

RECOMMENDATION FOR A COMPUTER AIDED
DESIGN CAPABILITY FOR THE ARCHITECTURE
DEPARTMENT OF THE BAPTIST SUNDAY SCHOOL BOARD

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REPORT DIVISIONS:

- I. Effects of a Computer Capability on Office, Organization and Work Procedure within the Architecture Department of the Baptist Sunday School Board
- II. Computer Software Specifications
- III. Computer Hardware Specifications
- IV. Presentation and Economic Evaluation of Alternatives

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I. EFFECTS OF A COMPUTER CAPABILITY ON OFFICE ORGANIZATION AND WORK PROCEDURE

1. Introduction

- 1.1 Architects have had trouble defining what the computer can do for them.
- 1.2 Computer's greatest attribute is its ability to perform many iterations of a task defined as a mathematical equation.
- 1.3 Architects have viewed their profession as a mixture of science and art, and they have traditionally believed that science and art are so totally integrated in the design process, little attempts had therefor been made to isolate and define quantifiable and objective tasks which the architects must perform. While design requirements may generate unique architectural solutions, certain similar if not identical tasks are performed in the production of each solution and this is the value of the computer. For if each solution generation grew from a one-of-a-kind decision sequence, the computer would not be advantageous to the architect. Of course, some architectural offices lend themselves to computer-aided design more than others. This appropriateness of fit is determined usually by the volume of work and the repetitive nature of work performed in an architectural office.
- 1.4 Only the largest architectural offices have begun to sense the economic and time saving advantages of computerizing certain office tasks. Today many of these firms are using computers for accounting and structural computations, but only a few firms have attempted to employ the computer as an integral part of the design and drawing production process. An office which has defined its repetitive tasks and which have a large volume of such tasks should find that the computer when integrated into office functions, will allow office employees to exploit their potentialities which are peculiar to man, while the computer performs those repetitive tasks which it does so efficiently. We believe that the Architecture Departments of the Baptist Sunday School Board is such an office.

2. Identification of Architectural Services at Baptist Sunday School Board

- 2.1 The complete description of each task performed by the architectural department at the Baptist Sunday School Board (BSSB) and the detailed flow of work will not be itemized in this report. This report will, however attempt to discuss the major operations performed from the inception of a job through the possible production of building layout drawings and finally the cataloging of the drawings for retrieval. The portion of this report devoted to system software specifications defines the computer routines which are proposed to give the BSSB a computer capability compatible with its present architectural services.

- 2.2 To augment the description of the systems software specifications, a condensed identification of present tasks which will be affected by the proposed system software is needed. This is given as a list as follows:
- 2.2
1. Letter of inquiry received from Church and file is begun.
- 2.2
2. Questionnaire sent to Church.
- 2.2
3. Field consultant visits Church.
- 2.2
4. Sends report of visit to BSSB
- 2.2
5. Report used by Building Program Consultants to formulate architectural program of spaces.
- 2.2
6. Program reviewed by Field Services supervisor and program consultant.
- 2.2
7. Building program sent to Architectural Services supervisor.
- 2.2
8. Architectural Services supervisor schedules jobs and designates and assigns draftsmen according to the work units load given to each job.
- 2.2
9. Preliminary plans drawn by draftsmen
 - a. References made to previous jobs of a similar nature
 - b. Recommendations of building program consultant are used as guide
- 2.2
10. Job reviewed by Architectural Services section supervisor.
- 2.2
11. Drawing sent to Church.
- 2.2
12. File becomes inactive
- 2.2
13. Original drawings retained for 5 years.
End of 5 years - originals are microfilmed and then destroyed.
- 2.3 Of course, computerization will handle other tasks in addition to those listed above; however, since this condensed list gives in essence the work done on a job by the BSSB, only the effects of a computer

capability upon these office chores is discussed. As shown in the Systems Software Specifications portion of this report, the key to the proposed computerized operation is the immediate access to files which contain information (records) on each active job. The tasks described in the previous section are redescribed below as if the proposed computerized operation had been implemented.

