



michiganite

SPRING 1986

VOLUME XXI, NUMBER 1

OFFICIAL PUBLICATION OF THE MICHIGAN SECTION OF THE INSTITUTE OF TRANSPORTATION ENGINEERS

The Michigan Trip Generation Study Program



PRESIDENT'S COLUMN

FROM THE DESK OF . . .

RICHARD A. CUNARD

WHAT'S AHEAD IN 1986

As this is the first issue of the MICHIGANITE for 1986 and my first column as President, I would like to highlight what the coming year has in store for Michigan Section members.

As we enter 1986, it is apparent that this will be a banner year for our Section. Financially, the Section is sound as a result of last year's dues increase. We can also look forward to the Annual Meeting of the National ITE which is scheduled for our District. In addition, we anticipate increased attendance at Section meetings as a result of our expanded technical program. Even the MICHIGANITE has received a bit of a face-lift and restructuring to better inform and serve our membership.

56th Annual Meeting - Indianapolis, Indiana, September 7-11, 1986

NEWS FLASH - Because of the outstanding reputation that District III (Michigan, Ohio, and Indiana) has developed over the years in producing high quality District meetings, the Institute of Transportation Engineers has announced that it will hold its 56th Annual Meeting in Indianapolis, Indiana at the same time as the District III Meeting.

Seriously, in case you have not heard, the Annual Meeting of the National ITE will be held in Indianapolis this year. With this meeting being held so close to Michigan, our section members have an excellent opportunity to attend a national meeting at much less expense than normal. Since it is only a little over 300 miles from southeast Michigan, those of use who want too will be able to drive to the meeting and thus avoid the costly airfare.

The technical program for this year's meeting includes a potpourri of outstanding topics, including: site impact analysis, urban traffic congestion, traffic signalization, and what is happening with Federal funding.

See **PRESIDENT . . . page 3**

Transportation professionals often need to analyze the traffic impacts of a proposed major commercial, industrial or residential development. In these situations, the ITE Trip Generation Manual is usually the main source for analysis.

In some cases, however, the Trip Generation Manual has limited sample information on specific travel generators or possibly no data at all. There are situations in Michigan which have unique traffic generators or generators which have definite seasonal traffic fluctuations. When confronted with a problem of this kind, it would be advantageous to have a trip generation rate that was developed within Michigan rather than rely on a national rate. Also, with the increasing number of major development projects in our state, it would be useful to have Michigan trip generation data and rates.

Since Michigan trip generation data would be a useful tool for transportation organizations to assess traffic impacts and review proposed land use changes, the Urban Transportation Planning Division of MDOT is working closely with the Michigan 3C Transportation Planning Directors Association (TPDA) to develop a coordinated approach for this activity. Toward that end, a joint committee has been established to develop a Michigan Trip Generation Study Program. Committee members are:

- Carmine Palombo, Manager of Trans. Program, Southeast Michigan Council of Governments.
- John Aldridge, Director of Trans. Planning, West Michigan Regional Planning Committee.
- Josh Austin, Director of Trans. Planning, W. Michigan Shoreline Regional Dev. Commission.
- Richard Nellett, Supervisor, Systems Dev. and Analysis Section, MDOT.
- Bill Hartwig, Project Development and Implementation Section, MDOT.
- Paul Hershkowitz, Supervisor, Proj. Development and Implementation Section, MDOT.

The goals of the study program are to:

1. Develop a catalog of trip generation rates for various land uses in Michigan's urbanized areas (50,000+ population).
2. Perform comparative analysis of trip generation rates between similar sized urbanized areas. Also, compare Michigan and national rates.
3. Submit results of the Michigan Study to ITE for nationwide distribution.
4. Establish an on-going, yearly program that develops trip generation rates for various land uses in urbanized areas. At a minimum, the committee would like to embed the trip

See **MICHIGAN TRIP . . . page 4**

INTERNATIONAL BOARD OF DIRECTION ADOPTS NEW GOALS FOR 1986

At the January meeting, the International Board of Direction adopted new goals for 1986. These goals include:

- a. Enhance the ITE Public Relations Program.
- b. Implement an expanded Membership Professional Development Program.
- c. Strengthen mechanisms for member input to local and national legislative issues.
- d. Plan for the implementation of Future Directions for the Institute.
- e. Improve communications between the members and the institute. Visits by the International President or other national officers to all Districts and Sections with a membership over 50 will continue in 1986.
- f. Continue to expand the Institute's membership base.
- g. Increase the pool of professionals trained and educated in traffic operations.
- h. Expand the Institute's services for employment and placement.

At the January meeting the following items were discussed: 1) ITE will be sponsoring a National Conference on Site Development and Transportation Impacts in Orlando, Florida, March 23-26, 1986; 2) The ITE Traffic Signal Installation and Maintenance Manual is expected to be published by June of 1986; 3) The Committee on Future Directions of the Institute reported that the 1985 survey indicated that members wished to retain the Institute's current name and also wished to retain the existing membership grades; 4) Milwaukee was selected as the site for the 1991 Annual Convention.

