Refugee Camps and Camp Planning
REFUGEE CAMPS & CAMP PLANNING:

REPORT I: CAMP PLANNING
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Appendices:

- Appendix I - Shelter Types
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INTRODUCTION

This report outlines the various stages of development that refugee camps will normally follow during the course of a refugee crisis. The report is divided into three sections, each outlining a particular type of camp that either now exists or may develop. Each type of camp represents a phase in the overall evolution of camp planning and development.

In past situations the first two types of camps, or phases, are the extent of the consideration given by the host country to camps for the refugees, and if the third phase is entered, very little foresight is used, thus increasing the cost of refugee maintenance as well as the socio-political problems which are related. The last section of this report explores concepts of relief based on several assumptions:

1. That the overall problem will not be of short duration and that the refugees may reside in the host country for many years.
2. That for political reasons, the host country will not permit the assimilation of the refugees into that country.
3. That the host country will not want to develop systems wherein the refugees become dependent wholly upon the host country and become a substantial burden on the economy of the nation.

An important facet to remember when dealing with the problems of refugee camps is that when large numbers of people are concentrated in a small geographic area, in effect a camp ceases to be a camp; in actuality it is a town or a small city with all the accompanying problems. Thus development plans for permanent camps should be considered with the same detail as a master plan for a town. It is our belief that if the refugee camp is treated as such and that if the government will undertake a comprehensive refugee relief program, that Phase III camps
such as those conceptualized in the last section of this report can be built and the net effect will be an overall reduction in the long range costs of supporting the refugees.

This report should be utilized to evaluate the particular phase that an existing camp is in and thus, for determining the relative priority permanent site improvements should receive. The report should be used in conjunction with Report II, Camp Improvements, and Report III, Camp Development Programming.

The objective of this study is to suggest alternative solutions and methods to camp Planning by which the functional and human needs of the refugees can be met within a context of political and economic realities.

Much of the material for this report was obtained from field work conducted during the summer of 1971 while the author worked with OXFAM-East India in the refugee camps of West Bengal. (See Locality Map)
THE PHASE I CAMP

Phase I refugee camps are those camps which are set up during the initial influx of refugees across the border and due to the shortage of time, no prior planning has been taken in their establishment. They are considered temporary by the government and receive only emergency items in the way of relief supplies. Despite being considered temporary camps, as long as the refugees come across the border in any number, the Phase I camp will be difficult to close. The Phase I camp is often used as a processing center and may thus be located near a railroad, a major highway, and sometimes an airfield. Due to the rapid expansion of its population and its temporary status, living conditions in the Phase I camp are the worst of all three types.

Physical Characteristics

Site selection for a Phase I camp is usually a matter of determining a proximate site that can be secured for the refugees in a short period of time. Often as not, the site is a tract of government land, sometimes the grounds or court of a public facility. In some cases, Phase I camps are built at a spot where a large group of refugees simply quit moving and a relief agency began distributing supplies.

Due to the indiscriminant selection of the site, the majority of the camps are extremely poorly located. Many are subject to complete inundation during heavy rains, and others are subject to excessive standing water due to the lack of adequate drainage. In extreme cases, some camps which have been built in low lying areas during the dry season, are completely flooded during the monsoon and have been rendered completely useless as camps soon after the first rains. (An example is the "Brick Factory" Camp near Barasat, West Bengal)

A Phase I camp may also be socially or politically situated in a poor site. Camps which have been built on government lands near or in a city bring a variety of problems to the administrator. Refugees seeking to enter the local labor
force will lower the wage scale of the surrounding community. In the eyes of the local residents, the refugees seem to receive better, or free, services from the government than the locals. This, plus the normal tension that accompanies the refugees, may combine to precipitate a series of incidents between the refugees and the residents of the locality.

Most Phase I camps are within a few miles of the border and thus may be subject to shelling as a result of nearby military action.

Site development in a Phase I camp is again limited by the site selection. Due to the fact that no one knows the ultimate size of the camp population, or how long the influx of people will last, the sites are usually too small to handle the number of people living in camp. The lack of adequate expansion room forces the camp administration to increase the density of the camp to the maximum and correspondingly and without intention, proportionately increase the incidence of adverse living conditions.

Housing is usually of a temporary variety and thus subject to rapid deterioration. One camp will usually have a mixture of shelter types ranging from permanent concrete structures temporarily occupied by the refugees, through tents, down to the "D" structures* (or "doghouses" as they are sometimes called) made of thatch and reeds. Very few, if any, have durable roofing or floors and they are usually subject to interior flooding during even average rains. The "D" structure is the worst possible type of structure for this type of camp for it forces the people to live in extremely close quarters at the same time making access difficult and thus, in effect hiding the sick from the medical staff. The placement of the housing is also scattered in both location and dimension thus inhibiting the development of circulation systems.

Drainage in the Phase I camp is virtually non-existent. It may utilize the natural drainage of the land, or in some cases, a drainage system already

* Appendix 1
in existence. This is due to the lack of time and manpower to plan and develop an adequate drain system. Also, as previously mentioned, often the site cannot be adequately drained without undertaking major construction and/or without the use of heavy equipment. The resulting lack of runoff allows water to constantly stand in the vicinity of the shelters and increases the probability and instances of water-borne diseases.

Sanitation is the Phase I camp is also nil. Due to the camp's usual lack of expansion room, latrines and waste disposal functions are located immediately adjacent to the camp and often in the core areas. During the rainy seasons, the latrines which are of temporary construction and are usually open, overflow and are difficult to service (if serviced at all), and therefore see decreasing use by the refugees. As fewer and fewer refugees use the facilities, a major health problem evolves as the amount of exposed excreta increases. During the later stages of the Phase I camp's use, temporary septic tanks may be installed.

Some power utility may be available at a Phase I camp during the early stages of occupation but only for permanent structures. In some cases, generators are in use and sometimes nearby powerlines have been jumped for use. In later stages however, any power which was originally available has quickly deteriorated and is unattainable for further use.

Due to the pattern of expansion in a Phase I camp, relief services are poorly located and not central to the camp layout. While this is not desirable, usually the physical size of the camp is small enough that the location of services is relatively unimportant. If however, it is decided to administer several proximate camps from a central location, few of the refugees will receive adequate services.*

* It has been observed that refugees living over 200 meters from a distribution center will rarely utilize the facilities.
The Refugees

The refugee residents of the Phase I camp are residing in the camp during their most crucial period as refugees. As the camps are set up during the initial stages of the refugee influx, the refugees who enter the camps are in deteriorated physical and emotional state. Many have trekked long distances to escape, many have lost relatives and friends only recently, and large numbers have been witness or subjected to atrocities. Thus, a substantial portion of the camp will be in a state of shock and complete disorientation when they arrive.

A major problem among Phase I camp occupants is disease. Their general health status has already been worn down by the trip to the camp and as the distribution of services cannot initially cope with the number of people, the incidence of disease increases at a rate which cannot be countered by the camp administration. The situation is further aggravated by the condition of the physical site. Because of the combined adverse conditions of the refugees and the site, the length of time necessary for the emotional recovery of the residents is substantially increased, thus further inhibiting administration and delivery of relief services.

Due to the shock and disorientation, plus the added uncertainty as to how long they will be in the camp, the refugees will have very little cohesiveness and will seem to be extremely apathetic, often to the point of having no regard for even the simplest personal sanitation or health measures. Camp administrators will have an extremely difficult time enlisting refugees for any self help projects or for recruitment into a refugee labor force. Even simple assignments such as developing a leader in each shelter to report on food or medical needs, will be difficult to carry out.
Example

An example of a Phase I camp is the Barasat Prison Compound Camp located in the city of Barasat, West Bengal. The camp is built on the grounds of a prison compound and has variously contained a refugee population of 17,000 or more refugees. The site is adjacent both to the Eastern Railroad and the Jessore Road and was initially set up to provide a service center for the refugees streaming toward Calcutta. The site belonged to the government and was thus easy to acquire for use as a camp.

The shelter consists of several hundred very small "D" structures built on the walkways which separate the rice paddies of the old prison grounds, several thatch and canvas covered "A" structures, and one concrete permanent building occupied by the refugees during the initial influx into the camp.

Drainage in the camp consists of one concrete drain which takes run-off from the main prison building, one drainage lateral which follows the natural drainage of the rice paddies, and two drainage ditches which carry water out of the main area to a depression adjacent to the railroad tracks which in turn carries water out of the camp entirely. As no point in the camp is more than one foot higher than another, very little water moves off quickly and during heavy rains the entire area is subject to flooding, sometimes up to two feet deep. Even in the vicinity of the dispensary, patients often wait hours in water up to their ankles for an examination by the doctors.

Sanitation consists of five open slit-trench latrines, all of which flood after a major rain. Two of the latrines are adjacent to a lake which is used for bathing by the refugees. The three remaining latrines are located in a low area, over 75 meters from the nearest housing shelters. Due to the high water table, the sumps for standard latrines will fill with water at a depth of less than two feet below the surface.
Administration of the camp is extremely difficult. Refugees come and go at will and it is impossible to keep refugees from joining the local populace and vice-versa. Due to the proximity of the camp to the central part of the city of Barasat, there is a constant strained relationship between the townspeople and the refugees and in several instances, full scale riots have broken out.

There have been no major physical improvements to the camp but in all fairness to the camp commandant, it should be pointed out that the camp has been periodically scheduled for closing, thus equipment and financial commitments to the camp have not received a priority.

Relief services consist of an outpatient clinic and dispensary and milk and rice distribution. Recently a cooking center has been built for preparation of CSM*. Sanitation teams from the Social Welfare Society-OXFAM also have been provided. Due to the number of people, and the inadequacy of the permanent staff, the relief operations can only be described at best as a holding action.

* CSM is a high protein diet consisting of cornmeal, soybean oil, and milk.
THE PHASE II CAMP

A Phase II camp refers to those camps which are set up with limited planning and are designed to be semi-permanent (no immediate closing is foreseen). The camps are usually in much better physical shape than the Phase I camp for usually the authorities have had time to both realize the magnitude to the refugee problem and to learn from the initial mistakes of the Phase I camps. The major difference in the overall site is the willingness by both the government and the relief organizations to commit permanent as well as semi-permanent items to camp development. These items include such articles as roofing materials, field hospitals, etc. In some cases the government will commit a major governmental property for use by the refugees as a camp. In most cases, the camp is built for a predetermined or maximum number of refugees.

Physical Characteristics

Some thought has usually been given to the site selection for a Phase II camp. In most instances the government has converted a large area such as a school or an abandoned or inactive military installation to refugee use. Because the site has previously been used for other large activities it usually will be above local flood levels and will offer room for expansion of the relief facilities. Increasingly, Phase II camps are located away from resident populations concentrations and are politically more acceptable to the nearby community.

Limited planning for the camp will be carried out by a variety of agencies usually under the supervision of the local Block Development Officer (BDO). The camp commandant is under the command of the BDO and rarely participates in the decisions regarding the physical development of the camp. Items which are installed in the camp are generally supplied by a combination of the government and the relief organizations. Minor construction items are often available
(such as brick, pipe, etc.) and continuous work is carried out in the improve-
ment of the site, especially the drainage and the housing. In most cases, 
technical assistance is available from professionals on the staff of the local 
administrative echelon but only rarely is this assistance provided on a regular 
daily basis.

The use of heavy equipment for camp development and improvements is limi-
ted but usually engineering items such as transits (dummy-levels) can be ob-
tained for use in the camps.

There is usually room for some expansion within the boundaries of the 
Phase II camp though movement away from the initial encampment increases the 
possibility of developing in areas subject to flooding. As the camps move 
outward from the initial site, the ability to deliver services decreases un-
less the administrative center continually relocates to the geographic center 
of the camp.

In general, the complete site of a Phase II camp is fairly large, in some 
cases reaching a half mile in length. In some cases the camp consists of a 
main camp with several smaller sites used only for shelter purposes, being 
developed on adjacent or nearby lands. The successful administration of the 
Phase II camp which is developed on a series of sites will depend on the 
establishment of an adequate circulation system and/or the decentralization 
of relief and administrative activities.

Housing types in the Phase II camp consist of a mixture of permanent and 
semi-permanent structures. Shelters of a standard design begin to appear and 
various building techniques begin to evolve. The most common type of structure 
is the "A" shelter. As relief supplies increase, these will receive semi-per-
manent roofing materials (polythene, rubber, and fiberglass) and the residents 
will make improvements to floors and walls. While housing types are adequate
in size, it should be remembered that these structures are extremely flammable during the dry season and pose a major threat to the safety of the occupants during this time.

Because the shelter designs are somewhat standardized, they can be located or grouped together in patterns which will enable development of circulation and drainage systems. Furthermore, the decision as to the type of shelter to be utilized permits further planning for the ultimate design capacity of the camp and its needed systems. In other words, by knowing the standard size and space requirements of the shelter, the camp planners can determine the ultimate number of people that can occupy the camp, the size and location of the drainage system, the extent to which latrines will be necessary, and the number of water wells that must be built.

Drainage in the Phase II camp is usually good in the main camp area but deteriorates in quality as distance increases from the main activity center of the camp. In most cases the system will handle average rains as long as final drains take the water to flowing streams. Maintenance of the system usually improves with time; however, because portions of the unimproved canals can easily collapse or silt, standing water after any rain is common.

Sanitation in the Phase II camp is generally fair depending on the height of the water table and on the length of time the camp has been occupied. Semi-permanent or permanent septic tanks and latrines have been installed in various camps and as equipment and materials become more available, will be installed with greater frequency. Relief organizations are willing to commit sanitation items to Phase II camps and refugees or contract labor can be retained to install and service them.

Power supply is increasingly available to Phase II camps and is usually a bureaucratic matter rather than an engineering item. In most cases, utility
lines are not only adjacent to the site, but lines and/or fixtures are scattered throughout the camp and can easily be activated. Long delays have been noted in getting the power turned on but more and more Phase II camps have at a minimum electricity for administrative and medical areas and in some cases the entire main camp.

In summary, Phase II camp site conditions are fair and further camp development is dependent on the continued material support of relief organizations and the availability of heavy equipment and increasing technical assistance.

The Refugees

The emotional state of the refugees is much improved over that of the occupants of the Phase I camps and the conditions within the camps are generally more conducive to emotional recovery. The stability of the Phase II camp provides the people time to readjust to their new surroundings without the fear of being immediately relocated. As time passes new associations between the refugees develop to replace family ties which have been severed and an infant cohesiveness among people living in the same vicinity. During the early stages of occupation this can be capitalized on by the camp administration to involve the refugees in work parties for site improvements. (Efforts at organization in a Phase II camp should be concentrated during the early stages of camp occupancy, otherwise the refugees will become obstinate and passive; i.e., the longer the refugees remain idle, the harder it will be to activate them.) This availability of labor is one of the main factors which will enable Phase II camps to improve and is the main social difference between Phase II and Phase I camps. Refugee organization thus becomes a major function of the Phase II camp administrator and his staff.

The general health characteristics of the refugees are also enhanced by the better condition of the camp. While many sick and hungry will still be assigned
to the Phase II camp, the better organization and administration will enable them to receive treatment much faster. The openness of the later types of shelter also facilitate the identification of patients who are unable to receive medical care from the dispensary. In most Phase II camps, at least limited attempts are made by the medical teams to visit each shelter on a regular basis, however, this is determined on the availability of medical staff.

While the incidence of disease is usually lower in the Phase II camp, the possibility of a contagious disease or epidemic is always present especially among newly arriving refugees. For this reason, the social organization of the camp should include establishment of a reporting system among the refugees to identify the sick to the staff as soon as they become sick.

Example

The Bonipur Relief Camp occupies the inactive site of the Physical Training College approximately three miles from the city of Habra in West Bengal. The camp contains almost 18,000 refugees who were both sent to the camp directly from the refugee route two miles away (the Jessore Road) or were relocated from Phase I camps in other nearby areas.

The camp was developed in two stages; during the first, refugees occupied a series of buildings burned out earlier by an attack by the Naxilites, and during the second, a series of "A" and "B" shelters were developed, the latter with canvas tarpaulin roofing.

Initial planning was fair but during a peak influx of refugees a satellite sector of the camp developed, approximately 2,000 feet from the center of the main camp and in an area not only subject to flooding due to its location in a low-lying area, but also because of its proximity to a nearby river. Except for the housing types ("A" structures) the satellite area resembles a small Phase I camp.
Planning for Bonipur has been conducted under the overall supervision of the Mayor 300 and his engineer. Limited planning assistance has been provided by OXFAM and materials have been jointly supplied by the government and the Social Welfare Society-OXFAM. A resident engineer was provided for two months by the Ghandi Peace Foundation.

Major construction items in the camp have included the development of a drainage system for the main camp, the installation of an experimental septic tank, the construction of various concrete and brick latrines, installation of, and improvements to, a series of water wells and construction of a cooking center. Housing construction has been standardized around the "A" and "B" shelters and various roofing materials have been utilized including Polythene, rubber stripping, canvas tarpaulins, and fiberglass. In the second sector, however, very little activities have occurred and a drainage system has not been developed.
A Phase III refugee camp is a large scale permanent camp set up to maximize control and administration, reduce overall costs, and to facilitate the delivery of relief services. The Phase III camp is usually set up during the last stages of the refugee crossing and after the major influx has subsided. The principal characteristics are that considerable advance planning has been undertaken and a comprehensive master plan for the camp has been developed before the refugees begin occupying the site. The critical element in the development of a Phase III camp is the ability of construction and administration to keep ahead of the resettlement of the refugees to the camp. Resources for balanced delivery of services, adequate drainage, shelter, and sanitation must be committed early in the development stages. If occupancy outruns production, the overwhelming masses of people will multiply the adverse factors in the camp and create situations which will be difficult to overcome and will increase such things as the incidence of disease, etc. Indeed, the government must often be ruthless in the assignment of refugees to such a camp and often deny many entry until the camp is sufficiently under construction.