2.3

1. Repetitive clerical tasks would be minimized once a church makes an inquiry and requests the services of the BSSB, the clerical correspondents would initiate a file by typing in the church's name and address. The record on this church would at that time be otherwise empty. As the record begins to grow the correspondence clerk could refer to a CRT terminal to note a job's progress as inquiries are received.

2.3

2. The software would then schedule a questionnaire which should be sent to the Church. When the completed questionnaire is returned to the BSSB it would be read by the computer and any additional information needed would be requested in a letter typed by the system.

2.3

3. Field consultants' visits would be scheduled by the system, from criteria such as the length of time a job has been in backlog or the proximity of a church to other churches scheduled on the field consultant's routes. A letter of notification to a church would be printed by the computer.

2.3

4. Field consultants could submit standard information documents about the characteristics of a church - These documents could be read and stored by the system.

2.3

5. Questionnaire received from church, site characteristics, and field consultant's reports would then be coupled with formulas and ? techniques already in use by the BSSB to generate a building program of the number, titles, and square footages of spaces required by the church being served, to satisfy the requirements of its congregation.

2.3

6. The formulas now in use by the BSSB to determine the spatial requirements of a church congregation are always subject to research and change. Review of the building program by the field services consultants and building program consultants would insure that these formulas found within the computerized system could be expanded and updated as needed.

2.3

7. The building program generated by the system would then be retrieved from the system by the architectural services supervisor since the job would now be ready to be used by draftsmen and designers to produce preliminary drawings.

2.3

8. The BSSB now has as finite method of evaluating the work load of a particular office job; whence, the architectural services section supervisor must now manually calculate the number of work units associated with a job to schedule the job, the computer will have the method for measuring the work units programmed into the system.

2.3

9. At present draftsmen and designers must rely upon their own memories in order to retrieve drawings of churches which contain characteristics similar to a current job. The software system will contain a data base of churches with matching characteristics thus enabling the designer to refer to these drawings quickly especially because computer output will be displayed on a CRT terminal with interactive capabilities. The draftsmen will be able to assemble portions of drawings from similar churches then modify these drawings to satisfy the requirements of his building program. As interactive graphics is added to the system, drawings may be generated directly by the system from the building program specifications. Designers will always, however, have the freedom to alter these computer generated solutions.

2.3

10. If the job has been drawn through interactive computer graphics, the architectural services section supervisor can review the CRT display and then have the stored drawing printed by an electro-static printer. This would allow any last minute alterations to be made.

2.3

11. Drawings would be mailed to the church. At present original tracings of these drawings are retained but they do not constitute a data base from which a designer can draw information. When he is finished with a job, the designer will list the characteristics of his design. These characteristics can then be used at a future date to identify projects similar to a current job.

2.3

12. At present the job file becomes inactive when the job is completed. The effects and the knowledge gained from a job will not become inactive so quickly under the proposed system. Characteristics of all jobs will be retained on a back-up tape. Drawings will also be retained in a drawing file within the computer. They will be ? as the frequency with which they are recalled is diminished. This system would bring about a more efficient and economic storage system than the present five-year retention plan for all original drawings.

3. Effects of the Proposed Computer Capability on the Types and Organization of Employees

- 3.1 The integration of a computer capability into an architectural office depends primarily upon the ease of man machine communication within that office. While the Baptist Sunday School Board Architecture Department performs tasks, which can be computerized as described above, personnel must be able

to integrate their office activities with input and output devices and view these devices as time saving tools much as one views the type - writer and calculator in the traditional office.

