

State and Local Safety Program

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The accepted standard criterion used by the public to measure the amount of work done and the success of the activities of the Indiana State Highway Commission is usually the number of new bridges and interchanges and the number of miles of new highways constructed each year. While it is true this work does require an extreme effort by highway personnel there are other activities which are just as necessary and fruitful.

The end result of all activities of the highway commission should be improvement of our traffic safety record. The total number of fatalities, personal injury, and property damage accidents on our highways is not brought into proper focus unless it is measured against annual increase in volumes of traffic. The greater number of vehicles on the highways increases the opportunity for accidents. If we can only continue to hold the line in the number of accidents, we would assure ourselves of some measure of success.

Indiana Highway Fatality Statistics

Figures published by the Indiana Office of Traffic Safety indicate that the number of deaths on Indiana roads has varied less than $33\frac{1}{3}$ percent in the last 25 years, and if the number of fatalities were plotted on a graph, an S-curve would be the result. In 1941 Indiana had a population of 3,491,300, had 1.2 million licensed operators, had 1.1 million registered vehicles, and had 90,000 miles of State road. A total of 1,478 motorists were killed on Indiana roads. This figure was surpassed for the first time in 1965, when 1,511 motorists were killed, but Indiana had increased its population to 4,875,000, had increased its number of licensed operators to 3.1 million, had increased its number of registered vehicles to 2.7 million, and had increased its number of miles of State road to 104,000. In between 1941 and 1965 the number of deaths per year averaged about 1,200. However, the number has increased steadily since 1961. Recent figures show that Indiana in 1966 is about 40 fatalities ahead of the record number killed last year.

Commission Efforts to Improve Safety

It is true that the highway commission is making strenuous efforts to complete the construction of the interstate system before the 1972 deadline. However, other programs are being carried on at the same time. The interstate system is being constructed to modern standards which have already proven to be successful in the promotion of highway safety. The highway commission is likewise carrying on a program to improve the quality of our other highway systems in order to create greater increased accident-free roadways for the use of the public. Much of the effort in this area is being carried on by the Division of Maintenance, the Division of Traffic, and the Division of Safety.

Since 1961 increased emphasis has been placed on programs which improve the safety of our entire highway system. The Division of Maintenance has widened many narrow bridges as well as many miles of narrow pavement, and has constructed many miles of stabilized shoulders. The Division of Traffic has also had an extensive program of traffic control improvements throughout the State which is primarily in the interest of safety.

Safety and the Division of Maintenance

Highway maintenance is defined as the preservation and upkeep of a highway to its originally constructed condition, or its subsequently improved condition with emphasis placed on safety for the traveling public.

The work done by the Division of Maintenance either directly or indirectly provides for safer highway travel. All planning and programming of any phase is for improved safety.

An intensified safety program was started during the year 1961 with the reactivation of the Office of Safety Director. The safety director is responsible to the highway commission for establishing a safety program whereby all employees are given proper instruction and direction in providing for their own safety as well as the safety of the highway user. That is to say the employees should know how to conduct themselves while they are working on highway jobs. They are also properly instructed in the use and control of all state highway vehicles with which they may be entrusted. The scope of this effort may be brought into sharper focus when it is known that the State Highway Department employs approximately 5,500 men and women. Of this number almost 3,000 are employed in our maintenance of highway and equipment efforts. Most of this number work along the highways. They may be patching chuck holes, cleaning ditches, picking

up debris, painting post or hand guardrails, or doing some other type of work which places them most of their working day on or near the travelled pavement. In addition to these maintenance forces we have several hundred engineers and helpers of all classifications who may be doing field work along or on the highway.

In the development and promulgation of a safety program, aggressive action was taken. A safety manual was compiled for the maintenance division. A monthly record of accidents, both personal injury and property damage, is published. Fluorescent vests were purchased and are worn by all personnel working on travelled portions of the highway. Fluorescent traffic cones were adopted for use in regulating traffic at maintenance repair areas. Large "Stop" and "Slow" signs replaced the red flag for controlling traffic at working areas.

The slogan "Bare Pavements" during snow and ice storms was adopted and every effort made to maintain the highways in a safe and proper manner. Snow fences were erected in order to eliminate some of the hazardous problems during blizzard conditions. The continuation of the above programs and projects is imperative if our highway safety is to improve with each succeeding year.