To date, there are only a few Phase III camps and these have already begun to break down due to the inability of the government to control the number of people entering the camps.

The following discussion represents the characteristics of a Phase III camp that has been adequately designed and controlled.

Physical Characteristics

The site for a Phase III camp is a large tract of land which is generally undeveloped and is fairly independent of nearby communities. The selection was made at the highest levels of the government with a realization that a major camp would be necessary to accommodate large numbers of new people and still be able to serve as a center for handling refugees from smaller camps that had to
be closed. Site selection considered drainage, climate, rainfall, proximity to populated areas, and political considerations. In the later stages of the refugee situation, Phase III camps may be located in less densely populated areas of the country, often quite a distance from the border.

Site development is good and a long-range master plan has been developed with an ultimate design capacity in mind. Construction, usually under the supervision of an army engineer, is planned in phases and site improvements are programmed to coincide with occupancy schedules. There is adequate room to expand on the campsite and often there is an attempt to build modules or units of the camp and preserve less desirable areas until other resources have been used. Constant improvements are scheduled and basic amenities of urban communities are recognized as necessities.

The master plan has provided a complimentary network of circulation systems and drainage systems and has been designed to facilitate sanitation in the camp. Though in many cases the site may not have good natural drainage, the drainage system is permanent in construction and utilizes standard sizes of sub-systems (canals, laterals, etc.). This drainage system can adequately drain the camp even during peak rainfall periods. Constant improvements and maintenance are carried out on the system.

The camp has been designed around a sanitation plan and latrines and waste disposal facilities are within easy reach of all occupants. Permanent and semi-permanent septic tanks are installed and regularly serviced. A sanitation regimen is enforced and there is an early effort on the part of the camp administrator to teach sanitation and hygiene discipline to the refugees. An extensive fly-proofing campaign is carried out. Water and refuse are adequately separated.

Basic utilities such as water and power are provided with improvements cons-
ently upgrading the systems. Centralized water purification has been deve-
loped and electricity is available in every sector of the camp and possibly
to the shelters.

Housing construction in the Phase III camp has been standardized and
at a minimum, roofing is of permanent or semi-permanent construction. New
housing types are developed which take into consideration the life-styles of
the refugee occupants and housing groups are located to further assist the
people in developing a camp routine. The standardization of housing shelters
also facilitates the development of the camp road and circulation system.

One of the major facets of a Phase III camp is the balance of centralized
e-■centalicod services and administration. Central administrative centers
are designated wherein overall operations are conducted but small service areas
for food distribution, medical care, etc. are scattered at various locations
throughout the camp. Administration is facilitated by the location of service
points, the symmetrical layout of the camp, and often by a public address

Development of a Phase II camp is assured only if the government is willing
to commit expert technical assistance, especially in engineering, heavy equip-
ment, and materials.

The Refugees

By its nature, the Phase III camp should have a fairly stable and well
adjusted refugee population. During the initial stages of occupation, the
people are in the same condition as those entering a Phase II camp, however
a large number should be relocatees from existing camps and it should thus be easier
to establish camp routines. Because many of the refugees are in a good emotional
state, labor groups can be formed immediately and the concept of total involve-
ment required for survival can be initiated. Once the inevitability of this
resident participation is accepted by the refugees, improvement projects of vast scale can be undertaken. The availability of this labor is of prime importance and is a major characteristic of the successful Phase III camp. Due to the fact that large groups of people are working, the emotional stress of the newer residents, as in the case of the Phase II camp, will be easier to overcome. The constant improvement of the general surroundings lessens the adverse environmental affects of the camp and further stabilizes the camps residents. The social adjustment follows the same process described earlier in reference to the Phase II camp but is more pronounced due to the necessity of forming these ties in a mass situation. After a time, these will further develop into refugee organizations and formal self improvement groups. The full scale organization of refugees can be undertaken and a self-help program with such supplementary programs as education can be carried out. (It is important that constant activities are planned, for if they become idle, costs of administration of such a large camp will soar.) As in the other type camps, refugee organization is an important and full time function of the camp administration.

If the construction of the camp keeps ahead of occupancy, the general status of the refugees should radically improve. In the initial stages, the government may only allow healthy families to relocate to a Phase III camp.

The design of the camp, the adequate drainage and sanitation, and the initial all-out effort at medical support will enable the refugees to rapidly become used to the camp and desire to maintain it.

In summary, if a massive initial relief operation on all levels can be effected during the initial occupation of the Phase III camp facilities, there should be a definite decline in the disease and mortality rate. Unless the camp, by design, succeeds in stimulating this reduction, it is not adequately designed and immediate
reassessments of the various elements of the camp should be made.

Example 1

Salt Lake City is a Phase III camp built on reclaimed land adjacent to Calcutta. Originally intended to be used as a new town or "counter-city" for Calcutta, the land was committed to the refugees for use as a camp in June 1971. The camp is an example of occupancy out-pacing construction and poor control by the government of the development of a balanced approach to camp planning.*

The camp is laid out in a series of grid patterns in several separate sectors. The overall length of the site is in excess of three miles and the ultimate width is limited only by natural barriers such as canals and marshlands and may eventually be several miles. Maximum design capacity is 300,000.

The site is in a low, sandy area, only a few feet above the flood level and is therefore subject to flooding. This has been offset by a well designed and constructed drainage system designed by an army engineer company that has been assigned to the camp. The system is constantly repaired and improved and has a full time maintenance crew assigned to this task due to the rapid silting. Due to constant flooding possibilities during the monsoon, much emphasis is placed on building shelters above the flood level, especially the structures' flooring.

The drainage system utilizes a progressively sized system of laterals and canals, all major portions of which are lined with either sand bags or bamboo mats. The canal system is coterminous with the road system of the camp which utilizes concrete culverts where bridges are necessary. The drainage and circulation systems are the most workable systems of the camp.

Initial sanitation was at best only fair but as soon as the heavy arrival

*Part of the occupancy problem is due to the influx of non-refugees from Calcutta who posed as refugees in order to get shelter and food, which at that time was more than many of the city's indigent could expect in the city. It has been extremely difficult to keep non-refugees from entering the camp.
of refugees started, all semblence of adequacy vanished. Latrines are located too far from the shelter areas and few people use them. Only recently have any new disposal systems been attempted, these a series of brick septic tanks. Adequate locations proximate to the shelter areas have not yet been designated. The lack of adequate latrines is the primary environmental deficiency of the camp and a major health problem is developing as a result.

Housing construction has been standardized and one major design (the "B" shelter) is used throughout. (In some instances tents are still used as temporary housing.) Various permanent and semi-permanent roofing types are utilized, depending on availability, varying from polythene sheeting to corrugated tin. The standardization of the housing has facilitated the development of the land grids and the road systems.

Administration of the camp is carried out by the government with supervision by the Army and technical assistance from the Calcutta Corporation (city government). There is a camp headquarters but at this time it is not centrally located. Services have been decentralized to each sector and include various dispensaries operated by different relief organizations. Food distribution is handled at a variety of locations but few or no permanent, fly-proofed godowns have been built. Food is normally trucked in and distributed from the vehicles.

The ability of the camp to develop rapidly has been facilitated by the willingness of the authorities to commit full-time professional technicians to camp administration and by the assignment of the army engineers. The location near Calcutta has enabled the camp to more readily procure construction materials and equipment. Without this combination of assistance, a camp of this magnitude could not have been built.

The refugees entering the camp are in a mixed emotional state. For many, the Salt Lake Camp is their first refugee camp since crossing the order, for
others it is the second or third. Many smaller, Phase I camps have been closed and the refugees sent to Salt Lake. The initial entrants were closely regulated and were immediately put into labor groups to develop the camp. Soon however, the numbers became so great the efforts at organization fell far behind. Due to existing camp conditions, the status of the refugees varies according to when they arrived, where they came from, and whether or not they are involved in the work details. (In general, it has been noted that those working continuously are in a noticeably better condition than those who are not.)

Refugee organizational efforts by the camp administration have been extensive but are hampered by conflicting administrative policy. The use of paid contractors for some of the work has also promoted trouble for they often use, illegally, refugees in the labor force thus creating a demand for pay on the part of "volunteer" laborers from the camp. In several instances, the withholding of ration cards has been used to get refugees to work.

The technique of organizing specialized labor teams for standardized production has been used with good results in the Salt Lake Camp. The basic building material is bamboo matting which is used for roofing, flooring, and the partitions in shelters, for lining drainage canals, and for construction of latrines. Each work party is organized and trained to carry out one sequence of construction. For instance, one group weaves the mats, another fixes them to frames, and another uses them in a particular type of construction. By using this system 8,000 shelters of approximately 1,000 square feet each were built in less than one month.* Other teams are similarly organized. Overall construction is not coordinated however, and housing production has run ahead of the installation of the drainage system and often housing is built over the proposed drainage routes.

* It is an indication of how fast the camp is growing to point out that refugees still outnumber the housing units.
The "Concept Plan for a Model Refugee Camp" (next page) represents a proposed Phase III camp which could be constructed under ideal circumstances. The camp is made up of a series of satellite sectors designed to represent "villages" within the total camp structure. In this concept, each village is built and operated separately from the others but is coordinated from a central administrative complex located at the center of the completed camp.

However, the concept is not static and the total camp and the various villages can be modified in many ways. The modular satellite village can be developed singly or in any number up to seven without losing its design features.*

There are many advantages to this concept, the most important is the ability of the authorities to control development. The circular modules are easy to adapt to terrain and thus a master plan can easily be designed and a maximum design capacity assigned. As the camp is built, each module expands in a regulated, uniform pattern to the maximum density. Despite the rate of growth, the development is balanced and the installation of improvements should be able to keep pace with the occupancy rate.

Another important feature of this concept, is that it provides for and facilitates the decentralization of administration and services. The geographic center of each village is reserved as a service area and even as the village grows, the area remains central to all the sector. This arrangement allows the staff to provide services to more people with less effort and ultimately less cost. The main headquarters of the camp is in the center of the village clusters; thus, the central camp administration is removed from the strain of the shelter areas and can operate much more efficiently.

* Seven is the maximum number recommended due to the problems of administration-out-of-control. Odd numbers of villages are also recommended to keep a balance of open space and expansion area.
The camp layout facilitates, and to some extent, is dependent upon, the development of centralized site improvements such as water distribution and sewage facilities. Each village can develop its own systems based on materials and the terrain. The construction of central water storage and distribution points and scattered latrines/septic tanks is mandatory in camps of this size.

One of the key features of the concept is that it permits the retention of interior lands which can be used to develop resources which can contribute to the maintenance of the camp. If, for instance, the lands separating the various villages are marshy, the lands could be used for rice production. By using new high yield rice strains, several crops a year could be produced which could assist in some measure in lowering overall food costs. Of equal importance, it would provide activities for the refugees to help in supporting themselves.

The reservation of these lands also produces a good environmental affect. The density of large scale camps makes the refugees feel isolated. The majority of the refugees are farmers. By reserving interior land for agricultural purposes, open spaces are thus provided which serve as a means of reducing the feeling of being fenced in.

The decentralization of administrative operations to the village level enhances the efforts to organize the refugees and enables the administrator of each camp to have more direct contact with the people. Once a village has reached its design capacity, the area becomes fairly static as routines are established. The administrator of each sector can more rapidly familiarize themselves with the particular problems of the village and can identify new problems before they become too great to cope with, particularly health problems. The reduced reaction time in the end can save many lives.

The concept of the camp permits the integration of various groups of
refugees into a single camp while allowing them to maintain a portion of their background or identity. For instance, while the majority of Bengali refugees are Hindu, many are Moslem. In this camp, it would be possible to establish villages for each group.* In another example, displacees from other camps could be reestablished as a unit in a new village, thus enabling any previous organizational efforts to continue with only minor interruption.

One of the most important features of this type of camp is that it would enable the government to utilize and test a variety of techniques and facilities and to make alterations in the overall design of the camp as they become needed.

As pointed out earlier, the basic unit of the camp, the village, can be altered in design. While the circular layout of the village module provides many advantages over the square or rectangular grid, the latter may be used with fairly good results as long as some separation between villages is maintained. The primary advantages of the circular design is the overall reduction of costs. Immediate reductions can be made in the installation of the water distribution and drainage systems, due to the smaller requirement for lines and canals respectively, as well as the long range costs of maintenance. The drainage system is also more easily able to follow the terrain and independent systems can be used. Other cost reductions are a result of better access and control of the shelter areas.

The circular system allows expansion of the village, yet tends to maintain separation of villages within the camp. This is an important factor in preserving space between the villages for self-help projects and to lesson the effects of population density. As mentioned earlier, this is important for

*While this approach could be subject to criticism on the basis of discrimination, the incidents which have already occurred between Hindu and Moslem refugees would tend to justify such a separation in order to reduce tensions inside the camp.
refugee organizational efforts. It will be much easier for people to adjust to a village-like environment than to a large, endless camp. Also, because the circular design will tend to keep the size of the camp within reasonable limits and maintain the administrative area in the center of the village, relief services and distribution activities can be accomplished with greater ease.
RECOMMENDED PLANNING APPROACH

The design of Phase III camps should be based on the assumption that maximum density may be achieved within a limited area without creating detrimental social problems by designing a community completely "balanced" within its primary borders yet integrated into the surrounding community.

The concept is to create complete new communities for refugees on surplus lands available under national and local governmental jurisdictions in specially designated areas. The development of the camp utilizes established programs and procedures and should demonstrate a joint public-private capability to create total new concepts in camps rather than simply more emergency shelter. Such camps will offer shelter as well as a full range of educational, recreation, and medical facilities.

The development of a Phase III camp should be intended from the outset to develop the highest quality in planning, camp design, and total environment for the refugees. Special emphasis should be placed on encouraging new and more efficient methods of site development, housing construction, and provisions of camp facilities through the practical application of new systems and technologies.

A Planning Approach

To initiate the development of a Phase III camp, a detailed feasibility study should be mounted. A critical path with decision points should be followed and consultation with all concerned national, state, and local officials and relief organizations should be effected early in the process.

Before designing the camp, some investigations of suitable techniques should be conducted to allow for the development of a concept of an "evolutionary" camp which functions as a semi-self supporting unit. This process should include recurring systems and engineering investigations in each stage of deve-
This communication-feedback-control process, in which each stage builds on previous work in a continuously adaptive sequence, suggests a process of "cybernetic planning."

The planning approach should be structured around the major phases of camp development: Program, Design, Production, and Occupancy.

Closely related to the planning approach are the social objectives, which include the purpose for development of the new camp, a description of the anticipated administrative structure, and an economic and cost profile. A new camp must be self-contained with a high percentage of development work carried out by the refugees themselves.

Program: The crucial first step assembles data and decisions about size, location, budget, timing, and social structure of the camp into an interrelated program. With the exception of social characteristics data, these are standard analyses and decisions, expanded from town planning practices. The refugee situation demands a refugee social profile and a preview of projected occupancy. These provide the socio-spatial basis for the design.

Design: This involves the testing of many alternative patterns against the program, the decision upon one arrangement, its expression in a preliminary plan, a review, and the production of a final construction plan. Special attention to the social and economic consequences of the plan is called for, and it should be exposed to review by as many agencies as possible before construction begins.

Production: One of the longest phases is the actual building of the new camp, with its myriad disruptions, confusions, compromises, and changes. Surveys of early refugee conditions during this stage will reflect the ordeal of their personal readjustments to new and different surroundings and their frustration in having to make do with minimal facilities. Nevertheless, it
is important to conduct on-site evaluations of the constructed areas in light of the actual versus anticipated physical and social performance. Mistakes in the design can often be corrected during the early stages of production. Since the new camps will be built in stages, there is opportunity for valuable feedback from the first stages to succeeding ones.

**Occupancy:** After the construction is complete and the refugees have moved into the camp, important social and health changes should begin to occur among the occupants as they readjust to camp life. At this point, the government should conduct a series of studies, including censuses, to enable indepth comparisons of actual, versus projected, refugee composition, activities, and interaction, along with an evaluation of the workability of the total camp design. For instance, a new generation of children may be born in these camps and if comparative research is undertaken with children from other situations as control groups, useful information about the impact of differing types of camps may be obtained. Continuing feedback of relevant data into programming for other new camps is probably the single greatest advantage of this approach, for it offers a means for continuously evolving operational environmental design objectives from actual experience.
REFUGEE CAMPS & CAMP PLANNING:

REPORT II: CAMP IMPROVEMENTS
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INTRODUCTION

This report outlines basic camp improvements which should be considered in all camps. The specific improvements outlined, however, are generally more applicable to Phase I and Phase II camps than to Phase III types.