- 3.2 The operational structure of an architectural office with a computer capability can usually be described with the aid of the diagram shown in Figure 1.
- 3.2
 1. Designing produce drawings and implement the design and analysis performed by the analytical and computer sections.
- 3.2
 2. The analytical section is problem oriented. They formulate finite mathematical relationships which will in turn be used to develop the square footages, cost estimation, qualities of spaces, etc.
- 3.2.
 3. The Computer Section is concerned with the writing of software which corresponds to mathematical relationships developed by the analytical section. The computer group would also translate management's decisions on job scheduling into a programmed sequence of orders which can be issued from the computer. Of course, the computer section would also be responsible for hardware maintenance and employee orientation to computer usage.
- 3.3 The existing organizational structure of the employees of the Architecture Department at the BSSB is shown on Figure 2. These employee titles are now placed on the operational structure shown in Figure 1 to produce Figure 3. Notice that additional employee titles appear on the diagram. Existing employees have meshed into the organizational diagram with few changes in their duties with the exception of their new communication with the computer.
- 3.3
 1. The Church Architecture Department Secretary would set well-defined operating policies and procedures in insure that the computer installation would serve goals set by management of the Baptist Sunday School Board.
- 3.3
 2. Draftsmen and Designers would continue to produce preliminary drawings as they presently do. However, an interactive graphics and an automated drawings search procedure will condense time required for the production of design solutions.
- 3.3
 3. Field consultants and building program consultant will comprise the analytical group, since it is they who determine the finite mathematical relationships which are used to generate a building program of spaces. Field consultants, in reviewing completed jobs, can offer feedback which should effect necessary changes in pre-established mathematical formulas.
- 3.3
 4. Clerical Services will link projects completed in the designers' section to the storing of project data into the computer system. Clerical services will

enter the computer section via the keypunch operator or operators. Interaction with a CRT terminal/typewriter should eliminate the need for a large amount of keypunch operation.

3.3

5. The head of a computer section should be appointed from within the architecture department. He knows almost everyone within the department and this will tend to simplify communications. While he may not need to know software programming, he should be able to act as a liason between management and the computer group. He would be responsible for planning, scheduling, and making reports on the programming efforts and its usefulness to the designers and draftsmen who must finally implement a job. In view of the present duties of the Architectural Services Supervisors, he is the most likely candidate for such a position since his present duties closely parallel those duties mentioned above.

3.3

6. The Baptist Sunday School Board would need to employ the following additional employees:
 1. Programmer - He would translate mathematical relationships defined by the building program consultants into systems software. He might also work with outside consultants such as Georgia Tech to assist in the development of a system's software.
 2. An operator would be employed to operate all input-output equipment to process programs. He would note any failures within the equipment to insure proper maintenance.
 3. The scheduler's main job would be to schedule work to ensure that the system is used efficiently. He tries to minimize unusual time, and, therefore reduces lag time during peak periods of use. He keeps records on all transactions taking place in the computer.
 4. A program librarian might be employed as the computer capability grows. The librarian would act as an information center matching tasks to existing software capability.

