

R-650

RESEARCH LABORATORY DIVISION OPERATIONS

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State of Michigan
Department of State Highways
Lansing, July 1967

RESEARCH LABORATORY DIVISION OPERATIONS

The Research Laboratory was established in 1939 to carry on the research work formerly done by the various Divisions within the Department. The Laboratory was charged with the responsibility of creating and executing a program of highway research commensurate with the needs of the Department.

FUNCTIONS

The functions of the Research Laboratory may be broadly defined as follows:

1. To visualize the problems of highway technology, to determine which of the many phases involve further research, to formulate and execute a definite program of research.
2. To perform experimental and developmental research directed toward the solution of technical problems arising in the various Divisions of the Department, or to the development of new procedures and methods and the improvement of existing ones.
3. To participate in theoretical researches directed toward the solution of certain major problems of interest in the general field of highway engineering.
4. To engage in cooperative research programs with educational institutions, agencies of the Federal Government, and certain manufacturers on problems of mutual interest.
5. To provide specifications and standards for materials, make specialized analyses and research tests on new materials, and render assistance in regard to construction difficulties.
6. To accumulate, analyze, and distribute to the Department technical and research information from outside sources pertaining to highway problems.
7. To prepare technical reports for distribution within the Department and, where applicable, for publication in national research publications.

8. Through membership in the various national technical organizations, represent the Department in their activities by taking part in committee work.

9. To act in an advisory capacity to the Department on problems of a technical nature or on matters of policy in regard to design, construction, and maintenance practices.

FACILITIES

A. Personnel

Research Laboratory capability is primarily a matter of developing a knowledgeable and specialized staff in the various aspects of highway design, construction, and maintenance. The staff of 75 people includes a professional staff of 35, consisting of 11 Civil Engineers, 3 Chemical Engineers, 6 Chemists, 3 Electrical Engineers, 1 Mechanical Engineer, 4 Physicists, 3 Geologists, and 2 Statisticians. We have been stressing graduate studies and 8 out of 11 of the staff, at the IV level or above, have one or more advanced degrees. At the III level, 5 out of 9 have one or more advanced degrees. Four out of 7 of our engineers at the III level are registered and, of course, all at the IV level and above are registered professional engineers. A staff of forty supporting personnel consists of 32 laboratory technicians and aides, 2 machinists, 1 technical writer, and 5 clerical persons.

B. Laboratories

The Research Division has been developed with special laboratories in the following areas: concrete, cement and aggregate, soils, structures, electronics, lighting and photometry, coatings, sealers and plastics, spectro-chemistry, and statistics and data processing. Each of the Laboratory areas is equipped with standard and specialized equipment to carry out their functions. The total equipment inventory consists of 1,570 items with a value of \$507,000.

ORGANIZATION

The operations of the Research Laboratory Division are organized into four sections: Materials Research; Spectroscopy and Photometry; Physical Research; and Soils and Aggregates, with supporting administrative units for Statistics and Data Processing, and Publications-Library, as shown in Figure 1.

OPERATIONS

The Research Laboratory Division's operations span a rather broad spectrum of Departmental interests, including research assignments in planning, traffic, design, construction, and maintenance. The Division conducts its activities primarily on the basis of requests and expressed needs of other operating Divisions and Offices of the Department. The Laboratory's current work program may be divided into the following four general areas of research:

1. Highway Planning and Research Projects: This research is conducted in cooperation with the Bureau of Public Roads, and largely Federally financed.

2. Departmental Research Projects: These are generated by requests of other Divisions and are generally of the following types:

A. Specific Assignments--where the study may be terminated upon completion of testing or analysis.

B. Continuing Performance Studies--where a study may continue for up to 15 years until definite results are obtained in the evaluation of the performance of materials or methods.

C. New Materials Project--these are evaluations of methods or materials referred to the Laboratory by the Department's New Materials Committee which first screens them in a preliminary review to determine if they are of interest to the Department. Since the Committee's formation in 1959, 169 projects have been assigned.

3. Technical Assistance: This service is rendered to other Divisions and Offices by specialists within the Laboratory on concrete, soil, structures, etc. Some of this work is handled through continuing Departmental Committees, such as Traffic Control Devices, or Bridge Inspection Committee; or Ad Hoc Committees for special areas such as continuously reinforced pavement design, or bridge deck finishing. This area also includes consultation work on special problems, as well as the more routine matter of developing new specifications or revising existing specifications.

4. Acceptance Testing: The Research Laboratory Division tests certain new or specialized materials such as highway lighting, luminaires, cable, standards, traffic control devices, reflectorized signs, signals, traffic controllers, illuminated case signs, delineators, traffic paint and glass beads, and other materials such as neoprene joint seals and epoxy materials.

The distribution of work in these four areas is shown in Figure 2 for 1964 and, more recently for March-April 1967. The major distribution changes are reflected in Acceptance Testing, an increase from 4 to 14 percent, and a decrease in Highway Planning and Research projects from 31 to 11 percent.

Highway Planning and Research Projects

These projects are initiated by the Research Laboratory preparation of a Project Proposal. This proposal covers the research problem, the scope of the study, the objectives, benefits of the study, the research plan or procedure, and an estimate of the cost. The proposal is then reviewed by the Department's Research Policy Committee and, if approved, is submitted to the Bureau of Public Roads for their review, approval, and incorporation in the HP&R, largely Federally financed, research program. To receive Federal financing, these projects must be of national rather than only local interest, and research benefits should be applicable to other States.