Report II is based upon and is an expansion of a field inspection report prepared by the author for OXFAM - East India (dated 9 July 1971) and was prepared to facilitate OXFAM's assistance to Bengali refugees in the Calcutta, West Bengal District of India.
REFUGEE CAMP IMPROVEMENTS

The problems faced in refugee camps fall into three general categories: overall camp planning/design; sewage and waste disposal; and housing. The overall effort in the physical operations has been very poor in all the refugee operations. The major problem has been the record of recent inability to organise large scale work parties with specialised tasks to carry out necessary operations. The camp commanders must be made to realise that each camp is a complete system and that each operation affects the other. They cannot hope to prevent disease only with medicines; they must also have sanitary conditions which will encourage safety, health, etc. The following recommendations should be effected immediately from the outset of the development of the camps.

A. Planning:

Camps must be planned units and the plans must enable the authorities to administer and control all related activities with maximum flexibility and minimum effort. In effect, a camp is a small city and all the amenities of a city must be installed. These include central activity centres (i.e. hospital, administrative offices, central supply, distribution and storage areas, etc.), proper drainage (to include run-off collectors, local collectors, and major drainage canals), proper waste disposal, lighting, housing cells, circulation systems, and recreation areas.

i. Layout: Due to the limited sophistication of planning techniques, overall camp planning must necessarily utilise a "use area" approach. This entails designation of all land areas as having a particular use and integrating the various uses into an overall system. In most terrains, a grid system of design can be adapted for the use area approach. While the grid provides the least privacy, it facilitates sanitation, drainage, and administration. The grids which delineate the use areas also provide the basis
for the circulation system and drainage system. The central activity centre should be the only unit of the system which does not follow the traditional grid and should have as much open area surrounding it as possible with all approaches well above flood level. (A typical layout is shown on page 4.)

If a permanent, or Phase III, camp is being designed, a more sophisticated design should be used. Several recommended designs are outlined in Report IV of this series.

ii. Circulation: Each camp should develop a circulation system. The system should include vehicular approaches, internal vehicular drives, major walkways connecting the various use areas, and footpaths for local circulation. The entire system should be above the local flood level.

Recommended construction material is brick, bamboo, and whatever wood is available. Drainage ways must be bridged to prevent the standing of water. In some camps, walks can be elevated by using earth extracted from the drainage canals. All walkways should be well lighted. (Typical construction is shown on page 6.)

iii. Lighting: Proper lighting must be installed as soon as possible. While it will assist the people in various ways such as keeping down disturbances, the singular most important aspect is that it will reduce the incidence of night defecation in areas other than the latrines.

iv. Recreational Areas: As the number of refugees increases, they must have a release for tensions that will build up. Thus areas must be designated and preserved for organised recreation. These areas should at least be big enough to play football. They can also be used for other programmes such as camp meetings, etc. The designation and development of these areas should, however, not receive a priority until the monsoon season has passed.
DETAIL 1
ROADWAY/WALKWAY CONSTRUCTION

DETAIL 2
CROSS SECTION OF WALKWAY CONSTRUCTION
v. **Central activity centre:** All administrative functions of the camps should be placed in a physically central location; as the camps become larger, these centralised posts can be established in sub-areas of the camps. All administrative areas must be above the flood level and well sand-bagged.

vi. **Signs:** A series of signs should be developed to facilitate the location of activities for both residents and visitors. Signs should be both graphic and colourful, in both the local language and English.

vii. **Drainage:** In areas subject to heavy rains, proper drainage systems serve dual purposes, the most singularly important being moving water out of the camp. But a second and extremely useful effect is the daily cleansing of the camp site. Therefore, in these areas the most important design/engineering function becomes the development of the drainage system.*

a. The system begins at each building or permanent structure. At the base of each a small localised trench is dug around the structure to collect the run-off and move it away.

b. These trenches, or localised collectors, empty into a lateral which is generally one to two feet wide and which carries the water away from the local areas. These laterals should not be more than one hundred feet long and should generally follow the footpaths of the circulation system.

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* See schematic of drainage system, Detail 3, page 7.
c. Laterals empty into major collectors which are placed approximately 200 - 500 feet apart and which follow the major walkways and vehicular approaches. In the smaller camps, only one or two major collectors are necessary. Laterals are usually 2 and a half to three and a half feet wide.

d. As the water reaches the lowest point in the camp or general area, it enters a drainage canal and is taken out of the camp. If possible, a single drainage canal is used to empty the entire camp and it is constructed well beyond the camp boundary to a nearby stream, lake or river a minimum of three hundred metres away. A series of straining gates should be deployed at the point where the drainage canal leaves the camp site to prevent solid waste from flowing into the adjoining countryside.

All the parts of the drainage system should be lined either with sandbags or whatever local materials are available. Bamboo matting, tree bark, plywood, plastic sheeting, etc., may be used. (See Detail 4, page 9). The major intersections of the system must have the opposing side wall supported to prevent washing away during heavy drainage flow periods. Brick material is very good for this purpose. (See Details 5 and 6, page 10). Backup gates should be installed throughout the system to aid in controlling flooding and to assist in repair and cleaning the system. (See Detail 7, page 11).

Depending on the local soils, maintenance of the drainage system will be a full-time job and should have the continuous supervision of the camp engineer. In dry periods, standing
LARGE BAMBOO POSTS ARE SET INTO THE GROUND CLOSE TO THE EDGE OF THE TRENCH. BAMBOO MATS ARE THEN SET BETWEEN STAKES & WALL OF THE TRENCH. STAKES MUST BE CLOSE ENOUGH TO WALL OF TRENCH TO ASSURE TIGHT FIT OF MATS.

BAMBOO MATS MUST BE OVERLAPPED IN DIRECTION OF WATER FLOW AS SHOWN. THIS WILL HELP TO PREVENT THEM BEING WASHED AWAY DURING HEAVY RAINS.

DETAIL OF MAJOR COLLECTOR TRENCH SHOWING LINING WITH BAMBOO MATS.

NOTE: NOT TO SCALE
DETAIL 5

BRICK LINING ON SIDE OF LATERAL TRENCH ACROSS FROM WHERE EACH LOCALIZED TRENCH EMPTIES INTO IT. THIS WILL HELP TO PREVENT EROSION.

BRICK LINING ON SIDE OF MAJOR COLLECTOR CANAL ACROSS FROM WHERE EACH LATERAL TRENCH EMPTIES INTO IT. THIS WILL HELP TO PREVENT EROSION.
DETAIL 7

THICK PLYWOOD BOARD
That can be put in place
as shown, when there is
danger of water backing
up into the camp.

NOTE: BACK-UP GATE SHOULD BE ON A
HIGH POINT OF GROUND AS CLOSE
AS POSSIBLE TO LAKE OR RIVER
AT END OF CANAL.

DETAIL OF MAIN' DRAINAGE CANAL
SHOWING BACK-UP GATE &
LINING OF CANAL WITH SAND-
BAGS.

NOTE: NOT TO SCALE
water must be pushed out of the pools, the silt removed and the lining repaired.

The system discussed herein is not a sophisticated system; in fact, it is similar in principle to the irrigation techniques employed universally. A force of 50 men per 1000 adult refugees can adequately build the system in most soils and 50 men per 2500 refugees can adequately maintain it.

B. Sewage and Waste Disposal:

Of primary importance, the problem of human wastes must be tackled with much greater effort than is usually expended. At this time, several new methods have been developed to handle human wastes, such as polythene septic tanks, porta cans, chemical latrines, etc. However, until they become available, primary reliance will continue to be standard earthen latrines, and each camp must continually build new latrines and keep the ones they already have clean. The sanitary team must hourly clean them out.

Sewage: The problems of the latrines fall into four categories: location, approaches, cleanliness and disposal. It should be remembered that the latrine regimen instilled in the refugees can have a long-range effect.

i. Location: The location of the latrines is usually dictated by circumstance. As much as possible, they should be below the prevailing wind, near the housing areas, away from the hospital, kitchen and contaminatables, and close to a surface water supply (for washing down).

ii. Approaches: The approaches to the latrine must be designed and maintained to encourage people to use the latrines at all times - night and day. Walkways must be constructed which are solid, dry and not slippery and which are well lighted at night (if electrical power is not available,
then lanterns or candles placed in tin cans should be used). Recent experience in Bengal indicates that bright lighting along the way to the latrines almost eliminated the amount of feces left near the latrines at night.

iii. Cleanliness: A work team must wash the latrines down at least every hour day and night and spread bleach or sanitation chemicals to reduce odours. Latrines which utilise concrete floors or squatting pans are useless unless they are washed out after each use.

iv. Construction of Latrines: The following general rules apply to the construction of all types of latrines:

a. To make sure that food and water will be protected from contamination, latrines should be built at least 100 yards from the unit mess and the nearest water source. Also, the latrine should not be dug below the water level in the ground nor in a place where it may drain into a water source. Usually, latrines are built at least 30 yards from the end of the unit area but within a reasonable distance for easy access. At night, if the military situation permits, they should be well lighted. If lights cannot be used, a piece of cord or tape may be fastened to trees or stakes to serve as a guide to the latrine.

b. A canvas or brush screen should be placed around each latrine, or the latrine may be enclosed within a tent. In cold climates this shelter should be heated. The screen or the tent should have a drainage ditch dug around its edges to prevent water from flowing over the ground into the latrine. For fly control, these shelters should be sprayed twice weekly with an approved insecticide.
c. On the outside of each latrine enclosure a simple hand-washing device should be installed. This device should always be kept filled with water and should be easy to operate.

d. Latrines should be policed every day. Certain unit personnel should be assigned the responsibility of ensuring that the latrines are being properly maintained.

e. When a latrine has been filled to within one foot of the surface, or when it is to be abandoned, it should be closed in the following manner: the contents of the pit, the side walls, and the ground surface to a distance of two feet from the side walls should be sprayed with a DDT residual solution or other insecticide. Then the pit should be filled to the ground surface with successive, 3-inch layers of earth. Each layer is packed down and its surface is sprayed with insecticide before the next layer is added. Then the latrine pit is mounded over with at least one foot of dirt. The purpose of this method of closing is to prevent any immature fly that may hatch in the closed latrine from getting out. The location of the latrine should then be plainly indicated with a sign which is marked LATRINE CLOSED and is dated.

Appendix I provides examples of some common latrines.

Solid Waste: Solid wastes must be collected and disposed of daily. Vehicles such as carts or wheelbarrows should be provided for this task. Disposal can take two forms - burial or burning.

i. **Burial:** This method is the most preferable in dry areas if the disinfectants can be secured. Pits are dug, the waste is sprayed with disinfectant and then covered with earth. This method can be useful for filling in low-lying areas and if disinfected properly will have no adverse effects.
The dirt cover must be a minimum of one foot thick, however, and garbage should be packed down in a series of layers as it is placed in the pit for disposal. The waste must be buried below the highest natural topographic peak in the land surface. During the monsoon season, burial operations must, of necessity, be in scattered locations and in deep pits (a minimum of four feet deep) and must be covered daily. If the area is subject to flooding, burial techniques should not be used. A pit 4' x 4' x 4' serves 100 people for one day; thus it can be readily seen that for large camps, burial is least preferable due to space requirements.

ii. Burning: When burning wastes, a permanent site should be selected as far as reasonably possible from the camp and below the prevailing wind. Decontamination prior to burning is not necessary, but chemical waste fuels (e.g., gasoline) should be used to ensure an even, intense burn. Each day ashes should receive a thin layer of dirt to keep them from blowing.

Garbage is often burned in open incinerators. Excellent types of open incinerators may be constructed from materials which are readily available in any camp area. Since incinerators will not handle wet garbage, it is necessary to separate the liquid from the solid portion. This is done by straining the garbage with a coarse strainer such as an old bucket, salvaged can, or 55-gallon drum in which holes have been punched in the bottom. The solids remaining in the strainer are incinerated, and the liquids are poured through a grease trap into a soakage pit or trench. Field incinerators should be located at least 50 yards downwind from the camp to prevent their being an odour nuisance.

The inclined plane incinerator (Detail 8) will dispose of the garbage of an entire camp, evacuation hospital, or other unit of similar size. Its effectiveness in combustion
DETAIL 8
INCLINED PLANE INCINERATOR

GARbage

LOADING PLATFORM

SHEET METAL PLANE

INCLINED SURFACE

3 55-GALLON DRUM (ENDS REMOVED CRIMPED AND TELESCOPED)

GRATE

VAPOR BURNER

NORMAL FUEL BURNER

DETAIL 9
BARREL INCINERATOR

55-GALLON DRUM WITH TOP AND BOTTOM REMOVED

IMPROVISED GRATE--UPPER LEVEL

IMPROVISED GRATE--LOWER LEVEL

PERFORATIONS

STONES

BRICKS

DIRT FILLED CANS
and the fact that it is somewhat protected from rain or wind make it an excellent improvised device. Time and skill, however, are required in building it. A sheet metal plane is inserted through telescoped 55-gallon drums from which the ends have been removed. The metal plane should extend approximately 2 feet beyond the upper end of the telescoped drums to serve as a loading or stoking platform. The telescoped drums are positioned on an inclined surface. A grate is placed at the lower end of the telescoped drums, and a wood or fuel oil fire is provided under the grate. After the incinerator becomes hot, drained garbage is placed on the stoking platform. As the garbage becomes dry, it is pushed through the telescoped drums in small amounts to burn. Final burning takes place on the grate. If time does not permit the construction of the inclined place incinerator, it can be simplified as follows: dig a fire pit at the bottom of an incline, line it with rocks, and place a grate over it. Place three telescoped drums in a shallow trench up to the incline, letting the lower end of the telescoped drums extend somewhat over the fire pit so the flame will be drawn up the drums. The sheet metal plane, if available, should be used, as it permits more thorough drying of the garbage.

A simple barrel incinerator can be made from a 55-gallon drum by cutting out both ends, punching many holes near the bottom, and inserting grates inside the barrel several inches above the holes. The barrel is supported several inches above the ground on stones, bricks, or dirt-filled cans, thus allowing space to build a fire under the barrel. The rubbish is put into the barrel on the top grate.

Examples of the above incinerators can be seen in Details 8 and 9, page 16.
Liquid Waste: In the field, wash, bath, and liquid kitchen wastes are disposed of in the soil usually by means of either soakage pits or soakage trenches. In order for the soil to absorb these liquids, the grease and soap, as well as any solid particles, must first be removed from them. For this reason, a grease trap is made a part of each soakage pit or trench to be used for the disposal of wash and liquid kitchen wastes. In places where heavy clay soil prevents the use of soakage pits or trenches, evaporation beds may be used if the climate is hot and dry.

i. Soakage Pits: In a temporary camp, a soakage pit 4 feet square and 4 feet deep normally will be adequate to dispose of liquid kitchen waste for 200 persons. If the people are to remain in the camp for 2 weeks, two pits should be constructed for disposal of liquid kitchen waste; each pit should be used on alternate days, thus lessening the possibility of clogging. Each device provided for washing and bathing must also have a soakage pit under it. These soakage pits are constructed in the same way as a urinal soakage pit (see Appendix I) except that the urinal pipes are omitted. A grease trap is provided for each pit, except those under showers. The area under field showers, as well as under drinking devices, should be excavated a few inches and then filled with small, smooth stones to keep the water from standing. Should a soakage pit become clogged, it is closed, and a new one is constructed. A soakage pit is closed by covering it with 1 foot of compacted earth and marked PIT CLOSED (date).

ii. Soakage Trenches: If the ground water level or a rock formation exists close to the surface, soakage trenches instead of pits should be used. A soakage trench consists of a pit, 2 feet square and 1 foot deep, with a trench extending outward from each of its sides for a distance of 6 or more feet.
The trenches are 1 foot wide and vary in depth from 1 foot at the central pit to 1 1/2 feet at the outer ends. The pit and trenches are filled with the same material used in a soakage pit. Two such units should be built to dispose of liquid kitchen waste for every 200 persons, and each unit should be used on alternate days. One unit should be built for each washing device provided. A grease trap is provided for each soakage trench. A soakage trench is closed by covering it with 1 foot of compacted earth and marked PIT CLOSED (date).

iii. Grease Traps:

a. Baffle Grease Trap: A baffle grease trap may be made from a drum (Detail 10). The drum is divided vertically into an entrance chamber and an exit chamber by attaching a wooden baffle. The baffle should be placed so that the entrance chamber will be approximately twice the size of the exit chamber. The baffle should hang to a point within 1 inch of the bottom. A strainer which may be made from a small perforated box filled with straw, hay, or burlap is inserted into the lid above the entrance chamber. A pipe is inserted into the exit chamber about 3 to 6 inches below the top as an outlet to the soakage pit. This baffle grease trap is usually placed on the ground at the side of the soakage pit with the outlet pipe extending 1 foot beneath the surface at the center of the pit. If a grease trap is not water-tight, it must be placed partially under the ground.

Before the grease trap is used, the chambers are filled with cool water. The waste liquid is poured through the strainer which retains any solids. As the warm liquid strikes the cool water, the grease rises to the surface of the entrance chamber and the liquid
runs under the baffle, filling the exit chamber. When the liquid reaches the outlet pipe near the top of the exit chamber, it runs through this pipe into the soakage pit. Unless the grease trap is of sufficient capacity, the warm greasy liquid poured into the trap will heat the cool water in the trap, thus allowing the grease to remain uncongealed and to pass through the trap. The efficiency of this grease trap can be increased by constructing it with multiple baffles. Also, a series of traps may be used.

