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LIMA DISASTER PREPAREDNESS REPORT

VOLUME IX

Low-Income Housing

by

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for

Office of U. S. Foreign Disaster Assistance

Agency for International Development

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FOREWORD

This is one volume of a fifteen volume report concerning disaster preparedness in Lima, Peru. It was researched in Lima by a team of disaster specialists during the period July - November, 1981, for the Agency for International Development's Office of Foreign Disaster Assistance and USAID Mission in Peru. The report is supplemented by a considerable number of maps, charts and resource documents which are located in the USAID/Peru Disaster Preparedness Resource Library in Lima.

November 1982

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The Lima Disaster Preparedness Report has 15 sections:

Volume I	Methodology Employed
Volume II	Port of Callao Infrastructure Security and Emergency Evacuation Needs
Volume III	Electricity
Volume IV	Water and Sewerage
Volume V	Heavy Equipment Rehabilitation and Maintenance
Volume VI	Airport and Aircraft Resources
Volume VII	Education
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Volume X	Emergency Medical Care
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INTRODUCTION/EXECUTIVE SUMMARY

This report describes the nature of principally low-income housing in Lima, focusing on the inner-city slum areas, called tugurios, and the relatively newer settlements which grew up on the outskirts of Lima during the late 1960's and 1970's, called pueblos jovenes. It includes a general assessment of the vulnerability and dangers in these areas in the event of a severe (8.4+ Richter) earthquake; the magnitude of shelter needs and options which such a disaster could generate and their policy implications; and some recommended disaster mitigation and preparedness actions.

Tugurios

Lima's inner-city tugurios are characterized by poor, overcrowded living conditions, principally large buildings originally designed to accommodate two or three families which have been converted into an average of 20 - 25 individual one-room dwellings. Each one-room dwelling is occupied by up to ten family members. About 175,000 such single-room dwellings exist in central Lima and other nearby tugurio areas in El Callao. Monthly rent for such a room is typically about US $5.00 to $10.00 and includes use of a communal water tap or two shared by all building residents; a common toilet area, which may or may not permit privacy to the user; and electricity services, some connected clandestinely by area residents without security precautions. The adobe and quincha (cane and mud) structures are generally in an

advanced state of deterioration which has been accelerated by recent relatively mild earthquakes (1970, 1974) and the almost absolute lack of maintenance services by building owners. The small number of such buildings which renters have managed to collectively purchase contrasts starkly in quality of services and structural maintenance.

During the 1960's and 1970's, when there was significant migration of rural Peruvians to Lima, many came first to the tugurios and, after a period, went to the newer pueblo joven settlements. Tugurio dwellers did not do so for a variety of reasons: proximity of their dwellings to their source of employment; cost and availability of transport from the newer areas to factory areas; cultural identification with central Lima; availability of running water, waste removal and electricity services -- however marginal -- in tugurio buildings, versus the certain knowledge that such services would be long delayed in coming to pueblos jovenes; and relatively negligible cost of rent in tugurios versus the cost of house construction and services in pueblos jovenes. Despite tugurio residents' sense of cultural and class identity with their central Lima environments, tugurios are notably bereft of social organizations and activities.

Milder earthquakes in 1970 and 1974 in Lima weakened tugurio buildings but did not destroy them, leaving local residents with a sense that their buildings are "earthquake resistant". Civil Defense authorities project, however, that most of the 60,000 deaths and 700,000 * injuries which can be anticipated for Lima in an 8.4+ Richter earthquake

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* These are Civil Defense estimates, the only ones available to the study. The ratio of deaths:injuries is different from some previous earthquake experiences.

would occur in these areas. Not only are the building structures inadequate, but they tend to have only one, narrow and precarious "escapeway" in each building -- and these "escapeways" may be more dangerous than the buildings themselves.

Perhaps the largest owner of tugurio property is the 440-year old Sociedad de Beneficencia Publica de Lima (SBPL), which operates orphanages, shelters for the homeless, services for the elderly, training of nurses, and other social services. The operation of these services depends on the SBPL's income principally from its tugurio holdings; it estimates that it owns or manages 20% of all tugurio properties.

SBPL obtained these properties through bequests from wealthy citizens of Lima who desired that the income from these properties support its social activities. Yet as the buildings have deteriorated and rent control has frozen rent rates, its income has diminished to the point where it has been forced to abandon its operation of many hospitals and faces termination of other social services as well. At the same time, SBPL is uncomfortable with its role of slum landlord and realizes that in a severe earthquake large numbers of fatalities and serious injuries will be attributable to its properties. As a prestigious private institution, whose President is appointed by the President of Peru and whose Board is appointed by the Minister of Health, SBPL desires to alter this situation -- a desire which may be shared by many other individual institutional owners -- religious orders,

universities, and insurance companies. But many tugurio buildings are owned by 30 - 50 different individual heirs who may not even know each other; in these cases, the already minimal income is further fragmented so that active interest in the property is negligible, and actions requiring legal sanction are difficult to implement.

Based on Civil Defense and other expert assessments, it can be anticipated that 30% - 50% of tugurio buildings would collapse in an 8.4+ Richter earthquake; that 20% would be so severely damaged as to be uninhabitable and require demolition; and 30% - 50% would remain damaged but inhabitable. For purposes of discussion, this report suggests that of those residents who remain homeless, about 50% will probably remain in some type of temporary shelter on or very close to their building; 30% would move in with friends, neighbors and relatives in inhabitable buildings in the same tugurio area or elsewhere around the city; and about 20% would seek to erect temporary shelters in parks, streets, and in public buildings. Negligible proportions would spontaneously move to pueblos jovenes on the outskirts of Lima or return to their (now distant rural) places of origin.

The statistical implication of the foregoing assumptions would be that 50,000/70,000 tugurio families would remain homeless. Of these, perhaps 23,000/33,000 would erect temporary shelters at their buildings sites; 15,000/21,000 would move into inhabitable buildings around Lima; and 10,000/14,000 would move into parks, streets and public buildings. Each of these solutions will present particular problems

to the Government of Peru.

For those who erect temporary shelters at their building sites, it is likely that a type of slum housing worse than current conditions will emerge and become permanent. As non-owners of the land, they may be hesitant to improve their shelters. In any case, a political confrontation over rights to that land between property owners and the former renters (who will then be called "squatters") is inevitable, especially as many of the buildings are located in areas with considerable commercial potential (some property owners may see the earthquake as the solution to their desire to empty the slums to redevelop their properties).

The ideal temporary solution from the Government's viewpoint will be that adopted by those who move in with friends, neighbors and relatives in inhabitable buildings around Lima. But the hosts will tolerate their homeless relations for temporary periods. not permanently. Thus, while this category is not as visible as the foregoing one, it will eventually require access to permanent housing.

Homeless families who settle in public parks (a policy currently encouraged by preparedness plans in Lima), streets and public buildings will have serious disruptive effects on the city; compete with emergency medical and other services for use of such property; and frequently expect the Government to resolve their permanent housing needs at little or no cost to themselves. The current plan to move the homeless in an organized program to tent cities in the public parks may aggravate rather than alleviate many problems.

Pueblos Jovenes

Pueblos jovenes are newer settlements generally located in the expansion zones on the outskirts of Lima, where about one million people currently reside. Such settlements begin in their initial stages with precarious temporary housing (wooden poles wrapped with plastic sheets or cane/estera mats), with water delivery by tanktruck and absence of other services. The settlers make enormous sacrifices to acquire and accumulate building materials, and gradually build steel-reinforced brick houses around their temporary homes. Later, they erect a 200-300 gallon concrete water tank in front of the house. If the community can get organized and obtain financing, it can eventually have household connections for water, waste removal and electricity installed. This evolutionary process may take ten to twenty years to complete.

Building specialists believe that 60% of the brick houses in pueblos jovenes are suitably reinforced for earthquake resistance; 20% are over-reinforced, adding to their weight but probably safe; and 20% are inadequately reinforced. Yet, in comparison with the much more densely populated tugurios, relatively few deaths and injuries are expected here.

The exception to this assumption would be newer settlements on extremely steep hillsides in the pueblos jovenes and even in central Lima. The proximity of each house to the next, the steepness of the hillsides, and the possible inadequacy of siting and foundations, could contribute to a large number of fatalities in such areas. In

addition, houses built along the edge of the Rimac River are subject -- even in the absence of earthquakes -- to fatalities due to mass failures along the cliffs on each side of the River.

Recommendations for Action

Disaster Mitigation

The main opportunity for saving lives and severe injuries in the shelter sector would appear to be in mitigating these risks in the tugurios, where the majority of Civil Defense's projected 60,000 deaths and 700,000 injuries would occur. But the mitigation of these risks is only a small part of the overall need to develop a comprehensive policy for dealing with the problems of the tugurios. This need is being increasingly focused upon by the Government of Peru. There are a number of discrete actions which would be of value in serving disaster mitigation and housing policy ends:

1. A detailed assessment of land tenure in the tugurios should be made, expanding on Map B introduced in this report. In a first stage, a district-by-district analysis of SBPL, religious order, university and insurance company holdings should be initiated, focusing first on the Cercado de Lima, Rimac and Victoria districts, and then expanding the geographical scope incrementally.

2. Options for development of tugurio properties need to be studied, especially in connection with SBPL. Removal of illegal occupants, consolidation of renters into better quality buildings, and demolition of the most dangerous structures should be considered.

SBPL property locations often have considerable commercial value; in such cases, some of their proceeds could be used to finance an incentive system for current occupants to encourage them to evacuate these buildings. Concessional financing for alternative inner-city low-income units has been suggested by SBPL. Integration of the currently planned World Bank-financed 30,000 sites and services program -- especially for Canto Grande development -- should be considered. Legislation enabling social welfare organizations to manage their properties more efficiently should be drafted. Finally, schemes which offer the possibility of collective building ownership by current residents should be evaluated.

For properties which can be evacuated, SBPL has suggested it could retain title, build and manage new buildings, and use rental income to support its social services. SBPL could also sell such properties, invest the proceeds, and use cash revenues to support such services. One experimental program integrating many of the foregoing features was the El Porvenir project from whose successes and failures many relevant lessons can be drawn.

Disaster Preparedness

In terms of disaster preparedness, two steps are recommended:

1. Advance preparation of inspection/demolition plans for buildings which have not collapsed but after an earthquake which may represent dangers to life.

2. Advance development of contingency plans and options for a post-disaster shelter policy. Current plans should be examined, up-dated and revised, where appropriate; and senior Government officials should have an opportunity to wrestle with the serious (and politically explosive) substantive issues before such a possible event.

A review of field assessments of housing programs after the 1970 Peru earthquake and similar assessments for Managua (1972) and Guatemala (1976) appear in Volume XII of this series and are too extensive to summarize in this volume. They offer valuable and relevant lessons concerning shelter, especially in the failure of tents and other temporary housing.

A list of selected public and private sector experts in low-income housing in Lima appears at the end of the report.

The reader should be warned that the nature of this review of the low-income housing sector is limited; it is not intended to be a thorough study of all facets of such housing in Lima, but mainly to suggest initial directions toward which disaster mitigation and preparedness efforts can be directed.

LOW-INCOME HOUSING

This report describes the nature of principally low-income housing in Lima, focusing on the inner-city slum areas, called tugurios, and the relatively newer settlements which grew up on the outskirts of Lima during the late 1960's and 1970's, called pueblos jovenes. It includes a general assessment of the vulnerability and dangers in these areas in the event of a severe (8.4+ Richter) earthquake; the magnitude of shelter needs and options which such a disaster could generate and their policy implications; and some recommended disaster mitigation and preparedness actions.*

DESCRIPTION OF TUGURIOS

General Background

Areas known as tugurios are characterized by poor, overcrowded living conditions in the central city. Typically, a large building designed to house a few families has been converted into an average of

* For general statistics on Lima's population by district and a map showing varieties of soil composition beneath Lima, see Annex B.

20 - 25 individual apartment dwellings, usually single rooms of about 10 to 20 square meters, each occupied by up to ten family members.

The latest (1981) census data was not yet available when fieldwork for this report was completed. The 1961 census estimated 117,300 dwelling units (34% of Lima's dwelling units) were rooms in such buildings. By 1972, it was estimated that 162,800 units fell into this category, representing about 26% of all units. While the number of units is projected to have increased significantly between 1972 and 1981, the proportion of all housing represented by tugurios may have diminished because of the overall city population increase which occurred during that period. Map A, produced by the Ministry of Housing, illustrates the tugurio zones of Lima.

Buildings in this area tend to be constructed of adobe or a combination of adobe and quincha. In the latter case, the adobe wall is built to a part of the height of the wall (or to the first floor); the balance of the wall (or second floor) is quincha, a cane wall structure filled with mud. The roof may also be of wood and mud construction.

Building Services

The quality of services in these buildings varies considerably. Some units -- though a minority -- provide minimal water supply and waste removal in the individual (room) dwelling. The more common arrangement appears to be a single communal water tap or two which are shared by all the residents of a building. There may also be a

common toilet area, which may or may not permit privacy for the user.

Electricity services are available to the majority of tugurio dwellers. Some are connected by ELECTRO-LIMA, which collects revenue for current which is used. Others, however, are connected through clandestine lines (lineas clandestinas), hooked up through the initiative of the resident from a mainline, with no electrical security system. The lineas clandestinas obviously generate no revenue for ELECTRO-LIMA, although the company has not been successful at controlling their installation.

Electrical wiring tends to be crude; inadequate for the level of current used; and installed without fuse boxes, casing, or other protective devices. Often the lines had a plastic casing when they were installed, but because of routine overloading, the plastic has dried and crumbled. Thus, exposed wires run along or through walls and roofs constructed of flammable material (such as quincha cane, dry lumber, or other flammable materials).

