202/4

PROPOSAL

FOR AN

EMERGENCY OR PERMANENT

RURAL COMMUNITY UTILITY DEVELOPMENT

AND SANITATION PROGRAM

OCTOBER 1975

A JOINT RESEARCH AND DEVELOPMENT PROJECT

OF

INTERTECT
P.O. Box 10502
DALLAS, TEXAS 75207
214/521-8921

TRIDENT ENGINEERING COMPANY
6220 GASTON AVENUE
DALLAS, TEXAS 75214
214/821-0740

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EMERGENCY OR PERMANENT
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BACKGROUND

This proposal is aimed at a multi-phase program (1) to investigate completely the feasibility of having simple water, sewer and electrical systems capable of assisting to provide, protect and improve, the health and welfare of residents of disaster relief camps. The system is adaptable to small rural communities needing general sanitation improvements utilizing simple and economical construction, operation and maintenance, (2) to design the systems if proven feasible in the initial phase, (3) to instruct the local people in their construction of their own utility systems, and (4) to instruct selected individuals in the operation and maintenance of the systems.

The proposed programs envision the design and construction of water, wastewater and electrical systems utilizing locally available material and untrained village labor. The program also make use of the possibility of stage development in instances for emergency disaster relief operations.

Such systems used either in an emergency disaster camp or in a permanent rural community have the capability of preventing or controling water borne diseases while providing for the necessities of life at a very low cost per capita.

WATER SYSTEM

Two water sources may be used in the program depending upon the location of a community, geologic conditions and other factors. The first is a surface supply

such as a river or stream with a continuous or intermittent flow. The second is a sub-surface source either of the well type or spring type.

The surface water system would consist of (1) an intake, (2) a pump, (3) pressure filters, (4) chlorination equipment, (5) elevated storage, and (6) the distribution system. The pressure filters along with the chlorination are the health protecting processes. Figure 1 provides a schematic arrangement of such a system. In some instances it might be necessary to have a plain sedimentation basin ahead of the pressure filters.

The sub-surface water, if potable, would only require pumps and piping to transport the water from the well to a water storage tank for gravity distribution to the "group facility' as described later. Figure 2 gives a schematic of such a system. The pipe would be plastic or native material, whereby it can be easily installed by hand methods and not require sophisticated equipment. Figure 5 gives the general schematic arrangement of the water and other utility systems.

SEWERAGE SYSTEM

Three types of sewage treatment to be considered in the study for possible development and use by emergency disaster camps or permanent rural villages. The selection would be dependent upon (1) the size of the camp or community, (2) the location of the camp or community, and (3) the soil conditions.

The first system to be considered for treatment of the wastewater from the "group facilities" is a submerged biological filter arrangement. The system consists of septic tanks, to collect and treat primary wastes, followed by a submerged biological filter for secondary treatment prior to discharge to a stream. See Figure 3 for a schematic arrangement.

The second system consists of one or more oxidation ponds with or without some form of mechanically induced aeration. A simple oxidation pond system would consist of a single pond treatment prior to the wastewater discharge to a stream or to an irrigation distribution system. The more complex system would be of the "racetract" type powered by a simple mechanical aeration device as shown in Figure 4.

The package type activated sludge plant might be considered for certain communities as a second or third stage of development. This system is not shown but consists of the collection system flow going to a septic tank where initial treatment occurs, to a second treatment unit and then discharged to a waterway or to an irrigation system.

The sewer collection system for any of the treatment methods would consist of plastic gravity flow pipe from the "group facility" to the treatment unit with a minimum of manholes. Such a system could readily be built using only hand equipment, by local labor. Figure 5 gives a general schematic arrangement of such a collection system along with the water and electrical distribution systems.

ELECTRICAL SYSTEM

The electrical generation system required to provide power to pump motors of the system as well as basic lighting for the community can be supplied by small inexpensive electric generations in the range of 2 to 5 K.W. Additional electric generators can be easily added to the system as the community grows. The generators can be run by several types of mechancial power sources, such as internal combustion engines, steam engines, water wheels, windmills or beasts of burden. The selection of the power source will depend on the best economical situation with consideration given to the problems of transporting non local fuels such as gasolene, diesel oil or coal.

GROUP FACILITY

The "group facility" is the heart of the utility systems in providing, protecting and improving sanitation and health of emergency disaster camps or rural communities. Such a unit will economically provide running water and bathroom facilities to all people of a community without requiring facilities to be placed in each house that would normally be overcrowded in emergency camps and often consist of a single room in rural communities.

Installation of water and sewage facilities in each living unit greatly multiplies the cost of providing equal health protection to the community and to the citizens of that community.

The "group facility" could be constructed of local material such as adobe, wood, thatch or concrete blocks. Separate facilities for men and women would be provided and located so that homes will be grouped around the facility.

A typical emergency disaster relief camp site plan with the housing units and other structures placed around the "group facilities" is shown in Figure 6. Examples of actual camp installations without the proposed utility systems are shown in Figure 7.

The men's area in a facility would consist of at least the equivalent of one comode, one shower, two lavatory basins, and two urinals. The women's area in a facility would have at least the equivalent of two comodes, one shower, two lavatory basins, and two wash tubs for laundry operations. Figure 8 gives a typical arrangement of such a facility and if necessary additional laundry tubs could be located outside.

The piping arrangement can be readily located and maintained with the proposed structure. A hose bib can be provided in each area which will allow ready flushing of the entire unit for cleaning purposes. The open, simple construction will allow ready application of pesticides to sanitize the facility.

A program of instruction on use and maintenance of the "group facility" would be necessary to be sure of the proper functioning of the unit and the systems.

In the event of an emergency disaster camp, the "group facility" can be developed in stages starting with a slit trench and tanked water storage with facuets and shower until that "group facility" is constructed and connected to the water and wastewater systems.

STUDY PROPOSAL

The joint venture of the Trident Engineering Comapny and Intertect proposes to carry out the specific study program outlined below to establish the feasibility for emergency disaster relief camps or permanent rural communities to provide water, sewerage, and electrical utilities.

The work schedule attached is for a permanent rural community installation but the results can be readily adapted to the emergency disaster relief refugee camp. It is proposed htat Phase I be funded to yield a feasiblity report prepared on that phase which will be the basis of determining whether or not the other phases are carried out.

Phase I would review in depth the methods possible for providing utility service to a small rural community. Selection of a country in which the study would be performed would be dependent upon a visit to the country and to talk with government officials plus visiting potential study communities and their officials. Data on the people and community would be accumulated and capabilities in each assessed. After on-site visits, alternate preliminary designs will be prepared and analyzed as to feasibility. The feasibility report of Phase I would make recommendations on the future operation of the program.

