THE VIRGINIA RECORD MAGAZINE

APRIL 1976

Don't feed it buried cables.

It's happened. Foundations have gone in, and phones have gone out. Because no one thought about buried cables.

Until it was too late. Then the job's delayed while the cable's fixed. So next time you're digging, call us. We'll tell you where the buried cables are.

Before some back-hoe chews them up.

Remember. Before you dig, call us.

Northern Virginia call collect
301-559-0100

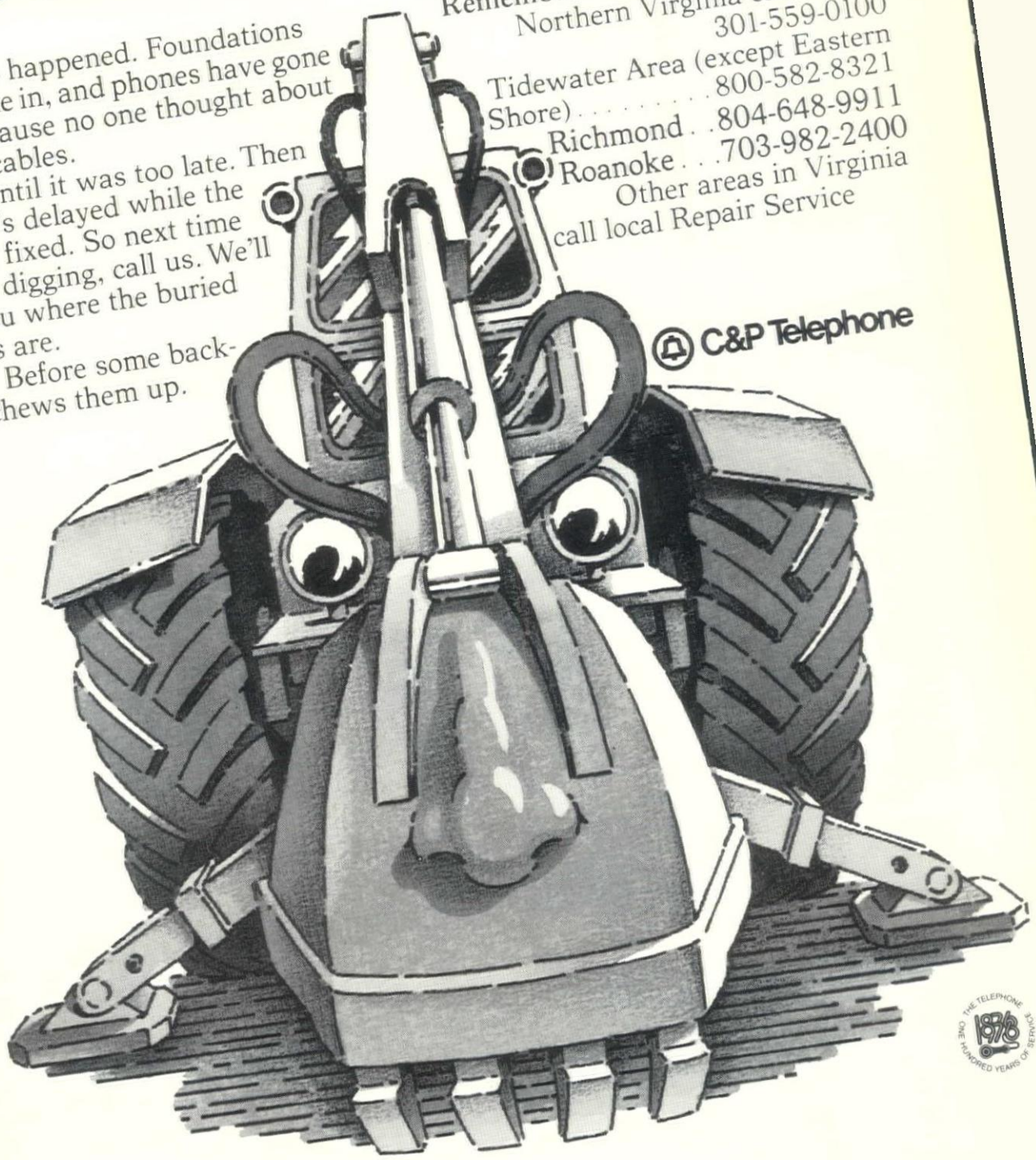
Tidewater Area (except Eastern Shore) 800-582-8321

Richmond . . 804-648-9911

Roanoke . . . 703-982-2400

Other areas in Virginia call local Repair Service

C&P Telephone



THE TELEPHONE 1876 ONE HUNDRED YEARS OF SERVICE

Pre-admission testing.

Often when you've made arrangements to enter the hospital, you and your doctor may be able to schedule your X-ray and lab tests on an outpatient basis. Instead of waiting in the hospital for test results, you can go home or back to work until the results are in. And if these pre-admission tests can reduce your actual hospital stay by two days, the results could be a $125 savings in room and board charges.

Of course, pre-admission testing isn't possible for every situation, but it's always a good idea to ask. Because you'll be doing more than reducing your hospital bill. By having your tests as an outpatient, you'll also be freeing a hospital bed for someone who really needs it, which increases the efficiency of Virginia's health care system—and helps control the cost of everyone's coverage.

That's why benefits like pre-admission testing are included in Blue Cross and Blue Shield of Virginia coverage.

Because, in addition to keeping our operating costs so low that we can spend 94¢ of every subscriber dollar for better and better benefits, we also want to do all we can to control the total cost of care itself—and the cost of your coverage.

Blue Cross® Blue Shield® of Virginia

We want to take good care of you.

To find out more about what you can do to help keep your health care costs down, get a free copy of "Rx for Health Care Costs." Write Blue Cross and Blue Shield of Virginia, Dept. VR46, P.O. Box 27401, Richmond 23279.

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Maybe you'll want to look over our permanent concrete stains that won't chip, crack or peel. Or check out Tex Cote, a new texture coating that covers most building materials with a uniform, long-lasting colorful finish.

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TO TELL THE VIRGINIA STORY

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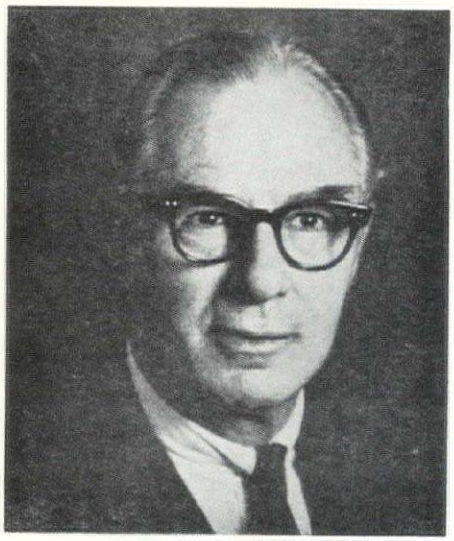


Clifford Dawley

Let Everybody Win

IT WAS EVELYN WAUGH, the late British writer of satirical novels, who made the tongue-in-cheek proposal that a certain authority should decree that universities grant a degree to "the deserving poor." At first, I was mildly amused at this flight of Waugh's comic spirit engaged in social commentary on a scene he had come to abhor.

Then, on public television, I heard another version of this satiric theme from Malcolm Muggeridge, the highly literate British gadfly. Commenting derisively on a growing tendency in England to get more and more people through some college, he said that he looked forward to the day when every British citizen was a college graduate except for a few old men, who would act as the nation's repository of learning.

Now, regarding the insatiable demands of the education industry, egged on by some politicians who propose diverting increasing amounts from the public revenue to education, I'm not sure that Waugh's antic idea should be dismissed in its entirety. There are several points worthy of consideration.

First, it has been clearly demonstrated that the post-war mania for processing bodies through some college or other has not been accompanied by either an increase of educated citizens or by higher standards of taste in the public. On the contrary, a larger proportion of the people seem unable to write grammatical English, and spoken English has degenerated — by way of official-ese and current slang or cult-slang — into catch phrases, passwords, expletives and exclamations which in themselves have little to no meaning and actually become a substitute for language. As for reading, the older I grow the more I am amazed at the numbers of persons of all ages who not only have no habit of reading but are admittedly incapable of performing the act of sitting down to read.

Since the vulgarization of our very language and the uses of it has grown during the escalation of enforced "higher education," we have here an application of the old axiom. "You can drive a horse to water but you can't make him drink." In other words, exposure to classrooms will not create motivation or work-habits, without both of which the time of everybody concerned is wasted. Then, think how much better it would be, from both a practical and humanistic standpoint, to grant the mental sluggards a degree rather than inflict on them the boredom, even torture, of enforced study of subjects which will never conceivably relate to their lives.

Think also of the immense savings to *(Continued on page 85)*

THE CONSULTING ENGINEERS COUNCIL OF VIRGINIA

By Richard P. Hankins

IN MAY 1962, representatives of ten consulting engineering firms in the Richmond area met to consider the formation of a state organization of consulting engineers under the auspices of the Consulting Engineers Council of the United States which had been formed in 1956. A decision was made to form the Consulting Engineers Council of Virginia and, after meetings with national CEC officers, an application was filed on July 16, 1962, for affiliation with the National Council. Carl Torrence of TORRENCE, DREELIN, FARTHING AND BUFORD was elected president; Richard P. Hankins of HANKINS AND ANDERSON was elected vice president; and Henry P. Sadler, Consulting Engineer, was elected secretary-treasurer.

The organization was formed with twelve member firms. A year later there were 21 member firms. Today the Council is an organization of 55 consulting engineering firms with more than 135 registered professional representatives. Each of these representatives is a principal or officer in his respective firm, and the firms themselves vary in strength from one man to more than 200 personnel. All of the member firms are engaged solely in the private practice of engineering, having no affiliation with manufacturers, suppliers or contractors, and thus are able to render unbiased engineering decisions in design and in the selection of materials.

The firms comprising the Consulting Engineers Council of Virginia serve many kinds of clients: government, industrial, commercial, institutional and private. They serve these clients in a variety of ways, from brief consultation to complete planning, design and supervision of major engineering projects.

CEC/V has established a central office staffed by a full-time Executive Director. The Executive Director carries out the policies and decisions of the elected officers who comprise the Executive Board acting on behalf of the members of the Council.

Fourteen standing committees and other special committees provide the medium through which so much of the Council's activity is accomplished. These activities include: legislative action, liaison with the architectural profession and the construction industry, publications, surveys of business practices, and many other areas of concern to professional engineers.

The American Consulting Engineers Council, with which CEC/V is affiliated, represents 2800 consulting engineering firms throughout the nation. ACEC is the largest organization devoted exclusively to the management of the business interests of engineers in independent private practice. Since the founding of the National Council in 1956, programs aiding consulting engineers have been created and developed on a scale and in a manner which no small or heterogeneous group of engineers could ever have achieved. CEC/V benefits greatly from the many activities of ACEC, including work on the national legislative scene, in the areas of insurance and pensions, professional registration, international business development, and others. Notable among the achievements of ACEC has been the creation of a "captive" professional liability insurance company, known as Design Professionals Insurance Company, to help solve the problem of professional liability insurance that exists for so many professionals today.

The list of Virginia engineers that have devoted their services to CEC/V since its founding in 1962 is distinguished and includes the following who have been presidents of the organization:

C. L. Torrence
Torrence, Dreelin, Farthing and Buford, Richmond, Virginia

J. E. Watlington
Austin Brockenbrough and Associates, Richmond, Virginia

A. M. Dreelin, III
Torrence, Dreelin, Farthing and Buford, Richmond, Virginia

T. A. Hanson
Thomas A. Hanson and Associates, Richmond, Virginia

R. M. Bartenstein
R. M. Bartenstein and Associates, Warrenton, Virginia

E. O. Rodes, Jr.
Sowers, Rodes and Whitescarver, Roanoke, Virginia

M. O. Roache, Jr.
Roache, Mercer and Faison, Richmond, Virginia

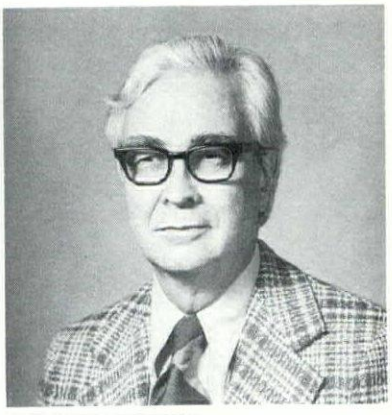
W. A. Thompson, Jr.
Thompson and Litton, Wise, Virginia

R. P. Hankins
Hankins and Anderson, Richmond, Virginia

D. L. Gusler
Vansant and Gusler, Norfolk, Virginia

W. L. Myers
Hayes, Seay, Mattern and Mattern, Roanoke, Virginia

W. G. Farthing
Torrence, Dreelin, Farthing and Buford, Richmond, Virginia



ABOUT THE AUTHOR

Richard P. Hankins is president of the Consulting Engineering firm of Hankins and Anderson, Inc. He is a graduate of Virginia Polytechnic Institute and a former member of the State Registration Board. In 1962 he assisted in the founding of the Consulting Engineers Council of Virginia and served as president of the Council 1970-1971.

M. J. Thompson, III
Mathew J. Thompson, III, Consulting Engineer, Newport News, Virginia

Current officers of the Council are:

President
Earl R. Simpson, Jr., Simpson-Johnson, Inc., Lynchburg, Virginia

President-Elect
Joseph H. Norman, Jr., Harris, Norman, Giles and Walker, Richmond, Virginia

Vice President
C. L. Wright, Jr., Vansant and Gusler, Norfolk, Virginia

Vice President
James A. Limerick, Jr., R. Stuart Royer and Associates, Richmond, Virginia

Vice President
Richard L. Williams, Consulting Engineer, Roanoke, Virginia

Secretary
Robert L. Mills, III, Hankins and Anderson, Inc., Richmond, Virginia

Treasurer
Henry P. Sadler, Henry P. Sadler and Associates, Inc., Richmond, Virginia

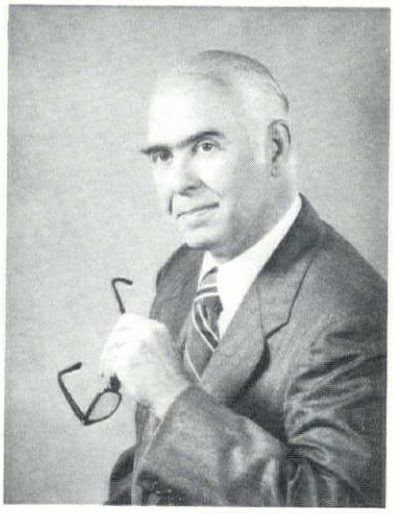
Director
Mathew J. Thompson, III, Consulting Engineer, Newport News, Virginia

Parker E. Connor, Jr., was engaged in 1968 as the first Executive Director of the Consulting Engineers Council of Virginia. Mr. Connor had just completed 29 years of regular army service as an infantry officer. These years of staff service in the United States Army provided an excellent background for this important position of management with the Council.

The officer of the Consulting Engineers Council of Virginia is located at 6924 Lakeside Avenue, Richmond, Virginia 23228. Telephone 804-264-0051.

Officers and Directors of the CEC of Virginia

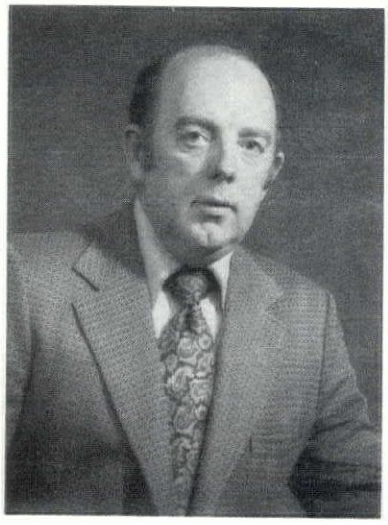
EARL R. SIMPSON, JR.
President



•Earl R. Simpson, Jr., of the Consulting Engineering Firm of Simpson-Johnson, Inc., of Lynchburg is President of the Consulting Engineers Council of Virginia.

Mr. Simpson is a 1949 graduate of V.P.I. with a B.S. degree in Mechanical Engineering. He is married to the former Helen Reaves of Blacksburg, Virginia and they have four children — Karen, Nancy, Kathy and Gary. Karen is a student at Northwestern University, Nancy is a student at Madison College, and Kathy is enrolled at the University of Florida.

Mr. Simpson is Superintendent of Studies at Centenary United Methodist Church, active in the Kiwanis Club, and State Chairman of Professional Employment Practices for Virginia Society of Professional Engineers.



JOSEPH H. NORMAN, JR.
President - Elect

•Our President Elect has been a member of CEC/V since 1967. He has served as Secretary of the organization for two years and was Regional Vice President in 1974. Mr. Norman has been Chairman of the Education Committee and a member of the Joint Action Committee and is now serving on our Public Relations Committee and Interprofessional Practices Committee.

He attended the University of Richmond and the University of Virginia and graduated from the University of Virginia in 1956 with a B.S. degree in Civil Engineering. Upon graduation, he served as a field engineer for Corde & Starke, Contractors, in the Tidewater area until going with Baskervill and Son, Architects in 1957. There he served as a structural designer and an associate in the firm until leaving to head up his own office — Joseph H. Norman, Consulting Structural Engineers — in 1966.

Mr. Norman has been a partner in the firm of Harris, Norman & Giles, and later Harris, Norman, Giles & Walker, since 1969.

He was a charter member of the Mechanicsville Kiwanis Club, a past Scoutmaster and a Deacon in Westhill Baptist Church. He is active in community activities especially those concerned with youth.

Joe and his wife, Nancy, now have four sons and they live in Mechanicsville in Hanover County, Virginia.

C. LEON WRIGHT, JR.
Vice President - Eastern

•C. Leon Wright, Jr., P. E. is the Regional Vice President, Eastern Region, CEC/V. Born February 7, 1932, he was educated in Norfolk Public Schools. Wright attended Norfolk Division, William and Mary and V.P.I. before entering the Army during the Korean War. Graduated BSME from V.P.I. in 1958, he has been employed by Vansant and Gusler since 1960, and became a partner in 1971.

His membership in Professional organizations includes: ASHRAE; Hampton Roads Engineers Club; VSPE (past President of Tidewater Chapter); and ACEC. An active member of the United States Power Squadron, he holds membership in the Norfolk Yacht and Country Club and the Rappahannock River Yacht Club. For recreation he enjoys cruising on his 30 foot sailing ketch.

Wright is married to Shirley P. Wright and they have one daughter, Leslie, age 11.

JAMES A. LIMERICK, JR.
Vice President - Central

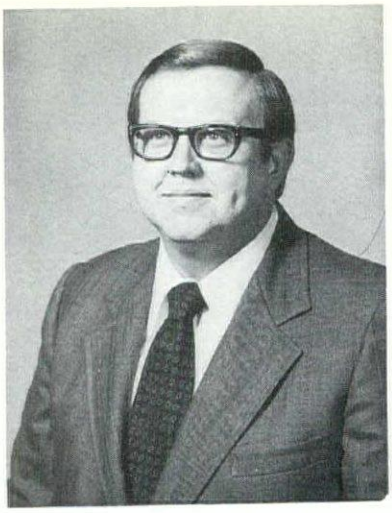
•CEC/V Vice President James A. Limerick, Jr. was born in Richmond, Virginia, May 30, 1928. He holds a B.S. degree in Civil Engineering from VPI & SU and joined R. Stuart Royer and Associates in May 1955. He has been a Certified Professional Engineer in Virginia since 1950; North Carolina, 1962; West Virginia, 1967.

Mr. Limerick has had experience as a Sanitary Engineer and Regional Sanitary Engineer, State of Virginia Health Department. He is a member of the National Society of Professional Engineers, Virginia Society of Professional Engineers, American Water Works Association, Water Pollution Control Federation, Consulting Engineers Council and Virginia Association of Professions.

RICHARD L. WILLIAMS
Vice President - Western

•CEC/V Vice President Richard L. Williams formed the firm of Richard L. Williams, Consulting Engineer in 1973. The firm serves architects, municipal governments, industry and contractors in the fields of civil, structural and sanitary engineering, with offices located in Roanoke, Virginia.

Mr. Williams received his B.S. degree in Civil Engineering from Virginia Polytechnic Institute in 1959. Since 1965 he has been a partner in several engineering firms in the Roanoke Valley and as owner of present firm is licensed to practice in Virginia, West Virginia, North Carolina, Tennessee, Kentucky, Ohio, Pennsylvania and Maryland.



ROBERT L. MILLS
Secretary

• CEC/V Secretary Robert L. Mills was born in Richmond February 15, 1946. A 1963 graduate of Douglas Freeman High School in Richmond, Mills received his BSCE degree from VPI & SU in 1968. He was founder and president of Bodie, Mills, Taylor and Puryear, Inc. — 1972-1975 and is currently vice president of Hankins and Anderson, Inc., Consulting Engineers.

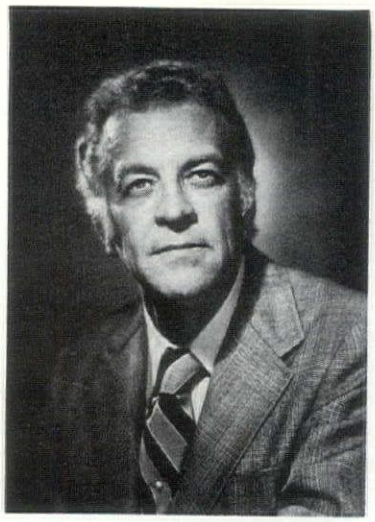
Mills, who states his goal as "making a *positive* contribution to life," is a Registered Professional Engineer in the Commonwealth of Virginia; is president of the Richmond Branch ASCE, 1975-'76; a committee chairman, Metropolitan Richmond Chamber of Commerce, 1975-'76; and was Jaycee of the year in 1970. He is married and has two children.

HENRY P. SADLER
Treasurer

•Henry P. Sadler is Treasurer of CEC/V, and is president of Henry P. Sadler & Associates, Inc., Consulting Engineers, 6924 Lakeside Avenue, Richmond, Virginia 23228.

Mr. Sadler is registered as a Civil Engineer in Virginia, North and South Carolina, and Florida.

A charter member of the Consulting Engineers Council of Virginia, he is also a member of American Society of Civil Engineers, American Arbitration Association, American Public Works Association, American Railway Engineering Association, American Water Works Association, National Society of Professional Engineers and the Virginia State Chamber of Commerce.



MATHEW J. THOMPSON, III
Director

• Mathew J. Thompson, III was born in Warwick County, Virginia on the Virginia Peninsula.

He attended the local primary and secondary schools and was graduated from Morrison High School in 1939.

Following High School he was employed by the Newport News Shipbuilding and Dry Dock Company anc in 1940 entered the company's Apprentice School. Immediately upon graduation from the Apprentice School as a Hull Draftsman he entered the United States Navy. After two years of service he returned to Shipyard employment as a draftsman.

In the fall of 1946 Mr. Thompson enrolled in Virginia Polytechnic Institute and received his Bachelor of Science Degree in Mechanical Engineering in 1950. While at Virginia Tech he was elected to membership in Tau Beta Pi, Pi Tau Sigma and Phi Kappa Phi fraternities. He was also a member of the Student Senate.

Following graduation he was employed as a Mechanical Engineer by James Posey & Associates in Baltimore, Maryland and Richmond, Virginia and later by Williams, Coile and Blanchard in Newport News. In 1954 he opened his office for private practice of consulting engineering. He is presently president of Mathew J. Thompson, III,

(Continued on page 81)

PARKER E. CONNOR, JR.
Executive Director

•Parker E. Connor, Jr. is Executive Director of the Consulting Engineers Council of Virginia.

Mr. Connor retired from the Regular Army in 1968, and at that time became the first employee of the Council. He is a 1939 graduate of Davidson College.

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OTHER OFFICES: P. O. Box 2277, Staunton, Virginia 24401
(703) 886-8555
SERVICES: Municipal, civil, environmental, electrical, hydraulic engineering, surveying, land use planning, investigations and reports
REPRESENTATIVE MEMBERS: John R. Williams, Robert W. Neeson, Anthony J. DeFalco, John W. Hawthorne, Marshall H. Craig

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P. O. Box D.M., Toano, Virginia 23168
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SERVICES: Consulting engineering, land planning and surveying, including reports, final plans, and supervision of construction. This firm can provide, by association, additional engineering for major projects.
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McGAUGHY, MARSHALL & McMILLAN
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OTHER OFFICES: Washington, D. C.; Omaha, Nebraska; Grand Island, Nebraska; Athens, Greece; Frankfurt, Germany
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(804) 595-7271
SERVICES: Regional planning; feasibility, environmental studies; design, construction administration. Infiltration/inflow studies. Operational manuals. Research, evaluation. Pilot plant design, operation. Project financing, bonding studies. Utility rates, appraisals, organizational studies. Expert testimony. Staff: environmental, structural, architectural, electrical, mechanical, planning, environmental and support. Specialties: water supply, industrial wastes, drainage, flood control, earth dams, water pollution, solid waste management.
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REPRESENTATIVE MEMBER: Edward S. Pringle

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Richmond, Virginia 23230
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SCOTT & SCOTT, INC.
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P. O. Box 7546, Roanoke, Virginia 24019
(703) 362-1291
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REPRESENTATIVE MEMBERS: Malcolm P. Scott, William W. Scott

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REPRESENTATIVE MEMBERS: M. Lyman Johnson, Earl R. Simpson, Jr.

SMITHEY AND BOYNTON
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Roanoke, Virginia 24015
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REPRESENTATIVE MEMBERS: William A. Sowers, Elmer O. Rodes, Jr., Charles K. Whitescarver, Jr., Charles D. Keffer, II

***ROBERT S. SPRATLEY & ASSOCIATES**
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SERVICES: Mechanical, electrical, HVAC, refrigeration, plumbing, power plants, power, lighting, communications
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(804) 648-3383
SERVICES: Structural and foundation engineering; including design, specifications, investigations, reports, cost estimates, studies for all types of conventional buildings and special structures, railway and highway bridges, certified fallout shelter analyst
REPRESENTATIVE MEMBER: Randall A. Strawbridge

OLIVER P. STRAWN, JR., CONSULTING ENGINEER
106 Washington Street, Blacksburg, Virginia 24060
(703) 552-7072
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REPRESENTATIVE MEMBER: Oliver P. Strawn, Jr.

THOMPSON & LITTON, INC.
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Wise, Virginia 24293
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OTHER OFFICES: Marion, Virginia
SERVICES: Civil, mining, architectural, urban planning, environmental planning, water supply and distribution, sewerage collection and treatment, pollution control, facilities planning, construction management
REPRESENTATIVE MEMBERS: William A. Thompson, Jr., John W. Litton, S. Hoyt Williams, Jr., P. Phillip Shu, Jerry H. Smith

MATHEW J. THOMPSON, III, CONSULTING ENGINEERS, INC.
Warwick Boulevard, Newport News, Virginia 23601
(804) 596-1401, 596-8601
OTHER OFFICES: Norfolk, Virginia
(804) 625-5984
SERVICES: Heating, ventilation, air conditioning, refrigeration, plumbing, power, lighting, communications
REPRESENTATIVE MEMBER: Mathew J. Thompson, III

C. T. TOMLIN, CONSULTING ENGINEER
3002 Lincoln Avenue, Richmond, Virginia 23228
(804) 264-2989
SERVICES: Civil and structural engineering, site development and planning.
REPRESENTATIVE MEMBER: C. T. Tomlin

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Suite 600, Seaboard Building
3600 West Broad Street, Richmond, Virginia 23230
(804) 358-9111
SERVICES: Engineering, architectural and planning services for industrial, commercial and municipal buildings and facilities.
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Colley Avenue and 46th Street, Norfolk, Virginia 23508
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VIRGINIA ENGINEERS, INC.
1020 Elm Drive, Mechanicsville, Virginia 23111
(804) 746-4743
SERVICES: Heating, ventilation, air conditioning, plumbing, power plant, power, lighting, communications, transmission and utilities.
REPRESENTATIVE MEMBERS: C. W. Johnson, A. V. Loving

VVKR PARTNERSHIP
720 North Saint Asaph Street
Alexandria, Virginia 22314
(703) 549-5200
SERVICES: The VVKR Partnership is a total services firm. The services may be commissioned comprehensively or selectively for projects of any kind. The broad base of services and experience permits a team approach with all the inherent advantages. Principle among the advantages is the single point of responsibility assuring control, quality, and creativity.
REPRESENTATIVE MEMBERS: Carl C. Redinger, Henry S. Brooks

***WAGNER & JONES**
2405 Westwood Avenue, Richmond, Virginia 23230
(804) 353-1296
SERVICES: Heating, ventilation, air conditioning, refrigeration, plumbing, power plants, utilities, electrical
REPRESENTATIVE MEMBERS: Walter K. Jones, Jr., Edwin E. Bohannon

ROY F. WESTON
1501 Santa Rosa Road, Suite B-14
Richmond, Virginia 23288
(804) 285-2115
SERVICES: Study and design services for environmental control facilities for wastewater, solid waste, air pollution and water management problems. Field testing, environmental management planning, construction management, operations services, operation's manuals, inflow/infiltration studies, resource recovery, OSHA, energy audits and conservation, industrial wastes and environmental assessment and planning.
REPRESENTATIVE MEMBER: Michael E. Fiore

WILKINS & WATSON, INC.
2405 Westwood Avenue, Richmond, Virginia 23230
(804) 358-4546
SERVICES: Civil, site development, structural, plant facilities, environmental control, and paper industry projects.
REPRESENTATIVE MEMBERS: C. L. Wilkins, Jr., C. M. Watson, Jr.

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4919 Colonial Avenue, S.W.
Roanoke, Virginia 24018
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P. O. Drawer F.U., Williamsburg, Virginia 23185
(804) 229-2472 (Williamsburg)
(804) 643-6992 (Richmond)
SERVICES: Land planning, drainage, highway design, bridge design, industrial and commercial buildings, foundation design, structural design, erosion control, waterfront structures, marina design, site design, route surveying, control surveying, topographic and boundary surveying.
REPRESENTATIVE MEMBERS: L. V. Woodson, P. E., B. D. Littlepage, C. L. S., Daniel J. DeYoung, P. E.

*CHARTER MEMBERS

WHAT IS A CONSULTING ENGINEER?

By Joseph H. Norman, Jr.
President Elect, CEC/V

THE CONSULTING Engineer is an experienced professional scientist in one or more of the many fields of engineering. He may operate as an individual or as a staff member in a large firm. His special expertise may be in one or more branches of engineering — electrical, civil, mechanical or structural. He may practice principally in such projects as those related to lighting, water treatment, air conditioning or soil mechanics. There are engineers to fit almost every discipline imaginable.

He is a professional . . . a citizen . . . and a businessman. As a professional, he has the qualifications of education, technical knowledge and legal registration to practice one or more branches of engineering. He has a creativity born of diverse experience with modern engineering application. As a consultant he has no commercial affiliations — thus assuring the rendering of unbiased and independent engineering judgment.

As a businessman he operates an independent, private engineering practice; offering as his services engineering feasibility studies and analyses, preplanning, design, and construction administration. His goals are to provide his client with the best engineering possible commensurate with the client's investment.

As a citizen he serves his clients and the public interest with honesty, integrity, impartiality and ingenuity. His clients — private, government, industrial and commercial — receive the most modern in professional engineering services. He builds his professional reputation on the successful fulfillment of every project he undertakes.

When to Seek Services of A Consultant

The Virginia Consulting Engineer should be called upon whenever specialized knowledge, independent engineering judgment, and broad experiences are essential. The size of the project is not criterion. The owner of a small restaurant or a multi-million dollar office building should be equally concerned with the selection, installation and operation of, for example, air conditioning equipment. The unbiased judgment of a specialist with no product allegiance, who has thorough knowledge of all types of equipment, can assure the most efficient and economical results.

Consulting engineering services are obviously indicated where the owner has no engineering staff. If it is a construction project, the consulting engineer provides a ready-made organization to relieve the owner of the difficult and costly problems of recruiting engineering talent, solving organizational and administrative matters, and finally disbanding or maintaining the organization when it has completed its task.

The Virginia consulting engineering firm is capable of assuming management of the project from its inception. This includes the necessary studies to get it underway, drafting of all plans and specifications, administering the construction phase, and even assisting in forming a permanent organization to operate the completed project.

If the owner has an engineering staff, the services of a consulting engineer or firm are indicated where the staff lacks the special technology, objectivity or mobility required for the project. In this case the consultant becomes in effect — a staff associate.

