PLANS FOR MEETING

DISASTER SITUATIONS IN THE PHILIPPINES

by

Serafin G. Aquino

B. S. Arch., University of Santo Tomas (1950)
M. Arch., Massachusetts Institute of Technology (1951)

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Head, Department of City and Regional Planning

Thesis Advisor

Author
Professor Frederick J. Adams, Head
Department of City and Regional Planning
School of Architecture and Planning
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dear Professor Adams:

I submit Plans For Meeting Disaster Situations in the Philippines as my thesis in partial fulfillment of the requirements for the degree of Master in City Planning.

Respectfully yours,

Serafin G. Aquino
ABSTRACT OF THESIS

Title: PLANS FOR MEETING DISASTER SITUATIONS IN THE PHILIPPINES

Author: Serafin G. Aquino

Submitted to the Department of City and Regional Planning on May 25, 1953, in partial fulfillment of the requirements for the degree of Master in City Planning.

Objectives:

It is the aim of this study to undertake a general survey of the total problem of meeting disaster situations from the physical point of view, and specifically (1) to identify those factors which do or should influence the preparation of physical plans to meet disasters and (2) to develop and illustrate an approach to preparation of physical plans which would alleviate the results of disasters.

Findings and Conclusions:

The study finds that adequate provision of temporary housing facilities is essential both to meet emergency needs and to assure satisfactory standards in the rebuilding of devastated areas. Factors important in the provision of temporary housing, such as climate, topography, population characteristics and circulation, are identified and analyzed for their significance in the preparation of temporary housing plans. On the basis of these findings, alternative plans are developed, to illustrate an approach to advance planning.

The study indicates that through adequate advance preparations, especially the use of standard plans, structures, and other necessary facilities, more orderly temporary housing operations, greater overall economy and greater convenience for the affected people could be realized. The thesis also shows that careful advance planning can lead to speedier and more rational physical recovery of people and communities from disasters.

Thesis Supervisor
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CHAPTER I

THE PROBLEM
Molten lava peril many island towns

Cabinet meets on problem—official death toll climbs to 266

MAMBAJAO, Camiguin Island, Dec. 7 (By Philippine Navy Radio) (PNS)—Mass evacuation of Camiguin was under way today as flowing lava from Mt. Hibokhibok threatened to bury this and other island towns with still no sign of a let-up in the volcano's eruption.

2,000 persons homeless, 300 houses razed

30 injured as blaze rages 4 hours; Red Cross, PACSA on relief duty

Two persons were killed, including a fireman, when fire caused by faulty electrical wiring swept through a large congested area at the Manila-Caloocan boundary in Maypajo, destroyed 300 houses occupied by some 500 families and rendered at least 2,000 persons homeless, shortly after 11:15 o'clock yesterday morning.
and so go a few of the hundreds of reports on disasters in the Philippines. And yet, the resulting blight, congestion, substandard living in substandard housing, poor sanitation, and other socioeconomic ills generally remain to be accepted as the inevitable consequences of such phenomena.

Every year, tens and even hundreds of thousands of people fall victims to calamities and thousands and thousands of houses are destroyed.  

In the absence of proper provisions for the requirements of the people under these circumstances, victims are either forced to crowd into already

congested dwellings or live in makeshift huts most of which are unfit for even the poorest beings in our age and civilization. Or again, they are forced to migrate to other areas or regions - with many succumbing to the rigors and frustrations of the exodus.\textsuperscript{2}

Such conditions tangibly affect community life and progress. The health, morals and the general well-being of the people are impaired. The social, economic and cultural systems are disrupted and inevitably the community reaches a chaotic and pitiful state.\textsuperscript{3}

Faced with the problem of improving such situations and affording to the victims and their communities certain means to a faster and more decent recovery from disasters, several government and relief agencies have ventured some answers. These measures, however, have been on the whole inadequate to meet the exigencies involved. This may have been due to the lack of enabling powers on the part of the administration. Or perhaps, it was simply because efforts in this field have been confined to a narrow range of functions and responsibilities.\textsuperscript{4} Nevertheless, each disaster met has demonstrated that with better planning and organization of services, problems become less difficult to surmount and more could be done for the victims and their communities, especially in so far as temporary housing is concerned, even within the existing framework of resources.

\textsuperscript{2} From all available reports of certain relief and government agencies as well as from newspaper reports, these are about the only alternatives for the overwhelming majority of displaced disaster victims.

\textsuperscript{3} Pitirim A. Sorokin, \textit{Man and Society in Calamity}, (New York: E. P. Dutton and Company, Inc., 1942), Chapters VI and VII.

\textsuperscript{4} In spite of this, however, the measures have made inestimable contributions to the physical relief of the victims and to the exposition of the urgency and complexity of the problem.
Although the causes of disasters cannot be eliminated and the displacement of people and the damage to facilities avoided with conditions status quo, a great deal could be accomplished to minimize the health and economic losses as well as the social disorganization resulting from the delay and inadequacy of the replacements for destroyed housing facilities. Similarly, much could be done for the rehabilitation of devastated areas to ensure minimum physical, social and economic damages, should catastrophes recur. However, no sustained efforts have, up to the present time, been directed to the bridging of the gap between what is being accomplished under present methods and what should be done. To the same end, there has been no attempt to undertake the vital tasks of research, formulation of physical rehabilitation policies, and physical planning.

Statement of the Objectives and Scope of Study. The problem under consideration is very broad; it is, by its nature, a multi-faceted one. It has its physical, social and economic aspects, each of which embraces its own field of study. Although no absolute delineations can be made between these equally significant aspects, attention is focused on the physical aspect, as this seems most proper for the purposes of a thesis in city planning.

It is the aim of this study to undertake a general survey of the total problem of meeting disaster situations from the physical point of view, and specifically (1) to identify those factors which do or should influence physical plans and techniques involved in meeting disasters; and (2) to develop and illustrate a new approach to the preparation of physical plans which would alleviate the results of disasters.

The Sources of Data. Because the subject has so far failed to receive the attention which it merits, in planning and in related fields,
this study has suffered from a serious lack of fundamental research materials. A great deal of planning standards and criteria used here, therefore, had to be derived through the interpolation of certain planning standards and criteria used in the United States and certain of those used by the American and Philippine Red Cross organizations and by the United States Army Corps of Engineers in the Southwest Pacific in the development of military camps, bases and airfields during World War II. Certain materials and reports of the Department of Social Affairs of the United Nations, as well as information gathered from newspaper reports and through correspondence with certain authorities of the Philippine Government, have greatly contributed to the basis of this thesis.

Statement of the Organization of the Thesis. The study will proceed to a general review of the total problem - taking into consideration its long range and short range requirements as well as the outstanding factors favorable to the fulfilment of such requisites. The present methods of meeting the problem will then be evaluated, and from this a consideration of the various factors which bear on the choice of any solution will be made and design standards derived. Alternative schemes, prepared to illustrate a possible line of approach, will then be presented. The latter part of the presentation will point out the significant advantages and limitations of the approach. The study ends with an indication of those problems which have been brought up, but which require research beyond the limits of the study, and a statement of its conclusions.
CHAPTER II

A GENERAL SURVEY OF THE NEED
FOR ADVANCE PREPARATION FOR DISASTERS

If past operations could be used as a gauge to public policy, the concept that seems to have prevailed is that the total problem of meeting the physical destruction arising from disasters could be solved by efforts limited to providing emergency housing and feeding and medical care. As evidenced by materials on hand, little thought seems to have been directed to other equally significant factors which influence the effectiveness of an approach. This section of the study will, therefore, be devoted to a general survey of a number of considerations which seem to have been neglected to some extent in the past.

1. Integration of Administration

A great many of the difficulties of present temporary housing schemes have been due to the lack of an integrated approach to the problem. Records show that, on the whole, disaster relief has remained in the hands of at least two major organizations, the Philippine National Red Cross, and the Social Welfare Administration, and of a number of small scattered public and private entities — each of which functions with very limited resources and power, and works under separate programs. 5

Recognizing the magnitude of relief work and the overall disadvantages of an unorganized relief system, the national government designated

5 PNRC, Policies, Organization and Procedures, Disaster Relief, (Manila, PNRC, 1947); PNRC, Disaster Preparedness and Relief, Committee Organization and Functions, (Manila, PNRC); SWA, Annual Report for the Fiscal Year, 1950-1951, (Manila, SWA); and newspaper accounts of disasters for 1951 and 1952.
the Philippine National Red Cross to coordinate all relief operations in disaster areas. Thus, when a disaster occurs, the relief service of the Philippine National Red Cross rushes to the scene and the relief chapter of the Social Welfare Administration, as well as other well-meaning entities and individuals, does likewise. At the scene of destruction, the Philippine National Red Cross supervises and coordinates all relief operations and the use and distribution of material aid, the bulk of which it has secured by itself, and a part of which was contributed by all the other agencies. From available facts, however, it is reasonable to believe that the coordination achieved has not proved to be sufficient for the problem. There are distinct advantages in a coordinated system of relief activities, of course, as contrasted to one under which a number of separate agencies operate independently. However, the fact that the same practical problems of liaison and functional relationships between the various agencies, the diseconomies of small-scale procurement of supplies and materials, and to a certain extent, the duplication of functions still persist, makes the practical advantages of the system of coordination doubtful.