As now viewed Phase II would consist of three tasks as outlined on the schedule;

PROJECT SCHEDULE

RURAL COMMUNITY UTILITY AND SANITATION PROGRAM

Phase	Task No.	Task Description	Time By Months
			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
I	1	Complete Feasibility Study	
II	1	Community Selection	
	2	System Selection	
	3	System Design	
III	1	Ordering materials	
	2	Construction	
	3	Start up	
IV	1	Operation instruction	
	2	Operational data	
	3	Final Report	

(1) community selection (there could be more than one community to test the feasibility of more than one system), (2) system selection for the specific community and (3) final system design. The design would entail on-site field information collection and the preparation of specific plans and specifications.

Phase III would consist of the securing of all equipment and construction materials. Construction would be accomplished with the labor being furnished by the community citizens, under the supervision of the joint venture representative. Following construction the systems will be started and the operational problems eliminated through an initial period.

Phase IV would consist of on-the-site instruction in the facility use and instruction of those local individuals that would be selected to operate and maintain the system or systems by the village authorities. During part of Phase IV, operational data would be collected to provide the basis of the final report and recommendations on the systems.

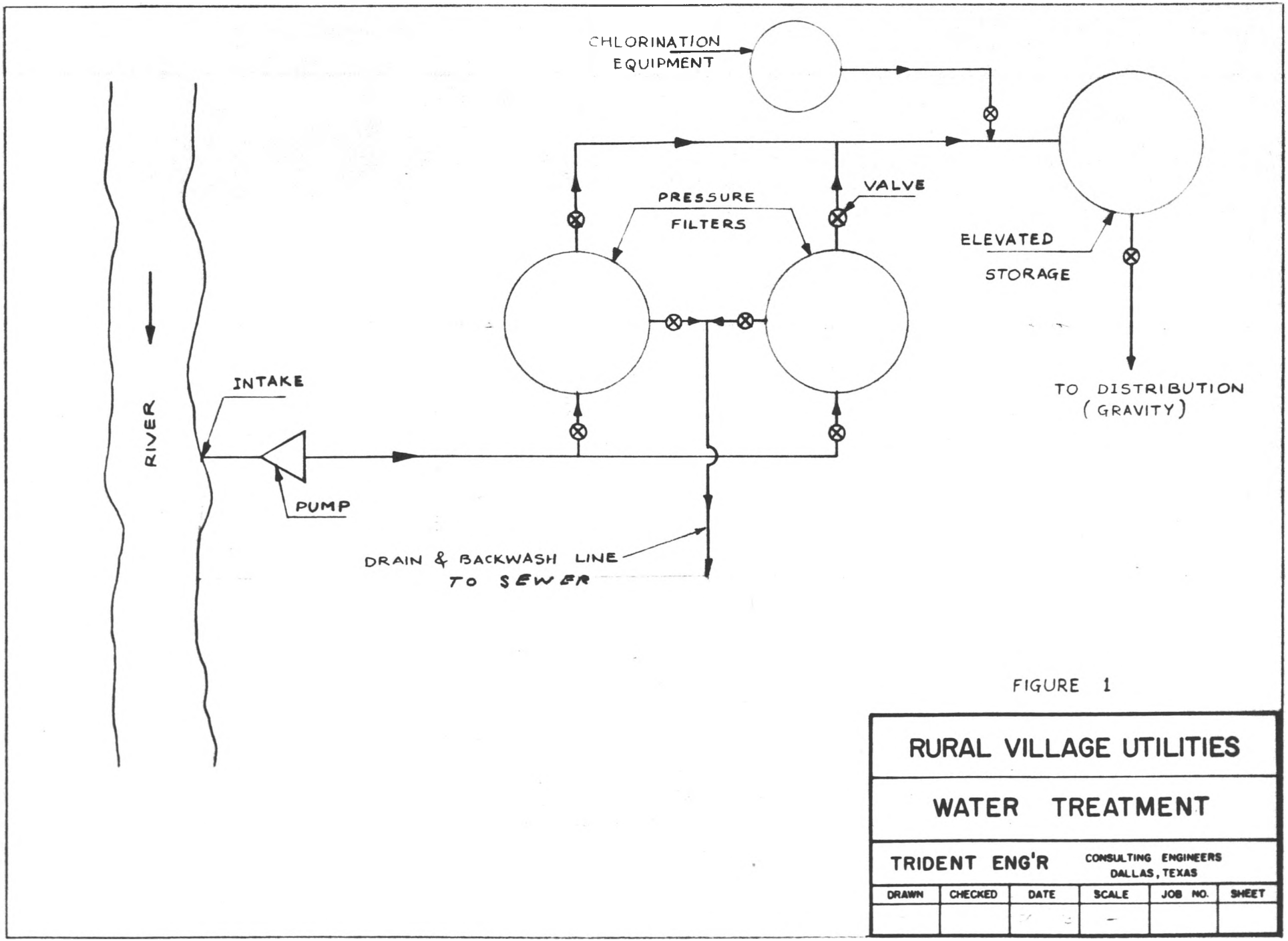


FIGURE 1

RURAL VILLAGE UTILITIES					
WATER TREATMENT					
TRIDENT ENG'R CONSULTING ENGINEERS DALLAS, TEXAS					
DRAWN	CHECKED	DATE	SCALE	JOB NO.	SHEET
			-		

