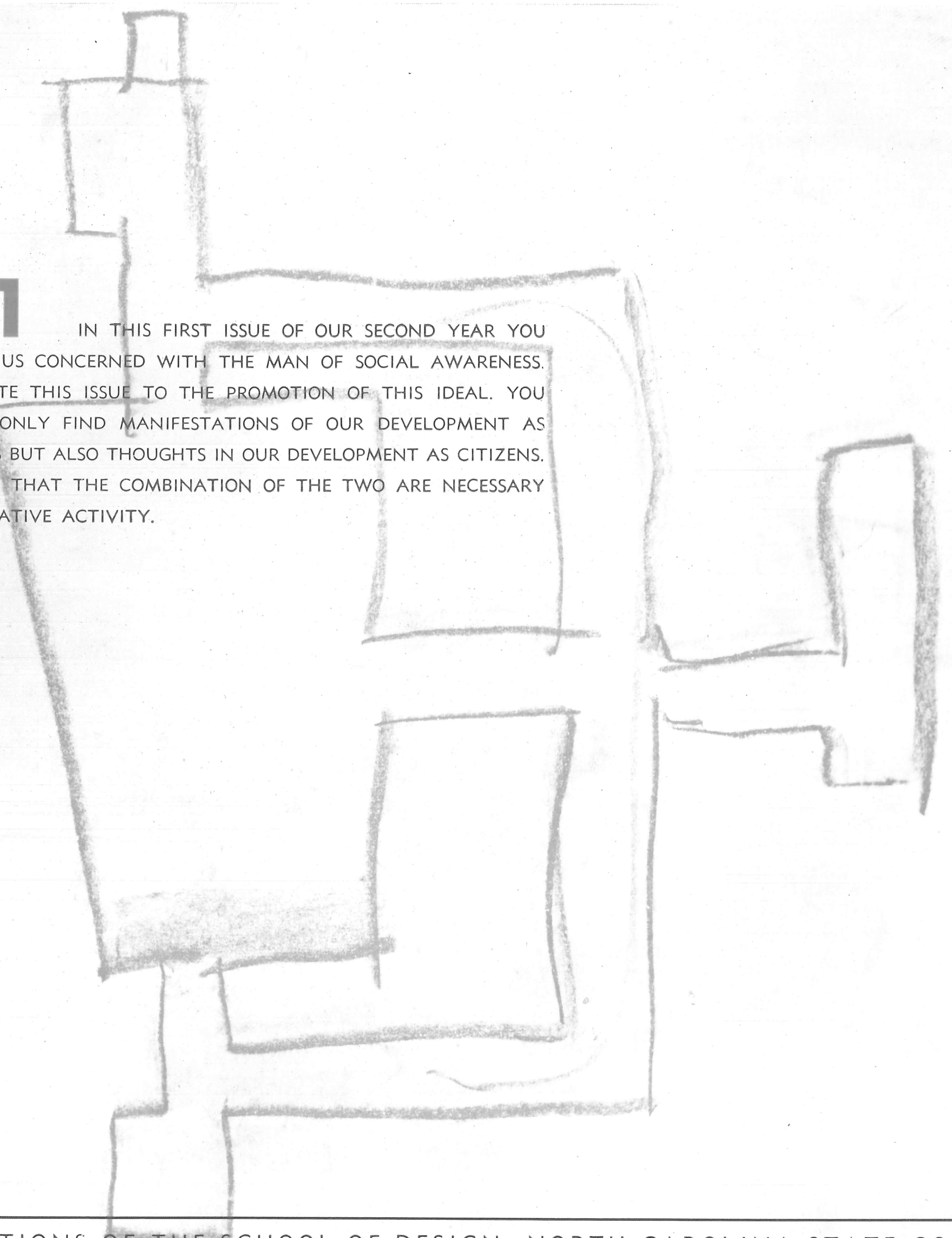
FALL 1951, RALEIGH, N. C



TWO: 1 IN THIS FIRST ISSUE OF OUR SECOND YEAR YOU WILL FIND US CONCERNED WITH THE MAN OF SOCIAL AWARENESS. WE DEDICATE THIS ISSUE TO THE PROMOTION OF THIS IDEAL. YOU WILL NOT ONLY FIND MANIFESTATIONS OF OUR DEVELOPMENT AS ARCHITECTS BUT ALSO THOUGHTS IN OUR DEVELOPMENT AS CITIZENS. WE PROFESS THAT THE COMBINATION OF THE TWO ARE NECESSARY IN ALL CREATIVE ACTIVITY.

STUDENT PUBLICATIONS OF THE SCHOOL OF DESIGN, NORTH CAROLINA STATE COLLEGE

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**THIS MAGAZINE WAS
ORIGINATED BY THE
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STUDENT CONTRIBUTED
FUNDS AS AN INDEPEND-
ENT STUDENT PROJECT**

. . . there are different kinds of citizens; and he is a citizen in the highest sense who shares in the honours of the state.

Aristotle
Politics Bk. III Ch. 6

DEPLOYMENT

a consideration of American Industry

Wars are now waged at the source of armament: the industrial coagulations which nurture upon our large cities. [illegible] our industrial complex has failed to adjust itself to the [illegible] development of our age has made us realize our extreme vulnerability. We must think and act to put our house in order. The loss of this industrial complex would not only mean the loss of our sovereignty as a nation but the loss to the world of the highest standard of [illegible] achieved by man. **A housecleaning is in order.** [illegible] now taking place in our cities and which [illegible] increasing rate, we call **deployment.**

What if there is no war? Suppose the United States and Russia do not go to war for the next ten years? Suppose the period of tension lasts? What is there for us to do but assume that it will? This **waiting** for full scale war without knowing where, or when, or **if** it will come has given us the state of mind necessary for self examination on a national scale.

In recent weeks we have been given adequate assurance that atomic energy no longer exclusively means atomic bombs. The age of universal atomic power is close at hand. But who wants atomic power in a Cape Cod cottage? It is bad enough to see nineteenth century architecture (built only last year) now sporting an air-conditioning unit in every window. These are the incongruities in our social culture that hamper our progress and prevent us from fully utilizing our technical knowledge to achieve what we have a right to expect of present day living.

In this present period of tension, we can reassess our industrial complex, our resources, our hospitals, our houses and our automobiles. We have a tremendous backlog of inventions which few people have felt we needed to employ to best advantages. As a nation now preparing for war and hoping for peace, we must make sure that we are using our resources and our industrial power in such a well designed program that, no matter whether the next quarter century brings war or peace, we as a nation will be equipped for a bigger war or a better peace than man ever thought possible. As soon as we learn that we can wage war and wage peace with the same equipment, we will have established an economy that every other nation will have to copy. Tremendous armament programs in times of emergency will be a thing of the past. Now, before the world has completely prepared for another world war, is the time for self-examination and reassessment. We must make a clear choice between one way of life and another. Like the air-conditioning unit and the Cape Cod cottage, we as a nation can no longer wastefully choose a little of this and a little of that and get the best of neither. We are a rich nation. We may always be, but all out war, even the possibility of all out war, is expensive and survival means being able to withstand this expense again and again and be ready to do so at any time. The nation that learns to do this with the least damage to its economy stands the best chance of survival.

In the School of Design a question was raised: Keeping in mind the current industrial decentralization trends and the need for new satellite communities, how can we bring the national standard of living up to the level of our technical achievements by using inventions and industrial processes which already exist? We began working. Some fifty, third and fourth year students spent some 30,000 man hours on this project.

The theory of deployment is simple; its possibilities are impressive and in practice it has already been proving itself for the past ten years. Deployment in its simplest terms means **organized** decentralization of industry and involves moving big industry out of the overcrowded cities and deploying it throughout the rural areas of the country.

The most feared consequence of full scale war is the undoubted use of atomic bombs by both sides. Most sociologists and atomic scientists agree that at present cities with a population less than 50,000 do not present a feasible target for atomic attack. On this basis, then, how many people are involved in deployment? From the 1947 corrected census it is estimated that the industrial heartland of the United States contains about 43 per cent of the national population. Of course, there are large areas in this heartland which are well below the critical density figure. In addition, the cities with a population greater than 50,000 would, of necessity, retain most of their inhabitants. Deployment does not aim at deserting the American cities. However, every effort should be made to remove large cities from the list of primary military or industrial targets.

A great deal is being said, but what is being done?

There are at present in Washington several large-scale proposals for deployment. They share one common fault: they depend upon the Federal Government to initiate the deployment program. The impetus for deployment must come from the states, one in competition with another for the advantages deploying industry offers. At present the states do not receive Federal aid under an organized deployment program. Consequently, the decentralization of industry is moving very slowly. Moreover, the Federal Government, in refusing to recognize the urgency for deployment of industry, has let ". . . 41 per cent of all the major defense contracts awarded up to August 15 to three states . . .".* Over two-thirds of this 41 per cent went to two states: ". . . Michigan — $2,250,000,000 (and) New York — $4,000,000,000. . ."** both already highly concentrated areas in the industrial heartland.

Industry is the key to breaking down the population of our large cities because if industry moves, large segments of the population move. This fact was established during the last war by population shifts toward new industry on the west coast. Similar surveys on population movements could help in determining the directions which deploying industry could most profitably take.

To initiate the deployment program and keep it running efficiently, a whole new field for trained personnel is opening up. The program involves problems which are sociological, economic, administrative, and industrial. Experts in these fields must receive special instruction in order to orient them with the special requirements demanded by a program for national deployment. A complete investigation of the consolidated University of North Carolina (the University of North Carolina at Chapel Hill, Women's College at Greensboro, and North Carolina State College at Raleigh) has been made to discover what facilities the colleges have at present that would fit the needs of the deployment program. The results of this investigation are most encouraging.

As a sociological consideration of deployment, one must understand the American Family as a group. Deployment involves moving people. Just how mobile are the people who must move and how will they react to being deployed? In this country's deployment program, just as in Britain's (far in advance of our own) the government does not single out a family or a group and tell them that they must move. The purpose of the program is to disperse industry. If a man has a job in a critical industry in Detroit and this industry, after assessing its role in the deployment program, decides to move to Missouri, then the worker can move into another industry in the Detroit area or move to Missouri with his job.

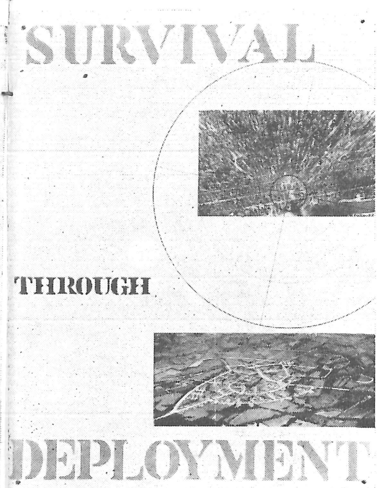
Kingsley Davis, Director of the Bureau of Applied Social Science Research at Columbia, states in an article, "The American Family: What it is—and Isn't" that, ". . . one-fifth of the native population lives in a state different from that of its birth, and that one out of every five adults changes his residence each year." These facts should help dispel any fears on the part of some of us that deployment is apt to disrupt the social and regional ties that produce a secure family life.

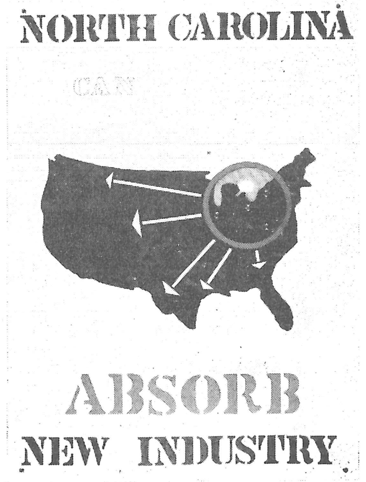
But what of the new towns in which these industries will be

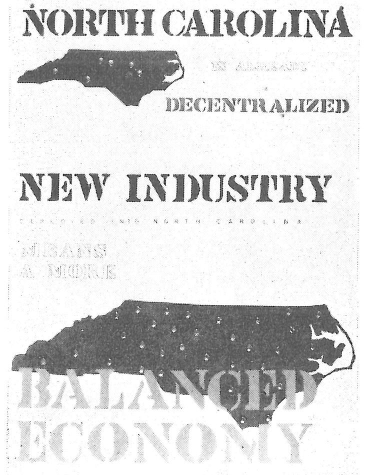
* Drew Pearson, Washington-Merry-Go-Round, October 1, 1951.
** ibid.

