety seminars provided by AERO staff, advisory and/or monitoring of air meets, shows, tours, races, Dawn Patrols and individual counseling of pilots by AERO employees who are FAA accident prevention counselors.

AERO provides safety seminars for pilots and monitors various air activities.

AERO and the Federal Aviation Administration (FAA) annually sponsor a "super safety seminar" ("SAFE 88") which provides aviation safety seminars for pilots, mechanics, aviation operators and flight instructors. In addition, AERO has sponsored a certified weather observation course and a survival course to enhance safety for Michigan pilots. AERO conducts training for airport managers and an annual engineering conference designed to increase safety awareness for airport personnel and engineers. AERO staff also completed research on recurrent flight training for pilots. It was discovered that 29 percent of all pilots participate in the FAA Pilot Safety Program yet account for only one and a half percent of total accidents.

AERO and FAA both sponsor safety seminars.

The bureau's bi-monthly safety bulletin, Michigan Aviation, is published and sent to over 17,000 pilots and other interested citizens in Michigan. It is also distributed to businesses that provide services to pilots and to flight schools for distribution to student pilots. Michigan Aviation includes safety related articles directed at varying levels of pilot skill, from student pilot to flight instructor to the airline transport pilot.

AERO publishes a bi-monthly aviation publication.

The Federal Aviation Administration contracts with AERO to inspect and verify existing conditions at 192 public-use airports. Fifty additional airports, not included in the Federal contract, are inspected to insure conformity with state licensing requirements. Three heliports, four seaplane bases and four prospective airport sites were inspected. The inspections assure provide a consistent level of safety and standardization of all public use airports in Michigan.

AERO inspects airports for the FAA.

AERO distributes charts and directories for pilots in the state.

Twenty-four thousand copies of the Michigan Aeronautical Chart and 7,000 copies of the Michigan Airport Directory were printed and distributed during 1988. The directory is free to aircraft owners and the chart is available to pilots at no charge. These publications, updated annually, furnish pilots with current information for safe navigation of Michigan airspace, including airport and navigational data.

There are 36 "Enroute Navigation and Non-Precision Approach Aids" facilities in Michigan. The state owns and operates seven classified Very High Frequency Omnidirectional Radio Range (VOR)/Distance Measuring Equipment (DME) stations. The state-owned VOR/DME facilities are located at Bad Axe, Gaylord, Houghton Lake, Manistique, Mt. Pleasant, Newberry, and West Branch.

The state owns and operates many state of the art landing aid systems at various airports.

The state owns three Microwave Landing Systems (MLS) located at Bellaire, Cadillac, and Sturgis. Cadillac, the world's first public unrestricted MLS, was commissioned in 1984. Bellaire and Sturgis are scheduled for commissioning in 1989.

Both the enroute and approach facilities provide navigational aids for pilots who travel to areas where aids to navigation are limited. The approach facilities enable the safe descent of aircraft to an airport during inclement weather.

The 1987 Tall Structures Act helps protect the airspace around airports.

In an effort to protect Michigan's airspace, the Tall Structures Act was passed into law in April 1987. This Act requires all communication companies to report to the Bureau of Aeronautics any proposed construction of tall structures in the vicinity of an airport. The intent is to protect the airspace around an airport to make air travel as safe as possible and to maintain the utility of the airport.

In addition, AERO is currently working with five communities to develop zoning plans for their airports. The plans include drawings depicting areas in the vicinity of airports that need to be protected as well as plans for implementation. Forecasted noise contours are depicted on the surrounding communities to highlight noise-sensitive areas for future land use control.

AERO is helping communities develop zoning plans to protect airport airspace and noise sensitive areas.



Recurrent flight training is an integral part of aviation.

Aviation Funding

Michigan received a record \$31 million of federal funds in 1986/87.

Airports in Michigan received a record \$31 million of federal funds during 1986/87 fiscal year. Nineteen Michigan airports received funds to improve runways, taxiways, approach lighting systems, aircraft parking areas, terminal facilities, and safety/security equipment.