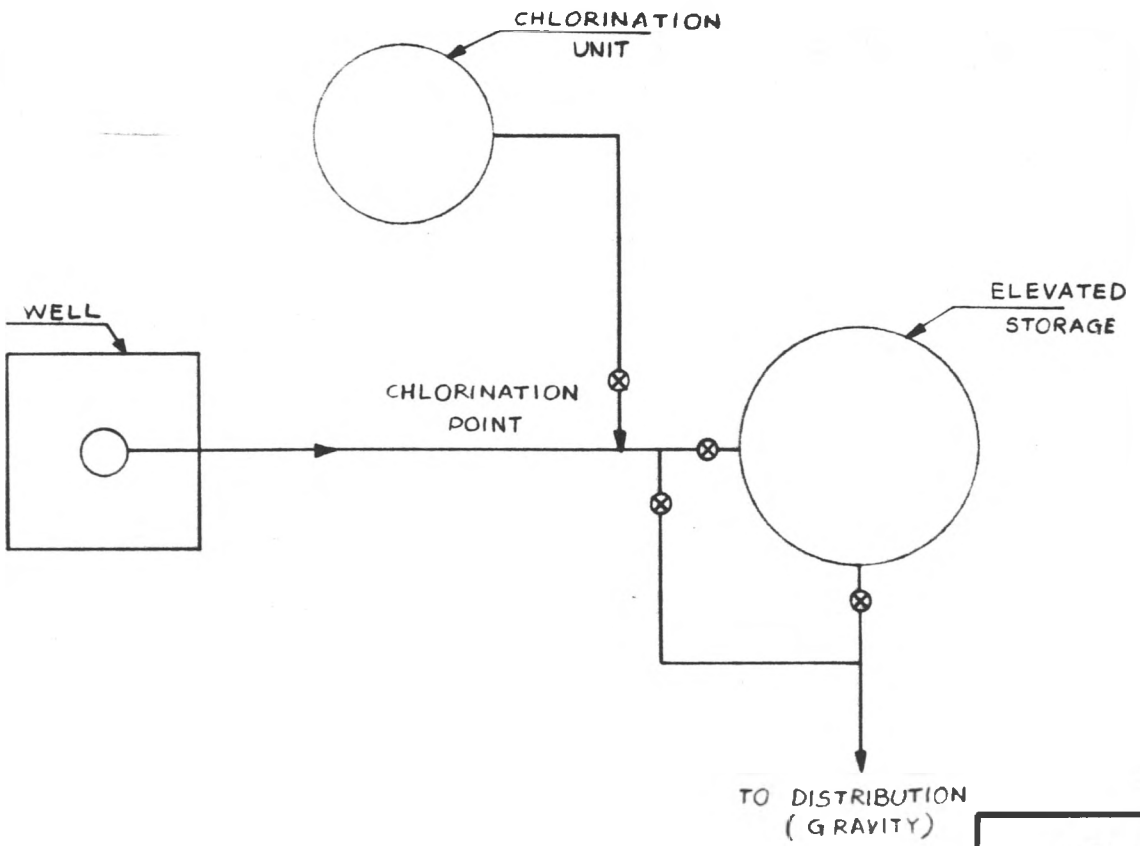
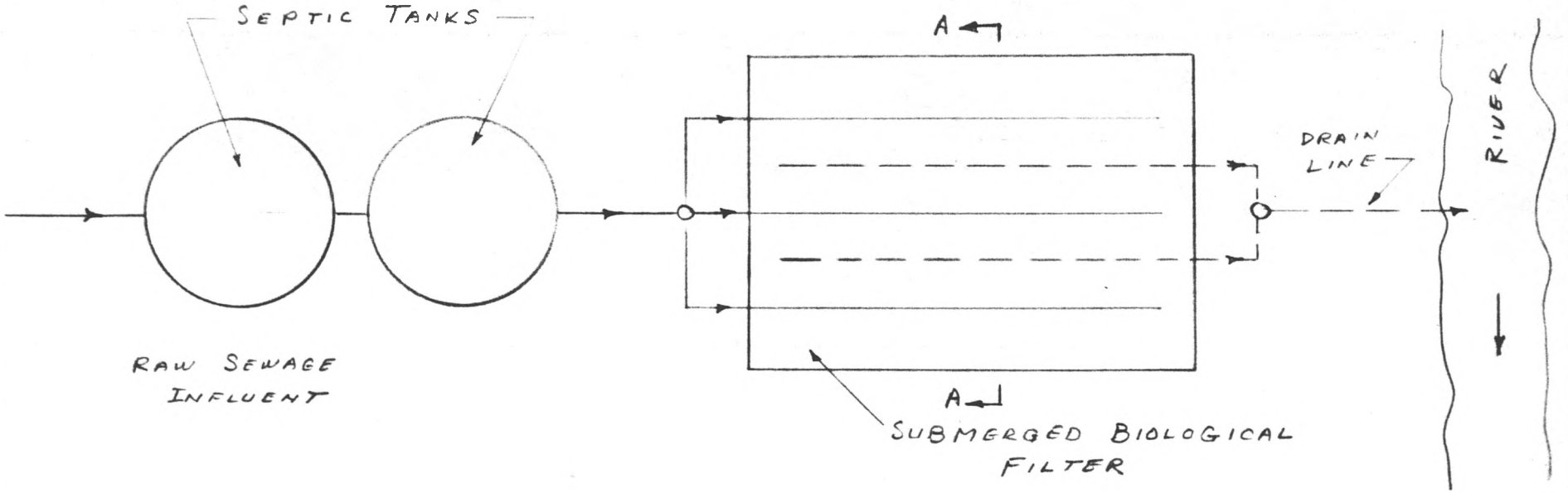
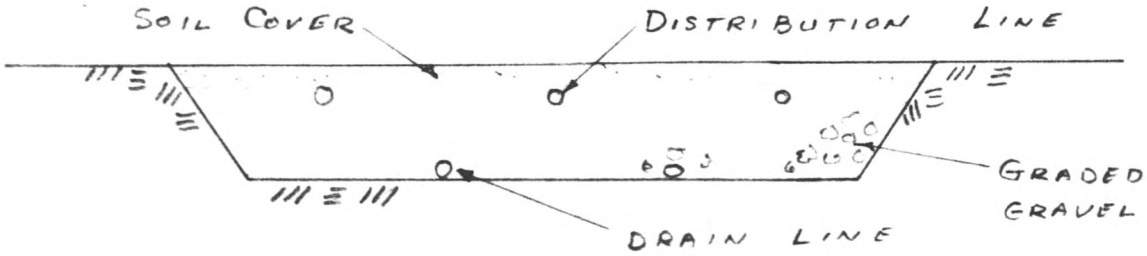


FIGURE 2

RURAL VILLAGE UTILITIES					
GROUND WATER SOURCE					
TRIDENT ENG'R CONSULTING ENGINEERS DALLAS, TEXAS					
DRAWN	CHECKED	DATE	SCALE	JOB NO.	SHEET





SECTION A-A

FIGURE 3

RURAL VILLAGE UTILITIES					
SEWAGE TREATMENT					
TRIDENT ENG'R CONSULTING ENGINEERS DALLAS, TEXAS					
DRAWN	CHECKED	DATE	SCALE	JOB NO	SHEET