The baffle grease trap must be properly maintained to prevent clogging of the soakage pit. The grease retained in the trap should be skimmed from the surface of the water daily or as often as required and either buried or burned. The entire trap should be emptied and thoroughly scrubbed with hot, soapy water as often as necessary.

b. Barrel Filter Grease Trap: The barrel filter grease trap may be made from a 30- to 50-gallon barrel or drum which has the top removed and a number of large holes bored into the bottom (Detail 11). Eight inches of gravel or small stones are placed in the bottom and covered with 12 to 18 inches of ashes or sand. A piece of burlap is fastened to the top of the barrel to serve as a coarse filter. The trap may be placed directly on the soakage pit, or it may be placed on a platform with a trough leading to the pit.

Every 2 days the grease trap should be emptied, washed, and refilled as described above. The material removed should be buried. The burlap filter should be either washed or replaced every day.

A pail strainer may be used instead of the burlap filter. It is made by boring holes in the bottom of
an old metal pail or can and filling it with grass or straw. This strainer will remove coarse particles of food and a small part of the grease. It is placed on top of the barrel grease trap.

iv. Evaporation Beds: In places where clay soil prevents the use of standard soakage pits, evaporation beds (Detail 12) may be used if the climate is hot and dry.

a. Sufficient beds, 8 by 10 feet, are constructed to allow 3 square feet of surface area per person per day for kitchen waste and 2 square feet per person per day for wash and bath wastes. The beds are spaced so that the wastes can be distributed to any one of the beds. In the construction of a bed, the top soil is first scraped to the edges, thus forming a small dike around it; then the earth within the bed is spaded to a depth of 10 to 15 inches and raked into a series of rows, making the ridges approximately 6 inches above the depressions. These rows may be formed either lengthwise or crosswise as deemed desirable for best distribution of water.

b. In operation, one bed is flooded during the day with liquid waste to the top of the ridges, which is equivalent to an average depth of 3 inches over the bed; then the liquid waste is allowed to evaporate and percolate. After 3 or 4 days this bed is usually sufficiently dry for respading and re-forming. The other beds are flooded on successive days, and the same sequence of events is followed.

c. Careful attention must be given to proper rotation, maintenance, and dosage of evaporation beds. It is also essential that the kitchen waste be run through an efficient grease trap before it is allowed to enter the evaporation beds. If these beds are used properly,
they create no insect hazard and only a slight odor. Other modifications of waste disposal methods are possible and should be used when they are more adaptable to the particular situation.

C. Housing:

Housing problems that usually arise are related to the problem of numbers of refugees as well as construction. The following is a discussion of construction and construction techniques, not design. Some recommended designs can be found in Report V of this series.

i. Roof Construction:

a. Thatch: In most areas there are usually sufficient indigenous materials for construction of adequate roofing material if proper design techniques are used. The thatch roof leaks only because it is being placed on the roofs improperly, i.e., laid out rather than woven. Until other material becomes available in quantity, the engineering team must force the people to utilise the bamboo and straw in the proper manner (if basket weavers are available within the camp, they should be placed in charge of weaving mats to be used as roofing material).

b. Tarpaulins: Tarps are generally good but have definite limitations. They are subject to shrinkage and rot. Both these conditions can be significantly slowed, however, by spraying them with a fabric preservant, specifically a product called "Scotch-Guard" manufactured by the 3M Company in the United States and Great Britain. Tarps are only as good as the means in which they are secured to the housing frame. Nylon cord should be used where possible.

c. Fibreglass roofing: The most durable material currently available, it should be used on the high activity
buildings initially, and then used for housing as much as possible. The supports for the material must be stronger and more secure than the frames used for holding the tarps and thatch due to the increase of weight and the increased wind resistance. On non-peaked roofs (lean-tos) the low end should be placed into the wind for maximum support and best cooling effect. Another means of cooling the fibreglass is to paint the top surface with a white paint.

d. Polythene Sheets, or synthetic rubber stripping: A good all-round construction material, polythene (or polyethylene) is easy to ship and store and is becoming widespread in use. As a roofing material, it is best used as an interim material or a supplement to existing roofs (to cover thatch, for example). Due to its susceptibility to wind damage and tearing, when used on the outer surface of a structure it should be attached to a frame (see Detail 13, page 26). In humid tropical areas, use of polythene over thatch often causes rot and deterioration of the thatch and can cause a health hazard in living or medical structures.

ii. Flooring:

a. Floors must be designed and built to assist the drainage in the immediate area. The centre line of the floor should be a peak to enable any water which enters the structure to flow outside.

b. Floors should be constructed of solid materials, preferably brick, and should be covered with either mud mortar or straw to enable cleaning activities on the floor.

c. Floors must be built above the local flood level (see page 27). If the availability of construction materials is limited, dikes and small levees must be built at the edges of the building beneath the roofline and should be...
DETAIL 14
PROTECTION FROM FLOODING

- Flood level
- Spoil from drains

- Flood level
- Spoil from camp excavations

- Flood level
- Raised floor
of sufficient strength to keep out any localised flood waters. Bricks are the best material for this type of construction. (If brick material is not available, bricks may be constructed by placing mud and straw in layers and compressing it between blocks or pieces of wood and heated by smoke fires in any dry enclosed room. This type of brick will work in temporary situations and should last approximately 10 days before deteriorating, much longer if the brick can be fired or dried for a long period.)

SUMMARY OF PLANNING RECOMMENDATIONS

A refugee camp must be designed from the beginning with a well-defined, orderly and symmetrical camp plan. Sanitation should have the top priority in the approach to each task. In the planning and administration of a camp, the following items should be carried out:

--- Establish water points for drinking and for washing; dig latrines immediately, and mark them plainly; locate the kitchens on the side of camp away from the latrines and close to the water wells; dig a garbage pit.
--- Establish a communications and administrative centre during the early stages of development. Develop and mark access roads and the camp road network.
--- Lay out and build camps and facilities around a sanitation plan. Make sanitation facilities convenient to all refugees and staff.
--- Control the water supply. Purify drinking water by accepted techniques. Establish and plainly mark separate water points for washing, cooking, and human consumption. Locate washing points downstream from points used for human consumption. (See Appendix II)
--- Give particular care to location, maintenance, and cleanliness of latrines. Follow prescribed designs in construction. Flyproof every
latrine. Locate latrines conveniently to shelter areas but away from the kitchens, dispensary, and water supply. Never locate a latrine uphill on a drainage line leading down toward a water source. When a latrine is taken out of use, it must be filled and covered, and then marked with a sign, **LATRINE CLOSED (date)**.

--- Sanitary conditions in the kitchen are as important as in the latrines. The kitchen, garbage pits, and if possible, the godown must be flyproof. Garbage must be kept covered and must be removed to garbage pits at least once daily. Empty food containers should either be burned or buried to prevent flies from swarming. For each kitchen a grease trap should be built for the disposal of waste grease and greasy water. Most important, the kitchen area must include facilities so that all kitchen gear (plus all pots and food containers) can be thoroughly washed down in boiling soapy water and then rinsed twice in boiling clear water.

--- Wage ceaseless war on insects and pests. The simplest way to control flies is to cut off their nourishment by screening latrines, kitchens and garbage pits. This keeps flies away from food and thus from poisoning the refugees. Watch for young flies, particularly inside a screened structure. The presence of young flies means that flies are breeding nearby, usually inside.

--- Drainage of standing water, coupled with oiling of stagnant pools and swampy areas, kills mosquito larvae as they breed. The clearing of tall grass, brush, and undergrowth helps to reduce the danger from mites. Human cleanliness and rodent control stop lice. All insect control problems can be reduced in the camps if periodic dusting or spraying with insecticides is carried out.

--- Be prepared for emergencies. Never neglect security; establish a camp guard; promulgate a fire bill; know your sources of outside help; keep your fuel dump secure against fire and theft; establish liaison with your neighbors.
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ACKNOWLEDGEMENTS

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Frederick C. Cuny and Associates provide specialized professional services for the preparation of plans and studies related to physical and social problems in urban and area development and environmental research and design. Established in 1970, the firm is a prime consultant to INTERTEC.
INTRODUCTION

The Camp Development Program (CDP) is a vital link between the Camp's Master Plan and the actual construction of facilities recommended by the plan. If a detailed CDP is not undertaken before construction, there is a high probability that improvements will not be realistically paired with resources. By Camp Development Programming, needs can be identified and priorities established in line with available resources. Thus, a higher utilization of these resources can be achieved.

The processes outlined in this guide are applicable to all phases of Refugee Camp Development and are recommended as a guide for Camp Development Programming Procedures.
DEFINITION OF TERMS

Site Improvements (Projects) - Site Improvements are major projects undertaken by the government that are not recurring on a periodic basis. They include major replacements, purchases, and construction added to the physical plant of the camp. Specific examples of site improvements are: (1) housing, administration centers, fire stations, playgrounds, (2) streets, (3) water lines, sewage, (4) drainage, etc. In developing a Site Improvements Program, the government establishes criteria as to what is considered a "site improvement" and thus what should be included in the Camp Development Program. The following criteria for defining site improvements in Phase II and III camps is suggested: (1) New construction and buildings, (2) All improvements (streets, drainage, etc.), (3) Major equipment and vehicles.

Camp Development Program (CDP) - The Camp Development Program is a schedule of projects for a one to three year period, along with estimated costs and sources of revenue. Normally, individual projects in the Camp Development Program are presented according to fiscal periods, showing the percentage of the project to be completed in each period. The period for a Camp Development Program should coincide with the government's fiscal increments.

Capital Budget - Capital Budget refers to a list of projects, along with costs and sources of procurement for the coming fiscal period. It can be viewed as the first period of the CDP.

Assisting Organization - A non-governmental agency, usually, but not necessarily, an international relief organization such as OXFAM, Red Cross, United Nations, etc.

Participating Organization - An organization or agency participating in one or more activities relating to the camp. A participating organization may be an assisting organization, a branch of the government, or a unit of the military.
ADVANTAGES OF CAMP DEVELOPMENT PROGRAMMING

The purpose of the program is to develop an orderly schedule of permanent improvements needed by the refugees. The CDP helps determine needs, establish priorities, and analyze the government's ability to bear total costs. The proposed, or concept, plan of the camp identifies in general terms what the government wants to accomplish. The Development Program is vital to the relief effort because it lays out a plan for financing improvements as well as scheduling activities.

PREPARING A CAMP DEVELOPMENT PROGRAM

Preparation of a CDP calls for the following steps:

1. An inventory of needed site improvements including cost estimates and an initial evaluation of their relative priority.
2. Analysis of past camp improvements and various systems workability.
3. Analysis of project requests from assisting relief organizations, usually involving discussion with the sponsoring organization.
4. Investigation of the financing capabilities of the government and/or assisting relief agencies.
5. An analysis of available material and equipment.
6. A schedule of project execution in a long-range program list that considers the relationships of the improvements to each other and overall material availability.
7. Selection from this schedule of a slate of improvements for early action. This generally takes the form of the development budget for the coming year.
8. Formal adoption of the development budget against the background of the long-range recommended program, usually after some form of higher review.
The preparation of the Camp Development Program must be a cooperative effort. The process should be initiated by the government through a communication asking for the cooperation of all involved, and outlining the purposes of the program. It is important to involve all groups who will be working in the camp in the identification of projects because of their knowledge of the specific needs of the refugees. The government plays an important coordinating role by making sure that requested improvements conform to the government's ability to pay. The government must establish general objectives and, of course, be responsible for the execution of the program. Refugee leaders must also be involved because of their knowledge of immediate needs.

PROCEDURES FOR PROGRAMMING

After the CDP has been initiated, several basic studies must be made. These involve three main areas - general information about the refugees to live in the camp, availability of money and materials, workability of proposals, and needed and planned projects. Much of the information may be available from other studies or from personnel at other camps.

Background Information - Certain general background materials are essential for the preparation of the Camp Development Program. These include demographic materials on current and/or projected population, geographic features of the camp site, the economy of the surrounding area, and other general information. An examination of current services in the camps and their adequacy should be carried out. Past and present site improvement projects should be examined to determine their effectiveness and the source of materials and current availability of materials.

Financial Analysis - The fundamental purpose of the financial analysis is to determine approximately the present and future ability of the government to pay for the construction and maintenance of site improvements by establishing the
present availability of funds, by research into the probable future trends in outside financial assistance, by appraisal of all factors related to the administration and operation of the camp, and by determining what limitations are imposed by prior commitments upon the government. In effect, this amounts to comprehensive financial planning for the camp. All avenues of financial assistance should be examined thoroughly. All possible factors that may affect the camp must be taken into account. The government must consider such matters as population change within the camp, rate of construction, etc. Estimates must be arrived at logically and should be accompanied by a complete explanation of how the estimates were calculated and what conditions might change the estimates.

Expenditures - It is important to examine both past expenditures, in order to get an inventory of low cost, workable improvements, and future expenditures, to help determine the government's ability to pay for future improvements. Two general types of expenditures should be examined - operation expenses and site improvements.

Operation expenses should be classified by major service areas. In most cases, the various participating organizations use convenient and meaningful classifications. Expenditures for each classification should be listed for the past six months. If major fluctuations occur from month to month, there should be a short explanation attached. Past expenditures are a vast asset in determining future operating expenses.

Estimates for operating expenditures should encompass the period covered by the Camp Development Program. Estimates of future operating expenses are normally based on past expenditures with adjustments for increases in camp population, general inflationary trends, etc. To a great extent, operating expenses are based on service levels provided by assisting organizations; therefore, in considering future operating expenses, the government must anticipate all increases or decreases in assistance from outside resources.
An analysis of past site improvement expenditures should be conducted. By examining past site improvements expenditures, the government can determine feasibility of new improvements. It is also helpful to know how past improvements have been financed. Site improvements and costs should equal about 20% of the total budget.

INVENTORY OF PROJECTS

Each participating organization should prepare a list of all projects improvements, or programs currently under way and needed in the future. Future projects should not be limited to just the length of the initial Development Program. A period of 5 - 10 years can be used in assembling a comprehensive list of all potential projects. Improvements can be identified from studies made during the design of the Camp's Master Plan.

All organizations should prepare individual project estimates. Forms should be prepared for this purpose which include such information as a description of the project, its priority rating (see below), justification, estimated cost, etc. Attachment No. I illustrates the project request form.

The government should require a priority rating on all projects. The following priority scale can be used:

1. Urgent - Should not be postponed. Essential to meet an emergency situation, to maintain present level of service, or to complete a project already under way.

2. Necessary - Should be carried out within the next several years to meet the anticipated needs of the camp or to replace unsatisfactory facilities.

3. Desirable - Needed for proper development of the camp, but exact timing of these projects must wait until funds are available.

4. Deferrable - Improvements which may be needed for ideal operation but which can be postponed.
The following criteria is suggested for the use of participating organizations in determining priorities of the project:

1. Will the project contribute to the protection of life and property, and/or the streamlining of relief services?
2. What is the relationship of the project to the welfare and progress of the refugees? Will the project enable the people to adapt to their new environment?
3. How will refugees be affected by the project? How many will be harmed or benefited if the project is or is not carried out?
4. Will the improvement replace existing facilities that are obsolete, or is the item new?
5. Will the project add to the self sufficiency of the camp?
6. How will the project affect neighboring existing communities and/or private property?
7. Will the general lifestyle or stability of the refugees be enhanced by completion of the project?
8. Will the improvement reduce or increase current operating costs?

REVIEW OF PROJECT REQUESTS

It is mandatory that the Government thoroughly analyze the project requests submitted by participating organizations. It is particularly important that projects conform to the Master Plan for the camp. Conferences should be held with participating organizations to get a more thorough understanding of individual project requests. Certain improvements at this time may be shifted into lower priorities.

After the projects are reviewed and consultation with participating organizations completed, the list should be considered in its entirety. The total requests should be reviewed according to the general criteria previously listed. After
final priorities are assigned, the first six month Camp Development Program can be prepared. A Camp Development Program Report should be prepared for distribution to interested parties and should include information such as individual project descriptions, priority ratings, justification, programming of the project, estimated cost by month, effect on the operating budget, and other factors related to the fiscal capacity of the government.

**UPDATING THE PROGRAM**

The CDP must be reviewed monthly and updated. It should be a continuing part of the government's budgeting process. Projects are reviewed to determine the progress of projects already started, and whether certain improvements should be continued, revised, delayed, or eliminated. The process of review involves the same people who participated in the formulation of the original CDP. The process includes evaluation of the projects currently included in the program, as well as the extension of the program by six months, and a review of resources available.

Changes in the CDP may be the result of a change in priorities due to unforeseen emergencies; new sources of assistance, etc. A monthly review of the program will assure that it reflects the most pressing needs of the refugees.
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REFUGEE CAMPS & CAMP PLANNING:

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INTRODUCTION

This report outlines some techniques and plans for the design of refugee camps. The material is presented to facilitate planning for new camps and to present some new ideas to alleviate problems encountered by the current "state of the art", and to provide some alternatives to laying out a refugee camp. Essentially, the data presented pertains to the design of Phase III type camps.

Much of the data contained herein was obtained from field research in East India during the Bengali refugee crisis in 1971, and this report was originally intended for use during that crisis. Work was initiated only several weeks before the outbreak of open hostilities and was not completed in time to be of use in that situation. Further research was conducted by the author in the Middle East in the spring of 1972 and the data from that trip has been included.

This report is intended for distribution to architects, engineers and planners involved in planning refugee camps in any situation.