Fires in the tugurio areas tend to be provoked by explosions of defective cooking-gas cylinders and, on occasion, by short circuits or other electrcial causes. Fire reportedly can spread by intense heat from quincha wall to quincha wall without direct fire contact between the walls.

Tugurio buildings are commonly called callejones by outsiders, and quintas by local residents, who prefer this term. They tend to be built around corridors with only one, narrow exitway; often, there is

only one precarious stairway between floors. Thus, even in normal emergencies escape from these buildings is perilous. The photographs on pages 16 - 47 (provided by SBPL in Lima, described later, of its own properties) illustrate conditions which are typical of tugurio housing.

Although most of the areas tugurizadas are used as housing for extended individual family units, there are numerous home industries in these areas as well. Many of them have substantial electrical equipment and tools and from field observations it would appear that electrical security for these is as poor as or worse than electricity arrangements for housing.

Tugurio Residents

Tugurio residents are low-income families, although as a rule at least one member of each family has a regular income. Rents in the tugurio areas are in the range of US $5.00 to US $10.00 per dwelling unit per month. In addition to renters, however, many tugurio buildings have substantial numbers of occupants who are "invaders", people who take over a room or apartment illegally and pay no rent. For those who pay, rent is collected monthly by a rental agent, although most people do not know to whom they are paying rent -- i.e., who the landlord is.

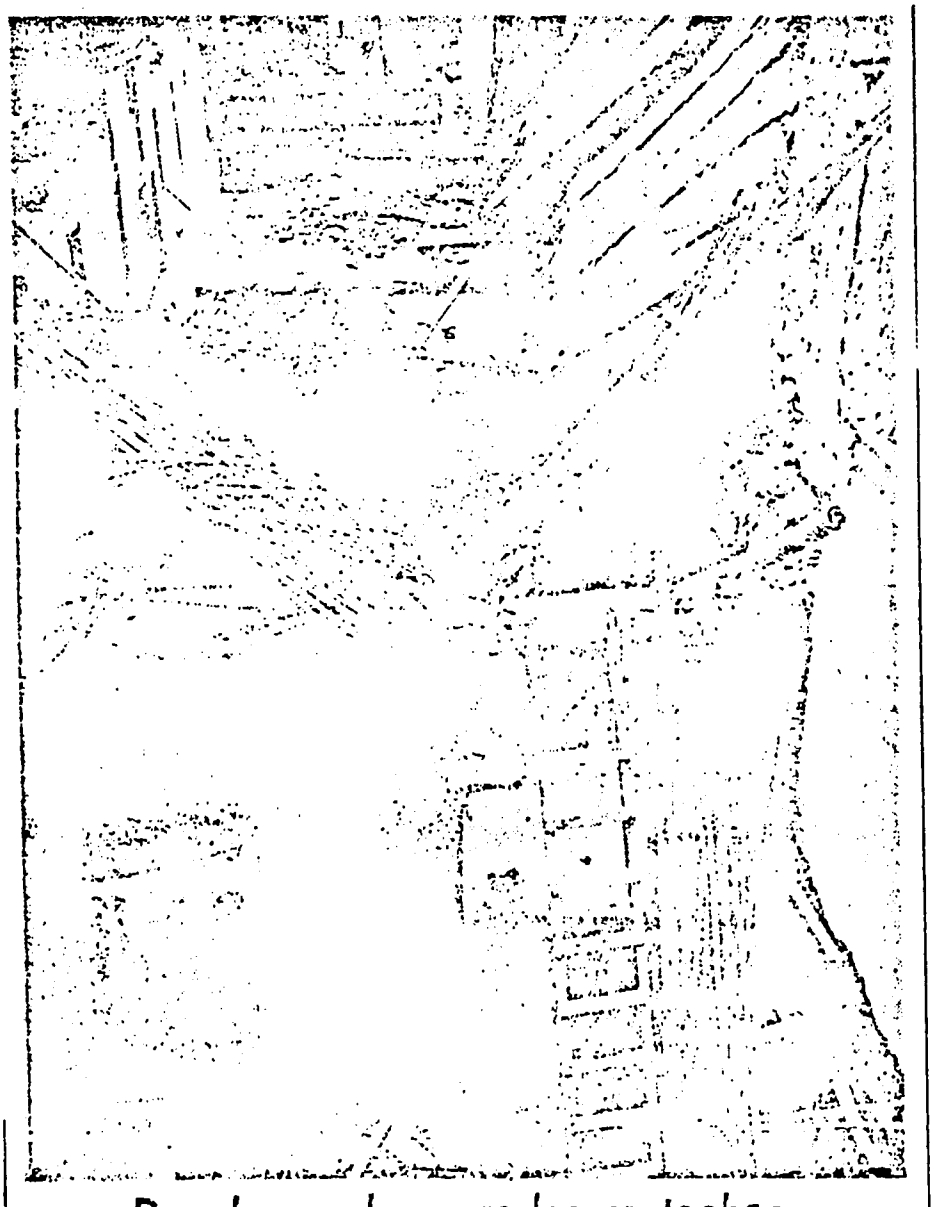
There are a very few cases of tugurio residents who as a group have been able to purchase their building. The quality of these buildings is markedly superior to those occupied by renters. Renter-occupied buildings receive virtually no maintenance services, and the

buildings themselves have therefore gradually deteriorated. In some cases, this deterioration reaches an extreme when the building simply collapses (see following page for a newspaper article, one of several which appeared during the period of fieldwork for this report).

People who live in the tugurios tend not to be newcomers to Lima. They consider themselves true Limeños. Most were born in these areas or have lived there for several generations. Others came to the areas between ten and thirty years ago. There was, during the 1970's, a group of more transient families: people from outlying provinces who passed through the tugurios temporarily en route to permanent settlement in pueblos jovenes. Today, the population influx from other cities and rural areas to central Lima has diminished and the character of the tugurios has become more stable.