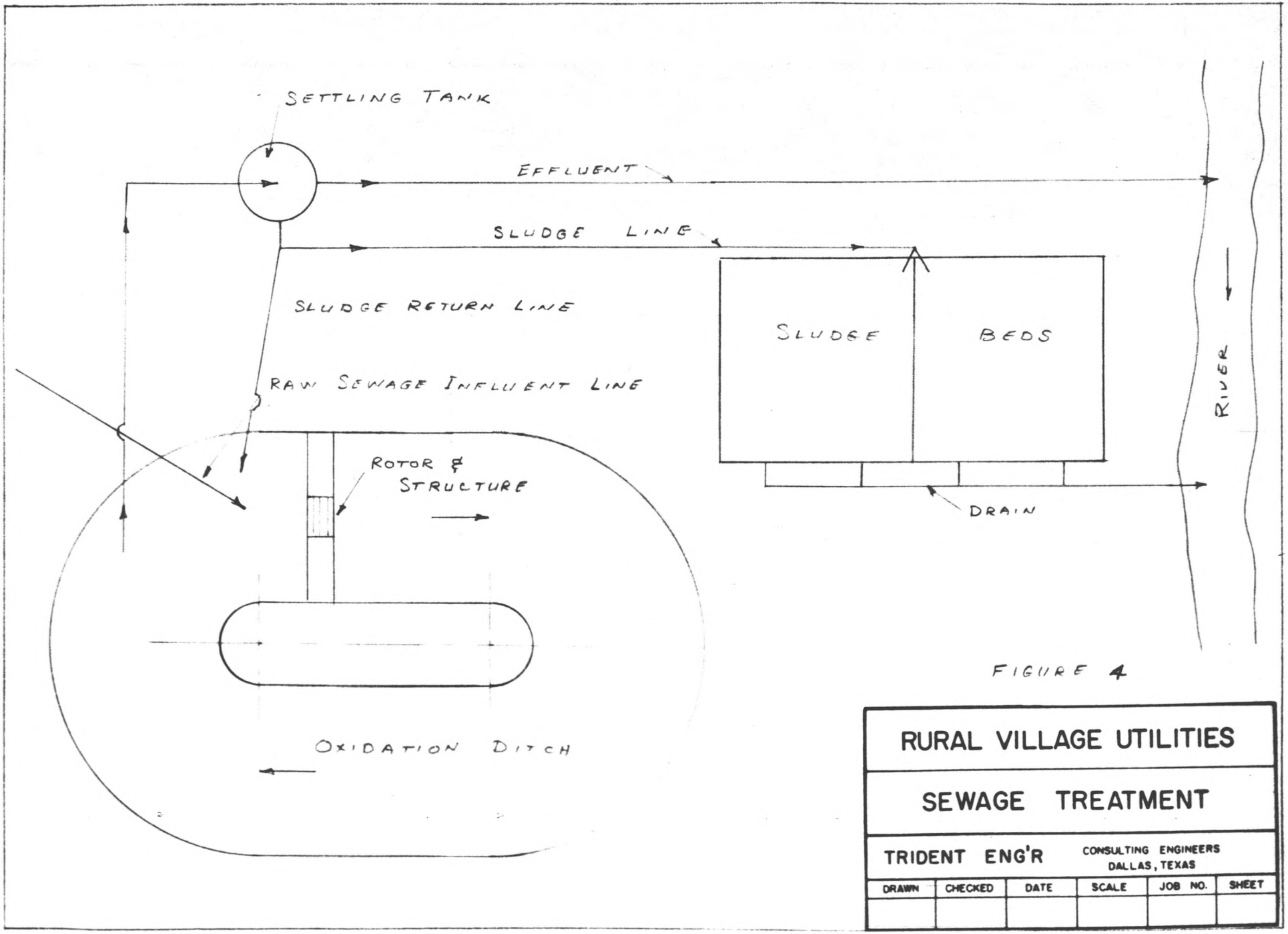


FIGURE 4

RURAL VILLAGE UTILITIES					
SEWAGE TREATMENT					
TRIDENT ENG'R — CONSULTING ENGINEERS DALLAS, TEXAS					
DRAWN	CHECKED	DATE	SCALE	JOB NO.	SHEET

