

the news



PHILADELPHIA SECTION
AMERICAN SOCIETY OF CIVIL ENGINEERS

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Our 66th Year

February, 1979

FEBRUARY MEETING

Philadelphia Section, American Society of Civil Engineers

TUESDAY, FEBRUARY 13, 1979

Engineers' Club, 1317 Spruce Street, Philadelphia

Cocktails — 5:30 P.M. Dinner — 6:30 P.M. Meeting — 7:30 P.M.

Happy Hour will be sponsored by the Aerial Data Reduction Associates of Pennsauken, N. J., who offer aerial photography, photointerpretation, and stereo-photogrammetric mapping service.

SUBJECT:

THE TETON DAM FAILURE, AN UPDATE

SPEAKER:

E. MONTFORD FUCIK, Chairman Emeritus, Harza Engineering Company

PROGRAM HOST:

DR. ISH ANEJA, Chairman, Structural Group



Mr. Fucik's talk will cover the most important features of the failure of Teton Dam which took place on June 5, 1976 in Idaho. The failure killed eleven persons and caused about \$400 million in property damage. Mr. Fucik will open his talk by presenting a very good 16 mm film which the U. S. Bureau of Reclamation put together.

E. Montford Fucik received his B.S. in Civil Engineering from Princeton University in 1935 and his M.S. in Engineering from Harvard in 1937. Mr. Fucik has been with the Harza Engineering Company continuously

since 1945, served as President of the Illinois Section of ASCE in 1954, and was National Director from 1968 to 1971. He served as a member of the Independent Panel to Review the Cause of Teton Dam Failure which worked from June to December 1976.

SPECIAL FEATURE:

UNIVERSITY OF PENNSYLVANIA NIGHT

The ASCE Student Chapter, Faculty and Alumni of the Civil Engineering Department of the University of Pennsylvania will be honored at this meeting. All students, faculty, and alumni are cordially invited to attend.

TECHNICAL GROUP ACTIVITIES

Geotechnical

Date: Tuesday, February 20, 1979

7:00 P.M. — Engineers' Club

Subject: **Acoustic Emissions in Rock**

Speaker: **Dr. Robert M. Koerner**

Professor of Civil Engineering, Drexel University. (Past President, Philadelphia Section, ASCE)

Dr. Koerner will illustrate and describe tunnels, mines, slope stability, gas reservoirs, etc. in rock and how these structures are monitored using the acoustic emission method.

Refreshments are served.

Hydraulics and Sanitary

Date: Wednesday, February 7, 1979

Luncheon Meeting — 12:00 Noon
Engineers' Club

Subject: **Dam Safety and Inspection**

Speaker: **Frank Vinci**

U. S. Army, Corps of Engineers

Program Host: **Clyde S. Younkin,**
Secretary-Treasurer, H. & S. Group

The speaker will discuss both the legal and technical aspects of dam inspection and dam safety.

For details and reservations contact Clyde S. Younkin, Greeley and Hansen, 1818 Market Street, Phila., Pa. 19103, Phone: (215) 563-3460.

Structural

Sponsor of Main Section Meeting
Tuesday, February 13, 1979

Mail Reservation Cards Immediately or call Mr. deKovacs at the Engineers' Club — 735-5234
Win a FREE DINNER!

STUDENTS — Plan to attend for Dinner (Half Price) or meeting after Dinner

ASCE HELPING YOUTH

Much progress has been made by ASCE members, in their effort to do their share in stemming the tide of unemployment among disadvantaged youth, which show the highest rate of unemployment of any sector in our society.

PUMP, the Philadelphia Urban Manpower Program, has been working under



Ervin Mackey (right), PUMP program participant, working in graphics with Edward M. Abrams, Senior Transportation Planner at Simpson & Curtin.

a grant from the INA Foundation to establish an "academy" within the Martin Luther King High School in Northwest Philadelphia. The idea is to provide these students with counseling; formal in-school education, and after school employment with on-the-job training; instruction experience and related services, including career opportunities.

Last year, each of the students in the "academy" class at the King High School were invited to meet with top management officials of key engineering offices to view first hand, the activities of an engineering firm while being briefed on



Trainee Mark Scott (left) of Martin Luther King High School receives his assignment and instruction from Thomas Furmaniak (right), Project Engineer, Louis T. Klauder and Associates.

these activities, by their top executives. Jobs were found for many (but, unfortunately, not all) of them, and one scholarship to the ASCE-sponsored Northeastern University Summer Institute was offered to a student.