Aviation does not use general fund money.

No general funds are used to support the state's aviation programs. The Michigan Aeronautics Fund is totally derived from aviation. Income is derived from an aviation fuel tax, aircraft registration fees and interest accrued by maintaining a positive balance in the fund.

Other Actions to Improve Safety and Future Safety Activities

AERO plans on expanding pilot safety seminars.

Because aviation safety is dependent on up-to-date pilot skills and knowledge, AERO plans to expand safety seminars for general aviation pilots, especially in areas where FAA safety seminars are limited. Expansion of safety presentations for airport managers and sponsoring of flight instructor refresher courses and other important aviation seminars are planned.

AERO offers safety seminars to organizations meeting in Michigan.

Additional staff involvement in researching specific accidents to determine cause and utilize information in aviation safety programs is also planned.

AERO coordinates and works with the Aviation Caucus.

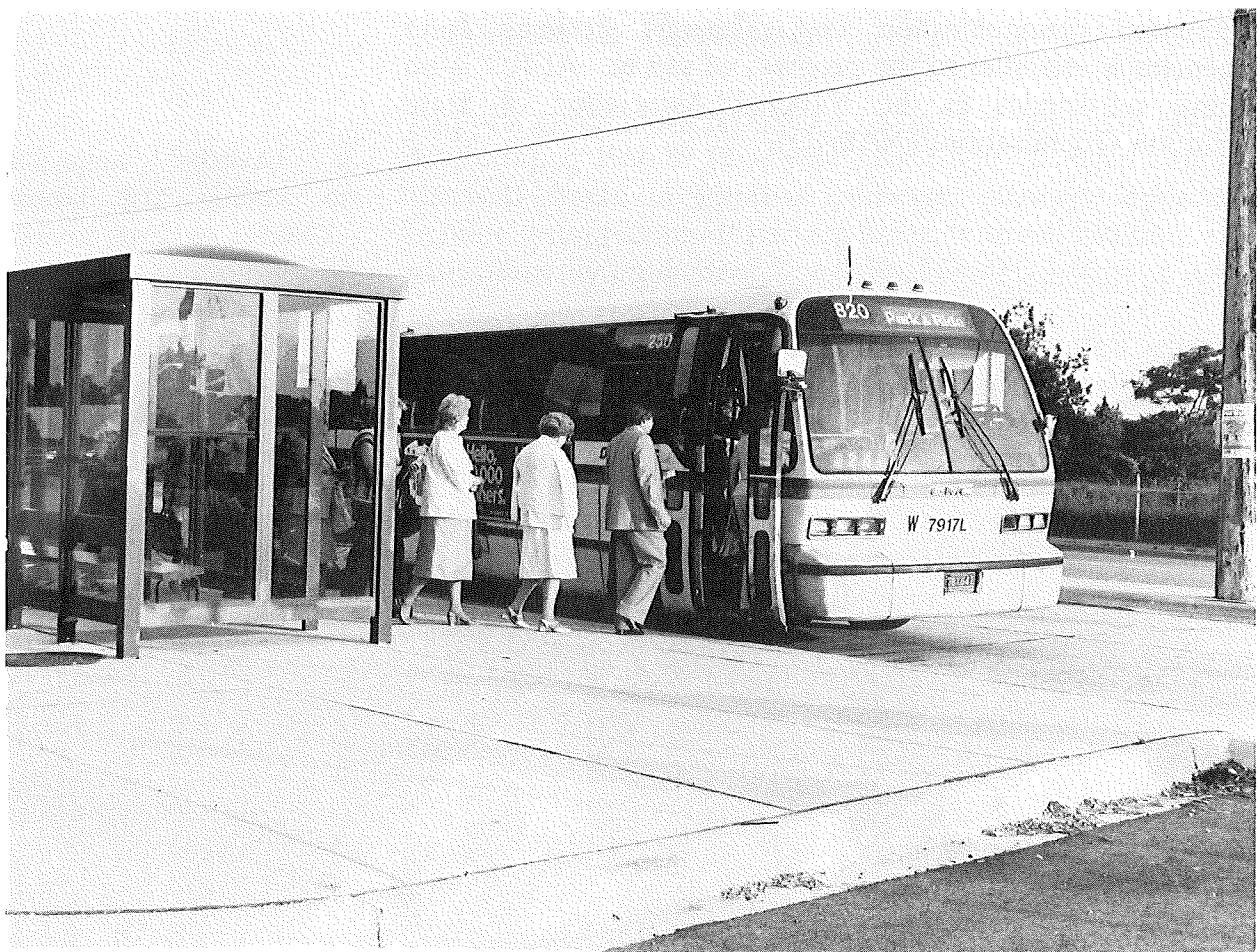
AERO efforts have attracted an increasing number of national clubs and associations into Michigan for their annual meetings. AERO organizes safety seminars for these groups on a variety of safety topics.

