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The Rapid Spread of Modern Buildings and the Simplification of Planning Method in Postwar Okinawa

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Abstract

The aim of this paper is to clarify how local architects, most of them trained at a technical college, adapted to the vast demands of concrete buildings, which required completely new construction methods, that were introduced by U.S. engineers in a short period of time after World War II. Though the planning and construction of buildings on military bases strictly followed U.S. specifications, local buildings were produced in accordance with local-government building codes based on those of mainland Japan. This paper shows the conditions under which architects designed in the early stages of the spread of concrete buildings in Okinawa.

Keywords: Okinawa, architecture, technology, concrete, adaptation

Aim

Buildings in towns and villages in Okinawa were totally destroyed during World War II, and Okinawa's recovery started from zero. The recovery, though, was very rapid considering the local construction background, such as the skill level of local architects, the ability of workers, the lack of familiarity with construction methods, i.e., concrete construction introduced by the U.S. engineers. Within less than two decades, concrete construction became dominant among local architects for every type of building including general local housing. At the present time, about 98% of new houses are built of concrete. It is a remarkable architectural phenomenon compared with other areas in the world, especially the mainland Japan (Fig.1). Before the end of the war, most buildings were built with timber construction. Although there were a small number of concrete buildings in Okinawa, they remained exceptional cases.

The aim of this study is to analyze and show the factors of the rapid spread of concrete buildings in Okinawa till its reversion to the mainland in 1972,

mainly from an architect's point of view.



Fig.1 An aerial view showing concrete buildings in Sashiki Town (2003)

Background

Okinawa is located in a sub-tropical area that is characterized by strong sunlight, heavy rain, and strong winds (typhoons). As far as buildings are concerned, typhoons are a serious problem along with termite attacks. In the late 1940s, several strong typhoons destroyed civilian temporary buildings as well as military ones. These disasters forced all the people on the islands to actively consider measures

against typhoons since then. Traditional Okinawan buildings were made of timber with sophisticated techniques and lasted for long time, but because of the war, many well-trained technicians disappeared from the islands. Technicians were in short supply for the total recovery period. First-aid temporary shelters for the local inhabitants were supplied by the military government with imported timber called "2x4s" (Fig.2). The 2x4 construction method did not employ sophisticated techniques and was easy for learners to master in a short time. Around the early 1950s, full-dress timber buildings in the traditional method gradually appeared in towns and villages.

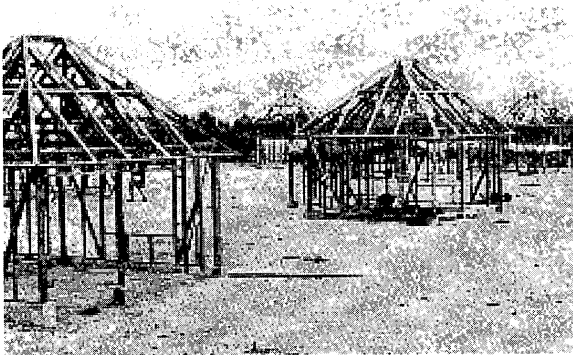


Fig.2 Temporary housing in 1946 using 2x4 construction method [source: reference 5)]

As for termite attacks, they had been a serious problem before the war as well as but there was a difference in degree. Most of the timber used for temporary construction after the war was not treated with repellent, and also some kinds of wood that termites preferred were used. This caused many problems, and locals rapidly lost faith in the structural stability of timber construction.

Introduction of Advanced Technology

Concrete construction was originally introduced by U.S. military engineers to build facilities with heavy machines that enabled rapid mass production. This introduction was caused by the strategic need to

fortify the island permanently during the Korean crisis in the late 1940s along with the need to prevent a recurrence of the serious damage caused by previous typhoons. The U.S. congress approved an enormous budget for the construction.

From around 1950, Okinawa saw a thriving construction boom accompanied by international competitive bids. All the military facilities were built precisely to military specifications, which were hard for the local contractors to master at first, but which, with great effort, they quickly understood under the strict guidance of foreign inspectors. Because of the huge amount of construction activity, a considerable number of locals were involved in the work. After that, their experience with the military was introduced to local construction all over the islands and enabled the construction of local buildings, including houses, using their newly acquired methods.

Administrative Measures

In addition to the military facilities, the local government made an effort to secure public facilities and private housing from typhoon damage. The strong typhoon that attacked Miyako Island in 1959 and destroyed a large part of the housing and infrastructure had a decisive effect on the spread of concrete houses. The government immediately asked the U.S. military engineers for consultations on measures that could be taken and a conference was held between local architects and military engineers on general measures to promote concrete building production regardless of whether public or private purposes all over the Okinawan islands. Moreover, the Okinawan architects' association held a housing competition to design a concrete farm house in order to encourage interest by both architects and clients. The competition was a sensational event and was reported widely in newspapers and the association's journal.

