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RURAL ELECTRIFICATION for DEVELOPING NATIONS

STANLEY CONSULTANTS

scope

This brochure presents fundamental concepts regarding the implementation of rural electrification in developing nations.

It outlines a number of factors that must be considered in establishing an effective rural electrification program.

This brochure also presents the qualifications of Stanley Consultants in the field of rural electrification.

rural electrification

Rural electrification may be defined as the extension of electric service to potential consumers in rural areas and villages now beyond the limits of urban electric service.

Rural electrification provides the social and economic benefits of electric service to those now deprived of it due to their location outside existing service areas. Rural electrification provides long-range economic benefits to a nation by increasing the productivity of the rural sector, including agriculture, agriculturally related industry and other industry that may locate in rural areas.

A successful rural electrification program requires new concepts as to organization, design, financing and management. The design and construction standards of electric systems used in urban areas are not directly applicable to the rural supply system. Nor are the prevailing concepts of organization, management, financing, and rate structure directly applicable.

Electric service has not been extended into many rural areas primarily because the economic criteria of urban systems have not been applicable to the less-settled areas.

Consumers are scattered, thus requiring a comparatively high investment in facilities to serve a given population. Initial electric requirements of rural consumers are usually low compared to the average urban user. Most utility systems serving urban areas have been slow to recognize the true potential of a successful rural electrification program. Some have tried unsuccessfully to apply urban economic criteria to rural areas. Some former colonial areas, simply have not been interested in serving people in the rural areas.

The need for a new approach to rural electrification has been proven even in such an affluent nation as the United States. Its government instituted an extensive rural electrification program in the 1930's. This gave rural electrification such an impetus that now over 98% of rural homes and industries located in rural areas have central station electric service.

Each developing nation must adopt its own approach and program for rural electrification if it wishes to achieve substantial progress in supplying reasonably priced electric service to rural areas. Many lessons can be learned from the experience of the United States and other nations and full advantage should be taken of such experience. However, a successful program for a particular nation must reflect its own local circumstances and needs.

stanley consultants background

In 1935 Stanley Consultants became one of the pioneers in the rural electrification field in the United States. We are proud to have designed the first REA-financed rural electric cooperative system to begin operation in the great agricultural state of Iowa. We also had the privilege of designing many of the other early projects in the Mid-West and we assisted in the initial organization of many cooperatives.

Stanley Consultants has continued its activities in rural electrification in the United States. For over 34 years we have continued to provide professional services to numerous rural electric distribution systems. As these cooperative systems have grown, we have provided consulting services on high voltage transmission systems and diesel, gas turbine, steam and hydroelectric generating stations. Our aggregate experience in all phases of rural electrification is undoubtedly greater than that of any other United States firm currently practicing in this field.

Stanley Consultants has extended its electrification activities to other continents. Since 1956 we have handled electrical work in the Republic of Liberia in West Africa. Our activities there have included a country-wide power resources survey, development of

an over-all plan of electrification, design and supervision of construction of several diesel electric plants, planning, design and supervision of construction of a hydro-electric plant including the associated dam and reservoir, and design and supervision of construction of extensive transmission and distribution facilities. The latter included a substantial amount of rural electrification. In addition, we have provided consulting management services and have assisted in training of staff for power plant and electric system operation.

Since 1966 we have been engaged in rural electrification work in Peru, South America. Our services there have included the development of an over-all program for rural electrification in that country, together with the design and construction supervision of the first pilot project in rural electrification. As these services continue, we are undertaking other studies for the development of extensive electrical systems to serve a large rural area.

In Argentina we are currently one of three U.S. firms registered to provide consulting services to rural electric systems. We are associated with Centro Consult, a local consulting firm, in the development of a number of rural electrification projects to be owned and operated by cooperatives.

Currently we are completing arrangements for consulting services on a pilot rural electrification project in the Dominican Republic. Our services will include selection of the area for the pilot project, organization of a cooperative, design and construction of the project, and subsequent development of a nation-wide rural electrification program.

approach to rural electrification

An adequate program for rural electrification requires consideration of a number of questions which are listed below in several categories.

Need

Is the country ready for rural electrification? How great is the need in various areas? How will initial acceptance and use of electric service divide between residential, agricultural, and industrial consumers?

Benefits

What are the benefits to potential rural consumers? What are the social and economic benefits of rural electrification to the country? Will it affect balance of payments of the country? Will it intensify agricultural production? Will it stimulate growth of rural industry?

Power Supply

Will bulk power for rural electrification be available from existing power sources? If so, at what cost? If not, what are the alternatives for providing power and the costs thereof?

Technical Standards

What technical standards should be adopted to guide the design and construction of

rural electrification systems? What voltages, phases, clearances and safety factors are warranted? What standards of service and system reliability are desirable?

Financing

What are the alternative sources of financing? How much subsidy must the government give to implement rural electrification? How would initial pilot projects be financed? How would long-range financing for continuing development of rural electrification be assured?

Costs

What factors will affect construction costs? What will be the level of capital investment to serve rural customers? What will be the range of annual costs and unit costs per kwhr? What costs will the consumer incur in order to accept initial electric service?

Economics

What is the resulting benefit-cost ratio of rural electrification? Can service be provided at rates that are tolerable to rural consumers? Do the economics of electrification warrant its implementation?

Organization

Will rural electrification be undertaken by existing electric systems? If not, will it be undertaken by cooperatives or by a special governmental agency? Is some combination desirable?

Management

How will management for rural electrification be provided? How can available talent be utilized to the greatest extent? What programs are needed to train technicians and administrators?

Consultants

What use will be made of consultants in developing and implementing the program? Can they assist in training technical and administrative staff? Should they provide general consultation to management on a continuing basis?

implementation

The following three-step procedure to implement a rural electrification program is based upon past experience of Stanley Consultants. It assumes that prior to such implementation, the local government will have accepted in principle that rural electrification is a timely matter for serious study and action.

Step 1 - General Feasibility

This step should be undertaken by the appropriate agency of the government with the assistance of consultants who are experienced in rural electrification. It involves an over-all examination of the needs, benefits and costs of a rural electrification program and identification of the alternate approaches to ownership, financing, power supply, design, operation and management of rural electric systems. Step 1 includes examination of desirable technical standards for design and construction. The end result should be a judgement of the technical and economic feasibility of a rural electrification program and the development of preliminary guidelines for its further implementation.

Step 2 - Pilot Project

The second step should be the construction of one or more pilot projects to test the

conclusions of the general studies and to gain valuable local experience. Beyond the selection of the projects, this step involves organization, finance, design, construction, and, finally, operation of the pilot projects. This step should be administered by the delegated governmental agency with the assistance of experienced consultants. Maximum use of local technicians and administrators is desirable, thus, providing valuable training for subsequent projects.

Step 3 - Program Definition

The conclusions of the general study may be re-examined in the light of the experience with the pilot projects. This can lead to the establishment of the over-all program for rural electrification, the preparation of required procedures, and the creation of the required administrative organization to guide the program. Rural electrification should then be established on a basis that it will continue to expand, bringing the greater benefits of electric service to more of the citizens of the country.

qualifications

Stanley Consultants offers the following qualifications to provide consulting services on rural electrification projects:

1. Over 34 years of intensive experience in rural electrification in the United States.
2. Broad experience and competence in all facets of electric power systems. This includes diesel, gas turbine, steam and hydroelectric generating stations, high voltage transmission lines and substations, and urban as well as rural distribution systems.
3. Extensive international experience, particularly in Africa, Latin America, and the Caribbean giving us first hand knowledge of the economic, climatological, and other conditions.
4. Wide experience with the economic feasibility and design of industrial plants, many of which have been closely related to agriculture.
5. Competence and experience in agricultural engineering and economics which are often closely related to rural electrification and rural area development.

summary of experience

The following statistics highlight the vast experience of Stanley Consultants in rural electrification and electric power systems:

Rural Distribution Systems

Number of clients served:	Over 60
Number of engagements:	Over 400
Miles of line designed:	Over 40,000
Voltages:	Mostly 12.5/7.2 kv

Transmission Systems (33 kv and up)

Number of clients served:	Over 25
Number of engagements:	Over 100
Miles of line designed:	Over 6,200
Voltages:	33 kv, 46 kv, 69 kv, 138 kv, 161 kv, 220 kv and 330 kv

Substations

Number of clients served:	Over 100
Number of engagements:	Over 350
Total kva:	Over 4,000,000
Voltage:	33 kv to 345 kv

Generating Stations

Number of clients served:	Over 100
Number of engagements:	Over 150
Total kw of capability:	Over 1,800,000
Range of unit size:	
Diesel	100 kw - 4,400 kw
Gas Turbine	to 11,500 kw
Steam	400 kw - 460,000 kw
Hydro	600 kw - 79,200 kw

personnel

The following resumes show the experience of selected key personnel of Stanley Consultants who are involved in our rural electrification work and our international operations.

General Management

C. M. Stanley

R. H. Stanley

International Operations

R. E. Barrett

H. P. Guttmann

G. H. Smith

J. R. B. Hodges

W. H. Jentsch

J. F. Lang

Electric Systems

E. H. Breckenfelder

V. W. Gruver

J. C. Leavitt

F. H. Biere

D. D. Osborn

C. E. Houseman

R. D. Prall

D. L. Metz

Agricultural Consultants

J. H. Cleave

J. H. Laeyendecker

Industrial Consultants

D. C. Johnson

N. B. Smith

These resumes are arranged alphabetically following Mr. R. H. Stanley.

C. M. STANLEY

PRESIDENT AND CHAIRMAN OF BOARD OF DIRECTORS
HEAD OF INTERNATIONAL DIVISION
STANLEY CONSULTANTS, INC

SENIOR PARTNER
STANLEY CONSULTANTS

PRESIDENT AND CHAIRMAN OF BOARD OF DIRECTORS
STANLEY CONSULTANTS, LTD. - LIBERIA

DIRECTOR
STANLEY CONSULTANTS, LTD. - NIGERIA

EDUCATION: University of Iowa -- B.S., General Engineering.
University of Iowa -- M.S., Hydraulic Engineering.

REGISTRATION: Registered Professional Engineer (Civil, Electrical, and Mechanical) -- Iowa, 18 other states, and the District of Columbia.
Holds National Council of Engineering Examiners Certificate

PROFESSIONAL SOCIETIES: Fellow -- ASCE; IEEE; ASME. Member -- NSPE; AICE; AWWA; NPA; IES (Past President); ISPE; and CEC/Iowa.

EXPERIENCE: General Manager since 1932.

Specialties: International operations; electric systems; water resources and hydraulics; utility rates and litigation; long-range planning; industrial organization and management; project administration; and general management.

PUBLICATIONS: Author of books "The Consulting Engineer" and "Waging Peace."

Over 60 articles and papers in professional and technical publications.

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PROFESSIONAL RECOGNITION:

Awarded Alfred Noble Prize by ASCE, IEEE, ASME, AIME, and WSE.

Awarded Collingwood Prize by ASCE.

Received Anson Marston Award, John Dunlap Award, and Distinguished Service Award from Iowa Engineering Society.

Received 1965 NSPE Award for outstanding service to the engineering profession from the National Society of Professional Engineers.

Awarded Grand Commander, Star of Africa decoration by Government of Liberia, West Africa.

Awarded honorary Doctor of Humane Letters degree by Iowa Wesleyan College.

Awarded Distinguished Service Award for 1967 by University of Iowa

Listed in "Who's Who in Engineering," "Who's Who in America," "Who's Who in the Midwest," "Leading Men in the U.S.A.," "World Who's Who in Commerce and Industry," "International Yearbook and Statesmen's Who's Who," and "International Businessmen's Who's Who."

R. H. STANLEY

EXECUTIVE VICE PRESIDENT
AND DIRECTOR
HEAD, OPERATIONS DIVISION
STANLEY CONSULTANTS, INC

PARTNER
STANLEY CONSULTANTS

DIRECTOR
STANLEY CONSULTANTS, LTD

EDUCATION: Iowa State University -- B.S., Mechanical Engineering
B.S., Electrical Engineering
University of Iowa -- M.S., Sanitary Engineering
American Management Association -- Management Course

REGISTRATION: Registered Professional Engineer -- Iowa and 14 other states.
Holds National Council of Engineering Examiners Certificate.

PROFESSIONAL PARTICIPATION: Member -- CEC/Iowa (Past President); NSPE; ANS; IEEE; ASME; ASCE; and IES (Past Chairman, Private Practice Section).
Vice Chairman, Advisory Council, Center for Industrial Research and Service, Iowa State University.

EXPERIENCE: With company since 1955.

At present Head of Operations Division, supervises all technical work of company, including reports, design, survey and resident inspection.

Projects involve thermal power plants; steam heating plants; nuclear facilities; industrial facilities; educational buildings; feasibility and planning studies; valuations; electric system studies; economic and financing studies; rate studies; city and regional planning; and water resources studies.

Professional experience includes project administration; design; studies and reports, former company positions of: Head of Building and Industrial Design Department and Head of Report Group.