Perhaps more could be gained by the integration of all relief agencies into a single organization. The size of an entity could not, by any means, be considered as a criterion of efficiency, but certain improvements in the relief program would become more realizable. For example, the pooling of all previously disconnected means and personnel would greatly strengthen the research and planning staffs necessary for the formulation of improved and more comprehensive temporary housing programs. Integration of purchases of relief supplies and materials would cut down the needlessly high prices at which these supplies are being haphazardly provided by the different entities. The duplication of functions could also be reduced to
a minimum, if not eliminated entirely. Concentration of responsibility for relief operations could altogether eliminate the time-consuming "emergency conferences" which are called for by disasters. 6

Undoubtedly, integration would bring up a complicated task for the government. Proper legislation to enable the merging of the various agencies would have to be drawn up. The re-establishment of relationships between the merging organizations, and the relegation of control, and all other factors would have to be considered carefully. But from the point of view of attaining the maximum of desirable results with the minimum of time, effort and materials, further progress in the integration of relief administration could well be undertaken.

2. Relocation Plans

In all cases, relocation of families from devastated areas would be needed, and some type of temporary quarters into which these people may move will have to be provided. In some instances, these people may even have to be resettled in other parts of the country—especially if the community is rendered completely and permanently uninhabitable. 7

In any event, advance comprehensive planning for the use of potential sites for the relocation of people is necessary to achieve orderly,

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7 A case in point is the devastation of several communities, including all the sources of livelihood of the inhabitants on Camiguin Islands as a result of a series of eruptions of the Hibok-Hibok Volcano. Philippine News Service, The Manila Times, December 9-14, 1951.
guided movements of population in contradistinction to unplanned and undirected shifts which are essentially chaotic and tragic in nature.

In the case of urban areas, relocation plans could expedite the temporary rehousing of displaced families by determining in advance the areas or sites on which temporary housing could be set up. These plans could also be efficient tools for the decongestion of sections of cities or towns within which affected areas are located - if such action is found necessary. Moreover, such plans would also ease the pressure of demands for the immediate re-use of devastated areas, thus making the control of rebuilding easier.

Comprehensive resettlement plans would prevent victims from pursuing "mapless migrations" which only lead to the intensification of the social disorganization and demoralization of those people. The areas to which displaced people could be evacuated and then rehabilitated can be determined and prepared in advance. This will prevent the unnecessary extension of abnormal living conditions for the displaced people. The resettlement plans could be very useful tools for effecting a better distribution of population from congested urban areas to underdeveloped parts of the country.

Relocation plans, to be most efficient, would have to be in accordance with the proposals recorded in the master plans or regional plans (in those cases where these exist).

3. Revision of Legal Powers - Land Acquisition Procedures and the Control of Rebuilding

There will certainly be cases where the proper course for redevelopment would require the public acquisition of the affected area. But the degree to which this action can be carried out would depend, to a great extent, upon the powers and procedures by which the government
could do so. Under the existing enabling statutes, the power of the government to acquire land is ill-defined and inadequate—rendering land acquisition procedures confusing and time-consuming. The importance of quick action in taking advantage of unexpected opportunities which do arise from most disasters cannot be overstressed. It is necessary that the immediate revision of land acquisition powers and procedures be undertaken.

Proper rebuilding along certain lines to enable the community to withstand the destructive forces of potential disasters could be greatly expedited by efficient legislative measures. Rational building, zoning and sanitation codes could be based on the possibility of establishing adequate standards for the physical safety of the community from potential disasters, aside from the usual provision for healthful and decent housing, stabilization of property values and social amenities. Proper spacing of houses, location and distribution of open areas, as well as the structural design of buildings, all oriented to protection from disasters, could be promoted through the effective enforcement of these legislative measures.

Existing sanitary and building codes are inadequate. Correction of this inadequacy is imperative, not only to enable communities to meet the immediate needs of disaster situations, but also to satisfy the requirements of long-term community plans for progress.

4. Advance Preparation

Pre-disaster Surveys and Studies. The fundamental guide to com-

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prehensive planning for meeting disaster situations would be the findings of advance surveys and studies. The reason for this becomes plain as soon as the requirements of comprehensive relief and rehabilitation operations are contrasted with a mere collection of proposals coming from different relief departments. With these studies and surveys, it would be possible to determine minimum physical standards, proper building materials and structural systems that are practical for temporary housing for the displaced victims.

This body of facts and figures should continually be developed and revised as conditions require and should be prepared with the aid of competent specialists and technicians. In the light of such a body of information, an adequate program could be developed. For example, predisaster topographical study and survey would determine well in advance potentially useful sites. After a disaster has struck, it facilitates the selection of the site, and hence the implementation of previously prepared temporary housing schemes.

Standard Plans and Written Programs. Individual planning for each disaster leads to the needless waste of time and results in extemporaneous and hasty methods. Experience has shown that on-the-spot methods are seriously inadequate in summation. Doubtless, less important and less difficult situations have been met by these, but when they were pitted against major catastrophies, they have fallen extremely short of total requirements.

Advance preparation of standard temporary housing schemes developed from the surveys and studies would be the base of a temporary housing program. It would afford a better perspective of total requirements and would minimize pragmatic and piecemeal programs. Such prepared plans would by no means fit automatically into all probable applications
but they would be adaptable to individual situations in different localities— with the proper modifications, of course. In most cases, the changes that would have to be made would still take much less time than planning when disaster has struck. Moreover, pre-disaster planning gives opportunities to review all the details for the reinforcement of possible weak points.

In addition to standard plans, written instructions and specifications are absolutely essential to serve as guides to orderly and efficient operation in the field and the proper direction of effort and the use of materials. These would outline the stages in which facilities should be set up and the relative priorities of the various elements of the plan.

The written programs should be placed in the hands of properly designated persons in the field to be used as guides to supervision. With these guides to supervision in hand, haphazard installation of temporary housing facilities can be avoided.

Master Plans. These are needed to be used as guides to the efficient siting of temporary housing facilities, as well as the selection of permanent rehousing sites. In temporary housing operations, speed is all-important, and the speed at which construction can take place depends to a great extent, upon the rate at which the sites can be selected. Ultimately, the faster the construction of the facilities, the greater the benefits will be to the victims. In addition to this, master plans would help greatly in solving the immediate problems without disrupting the long-term plans of the community.

Ironically enough, under most circumstances, disasters do offer opportunities for redevelopment. If communities are to take full advantage of these chances, however, long-range plans should first be drawn.
Most of the decisions about re-use of land, reconstruction, rehabilitation and repair could be made simpler and easier if there is a ready basis for such decisions. The significance of this advantage becomes more obvious with the knowledge that such opportunities do not exist for long.

As a rule, some short time after a disaster, a process of haphazard reconstruction takes place along lines which existed prior to the destruction or, more probably, even worse. The results of such an unguided recovery are only too well-known in the country. Furthermore, once reconstruction has taken place and people have settled down in these areas, no changes can be initiated without great loss of time, effort and money on the part of the administration, as well as of the affected people themselves.

It is therefore imperative, both from the immediate and long-range physical development of the community that master plans be made in advance.

The needs of the problem are complex. Under the most favorable conditions, most gain can be realized only by the full exploitation of all the above considerations toward the development of an effective approach to meeting disasters.

However, the center of the problem appears to be the provision of temporary housing, with more adequate consideration of long-term community plans for development and redevelopment for minimizing future disaster damage, and in some instances for regional redistribution of population.

General interest of the government and the public makes the development of a new approach reasonable, and likely to succeed. Government authorities are slowly focusing their attention on the physical relief and rehabilitation of disaster victims and disaster areas. Several agencies and members of the Cabinet, as well as of Congress, have made concrete recommendations for more adequate replacements for lost physical facilities; the
public is beginning to recognize the importance of the proper development of their physical environment.

In general, there is considerable agreement on the significance of the problem and its needs. The outlook for a new approach thus seems bright.
CHAPTER III

REVIEW OF PRESENT METHODS FOR
THE PROVISION OF TEMPORARY HOUSING TO DISASTER VICTIMS

The provision of temporary housing facilities for displaced victims is clearly the immediate need in meeting disaster situations. At present, there are several methods which are in actual application for meeting this need. So far, however, none has proved adequate. This chapter will discuss briefly the principal features of these methods in order to point out why this has been so. The material for this critical review is limited. Nevertheless, it seemed adequate for the formulation of the tentative conclusions which follow.

