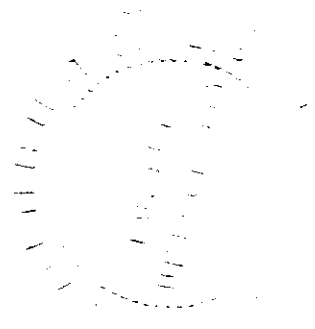


1957

Maintenance, its place in bank and office building management

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Boston University
College of Business Administration
Thesis
Maintenance, its Place in Bank and Office Building Management
by
Kenneth W. Fowler
(BS in M.E. Worcester Polytechnic Institute 1941)
Submitted in partial fulfillment of
the requirements for the degree of
Master of Business Administration
1957

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INTRODUCTION:

Maintenance, although held as a somewhat commonplace part of everyday life, has become an area of function that occupies an increasing portion of everyone's time and money. From the separate individual's consideration, as one extreme; to the complex problems of the large corporations, as the other extreme, maintenance in its various forms becomes not only a problem of present fancy but one that borders upon vital aspects of national welfare. Witness the huge "Do it Yourself" program invasion in the home maintenance field. The impact of present minimum wage laws plus the high wage levels in the trades have worked to create an elevation of the maintenance part of every operation.

PURPOSE OF THIS STUDY

The general purpose of this study will be to review the maintenance procedures of banking and office type of building management and to amplify these procedures by comparison with the trend in maintenance practices as found in other geographical and operational fields.

SCOPE OF COVERAGE

A substantial portion of the large business concerns in the United States have the resources to recognize and act upon maintenance requirements of their operation. Failure to observe proper attention to the upkeep of facilities is

magnified in a large operation to the point of easier detection than in the case of the smaller to generally average size of business concern. Through the use of methods in use at the large firms, others of smaller size can adapt organized counterparts to serve their needs. It is with these smaller sized operations in mind that this writing will be set down.

That Bank and Office building maintenance is stipulated as the area for consideration derives from the common problems of this grouping. The maintenance of office buildings is virtually the same as that of bank buildings in procedure and purpose, the largest basic difference being in specialized specifics with bank concentration upon security measures perhaps the main difference in so far as serious errors to be made in direct comparison.

In dealing with this field of maintenance, it is quite likely that ambiguity will enter into the use of the word and the connotations therein for the reader. To adopt some reasonable limitations for the area to be considered, let us think of a building structure to which maintenance is to be applied, and exclusive of special processes being conducted within the structure; then the control of matters pertaining to the efficient use of the building, both inside and outside, falls to the lot of the building maintenance function. To some, then, a building may be

personified and thought of as a living thing to which the flow of heat, light, power, care, repair, and other services is essential for the continued thriving existence of that building.*

FUNCTION:

Within that grouping of business operations that involve the production of a product, no dilatory program of maintenance can be tolerated without some direct effects upon the efficiency of the output. With machinery, the effects of wear can be ascertained in the product, with nearly a proportional relationship between wear and either loss of quality or spoilage. In the case of the bank or office type of building, the effects of wear and deterioration upon the building are not as directly measurable.

Larger, more highly organized firms are more likely to have included the maintenance function within their formal table of organization than are the smaller firms. The cause for this is perhaps found in the relative total amounts of money involved as between the two size groups. For whatever causes, this line of thinking leads to rather serious errors when one analyses the actual cost of maintenance with respect to size of plant. The plot of per cent of operating costs to gross income against smaller group and larger group buildings, as shown on the next page indicates

* 4, page 2

a rapid rise of cost level as the size of the unit decreases.* It is not desired that over-emphasis be placed upon maintenance in any event, but rather that it be accorded the attention that is commensurate with the individual situation and at the same time will prevent wasting away of building assets.

OTHER STUDIES:

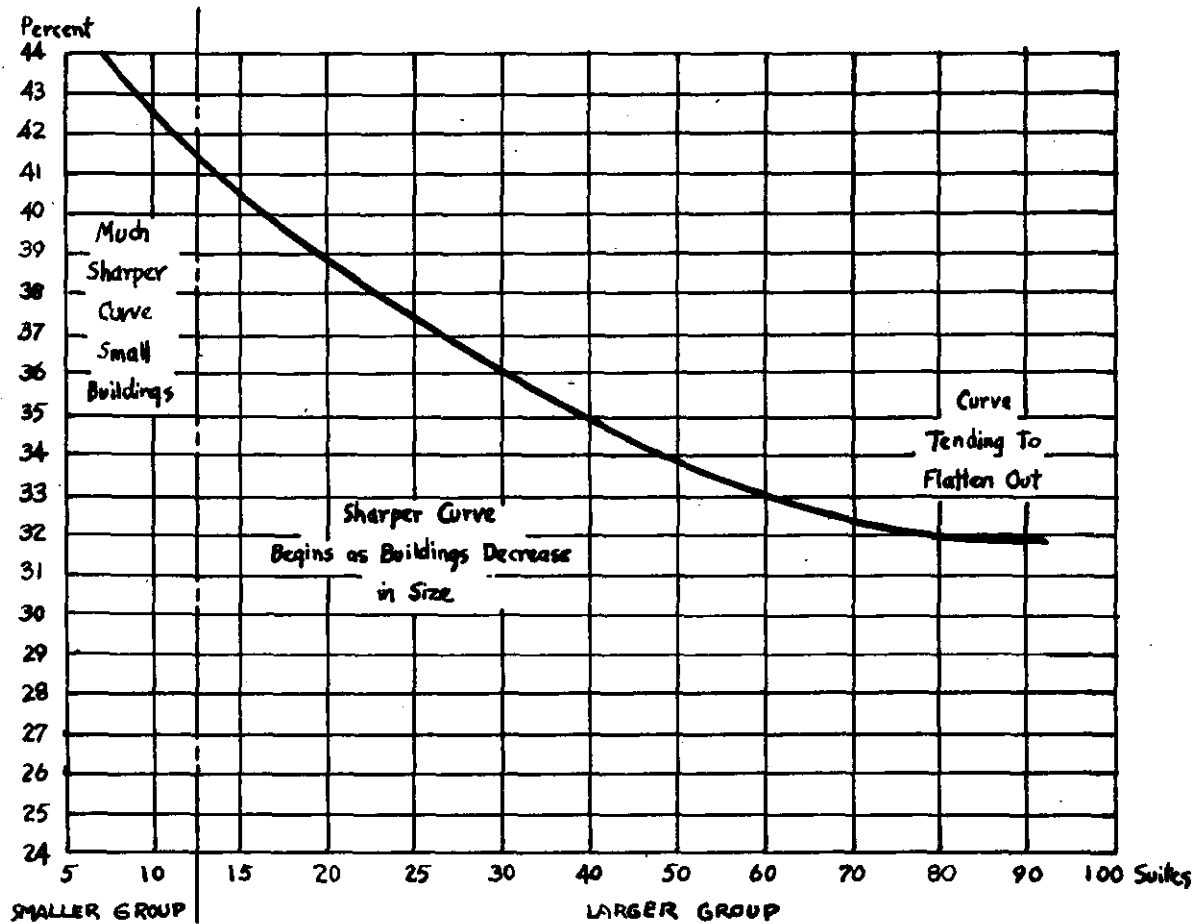
Millions of dollars are invested in office and public buildings in any United States city. All of these buildings require men and women trained to meet the public and to maintain the buildings and equipment. Much work has been done towards the building up of the morale and prestige of custodians, and in addition, this work has saved building and institutional managers thousands of dollars because of increased efficiency.**

The standards for a well written newspaper story stipulate coverage to the extent of the Who, What, Where, and When. Relative to the field of building maintenance, the WHY should rightfully be added to the above before adopting the standards to maintenance analysis. Indoctrination of personnel along the reasons for the maintenance procedures is paying off to judge from the numbers of manuals and instruction sheets that are appearing from various sources.

* 11, Winter 1956

** 6, page iii

CURVE SHOWING PER CENT OF OPERATING COSTS
OF GROSS INCOME VARIATION WITH
SIZE OF BUILDING



10 YEAR STUDY OF NEARLY FIFTY BUILDINGS
JOURNAL OF PROPERTY MANAGEMENT - WINTER 1956

Perhaps one of the best studies at hand is "Office Building Sanitation" a manual for Nationwide Insurance Maintenance Personnel. This publication of some eighty pages was the result of a comprehensive search for a maintenance program which led to the Industrial Sanitation Counselors of Louisville, Kentucky. With this consulting firm that specializes in sanitation and maintenance, the manual was compiled; resulting in one of the finest maintenance programs to be found and one that has saved months - perhaps years - in achieving a modern, thorough-going program.*

Many pamphlets and booklets are available on specific problems; these are published usually as a part of the sales effort for the product featured in the solution of the problem. For unbiased sources of reference and help for the building manager, experienced people in the field seem to hold the best solution if they know of the particular or similar problem.

An excellent publication that covers the United States is the National Association of Building Owners and Building Managers; "Experience Exchange Report". This report is the compiled data from currently some 625 buildings over the nation all of whom keep their records on a sufficiently same basis to invite comparison. The data are arranged as to the size of building, age of building, general area of

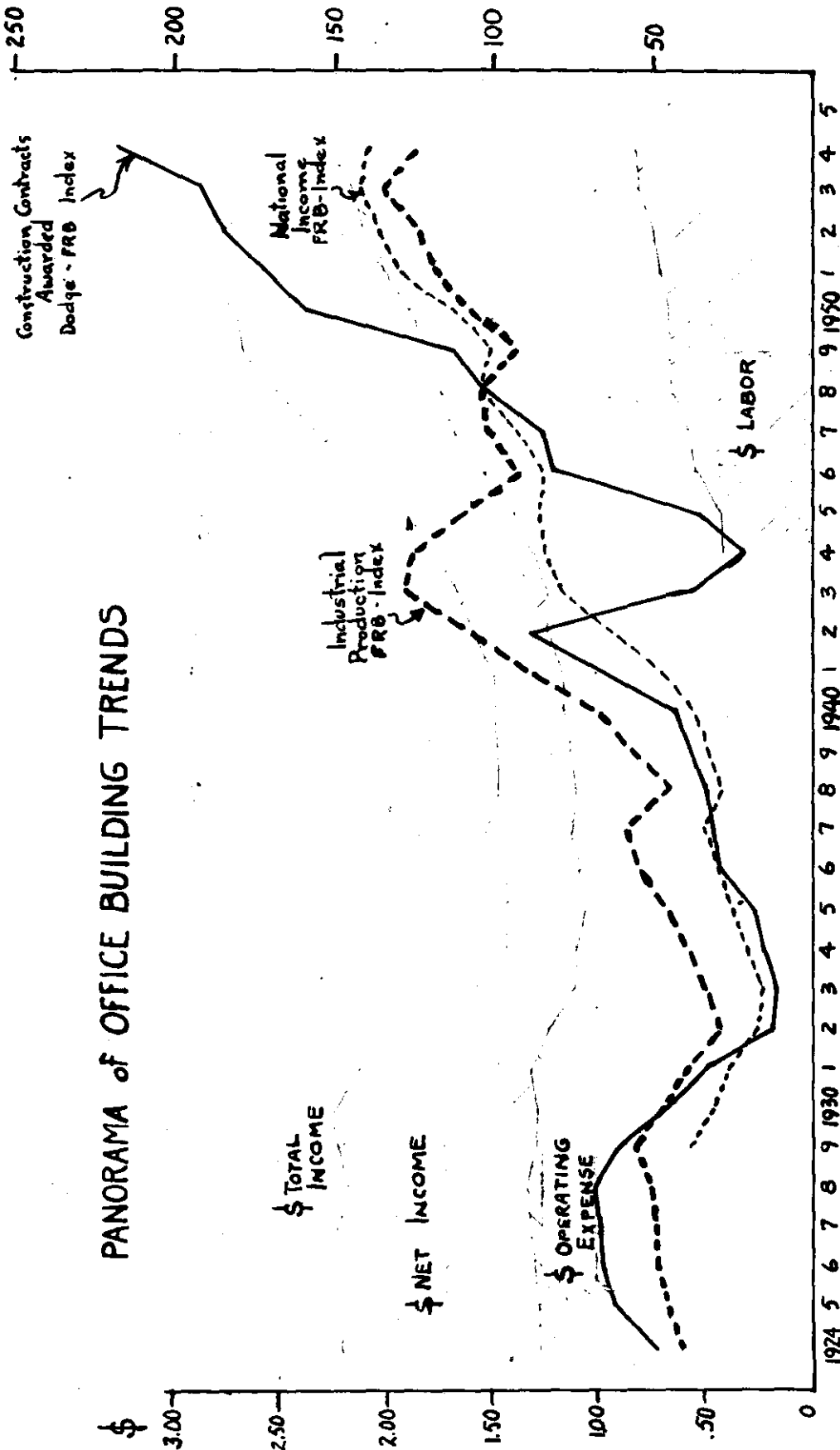
the country, and as to the size of city in which they are located. This service started in 1920 with only 90 buildings reporting.* On the following page is a chart reproduced from this publication showing trends of office building activity from 1924.