Recognition was also given, by a cash award and a distinctive plaque, to the outstanding student in the academy class last year.

This year, efforts are underway to complete the curriculum writing for the target courses that will be upgraded at the King High School, in response to the needs of the students as perceived by the ASCE (PUMP) Committee working with their school instructors.

At this time, 15 students are now enrolled in the PUMP program at the King High School, and efforts are now underway to develop a schedule for interviewing students at employment locations by early spring. Counseling will soon be underway for the students on how to conduct themselves in interviews. Also, by early spring, selected PUMP graduates will join ASCE members at the school to address incoming students for next year's program, which begins in the fall 1979.

Efforts are underway to set aside funds for drafting equipment, reference books, field trips and other supplies that are beyond the financial capabilities of the school to provide the "academy" students.

ASCE members are invited to join the PUMP program by communicating with Co-Chairman **Tom Furmaniak** c/o Louis T. Klauder & Associates, PNB Bank Building, Broad and Chestnut Sts., Philadelphia - (215) 563-2570; job commitments for after school work in the spring, for summer work and for full time draftsman positions, are urgently needed.

ASCE IS PEOPLE

To remain vital, ASCE needs a continual flow of new members. The Membership Committee is always on the lookout for prospective members who may be seeking information on ASCE activities. If you know someone who might be a candidate for membership, please contact:

John Schumann
Membership Secretary
(215) 563-2570

The Committee will take it from there.

MEETINGS ALERT!

PROGRAMS REVERSED

The speakers and topics for the **February** and **March**, 1979 Main Section Meetings have been reversed. The **February 13** meeting will host **E. Montford Fucik**, Chairman Emeritus of Harza Engineering in Chicago, who will present a movie and slide presentation on **The Grand Teton Dam Failure**.

The **March 13** meeting will present **Angelos Demetrou**, from the office of Angelos Demetrou, AIA, who will speak on **The Atlantic City Master Plan**.

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**COPY DEADLINE FOR
MARCH, 1979 ISSUE
FEBRUARY 13, 1979**



Philadelphia Section ASCE

— One Day Seminar —

USE OF FABRICS IN SOILS ENGINEERING AND CONSTRUCTION

Date: Friday, February 23, 1979

Place: Engineers' Club
1317 Spruce Street
Philadelphia, Pa.

Time: 9:00 A.M. to 5:00 P.M.

Cost: \$100 (includes seminar notes, lunch, coffee) All proceeds in addition to costs go to the Philadelphia Section ASCE to sponsor future National ASCE meetings.

Overview: The use of man-made fabrics in soils engineering and below ground construction is increasing at a tremendous rate. From 6,000,000 sq. yds. in 1976 to 18,000,000 sq. yds. in 1977 to an estimated 40,000,000 sq. yds. in 1978. This is reflected in the amount of advertising in Civil Engineering magazine each month on fabrics which currently amounts to the equivalent of 5 or 6 full page ads. In the past the major uses were for reinforcement of poor subgrade soils and for protection of underdrain systems. Many newer uses are currently being attempted.

This seminar will present an overview of all current uses which fall into the categories of separation, reinforcement, drainage, erosion control and for flexible forms. It will then briefly touch on the many fabrics currently available. This will be followed by a description of the current tests used to characterize fabrics (physical, mechanical, hydraulic and environmental tests) and then a review of the available guidelines for selection of fabrics.

We are then fortunate to have representatives of four major fabric manufacturers present details and specifics of their fabrics in a wide variety of construction applications. These companies are Celanese ("Mirafi"), duPont ("Tyvar"), Monsanto ("Bidim") and Philips ("Petromat"). To them our sincere appreciation.

This is a fantastic opportunity for exposure to this rapidly growing technology in a minimum amount of your time. We feel that the subject is of vital interest to all contractors, engineers and related personnel in the Delaware Valley area.