Virginia consulting engineers are used on projects of any size or character whenever their special qualifications or characteristics, skill and unbiased judgment, flexibility and mobility will result in the best possible job at the least cost.

How to Engage a Consulting Engineer

Principals of at least three different consulting firms should be called in for interview. There need be no hesitation in requesting the consultant to describe his particular qualifications.

Members of CEC are pledged to undertake an assignment only if they are certain their competence will accomplish the desired result.

A prudent first step in the selection process is to review the directory of the Consulting Engineers Council of Virginia. Listings of member firms provide detailed information about their fields of specialization.

When evaluating a consulting engineer's qualifications, one should consider:

Technical qualifications;
Reputation with clients;
Size and range of specialization of organization;
Experience in projects similar to that under consideration; and
Current work load.

The firm's size or years in practice by the principals are not always reliable indices of particular skills. A recently established small firm may possess the precise qualifications desired to a degree not found in the wider experience of another firm which may be older and larger.

Conversely, the project requirements may be better served by a larger organization offering a broad range of skills, a more extensive personnel roster, and greater financial resources.

Prospective consultants should be evaluated on the basis of individual qualifications and not on a competitive price basis. Professional engineers are compensated for services rendered in similar manner as other professionals.

Fees for consulting services are based on the size and complexity of the project, and the extent of services to be provided. Upon request, a consultant without obligation will submit a proposal setting forth the scope of work, time schedule, fees and other pertinent information for a project which falls within the scope of his practice. If acceptable, this proposal may be the basis for the written agreement between the owner and consultant.

VIRGINIA CONSULTING ENGINEERS ARE, FIRST OF ALL, PROFESSIONALS

By Earl R. Simpson, Jr.
President CEC/V

TODAY'S SOCIETY has been taken by many "rip-offs"; therefore, they appreciate knowing they can trust the professionals. It is to the credit of the professions, with their code of ethics, that they remain among those with whom the average citizen can really feel comfortable doing business.

Although the average citizen rarely conducts business directly with the professional engineer, commercial companies, institutions, industry and government at all levels depend greatly on engineers in numerous capacities. Engineers perform vital planning, designing and inspection duties in connection with the construction of buildings, bridges, airports, power plants, water supply and sewer treatment facilities, and other public works. Therefore, it is in society's best interests that registered engineers are equally as professional as the family doctor, lawyer or other professional practitioner. Without that moral code, our physical surroundings literally could crumble.

The American Consulting Engineers Council, of which the Consulting Engineers Council of Virginia is an affiliate, subscribes to a strict code of ethics.

"WITH HIGHEST REGARD FOR THEIR FELLOWMEN ... MEMBERS ... SHALL HOLD PARAMOUNT THE SAFETY, HEALTH AND WELFARE OF THE PUBLIC IN THE PERFORMANCE OF THEIR PROFESSIONAL DUTIES," states the opening of the ACEC Code of Ethics.

The Consulting Engineers Council of Virginia has been an affiliate of ACEC for the past 15 years. CEC/Virginia assists its members in achieving these higher professional, business and economic standards. This, in turn, enables its members to provide better consulting services to their clients, to better protect the welfare of the public, and to safeguard the ethical standards of the engineering profession.

A consulting engineer, first of all, is a professional engineer. As a consultant, whether on retainer by an architectural firm, in private practice as an individual, or practicing his or her profession exclusively with an engineering firm, an engineer provides professional engineering services based on objectives and impartial evaluation.

Consulting engineers are registered with government authorities as professionals. That registration is the public's warranty of professional competence. Violations can be cause for revocation. The professional engineer specializes in major branches of engineering, such as mechanical, electrical, structural and civil, and in a variety of specific and diverse specialties such as acoustics, hydrology and others. It is safe to say that engineers have had a hand in the design of almost every structure, tool, appliance, or other convenience known to modern society. Engineers' work is very apparent by all the visible evidence of man's progress since the first structures came into being.

As Americans proceed through and beyond their bicentennial, numerous problems will have to be solved to assure that this nation will survive another century. Not the least of these will be improving old and designing new energy systems, improving public transportation and planning for an acceptable environment. Engineers are becoming more recognized as the problem solvers that the nation needs to supply the answers to these and similar problems.

It is indeed comforting to realize that the registered professional engineer is an ethical practitioner — even George Washington, one of the country's first engineers, felt this when he reported on the removal of the cherry tree.

MALCOLM PIRNIE ENGINEERS, INC.

The Consulting Engineer's Role in Providing Environmental Engineering Services

By W. Douglas Ensor

DURING THE remainder of this decade billions of dollars must be spent if the goals of the Federal Water Pollution Control Act of 1972 are to be met. The Commonwealth of Virginia has been "earmarked" for a substantial amount of this money which will be spent for the planning, design and construction of wastewater treatment systems. The facilities of these systems will incorporate new technology and methods, some on a very sophisticated level. With the large sums of money involved and the need to accomplish desired results efficiently the consulting engineer will play a key role.

The Role of the Consulting Engineer

Consulting engineers are responsible for planning, conceiving and designing all types of engineering works and for providing assurance that they are constructed properly and economically for their intended use. Public health, safety, welfare and comfort depend considerably upon how well the consulting engineer fulfills his role. This role may consist of furnishing extensive and diversified engineering services as well as providing consultation, advice and expert testimony.

Consulting engineers draw on the talents of many experienced professionals such as planners, environmentalists, technical analysts, technicians, and other engineers to make available necessary engineering services. They must develop and define the concept of a given project, design the facilities, determine applicable processes, select equipment and machinery, set standards for facility performance and provide general administration and resident inspection of the project during construction.

ABOUT THE AUTHOR

W. Douglas Ensor is a vice president of the firm Malcolm Pirnie Engineers, Inc., 12284 Warwick Boulevard, Newport News, Virginia and Malcolm Pirnie, Inc., of White Plains, New York. He has been affiliated with this organization since 1964.

In his field of work, Mr. Ensor has experience in design, contract drawings, specifications and administration of construction of water supply systems and wastewater collection systems, transmissions mains and force mains, pumping stations, and booster stations, water storage tanks, water and wastewater treatment plants; environmental planning and reports, water resource studies; water rate studies; water quality studies, environmental assessments, and solid waste management.

Consulting Environmental Engineering

A consulting engineer who provides environmental engineering services or a consulting environmental engineering firm staffs trained specialists both on the broad level and in the specific disciplines concerned with the many aspects of water supply, pollution control, and solid wastes management. Whether engaged in an environmental water quality planning study, a pipeline design or the design of a complex treatment facility the consulting environmental engineer must have specific specialists available. These include specialists in hydrology, meteorology, geology, hydraulics; civil, mechanical, electrical, structural, and chemical engineering; computer programming; inorganic, organic and colloidal chemistry; biochemistry, bacteriology, biology, liminology; architecture; and finance, economics, and law.

There are very few branches of engineering in which consultants are called upon to supply such a broad understanding of so many scientific disciplines, or such a variety of services and the correlated application of so many aspects of engineering practice.

Consulting Environmental Engineering Services

Governmental organizations (federal, state and local), private utility companies and industries confronted with environmental problems may call on a consulting environmental engineer for the following types of services:

Preliminary investigation and report — A diagnosis and recommended solution of the problem based upon preliminary evaluations of alternative methods of solution;

Comprehensive studies — The study of water supply needs, wastewater disposal for whole areas with and without industrial wastes, drainage and flood control, solid waste management and air pollution;

Facility design — The preparation of detailed contract drawings, specifications, and contract documents. This engineering service can be the most time-consuming;

Construction administration — Evaluation of contractor's bids; recommendation on materials and equipment selection and purchase; checking of contractor's shop and working drawings; preparation of detailed working drawings; inspection of construction; review of cost and payment estimates; coordination of final acceptance testing; and preparation of record drawings;

Manual preparation — Operation and maintenance manuals for particular plant facilities, a necessary adjunct to operator training and a guide for the proper functioning and maintenance of facilities and equipment. The consultant is uniquely prepared to write such manuals;

Operation supervision — A service that may be utilized for one, two, or more years after the completion of a new plant. It may also be utilized for plants previously constructed;

Operating procedures review — A review preliminary to or an extension of operation supervision to provide a basis for recommendations as to design, operation, or maintenance practices;

Rate studies, valuations, and appraisals — An essential ingredient of any community's efforts to establish or

perpetuate sound financial operations of the community water supply, wastewater disposal facilities, or solid wastes disposal facilities;

Feasibility studies — An evaluation of proposed or possible plans or projects. Such studies are tailored to the significant factors of the particular situation, with special attention to process application, financing, taxes, income, permanence of installation, and operating costs;

Industrial waste studies — The basis for design and construction of facilities for abating or controlling pollution from manufacturing processes. Particular attention is given to the differences between municipal and industrial wastes, their effects on receiving waters or municipal treatment plants, treatment process applicability, costs of treatment and possible joint treatment with municiple wastes;

Research on treatment methods — An evaluation of different methods of treatment for specific problems or particular locations. This service provides the client with information necessary to reach important decisions on treatment needed to meet governmental standards;

Direct personal service — Services rendered on full-time or part-time basis usually on a retainage arrangement. They may consist of preparing legal proceedings, appearing before courts or commissions to state opinions and conclusions concerning technical matters. Such services require engineering knowledge, experience, and judgement.

Retaining a Consulting Engineer

Many municipalities, other governmental agencies, investor-owned utilities and industries retain consulting environmental engineers for the following reasons:

- Professional services and unbiased opinion will be provided to the client;
- The client will receive the benefit of a broad experience in many aspects of the problem to be solved;
- Consulting engineering services are provided on call, they are not a continuing overhead expense;
- A consulting engineer's services usually save more money than his fee, either on initial cost of equipment or on operating costs, or both. The cost of this service is small compared to the cost of construction. This can vary from 3 percent of total costs on large projects to 15 percent on small projects;
- Professional services are obtained for the solution of special problems, for the engineer is a professional in the same category as the doctor, the attorney, the certified public accountant, or the tax expert.

Selecting a Consulting Engineer

Most governmental agencies (state and local) and private industries have adopted procedures for selecting consulting engineers. Yet, some organizations faced with seeking the services of consulting engineers for the first time may require procedural guidelines for selection.

Those parties designated or authorized to select or recommend consulting engineers for various projects may be an administrator or department head supplemented by a selection committee. The individuals empowered to make the final selection must be free of any internal or external pressure.

The basic considerations a selection committee should adopt when selecting consulting engineers are as follows:

- Ask informed sources, e.g., engineering societies, for the names of several engineers and engineering firms capable of rendering the service desired;
- Advise several of these engineers or firms of the problem. Ask them to submit their qualifications for rendering the services desired;
- Interview the firms or individuals that appear to be qualified. Bids for services should not be requested. Bidding is not in the client's interest for it places importance on price rather than quality. A request of bids for these professional services is not much different than soliciting bids from physicians to perform delicate and complex surgery;
- Give first consideration to quality of the firm's professional accomplishments, its staff members, and its experience with the particular problem to be faced. Do not be influenced by firm size alone;
- Select one firm on the basis of competence, integrity, and mutual confidence. Negotiate an agreement — include the nature and extent of services to be rendered and the basis of payment. If there is some doubt as to the size of the fee, seek advice from a recognized engineering society, e.g., Consulting Engineer's Council of Virginia, American Society of Civil Engineers or the Virginia Society of Professional Engineers.

It is well to note in closing that consulting engineering firms vary in degrees of training, experience, skills, capabilities, personnel, work loads, particular abilities and expertise. Proper selection of a consulting engineering firm for a specific project can mean the difference between a well-planned, economically successful project, or a haphazardly planned and costly one.

JOHNSON AND WILLIAMS - CONSULTING ENGINEERS

THE ENVIRONMENTAL ENGINEER IN VIRGINIA

By Audrey Pendergast

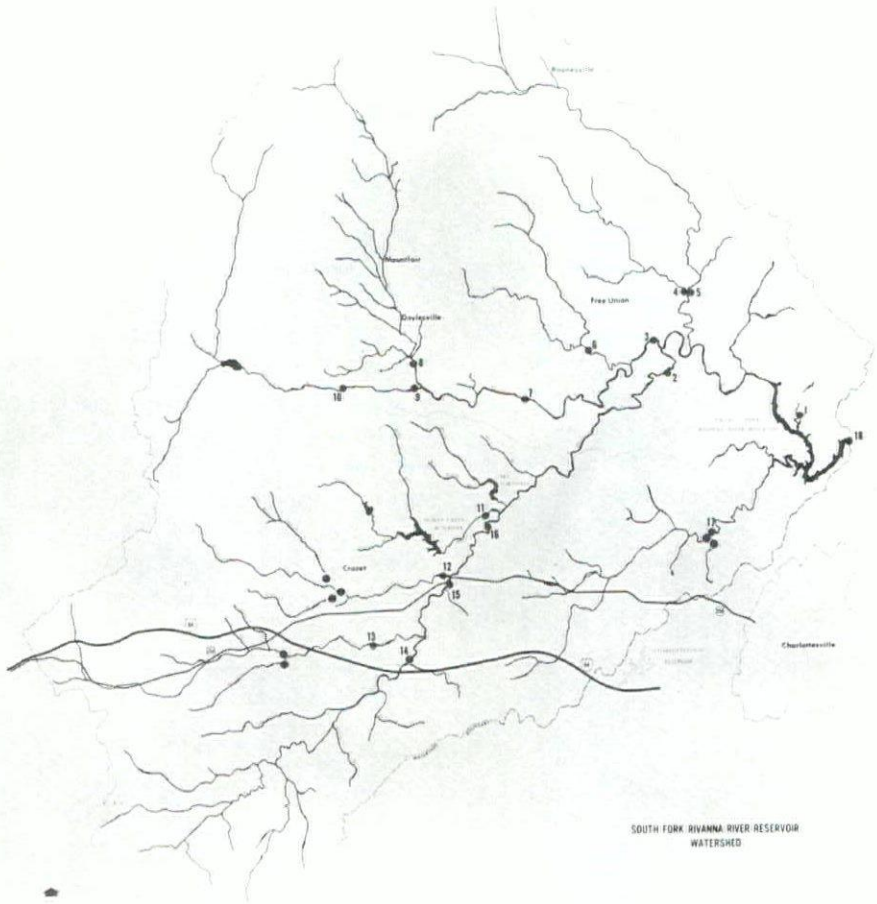
NOW THAT THE American people have come to realize that conservation of the environment must be given high priority, almost every aspect of commercial, industrial and professional business activity is affected. This national concern is reflected in a growing body of laws and governmental regulations.

Today a successful environmental engineering firm finds itself engaged primarily in work designed to promote a better quality of life. The manner in which this work is carried out is now closely regulated by several layers of government — especially the Federal. This may be illustrated by the strong impact of two recent laws — the National Environmental Policy Act of 1969 (NEPA - Public Law 91-190) and the 1972 Amendments to the Federal Water Pollution Control Act (FWPCA - Public Law 92-500). Public Law 92-500, as currently amended, places great emphasis on a systems approach to engineering. In this article some of Johnson and Williams' present projects will be described not only in terms of individual content but also in the light of Federal requirements.

Johnson and Williams was founded thirty years ago when the regulatory picture was much simpler and environmental concerns were not as deeply held as they are today. Although it has built its reputation on its demonstrated experience in the design of water and sewerage projects, and all facilities and studies related thereto, Johnson and Williams has grown and adapted to the changing demands of American society and has kept abreast of scientific and technological advances. The firm's principal office is in Vienna, Virginia, and subsidiary offices are located at Staunton and Virginia Beach. Johnson and Williams continues to offer the personalized and efficient day-to-day contacts and services of a small organization and the complementary services, as well, of a large reservoir of professional and technical resources by its affiliation in 1973 with Betz Environmental Engineers, Inc., of Plymouth Meeting, Pennsylvania.

In the pre-planning stages of a project which will affect the environment, Public Law 92-500 requires a detailed logical and thorough analysis of the situation before the design or construction of any facilities can take place. With a numbering system keyed to the appropriate sections of Public Law 92-500, some of these analyses or plans are referred to as 201, 208 and 303(e) studies. Johnson and Williams is developing considerable expertise in these studies, having been engaged in the preparation of a number of them.

A 201 study fulfills the requirements of the first stage, or Step I (the planning process), of the Public Law 92-500 grant program for the construction of publicly-owned waste treatment works. (Step II covers the design stage and Step III covers construction.) Step I in essence constitutes the definitive wastewater management facilities plan for a designated area and is comprised of an environmental assessment statement, an engineering feasibility study and, if sewage collection facilities are already in existence in the area, an infiltration/inflow study. Johnson and Williams has recently completed a 201 study for the Town of Craigsville, in Augusta County. This plan proposed a wastewater treatment plant and interceptor sewer to serve the Towns of Craigsville and Fordwick and, eventually, adjacent portions of Augusta County. This 201 study is one of the



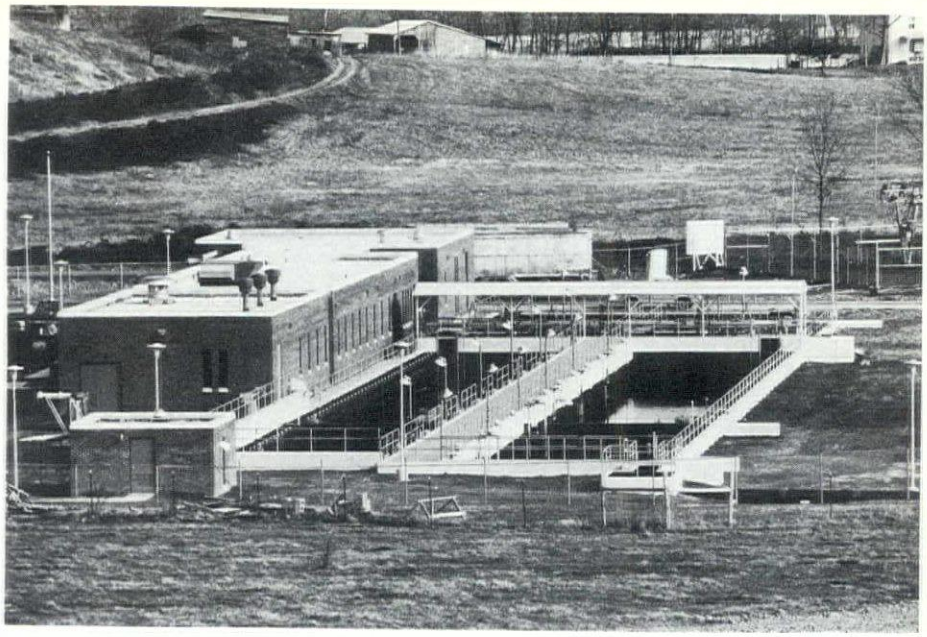
Area of Water Quality Study undertaken for the Rivanna Water and Sewer Authority.

first to be reviewed by the Commonwealth of Virginia State Water Control Board, whose acceptance of it is anticipated shortly. The firm has also recently contracted with the Town of Leesburg, in Loudoun County, for the preparation of a 201 study required in connection with expansion of the Town's wastewater treatment plant.

The Hampton Roads Water Quality Agency is a recently-formed consortium created in that area for the purpose of responding to Section 208 of Public Law 92-500. Section 208 covers the development and implementation of area-wide waste treatment management plans. Because of the size and scope of this 208 study, it has been broken down into a number of elements or task packages. Johnson and Williams/Betz has responsibility for two of these - Task Package 4.0, Prime Facilities Consultant, and Task Package 8.0, Industrial and Special Dischargers Inventory, Evaluation, Projection and Facilities Analysis.

Section 303(e) of Public Law 92-500 covers the preparation of basin plans, the purpose of which is to coordinate and direct continuing activities related to water quality management on a river basin scale. These plans cover the streams, rivers, lakes and tributaries and, indeed, all surface water area in a given basin. Simply stated, a basin plan is a pre-facilities plan management document that identifies the basin's water quality problems and sets forth a remedial program to alleviate them. Under the aegis of the Tidewater office of the Commonwealth of Virginia State Water Control Board, Johnson and Williams is preparing a 303(e) Basin Plan for the Eastern Shore of Virginia.

In addition to the significant part of the present workload of Johnson and Williams and Betz Environmental Engineers which is related to the preparation of studies required by NEPA and Public Law 92-500, Betz has recently been engaged by the Rivanna Water and Sewer Authority, which serves the City of Charlottesville and Albemarle County, to carry out an independent water quality study of the South Rivanna Reservoir and tributary area. The area of the watershed covered in the study is shown on the map illustrating this article. Evidence indicates that the reservoir is undergoing rapid cultural eutrophication and that excessive sedimentation may be occuring, resulting in decreased reservoir capacity to serve a steadily increasing population. This study will determine the present degree of eutrophication, the current reservoir storage capacity, and the amounts and sources of nutrients and sediments entering the reservoir. It will also formulate various watershed management programs which will maximize the life of the reservoir and maintain or improve the quality of its water. During the course of the study, samples of water will be taken weekly and measurements of pH, temperature, dissolved oxygen and transparency will be made in situ by a Betz mobile laboratory temporarily stationed in the area. An interior view of the mobile laboratory is shown herein.



Fishersville Regional Wastewater Treatment Plant, completed in the Fall of 1975.

Present emphasis on the various studies required by recent federal legislation, as well as completion of the several applications required to qualify a project for federal and state grant funds, is an extension of Johnson and Williams' previous work in the study

(Continued on page 81)

Interior View of Mobil Laboratory used in the Rivanna Study.

SAYRE AND SUTHERLAND, INC.

THE CONSULTING GEOTECHNICAL ENGINEER

• THE SAFETY and foundation stability of any construction project depends upon the performance of its foundation. It is then evident that the first step in the successful design of any foundation is to make a thorough site investigation using a qualified professional, the geotechnical engineer.

To meet this need of the construction industry and as a part of the Civil Engineering field, the geotechnical engineering consultant has become an important part of practically all projects. Sayre & Sutherland, Inc., was founded to provide this service.

The geotechnical engineer with his knowledge of soil mechanics and geology is in a prime position to make the necessary foundation investigation. Information gained from the investigation such as engineering properties of the soil, the load carrying capacity and type of structures to be built can be analyzed together. A geotechnical engineer with his background in soil mechanics can then minimize the need for overdesign and reduce to a minimum the cases of underdesign or failure due to "unforeseen" soil conditions. All of these elements together permit the selection of the best suited foundation material and will affect or govern the type and design of the structural foundation.

Different types of projects require varying activities and services. The geotechnical engineer is often retained directly by the owner to provide guidance in selection of a site suitable for the type of construction intended. In virtually all construction projects, involving soil or rock, the knowledge and judgment of an experienced consulting geotechnical engineer can minimize the risk of hazardous siting, foundation failure or overdesign. His advice and counsel throughout the design and construction stages can maximize both short and long-term cost effectiveness. The geotechnical engineer's services are as important on small projects as on large, since in many instances the owner of a small project does not have the financial resources to bear the expense of unexpected foundation costs or of a foundation failure.

What can a consulting geotechnical engineer such as the firm of Sayre & Sutherland, Inc. provide?

(1) Site Selection:

He will conduct preliminary studies of one or more potential sites to evaluate their relative suitability. In the evaluation consideration will be given to foundation conditions, material sources, drainage and ground water. Studies for a site may include a literature search, an interpretation of aerial photographs, on-site geological reconnaissance and frequently, for a larger project, geophysical surveys or preliminary exploratory borings.

(2) Determination of Scope:

After a site is selected, the geotechnical engineer may work as a member of the design professionals to develop the necessary design criteria.

(3) Field Exploration:

In connection with a detailed visual site reconnaissance, he may conduct an exploratory investigation of subsurface materials and conditions. This program may include borings and sampling by hand auger or mechanical means, test-pits, in-situ testing, and when appropriate, seismic or geophysical investigations.

(4) Laboratory Testing:

Samples from the field exploration may be tested in the laboratory to determine the properties necessary for engineering analyses.

(5) Engineering Analysis:

The geotechnical consultant analyzes the field and laboratory results and makes necessary engineering computations. Foundation schemes, drainage systems and construction sequences are considered with other members of the design team.

(6) Recommendations and Report:

Using information from the engineering analysis and his knowledge, the geotechnical consultant prepares design and construction recommendations. His recommendations may include any of the following: foundation types and depths, allowable bearing pressures, types and lengths of piles, estimated total and differential settlements, lateral earth pressures for retaining structures, or precautions on methods of construction. He may recommend solutions to vibration problems and earthquake effects. Guide specifications may also be part of his assignment.

(7) Plan and Specification Review:

In the design stage the geotechnical engineer may be used to review contract documents for compliance with original design criteria.

(8) Construction Consultation:

During construction, he provides field personnel to identify pertinent subsurface strata and to monitor and test such operations as excavation and shoring, filling, compaction, footing construction, pile driving, and underpinning. When requested, he can develop a quality assurance program that can be effective in the enforcement of contract specifications.

(9) Post-Construction Monitoring:

Following construction, he monitors long-range subsurface performance such as settlement rates, ground water levels, and vibrations.

(10) Other Services:

The geotechnical consultant also solves problems, often urgent, which are not related to new construction. Landslides, subsidence, differential settlement, tunnel insuitability, vibrations, and water loss from reservoirs may develop unexpectedly and require corrective action.

Because subsurface stratigraphy, soil properties, and other variables are never precisely known during preconstruction and because general conditions can be changed by construction methods selected by a contractor, the design of foundations and earth structures is not really complete until the end of construction.

GEOTECHNICAL ENGINEERING IS VITAL TO EFFECTIVE LAND DEVELOPMENT

By R. L. Sutherland, Jr., P. E.

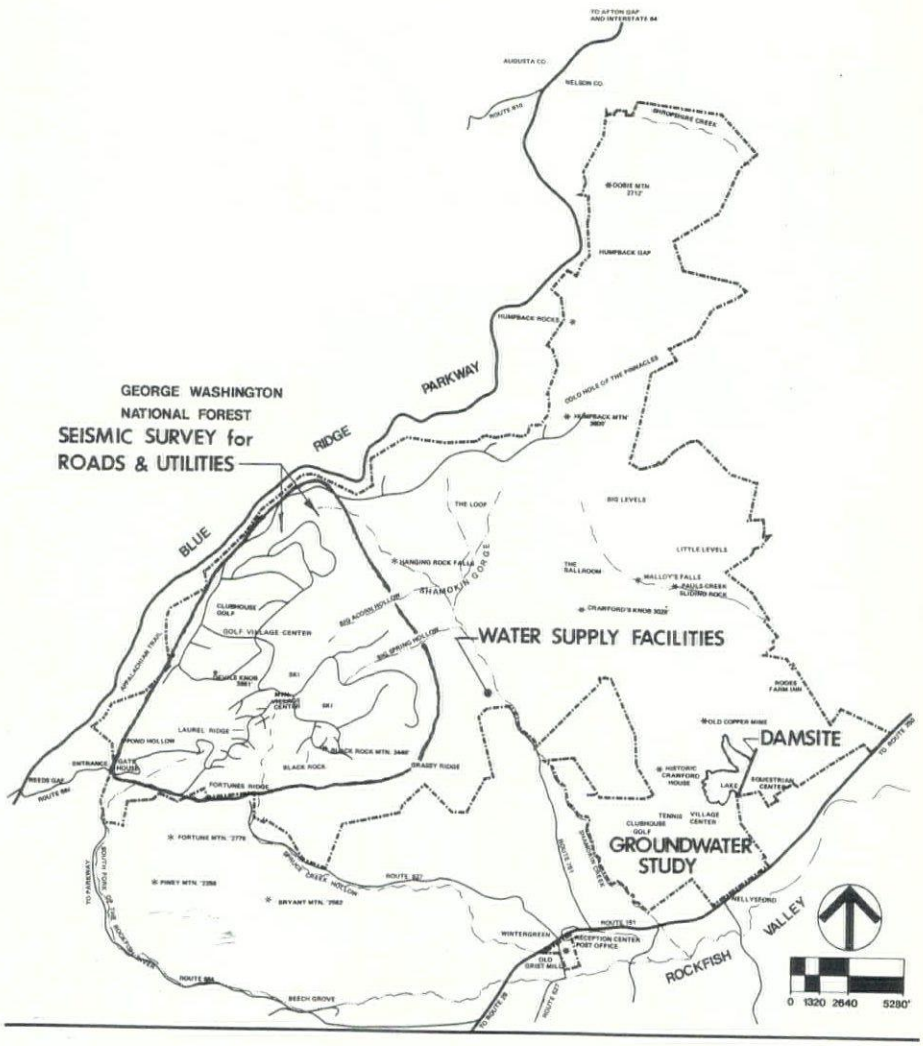
THE EXTENSIVE range of geotechnical engineering services required for a recreational land development project is exemplified by Wintergreen, Inc., located in Nelson County. The developer is Cabot, Cabot & Forbes of Boston. Engineers for the roads, site and utilities are Wiley & Wilson, Inc., of Lynchburg, who recognized early the need for geotechnical engineering services to meet the many facets of the project, and they called upon Sayre & Sutherland, Inc., of Richmond. In this development, the effects of the subsurface components had to be determined, evaluated and included in the overall project design.

The variety of projects encountered by the geotechnical specialist is part of the appeal of the profession. It appears that project types run in cycles, much depending on the economy of the nation. Before the recent slowdown in the economy, recreational developments were blossoming in the mountains and at the seashore. Many of these projects fell victim to the economy, but one which successfully rode out the uncertainties of the period was Wintergreen. Extending from the crest of the ancient Blue Ridge Mountains down the eastern flank into verdant Rockfish Valley, this serene and bucolic area of Nelson County, Virginia, is an idyllic place for leisure and permanent abode. Wintergreen, Inc., a subsidiary of Cabot, Cabot & Forbes of Boston, chose this setting for Wintergreen, a recreational and retirement community.

Under the leadership of Gary Green, an exuberant admirer of the concept and locale, Wintergreen is approaching completion of the first phase of development which will provide facilities for skiing, golfing, tennis, swimming, horseback riding, and myriad opportunities to coalesce with nature. Lodging is available for the transient sportsman and, if he is captivated by a particular view or location, lots are for sale for private weekend cottages or permanent residence.

As in all well-planned projects, preliminary data were needed by Wintergreen, Inc., to estimate construction costs, establish construction schedules and begin preliminary design of basic services such as roads and utilities. Wintergreen, Inc., decided that the availability of good roads in the initial stage of development of the 13,000-acre site were of prime importance. They would permit easy access to all parts of the project by both construction forces and potential land-owners. With the roads and utilities construction first on the schedule, Sayre & Sutherland, Inc., consulting geotechnical engineers of

(Continued on page 83)



Wintergreen

SAYRE & SUTHERLAND, INC.
Geotechnical Engineers

CABOT, CABOT & FORBES
WINTERGREEN, INC.
Developer

WILEY & WILSON, INC.
and
DUFRESNE-HENRY ENGINEERING CORP.
Engineers

RTKL ASSOCIATES, INC., Land Planners

OUTSTANDING AWARD FOR DRAFTING

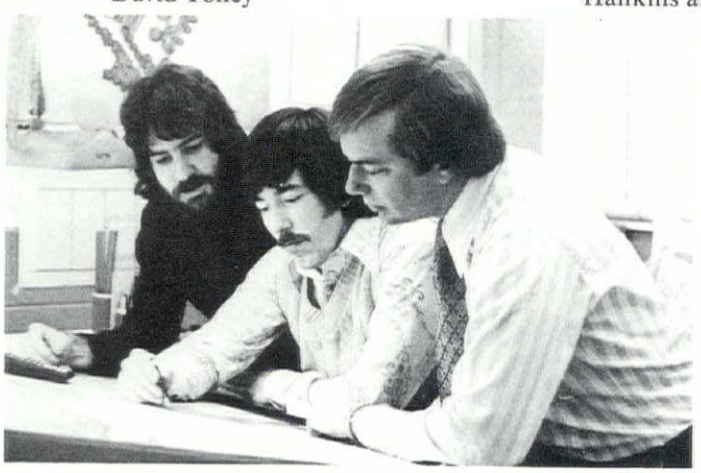
By Parker E. Connor, Jr.
Executive Director, CEC/V

EACH YEAR THE Consulting Engineers Council of Virginia conducts a special awards program to recognize superior work and effort on the part of draftsmen and draftswomen employed by member firms. First place and honorable mention awards are made in four (4) categories — Structural, Mechanical, Civil and Electrical. A grand award winner is then selected from the entrants who have placed first in each category.