Constitutional amendments to be placed before the membership during 1986 will include giving the Associated Organization Division a vote on the International Board of Direction. Currently only elected national officers and elected District Directors are permitted to vote on the International Board of Direction. The Technical Council Chairman and the Representative of the Associated Organization Division are represented on the Board of Direction but do not have a vote. Another amendment on the ballot for 1986 is a proposal to eliminate the Professional Engineering registration requirement for the Grade of Fellow.

By Richard F. Beaubien, P.E., District 3 Director

MICHIGAN SECTION ITE - TREASURER'S REPORT

Balance: November 30, 1985	\$2,153.02
Receipts:	
Dues and Interest	\$2,237.62
Michiganite Ads	1,180.00
Meetings	2,010.16
	<u>\$5,427.78</u>
Expenses:	
Meetings	\$1,811.90
Michiganite	503.00
Postage	609.03
Supplies	49.43
Awards	0.00
Printing	131.09
Miscellaneous	30.00
	<u>\$3,134.45</u>
Balance: February 28, 1986	<u>\$4,446.35</u>
Treasurer, David C. Bacon	

MICHIGANITE

Official Publication of the
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Institute of Transportation Engineers

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MICHIGANITE is published quarterly by the Michigan Section of the Institute of Transportation Engineers. It is distributed to more than 300 ITE members and over 100 cities and counties in Michigan. Address communications regarding the Michiganite to the Editor, Weldon Borton, 1014-B Montevideo, Lansing, Michigan, 48917 (Telephone (517) 321-5457).

1986 MEETING SCHEDULE

<u>Date</u>	<u>Location</u>	<u>Host</u>	<u>Event</u>
April 18	Lansing	Carrier/Henry	Couples Night
May 15	Southfield	Savage/Northrup	Vendor's Day
May 29	Grayling	Slater	8-hour Technical Session for Local Governments
June 12	Warren Valley	Nustad	Golf/Dinner
July 25/26	Mt. Pleasant	DeWitt	Technical Session/ Family Weekend
September 4	Saskatoon	Meredith	Golf/Dinner
September 7-10	Indianapolis	Bacon	National Meeting (9-8-86 Mich. Section Breakfast)
October 16	Ann Arbor	Barnes	Lunch/Technical Session
December 4	Metro Area	Smiadak	Annual Meeting/Technical Session

SECTION MEETINGS

PRESIDENT . . . continued from page 1

We have been informed by National that there will be three alternative hotels available for registration. The prices are: the Atkinson Hotel at \$50/single and \$48/double, the Embassy Suites at \$80/single or double and the Hyatt Regency - Indianapolis, which is the official convention hotel, at \$84/single or \$94/double.

Dave Bacon informs me that he and Jerry Carrier are also investigating additional alternative hotel sites across the street from the Hyatt which would offer reasonable room rates and, if there is enough interest by members, could become the Michigan Section headquarters for the meeting. This arrangement could provide the Section with our own hospitality suite and gathering spot.

Current plans for Section activities at the National meeting call for a Section breakfast on September 8 to get together all section members in attendance to see who is there, where they are staying and to inform them of what is being scheduled.

Start thinking about attending the meeting in Indianapolis. The opportunity of having the Annual Meeting of the National ITE this close to Michigan will not occur again for some time.

MICHIGANITE

As you can see by the mast head, the MICHIGANITE logo has received a face lift by working in the new National ITE logo. In addition, this issue is the second printed by our new printer and we are in the process of implementing procedures to standardize the location of articles, meeting schedules, pictures and ads. Our Editors are also attempting to print as many articles as possible by Section members, so if you have just completed a study of general interest or if you have knowledge of some activity which would be of interest to our membership, put a few paragraphs together and send it to Weldon Borton our MICHIGANITE editor or Glen Etelamaki our newly elected Director, for publication. Their address can be found on page 2 of this issue. Remember, the Michiganite is the primary means of communicating with Section members and it is through your contribution of articles that the membership can be kept abreast of what is happening in Michigan.

If you look at the meeting schedule listed on page 3, you will notice that we have fewer meetings scheduled for 1986 than we have had in recent years. However, you will also notice that all of the regular meetings are now scheduled as luncheon meetings with expanded technical sessions before and after lunch. These changes have been brought about as a result of your responses to our technical session survey at the Lansing meeting in March of 1985.

To summarize the changes in the meeting schedule from previous years, we have combined our January and February luncheon/guest speaker meetings into one full technical meeting in mid-February, we dropped our April dinner meeting, and expanded our November meeting to a full technical session. The Executive Board began to phase in some of these changes late last year and we met with immediate success! The November meeting in Flint, which was the first meeting with the new expanded technical program, had over 80 people in attendance - twice as many as the year before. The Annual meeting in December, which featured concurrent technical sessions for the first time ever, had one of the highest attendance for this meeting. This year's February meeting in Farmington Hills had over 60 people attending, up from 35 the year before.

