MANAGEMENT OF MAINTENANCE AND OPERATIONS OF BUILDINGS AND GROUNDS OF STATE AGENCIES

REPORT OF THE

COMMISSION FOR ECONOMY IN GOVERNMENTAL EXPENDITURES

TO THE GOVERNOR

and

THE GENERAL ASSEMBLY OF VIRGINIA

COMMONWEALTH OF VIRGINIA
Department of Purchases and Supply
Richmond
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Richmond, Virginia, December 8, 1961

TO:

HIS EXCELLENCY J. LINDSAY ALMOND, JR., *Governor of Virginia*

and

THE GENERAL ASSEMBLY OF VIRGINIA

The Commission for Economy in Governmental Expenditures, created in 1958 on a temporary basis, was established as a permanent Commission by Chapter 266 of the Acts of Assembly of 1960. This act provides that the Commission should consist of the Joint Auditing Committee of the Senate and House of Delegates together with three members of the Appropriations Committee of the House of Delegates appointed by the Speaker thereof, two members of the Senate appointed by the President of the Senate, and the Director of Personnel, ex-officio, who shall have no vote.

Amongst other things the act directed that the Commission consider present and proposed conditions of employment, what services and personnel might be eliminated, or combined in the interest of economical and efficient administration, needed administrative and supervisory practices, and, in general, make all necessary and needful studies to accomplish the aforesaid purpose.

Pursuant to the provisions of the act, the Commission undertook this study as one of a series under a long-range plan adopted by the Commission.

In the conduct of this study the Commission was aided by the Auditor of Public Accounts, its executive secretary; his staff; and its consultant, Mr. Wesley R. Ellms of the firm of Worden & Risberg, management consultants.

The Commission gratefully acknowledges the splendid cooperation of the departments, institutions and agencies of the State during the course of the study.

Respectfully submitted,

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COMMISSION FOR ECONOMY IN
GOVERNMENTAL EXPENDITURES

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APPROACH

To evaluate properly the management of buildings and grounds it was considered necessary to make a comprehensive study in considerable detail. The program included the following steps:

1. Basic information on buildings and grounds management was solicited and received from all State agencies and institutions having significant buildings. Of these, the data from 45 of the larger agencies and institutions, representing about 80% of the State's total building value, was tabulated and analyzed.

2. The following 35 agencies or institutions were visited:

Division of the Budget
Woodrow Wilson Rehabilitation Center
The College of William and Mary in Virginia
Richmond Professional Institute of The Colleges of William and Mary
The Norfolk College of William and Mary of The Colleges of William and Mary
Medical College of Virginia:
College Division
Hospital Division
University of Virginia:
College Division
Hospital Division
Virginia Polytechnic Institute
Virginia Military Institute
Virginia State College, at Petersburg
Virginia State College—Norfolk Division
Longwood College
Mary Washington College of the University of Virginia
Madison College
Virginia School for the Deaf and the Blind
Virginia State School at Newport News
State Convict Road Force
Blue Ridge Sanatorium
Catawba Sanatorium
Central State Hospital
Southwestern State Hospital
Western State Hospital
Lynchburg Training School and Hospital
DeJarnette State Sanatorium
State Penitentiary Farm
Bon Air School for Girls
Hanover School for Boys
Janie Porter Barrett School for Girls
Beaumont School for Boys
State Industrial Farm for Women
Southampton Penitentiary Farm
Petersburg Training School and Hospital
Alcoholic Beverage Control Board

3. The buildings and facilities of most of the agencies and institutions were examined in considerable detail. In some instances several days were devoted to this.

4. The entire field of buildings and grounds management was reviewed. This included, but was not necessarily restricted to, the following:

Building maintenance and repairs
Alterations, renovations, and additions to buildings
Operation and maintenance of heating plants
Utilities and mechanical services
Guard, watchman and police service
Lawns, gardens, shrubs and trees
Roads and walks related to buildings and institutions
Fire protection
Elevator operation and maintenance
Paper and trash removal
Cleaning
Housekeeping

5. In addition to examining the facilities, the work methods, organization and administrative procedures were reviewed with the appropriate personnel. Opinions were solicited as to any improvements in these areas which might be feasible at the particular institution or used elsewhere. The heating plants were inspected. The level of maintenance and cleanliness of buildings was compared with the average level of other institutions.

6. Data relative to dormitory housekeeping practices was requested and secured from all private institutions of higher learning in Virginia.

7. Additional data on dormitory housekeeping was obtained from the Office of Education, United States Department of Health, Education, and Welfare.

8. All states were requested by questionnaire to furnish information on the prices they paid for electric power.

9. From the accumulated data and opinions, the following aspects of buildings and grounds management were analyzed and evaluated:

Organization
Coordination and communications
Administrative procedures and controls
Policies
Methods and standards
Space utilization and layout
Value analysis and purchasing
Costs and cost controls

10. At the conclusion of each visit to an institution, the results and observations were discussed with the appropriate personnel.

This report presents the findings and recommendations of the study. Because of its broad scope, the recommendations cannot be stated practicably for specific institutions. Only those applying in some degree to all institutions are given here. In instances where the Commission believes specific corrective action is indicated, private conferences have been, or will be held with the particular institution involved.

GENERAL DISCUSSION OF OUTSTANDING PROBLEMS

The agencies and institutions of Virginia own and operate approximately 5,470 buildings having a total insurable value of over $250,000,000.

Associated grounds and utilities add substantially to this value. Replacement cost would far exceed this amount.

The *approximate* annual operating costs associated with building management, as defined previously under Approach, are as follows:

General repairs by contractors	$ 864,000
Utilities furnished by contractors	2,379,000
Fuel	1,669,000
Building and related materials	483,000
Fire insurance	277,000
Total Purchases	$ 5,672,000
Housekeeping salaries and wages	1,729,000
Maintenance salaries and wages	5,472,000
Heating plant salaries and wages	975,000
Total Salaries and Wages	$ 8,176,000
Grand Total	$13,848,000

The above costs have been determined as the result of several approximations. Not included are substantial costs incurred for renovations, additions, and modifications which are classified as "betterments" and consequently treated as capital outlays rather than operating expenses. Certain institutions charge their maintenance work to a rotating fund which is supported by credits from the departments receiving the service. These charges are sometimes reported as "other contractual services" and therefore would not be included in the above totals. Salaries and wages are not always reported as "housekeeping", "maintenance", or "heating plant", making it necessary to estimate these amounts from payroll lists. Also excluded from the above are the costs of some cleaning supplies which are reported as "other supplies" and are not easily extracted from this heterogeneous account. Despite these variations, however, the above cost breakdown is believed to be reasonably accurate even though somewhat understated.

Although the total annual expenditures for these activities—say $14,000,000—represents only 2.4% of the $589,000,000 expended by the State in the year ended June 30, 1960, it nevertheless represents an important *controllable* expenditure. Moreover in many institutions, this classification of costs represents a much higher proportion—7% or more—of the total expenditures.

The relative smallness of buildings and grounds maintenance costs, as compared to the main operating costs of an agency, tends to reduce the interest of many agency managements in controlling them. Furthermore, building management is usually unrelated to the "mission" of an agency. Very often these factors cause the management of an institution to be concerned with buildings and grounds management only to the extent that there is ample heat, adequate housekeeping, and a minimum of complaints over leaky plumbing, defaced walls, and the like. Conversely, some managements may set a low and inflexible buildings management budget, regardless of an obviously deteriorating plant.

In brief, it appears that, with some notable exceptions, buildings management receives rather spotty management attention. This often results in unnecessary costs and/or poor results. Obviously, the solution to

this problem is rather complex and varies with the type and size of the institution. Specific recommendations toward improving management's focus on this area of responsibility are given in the section on organization structure.

The scope of the work performed by the building maintenance staff poses another serious problem. There is nearly always difficulty in determining a proper balance between the amount of major projects performed by the staff as opposed to those performed by contract. Again, the requirements and hence the optimum balance varies with each institution. Policy statements bearing on this type of problem are recommended later in this report.

In the housekeeping function—a surprisingly costly activity—the major underlying problem is a general lack of agreement and understanding as to what constitutes the most effective work methods and materials. Supervisors, and even the workers, are often left to their own devices. They are frequently influenced more by salesmen or tradition than by other factors.

In the larger institutions, the most fruitful opportunity for reducing the cost of maintenance is the planning, scheduling and assignment of work. Maintenance work becomes very complex in a large institution and much manpower may be wasted by idle time, as well as by misapplied efforts and skills, if there is not an effective system of administrative and supervisory control.

This report represents only those findings, conclusions and recommendations that are applicable to the majority of institutions. We are pleased to state that both the effectiveness of building maintenance efforts and the quality of maintenance are generally good. It was found not practicable, however, to apply performance or quality standards with sufficient accuracy to make direct comparisons between institutions.

Evaluation of the performance of buildings and grounds management requires consideration of two basic factors: (a) the quality level of maintenance, and (b) the effectiveness of the maintenance effort. The first factor is the standard of building appearance and condition. The second factor represents the success of the organization in meeting that standard at minimum cost.

