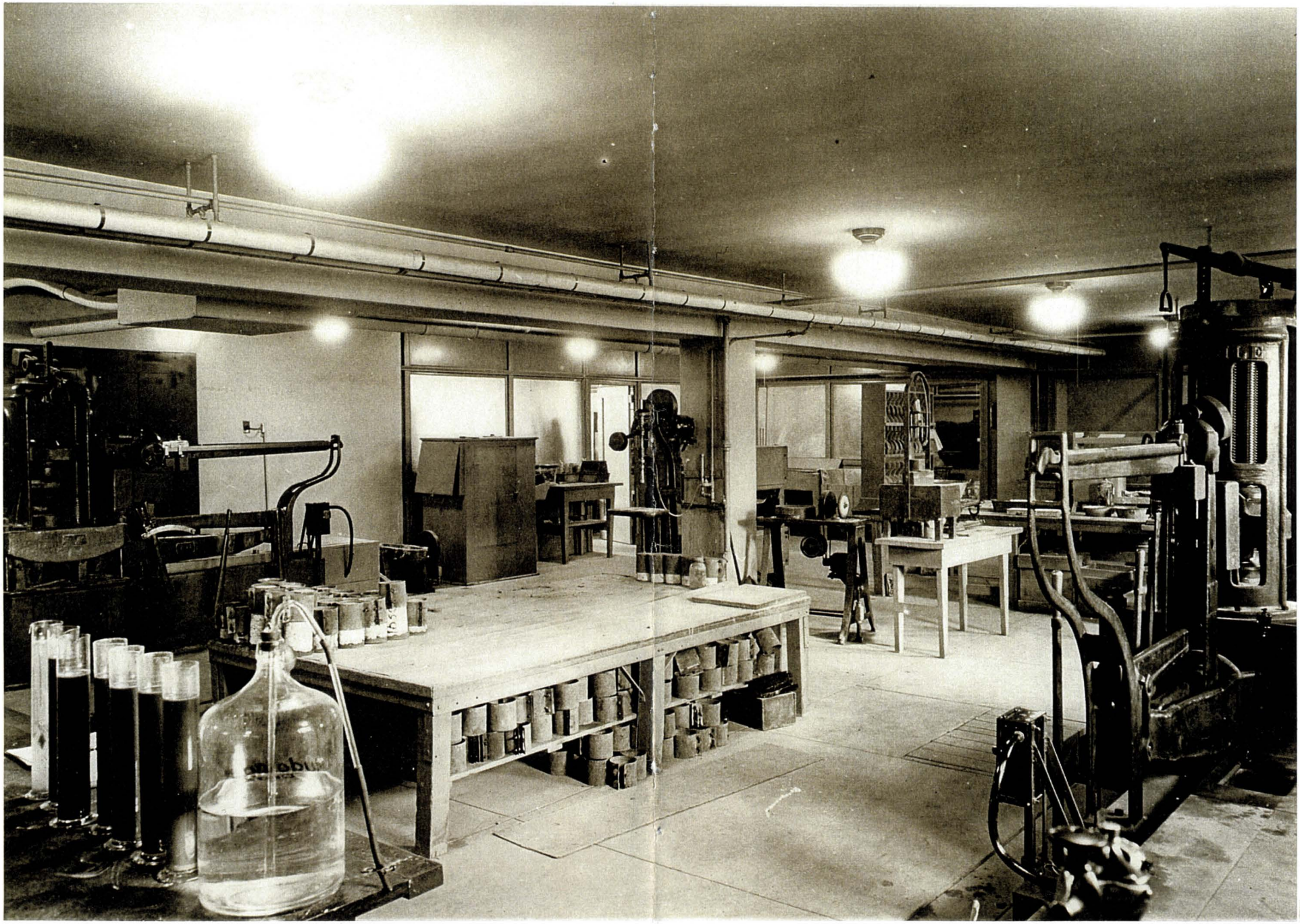