El Comercio

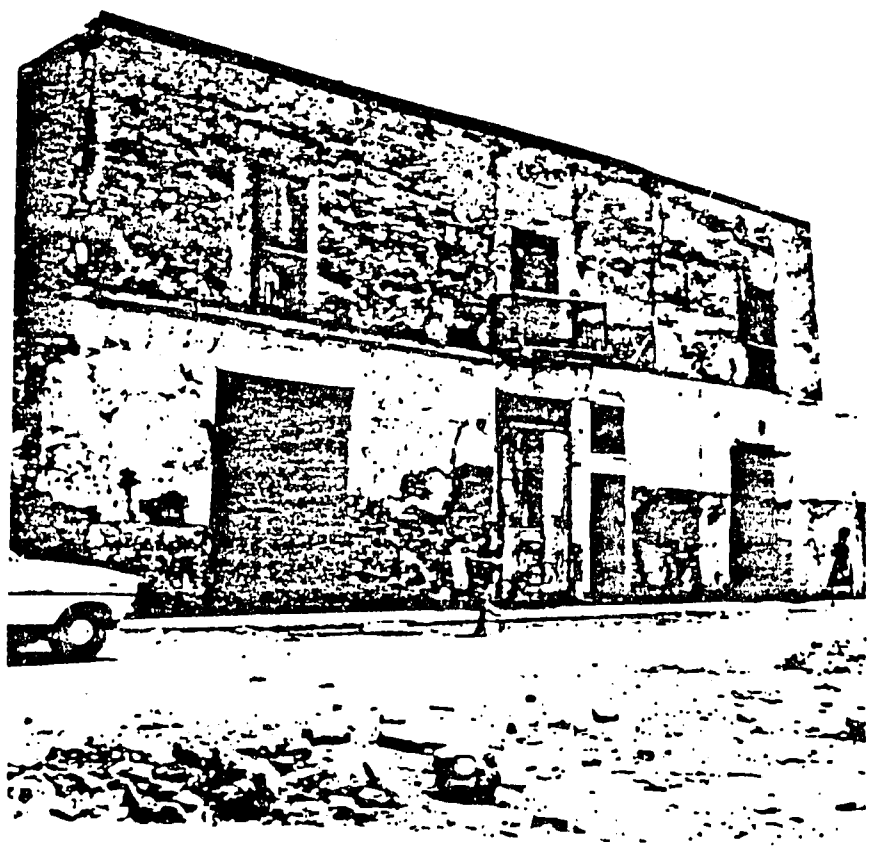
LIMA, VIERNES 14 DE AGOSTO DE 1981

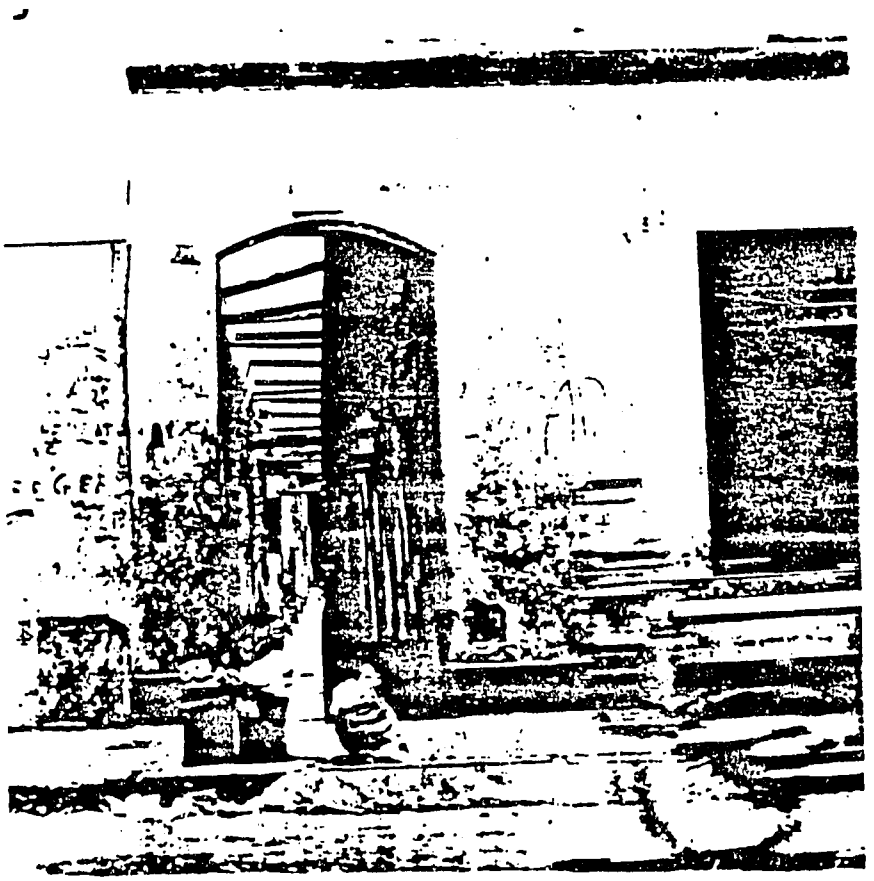


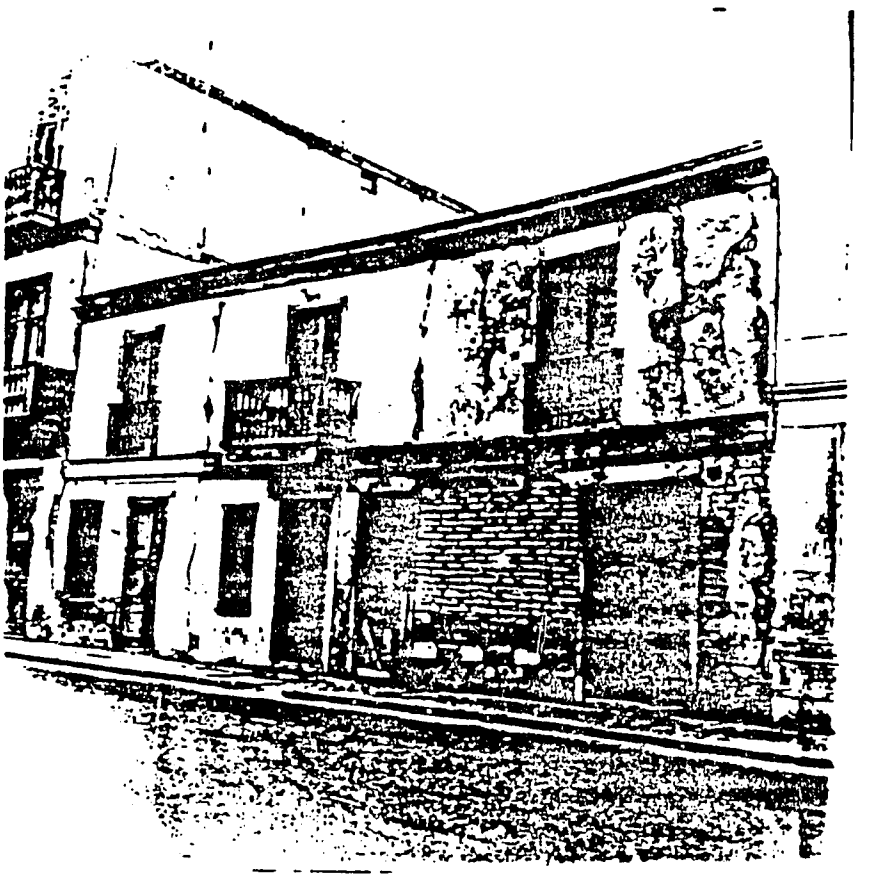
Desplome de paredes y techos

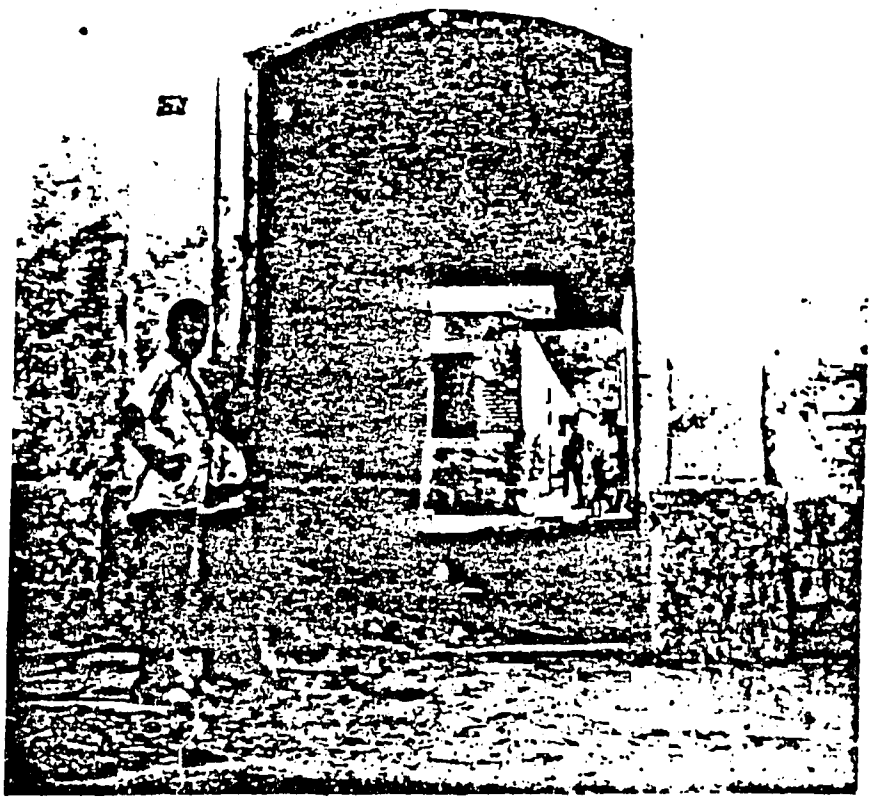
Paredes y techos de dos viejas casas de quincha ubicadas en el interior de una quinta del jirón Huanta Nº 655, se desplomaron. Al parecer, la fuerte lluvia humedeció y debilitó los techos y paredes, lo que provocó el derrumbe. Los dos departamentos estaban ocupados por un total de ocho personas, quienes quedaron atrapadas por breves minutos por la quincha, pero resultaron ilesas y salieron por su propia cuenta.

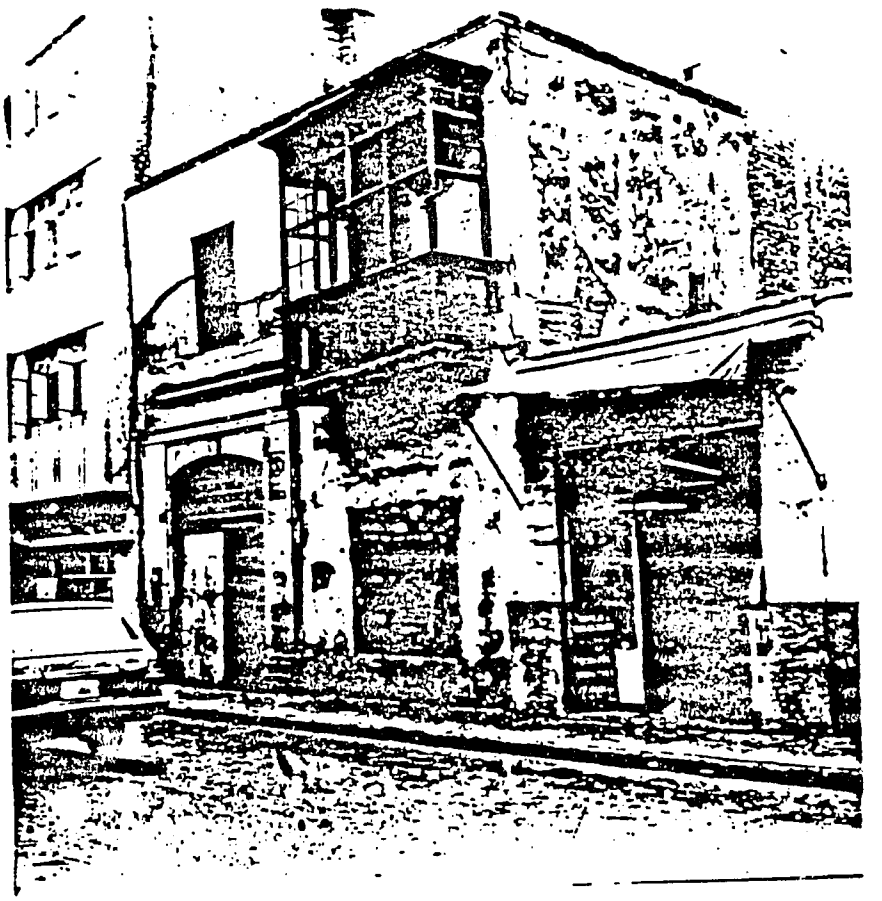
Typical Exteriors...