BACKGROUND

A Phase III refugee camp is a large scale, permanent camp set up to maximize control and administration, reduce overall costs, and facilitate the delivery of relief services. The Phase III camp is usually set up during the last stages of the refugee crossing and after the major influx has subsided. Current examples of these camps (but by no means good examples) are the camps housing the Palestinian refugees of the Middle East and the relocation centers for refugees of the Indo-China War in South Vietnam.

The principal characteristics of this type of camp are that considerable advance planning has been undertaken and a comprehensive master plan
for the camp has been developed before the refugees begin occupying the site. The critical element in the development of a Phase III camp is the ability of construction and administration to keep ahead of the resettlement of the refugees into the camp. Resources for balanced delivery of services, adequate drainage, shelter, and sanitation must be committed early in the development stages. For the purposes of this report, a Phase III camp should have the characteristics outlined below.

The site selected for a Phase III camp is usually a large tract of land which is generally undeveloped and is fairly independent of nearby communities. The selection of the site is usually made at the highest levels of the government with a realization that a major camp is necessary to accommodate large numbers of refugees and be able to serve as a center for handling refugees from smaller camps that are to be closed. Site selection considers drainage, climate, rainfall, proximity to populated areas, and political considerations. In some refugee situations, Phase III camps have been established in less densely populated areas of the country, often farther from the border than earlier camps.

More sophisticated camps require that a long-range master plan be developed with an ultimate design capacity in mind. Construction, usually under the supervision of an engineer, is planned in phases and site improvements programmed to coincide with occupancy schedules. There should be adequate room to expand on the campsite and attempts should be made to build in modules or units. Constant improvements are scheduled and basic amenities of urban communities are recognized as necessities.

The master plan provides a complementary network of circulation systems and drainage systems and is designed to facilitate sanitation in the camp. Though in many cases the site may not have good natural drainage, the drainage system is permanent in construction and utilizes
standard sizes of sub-systems (canals, laterals, etc.). This drainage system can adequately drain the camp even during peak rainfall periods.

The camp is designed around a sanitation plan, latrines and waste disposal facilities are within easy reach of all occupants, and a sanitation regimen is enforced. Basic utilities such as water and power are provided with improvements constantly upgrading the systems.

Housing construction in the Phase III camp is usually standardized and, at a minimum, roofing is of permanent or semi-permanent construction. Housing groups are located to further assist the people in developing a camp routine. The standardization of housing shelters facilitates the development of the camp road and circulation system.

One of the major facets of a Phase III camp is the balance of centralized and de-centralized services and administration. Central administrative centers are designated wherein overall operations are conducted but small service areas for food distribution, medical care, etc., are scattered at various locations throughout the camp. Administration is facilitated by the location of service points, the symmetrical layout of the camp, and by a public address system.

Development of a Phase III camp is assured only if the government is willing to commit expert technical assistance, especially in engineering, heavy equipment, and materials.
I. **STANDARD (OR GRID) PLAN**

The most widely used plan, the grid layout, is easy to design and construct; it can be built with only limited equipment and can be extended indefinitely with very little supervision required on the part of camp supervisors. Essentially, the camp is a series of square or rectangular use areas defined or separated by perpendicular and parallel streets or paths.*

The primary advantage of this layout is the simplicity of the design and the ease with which various elements of the camp's subsystems (water, drainage, etc.) can be integrated into the camp plan. This layout is also the one most always used to achieve a greater density, as the compactness and standard size of the various land uses require the least amount of additional space to delineate and separate individual areas.

It is precisely the tendency to use this design to achieve a high density which makes it the least desirable of the designs proposed, for a highly dense refugee camp encourages the spread of disease and can encourage undesirable social problems in the camp, all of which in the long run cause increased costs in administration and control.

The grid plan is most adaptable to flat, even terrain, but it can be modified for use in areas with slight elevations. The grid should not be used on hilly or mountainous terrain as the various drainage and sewage systems will not function properly.

---

* The camps are quite similar in appearance to military camps and are usually constructed by military engineers using "typical" plans used for military site planning. Herein lies a major problem, that camps laid out according to military needs (i.e., a group of individuals) neglect the basic problem of adequate space for families and the needs of special groups in the refugee community such as sick, orphan, elderly, etc. Such was the case of many British camps for Jewish refugees in Cyprus following World War II.
GRID PLAN

LATRINES

ADMINISTRATION

KITCHEN

CLINIC

WIND

FREDERICK C. CUNY & ASSOCIATES
INTERTEC
II. CROSS-AXIS CAMP (Cuny)

The cross-axis camp takes its name from the design of the principal planning units which make up the whole camp. The idea consists of grouping four housing units into one planning unit, creating a "+" shaped group wherein one axis serves as a road and the other a footpath.* The groups are located around a central activity center creating a closed system with decentralized points for providing services. At each stage of development, additional units can be added as necessary without conflicting with the planning principles. The housing areas expand outward while the center of the camp develops independently into a central internal nucleus with complete administrative function and is separated physically from the housing area by a belt of open space.

The most outstanding feature of this concept is the means by which open space can be provided without substantially increasing the density of the living areas. As each planning unit is integrated into the plan, a small plot of open space remains at the center of each adjoining cluster. These open spaces can be used for a variety of purposes by the refugees and/or the camp administration.

Another advantage of the design is the flexibility with which expansion can be carried out in a uniform pattern of growth with retention of balanced installation of site improvements.

Another important design feature is the provision of various areas which can be utilized for decentralization of services, still maintaining a geographic center for major centralized administrative functions and overall control.

The camp is not dependent upon the development of centralized water and sewage systems, but the design encourages their installation.

* Each housing unit is of identical rectangular size and abuts the intersection from a different direction. (See page 8)
CROSS-AXIS PLAN

Development

Site Plan

HOUSING AREAS

SERVICE CENTER

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INTERTECT
The cross-axis camp is designed for relatively flat areas but, by redesignation of walkways and roadways in certain sections, can be designed to fit into more rugged terrains by placing the camps between hills. While the concept of the planning units can be thus adapted, the camp will normally lose the advantage of a centralized administrative center.

The camp itself is a more sophisticated design than the grid, but in the establishment of drainage systems, housing, etc., it is no more difficult than the grid plan. Overall planning will require full time supervision, however, and in order to work properly, each planning and housing unit should be of uniform size and design.

**MODIFIED CROSS-AXIS PLAN**

The modified cross-axis plan utilizes the same general site plan as the standard cross-axis, especially in the road and pathway systems. It differs, however, in two key aspects. First, the housing types utilized must be individual, or at most two-family structures. Second, the housing units are arranged to form small planning units, or communities.

This arrangement has proved to be the best possible balance of land use and density and is especially useful in camps utilizing tents for housing. It is very adaptable and by increasing or reducing the number of housing units in the individual planning units, terrain features, trees, cover, etc., can be incorporated into the site without altering the overall design of the camp.

The community units have proved to be an excellent basis on which to organize the camp occupants. The common square in each provides space for group as well as individual cooking, washing, etc., and the limited number of people in each facilitates the tasks of social workers. In short, the design encourages the development of a "community" feeling among the refugees.

The design is also the safest for use with tents. The circulation
system provides an excellent system of firebreaks, every community is accessible to emergency vehicles, and the cooking fires located in the center of each square are a safe distance from the tents.

This design is also easy to lay out and requires no sophisticated equipment. In fact, in Nicaragua in 1973, this type camp was constructed with nothing more than a hand-held compass and 1,000 metres of string.
CMU COMMUNITY UNIT PLAN

Plan

Planning Unit

Section

Site Plan
CMU
COMMUNITY UNIT PLAN

Plan

Planning Unit

Section

Site Plan
TRIANGULAR PLAN

Planning Units

Site Plan

OXFAM
Sanitation Unit
Main Access Road
ADMINISTRATION
GARDENS

INTERTECT
Box 10502   Dallas, Texas  75207
LINEAR PLANS

Planning Unit

Site Plans

Roadside Camp

Camp on banks of a rice paddy

INTERTECT
Box 10502 Dallas, Texas 75207
III. INTEGRATED SITE-HOUSING PLANS

In recent years, there have been many breakthroughs in the field of low-cost housing construction and many of these can be directly applied or modified for use in refugee camps. In many camps the very design of the housing will determine the camp plan, thus the term "Integrated Site-Housing" applies to any plan which is dictated or greatly influenced by the design of the housing units.

One of the most adaptable designs is illustrated on page 13 and uses a completely standardized building unit for all buildings in the camp, both residential and non-residential. It should be pointed out, however, that this type of construction is initially more costly as units must be built of permanent materials (wood, sheet metal, concrete). The advantage is that a high density can be achieved and yet adequate open space can be retained. In this type camp, it is advisable to provide community dining facilities rather than allow cooking in the structures.
Integrated Site-Housing Concept Plan

Site Plan

Perspective

Analysis

ELEMENTS

The building system is based on three basic elements:

- Foundation beam
- External wall
- The saddle

CONSTRUCTION

4 units create 1 volume.

Piling up
IV. CIRCULAR PLAN (EATON PLAN)*

The Circular Camp Layout represents a proposed large scale Phase III camp which could be constructed under ideal circumstances. The camp is actually a regional plan, made up of a series of satellite camps designed to represent "villages" within the total camp structure. In this concept, each village is built and operated separately from the others but is coordinated from a central administrative complex located at the center of the completed camp. However, the concept is not static and the total camp and the various villages can be modified in many ways. The modular satellite village can be developed singly or in any number up to seven without losing its design features.**

There are many advantages to this concept, the most important being the ability of the authorities to control development. The circular modules are easy to adapt to terrain and thus a master plan can easily be designed and a maximum design capacity assigned. As the camp is built, each module expands in a regulated, uniform pattern to the maximum density. Despite the rate of growth, the development is balanced and the installation of improvements should be able to keep pace with the occupancy rate.

Another important feature of this concept is that it provides for and facilitates the decentralization of administration and services. The geographic center of each village is reserved as a service area and even as the village grows, the area remains central to all the sector. This arrangement allows the staff to provide services to more people with less effort and ultimately less cost. The main headquarters of the camp is in the center of the village clusters; thus, the central camp administration is removed from the strain of the shelter areas and can operate much more efficiently.

* For its designer, J. Craig Eaton, A.I.P.

** Seven is the maximum number recommended due to the problems of administrative span-of-control. Odd numbers of villages are also recommended to keep a balance of open space and expansion area.
The camp layout facilitates, and to some extent is dependent upon, the development of decentralized site improvements such as water distribution and sewage facilities. Each village can develop its own systems based on materials and the terrain. The construction of central water storage and distribution points and scattered latrines/septic tanks is mandatory in camps of this size.

One of the key features of the concept is that it permits the retention of interior lands which can be used to develop resources which can contribute to the maintenance of the camp. For instance, the lands separating the various villages might be used for limited agricultural production. By using new high-yield strains, several crops a year could be produced which could assist in some measure in lowering overall food costs. But more important, it would provide activities for the refugees to help in supporting themselves.

The reservation of these lands also produces a good environmental effect. The density of large scale camps makes the refugees feel isolated. In many cases, large numbers of the refugees are from rural areas. By reserving interior land for agricultural purposes, open spaces are thus provided which serve as a means of reducing the feeling of being "fenced in".

The decentralization of administrative operations to the village level enhances the efforts to organize the refugees and enables the administrator of each camp to have more direct contact with the people. Once a village has reached its design capacity, the area becomes fairly static as routines are established. The administrator of each sector can more rapidly familiarize himself with the particular problems of the village and can identify new problems before they become too great to cope with, particularly health problems. The reduced reaction time in the end can save many lives.

The concept of the camp permits the integration of various groups of refugees into a single camp while allowing them to maintain a portion of their background or identity. In this camp, it would be possible to
Concept Plan of a Model Refugee Camp

India

Plan of Typical Village Camp

25,000 Population
establish villages for groups such as people from the same village or region and/or religious and ethnic groups. In another example, displacees from other camps could be reestablished as a unit in a new village, thus enabling any previous organizational efforts to continue with only minor interruption.

One of the most important features of this type of camp is that it would enable the government to utilize and test a variety of techniques and facilities and to make alterations in the overall design of the camp as they become necessary.

As pointed out earlier, the basic unit of the camp -- the village -- can be altered in design. While the circular layout of the village module provides many advantages over the square or rectangular grid, the latter may be used with fairly good results as long as some separation between villages is maintained. The primary disadvantage to the system is that it takes a good deal of sophistication to lay out the camp and requires full-time supervision of construction in order to maintain conformity to the plan.

The primary advantage of the circular design is the overall reduction of costs. Immediate reductions can be made in the installation of the water distribution and drainage systems, due to the smaller requirement for lines and canals, respectively, as well as the long range costs of maintenance. The drainage system is also more easily adaptable to the terrain and, if necessary, independent systems can be used. Other cost reductions are a result of better access and control of the shelter areas.

The circular system allows expansion of the village, yet tends to maintain separation of villages within the camp. This is an important factor in preserving space between the villages for self-help projects and lessening the effects of population density. As mentioned earlier, this is important for refugee organizational efforts. It is easier for people to adjust to a village-like environment than to a large, endless camp. Also, because the circular design will tend to keep the size of the camp within reasonable limits and maintain the administrative area in the center of the village, relief services and distribution activities can be accomplished with greater ease.
REFUGEE SETTLEMENT CENTER

In the developing countries, a refugee situation puts an unwelcome strain on the economy of the host country. Many situations have developed into very long-term stalemates with refugees languishing for years, often generations, before either returning to their homelands or being absorbed by the host country.

In these stalemated situations, the host country may wish to explore an alternative to conventional refugee camps and develop self-supporting refugee settlement centers. The settlement center serves two functions. First it provides a balanced community wherein the refugees develop agricultural and light industrial operations to support themselves. Second, the center is used by the government to develop lands previously undeveloped. The centers also provide an excellent controlled environment to test new high-yield strains of crops.

The development of the RSC is more complex than standard refugee camps and requires a good deal of technical assistance in developing agricultural and economic activities, but in the long run, the centers can offset and greatly reduce the costs of maintaining the refugees.

The RSC would be well suited for use in Africa, the Middle East, and portions of South Asia. The RSC would also be extremely useful for resettling a nation's own refugees from natural disasters in any geographic area.
SUMMARY

The designs illustrated herein are essentially concepts which can be used to guide the refugee camp planner and provide him with some alternatives to existing plans. However, each situation calls for particular design and planning work and no pre-set plan can be made to fit each case. Every camp plan must take into consideration the "situation and terrain", and there is no substitute for an on-site engineer or planner-in-charge. As noted repeatedly, a refugee camp is essentially a town and must be planned and built under the same design criteria but with greater consideration for the occupants. Town planning techniques such as cul-de-sac streets, integrated walkways, development of perimeter streets, etc., are all adaptable to camps.

If the camp planner uses his imagination, follows a balanced plan, integrates services and facilities properly, and maximizes the use of every available material, a decent environment can be built in which refugees can live until they can return to their homes. And if the camp planner has done his job well, many former refugee facilities can be converted to other uses by the host country once they have ceased to house the refugees.
The architects prepared schematic site plans to show their general recommendations. In plan, a camp should have “simplicity and clarity of organization without regimentation,” they stated. At the center is the day-care facility, locus also of the clinic and other group facilities. Since the camps are not permanent settlements, it is hoped that a community feeling can be “built in” through natural meeting places, with the privacy of the individual family being respected through private spaces, indoors and out. Because of dust, the front of each dwelling is oriented away from the access road, yet each family must be able to look out on its most important possession, its car.
REFUGEE CAMP PLANNING:
THE STATE OF THE ART

By Frederick C. Cuny
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MIRPUR REDEVELOPMENT PROJECT

Original Conditions

After Reconstruction

A joint project of:
CMU
INTERTECT
MCC
OXFAM
UNICEF
REFUGEE CAMPS & CAMP PLANNING: THE STATE OF THE ART

I. Introduction

In 1971, a group of engineers and planners formed a team to undertake a detailed study and analysis of refugee camps — how they operated, how they could be made more manageable, and how they could be designed to be more cost-effective. The studies included an examination of social and health problems, an analysis of the economic constraints encountered by relief organizations and local governmental authorities, and a review of administrative and organizational factors which affect the management of camps. The results of the studies, which are on-going under the auspices of INTERTECT, emphasize several important points:

First, refugee camps are manageable. If properly laid-out and organized from the outset, problems can be substantially reduced.

Second, camps can be cost-effective. If properly planned, and if adequate resources are committed at the outset, refugee camps can be run with a minimum of administrative cost, with the refugees operating most -- if not all -- of the camp sub-systems. Furthermore, the total costs of designing and installing a livable refugee camp are less than the continuing operational costs of a sub-standard camp.

Third, in high exposure environments such as the tropics, good physical layouts or plans can save lives. Designs which facilitate sanitation and encourage refugee organization reduce the incidence of disease and promote participation by the site occupants in activities which ultimately lead to their looking after their own welfare.

The conclusions drawn thus far can be illustrated by examining the major case studies which were conducted by members of the team. The methodology employed in each case was to study first-hand problems of existing camps in various disaster situations, and to examine to the greatest extent possible
the following factors:

Physical Factors --
1. Layout or design of the camp, planned and actual.
2. Physical components of the camp, such as housing, sanitation, water distribution, etc.
3. Land use -- how facilities such as housing, clinics, etc., were grouped and how well they functioned in their area.
4. Land tenure -- who owned the land, how did it become available for a camp?