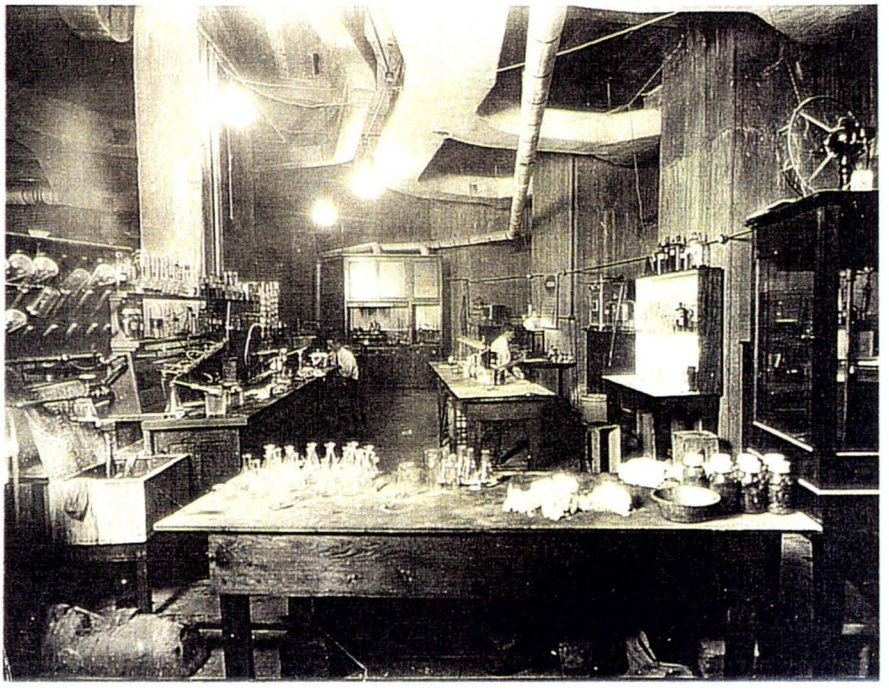
Missouri Department of Transportation