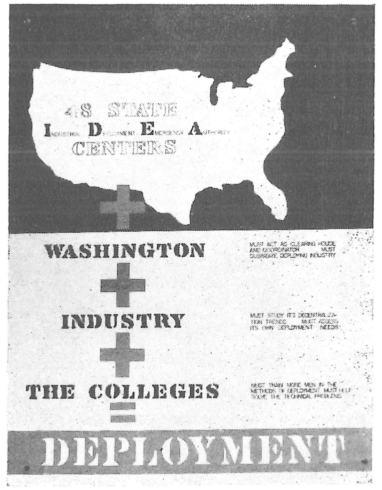
Poster series
executed as part
of the Deployment
Project by

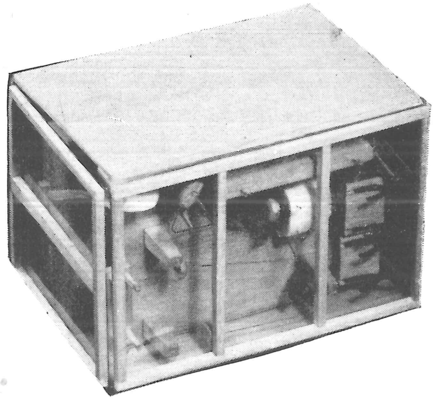
Jim Mitchell
Charles Moss
Sherman Pardue, Jr.
Fred M. Taylor
3rd and 4th Yr. Students
School of Design

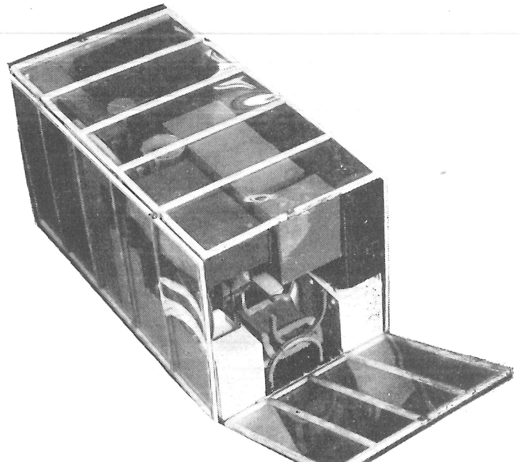


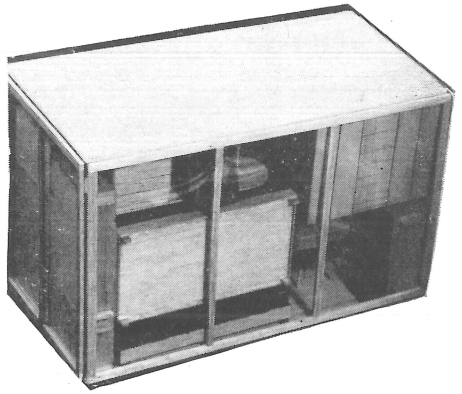








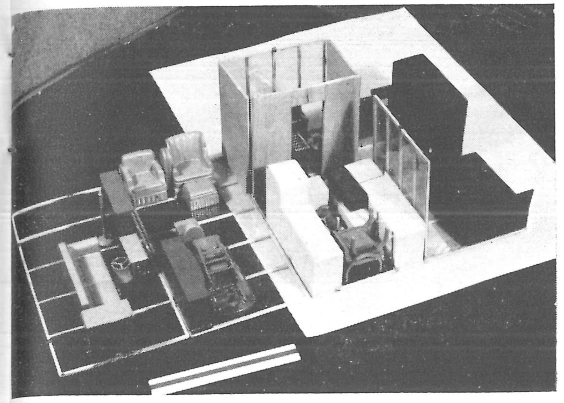


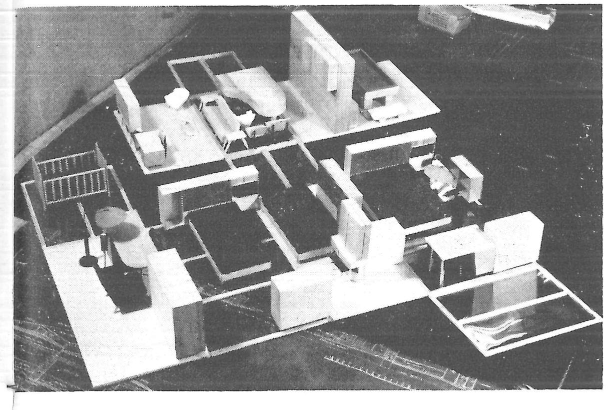


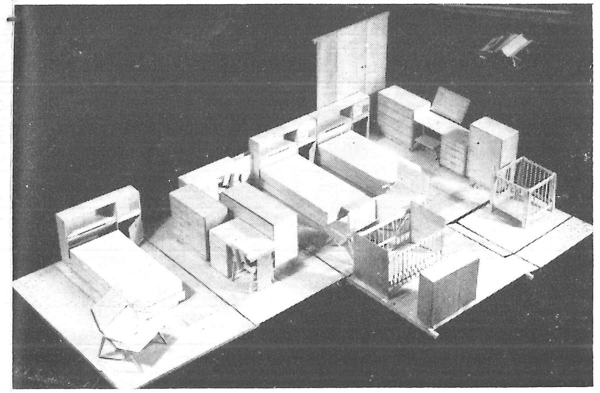
relocated? Some of the industries which have already moved out of the heartland on their own initiative are now operating in established towns. Others have set up housing projects. Still others have provided no housing facilities for their employees and in some cases 60 per cent of the workers commute as far as sixty miles daily to and from their jobs as a result of inadequate housing. The worse consequences of the present uncoordinated decentralization are the squalid conditions arising out of temporary housing set up in haste largely by the workers themselves. There are, of course, examples of well executed satellite communities such as the government projects at Los Alamos and the T.V.A., but these examples are rare.

In framing a deployment program, one of the primary aims must be towards raising the standard of living. We are decentralizing because we must. But to decentralize industry at the expense of our present standard of living is a disgrace to American resourcefulness. To decentralize without simultaneously **raising** the standard of living is a disgrace to American intelligence.

In establishing new satellite towns and in expanding existing towns, a simpler basis for the family economy is necessary. In America new communities have always necessitated a simpler economic basis . . . since the first pioneers ventured westward. Today the new basis for the family economy is quite reasonably found in the package industry. We have learned to package food and clothing, even individual pieces of furniture. Now we must learn to package whole inventories of family articles, even houses, hospitals, industries, even towns. Much in this direction has already been accomplished. It is a technique with which we are familiar. For some years we have been packaging kitchens and by the same process bathrooms. We must now employ our technical advantages to package water systems, sewerage systems, power plants, transportation and circulation systems.







Packaging is the clue to speed and economy, both essential to a sound deployment program.

More and more is being said and written every day about the coming war with Russia. Virtually all of it concerns the death and destruction which will be ours. Actually as things stand today, all of it is quite plausible. Most of the military staff agree that we would be lucky to destroy 25 per cent of an enemy air force bent on getting in the first blow. They would most certainly be carrying atomic bombs. We can continue to dwell on our unpreparedness, but this sort of disaster thinking does nothing to strengthen our defensive position. The United States and Russia are in balance so far as offensive strength is concerned, but we must augment our military position by actively waging defensive war. Deployment is no expediency. It is sound economic, social and military policy.

One thing is certain: as long as our machinery for war and peace is sitting in the bull's eye, we are begging for a knockout punch.

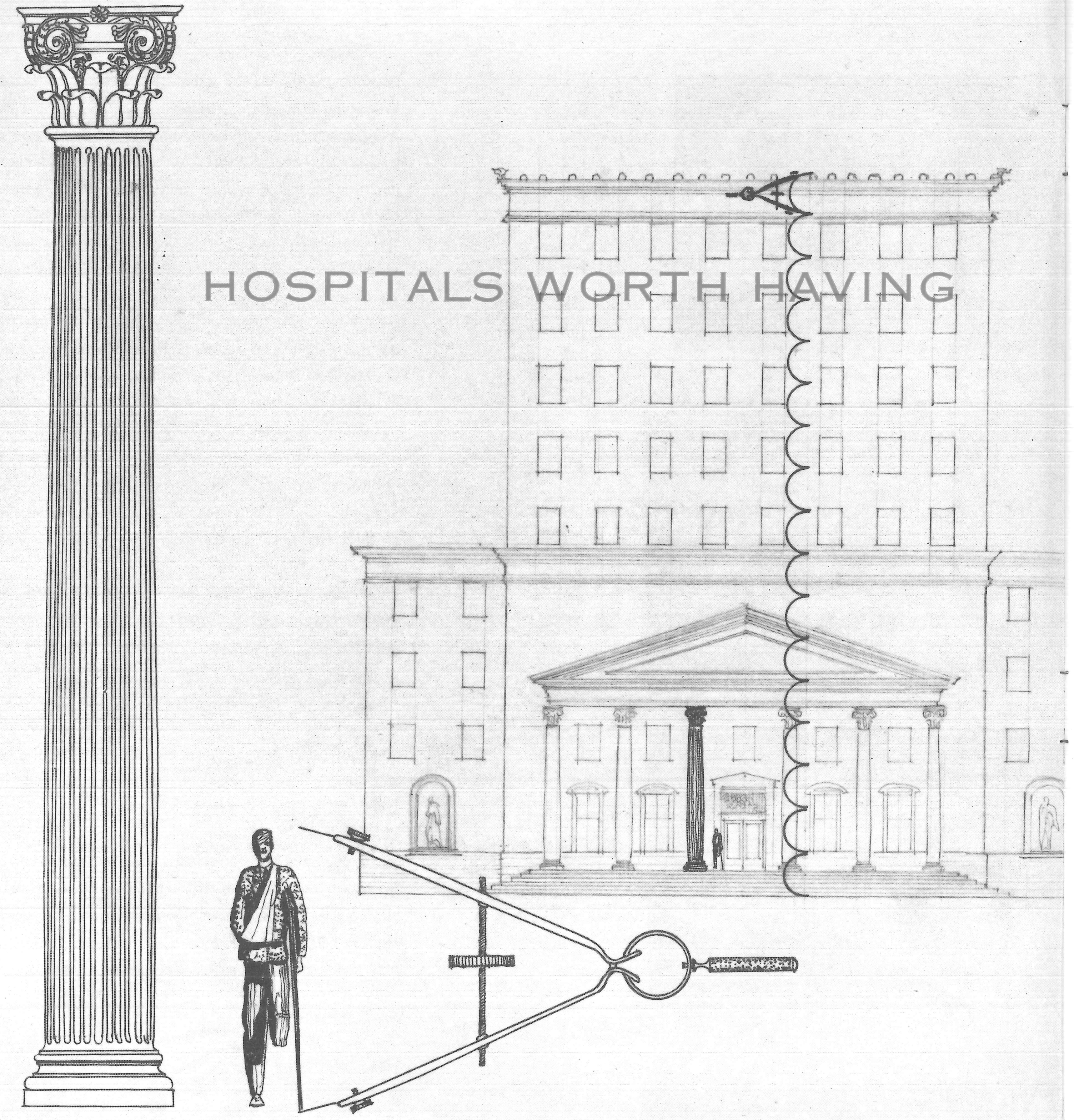
Forty-eight **states** must get ready to deploy industry. **Washington** must act as clearing house and coordinator and must subsidize deploying industry. **Industry** must study its decentralization trends and must assess its own deployment needs. The **colleges** must train more men in the methods of deployment and must help solve the technical problems.

The initial cost of deployment will be high, but the cost of rebuilding cities, if we don't deploy, will be higher.

Here at the School of Design we are not equipped to solve all of the problems by any means, but the universities can carry the program a long way. By analysis, research, experiment, and design, we have familiarized ourselves with the problem and projected a great many partial solutions. We are ready to collaborate.

SHERMAN PARDUE, JR.
4th Year Student

HOSPITALS WORTH HAVING



Disasters of greater or lesser extent such as the Texas City catastrophe, periodic railroad wrecks, and the recent Mid-west floods, will always reoccur. By their very recurrence they have conditioned us to rely upon the inadequate means we continually employ to meet these crises. In the last fifty years no revolutionary methods of dealing with disasters have been developed. Although aircraft are occasionally used to fly medical supplies to a stricken area, doctors are still called upon to perform emergency operations on army cots; sidewalks still serve as wards and morgues until the victims can be carted off to some distant hospital. Why does this situation exist? The doctors will tell you: only our large metropolitan hospitals contain the necessary medical equipment to adequately cope with disasters and disasters have a habit of not occurring in front of hospitals. You must also **go** to the hospital for an operation and you **go** to the hospital to have a baby.

Why do you go to the hospital? . . . because they can't bring the hospital to you.

What would you do if there were no hospitals? Take a look at that big hospital of yours because its sitting right in the bull's eye. In an atomic war, one bomb equals one city . . . hospitals included.

Hospitals are expensive. Moreover, our hospitals with their long waiting lists are inadequate to meet the daily demands placed upon them in peacetime. Any doctor can tell you that if war comes we will be forced to resort to a chaos of good intentions. A lot more people will die than are dying now from highway accidents, fires, and infantile paralysis, simply because they can't bring the hospital to you.

Every day in this country we make new demands on the hospitals we already have. The number of beds available to meet these new demands equals zero . . . not because we haven't the beds, and not because we haven't the staff, either.