Similar compiled reports on operational data are often published either by a large company or by a group of firms within a given locality, these reports serving to focus attention upon items that tend to change most rapidly. An example of one of this type of report is one published in Buildings Magazine and was compiled by the Building Owners and Managers Association of Philadelphia. Graphic results of this report can be found on page 11. The report reflects a general average taken from reliable experience tables and is intended for use as a measuring stick only. That operating costs rose slightly over the three year period is significant, with the greatest rise in depreciation costs (7¢ per square foot). The total rental area of the 37 buildings included in this report is 7,386,265 sq. ft. with an assessed valuation of \$94,000,000 and an annual rent roll of some \$31,517,000. The data on air conditioning is not too reliable since only 16 of the buildings are completely equipped and the balance are equipped in varying degrees.**

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PANORAMA of OFFICE BUILDING TRENDS



CLEANING

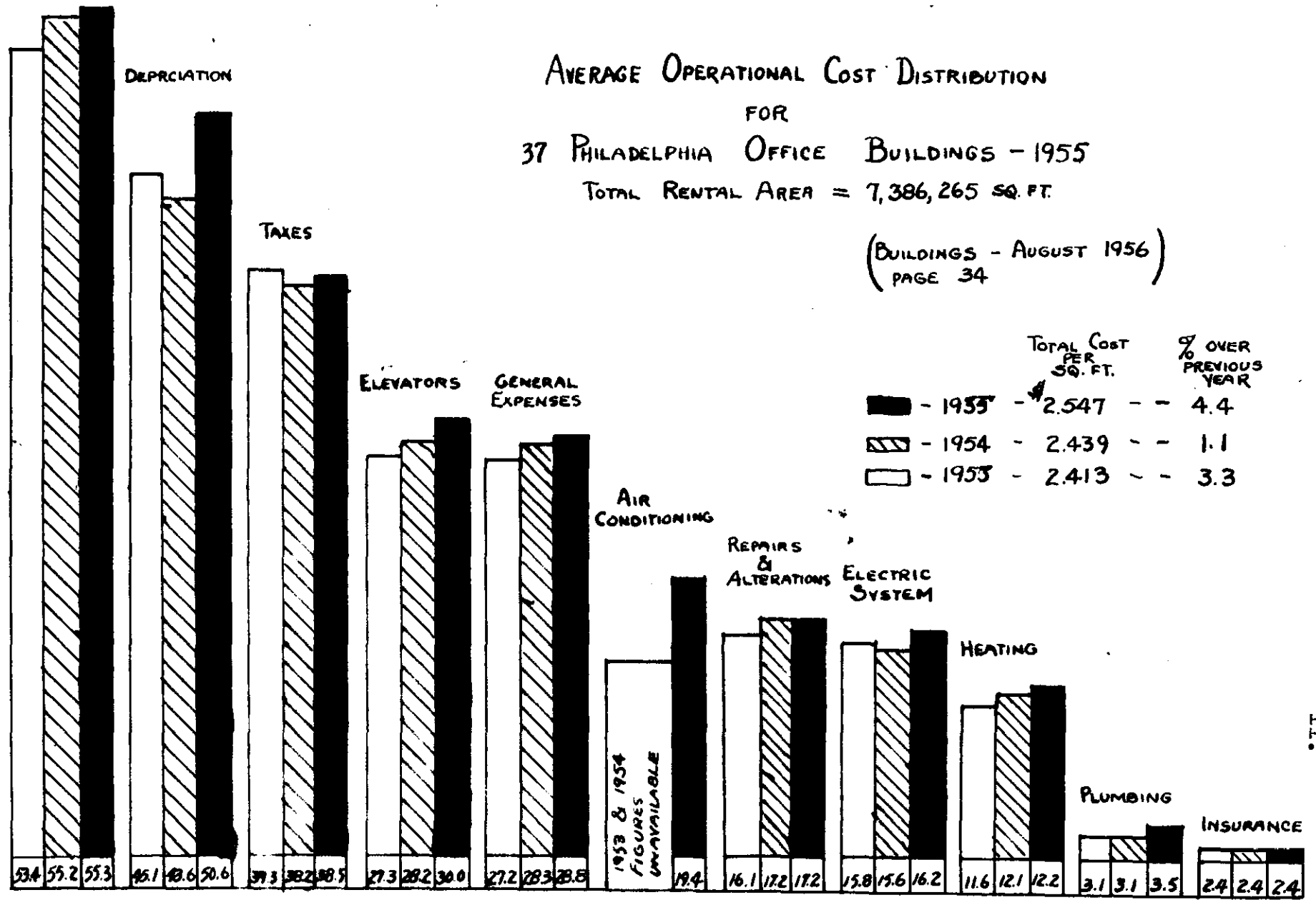
AVERAGE OPERATIONAL COST DISTRIBUTION

FOR
37 PHILADELPHIA OFFICE BUILDINGS - 1955

TOTAL RENTAL AREA = 7,386,265 SQ. FT.

(BUILDINGS - AUGUST 1956)
PAGE 34

COST IN ¢ PER SQ. FT.



Another excellent study in this field is the "Building Operation and Maintenance Manual" published by the staff of the Frank Wiggins Trade School in Los Angeles, California. This publication deals through detailed instruction sheets with the custodians and janitors directly rather than at a higher level of management.** Reaction to the use of a handbook of this type is generally excellent on the part of management, but meets with some resentment on the part of the working force unless the use is introduced through the medium of some sort of training course. The handing of booklets to operators meets with adverse comment of the following variety;- "After fifteen years of washing floors, the front office is going to tell me how to use the mop."; "I've been pushing a broom around here longer than most of the brass has been in the outfit, and now they know how to do the job better."; or "Some of the top dogs around here can't have much to do if they spend time thinking up ways to mess with the janitor's work."**

GOALS:

1. To explore the intangible and vital processes of building maintenance.
2. To bring together and summarize the available existing knowledge on bank and office building management as a whole.

3. To state representative ideas on maintenance improvement in a form that be of use to managers.

4. To add new ideas and interpretations that quite naturally evolve from such a study coupled with some experience in the area to be covered.

MOTIVATIONS BEHIND THIS STUDY:

To those engaged in the task of administering the care program for a building, there is the one easy and obvious path of action to follow; that is to establish a sort of rut of procedure and to continue to repeat these operations in a pattern of treadmill-like sequence. However, usually before complete stagnation sets in, or in the case of an able manager, long before this; some exception to the normal routine will provoke inquiry towards some change or even improvement. this inquiry is often not the ferreting out of a solution that fits the particular case, for the rather pathetic fact is that studies and data on cases in the classification are not commonly available due to the lack of a continuity of uniform operating data.* Pioneers within any field run in the minority of numbers, and lack of original thinking may result in "make-shift" solutions.

Not only are data commonly unavailable, but the substance of that which is available is often in a form that does not lend itself readily to comparisons. Methods of

* 11, Fall 1956, page 5

bookkeeping vary from firm to firm, and accounts with the same labels frequently are made up of differing items. The introduction of work standards into the field of building management has had a start, but a slight one.* One survey of maintenance conditions concentrated on determining what different plants included in their "maintenance" classification. In one group, only 55% of the reporting companies had the maintenance planning and control function within the maintenance department itself, only 65% of the companies reporting included sanitation within the maintenance department, and only 60% of those reporting included company vehicular maintenance within the maintenance department.** It is little wonder then that companies solve nearly identical problems in many different ways.

NEEDS:

For a given business, with at least some limitations upon expenditures for the maintenance of the building, how can the best use be made of the funds available? Can the working force be utilized more efficiently? To what extent is the building maintenance program effecting the other phases of the business operation if at all? Is the overall view of maintenance clearly in mind so that the long run results can be justified? The answers to these questions in many cases would provide some insight into the

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need for wider recognition of the maintenance function.

Typical of the rapid growth of the United States is the evidence of the condition of the buildings in its cities, most particularly those on the East coast. In many instances, the buildings were erected under conditions of economic expediency, so that both the construction of the units as well as the sites chosen were not heavily favored with considerations for distant future existence. Mid Western and Far Western cities were indeed fortunate to have had beneficial elements of timing enter into the growth of the cities and the need for business buildings. * Investigation into maintenance procedures reveals that those that use standardized and organized procedures are concentrated within the very large businesses and to some high degree in the areas of the Mid and Far Western sections of the country.

In the Experience Exchange Report of the National Association of Building Owners and Managers, 625 buildings reported from 104 cities. The city with the most active participation was San Francisco with 87 buildings, New York was the 14th most active participator with 10 buildings reporting, and Boston came low in the list with 2 buildings reporting. **

A management audit of the Roman Catholic Church rates this largest world society high in the overall

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performance of its administration. With regard to Catholic Church maintenance however; reserves for depreciation are non-existent and except for the facilities in Rome, buildings have been allowed to become antiquated beyond efficient usefulness with renewal a major problem. *

WASTED EFFORTS:

Often in the maintenance field, one finds that a concern has a group of employees loosely classed as janitors. Attempts to job evaluate such a group would in some cases occupy the proverbial five foot book shelf when completed. Within this grouping are two evils; one, the catch-all in the organization regarding duties to the end that if no one else will do it, the janitors will and two, the tendency for a willing employee to try most any task asked regardless of its nature. It is necessary for management to realistically face the limitations of this multi-purpose personnel and to operate within reasonable bounds. Likewise, employees who have the "I'll try anything once" attitude may very likely encounter difficulties. This loose classification of force, that works both ways, can frequently lead to duplication of effort, and costs that are way above those encountered if the task had been correctly assigned and executed in the first place. **

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Just as there are dangers in too loose a classification, so too are there dangers in the too specific assignment of duties and titles. Examples of the extreme strict codes of duties abound in present application of unionization to some of the areas that are overlapped by the trades.

Clearly some practical operating basis is necessary in cases where these circumstances occur. The wasted efforts that result cause sizeable misrepresentations in the work load and costs.

PREVALANCE OF MATERIEL:

The number of sources from which building maintenance materiel can be purchased are virtually without end. Hardware stores, department stores, paper supply houses, paint supply houses, grocery stores (both retail and wholesale outlets), are a few of the sources that are present in any average U.S. city. The list is hardly complete at this point for there are any number of agents and representatives in most cities that sell such goods for a state, interstate, or national firm that offers maintenance supplies in considerable depth of line. Each source claims superiority over all others for his product or products. Most of the sources have salesmen to call upon prospects, and a manager might well sit in his office and occupy considerable time with each

and every caller. Within the gamut of any one item, which is the manager to select? To the average observer, purchase of supplies appears to be a very simple matter.

For the normal firm, economy in purchasing enters heavily into the rule for guidance. For most banks and office building firms there is some pressure to purchase locally from people with which they deal. This pressure can work to an advantage as well as a disadvantage since the numbers of dealers in either case may easily preclude keeping all concerned happy. Sometimes it is possible to split purchases when conditions warrant it, and in other cases the quantities involved restrict the use of small amounts of the same item from several different sources. This can be a real part of the problems of a building manager. Take the case of a bank that has several substantial depositors all of whom are in the contracting business; should continuity of service be neglected to the point of rotation of these firms whenever such services are required? *

SALES BEFORE SERVICE:

With the acquisition of the materiel for the building maintenance program, the problems are not all solved. Frequently, a signed purchase order for the materiel terminates interest on the part of the seller, that is, until the time arrives for the next order to be signed. A large part of

the materiel involved is of the expendable variety so that top management may even side with the seller for reasons of political convenience, objections of the manager notwithstanding.

The foregoing may be difficult to understand, but even more so is the case wherein top management may go so far as to instruct the purchase of materiel from a source without an idea as to the suitability of the items involved. Thus the sales of some of the items used in the maintenance program come before the service that the item is supposed to render let alone the service that the seller might extend in support of his products.

COST OF WASTED EFFORTS:

The actual cost of wasted efforts depends entirely upon the instance that creates it. Mention of wasted efforts has been made with reference to assignment of personnel according to their ability. There is another form of wasted efforts, namely that of failure of management to recognize that maintenance is a necessary part of doing business.

Buildings begin to deteriorate from the day of their completion, and the rate of deterioration depends largely upon the character of the maintenance performed. If a building is neglected or begrudgingly maintained either because of carelessness or because the management "hates to spend the money", the deterioration will be rapid. Then one

day extensive rehabilitation will be necessary, and when that day comes it means the lump expenditure of several times as much as would have been required altogether during the intervening years to keep the building in shape. A further disadvantage is that the expense hits the business all at once, to say nothing of the loss due to the possible interruption of service to and by the occupants while the overhaul is in progress.

In many ways extensive rehabilitation, managers have learned to their regret, is poor business. In as much as rehabilitation cannot be avoided, can only be put off, and the longer it is put off the heavier the expense, why not have it commence the day the building is occupied? In this way, both corrective and preventive maintenance goes on without ceasing, which is the least expensive, and at the same time, the most effective kind of rehabilitation.*

Nor is maintenance complete without supervision which includes follow-up. Building conditions change not only with the weather and the seasons but with the natural cycle of the business the building serves. Traffic will not always flow or occur in the same unending pattern, activity within the building may fluctuate considerably for no good apparent reasons; and the alert supervisor can detect

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variations to the end of making his force more efficient. *

DETERMINATION OF PROGRAM EXTENT:

In the determination of a maintenance program, one of the first areas to cover is the company's history. Why, you ask? Because the history of a company's growth, the facilities acquired, products manufactured, and the financial progress provide a basis for assessing existing and projected maintenance costs and requirements. **

The existing maintenance policies and methods are, in many cases, the product of traditions, concepts, and habits developed in prior years - many times beyond the memory of the oldest of the employees. If one fails to understand how they came into existence, why they are accepted, and specifically where they are applied, it may well be that corrections can be made in the formulation of a new or revised program. ***

Study the problem from all angles that are available. Investigate the current costs of maintenance, is this too high a percentage of the firm's operation? Is the strength of the force high with respect to the total working force and the type of the function that is housed? Can the work and the personnel be fused by careful planning of the duties to gain lower costs, smoother function, or more bene-

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efits? Often the answers to such questions turn up surprising results and cause some shift or even reversal of preformed opinions.

Armed with a background of careful analysis, specific proposals together with a schedule of events leading to a set of objectives, present the material to management. Sell the plan to management and revise to whatever extent necessary to accommodate the policy and the complete backing of the management group. It is unwise to try to adapt a set of policies that have been successful for someone else for they often do not fit another's situation. The policy must be spelled out as a result of both new needed items and the setting forth of the old policies that are to be retained. The revision of existing policy may well be the area of most attention, for it will consist of recognized as well as unrecognized procedures. At least within the policies finally accepted, the inclusion of the three following general coverages is basic: 1. The place of the maintenance functions in the organization; 2. The purchase, repair, and replacement of facilities; and 3. The accounting treatment of new facilities and replacements purchased. *

SUMMARY:

The operation and maintenance of a building is a more complex and difficult task than is apparent to the casual

observer. To operate successfully and maintain a building with its equipment, furniture, and appliances requires a great variety of both knowledge and experience. It is necessary to be familiar with city ordinance and regulation, to know as well as to recognize safety, to know a good deal about all of the building trades in some detail, to know about boiler function, and whatever other building equipment contained within the particular building; to be familiar with the problems of space layout, lighting, electrical wiring, and telephone; to be conversant with the accounting system of the firm with which maintenance is performed; and to be familiar with the latest and the most economical methods for the cleaning and the maintaining of the surfaces on all sides of the building. The maintenance operation over and above the actual knowledge that is required demands alertness to change in the weather, changes in local contacts from whom materials and services can be obtained, and an alertness towards any source of potential trouble as well as towards the opportunity for the improvement of the maintenance operation. *

Building maintenance has been and is becoming a more important field, largely because of the increased complexity of the problems involved in the operation of any building. Acceptance and demand for more uniform temperature

* 5, page v

control, wider use of elevators, increased volume of telephone traffic and the greater movement of people through the wide use of the motor vehicle all tend to focus more attention upon the problem of building management and upkeep.*

II - ENVIRONMENT EFFECTS

A. EMPLOYEES:

Social workers, psychologists, and human relations men all seem to agree that environment does have a lot to do with the adjustment of the individual to a given situation in our society. To the end that environment for the worker in his work be one of at least reasonable comfort and appeal to sense of pride; many business executives will agree and thus tolerate some attention towards the making of pleasant worker surroundings.