Social Factors --
1. Demographic information -- who were the refugees? what was their life-style before they came to the camp? what was the make-up of the population by age, family, etc.?
2. Organizational factors -- what was the organizational-labor potential? what types of organizations were successful? how well did the refugee labor perform?

Health Factors --
1. Incidence of disease -- what diseases were prevalent? how were they most often spread? how were they affected by the layout and environment of the camp?
2. Health programs -- what programs were successful? how did the layout of the camp affect the manner in which they were conducted?

Administrative Factors --
1. Administration -- how was the camp run, by whom, and who made the real decisions?
2. Refugee organization -- were the refugees organized? if so, how? how did the organization work? to what extent did they participate in the running of the camp?
3. VOLAG Contributions — to what extent did voluntary agencies participate in camp administration? where were they most useful, and where was their money best spent?

4. Costs — who spent what, when, where and how much? were expenditures cost-effective?

In the research program the team relied heavily on the personal experience not only of our own staff but also of the field staff of the various governments and relief agencies.

II. Major Case Studies

A. Camps in an International Refugee Situation (India 1971):

The first case study undertaken by the team was conducted during the Bangladesh civil war in 1971. During the period preceding India's invasion of East Pakistan in December of that year, an estimated 10-12 million Bengalees fled to India for sanctuary from the fighting. The vast majority of these were placed in refugee camps which were concentrated in areas near the border. The largest number of camps were in the state of West Bengal, especially in the districts near Calcutta. Camps in this area ranged in size from a minimum of 3,000 persons to several which had a population of over 250,000.

The study of camps in this situation was important for several reasons. First, and most important, this was the largest relief operation ever conducted in the developing countries. Second, it was an international refugee situation; i.e., the refugees crossed an international border and their survival and maintenance became a responsibility of a government whose first obligation was to their own people, not to the refugees. Third, the refugee population was not constant; it kept expanding until the very end of the war, making it difficult to get ahead of the situation or even to stay abreast of developments.
The first conclusion which arose from our study of the Indian camps was the realization that, in a situation where there is a constant influx of refugees, three distinct classes of camps emerge. Each type can be identified or classified according to the stage of crisis during which it was erected, and to the extent of prior planning which was undertaken. Using these criteria, the three classes of camps were designated Phase I, Phase II and Phase III camps.

Phase I refugee camps are those camps which are set up immediately following a disaster or during the initial influx of refugees across a border. Due to the shortage of time, no prior planning has been taken in their establishment. They are considered temporary by the government and receive only emergency items in the way of relief supplies. Despite their being considered temporary, as long as there are large numbers of refugees without shelter, the Phase I camp is difficult to close. A Phase I camp is often used as a processing center and thus is usually located near a railroad, a major highway, or sometimes an airfield. Due to the expansion of its population and its temporary status, living conditions in the Phase I camp are the worst of the various types. (Figure I illustrates a typical Phase I camp.)

A Phase II camp designates those which are set up with limited planning and are designed to be semi-permanent (no immediate closing is foreseen). The camps are usually in much better physical shape than the Phase I camps since authorities have had time both to realize the magnitude of the refugee problem and to learn from the initial mistakes of the Phase I camps. The major difference in the overall site is the willingness by both government and relief organizations to commit permanent as well as semi-permanent items to camp development; these include such articles as roofing materials, field hospitals, etc. In some cases, the government will commit a major governmental property for use by the refugees as a camp. In most cases, the camp is restricted for a predetermined or maximum number of refugees.
A Phase III camp is a permanent camp built from the ground up as a refugee camp; it is designed to maximize control and administration, reduce overall costs and facilitate the delivery of relief services. The principal characteristics are that considerable advance planning has been undertaken and that a comprehensive master plan for the camp has been developed before the refugees begin occupying the site. The critical element to success in the development of a Phase III camp is the ability of construction and administration to keep ahead of the resettlement of refugees in the camp. Resources for balanced delivery of services, adequate drainage, shelter and sanitation are committed early in the development stage.

The significance of this classification of camps cannot be overstated. It gives the planner/researcher a framework for analyzing results in terms of the level of commitment, and it provides a basis for comparison of site plans and their relationship to the operation of a camp.

The second important lesson derived from the study in India was that successful operation of a camp is directly related to the layout of the camp. Across the board, camps which were disorganized and haphazard in their layout were more costly and difficult to manage than camps of similar or even larger size which were laid out in an orderly scheme. Most successful were those camps which were laid out on a use-area plan, i.e. common activities were provided land so that they could be grouped together.

In India, all the camps which had any kind of plan used a grid system; that is, the housing units were placed in lines which were divided by streets and walkways into squares. While this was better than no plan at all, it tended to give the camps a regimental appearance and did nothing to give identity to individual areas. Even so, we discovered a tendency of residents to regroup within the grid and to try to divide themselves up into some sort of community space. Why not, we asked, design camps with small communities built in?
These observations lead to the third major lesson identified in our study. This was the realization that when large numbers of people are concentrated in a small geographic area, in effect a camp ceases to be a camp; in actuality it becomes a town or a small city with all the accompanying problems. A refugee camp must have housing, water, sewers, roads, clinics, fire protection, garbage disposal, parks, schools -- everything found in a town. Thus, development plans for refugee camps should be considered with the same detail as a master plan for a town. If the camp is treated as such and if the government and voluntary agencies will coordinate the refugee relief program with the development of the camp, the net effect will be an overall reduction in the long-range costs of supporting the refugees.

The final observation of major importance learned in India was that the success of any camp plan is dependent on having adequate facilities installed before the refugees occupy the site. If occupancy outruns production, the unprovided-for people will multiply the adverse factors in the camp and will increase the problems which the camp was designed to alleviate. Indeed, authorities must often be ruthless in the assignment of refugees to a camp and often deny entry until the camp is sufficiently under construction. To reduce this problem, all components or systems of a refugee camp as well as the plan itself must be designed for extremely rapid installation and mass production. In terms of camps, this means developing a variety of standardized camp layouts. Based on given data, a layout suitable for a particular situation can then be selected.

B. Camps Following a Natural Disaster:

During the following year, the team studied a number of camps in various countries in Africa and the Middle East and began work on a series of standardized camp plans which could be used in a wide variety of situations. The earthquake in Managua, Nicaragua, in December 1972 provided a further case study and the opportunity to use a standard plan and monitor its performance.
1) Managua (1972): Several days after the disaster, INTERTECT sent a small team to Nicaragua to assist OXFAM and volunteers of the Catholic Institute on International Relations and the Nicaraguan government in establishing a refugee camp program. Construction was delayed for over a week while the government tried to decide how to handle the refugee problem. At this time there was no risk from weather exposure, and the majority of refugees had moved to outlying areas to stay with relatives. However, in the town of Masaya, which is 30 Km. from Managua, a large number of refugees without nearby relatives had moved into the town square, parks and open lots, and were living in the open without any health or sanitary provisions. On January 6, 1973, the government announced that it intended to build a series of refugee camps for the refugees who had not been absorbed by the extended family system, including one camp for the refugees at Masaya. At this point, OXFAM offered to assist in development of a model camp at Coyotepe, a site 2 Km. east of Masaya, with design and supervision of construction to be under the direction of INTERTECT. The Nicaraguan government accepted the offer and, on January 7th, the construction began.

The plan selected for the camp was called a modified cross-axis plan. It consisted of a series of small communities of 10-16 housing units (camping tents) grouped around a central administrative core where administration, clinics and storage facilities were located. Each community was designed to provide private space for each shelter as well as a large "common" or open area for community use. By orienting the opening of each shelter inward, it was felt that a sense of community could be provided. Each community had

1. See D. S. Yeager, OXFAM Operations: Nicaragua.
2. For an examination of the importance of the extended family in Nicaragua, see Ian Davis, Provision of Shelter in the Aftermath of Natural Disasters.
3. The name is derived from the points or axes where construction on each group of communities is begun. It differs from a cross-axis plan due to modifications necessary to allow single-family as opposed to multi-family housing.
provisions for group cooking, washing, and recreational activities. An integrated road and walkway system was built to provide access to all communities and was constructed with sufficient width to provide adequate fire breaks throughout the camp. Space was allotted at the edge of each roadway for drainage ditches to be built (see Figure 2 and Figure 8).

Sanitation was provided by bore-hole latrines placed at the perimeter of the camp but within easy walking distance to all shelters. Water was supplied daily by truck, although a few water lines were later installed. At the edge of each intersection of the roadways, a tall (10 meters) lightpost was installed with one high intensity mercury vapor light and several electrical outlets for use by each community.\(^4\)

OXFAM and the CIIR staff provided assistance to the refugees which included registration, social services and community organization (even organizing a camp newspaper). The refugees were included in all plans of the construction program and assisted to a limited extent in developing modifications to the cross-axis plan.

How did it work? Despite the failure of several of the sub-systems — notably the camping tents and the water systems — overall operation went very well. The camp remained in its initial form for several months\(^5\), and we had ample time to monitor various aspects of the whole camp. In addition, the U.S. Army built two refugee camps of the same size in other locations, both using a grid layout with no prior planning or sequencing of development. The differences between their camps and Coyotepe were amazing. As a sample:

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4. For a detailed discussion of the Coyotepe camp, see INTERTECT, Report on the Coyotepe Refugee Camp, and Ian Davis, "Disaster Housing: A Case Study of Managua".

5. Several months later, a German team moved into Coyotepe, removed the tents and installed some polyurethane igloos in a grid system. The refugees moved out gradually over the next month and the camp was closed.
-- Our camp cost 37% less to operate.

-- There were no major health problems in Coyotepe. The Army camps were plagued with skin infections, various waterborne diseases and several outbreaks of minor contagious disease. At the Tipitopa camp, 100% inoculations were conducted 6 times; at Coyotepe no inoculations were ever given except on an individual basis or to those living immediately next to an affected patient.

-- By every account, Coyotepe was a relatively happy and industrious camp. Photos show small cottage industries in the camp, children playing, and women working together on household chores. At Tipitopa, the Army had to forcibly segregate one segment of the camp to keep order, and thefts were prevalent.

-- A strong refugee council evolved at Coyotepe and informal organizations abounded; at the Army camps, participation was weak and the volunteers working there reported extreme apathy was prevalent.

It is difficult, of course, to determine how much of this was due to the layout of the camp as opposed to other factors such as the quality of the relief effort in each camp. But an examination of data collected about the refugees in each camp shows that they were all from the same socio-economic background, held the same level of skills, and received the same general social services. In addition, the same types of housing, latrines and water supply were used. On the basis of this data, we concluded that the layout of the camp had facilitated community organization, promoted a feeling of group security, reduced the incidence of disease, and reduced the level of administration required to operate the camp. This enabled the refugees to recover faster and look after their own welfare sooner.
The relief operations in Nicaragua gave the team an opportunity to study the differences between a major relief operation following a natural disaster and one for war refugees residing in a country which was not their own. The differences are significant, especially as they pertain to refugee camps. First, in the former case there is only one type of camp; there are no phases such as in an international refugee situation. Second, the government, for political reasons, must respond itself to the needs of the refugees; thus a camp will receive more consideration by local authorities, and more resources of the government will be available to the camp builders. At the outset of a crisis, in fact, more facilities are immediately available for a camp than for refugees residing outside a camp. However, these resources dry up very quickly as the priority shifts to reconstruction programs. The implication then is that flexible, pre-planned layouts are necessary from the outset to provide a framework for the commitment of maximum resources while they are available.

A third difference relating to camps is that the number of refugees following a natural disaster is constant. This enables the planner to design a camp for an ultimate capacity, facilitating selection of both a plan and a site.

Another factor is that social services within the camp are geared to getting the refugee back into the mainstream of national life, while in an international refugee situation, the government will usually restrict refugees to activities within their camps and prohibit them from meaningful work outside. The significance here is that social and community organization will be easier in the former type of camp while the supply of labor for camp improvement and maintenance will dwindle as reconstruction progresses. This further emphasizes that the camp, by design, must facilitate rapid and easy maintenance and operation.
A final point which is significant to the space allotment per family in the layout is that following a natural disaster, refugees usually have more possessions than do escapees or evacuees from war zones who in many cases travel long distances and cannot bring their valuables with them. Most camps will be located near their former homes, so they may often rescue such items as clothing, furniture and prized possessions. Furthermore, they will be able to obtain more goods as reconstruction progresses due to their inclusion in the work force. Thus, the camp planner must select a plan which allows more space per family and encourages a system of community participation in reducing thefts. In most cases, this means single-family housing units and some sort of community arrangement where everyone can see what is going on in the immediate area.

During the comparison of data obtained from our study of the camps in and around Managua and camps in other situations around the world, the team became aware of an important consideration affecting camp planning in all relief operations: the fact that few of the camps established following a natural disaster -- and Phase II or Phase III camps in an international refugee situation -- are ever totally abandoned. Once established, the land rarely reverts to its former use. In Managua, two out of three camps are still utilized as refugee communities, even though they are no longer classified as camps. We thus decided to expand our study to see how a refugee camp evolves and what forms it takes during evolution. This study would point to additional criteria to be considered in site selection for a camp. The refugee camp at Choloma following Hurricane Fifi's devastation of eastern Honduras in 1974 provides a case to illustrate this evolution.

2) Choloma, Honduras (1974): In the immediate aftermath of the hurricane, a number of camps were constructed as temporary settlements for refugees. The largest was established near the town of Choloma to house 318
families (1,831 persons). The site selected was formerly owned by a small cement company and was adjacent to their plant. The land is flat, bordered by a creek, a railroad, a government building site, and a major highway (see Figure 3). The main reasons for choosing the site were that it was close to the ruins of Choloma and that it had not flooded seriously during the hurricane.

The camp was built by a consortium of agencies. Housing consisted of tents provided by the Venezuelan and Canadian armies. The tents were laid out in two separate blocks, each of which used a grid pattern. No consideration was given to terrain (except to avoid obvious areas of standing water), spatial orientation or social factors. The tents were originally only 1-2 meters apart. A number of social services were provided by various relief agencies at sites which were scattered around the camp; latrines were likewise scattered.

INTERTECT visited the camp 3½ months after it was built. By that time, evolution of the camp was well advanced, and we were able to observe a number of interesting developments. First, the camp had already begun to change from a temporary refugee camp to a permanent community. A number of agencies had persuaded the cement company to sell the land, and a complex of multi-family housing was under construction.

The remainder of the camp had changed quite a bit from the original layout. The grid was still followed, but many of the families had relocated their tents or had exchanged tents with others in order to be near friends. In some cases the re-grouping consisted of community arrangements not unlike the community units in the Masaya camp in Nicaragua. All administrative services had re-established themselves near the center of the camp (except the clinic which was in a wooden building too heavy to move). What made this interesting to us, and the study significant, was that neither the government nor the voluntary agencies provided any administration for the camp; thus we were able to see what the refugees themselves did to the camp, and how the layout was affected.
From the study, we were able to identify three stages of development or transition within the camp. Subsequent studies have shown that these occur in almost all camps following a natural disaster. Stage I covers the period of initial occupancy. Refugees go where they are assigned, or take what is available. There is little or no involvement or participation of the refugees.

Stage II is the period of reorganization; people establish new friendships or find old friends, and a social reorganization begins. This is characterized by adjustments in the camp layout, such as moving tents, re-grouping into units, centralizing services, and establishing refugee organizations.

During Stage III, occupancy becomes tenure. The refugees are already on the land, so it seems "logical" that they rebuild here. After all, why move again? So permanent facilities are installed and the camp becomes a permanent community.

The trouble with this evolution is that -- more often than not -- the site for the new community has received no more consideration than that originally given to the refugee camp. In the case of Choloma, the site was exceptionally poor. A survey later showed that the reason the site had not flooded earlier was because a temporary diversionary dam had been created by mud slides upstream, and the site where the new housing was being constructed could easily be inundated in another severe storm. Thus, the camp planner is faced with a major design consideration: select every campsite as if it were for a permanent community. It very well may be!

C. Refugee Settlement Centers:

A discussion of housing activities around Choloma provides an opportunity to discuss another type of development which often comes under the planning activities of relief authorities; this is the resettlement community, or Refugee Settlement Center. Typically, these have developed following a
natural disaster when the site which was destroyed by the disaster is considered too dangerous to rebuild; thus, new communities are required.

In an international situation, Refugee Settlement Centers may also be built by a host country to re-settle refugees who have virtually no chance of returning to their own country. RSC's following a natural disaster are usually small communities of 25-50 houses built by a voluntary agency. The number is usually small due to the limited resources of the voluntary agency and the high cost of permanent housing. The RSC's are ordinarily found on sites near the old town, and the residents usually retain their identity with the whole community. In Choloma, a total of five RSC's were built and, although some are several miles from the town, all are officially considered a part of the township. (See Figure 4.)

Refugee Settlement Centers developed to rehouse international refugees are usually constructed by the host government and may be a great distance from the refugees' country, not to mention their former home. Host countries typically build RSC's for two reasons: to develop a community wherein the refugees can pay for their own maintenance, and/or to settle and develop lands previously underdeveloped or unpopulated.

The development of an RSC is more complex than that of a refugee camp and requires a good deal of technical assistance in developing appropriate layouts, agricultural and economic activities, and administrative structures. But in the long run, the centers can offset and greatly reduce the cost of maintaining the refugees. Because of the complexity of an RSC, each must be developed individually, and standard layouts can rarely be utilized.  