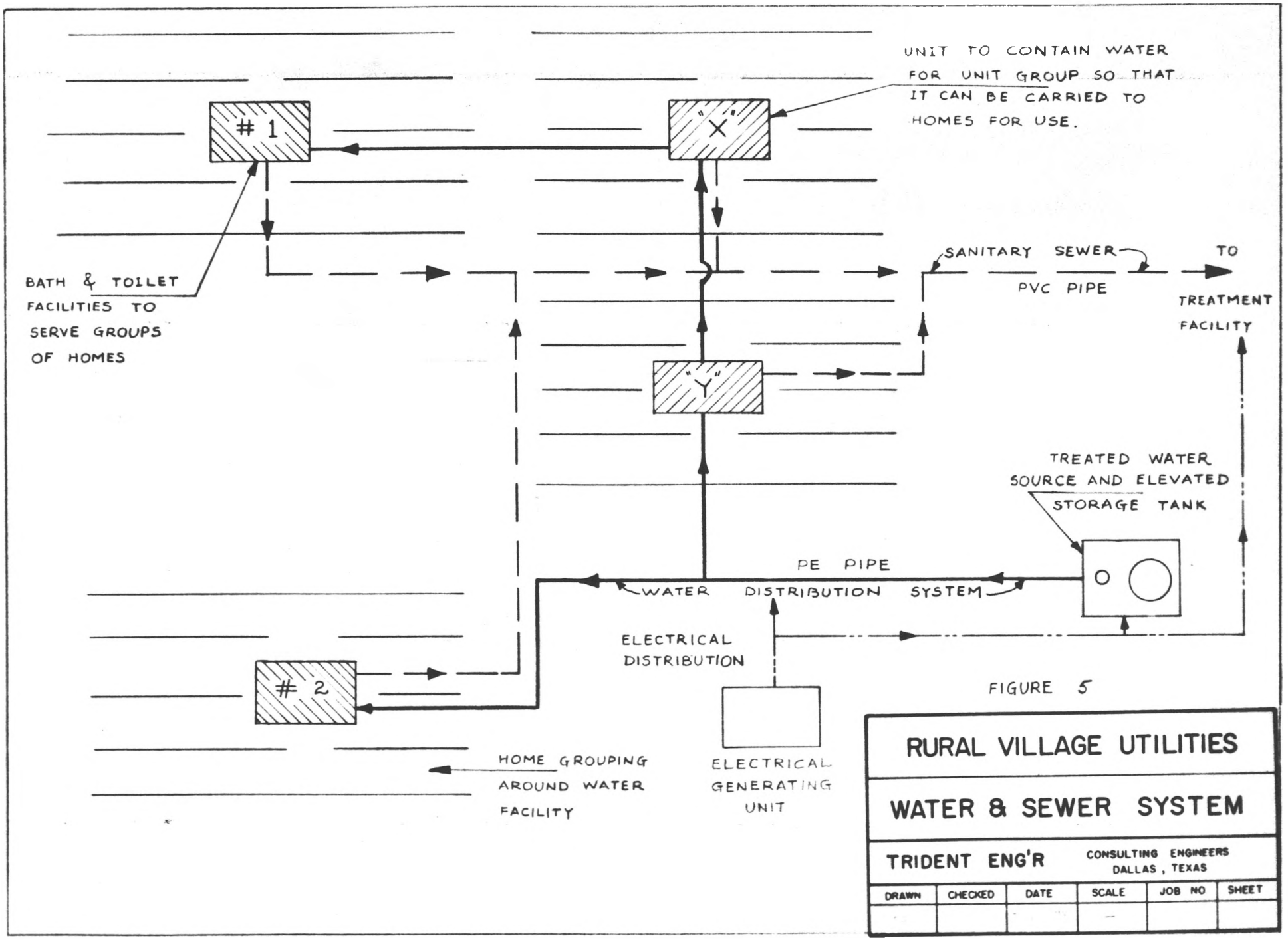


FIGURE 5

RURAL VILLAGE UTILITIES					
WATER & SEWER SYSTEM					
TRIDENT ENG'R CONSULTING ENGINEERS DALLAS, TEXAS					
DRAWN	CHECKED	DATE	SCALE	JOB NO	SHEET
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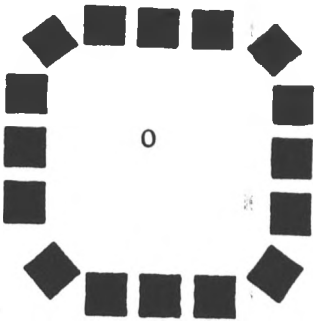
Planning Unit



Site Plan

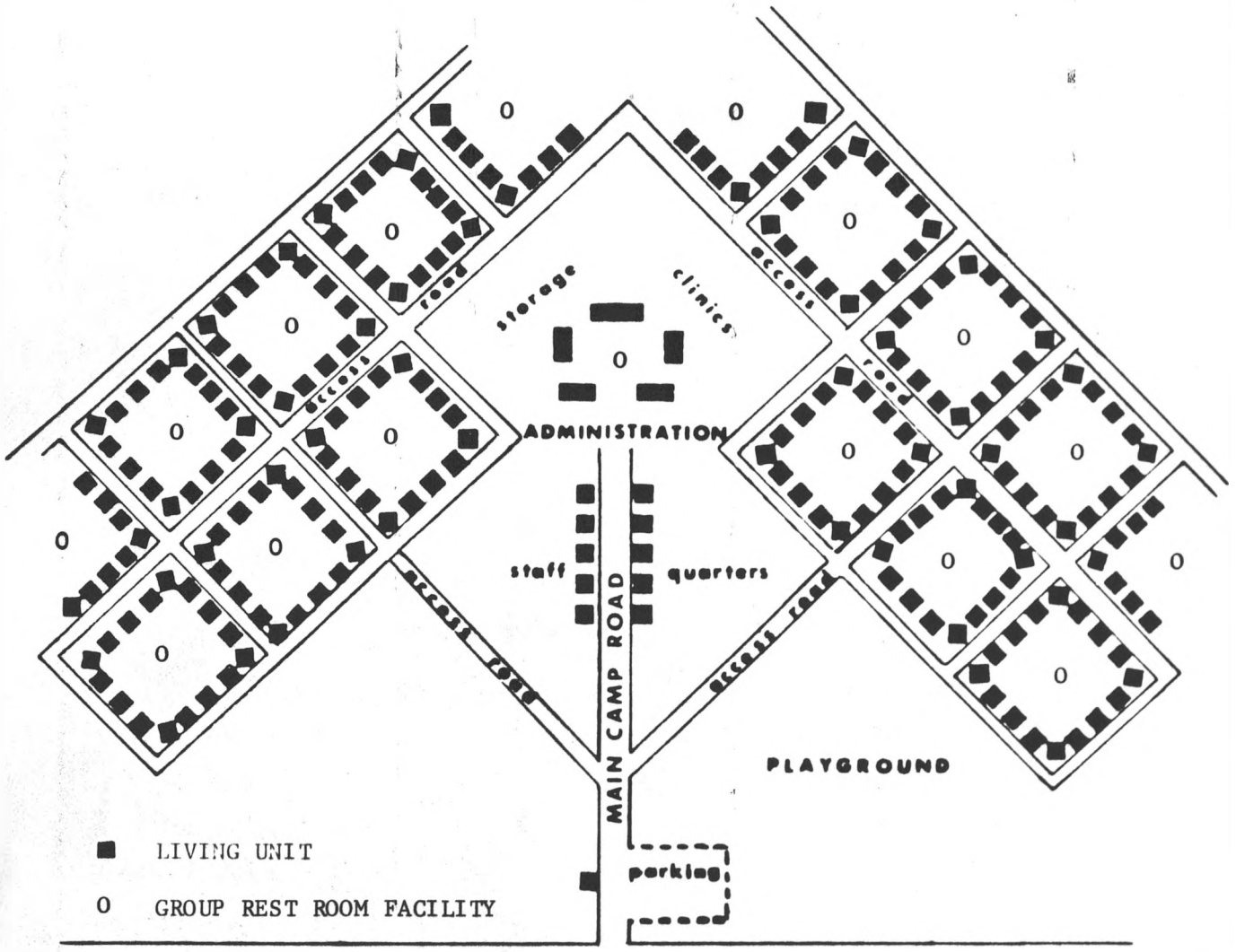
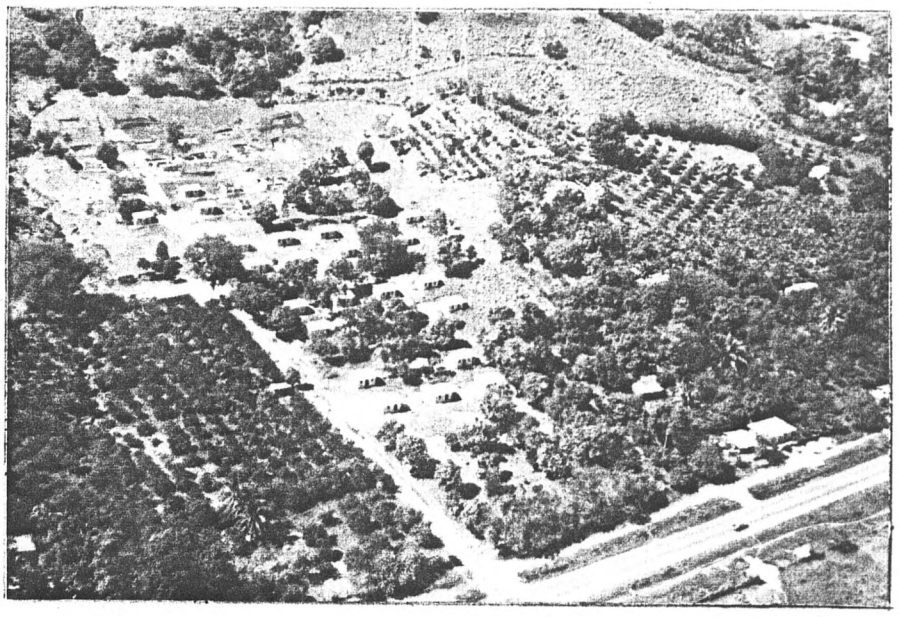