Clean, colorful workplaces attract good employees, build worker morale, reduce accidents, and serve to stimulate higher and better productivity. * Workers reflect discontent with the shoddiness even dirtiness, of their work environment in lowered standards including productivity. To be sure, these statements are relative and immeasurable to any exact degree, but certainly an employee is not inspired to work harder in dull, unattractive surroundings. The thinking employee may even draw the conclusion that the employer is divorced from the employees except in the matter of dollar profit maximization with minimum expense over absolute necessity.

In some circles, "the aesthetic approach", whether for the emotional reaction or the decorative effect, is

thought to be other than realistic; and not an item to be included in a place of hard-headed business procedure. However, with a hard-headed, practical approach to the consideration of color and brightness, these qualities can make for the feeling that efficiency has been or can be served. It still remains to be generally understood that the scientific use of color will provide for the best utilization of good light. The objectives of color are to reduce eye-straining glare in favor of light diffusion, to focus worker attention on the operating parts of equipment, give the workers "eye rest" areas for eye relaxation, give danger areas high visibility, and improve the appearance of the plant. The results are proving pragmatically practical - reduction of absenteeism, higher production, reduction of injuries, and better morale. *

In connection with the physical appearance of office interiors, one of the outstanding jobs of research along these lines has been done by the Pittsburgh Plate Glass Company in conjunction with the Johns Hopkins University Institute for Cooperative Research. This study was conducted to seek refinement and expansion of the existing knowledge of color. Intensive work was done with the use of colors in gradeschool classrooms; using three different schools in the city of Baltimore and the following program for the decoration of them: the first building remained unpainted throughout the tests and

served as a control unit and comparison basis for the tests; the second building was decorated in the conventional manner with all four walls the same color and with white ceilings; the third building was decorated according to the specifications provided by the paint manufacturer with fairly wide use of colors in conformity to a scientific pattern of application. The tests ran for two years and the procedures were kept secret from all personnel excepting the higher authorities. The table on page 28 pictures the findings of this study and perhaps the major conclusions were:

1. Color affects scholastic achievement more than behavior traits.

2. Absence decreased nearly 13% with the use of colors.

3. Opinion on morale favored the use of colors to a marked degree. *

Industry has experimented with the use of color dynamics in various types of process application with emphasis upon the bright colors to focus attention to vital levers and controls as well as to bring color attention to danger and caution areas. These experiments, while not substantiated with concrete evidence in all cases, have led to quite wide acceptance and use particularly in the machine tool industry.

Thus far, attention has been paid mainly to the physical appearance and the harmony of the colors within the worker quarters. Focusing upon economy, the application of surface treatment of any nature differs little as to whether one color or another is used. That some maintenance of the surroundings is advisable would not be heavily disputed, and the degree to which a given plant carries such a program will naturally depend upon the total expense feasible and/or the return to be realized from such expenditure.

However, within the maintenance function, there are other matters that can be included under the heading of environmental effects. Industry and business in many cases go to some lengths to control the humidity and heat of process atmosphere in order to improve the quality and control of the productive process. By the same token, the care and attention given to the control of the conditions in which humans are working can affect the quality and efficiency of performance. The relatively widespread use of air conditioning in office and bank buildings is some indication that such measures have merit.

Lighting is another contributor to the interior appearance of a building. Most people are quite aware of the presence of light through the sensory reaction to the absence of it, however comparatively few pay attention to the quality of light conditions. The more light a worker

has, the better he can see. For office conditions, the level of lighting for the general type of work should be between thirty to sixty foot-candles. With the use of a light meter, it is fairly simple to determine the light level for any area. The charts on the next page indicate the effects of light intensity upon visual speed, acuity, and sensitivity.

Whatever lighting conditions prevail in a given location, maintenance of the light sources can contribute heavily to the results obtained from the equipment. Failure to maintain the lighting facilities can reduce illumination by fifty percent of the original provision. This is illustrated in the chart on the following page. *

To measure exactly the effects of good maintenance upon employees would be difficult to accomplish, however such effects do have a bearing upon performance and in the interest of keeping performance high, maintenance pays off. Well maintained units indicate trends to the attraction and holding of a better class of help, and as a general rule, help to turn out a higher grade of work. **

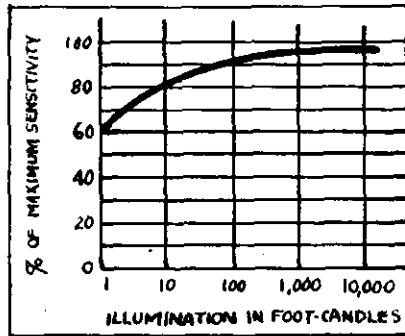
B. CUSTOMERS:

It used to be true - or so bankers thought - that people would entrust their dollars only to institutions

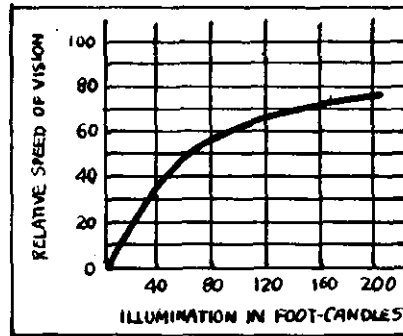
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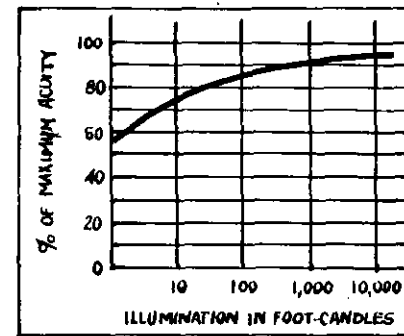
How Increased Light Improves Vision



CONTRAST SENSITIVITY
(I.E.S. HANDBOOK)

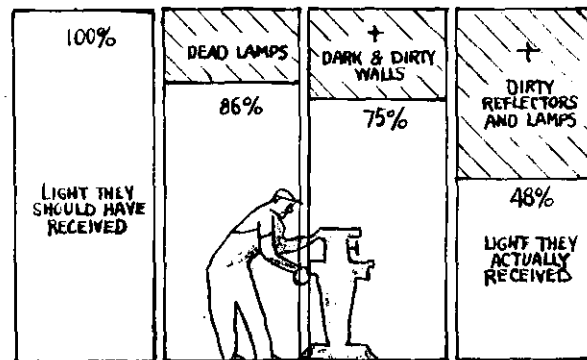


SPEED OF VISION
(STUDY BY FEREZ & RAND)



VISUAL ACUITY
(I.E.S. HANDBOOK)

POOR MAINTENANCE ROBS LIGHT & VISION



(Sylvania Electric Products Inc.)

resembling the Roman Forum. Corinthian columns, marble curlicues, and a stolid air were considered the best assurance of increased assets. Solidarity of exterior appearance, quietness, dark foreboding interiors together with men of conservative and austere manner were deemed to be the marks of the successful business operation. *

To understand just what the public does think of the buildings that house offices and banks, one needs more than a superficial "guesstimate". The Dickens type of establishment concept, along with the cartoon characterization of the capitalist of Wall Street may serve as an image of American modes to some; however, these images appear to have little actual remaining value today. Relatively few banks still have totally enclosed cages for their tellers, and modern offices minimize the number of solid wall, ceiling height, enclosures. Integrity through massiveness and physical restriction has given way in large part to integrity of performance and warm friendly dealings on a basis of near equality of position. **

Keeping and maintaining buildings in the same state of the original construction is not the only function of building maintenance. Keeping the building in good condition in a broad sense is more than cleaning, timely repair-

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ing, painting, and so on. It also consists in the making of timely additions or alterations to remedy defects in the original construction, which use develops, and without which no building is yet to be built. Prompt attention to such extensions or modifications of the original layout as changing conditions or business need may require is part of maintenance too. Allied with the requisites, particularly with office and banking firms, is the urgent necessity that the quarters present an appearance that is appealing and inviting to the customers that the firms hope to serve. *

CONCEPT CONFLICT:

In the year 1954, American bankers spent some \$500,000,000 on the modernization of bank buildings. Such lavish spending was based upon one main reason: "It brings in the customers". The resulting modernized banks were found to have increased their business on an average of twice that of the national average for all banks. ** Industry indicates considerable consciousness of the part their offices play in the important public relations function. To the end, that the so called "front office" of many of the companies throughout the country are models of modern, well-kept buildings regardless of the places in which the product may be

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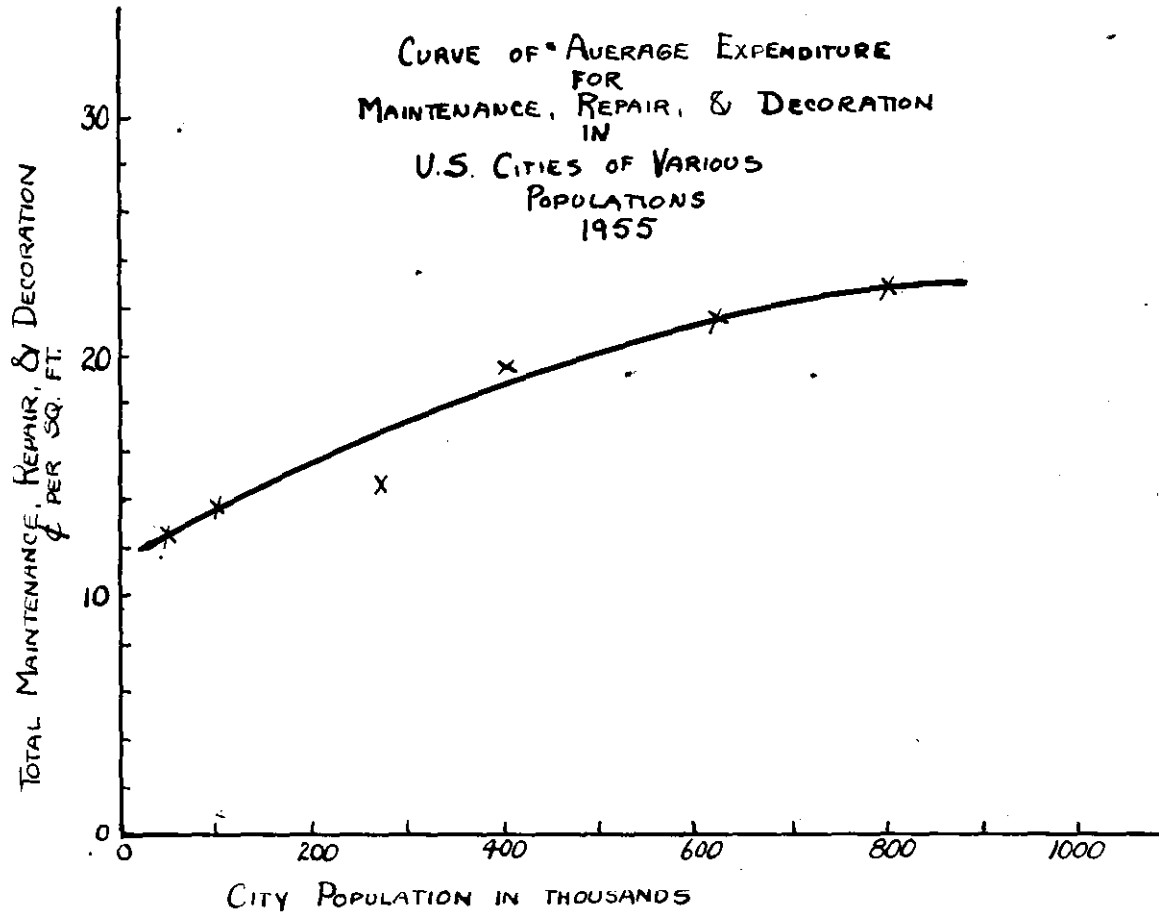
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made. Not to discount the production or work areas in favor of the office, in many instances, firms are spending millions to renovate and make comfortable the quarters for all workers. In most American cities, the main streets present a display of the various ways in which attractive store fronts may be constructed. The interiors of these same stores will for the most part also present a pleasing surrounding for the display and sale of goods.

From the curve on the following page, expenditure for maintenance, repair, and decoration is higher per square foot the larger the city in which the building is located. Reading this as evidence of competition for the trade by means of physical appeal of quarters, customers must be attracted to the well-kept premises.

On the other hand, how often in contemporary society does one hear of or become a party to the bargain that is available in the little "low overhead" place in the relatively inaccessible location? Devoid of the high gleam of modernization, there are offices and banks that do operate with at least some degree of success. The lure of the shabby store with the droll proprietor must have some validity by virtue of existence.

It would hardly seem to be conclusive that physical surroundings alone are the criterion, but the state of the premises does enter into the thinking of the average



(EXPERIENCE EXCHANGE REPORT - NATIONAL ASSOC. OF BUILDING
OWNERS & MANAGERS)

person. Regardless of modernization, shabby and ill-maintained quarters will directly or indirectly affect the thinking of the customer. Indication of proof of the nearly universal appeal of cleanliness and order to the American public lies in the existence and very active competition amongst the numerous producers of cleansing agents, polishers, storage devices, and systems equipment.

INDIFFERENCE:

In dealing with the total personality of the people who frequent business places, maintenance and appearance do not connote equally to all. Marketing surveys indicate that a large segment of money spent in our economy is spent by women of the country. The appeal of retail business must of necessity be directed towards the satisfaction of the greatest business potential. Condition of the surroundings is not always of concern to business men, and there are instances where the service and product carry weight in excess of the surroundings.