The Executive Board expects to continue the expanded technical program at our meetings, however, we have not forgotten the important role that social interaction plays in our professional development. Thus, by popular demand, we are again scheduling two golf outings in 1986 - the June golf outing at Warren Valley and the every popular September outing at Saskatoon. The Warren Valley outing was successfully resurrected in 1985 after being in hiatus for a number of years. This outing is an excellent opportunity for those of us in the southeast area to get together to shoot the ball (bull?). If you are like me, these golf outings are one of the few times you get out to golf during the year.

Before closing, I would like to extend my gratitude as an Executive Board and Section member to Bob Lariviere for the excellent leadership he provided as President in 1985 and for the outstanding job he has done on the Executive Board over the past four years. His dedicated service has helped to make the Michigan Section one of the finest Sections in the Institute.

Ed Swanson

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MICHIGAN TRIP . . . continued from page 1

generation effort in the on-going, urbanized area, 3C transportation planning process.

5. Expand the study program to eventually include rural and recreational trip generation rates.

The committee developed a questionnaire which was then distributed to the TPDA for review and response. A summary of preliminary responses from the questionnaires received to date indicate that:

1. About half of the 3C agencies in Michigan have performed traffic impact analyses using the ITE Trip Generation Manual.
2. About half of the 3C agencies in Michigan have performed a trip generation study for a specific type of land use. Types of land uses for which trip generation studies have been performed include shopping malls, P.U.D.'s, office parks, special commercial centers, and high and low density residential.
3. All of the 3C agencies would like to have trip generation rates for various land uses in Michigan.
4. All of the 3C agencies would be willing to participate in the study effort. All would be willing to collect the pertinent information about the trip generator (e.g. - employment, site acreage, square footage, number of parking spaces, etc.).
5. The five highest prioritized land uses which the 3C agencies collectively would like to see trip generation data and rates developed for, are office parks, special commercial centers ("one stop shopping"), restaurants, education facilities, and modal terminals. The 3C agencies were asked to rank, by preference, the land uses for which they would like to obtain trip generation information.

The next step for the committee is to determine, in priority order, those land-uses which are not currently covered in the ITE Trip Generation Manual. This will be done to fill in the "data gaps," to obtain information for the land-uses that currently are not in the Manual. This will be accomplished by cross-referencing the prioritized ranking (see #5) with the ITE Manual.

A tentative schedule to achieve the first goal of the study program follows:

1. After the "data gaps" have been determined, traffic counts will be taken this spring and summer for the selected land-uses. Pertinent socio-economic and land-use information will also be gathered.
2. During the summer, the committee will be taking the results of #1 above, and developing trip generation rates.
3. Distribution of the findings should occur this fall or winter.

For further information, or to share your ideas, contact either Bill Hartwig or Paul Hershkowitz. Both can be reached at (517) 373-9560.

By Paul Hershkowitz

The number of miles Americans currently put on their cars has more than doubled since 1960 but car travel percentages are shrinking slightly. More than 80 percent of all travel in 1960 was by car while in 1983 that figure slipped to 74 percent. Total miles traveled, however zoomed from 719 billion to over 1.7 trillion miles, according to the Motor Vehicle Manufacturer's Association.

ITE HALL OF FAME

At their August meeting, the ITE Board of Direction asked the Hall of Fame Committee to prepare a draft of criteria and procedure for selection of Hall of Fame candidates and inductees. The Chairman of the Committee, Stu Wright from San Francisco, California, suggested the following selection criteria:

1. Candidate must be (or have been) a member of ITE.
2. Candidate may be either living or deceased.
3. Candidacy is open to any member (worldwide).
4. The candidate's accomplishments may be Institute accomplishments or accomplishments in the professional field of transportation and traffic engineering.
5. The candidate's accomplishments may be of any scope (local, regional, national, international).

As selection procedures Chairman Wright suggested the following:

1. Candidates would be proposed to Sections by members of that Section.
2. The Section would screen the nominations and proposed candidates (any number) to their District.
3. The District would screen the nominations and proposed candidates (maximum of two per year) to the International Board of Direction.
4. A Committee of Board Members (Hall of Fame Committee) would screen the nominations and propose candidates (maximum of two per year) to the International Board of Direction.
5. The Board of Direction would elect members to the Hall of Fame.

In response to these suggestions, one of the Committee members, Carlton Robinson from the Highway Users Federation, proposed the following list of candidates for consideration. It was Robbie's belief that consideration of these candidates would help to clarify the true purpose and usefulness of the ITE Hall of Fame.

JOHN GRINDSTONE - For 15 successive years, John organized and conducted the ITE Section's Annual Picnic which consistently attracted the largest attendance of any section event. John developed many hours and personal dollars to the even and was beloved by section members and their families.

JOE HIGHRISE - Joe occupied each chair in the ITE section and district hierarchy in rapid succession. In the year he failed to be elected to international office, his section placed his name in nomination for Hall of Fame.

LARRY LONGLIFE - Larry's civil service status and ability to avoid controversy permitted him to remain as Traffic Engineer of Gridlock City for 27 years. He always attended ITE activities and was nominated for Hall of Fame at the time of his retirement.