4. Long Term Effects of a Computer Capability

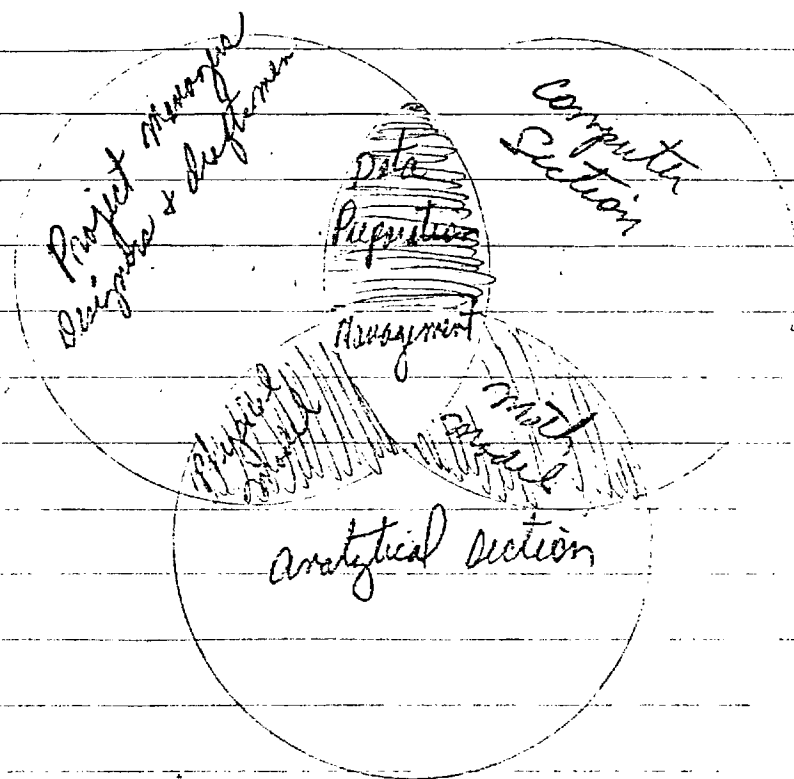
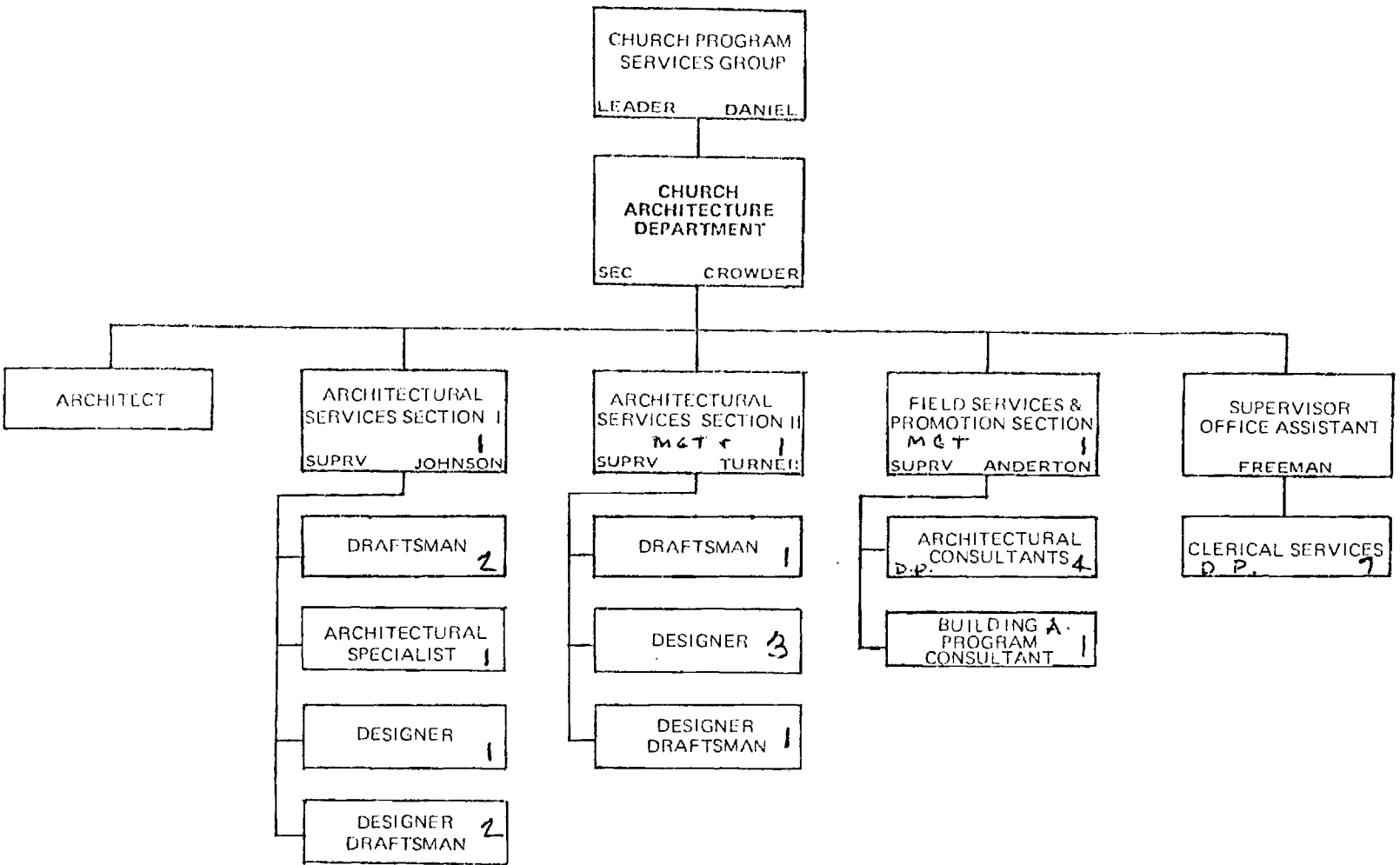