PUBLICATIONS: Numerous articles and papers published in professional and technical journals and presented at professional and technical meetings.

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PROFESSIONAL RECOGNITION:

Received Diamond Jubilee Award from American Society of Mechanical Engineers.

Received John Dunlap-Sherman Woodward Award from Iowa Engineering Society.

Received Young Alumnus Award from Iowa State University Alumni Association.

Received Distinguished Service Award from the Muscatine Junior Chamber of Commerce.

R. E. BARRETT

REGIONAL MANAGER
CARIBBEAN REGION
INTERNATIONAL DIVISION
AND VICE PRESIDENT
STANLEY CONSULTANTS, INC

EDUCATION: University of Iowa -- B. S., Mechanical Engineering.

REGISTRATION: Registered Professional Engineer -- Iowa.

PROFESSIONAL SOCIETIES: Member -- NSPE; ASME; and IES.

EXPERIENCE: With company since 1949.

At present, Regional Manager in charge of liaison and coordination between clients on international projects and company technical staff; in charge of international operations of the company in Caribbean Region.

Projects involve hydroelectric and diesel power generation and distribution facilities; waste disposal; water resources; feasibility studies; planning and over-all management of numerous projects; ports and harbors; airports; monumental government buildings; schools; commercial buildings; planning, organization and direction of training program for personnel employed in new hydroelectric station for Liberia, West Africa; and industrial facilities.

Professional experience includes project management; studies and reports; design; management consultant; Project Engineer; construction supervision; former company positions of Assistant Head of International Division; Liberia, West Africa, Branch Manager; and Head of management team which operated the Liberian electric power system.

PUBLICATIONS: A number of articles and papers in professional journals.

PROFESSIONAL RECOGNITION: Awarded Knight Commander, Humane Order of African Redemption Decoration by Government of Liberia.

Listed in "Who's Who In Engineering."

FRED H. BIERE

HEAD, ELECTRICAL DEPARTMENT
REPORT GROUP
STANLEY CONSULTANTS, INC

EDUCATION: University of Iowa -- B.S., Electrical Engineering.

REGISTRATION: Registered Professional Engineer -- Iowa.

PROFESSIONAL SOCIETIES: Member -- IEEE and IES.

EXPERIENCE: With company since 1949.

At present, Head of Electrical Department of Report Group, responsible for preparation of studies for electric generation, transmission and distribution systems.

Projects involve short and long range planning of power supply and transmission systems, operational studies of transmission systems, including interconnections, incremental loading and losses, load flows, fault currents, relay settings and transient stability; reports on thermal power supply, purchase contracts and high voltage transmission systems; rural and municipal electric distribution planning, including long range plans, annual work plans and sectionalizing studies; electric system financial forecasts; wholesale and retail electric rate studies; preparation and presentation of data and testimony before utility regulatory boards and commissions, as well as engineering services in connection with litigation; and studies on various network analyzers and digital computers, including the company owned computer.

Professional experience includes studies and reports; design; expert witness in field of electric power; consultant on special problems of system operation; relays, electric rates, and supply to new loads; and Resident Engineer.

E. H. BRECKENFELDER

PROJECT MANAGER
VICE PRESIDENT AND DIRECTOR
STANLEY CONSULTANTS, INC

EDUCATION: Iowa State University -- B. S., Electrical Engineering.

State University of Iowa -- M. S., Industrial and Management Engineering.

REGISTRATION: Registered Professional Engineer -- Iowa and 13 other states.

PROFESSIONAL SOCIETIES: Member -- IEEE; AIEE (Past Chairman, Quad Cities Subsection); and IES.

EXPERIENCE: 22 years experience in his field. With company since 1946.

At present, Project Manager, Electric Systems, in Project Division.

Projects involve electric distribution; high voltage transmission and substations; feasibility and power supply studies; thermal power plants; network analyzer studies; and rate studies.

Professional experience includes project management; studies and reports; design; system interconnections; consultation and expert witness in field of electric power; and instructor and lecturer on electric systems.

PUBLICATIONS: Co-author of AIEE transaction paper "Rural System Planning." Several articles published in Technical Magazines.

PROFESSIONAL RECOGNITION: Listed in "Who's Who in Engineering."

JOHN H. CLEAVE

AGRICULTURAL ECONOMIST
STANLEY CONSULTANTS, INC

EDUCATION: University of London--B.Sc., Economics (Economic Geography).

Hertford College, Oxford, England--Overseas Service Course.

Hertford College and Agricultural Economic Research Institute, Oxford, England--Diploma (with distinction) in Agricultural Economics.

Stanford University, California--M.A., Agricultural Economics.

Stanford University Food Research Institute--Ph.D., Agricultural Economics.

EXPERIENCE: 11 years in his field.

At present, Agricultural Economist assigned to Muscatine Group of International Division.

Professional experience includes formation of an Agricultural Economics Section within the Ministry of Agriculture and Cooperatives of Uganda. Policy advice to the Ministry also included initiation and administration of research into the economics of peasant farms and publication of results; organization and administration of the 3 1/2 year joint F.A.O. Census of Agriculture (part of the 1960 World Census Program); and various economic evaluations, including: feeder roads program; fertilizer factory project; agricultural credit organization; food crop marketing policy, Uganda and the European Common Market; development of a dairy industry; checks on acreage estimations; reorganization of the coffee industry; and mechanical cultivation on group farms. Professional duties in Uganda also included administrative and technical supervision and liaison with various overseas bodies such as IBRD, FAO, and USAID, as well as private industry and the agricultural research stations in Uganda.

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PUBLICATIONS: Dr. Cleave has been responsible for the following publications:

"Report on the Inomo Group Farm - 1965 - A Tentative Summary of Operating Results." Ministry of Agriculture and Co-operatives, 1966.

"Food Consumption in Uganda." East African Journal of Rural Economy, February, 1968.

"Economic Background to Agriculture in Uganda," (with E. H. Jones) Agriculture in Uganda, ed. J. D. Kameson. (Printing).

"The Economic Investigation of African Peasant Agriculture," (with D. G. R. Belshaw, joint Editor). (Printing)

"Investigations into the Economics of Peasant Farming in Uganda," (with E. H. Jones). (Printing)

"The Collection, Analysis, and Use of Farm Management Data in Uganda." (To be published in 1969)

FOREIGN LANGUAGE: Kiswahili--fluent.

French--reading knowledge.

Luganda--speaking knowledge.

V. W. GRUVER

PROJECT MANAGER
STANLEY CONSULTANTS, INC

EDUCATION: State University of Iowa -- B.S., Electrical Engineering.

REGISTRATION: Registered Professional Engineer -- Iowa and 8 other states.

PROFESSIONAL SOCIETIES: Member -- NSPE; IEEE; and IES.

EXPERIENCE: With company since 1938.

At present, Project Manager, Electric Distribution, in the Project Division.

Projects involve high voltage transmission lines including 161kv; switching and substations; electric system planning; sectionalizing studies; system maps; underground and overhead electric distribution systems; rate studies; water treatment plants; office buildings; and steam and diesel power plants.

Professional experience includes project management; studies and reports; design; system interconnections; consultant on electric system operation, maintenance and construction program planning; supervision of electric power lines reconnaissance surveys; expert in processing work orders for electric power facilities; preparation of final inventories; and Field Engineer.

PROFESSIONAL RECOGNITION: Listed in "Who's Who in Engineering."

H. PETER GUTTMANN

MANAGER
WASHINGTON, D. C., OFFICE
AND VICE PRESIDENT
STANLEY CONSULTANTS, INC

EDUCATION: University of San Carlos -- B.A.
Kings College, Cambridge, England.

PROFESSIONAL SOCIETIES: Member -- CEC/USA Committee for International Engineering.

EXPERIENCE: 25 years experience in his field. With company since 1961.

At present, Manager of Washington, D. C., office where he coordinates and acts as the liaison between our clients throughout the world and financial or approving agencies and institutions of the United States Government, United Nations, and eastern offices of industrial clients.

Projects involve diesel and hydro power facilities; highways; ports and harbors; railroad facilities; customs offices; warehouses; military assignments; personnel training; and maintenance of industrial facilities throughout the world.

Professional experience includes project management of international activities; feasibility studies; design; international construction contract negotiations; arbitration; technical, financial and commercial assistance to governments, industry and commerce; and director of export sales for a large American manufacturer of heavy industrial machinery.

PUBLICATIONS: A number of books and articles on technical and educational subjects.

PROFESSIONAL RECOGNITION: Awarded Knight Commander, Order of African Redemption and Commander, Star of Africa Decorations by Government of Liberia, West Africa.

Decorated by Governments of Colombia, Ecuador and Guatemala for services rendered ad-honorem.

FOREIGN LANGUAGES: German and Spanish -- Fluent in reading, writing and speaking knowledge.

French, Italian and Portuguese -- Useful reading, writing and speaking knowledge.

J. R. B. HODGES

REGIONAL MANAGER
EAST AND CENTRAL AFRICAN REGION
INTERNATIONAL DIVISION
STANLEY CONSULTANTS, INC

EDUCATION: Westminster School, London S. W.
Christ Church, Oxford University and London University.

EXPERIENCE: 18 years experience in his field.

At present, Regional Manager and Head of East Africa office, Nairobi, Kenya. Responsible for all business activities in East and Central Africa and project liaison between field and home office. Serves also as a company Economist.

Professional experience includes fifteen years in the Uganda Civil Service progressively acting as District Commissioner, Under Secretary of the Ministry of Agriculture and Cooperatives and Ag Permanent Secretary of the Ministry of Agriculture.

Other experience includes Permanent Secretary of the Ministry of Maritime Affairs, Nassau, Bahamas, including administration of Nassau Harbor Development Project; Permanent Secretary of the Ministry of Road Traffic and Records, Nassau, Bahamas.

CECIL E. HOUSEMAN

PRINCIPAL ENGINEER
POWER DESIGN GROUP
STANLEY CONSULTANTS, INC

EDUCATION: Iowa State University -- B.S., Electrical Engineering.

Graduate courses in nuclear engineering and power systems analysis.

REGISTRATION: Registered Professional Engineer -- Iowa.

PROFESSIONAL SOCIETIES: Member -- IEEE.

EXPERIENCE: With company since 1949.

At present, Project Engineer in Systems Electrical Department responsible for power system electrical design, including transmission and distribution lines, switching and substations, system control and communications.

Projects have included transmission, rural and urban distribution systems; substations up through 230 kv; steam and diesel power plant and central heating plant electrical facilities; schools; hospitals; motels; water and waste treatment plants; facilities for commercial, office and banks, industrial and manufacturing plants, customs and ports; complete electrical facilities for complex military installations for the Corps of Engineers; facilities for Atomic Energy Commission and Argonne Laboratory nuclear projects; and Executive Mansion for Republic of Liberia, West Africa.

Professional experience includes design; survey; Resident Engineer; and Distribution Superintendent and Supervising Engineer for the Monrovia Power Authority of Liberia, West Africa.

WAYNE H. JENTSCH

MANAGER
LAGOS, NIGERIA OFFICE
STANLEY CONSULTANTS, LTD-NIGERIA

EDUCATION: University of Texas -- B.S., Civil Engineering.

REGISTRATION: Registered Professional Engineer -- Texas.

PROFESSIONAL SOCIETIES: Member -- NSPE; ASCE; and Texas Society of Professional Engineers.

EXPERIENCE: Over 17 years in his field. With company since 1960.

At present, Managing Director at Lagos, Nigeria, with responsibilities for project management, design and construction supervision activities for Nigeria, Togo, Dahomey and Ghana.

Projects involve harbor facilities; office buildings; schools; industrial plants; textile mills; roads and highways; air bases; electric power plants; electric transmission and distribution facilities; municipal and industrial utilities; and industrial management activities.

Professional experience includes project management; studies and reports; and design. Has had over 12 years diversified foreign experience in engineering and management; has resided in Spain, Libya, Liberia and Nigeria; has held the former company positions of: Resident Engineer, Head of Construction Department, Project Engineer, Project Manager directing the Resident Management Team advising the Nigerian Western State Government Water Corporation and Assistant Manager of Lagos, Nigeria office.

FOREIGN LANGUAGES: Spanish -- Useful speaking knowledge.

D. C. JOHNSON

HEAD, INDUSTRIAL GROUP
STANLEY CONSULTANTS, INC

EDUCATION: University of North Dakota -- B.S., Mechanical Engineering.

REGISTRATION: Registered Professional Engineer -- Iowa, Illinois and Minnesota.

PROFESSIONAL SOCIETIES: Member -- NSPE.

EXPERIENCE: 19 years experience in his field. With company 11 years.

At present, Head of Industrial Group, directs activities of personnel in design of industrial projects and coordination with other disciplines.

Projects include major addition to sugar (dextrose) refinery; vegetable processing and canning plant; pigskin tannery; waste collection and metering facilities for major distillery; design, construction, start-up and operation of new processing lines for cereal production facility; ingredient storage and handling; batch weighing and mixing; bulk storage and handling; automatic bagging and handling; automated selection and delivery system; operation and maintenance of industrial plant and processing equipment; steam and diesel power plants; and heating, ventilating and plumbing systems for Air Force air base buildings.