1. The Use-of-Existing-Facilities Method.

Available records show that the most widely used scheme has been that which relies entirely on the use of whatever facilities still stand after the occurrence of a disaster in a community. Such facilities, which have usually been school and municipal buildings, hospitals, warehouses, theaters, gymnasiums, churches, convents, office buildings and private residences, are utilized as emergency housing facilities as soon as conditions permit. Usually, no alterations are undertaken to adapt these buildings properly for the temporary housing of displaced disaster victims.

Advantages. Aside from the fact that the government or its relief agency achieves maximum economy on shelter costs during relief operations, there is also the distinct advantage of avoiding such construction problems

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9 This scheme, being a direct implementation of the emergency housing policy of the PNRC, is therefore used for almost all cases of emergency re-housing of disaster victims. PNRC, Disaster Preparedness and Relief, Committee and Functions, (Manila, PNRC, 1949), pp. 4-5.
as the assembling and demounting of emergency housing facilities, materials procurement and/or transportation, and the employment of labor. In localities where shortages of construction materials and labor prevail, the advantages of this scheme become more obvious.

Disadvantages. A basic weakness of this scheme lies in the fact that even such structures mentioned earlier are equally subject to the same destructive forces, and in cases where these facilities collapse, the scheme would fail to work. In Legaspi City for example, "..... all public and private schools, hospitals, government offices, the Quirino stadium and other big establishments were either unroofed or demolished."10 Similarly, not many communities contain any "disaster-proof" structures and where disaster strikes at such communities, the scheme becomes at once impotent and useless.

Equally significant is the fact that the use of existing buildings implies communal living for the victims, a system which has been established as undesirable because it presents certain problems, among them, abnormal living conditions, sanitation and health problems, behavior problems and the influx of undesirable persons.11 For these reasons, individual shelters that provide for one family as a unit are preferable.

10 Philippine News Service, The Manila Times, October 24, 1952. This is part of an account of the devastation wrought by Typhoon "Trix" which occurred October 20-21.

11 The American National Red Cross, through their experience as an institution for many years, have found that communal living should be avoided as far as possible. American National Red Cross, Mass Care in Disaster, (Washington, D.C., American National Red Cross, 1951), pp. 24-25 and American National Red Cross, When Disaster Strikes, (Washington, D.C., American National Red Cross, 1948), p. 30 and p. 58.
2. The Evacuation Center Scheme

Another technique being used is the evacuation of those victims who are found willing to leave the stricken areas to evacuation centers in localities deemed safer. Except for the movement of the people, there appears to be no basic divergence between this and the above-mentioned scheme. Utilization of immediately available buildings for mass rehousing in these "centers" is similarly resorted to.

**Advantages.** In so far as securing facilities is concerned, this method has a definite advantage over the first, in that there are greater opportunities of finding structures to suit the purposes of emergency mass housing in an area which is unaffected than in the disaster area itself or in its immediate vicinity. Otherwise, the advantages of the first system hold true for this method.

**Disadvantages.** Since the same communal living is implied in this scheme, the same physical, social and economic disadvantages inherent in such a system present the same problems. Difficulties in transporting people and their belongings from one place to another may present more complications in that required transportation means may not be available at times called for or the road system may be so badly damaged that the movement of people and goods becomes impossible.12 A real weakness of this scheme arises from the fact that at a distance, people cannot work effectively, when and where rebuilding is possible. Furthermore, this scheme separates the workers from their means of

livelhood. Thus, whereas they could otherwise help rehabilitate themselves, even if only partially, they are rendered completely dependent upon the government.

3. The Tent Camp Method

Another scheme, but which is little used, utilizes tents as temporary rehousing facilities. It depends upon the Armed Forces of the Philippines for its supply of tents.

**Advantages.** On the condition that an adequate supply of tents can be procured, the tent scheme meets emergency shelter needs immediately when all suitable structures have been damaged. The provision of individual tented accommodations for each family ensures privacy, and to some degree, better sanitation and health conditions in the project. It also provides a pattern of housing nearest to that which the majority of the victims normally follow as individual families. This single factor may prove vital in minimizing the social repercussions of displacement due to disaster situations.  

**Disadvantages.** This method is handicapped by the fact that it depends upon the Armed Forces for its supply of tents. Its usefulness is lessened for the simple reason that army supplies may not always be ready and, if they should be, some time-consuming arrangements would have to be made before actual employment.

One other important weakness is found in the structural make-up of its major instrument - the tent. Tents could be extensively impaired by strong winds, rain and fire, and display poor insulating qualities.

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13 Sorokin, loc. cit.

which characteristics are especially undesirable in tropical climates.

There is neither a panacea for all the ills nor a ready formula to solve all the problems completely. In any case, mass housing would be necessary for the first day or days after a disaster occurs in any community. Construction of replacements, regardless of type, takes time, Besides, weather conditions, disrupted communication and transportation facilities, scarcity of labor, and other factors may cause some delay in the effectuation of any temporary housing scheme. However, the first emergency use of mass housing should not be extended through the longer period of rebuilding in the devastated area. It is such an extension which causes real problems.

An effective solution, therefore, should enable the victims to dispense with communal living in the shortest time possible and move into safe and sanitary facilities affording the closest resemblance to their normal mode of living. However, as the foregoing review has shown, up to the present time, there is no scheme which would satisfy this basic condition.

This thesis proposes to develop an approach to preparation of temporary housing plans and facilities specially designed and adapted to disaster conditions. This may be considered a new scheme and not just an improvement over present methods.
CHAPTER IV

FACTORS IMPORTANT
IN THE PROVISION OF TEMPORARY HOUSING

The review of problems to be solved in formulating a sound program for rehabilitation from disasters demonstrates that the principal planning requirement relates to the provision of temporary housing and community facilities. A final planning scheme depends upon several pertinent factors which must all be given attention. Perhaps the most significant results of analysis of these factors is the identification of factors which may be treated as constants in the preparation of plans to meet disaster situations.

The analysis of factors important in the provision for temporary housing has been organized under the following headings: (1) The Nature and Extent of Disaster, (2) The Availability of Resources, (3) Topographical Features and Earthquakes, (4) Climate, (5) Population Characteristics, (6) Shelter Requirements, (7) Safety and Livability, (8) Sanitation and Health, (9) Circulation Requirements, and (10) Shape of Standard Layout Plan.

From this analysis, design standards have been developed for the required temporary housing structure, for site selection, and site development. These standards will form the basis for a demonstration of a sound approach toward planning in preparation for a disaster.

1. The Nature and Extent of Disaster

Physical damage from a disaster is a function of several variables, namely - (1) the nature of a disaster, (2) the location of a community, (3) the layout of a community, and (4) the type of construction of the
buildings in the community. The order of importance of each factor will also vary for each disaster.

The extent of the physical damage determines the extent to which the people are displaced, and hence the number and type of temporary housing facilities which will have to be provided. In some cases, only a score or so of families are dislocated. In others, hundreds or even thousands of families lose their homes. Where only a small number of families are displaced, relocation does not pose a major problem to the community, as this process can easily be accomplished by the family case work method used by the Philippine National Red Cross. Therefore, the provision of temporary housing will not be necessary. However, in major disasters relocation alone will not suffice, and some form of temporary housing will have to be set up.

Different disaster circumstances will naturally bring up different requirements, and there is no way of accurately predicting all these. A possible thing to do would be to determine from available data a certain unit of displaced families which would be most useful as a basis of standard physical plans. Since detailed information for this purpose is available only for the year 1952, conclusions reached can only be tentative.