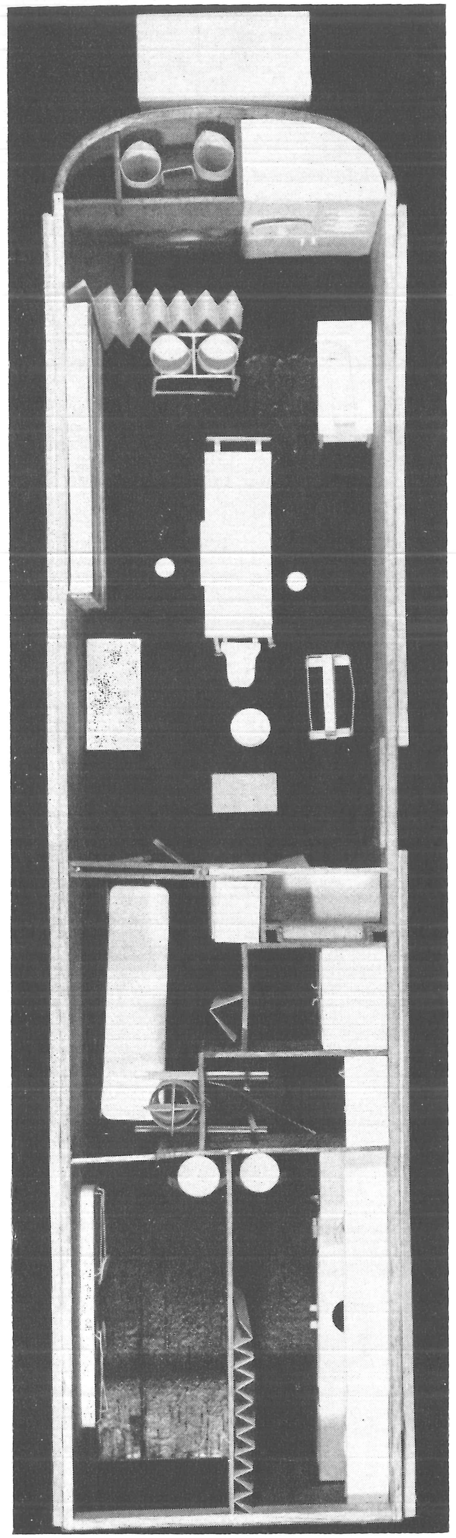
Hospitals, as we build them, are disproportionate in cost to services rendered.

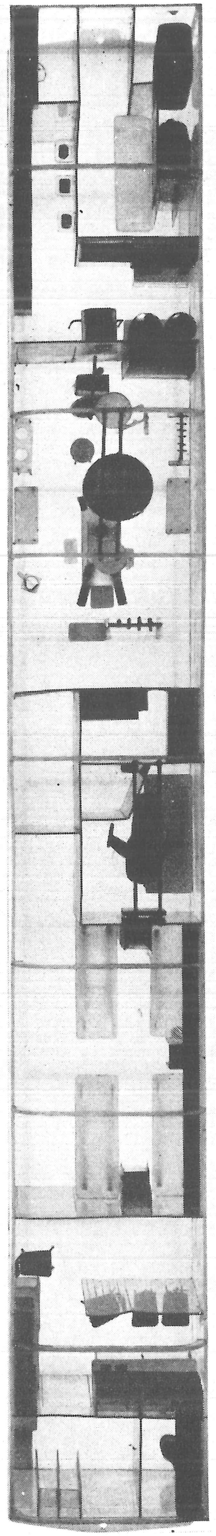
Our hospitals have failed to meet the present day demands of flexibility and mobility. Even our most modern hospitals are stationary structures and it is impossible to transport these facilities to different critical areas. Consequently, a great deal of duplication is necessary at enormous public expense. We need hospitals that could move intact by any of the common veins of travel: the railroad, the highway, and the air. A mobile fleet made up of the best medical facilities at our disposal could greatly relieve the overloaded conditions which now exist in our hospitals; and, in addition, they would be ready to converge immediately on any disaster point.

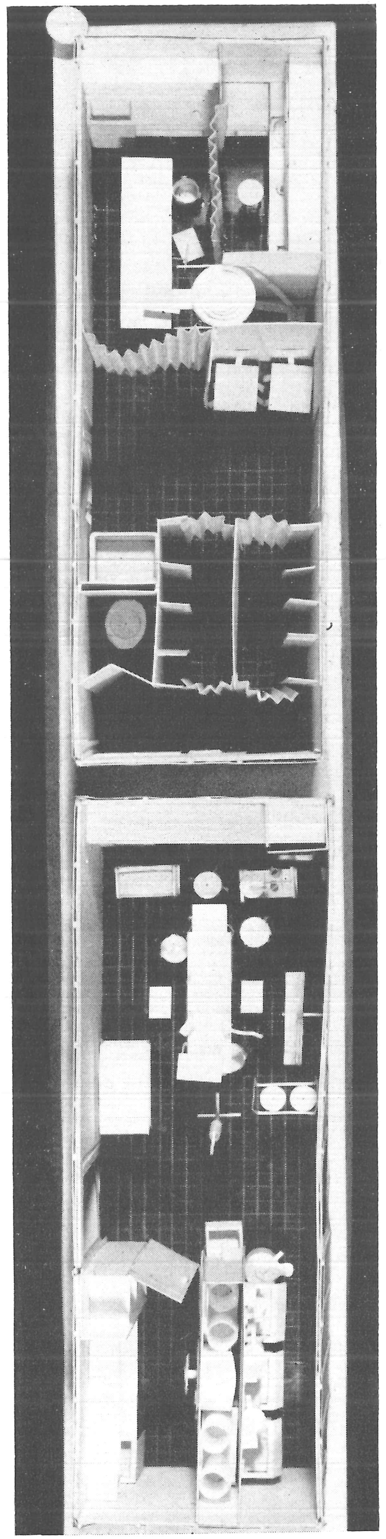
If war comes, such a mobile fleet will be the most dependable hospital in the country.

THREE UNITS have been designed by third year students in the School of Design. Mobile surgical units in the form of a railway car, a trailer truck and a packaged unit which can be placed on railway flat cars or in cargo planes, have been designed as possible solutions to our critical need for mobile hospitals. Also developed were packaged hospital structures designed for use with the mobile surgical units. These packaged structures are erectable and demountable in eleven man hours and they come equipped with their own water supply, heating units, beds, linen, electric power and equipment and tools for erection. These structures are packaged two to a thirty-two foot trailer. They are kept sterilized and when erected are airtight and completely insulated. Sixteen tractor-trailer units have been developed to make it possible to assemble a complete hospital.

Completely flexible and completely mobile, such a fleet strategically located during wartime outside the city could, in the event of bombing, immediately move into the disaster area, set-up hospital structures and begin operations



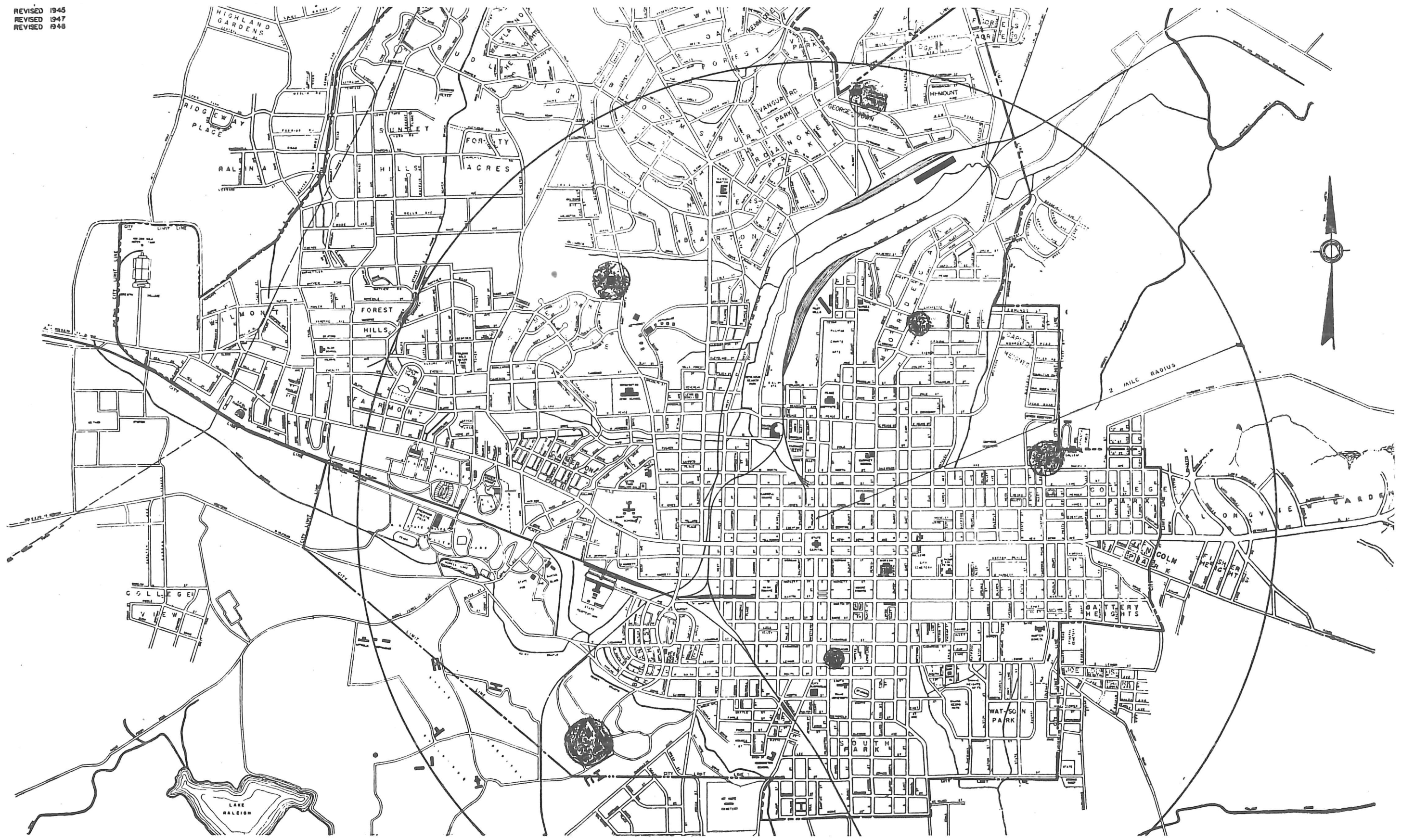




in the vicinity of greatest need. In peacetime the hospital could be assembled in a few hours and remain in operation indefinitely, complete with all necessary utilities, equipment and power. During an epidemic or other emergency, railroad cars could be rushed to the scene and operate from sidings. The best hospitals in the country could be located in your town at the time when they were most needed, at relatively small cost.

These mobile units are not intended to supplant existing hospitals, but merely to extend the range of first rate medical facilities. As a practical illustration we can evaluate the hospital equipment in the State of North Carolina. Calculations were made to determine how much and where additional mobile equipment is needed so that a hospital could be on the spot and in operation within one hour no matter where one might be needed. At present about 10 per cent of the state budget goes for hospital aid. A relatively accurate total cost of $1,795,000 will completely equip the state with additional mobile units meeting the requirements set-up by the designers. This figure represents less than 1 per cent of the state budget for the fiscal year 1952-53.