(OVER)

Format:

- 9:00 to 9:15 Welcome — B. M. McNamee
- 9:15 to 10:15 Fabric Use and Types — R. M. Koerner
- 10:15 to 10:45 Fabric Properties and Guidelines—J. L. Rosenfarb
- 10:45 to 11:00 Coffee
- 11:00 to 12:00 Celanese, "Mirafi"
- 12:00 to 1:30 Lunch
- 1:30 to 2:30 duPont, "Typar"
- 2:30 to 3:30 Monsanto, "Bidim"
- 3:30 to 4:30 Philips, "Petromat"
- 4:30 to 5:00 Fabrics as Forms and other Uses — J. P. Welsh

Instructors:

- Representatives of the four Fabric Manufacturers
- Joseph P. Welsh is Vice President of Hayward Baker Co. in Odenton, MD (301 551-8200)
- Jack L. Rosenfarb (215 895-2355) and Robert M. Koerner (215 895-2343) are Faculty at Drexel University
- Bernard M. McNamee (215 895-2369) is a Director of the Philadelphia Section ASCE

Application Form:

Name:

Firm:

Address:

Phone:

Fee: \$100 includes, seminar notes, lunch, coffee.

Make checks payable to Philadelphia Section, ASCE

Send to: Dr. Bernard M. McNamee
Director — Philadelphia Section ASCE
Drexel University
Department of Civil Engineering
Philadelphia, Pa. 19104

JANUARY MEETING

January 9, 1979 Engineers' Club

Editor's Note: THE NEWS thanks Scott A. Fritzinger, Chairman of the Geotechnical Group, for his excellent resume of the technical program, in the following article.

About 150 Philadelphia Section members and guests enjoyed a pleasant evening of camaraderie and an enlightening address on the subject: "Typical Problems in Rock Tunnel Excavation." The meeting was sponsored and arranged by the Geotechnical Group, and the very capable Program Host was its Chairman, **Scott A. Fritzinger**. Principal speaker was **Ronald E. Heuer, Ph.D.**, Consulting Engineer.

Drexel in Spotlight

The meeting focused on the Civil Engineering Departments and the ASCE Student Chapters of the Day and Evening Colleges of Drexel University. A great turnout of more than 60 students and faculty, and almost the same number of alumni, relished all the attention showered upon them.

Among Drexel's distinguished teachers and alumni attending were: **Dr. Richard E. Woodring**, Dean of the College of Engineering and a prominent Phila. Section member; **Dr. Bernard M. McNamee**, Chairman of the Department of Civil Engineering and current Phila. Section Director; **Dr. Robert M. Koerner**, Professor of Civil Engineering and a Past President of the Section; **Bartley Pierce**, Faculty Advisor, Evening College ASCE Student Chapter; **Joseph Lambert**, of the Evening College faculty; **Dr. John L. Rumpf**, former Chairman of the Drexel Civil Engineering Department, now Vice President of Temple University (he was also the Dean of the College of Engineering Technology at Temple when it was first established); and **Samuel S. Baxter**, a member of Drexel's Board of Trustees, Past National President of ASCE, and one of the Evening College's most renowned alumni.

Mr. Lambert explained the Evening College B.S. Unspecified Degree program, in which students choose specialty option areas: structural, water resources, environmental, highways, sanitary engineering, etc. In these courses, many of the peripheral subjects included in the Day College curricula are side tracked.

Day College ASCE Student Chapter President **Tom Lauer** introduced the officers and members, Activities Committee Chairmen, and undergraduates. He sketched the progress and growth of technical, athletic and social activities

at the school. Tom expressed pride that the Drexel ASCE Student Chapter has attained the status of a full-fledged professional college organization.

Dr. McNamee discussed the C.E. Department affairs, notably the encouraging prospects for a new engineering building on the campus, to accommodate the progressively larger enrollments in recent years, and projected expansion in programs. The Engineering College, noted Dr. McNamee, boasts of an increase of 10-15% annually, and the present enrollment is 2300. He described faculty changes and additions, and the introduction into the curricula of new, sophisticated disciplines such as statistical computer and related design technology.

Finally, brief remarks about the Evening College Student Chapter activities were presented by Chapter President **Jeff Stokes**.

Problem Definitions

The principal speaker of the evening: **Dr. Ronald Heuer**, a private consultant to contractors and engineers, began his discussion of typical problems in rock tunnelling and excavations with a series of viewgraphs illustrating the basic causes of instability. These include rock loosening, overstress, air slaking and overbreak.