From the figures in Table 1 following, a unit of 100 families seems to be a logical basis for planning. It has distinct advantages in that it is small enough to fit into the lower range of disaster cases, and yet big enough to make multiple use in the higher ranges a relatively uncomplicated procedure.
**TABLE 1**

**EFFECTS OF OUTSTANDING DISASTERS ON HOUSING FACILITIES IN 1952***

<table>
<thead>
<tr>
<th>Disaster</th>
<th>Date</th>
<th>Locality Affected</th>
<th>No. of Houses Destroyed</th>
<th>No. of People Affected Families Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhoon**</td>
<td>Jul. 2-3</td>
<td>Cebu Province</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Negros Occidental Prov.</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Iloilo Province</td>
<td>67</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Rizal Province</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Camarines Norte Prov.</td>
<td>106</td>
<td>106</td>
</tr>
<tr>
<td>Fire</td>
<td>Feb. 1</td>
<td>Umingan, Pangasinan</td>
<td>92</td>
<td>108</td>
</tr>
<tr>
<td>Typhoon**</td>
<td>Oct. 20-21</td>
<td>Capiz Province</td>
<td>110</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Palawan Province</td>
<td>108</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Antique Province</td>
<td>122</td>
<td>123</td>
</tr>
<tr>
<td>Fire</td>
<td>Aug. 16</td>
<td>Tabaco, Albay</td>
<td>60</td>
<td>124</td>
</tr>
<tr>
<td></td>
<td>Feb. 20</td>
<td>San Miguel, Bulacan</td>
<td>50</td>
<td>128</td>
</tr>
<tr>
<td>Typhoon**</td>
<td>Oct. 20-21</td>
<td>Marinduque Province</td>
<td>145</td>
<td>142</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Quezon Province</td>
<td>164</td>
<td>167</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Surigao Province</td>
<td>175</td>
<td>175</td>
</tr>
<tr>
<td>Fire</td>
<td>Aug. 5</td>
<td>Balatoc, Benguet</td>
<td>11 &amp; (1)</td>
<td>182</td>
</tr>
<tr>
<td>Fire</td>
<td>Jun. 1</td>
<td>Nasipit, Agusan</td>
<td>97</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Dec. 22</td>
<td>Laoag, Ilocos Norte</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Feb. 4</td>
<td>Licab, N. E.</td>
<td>188</td>
<td>203</td>
</tr>
<tr>
<td>Typhoon**</td>
<td>Oct. 20-21</td>
<td>Cebu Province</td>
<td>112</td>
<td>205</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Masbate Province</td>
<td>180</td>
<td>225</td>
</tr>
<tr>
<td>Flood</td>
<td>Dec. 29</td>
<td>Iligan City</td>
<td>84</td>
<td>235</td>
</tr>
<tr>
<td>Fire</td>
<td>&quot; 9</td>
<td>Butuan City</td>
<td>117</td>
<td>239</td>
</tr>
<tr>
<td></td>
<td>Oct. 13</td>
<td>Guiuan, Samar</td>
<td>220</td>
<td>254</td>
</tr>
<tr>
<td>Typhoon**</td>
<td>Oct. 20-21</td>
<td>Batangas</td>
<td>143</td>
<td>263</td>
</tr>
<tr>
<td>Fire</td>
<td>May 12</td>
<td>Tuguegarao, Cagayan</td>
<td>200</td>
<td>299</td>
</tr>
<tr>
<td></td>
<td>&quot; Apr. 27</td>
<td>Sexmoan, Pampanga</td>
<td>304</td>
<td>336</td>
</tr>
<tr>
<td></td>
<td>&quot; Mar. 10</td>
<td>Itogon, Benguet</td>
<td>(4) 2-story368 bunkhouses</td>
<td>1,350</td>
</tr>
<tr>
<td>Typhoon**</td>
<td>Oct. 20-21</td>
<td>Leyte</td>
<td>308</td>
<td>390</td>
</tr>
<tr>
<td>Fire</td>
<td>Dec. 1</td>
<td>Sta. Ana, Davao City</td>
<td>300</td>
<td>491</td>
</tr>
<tr>
<td>Typhoon**</td>
<td>Oct. 20-21</td>
<td>Mindoro</td>
<td>437</td>
<td>495</td>
</tr>
<tr>
<td>Fire</td>
<td>Jan. 3</td>
<td>Tondo &amp; Caloocan</td>
<td>258</td>
<td>570</td>
</tr>
<tr>
<td>Typhoon**</td>
<td>Oct. 20-21</td>
<td>Camarines Sur</td>
<td>600</td>
<td>645</td>
</tr>
<tr>
<td>Fire</td>
<td>Mar. 15</td>
<td>Dagupan, Pangasinan</td>
<td>528</td>
<td>815</td>
</tr>
<tr>
<td>Flood</td>
<td>Aug. 29-31</td>
<td>Zamboanga City</td>
<td>817</td>
<td>817</td>
</tr>
<tr>
<td>Typhoon**</td>
<td>Nov. 12-13</td>
<td>Basco, Mahatao</td>
<td>995</td>
<td>995</td>
</tr>
<tr>
<td>Typhoon**</td>
<td>Oct. 20-21</td>
<td>Samar</td>
<td>1,230</td>
<td>1,230</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Sorsogon</td>
<td>1,640</td>
<td>1,680</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Catanduanes</td>
<td>2,240</td>
<td>2,350</td>
</tr>
<tr>
<td></td>
<td>&quot; **</td>
<td>Albay</td>
<td>2,850</td>
<td>3,300</td>
</tr>
</tbody>
</table>
Note: This table shows that in some cases, the number of displaced families is bigger than the number of houses destroyed. In some places, particularly in "municipios" or town centers, dwelling space is highly desired not only for the conveniences such a location offers but also for the protection it offers from dissident elements and plain bandits. (In troubled provinces, particularly in Central Luzon, poverty has bred social unrest. Frequently, the government has had to resort to armed operations to quell the activities of these dissidents. Because of this, people move to the town centers to live, although they spend the day at their farms.) Thus, many of the houses in the town centers, if they were not originally constructed to accommodate more than one family, are converted into duplexes or are altered to accommodate even more families.

Also, the condition where there are more families than the number of dwellings is due to "doubling up", mostly by families related to each other, caused by financial difficulties or by the last world war, or by some previous disaster or local troubles caused by elements mentioned above.

2. The Availability of Resources

Except for lumber, a scarcity of construction materials prevails in the Philippines. Local production is limited while the needs of the construction industry are far too great. Heavy importation from other countries to help meet the needs cannot be depended upon because of the tremendous requirement for building materials in those countries themselves.\(^\text{15}\) However, the country has rich sources of wood, fibres, cement, and probably asbestos. Thses could be available for the manufacture of rigid sheet materials which have been found to be especially suited to the Philippine climate.

\(^{15}\) Report of the United States Advisory Housing Mission to the Commonwealth of the Philippines, op. cit. pp. 36-39. This was the finding in 1946, but there are indications that the condition persists.
The Philippines also suffer from a lack of construction equipment and skilled labor. This is mainly due to the fact that the economy of the country is still primarily agricultural, and partly to the depletion of the labor force and equipment resources during the last world war. Whatever skilled carpenters and other construction workers, as well as construction equipment, could be available, are usually concentrated in the cities and bigger towns. The recruiting of labor at one place and its transportation to another would not only be time-consuming but also expensive.

In view of the substantial requirements for provision of temporary housing for disaster victims and the limited resources available, building methods should stretch materials, skilled labor and equipment to the utmost. In practical terms this means that all structures to be used (1) must be as simple as possible, (2) must consist of light structural components, (3) must be of materials which could be easily produced locally, (4) must be capable of easy erection on the site by native labor, (5) must be capable of being erected without the use of construction machines, and (6) must be capable of demounting and re-use with minimum effort and loss of materials.

3. Topographical Features and Earthquakes

A general description of the principal characteristics of the major regions of the Philippines would indicate the range of requirements in site selection and development.

The lowlands, consisting of valleys and coastal plains, are gene-

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16 Ibid., p. 38.
rally, level, well-drained and honeycombed with streams. With a few exceptions, these areas are composed of tilled farms and plantations. High and constant water tables prevail in many parts.

The elevated regions are generally characterized by irregular terrain with many small, compact and level areas interspersed between the hills and mountains.

The Philippines lie along one of the most important earthquake belts in the world. Although destruction from this phenomenon has not been as great as in other countries, an earthquake introduces additional criteria of structural strength and suitability of sites.

In the selection of a site, the above should all be taken into consideration to achieve the maximum of safety and livability for the project. Although site selection for a temporary and movable housing scheme is a revocable step, sites which may be affected later on by potential hazards that would necessitate relocation of the project should be avoided. Specifically, sites which are subject to flooding, landslides, earth settlements and earthquake slippage along known geological fault lines should be avoided.

Sites with good natural drainage should be preferred to minimize the cutting of ditches, soakage pits, the use of culverts and other measures which are not only time-consuming but also expensive. Minimum slopes cannot be specified as these will depend on local soil conditions.

There will be cases, especially on flat terrain, where drainage

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systems will have to be installed. In such cases, a system consisting of open ditches and culverts to carry off storm water under streets may prove most practical and economical.

Inasmuch as single family detached or semi-detached dwelling types are most likely to be used, sites with only slight slopes and with regular physical characteristics should be selected. Sites with these characteristics can be adapted more easily for the type of development under study.