Professional experience includes studies and reports; design; former Head of Power Department and Assistant Head of Report Group for our company; and Manager of Engineering and Maintenance of major cereal, flour and feed producing plant.

J. HYKO LAEYENDECKER

TASK FORCE MANAGER
INTERNATIONAL DIVISION
STANLEY CONSULTANTS, INC

EDUCATION: State Agricultural University at Wageningen, Netherlands -- B. S. Degree in Agricultural Engineering and M. S. Degree in Irrigation, Drainage, Hydraulics and Soils Classification.

EXPERIENCE: Five years experience in his field. With company since 1964.

At present, Task Force Manager in Zambia responsible for special assignments. Serves also as a company Agronomist and Hydrologist.

Projects involve hydraulic and agricultural studies connected with acid mine-drainage and reclamation of the strip-mine areas of Ohio; studies and report on the establishment of a cassava starch industry in Liberia, West Africa; flow studies of the Mississippi River; service water studies for heavy industries; studies and reports on water resources; municipal and regional water supply projects in South Dakota, Ohio, Pennsylvania and Illinois; river basin hydrological studies in Jamaica, BWI; regional planning surveys in Central Africa; and various reports on surface runoff and hydraulic studies.

His education at the University occupied a period of seven years during which each candidate had to be actively employed for not less than six months in agricultural work. On leaving the University, Mr. Laeyendecker served for two years as weather forecaster in the Meteorological service of the Royal Netherlands Navy Airforce.

His experience in the United States also includes one year with the Bureau of Reclamation on drainage, stream-gaging and soil survey projects.

JAMES F. LANG

ASSISTANT TO THE PRESIDENT
AND PROJECT MANAGER
STANLEY CONSULTANTS, INC.

EDUCATION: Iowa State University -- B. S., Electrical Engineering.

REGISTRATION: Registered Professional Engineer -- Iowa and 3 other states.

PROFESSIONAL SOCIETIES: Member -- NSPE; IEEE; and IES.

EXPERIENCE: With company since 1958.

At present serves as assistant to C. M. Stanley, providing staff support in connection with both Corporate and International Division administration. Available also for selected Project Manager assignments.

Projects have involved electric power system planning; design; operation; valuation and rates. Design projects included steam electric generating stations through 100 MW; substations and switching stations through 161 KV. Mr. Lang is presently representing 22 rural electric systems in comprehensive power supply negotiations being conducted concurrently with four major power suppliers.

Professional experience includes project management and administration; preparation of studies and reports; electrical design; general consultation, expert witness testimony; negotiation of bulk power supply and system interconnection contracts; and wholesale and retail electric rate reviews.

JOHN C. LEAVITT

PROJECT MANAGER

STANLEY CONSULTANTS, INC

EDUCATION: University of Colorado--B.S., Electrical and Mechanical Engineering.

REGISTRATION: Registered Professional Engineer--Colorado and Kansas.

EXPERIENCE: With company since 1966.

At present, Project Manager and Resident Engineer at our office in Lima, Peru; responsible for providing advisory services to the Government of Peru for the pilot rural electrification project in the Mantaro Valley, including establishment of standards, preparation of plans and specifications, and assisting in construction supervision of transmission and distribution systems.

Professional experience includes project administration; studies and reports; design and construction of electric distribution systems and transmission lines for cooperatives, municipal, and private power systems; Administrative Officer with the Rural Electrification Administration in Washington, D. C.; and appraisal of and feasibility studies for proposed acquisition of properties.

Projects include distribution systems; transmission lines; substations; property acquisitions; and development of rural electric cooperatives.

FOREIGN LANGUAGES: Fluent in Spanish.

DAVID L. METZ

ELECTRICAL ENGINEER

POWER DESIGN GROUP

STANLEY CONSULTANTS, INC

EDUCATION: Marquette University, B.S., Electrical Engineering

Montana State University, courses in Latin American culture and government; also specialized studies in electrical engineering practices of Latin America.

PROFESSIONAL SOCIETIES: Member-IEEE

EXPERIENCE: 4 years in his field

At present Design Engineer in Systems Electrical Department involved in generating station electrical design.

Projects have involved over 50 miles of transmission and urban distribution lines in Ecuador, including installation of first interconnected transmission system between two towns in Ecuador; contributed to investigation of effects of extra high voltage on parallel power lines and communications circuits; assistance in preparation of programs using digital computer for positive and zero sequence impedance for overhead lines; operational studies of transmission systems, including interconnections, load flows, and fault currents; development of electric utility operating records for an agency of the Government of Ecuador; conducted linemen's training program; instructor of U.S. trained engineers for services in South America; and participated in study of electrical reliability of distribution system in Alaska.

Professional experience included Resident Engineer on electric transmission and distribution line construction for an agency of the Government of Ecuador; technical advisor to Board of Directors of an electric utility in Ecuador; studies and reports on special problems related to systems operations up to 345 kv; and electric generation and transmission facilities design.

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PUBLICATIONS: Assisted in developing Spanish-language technical promotional material in Ecuador.

FOREIGN LANGUAGE: Spanish--fluent in reading, writing and speaking. Translated technical bulletins into Spanish.

DONALD D. OSBORN

HEAD, SYSTEMS ELECTRICAL DESIGN DEPARTMENT
STANLEY CONSULTANTS, INC

EDUCATION: Iowa State University -- B.S., Electrical Engineering.

REGISTRATION: Registered Professional Engineer -- Iowa and 8 other states.

PROFESSIONAL SOCIETIES: Member -- IEEE (Senior Member); CEC/Iowa (Affiliate Representative); and IES.

EXPERIENCE: With company since 1949.

Department Head since 1962. Responsible for technical and administrative supervision of power system engineering design, including transmission and distribution lines, switching and substations, system control and communication design. Represents Company as Transmission System Consultant and serves as Head of EHV Standards and Design Criteria Research and Development.

Projects include responsible charge of design and/or construction of over 2,800 miles of transmission lines and 170 switching and substations from 34.5 to 345 kv for over 50 different clients located in such diverse topography and climates as permafrost regions of Alaska, deserts of southwestern United States, Rocky Mountains, and rain forests of West Africa; rural and urban overhead and underground distribution lines; steam plants; industrial facilities; system control and communications; and power system reports.

Professional experience includes studies and reports; previous company positions of: Lead Design Engineer, Project Engineer, Transmission Design Specialist, Head of Transmission and Distribution Section, Field Engineer, and Resident Engineer; survey; and staking.

(continued)

PROFESSIONAL RECOGNITION: Listed in "Who's Who in Midwest."

Responsible for design of Gold Hill-Healy Transmission Line, Alaska, which received CEC/Iowa Engineering Excellence Award and CEC/US Honorable Mention.

RICHARD D. PRALL

TRANSMISSION RESIDENT ENGINEER

STANLEY CONSULTANTS, INC.

EDUCATION: Special courses in Electrical Engineering with ICS.

Iowa State University - Completed extension course in Industrial Electrical Engineering.

EXPERIENCE: Over 15 years associated with high voltage transmission line, supervision and construction.

Projects have included construction management on 205 miles of 500 kv steel tower transmission line; Assistant Construction Manager on 101 miles of 345 kv steel tower transmission line; and journeyman lineman on construction and maintenance of distribution and transmission systems.

Field experience includes supervision of line construction on major transmission facilities; supervision of all field construction inspection on caisson type foundation installation, tower assembly and erection and conductor stringing operations; together with responsibility for handling of all material requirements for another steel tower transmission line project. Field operations have involved setting up complete inventory records; procuring material storage yards; supervising all unloading and storage of material; designing material receiving and inspection reports; approving and processing for payment material invoicing; maintaining cost records; expediting materials deliveries; and coordinating design modifications required for special conductor clearance problems.

HAROLD E. RICHARDSON

VICE PRESIDENT
REGIONAL MANAGER
WEST AFRICAN REGION
INTERNATIONAL DIVISION
STANLEY CONSULTANTS, INC

EDUCATION: Washington State University -- Electrical Engineering.

PROFESSIONAL SOCIETIES: Member -- AIEE and SAME.

EXPERIENCE: 23 years experience in his field. With company since 1964.

At present, Regional Manager and Manager of the Stanley Consultants, Ltd., Monrovia, Liberia office responsible for consulting activities in West Africa.

Projects involve installation and testing of hydroelectric facilities; diesel power plant; steel tower transmission lines; spillways; diamond drilling; foundation and contraction joint grouting; hydraulic fill; erection of a sea wall; piling and reinforced concrete tunnel; ice cofferdam; dams; highways; bridges; and commercial and residential buildings.

PROFESSIONAL RECOGNITION: Awarded Knight Commander, Order of African Redemption Decoration by Government of Liberia.

FOREIGN LANGUAGES: German -- Fluent in reading, writing and speaking knowledge.

Farsi and Pushtoo -- Useful speaking knowledge.

GEOFFREY H. SMITH

VICE PRESIDENT
REGIONAL MANAGER
INTERNATIONAL DIVISION
STANLEY CONSULTANTS, INC

EDUCATION: University of London, England -- B. Sc., Engineering.
Columbia University -- M.S., Civil Engineering.

REGISTRATION: Registered Professional Engineer - New York.

PROFESSIONAL SOCIETIES: Member -- ASCE; Member, Institution of Civil Engineers, London.

EXPERIENCE: Nearly 20 years experience in his field. With company since 1963.

At present, Regional Manager, responsible for consulting activities in the European and Mediterranean countries.

Professional experience includes project administration; design; studies and reports; Resident Engineer in charge of marine work in the United Kingdom and Bombay, India; and Project Engineer for various aspects of engineering and economic feasibility studies for power and civil work projects in Thailand, Cambodia, Laos, Cuba, Alaska, Puerto Rico, Bolivia, Liberia, Nigeria, and the USA.

Projects involve thermal power stations ranging up to 100 mw; harbors; port development and waterfront planning; highways; pipelines; cooling towers; prestressed concrete highway bridge; tanker wharves; warehouses; iron-ore unloading plant; coal unloading plant and bunkers; sea wall; cooling water pumphouse and intakes; dredging; causeways; airfields; barge berths; cargo terminals; and U.S. Navy piers.

NORMAN B. SMITH

SENIOR CHEMICAL ENGINEER
INDUSTRIAL DESIGN GROUP
STANLEY CONSULTANTS, INC

EDUCATION: University of Illinois -- B.S., Chemistry and B.S., Chemical Engineering.

Graduate courses in Computer Processing Control Theory.

REGISTRATION: Registered Chemical Engineer -- Iowa.

PROFESSIONAL SOCIETIES: Member -- American Chemical Society; American Institute of Chemical Engineers; Society of Industrial Microbiologists; NSPE; and the Iowa Engineering Society.

EXPERIENCE: 17 years experience in his field. With company since 1966.

At present, Head of Process Department and Senior Chemical Engineer, available for assistance and consultation on problems of a chemical nature.

Projects include manufacture and recovery of industrial fermentation products; production of corn starch and alcohol; process studies on starch and distillery industrial wastes; examination of mineral mining operations; phosphate fertilizer processes; corrosion resistant materials handling; studies and design of steel industrial waste systems; installation and start-up of new equipment, including centrifuges, evaporators, filters and dryers; processing of corn starch into corn syrups, dextrose, and "total sugar"; pilot plants for commercial manufacturing facilities; and research and development resulting in several United States patents on starch and corn sugar, with foreign patents pending or granted in 15 countries.