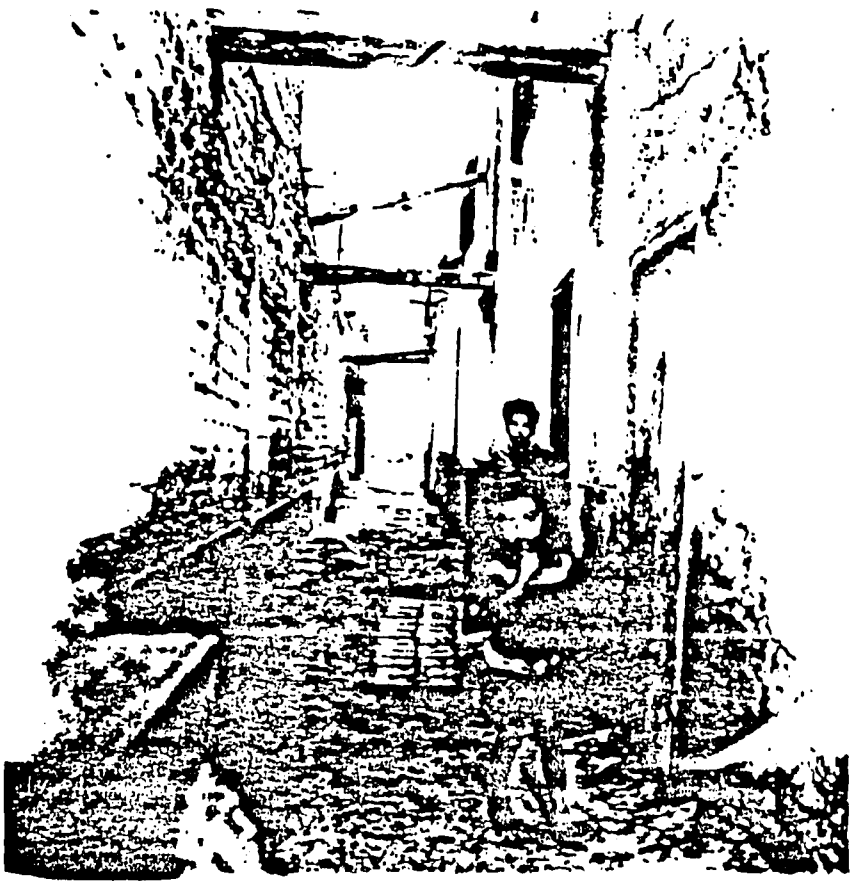


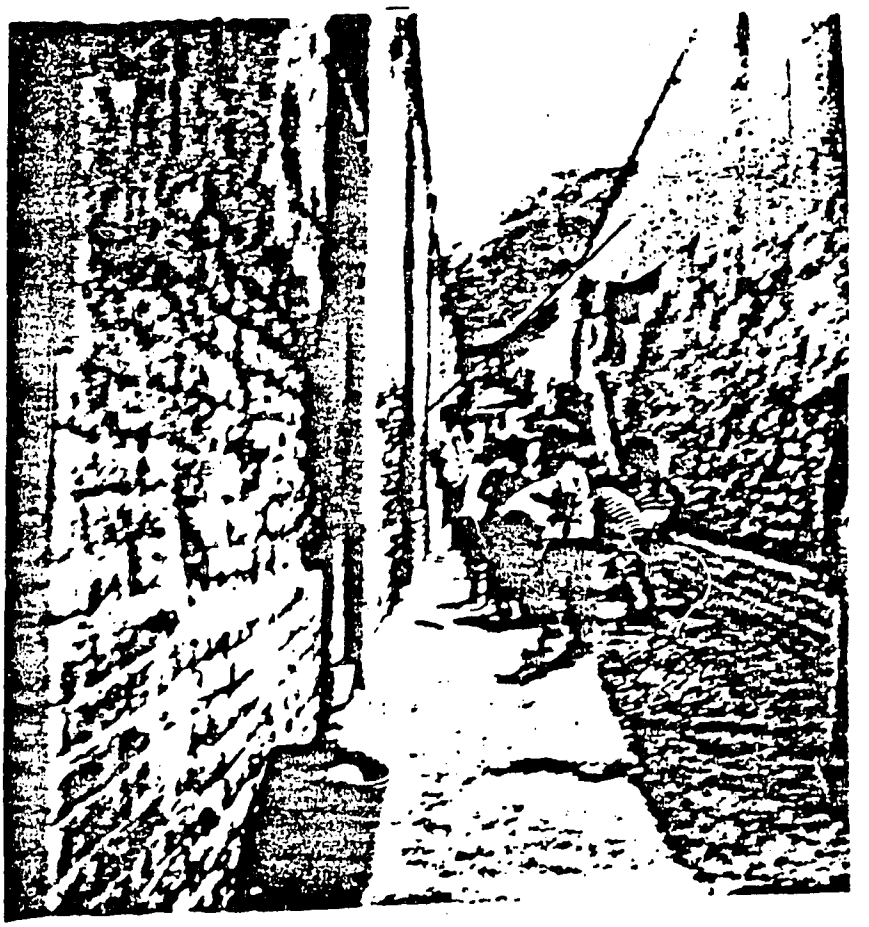


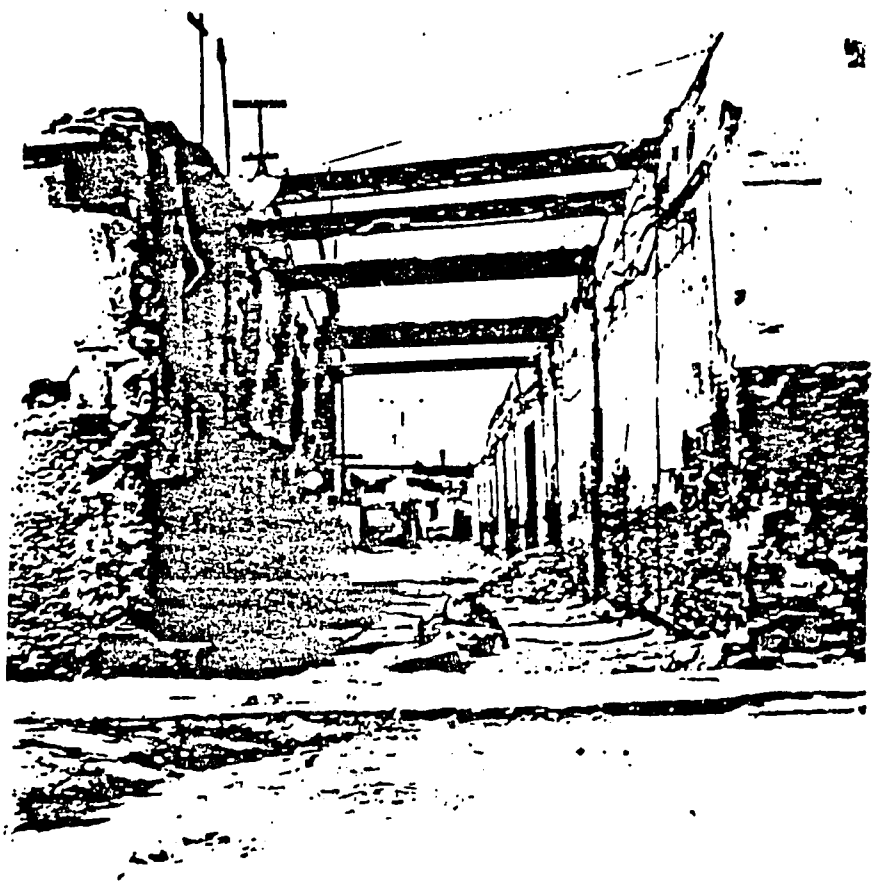


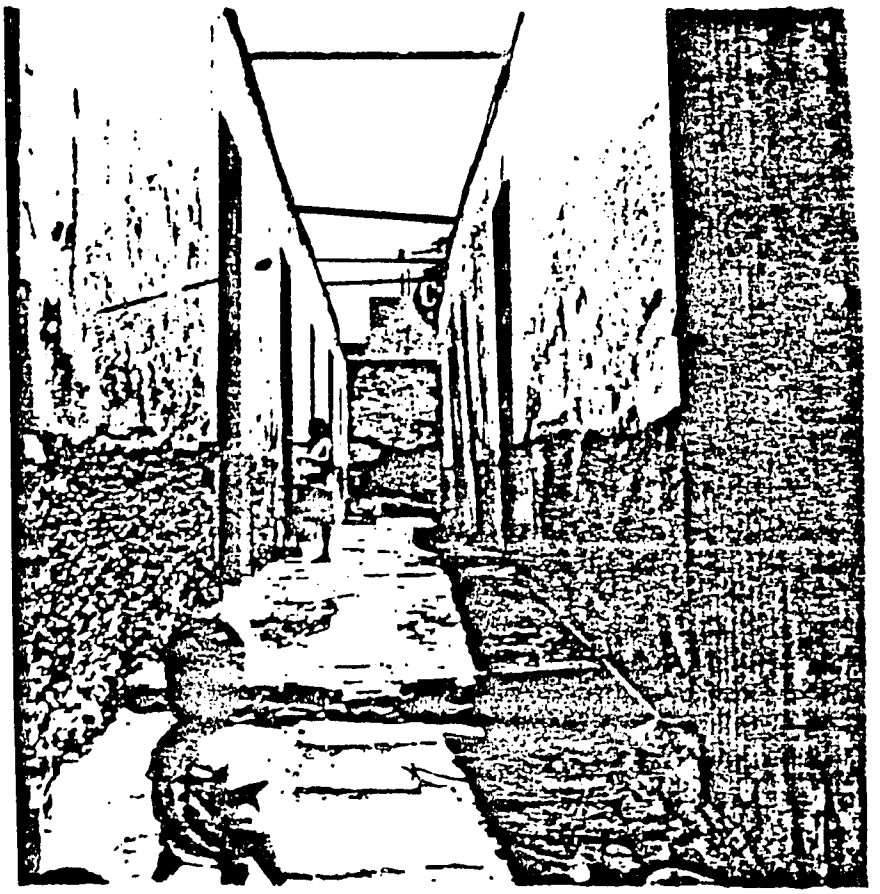


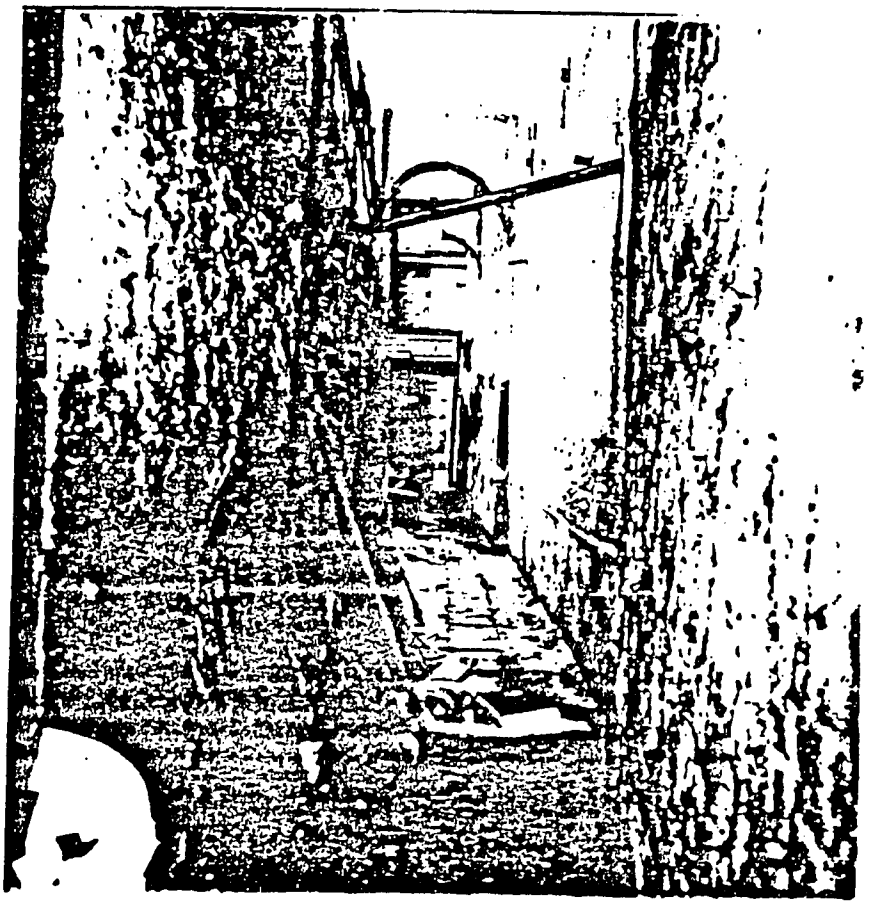
Typical Interior Passageways and Escapeways...



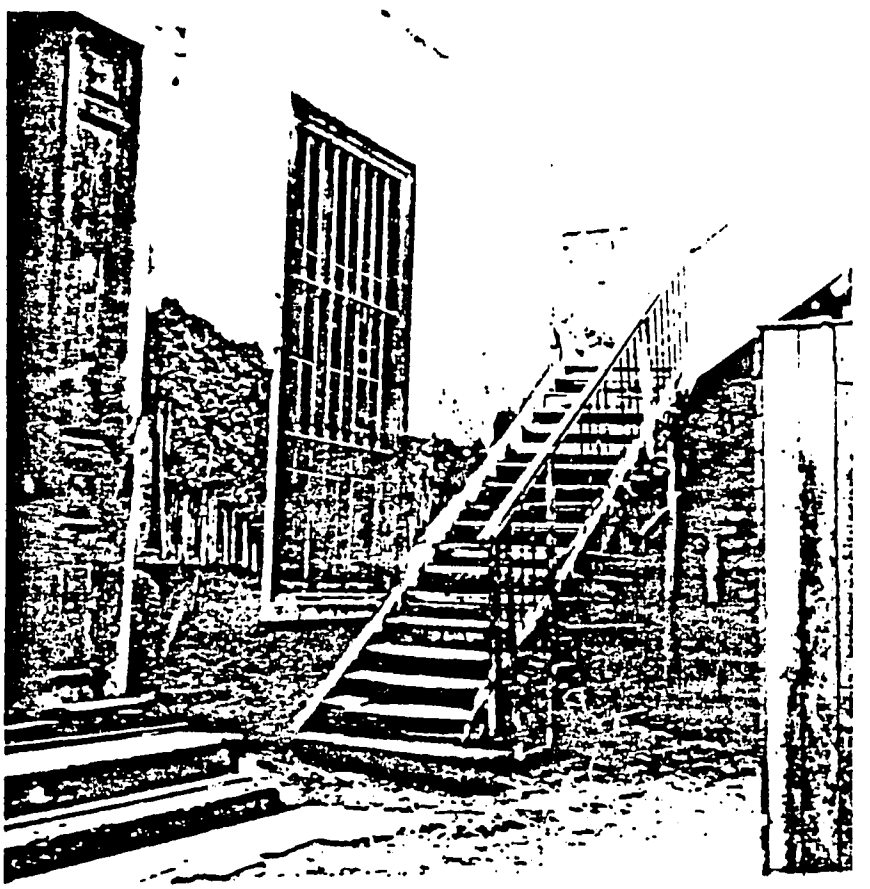




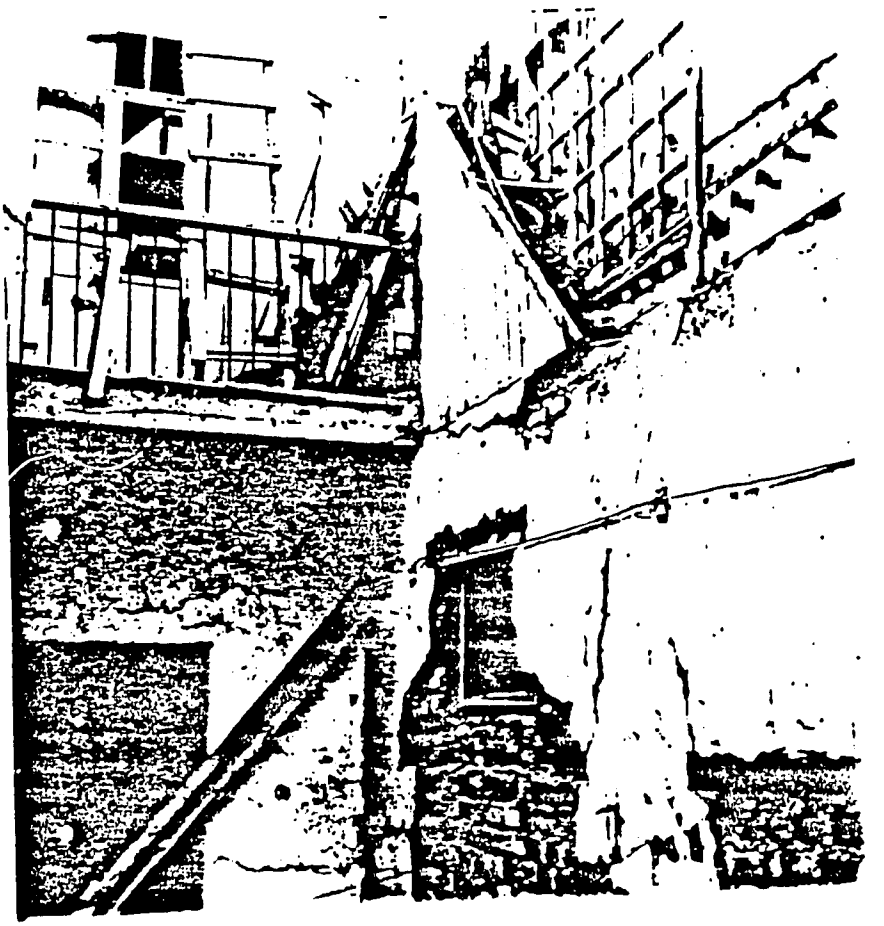


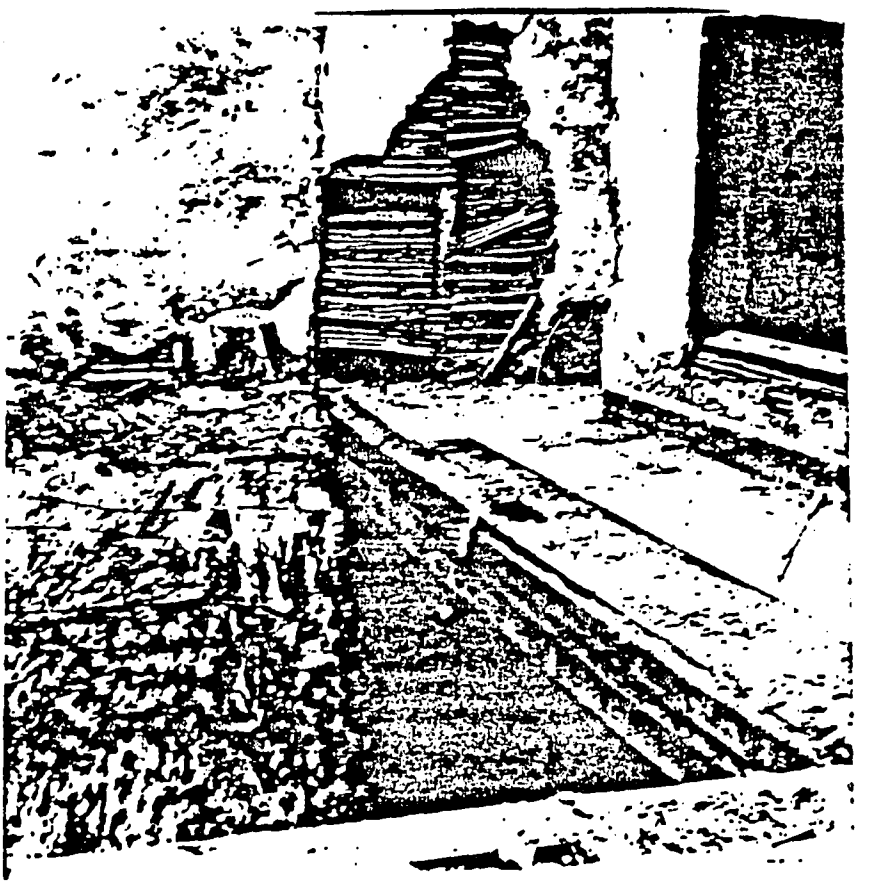


Interior Stairways...

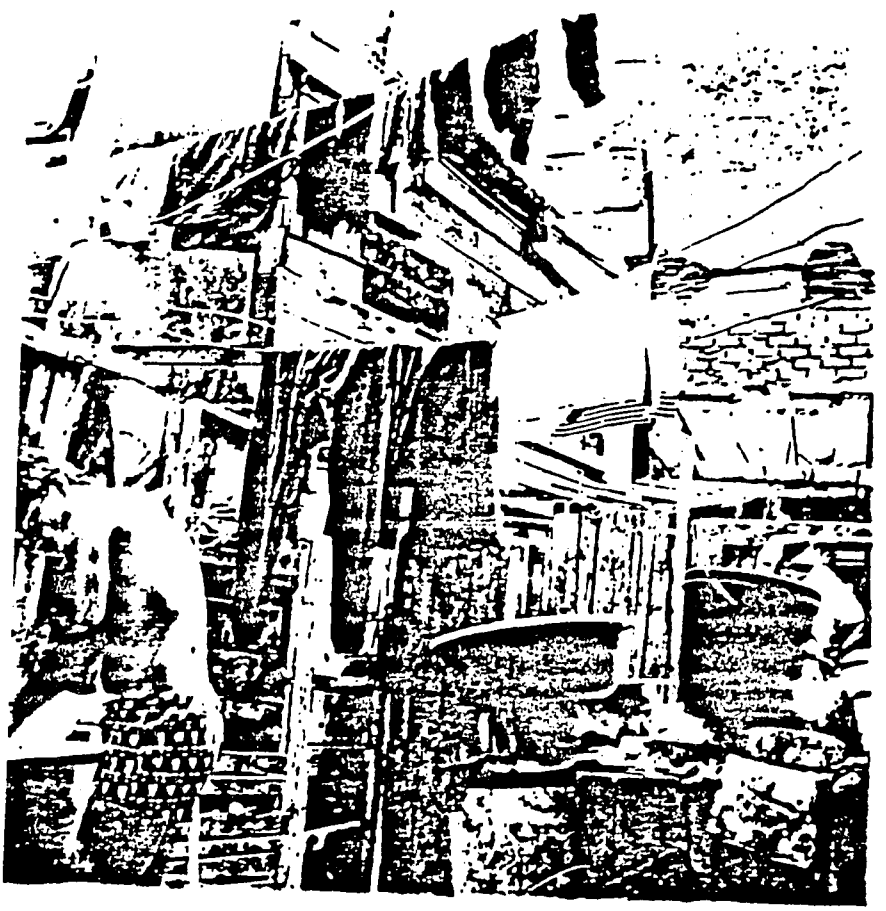


Interior Hallways...