The standard of building appearance varies widely from agency to agency, as well as from building to building within a particular institution. This variation is understandable and usually justifiable. Some buildings are historic and should be preserved with meticulous care. Others are outmoded for their present use, destined for early replacement, and hence should receive the minimum of repair and maintenance. Between these extremes there is a range of standards which are contingent on many factors such as exposure to public inspection and use of the buildings. Obviously the standard of appearance is not subject to a rigid formula but must be established through the good judgment of management. Our observations and inspections indicate that the great majority of buildings are maintained at a sensible standard of appearance and upkeep.

Th cost of building maintenance varies principally in relation to the following factors: (a) type of building, (b) age of building, (c) type of use, and (d) intensity of use. Every building possesses its own particular combination of these factors and specific buildings can be selected having very similar combinations. The comparable maintenance costs of such selected buildings gives a good indication of the relative effectiveness of the maintenance effort applied to them. In most instances, however, there

has been an intermixing of maintenance and improvement costs. This condition, together with the great variety of buildings coming under the responsibility of even a small institution introduces too many variables to permit close quantitative comparisons among institutions. We have therefore not attempted to rank institutions according to their maintenance performance. Instead, we have chosen to evaluate each on its own merits and to point out to the several managements the areas where improvement seemed to be possible.

Recommendations in this report are applicable to the majority of agencies. The Commission feels that all agencies are striving to perform their responsibilities in the most economical manner. Faults that are mentioned in the report are intended only to illustrate particular points. In most instances such faults have developed through oversight, poor communications, or the lack of definite policies, rather than through serious mismanagement. In those instances where the Commission believes specific corrective action is indicated, the matters have generally been arranged with the agencies.

In a study covering virtually all agencies having sizeable buildings and grounds operations, it is impractical to delineate specific changes that will result in predictable definite cost reductions. However, many of the recommendations of this report are directed toward the end of improving general operating efficiency which will result primarily in long range improvements. The results of these will depend upon the agencies' success in effecting these and in many instances there will be no present reduction in costs but rather a tendency to forestall expenditures which would otherwise be made at some time in the future. However, it seems appropriate to hazard an estimate of the potential savings that are considered probable if the recommendations are carried out to their ultimate effectiveness. The following annual amounts are estimated with this understanding:

Elimination of dormitory room service to students at institutions of higher learning	$150,000
Application of standards and methods to housekeeping activities	385,000
Application of improved work control to maintenance operations	75,000
Adoption of recommended policies on contractual housekeeping, maintenance, and other services	100,000
Total Potential Savings	$710,000

This represents a saving of about 5% on the total annual cost of building management of approximately $14,000,000. The Commission believes this is a conservative estimate of savings and that with proper follow up and implementation, particularly by the Department of Purchases and Supply, that considerably greater savings may be realized. However, in many instances, the recommended changes will occur gradually so that specific budget reductions cannot be identified with the change. Where this is the case, the advantages will be reflected in improved or extended service in other areas or in future appropriations smaller than would be required if the change had not been made. Certain specific changes capable of being effected quickly will be discussed by the Commission with the affected agencies and in such instances reductions can be made in current appropriations.

ORGANIZATION STRUCTURE

Buildings and Grounds Maintenance

Findings and Analysis

The buildings and grounds function usually is the main responsibility of a single department. In most, but not all, instances the responsibility also includes the heating plant. The housekeeping function, or part of it, is often included, as is traffic, transportation, messenger service and some other minor activities.

The department usually reports to a business manager, administrative services director, or similar position responsible for the efficient operation of auxiliary services and for general management. The size and complexity of an agency's buildings and grounds operations are largely reflected in the extent and differentiation of functions within the department. Similarly, the institutions that are expanding in scope and size need a department having a relatively large variety of skills to accommodate the frequent building alterations, installations of equipment, extension of utilities, and similar requirements.

As would be expected, the smaller buildings and grounds departments are managed informally, the buildings and grounds superintendent usually being intimately acquainted with the details of all work. In some instances, however, the superintendent tends to concentrate his attention in one or more areas while the remainder of the department handles its own problems in its own way.

The larger departments may have several administrative and supervisory positions and a total staff of as many as 175 employees. The subdivisions of the larger departments usually consist of the various trades, a grounds care group, a general duty or labor group, and a clerical, engineering, and accounting group. Additional functions, such as construction and renovation, sometimes fall under separate groups also. In some instances the maintenance stockroom is the responsibility of the department and in other instances is under purchasing.

In these larger departments, management constitutes a serious problem. The number and scope of activities require considerable delegation, while coordination and control are equally essential to assure adequate technical coverage and good manpower utilization. Also the larger departments must evaluate many projects to decide whether they are best done by the workforce or by contractors.

The departments in the middle range of size frequently present awkward organizational problems. Here the department is infrequently faced with difficult technical problems but must be prepared for them when they occur. Most of the department head's time and attention, however, is devoted to a multitude of practical daily problems. He is normally not an engineer and when an engineering problem arises he must seek help from another source. In such circumstances, his superior—usually the business manager or administrative services director—often becomes involved in the problem. The superior also frequently lacks the technical background necessary to permit his rendering much assistance in these matters. As a consequence he may devote an excessive amount of his time to buildings and grounds matters at the expense of his other responsibilities.

The type of institution also has a large bearing on the structure and scope of its buildings and grounds organization. The institutions having a general hospital for example must provide extraordinary service on a

24-hours per day schedule. Penal institutions make extensive use of inmate labor and mental hospitals find certain activities are suitable to patients.

Conclusions and Recommendations

1. Institutions having small buildings and grounds activities should maintain the simplest possible organization. The natural tendency to departmentalize should be resisted unless there are definite and obvious reasons. The key to efficiency in a small buildings and grounds organization is to take advantage of the short lines of communication, the diversified skills of workmen, and the broad practical knowledge of the superintendent. Particular care should be taken to develop a "second in command" who has the well rounded experience necessary to substitute for the superintendent.

2. In many of the medium sized buildings and grounds departments, say those having more than 25 employees, consideration should be given to having the superintendent of buildings and grounds report directly to the head of the institution. Whether this recommendation is applicable in a particular situation depends to a great extent upon the interests and aptitudes of the persons involved. It was found in some instances that although the buildings and ground superintendent reported officially to the business manager, the head of the institution dealt with him directly on certain matters. For example, in planning for future buildings or site revisions the superintendent might work independently of the business manager, while on questions of routine repair and maintenance of buildings he would deal directly with him.

In some institutions the business manager has primarily an accounting background while in others he may have a business administration or even an engineering background. The heads of some institutions are particularly interested in the details of their expansion programs, whereas in other institutions this area may be left largely in the hands of the business manager or administrative services director. Where the business manager has a large portfolio of responsibilities in addition to buildings and grounds and where he is not particularly interested nor qualified in technical matters there would be a definite advantage in having the superintendent report directly to the head of the institution. In some instances this would justify upgrading the superintendent position sufficiently to interest a highly qualified person with a technical background. The inclusion of such a position in some of the medium sized organizations would relieve the head of the institution of the necessity for concerning himself with many of the details of planning and modification of facilities.

Creating a higher level position as head of the buildings and grounds department should improve the management and effectiveness of the department. Thus, not only would the superior position be relieved of time-consuming involvement but the costs and quality of maintenance would be enhanced.

In most instances where circumstances justify the head of buildings and grounds reporting directly to the head of the institution there is need for fairly complex expansion planning. When this is so, it is believed that the technical aspects of the function warrant a position titled institutional engineer rather than superintendent of buildings and grounds.

3. The institutions having relatively large buildings and grounds organizations should carefully define the duties and responsibilities of the superintendent and his staff. Frequently the larger organization has grown from a much smaller one and many duties have fallen to particular positions by chance and without much analysis. This causes them to be

vaguely defined and poorly understood. Frequently a laissez faire attitude has developed that encourages deferment of action until the occasion of an emergency complaint or condition. In defining responsibilities it is desirable that the superintendent first list all of the functions for which he and his department are responsible. After securing the agreement of his superior that this constitutes his entire portfolio, he should then apportion the details of these responsibilities among his staff. In this way each member of the buildings and grounds organization will know his exact responsibilities as well as those of his colleagues.

In the larger buildings and grounds organizations there is a greater need for administrative controls than for revision of the organization itself. However, the development of effective administrative controls can be accomplished more easily after the organization has been carefully defined. Recommendations on administrative controls will be found later in this

Housekeeping

Findings and Analysis

Whereas the buildings and grounds function tends to be overly departmentalized, the housekeeping function, with few exceptions, tends to have inadequately defined responsibilities. In some instances there is confusion as to whom custodial personnel are responsible. Often the latter actually report to the department they service more than to the housekeeping supervisor. In one instance a housekeeping supervisor stated that she was really only a consultant and became involved in custodial problems only when they were called to her attention.

Frequently responsibility for the housekeeping function is divided. In hospitals, both mental and general, the housekeeping of the patient areas is performed by orderlies, attendants, and other personnel reporting to the nursing organization, while the housekeeping of offices, dormitories and other areas is the responsibility of a supervisor reporting to the business manager. In institutions of higher learning, the dormitory housekeeping is frequently a separate responsibility from the housekeeping of the remainder of the organization. There tends to be a lack of communication between such divided functions. In one institution, the two housekeeping supervisors had never met to discuss problems until the occasion of our inspection.

As would be expected in such loose organizations, there are nearly always wide differences of opinion as to the preferred methods and cleaning materials. Separate supervisors in the same institution may each spend much time interviewing salesmen and trying out new cleaning tools and supplies. Often the various custodial personnel will employ their own methods and establish their own work schedules.