Since July 1963, when this program became effective, 17 projects have been handled under the program. Two of these are completed--the "Pile Driving Study," and "Sign Brightness in Relation to Legibility." Five are nearly complete, with final reports being written or already submitted for review and approval. Some of these studies are:

1. Control and Prevention of Deterioration of Concrete Bridge Decks: This study involves evaluation of structural design, construction, materials and maintenance, and their effect on the durability of the bridge deck surface. Currently, the deterioration of bridge decks after 10 years or less as illustrated by the New York Thruway bridges, the Dan Ryan Expressway bridges in Chicago, and some of our own bridges, makes this an urgent problem.

2. Effect of Loadings on Bridge Life: The purpose of this study is to acquire the strain histories, at critical locations in bridge members under actual traffic loadings, in order to determine if fatigue from repeated loading will affect their structural life.

3. Concrete Pavement Design: All Michigan's postwar pavements have been studied in terms of performance observations at the end of 5-, 10-, and 15-year periods of service. Condition surveys and roughness measurements are made and the performance of these pavements in terms of the absence of cracking, spalling, joint blow-ups, etc., are related to construction, materials, traffic, and environmental variables, in a cause and effect analysis.

4. Lights and Lighting for Hazard Warning and Delineation: A study to improve safety under construction conditions, by developing and improving battery-operated flasher warning lights or other hazard warning devices which will eventually lead to improved specifications and possible standardization among the States.

During the fiscal year starting July 1, 1967, nine HP&R projects are programmed. Seven of these are continuations of previous studies and two are new projects. Approximately one-quarter of the research effort is scheduled on HP&R projects for the coming year. A few of the HP&R studies are as follows:

1. Automatic Weighing of Vehicles in Motion and Collection of Traffic Data by Electronic Methods. This project is in the final phase of testing the accuracy, and evaluating the serviceability, of the system.

2. Highway Quality Control Program. This is a continuation of a study to develop quality assurance for highway materials and methods based on statistical procedures adopted from industrial quality control methods.

3. Protective Coatings for Highway Metals. This is a continuing research program for improving the durability of paint and galvanized coatings for bridge steel, guard rails, etc.

4. Development of Nuclear Methods for Quality Control of Highway Embankment Construction. This is a continuing program to evaluate and improve the speed and accuracy of measuring density and moisture content of soil and aggregates by means of radioactive isotopes.

5. Dynamic Load Aspects of Truck Size and Weight. This project studies the effect of pavement roughness along with truck suspension characteristics, on the impact effect, or increasing dynamic axle load over the static axle weight.

Departmental Research Projects

Currently, the Research Laboratory is engaged in 94 Departmental research projects. The largest part of these are of the continuing variety, requiring long-term observations of performance.

Thirteen projects are performance evaluations of construction and maintenance methods.

Thirty-eight projects are performance evaluations of highway materials and methods.

Twenty-two projects are structural design studies.

Six projects are for the purpose of developing certain individual specifications.

Seven projects deal with gathering research information not directly applicable to specific project objectives, but necessary for departmental information or for application to other studies.

Eight projects cover investigations of cause and effect in situations on construction projects where performance was materially below normal.

In addition, there are currently 38 investigations or evaluations of new materials and methods. These are projects which have been assigned by the Committee for Investigation of New Materials and test results will be reported back to the Committee for possible approval and implementation into existing specifications.

The results of all of these studies are covered in reports. In Figure 3, the growth of new research projects in 5-year increments and the growth in reports in 2-year increments is shown.

Technical Assistance

An example of this area of research work is the Research Laboratory Division representation on the Bridge Deck Inspection Committee. The committee has inspected over 250 bridge decks where maintenance problems have developed. They assess the need for repairs, recommend materials and methods to restore them, provide an estimate of repair costs, etc.