For protection against earthquakes, (1) the weight of the roof construction should be light, (2) walls should be braced by diagonal members, (3) outside columns should be buttressed, and (4) the intersection of columns and beams or girders should be braced. 19

Since most damages from earthquakes occur to structures on soft soil, sites on hard soil should be selected. 20

4. Climate

The Philippine year divides into two seasons - the dry season which covers the months from December to June, and the rainy season, from July to November. The seasonal distinction is only relative in terms of rainfall distribution throughout the year as even during the "dry" season, there are usually a number of rainy days in each month, and conversely. The temperature does not vary much. The usual variation is not more than 15° F from day to night, from season to season, or from locality to locality.

19 Ibid., p. 71.
20 Ibid., p. 120.
In most places, the mean average temperature is 78° F. During the dry season, days are generally characterized by very strong sunlight and a temperature of about 90° F.

The general direction of winds is from the northeast from October to January, from the southeast from February to April, and from the southwest from May to September. The northeast and southwest air streams bring a considerable part of the total annual rainfall over most parts of the islands. Typhoons, often destructive due to torrential rains and high velocity winds which they bring, originate in the Pacific and strike the islands from the east to southeast, and then curve to the north. They can occur any time between April and January.

In view of the heavy rains, especially during the rainy season, sites which have suitable slopes for effective surface drainage must be selected. Adequate direct sunlight, which has enormous ability to dry the soil\textsuperscript{21}, must be assured. Particular attention should be given to the eastern side of any development, in order that the morning sun could dry up rain that had fallen during the night. This can be done by (1) selecting sites on the eastern side of hills, tall and dense growth, or other similar obstructions and (2) by providing clearings of adequate width. These provisions will vary according to the amount of rainfall and the height of obstructions to direct sunlight in the particular area.

Basically, then, structures should protect the occupants of the dwelling units against typhoons, undesirable winds, rain and sun. Buildings

\textsuperscript{21} Engineers of the Southwest Pacific, 1941-1945, op. cit., p. 455.
must have sufficient structural strength to withstand strong winds. Since there is no information available regarding the direction of winds during typhoons, no specific orientation of structures can be established. However, a general rule may be that all buildings must be oriented in such a manner that the maximum of protection of buildings against high-velocity winds during typhoons could be assured.

Floors must be raised from the ground to assure maximum protection against the undesirable effects of the dampness of the earth. For protection against rains, roofs have to be water-tight and must have adequate slope to shed rain effectively. Openings must be protected by canopies so that they can be opened for ventilation while it is raining. Walls and roof must be of as thin a construction as provision for typhoon protection would allow, because thick construction gives little benefit during the day and is of some disadvantage at night—heat absorbed during the day is stored and emitted at night. At the same time, buildings should be so spaced that the greatest benefit from air movements during hot summer days can be obtained. If it does not conflict with the orientation required for protection against typhoons, the buildings should be oriented to prevailing summer breezes.

5. Population Characteristics

The Filipino family possesses marked cohesiveness and unity. This solidarity is probably the strongest single social element in Phi-

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23 Ibid., p. 23
To preserve this factor, therefore, all planning should be based on the family as a unit.

Accurate analysis of temporary housing needs of each displaced family for each disaster case is not essential since such needs cannot possibly be satisfied without entailing use of time, effort and materials clearly out of proportion to the short period of usefulness of any temporary housing project.

Therefore, in the consideration of shelter requirements, census data on such population characteristics as family sizes, composition, and age distribution of children could be analyzed and the results used as the basis of space allocation for potential disaster victims. The average size of family will determine not so much the type of dwelling as its size, while composition and age distribution will bear more directly on the provisions which would be necessary to assure privacy within the house for the various members of the family.

For the purposes of this thesis, it will be assumed that meeting the needs of the average family of five members \(^2^{25}\) will be adequate. Further study would guide the refinement of design to provide the needed flexibility.

In providing privacy, it would not be economically feasible to provide extra rooms for children. Moreover, the use of rigid partitions would greatly diminish floor space. Therefore, some inexpensive partitioning devices will have to be employed - which could be curtains or other similar devices.

\(^2^{24}\) President's Action Committee on Social Amelioration, Philippine Social Trends, Basic Documents Pertinent to Long-Range Social Welfare Planning, (Manila: President's Action Committee on Social Amelioration, 1950) pp. 28-29.

\(^2^{25}\) Ibid., p. 17.
6. Shelter Requirements

The following table gives the minimum floor space requirements for various temporary housing facilities:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>AREA</th>
<th>Per Family</th>
<th>Per Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living Room-Bedroom</td>
<td>200 sq. ft.</td>
<td></td>
<td>40 sq. ft.</td>
</tr>
<tr>
<td>Storage in Dwelling</td>
<td>30 &quot; &quot;</td>
<td></td>
<td>6 &quot; &quot;</td>
</tr>
<tr>
<td>Laundry &amp; Bath &amp; Toilets</td>
<td>15 &quot; &quot;</td>
<td></td>
<td>3 &quot; &quot;</td>
</tr>
<tr>
<td>Administrative Office</td>
<td></td>
<td></td>
<td>60 &quot; &quot; (regularly engaged in office duties)</td>
</tr>
<tr>
<td>Feeding Station and Field Kitchen</td>
<td></td>
<td></td>
<td>40 sq. ft. (engaged in food preparation &amp; distribution)</td>
</tr>
<tr>
<td>Indoor Recreation</td>
<td>10 &quot; &quot;</td>
<td></td>
<td>2 sq. ft.</td>
</tr>
<tr>
<td>Warehouse (Food, Clothing and other Supplies)</td>
<td></td>
<td></td>
<td>.5 sq. ft.</td>
</tr>
</tbody>
</table>

The living room-bedroom area per person was adopted from the American National Red Cross shelter space assignment for each individual.\(^{26}\) This minimum floor area is adequate for a regular folding cot and some space for providing access to the cot. Trial arrangements on the drawing board have shown that this area could be satisfactory for temporary housing purposes.

The floor space for storage in dwelling was arrived at by estima-

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\(^{26}\) Mass Care in Disaster, p. 43. The minimum floor space (with 8 ft. ceiling height) allowable under the Housing Commission standards is approximately 50 sq. ft.
ting the area which would be taken up by the salvaged belongings of a family, such as pieces of furniture or even building materials.

Space for laundry, bath, and toilets was determined from trial arrangements on the drawing board using the minimum space allocation possible for fixtures and circulation in the sanitary building.

Office space was adopted from the United States Army specifications for tented facilities. 27

The space per person working in the field, kitchen and feeding stations was estimated from the number of persons required for the preparation of meals for 100 families or 500 persons and the area which would be occupied by the necessary equipment as given by the American National Red Cross 28 and adjusted to Philippine conditions.

Indoor recreation space per person was adopted from the United States Army specifications for tented or hutted facilities. 29

Warehouse space was estimated from the bulk of usual Red Cross supplies and donations received, and the number of persons to whom these supplies are given.

Building costs in meeting the needs for requirements for shelters may be reduced by the use of standardized, versatile and flexible building types. Uniform and interchangeable parts or equipment will greatly facilitate construction and maintenance of structures during field operations.

27 Engineers in the Southwest Pacific, 1941-1945, op. cit., p. 505

28 Mass Care in Disaster, op. cit., pp. 60-61, p. 78.

29 Engineers in the Southwest Pacific, 1941-1945, loc. cit.
7. Safety and Livability

Temporary Housing Services. A temporary housing project would, under most circumstances, have to provide common facilities for other important needs of the victims to be housed. For example, as a precautionary measure against epidemics which could arise from the insanitary and improper preparation of food by people who still do not have the implements to clean and cook their food properly, the authorities might have to provide a system of mass preparation and serving of food for all the victims in the project, and the facilities relevant to it.

Or, dispensaries would have to be set up in the field to treat, for a certain length of time, injured people who do not need hospitalization.

Again, facilities to house field administrative offices and ration distribution centers for relief goods need to be put up for consultations with relief officers, and for the occasional distribution of rations.

In all cases, the people need to walk to these services, regardless of the weather. This procedure may have to be carried on for a number of weeks, depending upon the health and sanitary conditions, as well as the general well-being of the people.

With these conditions in mind, siting the project on a single parcel of land, where efficient relations between these services and dwelling units could be realized, is preferable and should be provided for as much as possible. The crossing of streets, highways, and other possible hazards to people, especially to children and old people, could be avoided if all these pertinent services could be located within a single boundary. The convenience of the victims and the simplification of operations in the project could also be maximized.
There will be cases, however, where any single parcel of land available would not be adequate to contain all the temporary housing and services required. It will then be necessary to place units containing housing and related services on the available sites in the community.

Siting of the services must be considered in terms of (1) the convenience of the people to be served, (2) the special needs of each service, (3) the relations of all the services with each other, and (4) the general safety of the people living within the project and those providing the necessary services to the project.

Fire Protection. In a temporary housing development where economic considerations will necessitate the intense use of ground, buildings will have to be quite close to each other. Such a condition presents grave dangers from fires.