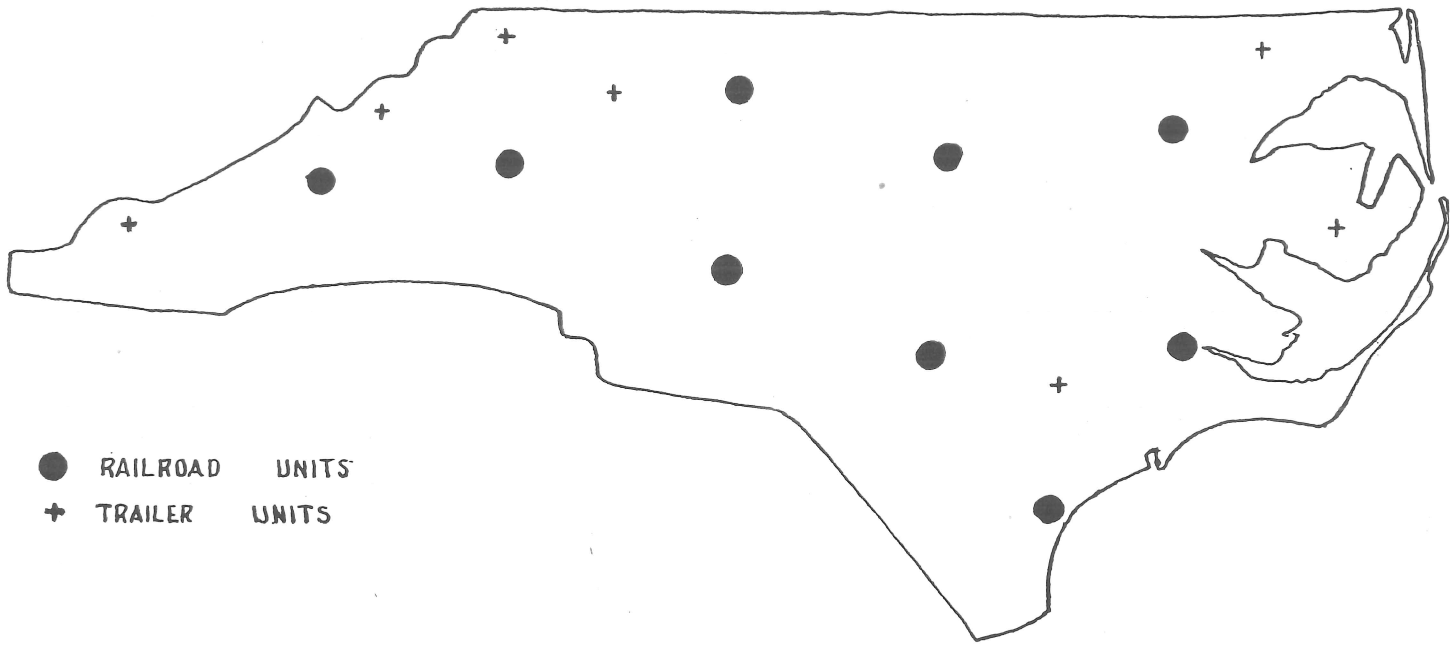
In addition to these units, smaller mobile first-aid units have been developed. For these units we have selected the standard milk truck. The milk truck unit is designed to replace

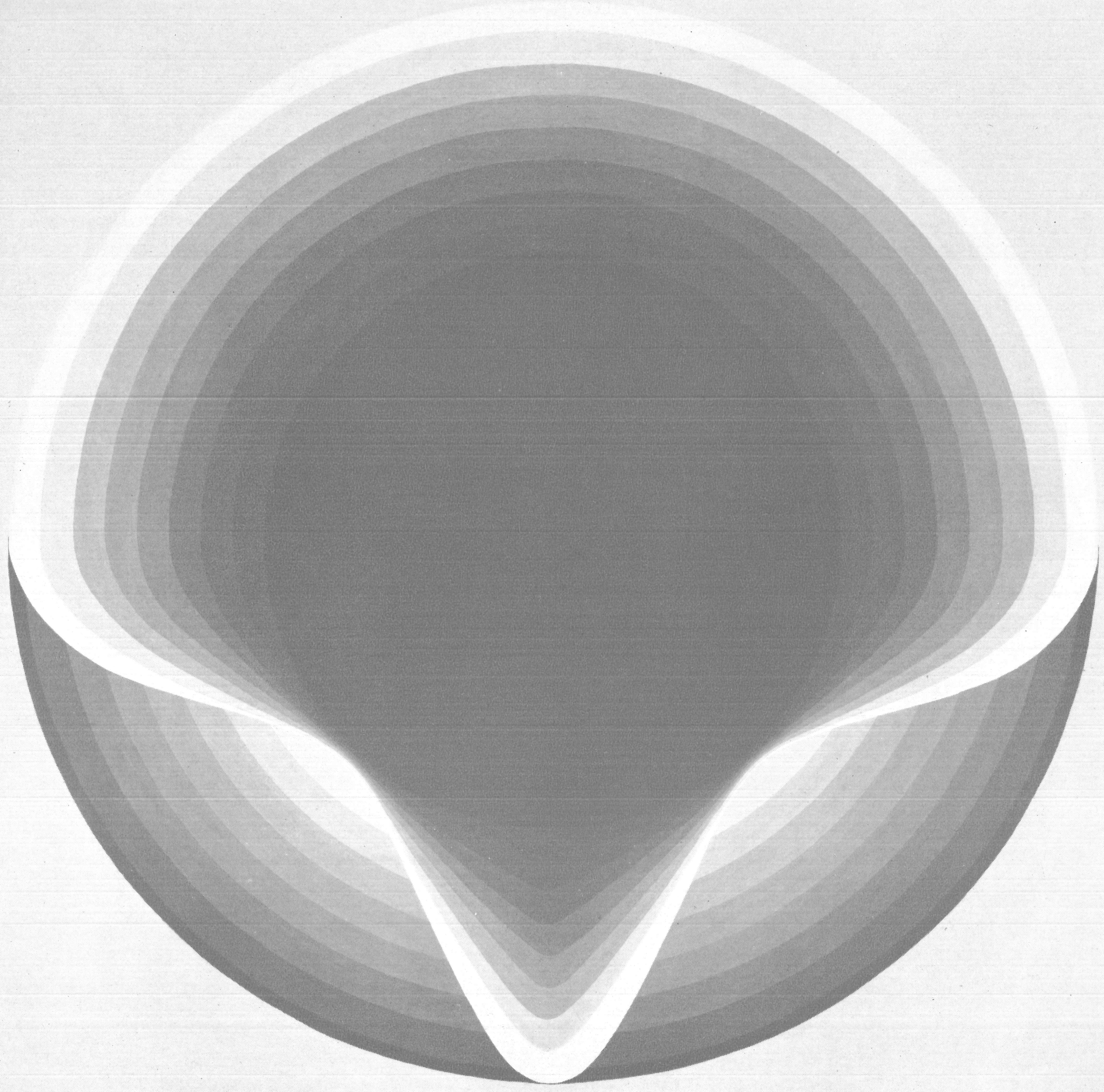


the ambulance and carries a doctor and basic operating equipment. It can be used in the cities by hospitals, police, Coast Guard, Civilian Defense Corps, and on the highways by the state police. No longer is it necessary for the small, inadequate ambulance to retrieve highway accident victims. Emergency operations and the relief of pain can take place on the spot using the finest skill and equipment.

Part of the economy and the general feasibility of this approach to the problem results from the fact that the milk truck, the railroad car, the tractor trailer, and all the medical equipment are standard articles and already in mass production. All units are adaptable to Civilian Defense needs, disaster needs, rural "hospital to home" needs, and the needs of the deployment program. All units are designed to raise the general standard of living. All units can minimize the loss of human life.

FRED TAYLOR
JOHN T. CALDWELL
BRUNO LEON
SHERMAN PARDUE, JR.
4th Year Students
School of Design
Working under the direction of
JAMES FITZGIBBON, Critic





WHY BASIC DESIGN

Nature is neither a phenomenon of an accidental complex nor a static force. It is part of a phenomenon of integration, a state of fluctuation and movement, a continued renewal and growth. We are an organism which is a part of this state. However, our actions, on the most part, have not been one of coordination and interplay but of inconsistency, disintegration and destruction. As a result, the world today is in chaos. Man, not being able to grow within the new dimension of his advancement in technology, has lost rather than gained in cultural growth. His forms are still of passed eras. They lack the flexibility, diversity and integration of things as a phenomena of many forces, not taken of one. Man must move toward an understanding of nature and his technology, learning their underlying principles and the assumptions which created their hypothesis of evolution. It becomes evident then, that man must understand the key words of integration and planning on all levels. He must be the comprehensive designer and a part of the leadership, growth and development of his day.

What has happened to architecture through the development of this new dimension has been explained with certain limitations by Arthur Clason Weatherhead.* He states:

* A. C. Weatherhead, History of Collegiate Education in Architecture in the United States: page 6, Weatherhead 1941.

1. "The gradual separation of the science of building construction from architecture. Until the modern era the architect and the designer of the structure were one. The materials with which he worked were simple wood and masonry and the structural problems were limited. As the elaborate science of engineering became applied to the construction of large buildings, however, the development of a separate and highly specialized profession became inevitable."

2. "The tendency to separate the allied arts from architecture. The influence of the Puritan background in American culture had restricted the use of adornment from Colonial times. Regardless of this tradition, however, there was little place for the arts of painting and sculpture in connection with the mechanized processes of the nineteenth century." As Lewis Mumford says, "The early domination of engineering as the supreme art was marked by the deterioration of all the traditional arts except those that by nature could retreat to the cloister."**

** Lewis Mumford, The Arts, Chapter XII; "Whither Mankind" Charles Beard, Editor; New York: Longmans, Green & Company, 1928 pp. 311.

3. "The deterioration of craftsmanship. The modern machine gradually replaced the hand tool in industry. . . . The change from the ancient tradition of the craftsman-architect to modern professionalism was one of the fundamental conditions of the time."*

Therefore, in order to achieve a new architecture, there must be a revision and revitalization of training. Training that must not start with the execution of minor structures in terms of professional skill but rather toward a growth and understanding of a new language of visual communication and the complexities of social order; for man is both an individual and a social animal. He lives in a fundamental social unit called the family which in turn reacts to the larger complexities of State, Nation and World. Whatever he does personally will be felt by the mass of which he is a part. We can no longer exist by individualism alone. Man, in order to exist, must recognize the necessities of life which he is dependent upon. His own reactions, the psychology of this animal, take the form of emotions and personality development. It becomes evident then, that in order to grow, the aspect of emotion and personality must not be allowed to continue in its present chaotic condition; for man will continue to destroy rather than construct. Thus, the student's own personality must be released and widened and his imagination developed and moved from past inhibitions which would stall his growth.

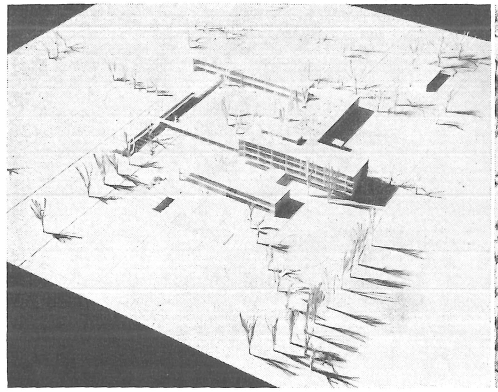
The student entering basic design must be reborn. He is to be oriented and familiarized with textures, shapes, growth and the complexities of nature. The common error in most architectural schools is that basic design is taught at an abstract level using contemporary artists as examples to go by. This secondhanded process usually produces little Mondrians, Bauers, Gabos, Moores or, if the faculty member has enough to offer, little duplications of himself. His work becomes quasi-intellectural in form and shape, sterilized to the extent that his own creative ability is entirely masked out. He must be taught principles and facts, not other men's exceptions. With the knowledge of these facts and principles, he may be able to move toward his own spontaneous expressions of art and a visualization of the whole picture as it is related to its parts.

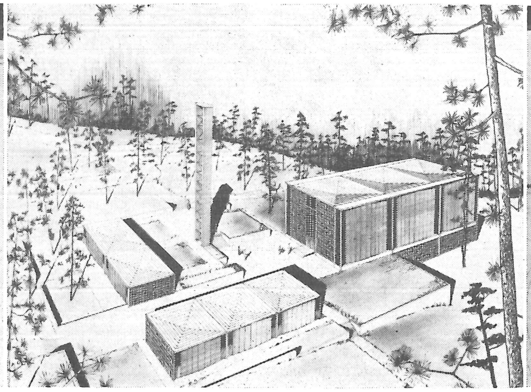
The "boy architect" enters his second year a bit under the weather, but his personality has been broadened to a stage verging on extroversion. He has supposedly learned the language well. He is at a crucial point. The next step usually ends in a failure and disappointment for all concerned. Instead of insisting upon the continuation of freedom in design, moving slowly toward habitable structures, he is flung into the claws of professional skill. The results are obvious. Where these problems could have had exquisite forms, decorations and harmonies, they are instead eclectic in nature. They usually take the form of the work of the architect who is recognized and their renderings hang on whether the latest "Arts and Architecture" magazine arrives in time.

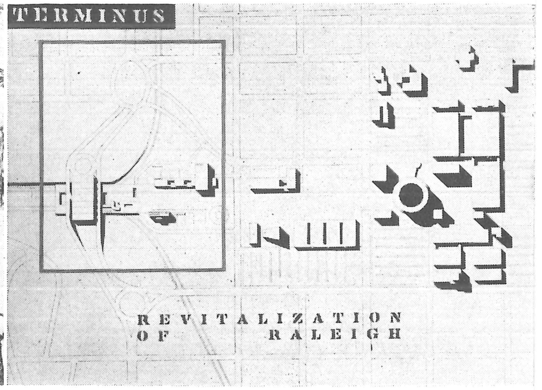
Basic design, therefore, must be taught in terms of principles on a non-abstract level. The student must be brought to understand the other arts, sciences, and industrial mechanical advantages of his day. By and during his second year, he must be able to think in terms of methods of approach, not actual solutions. For there are many solutions to a problem, but only a few methods. Basic design should be continued into the second year bringing in man as a social factor, not merely as a proportion. The student must not be left in the state of elevation that basic design has placed him with the hope that he will be able to make the transition to formalized and ordered structures by himself. If these elements are not taken into consideration, all that is striven for in the creation of The Citizen Architect will be lost.

