65-3128

MICHIGAN
STATE HIGHWAY DEPARTMENT
John C. Mackie, Commissioner

ANNUAL REPORT

of

TRAFFIC DIVISION

1959

OFFICE OF ENGINEERING
January, 1960

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The period covered in this Annual Report was purposely designated to be the calendar year from January 1, 1959, to December 31, 1959, in order to avoid conflict with fiscal year reports and activities. Commitments are relatively fewer at this time than at the end of the fiscal year which also coincides with the peak construction period.

Activities of the Traffic Division probably come closer to the everyday lives of the general and driving public than any other Highway Department function. It was deemed advisable, therefore, to spend some time and thought reviewing the past year's activities to re-acquaint ourselves and otheres, with not only the volume but the relatively diversified nature of the work involved to provide free, easy and safe transportation over our State Highway system.

The following, then, is a descriptive listing in narrative form of the accomplishments of the Traffic Division during the 1959 calendar year:

OPERATIONS SECTION

THE TRAFFIC OPERATIONS SECTION probably comes in closer contact with the general driving public than any other Divisional function because herein lies the activity that most directly effects their movements over the trunkline system.

SIGN ERECTION over both the Interstate and State trunkline systems is goverened by approved manuals and policy---the Interstate by the American Association of State Highway Officials approved National Manual and the State by the Michigan Manual. The latter is in the process of being revised to incorporate new policy and recently devised and approved signs. This manual is published by Legislative Act and constitutes our legal right to erect signs.

DURING THE PAST YEAR, 1,363 Lansing and District work orders were issued for sign erection, replacement and special pavement markings. Work and materials involved totaled approximately $800,000. In addition to this, signing plans for

inclusion of final signing in construction contracts have been prepared for 37 separate projects, covering 206 miles of expressway at an estimated cost of $1,100,000.

In order to obtain and maintain better control of our trunkline signs, an inventory of all signs was started during the past year. Under this system each sign will appear on a strip map in its correct location and will be revised as additions, deletions, and/or corrections are made. To date, this inventory is complete for Wayne County and for two entire trunklines--M-40 and M-60.

Pavement edge marking was started in Michigan in 1956 and to date approximately 1,000 miles have been marked. The additional mileage contemplated for 1959 had to be dropped however, due to lack of funds.

IN ADDITION TO SIGNS AND SPECIAL PAVEMENT MARKINGS, installation and modernization of electrical devices covers probably the next greatest volume of work in Traffic Operation. During the past year 479 work authorizations were processed for installing, removing and/or modernizing Stop and Go signals, flashing signals, and other electrical devices totaling approximately $650,000.

OF 97 REQUESTS FOR TRAFFIC SIGNAL INSTALLATION, it was determined that warrants were not met by 58, and these were consequently denied. 132 Requests for traffic surveys were issued to obtain more current information at problem areas.

A new type of school crossing protection sign, developed by the Research Section prior to 1959, was made operational this year. This sign contains alternately flashing amber lights and a disappearing numerical speed indication, and is actuated only during the period that the crossing is used by school children. It provides positive protection and due to the numerical speed indication, is easily enforceable. These installations are made with school participation and to date, 13 have been placed throughout the State and are proving very satisfactory.

IN ORDER TO PROVIDE FREER AND SAFER TRAFFIC FLOW, some restrictive regulations must necessarily be imposed. Toward this end, 59 Traffic Control Orders were

processed to prohibit parking in certain designated areas; 120 provided for establishment or revision of numerical speed in separate special speed control zones; and 17 were processed which revoked separate existing special speed control zones. All speed zones are checked periodically for adequacy. Parking prohibitions affected approximately 67 miles of both urban and rural highway and speed controls were either imposed, revoked, or changed on 192 miles.

EACH YEAR all proposed legislation affecting highway operation is reviewed and pro or con recommendations are made. In addition to this, a list of desired clarification, changes of existing and/or proposals for new legislation is prepared and submitted each year through proper channels. Also, thorough scrutiny is maintained regarding legality of all Division action, and all controversial subjects are submitted to the Attorney General's Office for legal Opinion. Cooperative action with the Michigan State Police is maintained in all matters requiring joint approval.