Safety and the Division of Traffic

The Division of Traffic has also accomplished an outstanding program. In 1962 the division spent \$3,350,000 in its efforts to provide improved safety on the highways. The following improvements were accomplished: 11,500 miles of highways were centerlined; 175,000 traffic signs were replaced and/or added to the highway system; traffic signals at 160 intersections were installed or modernized at a cost of \$101,000; channelization projects worth \$121,000 were completed; \$375,000 was spent for pavement markings; and \$75,000 was spent for new equipment to carry on normal maintenance work.

During 1963 the Division of Traffic expanded its program and made a special effort to improve traffic control devices in all cities and towns with a population of 5,000 or more. This urban program was geared toward the improvement of locations in high traffic volume areas where heavy congestion resulted in unsafe conditions. The expenditures for this special program included \$1,700,000 for traffic signal modernization and installation, \$580,000 for new signs and sign replacement, \$360,000 for channelization, and \$600,000 for permanent pavement markings. This consisted of over 1,600,000 lineal feet of plastic marking. This special program was in addition to the normal operations of the Division of Traffic which included expenditures of \$3,500,000. This was broken down with \$1,650,000 for materials

and supplies, \$528,000 for contract work, and \$1,230,000 for the cost of operating personnel including engineering and supervising as well as field courses. Other expenditures included equipment and miscellaneous items.

In 1964 the Division of Traffic undertook another accelerated improvement program which further expanded the efforts of 1963. The program was an all out effort to upgrade to national standards all traffic control devices. As had been done in the past, special attention was directed to those problem locations where high accident rates exist and also to locations with traffic congestion problems. A considerable effort was made daily by Division of Traffic personnel to identify and pin point high accident locations. A spot map showing the type and location of all accidents was prepared and distributed each month. Each location and recommended corrective measures were given priority ratings based on accident congestion experience and only those locations having the highest priorities were included in the program. About \$5,600,000 was spent on these efforts: \$1,300,000 for traffic signals; \$1,550,000 for special signing and signing structures; \$500,000 for channelization improvements; and \$450,000 for paint lines with \$750,000 for permanent plastic pavement markings. Of the \$1,550,000 for special signing projects, \$1,000,000 was spent for a complete resigning of all primary and secondary roads in the system. The Bureau of Public Roads required all roads to be signed to standard by 1966. Nearly all of our work was completed during the 1964 construction season. The remaining funds were used for materials and equipment and also additional personnel required to carry out this program.

In the fall of 1965 our traffic division altered its high-spot accident program at the request of the Bureau of Public Roads. Traffic sent letters to all towns in Indiana asking their help in preparing a state-wide list of high spot accident locations. Reports from the towns are still pouring in, and between 50 and 60 percent have replied already. After we have tabulated these reports, district personnel will check the locations where improvements are advised, and then recommend to the central office, what in their opinion, should be done. The proposed improvements are scheduled in future fiscal year programs according to priority (the most dangerous will be programmed first) and amount of money available.

A \$20 million highway safety improvement program will be offered to the commission itself Friday at the monthly highway commission meeting. Included in the program are several high-spot accident location projects, although the majority of projects listed are standard

traffic, maintenance, and construction projects. They have been categorized under the heading of safety improvement program, because the Bureau of Public Roads has also required the highway commission to have a safety program amounting to at least \$11 million for fiscal year 1966.

Highway User Safety in Construction Areas

During the progress of new highway construction and in particular with the resurfacing and/or widening of existing highways very careful attention and planning is given to the highway user's safety. Although this may not be such a serious problem when highways are built on new alignments and new locations, the fact that detours in many cases are required exposes the highway user to unusual conditions. In this connection the highway commission approved the use of higher quality construction signs. Any abrupt change in direction of travel or interference with the motorist's normal use of the roadway does cause opportunity for serious accidents. This was carefully considered during the revision of construction sign specifications, type of barricades and locations for the same. In instances where construction projects are being done under traffic, that is to say, that the motorists are not required to detour on bypass highways but may drive through the areas under construction, the road contractors are required to provide the utmost safety practices and measures to protect and direct such traffic. In many instances the protection of the motorist and the protection of the contractor's employees are of serious moment. Therefore, special signs are needed, and flagmen must be employed at various locations where contractor's equipment may be on the highway or crossing the highway. Our present specifications stipulate that all flagmen in the operation of directing traffic must wear a flame orange flagman's vest while doing so. Safety Director Roy Skene has recently been recommending the use of flame orange hats also. Such vests and hats afford greater visibility and are safety devices for both the flagmen and the traveling public. We also have prepared a small illustrated folder, *Instructions to Flagmen*, for the purpose of instructing them in the proper and uniform procedures for handling traffic. It is our belief that proper and uniform flagging procedures are an important element in the prevention of accidents on detours, runarounds, and in local areas necessitating traffic controls during construction activities.