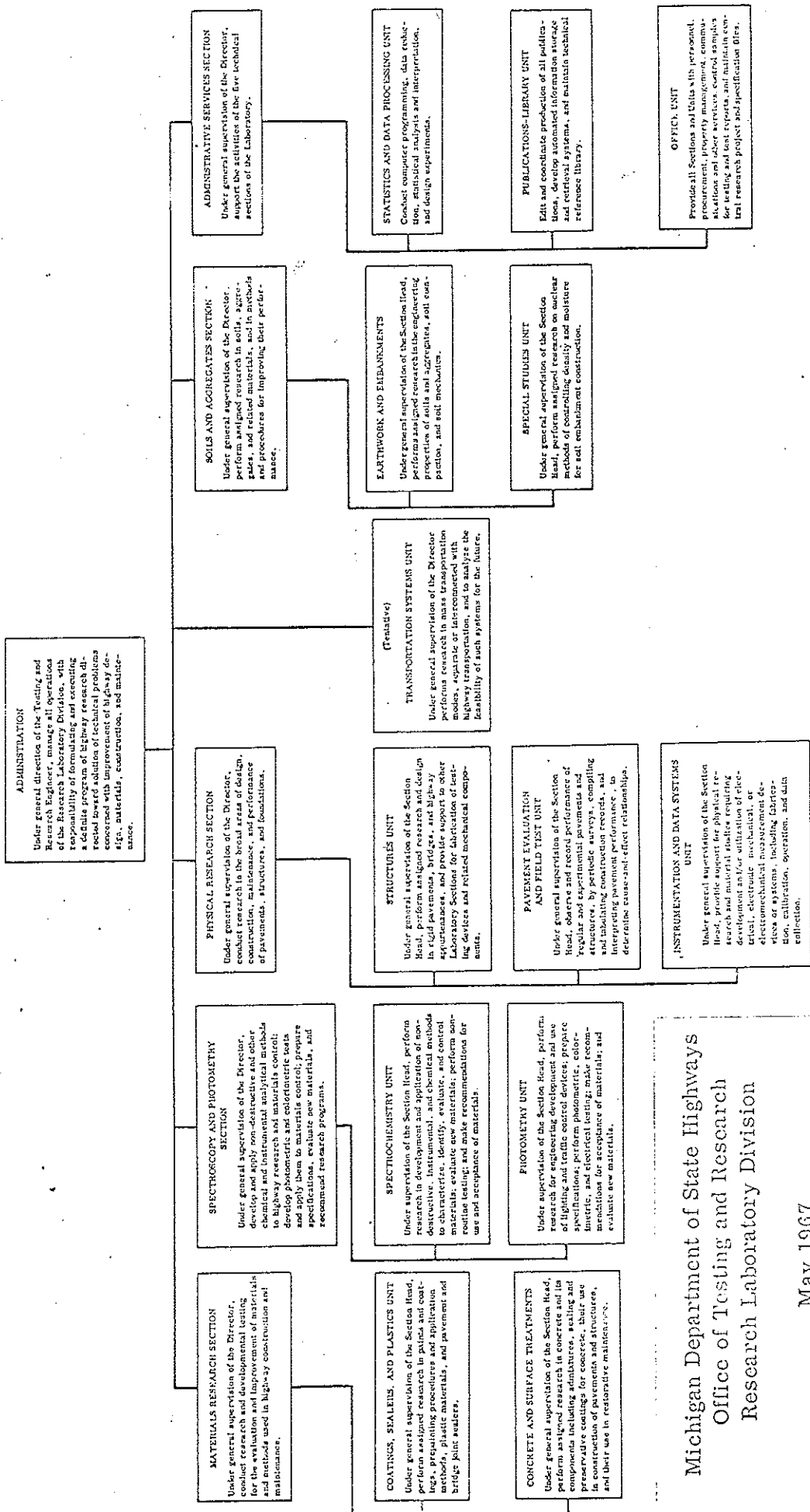
Acceptance Testing

The final major area of the Research Laboratory's work deals with acceptance testing of new or specialized materials. One area of such testing in which we have been involved for 10 years or more is traffic control devices (traffic signals, traffic controllers, illuminated signs, reflective sign materials, traffic paint, and traffic beads). Recently, two new major areas of acceptance testing have developed: 1) the use of preformed neoprene joint seals in place of hot-poured rubber-asphalt joint seals and 2) the initiation of lighting on highway projects in urban areas. Acceptance testing in connection with highway lighting,

requiring the building of special photometric equipment for measuring the light distribution at various angles from luminaires, and the testing of a variety of electrical wires and cables, and the testing of the light standards.

The growth of acceptance testing since 1964, in terms of materials tested is illustrated in Figure 4. It should be noted that the total number of samples tested for acceptance has grown in two years from 557 to 1,148, more than a 100 percent increase.

In summary, the Division's function in terms of Research and Development Studies, Technical Services, and Acceptance Testing, together with the interaction of these studies and their influence on Planning, Design and Traffic, Construction and Maintenance, is illustrated in Figure 5. The Division's previous and current research studies were reviewed and characterized to indicate their function in Highway Department operations.



Michigan Department of State Highways
Office of Testing and Research
Research Laboratory Division

May 1967

Figure 1. FUNCTIONAL ORGANIZATION CHART.