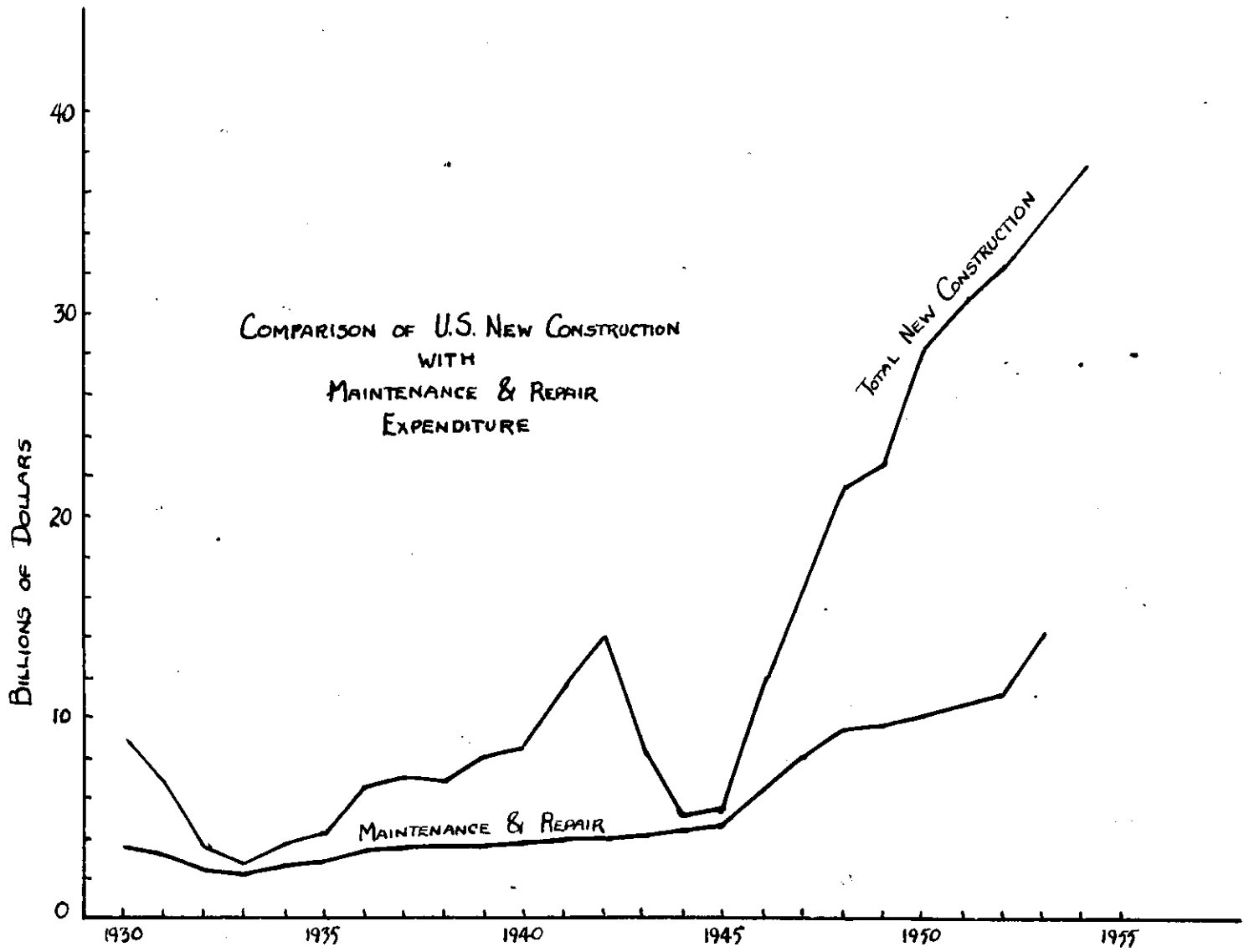
The segment of our business structure that has little to do with the feminine trade can be observed as examples of the variety of businesses that pay relatively less attention to appearances. Plumbing houses, coal and oil firms, and concerns of the industrial lines tend to rely upon functional necessity more than modern physical plant appeal. While this

is true in general, there are exceptions to indicate that even with the heavy industrials some regard for maintenance does pay off.

Rank indifference to exterior and interior appearances would be as difficult to prove as an opposite stand. The ultimate proof of customer attitude towards condition of the buildings that house business lies within the course of action of the contemporary firms. Certainly the trend within the building and construction industry cannot be classed as either failure or contraction to any extent; rather to the contrary. It is significant, as shown on the curve on the next page, that construction in the United States has risen over the years rather sharply despite economic dips and enforced curtailments. Maintenance on the other hand has maintained a rather steady level to slight increase. The comparison of this rapid rise of construction with the slower rising maintenance gives obvious weight to the thinking that maintenance is not being given its proper due.

BUSINESS PROGRESS:

Retail merchandise stores have been the most progressive group with regard to modernization and maintenance of building facilities with both customer appeal and customer convenience in mind. In the field of office and banking operations, many such units have followed suit to the extent of branch units,



(U.S. DEPT. OF COMMERCE; BUREAU OF LABOR STATISTICS)

branch sales offices, and some suburban office buildings. The number of all types of "roadside" type outlets has increased tremendously in the last decade. This trend includes but a comparatively small part of the banking and office operations of the nation however.

The office building, so much a part of the business district of every American city of size and so necessary in the everyday life of the community, is a nineteenth-century development. While there may be some few buildings still in use that were built before the year 1900, so great have been the advances made since in design, plan, and equipment that old buildings have little or no economic value today unless substantially rebuilt or rehabilitated. *

In the comparatively short space of approximately forty to fifty years the office building has become the fourth largest industry in the country on the basis of invested capital, its value at the present time amounting to some \$7,000,000,000. It is obvious that the financial success or failure of America's fourth largest industry and capital investment must seriously affect our entire economic structure. Actually much more than the capital investment in land and buildings is involved in the office-building industry. The industry is one of the nation's largest consumers of electricity, coal, oil, gas, paper products of all kinds,

soaps, cleaning materials, wire cables, floor coverings, wood and steel partitions, plaster, cement, roofing materials, steel, iron, copper, brass, paints, to say nothing of the ready made and complete unit of commodities purchased for the total function. The office-building industry is one of the largest taxpayers, for an office building cannot be hidden from the tax collector like some other forms of wealth. Finally, the payroll that is supported by the nation's office-building operations is tremendous and includes nearly every trade and several of the professions in performance of operations. *

III ECONOMIC ASPECTS

Thoughtful men everywhere are conscious of the fact that there have been great changes in our economy during the past twenty-five years. This change undoubtedly has been more significant in the field of commercial real estate than in many other fields. For within this area, the past 25 years have seen a far reaching revolution. As the commercial and business real estate activity is examined, one cannot help but to notice the fact that proportionately fewer and fewer buildings are being built by capital which seeks a return on its investment through the leasing or renting of space. This trend is true of residences (where the great bulk of building is made up of single family homes) and also true of other categories of buildings as well as with office and bank function units. There has been almost no recent construction of loft (rental) buildings. Most industry now owns its own small plant, and small operations must look to the older buildings for space. In the office building field, too, virtually no new properties have been erected in any of our major cities unless it has been by companies seeking primarily to house their own organizations. The medical profession and the legal profession appear to be the groups most aware of these trends which are operating to affect future welfare. *

* 11, Fall 1948

The remarks of the preceding paragraph, taken from an editorial indicate that in 1948 the issue of the economic trend towards reduced activity in the creation of office building facilities was of note. Since that writing, certainly the trend has not changed its course materially. This situation points to the use of older buildings to house the office and bank function of business intensifies the importance of the history of the maintenance program that may have prevailed in any given instance. To regard a building, noting its physical condition, and to conclude that the maintenance practice has been good or bad might well be shortsighted. Further investigation into the causes of the maintenance or the lack of it, particularly in light of the economic forces upon the policy, may shed light upon basic maintenance philosophy.

Prior to 1930, most business properties were operated by the individual owner or by the owning corporation. Prosperous times allowed for the existence of adequate to generous expense in the direction of property maintenance. However, the depression of the 30's radically changed all this, and wholesale foreclosure threw the bulk of the business income properties into the hands of the financial institutions. These financial organizations were not particularly well suited to manage these properties, and chose in many cases not to effectively manage them

because they felt that the ownership or control was merely of a temporary nature.

The temporary ownership or control of foreclosed properties became a frozen market condition that forced control and ownership to a much longer period that extended well through the thirties. In the five year period from 1939 to 1944, many such financial institutions sold every parcel of the real estate which they had acquired in the early 30's. Thus most of the real estate, involved with this type of background, reverted to the position which it had held in the 1920's. These present owners purchased these properties for one of the following four reasons:

1. Speculation
2. A management purchase
3. For self use
4. Investment

The speculative purchaser, who actually dominated the field during the period of rapid rise in property values during and after the war, has now disappeared for the most part. There remain largely the second, third, and fourth categories of owners, of which the second and third represent a small minority. Thus it is principally upon the fourth classification, the investors, that falls the burden of responsibility for the bulk of the nation's business real estate.

With the investor entering into the field of real estate, the need for fiduciary counsel and management is as strong as when the investment concentration is in the area of securities and non-tangible assets. However, many of the owners seem to have merely extended and distorted an understanding of simple household level maintenance to their holdings and the result has been not necessarily poorly managed properties, but properties that have been serviced in a not very thorough, well-rounded manner.

The strict classification of business real estate is not the only area wherein the maintenance program can be termed vague or lacking. Common to the institutional ownership of property and other types is this problem of failure to face and meet realistically the maintenance of facilities. Schools, hospitals, and public agency groups often acquire buildings through the generosity of interested people. Care and maintenance of the properties is seldom provided for in the conceptual thinking of the acquisition: resulting in a prolonged drain upon the operational budgets. The prolonged drain normally takes form in half-way measures to keep the building operating, and when the issue of major overhaul cannot be avoided, drastic measures have to be taken. There are notable exceptions to this situation, amongst which might be mentioned rare cases like Harvard University's Building and Grounds Department of some 1000 men and women* and

the UN Building in New York with its crew of some 350 plus outside contractors,* and the Pentagon in Washington with its crew of some 1500 service workers. **

LIABILITY:

The liability or responsibility for maintenance can be divided into two areas for consideration; moral liability and legal liability. Legal responsibility is perhaps the easier area to define and is normally found described in some detail in terms of the lease or other agreement that accompanies the occupancy of building space. This legal form rather minutely covers the relationship between the tenant and the landlord. However, the moral responsibility deals with a rather more general treatment of maintenance in light of judgement in the right or wrong sense and may be according to the social custom interpretation of a given situation. In an atmosphere charged with increasingly keener claim consciousness on the part of the public, management of building properties is becoming more and more aware of the moral responsibility involved in the maintenance of property.

MORAL:

Slum clearance in one form or another is a familiar term in today's vocabulary. Taking this as the extreme case

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of building deterioration through neglect of whatever cause, then somewhere along the course of this deterioration, has not there been a breach of moral responsibility? No legal responsibility may have been violated in the strict sense; conditions existing in violation of ordinance may have been legal under some sort of "Grandfather clause" in regulations. The occupants, to be sure, may have had the right of choice of moving or staying in a location or the board of health or any other governing agency might have ruled to change the course of conditions but did not take steps for any number of reasons. There is not a clear case of blame to be placed upon any particular person or group, but there does remain a collective failure to meet the moral issue provoked to the extent that currently the various public agencies are concerned with resulting conditions.

From the point of view of the owner of a property, the importance of maintenance might well be considered in light of his position. The fundamental interests of the owner are mainly:

1. Safeguarding the investment
2. Enhancement of worth
3. Net return
4. Goodwill

These four fundamental interests are best protected in all cases by the continuity of occupancy, for the loss of tenants jeopardizes all four. Consider the fundamental interests of the occupant as mainly:

1. Security
2. Peace
3. Comfort
4. Standard of living

These interests of the occupant are equally or even more important than the interests of the owner - - for unless all of the needs of the occupant are served adequately, the owner's interests are in danger. *

Thus real property is more than a bundle of rights. Nor is property merely a property in the sense that it is a physical entity having form and substance that cost money and labor to produce. Far more significant is the fact that it is the tangible structure of a social-economic organism vitally linking certain needs and desires of individual persons with the well being of groups of people. It is an organization of facilities intended to produce wealth for its owner and to supply service to its users. Separate and apart from the social, economic, or civic activities of man, such real estate is nothing more than an organized arrangement of inert matter and has no value whatever. **

* 11 Nov. 1936

** 11 Nov. 1936

LEGAL:

Personal injury claims, particularly those arising out of the operation of real estate, are more numerous than ever. In relative degree, this applies equally as well to other types of property. The stringency of statutory requirements and the far-reaching court decisions being handed down to claimants have expanded property owner liability to a point that he is virtually the insurer of all those who are lawfully upon his premises. Within the great body of claims made, a certain percentage of them are bona fide in that the injury sustained is legitimate and the cause of it was a case of disrepair or negligence in the maintenance of the property. However, there are still a large number of claims that are highly exaggerated and are of highly questionable origin. The very presence of a state of disrepair provides cause for a genuine accident as well as the stage for a fraudulent claim. *

Through due legal process, the lot of most occupants of property is to keep the premises in repair. This condition exists as the common law duty of any tenant. Many contractual relationships are executed as between tenant and landlord such as to exclude the landlord from certain stated sources of liability. However, should the owner or landlord be found guilty of gross negligence, or should he be found to have had knowledge of or by the exercise of reasonable care he ought

to have had knowledge of a defect or of a necessity to correct such a defect; the liability may be his. *

Steps to provide some degree of protection to frequenters of public places against negligence have been made through various types of agencies. Public building codes, inspection of utility service installations, safety council programs, fire prevention measures, and public health departments all aid in the enforcement of adherence to standards in the respective lines. The effects of these devices are hardly fool-proof unless the public cooperation exists to a high degree. Too often, the attitude is to pass any one of the inspections and to let down standards after the inspector passes the unit or to insure compliance with standards only at those times when inspections are to be made. Corruption of any of these agencies leads to an accelerated form of degeneration of the level of performance intended.

Somewhat more successful than the public agency type of maintenance standards enforcement are the insurance, social, and union organizational programs. Notable amongst this group are the mining unions which have accomplished revolutionary changes in the working and safety conditions for the miners. The American Safety Council together with the American Automobile Association and the Automobile Legal

* 11 June 1934

Association have accomplished much towards the correction of faulty conditions and to promote better maintenance in the highway systems of the country. With this type of program the recognition by and the co-operation of the public is essential to success.

The importance of a program for safety and the observance of rules to accomplish it cannot be emphasised too heavily if accidents are to be prevented and legal liability for them to be avoided. It is necessary that owners and operators alike heed the rules of the game, as prescribed by the innumerable court decisions and statute laws which regulate the ownership and management of property. *

INVESTMENT PRESERVATION:

Real property consisting of real estate or land on which buildings stand constitutes an investment on the part of the owner. Whether for self occupancy or for occupancy by others, the owner normally has four functional interests in the property, namely; to realize a return upon the funds invested, to safeguard the equity in the investment, to enhance the value therein whenever possible, and to continue some pride of possession. Property is by itself composed of a sum total of inert attributes such as: location, shelter, privacy, comforts, conveniences,

* 11 June 1934

and the like. These attributes cannot of or by themselves produce either satisfaction or income. *

It is mainly through astute management that property fulfills the requirements of both the owner and the occupants. In the earlier days of the country, almost any property underwent an enhancement of value through the growth of the community around it. This is no longer a common experience, and to preserve the total position of a property, constant attention to its condition and the forces which affect it is mandatory.