Intersecting joint sets and weak bedding planes allow separation of the individual exposed blocks of rock along the excavated tunnel crown and loss of key pieces leads to the successive fallout of adjacent unconstrained blocks. This phenomenon is termed rock loosening. Overstress of the rock along the excavated tunnel perimeter can produce either a brittle or ductile failure. The tunnel opening develops radial and circumferential stresses in the rock, similar to those around a stressed bolt hole in metal. Brittle failure occurs when the circumferential stresses exceed the unconfined compressive strength of the rock and wedges of rock, whose shape is determined from curvilinear stress lines and intersecting joints, fall from tunnel's perimeter. Ductile failure involves the plastic yielding of the rock, resulting in an inward squeeze and loosening of the material until equilibrium under the redistributed stresses is reached.

Air slaking of the rock in excavations occurs predominately in material with clay seams. Desiccation of the soil material causes a loosening of the surrounding rock with subsequent progressive failure.

Overbreak, an undesirable condition

where material in excess of the intended excavation is removed, is not necessarily the result of the excavation techniques employed. The engineered plans often call for configurations which develop tensile stresses in excess of the material's strength or which do not take into account the adverse dip of joint patterns in rock.

The orientation of the tunnel axes were shown to be related to the joint spacing and orientation, foliation and dip and strike of the bedding planes. Small amounts of fallout can be expected in tunnels driven in orthogonal, close-spaced joints while relatively large spacings of acutely-angled joints may develop large block of unstable rock. Tunnel excavation made along the strike of dipping beds could pose problems if the dip exceeds the angle of friction along the bedding planes of the rock.

Case Histories

Dr. Heuer next utilized numerous slides from various tunnels and excavations in rock to illustrate the problems described above. Methods of excavation shown included boring machines and drilling and blasting, spiling and partial-face tunnelling presupport techniques and rock bolting, ribs, drifts and gumite support techniques were also covered.

Tunnel boring machines are used to excavate circular-faced shafts in competent rock. The front-mounted cutting head contains rotating discs at various orientations which spall and break off rock. The forward advance, aligned with the use of lasers, utilizes hydraulically-operated rams reacting against radially-directed arms bearing on the tunnel perimeter. An alternative method of excavation involves grouping compressed air drills on multi-level platforms and blasting the face of the tunnel.

In areas where the face of the excavation is unstable, presupport may be necessary. Spiling involves the use of rods or channels to anchor adverse dipping blocks at the face until the excavation proceeds. Partial removal of the face, either by leaving a full-cut bench or sloping berm on the lower portion, is an alternative which can be employed separately or in conjunction with spiling.

The support of the tunnel walls and roof may be accomplished with the use of rock bolts and interconnecting pans. These steel rods, approximately one inch in diameter and eight feet long, are grouted or held by friction and tensioned to tie the unstable blocks to the competent rock mass. Pans provide support for the rock between bolts. Ribs are

(continued on page 4)

TAKE PRIDE**In Your Section Membership**

If you have been active in Philadelphia Section, ASCE affairs: attended monthly meetings regularly, participated in Technical Groups of your preference, enjoyed its social functions — then you certainly have experienced professional pride and fulfillment in your association with one of the largest affiliates of the prestigious National organization, The American Society of Civil Engineers.

If the Philadelphia Section has been deficient in serving your needs, its Officers, Board of Directors and publications media welcome your comments and suggestions; and we will discuss your grievances. But we also need your help and cooperation. Although your National ASCE membership automatically assigns you to the Phila. Section if you reside within its jurisdictional boundaries, we ask that you render the modest annual Section dues. Without this contribution on your part, the Section cannot achieve the ambitious objectives to which it aspires.

In addition, the Phila. Section receives a stipend from National ASCE for each Local Section dues-paying member. Without this subsidy from Headquarters we could not meet our budget, because the Section dues are not enough to cover per-member costs.

Certainly, the \$10.00 annual Section dues is reasonable. And your rewards are many. So please — if you have not yet submitted a check for the 1978 - 1979 season, do so now. Make check payable to: **Philadelphia Section, ASCE**, in the amount of \$10.00, and mail to ASCE, c/o Engineers' Club, 1317 Spruce Street, Phila., Pa. 19107, Attn. **Theodore Davis**, Treasurer. Thank you.