1964

MARCH - APRIL 1967

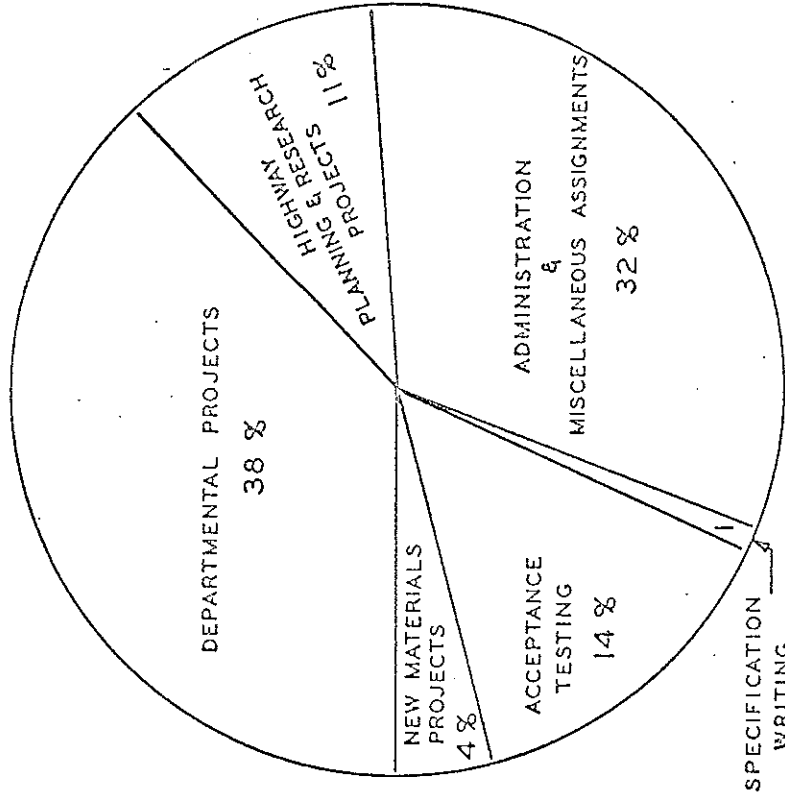
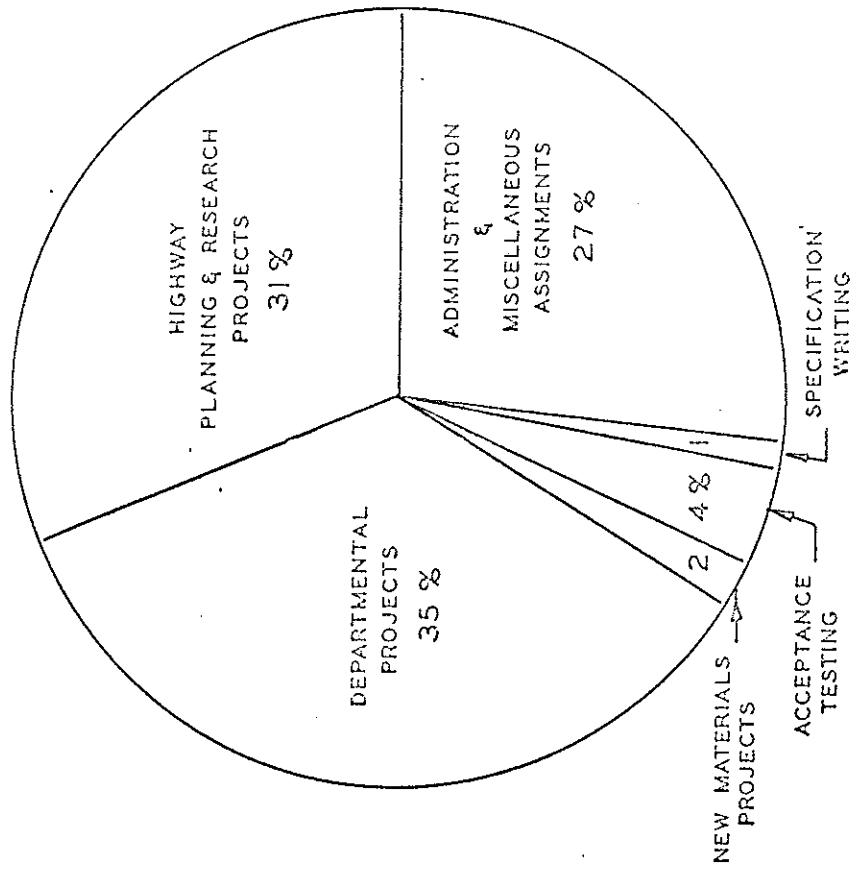


Figure 2. Research Laboratory Division Operational Distribution

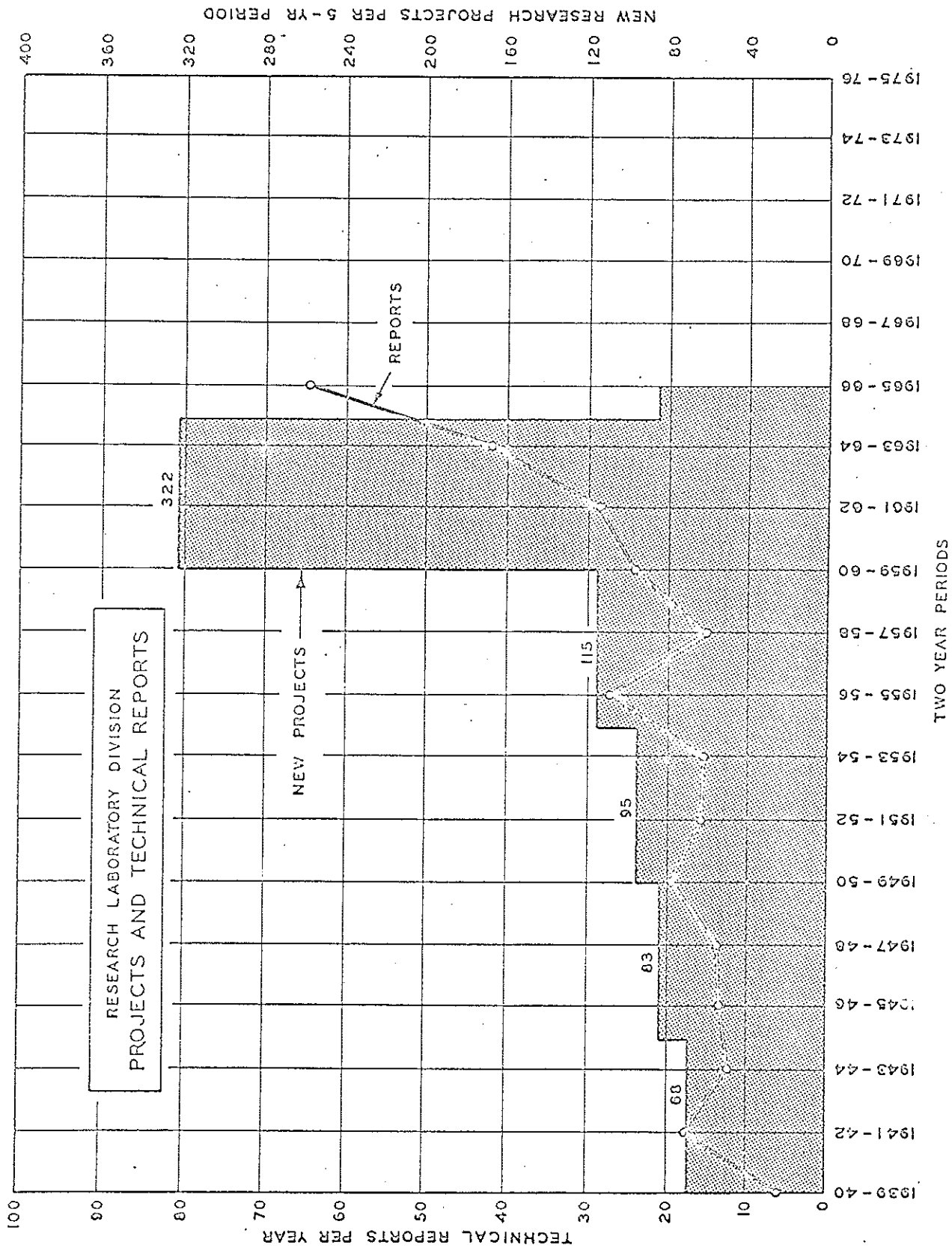


Figure 3.