FIGURE 6
TYPICAL SITE PLAN

INTERTECT



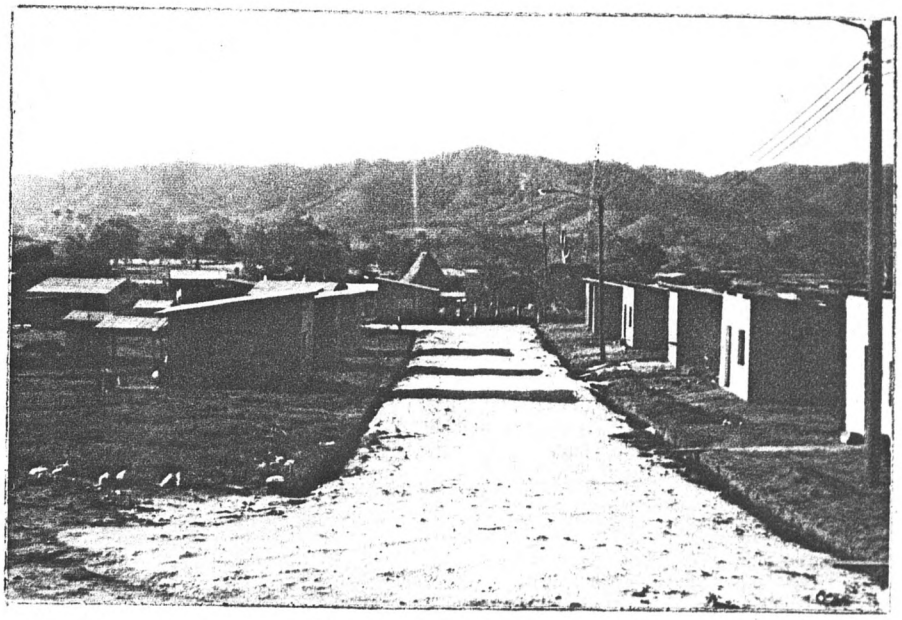


Figure 7

Examples Of INTERTECT Camp Developments

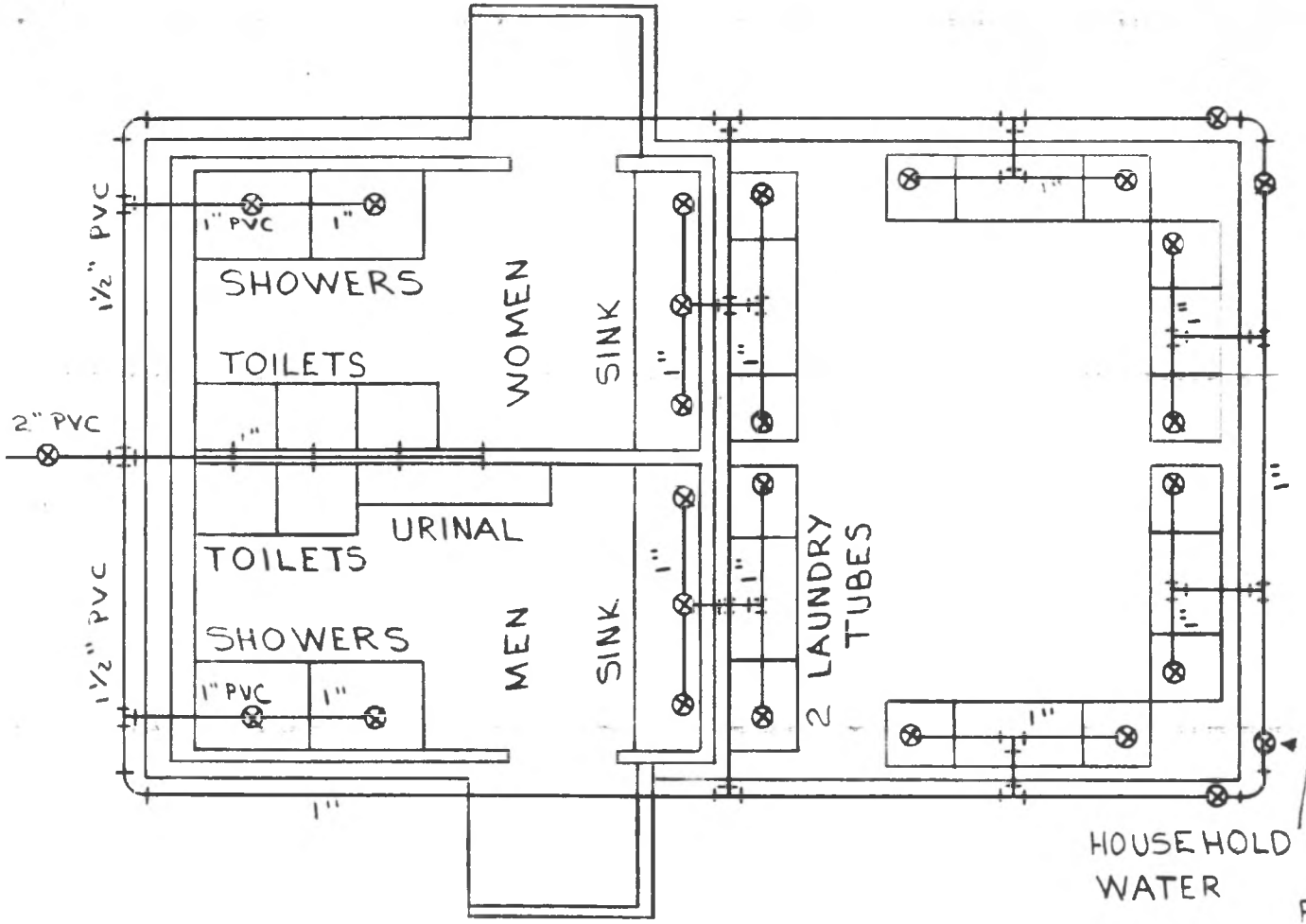


FIGURE 8

RURAL VILLAGE UTILITIES					
GROUP FACILITY					
TRIDENT ENG'R CONSULTING ENGINEERS DALLAS, TEXAS					
DRAWN	CHECKED	DATE	SCALE	JOB NO	SHEET

JOINT VENTURE ORGANIZATION

The joint venture organization is composed of TRIDENT ENGINEERING COMPANY and INTERTECT both based in Dallas, Texas, U.S.A. For each project a manager of the joint venture group is named and the necessary technical staff arranged from the firms.

