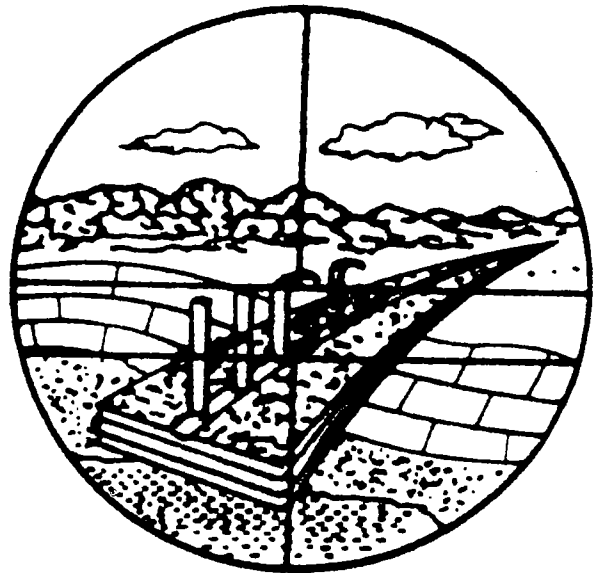


PROCEEDINGS OF THE 36TH ANNUAL HIGHWAY GEOLOGY SYMPOSIUM

BUILDING ON/WITH SEDIMENTARY BEDROCK

CLARKSVILLE, INDIANA
May 13-15, 1985

TERRY R. WEST, EDITOR



CO-SPONSORED BY
Indiana Department of Highways
Kentucky Transportation Cabinet
School of Civil Engineering
Purdue University

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Terry R. West, Editor

Cost \$15.00

36th Annual Highway Geology Symposium
and Field Trip
May 13-15, 1986
Clarksville, Indiana

The Planning Committee of the 36th Annual Highway Geology Symposium welcomed registrants to the Clarksville, Indiana (Greater Louisville, Kentucky) area. One and one-half days of technical sessions plus a one day field trip were included in the Symposium. Earl M. Wright and Richard T. Wilson of the Kentucky Highway Department served as field trip leaders. Construction projects along Interstates 65 and 71 in Kentucky and a stop on US 421 in Indiana were visited on the field trip. As always, the technical sessions and field trip provided opportunities to renew old friendships, establish new ones and to experience the pleasant, informal nature of the Symposium.

Dr. James F. Quinlan of the National Park Service was the speaker at the Annual banquet. His color slide presentation was entitled "Hydrology of the Mammoth Cave Kentucky Region with Emphasis on Groundwater Pollution".

C. William Lovell
Terry R. West
Symposium Co-Chairmen

36th Proceedings Volume HGS Dedicated
to David L. Royster
(1931-1985)



Mr. David L. Royster was born in Cross-Plains, Tennessee in 1931. He was educated at the University of Tennessee (BS in Geology-1958), with post graduate work through a National Institute of Public Affairs Fellowship at the University of Virginia (1967-68), and a Masters Degree in Business Administration at Middle Tennessee State University (1971). Prior to entering college Mr. Royster served in the U.S. Air Force (1950-1954).

In 1958 David Royster joined the Tennessee Department of Transportation as Assistant Soils Engineer, advancing to his most recent position (Engineering Manager of the Geotechnical and Laboratory Operations Office) through several levels of higher responsibility, including Chief Soils Engineer and Director of Soils and Geological Engineering. He served as a part time instructor at the University of Tennessee-Nashville where he taught "Geology for Engineers".

In addition to his work in Tennessee, Mr. Royster served periodically from 1979-1985 as a special consultant to the Republic of Peru concerning the correction of landslides along the Trans-Andean Highway.

David Royster was involved extensively as a leader of professional organizations, his service including: Chairman of the Section on Geology and Earth Materials of Transportation Research Board (TRB) (1976-82), Chairman Engineering Geology Committee for TRB (1971-75, 1982-85), Chairman of the Technical Advisory Committee for the Tennessee Department of Transportation, and Chairman of the National Steering Committee of the Highway Geology Symposium (1983-85). Mr. Royster was a registered Professional Engineering Geologist in California and in Georgia.

David Royster's list of awards and honors exemplified his impact on the profession of Engineering Geology. These include the Outstanding Paper Award by the Association of Engineering Geologists (AEG) in 1973 for his paper "Highway Landslide Problems Along the Cumberland Plateau in Tennessee" recognition as the only two time recipient of the best paper "Holdredge Award" presented by the AEG for his papers "Some Observations on the Use of Horizontal Drains in the Correction and Prevention of Landslides" (1978) and "Landslide Remedial Measures" (1983). Mr. Royster was also presented the Governor of Tennessee's "Outstanding Achievement Award" (1983) and the Tennessee Commissioner of the Department of Transportation's "Certificate of Merit" (1983) for his outstanding service to the transportation system of the State of Tennessee. Mr. Royster received the Medallion Award of the Highway Geology Symposium in 1982.

