

ject is a very broad one and little can be said in this paper beyond the barest details. Our standard practice on the subject covers some six hundred typewritten pages.

1. LIGHTING

A. Artificial light. Clerical work requires from five to ten foot-candles of evenly diffused light on the working surface, and the elimination of all glare. This is best obtained by the use of totally indirect lighting, although it is claimed by some lighting experts that there is a psychological value in permitting the clerk to see the source of the light. We doubt the validity of this claim but are willing to compromise, provided at least ninety per cent of the light is indirect. This prevents glare. Individual desk lights should not be permitted.

B. Daylight. Direct sunlight shining through a window causes a great deal of glare and discomfort. In cases where there is much discomfort from this source, we recommend Diffusilite Blinds, a venetian blind having an enameled upper surface which reflects the sunlight upon the ceiling and eliminates glare by giving proper diffusion of the light.

2. HEAT AND VENTILATION

Most offices located in office buildings have little control over this problem. The heat is usually obtained from steam radiators and the ventilation from the windows. The best practice is to combine the heating and ventilation with a forced draft system, heating or cooling the air at its original source. Small offices may correct their ventilation by the use of interior ventilators of the Garner type.

3. NOISE REDUCTION

The problem of noise in a large office is a serious one. A noisy office is a fatiguing one and results in nervous strain, which is entirely unnecessary. Noise is caused by the reverberations of the initial sound. Sound waves are reflected by hard surfaces and absorbed by soft ones. Most offices have hard surfaced walls and ceilings which absorb but little of the sound and reflect most of it. Professor Sabin of Harvard discovered that a ceiling of hair felt covered with white muslin would absorb fifty-seven per cent of the sound waves coming into contact with it. We have found that the use of this sound-absorbing felt makes a quiet office and greatly improves working conditions.

There is a sound-absorbing stone which can be used for architectural effects.

4. PROPER ROUTING

The proper flow of work from one clerk to another in an office is a subject that is rarely given the attention it deserves. The office should be planned with this thought in mind. Those who must have access to customers or visitors should be placed where that is possible with the least annoyance to those who must concentrate upon their work. The relation of one department to another must be carefully considered. The relation of workers within a department must also be considered.

5. SCIENTIFIC ARRANGEMENT IN THE BANK

Our first problem in the bank was to scientifically arrange the new premises. A brief outline of how this was done will be of interest.

Departmental surveys were made similar to the following standardized form:

REPORT OF SURVEY

- December 2nd, 1920.
1. Functions
 - (a) Analysis of customers' accounts.
 - (b) Miscellaneous reports covering earnings, expenses, etc.
 - (c) Maintenance of budget.
 2. Location

At present located on third floor, which is entirely suitable.

It is recommended that this department be placed on the third floor of the new building.
 3. Space

The present area is not sufficient. It is suggested that from 35% to 50% more space be allowed this department in the new building.
 4. Equipment

Present equipment is not sufficient. One more section for book-case and stationery cabinet is required in addition to the exchange of one single pedestal flat desk for a small desk now in use.
 5. Personnel

Mr., one assistant, one stenographer and one clerk. Work in arrears; requires additional clerk; request has been made and approved.
 6. Relation

Directly under Assistant Cashier, Mr., and not related to any other department.
 7. Material Received

General correspondence, analysis forms and reports; can be received and delivered by messenger.
 8. Communication

Present telephone service criticised. Almost all calls are internal. Only external, outside of personal ones, are a few in connection with Club activities.
 9. Expansion

If additional space recommended under paragraph three is supplied, it will be sufficient for the requirements of this department.

10. Suggestions

Mr. has no suggestions that effect his particular work at the present time, but has made various general suggestions.

Comment. I suggest that a study be made of the various reports prepared by this department. It is possible that some of these reports can be eliminated.

11. Forms

Three sets of forms used by the Analysis Department have been secured.

It will be readily understood that such a survey will yield a heavy by-product in ideas for the elimination of wasted energy. It is difficult to refrain from making such corrections at the moment. Careful note is taken, however, of all such opportunities for saving for future use.

6. MAKING THE FLOOR PLAN

Next a floor plan is made to scale; we have standardized upon a scale of $\frac{1}{4}$ in. to 1 ft. A set of standardized symbols are used to make reading of plans simple. Each piece of furniture is drawn in to exact scale in its exact present location. Whenever necessary for purposes of analysis, the flow of work is indicated on this drawing. From this tracing lithoprints are made. Our reasons for using lithoprints instead of blueprints are as follows:

1. Blueprints shrink and dimensions are never correct. Lithoprints do not shrink.
2. Lithoprints may be obtained on any kind of paper in black lines.

Three copies of the lithoprints are made; (1) on white drawing paper; (2) on green cardboard; (3) on heavy brown drafting paper. These are afterwards used for cutting templets.

A lithoprint drawing of the new floor plan (without desks or other furniture) is then mounted with thumb tacks on a cork board, and templets are pinned in place with small glass headed pins in the exact location desired. Here a standard color scheme is used as follows:

1. White templets indicate present furniture re-used.
2. Green templets indicate expansion space allowed.
3. Yellow templets indicate new furniture to be purchased.

The use of templets enables one to move them about easily, trying many tentative plans until an arrangement is made that meets the approval of all. The use of cork-board backing enables one to pin the templets down securely, so that the plan may be moved about,

stood on end, or otherwise handled as is necessary.

It is our practice to allow space for future expansion in each department and indicate it exactly by duplicating the templets, using green as stated above.

7. PLANNING THE PLAN

Before beginning on the final plan as outlined above, there is, of course, a great deal to be done in studying the information obtained on the departmental surveys. Lists of furniture must be prepared, estimates of the amount of space required for each department made from the space formerly occupied by the desks used in those departments, alphabetical lists of persons, and so forth. It is unnecessary to go into all of the preliminary planning work required, but it is sufficient to say that the amount of this work is usually far greater than the client has imagined. Many things are thought of which ordinarily are forgotten until the last moment. The data required for the analysis of the requirements for the bank in question covered hundreds of typewritten pages.

8. DETERMINING STANDARDS TO BE FOLLOWED

A new office gives an excellent chance to determine upon standards for desks, tables and other pieces of equipment. With space at \$6 a foot, as it is on lower Broadway, the size of a desk is an extremely important item. It was proved that for practically all clerical operations a desk 60" x 30" was ample, while for a large number of operations, 48" x 30" was sufficient. It was decided to limit all desks to the first dimension; those larger were to be junked in the interests of economy of space. Let us see what this amounts to. First; the average desk is about 30 inches wide, a minimum requirement for working space is another 30 inches, making a total five feet in length. Every foot saved on a desk, therefore, means a minimum saving of five feet of working space. At \$6 a foot this is an annual saving of \$30 or ten per cent interest on \$300. But this is not the only saving, for if desks are placed in rows, as they must be in large offices, an odd-sized desk may not only waste space of its own, but compel the planner to allow additional waste space on all other desks of smaller sizes in the same row. We have seen instances of the waste of 100 square feet in this manner! More than one hundreds desks and tables were junked as being oversized and not otherwise standard. This was not waste, but actual economy, as will be shown later.

As was previously stated, all metal equipment behind