# History of the Central Laboratory



*On the cover:*
*The second laboratory, located at the Highway Building, 1930.*



*The first laboratory, located in the basement of the Capitol, 1925.*

## History of the Missouri Department of Transportation Central Laboratory

The Missouri Department of Transportation's Central Laboratory has provided testing and control of materials used in highway construction and maintenance and conducted research for 74 years. The new building is the laboratory's fourth location in Jefferson City since about January 1, 1923 when its location was first in the basement of the State Capitol building.

The purpose of the Central Laboratory is to support the transportation system of Missouri through quality assurance of materials used in transportation, technical assistance and implementation of new technologies. A quality testing laboratory and research facility is essential to carrying out this mission.

The new laboratory is a state-of-the-art facility that blends testing and research with offices for field investigations, materials design functions and research evaluations.

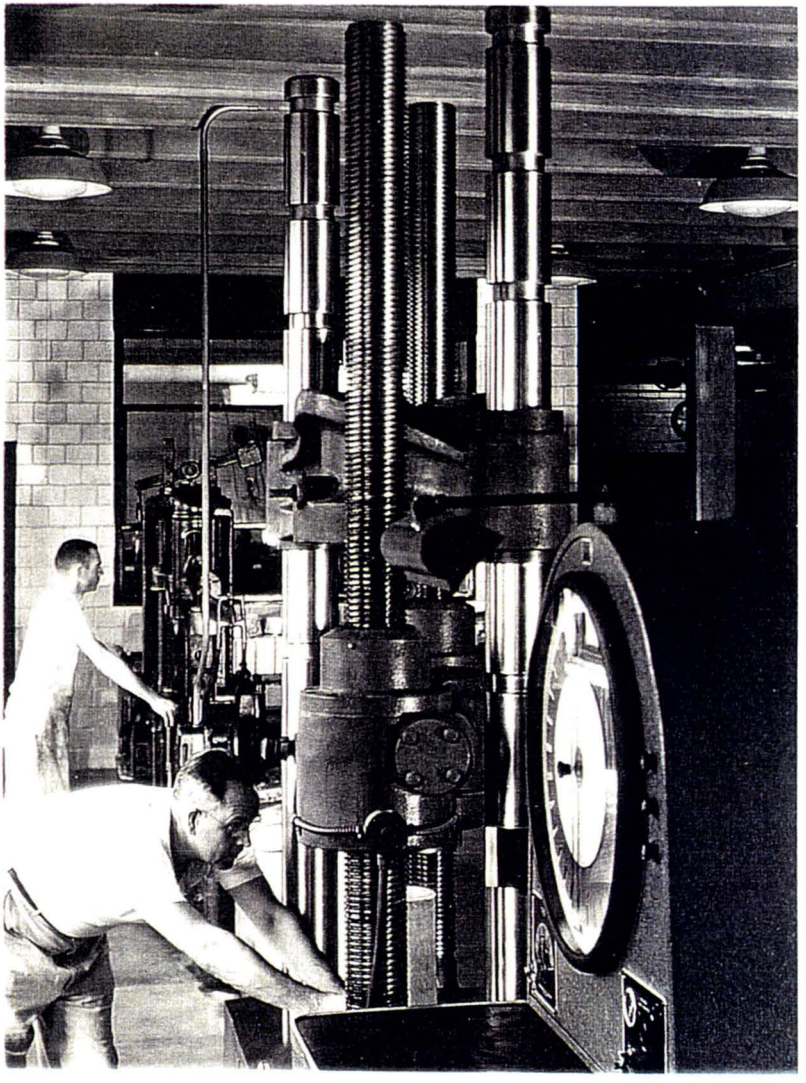
## Building History

The first laboratory was located in the Engineering Department of University of Missouri-Columbia under the direction of Professor H.A. LaRue, with a staff of five and one stenographer. According to the State Highway Board's *1921-22 Biennial Report*, "The magnitude of this testing work has grown to such proportions that, in the interest of economy and closer contact with the Construction Bureau, it has been deemed advisable to have the testing laboratory directly in connection with the general office (in Jefferson City)."

The first department laboratory in Jefferson City was located in the basement of the State Capitol building. Initially, there was one supervisor and six employees, including a stenographer employed in the laboratory. F.V. Reagel was the first engineer of tests and materials. The laboratory was equipped to take care of the routine chemical analysis of cement, steel, water, paint, oil, asphalt, tars, creosote and many other materials entering into or connected with highway construction. The laboratory was also equipped to handle routine physical tests of aggregate, steel, cement and brick, and to make preliminary quality tests to determine the suitability of various supplies of local stone and gravel for use on roadways.

The *Biennial Report* further added that testing was necessary because "No single material of construction is sufficiently standardized to be uniformly satisfactory. Probably none are free from the possibility of substitution or adulterations. Even nature fails to secure uniformity of production. The only positive assurance of receiving a uniformly high grade of materials, and therefore the fullest return on each dollar expended, is the use of proper specifications and the enforcement of such by inspection and tests. This is the function of the laboratory as it is being organized and equipped by the Missouri State Highway Department."

After operating in the Capitol Building for five years, the Central Laboratory was moved to the basement of the Highway Building at the corner of Capitol and Jefferson Streets after that



*The third laboratory, located at 1511 Missouri Boulevard., 1948.*

building was completed in 1928. During the first years of operation, the Bureau of Materials and the Central Laboratory increased their operations to include geology, core drilling, research, district materials engineers, field or plant inspectors and a special assignments engineer. Increased demands for testing and research in connection with continued advancement of highway construction methods and materials soon outpaced these facilities.