IVAN INVISIBLE - Ivan, although remaining a Junior Engineer through his current 42nd year with the City of Drim's Paradise, has developed and operates the most efficient arterial signal system in the state, saving motorists many thousands of hours of delay annually. His department head has received national acclaim for the smooth traffic flow in the city.

ALAN FASTTRACK - At age 24, Alan invented a superior pavement marker which immediately captured the market and saved public agencies thousands of dollars annually. At age 27, he keeps paying section dues but does not attend functions due to high travel costs from Tahiti.

At the January 1986 meeting, the ITE Board of Direction reviewed this list of candidates and concluded they were not yet ready for a Hall of Fame. The matter was referred to ITE staff for further study.

By Richard F. Beaubien, P.E., District 3 Director

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INDIANA SECTION TO HOST INTERNATIONAL ANNUAL MEETING

The Indiana Section of ITE will host this year's International Annual Meeting in the city of Indianapolis, September 7 to 11, 1986. Mr. James H. Cox, P.E., City Traffic Engineer of Indianapolis is General Chairman of the event, which will be held in the state of Indiana for the first time.

The logo for this year's meeting is shown below. It contains two main items; the oval (The 500 Race), and the theme of the meeting "Our Heritage - Our Future".



MICHIGAN SECTION MEETING FEBRUARY 1986

The city of Farmington Hills was the host for the February 13, 1986, ITE Lunch/Technical Session held at the Farmington Community Center. This was the first time that the meeting was held at the Community Center and the attendance of over 60 members highlighted its success.

The speakers of the day included James Roach of Michigan Department of Transportation, speaking on "High Speed Rail" and the potential for a Detroit to Chicago run. Mr. Roach mentioned that the existing track facilities between these two major cities provides the potential for a high speed rail system. This type of system would draw on the 7,400 daily car trips traveling this route. It may also draw on some of the air traffic. Concerns were addressed regarding the existing track alignment and the various curves which restrict the speed limit on the existing rail system. Particular emphasis was placed on the 3 percent curve between Ypsilanti and Chelsea which restricts the train speed to approximately 65 MPH. Other concerns included the drawbridge problem west of Porter as well as the 1,680 grade crossings four (4) different levels of service were reviewed which considered travel time alternatives varying from 110 minutes to 250 minutes. From Mr. Roach's analysis, it appears that the most cost effective consideration involves a 125 MPH high speed rail system which will necessitate trace improvements of approximately \$722 million. This proposal would allow for direct competition with the auto route as well as other travel services.

Next on the agenda was Dr. Albert King of Wayne State University, who spoke on "Injuries in America". Dr. King mentioned that although there have been many safety improvements in automobile construction including energy absorption interiors and steering systems

as well as high impact resistant windshields, still over 1.5 million injuries occur in traffic accidents each year. Of this amount, over 100,000 new cases of head and neck injuries result. Current statistics indicate that over 50 percent of all accidents involve head injuries and 16 percent involve neck. This is an extremely high percentage compared to the injuries on the remaining portion of the body. Dr. King's research is reviewing such things as how the brain is injured as well as the rotation of the head and its shearing action. He mentioned that research must be supported to allow onsite investigation, clinical studies of patients, as well as with human subjects and cadavers to determine additional improvements that can be provided to minimize these trauma type injuries in America. With all the money spent on heart disease and cancer, Dr. King feels that due to the significant loss of productive time through such trauma accidents, additional funding should be significantly increased.

Next on the agenda, Michelle Barnes of the Washenaw County Road Commission spoke on "Reflectivity as an Ongoing Study". She mentioned that the purpose of the reflectivity pilot study was to assist the county in purchasing sign materials as well as to determine if it would be of benefit in addressing the FHWA Reflectivity Guidelines. In addition, they were concerned with the adequate level of reflectivity and how it would impact their liability, as well as the degradation that can occur based on the direction and/or color of the material. Their conclusions indicated that overall reflectivity degrades at the rate that they observed, current dead values would be obtained beyond the seven year industry claim by the manufacturer. In addition, they concluded that there is no clear indication that the direction a material faces affects the reflectivity reduction.

Ms. Barnes' report concluded prior to lunch and once the lunch break was completed, David Reese of Energy Absorption discussed the "Use of Energy Absorption Devices"; including barrel, capsules and cartridges, which are available to reduce the potential energy dissipated during the occurrence of an accident. He mentioned that the hydrocells which currently maintain 60 percent of reusable salt water is a system of redirection whereas sand barrels are an inert system. In addition, he pointed out that maintenance was of the utmost importance and that these type of energy absorption systems should be used to their potential because guardrail, which is a fixed hazard, is very difficult to make into a crash-worthy safety feature.