David Royster authored some 40 professional papers and articles in such journals as the TRB Record, AEG Bulletin, Civil Engineering Magazine, Rural Roads, World Roads, and the Highway Geology Symposium. Some of his more recent professional papers not included above are "Field Investigation", Chapter 4, Landslides: Analysis and Control co-authored with G. F. Sowers in TRB Special Report 76 (1978); Horizontal Drains and Horizontal Drilling: An Overview, 59th TRB Meeting (1980), "Analysis de los Problemas de Estabilidad de Taludes", Vol. D, Estudio de Rehabilitacion de Carreteras en el Pais (1982), and "The Use of Sinkholes for Drainage", TRB (1984).

Mr. David L. Royster passed away at his home in Hermitage, Tennessee, on April 29, 1985.

HIGHWAY GEOLOGY SYMPOSIUM

History, Organization, and Function

Established to foster a better understanding and closer cooperation between geologists and civil engineers in the highway industry, the Highway Geology Symposium was organized and held its first meeting on February 16, 1950, in Richmond, Virginia. Since then, 36 consecutive annual meetings have been held in 23 different states. Between 1950 and 1962, the meetings were held east of the Mississippi River, with Virginia, Ohio, West Virginia, Maryland, North Carolina, Pennsylvania, Georgia, Florida, and Tennessee serving as the host states.

In 1962, the Symposium moved west for the first time to Phoenix, Arizona. Since then, it has rotated, for the most part, back and forth from east to west. Following meetings in Texas and Missouri in 1963 and 1964, the Symposium moved to Lexington, Kentucky in 1965, Ames, Iowa in 1966, Lafayette, Indiana in 1967, back to West Virginia at Morgantown in 1968, and then to Urbana, Illinois in 1969. Lawrence, Kansas was the site of the 1970 meeting, Norman, Oklahoma in 1971, and Old Point Comfort, Virginia the site in 1972.

The Wyoming Highway Department hosted the 1973 meeting in Sheridan. From there it moved to Raleigh, North Carolina in 1974, back west to Coeur d'Alene, Idaho in 1975, Orlando, Florida in 1976, Rapid City, South Dakota in 1977, and then back to Maryland in 1978; this time in Annapolis. Portland, Oregon was the site of the 1979 meeting, Austin, Texas in 1980, and Gatlinburg, Tennessee in 1981. The 1982 meeting was held in Vail, Colorado, and in Stone Mountain, Georgia in 1983. The 35th meeting in 1984 was held in San Jose, California and the 36th HGS was in Clarksville, Indiana. This marked a return to Indiana for HGS after 18 years.

Unlike most groups and organizations that meet on a regular basis, the Highway Geology Symposium has no central headquarters, no annual dues, and no formal membership requirements. The governing body of the Symposium is a steering committee composed of approximately 20 engineering geologists and geotechnical engineers from state and federal agencies, colleges and universities, as well as private service companies and consulting firms throughout the country. Steering committee members are elected for three-year terms, with their elections and re-elections being determined principally by their interests and participation in and contributions to the symposium. The officers include a chairman, vice chairman, secretary, and treasurer, all of whom are elected for a two-year term. Officers except for the treasurer may only succeed themselves for one additional term.

A number of three-member standing committees conduct the affairs of the organization. Some of these committees are: By-Laws, Public Relations, Awards Selection, and Publications. The lack of rigid requirements, routine, and the relatively relaxed overall functioning of the organization is what attracts many of the participants.

Meeting sites are chosen two or four years in advance and are selected by the Steering Committee following presentations made by representatives of potential host states. These presentations are usually made at the steering committee meeting which is held during the Annual Symposium. Upon selection, the state representative becomes the state chairman and a member pro tem of the Steering Committee. Depending on interest and degree of participation, the temporary member may gain full membership to the Steering Committee.

The symposia are generally for two and one-half days, with a day-and-a-half for technical papers and a full-day for the field trip. The symposium usually begins on Wednesday morning. The field trip is usually Thursday, followed by the annual banquet that evening. The final technical session generally ends by noon on Friday.