ACCIDENTS, of course, are always of prime concern in all functions of the Traffic Division. Copies of reports of all accidents which occurred on our rural trunkline system are received and reviewed in an attempt to pin point high accident locations and analyze accident patterns. Toward this end 28,588 accident reports were reviewed during the past year and of these, 1,628 were referred to the Office of Maintenance for checking of maintenance deficiencies, if any, and replacement of damaged Department property; 271 were referred for engineering study. These last referrals included areas where analysis of traffic movements appeared necessary prior to providing corrective measures, and some called for skid tests to determine length and severity of areas prior to corrective action.

IN PROBLEM AREAS where corrective measures of traffic operation are constructed or installed, studies are undertaken to determine the effectiveness of the method used. These are called "Before and After" accident studies, and serve to relate the number, kind, and severity of accidents occurring before and after

corrective action was taken. Continuing study was made at 66 of these locations during the past year. News releases are usually prepared for this type of study as soon as enough information has been obtained to determine results of actions.

MICHIGAN'S NATIONAL STATUS in the safety category was determined, and recognition given through the preparation of two reports: "The State Safety Activities Annual Inventory for 1958," and the "AAA Annual Pedestrian Safety Program." Michigan placed THIRD in safety activities and TIED FOR FIRST PLACE in the Pedestrian Safety Program.

GEOMETRICS SECTION

THE EXPANDING INTERSTATE PROGRAM has increased the work load of the Geometrics Section to a marked degree. Their function of preparing geometric layouts of all intersections and interchanges from assigned traffic volumes for the design year has become one of their major assignments. During the past year 44 separate projects have been so designed. Procedure involved in preparation of these layouts briefly follows this pattern: A review and interpretation of traffic estimates to determine type of interchange required; checking all critical points such as ramp terminals and weaving sections, to assure adequacy of design and final transmittal to Route Location for inclusion in the Engineering Report.

THE ENGINEERING REPORTS, when prepared, are submitted to the Traffic Division for review. 21 of these reports were reviewed, comments consolidated and letters of recommendation prepared and submitted.

In addition to the above, 12 recommendations were prepared for the Office of Planning on special major study areas, and 417 sets of road plans were reviewed for intersectional and operational adequacy with subsequent recommendations.

THE ABOVE DESCRIBED Geometrics work is largely concerned with the Interstate and Arterial Highway Systems, but the balance of the trunkline network is by no means neglected. The Operational Betterment Program, budgeted at $1,000,000 per year, involves reconstruction of problem areas to provide freer traffic flow and

elimination of accident hazards. Studies were completed for 35 of these locations and submitted to the Chief Engineer for approval and design. Projects at 22 Operational Betterment locations were either completed or placed under construction during the year.

ROADWAY IMPROVEMENT AND CONTROL is another continuing function of this Section. The scope of work involved includes site study, determination of control necessary, and preparation of plans and estimates for inclusion in contractual bid lettings. Types of work include minor channelization, curb construction or installation, and guard rail or guard post installation. Plans for 59 of these projects were completed during the year, of which 36 were authorized under the 1958-59 fiscal program (prior to June 30, 1959) and are complete. Of the remaining 23 projects, 5 are currently under construction and 11 are to be advertized for contractual bid in January, 1960. The yearly budgeted allotment for this program is $150,000.

856 applications for driveway permits were reviewed and checked for conformance to approved standards and for operational adequacy, as were a number of requests to construct crossovers on existing divided highways. Policies on design and location of driveways, both urban and rural, and design and location of crossovers have been prepared and approved.

SPECIAL STUDIES were made for a number of extensive major problem areas. These included M-53 (Van Dyke) from 8 Mile Road to Utica; US-10 (Woodward) for 4 miles through Royal Oak and several improvements in the cities of Ann Arbor, East Lansing, and Mount Clemens.