Mr. Reese's informative report was followed by Mr. Ed Swanson of Swanson Associates who further reported on "Quick Response Systems" and the response that they have had with the QRS Program and Documentation as well as the USCD P-System Run-time version. Mr. Swanson mentioned that the package was fairly easy to install and use, and that data requirements includes many different zone to zone travel times. The package also includes a breakup of the autos per household, total employment, retail employment and nonretail employment by zones. In addition, he mentioned that all documentation is available through a users guide available from the Transportation Research Board as well as the QRS System documentation being available through the Steam Support Center. His report basically included his experience with this system.

Following Mr. Swanson was Mike Labadie of Barton Aschman Associates discussing "Evergreen Road". His discussion included a review of their organization's experiences when contracted out by a local government to provide suggestions to upgrade the traffic safety in the area. Mr. Labadie called out this particular review as an "exercise in futility" wherein the many suggestions and concerns that were brought forth by their organization had a difficult time being accommodated due the political nature of the situation. As a result, Mr. Labadie mentioned that the road system remains status quo with none of their suggestions being implemented.

See FEBRUARY... page 7

The final speaker of the day included Mr. Ralph Killian, also of Barton Aschman, who discussed the Oakland Technology Park. Mr. Killian mentioned that their organization was hired to determine alternatives to prevent and/or minimize traffic congestion in the proposed Oakland Tech Park in the Auburn Hills area. Through his discussion, many of the upgrading of existing roadways included the widening of I-75, as well as the straightening of Adams Road. Other upgrades appear warranted in order to achieve adequate roadway network to service this proposed development. Currently, they are working with the developer in trying to fine-tune many of these proposed improvements which will eventually accommodate this 1,700 acre parcel over its 20 year plan development.

After this final speaker, the meeting was adjourned and the participants were allowed to meander through the old historical Farmington Community Center and view the building as well as review some of the literature available which dated its historical significance to the Farmington area.

By James Cubera, P.E.

PAVEMENT MARKERS PREVENT CRASHES IF THEY ARE RATIONALLY USED

Traffic accidents and fatalities in the U.S. are on the decline, reports Dr. Zoltan A. Nemeth, professor of civil engineering at Ohio State University and long-time traffic and transportation researcher. "But at the same time, night accidents are increasing as a percentage of the total number of accidents."

The rise in the number of night accidents has spurred the Federal Highway Administration to launch a research program aimed generally at finding out why this is so and what can be done about it.

Nemeth, for example, is in charge of a \$74,000 piece of this work, sponsored by the Federal Highway Administration and the Ohio Department of Highways and titled "Evaluation of Roadway Delineation Treatments."

Purpose of Study

He explains that the overall federal project is a study of "visual guidance for night driving" and includes the requirements for "optimum motorist performance under ideal roadway conditions" plus a determination of "visual guidance requirements" as modified by operational and environmental factors such as rain, snow, fog, and so on. The third part of the national study is aimed at evaluation and development of a "model which relates visual guidance techniques and visual complexity of the environment and estimates safety improvements expected from providing adequate guidance information."

It is the last part with which the Ohio State researcher is concerned and his work centers on the use of accident data to try to determine how much good, if any, various markings do on two-lane, rural highways. Nemeth says that this includes postmounted reflective signs used to outline highway edges and also raised pavement markers sometimes called "cat-eyes," imbedded in the pavement and also used to outline edges and centerlines of highways.

"For the most part, we are talking about the raised pavement marker, or rpm." When the rpm appeared a few years ago, it was something like an overnight "best seller" and was installed by the millions on some thousands of miles of highways all over.

"We spent a lot of dollars in the name of safety. The devices were widely used, but not always rationally used. A principal question now is to find out how much safety we bought."

SIXTH ANNUAL FAMILY-TECHNICAL WEEKEND MEETING-MT. PLEASANT JULY 25-27, 1986

NOW is the time to turn our thoughts toward summer and make your reservations for the Sixth Annual Family-Technical Weekend!!! Three days and two nights of fun for the whole family are waiting for you.

Following a technical session on Friday afternoon, you could be basking in the sun or taking advantage of any of these activities. . . Golf, Tennis, Racquetball, Fishing, Driving Range, Sauna, Whirlpool, Game Room, Shuffleboard, Indoor or Outdoor Pool, or dancing in the Lounge.

An open hospitality room poolside, with beverage, snacks and a continental style breakfast to greet you in the morning, will be yours to enjoy each day. Rooms and onsite RV camping are limited, so plan now to attend. For further information, please call Tim DeWitt at (313) 477-8700 or the Mt. Pleasant Holiday Inn at (517) 772-2905.

The answer, at least on the surface, is: practically none at all. Nemeth explains that accident data before rpm's were used are readily available, as is data afterward. "As the studies accumulate, the answer keeps coming in: no change. And yet one would expect to see decided improvement after installing the devices."

"If these rpm's are so good-or any good-why can't we show some improvement, find some evidence of reduced accidents? Is it even possible to use the data we have to measure the impact of the rpm's?"

Analyzing the Data

To decipher this apparent contradiction, Nemeth studied ODOT accident data from sites where the shiny reflectors were installed in 1977 and 1978 and then compared the results with data from the same spots three years later. "We have three years of "before" and three years of "after" data on hand, covering curves, exit ramps, and straight sections of highway." In all, he says, under study are: 380 curves, 24 exit ramp gore areas, and 55 miles of straightaway.