Entries are in the form of a single blueline print of a tracing which is part of a set of contract documents, and must be drawn by the contestant in the office of his present employer. The employer submits the entry on behalf of the employee. Members of the Council perform the judging which is based on clarity, accuracy, technique, composition and overall appearance.

Winners of the 1975 competition were selected in January 1976, and were honored at an awards luncheon on February 13, 1976 at the Hyatt House, Richmond. The quality of this year's entries was exceptionally high, and the judges carefully reviewed more than thirty (30) entries before arriving at their final selections. Winners were:

ELECTRICAL	Glenna B. Hayes	Sowers, Rodes & Whitescarver
	H. E. Lee	Hayes, Seay, Mattern and Mattern
CIVIL	Ed Smith	Hankins and Anderson, Inc.
	G. A. Cole	R. Stuart Royer & Associates
STRUCTURAL	Leola Beavers Pierce	Howard, Needles, Tammen & Bergendoff
	Jerry Donohoe	Harris, Norman, Giles and Walker
MECHANICAL	David Tolley	Hankins and Anderson, Inc.
	*Paul Greenburg	Hankins and Anderson, Inc.
	*Special Award for Innovative Drawing	
GRAND AWARD	David Tolley	Hankins and Anderson, Inc.



Congratulations to Hankins and Anderson for having three of their employees selected as winners. On the left in the photograph is Paul Greenburg, designated winner for his innovative drawing, "Simplified Schematic Piping Diagram of Solar Cooling System" for Fomento Factory, San Juan, Puerto Rico.

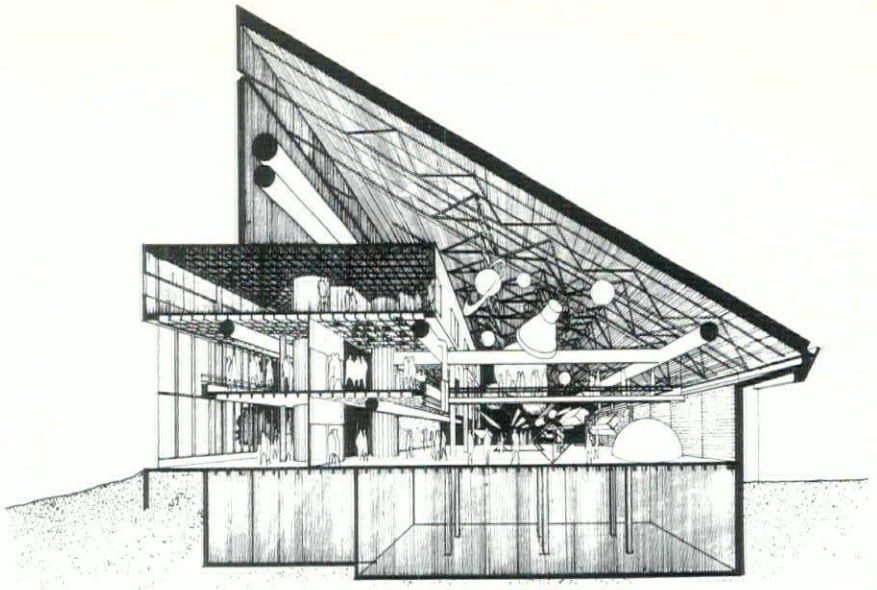
Paul is 23, married, and lives at 4121 Monarch Crescent, Henrico County. He is a graduate of Woodbridge High School and an Art Major at Virginia Commonwealth University for 1½ years. He has been employed by Hankins and Anderson for 5 years.

In the center of the picture is David W. Tolley whose drawing was selected as the "grand award winner." The drawing is a mechanical drawing of the LAW-GSBA Complex Dining Facility at the University of Virginia at Charlottesville. David is 28, married, and lives at 812 St. John's Wood Drive, Richmond. He is a graduate of Prince George High School and attended Richard Bland College, Pre-Engineer for 2½ years.

On the right is G. Edward Smith, Civil winner. This entry was a Dimensional Layout, Parking Lot 8, Philip Morris, U.S.A., on Commerce Road, Richmond, Virginia. Ed is 31, married with one child, home address 4113 Lawnwood Drive, Chesterfield, Virginia. He graduated from Churchland High School, Portsmouth, Virginia, and attended Old Dominion University as an Architect Major for 2½ years. He has been employed by Hankins and Anderson for 6 years.

Although she is not pictured, a special tribute should be given to Ms. Leola Beavers Pierce for having been a winner for several years, and this year her drawing was selected first place in the structural category. Each year her entry has been selected as a winner by a different panel of judges. She is employed by Howard, Needles, Tammen & Bergendoff of Alexandria, Virginia.

ENERGY CONSERVATION DESIGN FOR SCIENCE MUSEUM OF VIRGINIA WINS AWARD FOR HANKINS AND ANDERSON INC.



HANKINS & ANDERSON, INC.
Consulting Engineers
Mechanical/Electrical/Civil

•

WILLIAM J. DAVIS
Consulting Engineer
Structural

•

GLAVE, NEWMAN, ANDERSON AND ASSOCIATES
Architect

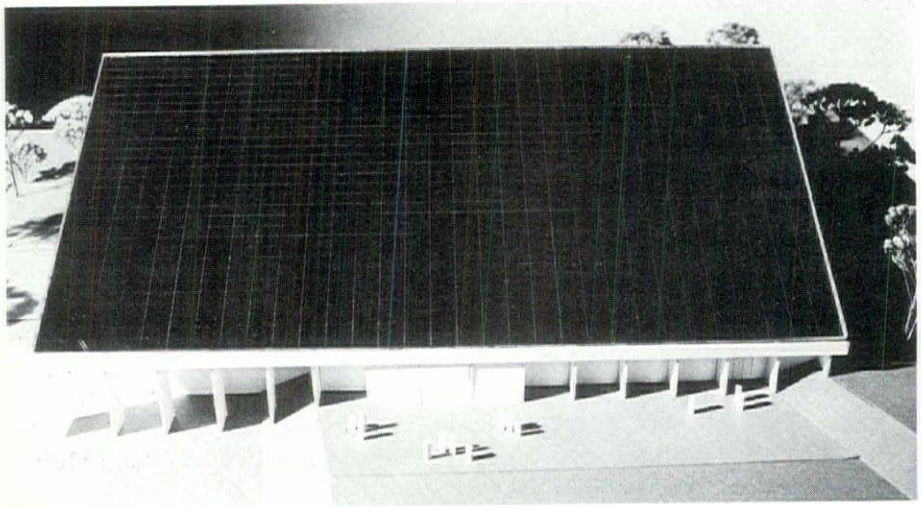
• Energy conservation was of primary concern in the design of the 56,000 sq. ft. Science Museum of Virginia to be located in Byrd Park in Richmond. The following paragraphs are quoted from Hankins and Anderson's award-winning entry in the Owens-Corning Fiberglas 1974 Energy Conservation Awards Program:

"The solar energy system and the heat recovery system employed in the mechanical facilities of this building are expected to reduce the operating costs for thermal energy for heating, cooling and domestic hot water to 25% of the cost of a conventional system of the same capacity: from $50,000 to $12,000.

"The solar energy system includes a 28,000 square foot collector on the roof which is designed to provide up to 150 tons of refrigeration. It is presently the largest known such system that has ever been attempted for providing the energy to both heat and cool a building.

"The heat recovery system is a low temperature hot water heating system which utilizes the heat rejected by a centrifugal chiller to its condenser water for heating purposes within the building...

"The 56,000 square foot building has a substantial year-around internal cooling load due to people and equipment. Lighting levels in most of the building will be kept low to reduce energy consumption and to permit spot lighting at individual exhibits. The building is well insulated . . . with heat absorbing insulating glass comprising only 8% of the building exterior surface. Consequently, the heating requirements of the building are relatively low as compared to the cooling requirements.



"It is anticipated that the solar energy system can handle the heating and domestic hot water loads unassisted down to about 45 deg. F ambient temperature. The heat recovery machine will assist the solar energy system when the ambient temperature is below 45 deg. F, which is about 40% of the heating season.

"The capacities of the solar energy system and the heat recovery system are so matched that together they can meet the entire heating requirements during an average heating season . . . if there are no totally overcast periods in the coldest weather which exceed three days. During prolonged overcast periods in cold weather, an auxiliary source of energy will have to be utilized as a source of heat after all of the useful heat in the solar energy storage tank has been extracted.

"During much of the heating season, building temperatures can be maintained by utilizing the perimeter radiation system, which will permit the complete shutdown of the air handling systems during unoccupied hours. Likewise, the air handling systems can be completely shut down during unoccupied hours of much of the cooling season.

"Water will be heated in the 28,000 square foot solar collector array and pumped to an underground storage tank. Hot water will be pumped from this storage tank when needed to run an absorption refrigeration machine in the

summer, to heat the building in the winter and to heat hot water year-round. ...

"The air conditioning load is to be handled by two refrigeration machines. One of these will be a 150 ton centrifugal chiller arranged for heat reclaim service. A second underground storage tank will store surplus heat that is rejected to the condenser water and that cannot be used at the time it is produced. ...

"The second machine will be a 150 ton output absorption unit to handle peak loads during the cooling season. The peak production of chilled water by the absorption machine will occur about noon, while the peak cooling load of the building will occur four or five hours later. In order for the absorption machine to meet the peak load, chilled water is circulated through a third underground storage tank and is chilled by both chillers at midday, enabling the centrifugal chiller to handle the peak load in the late afternoon.

"A boiler will meet the heating load when the solar heated tank has given off all of its heat and when the heat reclaim refrigeration machine cannot carry the heating load alone.

"The air distribution system in the building is also energy conserving in several ways. The primary supply and return air fans are variable volume in order to conserve energy during non-peak load conditions by means of a proportional decrease in fan horsepower. Many of the pressure reducing boxes are of the induction type which induce room air during non-peak load conditions, and which reduce the need for terminal reheat.

"Additionally, a sprayed coil dehumidifier will be used in the main air handling unit for cooling. This will permit evaporative cooling much of the year and, in turn, will allow the shut-down of the refrigeration machinery during partial load conditions.

"A computerized control system is to be incorporated into the mechanical system to monitor the operation of the equipment for optimum performance of the mechanical system as a whole. The automated control system will be programmed to utilize the heat produced by the solar energy system, and by the condenser water from the centrifugal chiller, to the maximum extent possible. Fans, pumps and chillers will be started and stopped as the various loads on the system vary throughout the day and throughout the year."

Virginia

CONSTRUCTION INDUSTRY GUIDELINES

JOINT COOPERATIVE COMMITTEE

AIA - AGC - CEC - VSPE

The Joint Cooperative Committee is composed of: Virginia Chapter, The American Institute of Architects; Virginia Branch, Associated General Contractors of America, Inc.; Consulting Engineers Council of Virginia, Inc.; and The Virginia Society of Professional Engineers. These organizations have joined in presenting to the business community of Virginia, the Construction Industry Guidelines which their agencies have adopted.

This publication is offered to provide the various segments of the building industry with logical solutions to industry related problems in the form of guidelines which clearly delineate the functions, duties, and expected performance levels to which those in the building industry should adhere in order that all segments can work harmoniously, efficiently and cooperatively. They can also serve to acquaint a prospective owner with what is considered to be fair and equitable practices in the construction process.

The guidelines set forth herein are not intended to supplant the responsibilities of contracting parties; nor do they preclude adjustments in order to safeguard or control a given contract; for in the final essence these conditions must be established to suit the individual needs of each project as set forth in documents for that specific contract.

These recommendations have made reference to various AIA documents and forms, since they are widely accepted throughout the Construction Industry and are generally available in most localities. Similar documents and forms sponsored by other technical and engineering societies may be used when they are deemed to better serve the objectives of the Contracting Parties.

Throughout the year of 1976 the guidelines in their entirety will be presented to the Virginia business community. It is our hope that they will be beneficial to all who peruse them.

In this edition of the *Virginia Record* we present for your information the Construction Industry Guidelines on: (7) Construction Contract Change Orders; and (8) "Punch List."

Virginia
CONSTRUCTION INDUSTRY GUIDELINES
JOINT COOPERATIVE COMMITTEE
AIA - AGC - CEC - VSPE
7

construction contract change orders

TYPES OF CHANGE ORDERS

The Contract Lump Sum Change Order—the most preferable type—may be initiated by either the owner, architect, or contractor. It is a written document, which serves as a legal agreement. In this kind of Change Order, a contractor submits a proposed cost for making a change in the originally specified installation. The request for the proposal should include all information needed by the contractor to make a fair, reasonable and realistic estimate of the work.

- The exact number and type of material items to be added, deleted, or substituted, and the location of this material in the structure;
- Supplementary or revised drawings, or authorization for the contractor to prepare such drawings, if needed;
- The time span for making the change, and a specific statement as to whether labor overtime is authorized;
- The amount of supplemental work the contractor is to perform, if the change is in an already completed area;
- The degree of detailed cost breakdown required of the contractor in his Change Order price proposal; and,
- Since construction can move so rapidly as to make a change estimate invalid almost overnight, a definite period of time during which the quoted price can be considered "firm".

A timely issuance of changes in the above manner can prevent excessive costs, delays, and hard feelings on the project. To prevent late changes in construction plans, owners can help by continuing to review the documents. The architect and contractor can also continue to review work in advance of construction to reduce conflicts and last minute revisions. The earlier the change is made, the less the cost involved.

When insufficient time is available for routine processing of the Change Orders, however, the owner's agent may use one of three common means of authorizing the work to proceed without prior settlement of the total price. These are the "Time and Material Order," the "Emergency Field Order" and "Recorded Changes".

Time and Material Change Order requests are usually made because:

1. There is insufficient time or information to process a formal request; and/or
2. The owner is convinced that this method is more economical.

Costs are based on the actual expense to the contractor in making the change and should be submitted to the owner/architect as the work progresses or shortly after completion.

The Emergency Field Order involves an owner's authorization to proceed with changes in the work on a Time & Material Basis. Usually such arrangements are used only when the change must be accomplished immediately.

Recorded Changes. All changes should be recorded regardless of scope. If changes involve cost, the contractor should notify the owner/architect promptly. The lump sum on time and material method should be used to determine amount.

AUTHORIZATION OF CHANGES

When a Change Order is to be made, the recommended procedure, which will assure smooth and efficient adjustments in the work, is a written authorization to proceed with changes, made in accordance with provisions in the original contract. Soon after award of the contract, it is necessary for the owner to identify individuals who are authorized to make changes on his behalf. The contractor also identifies certain employees, such as the job engineer, project manager, or job superintendent, who are authorized to accept changes. They, in turn, inform their foreman or superintendent of the changes. It is important that owners and architects deal only with the contractor's authorized representatives.

The major problem confronting most firms in dealing with Change Orders is in the time lag between the contractor's submittal of an estimated price and action by the owner. The longer the time lags between submittal and acceptance or rejection, the greater

the possibility of an increase in cost to the owner. Thus, the contractor finds it essential to stipulate on the face of the estimate a reasonable number of days during which the quoted price may be considered firm.

PREPARATION OF A PROPOSAL FOR A CONTRACT LUMP SUM CHANGE ORDER

If an owner requests a proposal for a Contract Change Order (rather than authorizing the contractor to proceed), there are several steps that are followed by the contractor in the development of the estimate:

1. Defining the exact scope of the change, and if necessary, obtaining clarification from the owner or his representative.
2. Determining and pricing all items of direct cost.
3. Calculating applicable overhead, such as:
   a. general operating overhead; and
   b. job facilities
4. Delayed Completion—if the completion of the contract is delayed into a new labor agreement period, additional costs to the contractor may result.
5. Applying a reasonable or specific rate of profit to the sum of materials, labor, and overhead. For additions and deductions, the following guidelines can be used:
   a. Where additions only are involved, the contractor is entitled to an addition to the contract sum in the amount of Direct and Indirect Job Costs, plus General And Administrative Overhead and Profit. If requested, the contractor *should* provide a detailed breakdown to verify his quotation.
   b. Where deductions only are involved, the contractor should calculate the reduction to the contract sum only in the amount of the reduction in Direct and Indirect Job Costs.
   c. Where a Change Order involves changes in scope, and both additions and deductions are involved, each should be calculated separately in accordance with "a" and "b" above.
6. Submitting the proposal with supplemental information needed in a clear form.

SUMMARY

As noted, each Change Order must be evaluated individually. But, just as certain procedures are recommended in all cases, there are essential principles that apply to handling all types of Change Orders.

- No work beyond the scope of the base contract should be done without specific authorization from the owner or his authorized representative;
- The identity of individuals authorized to request and approve change orders should be established definitely and early. This information should be given to the contractor's superintendent or foreman;
- A meeting to establish Change Order handling procedures should be held, if possible, at a Construction Coordination Conference;
- All changes in work should be authorized in writing prior to execution of the change;
- The scope of a Contract Change Order should be clear, and a request should contain enough information to enable the contractor to make a realistic estimate;
- Proposals should be submitted as soon as possible after receipt of a request, and once submitted, they should be approved or rejected as soon as possible;
- The proposal should be equitable, and all parties should acknowledge and honor the contractor's legitimate right to include overhead and profit percentages in Contract Change Order estimates or in Time and Material Change Order billings, and
- All parties should acknowledge and honor the contractor's right to compensation for the cost of time delays, processing deduct change orders, the costs of disposing of removed material, and all other costs incurred in the execution of the change.

Virginia

CONSTRUCTION INDUSTRY GUIDELINES 8

JOINT COOPERATIVE COMMITTEE

AIA - AGC - CEC - VSPE

"punch list"

CONTRACTOR & SUB-CONTRACTORS

This group must assume the greatest responsibility for the existence of work that must be corrected. More critical, exacting and progressive supervision is required of the contractor so that all trades perform their work in accordance with the highest standards of quality workmanship.

The following procedures are recommended:

1. The contractor should carefully check his own work and that of sub-contractors as the work is being performed;

2. From the very beginning of the project, it is suggested that the contractor's superintendent prepare and maintain a written record of deficiencies observed as the job progresses so as to preclude their being overlooked or forgotten;

3. Unsatisfactory work should be corrected immediately, and not be permitted to remain and become a part of the Punch List;

4. Corrections should be made before any particular sub-trade leaves the project. Unless this is done, the door is left open for subsequent evasion and disavowal of responsibility, and protracted delays.

5. During the finishing stages of the project, the contractor should make frequent and periodic inspections with sub-contractors, and architect/engineer representative so as to progressively check for and correct faulty work.

6. When the contractor has decided that the project has been completed satisfactorily and in accordance with the terms of the contract, he should notify the architect/engineer for the purpose of obtaining his concurrence.

ARCHITECT/ENGINEER

1. During the progress of the work, point out a deficiency as it is observed rather than waiting and placing it on the Punch List.

2. Upon representation by the contractor that in his opinion the project has been completed satisfactorily in accordance with the contract, the architect/engineer shall promptly make a thorough investigation and prepare a Punch List setting forth in accurate detail any items that are not found to be acceptable by the architect/engineer.

3. When the Punch List has been completed the architect/engineer representative shall arrange a meeting with the contractor and his sub-contractors to go on a tour of the project to identify and explain all items and answer any questions that may arise so there will be no misunderstanding of what the architect/engineer requires to be done before the project can be accepted as complete.

4. If the contractor gives notice that a major sub-contractor has completed his Punch List items, the architect/engineer should inspect that portion of the work and if the items are found to be satisfactorily completed, advise the contractor and sub-contractor accordingly.

5. When advised by contractor that all Punch List items have been completed, inspect the project with all contractors involved and, if said Punch List items are satisfactorily completed, issue final certificate.

6. If the owner or installer of owner's equipment and furnishings damages finished and previously accepted work, advise the owner of his obligations to repair damaged work.

7. Do not include items of maintenance or work damaged by the owner after he has taken occupancy. Should the owner want the contractor to repair or replace damaged work, he should be reimbursed for such costs on change order basis.

conclusion:

If these procedures are assiduously adhered to, it is reasonable to assume that the initial Punch List will be minimal, and that there would be no more than one additional Punch List between the period of initial occupancy and final acceptance. The issuance of multiple Punch Lists in series is considered improper and unnecessary.

HARRIS, NORMAN, GILES AND WALKER present . . .

CARLYLE HOUSE RESTORATION

J. EVERETTE FAUBER, JR., FAIA
Architect

DONALD PARKER, FASLA
Landscape Architect

CONSULTING ENGINEERS:
CARTER ENGINEERING, Mechanical/Electrical
HARRIS, NORMAN, GILES AND WALKER, Structural

WILLIAM P. LIPSCOMB CO., INC.
General Contractor

B. SMITH/R. BIERCE
Photography

THE ORIGINAL structure steeped in historical significance was built in the mid 1700s and restoration was completed in January 1976.

The existing structure was a hodgepodge of wood and rubble stone where over the years many apparent modifications were made to accommodate various uses of the building.

The engineers' first observation was one of concern that the building would remain standing long enough to do any work on the structure. It seemed feasible to demolish the structure systematically, marking the pieces for re-use and build it anew. This was not an acceptable solution and design of the structure was begun.

The structural requirements were to support the loads, tie the walls to the structure and to conceal the structure as much as possible within the existing structure. The solution that evolved was the use of structural angle columns in the corners of the rooms carrying structural tube section joists and beams that were fitted in the joist space. The loads were then transferred to these frames, thereby relieving the rubble walls of these loads. The frames and walls rested on new underpinning, the first major construction operation. The walls were reworked and tied to the frame.

A number of beams had to be reinforced by the use of flitch plates to meet the necessary live load requirements. Additional joists were also installed where necessary. Where earlier modifications had been made, these had to be removed and reworked to bring the new work into compliance with what was believed to be the original configuration.

Typical in restoration work, a considerable amount of field engineering was necessary during construction. Often as work progressed and elements of the building were exposed, they were not as had been anticipated. Most of these problems were minor with the exception of removal and rebuilding of one complete chimney.

The engineering firm does not consider the engineering to be particularly innovative, but they do consider the finished product a very dramatic contrast to the existing structure.

William P. Lipscomb Co., Inc. of Arlington was general contractor and handled excavating, foundations, carpentry, caulking, roof insulation, acoustical treatment and special flooring.

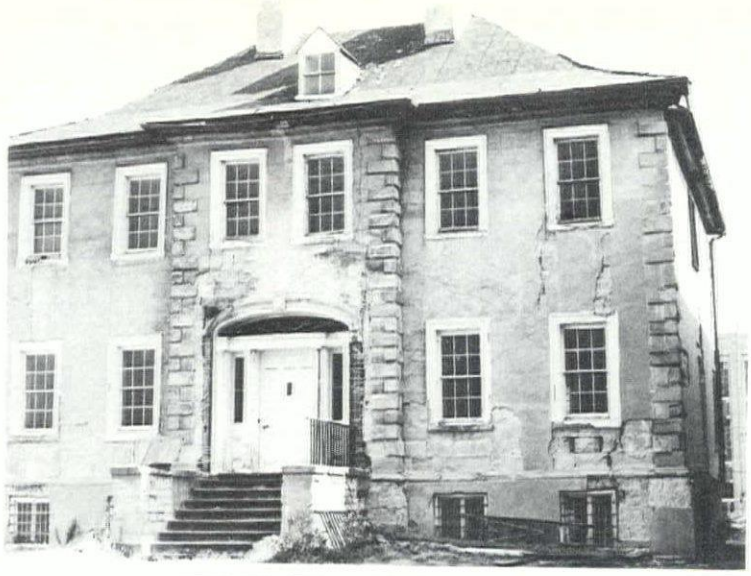
Subcontractors & Suppliers

From Washington, D.C. were: Anchor Associates, Inc., masonry contractor; Cushwa, masonry supplier, Alto Glass, glazing contractor; and, United, painting contractor.

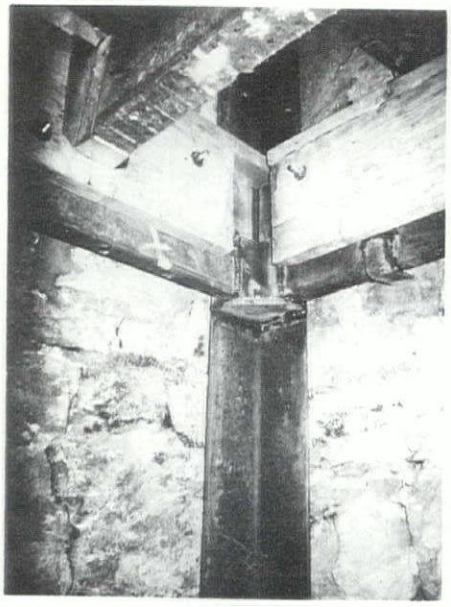
From Maryland were: Washington Woodworking, Landover, millwork, paneling, wood doors and windows; Jack's Roofing Co., Inc., Potomac, roofing - wood shingles; Builders Hardware, Bethesda, hardware supplier - modern historic; James S. Lertora, Inc., Silver Spring, plaster contractor; M. A. Hess, Hyattsville, plumbing fixture supplier, plumbing/heating/ventilating/air conditioning contractor; Boatman & Magnani, Inc., Capitol Heights, ceramic tile; and, Maryland Fire, Rockville, Halon extinguishing system.

Others were: Virginia Concrete, Alexandria, concrete supplier; Roubin & Janeiro, Inc., Fairfax, stonework contractor; Matthews Bros., Inc., Indiana, stonework supplier; Superior Iron Works, Inc., Springfield, steel supplier, steel erection, steel grating, miscellaneous metal and handrails; Prospect Industries, Inc., Fairfax, waterproofing; Bleako Glass Co., West Virginia, glass; Building Products, Alexandria, metal doors & frames; Joseph Sorber, Philadelphia, Pa., hardware supplier; The Sherwin-Williams Co., Cleveland, Ohio, paint manufacturer; Wheelovator, Louisiana, elevators; Lightolier Co., Inc., Jersey City, N.J., lighting fixtures supplier; and, Truland Corp., Arlington, electrical equipment supplier.

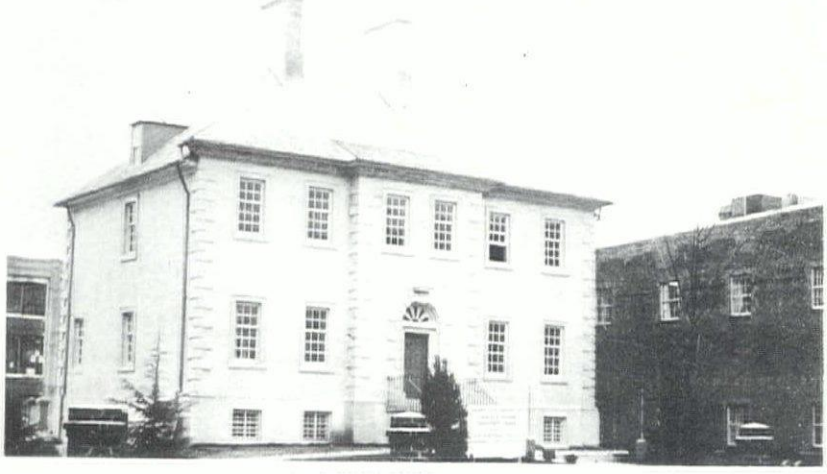
The owner handled sodding, seeding, etc., landscaping and was the landscaping contractor.



FRONT VIEW — BEFORE — 1974



DURING CONSTRUCTION — 1975



FRONT VIEW — 1976

PLANT SITE

Amelia Manufacturing Company Proposes Recycling Plant For Local Area

By Clyde L. Wilkins, Jr., P.E.
Wilkins & Watson, Inc.

THE PAPER INDUSTRY has come a long way and now the old is being combined with the new in a different concept of plant location. The recent trend is to build paper mills in remote areas close to the source of raw materials. This is a radical change since paper mills were first located in large cities, close to labor and consumers.

Amelia Manufacturing Company has found the perfect setting, a river, a railroad, neighboring markets and raw material supplies for their proposed recycling plant. The setting is on the Appomattox River only a few miles from downtown Richmond. The architectural design will blend favorably with the area.

The criteria for site development and plant design is conservation of raw materials and preservation or improvement of the local environment. There will be a three phase recycling plan; first in the basic raw material, second in recirculation of process waste and finally in effluent disposal.

The mill will produce from 100 to 150 tons of linerboard daily. This product is used for the outerply of corrugated containerboard. Instead of using virgin kraft pulp for the furnish, so called secondary or previously used fiber will be utilized. The source of this secondary fiber is clippings from paper converting plants and once used corrugated containers. By substituting this waste fiber for virgin pulp it is estimated that tree production from 30,000 to 60,000 acres will be saved each year.

The waste material is prepared for manufacturing by defibering, cleaning and refining. The refined fiber is then pumped in slurry form to a conventional fourdrinier paper machine for forming the finished sheet. The final product in the form of 60 inch diameter rolls will then be shipped to containerboard plants along the Eastern Seaboard.

There is a clear need and the Paper Industry is emphasizing recirculation of process water by designing so-called "Closed Systems." The benefits of this include conservation of raw materials, thermal energy and electricity. Before the recent emphasis on conservation and ecology, an effluent rate of 10,000 gallons per ton of paper was not considered as excessive. Using new technology and a desire for conservation this has been drastically reduced. Many mills operate with a zero discharge but there are usually associated problems such as slime build up, foaming, corrosion, etc. There is a means of disposal at this mill location and the effluent has been projected to be 1500 gallons per ton of product. Operating at this level should result in tolerable operating problems and the irrigation system can readily handle this quantity of wastewater. As experience is gained there will be a tendency to reduce this quantity during periods of low demand for wastewater and high rainfall.

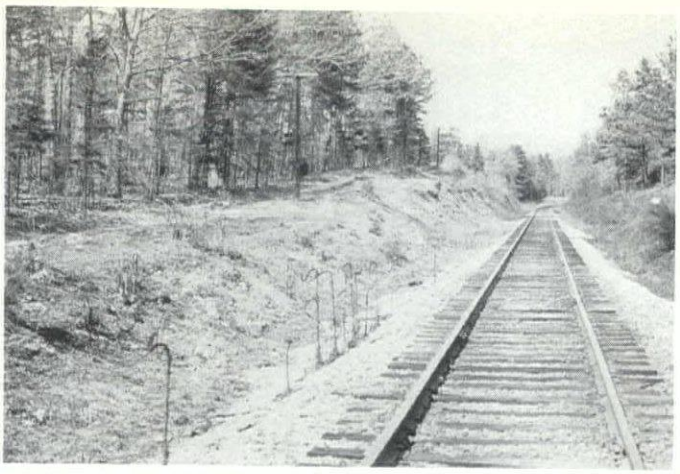
In the process of conserving process water it is passed through a disc filter or "Saveall" where suspended solids are removed for recycling. The filtrate which contains less than one half pound of solids per thousand gallons is reused in the process with the excess being discharged to the holding ponds for disposal.

The excess wastewater will be disposed of by spray irrigation. This disposal method was selected due to the future effluent limitation guidelines the proximity of the discharge point to a public water supply reservoir and the agricultural need for irrigation. It is generally conceded by ecologists and agricultural authorities that the place for wastewater is back to the land.

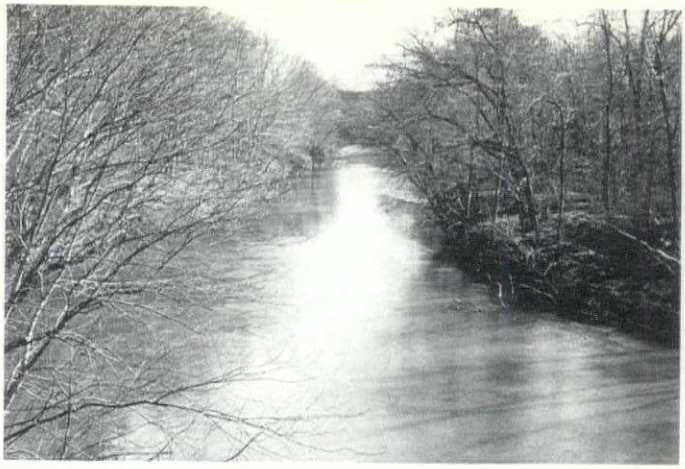
The effluent quality has been projected and no detrimental effect on soil, vegetation or groundwater is expected. In fact previous studies propose a substantial gain in crop and timber growth. This is based on experiments that have been conducted by outstanding Southern Agricultural Colleges.

Before this disposal means was selected, Soil Scientists, Geologists and Agricultural Engineers were consulted. Soil Borings were made and percolation and infiltration rates were determined. Complete data was then submitted to the State Water Control Board in the form of a "Zero Discharge Permit" application.