Communal Washing Area



Partial Room Interior

Attitudes of Tugurio Residents

When better living conditions became accessible to tugurio residents in the new pueblo joven settlement areas, they tended to prefer to remain in the tugurios. Though pueblos jovenes offered the opportunity of ownership of their land and house, in a much more open physical environment, with the chance for eventual direct water, sanitation and electricity services, they were and continue to be reluctant to leave the tugurios. Why?

There are several major reasons:

(a) Proximity to Employment A considerable proportion of industry in Lima, (where 75% of Peru's industry is located) is situated along the banks of the Rimac River and elsewhere in central Lima. In addition, many families have developed small businesses, home or cottage industries, stores or service jobs in the tugurio areas themselves. A large number of people are ambulantes, persons who sell their wares from carts on the street (and who often need to be near central market areas) (you can buy anything from fruit to suits to stereos from ambulantes in Lima). So for job security or convenience they feel they are better off in central Lima.

(b) Transportation Directly related to the foregoing, tugurio residents correctly believe that transportation from most pueblo joven areas is unreliable, costly, and time-consuming. Workers who live in some pueblos jovenes expect to travel for up to two hours each way at a considerable daily cost; on some days, they might be unable to get into work on time because of shortage of transport.

(c) Identification with Central Lima Many tugurio residents, especially those whose families are from the area, identify strongly with Central Lima. They may be of low-income status, but culturally they attach a postive value to their Limanean roots. They contrast these with the country-people, newcomers to Lima, who have settled outside the center of town.

(d) Services While tugurio water and sanitation services are very poor, it is also true that once a family has settled in a new pueblo joven, it may be some time before there is piped water or waste removal service -- or, for that matter, electricity. While the hope for improved services at some future time exists in the new areas, there is also a certainty of an extended period of limited services.

(e) Cost of Rent Renting a dwelling in a tugurio is extremely economical. Rents are protected from increases by rent control laws, and tenants jealously protect their tenure rights. Even if a tugurio resident leaves his dwelling, he tends to pass it on to another family member, first establishing continuity in the arrangement to insure the new tenant's rights. Although pueblos jovenes are attractive in some ways, they cost a lot of money -- an incomparably greater amount than the artificially-protected rents of the inner-cities. [Also, legal tenure to most homesites in pueblos jovenes is difficult and often impossible to obtain.]

It was difficult to gauge the level of community-cohesion in the tugurios. Initially, it appeared that people tend to mind their

own business. But in the oldest areas, people indicated that if they were forced by circumstances beyond their control to move elsewhere, they would wish to move together with the other residents of their buildings.

In terms of more formal social infrastructure, however, there was little or none: neighborhood groups, associations, cooperatives of some sort were largely absent in comparison with other areas of the city. While other areas of Lima have considerable numbers of local voluntary and international development group activity, the tugurios appear to have none. Even the Church has relatively few social activities.

People in tugurio neighborhoods were fairly reserved with the OFDA Disaster Team members with whom they met -- as well they might be. But after a short time they were friendly, articulate and forthcoming as long as they overcame their suspicion that the purpose of the interview was to levy a tax, increase their rent, or evict them from their building.

All of the interviews were conducted during the day, and no problems with personal security were encountered -- although many people who are not residents of the area cautioned against visiting these areas, describing them as crime-infested and subject to frequent mugging. (People describe New York the same way!) But in the end one meets ordinary, working-class people who are rightly curious about what one is up to and not at all hostile.

A Major Owner of Tugurio Property: The SBPL

A large number -- and perhaps the majority -- of tugurio buildings may be owned by socially-oriented organizations and insurance companies. The Sociedad de Beneficencia Publica de Lima (SBPL) is a case in point:

The SBPL is a public, non-profit organization established to provide social services to children, the elderly, the sick and other vulnerable groups in Lima. The organization, established in 1834, succeeded the Real Beneficencia de Lima, founded in 1538. So in one form or another, this organization, which now has about 6,000 employees, has been providing social services for about 440 years.

There are two parts to the SBPL operations: the social services which it provides; and the income-generating activities which finance these services.

SBPL Social Services

Until the early 1960's, the SBPL owned and managed most of the major hospitals in Lima. Between 1964 and 1974 it transferred the management of most of these hospitals to the Ministry of Health; SBPL retains title to the hospital properties and buildings. The last hospitals to be turned over to Ministry management were Hospitals Loayza, Segundo de Mayo, and Maternidad de Lima.

The Puericultorio Perez Aranibar, an orphanage and childcare center serving about 1,500 children up to 16 years of age, is one of the SBPL's more ambitious social projects. Located right on the coast of Magdalena del Mar, the building housing the orphanage is itself

not seismic-resistant.

About 250 elderly patients (between the ages of 70 and 90) receive intensive nursing care at the SBPL's Asilo San Vincente de Paul, located in Barrios Altos.

The SBPL's eight shelters for the homeless, provide still more services. Five are located in the District of Lima (Cercado de Lima), one in La Victoria and one in Rimac. Two of these have been condemned and were in the process of being evacuated by the SBPL in 1981.

In addition, the Society trains nurses at the National Nursing School (Escuela Nacional de Enfermeras); manages the City's major cemetery; sponsors a vocational training center for young women; and maintains several museums and libraries in the City.

SBPL Income-Generating Activities

The SBPL manages a number of income-producing activities designed to generate the cash which it requires to conduct the social service commitments described above. Some of these include the management of a principal lottery; the management of the Plaza de Acho bullfighting stadium; and some occasional income from the cemetery. But the chief source of its income are its tugurio holdings.

The Society is a repository for inner-city property bequeathed to it by wealthy citizens of Lima. When they died, property owners left these buildings to the Society, sometimes (but not always) on condition that they could not be resold, for use only as rent-generating assets. These conditions are still binding on the Society. In a few

cases, buildings bequeathed to the Society are designated for other purposes -- for example, for programs for the aged, and in these cases, too, the Society is bound by the stipulations of its benefactors.

Most of the properties were income-producing at the time they were received by the Society. Some cynics suggest that others were virtually worthless and the Society was used as a "repository of last resort" for dumping them with tax advantages. Nevertheless, today most of these tugurio buildings produce relatively little income. Rents are collected by the SBPL's Administracion del Patrimonio Inmobiliario from its thousands of occupant-families. The SBPL's President suggested that a substantial percentage of Central Lima's tugurio properties -- perhaps 20% or more -- may be owned by the Society; at another point it was reported that 3,000 families paid monthly rents to SBPL.

The SBPL is uncomfortable with its role as slum landlord. It fears for the safety of its residents, recognizing that the condition of the buildings heightens the likelihood of deaths and injuries in earthquakes or other structural failures. It is dissatisfied with the quality of housing and services which it provides. Finally, these buildings provide only the most minimal income for the Society. As this income declines, so too does the Society's ability to provide social services.

Some of the Sociedad's properties might also have considerable commercial value, if the properties could be evacuated, demolished, and made available for development by the SBPL or for sale. Map B,

made available by the SBPL, is a wall-size street map of Central Lima indicating the properties owned and managed by the SBPL. In addition, the map indicates properties which are managed by the SBPL but owned by some other social or religious group.

The proportion of property in the hands of the Society -- and the potential planning and policy implications of this ownership -- are immediately apparent. Yet there has been little attention outside SBPL to this matter, just as the tugurio residents themselves have received little attention or service from outside social and development agencies.

In addition to the SBPL, there are numerous other groups who hold lands in the tugurio areas. These include:

(a) Catholic University and other Church orders;

(b) Insurance companies; and

(c) Groups of multiple heirs. If a property owner dies and the building is not bequeathed to a single heir or if such an arrangement is successfully contested, the building tends to be divided in shares among various heirs. In each succeeding generation, ownership passes to the numerous heirs of each of the original heirs until a single building -- probably producing little or no income -- may be shared among 30 to 50 people, many of whom do not know each other. In these circumstances, there is little interest in building maintenance and services. Any action requiring legal sanction -- much as sale or redevelopment -- is very cumbersome.

The SBPL is the largest single owner of tugurio property, and

has a desire and a practical motivation for addressing the problems it perceives. In addition, as a prestigious national organization, the SBPL ought to be able to gain the support of the Government for its plan: its President is appointed directly by the President of Peru; and its Board of Directors is appointed by the Minister of Health.

Vulnerability of Tugurio Residents in Earthquakes

Lima has been the site of several earthquakes in recent years, for example in 1970 and 1974. The main effect of these shakes has been to continue, and perhaps accelerate, the natural deterioration of the already weakened buildings. Many -- if not most -- of them have severe cracks in the walls. One major problem is that local residents believe that because they survived the milder tremors of previous years, their buildings are earthquake-proof.

But studies by building specialists in association with Peru's Civil Defense authorities argue otherwise: tugurio areas are considered zones of greatest danger, where, in a severe (8.4+ Richter) earthquake 60,000 will likely be killed, and perhaps 700,000 may be severely injured.

The structure and condition of the buildings justify such projections and are further aggravated by the dangerous, narrow single passageways which are generally the only exits from most buildings and by the single precarious stairways between floors.

The principal dangers include: people struck by collapsing adobe

walls in the narrow passageways as they try to escape their buildings or by outwardly-collapsing walls after exiting from the buildings; collapsing staircases within the buildings; and trampling and panic as the building population attempt to exit. In addition, depending on the disposition of ELECTRO-LIMA, there could be a high incidence of electrocution from falling wires. If there is surface flooding, water could act as a conductor multiplying this danger. Finally, these could combine to create more victims immediately after the earthquake as relatives and friends plunge into the collapsed buildings and rubble to rescue trapped victims or to recover valuables.

During one dark night, the Disaster Team conducted a survey of building lighting facilities during hours of darkness in the tugurios. It found that most buildings had absolutely no hallway lighting or one lightbulb for the entire building, which provides very minimum illumination.

Some studies (such as those conducted by Civil Defense) have attempted to quantify the damage which would occur in an 8.4 Richter or greater earthquake. Other technicians are skeptical about these kind of calculations. But it can reasonable be expected that tugurio buildings will suffer three broad types of damage:

(a) Collapse This is the worst case, and estimates range from 30% to 50% of the callejon-type buildings would fall into this category.

(b) Severely Damaged - Uninhabitable Perhaps 20% of the callejones would fall into this category. While they would not collapse, they would remain in danger of collapse with additional tremors or further

gradual deterioration. There is a need to be able to quickly identify and demolish buildings which are extreme risks to life and safety.

(c) Damaged but Inhabitable About 30% - 50% of the buildings would remain inhabitable, even though they were damaged to some degree.

These projections are presented for illustrative purposes only and would vary depending on the nature of seismic waves, their strength, and their duration. The breakdown is presented here because it seems reflective of what a variety of earthquake engineering specialists expect in a severe earthquake.

The implication of these figures is that somewhere between 50% and 70% of tugurio residents -- equal to about 400,000 - 600,000 people in these areas alone -- would become homeless within minutes of a severe earthquake. If only half that number were affected, the impact would be very significant.

Projected Behavior of Earthquake Victims

Based on discussions with tugurio residents, Civil Defense authorities, and disaster specialists, and on previous earthquake experience in Peru and other Latin American countries, some illustrative projections can be made for purposes of discussion:

1. Although they are homeless, disaster victims will attempt to remain as close as possible to their home site, especially at the outset. They will seek to recover and properly bury family members and others buried in the rubble. They will seek to recover documents, cash, valuables, other salvageable family possessions and potential

shelter materials. They will be anxious to safeguard any legal claim or rights which they have or which they believe may devolve upon them as residents of their collapsed building. Finally, they may see no more viable place to quickly erect a temporary shelter.

The location of such shelters may also vary depending on the services which become available in the zone: availability of water; distribution of relief resources; rubble-removal and demolition policies; and Government actions with respect to land rights and re-settlement could influence the proportion of the homeless population which chooses to remain at their original building site.

2. Most engineers suggest that after a severe earthquake 30% - 50% of tugurio housing stock will remain inhabitable. Also, it is suggested that most housing in pueblos jovenes and "middle class" areas will suffer proportionately less damage. It can be expected that some proportion of tugurio dwellers left homeless will be able to relocate part or all of their families with relatives and friends whose dwellings remain intact. Members of such families would still travel daily to their collapsed homes for the reasons described in the foregoing paragraph, but would return to their relatives or friends homes in hours of darkness.

3. Almost none of the homeless families would consider returning to their rural areas of (now distant) origin. Doing so would remove them from their principal livelihoods, even if these were temporarily suspended because of the disaster; from their homesites where, as discussed earlier, they would have compelling reasons to remain; and

from any relief aid which they might anticipate. In the rural areas, there would likely be no support system remaining for them.

4. It seems unlikely that tugurio families would spontaneously migrate to pueblos jovenes, the new expansion zones of the city. Most of the same reasons which persuaded them not to move to pueblos jovenes in earlier times -- discussed elsewhere in this report -- would remain relevant to them. Then too, the compelling reasons for remaining near their collapsed home would mitigate against moving far away, especially immediately after an earthquake. The exceptions would be those homeless disaster victims (see paragraph 2, above) who move in with relatives and friends who happen to reside in pueblos jovenes.

5. At present, it is the notion of the Civil Defense authorities that they will conduct an organized, guided program of temporary resettlement for the homeless population in municipal parks around Lima, especially nearby the victims' destroyed homesites. Although no concrete measures have been taken to prepare for the implementation of this policy, a number of planning initiatives have been begun. For example, under the PLAN ALFA CENTAURO -- a planning exercise initiated in the wake of the Brady Earthquake Predictions -- the public utility authorities were called upon to install piped water, waste removal, and electrical connections in the parks. Another planning document anticipates a requirement for 485,000 tents to provide shelter in these locations.

