AN INDUSTRIALIZED COMPONENTS APPROACH TO HOTEL BUILDING

BY

EMMANUEL TRIPODAKIS
Bachelor of Architecture
Ethnicon Metsovion Polytechnion, Athens, Greece

Submitted in partial fulfillment of the requirements for the degree of MASTER OF ARCHITECTURE, ADVANCED STUDIES at the MASSACHUSETTS INSTITUTE OF TECHNOLOGY
June 1973
11 May 1973

Dean William Porter  
School of Architecture and Planning  
Massachusetts Institute of Technology

Dear Dean Porter:

In partial fulfillment of the requirements for the degree of Master of Architecture, Advanced Studies, I hereby submit this thesis entitled AN INDUSTRIALIZED COMPONENTS APPROACH TO HOTEL CONSTRUCTION.

Respectfully,

Emmanuel Tripodakis
11 May 1973

Institute Archivist
Massachusetts Institute
of Technology

Dear Sir:

This is to acknowledge that the drawings of this thesis do not conform to the standard format set by the Institute.

The author assumes all responsibility for any damages occurring during the binding process.

Yours truly,

Emmanuel Tripodakis

Thesis Supervisor
ACKNOWLEDGEMENTS:

The author gratefully acknowledges the following people who assisted in the development of this thesis.

Professor WACLAW P. ZALEWSKI, Thesis Advisor
Department of Architecture, M.I.T.

Professor EDUARDO CATALANO
Department of Architecture, M.I.T.

Professor ALBERT DIETZ
Department of Architecture, M.I.T.
TABLE OF CONTENTS

TITLE PAGE
LETTER OF SUBMITTAL
ACKNOWLEDGEMENTS
TABLE OF CONTENTS
ABSTRACT
INTRODUCTION
DESCRIPTION OF PROPOSAL
DRAWINGS
  Typical hotel layouts
  Erection sequence
  Bathroom units
  Bathroom unit - Detailed description, and explanation of the construction process
  Structural details
  Various alternative hotel layouts
  Elevation treatment example

BIBLIOGRAPHY
ABSTRACT

The aim of this study is to develop a hotel construction system using precast concrete components.

The emphasis of the study is placed on the concrete, box type, "bathroom units" which are produced in the factory and subsequently shipped to the site thus achieving obvious reduction in specialized labor requirements as well as construction time.

The first part of the thesis describes the local conditions that initiated and influenced the development of this idea and then proceeds to the description of the proposal.

In the second part the design proposal is explained through drawings illustrating basic plan layouts, proposed bath units, assembly sequence, structural details, alternative layouts, etc.
INTRODUCTION

The rapidly expanding tourist industry in Greece over the last years accounts for a steadily increasing demand in hotel accommodation of all categories. The rate of growth of tourism constantly surpasses that of new hotel building, and conventional construction methods seem to be unable to meet the requirements for very short construction time of this booming industry. Moreover conventional construction practices have been plagued by rising labor costs and problems of unavailability of skilled labor in locations somewhat removed from densely populated urban areas as often is the case with tourist installations. Significantly enough hotel construction was one of the very first areas in the Greek building industry where prefabrication methods were applied.

The purpose of this study is to develop a hotel building system using industrialized components as a partial solution to the aforementioned problems.
DESCRIPTION OF SYSTEM

The aim of the present proposal was the development of a hotel construction system using precast concrete components. These industrialized components could be produced either in the factory or at the site.

Reinforced concrete was selected as structural material for being by far the cheapest building material available in Greece and also the most widely used and familiar.

Two types of structural systems are proposed:
1) Precast columns, beams, and room size slabs also forming the balconies. The room dividing walls are non-bearing made out of porous lightweight concrete or possibly other materials.
2) Precast concrete bearing walls (room dividing) and room size slabs.

In both systems concrete box type bathroom units are used which will be extensively described later on. These units become integral parts of the general structure contributing largely to the stringent building earthquake specifications which are required.

In both cases the structure supporting the first floor is formed out of poured-in-place concrete believed to be the
most practical way at the present stage for meeting the
ground floor requirements in terms of various architectural
layouts and widely different topographies. This type of
continuous poured-in-place structural frame also contributes
greatly to the overall rigidity of the building. The system
has been studied for application to buildings up to ten
stories high.

Starting from the realization that bathroom interior finishing,
fixture installing, plumbing, etc. required a great deal
of on site skilled labor and also accounted for a sizeable
percentage of the total construction time, it was felt that
significant results could be achieved by transferring those
operations from the site to the factory.