There may be several ways of eliminating these hazards but the two which seem most practical at the present time are (1) the use of non-combustible or fire-resistant building materials and (2) proper placement of buildings to minimize the rapid spread of fire.

Whenever possible, incombustible materials or at least fire-resistant building materials should be used, for tropical breezes and tropical heat would render dwellings made of inflammable materials extremely dangerous to live in. Where such desirable materials are not available, buildings should be placed in such a way that the spread of fire could be easily stopped, if not prevented. All buildings should be easily accessible to fire fighting equipment.

For temporary housing purposes, it appears that a distance of 10 to 14 feet between buildings would provide the needed protection from fires within the project, as well as ensure the efficient utilization of
available ground. This figure was derived from the spacing requirements established by the American National Red Cross and the United States Army for tented facilities— which follow:30

<table>
<thead>
<tr>
<th>Type of Structure</th>
<th>Recommended Minimum Distance Between the Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>American National Red Cross — 16 x 16 army pyramidal tent</td>
<td>10 feet</td>
</tr>
<tr>
<td>United States Army — 16 x 16 army pyramidal tent</td>
<td>14 feet</td>
</tr>
</tbody>
</table>

Buffer strips of adequate width surrounding the project should also be provided whenever possible to protect it from fire originating from the outside.

A further precaution from fires would be the use of electricity for lighting purposes in all the buildings. This would eliminate the hazards of fire arising from the use of kerosene, candles, or other open flame illuminants. It would also simplify to a great degree the task of providing for light in the project. A 60-watt bulb for each building should be sufficient. Mobile generators could be used where connections to the municipal system could not be made.

Dust Control. During the dry season, when winds are likely to cause excessive dust from streets, walks or other open spaces, some dust control measures may have to be used to preserve the livability of the project. Such dust palliatives as molasses mixed with water in certain proportions, or light shots of cutback asphalt sprayed on the ground.

30 Information above was taken from Mass Care in Disaster, op. cit., p. 97; and Tents and Tent Pitching, op. cit., pp. 26-27.
surface, or pierced steel mat laid on the ground surfaces\textsuperscript{31} could be utilized.

If possible, however, a site having grass turfs should be selected to avoid the necessity of using the above palliatives which would only add to the cost of the project.

8. Sanitation and Health

Water Supply. Many municipalities in the Philippines do not have public water supply. Water for domestic use is usually taken from shallow dug wells, springs and streams. When a disaster strikes, most of these sources become polluted for with the destruction of sanitary facilities, improper disposal of waste and sewage becomes rampant. Therefore, to prevent the spread of diseases and epidemics, the provision of an adequate supply of pure, wholesome water to victims may have to be undertaken by the government authorities.

For a temporary housing development, a centralized water distribution system does not seem feasible. In the first place, it implies the installation of a pipe system which would require a considerable amount of skilled labor and critical materials to lay out and maintain. The cost would be tremendous in relation to the nature of the housing facilities being provided. It implies heavy pumping and purification machinery which will probably not be available at all.

In a central system, mechanical failures would result in disrupted service for sizeable parts of the project, if not the whole project itself, causing the people to revert to the old system of getting water from unsafe

\textsuperscript{31} Engineers of the Southwest Pacific, 1941-1945, op. cit., p. 441-442.
sources. Moreover, broken water mains and fittings may constitute serious maintenance problems. Also, such a system has characteristics of permanency not compatible with the desired temporariness of the project.

On the other hand, such a system could be the safest way to supply water to the people for the water would reach them directly from the purification plants. Connections to an existing municipal system may therefore be made whenever possible to do so at reasonable costs.

Under circumstances where a new supply must be developed, a system of distributing water from established water points by trucks or other similar carriers, and storing it in water tanks at points of consumption, may be the most practical. For one thing, such a system could be set up in a shorter time and without the use of piping and other critical materials. Therefore, there would be less problems in construction. This system is more flexible than the first — it can be adjusted more easily to changing conditions in the area. For example, a non-fixed system such as this is, would be easier to withdraw than a virtually fixed pipe system.

However, this water-point system might not be practical in cases where relatively large groups of people have to be served. A large fleet of water carriers or a more crowded schedule of delivery would be required, and this equipment might be more difficult to provide than piping.

Portable and collapsible canvas water tanks developed by the United States Army would prove very useful, since no hoisting equipment would be needed to lift these tanks onto the finished platform. These canvas tanks take up very little space in transport and are so simple to set up that common labor could be used.

Once in use, such tanks should be covered to protect the water from dust and other contaminating influences, and to avoid the breeding of mosquitoes.
Bathing and Washing Facilities. For the temporary housing under consideration, providing individual bathing and washing facilities is difficult, if not totally impossible. Communal facilities will have to suffice.

Such facilities should be so constructed that only a minimum of effort and time would be required for their maintenance. These should be located conveniently near the dwellings. Water from these facilities should be carried off the site through the ditches or some other means.

Refuse Disposal. Proper disposal of refuse should be given adequate attention because refuse decomposing around the dwellings would not only attract flies and rodents but may possibly result in the spread of communicable diseases. In the temporary housing development, covered containers should be provided for and a regular collection should be maintained. The ultimate disposal of refuse should be carefully supervised by the authorities.

Sewage Disposal. A very important factor in making provisions for temporary housing is the disposal of human wastes. There are several points which must be considered in the choice of a disposal system. First, economic and practical considerations will probably preclude the provision of individual toilet facilities for each family. Second, in many places, there are no water-borne disposal systems. And third, high ground-water level in most places in the lowlands, or poor soil conditions in higher areas, will preclude the use of pit or bore-hole latrines.

In view of the above considerations, bucket latrines will have to be used. There are several factors which condition the efficiency of this system. A regular collection service needs to be maintained. The privies have to be sheltered from the elements and so located as to facilitate collection and be equally convenient for all the families using them.
Odors will have to be controlled by the use of deodorizers or disinfectants such as compound cresole solution or lime.\textsuperscript{32}

The final disposal of the contents of the buckets will be accomplished by discharge into a sewer, if available, or by burial in fields. Discharge into a sewer is more convenient and more economical. However, if disposal by burial is the only alternative, the burial fields selected should be about a mile or two away from the points of collection.\textsuperscript{33}

The field selected should be downhill from any source of water supply.

Experience in the Philippines has shown that if scavenging is properly attended to, this bucket system could be very sanitary and economical in first cost. A bucket with a capacity of about 1.5 cu. ft. would serve 20 persons for 24 hours.\textsuperscript{34} Therefore, a bucket would suffice for about five families for 24 hours.

9. Circulation Requirements

For the temporary housing scheme needed, the circulation requirements would consist primarily of walks for people and service streets for fire trucks and other vehicles which might be necessary for transporting water and relief supplies into the project, for garbage collection, and sewage collection.

Walks from all the dwellings should provide convenient access to all the service facilities in the project as well as to other parts of


\textsuperscript{33} \textit{Ibid.}, p. 106.

\textsuperscript{34} \textit{Ibid.}, p. 108.
the project. Streets should assure efficient movement of service vehicles within the project.

Separation of vehicular and pedestrian traffic will not be necessary because vehicular use of the project streets will be only occasional. Due to the temporary nature of the project and the limited resources available, walks and streets need not be paved.

Since traffic in the "village" would be limited to these trucks, most of which go into the project only at certain intervals of time, the minimum right-of-way width should be 20 ft. This will permit the passage of one truck past another which is parked for a service stop.

10. Shape of Standard Layout Plan

If a standard layout plan is to be prepared to aid the speedy development of a site for temporary housing facilities, then its shape must be determined during the formulation of the plan. The standard scheme would be a module providing housing and services for a group of families. As developed in Section 1, a module of 100 families appears desirable to provide a unit adapted to smaller disasters and capable of being fitted to available sites of limited size. But a shape that would allow the adaptation of the layout plan to fit into available sites with the least modifications could save much time in the erection of facilities.

For ease in actual laying out, either a square or a rectangular pattern for streets and lots would be desirable. Where grading equipment is available, a rectangular shape has a special advantage over a square one. Experience gained by the United States Army Corps of Engineers in the construction of military airfields in the Southwest Pacific Area during World War II shows that there are less wasteful turning movements
for grading equipment in a longer and narrower area as compared to one which is wide and short. It was also found that this resulted in much more actual working time for the equipment, and consequently, the turning out of many more airdromes than would have been possible with the few men and machines available. In terms of the probable necessity for preparing several housing project sites in one or more communities with the use of limited equipment which might be available, this consideration attains some significance.

Most, if not all, of the towns in the Philippines were laid out on a gridiron street pattern. Consequently, most city or town blocks as well as playgrounds, are rectangular in shape. From the viewpoint of local acceptance and existing property shapes, a rectangular pattern for a standard layout appears to be logical.