(continued)

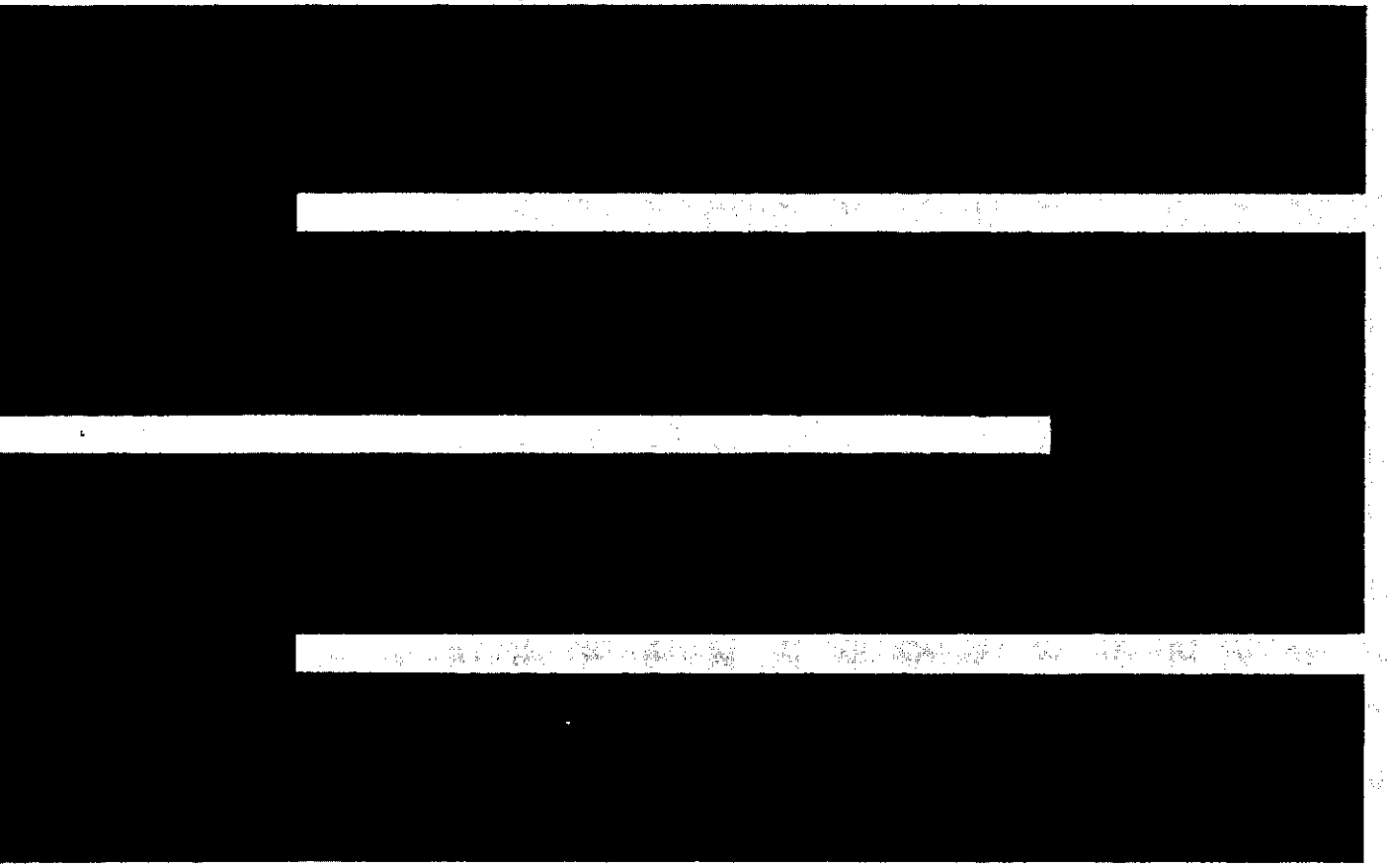
Professional experience includes planning and feasibility studies in West and Central Africa and U.S.; reports; design; consultant on starch and milling industry problems; industrial research and development; Assistant Plant Superintendent for a major industrial fermentation products processor; and successive responsible positions during 11 years with a major Midwest grain processing company of: Fermentation Plant Superintendent, Recovery Plant Superintendent, and Research and Development Engineer.

PUBLICATIONS: Several articles published in trade journals.

PROFESSIONAL RECOGNITION: Paper entitled "Experience with Evolutionary Operations" presented before European Meeting of Chemical Engineering, Frankfurt, Germany.

FOREIGN LANGUAGES: French and German -- useful reading and speaking knowledge.

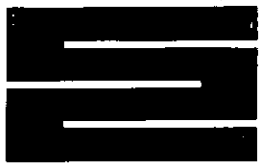
STANLEY CONSULTANTS, INC



INTERNATIONAL CONSULTANTS IN ENGINEERING, ARCHITECTURE, PLANNING AND MANAGEMENT

FORMERLY STANLEY ENGINEERING COMPANY

STANLEY CONSULTANTS, INC



THE SERVICES WE PERFORM

STANLEY CONSULTANTS INC. and its affiliates provide a complete range of technical services varying from brief consultations to complete engineering, architectural and supervision on large and complex projects, including:

Surveys, studies, investigations and reports on proposed projects.

Design and preparation of plans and specifications.

Economic studies, loan applications and financing plans.

Purchase, inspection and testing of equipment.

Supervision of construction and construction management.

Assistance in preliminary operation of new projects.

Management consultation, training of personnel, and management of industrial plants and utilities.

The range of our practice includes...

POWER

Generation
- Steam, diesel, gas turbine
- Hydroelectric, nuclear

Transmission and Distribution Systems
- Transmission lines, urban and rural distribution
- Substations and switching stations

Planning
- Network analyzer studies
- Long range electric system planning
- Country-wide power surveys
- Rural electrification

CIVIL WORKS

Water Resources
- River gaging, hydrologic data analysis
- Flood control, irrigation, drainage
- Water supply, treatment, distribution
- Dams, control works
- Resource surveys

Sanitation
- Sanitary sewers, storm sewers
- Sewage and industrial waste treatment
- Pollution control

Soils and Geology
- Soils exploration, testing
- Foundation design

Transportation
- Transportation studies
- Streets, highways and bridges
- Airfields, railroads
- Ports, harbors and inland waterways

INDUSTRIAL

Feasibility Studies
- Market surveys, plant location
- Product selection, manufacturing process
- Cost and profitability, financing recommendations

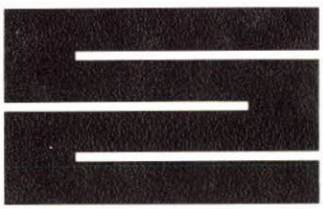
Industrial Plants
- Equipment selection
- Design of manufacturing and process plants
- Supervision of construction
- Management and operation

ARCHITECTURE AND CITY PLANNING
- Architectural, mechanical, structural, and electrical design for . . .
  - Schools and universities
  - Hospitals
  - Offices, banks, commercial and industrial buildings
  - Transportation terminals
  - Low cost housing
  - Hotels
- Planning of communities, cities, and recreational facilities

FINANCING AND ECONOMICS
- Economic feasibility studies
- Financing plans
- Loan applications
- Prospectus

MANAGEMENT SERVICES
- Industrial plants
- Electric power systems
- Water supply and sewage systems
- Management consultation on . . .
  - Organization
  - Operation
  - Training
  - Marketing
  - Financial and accounting
  - Rates and costs

Some of the



PROJECTS

we have handled . . .

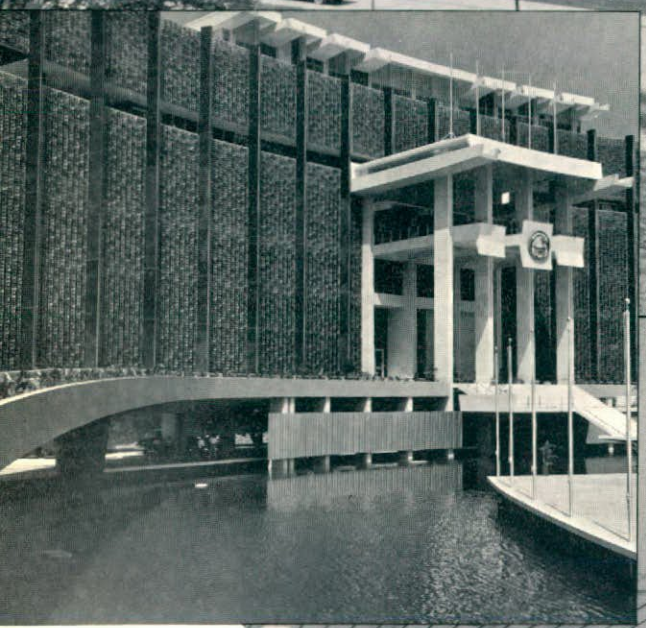
Quelques unes de nos réalisations

Algunos de los proyectos que hemos ejecutado

STANLEY CONSULTANTS, INC

ARCHITECTURE

• ARCHITECTURE
• ARQUITECTURA



Executive Mansion, Monrovia, Republic of Liberia, West Africa - Seat of the Executive Branch of the Government.

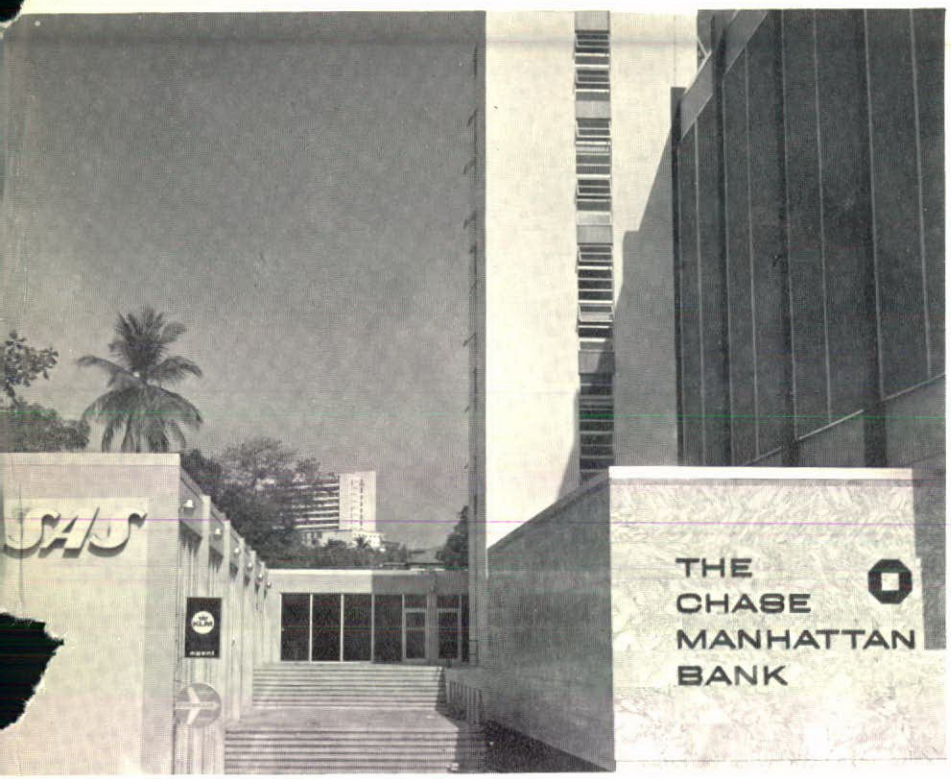
Palais du Gouvernement, Monrovia, République du Libéria, Afrique Occidentale, siège des Services Gouvernementaux de Direction.

Edificio del Poder Ejecutivo, Monrovia, República de Liberia, Africa Occidental - Sede de la División Ejecutiva del Gobierno.

STANLEY CONSULTANTS, INC

ARCHITECTURE

• ARCHITECTURE
• ARQUITECTURA



Office Complex for the Protestant Episcopal Mission - Monrovia, Liberia. Stanley Offices are on the Third Floor.

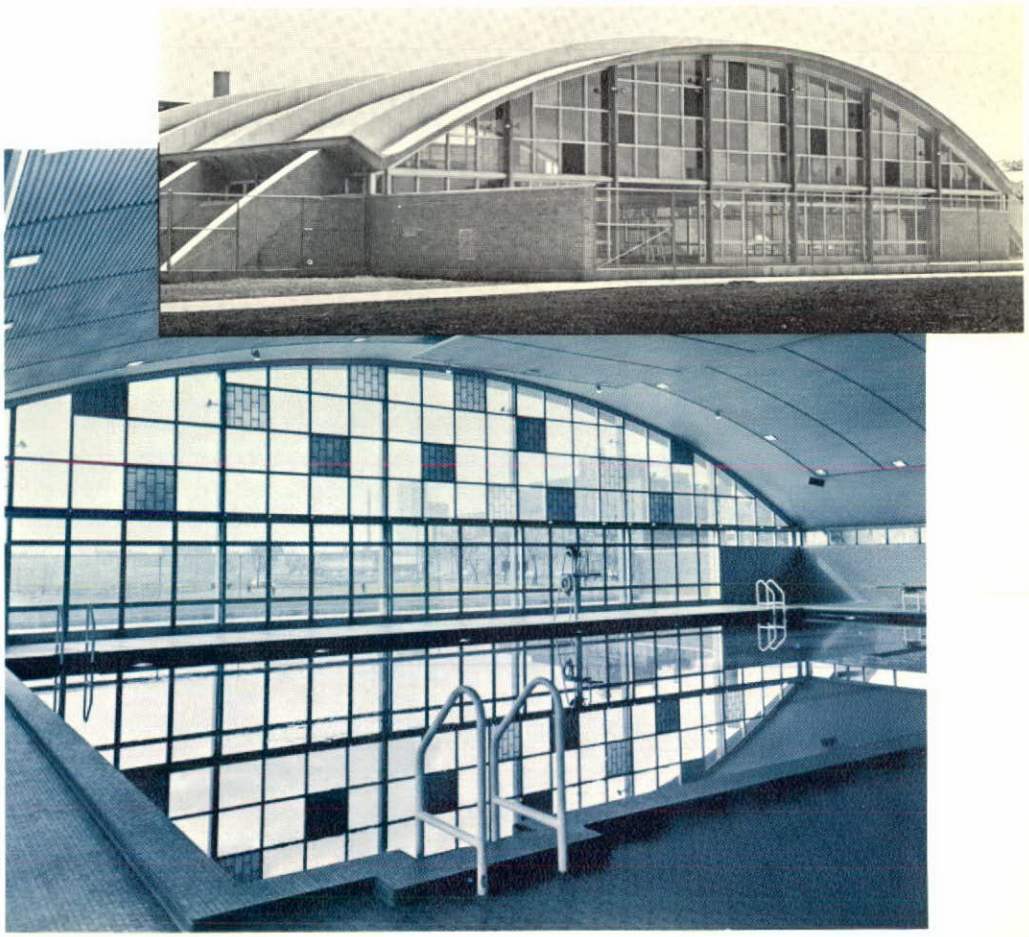
L'immeuble de bureaux de la Mission Protestante Episcopale - Monrovia, Libéria. Les bureaux de la Société Stanley sont installés au troisième étage.