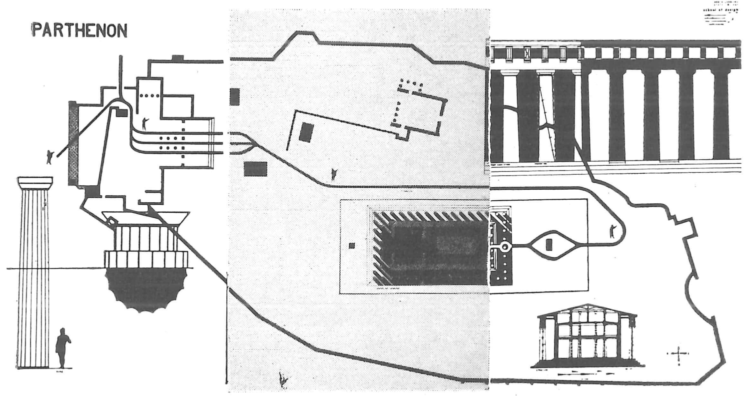
GERALD I. SCHIFF
5th Year Student

* A. C. Weatherhead, History of Collegiate Education in Architecture in the United States: page 6, Weatherhead 1941.

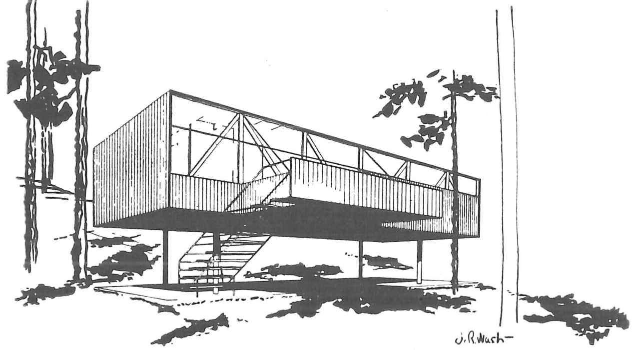


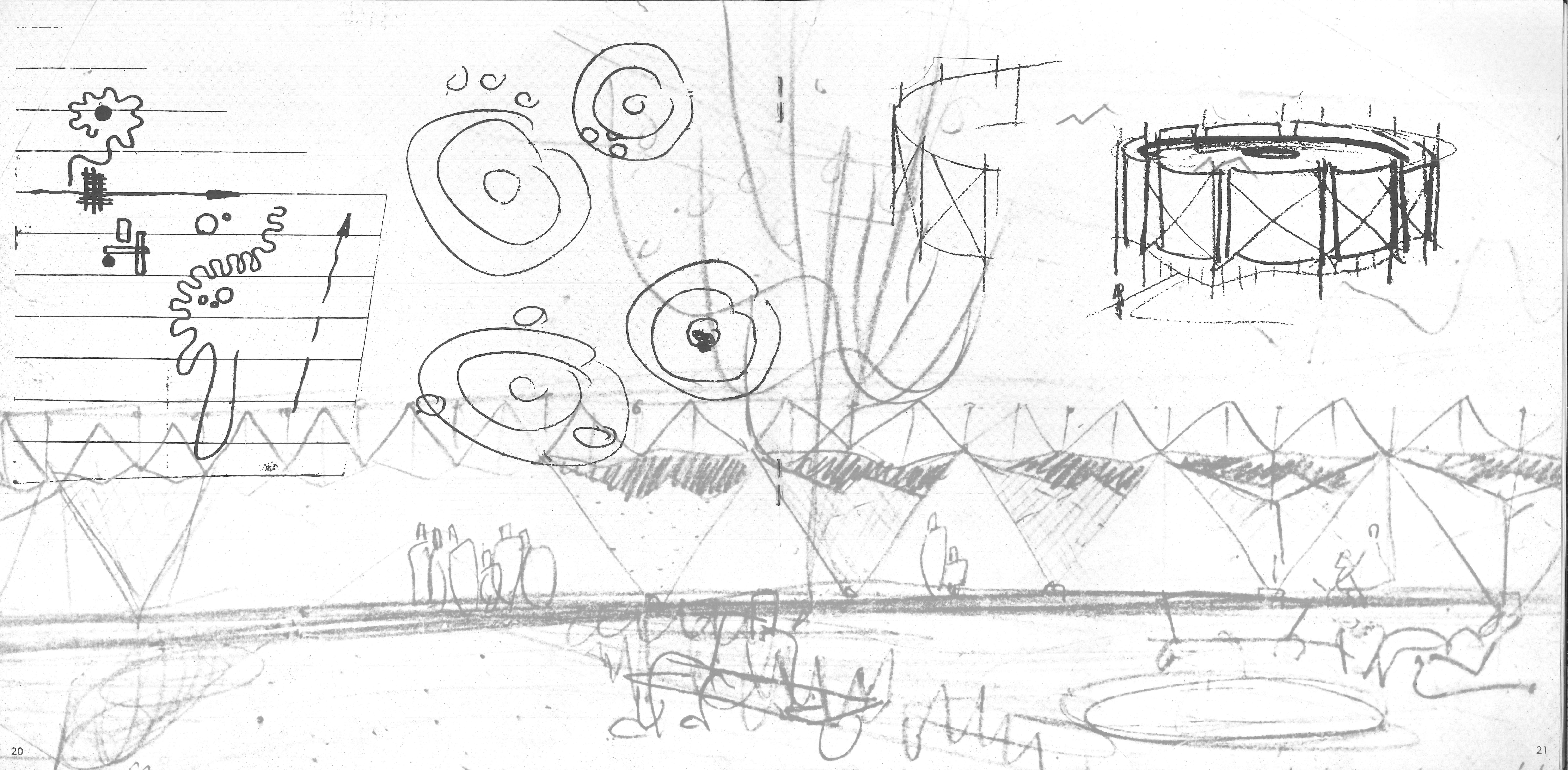




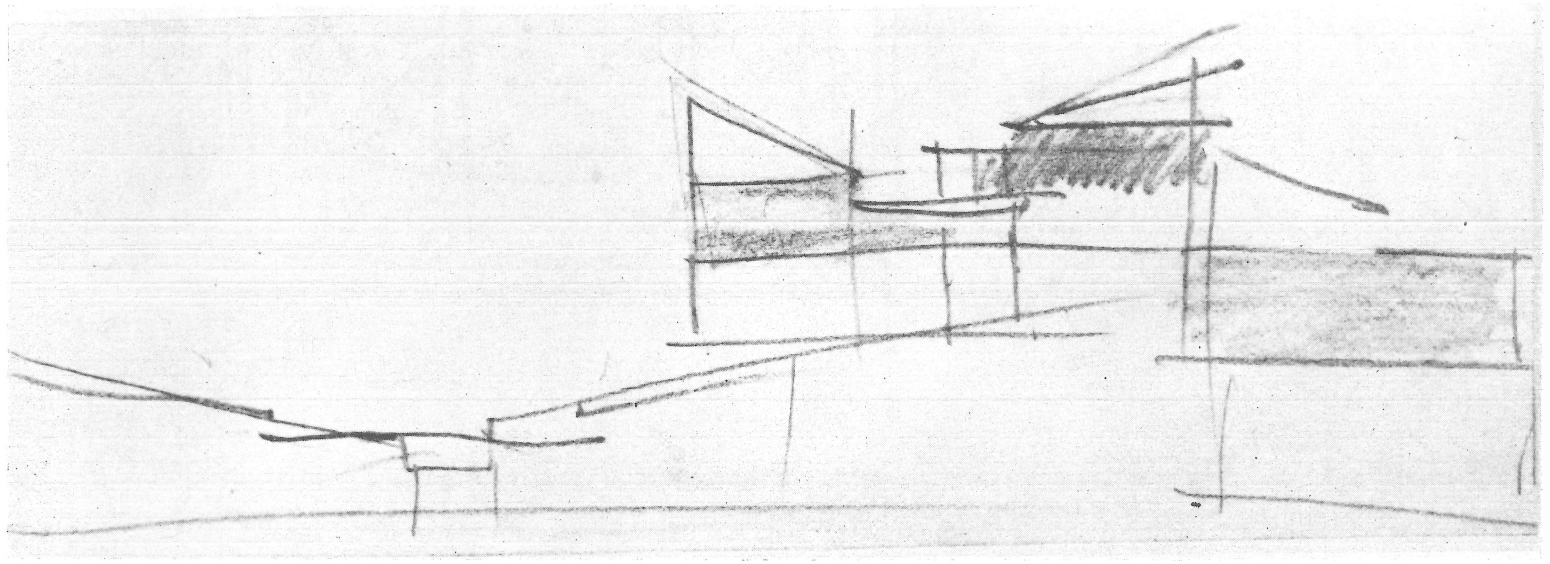


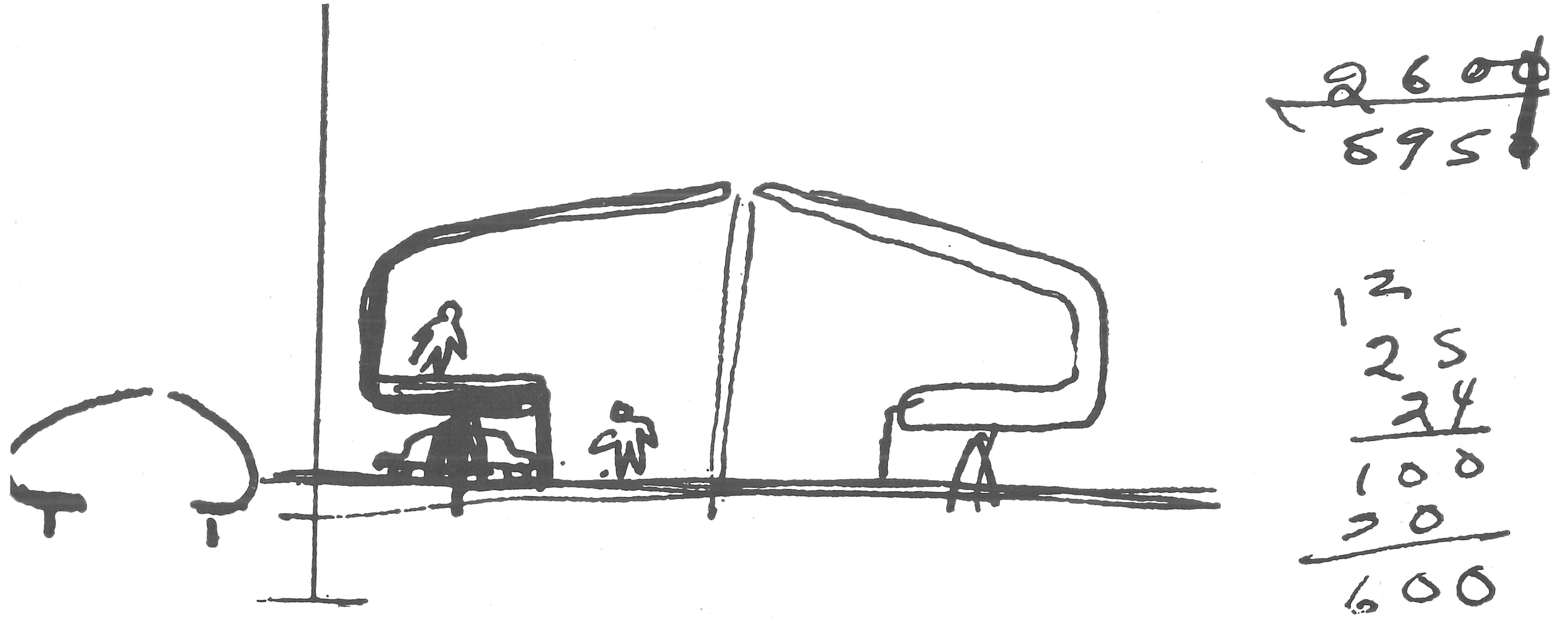
A GIRL SCOUT RETREAT