6. For more details of the Choloma project, see F.C. Cuny, Report on the Refugee Camp and Housing Program in Choloma, Honduras, for the Refugees of Hurricane Fifi, December 1974.
D. Redevelopment Programs:

To this point, we have discussed camps which have followed either a war or a natural disaster, the camps with which the relief administrator will normally be confronted. There is, however, one more type of camp which may be encountered, especially in countries such as India and Bangladesh which have extremely high density populations. These camps are the result of mass eviction. In south Asia, they are called "Bustee" camps and, as there are more in this area than anywhere else, that term is universally applied to connote this type of camp. These camps take on the worst aspects of Phase I or II camps, i.e., limited or no pre-planning; but what makes them unique for the relief administrator is that he does not have an opportunity to work with the refugees until the camp is a fait accompli. In order to effect a physical change, he must redesign an existing camp, an extensive task which few agencies are willing to undertake. However, redevelopment programs can be conducted successfully if a proper programming of activities is established. A recent case in Bangladesh can be used for illustration.

Following independence in 1971, the government of Bangladesh rounded up an ethnic group called Biharis whom they felt were Pakistani partisans and whom they intended to "ship back to Pakistan". Pakistan refused to accept them, and today most still languish in the camps set up after the war. One of the largest of these is Mirpur, a subdivision of Dacca which had been a Bihari area before the war. Thousands of additional people were forced into the area, and families were living in every available space and along several of the roads. The worst area of the camp was a one-acre plot at the edge of a stagnant pond, on which 108 families resided in 56 makeshift houses. Around the edge of the pond, dozens of open latrines had been built and, after three years, the health hazard and potential of disease was enormous.

A number of agencies were interested in trying to improve conditions in the area. Under the auspices of OXFAM, a demonstration redevelopment plan
was prepared by INTERTECT (Figure 5), in which all the agencies were able
to participate. The plan also incorporated a demonstration of two new relief
items: the OXFAM sanitation unit which had already been installed, and the
Emergency Shelter Unit designed by Carnegie-Mellon University/INTERTECT. 7

The plan consisted of three phases. In the first, several on-going
projects were incorporated and sequenced. These included improving the site
around the OXFAM sanitation unit; rehabilitating the pond from an open septic
pool to a fish pond; and installing a drainage system to keep runoff water
from the site entering the fishpond. This involved leveling the entire site,
filling in the cuts and holes, installing the drainage canals, draining the
pond and shaping the bottom, and building a berm around the edge.

Phase two called for demolishing the existing structures and installing
the Emergency Shelter Units. The units, which are multi-family structures,
were grouped in small, inward-facing rectangles. The objective was to provide
structurally sound housing for each family, at the same time providing areas
for community open space in each of the rectangles.

Phase three was an integrated camp improvement program consisting of
development of gardens and installation of tube wells in the open space within
each rectangle; construction of showers and washracks for the whole area; and
completion of the fish pond. During this stage, a number of social services
were also initiated. All work was carried out by the refugees themselves who
were paid under a Food-For-Work program. Participating agencies included
OXFAM, the Mennonite Central Committee, World Food Program (UN), UNICEF and
Carnegie-Mellon University/INTERTECT.

7. The OXFAM sanitation unit is probably the greatest single item yet produced
for relief operations, especially in refugee camps. It enables planners to
provide close-in sanitary facilities throughout camps, thus providing great
flexibility in design. It is to OXFAM's credit that they have been devel­
oped, to their detriment that they are not more readily available.
A complete report on the C-MU/INTERTECT Emergency Shelter Unit may be
obtained from Carnegie-Mellon University, Advanced Building Studies Program,
Schenley Park, Pittsburgh, Pennsylvania 15213.
This project illustrates two important considerations. First, an integrated re-development program can be conducted in an existing camp. While the costs may be high, by combining on-going programs and projects for which funds are already budgeted, a combined package can be developed wherein the costs can be distributed. The success of the Mirpur program to date provides a strong argument for the integration of social, health and physical programs.

Second, while a standard layout for the entire camp is not practical for re-development, elements of a standard layout -- such as the community units -- can be used. Thus, the camp planner should concentrate on developing various flexible community unit arrangements which can be selected for re-development programs. These unit plans must be developed using the same design criteria of a larger camp, taking into consideration such constraints as traditional living arrangements, housing types and spatial orientation.

III. Recommended Approach and Methodology

Once the examination of the various classes and types of camps, as well as their evolution, was complete, the team was able to develop an approach and methodology to refugee camp planning and design. We concluded that four elements are necessary to develop a successful refugee camp: a balanced planning approach; adequate site selection; good site planning; and development of a balanced camp improvement program. The design of refugee camps must be based on a realization that maximum density may be achieved within a limited area without creating detrimental social problems only by designing a community completely balanced within its primary borders. The development of the camp must create settlements rather than simply an area of emergency shelter. Camps must offer a full range of educational, recreational and medical facilities. Special emphasis should be placed on encouraging new
and more efficient methods of site development, housing construction and provision of camp facilities through the practical application of new systems and technologies.

To initiate the development of a refugee camp, a detailed master plan should be prepared. A critical path, with decision points, should be followed and consultation with all concerned national, state and local officials and relief organizations should be effected early in the process. Integrated in the planning process are social objectives, determination of administrative structure, and an economic and cost profile. A new camp should be self-contained with a high percentage of development work carried out by the refugees themselves. An investigation should be made to determine if suitable programs or items are available which can assist in making the camp semi-self-supporting. Such programs would include agriculture/garden projects, cottage industries, etc.

A. Planning Approach:

The planning approach should be structured to include the following: Program; Design; Production; and Occupancy.

Programming is the first step and includes assembling the data upon which decisions about size, location, budget, timing and social structure of the camp can be based. With the exception of social characteristics data, these are standard analyses which are based on town planning practices. All relief situations demand a social profile of the refugees and a preview of projected occupancy; these provide the socio-spatial basis for the design.

Design involves the testing of alternative plans against the data assembled; a decision upon a general layout; its expression in a preliminary site plan; and the production of a construction plan or Camp Development Program. 8 Special attention to the social and economic consequences of the

8. See F.C. Cuny, Refugee Camps & Camp Planning, Report III.
plan is called for, and it should be exposed to review by as many agencies as possible before construction begins.

Production is the longest phase and is the actual building of the new camp with its myriad disruptions, confusions, compromises, and changes. Surveys of early refugee conditions during this stage will reflect the ordeal of their personal readjustments to new and different surroundings and their frustration in having to make do with minimal facilities. Nevertheless, it is important to conduct on-site evaluations of the constructed areas in light of the actual-versus-anticipated physical and social performance. Mistakes in the design can often be corrected during the early stages of production.

Since the new camps will be in stages, there is opportunity for valuable feedback from the first stages to succeeding ones. Recurring systems and engineering investigations should also be conducted at each stage of development, with continuous communication of findings back to the design program.

Occupancy initiates the real testing of the planning approach selected. After construction is complete and the refugees have moved into the camp, important social and health changes should begin to occur among the occupants as they adjust to camp life. At this point, the authorities involved should conduct a series of studies (especially a census) to enable in-depth comparisons of actual-versus-projected refugee composition, activities and interaction, along with an evaluation of the workability of the total camp design. Continuing feedback of relevant data into programming for other new camps is probably the single greatest advantage of this approach, for it offers a means of continually evolving operational, environmental and design objectives from actual experience.

B. Site Selection:

Before a camp can be built, a suitable site must be selected and acquired. Varying factors which have a bearing on site selection include:
Topography: The site should be on gently sloping land of sufficient size to avoid overcrowding. Good drainage is essential; marshes or low ground which doesn't dry quickly after rains should be avoided. Extremely rocky sites are generally undesirable but are preferable to marshy lands.

Outline of Water Areas: A stream or the shore of a lake or other body of water may dictate modification of layout. High adjacent stream flood levels will require building at higher elevations. Flood hazards must be evaluated to preclude dangerous and unnecessary use of flood plains. Construction should be sited beyond the known flood level.

Soil Types and Conditions: Foundation difficulties due to ledgerock, swamp or other unfavorable soil conditions may affect layouts and require increasing the minimum distances between housing areas.

Existing Vegetation: Sites with grass or tree cover should be selected as opposed to barren sites. The value of ground cover for shade and heat reduction, dust control, and soil erosion prevention is great. Existing plants remaining in place give effective ground cover immediately; vegetation planted to take the place of ground cover which has been destroyed cannot be expected to protect until a later time. Modifications in plans and special measures adopted during construction to preserve existing vegetation cost less than the cost of restoration planting. Similarly, the preservation of existing soil, grass and trees, and the adjustment of all construction areas to conform to the dictates of topography, are the best preventative of soil erosion and assurances of dust and erosion control.

Prevailing Winds: The site should be selected to take advantage of winds but, at the same time, not to be overly exposed in high wind environments.

Access: All potential campsites must be located near roads. Larger camps should be near railroads or airports.
C. Site Planning:

Camps must be planned units, and the plans must enable authorities to administer and control all related activities with maximum flexibility and minimum effort. Considerations in site planning include:

Layout: Due to the limited sophistication of planning techniques, overall camp planning must necessarily utilize a "use area" approach. This entails assigning each land area a particular use (e.g., housing, administration, etc.), then integrating the various uses into an overall system. In most terrains, standardized designs can be adapted for use. The delineation of use areas provides the basis for circulation (road and walkway) and drainage systems. Efficiency of operation should be the prime consideration in the arrangement and relationship of areas such as housing, motor storage, warehouse-utility, recreation and other functional areas. Where economies in construction may be made by adjusting plans to topography, the housing area or other areas may be spaced farther apart. Savings in such costs, however, may be cancelled by the cost of additional roads and utility lines for expansion of the typical layout.

Sanitation: Each camp must be built around a sanitation plan. Especially crucial are latrines. In a large camp, the number necessary to adequately serve the population can be staggering, and placement of latrines can be a major problem. Also included in sanitation planning should be areas for washing and laundry.

Housing: The provision of adequate housing must be considered with great care. Where permanent buildings are not available, a variety of temporary structures may be utilized, depending on the climate and terrain. In selecting and siting housing, consideration should be given to the size of the families to utilize the structures; the social structure (extended families, individuals, tribal units, etc.); and traditional living
patterns. If, for example, the camp is to be composed of members of a village, a housing arrangement which is similar to the evacuated village may facilitate the refugees' assimilation into camp life.

**Drainage:** Good drainage is essential to the camp plan; if the camp cannot be drained adequately, the result will be an increase in disease. Provision for adequate drainage facilities in the early planning and early stages of construction will reduce the time needed for construction and overall expenses. Problems in draining various areas of the camp should not be treated independently from road drainage. Necessary excavations and grading should be considered in the preliminary studies and shown on construction plans and, in many cases, should precede other construction work to minimize hand labor. The work should be planned to utilize machine grading if available, but plans should be based on hand labor to be more realistic.

**Circulation and Transportation:** Each camp should have a circulation system which includes vehicular approaches, internal vehicular drives, major walkways connecting the various use areas, and footpaths for local circulation. The entire system should be above the local flood level and should be designed in conjunction with the drainage system.

**Water:** If a public water system is nearby, connections to the camp may be possible and the important problem of a satisfactory supply of water may be solved. Where the only sources of water are wells, springs, streams or ponds, these must be tested for quality and quantity and, when in use, should be continually checked by a physician so that all necessary measures against pollution/contamination can be carried out. If possible, water points should be established throughout the camp.

**Fire Prevention:** Selection of sites for individual structures is based upon the function of the structures and upon fire prevention procedures.
In areas of temporary-type construction, the following fire prevention provisions should be utilized:

- Firebreaks between every appropriate one thousand feet of built-up area; width of firebreak should be 50 meters.
- Spaces between buildings of frame construction should not be less than these minimums:
  - between one-story buildings: 15 meters
  - between one-story and two-story buildings: 20 meters
  - between two-story buildings: 20 meters
  - between isolated warehouses, not including platforms: 25 meters
- The preferred separation between the sides of warehouses which do not face railroad loading platforms is 30 meters.
- Spaces between tents should not be closer than the following minimums:
  - between tents measuring less than 5 meters by 10 meters, side by side: 2 meters
  - between rows of tents end-to-end, clearances of 10 meters
  - between tents and other types of structures: 10 meters
  - between every 300 meters of tent-occupied area, a firebreak of 25 meters

Waste Disposal: In large camps, the problem of waste disposal can be overwhelming. Areas and facilities must be planned for collection, transportation and disposal of both solid and liquid wastes.

Administration: All administrative functions of the camp should be placed in a physically central location; in larger camps, many functions can be decentralized and established in sub-areas of the camps. All administrative areas must be above the flood level. Activities which may be considered administrative are: camp administration; medical facilities; warehousing; vehicular storage and parking; educational facilities.

Lighting and Power: If existing electricity lines are not too far distant, temporary service may be possible; if not, internal sources of power
should be arranged utilizing generators. Proper lighting must be installed as soon as possible. While it will assist administration in many ways such as keeping down disturbances, the singular most important aspect is that it will reduce the incidence of night defecation in areas other than the latrines.

Recreational Areas: As the number of refugees increases, they must have a release for tensions that will build up. Thus areas must be designated and preserved for organized recreation. These areas should at least be big enough to play football. They can also be used for other programs such as camp meetings, etc. If possible, recreational equipment for small children should be provided.

Security: Arrangements should be made to provide areas and facilities for camp guards, police and fire personnel and equipment. Spacing of structures for fire protection based on the guidelines outlined earlier should be followed.

Commercial Areas: In many camps, planners may wish to establish areas for commercial stores, refugee work centers, or cottage or light industries which will enable the refugees to participate in their support.

Signs: A series of signs should be developed to facilitate the location of activities for both residents and visitors. Signs should be both graphic and colorful, in both the local language and the language(s) of principal foreign relief organizations.

D. Camp Development Programming:

A balanced plan for construction and improvement of a refugee camp is called a Camp Development Program. The CDP is a vital link between the camp's master plan and the actual construction of facilities. If a detailed CDP is not undertaken before construction, there is a high probability that improvements will not be realistically paired with resources. By camp development
programming, needs can be identified and priorities established in line with available resources; thus, a higher utilization of these resources can be achieved.

The purpose of the Camp Development Program is to develop an orderly schedule of permanent improvements needed by the refugees. The CDP aids in determining needs, establishing priorities and analyzing the government's ability to bear total costs. The proposed -- or concept -- plan of the camp identifies in general terms what the government wants to accomplish; it is vital to the relief effort because it lays out a plan for financing improvements as well as scheduling activities.

The processes outlined here are applicable to all phases of refugee camp development and are recommended as a guide. Preparation of a Camp Development Program calls for the following steps:

--- An inventory of needed site improvements including cost estimates and an initial evaluation of their relative priority.

--- Analysis of past camp improvements and various systems' workability.

--- Analysis of project requests from assisting relief organizations, usually involving discussion with the sponsoring organization.

--- Investigation of the financing capabilities of the government and/or assisting relief agencies.

--- Analysis of available material and equipment.

--- A schedule of project execution in a long-range program list which considers the relationships of the improvements to each other and overall material availability.

--- Selection from this schedule of a slate of improvements for early action. This generally takes the form of the development budget for the coming year.
Formal adoption of the development budget against the background of the long-range recommended program, usually after some form of higher review.

The preparation of the Camp Development Program must be a cooperative effort. The process should be initiated by the government through a communication asking for the cooperation of all involved and outlining the purposes of the program. It is important to involve all groups who will be working in the camp in the identification of projects because of their knowledge of the specific needs of the refugees. The government plays an important coordinating role by making sure that requested improvements conform to the government's ability to pay. The government must establish general objectives and, of course, be responsible for the execution of the program. Refugee leaders must also be involved because of their knowledge of immediate needs.

1) Procedures for Programming: After the CDP has been initiated, several basic studies must be made. These involve three main areas — general information about the refugees to live in the camp; availability of money and materials; workability of proposals, and needed and planned projects. Much of the information may be available from other studies or from personnel at other camps.

Background Information: Certain general background materials are essential for the preparation of the Camp Development Program. These include demographic materials on current and/or projected population; geographic features of the camp site; the economy of the surrounding area; and other general information. An examination of current services in the camps and their adequacy should be carried out. Past and present site improvement projects should be examined to determine their effectiveness, and the source and current availability of materials should be ascertained.
Financial Analysis: The fundamental purpose of the financial analysis is to determine approximately the present and future ability of the government to pay for the construction and maintenance of site improvements by establishing the present availability of funds; by research into probable future trends in outside financial assistance; by appraisal of all factors related to the administration and operation of the camp; and by determining what limitations are imposed by prior commitments upon the government. In effect, this amounts to comprehensive financial planning for the camp. All avenues of financial assistance should be examined thoroughly. All possible factors that may affect the camp must be taken into account. The government must consider such matters as population change within the camp, rate of construction, etc. Estimates must be arrived at logically and should be accompanied by a complete explanation of how the estimates were calculated and what conditions might change the estimates.

Expenditures: It is important to examine both past expenditures, in order to get an inventory of low-cost workable improvements, and future expenditures, to help determine the government's ability to pay for future improvements. Two general types of expenditures should be examined: operational expenses and site improvements.