Grupo de Edificios de Oficinas para la Misión Protestante Episcopal - Monrovia, Liberia. Las Oficinas de la Empresa Stanley se encuentran instaladas en el Tercer Piso.

Thin Shell Structure Housing a Swimming Pool - City of Chicago, Illinois.

Structure en voile mince abritant une Piscine - Ville de Chicago, Illinois.

Edificio de Armadura Delgada que contiene una Piscina de Natación - Ciudad de Chicago, Illinois.

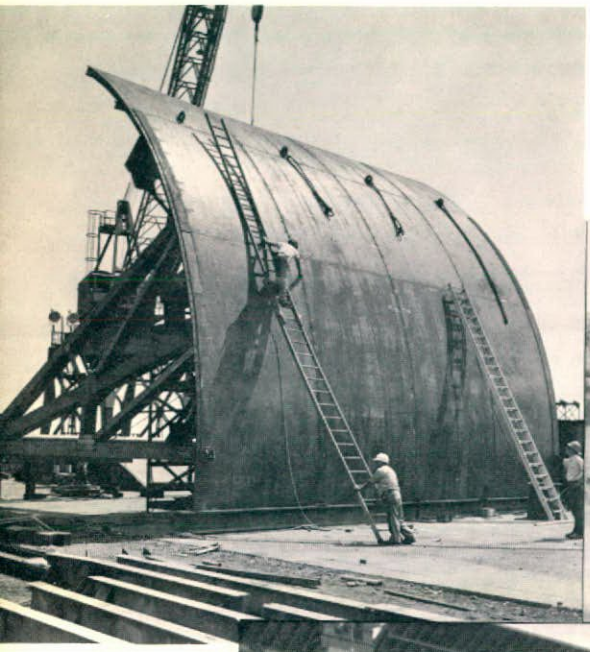


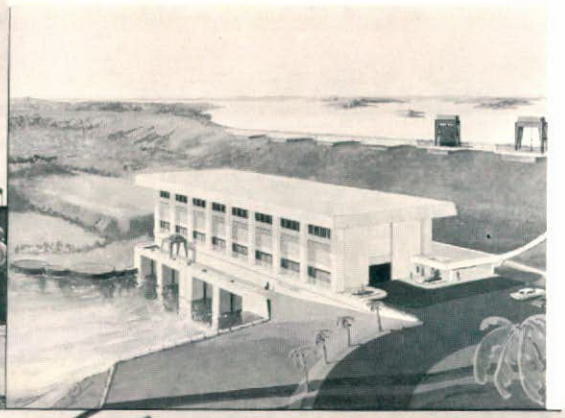
STANLEY CONSULTANTS, INC

HYDRO-ELECTRIC POWER

• CENTRALE HYDRO-ELECTRIQUE

• PLANTAS H DROELECTRICAS

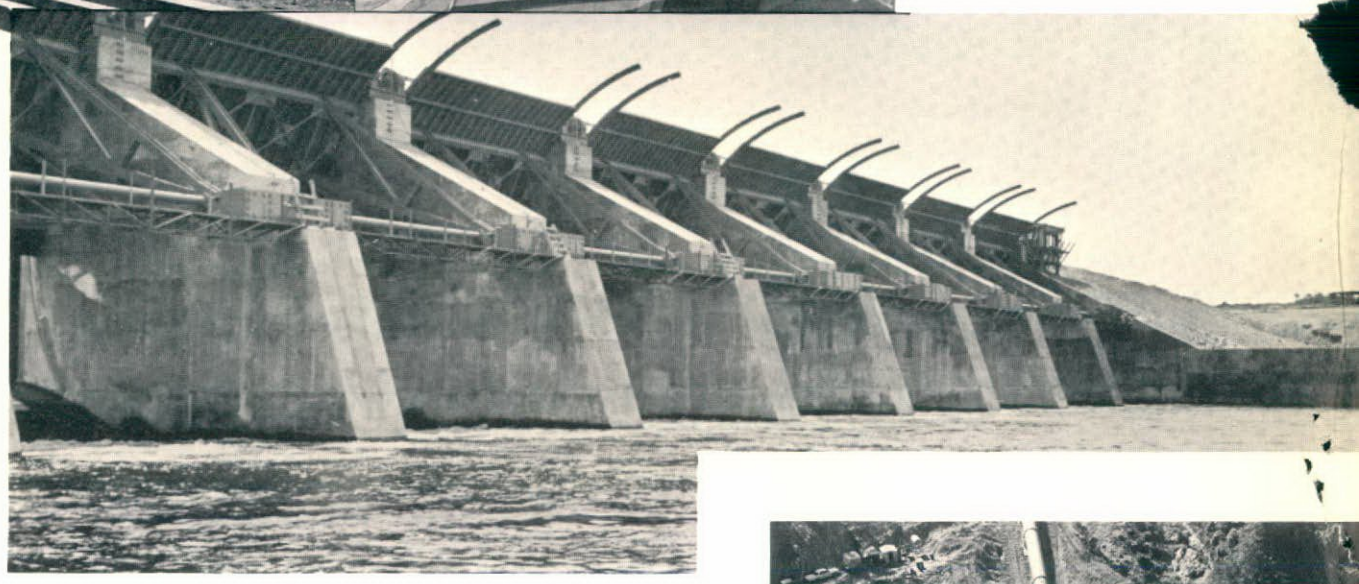




Powerhouse Main Spillway and one taintor gate of the Mount Coffee Project, Saint Paul River, Liberia.

Vertedero Principal de la Casa de Fuerza y una compuerta Taintor del proyecto de Monte Coffee, Rio San Pablo, Liberia.

Déversoir principal et une vanne à segment du Projet Mount Coffee, situé sur le fleuve Saint Paul, Libérie.



Middle Fork Power House on the American River in California, during construction by Ets-Hokin Corporation.

Centrale électrique Middle Fork, sur l'American River en Californie, pendant sa construction par la Société Ets-Hokin Corporation.

Central Eléctrica Middle Fork, situada en el río American en California, durante su construcción por la Sociedad Ets-Hokin Corporation.

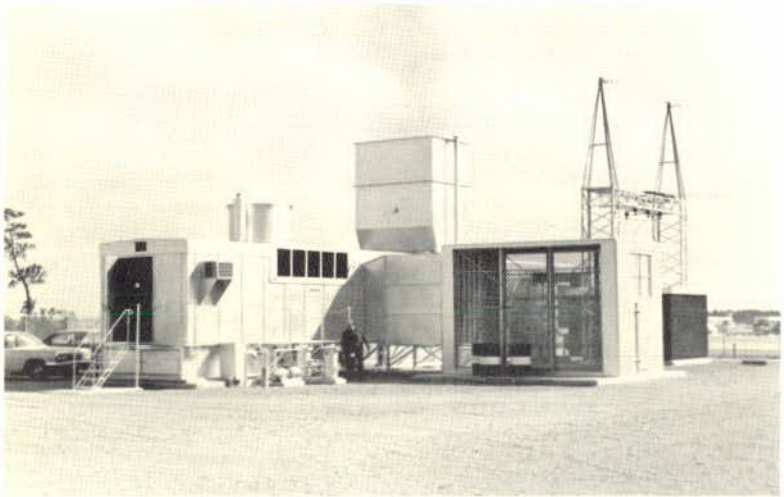
DIESEL POWER and GAS TURBINES

• CENTRALE DIESEL ET TURBINES A GAZ
• PLANTAS DIESEL Y TURBINAS A GAS

Bushrod Island Diesel Generating Plant, Monrovia, Liberia.

Centrale électrique Diesel à Bushrod Island, Monrovia, Liberia.

Central Eléctrica Diesel de Bushrod Island, Monrovia, Liberia.



A Gas Turbine Generating Plant, rated at 10,850 kw, designed for the Choctawhatchee Electric Cooperative, Inc., in Florida.

Une Centrale électrique à turbines à gaz, d'une puissance nominale de 10,850 kw., conçue pour la Société Choctawhatchee Electric Cooperative, Inc., en Floride.

Una Central Eléctrica accionada por Turbina de Gases, Potencia de Régimen 10,850 kw., diseñada para la Sociedad Choctawhatchee Electric Cooperative, Inc., en Florida.

Green Forest Plant, Poplar Bluff, Missouri.

Centrale Electrique, "Green Forest," Poplar Bluff, Missouri.

Central Eléctrica Green Forest, Poplar Bluff, Missouri.

STEAM POWER

• CENTRALE THERMIQUE
• PLANTAS A VAPOR

Earl F. Wisdom Steam Generating Station at Spencer, Iowa, with one 33,000 kw Turbine Generator owned by Corn Belt Power Cooperative.

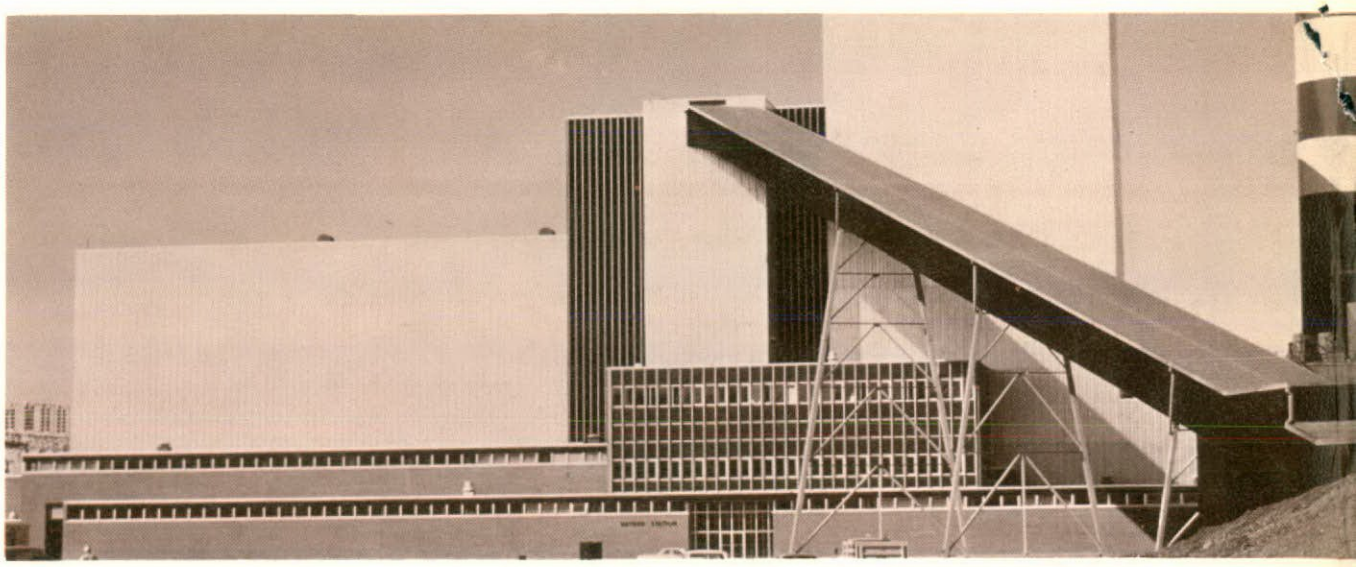
Centrale Thermique Earl F. Wisdom, située à Spencer, Iowa. Cette usine; dotée d'une turbo-generatrice de 33,000 kw, appartient à la Corn Belt Power Cooperative.

Central Termo-Eléctrica Earl F. Wisdom, situada en Spencer, Iowa, equipada con un grupo Turbo-Generador. Propietaria: la Corn Belt Power Cooperative.

A 22,000 kw Station at Montpelier, Iowa, owned by the Eastern Iowa Light and Power Cooperative.

Une Centrale électrique de 22,000 kw de puissance, située à Montpelier, Iowa, et appartenant à la Eastern Iowa Light and Power Cooperative.

Una Central Eléctrica de 22,000 kw de Capacidad Nominal, situada en Montpelier, Iowa. Propietaria: Eastern Iowa Light and Power Cooperative.



Colorado-Ute Electric Hayden Station, 150 MW Generating Plant, Montrose, Colorado.

Centrale électrique Hayden du Colorado-Ute, Cette usine, capable de produire 150 MW, est située à Montrose, Colorado.