We are pleased to furnish the following general information on the two firms, their structure and the principals.

TRIDENT ENGINEERING COMPANY.

Trident was founded in 1972 by three civil engineering firms who specialize in certain areas of professional engineering. The firm was created to provide a broader base of services to various clients and between the firms. Fields of civil engineering where service is provided are (1) municipal, (2) water, (3) wastewater, (4) utilities, (5) structural, (6) highways, (7) airports, (8) hydrology, (9) hydraulics, (10) soil stabilization and (11) drainage. All of the prinicpals are licensed professional engineers and recognized in their fields of proficiency.

I. W. Santry, Inc. The firm of I. W. Santry, Inc., was founded in 1968 on the 28 year professional civil engineering experience of I. W. Santry, Jr., P.E., in industry, teaching and consulting.

The firm has had additional professional civil engineers join it since its start, and add their experience in sanitary engineering, drainage and hydraulic engineering.

It is the policy of I. W. Santry, Inc., to provide its clients with high quality personal service by the principals in prosecuting each professional engagement.

The firm has many years of experience in the water, wastewater and municipal fields.

Duval and Associates, Inc., was created in 1970 as a firm concentrating on highways, airports and soil stabilization as based upon the engineering and contracting experience of H. H. Duval in the United States and in Africa, South America and Central America.

Biar, Mayes and Frost, Inc., has been engaged in structural and foundation design work for several years including work on warehouses, all types of buildings, schools and bridges.

Trident Staff Biography. Professor I. W. Santry, Jr., spent two years working at various engineering assignemnts in California following his graduation from the University of California with a bachelor's degree in civil engineering in 1940.

In 1942 he started as an instructor in the civil engineering department at Southern Methodist University, rising to a full professorship and chairman of the department before leaving in 1969. During this time Professor Santry earned a master's degree in civil engineering, worked on and managed several large research projects in the environmental field and devoted considerable time as a consultant to many clients.

The year 1968 found Professor Santry organizing I. W. Santry, Inc., as a consulting firm devoted to sanitary and civil engineering work. Upon leaving Southern Methodist University in 1969, he has devoted most of his time to the business, but found time to contribute to education by serving as adjunct professor of civil engineering at the University of Texas at Arlington, where he has supervised some research in the environmental area, as well as teaching periodically.

Most of Professor Santry's professional experience has been in investigating, analyzing, planning, design and management of water and wastewater facilities, although he has experience in air pollution. Since formation of I. W. Santry, Inc., the firm, under Professor Santry's guidance, has provided professional engineering services on regional sewer and plant planning, biological treatment processes, master planning of sewage treatment plants, stream pollution studies, and special facilities development.

Mr. R. Joe Sewell started his training as an engineer in the cooperative education program at Southern Methodist University, followed by a lectureship while completing his master's degree. After three years in the U.S. Public Health Service Crops as a commissioned officer, he entered industry.

During the year 1965-66, Mr. Sewell served as a field engineer for Can-Tex Industries. In 1966 he joined the faculty at Lamar University as an assistant professor of civil engineering, where he was involved in the environmental engineering program.

September, 1970, found Professor Sewell returning to school at the University of Houston to work on his doctorate and teach sanitary engineering subjects. While at Lamar University he served as a consultant to several clients in the areas of air, water, and sewer investigations and design, and continued some of his consulting while at the University of Houston. During part of the time he participated in an EPA research project of the City of Port Arthur in studying hydrogen sulfide control in sanitary sewers by oxygen injection.

Since June, 1974, Mr. Sewell has been a full-time member of I. W. Santry, Inc., although he has been a stockholder since 1970, where he has assisted with a rural water and wastewater planning effort for the North Central Texas Council of Governments.

Mr. Robert L. Wright, since his graduation in 1969 from Lamar University with a degree in civil engineering, has been involved in infiltration/inflow studies for various clients. In addition, he has been involved in the design of several sewage treatment facilities and sewer lines. During the past two years he has been in charge of the four-county rural water and wastewater plan for the North Central Texas Council of Governments. Also during this time he found time to complete a M.S. in C.E. degree at the University of Texas at Arlington.

Mr. T. H. Gaertner worked for I. W. Santry, Jr., during his last year in school and the period between graduation with a B.S. in C.E. from Southern Methodist University and service in the U. S. Naval Reserve. During this period he worked on statistical analysis of biological data and operation and maintenance manuals for the City of Garland.

Upon return from the service, Mr. Gaertner has worked on the design of water and wastewater treatment facilities and several hydrologic studies and drainage problems, plus completion of his M.S. in C.E. degree at Southern Methodist University.

Mr. Patrick S. Sinex, following graduation in 1972 from the University of Texas at Arlington with a B.S. in architecture, worked for Gordon Sibeck and Associates, where he assisted on the design of a multi-story building for a major retailer, plus the development of construction documents for several major stores. In addition, Mr. Sinex assisted in the design of several shopping centers.

In 1974 Mr. Sinex joined the firm of I. W. Santry, Inc., where he has been working at various drafting assignments, such as wastewater treatment plants, street, storm drainage and architectural rendering.

Mr. H. H. Duval has had twenty-four years of experience since graduation from the Virginia Military Institute in 1951 with a B.S.C.E. degree. He has had experience in the design, supervision, and construction of highways, airports, railroads and industrial plants. Mr. Duval has served as a consultant to several Latin American countries on their highway systems in planning, design and construction. At one time Mr. Duval was the chief civil engineer on a TAMS railroad project in Australia which was to serve an iron ore complex.

Mr. William B. Ellis, a 1951 graduate of the Virginia Military Institute with a degree in civil engineering, has developed twenty-four years of highway experience in numerous capacities. Much of his construction experience was in Arizona for the Bureau of Indian Affairs. Mr. Ellis has also had experience in bridges, specification writing and mining. At the present time he is engaged in the design and construction of a highway in Panama.