Effluent disposal by soil application is not new to the Paper Industry and with the new and more stringent requirements



SOUTHERN RAILROAD



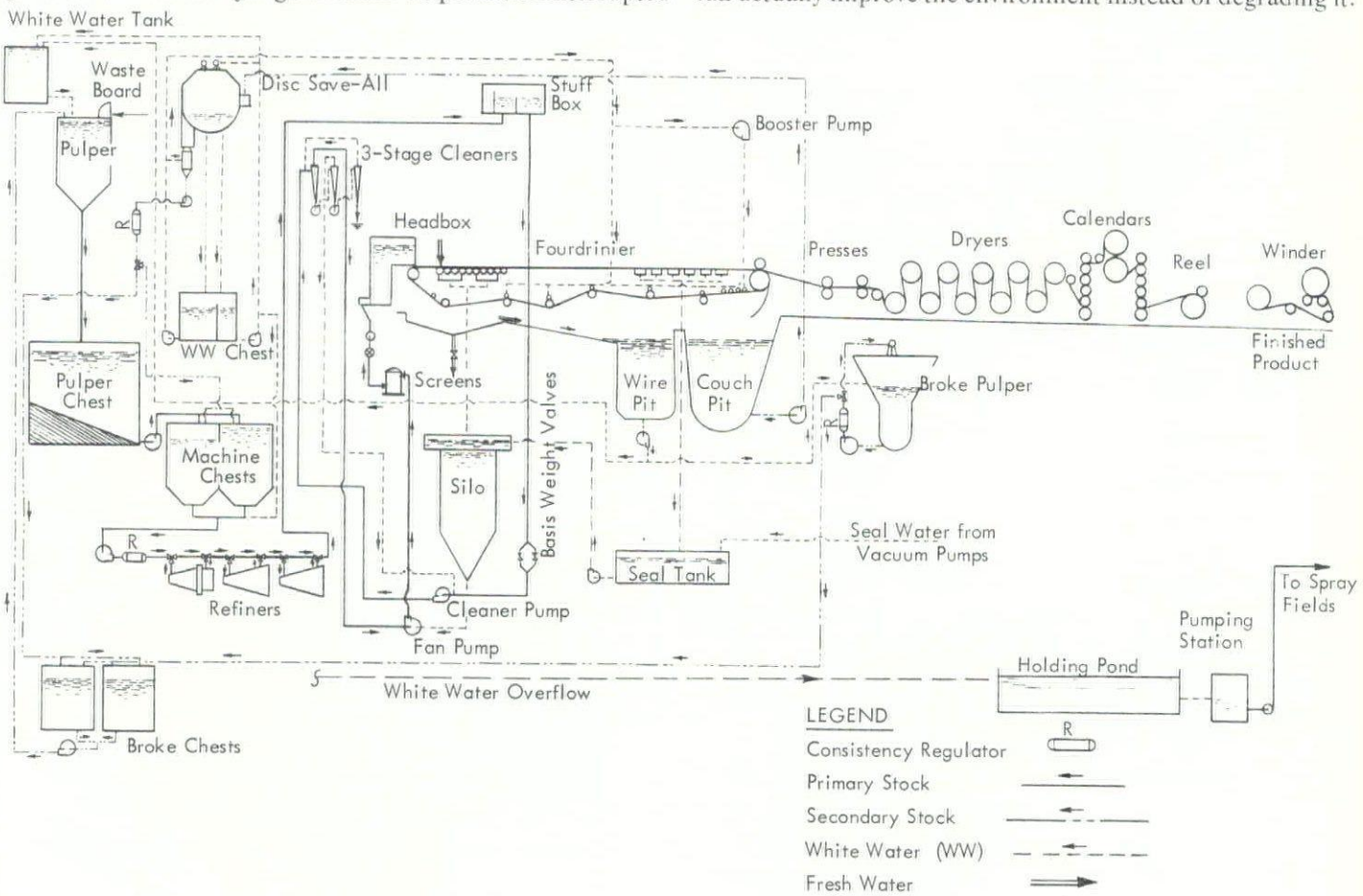
APPOMATTOX RIVER

by EPA and state agencies it will probably become more widely used where undeveloped land is available. The capital cost of this spray irrigation system is a fraction of the cost for conventional mechanical and biological treatment plants and irrigation provides an economic return on this cost.

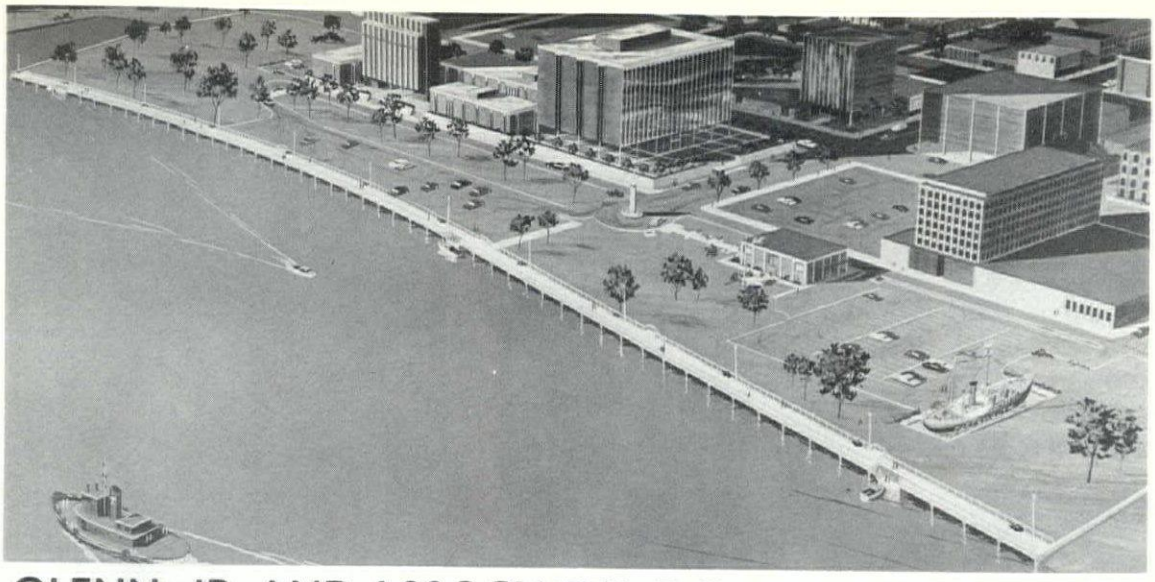
The spray fields will consist of pasture or hay crops of fescue, cash crops such as corn and soy beans and a large woodland area. In order to be assured that there will be no effluent run-off and BOD loading will not be exceeded, effluent application will be limited to one inch per week. This will require a spray field area of sixty acres.

Operation of the irrigation system cannot be continuous due to plant work schedule and probability of prolonged periods of abnormally high rainfall. To permit uninterrupted plant operation, holding ponds with thirty day effluent capacity will be provided. Sanitary waste will be disposed of by a septic tank or one of the many package sewage treatment units. Potable water will also be drawn from a well provided near the site. This well will also be used to note any effect on ground water from the irrigation system. Process water may also be drawn from wells or from the Appomattox River depending on economics and final project requirements.

This is the first major industry proposed for the area and will have a pronounced effect on the local economy by providing jobs and the associated requirements for services and supplies. It will demonstrate that industrial development can actually improve the environment instead of degrading it.



TYPICAL PROCESS DIAGRAM



JOE D. GLENN, JR. AND ASSOCIATES, P.C. present . . .

CRAWFORD BULKHEAD

YATES, BOGGS, BERKELEY AND SERVICE
Consulting Architect
W. F. MAGANN CORPORATION
General Contractor

BOWMAN AND ASSOCIATES
Consulting Engineer, Electrical
JOE D. GLENN, JR. AND ASSOCIATES, P.C.
Consulting Engineer, Structural/Civil

THE CRAWFORD BULKHEAD is a steel sheet pile bulkhead structure with concrete cap and retaining wall and prestressed concrete pedestrian walkway. This structure was constructed to protect and enhance the downtown waterfront in Portsmouth. It was also designed to become a part of a future downtown flood protection structure. The pedestrian walkway is above the historical high tide level and all penetrations for storm drainage are equipped with gravity gates.

In addition to flood protection, it was intended and has been used since completion as a focal point for leisure and recreational activities in downtown Portsmouth. A number of art shows, band concerts, and various other public activities have been staged on the facility. In addition, it is used quite extensively by downtown residents for recreational walks and sightseeing during the summer months. The present plans are underway to extend it to the north to encompass additional waterfront as a part of an overall development plan in downtown Portsmouth.

W. F. Magann Corp. of Portsmouth, was general contractor and handled excavating, foundations and concrete work.

Subcontractors & Suppliers

From Portsmouth were: Portsmouth Paving Corp., paving contractor; and Portsmouth Lumber Co., millwork. Others were: Ford Pile Foundations, Inc., Virginia Beach, piling; Hanna Garden Center, Inc., Virginia Beach, sodding, seeding, etc.; Hall Hodges/Read Steel Co., Inc., Norfolk/Chesapeake, reinforcing; Lone Star Industries, Inc., Norfolk, concrete supplier and prestressed concrete; Bethlehem Steel Corp., Bethlehem, Pa., steel supplier (sheet pile); Coley & Peterson, Inc., Norfolk, plumbing contractor; and Hitt Electric Corp., Virginia Beach, electrical contractor.

R. STUART ROYER AND ASSOCIATES present . . .

MAURY SERVICE AUTHORITY WATER TREATMENT PLANT

CONSULTING ENGINEERS:
ROACHE, MERCER AND FAISON, Mechanical/Electrical
TORRENCE, DREELIN, FARTHING AND BUFORD, INC., Structural
R. STUART ROYER AND ASSOCIATES, Civil

T & B BUILDERS, INC.
General Contractor

ANDRE STUDIO
Photography

THE MAURY Service Authority was formed in 1970 under the Virginia Water and Sewer Authorities Act for purposes of developing and financing water treatment and transmission facilities to serve the Cities of Lexington, Buena Vista and portions of Rockbridge County. The operation of the Authority is administered by a five man board composed of representatives of the political jurisdictions in the Authority's service area. The daily operation of the Authority is under the direction of Colonel J. C. Hanes, Executive Secretary and Chief Engineer.

In December 1970, R. Stuart Royer and Associates was commissioned to prepare a report detailing the recommended size and location of a water treatment plant and transmission facilities as well as the financial aspects of a project which would make potable water available in sufficient quantity and at the locations desired by the governing bodies comprising the Authority. The Authority sells water on a wholesale basis to the localities and it is the responsibility of the localities to deliver the water through their own distribution systems to retail customers. The Authority bills the governing bodies for the total metered quantity of water delivered to each of the participants and the local governments bill the individual consumers for the water used at a rate sufficient to cover the wholesale cost of the water purchased from the Authority plus the cost of delivering the water to the consumer.

The City of Buena Vista indicated that in the first stage construction program they did not desire to purchase water from the Authority and they would continue to serve their customers from existing wells and springs until such time as the supply became inadequate for the needs. This decision and the requirements of the City of Lexington and Rockbridge County resulted in the decision by the Authority to construct a two million gallon per day capacity plant, which with a minimum of expense, could be increased to 4 MGD when required.

The site selected for the plant was on the Maury River west of Lexington. This site was ideal as it was above maximum flood elevation and Lexington had many years ago constructed a low dam across the river to divert water to a raw water pumping station. The Authority purchased the city-owned dam, pumping station and a 10 inch main from the pumping station to the city-owned reservoir at the old Lexington filter plant.

A new raw water pumping station was constructed adjacent to the old station and the existing raw water main was utilized from the new pumping station to the plant.

The plant is a modern standard rate treatment facility with provisions for feeding any of the coagulant chemicals presently in use in water treatment. Chemical feeders are also installed to feed a variety of chemicals for control of taste and odor, pH stabilization, fluoridation, and sterilization.

Coagulation and sedimentation tanks are sized on the basis of a 4 MGD treatment rate in the so called "High-rate" mode of operation. All plant piping, feeders, rate controllers, etc. are sized for a 4 MGD rate.

To expand to 4 MGD, it is necessary only to change the filter media from standard silica sand to high-rate mixed media, add the coagulation control units required for high-rate operation, and install additional pumping equipment and raw water main. These modifications can be made without major structural changes and the plant can be kept in operation during the change-over.

The plant operation and the system status is fully instrumented. Continuous recordings are automatically made showing the amount of raw water pumped, finished water pumped, levels of all storage tanks on the system, as well as the output and condition of each filter in the plant.

Alarms are provided to indicate any abnormal occurrence such as low water in a tank which could result from a main break on the system.

Routine chemical analyses of the treated water have shown the water being delivered to the systems to be consistently of a better quality both chemically and bacteriologically than that required by the State Health Department.

Operation and routine maintenance of the plant is by personnel employed by the City of Lexington through a contractual agreement with the Authority.

The total capital investment by the Maury Service Authority including those facilities purchased from the City of Lexington is about $2,800,000. The Authority received a grant for the facilities of $727,850 from the U.S. Department of Housing and Urban Development.

T & B Builders, Inc. of Scottdale, Georgia was general contractor and handled foundations, concrete work, steel roof deck, carpentry, waterproofing, caulking and gypsum board work.

Subcontractors & Suppliers

From Roanoke were: Webster Brick Co., Inc., masonry supplier, Al-Steel

Fabricators, Inc., miscellaneous metal; PPG Industries, glass, glazing contractor, windows, window wall and storefront; Weil-McLain, heating equipment; Trane Co., air conditioning equipment; and, Square "D", electrical equipment supplier.

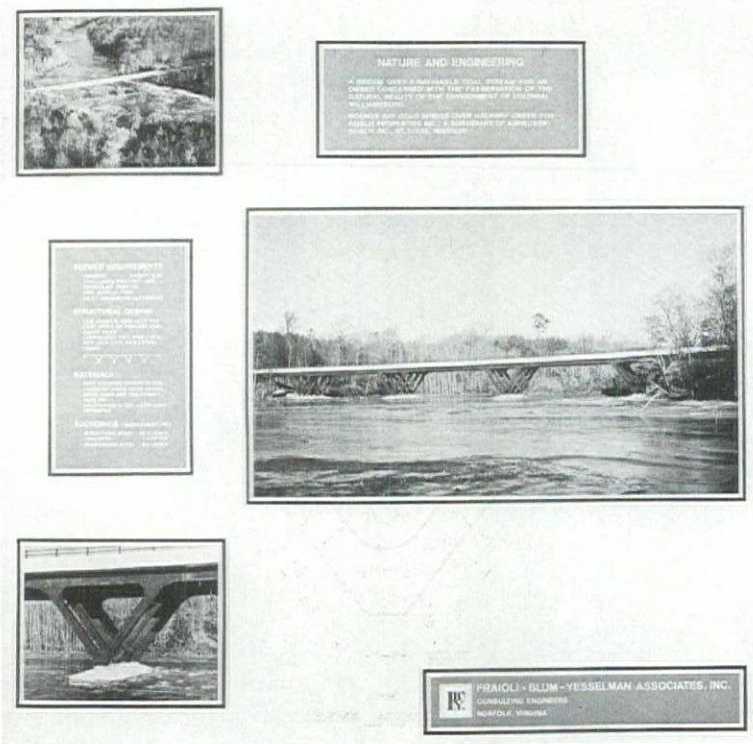
From Richmond were: Economy Cast Stone Co., stonework contractor and stonework supplier; J. S. Archer Co., Inc., metal doors & frames and hardware supplier; and, Eastern Building Supply Co., Inc., structural tile.

From North Carolina were: United Terrazzo Precast Co., Raleigh, terrazo; Shields, Inc., Winston-Salem, acoustical treatment and resilient tile; Thomas Industrial Coatings, Burlington, painting contractor and paint supplier; Dover Elevator Co., Greensboro, elevators; and, Crane Co., Greensboro, plumbing fixture supplier.

Others were: Charles W. Barger & Son Construction Co., Inc., Lexington, excavating, sodding, seeding, landscaping, landscaping contractor, paving contractor and concrete supplier; Floyd F. Austin & Co., Natural Bridge Station, reinforcing steel erection and steel joists; Master Builders, Cleveland, Ohio, mortar; Newman Brothers, Inc., Cincinnati, Ohio, handrails; Johns-Manville Sales Corp., New York, N.Y., built-up roof and roof insulation; Leonard Smith Sheet Metal & Roofing, Inc., Salem, sheet metal; Standard Tile Co., Inc., Verona, ceramic tile; Koppers Co., Inc., Pittsburgh, Pa., paint manufacturer; ILG Industries, Atlanta, Ga., ventilating equipment; Shenandoah Electric Co., Lexington, electrical contractor; Process Equipment Co., Tipp City, Ohio; BIF Industries, Providence, R. I.; Wallace and Tiernan, Inc., Belleville, N.J.; and, Link-Belt Co., Environmental Div., Chicago, Ill.

1976 ACEC ENGINEERING EXC

ENGINEERING EX



• CEC Virginia is pleased to submit two entries for competition in the American Consulting Engineers Council's Engineering Excellence Awards Competition.

The purpose of this national program is to recognize those engineering achievements demonstrating the highest degree of merit and ingenuity and providing a major contribution to technical, economic or social advancement. Any firm engaged in the private practice of consulting engineering is eligible to enter the contest regardless of whether that firm is a member of ACEC. Entries must be submitted to the national competition by a member organization.

Entries may deal with: completed planning and/or research studies; product or process development; development of techniques and/or

Mounts Bay Road Bridge over Halfway Creek Williamsburg

ENTRY BY: FRAIOLI-BLUM-YESSELMAN ASSOCIATES, INC.

• Mounts Bay Road Bridge is part of a residential, recreational and tourist development undertaken by Busch Properties, Inc., a Subsidiary of Anheuser-Busch, Inc., St. Louis, Missouri. The 4,000 acre development is bisected by Halfway Creek with the bridge providing the connecting link between the two parts of the property. The client strongly emphasized his desire to obtain a bridge structure that would blend well with the outstanding scenery of the site. Numerous schemes and materials for the structure were explored. The design chosen was felt to best fill this need due to its lightness and delicacy. The road alignment necessitated an inverted vertical curve throughout the length of the bridge. The lengths of the individual spans were so chosen that their ratio to the average clearance above the stream remained constant. Weathering steel was chosen for the framing as its rust color would complement the surroundings and require a minimum of maintenance. The same consideration led to the selection of tan concrete for the piers and superstructure.

The steel frame supporting the deck structure is designed as a fully continuous frame on six supports. The two piers closest to the center of the bridge are fixed, while the bearing on the remaining piers and abuttments are moveable. The advantage of this design is the elimination of expansion joints or hinges throughout the bridge structure. Framing is accomplished with rolled sections except at intersections. The deck girders are W36 x 135 and the members for the delta are W24 x 110. This choice has considerably reduced labor cost and simplified erection. Variations resulting from the rather involved geometry of the bridge are entirely accomodated in the built-up intersections. It is believed that the described design is unique and has been employed on this project for the first time.

Fraioli-Blum-Yesselman Associates, Inc. was responsible for the planning, the design and the supervision of the construction of the Mounts Bay Road Bridge over Halfway Creek. Sanford Construction Company, Sanford, North Carolina, was the general contractor and Globe Iron Construction Company, Norfolk, had an independent contract for the fabrication and erection of the structural steel.

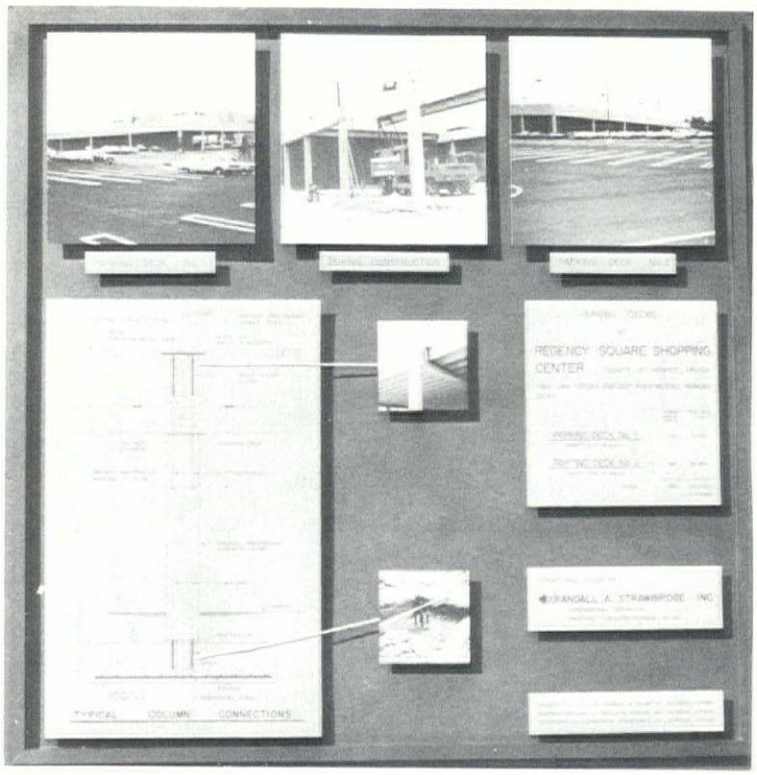
LENCE AWARDS COMPETITION

LLENCE AWARDS

design; related innovations or achievements. The project may have been executed anywhere in the world, but planning and research studies must have been publicly disclosed by the client and development or construction of projects must have been substantially completed during the 1975 calendar year.

Each entry will be judged on the basis of total engineering excellence (regardless of size of project, cost, or related factors) with emphasis on innovation and applicability of engineering solutions and social significance.

Awards in the national competition will be presented at the ACEC Annual Meeting in Washington, D. C. on May 19, 1976. CEC Virginia will present awards at the June CEC/V Annual Meeting at the Tides Inn, Irvington, Virginia.



Two One-Story Precast Prestressed Parking Decks
Regency Square - Henrico County

ENTRY BY: RANDALL A. STRAWBRIDGE, INC.

• Two one-story parking decks were required at Regency Square Shopping Center because of agreements with the stores and the limited site area.

Regency Square Shopping Center is located at the intersection of Parham and Quioccasin Roads in Henrico County (west of the City of Richmond).

The parking decks are constructed of precast prestressed columns, beams and double tees with poured-in-place concrete footings and deck topping. The site grades required the design and construction of five massive reinforced concrete cantilevered retaining walls.

The unique feature is the way the column connections to the footings and beams are made. Dowels at the column bottom ends and rods at the column top ends provide a simple, inexpensive and fast way in which to tie the structure together and also provide stability for the structure.

The height of the parking deck above the lower parking area on grade is 18 feet, which is an unusual feature due to the mall levels in the shopping center.

The cover that these parking decks provide during rainy, snowy, or hot weather is an added attraction to shoppers and a financial advantage to the stores.

The two parking decks are 250,000 square feet in area (5.74 acres) and were built at a total cost of 2.22 million dollars, which is 6 percent below the original cost estimate.

ROACHE, MERCER & FAISON, INC. present . . .

U. V. B. OPERATIONS CENTER

LEE, KING, POOLE AND WHITE
Architect

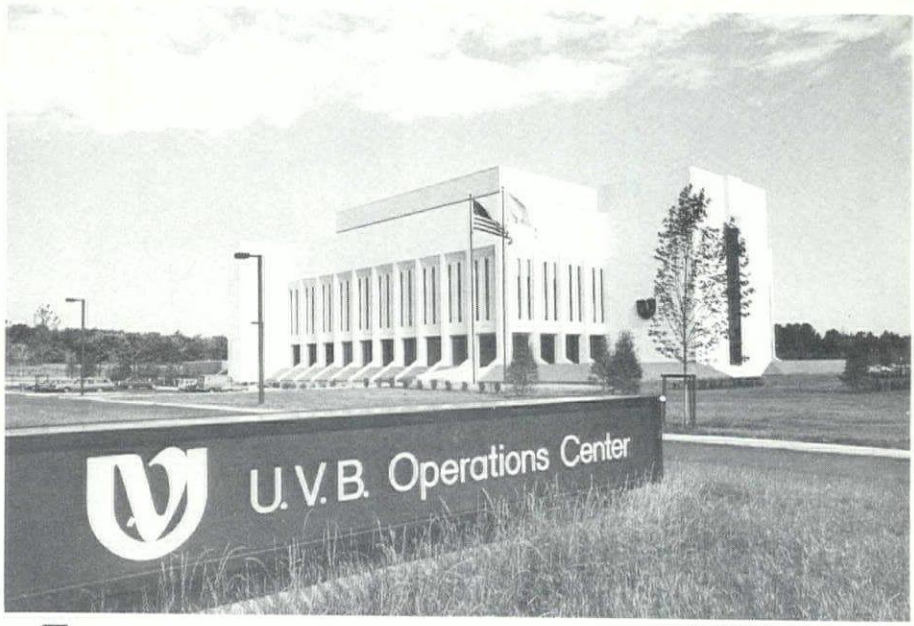
KENNETH R. HIGGINS
Landscape Architect

CONSULTING ENGINEERS:
ROACHE, MERCER & FAISON, INC.
Mechanical/Electrical
HARRIS, NORMAN, GILES & WALKER
Structural
AUSTIN BROCKENBROUGH & ASSOC.
Civil

GEORGE W. KANE
General Contractor
Phase I

J. A. JONES CONSTRUCTION CO.
General Contractor
Phase II

LUCY B. TURLINGTON/UVB
Interior Design.



THE OPERATIONS Center for United Virginia Bankshares, Incorporated, is one of the most modern and fully automated buildings in the Country today. The building, designed by Lee, King, Poole and White, Architects, and Roache, Mercer and Faison, Inc., Mechanical and Electrical Consulting Engineers, is located on Parham Road in western Henrico County. It consists of five floors and contains approximately two hundred and fifty thousand square feet. Each floor of the building is designed on a modular basis with a fully integrated ceiling system that includes lighting, air distribution and sprinkler outlets. The building is designed for future expansion in phases and will eventually contain approximately one million square feet. This unique facility houses Data Processing (Fig. 1), Check Clearing, and Bank Americard operations, as well as the Training Facilities, large Employee Cafeteria, and other key operations. The building is operated 24 hours a day, seven days a week, and is regarded as a high security installation.

Two large boilers (Fig. 2), which are equipped to operate on any grade of fuel oil or natural gas, supply steam that is used for the building's heating and cooling purposes (Fig. 3). The project is fed by two separate electrical services, and also contains an emergency generator with capacity to support Data Processing, Life Safety, and other key systems. All areas are completely sprinkled, and designated areas have an early warning type fire detection system.

In the early design stage, it became apparent that a computerized automation system was justified for energy management. After the decision was reached to provide such a system, it was found that it was economically

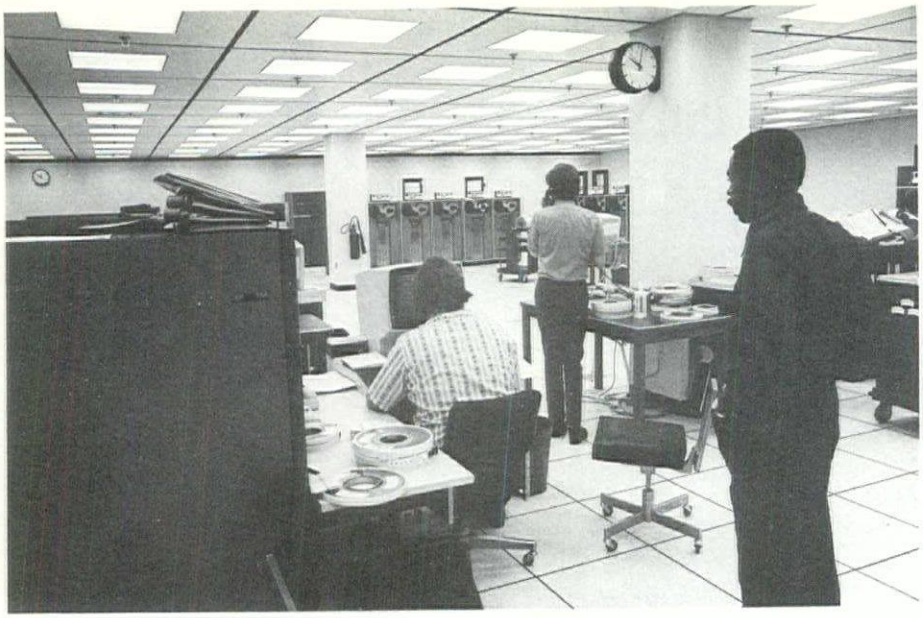


Fig. 1

justifiable to utilize the advantages of computerized control over most of the building sub-systems. The building fire alarm and detection system, clock system, security system, motor control system, automatic temperature control system, paging and background music systems could be operated directly by the computer realizing a first cost savings by simplifying the interfacing of the systems to meet the stringent building codes of today's modern buildings. After a thorough study of the industry, Johnson Controls, Inc., was selected to provide the JC/80 automation system. The heart of the system is a full purpose digital computer, interfaced with process type mini computers. The overall system is divided into two discreet sub-systems, one for Security and Life Safety and the other for building operation and control. Each sub-system has its own console located in separate rooms, and the operation of each is completely isolated. Although all Data Processing and Memory storage is performed in the primary computer, information is only supplied to the console having jurisdiction over that particular system. As an example, information that a motor needed servicing would be given only to the building operation console (Fig. 4), and information that a security violation had been detected would be given only to the Security console (Fig. 5). Some information is designated to be given to both consoles, especially information requiring action from both the security force and the building maintenance personnel, such as the

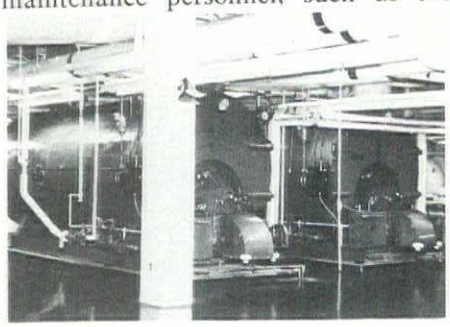


Fig. 2

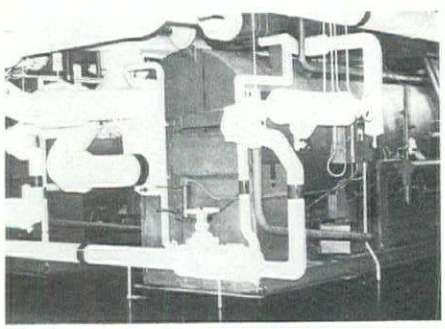


Fig. 3

detection of smoke in an area of the building. All communications with the automation system are made in full English language to minimize man to machine interface problems.

The Building Operations console is utilized by maintenance personnel and information such as "On" — "Off" status, temperatures, humidities, pressures (Fig. 6), water flow (Fig. 7), air flow (Fig.8), bearing temperature (Fig. 9), voltage and amperage readings, etc., are displayed on this console so that operating personnel can tell at a glance the condition of the building's plumbing, electrical, sprinkler, heating and air conditioning systems. Work orders for preventive maintenance are also generated by the system on the Building Operations console. The system maintains run time totals of all equipment in the building, and preventative maintenance work orders are generated based on actual operating time of the equipment. Work orders are also generated by the system based on certain operating conditions such as increase of operating temperature of motor or fan bearings, increase in pressure drop across filters, or the increase of amperage draw of certain equipment.

The energy management routines are extensive and represent the most modern technology in the field today. The computer has direct control over most all equipment that consumes energy in the facility. The temperatures on the heating and air conditioning units, chilled water system, and hot water system are maintained at their optimum point to satisfy environmental conditions in the building and utilize the least possible energy in the process. Fresh air is admitted to the individual areas of the building on a per-occupant basis for ventilation purposes, and is always kept at a minimum unless it can be used to supplement the work of the heating or air conditioning systems for heating or cooling purposes.

The building's electrical consumption is monitored and the system will automatically shed non-essential loads in order to keep demand peaks at an absolute minimum. The system operates on a "demand prediction forecast," which means that at the beginning of each demand period the

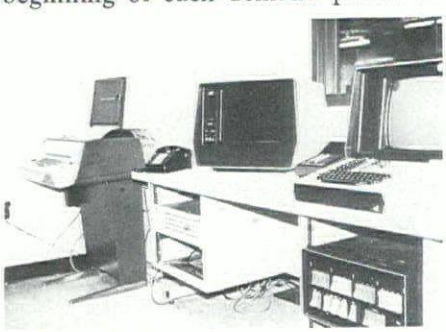


Fig. 4

Fig. 5

computer estimates what the demand for that period will be and trims the peak by shutting off smaller loads early in the demand period usually eliminating the need to shut off major equipment at the end of the demand period. In addition, overall consumption is kept to a minimum by shutting off equipment and lighting during times when areas of the building are not occupied. The system also monitors the normal electrical service and if an irregularity is detected the system will transfer the building to the alternate service. Upon a failure of both services, the computer will automatically start and transfer critical loads to the emergency generator. The system will monitor the output of the generator and continue to transfer loads as long as additional power is available without reaching an overload condition.