FIGURE. 1



AUGUST 1, 1972
REPLACES FEBRUARY 1, 1972

CHURCH ARCHITECTURE DEPARTMENT -B
ORGANIZATION CHART

FIGURE 2

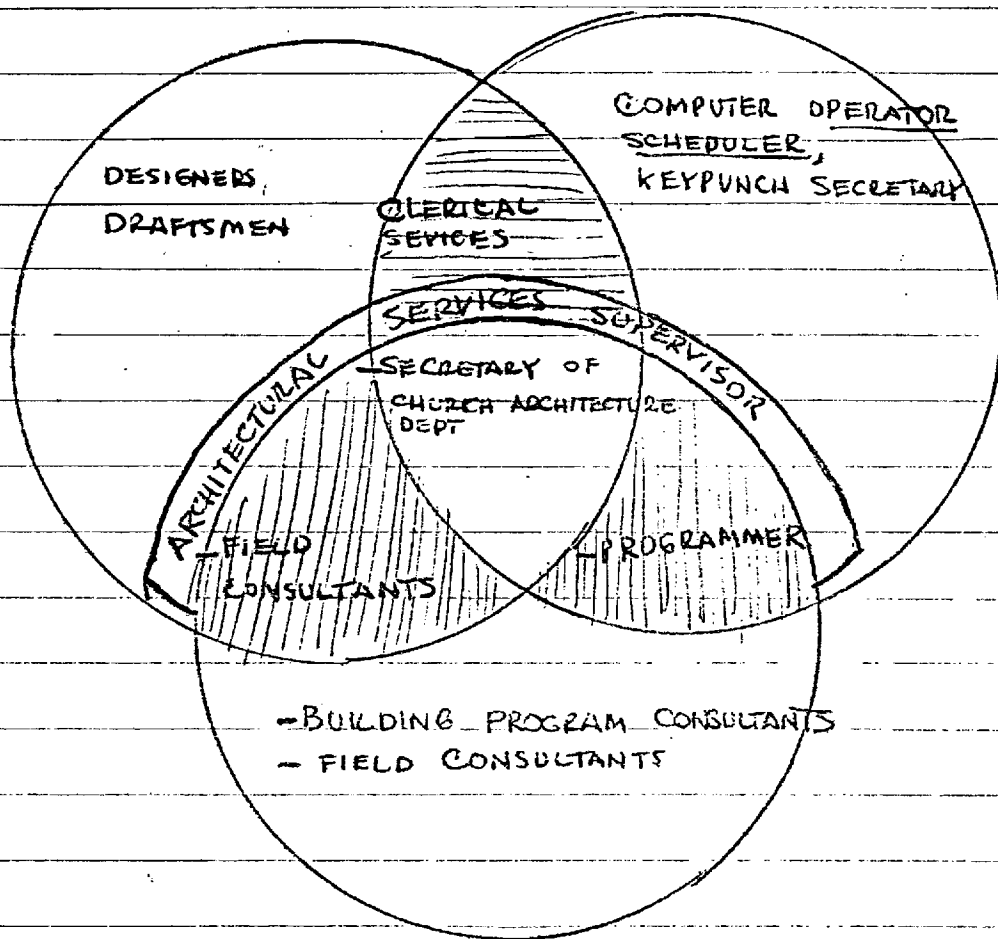


FIGURE 3.