Programming Techniques for Non-Professionals

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KEYWORDS

Programming techniques, spatial analysis, organization

The State of Louisiana constructs approximately 150 new or remodeled facilities each year. Most construction originates by request generated by individual agency directors. The request is in the form of a capital outlay budget to initiate a project. The purpose of this study was to establish a technique that could be standardized for initial use by non-architects to determine square footage, volumetric and relationship diagramming processes. The methods utilized to accomplish these goals were to compare existing facilities by building type with national programming standards, and compare previous capital outlay requests, to existing buildings, with regard for spatial sizes, burden factors, volumetric relationships. This interpolated information was then assembled into a workbook of instructions and area allotments typical for individual building types. Post occupancy results of the process show that projects programmed with these techniques fall within acceptable ranges when later professionally programmed and constructed.

Techniques de Programmation pour Non-Professionnels

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Mots-clés

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L'état de la Louisiane construit environ 150 amménagements nouveaux ou rénouvés chaque année. Les demandes provenant des directeurs d'agences individuelles sont à l'origine de la plupart des constructions. La demande se fait sous forme d'une budget de mises de fonds initiale pour démarrer un projet. Cette étude avait pour but d'établir une technique qui pourrait être standardisée. Celle-ci pourrait être utilisée au départ parvdes non-architectes pour déterminer le mètrage au carré, les processus volumétriques et de schématisation des relations. Les méthodes employées pour aboutir à ces fins comportaient une comparaison des amménagements existants par type de construction avec des critères nationaux de programmation, et une comparaison des demandes prédédentes de budget de mise de fonds initiale, avec les bâtiments existants, en ce qui concerne les dimensions spatiales, les facteurs de frais, et les relations volumétriques. Ces reneisgnements interpolés ont ensuite été rassemblés en un manuel de modes d'emploi et de répartitions sur le terrain caractéristique de chaque type de construction. Les résultats post occupatoires de ce processus montrent que les projets programmés avec ces techniques se situent dans des limites acceptables quant ils sont programmés et construits professionnelle par la suite.

INTRODUCTION

Webster's Dictionary defines programming as a process leading to the statement of an architectural problem and the requirements to be met in offering a solution.[1] It is the Architects responsibility to convert raw data into a negotiable form. The State of Louisiana constructs approximately 150 new or remodeled facilities each year. This construction amounts to a capital outlay of about 350,000,000 annually.[2] Individual projects range from new office space to house state workers to an equipment shed. The Division of Facility Planning and Control is charged with the responsibility of initiating new projects of construction at a rate of two per week. It is the Division's responsibility to insure that the states interest, as client, is represented during the pre-design, design and construction phases of a project. The Division also has the responsibility for aiding requests, usually initiated by individual directors of the various agencies, regarding initial programming, programming design, construction documents, and occupancy evaluation. Officials of the Division, in negotiations expressed a concern that a major problem for the Division was the regulation of incremental cost increases, of new construction projects. Officials suspected that the cost increases resulted as a bi-product of a project as it underwent the process of capital outlay. The outlay process is segmented, with different operations performed regarding a project over a period of years, for example the monies to program a project may be provided on year for programming and an outlay of funds provided for the various design stages another year. The resulting difficulty with this process was that an agency Director, in most cases the least likely individual to initially plan a project, pre-programmed or determined the scale, cost and capital outlay of an architectural project. The result of this approach was to bring projects back to the states legislature numerous times for increases in capital outlay budgets. To alleviate this problem the state solicited proposals to research, document and project pre-programming standards for architectural projects. A research team from Louisiana State University was selected, based upon a proposal presented to the Division. The project was performed as a part of a grant to establish guidelines for construction for the State of Louisiana and was restricted by both brevity of time allotted and limiting budget.

METHODOLOGY

Before research could be started it was necessary to classify first by building type, and later by job description the various job positions within the state. For example, University Professors, Geologists, Maintenance Supervisors, and State Inspectors were classified as having need for the same amount of space. This work was accomplished by comparing job classification

1. Kemper, Alfred M., Architectural Handbook, John Wiley & Sons, New York, 1979, p. 145.

2. Capital Outlay Budget Report, State of Louisiana, Division of Facility Planning and Control, Baton Rouge, Louisiana, 1983, p. 12.

titles and responses made by agency directors for spatial demands given job classification descriptions. This data was then verified with information obtained from a study of project standards for The Louisiana State Capital Complex Master Plan.[3]

The proposal called for two major areas to be researched in the project. The first area was the analysis of the national standards. The information on spatial size, volume, and scale were gathered using the 1982 Dodge construction systems costs publications by building type and later by job title.(1) This information was then correlated and compared to typical room, office, or work space requirements. Individual spaces were justified in direct relationship to the kinds of operation performed, the necessary equipment contained, space per occupant and circulation space for user. The work spaces and job titles were then utilized as the basis for further research of Louisiana construction projects.

The second area to be researched was the selection and examination of existing state facilities. Buildings were selected on the campus of Louisiana State University as representative of the array of state holdings. Individual buildings were selected through negotiations and discussions with the Division of Facility Planning and Control. Criteria for selection were based on factors such as use, occupancy, interior finishes and age of the construction. The following were the building types selected: a general classroom building, a dormitory, an office, an infirmary, a library, a physical plant shed, a machine shed, and a student union.