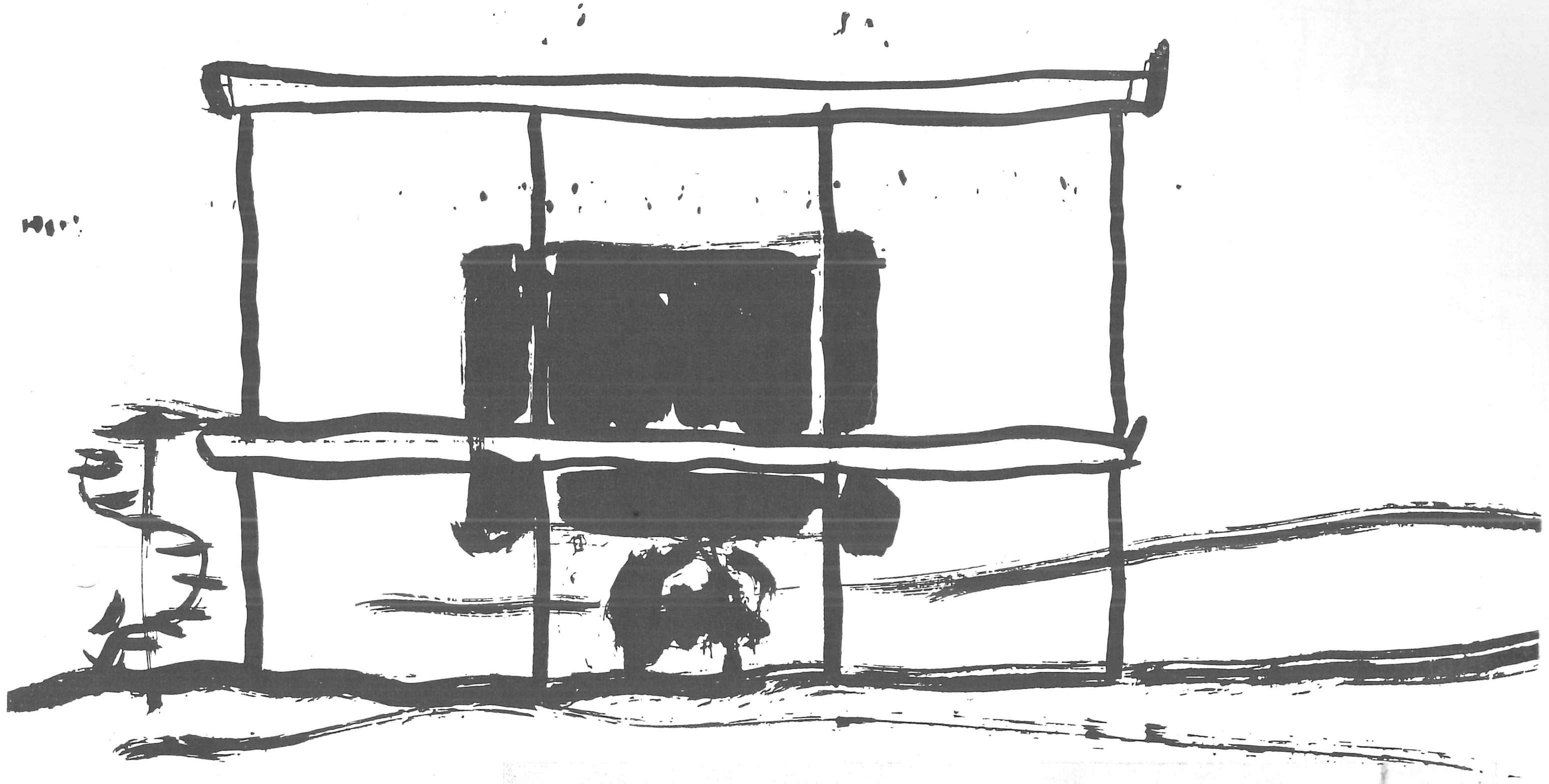


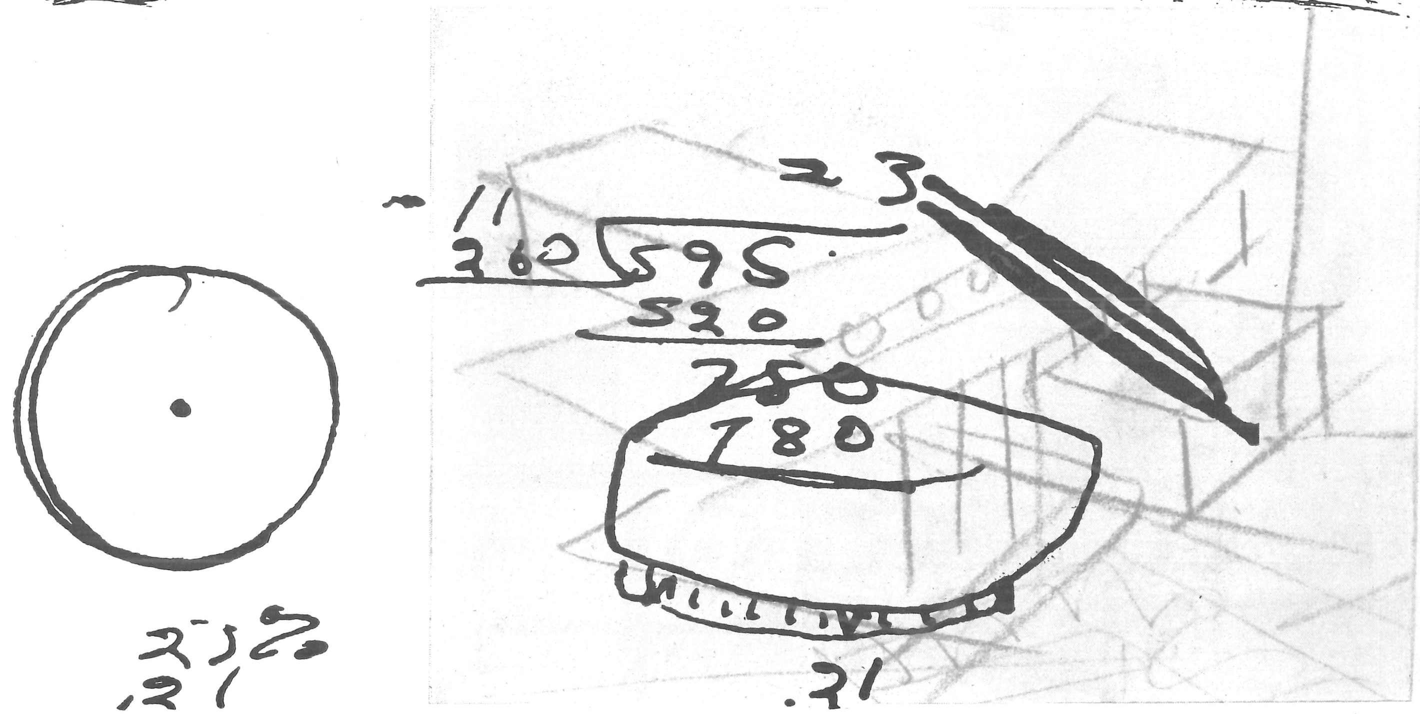


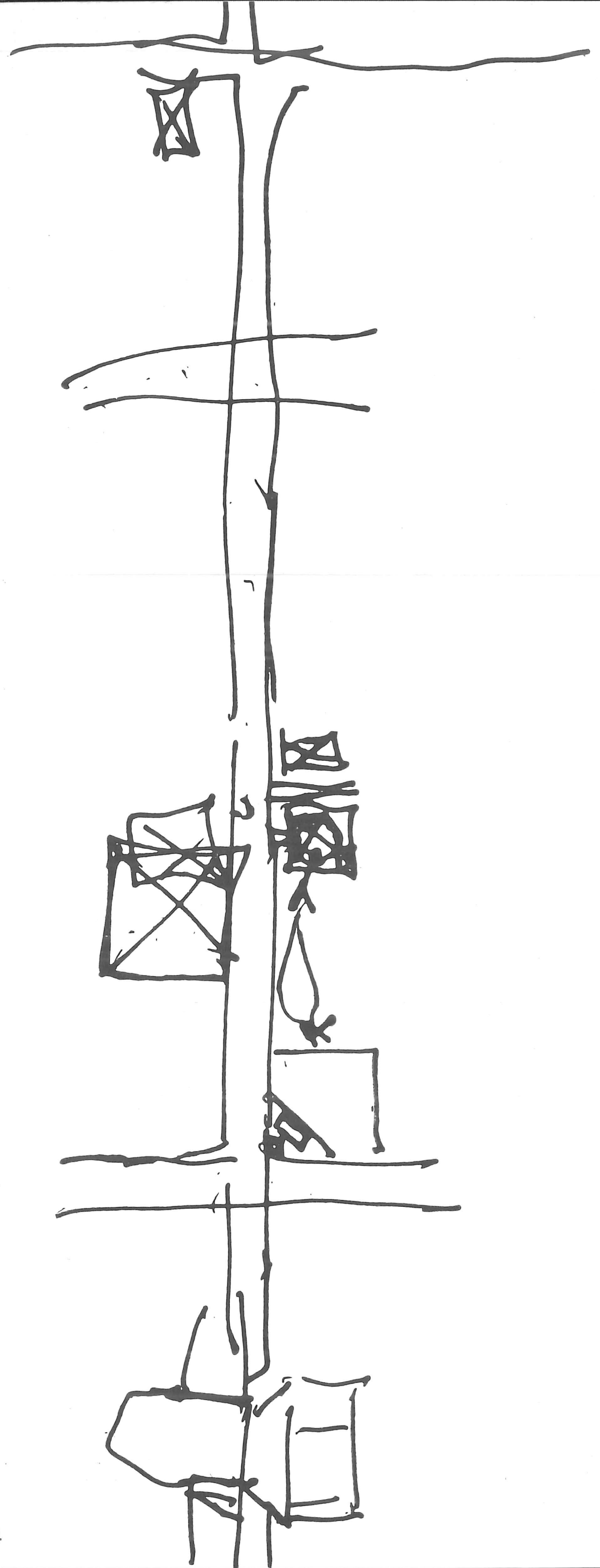
These sketches were dug from desk drawers, note books, trunks, shelves, and piles of debris which catch the students' architectural ideas at their inception.
Here are bits of tracing and notebook paper which are records of a design process showing the problem and the designer in development.