Mr. Paul G. Haben's experience has been in highways, drainage, irrigation and fire protection since obtaining his B.S.C.E. from Tri-State College in 1960. He has had seven of the fourteen years in the contracting business. One of his recent assignments was that of construction project engineer on a highway in Guatemala.

Mr. Richard T. Biar has had twenty-three years of structural experience since graduation from the University of Texas in 1951 with a B.S. degree in Architectural Engineering. His experience in structures includes analysis, design, reports, preparation of contract documents, and field supervision for commercial, institutional and industrial projects.

Mr. Jack W. Frost, a 1955 graduate of the United States Military Academy, has had fifteen years of experience involving structural design, feasibility studies, specifications, field supervision and contract administration for industrial, institutional, commercial and governmental projects.

INTERTECT.

Established in 1970, Intertect provides specialized professional services for the preparation of plans and studies related to physical and social problems in relief and refugee situations, urban and area development, administration, and environmental research and design.

Intertect is a organization of architects, engineers and planners who provide specialized services to international organizations, maintaining a competent professional staff and cooperating with internationally renowned organizations and apecialists. The permanent professional staff is assisted by adequate technical and clerical staff. Additional consultants -- outstanding in their fields -- are called in on an associated basis when necessary. This team of experts is brought into action to meet jointly the intericate and complex problems of relief situations with the latest modern techniques.

Intertect has the capability of undertaking a broad range of activities in research and development. The firm has undertaken several major projects individually as well as in cooperation with leading universities and researchers. Recent research has concentrated on refugee camp design, development of ultra low-cost housing systems for emergency use, and maximizing the use of indigenous materials in developing countries. Intertect is currently working on an AID-funded project with Carnegie-Mellon University in Pittsburgh, Pennsylvania, to develop refugee shelters for developing countries.

Frederick C. Cuny is the Executive Director of Intertect. A graduate of the University of Houston and Rice University, Mr. Cuny is a city planner, and in 1971 at the age of 27, he became the youngest registered city planner in Texas.

Mr. Cuny's career has spanned politics (when he was a candidate for the Texas state legislature), civil rights activities, public service, and urban planning and development. In 1969 he participated in a project to facilitate relief to war-torn Nigeria.

In the summer of 1971, Mr. Cuny journeyed to East India to assist in the relief effort for the Bengali refugees from East Pakistan (now Bangladesh). Working with OXFAM, a British organization, he became senior field advisor for planning with responsibility for 22 refugee camps in the Calcutta region. Since that time, he has devoted full time to Intertect and has participated in numerous major relief operations world-wide concentrating on the fields of refugee camp design and construction, relief management, and ultra low-cost housing for the developing countries.

Mr. Cuny was recently appointed Visiting Professor of Engineering at the Carnegie-Mellon University School of Urban and Public Affairs. He is currently acting as consultant to Carnegie-Mellon, with funding from both private and governmental sources, in the research and development of ultra low-cost housing for developing nations; in conjunction with this project, he is laying the groundwork for an international symposium and workshop to he held next year.

In addition to his Intertect activities, Mr. Cuny serves as a planning consultant to various southwestern cities. In this capacity, he has developed the Environmental Design Session -- a comprehensive planning programme that utilizes a combination of gaming techniques, sensitivity sessions and design exercises to determine how the citizens of a community view their city and what programs can be successfully undertaken. His use of the EDS in Victoria, Texas marked the first successful use of gaming techniques in actual comprehensive city planning the United States.

Robert T. Groves is an architect, registered in the State of Texas, and is a member of Intertect. A graduate of Texas Tech University, Mr. Groves' specialties are construction supervision, specifications and contract administration.

Mr. Groves' career has included work with architectural, engineering and planning organizations. Upon graduation from Texas Tech, he was employed by General Dynamics/Ft. Worth Division with architectural and structural responsibility for new construction and rearrangement of areas with existing buildings on General Dynamics' large industrial reservation.

In 1970, Mr. Groves joined the firm of Carter & Burgess, Inc., Engineers and Planners, in Fort Worth, During this period, he worked as a planner handling city and subdivision plans, ruban renewal programs and miscellaneous land planning projects. It was during this period that he first worked with Intertect assisting in the development of site plans for refugee camps in India in 1971.

In 1972, the Dallas firm of Olds, Udstuen & Thompson (now Thompson & Parkey) hired Mr. Groves as a staff architect with responsibility for construction supervision as well as design of their small site projects. During this time, he assisted Intertect in its experimental ultra low-cost housing project with Carnegie-Mellon University (funded by U. S. Agency for International Development) and prepared much of the material for the Housing section of the Intertect Relief Operations Guidebook.

In 1974, Mr. Groves joined Intertect as a part-time staff architect with responsibility for advising on housing, planning and construction. He is currently working with the Dallas County Community College District as construction inspector.

W. Neil Thompson holds a Master of Architecture degree from the University of Pennsylvania.

In 1965-66 Mr. Thompson worked with Louis I. Kahn, Architect, assisting with the design development of the Second Capital Project, Dacca, East Pakistan, and with the coordination of plans for the Salk Institute for Biological Studies, La Jolla, California. In 1966 he joined the School of Architecture, University of Oregon, as assistant professor. There he directed a design studio and organized a course in Environmental Technologies in Architecture (mechanacial, electrical, plumbing, acoustical, lighting and systems intergration).

In 1967 he returned as architect's representative to Louis I, Kahn, Architect. Among his projects, he represented Kahn on the Second Capital Project in Dacca. He supervised the construction, coordinated the mechanical, electrical, structural and communications systems of teh National Assembly Building. He also assisted in the preparation of various stages of schematic, preliminary working drawings, and site supervision of several other facilities of this project. His other projects during this period included the coordination of architectural, mechanical, electrical and structural drawings for the Kimbell Museum in Fort Worth, Texas, and for the theater of the Fort Wayne, Indiana, cultural center.

In 1970 Mr. Thompson joined the U. S. Information Agency as architectural advisor; the first architect ever to be hired by USIA to improve the worldwide facilities, he was responsible for the review, design, construction, renovation, alteration and refurbishing of U. S. information centers, U. S. cultrual centers bi-national centers and related government facilities.

In 1973 Mr. Thompson became Director of Professional Services in the Washington, D.C. office of the architecture/planning/management firm of McCue Boone Tomsick (MBT). This position required extensive contact with government officials and representatives from the private sector both here in the U. S. and abroad, including representing MBT in the Middle East (Iran, Saudi Arabia, Jordan and Lebanon).

Also in 1973, Mr. Thompson joined the Department of Architecture and Planning, Catholic University, Washington, D.C., as assistant professor.