Nevertheless, it is believed that an organized or guided distribution of homeless families in the parks is an objective which is unlikely to

be achieved. It is likely, however, that some proportion of homeless victims will attempt to gain access to park space around the City. This space will be occupied on a "first-come, first served" random basis.

Recapitulation of Victim Behavior

The foregoing projection suggests five categories of shelter solutions which the homeless population can be expected to establish, at least in the immediate period after a severe earthquake.

One illustrative breakdown of the possible shelter solutions would be as follows:

Category #1 Temporary Shelter at Collapsed Homesite	47%
Category #2 Move In With Relatives and Friends Around Lima	30%
Category #3 Temporary Shelter in a Green Area, Streets & Public Buildings	20%
Category #4 Spontaneous Move to Pueblos Jovenes (excluding #2 above)	2%
Category #5 Return to Rural Areas	1%
	100%

To illustrate the magnitude of this problem, one predominantly tugurio district, whose population comprises nearly 20% of the city-wide tugurio population, Rimac, with a population of about 26,000 families, has been selected. Rimac is fairly typical of tugurio zones; in fact, the Barrios Altos area of Lima District, which is immediately adjacent to Rimac and has a similar population, would be good as an example.

RIMAC PROJECTIONS

Illustrative Population: 26,000 Families

Impact of Severe Earthquake on Housing Units	Percentage of Impact Minimum	Maximum
Collapsed 30%/50%	8,000	13,000
Must be Demolished 20%	5,000	5,000
Inhabitable 30%/50%	13,000	8,000
Total	26,000	26,000 families
Number of Homeless Families	13,000	18,000 families

Immediate Post-Disaster Shelter Solutions	Percentage of Impact Minimum	Maximum
Category #1: Temporary Shelter at Homesite (47%)	6,110	8,460
Category #2: Move in With Relatives and Friends Around Lima (30%)	3,900	5,400
Category #3: Green Areas, Public Buildings and Streets (20%)	2,600	3,600
Category #4: Spontaneous Move to PJ's (excluding #2, above) (2%)	260	360
Category #5: Return to Rural Areas (1%)	130	180
Total	13,000	18,000

Making similar projections for an estimated 100,000 families who reside in tugurio dwelling units -- if anything a conservative estimate -- and applying the same percentages to this total as to Rimac District, the following estimates would be derived:

CITY-WIDE TUGURIO PROJECTIONS

Illustrative Population: 100,000 families

Impact of Severe Earthquake on Housing Units	Percentage of Impact Minimum	Maximum
Collapsed 30%/50%	30,000	50,000
Must be Demolished 20%	20,000	20,000
Inhabitable 30%/50%	50,000	30,000
Total	100,000	100,000 families
Number of Homeless Families:	50,000	70,000 families

Immediate Post-Disaster Shelter Solutions	Percentage of Impact Minimum	Maximum
Category #1: Temporary Shelter at Homesite (47%)	23,500	32,900
Category #2: Move in with Relatives and Friends Around Lima (30%)	15,000	21,000
Category #3: Green Areas, Public Buildings and Streets (20%)	10,000	14,000
Category #4: Spontaneous Moves to PJ's (excluding #2 above) (2%)	1,000	1,400
Category #5: Return to Rural Areas (1%)	500	700
Total	50,000	70,000

Immediate Post-Disaster Options

The view of this report is that the great majority of tugurio dwellers rendered homeless by a severe earthquake would make immediate arrangements of their own for temporary shelter, principally by putting up a makeshift shelter on their former building site; moving in with relatives and friends; or moving to public areas -- parks, churches, schools and streets. Each of these options will present particular problems and opportunities to the Government of Peru.

Category #1: Temporary Shelters at Homesites

The estimates suggest that 25,000 - 30,000 families will remain on the sites of their previous buildings. Within a short time, three issues concerning this action will emerge:

(a) Left to continue in that manner, it is likely that slum housing (at first considered "temporary") of a quality much worse than the poor conditions of the tugurios will become permanent. The amount of space per occupant will be minimal, and shanties constructed of rubble will provide inadequate housing. As non-owners of the plots on which they will have placed their shelters, the tugurio dwellers will be unwilling and unable to replace the temporary shacks with permanent construction. Essential services -- water, sewage, and electricity -- will have diminished considerably in quality and quantity as a result of the earthquake; and their reinstatement will require considerable time.

(b) The land upon which the homeless tugurio dwellers will have placed their shacks will not be their own property. Whether the

property of a public-spirited or social organization; an insurance company; a collection of anonymous property heirs; or private landlords, each will have plans for the use of the land. The earthquake will be seen by some landlords as the solution to their perceived need to empty their slum buildings in order to redevelop their valuable property. A political confrontation of interests between landowner and former renter is a certainty. In this confrontation, the weight of the law will be with the landowner. At the present time, the possibility of compensated or uncompensated nationalization seems remote. The State lacks funds to implement the compensated alternative; and the philosophy of the current Government precludes the uncompensated variety.

(c) Individual landowners; the municipal authorities of Lima; and the Government of Peru will endeavor to implement policies which will tend to introduce a new type of development to the current tugurio areas. Whether policies of promoting commercial development; low-or-middle-income housing development; increased recreation areas and parks; or others are adopted, it is likely that there will be a consensus that the type of spontaneous emergence of squatter slums likely to occur in the absence of Government policy is undesirable. But the presence of massive slum or shack housing solutions unregulated immediately after an earthquake may realistically preclude any other type of decision. Alternative policy actions will become even more difficult if Government delays are encountered and residents become more firmly attached to their sites.

Category #2: Moving In With Relatives and Friends Around Lima

This short- and medium-term solution for the shelter problem is ideal in some ways. It uses existing shelter space and services which are not rendered uninhabitable by an earthquake. However, this is not a permanent solution.

Relatives and friends will welcome/tolerate their less fortunate homeless relations for some months, but not for many years. As a temporary measure this is the ideal solution from the standpoint of the Government. But this category of disaster victim cannot be forgotten or written off because it is not visible in parks or squatter areas. Eventually, these people -- like these other categories -- will require access to permanent housing solutions.

Category #3: Green Areas, Public Buildings, and Streets

This is probably the type of immediate shelter solution which is potentially the most disruptive to the City. It will affect the City's ability to maintain education and health services; to insure the conduct of vehicular traffic; provide recreational opportunities; and other services.

In some respects, this solution may not even be viable. For example, Government authorities are currently contemplating a plan for widespread use of the municipal parks for emergency shelter. Yet the possible number of families who would desire shelter in such parks will exceed the amount of available acreage. In some cases, such as Barrios Altos, there are almost no parks within the area and the few open areas nearby. Most districts are thus incapable of

accommodating the number of homeless families likely to require and desire such space.

A final difficulty is that people who establish temporary shelter in public parks, streets and buildings frequently expect the Government to solve their long-term shelter problems at no cost or at minimal cost to themselves. Since the Government will not have the ability to satisfy this demand, nor is it necessarily desirable that Government do so, it is likely that people will reside in these areas for extended periods. The current Government plan to install water, waste removal, electricity services and providing tents for shelters in such areas will encourage such an outcome.

In addition, there may be various interests competing for the use of the parks. At present, only the number of homeless tugurio dwellers who might seek shelter in the parks (10,000 - 14,000 families) is discussed. Yet there will be homeless families from the lower and middle class who do not reside in tugurios who will compete for the same terrain. It is likely that many of the parks will be closer to the middle-class homes and that they will more likely get the space before the tugurio dwellers. Moreover, emergency medical services, collection and identification of those killed by the earthquake, and emergency helicopter, ambulance and other equipment and fuel installations may need to operate from these open areas as well. These services -- which cater to the injured public-at-large may require priority over individual space seekers.

The problem of emergency tent residents who expect Government

Daily Newspaper "EXTRA" - FRONT PAGE STORY
November 6, 1981

HOMELESS LIVE IN TENTS LIKE GYPSIES

In tents provided by Civil Defense and in precarious shelter, 20 families have been living like gypsies since the past month of September. They are located on Block 27 of Avenida Argentina, and, according to their statements, expect to be resettled in a place which offers better (living) conditions.

Extra

Jr. Ica Nº 646 - Teléfono 287479

El Vespertino de Mayor Circulación Nacional S/.70

Director: Guillermo Cortez Núñez

Lima, Viernes 6 de Noviembre de 1981 — Nº 5128

desalojadas viven en carpas como gitanos

En carpas otorgadas por Defense Civil, y en precarias viviendas 20 familias viven como gitanos desde el pasado mes de setiembre. Ellos están ubicados en la cuadra 27 de la Av. Argentina y de acuerdo con sus declaraciones esperan ser reubicados en un lugar que les permita mejores condiciones.

solutions to their problems is actually a common one in ordinary emergencies in Lima, as the newspaper article on the previous page illustrates. Here, a number of families who were provided emergency shelter in tents after a fire destroyed their homes, complain that "they have been living like gypsies" for several months while "expect[ing] to be resettled [emphasis added] in a place which offers better conditions."

Category #4: Spontaneous Move to Pueblos Jovenes

This small number (2%) of families will move to pueblos jovenes without Government encouragement or assistance. In doing so, they will seek to find their own permanent housing solution. Perhaps this group and its experience can form the nucleus or model for actions for other later programs.

Category #5: Return to Rural Areas of Origin (1%)

As in the case of Category #4, this solution may be viewed as desirable -- especially in light of the super-influx of population into Lima during the 1970's. However, the small numbers involved are such that they must be discounted as a major solution to this problem.

It is probable that some type of forced- or incentive-supported return to rural areas of origin will be an option brought up in some circles. The main motivation for such thinking will be the reasonable assertion that the City is vastly over-populated in relation to its ability to provide services and employement to its low-income sectors.

But with respect to tugurio dwellers, as desirable as such a solution might be seen by some, it is simply not practical.

This report will now interrupt this discussion of the tugurios for a brief period to focus on the other major low-income residential area of Lima -- the pueblos jovenes. Thereafter, the recommendations for disaster mitigation and preparedness activities will be presented.

DESCRIPTION OF PUEBLOS JOVENES

Evolution

The pueblos jovenes are relatively new settlements generally located in the expansion zones on the outskirts of Lima (see Map C). At present, the number of persons estimated to reside in such settlements is about one million. Typically, a pueblo joven began with a Government-sanctioned "invasion" of abandoned desert-like land, which was divided by Government agents into family-sized plots. Each family was provided the use (although generally not the formal title) to one plot.

To provide its essential shelter on this site, families erected a cane-mat (estera) house by tying five of the large mats together -- four for walls, one for a roof. Because the weather is mild and it rains only a few days a year, these shelters proved adequate for the family. In some cases, even before the estera-mat houses were erected, families used wooden poles with plastic wraparounds as temporary homes.

As soon as the family accumulates some cash, it is invested in bricks and other basic building materials. During this process, it is not unusual that a family will economize severely on food and other essentials, making great sacrifices in order to initiate a permanent dwelling. When enough materials are accumulated, partial construction of a permanent, brick house begins. Depending on the availability of materials, the family might begin to erect four walls to a height of a meter or more. When more materials are available, the building will continue. From the beginning, the brick walls

are constructed around the initial estera-mat house, in which the family continues to live until the more permanent structure is completed.

When the foundation and walls are completed, a "first-stage" roof is placed on them. This roof would be made of ETERNIT -- a locally-manufactured asbestos-cement material with good thermal qualities for Lima's climate -- or of CALAMINA, which is corrugated galvanized steel sheeting, also locally manufactured. Once again, as the family's resource base evolves, this roof will be replaced with a concrete and steel-reinforced brick roof. This basic housing unit might be elaborated upon at a later date with a second story of similar construction, or even with a make-shift wooden shack atop the roof.

Today, pueblos jovenes around Lima are observed in all states of evolution: there are settlements which are still in the estera-mat stage; settlements still using estera houses with brick walls built up partially around them; settlements of permanent brick homes with roofs in various stages of evolution; and those with permanent, two-story buildings. There are also differences within each settlement.

The evolution of a pueblo joven is visually illustrated in a Catholic University documentary, Espacio Vital (available at the USAID Mission in Lima). The process begins in February, 1976, with an invasion of unsettled land around the Huascar Bridge by tugurio residents. During the first four days, the families reside in individual shelters constructed of thin wooden poles with walls made of plastic tablecloths and cardboard.

After four-days of makeshift residence around the Bridge, the

Government identifies a permanent site where this group of families will be permitted to settle. The site is located in Canto Grande, a valley in which many pueblo joven settlements are located, which is about 45 minutes from the center of Lima.

SINAMOS, a Peruvian Government agency, divides the site into lots of 90, 120 and 140 square meters. Sites are distributed to individual families through a lottery witnessed by all the families. Within hours, the families have found their sites and reconstructed their temporary dwellings, relying on the same types of materials they had at the Bridge and, to a greater degree, on estera-mats.

After demonstrating the manner in which water distribution and latrines are organized; the almost instant creation of small shops; and other immediate developments, the documentary ends the 1976 segment.

The film's second segment, filmed in July, 1978, just over two years later, witnesses a considerable amount of evolution in housing (mainly completed brick houses) and services. The film provides an insight into the ground-level roots and development of the pueblo joven movement.

Essential Services: Water, Waste Removal and Electricity

Essential services evolve from a simple, rustic stage at the outset to more complex individualized service. For example, when a pueblo joven is intially settled, a 2,000 gallon tank-truck makes a neighborhood stop once or twice a day, and families bring buckets, plastic pails, and other receptacles to purchase and collect water. In time, the

family acquires a 55-gallon drum, and the tanktruck makes a door-to-door stop to deliver it. Residents pay a fairly high price for such water -- about S110/S150 per drum (September, 1981 rate). One possible next step is a 200-300 gallon concrete storage tank built by the family in front of the house, periodically filled by a tanktruck.