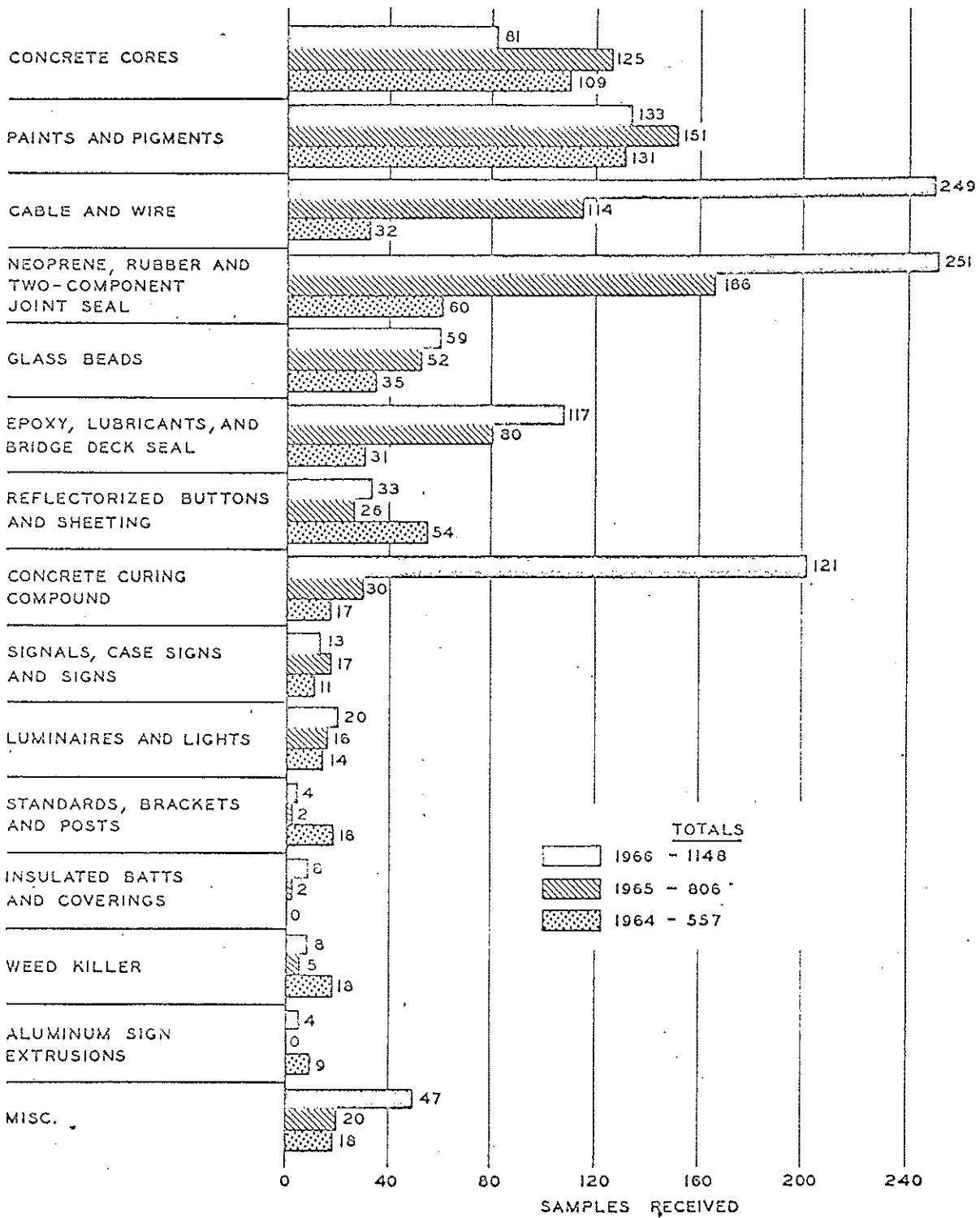
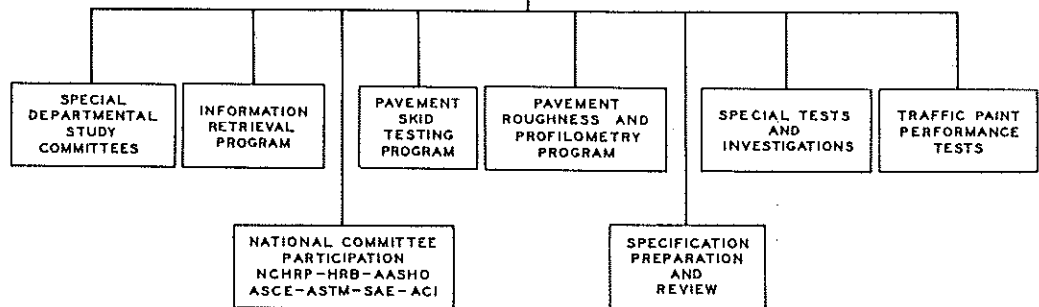