With the nation in an economy experiencing the spiral of a rising prosperity, it becomes easy to postpone general maintenance work on properties because of the shortages of labor, high costs, and some scarcity of suitable materials. This outlook gives rise to neglect through failure to maintain and to temporary measures that often lead to far greater eventual total expense in the long run. Thus physical deterioration is accelerated to a greater rate than under conditions of normal use and realistic maintenance. **

To many, maintenance is regarded as a function of a janitorial nature more than one of more serious scope. Maintenance is often a concept of repair to that which is faulty rather than a program to prevent and forestall actual faulty condition. Vital services that permit a building to

* 11 Dec. 1944

** 11 Fall 1948

operate are more often that not either concealed within the walls or located in places that are not within easy observation for the casual person frequenting the place. Insurance and public agency inspections provide a check on the inaccessible to some extent but are intended to hold conditions above that level at which operation is unwise or uninsurable. All items that need maintenance are not covered by such inspections as such therefore, maintenance programing should aim for a position between the minimum standard and perfection. The battle for a successful air conditioning operation may be won with a careful maintenance schedule during the winter months.

To the investor of average outlook, some means of protection for his investment becomes nearly instinctive, and to this end some counsel or service is worthy of its hire. This distinction is not always clearly discernable with the case of the real estate investor; yet for the seventeen year period from 1939 to 1955, real estate yields averaged some 7.7% * and the protection of such an income producing investment to the extend of maintenance would seem a natural and logical precaution.

LOSS OF OPERATION:

With a unit of machinery, whether of the very delicate variety or not, there is a theoretical point of wear beyond

* 11 Fall 1956

which operation of the unit becomes ineffective or impossible or both. Machine unit operation requires maintenance before the inoperative status is reached. With an automobile, users would agree that a certain amount of care of the vehicle results in reliable transportation with a minimum of breakdown. So too, with a building, repair and maintenance can keep its function intact and at full efficiency.

The continuity of the utility services borders upon being a necessity for the occupants of a building. Temporary shut down of the utilities can usually be tolerated under conditions that require it. Such shut downs, if anticipated (whenever possible) and planned carefully can be accomplished with very little if any interference with the routine of the building. Frequent disruptions of the services with no warning to the occupants endanger the operation whether on the part of tenants or employees. Aside from inconvenience, shut downs are expensive and to minimize them is the desire of all property owners.

The battle for the minimization of maintenance is often lost on the drawing board when a building is proposed for construction. These maintenance difficulties arise both from failure to consider the maintenance aspect of a structure and failure to appreciate fully the uses to which all quarters of the structure are to be subjected. Some part of these problems might be greatly reduced or eliminated with the

provision of access devices to maintain concealed utility services. Another portion of at least a partial solution would lie within the scope of having the drawings of a building conform to the actual locations and specifications of the various distribution systems of the plant. Violations of the drawings either in the actual construction (often made to adjust to variations not foreseen at the time plans were drawn) or in subsequent repairs and changes in the facilities are not uncommon. Oversight or failure to keep drawings up to date can cause havoc with subsequent problems. *

Total elimination of all operational loss is an ideal condition, for in the due process of orderly maintenance, it becomes necessary to restrict the use of certain functions in the performance of the maintenance function. With some degree of ingenuity in planning, any restriction necessary can be minimized to a large extent. Devices that can be used for this are: odd or off time crews, vacation periods that coincide with work to be undertaken, and perhaps the least desirable but often necessary use of overtime work of regular workers during week ends or evenings.

Even with the utmost care in planning and administration of the maintenance program, unforeseen emergencies do arise. To meet an emergency, a well organized plant can usu-

ally rally to a given situation more effectively than one in which there has been little or no thought given to reasonable possibility. Again, access to the vital points of the building, with key personnel informed of alternatives to meet the unusual can expedite intelligent action. Certainly no better example of this type of thinking would be the structure and premise behind the Civilian Defense program. The effectiveness of preparedness might well be illustrated further with the actions or lack of them by the populace involved with any disaster. That training and programing of personnel to meet emergency bears merit, proof is plentifully supplied by the numerous wartime exploits within our armed services.

INEFFICIENCY RESULTS:

"Sending a boy to do a man's work" is a common enough expression loosely used to describe what can be termed as the inefficient utilization of labor. The basic urge to accomplish maximum results with minimum expense can be the motivation that will lead to a false economy. It is not difficult with a willing and interested employee at hand to extend his ability to cover nearly any contingency that arises. In dealing with a building and its equipment, procedure of this sort can lead to costly repairs and replacements either as a direct result or as an indirect result, neither one of which is readily recognized. Expediency use

of personnel causes inefficiency of maintenance results. *

Modern thinking is along the lines of speed in many ways of application. Speed in the building and construction field is no exception. Architects and contractors have used their utmost ingenuity in the development of speed in modern construction. Structural steel and masonry units have cut construction time requirements to what seems like an irreducible minimum, and coupled with the use of portable hoists and rigging, present day construction speed records are made possible. Today, a new building develops in a surprisingly short time. Before the structural steel of the top floors is in place, the workmen start to set masonry units in place, and shortly thereafter electricians, plumbers, carpenters, plasterers, and painters are working at top speed and simultaneously.

There have been both good and bad effects from the high-speed construction methods. The outstandingly good features are: (1) the reduction of steel and masonry unit costs, and (2) the reduction of the period of time over which the property does not produce. The bad effects of this ultra speed are highlighted by: (1) poor workmanship, (2) faulty design, (3) improper relationship of materials. **

Also, the high-speed methods make necessary immediate steps to start maintenance upon the building

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** 11 Feb. 1938

completion. Under the old-time methods of construction, a building would require practically no major maintenance for upwards of ten years. Thus buildings erected before 1920, have in general, cost the owners less to maintain than buildings erected since. *

From whatever sources the need for maintenance arises, the efficiency or lack of it can be traced to the effectiveness of the control or management over it. Constant follow-up, care in incorporate new thinking, recognition of problems that occur, and review of the operation of the maintenance procedures are necessary to prevent the deterioration of accomplishment that the results of inefficiency can bring.

IV PROGRAM ESTABLISHMENT

To each business belongs the problem of decision in the formulating of policy to determine the scope of maintenance that is both necessary and commensurate with the ability of the business to support. The policy governing maintenance, like other policies, has to be varied from time to time to meet the pressures of changing conditions as they arise. To regard any policy as irrevocable is foolhardy, so that standing plans or standards must be used for the repetitive aspects of the operation, and overall policy must be sufficiently flexible to permit effective administration under it. *

ATTAINMENT DESIRED:

In thinking of the degree to which a maintenance program should be carried, consider the habits of automobile owners. On the one hand is the owner who regards his vehicle as a slave; demands service, and extends care only to the extent of gasoline in the tank and that only because of necessity, additional attention when forced upon him. On the other hand is the owner who preserves his car beyond all reason: hesitates to use the car if the weather is uncertain, spends more time wiping and polishing than in use of it, and carries the care and attention to the point that transportation becomes the least of the relationship.

So in the realm of building maintenance, there can be extremes in the goals of attainment. The use of the building should be and remain the paramount purpose of its conception and construction. The investment in the materials of which it is made prohibits the preservationist approach and abhors the approach in which the property becomes a candidate for the slum area label. A practical working maintenance program must operate between the two extremes.

Perhaps no other organization in the world has the diversity of plant and geographical scope of problem that the United States Army Maintenance Program handles. The program is guided by a simple set of objectives that frame and state its purpose. For examination, the General Objectives of the Army Maintenance Program follow:

A. To furnish utilities services, fire protection, management and other services at Army installations in accordance with operating policies which emphasize conservation of resources and economy of operation.

B. To provide maintenance and repair to real property and appurtenant facilities sufficient to protect the facilities from deterioration beyond normal wear and tear and to assure their economical and efficient utilization for the expected period of use.

C. To accomplish alterations, additions and other modifications to existing facilities and minor construction, as necessary to provide adequate facilities for using facilities.

D. To provide maintenance and services, and appropriate lay-up measures, for inactive facilities sufficient only to permit reactivation as required. *

These objectives might serve as a guide to the formulation of an operating policy or a set of objectives for any concern. The magnitude of the policy as it exists is wide and in itself has to be modified to fit the individual circumstance. Military maintenance planning provides for constant study and observation of the resulting system; and for the incorporation of change as advisable. The system is quite flexible and adapts to a post where expandable structures exist along with permanent ones.

For an office or bank building a more detailed plan might be necessary for guidance of the maintenance and management function. Such an outline follows in full and is from a concern that wishes not to be identified. This firm operates a large building which is about one half rental and one half self occupied.

1. BASIC FUNCTION:

Operate, maintain and rent the real property and provide for its security.

2. GENERAL OBJECTIVES AND RESPONSIBILITIES are to
 - a. Operate the main building, annex, and the parking lots providing all necessary services requirements of heat, light, power, elevator service, etc.
 - b. Maintain the main building, annex and all parking lots providing all necessary services required for good housekeeping and proper upkeep of the properties.
 - c. Rent those areas designated by management as not required for Company use and negotiate the provisions of leases when demanded.
 - d. Provide for the security of the home office buildings and contents through proper safeguards against fire and unauthorized entrance and maintain emergency fire fighting equipment and night watchman service. (Responsibility for the security of the Security Vault and its protective devices resides in the financial division.)
 - e. Supervise the work of outside contractors on alterations and construction and the installation of building equipment.
 - f. Maintain home office furniture, cleaning and polishing on schedules, and move either in and out of stock of within departments as requested.
3. REPORTS
 - a. The manager will prepare early in January each year and submit to the Vice President in charge for inclusion in his report to the President a report of what your department has accomplished during the calendar year preceeding, including comparisons between goals achieved and those previously planned, and in addition, what you expect to accomplish in the next year.

- b. The manager will develop and submit to the Vice President in charge each year an itemized estimate of all expenditures for which need is to be anticipated for operating the department during the next year, the information to be used for the establishment of the Company annual budget.
- c. The manager will prepare and submit such progress reports as may be requested from time to time for presentation to the President.

4. LIMITS OF AUTHORITY

- a. Expenditures made for the operation within the annual budget allowances approved by management for the department are authorized.
- b. Ordering of services, supplies, furniture and equipment will be made in accordance with Company purchasing policy, which centralizes the control of purchasing in the purchasing department.
- c. Additions to, promotions of and salaries of personnel of the department will be made in accordance with company personnel policy as specified in Head of Department's manual.
- d. All changes in operating methods, policies or organization will be submitted to the Vice President for approval before being made effective. Recommendations for such changes should be initiated whenever indicated.

Not all maintenance can be termed or thought of as that which is absolutely necessary. To some forms of businesses, typified by banking and some office functions, maintenance may have other very important aspects. The setting for the productive performance involved may not ordinarily require more than good housekeeping. However, in banks, insurance companies and other businesses the feeling is that top level or superlative quarters are a part of a successful unit. Firms with this type of regard for appearances will support a more expensive maintenance program than will the rank and file of office operation. *

As with any accomplishment, so with maintenance, vagueness will not cause the materialization of results. Maintenance does not have to be an earthy routine of repetitive drudgery, but can present a challenge comparable to any field of endeavor.

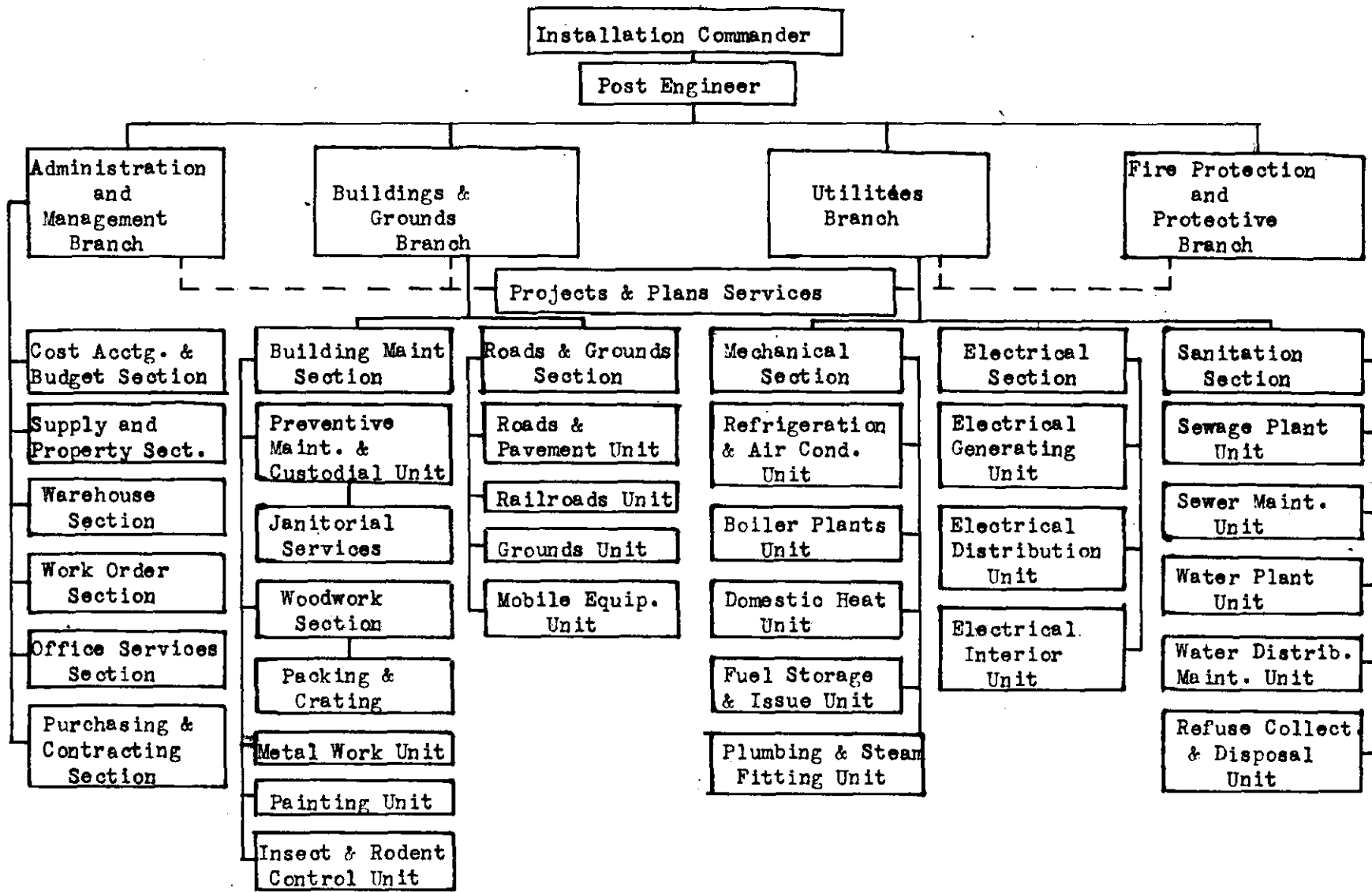
ORGANIZATIONAL POSITION:

The position of the maintenance personnel in current organizations probably occupies as varied a level of importance as any other group function. The maintenance operation cuts across most of the lines of command and ultimately comes in contact with nearly every individual in the company in its various capacities. Too low a position in the organi-

zation can result in conflict and scramble in the sequencing of events due to the lack of communication and representation at a reasonably high level.