If the neighborhood or community can organize itself, pool its resources, and gain a loan through a cooperative, association, or mutual, it is possible for piped water to be installed, with either public standpipes or, eventually, individualized household connections. But because of distance from the water source, topography, low water pressure or shortage of water supply, a community which has piped water may well find itself continuing to rely on tanktruck deliveries during part of the year. The organization of the tanktruck business is described in the volume of this report concerned with water.

Waste removal systems begin with a simple latrine constructed at the rear of a newly settled plot and evolve through communal waste removal facilities to formal individualized in-house waste removal systems.

Pueblo joven pioneers solve their electricity problems in a variety of ways. At the outset, these settlements do not have the benefit of electrical services. After a time, some pueblo joven entrepreneurs obtain generators and sell electrical power to their neighbors; others use the celebrated "lineas clandestinas" -- illegal taps into the ELECTRO-LIMA system -- at some initial stages of their development. The result of these systems are mazes of what appear to be hundreds of

lines strung across the sky, with no electrical security system. As with the water system, the community can obtain ELECTRO-LIMA service if financing can be arranged; that may depend, once again, on forming or joining a reliable cooperative, housing association or mutual, to arrange financing. Delinquency on loans to such groups tends to be low because the utility company can disconnect water, electricity and other services if payments are not made; and the nature of these loans requires a type of mutual reliance among all the family-participants in which failure to make a repayment installment would jeopardize the service for all.

The evolution of the pueblos jovenes is a dynamic process which often takes ten to twenty years for legal recognition and finished permanent construction and may vary in accordance with employment possibilities, degree of Government-assistance (especially in the case of the Government's "model" settlement area, Villa El Salvador in the southern part of Lima) and other factors. Most of the settlers in these expansion zones are of rural origin, although a fair proportion spent up to three years in the tugurios of central Lima after departure from their origins and before their move to the pueblos jovenes. They are independent, vigorous, and self-reliant and -- with the exception of a few "model" areas -- have come to believe that they can expect little help from the Government. Thus, not only their essential services, but also their schools, health clinics, roads and other services are likely to have been built by the settlers themselves.

The number of pueblos jovenes houses without piped water/sewage services

has increased dramatically during the past two decades. In 1961, the Ministry counted 69,000 such housing units in Lima, accounting for about 20% of all housing units. By 1972, the number had risen to 135,000, although because of the general population increase and urban migration the percentage of all housing units represented by this figure was still about 22%. At the time of this survey, the Ministry was projecting the current number of such dwellings to be about 225,000, about 23% of the City's population; but this rough estimate is subject to the final conclusions of the 1981 census.

What these figures do not include is the number of pueblo joven homes which have piped water and sewage. These are integrated into another category -- "Other Urban" houses -- which have increased as follows:

Year	Number of Units	Percentage of All Lima
1961	158,600	46%
1972	325,100	52%
1980 Est.	548,500	56%

Even without its share of the "Other Urban" category, however, the pueblos jovenes represent a significant proportion of the City's population. It is unlikely that the growth rate of the pueblos jovenes will continue, however, because since the late 1970's, the urban migration which fed the pueblo joven movement has slowed down considerably.

Vulnerability in a Major Earthquake

The quality of construction in the pueblos jovenes is generally considered good. The estera-mat houses, of course, are safe in earthquakes. Specialists consulted in the course of this study generally considered that the brick houses are, in 60% of the cases, properly reinforced; in 20% over-reinforced (and thus over-weight) but probably safe; and 20% inadequately reinforced. Some families tend to store their bricks as they accumulate them in large piles near their front doorways or on the edge of their roofs. In these cases, the bricks could present hazards as they collapse near the doorways of houses. Otherwise, rapid evacuation of these one-family houses should proceed unimpeded in the wake of an earthquake. One weakness in some of the pueblos jovenes is that the homes are constructed with no space between adjoining walls. But despite these several problems, it is not believed that the pueblos jovenes would produce large numbers of deaths, collapsed houses, or other life-threatening damages in a severe earthquake which would be anticipated in the tugurios.

An exception to this assessment is one type of spontaneous settlement -- sometimes, but not always, referred to as a pueblo joven -- is that which has emerged on extremely steep hillsides around central Lima and also around the pueblos jovenes. Many of these settlements follow the evolutionary patterns of the pueblos jovenes, i.e., spontaneous settlement, initiated with cane-mat structures and developing into brick houses. As contrasted with most pueblos jovenes, however, their sitting on very steep hillsides, proximity to each other, and the

quality of their foundations raise serious questions about their safety in an earthquake. The potential for death and injury should these homes collapse or tumble on one another, appears considerable. Yet, specialists in this field claim the houses are properly constructed to resist such an event. No matter what label is affixed to this type of settlement -- urbanization, pueblo joven, etc. -- it appears that further assessment of this situation ought to be made.

Another group of homes which do not fall strictly into one category or another are those built along the edge of the Rimac River in many parts of the city. These are vulnerable to mass failure in normal times, but would be particularly dangerous in a severe earthquake. Civil Defense efforts to relocate these families have failed in the past because of resistance by the families to change homesite even when Civil Defense has made alternative arrangements for them. Thus, the danger persists.

Social Organization

The pueblos jovenes generally have both indigenous and externally-directed social organizations.

Under the general coordination of the Direccion de Asentamientos Humanos No Regulados, the Ministry of Housing assist in the organization of a type of representative community organization which has three levels: Comites Vecinales (a three-person committee elected by a group of 30 families); Comites de Promocion y Desarrollo (COPRODE) (consisting of between 1 - 3 representatives from each Comite Vecinal); and a

Junta Directiva Central (the governing body of the COPRODE, a type of Cabinet for the larger organization).

Residents of the pueblos jovenes express mixed feelings about these groups, usually indicating that they have some excellent members but that at the institutional level they are vulnerable to excessive political and unproductive influences.

Many of the areas have active housing cooperatives and associations, which in turn may be members of cooperative or housing association federations.

Finally, there are a number of externally-directed social welfare and development agencies active in the pueblos jovenes. These include the Seventh Day Adventist group, OFASA; CARITAS; and numerous international religious and service organizations.

Planned Development

In many of the same general areas where pueblos jovenes have emerged, a planned process of housing development managed by the private sector has also occurred. In the 1960's and 1970's some areas were managed by land developers who prepared the sites and services in advance and accelerated the growth of "urbanizaciones" side-by-side with the more spontaneous pueblos jovenes. A major new initiative, however, is currently underway in two zones which offer considerable possibilities of future expansion for the City -- Villa El Salvador and Canto Grande.

Under a planned US $150 million World Bank program, nearly 30,000

lots with services may be developed. Roughly 9,600 will be located in Villa El Salvador (3,200 of which are now ready); and another 18,000 will be devloped in Canto Grande. The total cost of a full service lot, in September, 1981, is S 800,000. With interest at 23%, this would require a monthly payment by a buyer of about S 16,000. However, the program will offer optional degrees of service scaled all the way down to a simple lot with no services.

Employment Opportunities in Pueblos Jovenes

Residents of pueblos jovenes tend to have the same reservations about their own areas as do residents of tugurios: transport is unreliable and expensive; and jobs are difficult to find.

To attempt to assist these residents, the Government has experimented with the development of industrial parks in the pueblo joven areas. The industrial park in Villa El Salvador, for example, is equipped with power and other utility installations ideal for industrial development. Industry, however, has been reluctant to move to the pueblos jovenes, and the park remains largely unused. Security problems, distance from the center of Lima and the Port of Callao, and probably inertia account for much of the reticence.

RECOMMENDATIONS FOR ACTION

Disaster Mitigation

The main opportunity for saving lives and severe injuries in the shelter sector would appear to be in mitigating these risks in the *tugurios*, where it can be safely predicted that the majority of damage would occur. But the mitigation of these problems as disaster risks is only a very small part of an overall need increasingly focused upon by the Government of Peru to develop a comprehensive policy for dealing with the problems of the *tugurios*. At best, considerations of disaster mitigation will form only a small part of this complex issue.

Nevertheless, there are a number of discrete steps which could be taken which might be of value in serving both ends:

1. Detailed Assessment of Land Tenure

What appeared as a revelation to some, was a long-time assumption for others: a considerable proportion of *tugurio* properties is in the hands of social and religious organizations (such as the SBPL). It may be a relatively simple matter to commission a small contract study which would provide a district-by-district analysis -- illustrated on the type of street map (Map B) which accompanies this study -- of land ownership. At first, such a study could focus on university, church, SBPL, and other public institutions. The cost of such a study need not exceed $10,000/$15,000.

The information so gathered would be of value in assessing alternative policy and management options for these areas and establishing their feasibility. The Cercado de Lima District and Rimac and Victoria Districts would be good choices for the initial stages of such a study.

2. Options for Redevelopment of Tugurio Properties

A number of options for reducing life-threatening hazards while permitting institutional owners to realize greater income from some of their properties needs to be studied.

Among these options are the removal of illegal occupants; consolidation of renters into better quality buildings; and demolition of the most dangerous units. Financial support for the demolition of already abandoned and semi-abandoned buildings needs to be considered as well.

In addition to consolidation, other suggested alternatives are:

(a) Development by the SBPL under concessional financing of new low-income housing which it can offer its current tugurio occupants at rates of rent calculated based upon their ability to pay. This is the preferred option of the SBPL itself and might form part of a staged relocation and upgrading plan if its drawbacks could be overcome.

(b) Integration of some currently planned development programs for sites and services in expansion areas of the city with the goal of demolishing the most dangerous inner-city buildings. For example, the 30,000 World Bank-financed sites and services of different varieties -- geared to various income levels -- might be

coordinated in some way with a form of incentivized relocation program.

(c) Development of an incentive scheme for tugurio residents to encourage them to evacuate certain buildings. For example, SBPL has some tugurio dwellings located in central Lima which are prime candidates for commercial and housing redevelopment. The value of these buildings is so much greater than the negligible income the SBPL is receiving from them that if they could be converted SBPL could afford some sort of incentive scheme for tenants. Under current rent control regulations, SBPL (and all landlords) are prohibited from evicting tenants or from raising rents except under unusual circumstances and then within unrealistically modest limits. These rules may, in part, be responsible for the deteriorated condition of the tugurio buildings.

(d) Further exploration of the feasibility and desireability of selling tugurio buildings to their occupants, and assessment of experience to date with this strategy.

If -- through consolidation schemes, incentives, or coordination with new housing initiatives in Lima, new legislation or through a combination of these -- groups like SBPL succeed in emptying some of these properties, several options for their development emerge:

(a) SBPL has suggested that it retain title to and management of its properties, developing them as commercial, residential or dual-purpose buildings. Continued ownership of property and buildings would protect SBPL against inflation and provide for a reliable source of income for the future. With this income, it can maintain and

revive the social services for which it was intended.*

(b) SBPL could also sell those properties which it obtained unconditionally (i.e., those which it is not prohibited from selling under the terms of the bequests through which they acquired them; and those not required to be used for designated social services). The revenues could be invested, and the SBPL could use the income for its social programs. Under this option, SBPL would be relieved of the direct management of properties and buildings.

(c) Properties which have been demolished but which have no possibility for redevelopment at present could be turned into small parks or recreation areas, of which most tugurio neighborhoods have none.

Much of what has been suggested does not conflict with current rent-control laws. It is possible that some special legislative dispensations for social and religious organizations like SBPL, if needed, could be adopted.

Two international funding institutions -- the World Bank and the U. S. Agency for International Development, which both have interests in the field of housing and urban development in Peru -- have expressed interest in exploring some of the foregoing.

* The Government of Peru's experience with the El Porvenir project, should be taken into consideration in the development of this type of scheme. A summary of that experience is the Annex to this report.

Disaster Preparedness

There are two steps which could be taken in advance as preparedness measures which would accelerate recovery from a severe disaster and help to insure that the City is prepared to respond effectively to such an emergency:

1. Inspection/Demolition Plans

In a severe eqrthquake, many buildings -- principally residential houses in the tugurios but also public buildings) will not collapse but will be severely damaged. It will be important to assess such buildings quickly to determine whether they must be demolished in order to prevent further losses of life.

An operational plan should be developed to mobilize public and private sector engineers and resources to perform inspections; to develop guidelines for determination of the condition of a building; and to inventory equipment required to demolish identified risk-structures. Such a function might well be delegated to the Ministry of Public Works and the Ministry of Housing or other responsible body within the Civil Defense system.

2. Emergency Shelter/Resettlement Plans

The major post-disaster shelter policy issue will probably revolve around the tugurio problems discussed earlier in the report. The magnitude of the policy issues with which the Government of Peru will be presented seem overwhelming. Advance planning may mitigate some of the magnitude, but will not eliminate it.

Nevertheless, it would be valuable for Civil Defense, Ministry of Housing and other Government officials to focus additional attention on the problems likely to be generated by such a disaster and on the options available to it, including the advantages and disadvantages of each. To some degree, the Government will not be able to control events in the immediate aftermath of a disaster. By the time Government is ready to respond, most people will have already made temporary shelter arrangements on their previous homesites with friends and relatives; and in parks, streets, and public buildings. Depending on the policies which Government pursues, it probably can significantly alter the proportion of families which remain in this status after 72 hours. However, the types of plans Government articulates in advance (for example, the current policy of moving people into parks); the way in which it organizes emergency services (water, waste removal, power, relief resources such as food and shelter materials); and the incentives which it is prepared by advance planning to offer in new expansion zones (Canto Grande particularly); could all influence the degree to which Government can influence events. This degree, it is believed, will be a function, in part, of how quickly these policies are implemented; and that, in turn, is a function at least in part of advance planning.