The motor control centers (Fig. 10) were provided as integral parts of the system, allowing the computer to have direct control over most equipment in the building and eliminating the need for extensive field interface wiring.

The Security Console is monitored by security personnel on a 24 hour basis and is located in the Security Central Station. This custom-built console gives security personnel direct control over the background music and paging, two-way radio, security, fire alarm, and closed circuit television systems. The security system utilizes some of the most advanced detection devices available today. Access to critical areas is controlled through the use of card readers which allows entrance to only those persons who have been cleared. This system provides written records identifying the individual and the time for all entries into these areas, and reports a violation if an individual attempts to gain entry into an area in which he has not been cleared. Console operators have the ability to lock and unlock doors and to activate intrusion alarms devices in critical areas during periods of unoccupancy. If a security alarm is detected, the location and type of alarm will be presented in the English language on a cathode ray tube similar in appearance to an ordinary television screen. The information will also be recorded in the same format by one of the printers and a slide projector

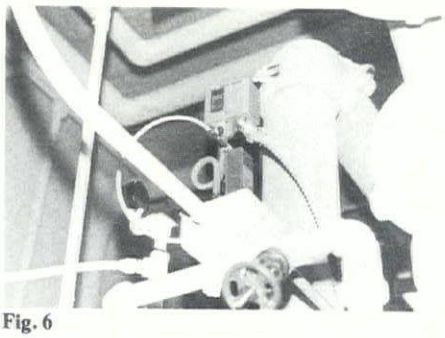


Fig. 6

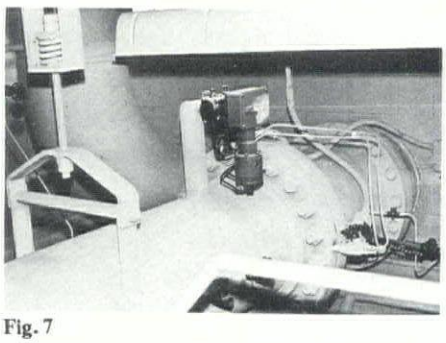


Fig. 7

will display the floor plan of the area in which the alarm occurred. The operator then can lock stairway doors and stop the elevators until security forces can be dispatched to the area to investigate the violation.

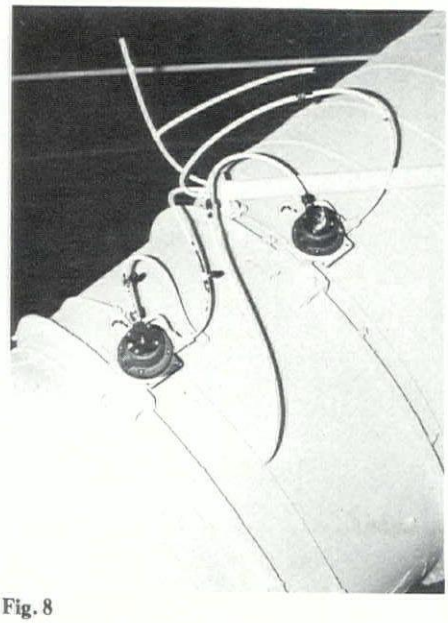


Fig. 8

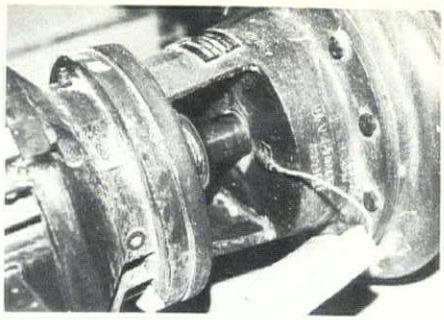


Fig. 9

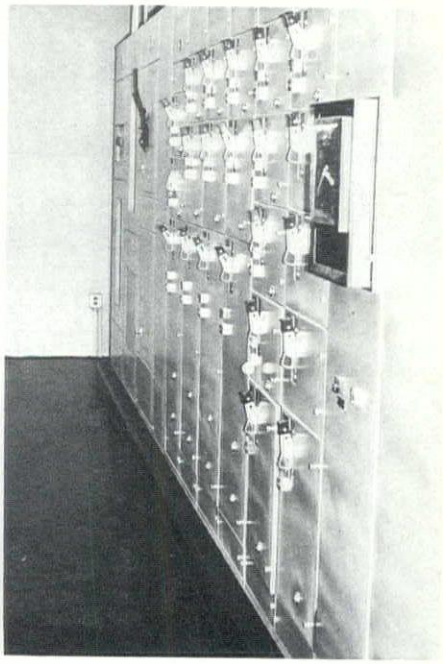


Fig. 10

An extensive closed circuit television system (Fig. 11) is connected into the automation system, which allows operators to select many areas of the building to be displayed on the console monitors for visual surveillance. The

Fig. 11

paging system allows the operator to broadcast voice messages to selected areas or to the whole building as required. Two-way voice communication allows security personnel to talk directly with building occupants in many areas. An intercom system provides Central Station operators direct communications with remote guard stations and the Director of Security Office. Two-way radio communications allow console operators to be in direct touch with the roving guards as well as security vehicles. Key areas in the building are equipped with early warning type fire detection sensors, which report to the computer when smoke or ionized particles are detected. The computer alerts both consoles so that maintenance and security personnel can be dispatched to investigate the source of the problem. If the source of the trouble cannot quickly be identified, the fire department will be automatically notified.

George W. Kane of Henderson, North Carolina was the general contractor for Phase I. J. A. Jones Construction Co. of Charlotte, North Carolina was the general contractor for Phase II and handled concrete work and carpentry.

Subcontractors and Suppliers

From Richmond were: R. H. Rose, sodding, seeding, etc.; Lee-Hy Paving Co., paving contractor; Franki Foundation Co., foundations; Massey Concrete Corp., concrete supplier; Hammond Masonry Corp., masonry contractor; Eastern Building Supply Co., Inc., furnished Stone Creek face brick and McNees-Kittanning glazed brick; Economy Cast Stone Co., stonework contractor; Empire Granite Corp., stonework erector; W. O. Grubb Steel Erection, Inc., steel erection; Ruffin & Payne, Inc., millwork, and wood doors; Brisk Waterproofing Co., Inc., waterproofing and caulking; N. W. Martin & Bros., Inc., built-up roof, roof insulation and sheet metal; W. W. Nash & Sons, Inc., wall insulation, painting contractor and wall covering; W. H. Stovall & Co., Inc., glazing contractor, windows, window walls and storefront; Pleasants Hardware, hardware supplier; Wilton & Denton, Inc., plaster contractor and gypsum board contractor; General Tile & Marble Co., Inc., ceramic tile; O'Ferrall, Inc., acoustical treatment and resilient tile; M. A. Bruder & Sons, Inc., paint; The Poole & Kent Corp., plumbing/heating/ventilating/air conditioning contractor; General Electric Co., electrical equipment supplier; and, E. C. Ernst, Inc., electrical supplier.

Others were: Mason C. Day, Inc., South Boston, excavating; Watkins Nurseries, Inc., Midlothian, landscaping and landscaping contractor; Montague-Betts Co., Inc., Lynchburg, reinforcing, steel supplier, steel roof deck, steel grating, miscellaneous metal, handrails and metal doors & frames; Marsteller Corp., Roanoke, special flooring; Va. Metal Products, Orange, specialties — movable partitions; Dover Elevator Co., Orange, elevators; Va. Sprinkler Co., Inc., Ashland, sprinkler contractor; and, Johnson Controls, Inc., Milwaukee, Wisconsin, general automation system.

HANKINS AND ANDERSON, INC. present . . .

Philip Morris, Inc.

BELLS ROAD BOILER PLANT

RAWLINGS, WILSON AND FRAHER
Architect

CONSULTING ENGINEERS:
HANKINS AND ANDERSON, INC.
Mechanical/Electrical/Civil
TORRENCE, DREELIN, FARTHING AND BUFORD, INC.
Structural

PHILIP MORRIS, INC.
General Contractor

HANKINS and Anderson were the prime consultants for the design of the Bells Road Boiler Plant for Philip Morris in Richmond. The plant houses a 150,000 lb./hr., pulverized coal fired field erected boiler which can also burn oil or gas. Light oil is used for ignition. The plant is designed to be doubled in capacity in the future.

The coal system has been designed to be dust free to prevent pollution. Coal is brought in from the main line railroad to a siding and an unloading station. At the unloading station the coal is sprayed with a suppressant to prevent dust from spreading as it is loaded onto elevators to carry it directly to the boiler or to storage silos which can store 5000 tons. Inside the boiler plant there is an overhead conveyor to transport the coal. Dual in-plant coal storage bunkers can hold 400 tons. The ventilation system and the sophisticated ash system also contribute to maintaining a dust free environment. The control center, which is air conditioned, houses the combustion control system for the plant, including an electronic furnace flame failure detection system.

The plant has heat traps to reduce energy consumption, electrostatic precipitators to reduce air pollution, and a 150 foot tall free standing chimney.

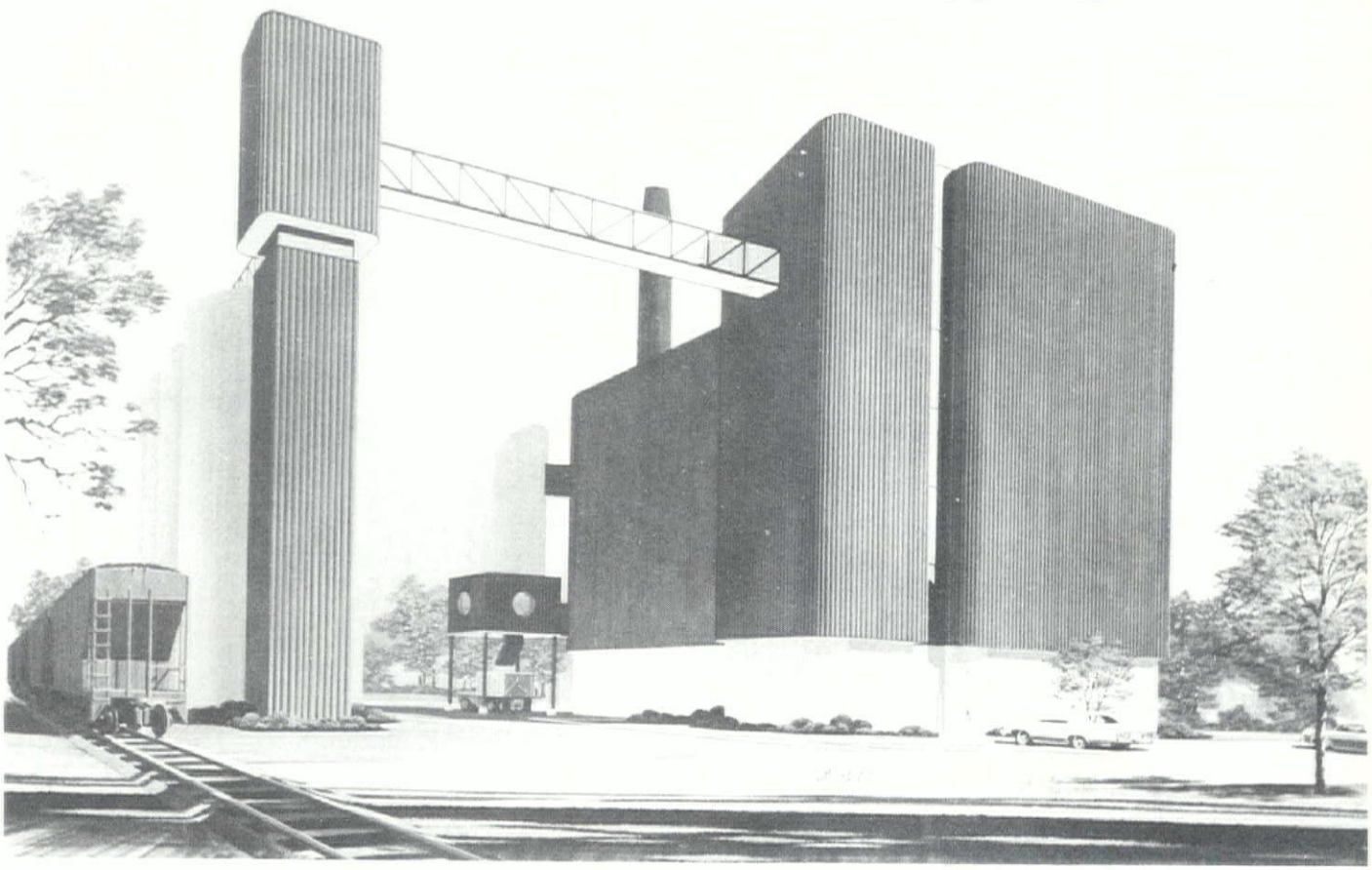
A fuel oil unloading and distribution system serves this plant and at the same time permits oil to be loaded on trucks to be transported to other facilities or to be pumped to auxiliary storage facilities across Bells Road.

An above ground steam distribution system connects the new Boiler Plant to the existing steam system in the main Philip Morris complex to the east across Bells Road.

The owner acted as general contractor.

Subcontractors & Suppliers
(Richmond Firms Unless Noted)

Green Bank Services, excavating, sodding, seeding, etc., landscaping and landscaping contractor; J. A. Walder, Inc., piling; Lee Hy Paving, paving contractor; Cleveland Cement Contractors, concrete contractor; Montague-Betts Co., Inc. steel supplier; Williams Enterprise, Inc., Merrifield, steel erection; Whitley Roofing Co., roof deck and other roofing; Natkin & Co., plumbing/heating/ventilating/air conditioning contractor; and The Howard P. Foley Co., electrical equipment supplier.



JOE D. GLENN, JR. & ASSOCIATES, P.C. present . . .

EDINBURGH SQUARE PARKING GARAGE

ARANYI, MURRELL AND ASSOCIATES
Consulting Architect
EDWARD G. CARSON AND ASSOCIATES
Landscape Architect
CONSULTING ENGINEERS:
BOWMAN AND ASSOCIATES, Mechanical/Electrical
JOE D. GLENN, JR. AND ASSOCIATES, P.C., Structural/Civil
W. B. MEREDITH, II, INC., General Contractor

THIS MUNICIPAL parking structure was constructed for the Portsmouth Parking Authority, City of Portsmouth, and is a three level structure containing 670 parking spaces. The complete structure is constructed of precast, prestressed concrete components with a cast-in-place concrete topping and architectural treatment. Office space, repair shops, and storage areas are contained underneath the ramps on the first floor.

This structure is located in downtown Portsmouth and is intended for shoppers' parking on the first level and monthly parking on the upper two levels. The construction cost for the complete structure including landscaping and all other items was less than $1,800.00 per car.

W.B. Meredith, II, Inc. of Norfolk, was general contractor and handled excavating, foundations, concrete work and all other items not covered below.

Subcontractors & Suppliers

Others from Norfolk were: Winn Nursery, sodding, seeding, etc., landscaping & landscaping contractor; Hall Hodges Co., reinforcing; Lone Star Industries, Inc., concrete supplier, prestressed concrete and masonry supplier; PPG Industries, glass and window walls; Door Engineering Corp., metal doors & frames; Dover Elevator Co., elevators; and Charles W. Davis, electrical contractor.

Firms from Portsmouth were: Portsmouth Paving Corp., paving contractor; and J. T. Eley, Jr., masonry contractor.

HAYES, SEAY, MATTERN AND MATTERN present . . .

CONTINUOUS NITROCELLULOSE PLANT AT RADFORD ARMY AMMUNITION PLANT

HAYES, SEAY, MATTERN AND MATTERN
Architect/Engineer
HARRIS MECHANICAL CONTRACTORS, INC.
General Contractor

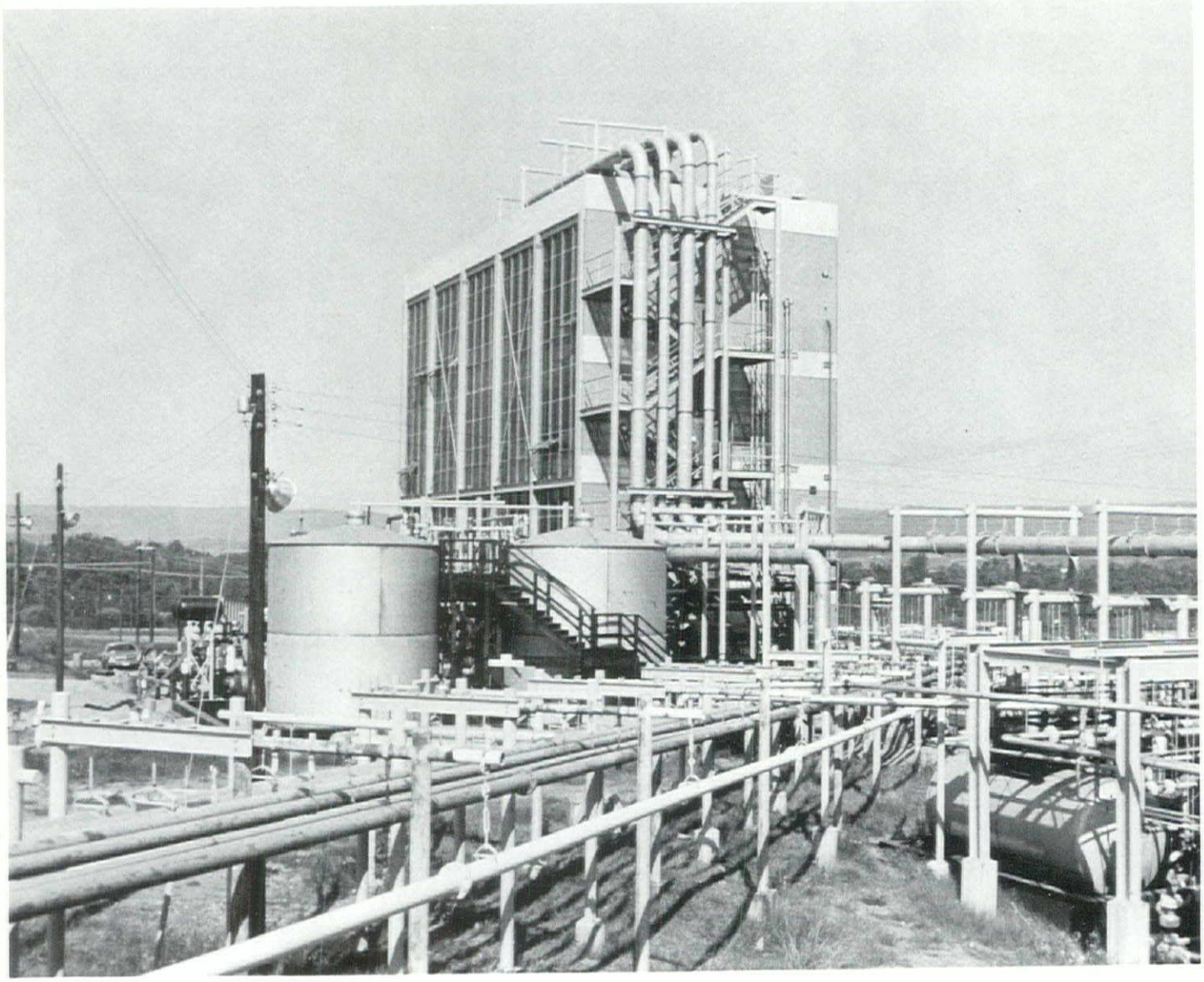
THE 4,000,000 pounds per month Continuous Nitrocellulose Manufacturing Process Facility was constructed by the Norfolk District Corps of Engineers for the Army Materiel Command at the Radford Army Ammunition Plant (RAAP), and was designed by Hayes, Seay, Mattern and Mattern. The operating contractor and the process proprietor at RAAP is Hercules, Inc. This project was completed in 1975.

The continuous process, which will replace the existing batch process, is part of the modernization program at RAAP. The new process will produce nitrocellulose more economically, result in less water and air pollution, and require a less hazardous operation than the batch process.

Process equipment is custom-built equipment designed by the process proprietor and purchased by the Army Materiel Command. All wettable parts of process piping, valves and instrumentation are stainless steel.

The nitrating house is the focal point of the entire project, housing all of the equipment required in the nitration process, but the project also includes an operational control center, office areas and toilets. Arrangement of the areas and their relationships are based on functional material flows and control.

The nitration of cellulose process uses either wood pulp or cotton linters as the

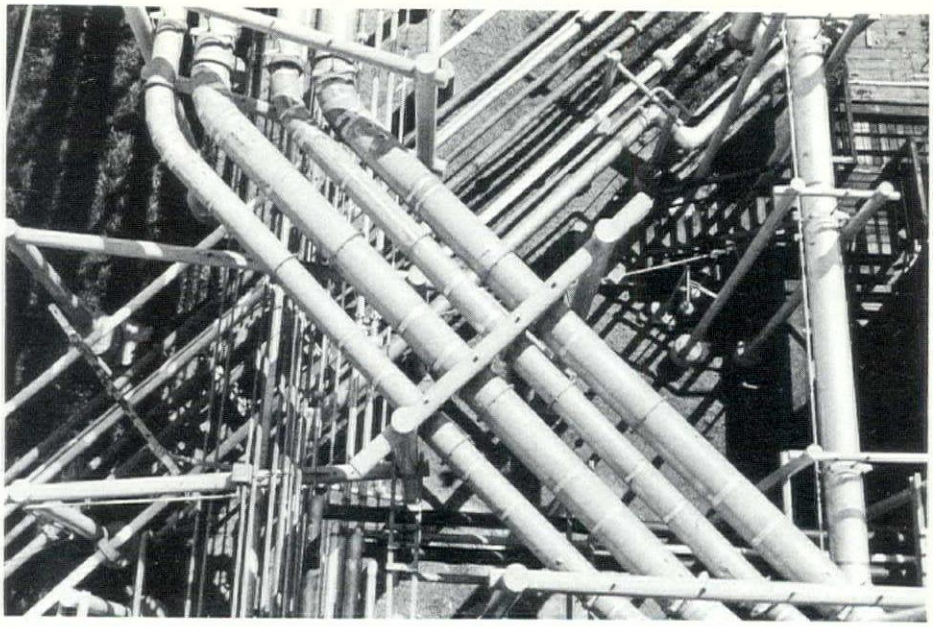


cullulose feedstock and a mixture of nitric and sulfuric acid as the acid feedstock. Nitrocellulose will be produced on the basis of a continuous process conforming substantially to the design supplied by the process proprietor.

The production complex consists primarily of the following operations and support facilities, so arranged as to provide a single integrated production line:

a. Wood pulp and cotton linters storage, drying, preparation and feeding;
b. Nitration acid storage, conditioning, and feeding;
c. Continuous nitration of either wood pulp or cotton linters;
d. Centrifugal recovery and washing of the nitrocellulose produced, followed by its transfer to the existing nitrocellulose purification facilities;
e. Recovery of spent nitration acids for reconcentration and reuse and recycling of nitrocellulose fines;
f. Fume treatment for removal of NO_x generated in the process consists of a scrubber for NO_2 absorption and molecular sieve for catalized reduction of NO_x recovered nitric acid is pumped to spend acid recovery for recycling;
g. An Operational Control Center.

The Nitrating House consists of a single structure with four operating levels. Located nearby are the acid storage, mixing and feed tankage and cellulose drying and transfer equipment. The building houses all equipment needed for the process, including acid conditioning and refrigeration. Along the north and south walls, a continuous pipe and utility space approximately 12 inches wide is provided for vertical runs of pipe, control tubing and wiring, and general utility space. This chase eliminates the necessity of constructing many costly floor penetrations, most of which would require flashing and/or curbings, and would greatly simplify future additions and/or alterations to the process and control systems. The north and south walls are curtain walls constructed of stainless steel framing members and acrylic plastic glazing. This construction will provide good natural light and ventilation as well as easily maintainable surfaces which can be washed with a hose to combat the highly corrosive atmosphere of the facility. All floors of the process area are sloped,and continuous gutters are provided to permit rapid runoff of acids and washing operations. All interior surfaces of the nitration process area will receive acid resistant coatings. The use of acid brick was limited to the areas which will receive the most frequent contact with acid. All materials were selected on the basis of low construction cost and low long-range maintenance cost and to develop and provide an economical design consistent with the anticipated process requirement.



Harris Mechanical Contractors, Inc. of Radford was the general contractor.

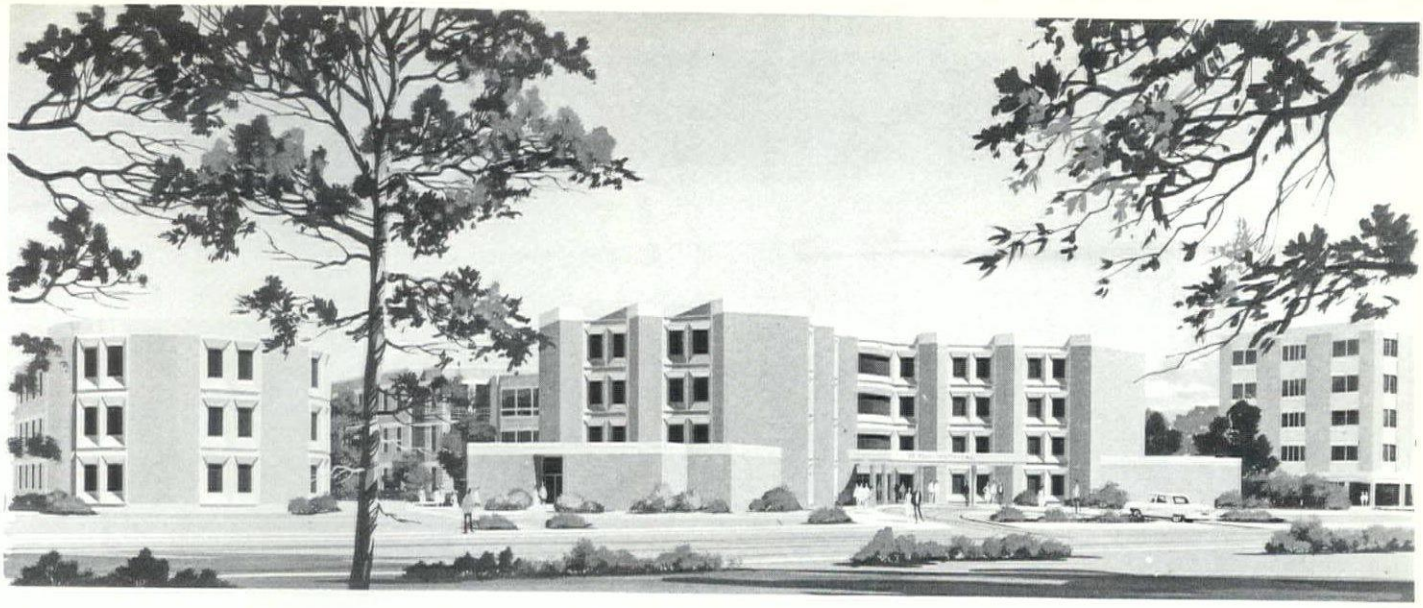
Subcontractors & Suppliers

From Roanoke were: Adams Construction Company, paving contractor; Atlantic Concrete Company, concrete supplier; Lightweight Block Company, masonry supplier; Eastern State Insulation Co., Inc., roofing — traffic bearing; Roanoke Engineering Sales Co., Inc. metal doors & frames; Skyline Hardware Company, hardware supplier; Western State Insulation Co., Inc., resilient tile, acid brick floor and acid resistant coating; and, Davis H. Elliot Company, Inc., electrical contractor.

From Richmond were: J. A. Walder, Inc., piling; Ar-Wall, Inc. of Virginia, acrylic plastic glazing; Automatic Sprinkler Corp. of America, sprinkler contractor; Hercules, Inc., tanks, wash acid filters, nitrators, centrifugal spray pipes, centrifuge slug feeders; Richmond Engineering Company, Inc., fines tank; and, Mixing Equipment Company, Inc., agitator-slurry tank, nitrating vessel and agitators.

Others were: Valley Steel Corporation, Salem, reinforcing; Montague-Betts Company, Inc., Lynchburg, steel supplier; Hawkins & Cox, Inc., Vinton, steel erection; Sale Brothers, Radford, structural wood; Elwin G. Smith Company, Pittsburgh, Pa., insulated steel panels supplier; Merrick Scale Mfg. Co., Passaic, N.J., weigh conveyor and collector conveyor; Baker Perkins, Inc., Saginaw, Mich., centrifuge; and, Cleveland Mixer Co., agitator - fines tank.

Manufacturers or suppliers of special equipment were: Honeywell, Inc., Roanoke; Reco Constructors, Inc., Richmond; Johnson Controls, Inc., Roanoke; Virginia Carolina Controls, Lynchburg; McJunkin Corp., Charleston, W. Va.; American Air Filter Company, Inc., Richmond; Taylor Instrument, Greensboro, N.C.; Elwin G. Smith Co., Pittsburgh, Pa.; Roanoke Concrete Products, Roanoke; Lynchburg Foundry Co., Radford; American Industrial Corp. Virginia Beach; Stevens Supply Corp., Radford; D & M Concrete Specialty Co., Roanoke; Rev-Car Fasteners Co., Roanoke; and, C. M. Kemp Manufacturing Co., Richmond.



HANKINS AND ANDERSON, INC. present . . .

DePAUL HOSPITAL

BASKERVILL AND SON
Architect

CONSULTING ENGINEERS:

HANKINS AND ANDERSON, INC.
Mechanical/Electrical/Civil

FRAIOLI, BLUM AND YESSELMAN ASSOC., INC.
Structural

DOYLE AND RUSSELL, INC. - General Contractor

THE TWO greatest challenges for Hankins and Anderson in the design of the engineering systems for 270,000 sq. ft. of additions and alterations for DePaul Hospital in Norfolk were the central utility plant and air conditioning the numerous operating rooms, delivery rooms and patient rooms.

The central utility plant is the hub of all of the utilities produced for the hospital. The heating plant consists of three 30,000 lb./hr. high pressure water tube boilers. Hankins and Anderson studied three systems for producing chilled water: electric drive centrifugal refrigeration machines, absorption refrigeration machines, and a combination arrangement with steam turbine driven centrifugal machines exhausting to absorption machines. For life-cycle reasons the last arrangement was selected.

With the combined steam turbine and absorption machines, steam is taken from the high pressure boilers to the two steam turbines driving centrifugal refrigeration machines. Low pressure steam is exhausted from the turbines and delivered to the two absorption refrigeration machines where it is used to drive the chemical refrigeration cycle in the chillers. Condensed steam leaving the absorption chillers is then delivered by three CB pumps directly back into the boiler supply system, resulting in a very small loss of condensate and flash steam. This system is highly adaptive to varying loads and follows the fluctuations in chilled water requirements with little wasted energy. The total system capacity is 2600 tons of refrigeration.

When the chilled water requirements are below approximately 35% of the maximum demand, the automatic control system will automatically bypass the steam around the turbine directly to the absorption machine. Bypassing steam directly to the absorption chiller at low loads results in operating economies because the absorption chillers are more efficient and consume less steam per ton of refrigeration at low operating loads. When the chilled water requirements are above 35%, the combined system is in operation.

An automatic control system provides central control and surveillance of all mechanical and electrical facilities in the hospital. Other systems in the central plant include emergency generators, fire pumps, compressed air and a domestic booster water system.

The air conditioning systems for the operating rooms and patient rooms, which use 100% fresh air and no recirculated air, have several unique features to reduce energy consumption and reduce germ contamination. In the patient rooms, radiant heating and cooling ceilings reduce the amount of air supplied to each room to the minimum required for comfort air movement.

To minimize the possibility of airborne infection, the air in the operating rooms is replaced about every three minutes with outside air. The supply air to the new patient rooms, delivery rooms and surgery suites is conditioned

(Continued on page 84)

HARRIS, NORMAN, GILES AND WALKER present . . .