A LIBRARY of 35 mm. transparencies covering pictorially new installations, problem areas, interchange operation, guard rail damage, etc. was started and to date a file of approximately 1,500 slides have been acquired. These include both ground and air shots. Also, Division personnel observed from the air operation of various facilities during peak traffic volume periods over weekends and holidays during the summer season. Reports were filed and recommendations made for each

flight and in a number of cases observations were extremely beneficial because concentrations of traffic could be analyzed over larger areas rather than at individual locations.

COOPERATION AND COORDINATION with other offices and divisions of the Department is essential to efficiently expedite the work in this Section. It is conservatively estimated that 25% of the time of key personnel is rewardingly spent in this liaison effort.

In addition to publications previously mentioned, two others have been prepared and distributed: "Geometric Determination of Interchange Types," and "Standards for Diamond Interchange Design." The latter having been based and determined from comprehensive analysis of interchanges in operation.

SURVEY SECTION

THE TRAFFIC SURVEY SECTION is primarily concerned with gathering and compiling traffic data for use by the entire Department. Data for one phase of this function is obtained from the permanent traffic recorders. These are electrically operated counting machines which count traffic by means of an electrical impulse actuated whenever a vehicle passes through a magnetic field set up by a Detector installed under the pavement slab at each machine site. The permanent recorders operate 24 hours a day, continuously. Fifty of these installations are located at strategic points on our trunkline system and 5 on the county road system. They are all visited at least once each week by field personnel. At this time they are checked for counting accuracy, tapes containing the recorded data removed and are otherwise generally serviced.

TO EXPAND AND CHECK ON TRAFFIC PATTERNS indicated by data obtained from the permanent traffic recorders, a network of so called "A", "B" and "C" stations are established from an overall statewide plan and counts are taken at each on a predetermined schedule. These traffic volume counts are taken by field personnel using portable traffic recorders and placed at stations scheduled by the Lansing

Office and become part of the statewide traffic survey which is a continuing project. During the year, 4,530 traffic volume counts were taken at these stations. In addition to the scheduled counts, volumes were obtained at 821 other locations to provide data for the preparation of traffic estimates. During the winter months when weather conditions do not permit setting the portable recorders, 8 and 24 hour manual classification studies are scheduled to provide necessary information regarding volumes of vehicles by type that are operating on the trunkline system. This data was obtained at 163 locations, predetermined to fit the statewide pattern.

IN ADDITION TO THE STATEWIDE PROJECT, other field personnel are required to expedite the requests for the operational type of traffic survey, which includes studies necessary to determine the volumes and directional movements of vehicles and pedestrians. These are manually operated surveys and are used in the analysis of situations prior to installation of traffic control devices. This "Turning Movement" type of survey was made at 368 intersection locations this year, 38 of which included classification of vehicles and 39 included pedestrian volumes by direction. In addition to this more or less standard type of survey, special studies were made at 3 interchange locations, 7 vehicle gap spacing surveys were taken and parking analysis data obtained over certain areas in 3 cities. The Annual Loadometer Study was alos taken in Juhe of this report year. All field data in compiled and processed for submission by the Lansing Office Staff.

A TRAFFIC FLOW MAP, showing band width, the average daily traffic for 1958 on all Michigan trunklines was prepared, printed and distributed in June 1959. Data necessary for this publication is obtained from field operations listed above.

ORIGIN AND DESTINATION traffic studies, as the name implies, are for this prime purpose; also to determine volumes, routes traveled, and desired movements in and around designated areas, usually cities.

PILOT STUDIES were conducted at 47 locations prior to scheduling the 1960 Multiple Screen Line O-D which will establish a new State and Region wide base for determination of traffic flow and desire movements. Color card studies, a short

type of O-D survey, were taken at 16 cities or villages. All data was tabulated and flow diagrams showing traffic distribution were drawn for each study area.