A study of all the data from the curve areas shows there were essentially the same number of accidents before and after rpm's were installed, though the night and weekend accident categories went up.

Seeking to understand the anomaly, Nemeth painstakingly sifted through the numbers and reclassified some curves into "high" risk areas and refigured. "We selected 23 sites and evaluated them for before-and-after results." And? "And found statistically significant reductions in accidents."

He reasons that "This probably means that these are the sites where the pavement markers should have been installed in the first place." And it follows, then, that "excessive" use of the markers is, in effect, "diluting" the data. He won't call it "wrong" to have installed them where they were not needed, but says, "They did not solve whatever the problem was."

Not Always Effective

In one example, he zeroed in on three "obvious problem" curves. "At one site, after rpm's were added, the reduction was dramatic-from 11 to three. But at two other locations, it did not work. There was no reduction in night accidents. What that means to me is that the problem, whatever it was, was not solved by the rpm's."

Based on his study to date, he tentatively concludes that "The raised pavement marker can indeed

See PAVEMENT . . . page 11

STRIPING MATERIALS VARY IN DURABILITY, UTILITY, AND COST

Traffic paints, typically an alkyd formulation, have been used for lane delineation on Kentucky highways for decades. In the past few years, more durable marking materials have been developed. These include epoxy and polyester paints, preformed tapes, and thermoplastics. These materials could prove to be more cost-effective than typical traffic paint on certain types of highways.

The objective of this study is to evaluate the cost-effectiveness of available durable marking materials by means of field tests and to develop a policy for material selection based on these tests. Most test installations have been in place for over two years, and this report (December 1984) summarizes the findings for that period. Evaluation will continue for another 18 months with recommendations presented in a final report.

Materials were placed under several contracts. All but two of the materials were placed in Kentucky and the other two in Indiana.

Data collection included three areas: durability, reflectivity, and appearance. The method of conducting road service tests as described in ANSI/ASTM D 713-69 was used as a guide. It describes the rating of traffic paint in terms of appearance, durability, and nighttime visibility. Both daytime and nighttime photographs were taken.

Durability and appearance of the materials were evaluated visually. The durability evaluation related to the ability of the material to remain on the surface. The appearance evaluation dealt with the color of white or yellow lines as compared to their original color and as compared to a desirable color. Reflectivity readings were measured using a portable retro-reflectometer (PRR). Nighttime observations were also conducted.

100 percent solid epoxy paint

This material is a two-component, chemically reacted system that is 100 percent solids. The two parts are mixed by pumps on the striping equipment. The old paint stripe was removed prior to placing the epoxy. Line thickness was 15 mils wet and dry. A no-track time of 10 minutes was specified and cones were used for protection. Beads were applied at about 23 lbs. per gallon as a means to prevent tracking.

Four separate installations involving solid epoxy paint were placed in the summer of 1982 by three separate contractors. Three of the contracts involved lane marking on state-maintained streets in three major metropolitan areas in the state: Fayette County, Jefferson County, and the northern Kentucky counties of

Boone, Kenton, and Campbell. The other contract involved pavement markings at various narrow bridge locations throughout the eastern half of Kentucky.

Over seven million linear feet of solid epoxy paint were applied under the four contracts. The contract cost varied from 24.3 to 25.6 cents per foot. These prices were midway of the typical price range of 20 to 30 cents per foot. The contract specified that at least 65 percent of the pavement be exposed prior to application, which required removing the old line. The old line typically was ground off.

As previously noted, a large quantity of beads were placed on the stripe. That reduced the no-track time and also increased reflectivity. Beads were applied using either a free-fall dispenser or by pressure through bead guns.

As shown by PRR testing the initial reflectivity was good compared to the other materials and has been maintained as well as any other material in areas where durability has not been a problem.

After two years in service, the reflectivity remained adequate. This was revealed through nighttime observation and PRR measurements.

Varying levels of durability problems were experienced on each of the four solid epoxy contracts. All problems were attributed to improper mixing of the two epoxy components, related to not controlling pressure on the pumps on the striping equipment.

The first evidence of a problem is a brown discoloration of the stripe. This discoloration appears at a regular interval along the stripe, which corresponds to the cycle of the pump that is not properly proportioning the two components. Spots become darker as the material softens. Eventually, the soft portion of the line will wear off.

Problems were also observed in the appearance of the solid epoxy lines, specifically the white lines. The appearance of the markings was good immediately after placement. In one example the yellow line generally has retained a good appearance after two years of service. However, the yellow is not as bright as that provided by typical traffic paint. The grayish color of the white line is more of a problem on concrete where the color of the line blends in the pavement surface.