With input and coordination of AERO, the Aviation Caucus meets to discuss and act upon aviation safety issues. The caucus consists of state senators and legislators with aviation experience and an interest in aviation safety. The Aviation Caucus meets several times annually and has been a catalyst for change of some Michigan aviation rules and regulations.

Increased communication and exchange between state agencies is essential to the progress of safety. AERO is an active participant in the National Association of State Aviation Organizations (NASAO).



Maintenance is important to air safety.



Ninety-one million people used some form of Michigan public transit in 1988

PUBLIC TRANSIT SAFETY

Responsibility

The Bus Transit Division of the Bureau of Urban and Public Transportation is involved with the safety of the general public bus ridership throughout the State of Michigan. Buses are purchased with state and/or federal funds for all eligible public transit providers. The Bus Transit Division also assists most of the smaller rural transit operators with the purchase of capital items such as buses. The urban transit operators normally control their own capital purchasing program.

Urban and small transit systems use federal and state funds to purchase buses.

Transit agencies use federal and state operational funds for day to day expenses. The Bus Transit Division uses additional federal and state funds to provide and conduct safety training in driving, maintenance and accident prevention.

MDOT uses additional federal and state funds to conduct safety training.

The authority and funding for these activities comes from the Michigan "Act 51" and from the Urban Mass Transportation Act of 1964, Sections 3, 9, 9b, 16b2, and 18

Transit funding comes from "Act 51" and the U.S. DOT.

System Description

During fiscal 1988, over 91 million rides were provided on public transportation buses. A total of 2,287 buses were employed to carry passengers statewide on 14 urban transit systems, 47 specialized service systems, and 55 non-urban local systems.

In 1988, 2,287 buses carried over 91 million riders.

Public Transit Safety Programs

Transit safety focuses on driver training and licensing.

Driver training and driver licensing continue to be the main focus of public transit safety. Vehicle maintenance is the second most important element. The Bus Transit Division concentrates technical efforts towards these two areas and provides both direct and indirect training. Safety training aids are constantly being researched and explored for new innovations that can improve bus safety.

Other Actions to Improve Safety and Future Safety Activities

The Bus Transit Division supports other actions and future programs such as:

Future transit safety activities should include expanded driver and maintenance training, implementing the new national licensing regulations, and improving road surfaces.

- Increased driver training to accommodate new technology and improved bus designs being constructed.
- Increased maintenance training.
- Adoption of new federal regulations for driver examination, training and licensing.
- Additional highway improvements that will enhance bus safety. Many gravel and unpaved roads accelerate deterioration of buses which compromises bus safety equipment.

INTERCITY BUS SAFETY

Responsibility

The Intercity Division of the Bureau of Urban and Public Transportation, in support of the private intercity motor bus industry, is responsible for regulating intrastate passenger motor carriers. They discharge the department's duties and responsibilities as prescribed by Michigan statutes. Responsibilities include issuing operating authorities, monitoring operator insurance levels and conducting safety inspections of all buses. This division also participates in the Motor Carrier Safety Assistance Program and the Federal Motor Carrier Safety Information Network funded by the Federal Highway Administration.