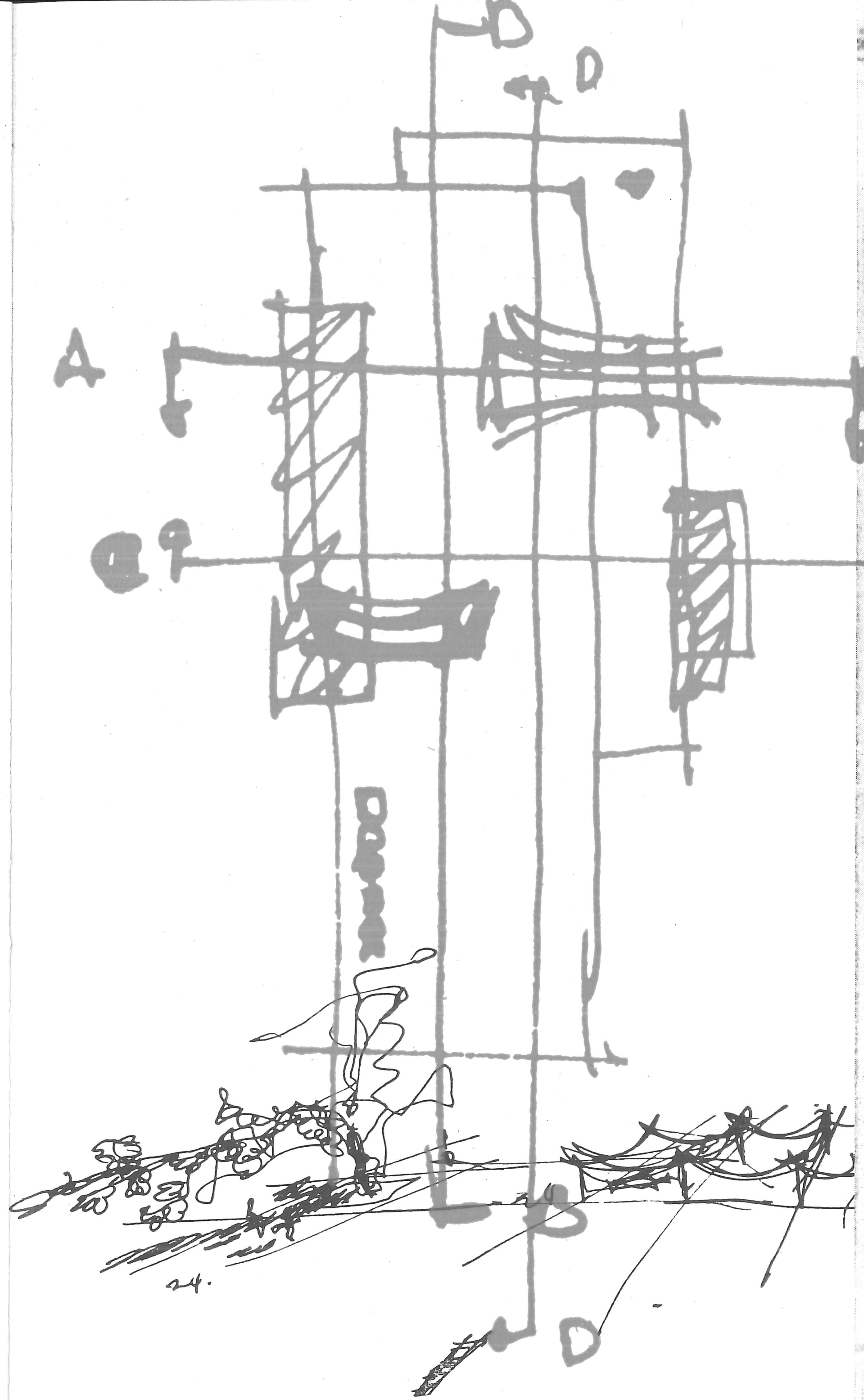


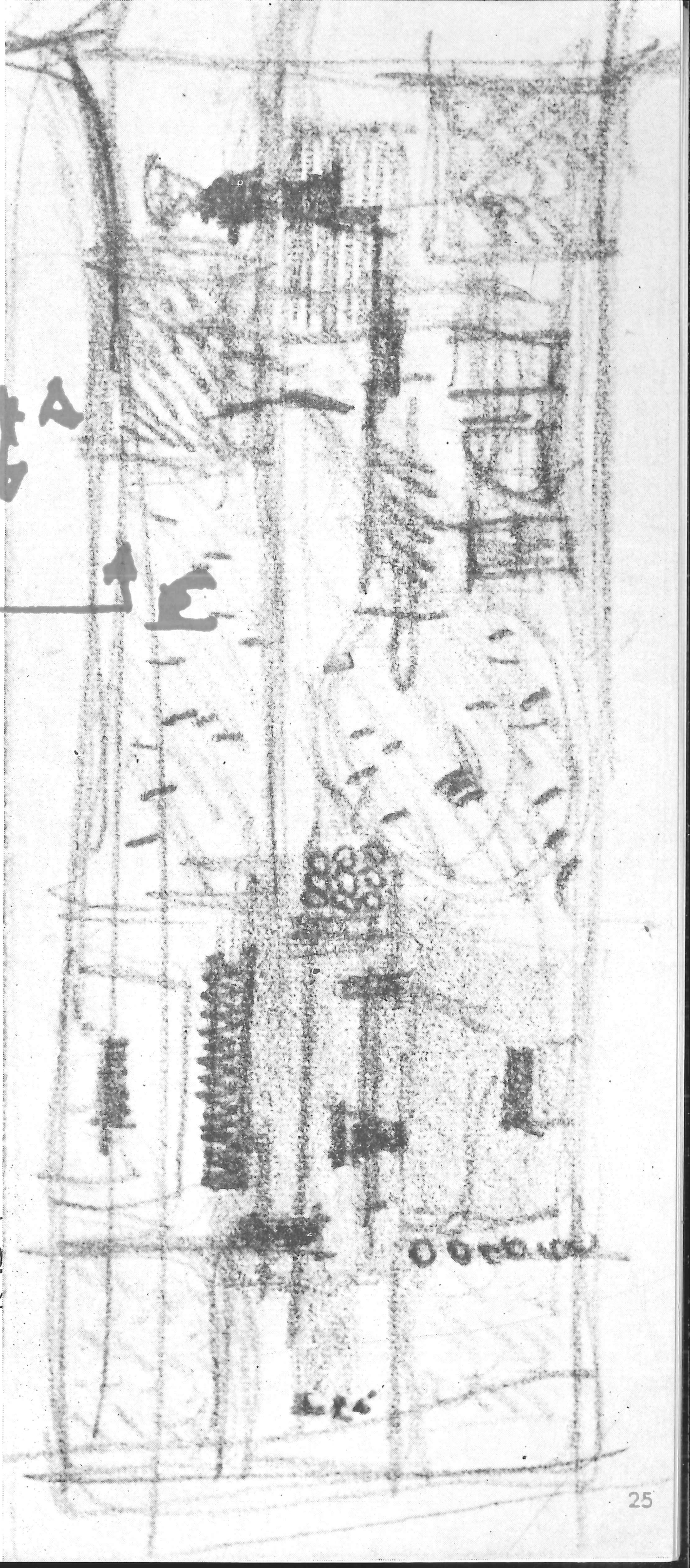












A FALLACY OF INDUSTRIALIZATION

One problem with which the contemporary architect should be more seriously concerned is housing. He should be concerned with housing for the great mass of society rather than only for that limited group having sufficient means to acquire the custom built house. It is this particular problem that the architect has evaded. He has attributed this evasion to various causes but the rationalizations have constituted self delusion.

The problem in its statement is simple: the acquisition of decent living space to the largest possible extent for all individuals, regardless of economic status. This does not mean that economics is to be abolished, but rather that it is to be considered as a necessary restriction. The difficulty in the past seems to lie in the fact that this consideration has meant only quantity of space. It is the qualitative character of space which has been neglected. In other words, quantity is necessary, but quality in the sense of flexibility is also important.

The great mass of housing is devoted to the middle income group, and due consideration of the economic status of this group makes it apparent that quantity of space is restrictive. A few innovations have been attempted to take full advantage of this minimal space, such as open planning and mass produced homes. The open planning technique is not a serious consideration of the problem since this is a "general" procedure in every type of dwelling of a contemporary nature. It is a manifestation of a general sociological trend of increased informality rather than a consideration of the space restriction in minimum housing. The mass produced house technique is a much more fundamental approach to the problem and deserves serious consideration. The single great characteristic of contemporary society, which can lend itself to the raising of the standard of living, is the industrial potential. In the application of this potential lies a critical area. It is an area which has beguilded us to the extent of minimizing its value. The attempts at utilization of this factor in housing have been important more from the attitude manifested, than in the manner of application. The approach has been similar to walking around backwards. We see what has been done, but not what could be possible. This is valuable as a study of historical progress but not as a basis for mimicry.

I mean that a flexible end product has been attempted from the basis of rigid methods of production accepted as the highest standard. It is this latter thought (which the architect has accepted) that is at fault.

The rigidity of mass production methods, as considered here, emanates from the conception that mass is an adequate substitute for quality. This is purely an economic consideration. The result has been that the social structure has transferred from the conveyor of ethical standards to the conveyor of materialistic nihilism as though the first never existed. The difficulty which arises from this state of mind is that consideration of change is forbidden lest it anger the great god of mass. Surely, a change of mind is necessary! When this clarification does exist, the potential for flexible mass production will be unlimited. By the use of the most advanced scientific, technological, and ethical standards we could transform a fumbling infant into a constructive giant. This future colossus could produce flexible products because it would no longer be rigid but susceptible to rapid and inexpensive change. The housing problem could finally be solved, not by identical mass alone but by quality mass.

Up to this point, we have merely attempted to bring to light the fact that housing has not been successful because it has at times tried to use a rigid system of mass production or because it has ignored this great potential asset for more archaic methods of production such as the claw hammer and nail. This fact is the result of some very simple misconceptions. As an example, let us consider the die.

In all of our consideration of mass production, we must invariably make use of the die. We have considered the die as a constructive tool. From the standpoint of a tool and die maker, many inadequacies are immediately apparent in this conception. The method of die process is as static and retrogressive as hand plowing. It is unreasonable both technically and economically. The many millions of dollars spent for the procurement of dies for mass production is not so much indicative of the required skill of the craftsman as it is of technological lag. Economic restitution is possible (under this system) only by the production of untold thousands of identical units. It is useless when the press of progress forces a design change. The lag between technology and progress is thereby increased and becomes a burden upon the economic system because of the reticience to retire into obsolescence such an expensive element. In other words, the die is inflexible as a constructive tool because it is worthless as a sensible productive tool.

The die is constructed as though a primitive were at work. Briefly, it is first roughly machined from a previously made wood pattern and then hand filed and stoned in order that the male and female complements fit together accurately. This requires great periods of labor by skilled craftsmen at great expense. Upon completion, it is looked upon as a productive element that brings into the range of lower income groups many benefits impossible under the handicraft methods. This view is substantially correct, but it also contains a basic fallacy. This fallacy is that the original product, namely, the die itself, is not within the economic range of lower income groups because as presently constructed it prevents the immediate application of scientific discoveries towards rapid improvement of existing advantages. The result is that products at their material inception are often obsolete. Yet, they must of necessity be considered as the most advanced of their type for some period of time. This period of time is dependent upon the sale of the product which can pay for the expensive die, produce a substantial profit, and contribute toward the evolution of a similar cycle relative to a new die. It is obvious that if a process were developed whereby skilled or semi-skilled workmen could completely process a new die in a single day the cost would not be prohibitive and change would be rapid. This new capacity for rapid change would allow the end products to be the result of immediate discoveries, and it would revolutionize the living standard of a society, not only in the matter of mass, but in the matter of mass with the highest available advantages.

The machine tool is similar in that it is as equally incapable of realizing the full industrial potential. The cost of specialized machine tools (those capable of only token variances in performing a single operation) is diametrically opposed to the idea of flexible housing or flexible anything. Untold millions of dollars are spent on these machine tools. They are similar to the die in that they are extremely accurate and necessitate the extended use of many skilled workmen. Yet, they also are conceived upon the basic premise that they are to perform their one special operation toward the end product and will not be abolished until they are completely incapable of further adequate operation. These tools do possess a singular characteristic, however, not found in the die. This characteristic is their tenacity in maintaining operative life. From the standpoint of economic investment on the part of the industrialist, this is a desirable quality and is continually striven for. From the standpoint of the consumer, it is not. This is evident when it is considered that the inflexibility of these tools makes it necessary to maintain their operation in a newly developed product. It simply means that a characteristic of the obsolete product must be maintained. Progress is then necessarily piecemeal rather than comprehensive. This is not intended to imply that these tools must be made shabbily in order that they will wear out quickly and thereby allow room for change. it is intended to mean that the tenacity towards operative life is a desirable characteristic in itself, but it should be applied to flexible machine tools restudied continually in order to maintain and increase their flexibility. These machines (with some necessary exceptions) impose upon the creative individual an unjustified restriction. This restriction has been in existence for so long and has been embraced so readily that it is not considered as such any longer. From Goethe's "Faust" we have the summary of our attitude:

> "For Fate has put a spirit in his breast
> That drives him madly on without a pause,
> And whose precipitate and rash behest
> O'erleaps the joys of earth and natural laws."

In what manner does this concern the architect with relation to the housing problem? It concerns him fundamentally because he must realize that the industrial production potential is one of his tools; one which previous civilization did not possess, and also, because this industrial tool is not to be considered as a producer of stereotyped minimum homes outside his consideration or beneath his dignity. It is the great beneficent asset with which he can produce new horizons for society. He must seriously apply himself to a study of the processes and application of this asset in order to raise himself to the position of the individual of social concern. A position which he has obviously lost.

The individual with social concern must re-evaluate the machine and develop its potential until it is capable of flexible production. The technology is available and will take care of itself. The considered use of this technology in the design of housing must be adopted as a policy in order to achieve a harmonious balance between economy, adequate shelter and adequate availability of the greatest possible quantity of good.

BRUNO LEON
4th Year Student

THE 90 PER CENT AUTOMATIC FACTORY

The following article is a seminar synopsis of the program to be given to a selected group of 12 students at the school of Design, N. C. State College. In the event the energies of the students are sufficient to produce substantial results a future article concerning these results will appear in this magazine.

The 90 Per Cent Automatic Factory

How an entirely new factory architecture may precipitate the mechanical **evolution**

A new cotton mill as a specific proto-type problem generic to the greater imminent problems of the widely deployed semi-autonomous elements of **an invulnerable** industrialization.

Manufacture of cotton goods is one of the oldest of industrial enterprises. Its mechanical evolution initiated much of the general scheme of differentiated and reintegrated functioning of industry.

A comprehensive resurvey of cotton manufacturing evolution from our now great "hindsight" advantage, discovers patterns involving what were originally basic assumptions which—though no longer basic—as yet pace the whole conception of that industry.

These basic assumptions became obvious and then too obvious and were lost sight of in the accelerating sequence of secondary consequences. None the less many of the original factors, no longer valid, underlie the ever swifter mutations of the original integration. How this basic conceptioning can pace later events to disadvantage can be seen, in a field other than cotton manufacture, a field with which everyone is familiar—for instance, in the field of cooking apparatus.

We see how open fires with spits became gradually surrounded by stone chimneyplaces that improved draught and controlled smoke. Observation of the desirable properties of the heated stones brought about the fortuitous invention of stone ovens and invention of the kind of foods that might take advantage of this method of sterilization in pre-refrigerator days. Stone grating improved wood fireplaces, metal grating replaced stone grating, made possible better boxing of fire and valving of controls, quicker and higher heating ovens which precipitated further invention of new recipes. Types of pots and kitchen utensils were evolved for the continuous banked fire. This sequence is all logical and had a basic assumption, (1) predicated on the obvious fact that it would "always" be extremely difficult to ignite a fire and that because fuel was very plentiful and immediately at hand, it was obviously logical to keep a fire going, once it was started; (2) food was procured at unpredictable intervals and deteriorated rapidly but could be made safe and palatable by various degrees of cauterization. Finally the whole concept of design of the frontier homesteads was evolved around this basic assumption.

The basic home economics sparked the preferred commerce of even such large events as the discovery of the Americas—to procure spices to preserve foods. Enormous capital risks were taken to reach India for this purpose, by westward circumnavigation of the globe.