Operating expenses should be classified by major service areas. In most cases, the various participating organizations use convenient and meaningful classifications. Expenditures for each classification should be listed for the past six months. If major fluctuations occur from month to month, there should be a short explanation attached. Past expenditures are a great asset in determining future operating expenses. Estimates for operating expenditures should encompass the period covered by the Camp Development Program. Estimates of future operating expenses
are normally based on past expenditures with adjustments for increases in
camp population, general inflationary trends, etc. To a great extent,
operating expenses are based on service levels provided by assisting or­
ganizations; therefore, in considering future operating expenses, the
government must anticipate all increases or decreases in assistance from
outside resources.

An analysis of past site improvement expenditures should be conducted.
By examining past site improvement expenditures, the government can deter­
mine the feasibility of new improvements. It is also helpful to know
how past improvements have been financed. Site improvements and costs
should equal about 20% of the total budget.

2) Inventory of Projects: Each participating organization should pre­
pare a list of all projects, improvements or programs currently underway and
needed in the future. Future projects should not be limited to just the
length of the initial development program. A period of 5-10 years can be used
in assembling a comprehensive list of all potential projects. Improvements can
be identified from studies made during the design of the camp's master plan.

All organizations should prepare individual project estimates. Forms
should be prepared for this purpose which include such information as a des­
cRIPTION of the project, its priority rating, justification, estimated cost,
etc. A priority rating should be required for all projects; the following
priority scale may be used:

Urgent: Should not be postponed. Essential to meet an emergency situation,
to maintain present level of service, or to complete a project already
underway.

Necessary: Should be carried out within an indicated period of time to
meet the anticipated needs of the camp or to replace unsatisfactory
facilities.

Desirable: Needed for proper development of the camp, but exact timing of
these projects must wait until funds are available.
Deferrable: Improvements which may be needed for ideal operation but which can be postponed.

The following criteria are suggested for use in determining priorities of projects:

--- Will the project contribute to the protection of life and property, and/or the streamlining of relief services?

--- What is the relationship of the project to the welfare and progress of the refugees? Will the project enable the people to adapt to their new environment?

--- How will the refugees be affected by the project? How many will be harmed or benefited if the project is or is not carried out?

--- Will the improvement replace existing facilities which are obsolete, or is the item new?

--- Will the project add to the self-sufficiency of the camp?

--- How will the project affect neighboring existing communities and/or private property?

--- Will the general lifestyle or stability of the refugees be enhanced by completion of the project?

--- Will the improvement reduce or increase current operating costs?

3) Review of Project Requests: It is mandatory to thoroughly analyze the project requests submitted. It is particularly important that projects conform to the master plan for the camp. Conferences should be held with participating organizations to gain a more thorough understanding of individual project requests. Certain improvements at this time may be shifted into lower priorities.

After the projects are reviewed and consultations with participating organizations completed, the list should be considered in its entirety. Total requests should be reviewed according to the general criteria previously listed. After final priorities are assigned, the first six-month Camp Development
Program can be prepared. A Camp Development Program Report should be prepared for distribution to interested parties and should include information such as individual project descriptions, priority ratings, justification, programming of the project, estimated cost by month, effect on the operating budget, and other factors related to the fiscal capacity of the government/agencies.

4) Updating the Program: The CDP must be reviewed monthly and updated. It should be a continuing part of the government's budgeting process. Projects are reviewed to determine the progress of projects already started, and whether certain improvements should be continued, revised, delayed or eliminated. The process of review involves the same people who participated in the formulation of the original CDP. The process includes evaluation of the projects currently included in the program, as well as the extension of the program by six months, and a review of resources available.

Changes in the Camp Development Program may be the result of a change in priorities due to unforeseen emergencies, new sources of assistance, etc. A monthly review of the program will ensure that it reflects the most pressing needs of the refugees.

IV. Use of Standardized Layouts

In order to facilitate and speed construction — as well as to integrate the various objectives outlined earlier — a number of standardized camp plans have been developed. Before reviewing these, however, it is necessary to examine the factors which may affect selection of a standardized plan.

The first factor to be considered is the terrain. All plans are based on geometry and order, and each one can be modified to some extent to allow for topographic variations. However, each has its limitations. There is no point in selecting a grid, for example, for use on steep, hilly terrain, nor a circular layout for a camp on a thin peninsula. Square or rectangular
patterns work best on flat lands; circular patterns work best on hilly terrain.

The second consideration is the estimated population of the camp. Some plans require more space per capita than others, thus the size of the population may be too great to achieve an acceptable density level.

The types and sizes of the housing to be utilized is another major factor. Most layouts accommodate either single-family or multi-family shelters, but again an acceptable density must be considered; thus some layouts have been designed specifically for one or the other. Also to be considered is standardization of size and type. If a variety of shelters are going to be used, individual sectors or communities may have to be adjusted in size to retain the geometry of the plan. In some cases, the type of shelter used dictates the plan. These layouts, called "site-housing" plans, vary widely with the type of shelter and generally require more sophisticated planning.

It is necessary to determine the social, economic and administrative objectives of the overall relief program before making a final choice of layout. If the objective, for example, is to make the camp semi-self-sufficient, layouts must be chosen which provide space for gardens. If an objective is to encourage integration of the refugees into the surrounding economy, a layout with designated areas for small stores or shops (preferably near roads used by non-refugees) is desirable. If control and separation of the refugees from the surrounding community is a goal, layouts which reduce the feeling of isolation and encourage the development of self-supporting social structures within the camp itself are mandatory.

Finally, it must be remembered that a standardized plan is a concept of order. It must not be regarded as inflexible; rather, it provides a plan upon which immediate action can be taken, keeping in mind the variations which must be made due to situation and terrain. All of the above factors must be examined with regard to a realistic assessment of the resources available. Once trade-offs are made based on the priorities of the situation, a suitable plan may be chosen.
A. Classification of Plans:

Standardized camp plans are classified according to the major limiting factor which determines whether it will be used in a given situation. In most cases, the limiting factor is either the terrain or the type of housing to be utilized. Thus there are three classifications of camps — open camps which require large, flat and open areas; terrain-dictated camps which offer the only viable plan in a particular site; and integrated site-housing camps whose layouts must conform to the dictates of the shelter units being used.

1) Open Class Layouts: Open class camps are used when large open spaces are available. The area must be relatively flat with only enough slope to adequately drain the site in a heavy rain. In this class, camps are divided into two categories: grid and community unit camps.

Grid Camps (Fig. 6): The grid has been the type most often selected in the past because it appears to be orderly and easy to lay out with very little supervision. Grid camps are composed of a series of square or rectangular use areas defined or separated by pairs of parallel streets or paths which intersect perpendicularly and form the use areas. The primary advantage of this layout is the simplicity of the design and ease with which various elements of the camp's sub-systems (water, drainage, etc.) can be integrated into the camp plan. This layout is also the one most always used to achieve high density, as the compactness and standard size of the various land uses require the least amount of additional space to delineate and separate individual areas.

It is precisely this tendency to use the design to achieve high density which makes the grid the least desirable of the designs proposed, for a highly dense refugee camp encourages the spread of disease and can encourage undesirable social conditions in the camp, all of which in the long run cause increased costs in administration and control.
The grid plan is most adaptable to flat, even terrain, but it can be modified for use in areas with slight elevations. The grid should not be used on hilly or mountainous terrain as the drainage and sewage systems will not function properly. Grid camps are quite similar in appearance to military camps and are often constructed by military engineers using "typical" plans for military site-planning. Herein lies a major problem—that camps laid out according to military needs (i.e. a group of individuals) neglect the basic requirements of adequate space for families and the needs of special groups in the refugee community.

**Community Unit Camps:** These consist of camps whose layouts utilize a small cluster or community of units as the primary planning component. Outstanding among these plans are the cross-axis, modified cross-axis, and a camp designed by Carnegie-Mellon University/INTERTECT for use with their refugee housing unit. The **cross-axis** camp takes its name from the design of the principal planning units which make up the whole camp. The idea consists of grouping four housing units into one planning unit, creating a "+"-shaped grouping wherein one axis serves as a road and the other as a footpath. Each housing unit is of identical rectangular size and abuts the intersection from a different direction. The groups are located around a central activity center creating a closed system with decentralized points for providing services. At each stage of development, additional units can be added as necessary without conflicting with the planning principles. The housing areas expand outward while the center of the camp develops independently into a central internal nucleus with complete administrative function and is separated physically from the housing area by a belt of open space (Fig. 7).

The most outstanding feature of this concept is the means by which open space can be provided without substantially increasing the density
of the living plan — a small plot of open space remains at the center of each adjoining cluster. These open spaces can be used for a variety of purposes by the refugees and/or camp administration. Another advantage of the design is the flexibility with which expansion can be carried out in a uniform pattern of growth with retention of balanced installation of site improvements. An important design feature is the provision of various areas which can be utilized for decentralization of services, still maintaining a geographic center for major centralized administrative functions and overall control. The camp is not dependent upon the development of centralized water and sewage systems, but the design encourages their installation.

The cross-axis camp is designed for relatively flat areas but, by redesignation of walkways and roadways in certain sections, can be designed to fit into more rugged terrains by placing the camps between hills. While the concept of the planning units can be thus adapted, the camp will normally lose the advantage of a centralized administrative center. This is a more sophisticated design than the grid; but in the establishment of drainage systems, housing, etc., it is no more difficult than the grid plan. Overall planning will require full-time supervision, however, and in order to work properly, each planning and housing unit should be of uniform size and design.

The modified cross-axis plan utilizes the same general site plan as the standard cross-axis, especially in the road and pathway systems. It differs in two key aspects, however. First, the housing types utilized must be individual, or at most two-family structures. Second, the housing units are arranged to form small planning units or communities. This arrangement has proved to be the best possible balance of land use and density and is especially useful in camps utilizing tents for housing. It is very adaptable
and, by increasing or reducing the number of housing units in the individual planning units, terrain features (trees, ground cover, etc.) can be incorporated into the site without altering the overall design of the camp. The community units have proved to be an excellent basis on which to organize the camp residents. The common square in each provides space for group as well as individual cooking, washing, etc., and the limited number of people in each facilitates the tasks of social workers. In short, the design encourages the development of a "community" feeling among the residents (Fig. 8).

The design is the safest for use with tents. The road and walkway system provides excellent firebreaks; every community is accessible to emergency vehicles; and the cooking fires located in the center of each square are a safe distance from the tents. The design is also easy to lay out and requires no sophisticated equipment. In fact, in Nicaragua in 1973, this type of camp was constructed with nothing more than a hand-held compass and 1,000 meters of string.

The CMU community unit plan was developed by a CMU team for use in a Bihari camp in Bangladesh. The community units are long "U"-shaped areas, formed by large multi-family shelters (the CMU/INTERTECT Emergency Shelter Unit). The plan takes good advantage of local winds for cooling and still provides protection from extreme winds. The communities provide ample open space and, by design, relieve density. The camp is excellent for use with 3,500 or fewer refugees; larger populations will require modification of the layout (Fig. 9).  

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2) Terrain-Dictated Camps: The second classification of camp designs consists of those which are terrain-dependent. These are not the best designs; but given the topographical constraints, they are the most balanced. The first of these is the circular camp or Eaton Plan\(^\text{10}\), designed for use in hilly or mountainous terrain. If necessary, a number of circular units can be built in close proximity and the group can be administered as one camp. Such a group is actually a regional plan, made up of a series of satellite camps designed to represent "villages" within the total camp structure. In this concept, each village is built and operated separately from the others but is coordinated from a central administrative complex located at the center of the completed camp. However, the concept is not fixed, and the total camp and the various villages can be modified in many ways. The modular satellite village can be developed singly or in any number up to seven without losing its design features (Fig. 10).\(^\text{11}\)

There are many advantages to this concept, the most important being the ability of the authorities to control development. The circular modules are easy to adapt to terrain and thus a master plan can easily be designed and a maximum design capacity assigned. As the camp is built, each module expands in a regulated, uniform pattern to the maximum density. With any rate of growth, development can be balanced, and the installation of improvements should be able to keep pace with the occupancy rate. The camp layout facilitates -- and to some extent is dependent upon -- the development of decentralized site improvements such as water distribution and sewage facilities. Each unit or village can develop its own systems based on materials and terrain. The construction of central water storage and distribution points and scattered latrines/septic tanks is mandatory in each of the units.

10. Named for the designer, J. Craig Eaton, AIP.
11. Seven is the maximum number recommended due to the problems of administrative span-of-control. Odd numbers of villages are also recommended to keep a balance of open space and expansion area.
CONCEPT PLAN OF A
MODEL REFUGEE CAMP
INDIA

PLAN OF TYPICAL VILLAGE CAMP
89,000 POPULATION
One of the key features of the concept is that it permits the retention of interior lands which can be used to develop resources which contribute to the maintenance of the camp. For instance, the lands separating the various villages might be used for limited agricultural production. By using new high-yield strains, several crops per year could be produced which could assist in some measure in lowering overall food costs. But more importantly, it would provide activities for the refugees to help in supporting themselves.

The circular design allows the installation of the road, drainage and sanitation systems to follow logical terrain features; and the actual requirement for lines and canals is reduced. Socially, the concept of a regional camp with clusters permits the integration of various groups of refugees into a single camp, while allowing them to maintain a portion of their background or identity. In such a camp, it is possible to establish villages for groups, such as people from the same region or village, and/or religious/ethnic groups. In another example, displacees from other camps could be re-established as a unit in a new village, thus enabling any previous organizational efforts to continue with minimal interruption.

The second type of terrain-dictated camp is the linear camp. These are camps which -- due to flooding, standing water or restrictive land uses -- must be built adjacent to roads or on a long, narrow rectangular site. About the only thing the planner can do is to attempt to break up the camp as best he can, and to decentralize the services to the greatest extent possible. If flooding is the reason for sticking to the roadway, labor teams should be organized to build small platforms on which small groups of housing can be placed. (In low water areas such as paddies, an alternative is to build the housing on stilts, but this is rarely a good solution.) Little can be done with this type of arrangement, however, and the best solution is to move to a better site as soon as practical (Fig. 11).
LINEAR PLANS

Planning Unit

Site Plans

Roadside Camp

Camp on banks of a rice paddy
A third plan for a terrain-dictated camp is the triangular camp, which is designed for use on a peninsula or on irregular plots in urban areas. The layout depicted (Fig. 12) is for a small camp; larger ones should also be comprised of community units.

3) Integrated Site-Housing Plans: In recent years there have been many breakthroughs in the field of low-cost housing for use in refugee camps. In many camps, the very design of the housing will determine the camp plan; thus the term "integrated site-housing" applies to any plan which is dictated or greatly influenced by the design of the housing units. One of the most adaptable designs is depicted in Fig. 13. It utilizes a completely standardized building unit for all the buildings in the camp, both shelters and administrative structures. The plan shown is based on an Israeli pre-fab building system, originally designed for rapid construction in new settlements. The same unit can be adapted for use with a tilt-up concrete building process, or the components can be made of wood. In any case, a camp such as the one depicted could easily be built; it would require special consideration due to the design of the buildings and the close proximity of shelter units. It should be pointed out, however, that this type of construction is initially more costly as units must be built of permanent materials (wood, sheet metal, concrete, etc.). The advantage is that a high density can be achieved and yet adequate open space can be retained.

B. Summary:

The designs illustrated herein are essentially concepts which can be used to guide the refugee camp planner and provide him with some alternatives to existing plans. However, each situation calls for particular design and planning work, and no pre-set plan can be made to fit each case. Every camp plan must take into consideration the situation and terrain, and there is no substitute for an on-site engineer or planner-in-charge. As noted earlier, a refugee camp is essentially a town and must be planned and constructed under the same design
TRIANGULAR PLAN

Planning Units

Site Plan

INTERTECT
Box 10502   Dallas, Texas  75207
Integrated Site-Housing Concept Plan

Site Plan

Perspective

Analysis ELEMENTS

The building system is based on three basic elements:

- Foundation beam
- External wall
- The saddle

CONSTRUCTION

4 units create 1 volume.

Piling up
criteria but with greater consideration for the occupants. Town planning techniques such as cul-de-sac streets, integrated walkways, development of perimeter streets, etc., are all adaptable to camps.

If the camp planner uses his imagination, follows a balanced plan, integrates services and facilities properly, and maximizes the use of every available material, a decent environment can be built in which refugees can live until they can return to their homes. And if the camp planner has done his job well, many former refugee facilities can be converted to other uses by the host country once they have ceased to house the refugees.
ILLUSTRATIONS

1. Barasat Camp (W. Bengal, India 1971): This drawing illustrates a typical Phase I camp. It was built on government lands surrounding a prison. Note the shelters which were constructed on the embankments of rice paddies and have no scheme of layout.

2. Coyotepe Camp (Nicaragua 1972): This photo shows the camp in its early stages. Note the communities and various use areas (see also Fig. 8).

3. Choloma Camp (Honduras 1974): This aerial photo shows all three stages of a camp in transition. The original grid layout of the tents can still be seen as can the re-grouping typical of the second stage. On the left, the new permanent housing can be seen under construction.


5. Mirpur Redevelopment Project (Bangladesh 1975).

6. Photo of a typical grid layout (Sudan 1972). (Photo courtesy of the U.N. High Commissioner for Refugees.)


8. Modified Cross-Axis Plan (see also Fig. 2).

9. CMU Plan.


11. Linear Plan.

12. Triangular (Peninsular) Plan.

13. Integrated Site-Housing Plan.
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