Central Eléctrica Hayden del Colorado-Ute, Planta Generadora de 150 MW de Capacidad, situada en Montrose, Colorado.

TRANSMISSION and DISTRIBUTION

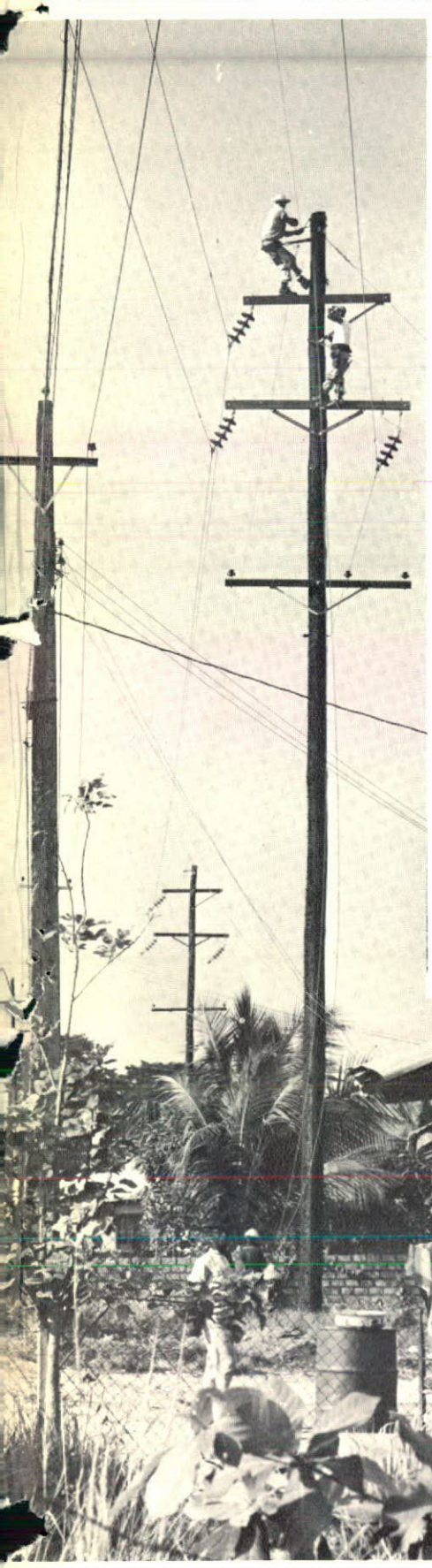
• TRANSMISSION ET DISTRIBUTION

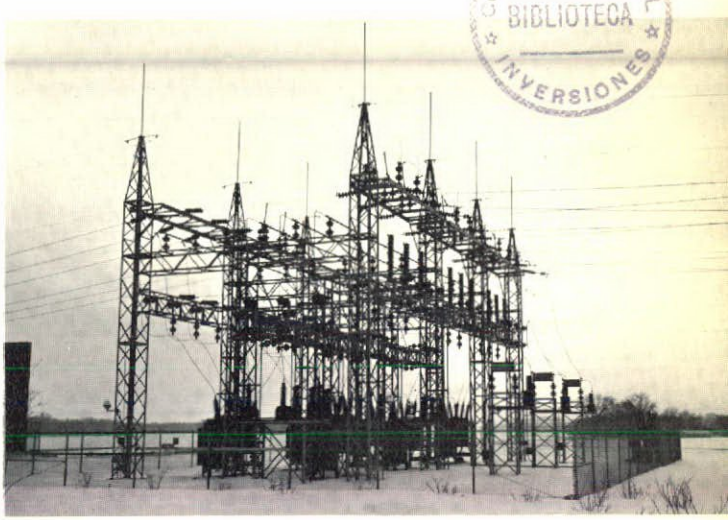
• TRANSMISION Y DISTRIBUCION

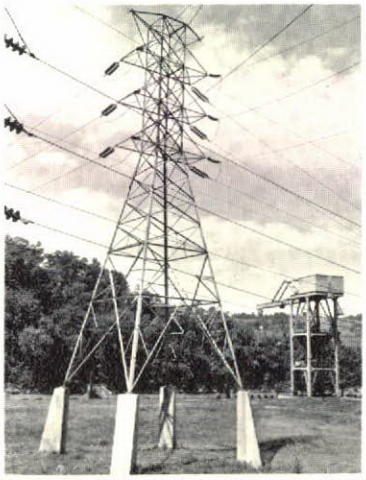
Some Typical Transmission and Switching Facilities located in Africa and in the United States.

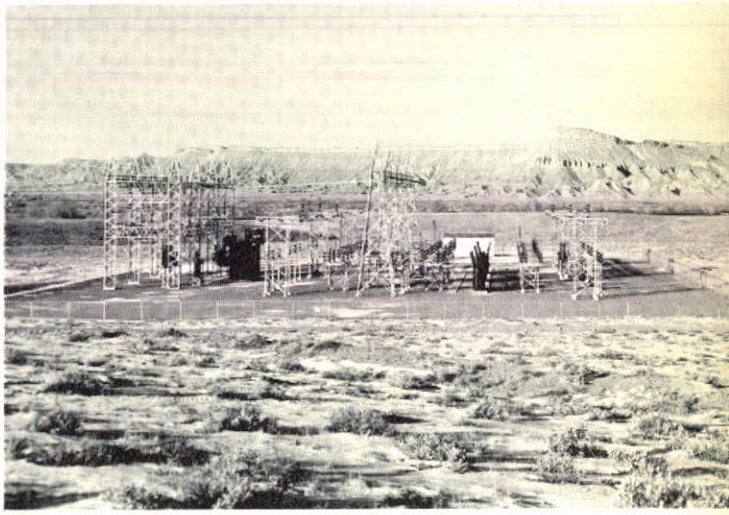
Quelques installations typiques de transmission et de commutation situées en Afrique et aux USA.

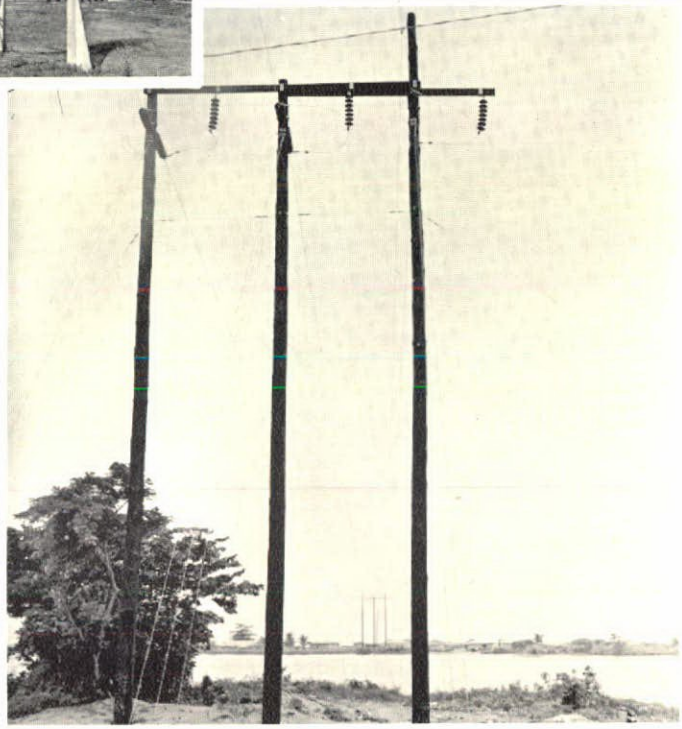
Algunas Instalaciones Típicas de Transmisión y de Conmutación situadas en Africa y en los USA.





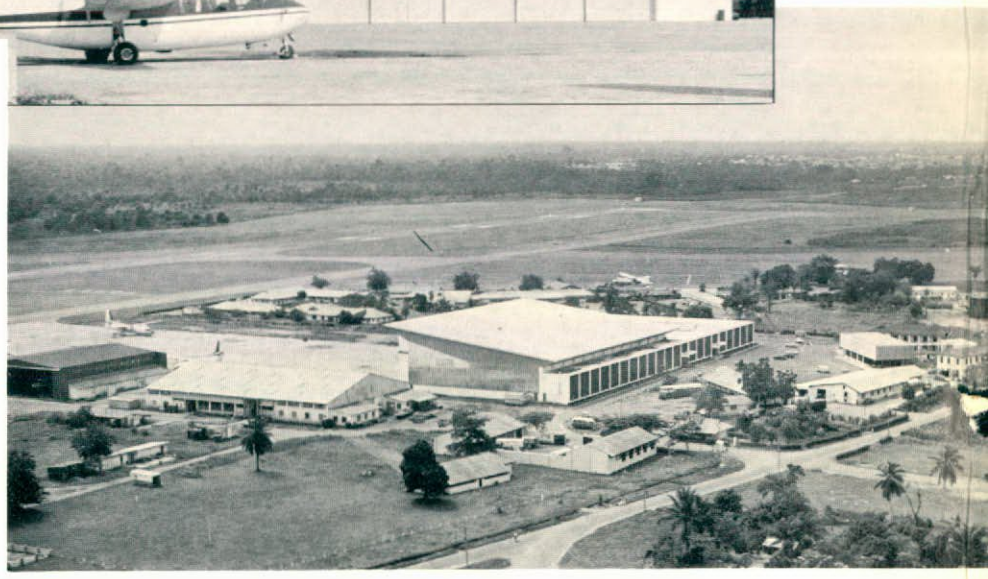






AIRPORTS

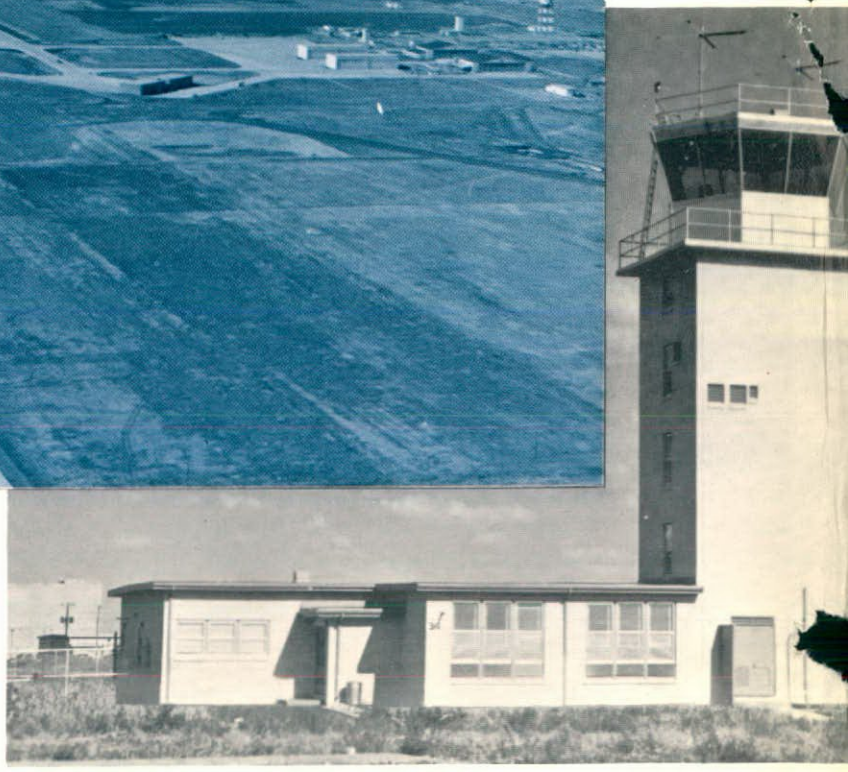
• AEROPORTS
• AEROPUERTOS



Base Hangar and Service Building Designed for WAAC (Nigeria) at Ikeja Airport, Lagos. Viewed both from the Ground and from the Air.

Hangar d'aérodrome et Bâtiment des Services de l'Aéroport d'Ikeja, Lagos, Nigeria, Conçus pour le compte de la WAAC. Vues terrestres et aériennes.

Hangar de Base y Edificio de Servicios diseñados para la WAAC (Nigeria), en el Aeropuerto de Ikeja, Lagos. Vistas terrestre y aérea.



Aerial View of Grand Forks Air Force Base in North Dakota, together with Close-up of Base Operations Building and Control Tower.

Vue aérienne de la base de l'U.S. Air Force à Grand Forks, dans l'Etat du Dakota, ainsi qu'une vue de détail montrant le Bâtiment des Opérations et la Tour de Contrôle.

Aerofotografía de la Base de la Fuerza Aérea Norte Americana de Grand Forks, en el Estado de Dakota, y asimismo una vista de detalle del Edificio de Operaciones de la Base y de la Torre de Control.