Victories in chemistry and physics brought first the gas lines and electric wiring to the home, and with them instantaneous and sustained specific energy controls, as heat or lack of heat, doing away fundamentally with the necessity of root cellars, coal bins, ice houses et al. So strong were the habits of underlying assumption that the coal and wood containing metal box and its hot plate top became the logical device into which to insinuate the gas pipes and electric wires, and the old ice box the logical device into which to insinuate the electric refrigeration element. Little or no thought was given to the concept of whether the boxful of variety of foods, under local preservation, later to be cauterized by the heat, was as yet a valid requirement for health and pleasure. That food could be brought in a matter of hours from distant places in prime condition and could be consumed to better advantage while fresh and uncooked, was a fleeting and secondary thought. Better health and beauty of body may, in a few years, be discovered to be the reward for a broad revolution dispensing with the whole of our present kitchen paraphernalia and cook books. Ten years from today may see our present guided missile development atomic powered and winging the world's best produce directly to worldwide tummies.

The great inertias in home customs and the consequent complex of broadscale economics may be blamed for the lack of comprehensive perspective which results in the progressive, short-term and random component substitutions within a static overall scheme in food preparation mechanics.

One might expect more fundamental thinking to characterize new engineering undertakings in the newer world of high speed transportation. Such thoughts are however contradicted by fact. American engineers consulted by Brazil in the matter of increasing that country's advancement of its industrialization, resorted to century past evolutionary events and prescribed installation of railroad systems appropriate to the problems in North America a century ago, when no transportation in the form of flying existed. They wrongly assumed that Brazil could only come to its flying after a century's evolution from the railroad installation stage. These engineers were unaware, or paid no heed, to the fact that the Brazilians were even then flying many more miles per capita than the North Americans. It's taken less than a decade to demonstrate that the Brazilians have jumped the whole century of transport evolution and come in at an air age level. Their whole economy is now evolving from the accelerating air transport advantage.

Returning to our survey of cotton manufacture, we find that its first obvious assumptions were that cotton mills must be installed beside mill dams because their machinery would "always" be powered by water wheels, requiring translations of power by belting pulleys and meticulous paralleling of shafting in the most geometrically economical patterns, consistent with all the functions of picking, carding, combing, twining, spinning and weaving. Obviously logical for the preservation of the expensive machinery was its housing: One hundred per cent compressively conceived stone masonry for vertical components and heavily sectioned wooden platforms for the horizontal components. The natural clustering of the necessary mechanical stages of the manufacturing called for a geometry of four or five tiers of flooring.

Bigger and better and more machinery quickly evolved and the weights went up and it became necessary to invest some of the precious iron in stancions to shore up the overloaded floors and replace rotting wooden verticals. The overloadings and high tiered flooring brought about bulging and failing walls due to building settlement and lack of tensive cohesiveness and more of the precious iron went into the installation of the first of metal structural components ever to be introduced into buildings, i.e., into cross tie rods between outer walls.

The coming of electric motors three centuries later brought about unit machine autonomy and a partial revolution in cotton mills, which tended to a new distribution of the machinery to one story concrete floors, similar to large automobile production plants, being no longer limited by the economics of pulley shafting. But this whole revolution was also predicated upon the piecemeal and intermittent set of events constituting the history of the separate pieces of manufacturing apparatus—originally very heavy and even more heavily framed, particularly in view of the necessity of maintaining precise alignment of the large apparatus with the pulley shafting and to make the apparatus itself impervious in its structural integrity to the progressive sag ging of the wood floors.

The whole early concept of factories assumed flooring requirements able to carry 200 lbs. to the square foot at **any** square foot, because which foot might be eventually employed, could not be foretold. The revolution of new cotton mill design, characterizing the switch from New England to the Southern States for economic reasons occurred after electric motors were introduced and steel structuring was available, and made possible by air conditioning and large spans of steel trusses, etc. However the one floor scheme exposed large roof areas to the sun and consequent lack of energy efficiency in providing the desirable air conditioning. Furthermore the machinery itself, though now installed on one floor, represented widely separated operations. The cotton itself in various stages of process, had to be removed in batches by various types of reels and containers and progressively introduced into the separate types of machines, while the basic floor design persisted, assuming potential machine load installations at every square foot. That little gain has been made in the numbers of automatic functions, is the result of the primary building designs themselves. Due to their enormous foundation layout and assumptions of "anywhere-everywhere" loading, the cost of buildings has continuously risen and along with it their maintenance cost.

Two industries with more recent starts than that of cotton manufacture and therefore with less accumulated tradition of conceptioning and operating strategy have shown far greater susceptibility to scientic treatment and therefore to acceleration in evolution of both general and particular physical mutations, i.e., the chemical manufacturing industry and electrical power generating and distributing industry. As a result these latter have demonstrated economy and profit of greater magnitude than has cotton processing of recent years. That is not all, though originally types of industry seemingly remote from cotton manufacturing, "bi-products" of these two new comers have in combination threatened the validity and very existence of manufactured cotton products, by rayon, nylon, etc.

No. 1 The chemical manufacturing industry soon took scaling ladder advantage of its own generally advancing chemical knowledge of natural association-dissociation principles by developing non-deteriorating all-weather and continuously operating machinery, and like a chicken, burst out of its classical arch corniced brick egg to stretch out nakedly and majestically in the local day and night sky with its omnidirectional system of receiving, self-meteringly valved, fractionating, accumulating, regeneratively circuiting and distributing facilities.

No. 2. The relatively very new electrical generating industry and its distribution system (and its bi-product coke and coke derivative chemical processing) have been repeating the out-of-egg process and is now better than half emerged. Its greater transformers and other major apparatus are now in open air switchyards.

In partial fulfillment of this same emergent trend principle people have gone out of their fixed housing in all-weather, multi-person clothing, enclosing sofas with wheel supports and integral motors, the automobile, to sit comfortable outdoors at open-air movie theatres.

The cotton mill might seem to possess **inherent** and insurmountable obstacles prohibiting synchronization with these dynamic trends; such, for instance, as the natural structure and behavior of cotton which unlike liquids and electrons would seem to prohibit its pipeable, wireable "flow" treatment. But this is not true. Approximately a half century ago cotton was first vacuumed out of its freight cars and blown 60 feet to the top floor picker-room of cotton mills.

A totally new start in cotton mill conception is now proposed in which only the essential articulating and reciprocating mechanical components of the various stages of manufacture are separated out from their pre-conceived separate chassis, which now obsolete chassis assumed their parallel and "standing" placement on floors, relative to shafting.

Instead, it is proposed that a unitary, three quarter spherical air conditioned enclosure be provided, with a secondary ¾ sphere interior geodesic structuring entirely independent of the enclosing structure, which shall serve only to support the articulating mechanisms to be suspended in preferred four dimensional arrangement within. Thus a true flow pattern, similar to the digestive, shunting, secretive, and regenerative pattern of the human anatomy, will digest and process the cotton, taking advantage of ample height and gravity to drop-lead, space-accumulate and meter the progressive bats, slivers and threads and thus eliminate the primary "re-introduction" chores of workers, and the enormous and heavy floors around which roll the relatively light loads. The savings in amounts of metal required to permanently truss-sling the apparatus into the preferred flow patterning positions will be of dramatically significant magnitudes, and the heavy flooring itself will be eliminated. The free space positioning of the apparatus will be such as to permit its interpenetration by swiftly conveyed mobile staging and to bring the few expert attendants into intimate advantage relative to any stoppage in the automatic processing. The whole process may be kept in constant review from central space advantage. The preferred aerodynamics of the ¾ sphere in its economy of laminar circulation will provide highly efficient air conditioning and illumination, etc., and a minimum of concentrated foundation to support the base of the geodesic structuring.

This seminar will involve research, on the part of all its architectural students, within the N. C. State Engineering, Textile, and Business Administration Schools and expert consultation in establishing the entirely new fundamental assumptions and a trial-balance-design must be taken involving a working familiarity with all the functions. Within thirty days a general assembly, and primary sub assembly, set of drawings must be developed, clearly revealing the fundamental scheme and cogently demonstrating the net economic gains in pertinent industrial logistics in metals, energy and time investments of original installation and subsequent operation, etc. To realize so comprehensive a program in so short a period, the participating students will have to establish procedural team discipline in which they will sub-divide the special tasks, but will avoid isolation from comprehensive responsibility by frequent convening of teams, reporting to the whole group and group discussions and tactical decisions.

It is hoped that the time budget will provide enough margin to undertake a few schematic sketches on the part of each student in which he himself applies this principle of automatic and integrated mechanics suspension to other fields of manufacture. It will be clear, as the problem develops, that this omni-directional, multi-dimensional spherical patterning introduces relationships and energy efficiencies that are not only novel but to be contrasted to the present 1, 2, and 3 dimensional geometry limitation of intermittent batch and production **lines.** RICHARD BUCKMINSTER FULLER

Visiting Seminar Director

STUDY OF ARCHITECTURAL SCHOOLS

NOTE: This study was done for the Association of Collegiate Schools of Architecture and was made possible by a grant from the Carnegie Corporation of New York, Charles Scribner's Sons 1932. Authors: F. H. Bosworth, Jr. and Roy Childs Jones.

1. THE SCHOOL

"Go through, of an evening, any university campus containing an architectural school. That school can be spotted without fail. It is the one brilliantly lighted attic. It is always an attic, usually in the oldest and least desirable building."

2. THE STUDENT

"His ways and habits are hard to understand. He goes back to his drafting room at night, he makes an infernal racket when he works, he rather enjoys having a victrola or radio blaring forth ragtime, or 'Amos and Andy' when he attempts to concentrate. That he really works is seldom acknowledged. That he plays with great gusto is heartily conceded. Why he enjoys the process of 'getting an education' is for some people difficult to explain."

3. THE CURRICULUM

"From the viewpoint of the head of an engineering division it is entirely understandable that he should question the policy of setting up special courses for the structural option architects. In his mind structural design is structural design, and whether the architectural student is being trained in the problems of bridge design or higher structures is of less importance than that his training should be thorough."

4. THE FACULTY

"The teachers of design are a casual lot. They give comparatively little organized instruction. They detest rules and regulations. They never take attendance. When attendance records are required they are often filled out with a delightfully imaginitive spirit having little relation to fact, and with the charming gaiety of Santa Claus. If the registrar wants the top of attendance, they give it to him 100 per cent, as often and whenever he asks for it. Yet nobody questions the enthusiasm of students in the work which these teachers direct."

5. STUDENT-FACULTY RELATIONS

"There is another characteristic which architectural students and architectural teachers have in common. They both have a liking for each other's company. Perhaps the teacher doesn't stand sufficiently on his academic dignity, for at some schools the students address him by his first name. At others a large table at the student union by common consent belongs to architecture for lunch, and at it sit both faculty and students. They seem to draw few lines in the subjects discussed. Academic rules and regulations—the general curriculum or student misconduct—seem to be freely open to criticism from both parties. It is no rare thing in casually calling on a faculty member of an evening to find some ten or fifteen students at his house. Faculty members too have a habit of dropping in of an evening at the drafting room, just to see what's going on, often only to adjourn to the smoking room for a talk—"bull session" is the technical term."

1932—

In the gentle glow of twenty years this study of the architectural schools produces one particular curiosity. No one seemed really to know what Architectural Education was. It seems reasonable to ask whether anyone now knows what Architectural Education is? In 1931 the entire outline of the 1951 modes and methods for educating the Architect can be seen. All the hopes and fears, all the shibboleths, all the schemes, plans and ideas, all the debate and questioning; then so timely, then so earnestly considered; each one, all of them nagging for resolution, still earnestly debated.

Economic and social pressures have been recognized in School problem programs. The Palace for Exiled Monarch in a Mountainous Country is replaced by Health Center in an Industrial Community. This seems a positive movement in twenty years. The French influence on the wane in '31 is almost vanished in '51, the Palladian module has been replaced by the Grid module.

In general, a sense of urgency in cleaning up for new days is felt in these two decades. Splendid manifests in new curricula for the new architecture. Heroic rejections and dedications and only perhaps a few babies thrown out with the bath water.

No one could seriously propose a return to the pre-thirties system of educating for architecture. Still, a sneaking suspicion can be entertained that some of the improvements claimed for the newer methodology is more apparent than real. Where are we going architecturally? What is actually teachable in the architectural equation? What really is a curriculum? What is an Architect? Is it certain that our 1951 modules are really so pure?

THE STAFF

VISITING PERSONALITIES

WINTER TERM

January 1-31 (one month)

Richard Buckminster Fuller

Problem with select group of 12 students.

February 11-13 (3 days)

Mies Van der Rohe

Three seminars on the Barcelona Exhibition Building and the Chicago Promontory Apartments.

SPRING TERM

April 7-9 (3 days)

Pietro Belluschi

Three seminars—Two on the Equitable Life Insurance Building in Portland, Oregon. One on Oregon house.

April 14-19 (6 days)

Lewis Mumford

Five seminars—one lecture.

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