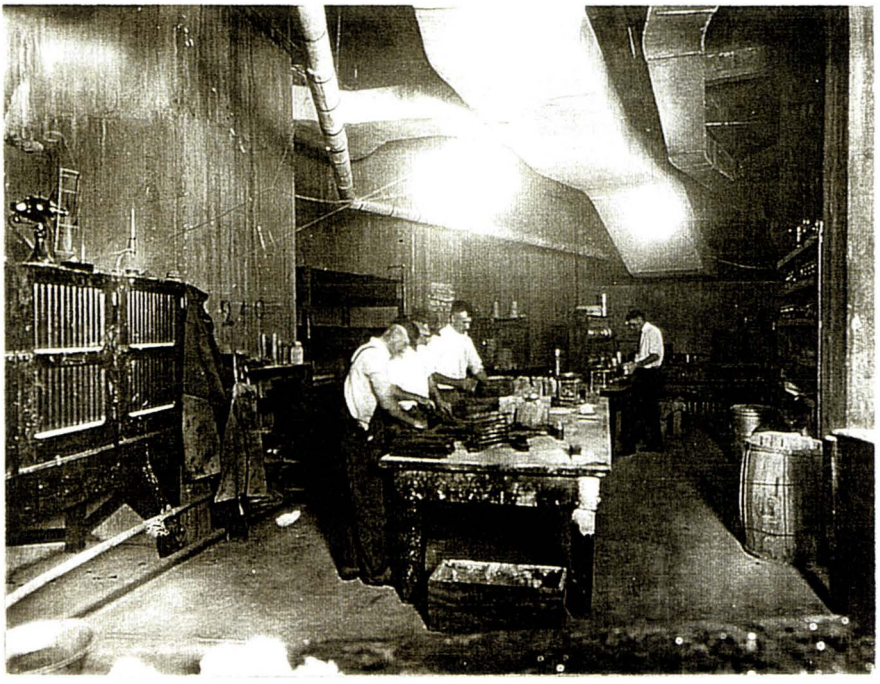
In 1938, a new, two-story building was constructed at 1511 Missouri Blvd. to house both the Materials Laboratory and the department's District 5 office. The Central Laboratory moved into this building in the latter part of 1939. In 1959, an addition was built to handle increased testing required by the interstate highway program begun three years earlier and to provide additional office space for District 5. Increased testing requirements associated with 1991 federal transportation legislation, the Intermodal Surface Transportation Efficiency Act, the Strategic Highway Research Program (SHRP) and the department's accelerated highway work schedule with the need for worker safety increased the need for a new laboratory. An employee committee worked on the basic design parameters and continued to work with the architects throughout the building's design phase.

The Benham Group, Inc., a St. Louis architectural firm, was selected in October 1990 to design the new 67,843-square foot structure, which has approximately two and a half times the space for materials testing as did the old building. Prost Builders, Inc. of Jefferson City, Mo., was awarded a contract in 1993 for $6,940,440 and completed the building in late 1995.

## New Laboratory Features

The design of the various work areas allows efficient flow of materials for storage, testing and evaluation.

The facility was built with selective, energy efficient heating, air conditioning and ventilation systems for office and laboratory space to provide a quality working environment.



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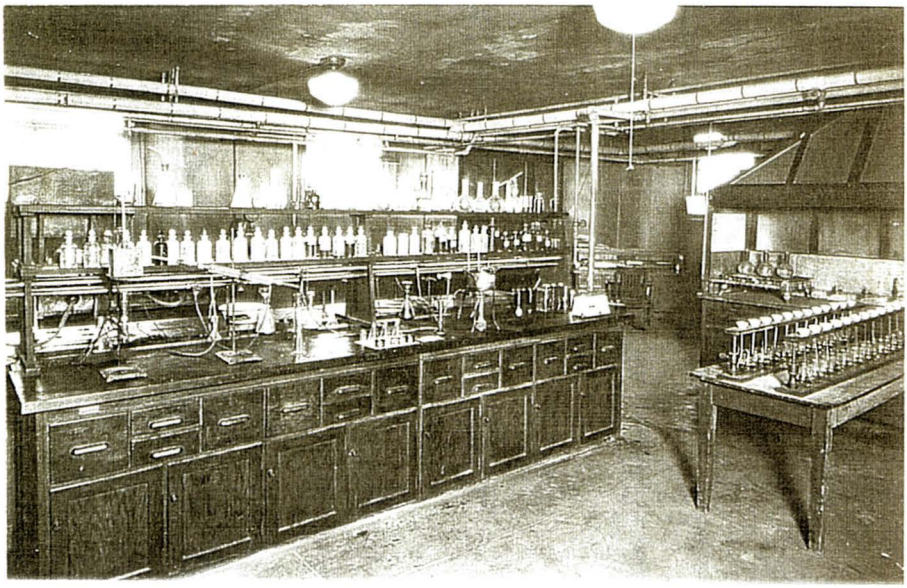
Various building codes such as Americans with Disabilities Act, safety, electrical, hazardous waste and plumbing were used in the design.