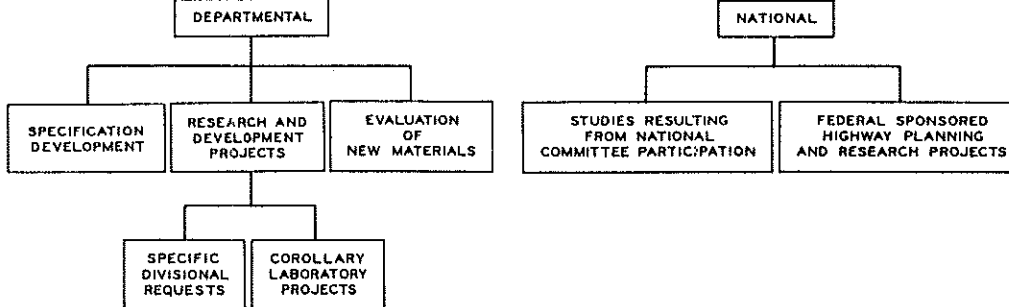
Figure 4. Research Laboratory Division Distribution of Testing by Materials.

RESEARCH LABORATORY FUNCTIONS

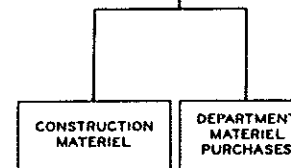
TECHNICAL SERVICES



RESEARCH AND DEVELOPMENT



ACCEPTANCE TESTING



PLANNING

THE RESEARCH LABORATORY DOES NOT NORMALLY PARTICIPATE DIRECTLY IN THE PLANNING PHASES OF DEPARTMENTAL OPERATIONS, HOWEVER, IT IS INDIRECTLY INVOLVED AS A RESULT OF ITS RESPONSIBILITY FOR MANY OF THE LONG-RANGE STUDIES THAT FORM THE TECHNOLOGICAL FOUNDATION UPON WHICH PLANNING IS ULTIMATELY BASED.

THE LABORATORY CONSULTS, PERFORMS STUDIES, OR PREPARES PRELIMINARY DESIGNS WHERE NECESSARY, TO FACILITATE OR DEMONSTRATE FEASIBILITY OF PROJECTS INVOLVING SPECIAL OR UNIQUE PROBLEMS.

THE RESEARCH AND PLANNING STAFFS SHARE A MUTUAL INTEREST IN LONG-RANGE DEVELOPMENTS IN HIGHWAY TECHNOLOGY AND TRANSPORTATION, NOTABLY EXPRESSED IN THE DELIBERATIONS OF THE DEPARTMENT'S RESEARCH POLICY COMMITTEE. THE GROUP REVIEWS AND APPROVES PROPOSALS AND PROGRESS OF MAJOR RESEARCH INVESTIGATIONS, AFFORDING AN OPPORTUNITY TO ANTICIPATE MATTERS OF FUTURE CONCERN TO HIGHWAY PLANNING.

DESIGN AND TRAFFIC

THE DESIGN OF HIGHWAY STRUCTURES DRAWS HEAVILY ON METHOD AND MATERIAL SPECIFICATIONS. THESE SPECIFICATIONS ARE A FUNDAMENTAL AND DIRECT RESULT OF THE MANY AND DIVERSE RESEARCH PROJECTS CARRIED OUT BY THE RESEARCH LABORATORY. TO A HIGHLY SIGNIFICANT DEGREE THE SPECIFICATIONS INCORPORATED IN DESIGNS REFLECT PAST ACCOMPLISHMENTS OF PARTICULAR RESEARCH PROGRAMS OR THE RESULTS OF RESEARCH EVALUATION AND ANALYSIS OF STRUCTURE PERFORMANCE.

CONSTRUCTION

CONSTRUCTION PROJECTS, PERFORMED BY CONTRACTORS AND SUPERVISED BY THE DEPARTMENT, ARE ALMOST COMPLETELY GOVERNED BY MATERIALS AND METHOD SPECIFICATIONS. THESE SPECIFICATIONS INVOLVE, OR RESULT FROM, RESEARCH LABORATORY EXPERIMENTS AND RESEARCH PROJECTS. THEY CONSIST OF QUANTITATIVE AND QUALITATIVE DEFINITIONS AND DESCRIPTIONS OF ALL MATERIALS TO BE USED, AND OF THE METHODS AND PROCESSES FOR HANDLING, UTILIZING, COMBINING, ERECTING, AND ASSEMBLING MATERIALS INTO A HIGHWAY STRUCTURE.

ON SPECIAL EXPERIMENTAL CONSTRUCTION PROJECTS, THE LABORATORY MAY PARTICIPATE IN THE DESIGN PHASE, SUPERVISE, CO-SUPERVISE, OR ADVISE DURING THE FIELD PHASE, EVALUATE PERFORMANCE OF THE STRUCTURE DURING ITS SERVICE LIFE, AND FINALLY RECOMMEND OR EFFECT SPECIFICATION CHANGES ON THE BASIS OF EXPERIMENTAL RESULTS.

MAINTENANCE

MAINTENANCE PROCEDURES ARE NORMALLY BASED ON SPECIFICATIONS WHICH FREQUENTLY ARE THE RESULT OF RESEARCH OPERATIONS. MANY OF THE SPECIFICATIONS DEVELOPED FOR THE DESIGN AND CONSTRUCTION PHASES ARE ALSO APPLICABLE TO MAINTENANCE. HOWEVER, UNIQUE, NON-ROUTINE PROBLEMS, NOT COVERED BY SPECIFICATIONS, ARE ENCOUNTERED DURING MAINTENANCE OPERATIONS. THE RESEARCH LABORATORY RESOLVES MANY OF THESE PROBLEMS ON A CONSULTING BASIS, MAKING PROCEDURAL AND MATERIAL RECOMMENDATIONS.