STANLEY CONSULTANTS, INC

HIGHWAYS, RAILROADS, and BRIDGES

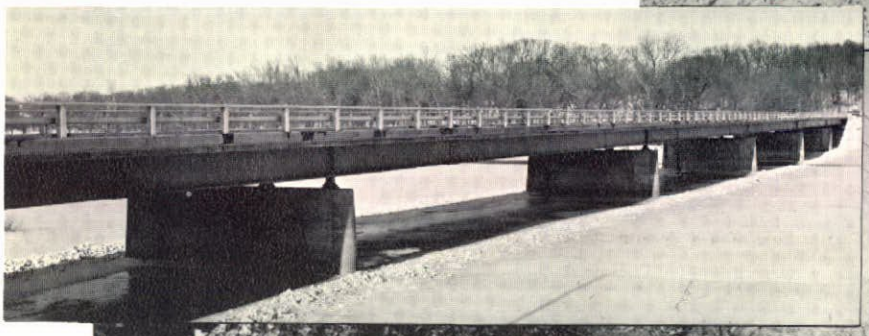
• ROUTES, VOIES FERREES, ET PONTS

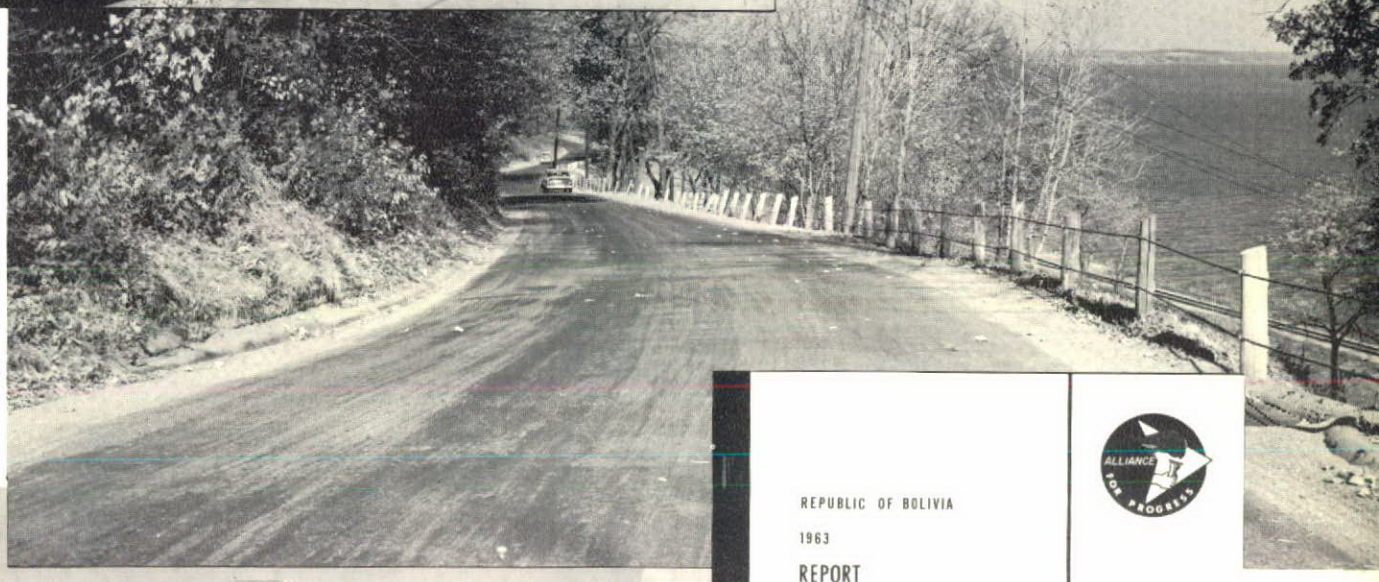
• CARRETERAS, FERROCARRILES Y PUENTES

This page shows work designed in the transportation field including primary highway in West Africa, continuous composite I beam bridge in northern Iowa, a secondary highway along the Mississippi River, and a triple span expressway in Chicago, Illinois.

Divers projets conçus dans le domaine de la circulation routière, y compris une route principale en Afrique Occidentale; un pont de poutres continues composées en I construit dans le nord de l'Etat d'Iowa, USA; une route secondaire longeant le fleuve Mississippi et une autoroute à triples travées à Chicago, Illinois.

Esta página muestra trabajo de diseño en el area de transportes incluyendo una carretera principal en Africa Occidental, viga I continua en el norte de Iowa, una carretera secundaria a lo largo del Rio Mississippi y un puente de tres luces en la vía expresa de Chicago, Illinois.





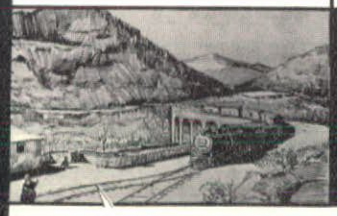
REPUBLIC OF BOLIVIA

1963

REPORT

ON....

ALLIANCE FOR PROGRESS



RAILROADS
LA PAZ AREA

STANLEY CONSULTANTS, INC

PORTS and HARBORS

- PORTS
- PUERTOS Y BAHIAS

Quay Wharf at Greenville, Liberia, Designed to handle Deep-Draft Vessels.

Quai de chargement du port de Greenville, Libéria, conçu pour l'accostage des navires à fort tirant d'eau.

Muelle de Atracadero en Greenville, Liberia, diseñado para atracado de buques de mucho calado.

Inauguration Ceremonies at First Deep Water Berth, Port of Koko, Nigeria.

Cérémonies d'inauguration du premier poste de mouillage en eau profonde du port de Koko, Nigéria.

Ceremonías de Inauguración del Primer Borneadero de Agua Profunda, en el Puerto de Koko, Nigeria.

Harbor at Nassau in the Bahamas, Site of a Major Port Improvement Program.

Port de Nassau, aux Iles Bahamas, où un programme important d'améliorations des conditions portuaires est mis en oeuvre.

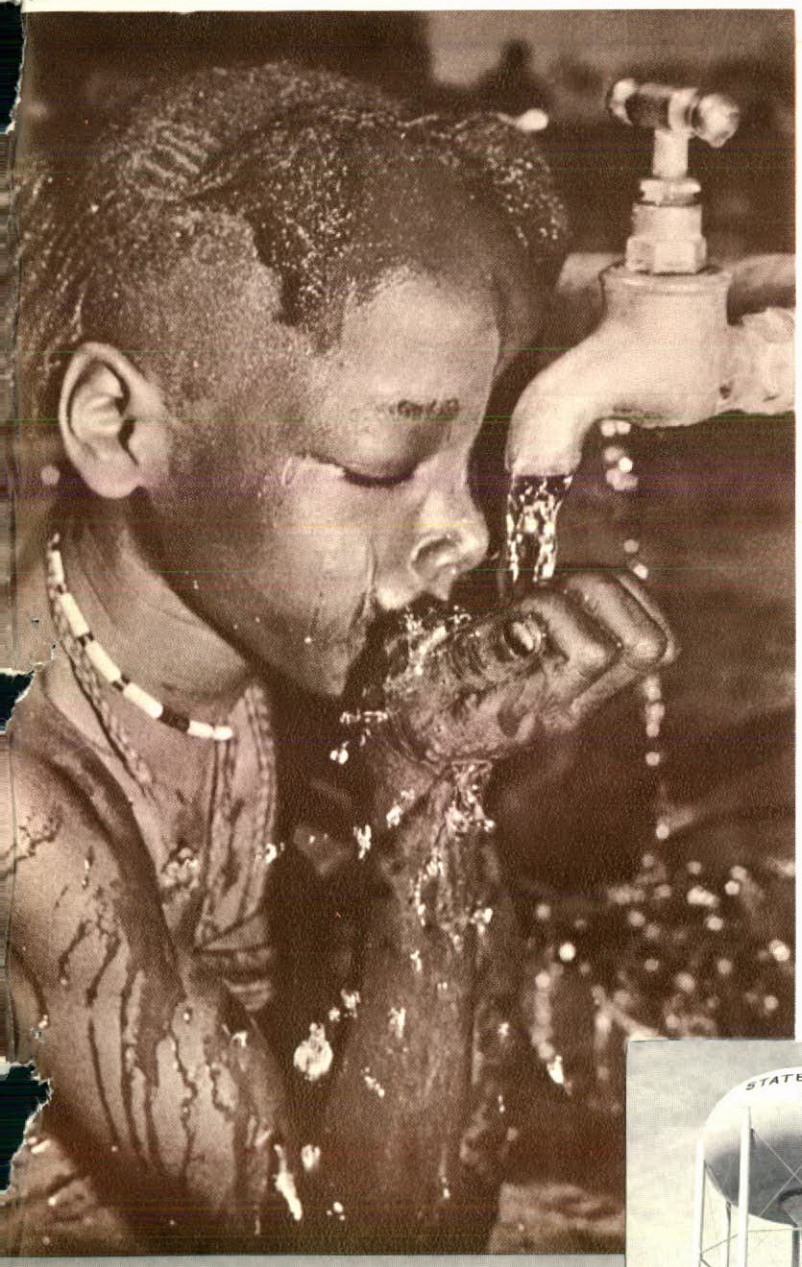
Puerto de Nassau, en las Islas Bahamas, el sitio de un Programa Importante de Mejoras Portuarias.

STANLEY CONSULTANTS, INC

SANITATION, WATER SUPPLY, and DRAINAGE

• ASSAINISSEMENT, DISTRIBUTION D'EAU, ET DRAINAGE

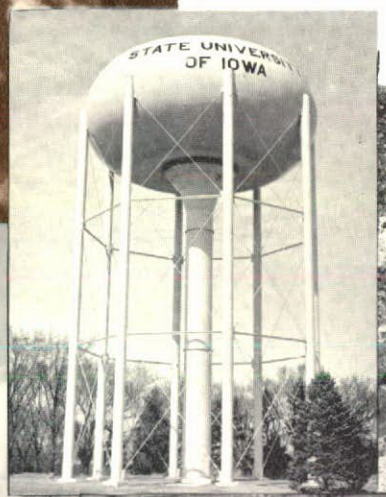
• SANIDAD, SUMINISTRO DE AGUA Y DESAGUE

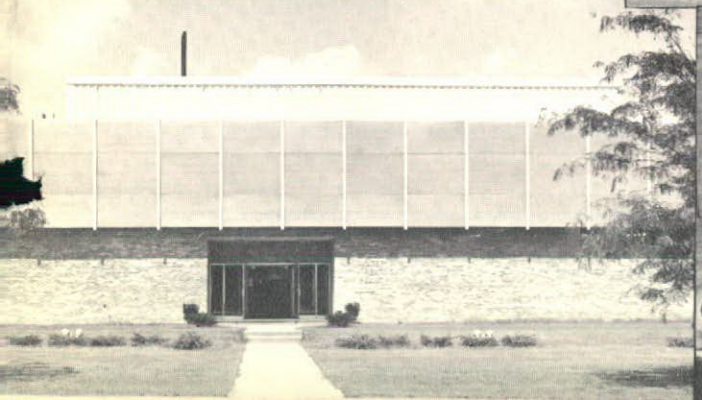


Photographs on this page show work in the sanitary water supply and drainage field including 132″ storm sewer in Illinois, water treatment facilities and elevated storage tank at the University of Iowa, and a sewage treatment plant in northwest Iowa designed for both municipal and industrial waste.

Travaux exécutés en distributions d'eau potable et drainage d'eaux résiduelles, y compris une conduite d'évacuation d'eaux pluviales de 132 pouces (3,35 m.) de diamètre, dans l'Etat d'Illinois; diverses installations hydrotechniques et un réservoir d'eau aérien à l'Université de l'Etat d'Iowa, et une installation de clarification d'eaux résiduelles située dans le nord-ouest de l'Iowa et destinée au traitement des résidus municipaux et industriels.

Las fotografías de esta página muestran trabajos en el area de suministro de agua y desagüe incluyendo un drenage de lluvias de 132″ en Illinois, instalación de tratamiento de agua y tanque elevado de almacenamiento de agua para la Universidad de Iowa y una planta de tratamiento de aguas servidas en el noroeste de Iowa para desagüe municipal e industrial simultaneamente.