MDOT is directly responsible for issuing authority to operate, monitoring insurance coverage and inspecting vehicles for safety.

System Description

During 1988, 4818 buses were operated by private bus companies. These companies provided transportation of large groups of passengers traveling throughout the state in tours, charters and regular scheduled service.

Safety Inspection Data

During 1988, bus inspections resulted in an average count of 3.4 violations per bus with 14 percent of all buses inspected being removed from passenger service due to defects which could cause the driver to lose control of the vehicle. Brake defects accounted for 68 percent of the out-of-service vehicle violations discovered. Defects included inoperative brakes, damaged brake hoses and tubes, air leaks, inadequate or missing brake linings and brake drums.

In 1988 MDOT discovered 3.4 violations per bus, and removed from service 14 % of all buses inspected.

Intercity Bus Safety Programs

Bus inspections require high standards of safety.

The Regulatory Affairs Section is responsible for assuring the health, welfare, and safety of the traveling public is protected by requiring high safety standards for all buses operating on state highways. In addition, they insure that all motor carriers maintain proper liability insurance. These duties require:

Inspections are random and unannounced.

MDOT cooperates with a national safety information network.

MDOT monitors levels of insurance coverage.

- Conducting or certifying inspection of all safety related items and identification of any defects which require correction. This inspection and certification is required of all buses being operated in the state.
- Conducting random, unannounced safety and compliance inspections at major sports events and tourist attractions which draw large numbers of groups traveling by motorcoach. Some of these inspection activities are in conjunction with FHWA, the Interstate Commerce Commission, and the Michigan State Police Motor Carrier Division.
- Participating in the Motor Carrier Safety Information Network funded by the Federal Highway Administration to track safety compliance of all motor carriers nationwide.
- Monitoring insurance certificates of all Michigan motor carriers of passengers to ensure compliance of the required minimum levels of passenger and property protection.
- Issuing authorities to motor carriers who prove that they are fit, willing and able to provide safe and dependable passenger transportation service.

- Semi-annually inspecting all intercity buses owned by the state to identify and resolve any existing or potential safety hazards.
- Training maintenance personnel in a complete preventative maintenance program. This includes identifying the proper criteria and using the correct procedures to determine the condition of safety related items. This program adds to the life of the vehicle, makes it more reliable and makes it safer.
- Providing safe and dependable new or improved intercity vehicles by lease to qualified carriers on scheduled routes.

Buses are inspected semi-annually.

Mechanics are trained in preventative maintenance.

Intercity Bus Safety Funding

Comprehensive Transportation Funds are used to fund this program. The private intercity carriers pay back the CTF through fees for bus registration, authority applications and modifications.

Other Actions to Improve Safety and Future Safety Activities

During 1988, legislation was introduced to update the Motor Bus Transportation Act. This legislation would improve the administration of the act and increase safety of intercity buses operating over the highways of the state. The legislation also adds MDOT responsibility to regulate additional vehicle types used for the transportation of passengers for hire.

New safety related items in the proposed act include:

- A person leasing a vehicle for the transportation of passengers shall be informed of the requirements of this safety act by the lessor.

New legislation expands MDOT's responsibilities and expands the types of vehicles requiring regulation.

Expanded MDOT responsibilities will comply with new federal motor carrier safety regulations.

- All buses must pass the required annual safety inspection before the vehicle may be operated over the public highways of this state.
- A penalty is added for not completing the annual required inspection.
- Allows the department to conduct an audit of company safety related records to determine that the carrier has complied with state and federal laws.
- Adoption of federal motor carrier safety regulations for:
 - A. Qualification of Drivers
 - B. Driving Motor Vehicles
 - C. Parts and Accessories Necessary for Safety
 - D. Drivers Hours of Service
 - E. Inspection, Repair, and Maintenance
- Enforcement coordination.

It is expected that the increased emphasis in these areas will reduce commercial motor bus highway accidents, death, injury and property damage.



MDOT's expert mechanics inspect intercity buses for safety.