Within the military, the organization is such that responsibilities for specific functions can be placed in a similar pattern at all levels, from the departmental down to the most remote installation where the work is actually performed. An important man in Army Maintenance organization is the post engineer. He has the same responsibilities on an Army post that a plant engineer has in industry, or that a building superintendent might have in an office or bank building. Since he is the custodian of all real property on the post, it is his job to determine which items of work require immediate attention and which can be placed on backlog when resources are limited. A standard organizational chart of a post engineer and the variety of facilities under his responsibility are as shown in the accompanying chart. *

Upon examination of the Post Engineer's chart, the various subdivisions indicate a comprehensive coverage of a sizeable operation. However, such a chart does not necessarily mean one man or more for each box on the chart, and responsibility for the functions indicated can be grouped and inter-related for as many or as few men as the unit may require in application to a post. Also, in some cases, some of the func-



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tions may be eliminated and/or others substituted; but with the same typical structure. The Post Engineer reports directly to the installation commander.

By comparison with the highly organized system in effect in the military, there are large buildings that are operated by a crew of little more than diligent laborers. Properties throughout the country, in practically every town and city need property management. Costly structures are virtually run by janitors, and thousands of owners are paying staggering running expenses which could naturally be reduced or redistributed to considerable gain in the direction of funds better spent. *

MANAGEMENT EXPECTATIONS

To a management that has relegated the maintenance people to the lower classes of laborers or "janitors", and who has further adopted the attitude that no further attention need be paid to this portion of the personnel other than to make demands; expectations for performance fall short of results. Maintenance personnel are not geni capable of executing all desires as commands. Limitations of capabilities must be recognized in this field as in others. Repairs and correction of conditions take time for execution, time for the securing of materials, and time for the determination of cause. Some conditions require the services of

* 11 June 1934

skilled workmen trained for the particular job at hand.

Office building maintenance personnel are frequently not the highest paid persons in the building and some opportunity for advancement through training is desirable. * The assured adjustment of the worker in his work at any level repays management. With encouragement for training, provision of proper equipment, and explained performance standards; gains for the owners can be realized over the stagnant type of outlook towards the men servicing the building.

Some indication of the effectiveness of the maintenance program for a concern can be gained by a careful review of the existing program along the following lines:

1. Is there a clear cut work request procedure?
2. Is the work classified as to the performance time?
3. Is there a preference for certain types of work?
4. Is there any attempt to allocate time for the tasks requested?
5. Are jobs rated by importance or by "the squeakiest wheel gets the grease" method?
6. Is there a record of progress kept?
7. Is work planned in advance for the men:

* 11 Nov. 1936

8. Do big jobs take precedence over little ones?
9. Are completion dates met?
10. Are equipment preventive maintenance schedules set up?
11. Are requests for work initiated when need is noted?
12. Can any source render backlog information?
13. Are "rush" jobs handled properly?
14. Can the manpower requirements be forecasted?
15. Is there an amount of time scheduled for routine inspection tours and do they occur regularly? *

Should the answers to all the above questions be undisputably "yes", the program is in excellent control; however, if there are negative or vague answers to the questions, additional study and improvement upon the system is necessary. A completely fresh start is seldom possible or required, but a revised program with the weak points strengthened can accomplish the building of a successful maintenance program.

In the evaluation of an existing maintenance program, definite and specific objectives should be set down; these to be followed by goals for the direction and improvement; and some form of planned schedule for the accomplishment of the phases in the revision. The E.I. du Pont de Nemours company presently uses a system of evaluation for improvement

and time table for its accomplishment. The following two pages contain reproduced forms of the du Pont system with a basic data summary sheet and a time schedule for its accomplishment. *

The thinking of management towards maintenance must include sufficient skilled personnel with time allocated to them for the examination of the premises. It is difficult for maintenance people that are well occupied with their assigned tasks to anticipate contingency conditions. Within the maintenance function, one of the most important facets is the inspection, evaluation, and decision upon a course of action for any given problem.

MANAGEMENT POLICY

Management policy as regards maintenance can be divided into two classes at this point: one, the governing type of policy that determines the scope of maintenance; and two, the policy that determines the jurisdiction to be exercised over the personnel in the maintenance department. It is to the latter that attention is directed, for with the maintenance personnel working throughout the property and more or less in contact with the total personnel of the plant, organizational lines of authority become somewhat tangled.

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BASIC DATA SUMMARY SHEET

	Factors	Present Survey	Future Goal
PLANNING	Labor effectiveness	65.0%	80.0%
	Percentage of total man-hours of maintenance on work planned and forecast weekly	50.0%	85.0%
	Percentage of total man-hours for emergency work per month	15.0%	4.0%
	Percentage of total man-hours for overtime worked per month	8.0%	2.0%
	Crew weeks of current backlog	5.0 weeks	3.0 weeks
WORK LOAD	Crew weeks of total backlog	8.5	5.0
	Percentage of total man-hours per month for preventive maintenance	10.0%	25.0%
	Percentage of total man-hours per month for daily maintenance work	90.0%	75.0%
	Maintenance cost as a percentage of plant investment	10.5%	6.0%
COST	Per cent increase or decrease in maintenance cost per unit of product produced over a base period	+ 15.0%	- 10.0%
	Percentage of total maintenance dollar cost for direct and general maintenance	65.0%	85.0%
	Percentage of total maintenance dollar cost for indirect maintenance	35.0%	15.0%
	Maintenance activity as expressed by percentage of manpower productively engaged	55.0%	75.0%
PRODUCTIVITY	Percentage of forecasting effectiveness	40.0%	75.0%
	Percentage of operating time lost in mechanical downtime for maintenance reasons	12.0%	3.0%
	Per cent increase or decrease in number of units of product produced per maintenance dollar over a base period	+ 17.0%	+ 12.0%

TYPICAL IMPROVEMENT PROGRAM WITH SCHEDULE

	Schedule of months to be effective											
ORGANIZATION	1	2										
Structure	1											
Functions & responsibilities		2										
PROCEDURES & CONTROLS		2	3	4								
Work order		2										
Backlog		2										
Emergency & overtime			3									
Cost controls		2	3	4								
PLANNING & SCHEDULING			3	4	5	6	7	8	9			
Job preplanning			3	4	5	6	7	8				
Weekly forecasting				4	5	6	7	8	9			
Daily scheduling				4	5	6	7	8				
PREVENTIVE MAINTENANCE	1	2	3	4	5	6	7	8	9	10	11	12
Work load study	1	2										
Inspections & overhauls, etc.			3	4	5	6	7	8	9	10	11	12
CORRECTIVE MAINTENANCE							7	8	9	10	11	12
Changes in design							7	8	9	10	11	12
Technological improvements							7	8	9	10	11	12
STANDARDIZATION		2	3	4	5	6	7	8	9	10	11	12
Crew sizes		2	3									
Job standardization - tools			3	4	5	6	7	8	9	10	11	12
TRAINING	1	2	3	4	5	6	7	8	9	10	11	12
Selection & upgrading		2	3	4	5	6	7					
Mechanics training			3	4	5	6	7	8	9	10	11	12
Engineer & supervisory	1	2	3	4	5	6	7	8	9	10	11	12
MAINTENANCE MEASUREMENT				4	5	6	7	8	9	10	11	12

Typical of a 12-month schedule for the organized improvement of maintenance performance

Individual preference or convenience cannot be served throughout the plant and still serve the best interests of the maintenance program. The two aspects of this situation are the personnel and personal individual preferences or conveniences.

There are parts of the maintenance program that entail work being done in off hours, and others that parts that for one reason or another have to be done during the span of business hours. Sacrifice of maintenance efficiency for the preference of a small group results in costs being assessed to maintenance that are the fault of others. The matter of convenience to non-maintenance personnel is one that should be decided by the supervisors that are concerned with the inconvenience. Maintenance of the business facilities has to be integrated with the operation of the business. In the cases of large projects that involve several weeks, top level management should make the decisions as to timing. *

The personal angle of the maintenance department is one on which a good many officials kid themselves, and yet the "government work" goes on in every business. The President's wife wants a toaster fixed, the plant manager's car bumper has to be straightened, a VIP has to have transportation to the nearest airport; why does the maintenance

department do this work at all? Put yourself in the shoes of the superintendent. These requests come, if through him, for the most part from people who rank him in the organization or from men with whom he has to work every day in the year. Management should either stop this practice or else provide some way to allocate the charges so they won't make the maintenance department look bad when the department is being measured.

VARIATION OF FUNCTION

Under the cloak of the maintenance title comes a seemingly never ending stream of function and duty. Much of this is determined by the form of organizational set up in the individual case. The building superintendent may be merely a glorified watchman's position on the one hand, and on the other may be the most inclusive type of position requiring a highly trained man of considerable experience.

Within a highly organized building crew such as in the United Nations Building in New York, or the Pentagon in Washington, there exists within the crew duplicate workmen for performing the same duty. By far the more common case requires that one person perform more than one type of duty in order to occupy a full time position. In this more common type of case, it is quite difficult to evaluate the job being done from the variety of duties that may be included

in the one man's day to day actual operation. In an office building, there is frequently need for the swapping around of personnel to cover the basic requirements during the noon hour, for the duration of an emergency, for the coverage of an absent employee, or for the accomodation of special events. This same problem arises in bank building procedure to a greater extent due to the necessary security precautions that have to be exercised continually. *

To more adequately present the circumstances in which a bank becomes involved in the matter of variety of function, a chart showing the main duties of the six man crew that mans a six floor bank building that houses some 260 workers appears on the following page. From the chart, one can see that with three of the six men being required to cover the rear door, elevator, and lobby attendant post respectively; the thin spots of personnel coverage occur during the noon hour and between four and five o'clock. Brief relief for the three restrictive jobs is provided during the day by any of the other three who are available; these reliefs are on an informal basis. The duties of the three general workers include: bulb replacement, tending the boilers and air conditioning units, furniture moving, cleaning, care of bank cars, sidewalk cleaning, minor leaks, supplies distribution, errands, as well as some cleaning and maintenance for four

HOURS	7 AM	8	9	10	11	12 NOON	1	2	3	4	5	6 PM
EMPLOYEES												
1. REAR DOOR	←-----> α ←----->											
2. ELEVATOR	----- α -----											
3. LOBBY ATTENDANT α											
4. GENERAL	-G-G- α -----> G-G-G ←-----> OR UNTIL VAULTS CLOSE											
5. GENERAL	-G-G-G-G-G-G ←-----> α -G-G-											
6. GENERAL	-G-G-G-G-G-G α -G-G-G-											
AVAILABLE MEN EACH HOUR	4	5	6	6	5	3	4	5	5	2	1	+ NIGHT CLEANERS

KEY

- ←-----> REAR DOOR
 - LOBBY ATTENDANT
 - |-----| FRONT ELEVATOR
 - G-G- GENERAL WORK
 - α LUNCH HOUR
- } 100% COVERAGE REQUIRED

BUILDINGS CREW
 DAY TIME WORK SCHEDULE
 MAIN OFFICE

6 FLOORS
 260 EMPLOYEES

APRIL 10, 1957
 K.W.F.

local branch offices. Vacation periods, illnesses, and special events necessitate additional coverage by the same men, an extra man called in temporarily, or some sacrifice in the performance of the group. *

Over and above these more obvious types of shifts that bring about a variety of duty for the individual worker, the flow and tide of events within the function of the maintenance program seldom results in a repeating pattern of jobs to be done. This is less true the larger the plant under consideration wherein there is a greater opportunity for the establishment of standards and routines. In the smaller to average sized plants, the depth of the maintenance crew is usually not so great and the variety increases. The variety tends to be least in the true custodial operations, more in the preventive maintenance operations, and greatest in the repair type of operation. **

The variation of function can be lessened to some extent if the scope of the maintenance program is properly fitted to the size of the maintenance force. A realistic evaluation of the work force available for maintenance in light of the work to be performed is not a simple matter, and it becomes all the more difficult when work load excess necessitates outside services. This choice between use of

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the normal force and the use of outside service exerts some pressure towards the extension of the regular worker's skill and ability.

EQUITY IN CONSIDERATIONS

In the small to average sized plant, one without the benefits of a sufficiently large maintenance crew to establish specific and specialist type duties for each man, the maintenance force occupies a blanket-like type of position - one that covers the somehow expected performance. Within such a classification, despite the job and its worth or the performance of the individual in it, considerations are largely accorded in order of seniority if at all. The crew are often regarded as janitors and the term carries a stigma in the minds of management to the point that recognition is awarded to a lesser degree than to the more measurable efforts or efforts directly related to the main business function. *

Maintenance employees are certainly part of the total makeup of the organization and should be entitled to the stated benefits of a company as well as to the considerations not specifically stated but generally accorded. That this group should be set apart from the company in any way indirectly or in fact may lead to just the situation

that management would seek to avoid in view of the disjointed stratified organizational consequences. The social program of a concern is presumably for its employees and as employees, the custodians and the maintenance crew have cause to be slighted if not included. Yet, it is not uncommon for the maintenance crew to be regarded as the "strong back - weak mind" part of the outfit, and their place must be kept. *

In the matter of financial recognition accorded to the maintenance crew, the normal occurrence of overtime work is sometimes the basis for neglecting wage increases for this group; the total year's wage used for gauging measurement of wage evaluation. Since overtime is usually for the company's accomodation even more than for the financial desires of the personnel, the overtime wages paid the maintenance workers should hardly effect policy regarding wage raises. If anything, the willingness to undertake the extra duty might well enter into the thinking as regards to merit rating of the worker. Overtime work is often listed in management texts as one of the means of expanding the production without the hiring of additional personnel, and as such, benefits the company far more than the personnel.