The housekeeping organization often includes such auxiliary activities as trash removal, dormitory supervision, laundry workers, hostesses, and other functions. These frequently report in some degree to positions outside the housekeeping function.

The relative simplicity of housekeeping activities does not require a complex organizational structure. Usually there is a simple line of authority from the top housekeeping supervisor to subordinate supervisors, each of whom is responsible for a given area. In some instances a "floating" crew is maintained for such infrequently scheduled tasks as window washing, floor scrubbing, wall washing, and similar activities.

Recommendations

1. There should be only one housekeeping executive in each institution. In hospitals, or institutions having hospitals, the position should have indirect or staff responsibility for the methods, materials, and work standards of hospital personnel whose duties include housekeeping work. The direct supervision of such personnel should continue under the appropriate position, or positions, in the hospital organization.

2. The executive housekeeper should be responsible for determining cleaning schedules, work tasks, methods, and materials for all housekeeping activities of the institution.

3. All housekeeping personnel, except as noted above, should be responsible to the housekeeping executive. There should be a clear understanding that such personnel do not report to the departments they service.

4. The responsibility for the housekeeping function should be placed firmly and definitely in the overall organization. In the small and medium sized institutions the most effective location is in the buildings and grounds department. In the larger organizations the volume and complexity of housekeeping activities may be so great that the function operates more effectively as a separate department. In either case, housekeeping responsibility should not be split except where this is unavoidable.

Watchman and Police Service

Findings and Analysis

Watchman and police services are usually the responsibility of buildings and grounds but in some instances report directly to the business manager or similar position. The latter relationship is said to be desirable because the shorter line of communication to the top management of the institution lends added prestige, authority, and responsibility to the function. Also, it is argued, buildings and grounds is responsible for the custody of valuable materials and supplies and therefore in the interests of good control should not employ the personnel who are responsible for surveillance.

The extent of watchman and police service varies greatly in similar institutions. Some make extensive use of local police service. Some provide service at night but not in the daytime.

Watchmen are sometimes employed primarily to permit the opening of locked buildings in case an occupant wishes to enter during non-business hours. Insurance rates are seldom seriously affected by a reduction in the number of watchmen although most insurance companies urge heavy watchman coverage.

Recommendations

1. Agencies and institutions should analyze their needs for policemen and watchmen very carefully. It is frequently found that heavy coverage adds very little to the security of premises and that the same results could be achieved with fewer personnel. Where watchmen are used primarily to control access during non-business hours it may be found that the frequency of such access is so small as to permit adequate coverage by one watchman for several buildings.

2. In some instances, the watchman position should be combined with a night housekeeping supervisor position.

3. Whenever possible, the police patrol of the local community should be utilized. A telephone connection through the institution's power house, for example, would assure prompt response to emergency calls.

4. The police service should report to the business manager or similar position whenever this is practical.

POLICIES

CONTRACTUAL WORK

Findings and Analysis

Closely related to the question of the optimum size and scope of the buildings and grounds organization is an institution's policy on the proportion of work that is contracted rather than performed by the institution's work force. There are two types of work to consider: (a) routine maintenance and repair, and (b) special one-time projects of modification, renovation, or new construction.

Several institutions or agencies with only moderate maintenance requirements appear to have excessive maintenance forces to the extent that there is frequently insufficient worthwhile work for them. Some institutions attempt to justify this by the argument that the entire workforce is required at certain periods for general cleanup, painting, and other requirements.

Institutions whose physical plants are not expanding have much less need for a large maintenance department. Their activities are largely confined to ordinary repair and upkeep. Conversely the larger institutions, particularly those in the field of education, may have several complex modification or renovation projects in progress at all times.

Institutions with a heavy schedule of major projects are sometimes in a location where temporary help of high calibre may be easily and economically secured. Other institutions find that the available temporary help must receive training and close supervision to be effective.

All these factors must be taken into account before deciding upon the degree to which work is to be subcontracted.

Conclusions and Recommendations

1. It is recommended that it be the basic policy of agencies and institutions not to include on their staffs a maintenance force greater than that needed for normal repair and upkeep of its buildings except where there is an approved, scheduled, sustained program of improvement, renovation, or modification that effectually utilizes all manpower, and unless there is assurance of adequate competent supervision.

Some agencies have found there are fewer management problems when there is a pool of manpower always available to undertake whatever unplanned projects may arise. Others with widely dispersed facilities employ a travelling workforce rather than to negotiate contracts separately for each project. One agency, for example, uses centrally based painters to accommodate State-wide facilities. In this instance the cost of labor, travel and incidental expenses per gallon of paint spread amounts to $42.00 as compared to a standard of $18.00 per gallon at one of the large institutions.

2. When an institution can plan with reasonable certainty on a sustained program of special projects, it is desirable that they *do* maintain a workforce that, with augmentation of temporary help if necessary, can accomplish a portion of the non-routine work. Although too large a workforce results in an inability to schedule effectively, it should nevertheless be large enough to perform an occasional project of reasonably challenging size. Such a workforce permits the retention of a nucleus of skilled workers and a staff capable of accurately estimating costs and performance.

Situations frequently occur when all available qualified contractors are heavily scheduled in the immediate future. Under such circumstances, bids may necessarily include provision for the additional expenses of securing temporary tradesmen, supervision, and engineering service as well as the contingent costs of overtime payments. In some localities nearby qualified contractors are not always available and bids from distant contractors include the costs of travel or living at the job site. When these conditions exist it is quite often more economical to have the work performed by the institutional staff. Obviously, however, a careful cost estimate and work schedule must be prepared to determine if this is truly the case.

Another type of situation where the institutional workforce is often preferable is when a project must be scheduled intermittently. For example, a series of office renovations may need to be phased with certain transfers of activities. This may require one or two tradesmen for one period, then a group of several for another period. The contractor finds it difficult to transfer men in and out of such projects and must therefore provide for contingent costs to which the institutional workforce is not subject if it is administered with good work control procedures.

3. Agencies should perform specialized maintenance services with their own workforce when careful analysis shows this is more economical to the State. The opportunities for savings in such services are largely restricted to the larger plants or to compact groups of smaller ones. The following services have been particularly noted:

Servicing of Office Equipment—A number of institutions and agencies have considered the desirability of providing for their own maintenance and servicing of office equipment. Obviously, this is not a practical procedure in smaller institutions. One of the larger educational institutions has set up such a service, however, and after two or three years the consensus is that it is highly desirable. It provides more prompt and comprehensive servicing than is available through separate service contracts with the several office machine manufacturers whose equipment is used by the institution.

The key to the successful operation of this service is to engage a mechanic who is acquainted with the repair and maintenance of the particular types of machines requiring service. In the event a preliminary analysis shows that the total cost of service contracts is not sufficient to justify the salary of an office machine repairman, it is possible that he may be utilized for other duties such as maintaining and repairing time clocks, laboratory equipment, or building temperature controls. The aforementioned institution finds that the present service covers about 600 machines of various types. The necessary equipment, space, and parts inventory are modest. The service is estimated to cost approximately $8,000 per year less than when done through service contracts.

It is recommended that the Department of Purchases and Supply study the possibility of providing a similar service for other Richmond agencies. It is important that the function be kept simple and capable of providing prompt service. Whenever the quantity of machines is sufficient, the service should be provided in the same building. Charges should be based on an experiential cost basis.

Elevator Maintenance—The institutions that have tried maintaining their own elevators have found this to be considerably less expensive and more convenient than using contractual maintenance service. Here the most important thing is to have sufficient work to permit full utilization of

a specialist. The specialist normally works without much supervision and must be fully reliable.

Whichever method of elevator maintenance is employed it is well to have an independent inspector make a periodic safety check. This will not take place unless the management of the institution arranges for it. State buildings are not subject to local codes.

DORMITORY ROOM SERVICE

Findings and Analysis

One of the heavier housekeeping expenses in some of the institutions of higher learning is incurred in room cleaning and laundry service, as well as in the furnishing of bed linens, drapes, blankets and similar items. The extent of such services varies greatly, ranging from a level normally found in hotels, to virtually no service at all.

In discussing this question with the institutions, they sometimes advanced the argument that the costs of such services are included in the operating costs of dormitories and that these are fully liquidated by student dormitory fees. Since the student pays for the service, it was further argued, no general funds are expended and the Commission therefore has no legitimate interest in the cost of such services.

While granting that this position is *theoretically* sound, the Commission wishes to point out that the increasing cost of higher education is of concern to everyone and that the high cost of *any* services will inevitably bring pressure to reduce, or not to increase, the charges for other elements of educational expenses, such as tuition. This pressure tends toward an ever greater proportion of academic operating expenses being contributed from the State's general fund. Therefore the Commonwealth has a *practical* interest in the cost of dormitory room service.

The Cost of Room Service

An analysis made in connection with this study shows that in institutions offering a high level of room cleaning service, the annual cost per student ranges from $21.00 to $58.00. This does not include the cost of furnishing and/or cleaning bed linens, blankets, drapes, and similar items that are furnished at some institutions. This range of costs compares reasonably with an average cost of $43.00 reported on a national basis* for room service *plus* linen service. The cost of high level room cleaning and linen service accounts for roughly 20% of the room charges to students in those institutions offering the service. Eliminating or reducing the service to a minimum would effect a corresponding reduction in these charges or permit the revenue to be applied to more useful purposes.