The field trip is the focus of the meeting. In most cases, the trips cover approximately from 150 to 200 miles, provide for six to eight scheduled stops, and require about eight hours. Occasionally cultural stops are scheduled around geological and geotechnical points of interest. In Wyoming, the group viewed landslides in the Big Horn Mountains; Florida's trip included a tour of Cape Canaveral and the NASA space installation; the Idaho and South Dakota trips dealt principally with mining activities; North Carolina provided stops at a quarry site, a dam construction site, and a nuclear generating site; in Maryland the group visited the Chesapeake Bay hydraulic model and the Goddard Space Center; the Oregon trip included visits to the Columbia River Gorge and Mount Hood; the Central Mineral Region was visited in Texas; and the Tennessee trip provided stops at several repaired landslides in Appalachia. The Colorado field trip consisted of stops at geological and geotechnical problem areas along Interstate 70 in Vail Pass and Glenwood Canyon, while the Georgia trip in 1983 concentrated on highway design and construction problems in the Atlanta urban environment. The 1984 field trip had stops in the San Francisco Bay area which illustrated the interaction of fault activity, urban landslides, and coastal erosion with the planning, construction, and maintenance of transportation systems. In 1985 the one day trip illustrated new highway construction procedures in the greater Louisville area.

At the technical sessions, case histories and state-of-the-art papers are most common with highly theoretical papers the exception. The papers presented at the technical sessions are published in the annual proceedings. Some of these proceedings are out of print, but copies of most of the last fifteen proceedings may be obtained from the Treasurer of the Symposium, David Bingham, of the North Carolina Department of Transportation in Raleigh 27611. Costs generally range from \$5.00 to \$15.00, plus postage.

* MEDALLION WINNERS

HIGHWAY GEOLOGY SYMPOSIUM

Hugh Chase	- 1970
Tom Parrott	- 1970
Paul Price	- 1970
K.B. Woods	- 1971
R.J. Edmonson	- 1972
C.S. Mullin	- 1974
A.C. Dodson	- 1975
Burrell Whitlow	- 1978
William Sherman	- 1980
Virgil Burgat	- 1981
Henry Mathis	- 1982
David Royster	- 1982
Terry West	- 1983
David Bingham	- 1984

* In 1969, the Symposium instituted an awards program, and with the support of Mobile Drilling Company of Indianapolis, Indiana designed a plaque to be presented to individuals who have made significant contributions to the Highway Geology Symposium over a period of years. The award, a 3.5" medallion mounted on a walnut shield and appropriately inscribed, is presented during the banquet at the Annual Symposium.

STEERING COMMITTEE MEMBERS
1985

	<u>TERM EXPIRES</u>
David L. Royster - Chairman Engineering Administrator Geotechnical & Laboratory Operations Office Tennessee Department of Transportation 2200 Charlotte Avenue Nashville, TN 37203 Phone (615) 320-8241	1985
Henry Mathis - Vice Chairman Manager, Geotechnical Branch Division of Materials Kentucky Dept. of Transportation Frankfort, KY 40601 Phone (502) 564-3160	1986
Vernon L. Bump - Secretary Foundation Engineer Department of Transportation Division of Engineering Pierre, SD 57501 Phone (605) 773-340	1987
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- David Mitchell 1987
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William F. Sherman Chief Geologist Wyoming Highway Department P.O. Box 1708 Cheyenne, WY 28001 Phone (307) 777-7450	1986
Mitchell D. Smith Engineer, Res. & Develop. Div. Oklahoma Dept. of Transportation 200 N.E. 21st Street Oklahoma City, OK 73105 Phone (405) 521-2671	1986
Berke Thompson Asst. Director, Materials Control, Soil & Testing Division West Virginia Dept. of Highways 312 Michigan Avenue Charleston, WV 25311 Phone (304) 348-3644	1985
W. A. Wisner Geologist Florida Dept. of Transportation Office of Materials & Research P.O. Box 1029 Gainesville, FL 32601 Phone (904) 372-5304	1987
Ed J. Zeigler, Associate Rummel, Klepper, and Kahl 1035 N. Calvert Street Baltimore, MD 21202 Phone (301) 247-2260	1986
Mr. Joe E. Armstrong - Member Protem Chief Geologist Montana Dept. of Highways 2701 Prospect Avenue Helena, MT 59620 Phone (406) 449-2098	1986

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HIGHWAY GEOLOGY SYMPOSIUM

R. F. Baker
V. E. Burgat
R. G. Charboneau
Hugh Chase
A. C. Dodson
John Lemish
George Meadors
W. T. Parrot
Paul Price
David Royster

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Welcome and Opening Remarks

by Paul L. Owens

Deputy Director, Engineering and Management Services,
Indiana Department of Highways
Indianapolis, Indiana

Mr. Owens welcomed the speakers and other registrants on behalf of the Indiana Department of Highways. Following these welcoming remarks he provided examples of highway construction concerns in southern Indiana related to some specific aspects of sedimentary rocks.