ITEMS OF INTEREST**Lewis Joins Engineering-Science**

Past President **Brian J. Lewis** is moving to McLean, Virginia, where he has recently been appointed Eastern Regional Manager and Vice-President of Engineering-Science Company.

ES is a multi-disciplinary environmental consulting engineering firm with approximately 400 employees.

We'll still be seeing Brian at our meetings as Pennsylvania is part of the territory served from his new office. Brian's phone number is (703) 790-9300.

Greetings from the Giles'

Editor Sid Robin is pleased to forward to the Philadelphia Section Membership

**COMMUNITY AFFAIRS
COMMITTEE**

by **John E. Spitko**

Staff writer of THE NEWS and member of the Community Affairs Committee

The Philadelphia Section's Community Affairs Committee, established last year by then-President **Brian J. Lewis**, has continued progress in forming its goals and purposes. Under the able chairmanship of newly appointed **Edward Lutz**, an engineer for Catalytic, Inc., the nine-member committee has met two or three times each month for its lively give-and-take sessions. The main subject occupying the committee for the last three months has been an investigation into PennDOT's (Pennsylvania Department of Transportation) operations, finances and problems. An Ad Hoc Subcommittee on Transportation was also formed to aid the committee. The Ad Hoc committee includes **Jack Claffey** of DVRPC and **Jim McPhillips** of the Philadelphia Department of Streets. After the November election of Governor Thornburg, the committee decided to offer ASCE's expertise to the new governor in his screening of candidates for new PennDOT Secretary.

The committee reports that it unfortunately has found out (a) how busy a new Governor-elect really is and (b) how difficult it is to contact his key people. A letter was sent to Mr. Thornburg but efforts to contact him or his top aides by phone have been unsuccessful so far.

Other subjects which the Committee is considering, in addition to picking up the PennDOT issue again, are: (a) development of a regional dialogue with EPA on current environmental policies, (b) generation of energy from refuse for the Delaware Valley, and (c) development of Section position on Urban Mass Transit Agency (UMTA) regulations regarding renovation of buses to provide access to wheelchair-bound, handicapped individuals.

The committee welcomes input from the general membership. Please contact committee Chairman **Ed Lutz** at — 864-8132.

Greetings and Best Wishes from Past President (1963 - 1964) **Ranald V. Giles** and his lovely wife, Adele, who now reside in Florida. Mr. Giles is retired Professor of Civil Engineering at Drexel University. Ran and Adele would be glad to hear from their old friends in the Philadelphia Section. Their address is 750 Spanish River Blvd., East — Apt. 310, Boca Raton, Florida 33431.

JANUARY MEETING

(continued from page 3)

straight or curved wide flange sections nominally spaced three to five apart along the walls and roof which provide general resistance for excavations in unstable material. Timber lagging may be used to support the material between the steel ribs. In areas where significant lateral rock stresses may develop, invert ribs may also be installed. Drifts, small face tunnels which precede the main face excavation, are often used to allow prior placement of the ribs in segments for large cross-section excavations. A combination of many presupport and support techniques may be necessary for the varied conditions encountered in the larger tunnelling projects. The use of gunite, a sprayed-on hydraulic Portland cement, can prevent air slaking by sealing the surface of the rock against moisture loss.

The solution of limestone is a particular problem in that groundwater may have dissolved the rock along joints and replaced it with soil and/or soft rock. Tunnel excavations in these regions may encounter many varied conditions and liners could be required in cavernous areas. Seams of minerally altered rock can also present planes of weakness in otherwise competent material.

Dr. Heuer's commendable address was punctuated with many examples of his spicy wit and subtle humor. He is an articulate and knowledgeable speaker, and he maintained close audience attention throughout his presentation. The talk was liberally illustrated with diagrams and slides detailing the sometimes unpredictable, often treacherous operational challenges of tunnelling. In a lively question and answer period, which was terminated only by the lateness of the hour, Dr. Heuer fielded expertly the many "penetrating" questions directed to him by the audience.

At the conclusion of Dr. Heuer's address, Section President **Chuck Pennoni** presented our distinguished speaker the Section's Certificate of Appreciation and a copy of the Section's Commemorative book: "The History of Civil Engineering and Construction in the Delaware Valley", the publication authored in honor of the ASCE 1976 National Bicentennial Convention hosted by the Phila. Section.

See
YOU
at the
Meeting
February 13, 1979