The total potential savings if service were reduced to a minimum in all tax supported institutions of higher learning would be substantial—probably about $150,000 per year. A more important consideration is that of principle. Should one tax supported institution, by furnishing an abundance of maid service, cultivate a reputation as a "deluxe" institution while another holds such services to a minimum and directs all possible revenues toward its academic requirements? An example of the disparity in service can be observed by a comparison. One dormitory of one institu-

*This cost is approximated from data obtained from questionnaires returned by 466 institutions of higher learning and reported in Higher Education Planning and Management Data, 1958-1959, U. S. Dept. of Health, Education and Welfare, Office of Education.

tion has a ratio of maid, janitor, and hostess personnel to students of one to ten while the same institution has a faculty-student ratio of one to sixteen. Contrasting with this is another institution whose ratio of dormitory custodial personnel to students is one to one hundred and fifty while the faculty-student ratio is one to fourteen.

Comparison of Service with Other Institutions

As a part of this study, the *privately financed* institutions of higher learning in Virginia were questioned as to their dormitory housekeeping practices. Following is a summary of the 24 replies received:

	Institutions Providing Service	
Service	*Number*	*%*
Making beds daily	3	12.5
Cleaning rooms daily	7	29.2
Cleaning rooms weekly	5	20.8
Providing bed linens	8	33.3
Cleaning bed linens	7	29.2
Providing blankets	2	8.3
Cleaning blankets	3	12.5
Providing bedspreads	1	4.1
Cleaning bedspreads	3	12.5
Providing pillows	11	45.8
Cleaning pillows	10	41.6

These replies indicate that some of the tax supported institutions furnish services considerably beyond the scope furnished by the majority of privately financed institutions in Virginia.

Nationally, there has been a continuing trend during the last decade to reduce the amount of room service. A survey* in 1957 showed that, for men, 12% of public, and 18% of private, institutions provided daily room service. Weekly service was provided by an additional 17% of public, and 21% of private, institutions. In each category, a slightly lower percentage of women's institutions furnished room service.

It is significant that many privately financed institutions, with enviable scholastic standings and with student fees far higher than Virginia's tax supported institutions, do not provide a high level of room service. Institutions which have reduced such services have frequently found the new policy to offer a valuable opportunity for inculcating a sense of responsibility for personal cleanliness in their students. One outstanding women's institution, for example, requires its students to pledge three or four hours per week to housekeeping and food service. It considers this an important part of a young woman's training.

In visiting the State's institutions, representatives of the Commission had occasion to discuss the effect of minimum room cleaning service with students. The opinion of most seemed to be that room service would be appreciated if given, but that lack of it posed no hindrance to the pursuit of studies and the money was better spent on more important educational requirements.

The Commission found in its observations at the institutions it visited that, where properly administered, the use of students for part-time

**Higher Education Planning and Management Data, 1957-58*, U. S. Dept. of Health, Education, and Welfare, Office of Education.

custodial work was useful, effective and economical. Although in some instances this type of employment was used as a means of granting financial aid in excess of the efforts applied, the policy of such part-time student employment is considered desirable and, with adequate standards of performance, it should be encouraged.

Conclusions and Recommendations

1. Room Service Standards

The Commission recognizes that variations in the structure, layout, and condition of dormitories makes completely uniform standards of room service impractical. However, it recommends that the practical minimum of such service be furnished consistent with hygienic standards and the ability of the institution to inculcate a sense of responsibility and discipline in its students. It therefore recommends that the Council of Higher Education establish a schedule of optimum services to be provided by institutions.

It is recommended that the Council not exceed the following levels of service:

(a) Thorough cleaning of dormitory rooms, including buffing of floors, two times per semester.

(b) Cleaning of toilets and baths once each week

(c) Adequate but controlled furnishing of light bulbs, cleaners and other necessities.

(d) Blankets, bedspreads, draperies, sheets, pillow cases and similar items should *not* be furnished. The institution *should* establish arrangements for laundering such items for a fixed fee by the student. The institution *should* establish and enforce rules governing the changing of bed linen and other sanitary practices by the students.

(e) The institution should provide for convenient trash accumulation and disposal, daily cleaning of corridors and related dormitory areas.

The Commission is aware that special conditions may warrant deviations from the above standards, for example in the case of graduate and medical school students. Such deviations should, however, be justified prior to their effectuation. With these exceptions, the institutions now providing service in excess of the above levels should take steps toward reduction.

2. Student Assistance

Institutions should give greater emphasis to the employment of students in custodial work. Supervision in methods should be given. Pay should be commensurate with regular employees. Tasks should be carefully established and performance examined. The costs should be included in the appropriate cost classification. The Council of Higher Education should establish maximum hours of such work which a student may be permitted to perform, so that his education will not be impeded.

STATE MANUFACTURED BUILDING MATERIALS

Findings and Analysis

The State Penitentiary Farm and the Southampton Penitentiary Farm both manufacture brick. This and some other building materials, such as

concrete block and drain tile, could be used much more extensively by the State in new construction and building modification, and would reduce building construction costs significantly.

It is conceded that this would remove a small part of Virginia's private manufacturers' market. The amount of these materials required for State use is so small however as to have no significant effect on the total market.

The manufacture of brick is exceptionally well adapted to the use of penitentiary labor. The principle of employing penal inmates in useful occupations is long established and accepted. If not used for this purpose, they must be employed in other activities which also have an effect on private enterprise. It seems desirable to reaffirm the principle that State manufactured materials should be employed to the fullest possible extent so long as they are restricted to State use.

The present brick manufacturing facilities in the two institutions are not fully utilized. Southampton has an inventory of approximately 5,000,000 bricks. The present pricing policy precludes their being shipped very far to sell competitively with locally manufactured brick. Institutions and architects are not encouraged to specify State manufactured brick. In some instances materials of inferior characteristics are used for purposes of economy when State manufactured brick could have been used. These materials are sometimes purchased outside the State.

Conclusions and Recommendations

1. The Bureau of Engineering and Maintenance of the Division of the Budget as well as institutions should specify State manufactured building materials whenever these are applicable.

2. The Department of Purchases and Supply should establish a pricing formula permitting State manufactured materials to be used competitively in a wider area than at present.

PURCHASE OF ELECTRIC POWER

Findings and Analysis

All institutions except Virginia Polytechnic Institute purchase all their electric power from private utilities. Even VPI purchases most of its power, utilizing part of its waste steam for power generation.

The State has arrangements with the private utilities to supply current to all institutions at a rate of $.01 per KWH. As part of this study, the Department of Purchases and Supply sent questionnaires to the other states asking for their methods of power generation and purchase. The results of this survey indicate that some states generate more of their own power at the institutional level than does Virginia. A few states obtain a portion of their purchased power at less than Virginia's price. In general, however, we conclude that Virginia has the simplest and most advantageous arrangement possible.

Conclusions and Recommendations

1. Virginia should continue its present power purchasing arrangements.

TREES AND SHRUBS

Findings and Analysis

Although accurate data on the cost of trees and shrubs purchased by the several agencies was not easily obtainable, it is apparent that a considerable total expenditure is involved. In some instances, shrubs and trees are purchased out-of-State.

The State Industrial Farm for Women has a small nursery which provides a limited quantity of trees and shrubs for other institutions. The Highway Department recently has been developing district nurseries to provide roadside trees and shrubs. A number of other agencies have their own greenhouses, propagating beds, and nurseries. Nevertheless, new developments and buildings of many agencies, as well as new highways, require trees and shrubs to be provided by purchase or contract.

Conclusions and Recommendations

1. It is recommended that the Department of Welfare and Institutions develop a program for cultivating a complete variety of shrubs and trees suitable for institutional grounds and highways.

The services of penal inmates appear to be well suited to this type of work and would probably be more effective than in some of the activities in which they are presently engaged. The work appears to offer desirable rehabilitation and training advantages. If such nursery stock were made available at low cost, institutions would be encouraged to add attractive shrubbery to their grounds.

2. As a further development of this thought it is recommended that the Highway Department plan and develop intensively beautified roadsides on strategic routes into the State. These could be coordinated with public relations efforts to encourage tourism. For example, beautified (and publicized) routes leading out of Washington, D. C. could attract many of the tourists visiting there in the spring to view the cherry blossoms.

Commercial nurseries should benefit from the proposed program. Intensified attention to the beautification of roadsides and institutional grounds would stimulate public interest and influence property owners to follow suit. The additional plantings on State property would largely consist of those which would not normally have occurred except for this program.

CONTRACTUAL HOUSEKEEPING

Findings and Analysis

For an institution to provide effective and satisfactory custodial service requires that considerable skill and management attention be devoted to this function. Contractors who specialize in such services employ the latest methods and supplies. They frequently can demonstrate that under their management such housekeeping activities as cleaning, trash removal and elevator operation are performed more economically than by institutions themselves.

In a sizeable agency or institution, however, the housekeeping function is big enough to warrant close management attention as well as qualified supervision. When these factors are present, it is reasonable to expect that the institution can provide adequate housekeeping service at mini-

mum cost and with a closer control over their varying requirements than can be provided by contractors.

An illustration of this is presented by comparing certain building costs. The average annual operating cost of several State buildings in Richmond which utilize State employees for operating activities (cleaning, elevator operation, etc.) is $0.35 per square foot. Another State building in Richmond contracts for these services at an annual cost of $0.60 per square foot. For an average size office building of 60,000 square feet, this difference in unit costs represents about $15,000 additional annual expense to the State.