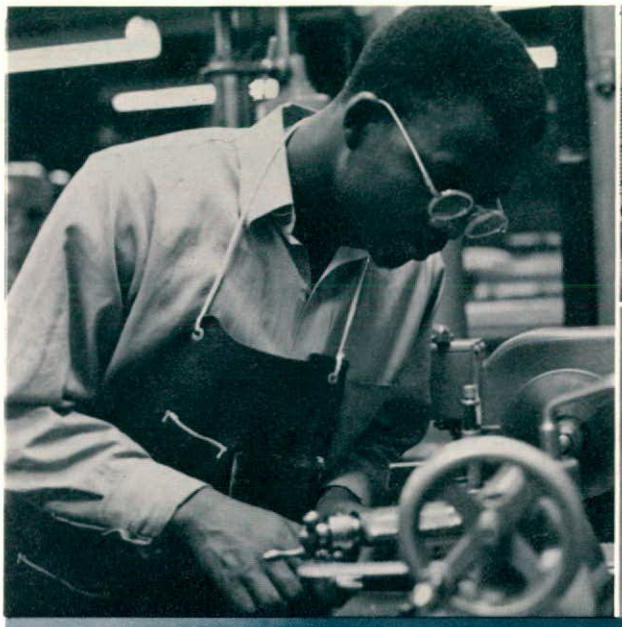
INDUSTRY and MANAGEMENT

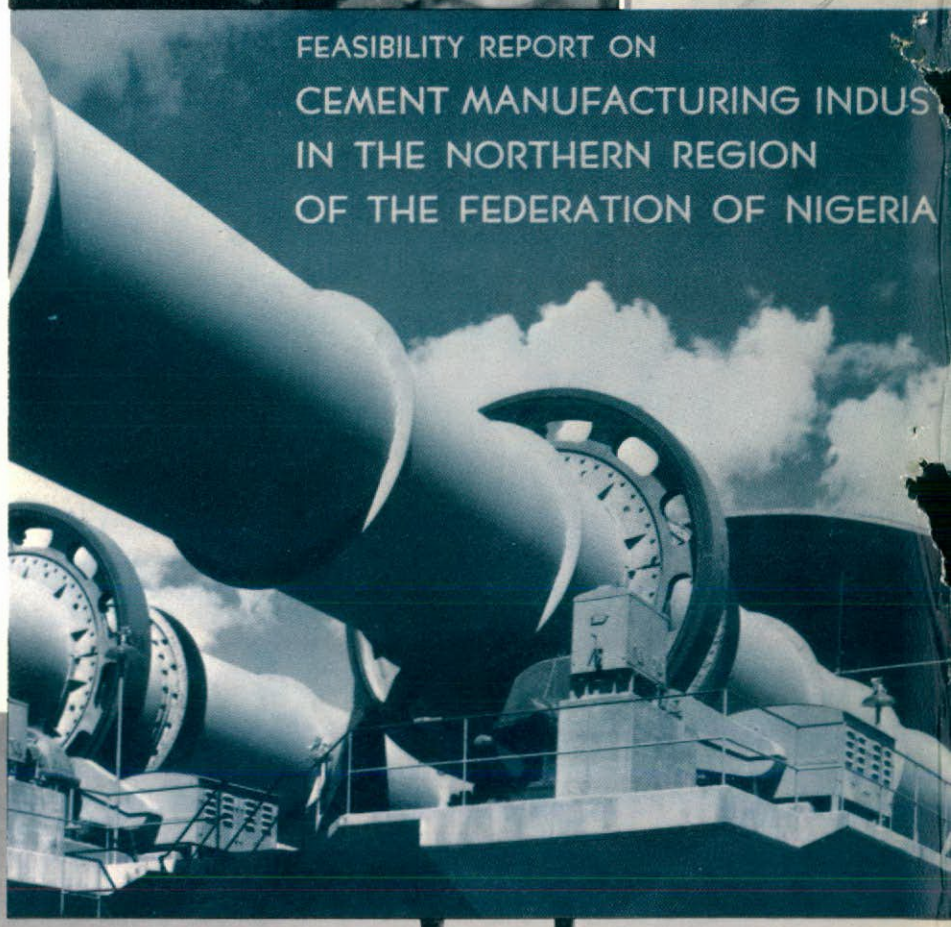
• INDUSTRIE ET ADMINISTRATION
• INDUSTRIA Y ADMINISTRACION

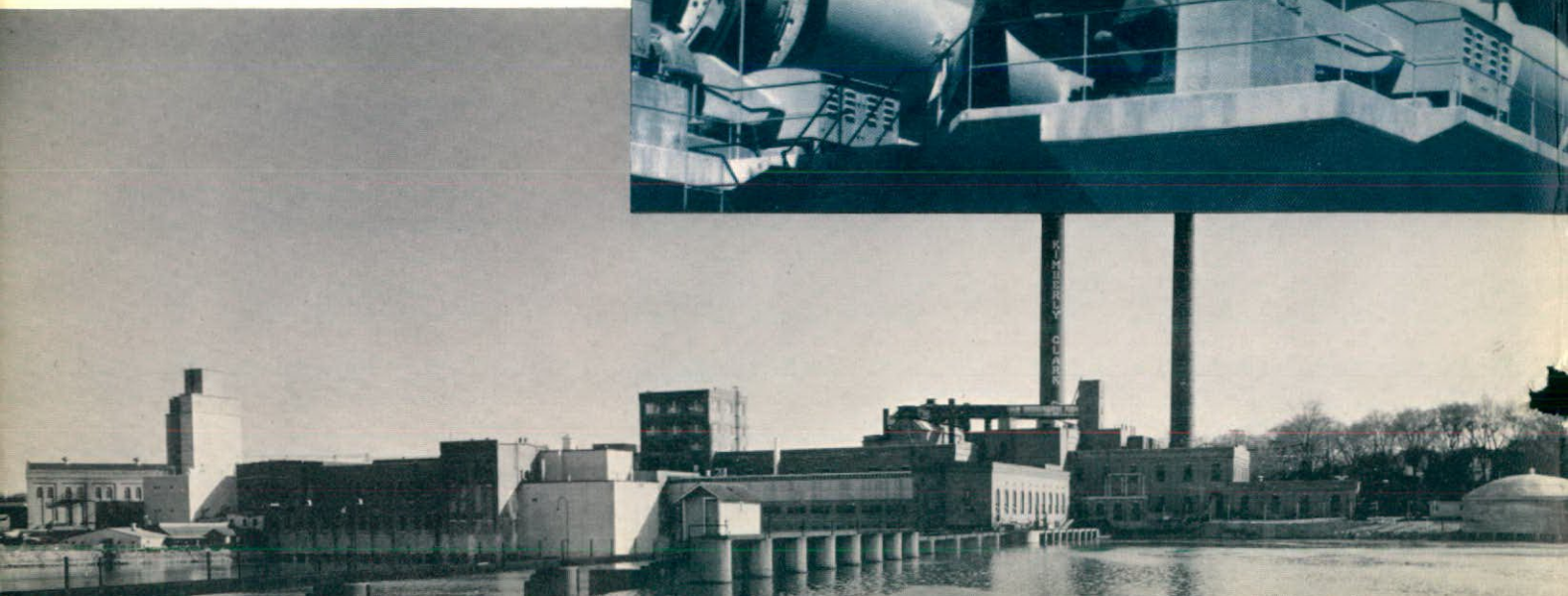
Photographs of work handled in the industrial management field indicate a paper mill in Wisconsin, electrical repair shop in Nigeria, the control room of atomic energy facilities in New Mexico, and a Liberian student engaged in U.S. training for future assignment in his homeland.

Vues de réalisations industrielles: On voit une fabrique de papier dans l'Etat de Wisconsin, USA; un atelier de réparations électriques en Nigérie; la salle de commande d'installations d'énergie atomique dans l'Etat de New Mexico, USA; et un étudiant Libérien en stage de formation aux USA en vue de son affectation future dans sa patrie.

Las fotografías del trabajo realizado en el area de administración industrial comprende una fábrica de papel en Wisconsin, un taller de reparaciones eléctricas en Nigeria, la sala de control de unas instalaciones de energía atómica en Nueva Méjico y un estudiante de Liberia en entrenamiento en Estados Unidos para volver a su país natal.







STANLEY CONSULTANTS, INC

SOME OF OUR CLIENTS

SANITATION AND DRAINAGE

Federal Ministry of Works and Surveys, Nigeria
University College Hospital, Ibadan, Nigeria
The City of Cleveland, Ohio
The City of Downers Grove, Illinois
The Metropolitan Sanitary District of Greater Chicago
The City of Moline, Illinois

ARCHITECTURE

Bank of Monrovia, Liberia
Chase Manhattan Bank
Government of the Republic of Liberia
United States Government:
- Agency for International Development, Liberia/Nigeria/Guinea/Bolivia
- Department of State (Office of Foreign Buildings)
- Corps of Engineers, Omaha District
- General Services Administration, Region 6

The Netherlands Embassy, Liberia
The Federal Republic of Nigeria (Nigerian Airway)
Lutheran Church in America, Liberia
School districts, Muscatine, Durant, Thompson
Protestant Episcopal Mission, Liberia

CITY AND AREA PLANNING

State of Ohio Department of Natural Resources
Scott County Conservation Board
Miami Conservancy District
Area Redevelopment Administration, Scioto County, Ohio
City of East Moline, Illinois
Iowa Development Commission

POWER

Golden Valley Electric Association, Inc., Alaska
Corporacion de Reconstruccion y Fomento del Cuzco, Cuzco, Peru, S.A.
Electricity, Nigeria
Public Utilities Authority, Liberia
Liberia Mining Company, Liberia
Alabama Electric Cooperative, Inc., Andalusia, Alabama
East Kentucky Rural Electric Cooperative, Winchester, Kentucky
The Ets-Hokin Corporation, San Francisco, California

TRANSPORTATION

State Highway Commissions, Iowa and Illinois
The Republic of Bolivia, La Paz, Bolivia, S.A.
Federal Ministry of Transport and Aviation, Nigeria
The Department of Public Works and Utilities, Liberia
Grand Forks Air Force Base, North Dakota
Government of Jamaica, Kingston
Ministry of Maritime Affairs, Government of Bahamas, Nassau
Government of Antigua, St. John's

WATER RESOURCES, FLOOD CONTROL

Department of Public Works and Utilities, Liberia
Ministry of Works of Northern Nigeria, Kaduna, Nigeria
Federal Ministry of Works and Surveys, Nigeria
Corps of Engineers, Omaha District
Corps of Engineers, Rock Island District
Corps of Engineers, Zanesville, Ohio

INDUSTRY

Nuclear

Argonne National Laboratory, Argonne, Illinois
Atomic Energy Commission, Los Alamos, New Mexico

Miscellaneous

Morrison-Shuts Manufacturing Company, Puerto Rico
McDowell Company, Venezuela
Celulosa de Chihuahua, Chihuahua, Mexico
Rockefeller Brothers Fund, Lagos, Nigeria

Petroleum

Mobil Oil Liberia Inc., Monrovia, Liberia
Shell Company of West Africa Limited, Monrovia, Liberia
Texaco Africa Limited, Monrovia, Liberia

Foods

H. J. Heinz Company, Muscatine, Iowa
Morton House Kitchens, Inc., Nebraska City, Nebraska
Standard Brands Incorporated, New York, New York
Wilson & Co., Inc., Chicago, Illinois

Steel

Inland Steel Company, East Chicago, Indiana
Jones & Laughlin Steel Corporation, Cleveland, Ohio
Pittsburgh Steel Company, Monessen, Pennsylvania
Republic Steel Corporation, Cleveland, Ohio

Chemicals, Drugs, and Fertilizers

B. F. Goodrich, Liberia, Inc., Monrovia, Liberia
Eastman Kodak Company, Chicago, Illinois
S. C. Johnson & Son, Inc., Racine, Wisconsin
Monsanto Chemical Company, St. Louis, Missouri
Olin Mathieson Chemical Corporation, East Alton, Illinois
Sterling Drug International, Accra, Ghana
Indian Head Mills, Inc., Aba, Nigeria

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Caterpillar Tractor Co., Peoria, Illinois
Deere & Company, Moline, Illinois
General Electric Company, Cincinnati, Ohio

Paper

Kimberly-Clark Corporation, Neenah, Wisconsin
Riverside Paper Corporation, Appleton, Wisconsin

Electronics and Precision Manufacturing

Collins Radio Company, Cedar Rapids, Iowa
Westclox Division, General Time Corporation, La Salle, Illinois
W. A. Sheaffer Pen Company, Fort Madison, Iowa

MANAGEMENT

Western Region Water Corporation, Ibadan, Nigeria
Public Utilities Authority, Monrovia, Liberia
Precast Concrete Limited, Lagos, Nigeria
Nigeria Manufacturing Company Limited, Lagos, Nigeria

THE STANLEY STORY

HISTORY
Founded 1913—over 50 years of continuous operation.

STAFF
Staff of 350, including many professional disciplines (electrical, mechanical, civil, chemical, industrial, architectural, management, planning).

Language fluency other than English.

EXPERIENCE
More than 4,500 engagements for some 800 industrial, governmental and private clients, averaging 6 engagements per client.

300 overseas engagements.

Work in 38 states in the U.S.A. and 10 foreign countries.

Largest single project $73,000,000. The total construction costs of all projects exceeds $750,000,000.

OFFICES
Home offices - company-owned building in Muscatine, Iowa.

U. S. offices - Cleveland, Chicago and Washington.

Overseas offices - Liberia, Nigeria, Tunisia, Bahamas, Jamaica, Bolivia, Guinea and Kenya with Project offices in several other countries.

FACILITIES
Modern offices and office equipment.

Electronic computer.

Extensive library.

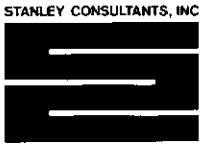
Testing and other engineering equipment.

Survey equipment.

Airplane.

Automobiles and boats.

STANLEY CONSULTANTS, INC



Call on any of our offices for more complete information on our qualifications and experience.

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STANLEY ENGINEERING COMPANY OF AFRICA

P.E.M. Building, P.O. Box 444	Monrovia, Liberia	STANLEY, MONROVIA	22210

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