This type of study, along with other pertinent data, is essential in the determination of traffic estimates, assignments, and forecasts. Current traffic estimates and forecasts of traffic for the design year are made on each existing road as well as the proposed new facility throughout the entire location corridor submitted by Route Location. This type of study was prepared for 128 projects during the year.

A booklet "ESTIMATING TRAFFIC ON MICHIGAN HIGHWAYS" was prepared, published, and distributed. This is, we believe, the first time the complicated procedure involved in this function has ever been printed in this step by step from. It was published in cooperation with the Bureau of Public Roads and has received their full approval.

SPEED STUDY is another continuing function of this Section. Three Radar machines were used in the speed sampling at predetermined locations throughout the State at which a minimum of 200 vehicle speeds are taken as a sample. These studies were made at 2,188 locations in existing speed zones to check adequacy and at 190 new locations to determine the advisability of establishing a new speed zone. In addition to this continuing study "Quarterly Speeds" (January, April, July, and October) are taken at 22 daytime and 9 nighttime locations. These are for submission to the Bureau of Public Roads and are used to determine speed trends on highways of various lane widths, i.e., 2 lane, 3 lane, 4 lane (undivided), and divided highways.

RESEARCH SECTION

TRAFFIC RESEARCH is a relatively new Section in the Traffic Division, but has already contributed a great deal toward the total effort. Among its main functions are the determination of effectiveness of design features, traffic control devices, signing, etc. on the vehicle driver; develop equipment for traffic research, control

and survey work; investigate research of outside agencies to determine adaptability to Traffic Division activities; and to prepare reports and manuals on work accomplished.

THE OPENING OF THE MACKINAC BRIDGE posed one of the early problems in that some type of signalized lane control was deemed necessary to control usage and speed. The Research Section devised the blankout neon type of lane signal and symbols, completed the laboratory and field tests on its effectiveness, and prepared the report. The signals are now in use on the bridge and are being tested further for possible use on expressways.

A PROJECT was set up to study the effectiveness of barricade lighting and a report prepared. Subsequently, preliminary specifications on battery-operated barricade warning lights were prepared. These lights are now being used.

A STUDY WAS INITIATED for the development of a new translucent material for use on internally illuminated overhead signs. A material was developed and is installed on one of the large modular signs on the south approach of the Mackinac Bridge. Observations are still being carried on to study the effects of time and weather on the material.

FINAL DEVELOPMENT WORK was completed on the illuminated red stop sign. This sign now has been installed at numerous high accident intersections throughout the State with very favorable results.

FIELD WORK AND PRELIMINARY REPORT on adequacy of existing "No Passing Zones" was completed and final report is now being prepared.

A handbook on "METHODS OF SIGNAL TIMING" is in preparation. It is intended to be a guide for student technicians and for cities and villages which do not have access to the services of experienced traffic engineers.

EXPERIMENTS are being carried on in conjunction with the Survey Section to determine accuracy and versatility of sonar and radar devices for use in permanent installations to record speed and volume of traffic. One sound detector has been installed in a test site on M-60 near Homer, and further test installations will be made on the Detroit Expressway System.

A PROJECT was begun to develop a new type of railroad crossbuck sign. A model was prepared and has been submitted to national committees of AASHO and Railroad representatives for comments prior to incorporation in Michigan Standards.

MORE DIRECTLY PERTAINING TO TRAFFIC OPERATION was a special study conducted in cooperation with the City of Detroit and Michigan State University to observe and record traffic behavior in the vicinity of the Ford-Lodge Interchange in Detroit. Frequent stoppages had been observed at certain times of the day at this location. In an attempt to determine the cause, traffic counts, speeds, observations, and moving pictures were taken at different times of the day and with varying imposed ramp restrictions.

A wealth of data was obtained and results are being tabulated and studied.

PERHAPS the largest single research project to be attempted, however, is the "Expressway Traffic Surveillance Project." This is a proposed undertaking to study traffic behavior by means of television cameras and will be conducted jointly by the Highway Department, City of Detroit, Wayne County Road Commission, and the Federal Bureau of Public Roads.