Conclusions and Recommendations

1. Agencies and institutions with housekeeping requirements large enough to warrant a supervisor should perform this activity with their own employees. If special circumstances seem to justify contractual services, a careful cost analysis should be made to determine relative costs under the two methods.

2. In many instances specialized services such as trash removal, window washing, and exterminating services can be furnished more practicably and economically by contractors, while routine activities such as cleaning and elevator operation are more advantageously performed by the agency employees.

It is recognized that many agencies are not in a position to select, supervise, and manage custodial workers. A means for assistance in this area is recommended in the section Coordination and Communications.

PERSONNEL AND SUPERVISION

Buildings and Grounds Maintenance

Findings and Analysis

In the smaller buildings and grounds organizations the position of the foreman tends to be mainly titular. He exercises little supervisory responsibility. Most of the workers' assignments come directly from the superintendent of buildings and grounds.

Even in the larger buildings and grounds organizations the foremen devote more time to their trade than to actual supervision. In most instances this is a necessary and desirable practice since the ratio of foremen to workers is quite low. Frequently the position of foreman appears to have been established mainly as a means of obtaining a rate of pay considered to be adequate for a first-class tradesman. In some instances a foreman has no workers reporting to him.

There are few buildings and grounds organizations where the foremen deal with matters of discipline or interpretation of work rules. At some institutions they examine the time reports of workmen and keep account of the time spent on various jobs.

Personnel policies are often quite vague, and may be inconsistent in their application to different workers. In some instances temporary employees work considerably longer hours than permanent employees. They receive compensation for overtime work, and hence are able to receive a higher income than the permanent employees. There are frequently differences in title and pay scale of workers performing substantially the same

work. This may be true within a single organization, but more frequently occurs among separate institutions.

There is a decided reluctance on the part of supervisors to discipline or downgrade a worker who performs inadequately or for whom there is insufficient work. There is a general understanding that once a worker becomes a permanent employee he has a legal prerogative to remain in his position, and that the position title may not be downgraded. This attitude is firmly fixed in the minds of foremen and higher supervisors. The policy is accepted, at least tacitly, by the higher management of many institutions. Some institutions have retained individuals on temporary payrolls, at their request, for months or years. This arrangement is preferred by employees because of the opportunity to obtain a higher rate of pay in a temporary classification. Workers are frequently upgraded solely on the basis of length of service. For example, an assistant tradesman may become a journeyman only because the journeyman position becomes vacant. There is seldom much effort to encourage workers to advance their skills or to take desirable training or educational courses.

In the smaller institutions there is a tendency for workers to perform tasks entirely outside the area of their position title. For example, heating plant shift supervisors may spend a good part of their time doing plumbing work. This is usually a desirable practice since it develops all-round workers and allows the needed flexibility in the work assignments of a small organization. In the larger and more differentiated organizations there is a tendency for workers to be grouped according to their trade, and there is a reluctance for one trade to perform the work of another. Consequently, in the absence of an effective work control system there are frequently occasions when the workers of one trade may be short of work while there is a backlog of work for another trade.

One barrier to interchanging workmen exists between the groundskeeping personnel and the building maintenance personnel. Some institutions feel that it is impractical to assign a groundsman to inside work, and he may be allowed to be idle or even sent home rather than to assign him indoor tasks. One or two institutions, however, are successful in arranging for effective interchangeability in these two work classifications. Groundsmen have been found to be very useful during inclement weather in performing such tasks as general clean up and moving equipment and furniture. Conversely, inside workers are found to be quite capable of performing many of the groundskeeping activities.

Conclusions and Recommendations

1. Each institution should establish definite, published work rules covering buildings and grounds employees. These manuals should be submitted to Division of Personnel for review as to consistency with Statewide policies and practices.

Foreman and other supervisors should be instructed as to their supervisory responsibilities and authorities. Follow-up action to assure proper supervisory performance should be arranged and failure to exercise proper supervision should result in disciplinary measures.

2. Consideration should be given to establishing a new position series entitled Institutional Maintenance Specialist to replace several of the present trades position series. The beginning rate for this series should be in the range of the present tradesman assistant classification and the top rate should be the same as the present leadman classification. Advancement within this broad range should be based on carefully defined skills

tests and qualifications. These should be based on ability and knowledge in the several trades associated with buildings and grounds maintenance such as carpentry, boiler operation, electrical work, etc.

The advantage of such a classification plan is that it would encourage the recruitment of untrained persons with ambition and mechanical aptitude who would be attracted by the opportunity for learning comprehensive skills and advancing on the basis of acquired ability rather than long job tenure. This plan would develop all around mechanics who would constitute a much more flexible work force, thus reducing the problem of scheduling manpower effectively. The number of job classifications would be greatly reduced, thus simplifying personnel record keeping.

NOTE: Other questions of personnel policy implied under Findings and Analysis are more properly a subject for further consideration as a part of a general study of personnel policies and practices which the Commission plans to make. Further recommendations in this area are therefore not made in this report.

Housekeeping

Findings and Analysis

The ratio of workers to supervisors is too high at many institutions. Custodial workers tend to be left alone as long as there are no complaints from the departments they service. The need for close supervision and evaluation of results does not seem to be recognized in many housekeeping organizations. Many of the lower supervisory positions appear to have been established principally for the purpose of permitting a higher pay scale.

Some custodial workers are employed on a "temporary" basis in order to permit compensation for extraordinary long working hours. In one instance this averaged about 60 hours per week.

The dispensing of custodial supplies is frequently poorly controlled. Often the usage of cleaners, waxes, etc., is not recorded and these are drawn from stock as required by the custodial workers.

The distinction between work performed by "B" and "A" rated personnel is often very slight. In some instances the "B" rating reflects little more than length of service. Tasks considered to require a "B" classification in one institution may be considered "A" work in another.

Custodial supervision tends to be desultory and poorly trained in some institutions. Trained and competent personnel are difficult to obtain and subject to a high turnover rate. Practices in respect to methods and materials tend to have been the result of uncritical tradition or early experience. These practices may be strongly defended but often only through resistance to change or loyalty to a particular product line or sales representative.

The testing of methods, tools, and products is not often performed on a basis that furnishes conclusive results. When new methods or materials are decided upon, these are seldom explained or demonstrated adequately to the custodial workers.

1. The ratio of workers to supervisors should be low enough to assure that all custodial workers are adequately supervised. Greater emphasis should be placed on evaluation of the quality and quantity of work performed. This requires a good judgment as to what constitutes adequate quality—some institutions have been over-zealous on quality. The supervisor's main concern should be to provide *adequate* quality at *minimum* cost.

2. Dispensing of cleaners, waxes, and similar supplies should be put under the positive control of one person. The amounts dispensed to individual's should be controlled.

3. More definite responsibilities should be spelled out for housekeeping departments, their supervisors, and workers.

4. The advancement of custodial personnel should be based on their ability to meet established performance standards rather than by differences in duties.

5. Working conditions, rules, and personnel policies should be made more uniform. Desirable flexibility, however, should not be eliminated. For example, some custodial employees of educational institutions are scheduled for long hours during school sessions but are granted compensating time off in the summer or during holidays. This practice provides the necessary labor when it is needed and usually suits the personal convenience of the employee.

ADMINISTRATIVE PROCEDURE AND CONTROLS

Buildings and Grounds Maintenance

Findings and Analysis

The smaller organizations tend to have very little formal control over work or costs. Where the supervision and management are alert and cost conscious the absence of such formal controls is not important; in fact, it is frequently found that attempts to develop sophisticated controls in the small organization introduce unnecessary paper work and defeat the very purpose for which controls are applied in larger organizations. A noticeable lack in many of the smaller organizations, however, is the recording of work backlogs and the use of periodic inspection for ascertaining the repair and maintenance requirements of buildings and grounds.

The smaller institutions seldom have a job costing procedure. In most instances, however, sizeable jobs are costed informally by the superintendent's keeping track of the manhours and materials required.

The larger buildings and grounds organizations usually have some formal means of recording maintenance requests and frequently these are incorporated in work orders. Despite such records there are deficiencies in planning and control. Projects tend to be worked on where complaints are the loudest. Costing of work may be detailed but is often ineffective from a control standpoint. The management of one institution, for example, stated that work orders were examined only to compare material costs—that labor costs were unimportant inasmuch as the manpower was paid anyway and if it were not working on one project, it would be on another.

The lack of planning and control tends to create frequent imbalances between workload and manpower. Work on projects must frequently be interrupted to assign workers temporarily to more pressing projects. On

the other hand it was found in many instances that workers might be idle or "stretching" their jobs in one area while manpower was badly needed in another.

The departmentalization of the buildings and grounds functions in the larger institutions has tended to develop an independent control by each of the trade subdivisions. Requests for work, for example, may be made directly to a carpenter or plumbing shop and the management of the department may be unaware of the work projects in progress or of the justification for them.