In all respects and to the greatest extent practicable, the same company considerations that are extended to the rank and file employees should be extended to the main-

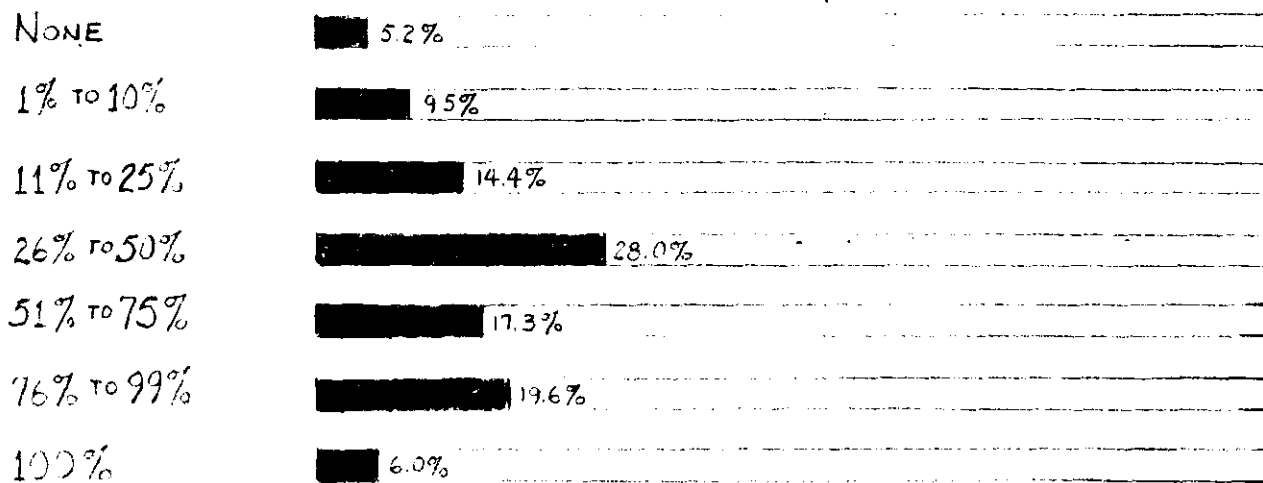
tenance workers as well. In office and bank operations, there are frequently sponsored courses for the clerks, tellers, accountants, and other groups designed to help realize greater potential from the individual as well as elevation within the organization. Granted that the maintenance force would not fit into the existing educational programs, there is ample opportunity for a company to encourage attendance at evening trade school courses. To accomplish the elevation of a capable janitor to say the level of a licensed electrician or a plumber is to secure greater potential both for the company and the employee.

WORK SCHEDULING

Proper work planning will raise maintenance efficiency by providing: (1) Adequate preparation, which includes tools, materials, parts, and men; (2) Formal instructions to the workers as to the order of work; (3) Proper tie-in between crafts; (4) Proper job priority so that downtime can be held at a minimum; and (5) Insurance that all jobs are completed once they are started. This phase of maintenance is often the most neglected as evidenced by the findings of McGraw-Hill Research Department shown on the chart on the following page. As a result, the improvement of planning and work scheduling methods usually bring the largest and most immediate pay-off. *

PERCENTAGE
EXTENT OF FORMALLY
SCHEDULED
WORK ORDERS

PERCENTAGE OF THOSE REPORTING



1953 MCGRAW-HILL RESEARCH DEPT.
12% OF U.S. MFG'G. PLANTS REPORTING

The main argument against work scheduling seems to be that rush jobs and breakdowns continuously interfere with any attempt at planning ahead. This argument indicates that preventive maintenance is poor or that too detailed a job of planning is being attempted or that planning procedures have been misguided to exclusion of flexibility. Maintenance planning and scheduling that can anticipate 80% or more of the work a day ahead is good. *

In the scheduling of work, some sort of priority must be established for the attention to be given to individual tasks to be done. Normally, the following general breakdown will suffice:

1. Repairs that are occasioned by breakdown.
2. Repairs that are a result of inspections.
3. Repairs that, if not made, will result in hazard to workers.
4. Repairs that, if not made, will result in loss of product or breakage of machinery.
5. Routine plant requests.
6. Alterations or capitalized jobs.

With a list such as this for the classification of jobs, and a record of work to be done, the maintenance supervisor can exert control with the over-all needs of the entire operation. Each man can have a list or source of information as to what

is to be done next. Oral orders and top of the head supervision leads to spotty sequencing, items not done through oversight, and time wasted by the men waiting or looking for the supervisor to give information as to what work to do. *

Scheduling not only results in the increased efficiency of the maintenance program, but allows records to be kept that aid in the detecting of repetitive repairs, that aid in the estimation of future operation, and that aid in the evaluation of methods and men. In the final analysis, scheduling to keep all personnel busy while fully satisfying the maintenance function depends upon allowed expenditure, company policy, crew potential, and the actual need of the business to be served.

EVALUATION THROUGH COMPARISONS

Top management executives of the operating and maintenance group become very conscious of the impact of maintenance costs on narrowing profit margins. These officials bombard likely sources of information with inquiries for data on costs that in almost every case they want to use as a yardstick for gaging the performance of their own company. It would be in error to say that cost data on the subject are valueless for they do help to indicate how one stands in his field, particularly if the data has been developed on a fairly

comparable basis - but that happens very infrequently. Comparison of maintenance cost data is much like judging brain power on the basis of hat size. To be sure, one can determine costs for maintenance in his plant or what it costs for the industry; but to determine what maintenance should cost within a plant constitutes a large difference. *

There are several basic points on which comparisons made should be examined before validity can be established.

These are:

1. Definition of Maintenance
2. Age and condition of buildings and equipment
3. Type of operation
4. Quality of maintenance
5. Efficiency of maintenance force
6. Accounting standards
7. Labor costs
8. Amount of mechanization

Maintenance stands considerably behind production in its progress towards the use of scientific methods and tools, so that it's still immature. Management is on the right track in wanting to examine the costs of maintenance, but it makes a mistake in wanting to appraise its own performance by what others are doing.

Either in review of an existing maintenance program or in the establishment of a new program, the first step would be to determine the optimum amount of service to be rendered by maintenance that will produce a minimum total cost result. Some inquiry and investigation into whether or not the need for maintenance has "backed up" in the preceding years to the point that abnormal expenditures may be required to catch up. Having arrived at some evaluation of the historical and present need for maintenance, the present or normal need for service might be broken down into the following categories:

1. Items that can justify preventive inspections, periodic overhauls, or changes.
2. Routine service that logically devolves upon the maintenance function to perform, and the time to perform it.
3. Items that might be best maintained by non-scheduled requisition from operating supervisors.
4. Items that may be pre-planned and held for fill-in jobs.
5. Items as emergency anticipation and the desired capacity or potential to allow necessary action.

With these classifications listed in some detail, the amount of labor for the work deemed proper can be budgeted. *

COST

In an economy of rising prices, maintenance along with the general trend has been no exception and maintenance costs have risen to some extent. Evidence of rising maintenance costs has been presented in previous tables throughout this writing. The wisdom of not making direct comparisons has already been pointed out. However, to ascertain one's relative standing in the matter of maintenance costs, some data on costs and discussion of it follow.

Perhaps the most cost conscious group of building operators are those who are concerned to a high degree in the rental aspects of the building they operate. At least the owners of self use buildings, whether partially rented or not, have not formed large associations for mutual benefit. Industrial concerns are very conscious of maintenance costs and data on these industrial firms is fairly plentiful showing the number of maintenance workers per productive employee, per horsepower of connected load, per square foot of manufacturing area, and per employee of various classified groups; all separated as to the particular type of major industry. Data of this type has little bearing upon a bank or office building due to the lack of similarity in the very nature of the maintenance function. Within the bank and office building class, there is little correlation as to the size of operation and whether the maintenance is by outside service

concerns or by self-employed labor or a combination of both. Office building figures available will be used to illustrate maintenance cost status.

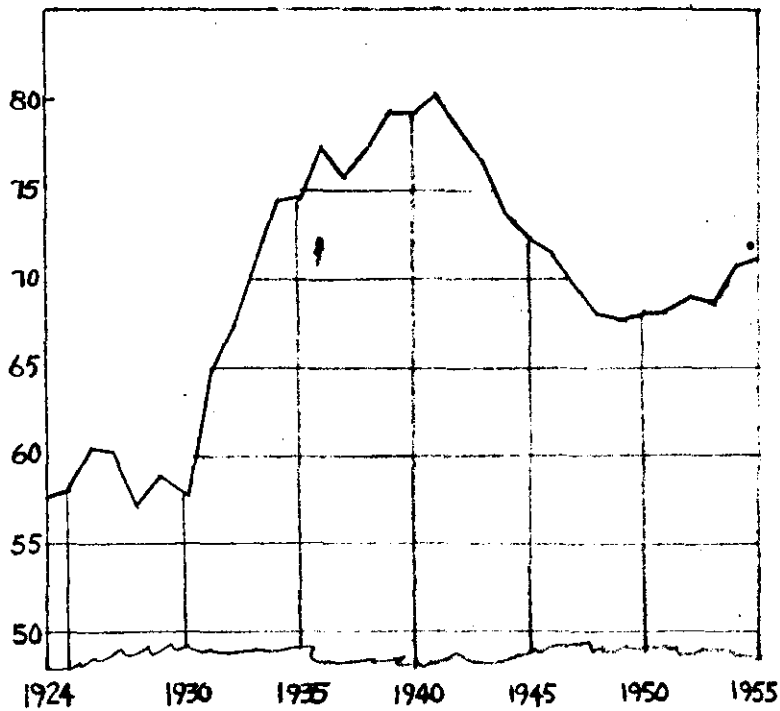
The chart on the next page pictures the movement of the operating ratio over thirty years. This ratio of total building expense to revenue dollar reflects the growing size of operational cost and the higher this percentage, the less that remains to cover financial requirements including investment return. This graph reminds one that there was an unhappy period some years back when the operating ratio got badly out of hand. Decline from this peak of 1941 was sharp and reassuring, as far as it went, but it stopped 10 points above the level from which it originally rose.

While the increase in operating ratio of one half of one percent in 1955 may be nothing to view with alarm, it seems to confirm a renewal of the upward trend which the industry should not regard lightly. Formerly, 60% was generally accepted as "normal." It would now appear that a new pattern is in the making, with the norm in the neighborhood of 70%. With the introduction of new types of service, and labor taking a larger share, the income dollar does not go as far as it once did. *

Closely related to the operating ratio is the condition of the occupancy figures for office buildings. Vacant

OPERATING RATIO

$$\left(\frac{\text{TOTAL BUILDING EXPENSE}}{\text{REVENUE DOLLAR}} \right)$$



1954 EXPERIENCE EXCHANGE
REPORT OF NAT'L ASSOC.
OF BLDG. OWNERS & MGR'S.

space is non-productive but is not without expense. In the present instance, however, this affords little in the way of a clue, for the occupancy of office buildings stands just where it did a year ago - at 97.7%

In the analysis of cost figures, it is always interesting to determine the control over the costs is exerted both as to the extent of control and by whom. Several systems are in common use for the control of costs: one is to have authority of approval stratified with various stepped amounts under the control of the various levels within the organization; another is to have minimum dollar amounts over which an estimate in writing is required; while still others exert only occasional checks whenever the correct supervisor is either moved by interest or by cost reduction motivations. The graph on the following page illustrates the variance in responsibility for the authorization of different classes of expense. *

There are numerous sources of detailed data available on different types of costs for maintenance. These sources vary greatly in purpose for which they are compiled, and the purpose behind the data and its arrangement may be part of a sales campaign for a particular product or possibly a more or less loosely defined class within a census taking or survey all of whose motivating drives may be intended for anything but the application of the data to one's own specific

case. Two examples of this cost data portrayal follow. In the case of the "Cost Comparison" chart, the \$2.27 cost per square foot for an income of \$3.15 per square foot bears out the operating ratio for the same year of some 72%. In the case of the "Analysis of Cleaning Costs" chart, it is of interest to note that over the 500 buildings reporting that the average cleaning cost figure falls at just under 50¢ per square foot; but it is quite significant to note the considerable variation of the costs on both sides of the average.

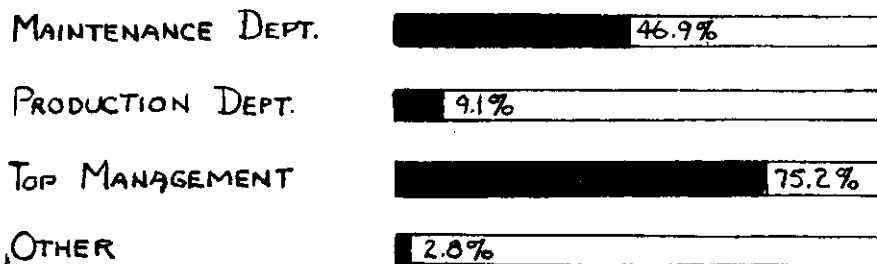
During the examination of cost data from sources that are not from a source with which one has any intimacy, there are more often than not desires to know more about the figures and what they truly represent in terms of one's own situation. Certainly the matter of interpretation of cost information demands attention whether from a source internal or external to a business operation.

INTERPRETATION

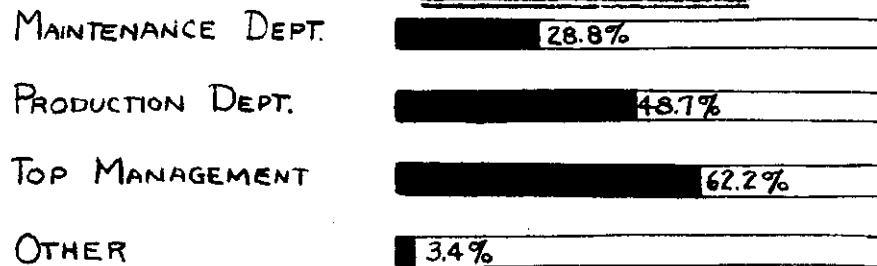
In the interpretation of data of any sort, one has to adjust for differences between the source and his own set of circumstances. One yardstick to use for adjustment guidance is reference to the eight points to check before establishment of validity for a comparison. These eight points can be found in the previous section on "Evaluation Through Comparisons".