Based on interviews with housing, municipal, and other authorities in Lima it appears that there is a general consensus on the following issues:

1. If a significant portion of the tugurio zones collapse or must be demolished, the City should encourage a different type of development in these areas.

2. Tugurio dwellers should be encouraged with material incentives to resettle in the City's expansion zones. Such incentives could include provision of land, construction materials, emergency water supplies, relief resources, and support services for the community in health, education, security and other sectors.

3. The Government will be unable to provide free replacement housing for large numbers of persons. A considerable self-help element must be included in their shelter solution.

4. Persons who have sought shelter in public streets, parks and buildings should be encouraged to move to permanent sites quickly, lest they become accustomed to these new locations or come to believe that Government will be fully responsible for their future housing arrangements.

5. Nationalization of tugurio properties is unlikely. At present, persons rendered homeless as a result of an earthquake would have no claim to the land on which these properties are located. However, under some scheme, they might be provided priority opportunity to rent units in buildings subsequently erected in their areas.

What seems important here is not what detailed specific policies might be decided upon in advance, but rather that some general policies

or emergency plans are put in place for such a contingency. The process of consideration of such policies would be worthwhile in itself in heightening awareness of the problems likely to be faced.

ANNEX A

The El Porvenir Experience

The El Porvenir Experience

During the years of the Velasco Government of the 1970's, the Government of Peru inadvertently became the owner of 3,000 rental units in tugurio areas of La Victoria District. The Government, in the process of nationalizing the assets of a local Bank, found that among its assets were the 3,000 rental units, located in the Porvenir neighborhood of the District.

For a variety of reasons, the Government decided to conduct an urban renewal program for the Porvenir area and, in particular, the roughly 15,000 tenants who occupied its newly acquired rental units. First, the Government was interested in upgrading the quality of shelter of the families, as part of its overall social policy. Second, rents were not being collected, so that not even maintenance costs were covered by revenues. Finally, Government had a general policy of not wishing to own residential property and especially did not wish to find itself for very long in the role of "slum landlord".

The project afforded several options to the tenants:

(a) The opportunity for a plot of land in Villa El Salvador, a pueblo joven -- new settlement -- on the southern outskirts of Lima. In this case, the family was provided with the plot, a 55-gallon drum of water and estera-mats for the construction of a temporary shelter. From that point on, like all other pueblo joven settlers, the family was on its own.

(b) An opportunity to rent space in the same building after it had been renovated and several dwellings were consolidated into larger apartments. This option required the family to move temporarily into other buildings while the renovation and consolidation of their own building was accomplished. The renovations extended not only to the renewal and consolidation of the dwellings themselves, but also included improved lighting, safer stairways, structural improvements, and provisions for better air circulation.

(c) An opportunity to rent a new dwelling in low-rise buildings newly constructed under the project. In practice, two such buildings were erected.

Each of these options was available to all the tenants. However, in choosing each option, the tenant was required to pay a rent which was deemed appropriate for the quality of unit provided.

In practice, the project proceeded as follows: first, illegal occupants ("invasores") and many of the low-income families who chose to do so were resettled under (a), above -- a lot in Villa El Salvador. Second, the remaining occupants were consolidated into some of the thirteen tugurio buildings covered under the program. Only two of the buildings were renovated -- because of lack of financing -- and these were quickly reoccupied by families from the group who could afford the higher rents. Unfortunately, the project was discontinued in midstream because of lack of financing. [According to the Banco de la Vivienda del Peru, approximately S/450 million is still (September 1981) owed by Government on this project, including S/300 million in principal

and $150 million in interest, representing one of the Bank's major delinquent accounts.]

The Porvenir experience may offer some experience which would be valuable in assessing what types of plans for renewal of tugurio properties are financially realistic; how consolidation programs could be managed; and the social impact of such efforts.

ANNEX B

Census Figures for Metropolitan Lima

CENSUS FIGURES FOR METROPOLITAN LIMA

AREA	1972	1981	Number of Families	Percentage of Change
Dist. Lima	354,292	375,957	68,356	5.8 %
Ancón	5,581	8,610	1,565	54.3 %
Ate	60,542	147,202	26,764	143.1 %
Barranco	49,091	46,388	8,434	- 5.5 %
Breña	112,202	112,798	20,509	0.5 %
Carabayllo	27,847	53,146	9,663	90.5 %
Chaclacayo	21,390	31,583	5,742	47.6 %
Chorrillos	90,618	138,688	25,216	53.0 %
Cieneguilla	2,527	4,637	843	83.3 %
Comas	173,101	287,560	52,284	66.1 %
El Agustino	117,077	171,127	31,114	46.2 %
Independencia	109,873	138,987	25,270	26.5 %
Jesús Maria	84,128	81,843	14,881	- 2.7 %
La Molina	5,951	14,426	2,623	142.4 %
La Victoria	265,636	269,542	49,008	1.5 %
Lince	83,064	78,960	14,356	- 4.9 %
Lurigancho	51,366	65,514	11,912	27.5 %
Lurin	12,789	17,761	3,229	38.9 %
Magdalena del Mar	56,886	55,578	10,105	- 2.3 %
Magdalena Viefa	78,155	82,709	15,038	5.8 %
Miraflores	99,804	101,945	18,535	2.1 %
Pachacamac	4,534	6,772	1,231	49.4 %
Pucusana	2,835	3,565	648	25.7 %
Puente Piedra	18,861	34,012	6,184	80.3 %
Punta Hermosa	908	1,010	184	11.2 %
Punta Negra	744	552	100	- 25.8 %
Rimac	172,564	188,164	34,212	9.0 %
San Bartolo	1,458	2,925	532	100.5 %
San Isidro	63,296	73,016	13,276	15.4 %
S. J. de Lurigancho	86,173	261,876	47,614	203.9 %
S. J. de Miraflores	106,755	167,899	31,527	57.3 %
San Luis	24,007	54,099	9,836	125.3 %
S. Martin de Porres	230,813	403,445	73,355	74.8 %
San Miguel	63,139	93,640	17,025	48.3 %
Santa María del Mar	44	96	17	118.2 %
Santa Rosa	217	489	89	125.3 %
Santiago de Surco	71,954	148,118	26,931	105.9 %
Surquillo	90,111	129,195	23,490	43.4 %
V. María de Triunfo	180,959	300,328	54,605	66.0 %
TOTAL PROV. LIMA	2,981,292	4,154,161	755,302	39.3 %
Dist. Callao	198,573	265,448	48,263	33.7 %
Bellavista	39,724	69,113	12,566	74.0 %
Carmen de la Legua	26,043	38,453	6,991	47.7 %
La Perla	33,410	47,738	8,680	42.9 %
La Punta	6,697	5,564	1,012	- 16.9 %
Ventilla	16,784	20,414	3,711	21.6 %
TOTAL PROV. CALLAO	321,231	446,730	81,223	39.1 %
TOTAL METROPOLITAN LIMA	3,302,523	4,600,891	836,525	39.3 %

MINISTERIO DE VIVIENDA Y CONSTRUCCION
Oficina Sectorial de Planificación
Dirección de Planificación Financiera

INDICADORES SOCIO-ECONOMICOS DE LAS PRINCIPALES CIUDADES DEL PAIS

" II PROYECTO DE DESARROLLO URBANO"

Lima, Mayo de 1981

LIMA METROPOLITANA

1.- Ubicación Departamento Lima

2.- Altura Promedio 137.0 = 450 ft
(Mts. sobre el nivel del mar)

3.- Información Meteorológica :

- Temperatura : °C
  - Máxima 26.9; Mes: = 85°F Marzo
  - Mínima 14.4; Mes: = 58°F Agosto

Precipitación Pluvial : mm.
- Máxima 1.7; Mes: .07 mm Julio (0.8 mm por year)

Humedad :
- Máxima 88%; Mes : Setiembre
- Mínima 82%; Mes : Abril

4.- Información Demográfica :

- Población 1979 : 4'697,966
- Población 1990 : 7'939,116
- Crecimiento Poblacional (%) :
  1990/1979 : 4.9
- Menores de 14 años 1972%: 34.6

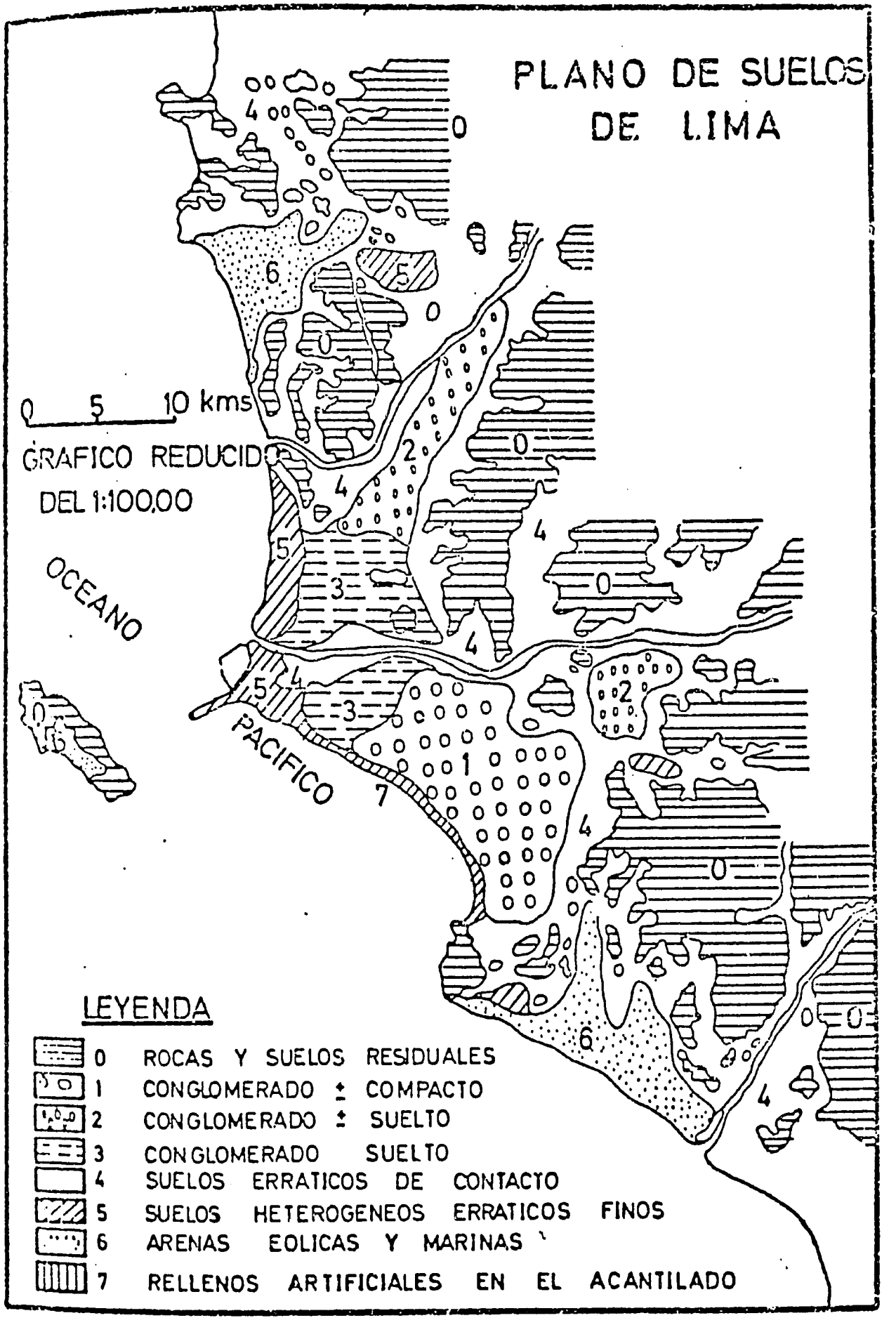
5.- Características de la PEA 1979

- Desempleo (%) 7.1
- Estructura por Sectores (%) 1972
  - Primario : 3.3
  - Secundario : 29.4
  - Terciario : 67.3

6.- Los Pueblos Jóvenes (PP.JJ)

- Población 1979 : 1'068,265
  1972 : 783,093
- Crecimiento Poblacional (%)
  1972/1961 : 10.2
  1979/1972 : 4.5
- Población en PP.JJ. (%)
  1979 : 22.7
  1972 : 25.2
- Número de PP.JJ.
  1979 : 330
  1972 : 264

	PUEBLOS JOVENES 1972	PUEBLOS JOVENES 1979	CIUDAD 1979
7.- Características de la Vivienda :			
- Número de Viviendas	144,017	178,604	782,547
- Habitantes por Vivienda	5.44	5.58	6.00
- Crecimiento del N° de Viv. (%)	9.70	3.10	3.50
Viviendas servidas adecuadamente con :			
Agua (%)	28.80	36.10	66.50
Desagüe (%)	29.40	42.60	61.40
• Electricidad (%)	46.90	68.10	78.20
Viviendas Propias (%)	n.d.	15.70	50.90
Viviendas construidas con :			
• Pisos adecuados (%)	n.d.	n.d.	81.40
• Techos adecuados (%)	n.d.	n.d.	67.20
• Paredes adecuadas (%)	n.d.	n.d.	81.50


PLANO DE SUELOS
DE LIMA
0 5 10 kms
GRAFICO REDUCIDO
DEL 1:100.00
OCEANO
PACIFICO
LEYENDA
0 ROCAS Y SUELOS RESIDUALES
1 CONGLOMERADO ± COMPACTO
2 CONGLOMERADO ± SUELTO
3 CONGLOMERADO SUELTO
4 SUELOS ERRATICOS DE CONTACTO
5 SUELOS HETEROGENEOS ERRATICOS FINOS
6 ARENAS EOLICAS Y MARINAS
7 RELLENOS ARTIFICIALES EN EL ACANTILADO

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