LEWIS HALL
WASHINGTON AND LEE UNIVERSITY

MARCELLUS WRIGHT, COX, CILIMBERG AND LADD
Architect

GRISWOLD, WINTERS, SWAIN AND MULLEN
Landscape Architect

CONSULTING ENGINEERS:
HANKINS AND ANDERSON, Mechanical/Electrical
HARRIS, NORMAN, GILES AND WALKER, Structural
KELLY/HOUGH, INC., Concrete
BOLT, BERANEK AND NEWMAN, INC., Acoustics

GEORGE W. KANE, INC.
General Contractor

SALLY MANN, Photography

WASHINGTON AND LEE University anxiously awaits the opening this Spring of "Lewis Hall," its new law building. Located on a site across picturesque Woods Creek, the building is slightly remote from, yet within easy walking distance of the main campus.

The oldest buildings, through their charm, scale and originality of architectural expression, have made a lasting contribution to the architectural and cultural education of generations of Washington and Lee graduates. It was the goal of the design team to produce a contemporary, but compatible architectural expression and contribution for future generations in the new law facility without attempting to produce a facsimile of the old.

Accordingly, the exterior building materials chosen were concrete lightly sandblasted to give a slight texture to the white surfaces of the columns and horizontal panels, and the brick on the vertical faces will recall the color range of brick in the Washington College group of buildings. Windows are tinted glass.

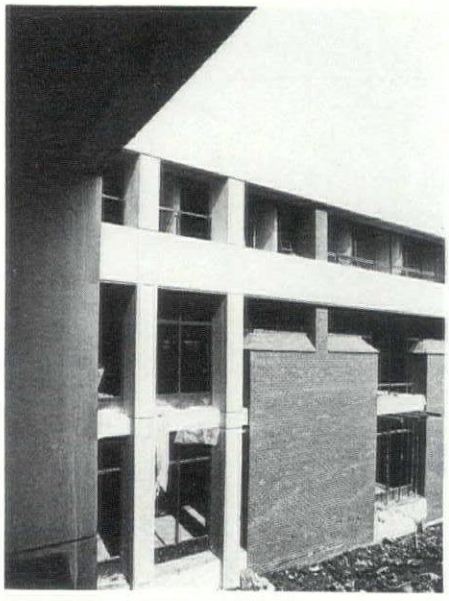
On the main level the interior ceilings are of exposed coffered panels of concrete. Ceilings in other areas are textured acoustical tile. Walls in public areas are brick, plaster and glass; walls in work areas are painted concrete masonry blocks. A great deal of carpeting has been used for floors, with some brick and vinyl asbestos and ceramic tile in work areas. Wood

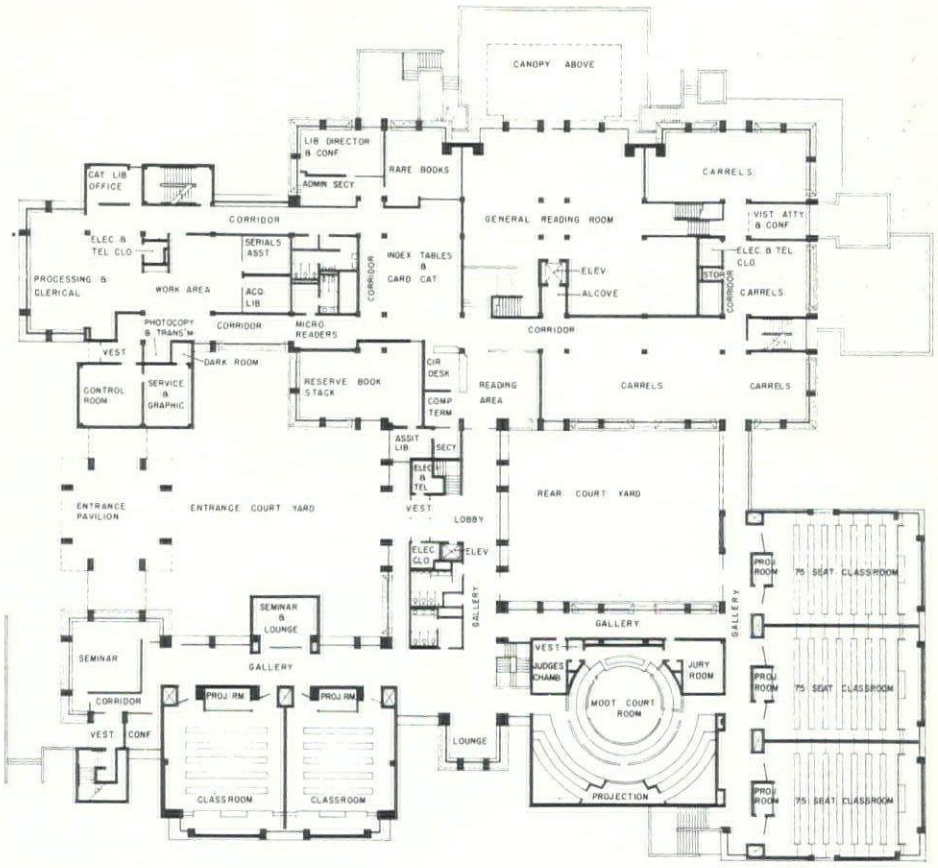
paneling and strips are employed in the classrooms and other areas such as the faculty lounge for both acoustical and aesthetic reasons. The materials are intended to give the building a harmonious, yet simple and elegant feeling throughout. At the same time, they will help to keep maintenance expenses at the lowest possible level.

The decision to expose the concrete framing presented a challenge to both the engineer and the architect. Special consideration had to be given to the selection of materials for the concrete mix, reinforcing and accessories and most especially to the location of reveal joints to conceal necessary joints in the formwork. To this end the services of a special concrete consultant were obtained.

All exposed exterior concrete was formed with 5'-0" x 10'-0" "Finn-form" plywood panels. To realize maximum economy with this relatively expensive material, maximum re-use of forms was required. This was accomplished with only slight modification to the structural elements. The result was significant savings in formwork cost. The forming methods and materials used and the care exercised by the contractor resulted in a finish which was of such quality that the owner and architect elected not to sandblast the surface but to accept "out of form" surfaces as more desirable.

The exterior concrete is a blend of white cement with natural aggregates indigenous to the area, there again realizing maximum benefit from a minimum expenditure. Of special structural significance is the detailing required to allow the interior gray concrete to be placed independent of the exterior white concrete and at the same time maintain the structural integrity of the building.





MAIN LEVEL

Inc., Lynchburg, steel supplier; Snow Lumber Co., High Point, N.C., millwork; Seager Waterproofing, Inc., Greensboro, N.C., waterproofing; and, Leonard Smith Sheet Metal & Roofing, Inc., Salem, built-up roof.

Also, The Bonitz All-Weather Crete Co., Greensboro, N.C., roof insulation; C. E. Thurston & Sons, Inc., Roanoke, wall insulation and foundation insulation; General Glass Co., Inc., Charleston, W. Va., glass; Augusta Steel Corp., Verona, metal doors & frames; Hope's Windows, Silver Spring, Md., windows; Contract Hardware, Inc., Lynchburg, hardware supplier; Jack R. Maness Co., Denton, N.C., plaster contractor, gypsum board contractor and resilient tile; Herring Decorators, Inc., Winston-Salem, N.C., painting contractor; Modern School Equipment, Inc., Richmond, specialties; Dover Elevator Co., Greensboro, N.C., elevators; and, G. J. Hopkins, Inc., Roanoke, plumbing/heating/ventilating/air conditioning/electrical contractor.

George W. Kane, Inc. of Durham, North Carolina was the general contractor.

Subcontractors & Suppliers

Plecker Construction Co., Millboro, excavating; Roadside Nurseries, Altavista, landscaping: Adams Construction Co., Roanoke, paving contractor; The Ceco Corporation, Richmond, concrete - formwork; Bethlehem Steel Corp., Richmond, reinforcing; Charles W. Barger & Son Construction Co., Inc., Lexington, concrete supplier; Exposaic Industries, Inc., Winston-Salem, N.C., precast concrete; Lightweight Block Co., Inc., Roanoke, masonry contractor-block; General Shale Corp., Glasgow, masonry supplier-brick; Montague-Betts Co.,

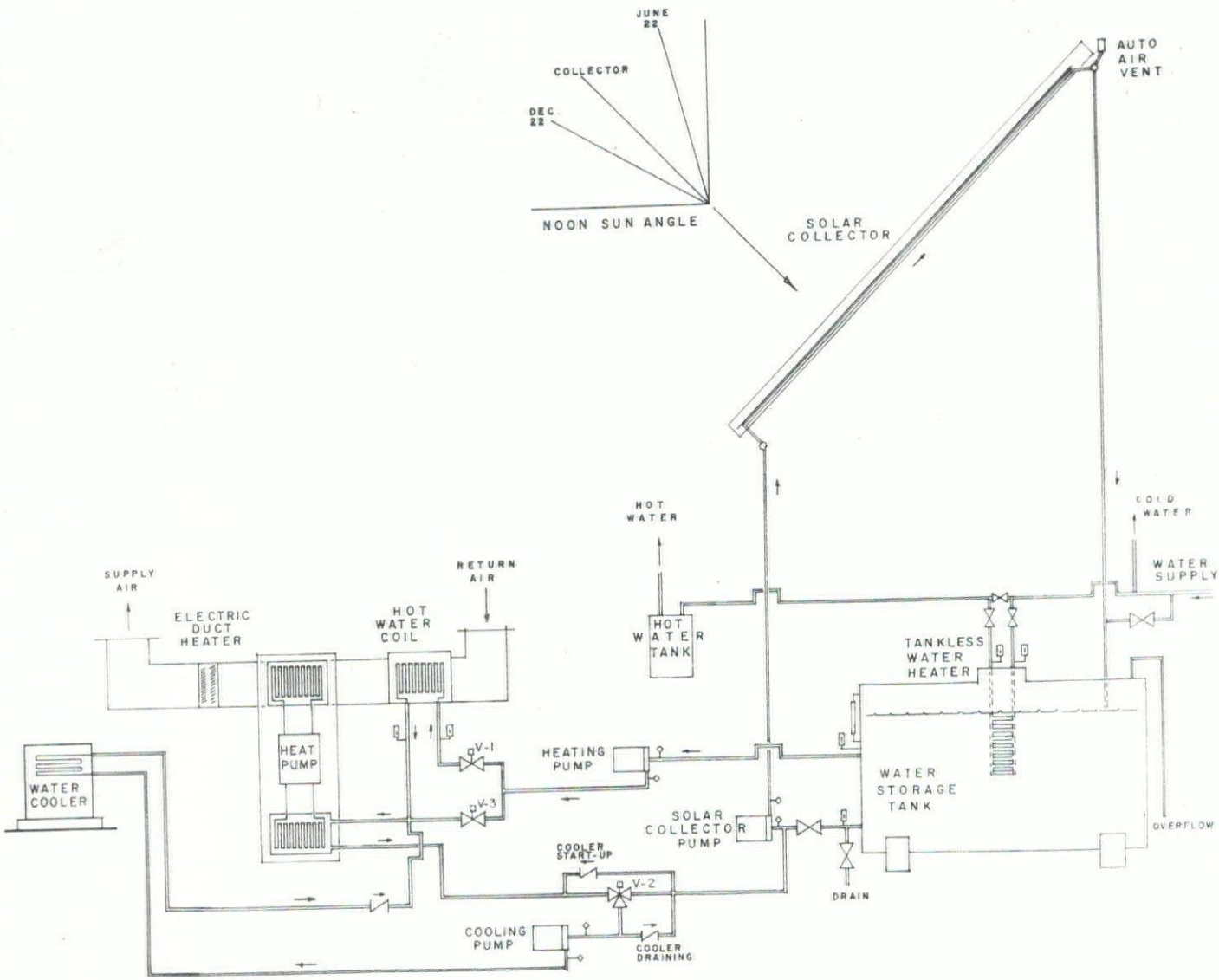
SIMPSON-JOHNSON, INC. present . . .

OFFICE BUILDING FOR DAVID W. BISHOP, D.D.S.

G. LEWIS CRAIG AND ASSOCIATES
Architect
SIMPSON-JOHNSON, INC.
Consulting Engineer, Mechanical/Electrical
DRAFT BUILDING COMPANY
General Contractor

THE CITY OF Waynesboro now has its first solar heated building. It was the result of a close team effort on the part of the architects, G. Lewis Craig and Robert P. Daughtry of the firm of G. Lewis Craig and Associates, of Waynesboro. M. Lyman Johnson and Earl R. Simpson, Jr., of the firm of Simpson-Johnson, Inc., of Lynchburg and Terrell E. Mosely of the firm of Terrell E. Moseley, Inc., the mechanical contractor, of Lynchburg and, last but not least, the owners, Dr. and Mrs. David W. Bishop who have shown a keen interest in the use of solar energy and have had the opportunity to attend several solar heating conferences.

Each member played a very significant part in the decisions on every



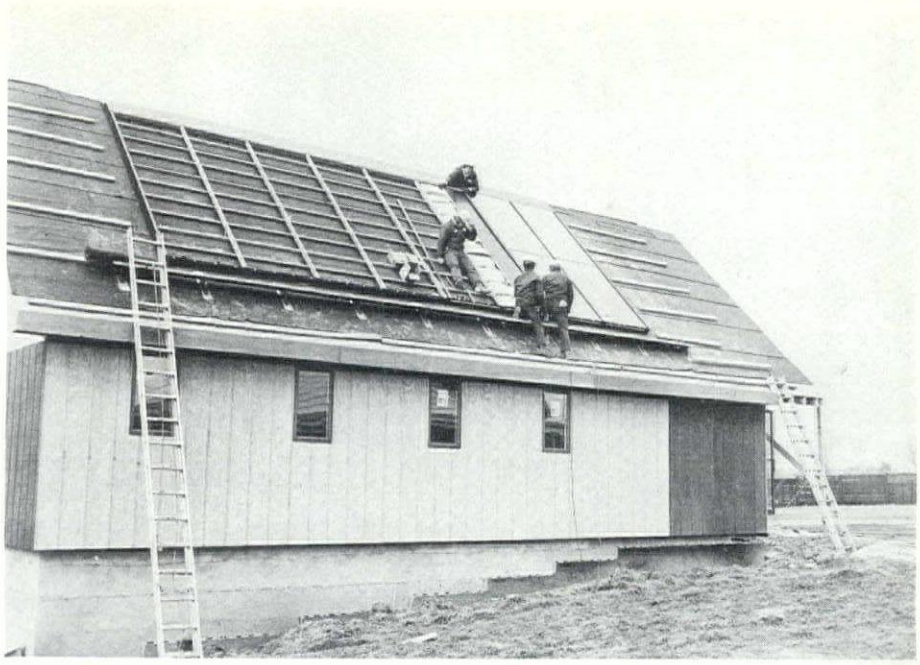
PIPING SCHEMATIC - SOLAR HEATING SYSTEM

facet of the design, including materials, type of construction, angles of orientation, etc. A substantial contribution was made by the mechanical contractor, Terrell Moseley, who has been exprimenting with solar collectors and their associated equipment since he ran his experiments and wrote his Master's thesis at the University of Illinois back in the 'fifties.

The basic concept was to use everyday material and readily available equipment to keep the installation as simple as possible, so as to keep the first cost to a minimum and to assure a minimum of maintenance. Consequently several conferences were held involving the entire group discussing and inspecting various materials, particularly those involved in the construction of the solar panels.

It is a system that includes basically 400 square feet of solar panels mounted on the roof at a 45 degree angle facing due south. The panels are aluminum plate painted flat black with attached copper tubing. The panel cover is a single layer of tempered glass. The water is circulated through the panels to pick up the solar heat which is trapped below the glass and then stored in a 2000 gallon insulated tank in the basement. The distribution system consists of a water-to-air heat pump, air ducts and a hot water duct coil sized to use the stored hot water for heating the building. The tank is capable of storing sufficient heat for two to four day periods when there is no solar heat available. Should the cloud cover time be extensive, the heat pump will provide the first back-up heat source and the next step would be to utilize the electric heating coil in the heat pump should further back-up be required. It is anticipated that this electric coil will get a very minimum of use.

It is anticipated that the solar system will provide as much as 60% to 65% of the energy needed for heating the building and the domestic hot water for this project; however, because of the added investment which is approximately three times as much as a normal air conditioning system costs for a building of this size (1200 square feet), it will take twelve to fifteen years to pay back the investment based on a conservation estimate on a rise of fuel costs. In larger buildings the percent increase of the first cost for the additional solar equipment would be significantly less.



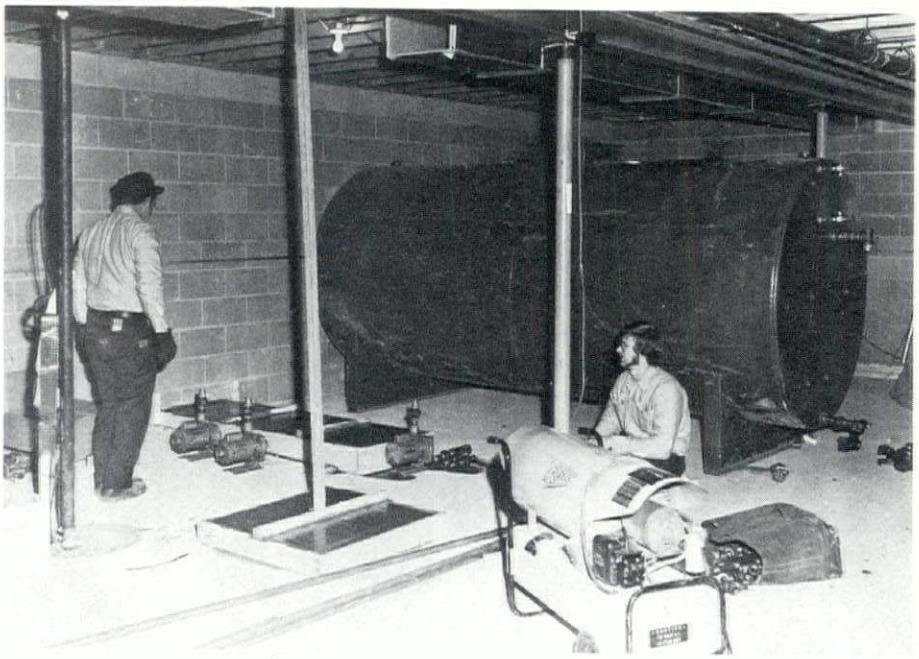
The collector is designed for maximum efficiency by the use of a single pane of glass operating at the lowest possible temperature to prevent reverse losses. The system is designed to allow the water to drain to the tank when the solar pump is not in operation, thus avoiding the reduced efficiency when using an anti-freeze solution. The piping is all copper and the storage tank interior is coated to reduce corrosion.

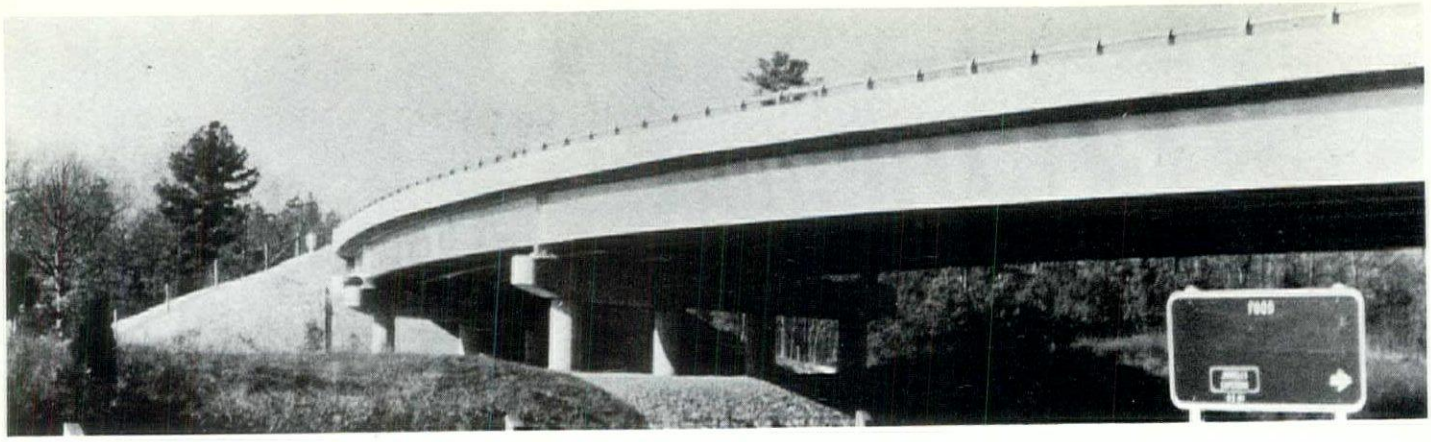
There has been considerable interest in the Valley over one of the most unique orthodontist offices in the country.

The general contractor was Draft Building Co. of Waynesboro.

Subcontractors & Suppliers

Terrell E. Moseley, Inc., Lynchburg, heating & air conditioning; R. W. Cash Plumbing & Heating, Staunton, plumbing; Myers & Whitesell, Inc., Waynesboro, electrical; and Romaine Glass & Mirror Co., Waynesboro, glazing.





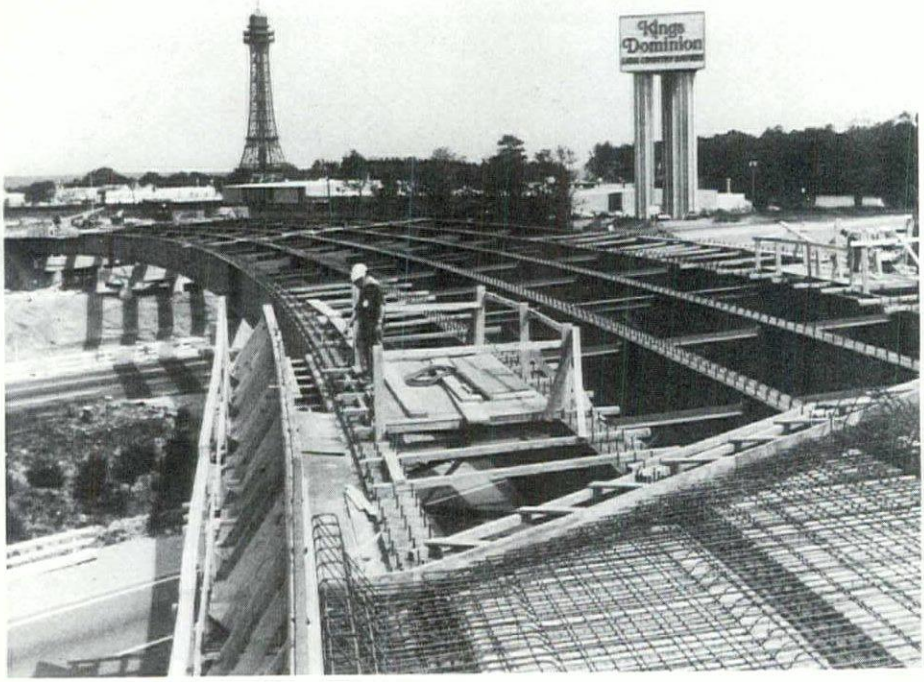
HAYES, SEAY, MATTERN AND MATTERN present . . .

RAMP "A" OVER ROUTE 95 AND FRONTAGE ROAD
KING'S DOMINION AMUSEMENT PARK

HAYES, SEAY, MATTERN AND MATTERN
Bridge Engineer
BERO CONSTRUCTION CORPORATION
General Contractor

THE NEW four-bridge Interstate 95 interchange at Doswell, planned in conjunction with the development of the King's Dominion amusement park in Hanover County, is now serving motorists who visit the popular complex. Presently entering its second season, King's Dominion, located about 15 miles north of Richmond, is billed as the nation's third largest theme park.

The interchange features a 457-foot curved ramp structure, carrying a three-lane roadway across I-95, and a frontage road directly into the park. The 53 foot wide flyover is composed of five spans: two tapered-girder simple end spans, and a three-span (132 foot, 160 foot, and 87 foot) continuous unit supported on skewed piers. Constraints on location of substructure elements made a more nearly ideal span length balance impossible.



In each span, the 8½ inch thick concrete deck slab is designed for composite action, with six strings of A36 steel welded plate I-girders. The 6 foot deep continuous girders were fabricated straight, then curved to a 980 foot average radius by application of heat to the flanges.

Shipped by truck in 92 foot maximum lengths, the girders were subassembled near the site into sections up to 176 feet long. The subassemblies were then lifted into place and spliced, with a minimum of disruption to I-95 traffic.

Geometrical complexities of vertical curvature, horizontal curvature, skewed piers and super-elevation made careful preparation of steel shop drawings especially important in securing reportedly smooth field erection. Bottom lateral braces were fabricated with slightly oversized bolt holes to assure ease of assembly.

Horizontally curved steel bridge girders, while not very common in Virginia, were selected because they fitted the curved alignment and span length requirements better than girders composed of straight segments, as well as for their aesthetic superiority.

In keeping the height of the ramp approach embankments to a minimum,

span continuity was utilized to keep the girders slender. Details of span continuity were considered by the designer to be simpler for curved girders than for straight girder segments. For example, straight girder segments would have required skewed splices, irregular overhanging deck soffit widths, and nonconstant center-to-center girder spacing. Curved girders yielded uniformity of concrete deck, forming neat connection details and a uniform cantilever deck width at the fascia girders.

The Doswell interchange project was planned and constructed under the direction of the Virginia Department of Highways and Transportation. Leisure Centers, Inc., developer of King's Dominion, is owner of the Ramp A bridge. The designer was Hayes, Seay, Mattern and Mattern of Roanoke, Virginia; General Contractor was Bero Construction Corporation, Waterloo, New York; and Steel Fabricator was Roanoke Iron and Bridge Works, Inc., Roanoke, Virginia.

The bridge was opened to traffic on November 21, 1975.

Bero Construction Corp. of Waterloo, New York the general contractor, handled excavating, piling, sodding, seeding, landscaping, foundations and concrete work.

Among the subcontractors and suppliers were: Haley Ready Mix Co., Inc., Ashland, concrete supplier; Union Steel Erectors, Inc., Chester, steel erection; and, Old-North Manufacturing Co., Inc., Lenoir, N.C., deck expansion joints.

HANKINS AND ANDERSON, INC. present . . .

CENTRAL MECHANICAL PLANT FOR THE GRADUATE SCHOOL COMPLEX, U. VA.

RAWLINGS, WILSON AND FRAHER
Architect
CONSULTING ENGINEERS:
HANKINS AND ANDERSON, INC.
Mechanical/Electrical/Civil
THOMAS A. HANSON AND ASSOC.
Structural
J. M. TURNER AND CO., INC.
General Contractor

IN 1970, the University of Virginia engaged Hankins and Anderson, Inc., to develop a master utility plan for a new Graduate School Complex to be built on Copeley Hill. The complex comprises four buildings with a total of 315,000 sq. ft. of space, including a Central Mechanical Plant, the School of Law, the Graduate School of Business Administration, and the Judge Advocate General's School. The master plan included the site utilities and the roadways for the complex.

Hankins and Anderson studied the alternatives of having a central mechanical plant and of having individual plants for each of the three schools. A central mechanical plant was chosen because of its higher operating efficiency, reduced maintenance and operating labor requirements, and improved control. The total installed capacity of the central plant is less than that which would have been installed in three separate building plants because of the diversity in the system. The use of a central plant also eliminated the need for a boiler room, chimney, fuel storage and cooling tower at each building. In addition, it proved to be economically justified on a life cycle cost basis with a lower total owning and operating cost over the life of the system.

Once it had been decided to build a central mechanical plant for the complex, Hankins and Anderson evaluated the generation of steam versus high temperature hot water. The latter was chosen because of its smaller initial investment, less heat loss, less system maintenance, higher system diversity, and less system corrosion. Also, the topography of the site favored the use of high temperature hot water.

The mechanical plant houses two 20 million BTU high temperature hot water boilers which deliver 350 deg. F water to the system. A primary hot water loop pumps water at a constant rate through the two boilers. A secondary loop distributes the heat to the buildings. Two large pumps are employed for winter operation, and one small pump is used for summer operation. The burners are able to burn either light oil or heavy oil as the primary fuel. There is an electronic combustion control system, and an electronic flame failure system provides further protection. The system is pressurized with high pressure nitrogen.

For the production of chilled water, the decision to install a central refrigeration plant was arrived at after a reasoning similar to that used to select a high temperature hot water generating plant. Accordingly, two 800 ton electrically driven centrifugal refrigeration machines were installed, with a chilled water loop serving the three school buildings.

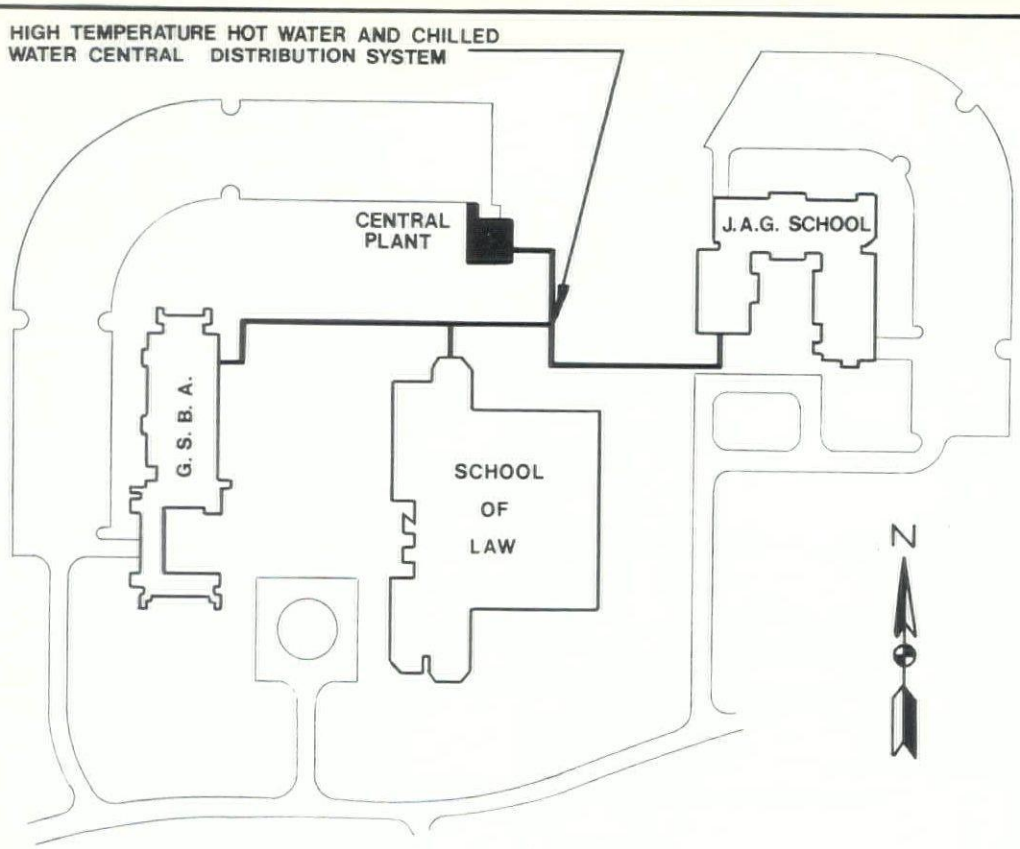
A central automated management center was installed to control all mechanical and electrical systems in the complex. This system remotely monitors and controls the entire system through automatic programs, thus providing maximum efficient energy usage by all systems in the complex.

The distribution system from the central plant to each building utilizes direct-buried preinsulated pipes suitable for high temperature hot water and chilled water. In each building the high temperature hot water is passed through a water-to-water heat exchanger for producing low temperature hot water for heating. Chilled water is distributed in each building directly to the air handling units. The air conditioning systems in the three schools are of the energy-conserving variable-volume type which utilize reduced fan horsepower during periods of reduced loads.

The general contractor was J. M. Turner & Co., Inc. of Salem.

Subcontractors and Suppliers

Among the subcontractors and suppliers were: Albemarle Construction Corp., Charlottesville, excavating; J & W Landscaping, Winchester, sodding, seeding, etc.; S. L. Williamson Co., Inc., Charlottesville, paving contractor; Valley Steel Corp., Salem, reinforcing; Allied Concrete Co., Charlottesville, concrete supplier; Fred M. Stinnette & Co., Madison Heights, masonry contractor; E.M. Martin, Inc., Charlottesville, roof; and Augusta Steel Corp., Verona, miscellaneous metal.