Our studies showed that often there is not a clear idea of what work tasks were necessary or scheduled to be accomplished even one or two days ahead. The more usual approach to work control is for buildings and grounds management to determine who is currently without work and then from memory arrive at a suitable task on the spur of the moment. This practice often results in idle time while the decision is being made, in interrupted work due to a lack of materials, in inadequate instructions as to what work is required, or in conflicts with other activities. A simple system of work control would permit planning, estimating and ordering of materials well in advance of the scheduled starting date. It would prevent needed work from being overlooked, and allow plans to be made for shifting manpower from one project or type of activity to another so as to maintain a balance between work requirements and available manpower.

Conclusions and Recommendations

1. The buildings and grounds departments of all institutions should establish a backlog record of maintenance and repair work. Tasks and projects should be transferred from this backlog and put in the form of work orders as soon as the need is established. This will assure that necessary maintenance is not overlooked and that there is always work available for assignment.

2. Each institution should arrange for periodic maintenance inspection of all buildings and facilities. This will prevent serious deterioration setting in before its discovery. The maintenance inspection should be performed by high level and responsible personnel. Many items, such as leaks, damaged doors, broken windows, and the like, should be placed immediately as work orders.

3. Each institution should develop a system of work control. The extent and detail of such a system varies with the scope of the buildings and grounds activity. The smaller organizations may require nothing more, perhaps, than a revision of the manner in which the superintendent of buildings and grounds records the work backlog and assigns tasks to workers. The large institutions may require rather detailed procedures and a realignment of supervisory and clerical responsibilities.

Regardless of an institution's size, however, the objective of its work control system should be to assure that all buildings and grounds work or potential work is recorded, estimated, planned, accomplished and followed up in an orderly manner with maximum utilization of personnel. The essential features of the work control system are as follows:

(a) All work requirements should be recorded (except as noted below) in advance of assignment to the workers. The records should consist of the backlog register, previously mentioned, a register of current requests for service, and a register of "special projects" capable of being anticipated and planned in advance.

Such duties as air conditioner servicing, lawn mowing, and truck driving, being of an "as needed" nature are not subject to prior recording as specific tasks but only as duties or responsibilities.

(b) Each item entered on the work registers should include the estimated number of manhours for each item so that the total backlog of work can be determined whenever necessary for planning purposes.

(c) All tasks should be assigned to workers through the medium of work orders. The "maintenance duties", mentioned above, may be on open or standing work orders, and the "special projects" may be covered by a work order covering the entire project. All other tasks should be assigned by means of a separate work order for each worker. The estimated time required for each task should be shown on the work order and the employee should understand he is expected to accomplish the work within this limit. Orders should be reviewed by supervision soon after completion and where the actual time exceeds the estimated time, the reasons should be determined.

(d) All institutions should have *one* central place for receiving all work requests and from which work is assigned. This may be the desk of the buildings and grounds superintendent in smaller organizations while in the larger a separate position or positions may be required and the function designated maintenance control. All requests, written or by phone, should be entered on one of the registers as soon as it is received.

(e) The special projects should be recorded as soon as they are identified in the form of a work request even though they have not been approved. At this stage they can be considered as "preliminary" work orders.

The purpose of this treatment is to assure that requests do not get mislaid or overlooked and that they will be planned, estimated, and specified in an orderly fashion.

When approved, special projects should be recorded on individual records that will assure their being properly scheduled and that purchase orders are prepared in sufficient time to permit delivery of necessary materials and equipment prior to the time they are needed.

(f) The costs of improvement projects that are not covered by capital outlay appropriations should be accumulated by the institution on memorandum accounts. This will serve to separate normal maintenance and repair from "betterments" and will facilitate the comparison of maintenance and repair costs between different buildings. Such data will also be very useful in determining biannual maintenance budgets. This type of project should always be approved by a position outside the buildings and grounds department so that there will be an authoritative judgment as to the relative justification of the requests made by the various departments of the institution.

NOTE: The practical and effective application of work control procedures require much careful planning. A system adapted to Virginia's institutions has been developed in the form of a manual as part of this study. Institutions desiring copies of this should address their requests to the Commission.

Housekeeping

Findings and Analysis

In most instances there are few administrative procedures connected with housekeeping activities. This service is relatively simple and therefore extensive controls would not be appropriate. There are, however, many noticeable deficiencies in the control over the issuance of supplies, materials, and tools, as well as in the work assignments.

Conclusions and Recommendations

1. Materials, supplies, and tools should be issued on a measured and periodic basis. The amount of detergent, wax, and similar items required by each custodial worker or group of workers can and should be determined with reasonable accuracy. These should be measured out and set aside in advance and dispensed at stated times (usually once a week). The advantage of this plan is not only to prevent misuse but to assure that too much is not used. Excessive application of wax, for example, is not only costly but may cause unsatisfactory results.

2. Records should be established and maintained of custodial workers' tasks and assignments. These should be detailed sufficiently to permit reasonably accurate performance comparisons between individual workers or groups of workers. Recommendations are made elsewhere in this report for the establishment of definite custodial standards of performance. To be effective such standards need to be applied through a carefully maintained record system of work assignments that can be adjusted conveniently in accordance with the applicable standards.

3. The present program of the Department of Purchases and Supply to warehouse and distribute housekeeping supplies and tools along with food staples should be encouraged and expanded as rapidly as possible. It permits institutions to order their requirements at minimum prices with frequent deliveries by the department's trucks.

METHODS AND STANDARDS

Buildings and Grounds Maintenance

Findings and Analysis

The scope and complexity of institutional buildings and grounds maintenance are not sufficiently extensive to justify sophisticated maintenance methods. Where highly technical skills, methods, or knowledge are required, most institutions arrange for outside services. In some instances selected workers are sent to factory schools for training in the maintenance and operation of temperature controls, air conditioning equipment, and similar equipment.

Since most of the maintenance requirements are quite simple, the noted deficiencies in methods were mostly of a practical nature. The most common of these are listed below:

—Three types of preventive maintenance are noticeably lacking at most institutions.

(a) Important operating equipment such as ventilators, pumps, air conditioners, etc., are not regularly inspected, serviced, and recorded.

(b) Buildings and grounds are not periodically inspected to determine the need for painting, replacing roof gutters, applying new roofing, repairs of walkways, storm sewers, and similar items.

(c) Maintenance patrols are not used to report or repair minor items such as plumbing leaks, broken windows, and similar items.

All three of these means are economical in the long run. Yet some institutions permit a leak to ruin a ceiling before undertaking to make the relatively simple repair.

—Interior painting of walls (particularly corridor walls) is often scheduled more frequently than would be required if wall cleaning were performed between paint applications.

—Corridor and stairwell walls are often faced with plaster which is easily marred and difficult to clean. In some instances no paint is applied to new plaster for one or two years for fear the paint will "burn". This causes defacement to occur even more easily.

—Acoustic ceiling, particularly in new buildings, tends to fall in damp weather. Building contractors should be required to guarantee this not happening and be required to replace it.

—As an economy measure in many educational institutions there are regulations against using nails or adhesives on dormitory walls. This seems to be expecting the impossible since few dormitories were inspected where frequent infractions were not observed.

—In several instances excessive time was spent in lawn mowing because of failure to provide sufficiently large mowers.

—Some institutions maintain their own water mains even though better and more economical service might possibly be provided by the public water system to which they are connected.

There are very few maintenance work standards in use at any of the institutions. This is understandable because of the great variety of tasks and conditions as well as the high frequency of situations where there is no definite information as to what corrective action will be required to satisfy a complaint.

Conclusions and Recommendations

1. Institutions should establish records of all important operating equipment showing the servicing and inspection requirements. The record should indicate the required frequency of inspection and servicing. Repairs and parts replacements should also be shown on the same record.

2. Periodic maintenance inspections should be established at each institution. All discovered maintenance needs should be recorded on a backlog report. The inspections should be conducted by a committee including a person outside of the maintenance organization. Such inspections should be conducted semi-annually, or at least annually.

Between maintenance inspections, "maintenance patrols" should be scheduled. These should be conducted by maintenance workers and restricted to particular facilities requiring frequent attention such as toilets and washrooms.

3. The use of practical performance standards should be encouraged as a means of improving scheduling. The use of standards requires ad-

ministrative procedures and controls which are discussed in another section.

4. Areas and facilities requiring an unusual amount of maintenance and repair should be studied to determine ways in which their maintenance and repair costs may be reduced.

Housekeeping

Findings and Analysis

Housekeeping methods in the State's institutions vary from poor to excellent, with the majority rating a mark of "average". Probably 40% of housekeeping costs are the result of floor care. In this activity, as in all others, methods differ widely. In floor dusting, the most common activity, institutions use brooms and brushes, dry mops, and treated cloths. The dust is disposed of by sweeping into dust pans, shaking into trash receptacles, and even by shaking mops out of the windows.

Waxing of floors is frequently done incorrectly. Some floors are waxed weekly without stripping—a wasteful and expensive process. At the other extreme some floors are waxed only once or twice a year and as a result they deteriorate rapidly.

Some institutions have not provided sufficient means for mud removal at entrances, thus causing dirt to be tracked into the buildings to an extent that greatly increases the cost of floor care as well as unnecessary wear.

None of the institutions studied uses definite standards in the assignment of tasks or areas to custodial personnel. Supervision tends to be loose, frequently divided between housekeeping supervision and the activity serviced. Tasks are typically adjusted only when the serviced activity complains about the service, or when loitering becomes obvious.

The level of service varies widely. Some offices and classrooms are dusted with excessive care regardless of the time (and cost). In one instance a custodial supervisor stated that he could not rely on the quality requirements of the office personnel because they were too easily satisfied.