SPECIAL OPERATIONS

THE RESEARCH LABORATORY IS CALLED UPON TO PERFORM IN A GREAT VARIETY OF AREAS WHICH ARE NOT SPECIFICALLY ASSIGNABLE TO ANY OF THE DEPARTMENTAL OFFICES. THESE AREAS RANGE ACROSS ALL OF THE ENGINEERING AND SCIENCE DISCIPLINES AVAILABLE IN THE LABORATORY. THEY ARE USUALLY OF A TECHNICAL SERVICE NATURE, BUT ON OCCASION ALSO INVOLVE RESEARCH AND DEVELOPMENT.

THE TABULATION WHICH FOLLOWS PRESENTS A PORTION OF THE WORK IN THIS CATEGORY PERFORMED IN RECENT YEARS.

TECHNICAL SERVICES

Currently the Laboratory is not performing in the technical service category for the Office of Planning. However, if a recent proposal is approved the Laboratory will undertake an extensive program of measuring present serviceability indices as a part of pavement sufficiency determinations, the results of which will bear directly on the operations of the Route Location and Programming Divisions of the Office of Planning.

Most of the technical services performed for the Office of Design and Traffic relate to the traffic and highway safety areas, and include such items as the Continuing Pavement and Bridge Skid Test Program for High Accident Locations, the Continuing Trunkline Skid Survey, and Determination of Skid Coefficients of Resurfaced Projects. Removal of Joint Base Plate to Improve Joint Performance, Atmospheric Pollution Measurements, and Evaluation of Externally Illuminated Signs.

The Research Laboratory frequently serves as a consulting agency to the Office of Construction, suggesting solutions to non-routine problems arising during construction that are not directly covered by specification.

Technical services performed for the Office of Maintenance include: Pavement and Bridge Profile and Roughness Determinations, Grader Blade Evaluation, Investigation of Failure of Aluminum Truss Sign Supports, Repair Techniques for Pavement Joint Blowups, Repair of Continuously Reinforced Pavements, Evaluation of Base Area Lighting, Test Methods for Guardrail Post Preservatives, and Assistance with Roadway Striping.

Editorial services for all Testing and Research publications. Review, interpretation, and applicability determination of the contents of the multitude of highway-related publications and reports produced by other agencies. Traffic paint performance tests for City of Detroit and Wayne County. Application of traffic paint test stripes for State of Ohio. Concrete core compression tests for Capital City Airport. Soil analyses for stain organizations. Determination of the physical properties of safety ropes for Michigan State Police. Investigation of complaints of vegetation damage resulting from ice control chemicals. Noise and vibration studies to determine validity of complaints relative to construction operations and to purported structure damage resulting from vehicle-rough pavement induced vibrations. Investigation of water pump impeller failures for Wayne County. Assisting in the motorization of the St. Clair Swing Bridge. Evaluation of vehicle warning flashers. Color testing of vehicle paints. Determination of effects on vehicle paints of asphalt resurfacing. Identification of gasoline and crankcase additives. Continuing evaluation of all types of measurement instrumentation related to the highway problem.

RESEARCH AND DEVELOPMENT

Research and development programs carried out by the Laboratory which apply to Departmental Planning operations include: M 115 Michigan Test Road, M 43 Test Road, US 27 Test Road, I 96 (west) Continuously Reinforced Test Road, I 96 (east) Continuously Reinforced Test Road, I 96 Experimental Transverse Joint Test Road, and the I 94 DIE Studies (basis for relocation or salvage decision).

Projects of major significance and application performed cooperatively with the Bureau of Public Roads (BPR Funding) are: Study of Dynamic Load Aspects of Truck Size and Weight, Automatic Weighing of Vehicles in Motion and Collection of Traffic Data by Electronic Methods, Highway Quality Control Program, Development of Information Storage and Retrieval Systems for State Highway Technical Information, Evaluation of Aggregate Sources of Glacial Origin, Effects of Loadings on Bridge Life, Statewide Determination of Highway Loadings and Conversion to 18-Kip Single-Axle Load Equivalents, and Concrete Pavement Design.

Major long-range programs, performed by agencies outside of Michigan, which have been studied, analyzed, and interpreted by the Laboratory for the Department include: Maryland Test Road, WASHO Test Road, and the AASHTO Test Road.

Projects directed towards establishment or refinement of design specifications which are currently active (1967) include: Concrete Pavement Design, Performance of all Postway Concrete Pavements, Systematic Installation of Bituminous Pavements, Pavement Slab Action Under Dynamic Loads, Concrete Recapping (Grosbeck Highway and US 127, Holt), Continuously Reinforced Concrete Pavement (I 96 East and I 96 West), Dynamic Loading Effects on Bridges, Transverse Joint Construction (I 96), Experimental Expansion-Contraction Joints, Performance of Interstate Bituminous Pavements, Soil Aggregate Cushions for Preventing Pavement Reflection Cracking, Compilation of Design and Construction Data for Concrete and Bituminous Pavements, Extruded Neoprene Joint Seals, Cleaning and Painting Structural Steel, Rubber Pads for Railroad Crossings, Barrier Rail Studies, Elastomeric Bearing Pads for Bridges, Fracture Plane Determination of Bridge Decks, Orthotropic Plate Bridge, Welded Bar Mat Concrete Reinforcement, Concrete Bearing Strengthening in Warping Joints, Parapet Bridge Rail Anchorage, and Durability and Weatherability Index of Asphalt.