Other shapes such as the hexagon, the triangle and the circle possess certain characteristics which preclude their use as a standard layout shape. A circular pattern would be difficult and would take too much time to lay out. A triangular or hexagonal shape would necessarily result in many sharp angles which are almost always inconvenient as well as wasteful of space. In terms of a single family detached dwelling

35 Engineers of the Southwest Pacific, 1941-1945, op. cit., p. 123.


type of development, the resultant waste of space and inconvenience would be considerable.

The first few tests on the drawing board have also demonstrated that of the square, the rectangle, the triangle, the hexagon and the circle—all having the same area and used in multiples in several given sites, the rectangle was found most efficient in the use of land. 38

From the above observations, a tentative conclusion for design purposes could be made—that a rectangular pattern for a standard layout plan is the most efficient.

38 This finding is tentative. A mathematical procedure or a more reliable method of testing may arrive at a different conclusion.
CHAPTER V

AN APPROACH TOWARD PLANNING
IN PREPARATION FOR DISASTERS

On the basis of the criteria and standards established in the preceding chapter, alternative schemes which illustrate a new line of approach toward planning in preparation for disasters are presented.

What probably distinguishes this new approach from methods that have been or are in actual application is that it is developed around a modular design for the site as well as the structure. Perhaps another distinguishing feature of this approach is that the rehousing of more people is accomplished not by the expansion of a "temporary housing village" but by the establishment of additional "villages". (See Figure 1 on the following page). This offers advantages of (1) flexibility and convenience in the temporary relocation of people, (2) focusing responsibility for the successful operation of temporary shelters, (3) simplified and more efficient maintenance of services to the people, and (4) piece-meal reconstruction of the affected area, which would probably be the necessary procedure with the limited finances and materials available.

In the following pages - (1) "village schemes", planned in accordance with the findings of Chapter IV (Population Characteristics) are illustrated and compared with each other, (2) a number of "family groupings", which are the basic components of a "village scheme" are also illustrated and then compared with each other to point out their possibilities, and (3) a description of the structure, which was developed with the design standards established in the preceding chapter as basis is included.
FIGURE 1:
Possible arrangements of "temporary housing villages" in relation to a devastated area.
1. Illustration and Comparison of "Village Schemes"

All "village schemes" shown from Page 46 to Page 49 contain practically the same number of families and the same elements, namely - (1) administration building, (2) field kitchen, (3) feeding station, (4) storage building, (5) recreation building, (6) dwellings, (7) sanitary buildings (toilets, laundry and bath), (8) water storage tanks, and (9) sheltered bus stops. There are no basic divergences between these schemes except the number of water tank platforms and sanitary buildings, walking distances between the service facilities and the dwellings, and the amount of drainage works required. Therefore, the comparison between these "village schemes" will be limited to these aspects. To illustrate more clearly their differences, the comparison is tabulated on Page 51.

From this table, it appears that village scheme "B" has a definite advantage over the others, in that for the same number of people it requires fewer water tank platforms and sanitary buildings. Also, fewer sanitary buildings or groupings of sanitary buildings mean a simpler drainage system (where this is needed) to maintain. This is shown by Figure 6 on Page 50.

Schemes "A" and "C" have the shortest walking distances while scheme "D" has the longest.

From the point of view of vehicular circulation to the water tanks and within the "village", schemes "A" and "D" seem to have more efficient layouts than the rest. All water tanks and sanitary buildings are so located that they are accessible to service vehicles from one straight street. Because of better layouts, traffic hazards in the "villages" are greatly minimized. This attribute becomes more important when the collection of night soil and the accompanying disagreeable odors are considered.
From all considerations, scheme "B" seems to be most practical. As Table 1 shows, it is the scheme with the least number of water tank platforms and sanitary buildings and it involves shorter walking distances between the dwelling units and the service facilities. It also utilizes land well and offers a compact arrangement of the various facilities.

These schemes illustrate the fact that careful planning can provide greater convenience and economy. None of these schemes is considered fully studied and suitable for use.
Note: Each square is 28' x 28'.

Figure 2. "Village Scheme" A
Note: Each square is 28' x 28'.

Figure 3. "Village Scheme" B

- Administration Building
- Field Kitchen
- Feeding Station
- Storage Building
- Recreation Building
- Dwelling
- Sanitary Building (toilets, laundry, bath)
- Water Storage Tanks
- Sheltered Bus Stop
Note: Each square is 28' x 28'.

Figure 4. "Village Scheme" C

- Administration Building
- Field Kitchen
- Feeding Station
- Storage Building
- Recreation Building
- Dwelling
- Sanitary Building (toilets, laundry, bath)
- Water Storage Tanks
- Sheltered Bus Stop
Note: Each square is 28' x 28'.

Figure 5. "Village Scheme" D

- Administration Building
- Field Kitchen
- Feeding Station
- Storage Building
- Recreation Building
- Dwelling
- Sanitary Building (toilets, laundry, bath)
- Water Storage Tanks
- Sheltered Bus Stop
Figure 6. Possible Simplification of Drainage System by the Use of Fewer Sanitary Buildings
### TABLE 3

**COMPARISON OF "VILLAGE SCHEMES"**

<table>
<thead>
<tr>
<th>Village</th>
<th>No. of Families</th>
<th>No. of Water Tanks</th>
<th>No. of Sanitary buildings*</th>
<th>Total Area (in acres)</th>
<th>Gross Density Families per Acre</th>
<th>Walking Distances**</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90</td>
<td>10</td>
<td>10</td>
<td>5.62</td>
<td>16.0</td>
<td>475</td>
</tr>
<tr>
<td>B</td>
<td>100</td>
<td>5</td>
<td>5</td>
<td>5.39</td>
<td>18.5</td>
<td>504</td>
</tr>
<tr>
<td>C</td>
<td>99</td>
<td>9</td>
<td>9</td>
<td>5.67</td>
<td>17.5</td>
<td>475</td>
</tr>
<tr>
<td>D</td>
<td>105</td>
<td>7</td>
<td>7</td>
<td>6.75</td>
<td>15.6</td>
<td>640</td>
</tr>
</tbody>
</table>

* Sanitary buildings - communal laundry and washhouses and toilets.

** This is the distance between the feeding station and the most distant family unit.
2. Illustration and Comparison of "Family Groupings"

The "family groupings" shown in Figure 7 on Page 54 indicate some of several possible arrangements which can be made under the modular method. They vary in walking distances between dwellings and sanitary buildings, ground utilization and in the use of such common facilities as water tanks and sanitary buildings. (See Table 4) Groupings 1 and 2 are used as the basic groupings; the other three are adaptations or variations of either or both. For the purposes of this study, it will be assumed that 8-20 families could compose a grouping which would lend itself to easy management, as well as creating social conditions favorable to the families in the group.

On one hand, Grouping 1 (see Figure 7) achieves a high degree of ground utilization and the efficient proximity of the people to the service facilities simultaneously. On the other hand, Grouping 2 involves a greater land area and implies a farther distance between the people housed and the sanitary buildings. The distance involved becomes more important during the rainy season. Because of its lower density, Grouping 2 requires the preparation of a relatively bigger site.

Grouping 2, however, makes for greater economy because it results in less number of utilities to be installed. For example, Grouping 1 requires the installation of two water tank platforms for 18 families whereas Grouping 2, which contains 15 families, requires only one. Fewer common facilities mean less movement in the project of the vehicles necessary to service them. The movement of trucks in the "village" thus limited, hazards to pedestrians, especially to children, are minimized. This limited circulation is also most practical for the collection of night soil, particularly for minimizing the accompanying disagreeable sight and odors.
For the purposes of supervision, Grouping 1 has the advantage over Grouping 2. It is easier to establish some responsibility for the care and upkeep of utilities within a smaller group. A larger group tends to become unwieldy.

Grouping 2 requires a simplified drainage system. It requires a shorter length of drainage ditches for each "village" of 100 families.

Grouping 3, which houses 20 families, is an adaptation incorporating in varying degrees the advantages of the first two groupings. It is more efficient in ground utilization than Grouping 1 and has the advantage of greater economy in the installation of water tank platforms than Grouping 2. It is as economical as Grouping 2 in the use of ditches. It would have the advantage of limited traffic with its attendant benefits, in view of fewer sanitary facilities that have to be serviced. However, the far-walking-distance problem that Grouping 2 presents, is only slightly minimized.

Grouping 4, which contains 11 families, is a slight improvement over Grouping 1 in that it accommodates more people for the use of the same number of facilities.

Grouping 5 houses 9 families. It is a variation of Grouping 1 but it offers possibilities for more logical arrangement of utilities to simplify the vehicle circulation in the "village".