In terms of public facilities, the same style

schools and post offices that prevailed all over the island were typical forerunners of concrete buildings in the '50s. They played a considerable role in spreading the concrete building method to the public. As for school buildings, concrete block was introduced in 1954 when the U.S. military government started a program to provide concrete classrooms all over the islands. In those days, there was not total planning for schools that contained a systematic layout of buildings because of the lack of budget. As a result, a few classrooms were provided each year for each school before the conversion to Japan. The spread of the concrete classroom made significant influence on concrete housing, for the classrooms had a simple box-like shape, and the scale was suitable for a single, detached house. In remote areas, there was not a building confirmation system even in the late '60s and people could build their house by themselves copying directly from similar buildings.

On the other hand, for private housing finance, the government provided a housing loan system that was advantageous to concrete houses, i.e., a large amount for a longer term compared with timber houses. More than half of new houses were built of concrete in the capital city, Naha, in 1960. Though the government was run by Okinawans, the budget was supplied by the U.S. military, which supported the wide spread of typhoon-resistant houses.

Educational System

There was only a single technical high school for architectural education in the '50s and '60s in Okinawa. For local buildings, the Japanese architectural system was applied. In terms of architectural education, the system differed from the Western one. The Japanese system has a tradition of aiming for comprehensive education including an engineering aspect, and as a result, the architecture course belonged to the technical high school.

For higher education, young, able people had to study abroad with the aid of scholarships from the governments of the Ryukyus, Japan, and the U.S. But the number who did so was quite small compared with the number of graduates from the technical high school, which graduated about 80 students yearly in the late '50s. In the '60s, the number of schools increased rapidly to supply the demand for architects and engineers. Accompanied by international competitive bids for the base facilities, many qualified architects from mainland Japan and America arrived in Okinawa. Many of them left Okinawa after they completed their work, but a small number of them settled here and ran their own firms.

In terms of contemporary architectural information, overseas architectural magazines did not circulate publicly in Okinawa in the '50s, and the local architects' association published a journal yearly. Most of the local architects had limited contemporary information and had to collect information from the fields or private partnerships. In addition, there was a shortage of textbooks even for the technical high school in the '50s.

Architects and their Activities

Though the planning on bases was carried out in accordance with U.S. codes, local buildings were planned to Japanese codes, and the local architects were qualified in the same way. In the mid 1950s, a registration system for qualified architects and architectural offices was introduced. The number of registered architects was 66 (1st class) and 172 (2nd class) in 1957, 83 and 405 respectively in 1959, and 241 and 808 in 1971. As for the number of registered architectural offices, in 1971 there were 131 (1st class) and 218 (2nd class).

Statistics on applications for building confirmations, which were limited to a few major cities then, show that there were 2,123 timber buildings and 2,120

non-timber buildings in 1961, and 426 timber buildings and 9,781 non-timber buildings in 1971. Almost every non-timber building was of concrete. These numbers clearly demonstrate the rapid spread of concrete buildings in a short period of time and also how busy the architects were in those days.

Design Methods

One of most effective design methods is to apply a basic form to various demands according to the conditions. Generally, it is considered economical in concrete construction for a beam to span from five to eight meters. In those days, most Okinawan architects patterned on a simple basic unit space that consisted of posts and beams as the structural frame. For example, a classroom consisted of three unit-spaces in line (Fig. 3). The same composition can be seen in houses (Fig. 4), post offices (Fig. 5) and community centers, which were almost the same in scale. In addition, larger scale buildings such as office buildings and town houses consisted of two or more rows of the unit-spaces. Good examples can be seen in the works of an office run by a leading architect (Fig. 6). Apart from structural design, there was a small choice of finish materials for both the exterior and the interior except for housing that required flooring materials for bare feet.

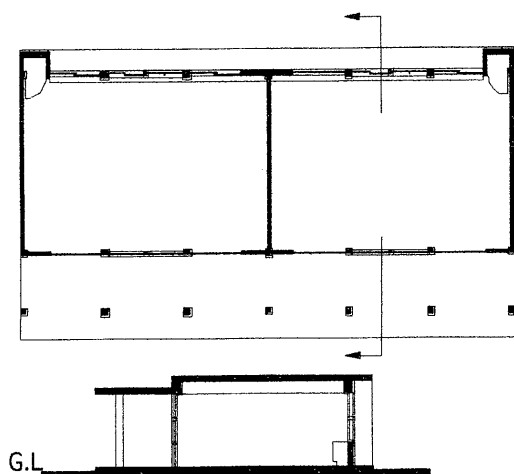


Fig.3 Classroom (plan & section)