SITE PLAN OF
GRADUATE SCHOOL COMPLEX
AT THE UNIVERSITY OF VIRGINIA

MATHEW J. THOMPSON, III presents . . .

NEWPORT NEWS PUBLIC SAFETY BUILDING

RANCORN, WILDMAN & KRAUSE
Architect/Landscape Architect
Interior Design/Photography

CONSULTING ENGINEERS:
MATHEW J. THOMPSON, III, Mechanical
RICHARD B. LEWIS, Electrical
FRAIOLI, BLUM, YESSELMAN ASSOC., INC., Structural

W. M. JORDAN CO., INC.
General Contractor

By James R. Walls, P.E.
Electrical Engineer
Mathew J. Thompson, III
Consulting Engineers, Inc.

THE NEWPORT NEWS Public Safety Building under construction at a cost of $5,876,000, will be one of the finest facilities of its type when completed in the latter part of 1976. Located in the center of downtown Newport News, the building will be occupied by the Newport News Police and Sheriff's Departments and will have cell capacity for 217 inmates.

The seven-story windowless structure has provisions for adding two future stories. Processing facilities and cells for short term inmates are located on the first floor. Administrative spaces for the Police Department are provided on the second and third floors. Major air conditioning equipment, complete kitchen facilities and administrative spaces for the Sheriff's Department are located on the fourth floor. The heating plant and confinement facilities comprise the fifth floor and the sixth and seventh floors consist of confinement facilities.

The mechanical systems feature two 300-horsepower steam boilers and a 285 ton steam absorption chiller and will cost $1,457,000. Three existing municipal buildings in addition to the new Public Safety Building will be served by the boilers. This requirement dictated the selection of a steam system because the three buildings are presently served by boilers in the existing Public Safety Building, which will be demolished after completion of the new building. Each boiler has a capacity equal to two thirds of the calculated load and can be fired by fuel oil or natural gas.

The air handling systems are designed for economy of operation. All outside air and exhaust air for the building passes through a rotary air to air regenerative heat exchanger more popularly called a heat wheel. This reduces the required capacity of the boilers by approximately 50 horsepower and the chiller capacity by 95 tons. In addition to savings in first cost of the boilers and the chiller, the heat wheel is expected to pay for itself in a reasonably short period with savings in fuel and power cost. Internal heat gains from people, equipment and lights will be returned to the system where possible during heating season by mixing return air with the required amount of fresh air. Outside air will be used for cooling whenever the weather is cold enough, thus saving operating costs. Cell areas receive 100 percent outside air in accordance with penal regulations. Two air handlers each serve one-half of the cell areas in the upper three floors. This allows inmates to be retained on the same floor by shifting them to the opposite side if one unit fails.

The electrical service is distributed from a 2500 amp, 277/480 volt main switchboard. In the event of utility failure, a 250 KVA diesel generator provides emergency service to essential equipment including fire pump, air handling units, emergency lighting, elevator, fire alarm and door alarms.

Special design features of the electrical system include a closed circuit television system, electric door locks and intercommunication systems. The closed circuit television systems provide a means of observing inmate activity from a central location. Door locks for the cell areas are electrically operated from a central point with indicating lights indicating the position of each

door on the central monitor. Intercom systems provide two way communication throughout the building. Personnel movement through confinement areas is controlled by the above systems. Authorized personnel may alert the central operator with the intercom system and be observed by TV system before doors are unlocked electrically by operator.

W. M. Jordan Co., Inc., of Newport News, is general contractor and handled foundations, concrete work and carpentry.

Subcontractors & Suppliers

From Newport News were: Benson-Phillips Co., concrete supplier, masonry supplier & mortar; Atlas Cement, mortar; Weaver Brothers, millwork, paneling, cabinets & wood doors; W. M. Jordan Co., Inc., foundation insulation; Pompei Tile Co., Inc., ceramic tile & terrazzo; Rugland, Ltd., carpet; Glidden Paint & Decorating Center, paint supplier; Noland Company, American Standard plumbing fixture supplier; Warwick Plumbing & Heating Corp., plumbing/heating/ventilating/air conditioning contractor; and, Perry Electric Co., Inc., electrical contractor.

Hampton firms were: K. F. Wilson, excavating; Lockwood Brothers, Inc., piling; Virginia Steel, Inc., steel supplier, steel erection, steel roof deck, steel grating, miscellaneous metal & handrails; and, Westinghouse Electric Supply Co., lighting fixture/electrical equipment supplier.

Norfolk firms were: Winn Nurseries, sodding, seeding, etc., landscaping & landscaping contractor; Hall-Hodges Co., Inc., reinforcing; Roof Engineering Corp., waterproofing, built-up roof & roof insulation; American Sheet Metal Corp., sheet metal; Walker & Laberge Co., Inc., glass, glazing contractor & bronze entry; Shaw Paint & Wall Paper Co., Inc., painting contractor, special wall finish & wallcovering; C.E. Thurston & Sons, Inc., walk-in freezer/refrigerator; and Motorola Communications & Electronics, Inc., audio/visual communications.

From Richmond were: E. S. Chappell & Son, Inc., caulking; O'Ferrall, Inc., resilient tile; Modern School Equipment, Inc., specialties (projection screen, tack boards, chalk boards); and, W. W. Moore & Sons, Dover elevators.

Others were: C.A. Barrs Contractor, Inc., Williamsburg, paving contractor; Hammond Masonry Corp., Sandston, masonry contractor, stonework contractor & structural (glazed) tile; Ingalls Stone Co. Inc., Bedford, Indiana, stonework supplier; Todd & Dixon, Tabb, wall insulation & plaster contractor; Schatz Kitchen Equipment, Inc., Washington, D.C., kitchen equipment; Architectural Products of Va., Va. Beach, metal doors & frames & hardware supplier; Virginia Construction Specialties, Inc., Tabb, acoustical treatment; Glidden, Cleveland, Ohio, paint manufacturer; Liskey Aluminum, Inc., Glen Burnie, Md., computer floor; Dominion Ecological Services, Staunton, refuse container/compactor system and, Roanoke Iron & Bridge Works, Inc., Roanoke, prison equipment.

TWO PROJECTS BY
TORRENCE DREELIN FARTHING AND BUFORD, INC.
ENGINEER/ARCHITECT

PECK IRON AND METAL CO.
SHREDDER FACILITY

Phase I

OFFICE AND WAREHOUSE

Phase II

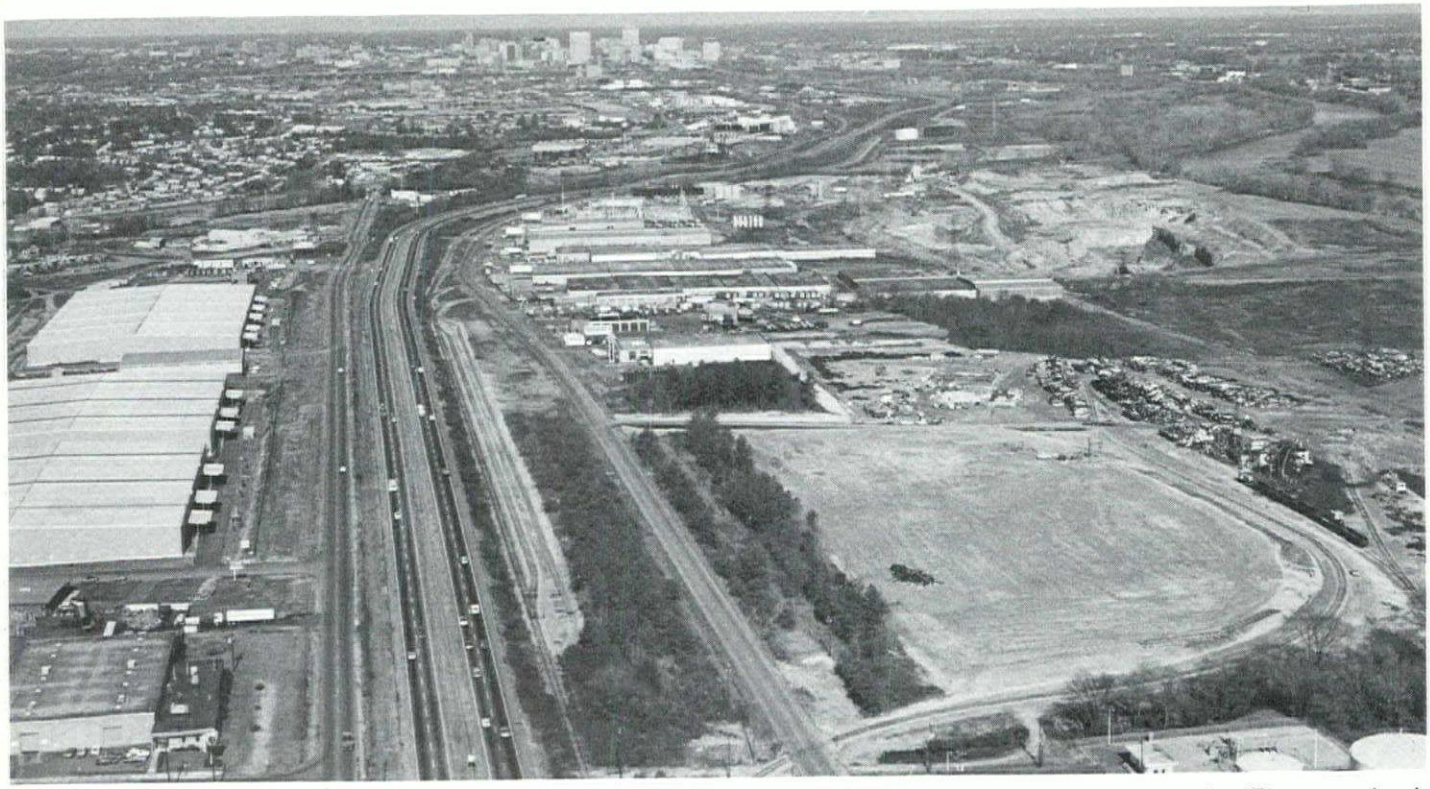
BASS CONSTRUCTION CO., INC., General Contractor

LOCATED ALONG the banks of the James River south of Richmond, across I-95 from the big Phillip Morris plant, lies one of the largest and most sophisticated steel and metal recycling operations in the United States.

Since its beginning 30 years ago, Peck Iron and Metal Company has continually updated its growing metals reclamation operation to meet the changing needs of iron and metal manufacturers and society as a whole. As natural resources continue to dwindle and prices skyrocket, today's demand is quite clear: collect every possible type of waste metal and process it in a form that can be used again.

In 1973, Peck joined with the Richmond engineering and architectural firm of Torrence, Dreelin, Farthing and Buford, Inc. to plan an expanded recycling operation on a new site that would not only contribute to ecological balance through its business but would also avoid adverse environmental impact on its South Richmond location. Bass Construction Company was the general contractor for much of the work. The result of two years of planning and construction is a smooth, efficient operation that goes about its business virtually unnoticed by the Central Virginia community - and processes for re-use more than 240 million pounds of metal materials each year for mills and foundries throughout the United States.

The challenge to the consulting engineer on this project was to design the buildings, equipment, foundations and used-metals storage that would be efficient, environmentally sound and

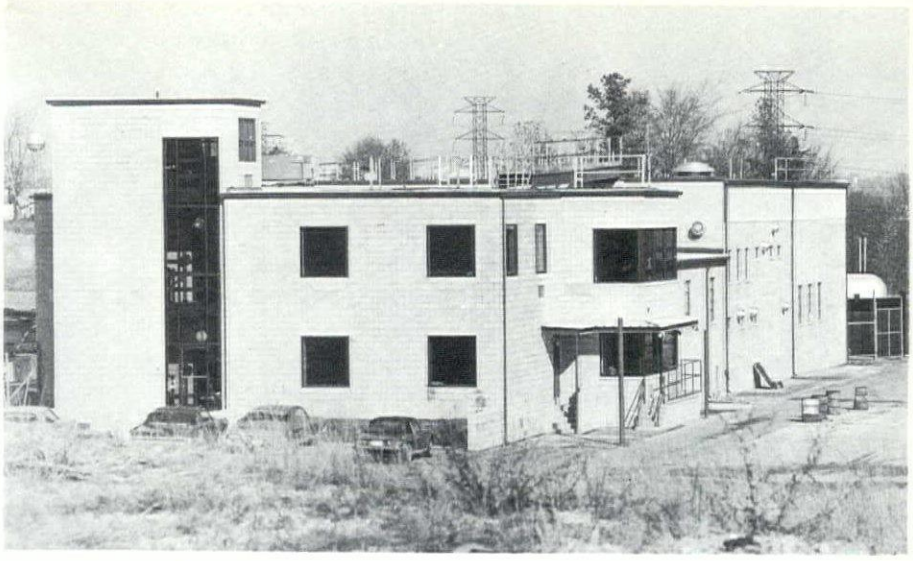


Peck's metals reclamation center operates each day virtually unnoticed by the central Virginia community. The operation is screened from view of passing motorists along I-95 by a natural buffer of trees.

flexible enough to allow for continued expansion. After building a scale model of the 100-acre site, the first step was to determine how the railroad would get onto the property for transporting the recycled iron and steel back to the mills. When the positioning for the trackage was determined, the next task was to build a home for the multi-million dollar steel fragmentizer, a giant automobile-eater that can recycle a complete automobile into a pile of high-quality steel scrap in approximately 40 seconds.

The steel fragmentizer is the heart of the Peck operation. Only about 140 of these machines are in operation today all over the world. Making a home for the fragmentizer required a massive foundation and a control building that could house electrical equipment, a shop and a sophisticated, glass-enclosed master control booth for the big machine. The facility also included a support for a stationary crane that would lift the cars and other scrap from a pile and place them in the fragmentizer.

After the automobile is placed in the fragmentizer, or "shredder" as it is frequently called, large hammers in a giant steel box rip the car into shreds. The ferrous metal (steel) is magnetically separated from the non-ferrous metals. Air cyclones vacuum away the non-metalic substances, such as glass, plastic, upholstery and even paint. After a last minute quality control check at the end of the conveyor belt by a Peck employee, the tons of small chunks of pure, number one steel are deposited directly onto railroad cars for immediate transportation back to the steel mills. Running at near capacity, this machine can chew up more than 150,000 old cars each year - converting each one into 1,500 pounds of useable steel scrap.

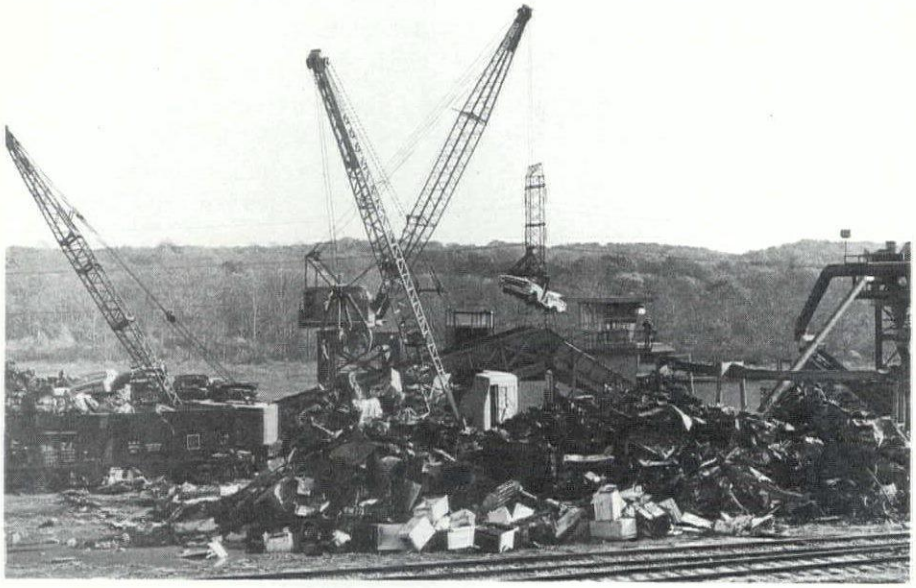


The brand new Peck office building overlooks the reclamation operation. In the metals warehouse (to the rear of the offices), approximately 100 different alloys of non-ferrous metals are identified and prepared for recycling.

Hundreds of abandoned or useless automobiles are brought in by tractor trailer and tow trucks from all over Virginia each day for sale to the Peck company. Prices for the old cars vary according to weight and current market prices, but all those who bring in the cars are paid cash right on the spot after the materials are weighed. Because of the amount of truck traffic on the property each day, truck scales were positioned near the main office building so that truckers could weigh in, circle the property for unloading, weigh out and leave in the shortest time with the greatest possible convenience.

"Mining above ground" is the expression frequently used to describe this type of operation. And there's no question that this kind of mining is much more economical for society than the mining of raw ore for the production of steel. Producing one pound of steel from virgin ore consumes about five times as much energy as producing that same amount of steel from ferrous scrap.

Metal reclamation is certainly not a new industry. What is new is the development of the technology that makes it economically feasible to "mine" or recycle metal waste of all kinds to create nearly pure products without polluting natural resources in the process. This technology was spurred by a worldwide recognition of the need to conserve natural resources



From worn out washing machines to smashed up old cars . . . Peck processes for re-use more than 240 million pounds of metal materials each year for mills and foundries throughout the U.S. The car above is being placed in the fragmentizer. In less than 60 seconds it will become 1,500 pounds of steel ready for use again at the mill.

and by the increasing demand for raw materials.

Recyclable metal materials include vast amounts of consumer-produced waste. According to information in a new brochure produced recently by the Peck Company, Americans alone discard almost 10 million automobiles, more than 20 million appliances and 30 billion steel cans each year.

But the steel fragmentizer is only one part of the Peck recycling operation. Adjacent to a newly-constructed office facility that overlooks the site is a processing plant and metals warehouse that will recycle millions of pounds of non-ferrous metals each year. The processing plant, with its giant sweat furnace, permits the sorting and smelting of non-ferrous metals into more than 100 different alloys. The metals are sorted by experienced craftsmen with acids and grinding wheels. They are then separated, sheared, baled or melted before being shipped back to refiners and primary metal producers.

Typical materials that you might see in the Peck processing plant include aluminum from beach chairs, pistons and lawn mowers; copper from electric transformers and motors; zinc alloys from carburetors; nickel and cobalt from jet engines; lead from batteries; brass pipe and fittings from auto radiators; x-ray films; silver serving trays; pewter mugs and even an old brass tuba. The processing plant also includes a laboratory for more extensive testing of non-ferrous metals.

It was only appropriate that some of the materials used in building the processing plant be taken from the Peck scrap inventory. Steel trusses from the Peck operation were used to great advantage to clear span the building requiring no columns inside. The unobstructed floor allows the greatest use of space and maximum flexibility as new processes are developed in the future.

Torrence, Dreelin, Farthing and Buford, Inc. is now in the process of designing foundations and a control building for a huge metal cutting tool called a guillotine shear. With a cutting force of more than two million pounds, the shear is used to reduce large, unwieldy pieces of metal such as sections of railroad cars and bridges into an appropriate form for shipping back to the primary metals manufacturer.

Another key piece of equipment used in the Peck operation is a giant car smasher called a hydraulic baler. This is a fascinating piece of equipment (which you may remember from the James Bond movie "Goldfinger") which reduces large bulks of steel, like an automobile, into small compressed bales. These steel bales are either processed further or are shipped back to the mills as they are.

Future plans include the addition of rail and truck access to the waterfront where a large 300' long bulkhead will be located to permit receiving and shipping from barges using the James River.

As mentioned earlier, all of the activity at the Peck site goes on virtually unnoticed. The giant fragmentizer, other heavy equipment and the used-metals inventory are positioned several hundred feet off the service road on an earth bench below the level of the rest of the property. The offices and metals' warehouse are strategically located near the main road entering the site. And the entire property is screened from the view of motorists on the interstate by a natural buffer of trees that were strategically left standing during the original site planning.

New businesses always present new challenges. And the Peck operation is an exciting example of the way Torrence, Dreelin, Farthing and Buford, Inc. and Peck's staff collaborated to use new forms of technology and new ways to deal with them.

Bass Construction Co., Inc. of Richmond was the general contractor for Phases I and II.

Subcontractors & Suppliers
Phase I
(All Richmond Firms)

E. G. Bowles Co., general excavation, backfilling, grading, drainage piping, piling and paving; Garrett Bros., masonry; Liphart Steel Co., Inc., metals (not furnished by owner) and fabrication; N. W. Martin & Bros., roofing & sheet metal; SDG, Inc., toilet partitions, metal doors and windows and overhead doors; City Wide Decorators, Inc., painting; Reames & Moyer, Inc., mechanical; Central Electrical Service Corp., electrical; and, Tidewater Materials Corp., concrete.

Subcontractors & Suppliers
Phase II
(All Richmond Firms)

E. G. Bowles Co., general excavation, compacted fill, storm drainage and paving; Southern Brick Contractors, Inc., masonry; Cruickshanks Iron Works Co., structural steel, miscellaneous iron, metal roof deck & slabform (not furnished by owner); R. Willison Roofing Co., roofing and sheet metal; Bass Steel Buildings Corp., translucent panels; SDG, Inc., AL2 storefront and windows, glass, glazing, steel windows and overhead doors; J. S. Archer Co., Inc., metal doors & frames, toilet partitions and dockboards; Pleasants Hardware, finish hardware & toilet accessories; R. A. Siewers, Inc., millwork; E. S. Chappell & Son, Inc., caulking and weatherstripping; F. Richard Wilton, Jr., Inc., demountable partitions and drywall; Stonnell-Satterwhite, Inc., ceramic tile & terrazzo treads; Consolidated Tile Co., Inc., acoustical ceiling, floor covering and base; City Wide Decorators, Inc., painting and dampproofing; Reames & Moyer, Inc., mechanical and ventilation; Ben Collier Electrical Contractor, Inc., electrical; and, Tidewater Materials Corp., concrete.

THOMPSON AND LITTON, INC. present . . .

Finding Solutions to Water Quality Problems in the Coalfields

THOMPSON AND LITTON, INC. and DEWBERRY, NEALON AND DAVIS
Consulting Engineers

The mountainous coalfields of Southwest Virginia's Appalachian Plateau are 100 miles long, 30 miles wide, cover all of Buchanan and Dickenson Counties, and include parts of Lee, Scott, Tazewell, Wise and Russell Counties. The vast reserve already provides for seven percent of the nation's coal needs and can continue to do so for another 200 years.

At least fifty different coal deposits or seams have been discovered in Southwest Virginia. Some of them contain the best quality reserves to be found in the United States, and are in demand not only as steam-generator fuel, but also for metallurgical and other industrial applications.

It is, therefore, not too surprising that 40 percent of the region's available labor force is directly employed by the mining industry, and that much of the remainder is indirectly dependent upon it. In 1973, about 720 mines produced 34,000,000 tons and met a payroll of $126,000,000.

Most of the coal in Virginia is produced in underground mines, but surface mines are increasing and have accounted for about 30 percent of overall production in recent years. Although many authorities expect coal production to triple during the next 30 years, their estimate may be low Virginia's surface mines almost doubled in number from 1973 to 1974.

Since the mountains have many small headwater streams that are nearly dry during periods of drought, there is a major problem in maintaining water quality standards.

Coal mining can sometimes cause increased amounts of acid, sediment, and other pollutants in nearby streams. Of all the mine-related pollutants, acid drainage has the greatest effect on nearly every type of water use. It increases costs to industrial and municipal water users and sometimes prevents the use of surface waters for recreation. It can also be detrimental to fish and other aquatic life.

Almost 80 percent of the area's acid pollution is thought to come from abandoned mines, mostly underground operations.

Thus, Southwest Virginian's are faced with a complex problem. Mining-related and other wastewater quality

Open pit or "Strip" coal mine operations in Southwest Virginia. Note exposed coal seams in right foreground.

problems are already evident in some of the area's surface waters. There are natural limitations in groundwater supplies. These two factors severely reduce the ability of the environment (as it is now understood) to support the very increases in population and economic activities that will be required for expansion of the coal industry. Unless present water quality problems are solved and future wasteloads controlled, coal extraction rates could be curtailed, growth potential of the area could be reduced and the amount of vital energy production to be achieved could be restricted.

The coal industry, in conjunction with various governmental agencies, is taking active and concerned steps to help control water pollution within the limited means now available through existing reclamation programs and discharge permits. Despite these efforts, and despite the fact that effective abatement technologies exist for the mining industry, problems remain in a number of stream segments. This is true because it is often impossible to provide a complete solution to a mine waste problem using a single or localized technique.

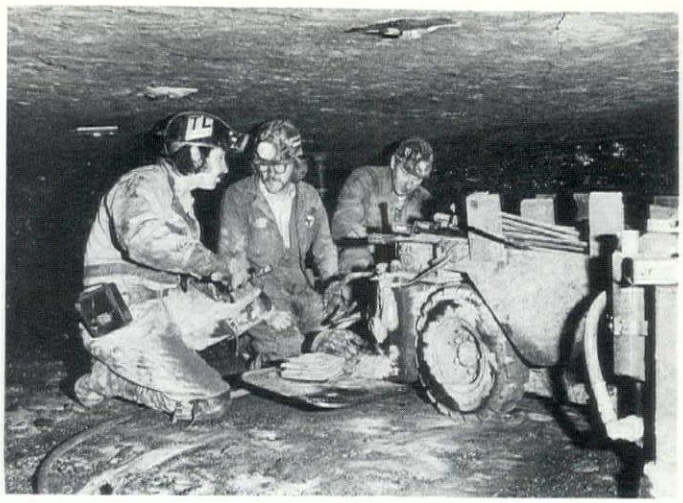
In January of 1974, Virginia's Governor Holton initiated a program to provide a means for addressing the area's dilemma by designating the coalfields as a special "208" planning area, under the 1972 Federal Water Pollution Control Act Amendments. This provided the area with the opportunity to develop and implement an integrated, regional waste management strategy. Since the area included both the Lenowisco and the Cumberland Plateau Planning Districts, these two agencies formed a consortium called the Southwest Virginia 208 Planning Agency to provide a means of administering and implementing the planning effort.

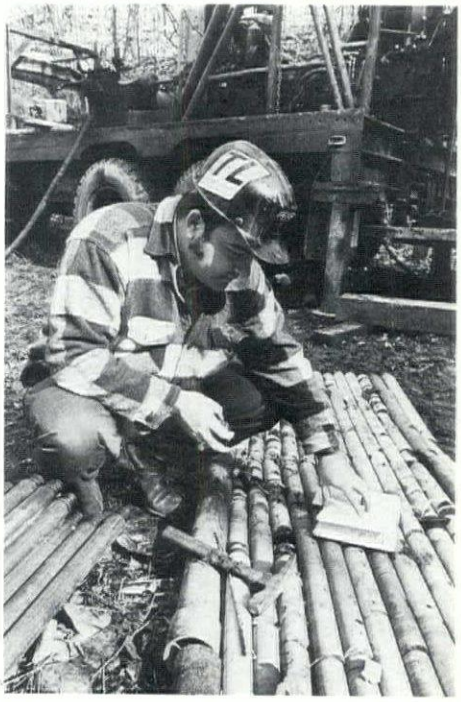
The United States Enviromental Protection Agency granted funds to the consortium, a staff was recruited and efforts began in the summer of 1975 to initiate a massive remedial and management program. The State Water Control Board provided assistance to further the Agency's effort.

The 208 Agency has organized a task force to study the problems and arrive at solutions. That task force is made up of professionals from the staff of each planning district commission involved and professional engineers provided by Thompson & Litton, Inc. a consulting firm with many years' experience in the coalfields. Some elements of this task force had already worked together in the study of other area-wide water quality management problems and thus had unique familiarity with the area and its people. Additionally, Thompson & Litton, a CEC member firm, had since 1956 provided extensive coal mining engineering services, ranging from geological surveys, land studies and cost analyses, to designs of systems to extract and prepare coal for the marketplace.

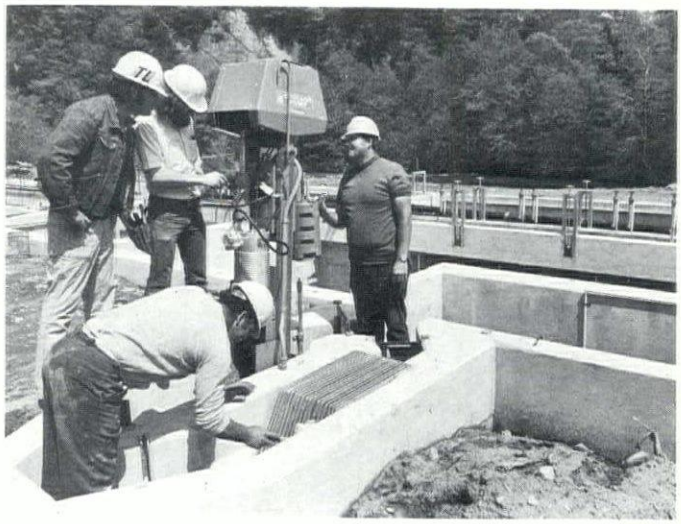
This provided the firm with first-hand working knowledge of hundreds of active or completed surface and underground operations on coal lands covering over three-quarters of a million acres.

The consultant's contribution to the planning effort includes the conduct of an extensive stream quality survey and mined lands inventory. Portions of the planning effort, including a stream monitoring program and related





Top photo: Underground coal mine operations inspection is a routine duty of the Mining Engineering Consultant. They provide operating insights to the 208 Study Task Force. Center: Mining Engineer examines diamond drill cores—coal exploration and geological survey project. And, bottom photo: Sewerage facilities under construction in Southwest Virginia.



laboratory tasks, are being provided by Dewberry, Nealon and Davis, a northern Virginia firm which also has wide experience and expertise in the environmental field. Thompson & Litton and Dewberry, Nealon and Davis are in the process of merger and are providing joint assistance to other environmental engineering and planning projects in the state.

Thompson & Litton had also designed many of the area's sewerage facilities, and in cooperation with the planning districts, had not only authored and prepared previous water quality management plans for the area; utility plans for most of the counties involved; but had, together with Dewberry, Nealon and Davis, written overall water quality management plans for each of the river basins involved. These efforts provided the Planning District - Consultant - Task Force with unique experience and insights which covered the entire planning area.

The 208 study will be completed in early 1978. It will provide protection of the area's water resources by means of a management system which shall provide a clear line of authority and responsibility. Southwest Virginia can then achieve a position of stewardship of its precious water and mineral resources which will very likely set an example to the nation in the years ahead.

SOWERS, RODES AND WHITESCARVER present . . .

Principal Manufacturing Plant and National Headquarters for

HUBBELL LIGHTING DIVISION

SOWERS, RODES AND WHITESCARVER
Prime Professional Firm

GREGORY AND ASSOCIATES
Consulting Architect

CONSULTING ENGINEERS:
FRAIOLI-BLUM-YESSELMAN ASSOCIATES, INC.
Structural
SCHNABEL ENGINEERING ASSOCIATES
Soils

DOBYNS, INC.
General Contractor

SOWERS, RODES AND WHITESCARVER served as the prime professional firm for the Hubbell Lighting Division plant in Christiansburg, Virginia. The project consists of 140,000 square feet of manufacturing facilities, 5,000 square feet of photometrics laboratory and 20,000 square feet of office space.

The Christiansburg facility is the principal manufacturing plant and the national headquarters for the Hubbell Lighting Division of Harvey Hubbell, Inc. Other facilities for the division are located in Georgia and California. This plant produces outdoor and indoor lighting equipment for buildings as well as sports and landscape lighting.

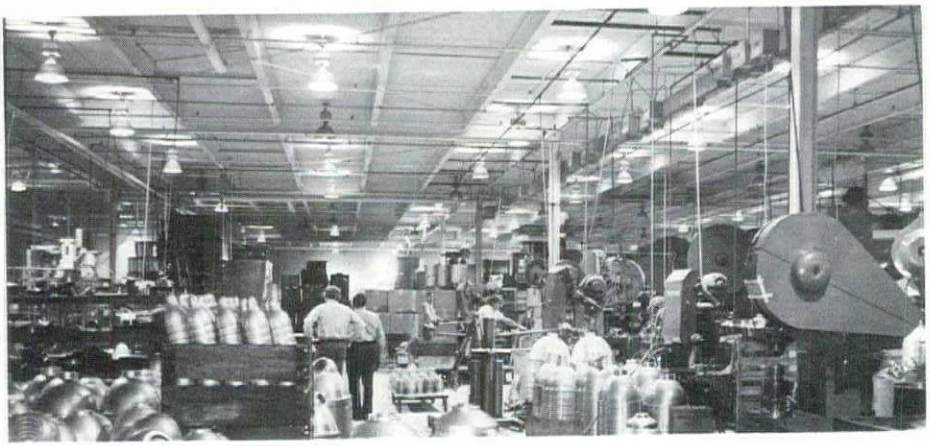
"Fast-Track" or design while construction is in progress, was the method used to produce the project. A separate contract for rough grading was let in mid-March 1972. A second contract for foundations and structural steel was let the latter part of April 1972. Dobyns, Inc. was the successful bidder for the second contract and was retained as general contractor on a negotiated basis to handle remaining contracts which were bid and awarded as design progressed. Approximately one-third of the plant space was occupied by the owner in October 1972 with the remainder of the plant and office fully occupied the following February. Only about ten months time was required to complete the building construction.