Not only is it necessary to provide for the protection of the public within the construction area, but it is also highly important that highway engineering staff, inspectors, and testing personnel as well as the

contractor's personnel be protected. In view of the increased sizes and maneuverability of heavy earth moving equipment and the speed at which they travel within construction limits it is important that the utmost effort be made to provide safety measures for the protection of all personnel and employees.

Our standards and construction requirements stipulate the type of signs and barricades to be used on all construction projects. These standards also identify the location and type of prewarning signs. The uniform enforcement of these specifications pertaining to the erection and maintenance of signs and barricades is recognized as a vital safety measure. The contractor is responsible for the proper erection and maintenance of these signs and barricades. The project engineer is required to obtain compliance. In fact the highway department requires the project engineer to submit a formal report with each progress estimate indicating that all signs and barricades are being properly erected and maintained. If this is not so stipulated the payment to the contractor will be withheld until necessary corrective measures have been taken. These facts are brought forth to indicate the seriousness which road and bridge construction projects give to traffic safety measures.

Some significant figures are presented which may give some insight to the scope of contracting operations on State highways in Indiana. There are at least 80 major contractors in Indiana who do work for the highway commission not to mention many additional smaller contractors who have minor contracts or may be doing sublet work for the major contractors. During the construction season the employees of these contractors may range in number from 3,500 to 5,000 or more. Many are regular employees with proper background and training for their work. However, all contractors find it necessary from time to time to pick up "green hands" who lack experience and must be trained. The equipment owned and operated on the various contract jobs may vary from \$100,000 for small contractors to \$1 million or more for the large contractors. It is safe to say that our State highway contractors may have from \$12 million to \$15 million invested in modern highway construction equipment. Construction contracts during the season may vary in number from 100 to 300 and may vary in cost from a few thousand to near \$10 million. With this information one can readily visualize the scope of the responsibility of the highway contractor to his employees and our employees as well as the motoring public.

While it is true that such operations as road and bridge construction, and maintenance of highway, traffic control devices and markings

are more familiar to the public, we must not overlook the fact that other highway efforts may not be so obvious and perhaps glamorous yet they make a large contribution for the future safety of the highway user. By these we mean planning and designing.

Highway Safety Through Design

Much effort and time by both highway employees as well as consultants are spent in learning where improvements such as new bypasses, dual laning, separations, interchanges and other important changes in highway features should be made. This work is generally well ahead of actual design and contracting. However, this is necessary in that this advance planning is based on future needs. Before traffic congestion and accident-proof locations develop, we must be foresighted enough to build to provide for the increase in highway traffic and the elimination of these bottlenecks. Our planning people are looking ahead 20 years in hopes that the future generations experience improved safety on our highways.

Our State Highway Design Division is always leading the pack with new ideas and improved features in highway design. Last February, Indiana adopted new design standards for both horizontal alignment and highway grades which give consideration to the increasing traffic volumes and speeds.

New design standards also provide for divided highway sections when opposing traffic warrants such design. In dual-lane or divided highway designs, independent alignment and grade for each roadway are being used to permit the increase in the roadway separation and reduce the monotony for the highway user. Greater use of railroad separations as well as minor road separations are incorporated in designs to preclude these high accident grade crossings. More highway interchanges are also being included to permit the easier and safer flow of traffic from one roadway to the other. Right-of-way widths are being increased to permit longer sight distances and to remove roadside obstacles and developments further from the roadway. These wider rights-of-way permit the reduction of cut and fill slopes to a maximum of three to one, thus reducing danger of loss of control of the vehicle should a motorist inadvertently leave or be forced off the roadway. Greater use of stabilized shoulders in design is made to provide a safer place for motorists who must find it advantageous or desirable to leave the roadway.

Many other safety features are being added in the design stage to provide less hazardous driving conditions.

Conclusion

When all the efforts now being made by the several divisions of the Indiana State Highway Commission are taken into account, plus the personal achievements of each employee as well as all the contractors and consultants, we are confident this will add up to a record of increased highway safety for the users of Indiana state highways.