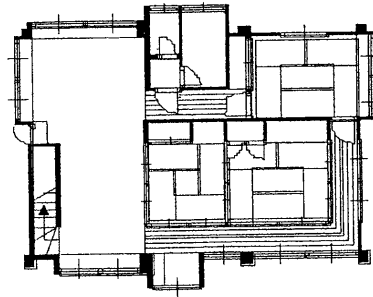


Fig.4 Plan of a local house

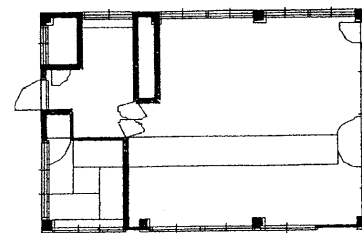


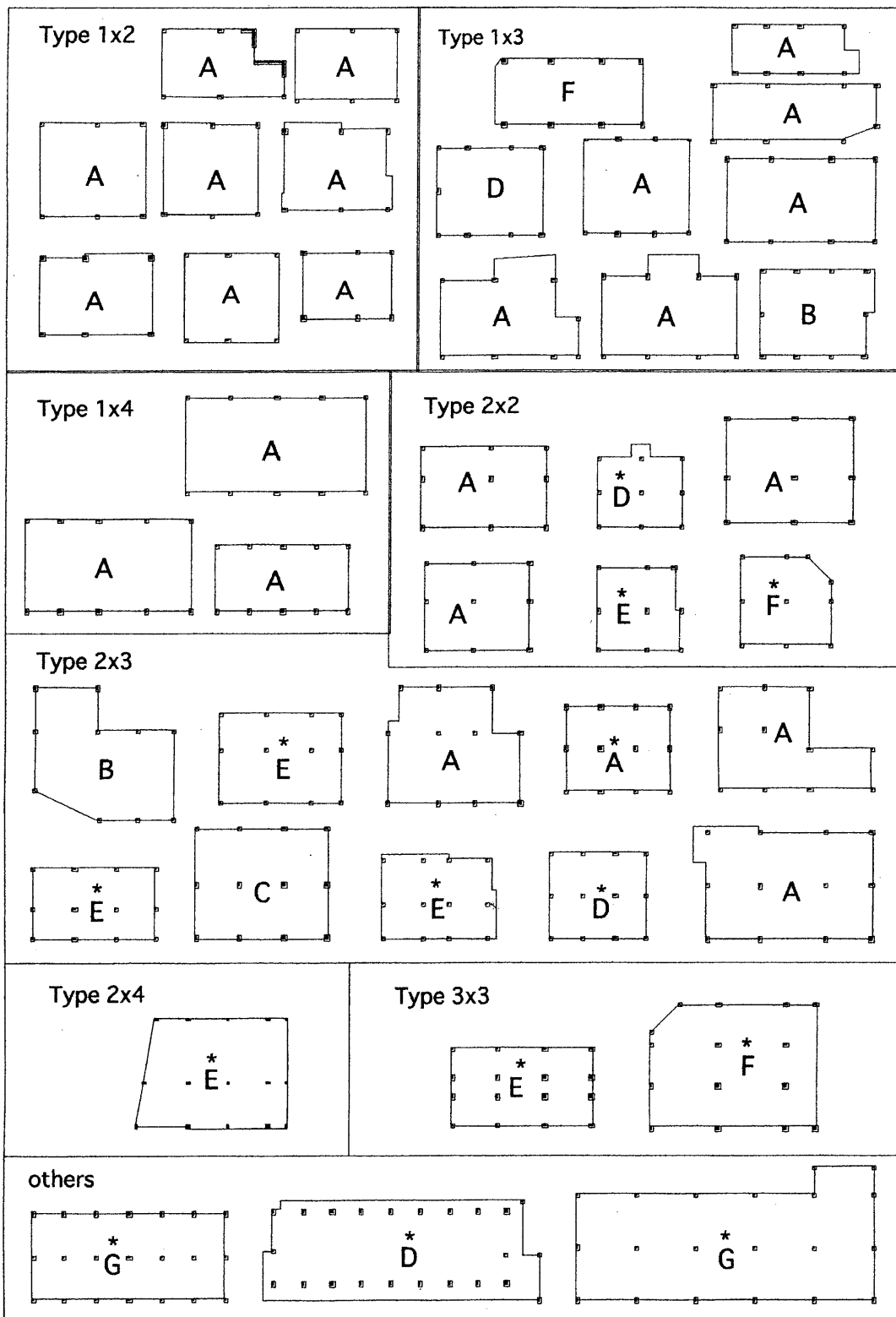
Fig.5 Plan of a post office

As a result, architects could design buildings for various uses with small changes in plans. These methods, which can be readily shared among architects, enabled them to design a massive amount of similar buildings rapidly.

Conclusion

It is remarkable that Okinawan architects showed a totally different process in progressing to modern architecture compared with the West. In the process, they adapted by applying a basic form to various demands through the reduction and enlargement of unit-spaces, which were added according to demands for additional floor space and arranged formally. By the simplification of building planning, they fulfilled the vast demand for construction in a short period of time.

Also, from the view point of localization of advanced technology for developing areas, it is significant that the Okinawan example contains some clues for



A:house B:house+shop C:shop D:office E:clinic F: apartment house G: factory



Fig. 6 Plan types

overcoming the differences in background of production in diverse fields, not just the architectural field.

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