Summary: 100 percent solid epoxy paint had the highest reflectivity of any of the paints. However, durability and appearance problems preclude widespread future use until it is demonstrated that those problems have been solved. The durability problem was related to equipment problems, specifically improper mixing of the two epoxy components. The major appearance problem was the dull daytime appearance of the lines. This material has been used extensively in other states and the manufacturer of the paint indicated that the two

See *STRIPING* . . . page 9



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STRIPING continued from page 8

problems have been remedied. Another test installation is warranted to determine whether future use of the material is justified.

Polyester paint

This material is a two-component, thermosetting material consisting of a resin and catalyst. Two separate systems and guns are required on the striper. A minimum thickness of 16 mils was specified. The wet and dry thicknesses would be approximately the same. A pressure-regulated air jet was used to remove all debris from the pavement in advance of the spray guns. Glass beads were applied by pressure at a rate of 15 lbs. per gallon. Air temperature had to be above 40 deg. F. No-track time is 8 to 12 minutes on a normal sunny day; therefore, line protection is required.

Polyester paint was first used in Jefferson County in the summer of 1982 with a project completed at a contract price of 7.4 cents per linear foot, the lowest of any of the durable materials. Some sections had been restriped in 1983 and 1984 under the same contract.

PRR measurements and nighttime observations showed the white material maintained its reflectivity better than the yellow, which was subject to more wear as it was used as centerline while the white material was used as edgeline.

No significant durability problems were experienced when the polyester paint was placed over pavement or old paint. The only durability problem occurred when new polyester was placed over old polyester paint. In one instance poor adhesion was related to a formulation problem, which was resolved in later restriping installations.

While the polyester paints generally did not appear as bright as typical white or yellow traffic paints, their appearances were adequate. Again, the only appearance problem encountered was related to the formulation used when restriping over old polyester. When the formulation originally was changed, solvent was added so it would dry quicker and would not chip. The problem was solved but the paint remained tacky, allowing it to become contaminated with dirt, resulting in off-color lines. This problem was solved by using another formulation from a different paint manufacturer.

Most markings were placed on low-volume streets; therefore, performance on high-volume streets is unknown. Also, all material was placed on asphalt since work conducted in other states reported durability problems when polyester paint was placed on concrete.

Summary: Polyester paint had the lowest price of any of the durable materials. Reflectivity was adequate, although not as good as solid epoxy. Some durability and appearance problems were detected but were solved by changing the paint formulation. Future use of this material is warranted on low-volume asphalt streets and highways. Additional testing is needed to determine whether this material may be used on high-volume roadways. Also, since there has been restriping in 1983 and 1984, there is a need for continued monitoring. (Article will be continued in the Summer 1986 issue).

Reprinted in Part
Roads and Bridges/May 1985

Estimated ton-miles for all freight transportation modes - that is motor trucks, railways, inland waterways, pipelines, and domestic airways - ran almost 2.6 trillion miles in 1984 to nearly topple the best ever mark set in 1979, according to the Motor Vehicle Manufacturer's Association.



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Are you tired of trying to find a professional organization specifically representing transportation planners? In the past, some professional societies have had minor divisions for transportation planning, but they have been relatively inactive. The Institute of Transportation Engineers (ITE) announces the formation of the Transportation Planners Council. At its January 1986 meeting, ITE approved bylaws creating the Transportation Planners Council (TPC), specifically dedicated to better addressing the professional needs of transportation planners.

The increasing emphasis on transportation planning makes formation of the TPC within ITE timely. If you are engaged in one of the following transportation planning activities, you are invited to contact ITE for more information about becoming a member:

1. Planning new transportation facilities
2. Assessing impacts of land development on the transportation system
3. Multi-modal transportation planning for people and goods
4. Transportation systems research
5. Travel and transportation system surveillance
6. Transportation modeling and forecasting
7. Transportation policy analysis
8. Transportation program evaluation
9. Other transportation planning activities at the state and local levels

Prospective services may include:

1. Presenting technical programs at ITE annual and section meeting on issues of concern to those in the transportation planning field.
2. Stimulate programs to attract more students into transportation planning.
3. Assist ITE to identify new technical committee activities needing to be initiated.
4. ITE Journal article summarizing recent developments on issues of concern to transportation planners.
5. Listings of articles appearing in recent journals on transportation planning.
6. Recognizing outstanding examples of transportation planning processes and products.
7. Identify needed seminars.
8. Determine need for and interest in a transportation planning handbook.
9. Participate in review of Trip Generation and Parking Generation reports and determine future needed improvements.