In addition, the Research Laboratory has been actively involved in traffic oriented studies since 1954. This program, accomplished in cooperation with the Traffic Division, has been devoted primarily to the development of specifications for traffic control devices, and has resulted in a great variety of traffic specifications, including: Traffic Signals, Traffic Controllers, Traffic Signs, ReflectORIZED Sign Sheeting, Battery Operated Flashers, Illuminated Case Signs, Internally Illuminated Signs, Aluminum Sign Panel Extrusions, Aluminum Overhead Sign Support Structures, Roadside Cantilever Sign Supports, Traffic Cones, Reflector Buttons, Glass Beads, Traffic Paints, Development of Illuminated Target Arrow Sign, Sheet Steel Signs, Thin-Walled Formed Steel Sign Sections, Louvered or Non-Solid Sign Backings, Breakaway Supports for Signs and Light Standards, Glare Screen Evaluation, Luminance of Signs Set back from Roadway, Sign Brightness in Relation to Legibility, and Lights and Lighting for Hazard Warning and Definition.

Recent or current research and development related to construction includes the following projects: Concrete Admixtures, Limestone Aggregate Sources, Slag Aggregate Sources, Sodium Chloride Shoulder Stabilization, Addition of Lime to Soil-Aggregate Mixtures, Methods of Shoulder Stabilization, Bituminous Pavement Foundations, Concrete Base Widening, Degradation of Base Course Aggregates, Service Joint Filler and Sealer, Bridge Deflections Under Machine Finishers, Effects on Concrete of Bridge Machine Finishers, Damping Bridge Vibration During Construction Whining, Prestressed Concrete Bridge Beam Practices, Hollow Plastic Joint Fillers, Sealing Structure and Pavement Joints, Rippling of Bridge Decks, Freezing Index Studies, Investigation of Overruns on I 69 Bridges, Highway Quality Control Program, Determination of Placemnt A in Hardened Concrete, Corrosion Resistance of Dowels, Use of Low Alloy Steels in Bridges and Apertures, Protective Coatings for Structural Steel, Study of Air-Entrainment Factors in Concrete, Improvement of Soil Density Control Methods, Evaluation of Nuclear Methods for Weighing Aggregates, Development of "One Point" Proctor Density Test, Evaluation of Speedy Moisture Tester, and Evaluation of Soil Stabilizers.

For maintenance problems of an extensive or long-range nature, research studies are performed to develop appropriate specifications. Typical projects would be: Latex and Fast-Set Concrete for Structure Restoration, Effects of Salt on Concrete, Bridge Deck Sealing and Curing Compounds, Maintenance Determination Program for Structures (Bridge Deck Inspection Committee), Determination of Cause of Spalling of Substructure Concrete on Detroit Expressways, Sealant Coatings for Bridge Decks, Metallic and Paint Coatings on Highway Structures, Evaluation of Ice Control Chemicals, Study of Frost Action in Shoulders, Determination of Methods for Reducing Shoulder Cracking, and Pavement Marking Materials.

Measurement instruments, devices, and methods necessary to accomplish many laboratory assignments, do not exist or are not commercially available. As a consequence, the development of such methods or devices is an important phase of many projects. A portion of such developments of recent years are: Force, Acceleration and Penetration Instrumentation for Pile Driving Hammers, Street Light Photometer and Gonphotometer, Pavement and Bridge Load Test Vehicle, Rapid Travel Road Profilometer, Pavement Skid Testing Equipment, Pavement Roughness Measuring Equipment, Impact Testing Device for Embedded Anchors, Fatigue Testing Device for Extruded Neoprene Joint Seals, and a Device for Field Measurement of Pavement Core Thickness, Low Temperature Bond Test Equipment for Joint Seals, High Pressure Meter for Measuring Air Content of Hardened Concrete, Abrasion Tester for Aggregates, Original Design and Specifications for Automatic Freeze-Thaw Equipment for Determining Concrete Durability, Constant Temperature and Humidity Cabinet for Testing Concrete Curing Materials, Differential Thermal Analyzer for Identifying Clay Materials in Soils, Controlled Freezing Effects Cabinet for Simulating and Measuring Frost Action Effects in Soils, Portable Instrumentation for Measuring Transverse Bulging of Pavement Surfaces, Apparatus for Measuring and Evaluating the Effects of Water Movement in Soils and Aggregates, Portable Device for Measuring Depth and Area of Freezing in Pavement Foundations.

Test method developments include Water Retention for Curing Compounds, Determination of Calcium and Magnesium in Urine, and Determination of Sodium and Potassium in concrete by flame.

ACCEPTANCE TESTING

Acceptance testing of certain special construction materials and the development of field and laboratory test equipment for certifying compliance with material and method specifications is a function of the Research Laboratory. Recent equipment developments include the Nuclear Soil Moisture and Density Gage, and the Neutron Concrete Moisture Gage. Construction materials which are acceptance tested include: Neoprene Joint Seals, Epoxy Compounds, Polyamide and Polyurethane, Plastic Water-Stops, Traffic Controllers, Signs and Signals, ReflectORIZED Sheeting, Light Standards, Luminaires, Aluminum Sign Panel Extrusions, Reflector Buttons, Wire and Cable, and Hazard Warning Lights. The Laboratory also does part of the acceptance testing on Hot-Pour and Cold-Applied Joint Seals, and Curing Compounds.

Acceptance testing performed for the Office of Maintenance duplicates much of that performed for the Office of Construction. It includes the same construction and traffic materials and devices plus Traffic Cones, Glass Beads, Traffic Paints, and Herbicides.