The use of "family groupings" seems to offer several advantages. First, it would make the splitting of "a temporary housing village" easier and less disrupting from the viewpoint of operation of the project. Second, it would make for layouts that would render the spread of fire in the development less likely. And third, such groupings, when carefully studied as to size, might foster better social relationships between families and persons in the group, conducive to a faster recovery of these people from the crisis.
Grouping 1

Grouping 2

Grouping 3

Grouping 4

Grouping 5

Note: Each square is 28' x 28'.

- □ Dwelling unit
- ■ Sanitary building
- ★ Water Storage Tanks

Figure 7. Possible "Family Groupings"
<table>
<thead>
<tr>
<th>Grouping</th>
<th>Capacity in families</th>
<th>Land Area (sq. ft.)</th>
<th>Built-on Total Ratio</th>
<th>Gross Density</th>
<th>Walking Distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>8,624</td>
<td>18,816</td>
<td>.46</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>14,112</td>
<td>32,928</td>
<td>.43</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>18,032</td>
<td>37,632</td>
<td>.48</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>10,192</td>
<td>21,952</td>
<td>.46</td>
<td>22</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>8,624</td>
<td>18,816</td>
<td>.46</td>
<td>21</td>
</tr>
</tbody>
</table>
3. The Structure

With the design standards formulated in the preceding chapter as basis, a structure for temporary housing purposes has been developed. It is of simple panel construction and bolted connections and is capable of being erected easily and quickly by common labor. Highly standardized and expansible, it is readily adaptable for a wide variety of building types such as temporary dwellings, shelter for temporary field offices of relief agencies, dispensaries, recreation centers, field kitchens, field laundry, warehouses, bus stops, and play sheds. With the use of a single type of structure, therefore, it would be possible to satisfy all the shelter requirements within the scope of the temporary housing scheme under consideration.

The structural system consists of basic units. The number of units to be used and the manner of arranging these units will depend on the type of building required. For example, two basic units placed side by side and facing the same direction would make a bus stop shelter, while six units, installed in two equal rows facing each other, would make a shelter for a family of five. The structure can be expanded by the installation of additional units along the longitudinal axis. (See Figure 8 on the following page).

39 This structure, called the Multi-functional Demountable Structure, (MDS), was originally designed by the writer in the course of his studies in the Department of Architecture of this Institute. For the purposes of this study, the structure was developed further.
Figure 8. Photo of Multi-functional Demountable Structure
A basic unit consists of one plywood-faced, paper core panel\textsuperscript{40} each for the roof, wall and floor, two wooden tripods, five pre-cast concrete footings, and four cables, and is described as follows:

At the vertex of each tripod, a specially designed pin joint secures together all the three legs, each of which is sustained as well as tied to the ground by a footing.

The roof panel is held up on two of its edges by the principal leg of each tripod and supported at the other two edges by cables from the tripod head.

When a complete shelter is called for, strips of galvanized iron bolted in pairs along the joints between the panel roofs, and floor and wall panels of the same material used for roofing, could be employed.

The process of erecting the MDS is simple. To start, the footings are laid out according to specified measurements. Then the tripods are set up and bolted to the footings. The roof panels are hoisted by hand and bolted on two edges to the principal legs of the tripods. After this, the cables for supporting the other two edges of the roof panel are snapped into place. Finally, the floor and wall panels and the metal flashings are attached. The building is set ready for use. (Figure 9 shows the major details of structure, to illustrate ease of construction on site, while Figure 10 shows various construction stages.)

\textsuperscript{40} This material is believed to possess great possibilities for use in this type of construction because it could "serve at once as structure, insulation, enclosure, and finish". This would greatly simplify structural systems for this type of housing. Burnham Kelly, The Prefabrication of Houses, (New York: Published jointly by the Technology Press of MIT and John Wiley and Sons, 1951) pp. 227-233; 325.
For this structure, replacement of parts does not present a problem, since all of its components are standardized.

The transportation of quantities of this structure is made easy by the fact that the biggest panels can be contained in any standard highway or railroad carrier.

Figures 11 and 12 on the following pages show the typical plan, the possible expansion of floor area, elevation of the MDS, and some possible compositions of the dwelling space.

In practical application, the use of such a structure as the MDS could possibly contribute to overall economies. Its flexibility, versatility, and demountability would probably simplify the operations involved in the provision of temporary housing facilities for disaster victims.
Figure 9. Details of Structure, Illustrating its Simplicity and Ease of Construction on Site
Footings are laid out.

Tripods are set up and bolted to footings.

Roof panels are hoisted and connected.

Cables are snapped in place.

Metal flashings are attached.

Floor and wall panels are attached. Canvas flaps above end walls are also attached.

Figure 10. Various Construction Stages of Structure
Expansion of the floor area can be achieved by installing additional basic units along the longitudinal axis. For wider floor, basic units with increased dimensions could be used.

Figure 11. Typical Plan, Possible Expansion of Floor Area and Elevations of the MDS.

Scale 0 5 10 ft.
Note: Each plan has a floor area of 288 sq. ft. (16' x 18')

Figure 12. Possible Compositions of the Dwelling Space
CHAPTER VI

CONCLUSION

The problem of meeting disaster situations in the Philippines occurs frequently. Every year, thousands of families are made homeless as a result of fires, typhoons, floods, earthquakes, and volcanic eruptions. After a flood recedes or a typhoon passes, its effects are felt by the community, if not by the whole nation, for a long period of time.

The needs of the problem are complex and require more emphasis on advance preparation. Much study and research have to be undertaken on a continuing basis leading to improved solutions to the administrative and planning problems involved in recovery from disasters.

The present methods to meet disaster situations are inadequate to meet the requirements of the problem. More adequate shelter during the recovery period is essential to meet family needs and to reduce the pressure for haphazard rebuilding with makeshift structures.

A study of past experience indicates the importance of provision of temporary housing to disaster victims. If temporary housing needs are met, more adequate consideration can be given to long term community plans for development and redevelopment and for minimizing future disaster damage.

From analysis of the several factors influencing plans for temporary housing, design standards can be developed for the required temporary housing structure, for site selection, and for site development. These criteria can then be used as the basis for advance planning of demountable temporary housing.

Other factors such as the withdrawal of facilities at the proper time
in conjunction with community redevelopment plans, the strategic location of
storage points for equipment all over the country to expedite the tempo-
rary housing program, the determination of space standards based upon tri-
al experiments, and the development of structures and materials adapted
to the specialized requirements of temporary housing should also be consid-
ered. Although in the course of this study, these were recognized as vital
to the development of adequate plans, they require research beyond the li-
mits of this thesis and were therefore considered as fields for future
study.

A modular approach in advance planning for temporary housing
structures and sites is feasible. It has possibilities for achieving
more orderly operations, greater overall economy and greater speed in
providing adequate temporary housing facilities for disaster victims.
Hence, it has great potentialities for aiding in achieving a speedier
and more rational physical recovery of people and communities from dis-
esters.
BIBLIOGRAPHY

BOOKS

Commonwealth department of post-war reconstruction. Regional planning in Australia, a history of progress and review of regional planning activities through the Commonwealth. Canberra, Commonwealth department of post-war reconstruction, 1949. 103 p.


BULLETINS


Board of governors, on the recommendation of the association's committee on post war housing. The use of demountable houses in the war housing program. Chicago, National association of housing officials. 4 p.


Interagency working group on emergency housing and community facilities. Preliminary findings of the interagency working group on emergency housing and community facilities. Washington, National Security Resources, April, 1950. 19 p. (With Appendices I-V)


President's action committee on social amelioration. Philippine social trends, basic documents pertinent to long-range social welfare planning. Manila, President's action committee on social amelioration, 1950. 50 p.

President's action committee on social amelioration. Social amelioration and you, a report of the PACSA to the people of the Philippines. Manila, Bureau of printing, October, 1949. 41 p.

Philippine national red cross. Disaster preparedness and relief, committee organization and functions. Manila, Philippine national red cross. 6 p.


-------, same subject, United Nations, January, 1951. 69 p.

United nations secretariat, Department of social affairs. Current information on urban land policies. New York, Department of social affairs, United nations, April, 1952. 263 p.

United nations secretariat, Department of social affairs. Low-cost housing in south and southeast Asia. New York, United nations, July, 1951.

United nations secretariat, Department of social affairs. Survey of problems of low-cost housing in tropical areas. New York, United nations, November, 1950. 113 p.

Violich, Francis. Low-cost housing in Latin America. Washington, Pan American Union, Department of economic and social affairs, Division of labor and social information, 1949. 91 p.


Woodbury, Coleman. Britain begins to build her cities. Reprinted from The American political science review 41, October, 1947.
PERIODICALS