Membership in ITE and the Transportation Planners Council is open to all persons engaged in transportation planning. Learn more about the Transportation Planners Council by contacting:

Thomas Brahm
Executive Director
Institute of Transportation Engineers
525 School Street, S.W., Suite 410
Washington, D.C. 20024
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PEOPLE in the news

New Members of Michigan Section - ITE

We welcome the following new members into the Michigan Section of ITE:

- ✓ Kealoha Christopher Rossiter, City of Grand Rapids
- ✓ Brian Zimmerman, Michigan Department of Transportation
- ✓ Randy Chesney, City of Lansing
- ✓ Joseph Hummer, Goode11-Grivas, Inc.
- ✓ Gerald Dresselhouse, P.E.
- ✓ Neall Schroeder, City of Rochester Hills
- ✓ Dean Derks, Michigan Department of Transportation
- ✓ Kenneth Everhart, Stimsonite Products
- ✓ Gary Shrefler, Ash Instrumentation

FHWA Reports Available

The following reports are recent releases from the Federal Highway Administration. You may contact Dave Morena, (517-377-1842) for assistance in obtaining a copy of these reports:

"Time-Based Coordinator of Traffic Signals", FHWA This report provides a good overview of the five traffic signal coordination systems in use today, with emphasis in the time-base coordinator (TBC) strategy. The report provides a case history discussion of TBC programs in seven selected cities, one of which is Wyoming, Michigan.

"Traffic Signal Brightness: An Examination of Nighttime Dimming", FHWA - This is a research report which concludes that many traffic signals may be safely dimmed to a maintained level of luminescence which is 30 percent of the current ITE recommendation for daytime luminescence. Such dimming is not now allowed by ITE or by the Manual on Uniform Traffic Control Devices; however, this research may lead to changes in the standards.

"SOAP 84 User's Manual" and "SOAP 84 Data Input Manager", SOAP 84, like earlier versions of SOAP, is a computer software program for analysis of design alternative at four-legged intersection under traffic signal control. This version includes several operating improvements, including microcomputer capability. The SOAP 84 software plus technical support on how to use it is available from the FHWA Washington office. In addition, FHWA has on hand and would like to distribute copies of the following older reports:

"User Guide for Removal of Not Needed Traffic Signals", FHWA - 1980. This report provides signal removal criteria based on side-street sight distance, traffic volumes, and accident experience.

"Synthesis of Safety Research Related to Traffic Control and Roadway Elements", FHWA - 1982. This two-volume set presents research results in 17 subject areas, including pavement surface, access control and driveways, roadside features, on-street parking, intersections, one-way streets, and railroad crossings. By Dave Morena

PAVEMENT . . . continued from page 7

solve problems, but not all problems-it just won't help if a row of bushes is too close to the road or if a tree overhangs and obscures a curve."

So, returning to the original question of whether accident data can be used to judge the effectiveness of rpm's, Nemeth answers: "Yes, such data can be used to show improvements-provided we look in the right places."

To do this more easily, he is presently constructing a computer program able to manipulate data easily and quickly to find these "right places." The program, when complete, will have diagnostic and, eventually, predictive capability.

Which means that, some day, Nemeth or another researcher armed with the program can say: if a site has this or that characteristic, curve, slope, shape and so on, under these specific terrain conditions then some combination of rpm's in the center line or along the edges will or will not reduce accidents. Nemeth's opinion based on what he has seen so far, is that the rational, proper, well thought out use of rpm's can easily cut accidents in half, and "quite possibly eliminate nearly all delineation-related accidents.

Reprinted from News In Engineering
a publication of Ohio State University

Automotive History Highlight: One of the New York insurance companies has undertaken a new line of business, reported Horseless Age in 1899. "It insures owners of motor vehicles against loss by litigation for the period of one year for the sum of \$15. The company is said to have gone pretty thoroughly into the subject and has no doubt allowed a liberal margin for profit," the publication said, according to the historical files of the Motor Vehicle Manufacturer's Association.

New Yorkers, especially those living in the Big Apple area, have a greater disdain for car driving than other states' residents. Nearly 33 percent of New York State households have no motor vehicles available, according to the Motor Vehicle Manufacturer's Association.

Drivers in Arizona, Georgia, Indiana, Missouri, and Virginia have one habit in common: they like the country as well as the city. In all five states, motorists regularly put an almost equal amount of miles on rural roads and urban streets, according to the Motor Vehicle Manufacturer's Association.



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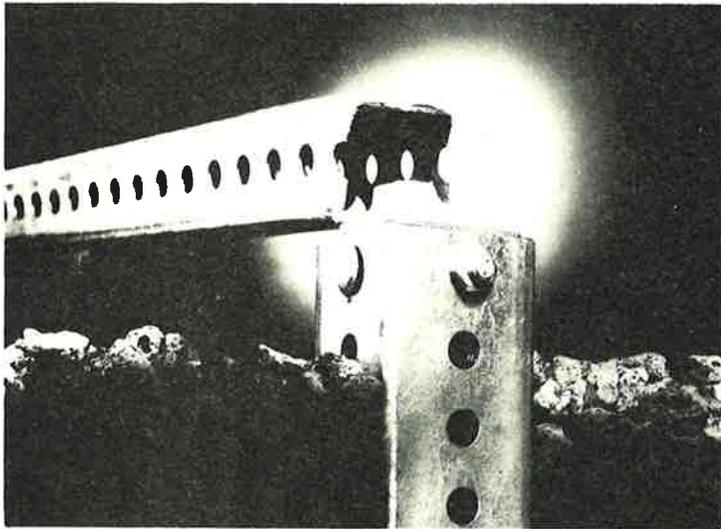
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