A considerable amount of ground work in project specifications and control has been done by the Research Section, and while final plans are not as yet complete it is anticipated that a great deal of valuable information regarding traffic behavior and control can be gained from this versatile research project.

DISTRICT TRAFFIC ENGINEERS

THE TRAFFIC DIVISION is represented in each of the 10 State Districts by a District Traffic Engineer, and in the more populous ones he is aided by an assistant. Their principle function is to represent the Department in all matters pertaining to traffic, within the jurisdiction of the Division, in their respective Districts. This entails investigating and field checking all complaints regarding traffic operation and/or signing; preparing preliminary plans for sigh erection and pavement marking; representing the Department at hearings, meetings, and at

investigations in connection with restrictions of speed and parking; erecting signs and signals; construction roadside control and development, and otherwise conducting liaison with local governmental units.

DISTRICT MEETINGS with the Lansing staff are held twice each year, but due to the expanding highway program an effort is being made to increase this to three or even four. Experience during the past year has indicated that because of the rapid changes which occur during a stepped-up program, closer personal contact between the Lansing staff and District personnel is mutually beneficial.

PERSONNEL

TO EXPEDITE THE WORK listed in this report, the Traffic Division has added during the year 6 classified engineers, 7 engineering aides, and 1 clerk to bring the total personnel roster to 58 classified engineers, 9 technicians, 42 engineering aides and 48 non-engineers (repairmen, clerks, typists, etc.) for a total of 157.

During the early part of 1959 when the Trainee Program was still in effect, the Division processed 10 trainees through the 7-week program. This has since been replaced by the Student Highway Technician Program in cooperation with the Lansing Community College, and in this effort the Division now employs 20 students on a half day each basis.

CIVIC ACTIVITIES

THE TRAFFIC DIVISION has participated in several activities of an educational nature. The Traffic Safety Center at Michigan State University conducts courses for Driver Education instructors as well as "Work Shop" for Police Officers and several of the Division personnel have appeared as guest speakers at these various functions. Aid has also been given to other State colleges and civic groups which have requested it.

One other activity deserves mention: The Traffic Safety Center at M.S.U. has been instrumental in producing a radio panel show entitled "You are the Jury," which incidentally has won the Peabody Award. A Review Board edits and clears all material used on the show prior to presentation. The Board is composed of representatives from the Secretary of State's Office, Department of Public Instruction, Sheriff's Association, Michigan State Police, Judges' Association and the Michigan State Highway Department.

The Traffic Division has for a number of years had the responsibility of representing the Highway Department.

FOREIGN VISITORS

ON SEVERAL OCCASIONS the Traffic Division has been visited by representatives from foreign countries who were interested in learning how to administer traffic regulations in their respective countries. Some of these were merely students on tour while others were specifically sent by their governments to gain pertinent information. One Fellowship Student group of 29 persons contained representatives from 20 countries in 4 continents.

OTHER SMALLER GROUPS and individuals, however, were directed to the Michigan State Highway Department, and specifically the Traffic Division, by their governments and the Federal Bureau of Public Roads through the Department of State. These included the Highway Safety and Traffic Study team from Yugoslavia and groups from Sweden and Ghana as well as individuals from Algeria, Turkey, and South Africa. All were keenly interested in traffic operation and while their individual problems differed widely in nature, administration, and scope, they left with the knowledge that basic concepts of regulation and control could be applied and advantage gained. All were deeply appreciative of any courtesy shown them.

ADDENDUM

REITERATION OF YEARLY ACCOMPLISHMENTS serves a multi-fold purpose: It re-acquaints Division personnel with work done, not only to gain a sense of accomplishment and satisfaction, but to add greater incentive to future effort. At the same time, it acquaints Department personnel with the responsibilities, scope, and diversity of Traffic Division functions. All of us should take this opportunity to pause and reflect again on our main purpose--to provide free, easy and safe transportation over the state trunkline system.