DEPARTMENT RESPONSIBLE FOR EXPENSE
AUTHORIZATION
FOR EACH OF THE FOLLOWING

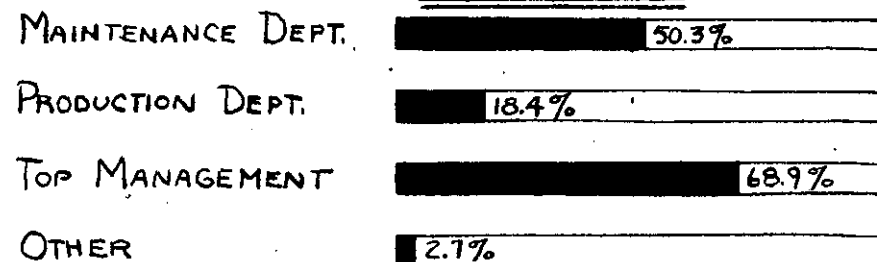
BUILDINGS



PRODUCTION EQUIPMENT



PLANT EQUIPMENT

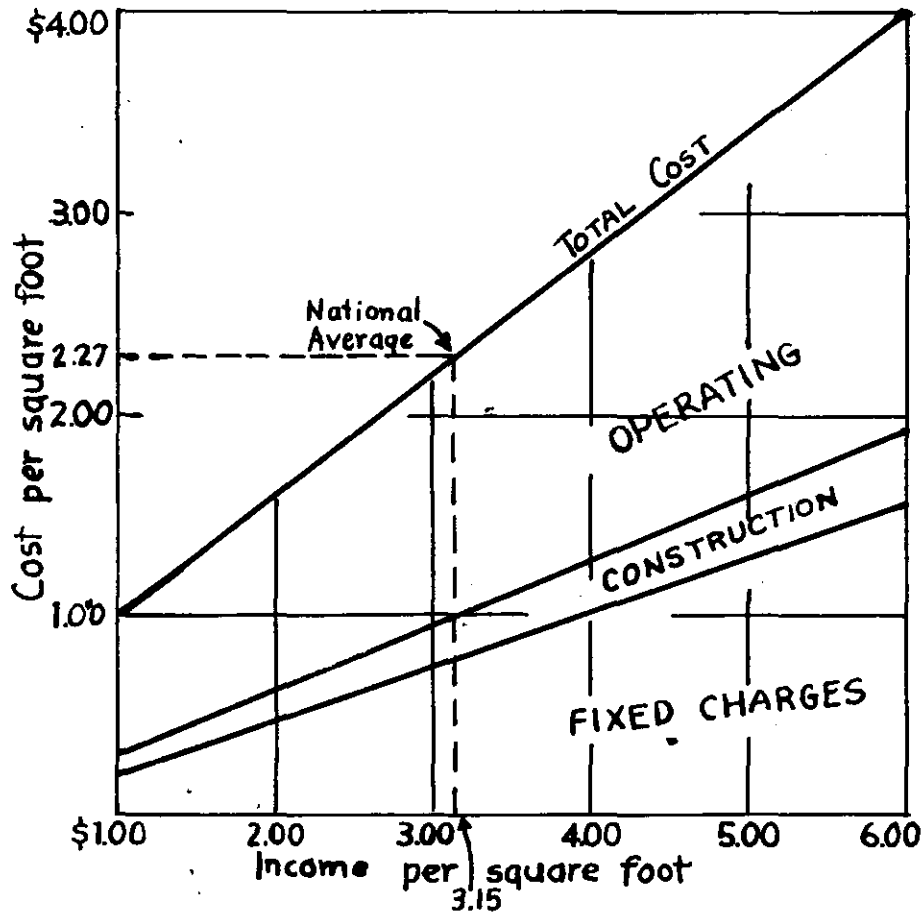


(MORE THAN ONE ANSWER FROM SOME PLANTS)

1953 MCGRAW-HILL RESEARCH
DEPARTMENT

COST COMPARISON

On Income Relationship Basis



1954 NATIONAL ASSOCIATION
OF BUILDING OWNERS &
MANAGERS EXPERIENCE
EXCHANGE REPORTS

ANALYSIS OF CLEANING COSTS

NUMBER OF BUILDINGS	RANGE ¢ PER SQ. FT.	AVERAGE WITHIN RANGE
19	UNDER .20¢	.131
79	.20 to .30¢	.252
105	.30 to .40¢	.347
129	.40 to .50¢	.447
88	.50 to .60¢	.548
40	.60 to .70¢	.640
22	.70 to .80¢	.742
18	.80 AND OVER	.875
500		.472

1954 EXPERIENCE EXCHANGE REPORT
OF NAT'L ASSOC. OF BLDG. OWNERS
AND MANAGERS

Under the definition of maintenance validity point, no two plants include the identical functions in their maintenance program. Some plants include porters, watchmen, salvage - some don't. In the McGraw-Hill Company's Research Department report, the table on the following page appeared to show the disparity of function covered by the maintenance department in various plants according to number of employees. These figures are tabulated as a percentage of those plants in which the service is performed. While this table does not include every possible maintenance function, it does include enough of the normal grouping to indicate a trend. As the plant gets larger, so do the responsibilities of the maintenance department, in fact it is rare that a plant over 1000 employees in labor force size has a maintenance department whose responsibility doesn't cover almost everything in sight; exceptions being highly specialized jobs that call for people with skill and knowledge beyond the scope of the department.

As a plant and equipment gets older, it requires more and more maintenance. The type of operation involved in the specific building will vary the maintenance requirements according to the number of employees passing through the quarters, the location and class of business, and the nature of the business. The quality of maintenance that prevails, as determined by management policy, will reflect

SERVICES FOR WHICH THE MAINTENANCE DEPARTMENT IS RESPONSIBLE

	Number of Employees			
	<u>101-250</u>	<u>251-500</u>	<u>501-1000</u>	<u>Over 1000</u>
Bldg. inspection & upkeep	87%	96%	88%	88%
Mtce. planning & control	55%	80%	84%	85%
Mtce. of electric equip.	73%	93%	95%	99%
Repair electrical equip.	70%	90%	93%	98%
Mtce. mechanical equip.	93%	91%	98%	98%
Repair mechanical equip.	91%	93%	98%	98%
Mtce. industrial trucks	60%	71%	91%	89%
Lighting	75%	88%	98%	97%
Lub. plant equip.	82%	87%	83%	99%
Sanitation	65%	78%	86%	92%
Wiring	71%	93%	88%	99%

different data patterns. To estimate quality, an inspection of the premises is almost necessary unless a detailed maintenance sequence is provided. The efficiency of the maintenance force is a point that is again difficult to determine, but proper organization, good supervision, good equipment, and a good shop play a big hand in this.

There is no standard maintenance accounting system. Some plants throw engineering costs into maintenance, or experimental costs. Some make no distinction in allocating cost of upkeep, repairs, or replacement. In some plants lots of maintenance isn't labeled as such, and gets into other accounts. Perhaps even worse, lots of non-maintenance gets charged to maintenance. The more highly mechanized operations need more maintenance, hence maintenance costs are proportionately higher. Savings in direct labor, however, may be many times greater. So of what use is even a direct-indirect labor ratio comparison?

Last but by no means least, the item of labor costs that are included in data are perhaps the most misleading of all other items. Dollar-wise one can hardly compare maintenance labor costs because hourly wages differ greatly from locality to locality. Labor for the maintenance force in a unionized shop may preclude any overlapping of the trade skills in the force; whereas in the non-unionized shop a "broad-gage" worker can overlap into several of the trades that border

upon the particular specialty he may have. The competition for labor within a locality and the degree to which skilled labor is available casts definite cost and performance results into data compilations.

CONCLUSIONS

Conclusions on a subject such as this one cannot be boiled down to an empirical essence that can be applied as a panacea for all those who are engaged in the field. Maintenance in the purest sense possible, is filled with variables even within the smallest subdivisions of specialty operations. General lines of reasoning drawn from the experience of proven results and from the substantiated findings of qualified people in the field must form a perceptible portion of the facts for the further progress of maintenance activity.

All maintenance cannot be a product of the past experience and present knowledge of existing methods, but must have some projection into the future in order to accomplish progress in the use of new systems, new materials, and new methods. As a field of endeavor, maintenance is often held as a necessary but humdrum part of operations. However, where maintenance is accorded attention commensurate with the type of business it serves, maintenance can serve to safeguard the continuity of a successful operation. With building costs rising, along with taxes and labor, the urgent need for an integrated program of maintenance becomes a vital concern for business executives.

DESIGN OF BUILDING

With the high cost of labor that is in effect, labor-saving devices that can realistically reduce operating expenses and thereby increase net income are in high regard. Net income has been higher, based upon historical data, when a minimum of special services are required for building maintenance. Special services and labor-saving devices as well as the efforts towards more scientific maintenance procedure are all directed to the basic fact that a building or plant that can be operated with the least personnel is the most profitable.

Buildings are frequently planned with major thoughts and efforts expended upon the space requirements of the occupants; utilities and building equipment relegated to the position of being a necessary adjunct to the whole, and included with concentration into a minimum space and space that can be spared with the least inconvenience to the operation. Sometimes motors, pump and sump pump shafts cannot be removed without first moving other equipment or removing part of the building. Doors, both internal and external, are frequently located without thought of operational demands that may be made upon them. Doorways provide access and are important for the flow and safety of personnel, however doors can amount to increased costs in the matter of receptionists, lobby attendants, watchmen or guards to maintain building

security. Architects and building designers should so completely understand the use of the building that the business operation is adequately housed and with a minimum of maintenance.

Present hardships in the matter of expanding the electrical distribution in buildings to keep pace with the current day power requirements might be lightened with provision for access and for the addition of more and heavier lines. Plumbing lines are notoriously inaccessible and yet with a twenty year life expectancy, one major expense in the long run maintenance operation could be eliminated with careful design for this contingency.

Building designers and architects can well afford to consult with people experienced in the maintenance of buildings to help effect a stabilizing influence on the maintenance that will be required of the owners. During the construction of a building, the presence of the maintenance man is as important as the presence of the engineer in charge of the construction, for having witnessed the building taking form, the maintenance man knows what is contained within the building for which he is to be held responsible. Consultation with the maintenance people will not defeat the architect's purpose but help to further the success of the completed structure.

COST REALISM

Maintenance costs reflect a combination of that which is necessary and that which is desirable. Desire can be so strong that it approaches the status of necessity. Unfortunately within the considerations for maintenance, much of the equipment and facilities is out of sight so that cost for the desired visual improvements is favored over the less obvious requirements.

"High quality maintenance pays off" according to Cecil A. Roberts, Superintendent of Buildings and Grounds at Harvard University. To substantiate this statement, a visit to the University will impress one with the condition of the buildings, many of them old by any reasonable standard of measurement. Within this fine program of building maintenance the necessities come first and the desires are scheduled in order of importance and the cost structure of carefully considered budgets.

The cost of maintenance must be recognized and not put off in an ostrich-like manner for the day of reckoning will eventually arrive. Maintenance costs can be regarded as a two-sided matter, one is the cost of the work under consideration and two, the ultimate cost if the work is put off until a later date. Frequently the ultimate cost is greater than the cost when first considered. An illustration

of this is in the consideration of material for the public lobby area of the floor. Ceramic tile flooring will run twice the cost of a good tile floor installation, but the maintenance of the tile over that of the ceramic tile will pay for the difference in the matter of seven to ten years.

It is difficult to control heat as closely as expected for all conditions under which a building is operated. The complexity of a modern system requires the services of an expert to insure proper operation of all of the devices for the control of the heat system; this service can be provided by an employee or a service contract with outside people. The cost of the service to the system on whatever basis may be too high for the satisfaction and at the expense of defeat to the high purpose of the designer, the system is converted from automatic to manual control. Realistic evaluation of the costs for heating system operation would have saved money.

Maintenance costs - catch-all for loosely classed items of the operation or maintenance in the legitimate sense of the care and repair of the buildings? Accounting procedures for the maintenance department ought to reflect just what the company intends for term. If watchmen come under the maintenance department, then watchmen's wages do not belong with the wages of the carpenters and electricians but in an account separated out to show what relationship the watchmen's wages show with respect to the rest of the maintenance department.

Stiffening of maintenance cost control and accounting is needed if management wishes to know what it costs to run the plant. There is little gain to struggle with reduction of maintenance costs if maintenance costs evade definition.

STANDARDS

From the work of Frederick W. Taylor and Frank Gilbreth much has been developed to standardize labor requirements for highly repetitive tasks in the industrial field. At present, application of this field of time and motion study has progressed beyond the expectations of these pioneers in the time-effort measurement area. In the field of maintenance, standards are being used with some degree of success. Standards are more difficult to apply in the type of non-repetitive repair job than in the routine type of task. It behooves a company to take the time to standardize their maintenance work.

Standards in maintenance work have to be established on a basis of time for the task rather than time for the motions and elements of the worker. The nature of natural variation in the course of much of maintenance work rules out the industrial approach of having each worker do a given job with exactly the same motion pattern in exactly the same time. Once standards are obtained for the maintenance functions,

comparisons of men, methods, and material are possible. These comparisons can lead to justifying a training program for maintenance personnel and with the compilation of data estimates of new or different work can be formulated on the basis of the particular experience of the building.

Standards can work for management and the worker alike. An incentive through standards allows workers to increase earnings to the extent of their capabilities. Higher morale amongst the maintenance workers can be achieved through the recognition of higher wages for greater effort. Standards are a necessary part of a fully integrated maintenance program.

SUMMARY

Maintenance is seldom part of the confidential matter of business competition. In other areas of business endeavor such as accounting, stenography, and statistics education is readily available for the procedural understanding necessary to enter into this phase of occupation. So too with maintenance, the basic understanding of procedure ought to be part of the educational offering. Training for the useful preservation of building assets is just as important as the training for the creation of them. The nature of maintenance depends upon some measure of experience and alertness on the part of the maintenance supervisors.

Experience and alertness in other fields is accelerated and encouraged by the free exchange of ideas through the medium of societies and meetings of like interested and employed persons. Greater use of the mutual exchange of experience in the maintenance area can accomplish much to elevate the function and hasten its growth.

Bank and office building maintenance managers can realize benefits from association with each other. Within a locality, common solutions to common problems would eliminate the need for each going their separate way and the duplication of efforts next door.

The difference between the maintenance supervisor of the past and the maintenance supervisor of the future must be the difference between the craftsman and the professional. It must not lie within the ability to buy a window shade or to order a paint job, but in the ability to decide what kind of shade or what kind of paint job to apply. These differences may well mean life and future profits rather than slow death of the property through obsolescence and depreciation. The future will see a new class of maintenance managers with a keen sense of obligation that goes with the stewardship of property responsibility and the desire to increase knowledge and to improve techniques.

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