Even where supervision is capable and conscientious, the lack of performance standards results in inequitable work assignments and inefficient utilization of manpower. In one instance a supervisor stated that the crew in one building was much less effective than the crew in another building. A careful analysis, as part of this study, showed that in reality the work expected of the "inferior" crew was considerably greater than that of the other, whose real performance was quite low in terms of a common standard.

A detailed analysis of performance shows that, generally speaking, the custodial service in terms of area cleaned per man hour is far below commonly accepted standards. The validity of this comparison is supported by many observations at the various institutions. A part of the disparity is the result of rendering service in excess of normal requirements, but a greater proportion is caused by lack of effort, poor methods, and inadequate supervision.

If the custodial effort were improved to acceptable standards, our studies indicate that a 35% reduction could be effected in custodial costs. The total custodial and housekeeping costs in all State institutions is estimated at $1,729,000. Deducting the costs of room service in dormitories (concerning which other recommendations have been made) and custodial

services by orderlies in hospitals, would leave a remainder of about $1,100,000. The potential realizable saving is therefore 35% of this amount, or $385,000 per year.

The increase in numbers of supervisors required to institute more positive work measurement and control should not be very great. In general, much better utilization of present supervision is possible and the necessary increases in the number of these positions could be accomplished without affecting the estimated total saving. As a matter of fact, the performance standards used are considerably below those which should ultimately be applied.

Conclusions and Recommendations

1. The varying conditions under which housekeeping methods are employed preclude listing specific and detailed revisions covering all institutions. However, the following represent significant and obvious methods and practices that should be established at many institutions:

(a) In all areas except those having rough floors (shops, garages, stockrooms, basements, etc.) the dusting of floors should be done with treated, washable dust cloths. Consideration should be given to washing and treating these on the premises. Cloths should be changed as often as they become soiled to the extent that they can no longer effectively hold dirt.

(b) Only very limited "touch up" coats of wax should be applied to floors between "stripping" operations.

(c) Entrances to buildings should be provided with adequate walks and outdoor aprons at entranceways. Ample door mats should be provided and these should be cleaned regularly.

(d) Trash should be removed from buildings daily. Trash chutes and incinerators are less conducive to good housekeeping than trash receptacles located inconspicuously outside the building.

(e) Terrazzo floors should be sealed but not waxed.

2. As recommended elsewhere in this report, a housekeeping specialist should be employed in the Department of Purchases and Supply to coordinate the evaluation of housekeeping methods. This position would also assist institutions in establishing and applying quality and performance standards. Although standards are relatively simple, in their final form they require considerable detail analysis to develop and install and therefore most institutions will require outside assistance. Moreover, a reasonably uniform approach by the institutions is highly desirable and such uniformity will not be possible without coordination.

The recommended specialist would provide coordination services in addition to methods and standards development. A fuller description of the position is given in the section Coordination and Communications which follows.

COORDINATION AND COMMUNICATIONS

Buildings and Grounds Maintenance

Findings and Analysis

Internal communications in the separate institutions are usually quite good. The principal weakness is failure to report and record needed main-

tenance and repairs. In many instances poor conditions were noted that were claimed to have been reported (often more than once), but the maintenance department denied having received the information. This and such problems as coordinating the distribution of manpower where it is most needed, communications with purchasing on the procurement of materials, and similar administrative requirements were discussed in the section on Administrative Procedures and Controls.

There is little coordination on buildings and grounds matters between institutions within a given agency. Some agencies have small central staffs to deal with building problems, but these devote nearly all their attention to new construction or the larger modification projects.

There is a noticeable lack at the institutional level in reviewing plans for new construction or modifications toward the end of simplifying future maintenance or housekeeping. The plans are frequently finalized and construction started before the appropriate buildings and grounds personnel have seen them.

The Bureau of Engineering and Maintenance of the Division of the Budget ostensibly reviews all capital outlay plans to assure, among other things, that the needs of effective maintenance and housekeeping will be served. However, the latter has no manual of approved design features or specifications but reviews each set of plans on its own merits and according to the judgment of the particular person to whom the review is assigned. Institutions tend to consider such reviews arbitrary and unnecessary.

Institutional personnel find that certain materials continue to be specified in new construction even though they may object to them. For example, in one institution a person responsible for a housekeeping function was strongly opposed to vinyl flooring because of the difficulty in keeping it clean. Nevertheless, the buildings and grounds superintendent was currently installing this flooring, at a higher cost, because in his opinion it was easier to keep clean.

Conclusions and Recommendations

1. The Bureau of Engineering and Maintenance of the Division of the Budget should prepare a manual of recommended specifications, practices, and materials for the use of institutions and architects in preparing construction plans. This manual should state the specifications, materials and practices that will result in long-term economies of operation as well as construction costs. Most institutions are anxious to incorporate the most economical features in their modification and new construction plans but in many instances are unaware of the latest developments or the success others have experienced in using them.

The development of a manual of recommended specifications, practices, and materials by the Bureau of Engineering and Maintenance of the Division of the Budget, would facilitate the work of professional architects engaged by the institutions. This would encourage compliance with economical practices and would greatly reduce the detail in which some plans are reviewed by the bureau. Construction plans could be approved more quickly.

In some instances building plans are carefully reviewed several times: first, by the institution's architects; second, by the engineering staff of the institution; third (in some instances) by the central staff of the agency, and finally by the Bureau of Engineering and Maintenance of the Division

of the Budget. It would seem that the final check need be only for compliance with planning premises and specifically recommended practices. The final close checking of dimensions and mechanical details appears to be largely a duplication of effort. If the professional architects cannot be relied upon for such details, they should not be engaged in the first place.

2. The Bureau of Engineering and Maintenance of the Division of the Budget should employ a Heating and Air Conditioning Controls Engineer. This individual should be thoroughly familiar with the various types of controls used by State institutions. He should assist institutions in determining the most effective systems for their requirements.

Many institutions are not fully aware of the benefits obtainable from the temperature control systems that have been installed as part of new buildings. Others must depend on contractual maintenance service to keep them in proper operation. Some institutions have sent individuals to various factory training schools. Few institutions, however, obtain the maximum benefit from these controls.

The duties of the recommended position would include visits to each institution. A particular individual at each institution would be designated to work with the engineer and this same individual would be responsible for the operation and maintenance of the system.

3. Central staff architects should not be employed by agencies whose architectural work can be performed by the Bureau of Engineering and Maintenance. Those presently so employed should be transferred to other duties or to the bureau. The elimination of detailed checking of professionally prepared plans should make engineering talent available for preparing engineering studies, preparing plans for alteration projects and similar activities of which there is now a large backlog. In addition, more attention should be given to the review of preliminary plans and planning premises so that institutions and professional architects would be better informed about requirements before working drawings are developed.

4. The Bureau of Engineering and Maintenance of the Division of the Budget should arrange for tests of various types of building equipment. The results should be reported in bulletins sent to each institution. This work should be coordinated with the Department of Purchases and Supply to assure effective value analysis and standardization of equipment wherever this is indicated as being desirable.

Housekeeping

Findings and Analysis

There is poor coordination and insufficient communications in nearly all of the housekeeping functions of the State agencies. Internal coordination at the level of the worker and his immediate supervisor is quite often inadequate (as was mentioned in the section Personnel and Supervision). Close contact between supervisors in the same organization is usually spotty and serious gaps are noticeable between the head of the housekeeping department and the official to whom he reports. Where housekeeping, or a part of housekeeping is under buildings and grounds, there are reasonably good communications, but where housekeeping is independent of buildings and grounds as in the larger institutions there tends to be inadequate cooperation or communication. This is unfortunate and unnecessary because maintenance requirements can be conveniently and effectively reported by custodial personnel.

There is virtually no communication among the housekeeping functions of the various agencies or even among the separate institutions within an agency. As a result, there is a great variety of methods in use. There is little agreement on the effectiveness of various materials. Some supervisors are well versed in the latest methods while others have remained quite aloof from new developments.

Conclusions and Recommendations

1. The management of institutions having housekeeping separate from buildings and grounds should take steps to improve the communications between these two functions. This may be achieved through emphasis at staff meetings attended by both department heads, through procedures for custodial workers to report needed maintenance, and through the close day-to-day cooperation of the individuals concerned.

2. A housekeeping specialist should be employed by the Department of Purchases and Supply to coordinate housekeeping activities among all institutions and agencies. Since such a position must be closely related to the purchasing of housekeeping materials, it is discussed more fully in the next section of this report, Purchasing and Value Analysis.

Purchasing and Value Analysis

Findings and Analysis

The purchasing service rendered to the various buildings and grounds departments was found to be much more effective than in previous studies. Some buildings and grounds organizations felt that there were still occasions when local purchasing would be more effective than central purchasing.

The majority of complaints centered about the length of time required to obtain particular items of materials or equipment. Investigation of specific instances indicated that in nearly all cases the requesting department had not communicated its requirements sufficiently in advance or had not described the desired item in sufficient detail. In some cases the purchasing function of the institution had failed to give sufficient indication of the urgency for early procurement or had customarily marked all delivery requirements or purchase requisitions "as soon as possible".

There tends to be a lack of consistent and coordinated procedures between buildings and grounds and the institution's purchasing department to assure that all necessary materials and equipment for particular projects are anticipated, specified and requisitioned. Follow-up of purchase orders is likely to be spotty and may not occur until the time the item is actually required.