Considerable effort was made to insure that a sound mix of various aged construction was represented. Once the selection process was completed, a set of drawings for each facility was obtained from the architect of record. Each building was then broken down into individual rooms and were assigned job/space title on a page. The result was a project manual that would be used as a workbook throughout the rest of the project for data gathering and recording of individual spaces of a building type. Project manuals ranged in size from about 50 pages for a small project to a maximum of 200 pages for a complex project. A typical space assignment form follows in Table 1.

Data collection was accomplished with the help of research assistants who would record and analyze the individual spaces. There was also a section of the form where an assistant could note any conflicts in use of a space or defects in room finishes or surface coverings, and any special requirements for a space.

DATA COMPARISON

The next phase of the project was to compare the data collected on individual spaces in Louisiana facilities to national space programming standards. As a general rule, spaces measured in Louisiana buildings exceeded the national spatial standards by an average of 6 to 12%.

3. Louisiana State Capital Complex Master Plan Executive Brief, Environetics, Los Angeles, CA, 1982, p. 16.

The data in Table 2 illustrates the comparison in terms of net to gross and gross to net ratios of Louisiana construction to national construction.

The final phase of the project was the projection of the spatial standards in a form (a workbook of instructions) that the agency directors could utilize as part of the inception of a project for capital outlay. The brochure was organized by building type, with cross reference sections of job title descriptions. For example, if information on office spaces in an educational building was needed, a director would look for the appropriate job or activity title by building type. A sample of a typical section is included in Table 3.

CONCLUSION

The pre-programming brochure has been in use for two years by state officials. The document is issued to agency directors as a part of the initial request for new facilities. To date 85% of all projects pre-programmed by this method have fallen within acceptable limits for construction cost, spatial size, and overall completeness. The single most important aspect of the project state officials point out is the resulting standardization, by job title and spatial size that the directors can utilize in the pre-programming phase.

REFERENCES

1. 1982 Dodge Construction Systems Costs, McGraw Hill Informaiton Systems, Princton, 1983.

TABLE 1

Building Space Name _____

Dimensions
Length Dimension _____
Width Dimension _____ total square feet
Height Dimension _____ per occupant

Equipment
Note: The equipment in the space. Note number of pieces, title, L. W. H. of each piece.

Acoustic level _____ DBA
Illumination level _____ F.C.

Interior Finishes (Specify Material) Colors

Walls	_____	_____
Floors	_____	_____
Ceiling	_____	_____

Comments
_____
_____
_____

Sketch of the space including major pieces of equipment and location.

TABLE 2

BUILDING TYPE	NATIONAL STANDARDS NET TO GROSS RATIO	NATIONAL STANDARDS GROSS TO NET RATIO	LOUISIANA STANDARDS NET TO GROSS RATIO	LOUISIANA STANDARDS GROSS TO NET RATIO
Administrative	67%	150%	60%	166%
Apartment	64	156	55	181
Auditorium	70	142	60	166
Biology	62	161	51	196
Chemistry	59	170	50	200
Classroom	66	152	50	200
Dining Hall	72	138	57	175
Dormitory	65	154	62	161
Engineering	61	164	61	163
Fraternity	63	160	85	117
Garage	85	118	70	142
Gymnasium	70	142	52	192
Hospital	55	183	60	166
Hotel	63	158	52	192
Laboratory	58	171	70	142
Library	76	132	72	138
Office	75	135	70	142
Restaurant	70	141	58	172
Science	60	167	81	123
Service	83	120	52	192
Student Union	59	172	93	108
Warehouse	93	108		

TABLE 3. LIBRARIES--COLLEGE & UNIVERSITY

Library space can generally be categorized into four areas--stack space, reading room space, carrel space, and technical and service space. Stack space includes any shelving located within a library for the housing of books, periodicals, and manuscripts. Similar facilities located in conference rooms, offices, classrooms, etc., should not be classified as stack space. A reading room is any open space in the library equipped with tables and chairs for reading rooms. A library carrel is an individual study station within or adjoining the stacks.

The amount of space required in the library is a function of three factors--the number of bound volumes to be housed, the size and mix of the study body, and the number of faculty.

LIBRARY STACK SPACE STANDARDS

Number of Volumes	Square Feet Per Volume
First 150,000	.10
Second 150,000	.09
Next 300,000	.08
Next 400,000	.07
Second 1,000,000	.06

Reading rooms should be constructed to seat 25 per cent of the total undergraduate student population, with an allowance of 25 square feet per station (6.25 square feet per undergraduate student.)

Carrel space is generated by graduate students and faculty members. An acceptable general standard for carrels is 12 square feet for each full-time graduate student and faculty member at the rank of instructor and above. Carrel space may be determined according to the following:

33.3% of full-time Masters degree students X 30 square feet
33.3% of full-time Doctorates degree students X 40 square feet.
33.3% of full-time faculty (Instructor and above) X 40 square feet.

Technical and service space may be calculated as 25% of total reader space (reading rooms plus carrels).

note: Burden factor will account for circulation, structure, toilet rooms, services, lobby and mechanical. Burden factor: 1.32.