The office portion of the structure is enclosed with masonry walls utilizing considerable double glazing on the front. Two large open office areas constitute much of the space and are surrounded by private offices and conference rooms with a large reception area in the center front. All office space has acoustical modular air transfer type lighting units which provide easy flexibility for future subdivision of spaces. Walls are finished with vinyl and wood panels and all floors are carpeted.

The exterior walls of the plant are of insulated metal panels above a four feet high masonry wall. Spaces inside the plant include raw materials receiving and storage area, machine shop, anodizing line, automated paint line, product assembly lines, finished product warehousing and shipping and a complete metal pole fabrication and finishing shop for the outdoor lighting standards. Rooftop units provide year around space conditioning inside the plant.

All exterior building and parking area lighting is accomplished by utilization of Hubbell's own mercury outdoor equipment, some of which was manufactured in this plant. Universal type mounting of the units enables Hubbell to replace the lighting as new units are designed and developed. The plant is lighted by Hubbell's high-bay 400 watt mercury units.

A complete photometrics laboratory within the building permits the company to photometrically test all equipment which they manufacture. In addition the laboratory is used to ex-



periment with new lighting concepts in development of new equipment.

The project was developed and completed within the budget originally established by the owners and all of the owner's design criteria was incorporated in the project.

Dobyns, Inc. of Dublin was the general contractor and handled foundations, concrete work and carpentry.

Subcontractors & Suppliers

From Roanoke were: Adams Construction Co., paving contractor; Valley Steel Corp., reinforcing; Structural Steel Co., Inc., steel suplier and steel roof deck; Lafon's Erecting Co., Inc., steel erection; Roanoke Iron & Bridge Works, Inc., miscellaneous metal and handrails; Valley Lumber Co., millwork and wood doors; John H. Hampshire, Inc., paneling, plaster contractor, gypsum board contractor and acoustical treatment; PPG Industries, glass; Cates Building Specialties, metal doors & frames; Graves-Humphries, Inc., hardware supplier; Devoe Paint Co., paint manufacturer; Magic City Sprinkler, Inc., sprinkler contractor; Lowe & Nelson Plumbing & Heating Corp., plumbing/heating/ventilating/air conditioning contractor; and, Noland Co., American Standard plumbing fixture supplier.

Others were: Sisson & Ryan, Inc., Shawsville, excavating and sodding, seeding, etc.; Southern Foundation Corp., Greensboro, N.C., caissons; Concrete Products Co., Christiansburg, concrete supplier; Masonry Contractors, Inc., Salem, masonry contractor; John W. Hancock Co., Salem, steel joists; Leonard Smith Sheet Metal & Roofing, Inc., Salem, built-up roof, roof insulation and sheet metal; H. H. Robertson Co., Richmond, wall insulation; Central Glass Co. of Virginia, Inc., Bristol, glazing contractor and storefront; Joe Rainero Tile Co., Inc., Bristol, ceramic tile; DeHart Tile Co., Inc., Christiansburg, carpet; Tilley Paint Co., Inc., Pulaski, painting contractor; Hubbell Lighting Division, Christiansburg, lighting fixtures supplier; ITE, Atlanta, Ga., electrical equipment supplier; and, Bryant Electric Co., Inc., High Point, N.C., electrical contractor.

SIMPSON-JOHNSON, INC. present . . .

POWELL VALLEY PRIMARY SCHOOL

CHARLES B. McELROY, AIA
Architect

CONSULTING ENGINEERS:
SIMPSON-JOHNSON, INC.
Mechanical/Electrical
RICHARD L. WILLIAMS
Structural/Civil

RICHARD E. PHILLIPPI, INC.
General Contractor

ENERGY conservation and flexibility were the key words in designing the engineering systems for the Powell Valley Primary School located in the southern part of Wise County in beautiful southwest Virginia. The Wise County School Board chose to go with an open type concept of classroom to serve the kindergarten through the fifth grades. The 73,500 sq. ft. building is divided up into two basic areas, one being the classroom area and the other being the administration/multi-purpose area. The two areas are separated by a fire wall. Sprinkling the classroom area, gave the architect a greater freedom in choosing his desired construction materials and floor plan.

The open classroom spaces are divided in areas of multiple of 30 feet; for example, one classroom area is 90′ x 90′. In adjoining area a 30′ x 30′ section is partitioned off as a music room and a similar 30′ x 30′ area is partitioned off for toilets and storage space. If the educational philosophy changes in the future and requires more partitioning, this could be done conveniently on the 30′ module concept.

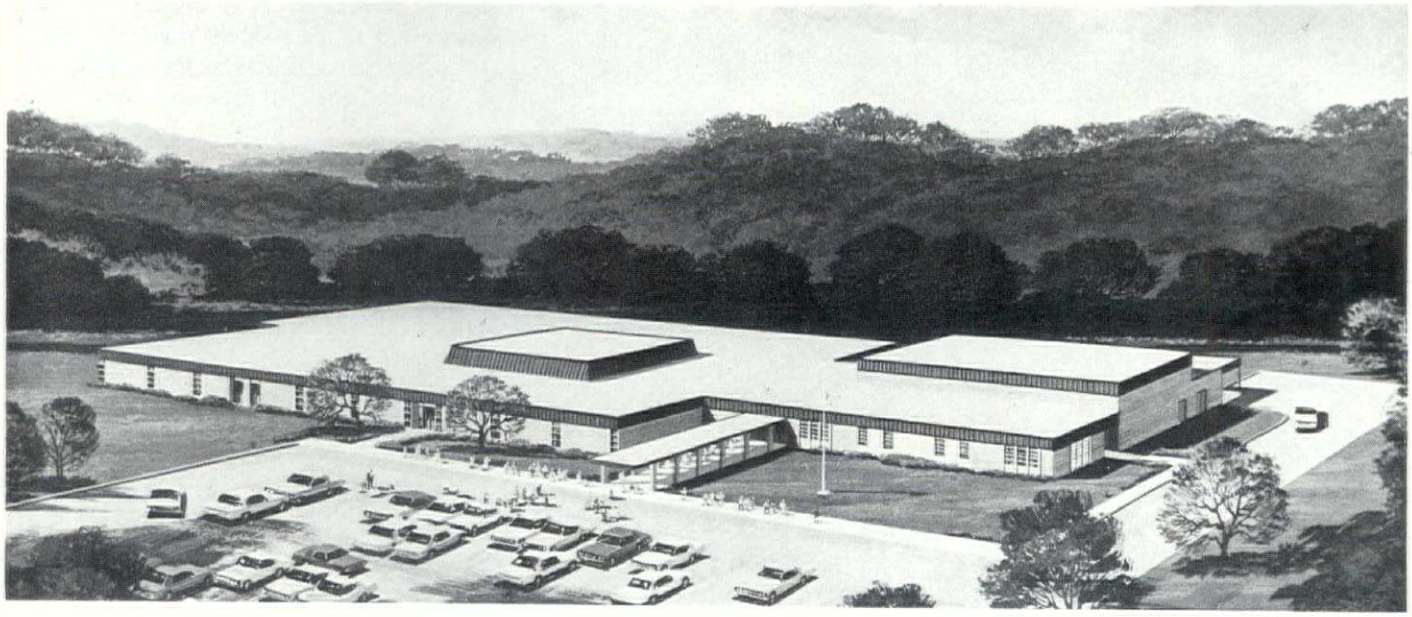
Because of this future possibility, all the engineering systems such as the lighting, heating, ventilating and air conditioning systems were likewise arranged to fit the invisible 30′ x 30′ areas.

The basic heating and air conditioning system is composed of a variable volume system with the central equipment installed in a penthouse above the central corridor. Return air is taken throught the light fixtures, capturing the heat of the light fixture; the ceiling cavity is then used as the return plenum. Also air is encouraged to be returned at the exterior doors by the use of small in-line fans installed above the ceiling which draw the air into grilles at the floor near the entrances and discharge it into the air plenum above the ceiling, thus reducing the cold drafts that would blow across the classroom floors as would be the case in this open classroom design. This is particularly a concern in the lower grades where the floors are used extensively for both school work and rest. The heating load along the exterior wall or "skin surface" was taken care of by the use of electric baseboard type radiation.

Particular concern was paid to the transmission of noise to the classroom areas; consequently the equipment rooms were placed above the corridors. Both the supply and return ducts have substantial portions of their ductwork lined to reduce to a minimum the transmission of equipment and air noise. All the equipment including the air handling units and condensing units are mounted on vibration isolators. Since there is a large amount of interior space cooling is required a large part of the year. In the interest of conserving energy, an economizer cycle was included as part of the design of these systems, thus allowing the classroom areas to take advantage of the cooler outside air to do free cooling whenever the temperature is suitable.

Electricity is used as the heating and cooling energy source. Each air handling system has a direct expansion cooling coil and an electric resistant heating coil. Filtering is done by medium efficiency filters. All condensing units are air cooled, thus making it possible to cool any area whenever it needs it year around.

The band room, multi-purpose



room, kitchen and the administration area each have their own air handling systems, thus allowing the school officials to operate any of these areas on any schedule. Any schedule that is chosen will not affect the other portions of the building.

All the air handling system components are installed in a simple insulated penthouse. Since the equipment is protected from the weather, the equipment is less expensive and this allows the school system to receive the best possible maintenance on the equipment. It also extends the life of the equipment, since it is not exposed to the varying elements.

The kitchen has a grease extractor type hood installed over the main cooking units. This eliminates the need for grease filters. The hood has a wash-down system that allows the staff to remove any accumulated grease from the hood periodically. The hood also has a fire protection system. The kitchen hood system is a two-speed system so that only a minimum amount of air will be circulated during the times that only one section of the hood is in use.

The multi-purpose room has an exposed truss type design with a stage at one end. The room is used for assembly, for dining and play. An angle iron cradle was designed to receive lay-in light fixtures between the exposed truss at the level of the bottom chord of the truss, thus there are no projections below the bottom of the truss. The lights are double switched to allow two levels of lighting. Being an elementary school, the stage lighting is simple. It includes a "light track" both on the stage and in front of the stage with adjustable and movable spot and flood lights. They can be arranged for a particular happening. The lights have dimmer controls on the stage wall.

The light system includes the appropriate exit lights and also an emergency light system. Attractive emergency light fixtures were selected, thus avoiding the raw looking battery type so often seen sitting on wall brackets. A complete Master TV antenna system is installed in the building to allow teachers to use the educational resources of both the commercial and educational channels.

Also included is a dial access intercommunication system allowing the office and each section to be in communication with all other sections of the building and thus eliminate a large amount of movement that would be required without it.

The master time and program system not only serves to identify the classroom hours but also is used to program the temperatures and ventilation of the school building. During unoccupied times the program clock de-energizes the exhaust fans and all fresh air dampers are closed, thus reducing the energy needs; it also reduces the space temperature during the winter months. When the occupants return to the building, the outside air ventilation is then restored to the system, the exhaust fans are again energized and the temperature is programmed as needed. Timers are provided to allow various adjustments in the school program so that should the auditorium, for example, be used for an additional six hours, its timer can be set for the appropriate additional time; the system will automatically go back into the normal program following the elapse of the dialed time.

The building, in addition to the fire alarm system, includes a burglar alarm system. The burglar alarm system is set so that should any door opening occur after hours, at any of the exits, an alarm would sound which dials the police, principal or nearest staff member. This same dialer also functions to announce a fire alarm. There is a time delay in the alarm system to allow the school staff to enter the building or leave the building by dialing an appropriate code.

The building is designed to meet the provisions necessary for the handicapped. This includes suitable plumbing fixtures in the toilets, clearances necessary for wheel chairs, etc. The main wash-up units in the toilets are semi-circular wash fountains. All water piping throughout is copper and the waste lines are generally cast iron. All equipment is identified throughout the building to aid in the

maintenance. This includes metal tags on valves, laminated engraved plastic nameplates on equipment and markers identifying ceiling panels that have unseen valves, dampers, etc., above them in the ceiling space.

The compactness of the building, the careful selection of the equipment, the concern for the noise level, the awareness of the possible future partitioning has all been combined in the designs to make this building one that can be used in any fashion that the owner chooses in the years to come.

The general contractor was Richard E. Phillippi, Inc. of Wytheville. This firm also handled foundations, steel erection, carpentry and waterproofing.

Subcontractors & Suppliers

Firms from Roanoke were: Structural Steel Co., Inc., steel supplier, steel joists & miscellaneous metal; Roanoke Engineering Sales Co., Inc., metal doors & frames & windows; and Carpet Discount Center, carpet.

Others were: Jessee Paving Co., Inc., Castlewood, paving contractor; Coy Lee Hall, Bristol, Va., concrete contractor; Callaway Building Products, Knoxville, Tenn., reinforcing; Marty Materials, Big Stone Gap, concrete supplier; Southern Cast Stone, Knoxville, Tenn., prestressed concrete; K.M. Hutton Construction Co., Bristol, Tenn., masonry supplier; Bris-Blox, Bristol, Tenn., masonry supplier; Riverton Lime Co., Riverton, mortar; and Tauscher Roof Deck, Bristol, Tenn., steel roof deck.

Also: Miller Mfg. Co., Richmond, wood doors & millwork; Tilley Paint Co., Pulaski, caulking and painting contractor/supplier; Industrial Roofing & Decking, Bristol, Va., built-up roof; Holston Glass Co., Inc., Kingsport, Tenn., glass & glazing contractor; Lynchburg Steel & Specialty Co., Monroe, hardware supplier; W.D. Harless Co., Inc., Dryden, plaster contractor; East Tennessee Tile & Marble, Inc., Johnson City, Tenn., ceramic tile & terrazzo; Bonitz Insulation Co. Carolina-Tennessee, Inc., Asheville, N.C., acoustical treatment; Arc Tile, Johnson City, Tenn., resilient tile; Daniels Plumbing & Heating, Inc., Norton, plumbing/heating/ventilating/air conditioning contractor; and Harmon Electric Co., Norton, electrical contractor.

M.J. Thompson, III *(From page 13)*

Consulting Engineers, Inc., in Newport News, Virginia.

He is married to the former Glenna Howser. They have a son who is a sophomore in Mechanical Engineering at Virginia Tech and a daughter who is a Junior at Hampton Roads Academy in Newport News.

He is active in community and church affairs having been active in the Scouting Program for a number of years and has served in many capacities in his church. He is a member of Orcutt Baptist Church in Newport News.

His professional affiliations include membership in the American Consulting Engineers Council, Consulting Engineers Council of Virginia, National Society of Professional Engineers, Virginia Society of Professional Engineers, National Fire Protection Association, Building Official - Code Administrators, International, and Council of Educational Facility Planners. He is Past President of Consulting Engineers Council of Virginia and presently is a National Director of American Consulting Engineers Council.

The Environmental Engineer in Virginia

(From page 25)

area and does not replace the firm's traditional and continuing activity in the design field, as evidenced by the recently designed Fishersville Regional Wastewater Treatment Plant, illustrated herein, construction of which was completed in the fall of 1975. Besides preparation of comprehensive area-wide water and sewerage plans and individual water and sewerage studies for towns, cities, counties and public service districts, Johnson and Williams' previous work in the study area has included all types of financial feasibility studies, detailing the estimated cost of facilities, sources of funding, bond issue requirements, rate studies and related financial requirements. In addition, the firm also undertakes work in the field of industrial waste treatment. Projects in the industrial area have recently been completed at various locations in Virginia for Allied Chemical Company, American Telephone and Telegraph Company, General Electric Company and the Xerox Corporation.

In order to stay abreast of the latest changes in legislation as well as advances in rapidly changing technology, today's consulting engineer in the environmental field must maintain not only an awareness of but also a high degree of expertise in the sophisticated requirements of the regulatory agencies. By familiarizing itself at the outset with the requirements of NEPA and Public Law 92-500, Johnson and Williams has developed this awareness and expertise in the water pollution control field to represent its clientele effectively.

HAYES, SEAY, MATTERN AND MATTERN present . . .

DANVILLE REGIONAL WASTEWATER TREATMENT FACILITY

J. M. TURNER AND CO., INC.
General Contractor

IN EARLY 1970 the City of Danville made a decision to expand its wastewater treatment facilities to provide regional service and capacity and to treat all of the industrial wastewater from Dan River, Inc. Expansion was necessary because the existing facilities were constructed only to meet the requirements of the city's residential, commercial, and a part of the industrial wastewater needs of Dan River, Inc. Accordingly, Dan River, Inc. agreed to cooperate with the city in the construction of the expanded facilities. A resulting study led to the proposal of the new facility on the north bank of the Dan River, opposite the city's existing facility.

The characteristics of the industrial wastewater posed several unique treatment problems. A drastic fluctuation in flows, corresponding to Dan River Mills operations, would have to be expected and a fluctuating pH and fiber content posed additional design problems.

Construction of the new plant began in August 1973, with the three parts of the new interceptor commencing in September 1973. The interceptor was essentially completed by March 1975, awaiting only the tie-ins with the existing system and industry. The four miles of 36-inch through 60-inch sewer pipe, costing over three million dollars, were built to meet a 50 gallon/inch of diameter/mile/day infiltration specification.

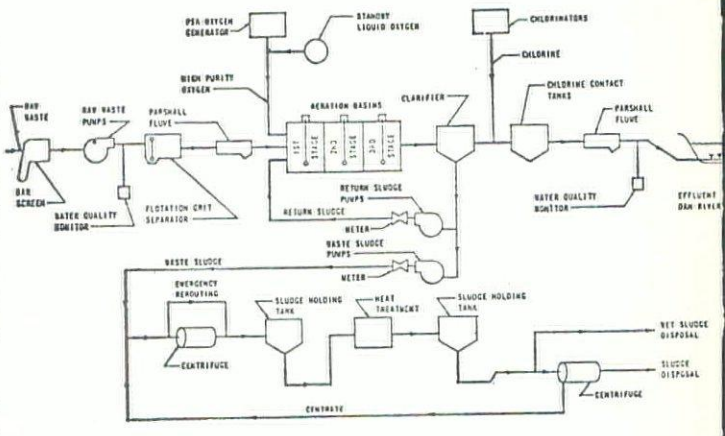
The site chosen for the facility fell within the Dan River Flood Plain, and criteria subsequently called for the establishment of a hydraulic gradient which would keep the facility operable at the 100 year flood. The site was to bring forth further design limitations: Subsurface exploration called for the use of piling for any heavy structures built on the site, and a limited amount of available land for a conventional aeration process led to the consideration of an alternate treatment process.

In attempting to address these problems, a pilot plant study was conducted in cooperation with the Linde Division of Union Carbide.

The system utilizes high purity oxygen produced by a Pressure Swing Adsorption Unit (PSA Unit) and stored liquid oxygen as a standby source. The injection of high purity oxygen into closed aeration tanks reduces holding time, which in turn reduces required site area. Aeration tank area was reduced by approximately one tenth, and the cost of the closed high purity oxygen system proved less than that of developing the equivalent conventional aeration process.

The Unox System meets EPA wastewater effluent criteria and in this application was the cost effective answer to limitations posed by the site.

The new Danville plant has been designed to meet EPA requirements for reliability in treatment. This requirement meant that it was necessary to provide two alternate sources

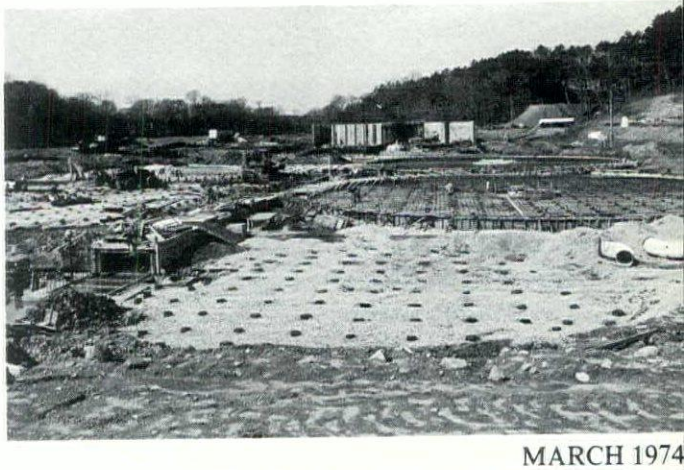


SCHEMATIC FLOW DIAGRAM

of power to the plant; standby units and independent control within the process were also essential in fulfilling requirements of reliability. Redundancy, for example, occurs in the bar screens, raw sewage pumps, chlorinators, the flotation grit separator and holding tanks.

The figure below illustrates plant flow. The effluent to the plant proceeds straight through the Bar Screens, Raw Sewage Pumps, Aeration Tanks, Clarifiers and Chlorine Contact Tank and then is discharged through the effluent diffusers into the Dan River. The recirculation of flow within the Flotation Grit Separator, Aeration Tanks and Clarifiers assures high quality treatment. The removal of grit, scum and sludge becomes an efficient process.

The Sludge Handling Building contains sludge conditioning and dewatering facilities. Extensive monitoring of all phases of treatment is performed in the Control Building. A Maintenance and Storage Building has been provided on the site and is utilized for the complete overhauling of any piece of equipment in the plant. This feature of the facility gives it the capability of reducing the "down time" of the equipment.

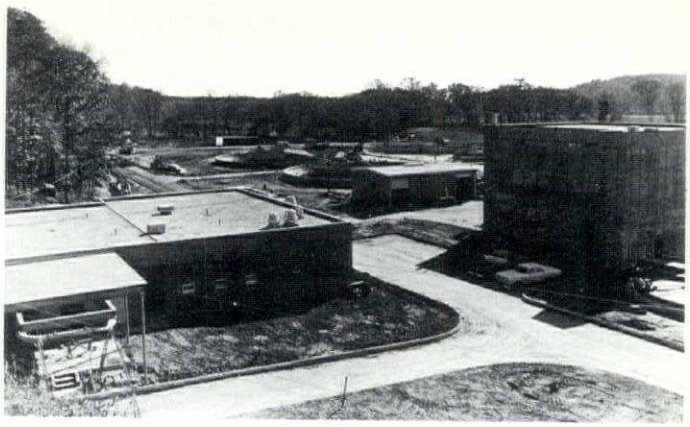


The new plant, costing in excess of nine million dollars, has proceeded on schedule, with 73,000 linear feet of wooden piles and 16,000 cubic yards of concrete in place by August 1975, and with more than 50 percent of the equipment installed. A utility bridge connecting the existing south bank facility with the new north bank facility across the Dan River is currently under construction, and will enable the separate facilities to transport sewage and sludge. Within the last few months, the remaining equipment has been installed, tested and started up, and the plant is scheduled to receive sewage in January 1976. Process testing will then be scheduled for all the equipment and the system.

J. M. Turner and Co., Inc., of Salem, is general contractor for the project.

Subcontractors & Suppliers

Carolina Pile Driving Corp. and Carolina Crane Corp., Raleigh, piling; Roadside Nurseries Altavista, sodding, seeding, etc., landscaping, landscaping contractor; Thompson-Arthur Paving Co., Danville, paving contractor; Montague-Betts Co., Inc., Lynchburg, reinforcing & miscellaneous metal; Thompson's Ready Mix, Inc., Danville, concrete supplier; Phoenix Concrete Products, Inc., prestressed concrete; C. F. Curtis, Inc., Danville, masonry contractor; Saunders Oil Co., waterproofing; E. S. Chappell & Son, Inc., Richmond, caulking; and, Helms Roofing Corp., Martinsville, built-up roof, roofing (other), roof insulation and sheet metal.



NOVEMBER 1975

And, Danville Glass Co., Danville, glazing contractor; Seybar, Inc., Martinsville, metal doors & frames & hardware supplier; Mahone, Inc., windows; Marus Marble & Tile Co., Inc., Greensboro, N.C., ceramic tile; J. D. Porter Contractor, Inc., painting contractor; Prillaman & Pace, Inc., Martinsville, plumbing/heating/ventilating/air conditioning contractor; and Wise-Hundley Electrical Co., Inc., Danville, electrical contractor.

Others were: Heyward, Inc., bar screens, flotation and grit separator, clarifiers, chlorine contact tanks and centrifuges; Taulman Co., oxygenation system and sludge heat treatment; and, Worthington Corp. and Robbins & Meyers, Inc., pumping equipment.

Geotechnical Engineering is Vital . . . *(From page 27)*

Richmond, were retained to provide subsurface data to be used in a construction cost estimate of the roads and utilities (utilities would be in the roadways) serving individual lots and the ski areas. Specifically, a description of the materials in the top 10 feet of ground along the road alignment was needed to determine what excavation methods would be required. At this time, access to the mountain was primarily by narrow jeep trails and foot paths. Incidentally, the Blue Ridge Parkway and the Maine-to-Georgia Appalachian Trail parallel the community along the crest of the Blue Ridge Mountains.

Sayre & Sutherland, Inc., performed subsurface investigations and geologic reconnaissances to obtain the required data. Seismic surveys were conducted at numerous locations on the road alignment. To support and supplement this information, auger probes were correlated with the seismic results. The remainder of the 23.9 miles of road was covered on foot by a geologist noting rock outcrops for determination of type and geologic attitude. Geologic trends of the Catoctin greenstone and Pedler gneiss were established for evaluation of their effects on the road construction. Based on these data and the seismic velocities obtained from induced shock waves, three categories of subsurface materials were designated for estimating purposes. Estimates were prepared and construction proceeded. On completion of the roads, Wintergreen, Inc., announced that their cost estimate was within 5% of their final construction costs.

As Wintergreen progressed, other investigations were performed both on the mountain and in the valley. Foundation

design criteria for a ski lodge, condominiums, maintenance areas and water storage tanks on the mountain were provided. In the valley, studies were made for water supply facilities, including pipeline routes and an earth dam. An existing earth dam will be included in the embankment of a new and larger earth dam. Soil samples were taken from the existing embankment for laboratory testing and analysis. The dam foundation was examined by rock coring, and field permeability tests were performed in the foundation to evaluate seepage potential. Exploration for embankment materials was made in several areas near the dam site. Soil samples from these sources were tested in the laboratory to determine their engineering characteristics and suitability for use in the embankment. Construction of the dam is planned for a later phase of development.

Valley Center, primarily a residential area of Wintergreen, will be located at the base of the Blue Ridge. Plans are to offer the public 3 to 5-acre lots with individual water and sewer facilities. Sayre & Sutherland, Inc., studied the feasibility of dug wells in this area. An inventory of existing wells combined with test wells and a ground water study provided data for evaluating the feasibility of dug wells.

Inherent unknowns which lie below the surface of the earth, more than any other condition, hold the largest potential for unexpected cost increases during construction. Adequate geotechnical investigations and analyses can significantly reduce this potential. The specialized knowledge of the geotechnical engineer is essential to successful preliminary planning and economic analysis, final design and quality control during construction.

DePaul Hospital

(From page 57)

in Kathabar air handling units. The Kathabar unit is not a source of pathogenic bacteria because there is no exposed water on the coil or elsewhere in the air handling unit to provide a breeding ground for bacteria. Instead, the unit absorbs water like a sponge by scrubbing the air with a uniform spray of lithium chloride and other additives. While passing over the Kathabar coil, the air is either humidified and heated in the winter or cooled and dehumidified in the summer. Further, it is sterilized throughout the year when the microorganisms in the air impinge into the solution spray where they become permanently trapped due to the high surface tension of the spray solution.

Heat wheels are also employed in the air conditioning system to recover both sensible and latent energy from the clean exhaust air and to transfer this heat to incoming outside air, thus conserving a considerable amount of energy. The heat wheels are able to transfer about 75% of the energy required to condition the incoming air from the exhausted air, which permits the cooling plant installation to be smaller than would otherwise be the case and results in ongoing savings in energy consumption by the Hospital.

Doyle & Russell Co., Inc. of Norfolk, was general contractor and handled foundations, carpentry and was concrete contractor.

Among the subcontractors and suppliers were: Johnson & Jolliff, Inc., Virginia Beach, excavating; Welch Contracting Co., Virginia Beach, piling; Birsch Construction Co., Norfolk, paving contractor; Liberty Steel, Inc., Chesapeake, steel erection & reinforcing; Lone Star Industries, Inc., Norfolk, concrete supplier; Hammond Masonry Corp., Sandston, masonry contractor/supplier, mortar & stonework contractor; Economy Cast Stone Co., Richmond, stonework supplier; Tidewater Steel Co., Inc., Norfolk, steel supplier, steel joists, miscellaneous metal and handrails; Inland-Ryerson Construction Products Co., Baltimore, Md., steel roof deck; Weaver Brothers, Inc., Hampton, millwork, paneling & cabinets; and Brisk Waterproofing Co., Inc., Richmond, caulking.

LET EVERYBODY WIN

(From page 7)

the taxpayers. With such savings, the bi-annual hassle over ever increasing appropriations could be avoided between the General Assembly and representatives of the state-supported education industry. In this way, these two august bodies could address themselves to problems of teaching and learning.

As it is now, state-supported education essentially provides services, and since services must continue to cost more, the services in education are merely one of countless services which can fall only on the beset taxpayer. Since professors and other personnel in educational institutions should not be discriminated against in pay, elimination of the dunderheads would require less services. This reduction in the numbers of dullards would also require less building. In a wonderful circularity, this decline in the unqualified would require less Ph.D.s for the pointless struggle of trying to inculcate knowledge in resistent minds.

There would be a promotion of the divisions already advocated by many between those truly interested in educating their minds and those interested in acquiring useful skills. I read recently that of the three objectives for a student learning to read, two were the ability to read a driver's license and television programs. Surely such handy adjuncts to coping with life in our modern society can be acquired outside classrooms in which more or less serious students are preparing for graduate work in the professions, such as medicine and law, and a few quaintly old-fashioned souls in the sheer cultivation of their minds and tastes. Yet those being trained solely for marketable skills would be spared any sense of inequality by the degree which would be granted.

Among those being trained at skills in many institutions, though not all, would be players of various games, such as football and basketball, in intercollegiate competition. As has been suggested by others, it would be fairer to these gladiators to allow them to be undistracted by attending classrooms and from the pretense of working toward a degree. In this way those institutions which regard winning in sports as next to godliness could quite frankly support their professional caste without all the subterfuge that occasionally gives college athletics a somewhat sleazy look. The Big Money which I understand is involved with big-time college sports would in nowise be jeopardized; on the contrary, such a forthrightly honest approach would quiet the stuffier critics of the sporting extravaganzas.

Before such suggestions are dismissed in their entirety as too fanciful — as I initially dismissed Evelyn Waugh's proposal — one would do well to realize that the volumes of money that can be gathered through taxation do have a limit in time. Some modification of the proposal to grant degrees would be a bold step toward control of one of the costly service programs which, like so many of its fellows, grows on its own momentum. Then, if the education industry got out of the numbers game, perhaps it could free itself of lunatic experimentation such as quotas, and both state-supported and private institutions could concentrate on providing disciplines designed to fit qualified young persons growing into adulthood for self-fulfilling lives and rational citizenship.

As for those whose resistance to education would be respected, the grant of a degree instead of frustrating hours to no purpose would have no effect on their enjoyment of the simple satisfactions of their preference. These preferences can be seen daily on your local television. Along with the undemanding banalities of the programs, the viewers are presumably entertained by unending variety of commercials which advise them on the delights of certain beers and the joys of certain automobiles, on quick, easy relief from pains and aches and upset stomachs, on laxatives and deodorants and beauty-enhancing shampoos, and on promises of future programs in which they may watch man pretend to fight and/or shoot and/or blow-up one another amidst automobiles and buildings and boats exploding in flames. For appreciating that wonderful world of juvenile idiocy on the little box, no preparation is needed, and the assurance of a degree would relieve the mentally unmotivated young from the worries associated with obtaining some sort of degree.

Everyone could look ahead to a future unstigmatized by being one of the few in a community who had not been processed through some institution supposedly of learning. Full-scale equality would at last be achieved — and with that, talk of "quality education" might begin to have some meaning.

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