The building was designed and built to have functional and adequate testing areas as well as room for future expansion.

The new Central Laboratory is an integrated facility used to conduct research and for chemical and physical testing and evaluation of materials used in building and maintaining Missouri's transportation system. Operations in the Central Laboratory are dedicated to quality assurance of materials testing, geotechnical services and research development and technology.



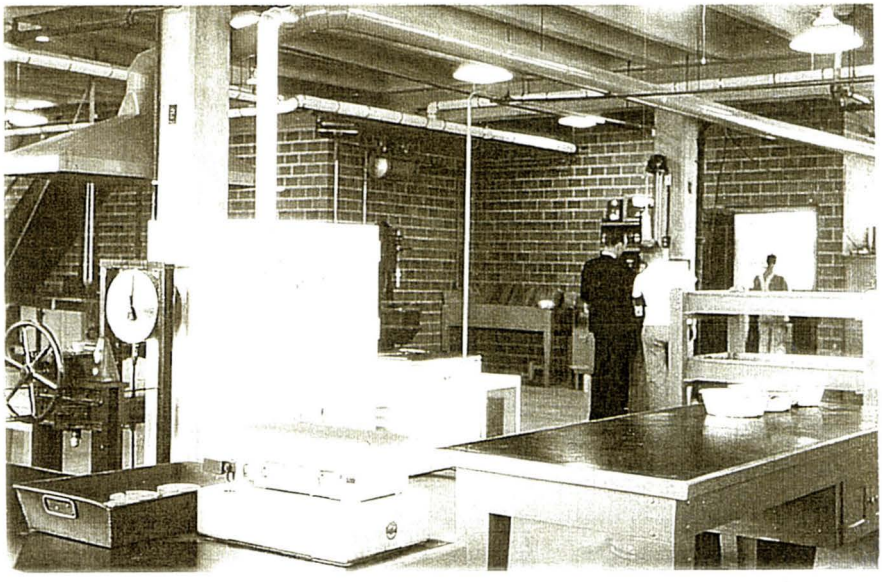
*The second laboratory, located in the Highway Building, 1930.*

## Operations of the Materials Division

The Materials Division consists of a chemical laboratory, a physical laboratory, field materials and soils and geology sections.

## Chemical Laboratory

The chemical laboratory provides quality assurance chemical testing, investigational testing and analysis of various highway construction and maintenance materials for the department. It also tests and evaluates portland cement, reflective sign sheeting and signs. Additionally, suspected asbestos-containing materials, sand blasting residue and contaminated soils are evaluated for environmental compliance. This section serves as a contact for district and other department personnel regarding test results, approval or rejection of materials, material specifications and evaluation of new or improved materials. It also approves asphalt refineries and terminals, emulsion, paint, fly ash and cement facilities that



*The third laboratory, located at 1511 Missouri Boulevard, 1948.*

produce materials for department use. The chemical laboratory participates in proficiency sample programs and inspections by the National Institute of Standards and Technology.