Thus the bathroom box type precast concrete unit was con-
ceived comprising two adjacent bathrooms divided by the
same utilities chase. These units can be completely factory
finished including installation of all fixtures, mirrors,
tiles, hung ceiling, doors, etc. Furthermore individual
room air conditioning units can be installed at the factory
in the space over the hung ceiling of the unit and achieve
this way greater efficiency in transportation and further
reduction of on site installation costs.

A variety of bathroom unit types has been developed in
compliance with the minimum width and square footage requirements for A, B, and C category hotels of the Greek National Tourist Organization.

Some types of vertical circulation areas are proposed ranging in width from two to four room modules. Also included in the study are some hotel layout variations including L shaped or staggered configurations. Possible facade configurations with the use mainly of precast concrete components were also examined.

**Mechanical System**

As mentioned previously heating and air conditioning is individually available to each room through the use of fan coil units placed in the adjacent bathroom unit.

This configuration has the advantage of eliminating extensive ductwork save for the length from the unit to the room wall in addition to providing greater flexibility to the contractor allowing for installation of individual units at a later stage if so required.

Access to the units is provided through removal of the snap-on type bathroom ceiling elements.
Bathrooms are naturally ventilated through the utilities chase with the possible assistance of an extractor type fan.

All pipes and electrical conduits are run through these utilities chases and are directly accessible through openings from the corridor for ease of maintenance and repair work.
BIBLIOGRAPHY

1. Cornell University. THE NEW BUILDING BLOCK
2. Gyula Sebestyen. LARGE PANEL BUILDINGS
3. H.U.D.. OPERATION BREAKTHROUGH
4. Koncz. SYSTEM BUILDING WITH LARGE PANELS, MANUAL OF PRECAST CONCRETE CONSTRUCTION
5. R.J. Lytle. INDUSTRIALIZED BUILDERS HANDBOOK
6. M.I.T. 1971. Master's class with Professor Eduardo Catalano. HOUSING SYSTEMS, Seven Studies for Factory Produced Concrete and Steel Modular Units.
7. Moshe Safdie. BEYOND HABITAT
8. Thomas Schmid and Carlo Testa. SYSTEMS BUILDING
9. Alavi and Mountjox. INDUSTRIALIZATION AND UNDER DEVELOPED COUNTRIES
TYPICAL HOTEL LAYOUT
STRUCTURE
ERECCTION SEQUENCE 3
ERECTION SEQUENCE 4
CLASS AA BATHROOM UNIT TYPE
CLASS AB BATHROOM UNIT TYPE
CLASS B MIN DIMENSIONS
ROOM 1350M² WIDTH 275M
BATH 300M² WIDTH 120M

CLASS B A BATHROOM UNIT TYPE
CLASS C MIN DIMENSIONS
ROOM 11M2 WIDTH 250M
BATH 250M2 WIDTH 120M

CLASS CA BATHROOM UNIT TYPE
CLASS CB BATHROOM UNIT TYPE
BATHROOM UNIT PLAN
BATHROOM UNIT TYPE

SECTION C-D
BATHROOM UNIT ASSEMBLY SEQUENCE

3

BATHROOM UNIT

4

ASSEMBLY SEQUENCE
BATHROOM UNIT - ASSEMBLY SEQUENCE
BATHROOM UNIT

ASSEMBLY SEQUENCE
STRAIGHT PLATE
1/2" BOLTS
GROUT FILLING

TILES
TILE TO COVER CONN.
STEEL PLATE

STRUCTURAL DETAILS
HOTEL LAYOUTS - CORRESPONDING GROUND FLOOR STRUCTURES
HOTEL LAYOUTS - CORRESPONDING GROUND FLOOR STRUCTURES
VERTICAL CIRCULATION CORE TYPE 1

STRUCTURE
ALTERNATIVE STRUCTURAL SYSTEM - BEARING CROSS-WALLS
ELEVATION CONFIGURATIONS - CONCRETE COMPONENTS
WOOD BASEBOARD
ELECTR. WIRING VOIDS
CONCRETE TOPPING
HARD NEOPRENE STRIP
1/2" BOLTS
U SHAPED STEEL SEAT
THREADED INSERTS

STRUCTURAL DETAILS
STRUCTURAL DETAILS

A

BEDROOM

WOOD BASEBOARD
CONCRETE TOPPING
BATHROOM UNIT
ALIGNMENT ROD
HARD NEOPRENE STRIP
EMBDEDED STEEL PLATE
ROOM SLAB SUPPORTING BEAM

B

CORRIDOR
CONCRETE TOPPING
CORRIDOR SLAB
STEEL CONNECTOR WELDED TO
STEEL PLATE

BATHROOM
CONCRETE TOPPING
WOOD BASEBOARD
WOOD PLUGS
ELECTR. WIRING VOID

STRUCTURAL DETAILS