In general, it is believed that any difficulties which exist in the coordination with purchasing can be corrected by application of more careful procedures at the institutional level. The Department of Purchases and Supply, recognizing that emergencies will occur and that occasional oversights are inevitable, has a policy under these conditions of granting the local institution permission to buy directly or to provide it with immediate streamlined purchasing service by the department's staff.

In light of the facts presented, it is believed that the only corrective action required in respect to coordination is in the administrative procedures and controls at the institutional level. These have been dealt with in another section of this report.

The Department of Purchases and Supply has initiated and developed an extensive and effective program for analyzing the value of building and housekeeping materials and supplies. In this activity they have enlisted the cooperation of specialists in many of the institutions through the establishment of value analysis councils or committees. These groups have compared their separate observations of various materials, supplies and equipment, have investigated the latest developments and have agreed upon standard brands or types. This program has been very successful in reducing the great variety of such items and has permitted the Department of Purchases and Supply to obtain very beneficial price advantages through the purchase of larger quantities of standardized items.

In a number of instances the quantities of such items has been sufficient so that the suppliers have provided technical service and instruction whenever requested by the using departments or agencies. This has had a salutary effect in improving methods and applications.

Our observations have indicated that a further extension of value analysis will provide additional opportunities for economies. We refer to the analysis of such items in respect to their durability or "mileage" and to the labor cost of application. To exploit fully this factor of value analysis it is essential to include a careful analysis of methods. The occasional meeting of councils or groups does not provide for the depth of analysis necessary unless there is a continuous coordination established among the members. Such coordination is not practical unless it is made a specific responsibility of a single position.

Conclusions and Recommendations

1. The administrative procedures associated with the buildings and grounds departments of the institutions should be carefully reviewed to assure that effective planning for materials and equipment is incorporated in them.

2. It is recommended that the present value analysis function of the Department of Purchases and Supply be augmented to include an analysis of methods associated with the various building materials and supplies. The total value analysis, therefore, will include not only the cost of the materials but also the cost of application and use.

To implement this recommendation the service of the present Value Analyst (payroll title Procedures Analyst) employed in the Department of Purchases and Supply should be augmented by the following two positions:

Standards Engineer—The Standards Engineer will work closely with the institutions through value analysis councils or committees in establishing standard types or brands of materials and supplies. He will arrange for tests in representative conditions at the various institutions and see that these are carefully planned and documented so that the results will be definitive, valid and comparable with previous or subsequent tests on similar products. Typical of the materials and supplies with which he will be concerned are floor tile, carpeting, building fixtures, paints, roofing materials, wall coatings, waxes, synthetic floor finishes, cleansers, built-in furniture, light bulbs, internal communication systems.

In evaluating such items as waxes, floor finishes, coatings and paints he will work closely with the Housekeeping Specialist (position described below), manufacturers representatives, institutional personnel and any other persons from whom he may receive information. It is essential that this position does not duplicate the engineering appraisal of materials and

equipment which properly come under the responsibility of the Bureau of Engineering and Maintenance of the Division of the Budget in respect to their technical desirability. To prevent this, there should be a close working relationship between the two organizations.

Housekeeping Specialist—The Housekeeping Specialist will also work closely with councils or committees from the various institutions. He will be particularly concerned with the establishment of the most effective methods. Obviously, since methods cannot be analyzed separately from materials and supplies, he will work closely with the Standards Engineer whenever such items are of significance. He will, for example, consider the relative effectiveness of buffing, scrubbing, wet mopping, dry mopping and vacuuming floors at various intervals and in various sequences. He will establish recommended housekeeping quality standards. These will not be mandatory but will furnish a guide for the institutions in determining whether they are maintaining standards in line with similar institutions. He will establish performance standards. These will be used by institutions in determining workers' assignments and assuring that the proper ratio of supervision to workers is established.

The three positions making up the value analysis unit will work closely with one another in covering the various aspects of value analysis. In addition to arranging for application and durability tests with the institutions, they will also conduct methods and training seminars and issue bulletins and instructions outlining the results of tests and methods studies. Much of the potential savings in housekeeping costs will depend upon the efforts of this group.

HEATING PLANTS AND FUEL

Operation of Heating Plants

Findings and Analysis

The typical heating plant is operated under the responsibility of a heating plant superintendent who reports to the superintendent of buildings and grounds or to the business manager. The operation is highly technical and in most instances the person to whom the heating plant superintendent reports is not well acquainted with its operation. The latter position is therefore frequently out of touch with the rest of the organization. In many instances the incumbent, though a qualified operator, is not fully conversant with technical aspects of his responsibility.

The Bureau of Engineering and Maintenance of the Division of the Budget employs specialists to assist institutions in their heating plant operations. These personnel receive data from some institutions which is used to compile a monthly report, available to all, showing the relative efficiency, fuel consumption, and other data of the reporting institutions. Participation in this reporting system is voluntary and some institutions decline or neglect to be included. Due to late replies from some institutions and because of pressure of other activities in the bureau, the report is usually several months late. Although giving a reliable and useful indication of the comparative cost of fuel per thousand pounds of steam produced, the report does not offer a means of showing the total cost including labor, repairs, and supplies. The plant efficiency is stated in terms of comparative actual efficiency. Such efficiency is largely built into the design of the plant and hence it does not indicate the proportion of attainable efficiency represented by the actual efficiency. For example, 65% efficiency attained in a plant designed for a maximum of 70% is a more creditable per-

formance than a plant obtaining 72% efficiency from a designed maximum of 80%.

The relative efficiency of coal handling varies greatly and is sometimes largely manual and quite expensive. In one institution six men are required for coal handling while cars are unloaded, an activity consuming several hours a day during cold weather. Other institutions, with better storage and handling equipment, require only one or two men for this.

One institution is equipped with decentralized fully automatic oil burners which need to be checked only at intervals by the custodial staff. Other institutions have automatic or semi-automatic plants but still require 24 hour attendance by one or more persons. One institution employs 17 persons as boiler attendants, firemen, etc., in addition to power plant maintenance personnel.

The relative economic advantage of oil as compared to coal is questionable. Some institutions feel they have reduced costs by converting to oil. In reality, however, the true cost of heating by the two methods is not easily determined with the present reporting system. The labor cost of coal and ash handling is a factor that in general receives too little attention from institutional management.

Recently introduced "package" plants using oil have been found to be safe and efficient without constant attendance. Similar plants using coal are being developed and show promise. Neither of these developments has received sufficient attention from State agencies.

Conclusions and Recommendations

1. All State operated heating plants should be required to report the necessary standard data to the Bureau of Engineering of the Division of the Budget. The bureau should issue its performance report to the head or business manager of each institution.

2. The monthly performance report issued by the bureau should be revised to show (a) the total operating cost per 1,000 pounds of steam; broken down by labor, supplies, and fuel, and (b) the efficiency performance; i.e., the percent of designed efficiency achieved.

3. The bureau should attach to each report an interpretation of the data as well as pointing out good and poor performance.

4. The bureau should make a formal inspection of each heating plant annually. The report should evaluate the condition of repair and upkeep, cleanliness, methods of operation and other important factors. In addition it should summarize the relative performance of the plant during the previous 12 months. The report should be submitted to the head of the institution or to the business manager.

5. The bureau should make engineering studies of:

(a) The economies of providing domestic hot water and process steam by centralized and decentralized automatic units during the summer months. It appears that in many instances sufficient hot water could be made available by employing decentralized hot water heaters in each building thus eliminating the heat loss of extended steam mains. The use of either centralized or decentralized warm weather heating equipment would eliminate the need for summer heating plant attendance and would relieve personnel for other duties. The more efficient equipment would also reduce fuel cost.

(b) The use of automatic and semi-automatic oil and coal fired heating plants. Particular emphasis should be given to the use of coal burning units because of the inherent economy of this fuel and its importance to the State's economy.

Fuel

Findings and Analysis

The State spends about $1,500,000 annually for fuel. Over $1,000,000 of this is for native coal, with fuel oil accounting for most of the remainder. Bottled gas, kerosene and wood account for minor expenditures. Increased expenditures have been made recently for natural gas because two institutions have converted, at least partially, to this fuel.

The institutions using natural gas report a unit fuel cost approximately 50% greater than coal burning institutions. The conversions to gas have been based on the claim that it avoids complaints from neighbors over soot and ash deposits and that it can be fired automatically, thus requiring less labor for coal handling and boiler attendance. However, since a reasonable gas price is dependent on the user agreeing to change to another fuel when gas demands are high, there has been a tendency to retain the same labor force required for the alternate fuel.

Soot and ash problems usually occur in warm weather when steam is required mainly for process steam in laundries and kitchens and for domestic hot water. At such times, the boilers operate well below their efficient burning rate and there is apt to be incomplete combustion.

Conclusions and Recommendations

1. Conversion to, or new installations of, natural gas heating plants should be avoided unless there are important provable cost savings. Other methods for reducing soot and ash should be explored before conversion.

2. Institutions should carefully analyze the use which they make of building temperature controls. It can be demonstrated that a reduction of over 5% can be effected through careful use of such controls. Particular attention should be given to seeing that temperatures are reduced at nights and on weekends when normal temperatures are not required. Effective control must have management attention. The responsibility cannot be left to custodians or the building occupants.