## Physical Laboratory

The physical laboratory provides quality assurance physical testing of various highway construction and maintenance materials for the department. It tests bituminous mixtures, soils, general materials such as reinforcing steel, high-strength bolds and concrete test cylinders. All aggregate suppliers are tested and evaluated by the physical lab, from preliminary approval to the final product used by the department. This section serves as a contact for district and other department personnel regarding test results, approval or rejection of materials, materials specifications, evaluation of new or improved materials and recommendations for resolving materials problems. The physical laboratory also participates in proficiency

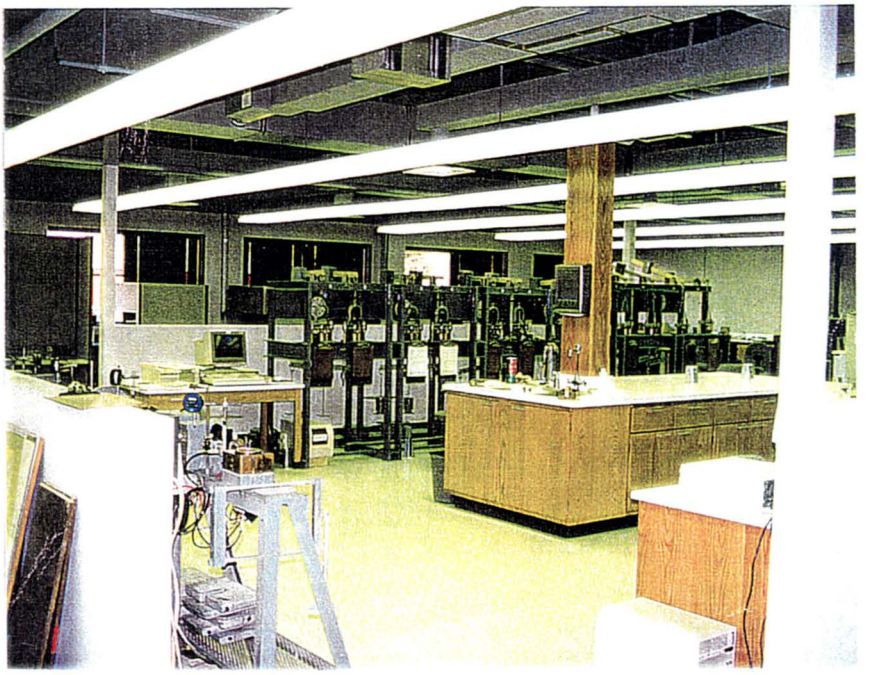
sample programs and inspections by the National Institute of Standards and Technology.

## Field Materials

The field materials section supervises the design of bituminous mixtures, concrete mixtures and special studies for the Materials Division. This section is a liaison between the districts and divisions regarding Materials Division activities and materials specifications. It interprets specifications and procedures for the districts, prepares and conducts training schools, provides guidance and instruction in problem areas. The field materials section is the lead contact in implementing the Strategic Highway Research Program (SHRP) for bituminous mixtures, such as Superpave, and other materials-related SHRP products.

## Soils and Geology

The soils and geology section provides geotechnical services for the department including laboratory and field testing as well as subsurface drilling. This section obtains and interprets the subsurface information needed to design highways and bridges. Soils and geology personnel also investigate various geotechnical matters including foundation stability and settlement of embankments; slide corrections, subgrade and base stabilization; bridge and wall foundations; sinks and mine subsidence; and the use of new technology and products. Soils and geology serves as a contact regarding geotechnical problems, new products, specifications, training programs and implementation of new products or procedures. This section also participates in proficiency sample programs and inspections by the National Institute of Standards and Technology.



*The new Central Laboratory, located at 1617 Missouri Blvd., 1996.*

## Accreditation

The Central Laboratory is accredited and regularly inspected by the Cement and Concrete Reference Laboratory (CCRL) and the American Association of State Highway and Transportation Officials Materials Reference Laboratory (AMRL), which operate out of the National Institute of Standards and Technology (NIST). It has been participating in the Reference Sample programs of CCRL and AMRL since their inception. The cement section of the chemical laboratory has been testing CCRL reference cement samples since 1929. The Central Laboratory has been participating in AMRL inspections since 1966, when the first inspection tour was started.

## Research Development and Technology Division

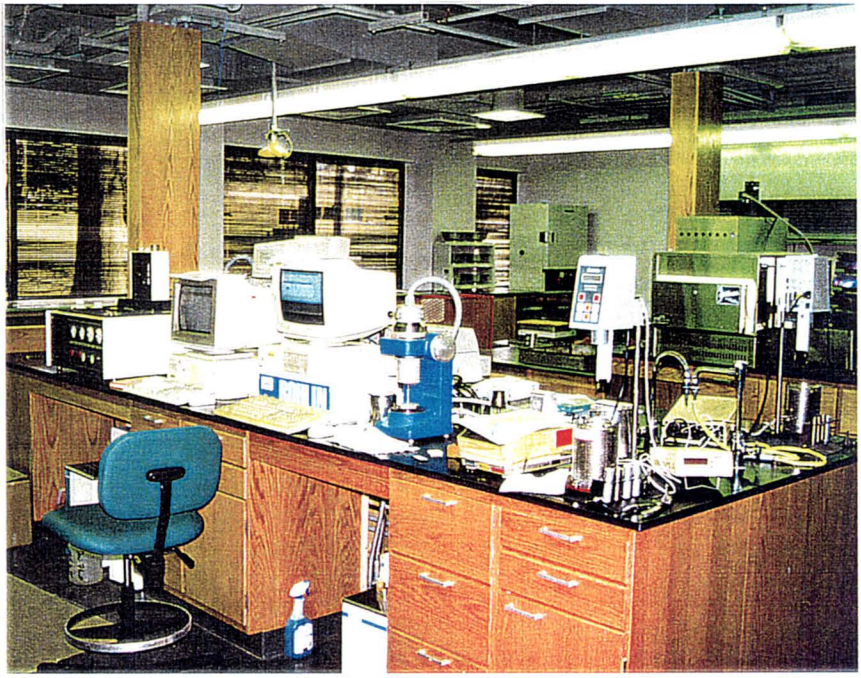
The Research Development and Technology Division, which was formed in 1996, provides the Missouri Department of Transportation with an emphasis and focus on research, development, technology transfer and implementation of innovative ideas. Establishment of this division was the result of department efforts to place more emphasis on research and identify and be responsive to the research development and technological needs of the customer. Research has long been recognized as a valuable tool to provide the most effective and economical solutions to transportation problems. The department realizes an effective research program is essential to accomplishing its mission. This new division will play an important role as the department continues to provide Missouri with a safe, effective and efficient transportation system.

## Modern Challenges

Many materials routinely tested in the field are also tested in the laboratory to ensure statewide uniform testing procedures and for specification compliance to assure that quality materials are used. The laboratory conducts tests on materials requiring specialized equipment and highly technical procedures, which are only available at the Central Laboratory. Efforts to automate laboratory tests through digital data acquisition continues to be a goal to provide uniformity throughout the Materials Division.

The Materials Division continues to develop and monitor new asphaltic concrete mixtures designed to help prevent premature rutting and add increased life. Stone mastic asphalt (SMA) and mixes containing polymers or different types of scrap rubber from used tires are some of the special mixes being evaluated. SMA is a bituminous mixture designed with a stable stone-on-stone skeleton held together by a rich mixture of asphalt cement, filler and a mineral or cellulose fiber.

The department strongly supports the Strategic Highway Research Program (SHRP) and is committed to implementing new



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SHRP-developed technology. SHRP is presently evaluating 21 as-built pavement test sections and six special-built pavement test sections in Missouri. Equipment has been purchased, and personnel are being trained to conduct tests on bituminous binders and mixtures in accordance with new SHRP testing procedures, including SHRP Superpave mixture design. Experimental projects incorporating SHRP Superpave technology have already been contracted and will be evaluated for effectiveness.

*The new Central Laboratory, located at 1617 Missouri Blvd., 1996.*

## The Future

The Central Laboratory is a state-of-the-art facility designed for testing and research. It was built to meet the needs of the department to assure the use of quality materials in constructing and maintaining Missouri's transportation system. This facility will provide support for the department and its changing environment.