

A SURVEY OF PRACTICES AND POLICIES OF PHYSICAL PLANT OPERATION
AND ADMINISTRATION IN EIGHTEEN COLLEGES AND UNIVERSITIES
AND ONE CANADIAN PROVINCE

BY

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CHAPTER I

INTRODUCTION

Modern day college and university physical plant operations have become big business. It has become necessary to administer these extensive investments scientifically and carefully.

Actual physical plant administration in rapidly growing colleges and universities has become a complex operation involving many and diversified activities. Especially since World War II, physical plant facilities have constantly expanded to keep up with the great increase in college enrollment. In pre-war times the head janitor in many cases was the plant director and all business and planning functions of the department were handled by the school administration. The new growth and expansion in education by necessity has brought many new areas of responsibility to the college physical plant such as financing, campus planning, construction, and landscaping. The importance of good, efficient maintenance of buildings and grounds at a minimum cost has been realized more and more by most college presidents.

The need for a physical plant department with a competent director and staff capable of handling the various operations demanded of it is determined from the availability of outside services and the degree of economy and convenience which can be provided by physical plant departments.¹ Not only the maintenance of property worth millions of dollars but also the safety and health of students and faculty alike are

¹
American Council on Education, College and University Business Administration, Vol. 2, 1955.

dependent upon the competency of the plant administration.² The physical plant exists primarily to better the conditions which surround the teaching and learning situations. This can be carried out many ways depending upon the philosophy of the plant director and the administration of the school.

Unfortunately very few schools offer extensive, formal training in physical plant administration, so the directors of plants usually come into this work from some related field.³ Many have degrees in engineering, others are architects, and some are teachers. Ideally the plant director should be an expert in many different fields. Engineering, architecture, landscaping, trades, labor management, and business administration are some of the fields with which he must be familiar. There is much disagreement among school administrators as to the required background qualifications of the plant director.

The indicated complexity of school plant problems with its need for better direction and the failure on the part of the writer to locate adequate information led to the desire to investigate the nature of school plant problems - the objective of this investigation.

Statement of Problem

The problem was to locate information to answer questions concerning the physical plant director and physical plant operation. Answers to the following kinds of questions were sought:

² Linn, H. H., Helm, L. D., Grabarkiewicz, K. P., The School Custodian's Housekeeping Handbook, Bureau of Publications Teachers College, Columbia University, New York, 1948.

³ Ibid., p. 39.

1. What are the various methods and materials used by physical plant departments in directing plant operations?

2. What is the physical plant director's attitude toward the place of the physical plant in the over-all operation of the college?

3. What is the nature of the personnel employed in physical plants?

4. What are the relationships between physical plant employees and school faculties?

5. How are the various buildings integrated into the over-all campus plan?

6. What are the new developments in classroom and office planning and design?

7. What practices are followed in grounds maintenance and beautification?

8. What are the common and unique practices in constructing and maintaining the mechanical parts of school plants?

9. What are the colleges and universities doing toward providing and regulating housing, recreation, and parking facilities for students and faculties?

10. How are police and traffic control departments staffed and operated?

11. What plant staff and college-wide efficiency measures are carried on by physical plants and what are their effects on the over-all school operations?

Procedures

A search for literature concerning college and university physical plants was conducted. The search revealed that most of the literature was in the form of current magazine articles, with some scattered sections in bound books. No complete books specifically devoted to college and university physical plants were located.

Since a very limited amount of literature was located, it was decided to use visitations to seek the answers to the questions sought.

Limitations

It was felt that the predominant number of schools should be state supported schools since that was the area the writer was most interested in. Two private schools were chosen for comparison. It was decided to visit schools of under 10,000 students with the major emphasis ranging from 2,000 to 6,000 because that also was where the interest of the writer laid. It was felt that the schools chosen would represent a cross section of the schools in the area of the northwestern states. Two schools in Canada were chosen for comparison.

Schools included in the survey were:

1. University of Alberta.....Edmonton, Alberta, Canada
2. Boise Jr. College.....Boise, Idaho
3. Brigham Young University.....Provo, Utah
4. Calgary Technical School.....Calgary, Alberta, Canada
5. Colorado State College.....Fort Collins, Colorado
6. University of Colorado.....Boulder, Colorado
7. Idaho State College.....Pocatello, Idaho

8. University of Idaho.....Moscow, Idaho
9. Montana State College.....Bozeman, Montana
10. Montana State University.....Missoula, Montana
11. Oregon State College.....Corvallis, Oregon
12. University of Oregon.....Eugene, Oregon
13. College of Puget Sound.....Tacoma, Washington
14. Utah State University.....Logan, Utah
15. Washington State College.....Pullman, Washington
16. Weber College.....Ogden, Utah
17. Western Montana College.....Dillon, Montana
18. University of Wyoming.....Laramie, Wyoming

CHAPTER II

SURVEY PLANNING AND TECHNIQUES

Once it was decided to make a survey of policies and practices there were several jobs in preliminary planning that seemed to stand out. The first was to determine the general nature and extent of the survey that was to be made involving chiefly the selection of the schools. Once this was done it was necessary to plan the visitation details which also involved the preparation of a questionnaire guide. Details of planning and techniques used are given in the following sections.

Nature and Extent of the Survey

The information for this paper was gathered in two ways. First, a search was made for literature concerning the physical plant. The information found was primarily in the form of magazine articles. Since there was a minimum of written information available, it was decided to make a series of visitations to gain first-hand information about the physical plant. The writer made his own arbitrary classification of school sizes. Schools over 7500 enrollment were classified as large schools, 2500 to 7500 were considered to be in the medium range, and schools under 2500 were considered as small schools.

Selection of the schools to be visited was based on several factors. There was a desire to place emphasis on schools with enrollments of under 4000 because that was where the writer's interest was concentrated. However, it was felt that some large schools and some small schools should be included for contrast.

The schools were grouped according to climatical conditions considered to be somewhat similar to those of the Montana area with its somewhat seasonal extremes. Schools in a more moderate temperature zone were included for contrast. It was also felt that a study of some schools in a coastal area would be of value. The majority of the schools to be selected were state supported schools with one or two private schools included for comparison.

Schools were also considered from the standpoint of ease of visitation and the economy of making these visitations. No schools from the deep south were included because of their extreme variance of conditions compared to the northern schools.

A list of the colleges and universities meeting these requirements was made and 18 of those most nearly fitting all five of the factors considered were selected for the visitations.

Visitation Details

Contacts were made with plant directors prior to the visitations (See sample letter in appendix). It was planned to have personal interviews with the plant directors and with other persons such as college presidents, deans, business managers, housing directors, athletic directors, campus police, and a sampling of physical plant employees. Observations were planned to be made in the company of the plant director or persons in charge of various areas of the physical plant. It was also planned to make these observations while the colleges and departments were in active session.

Five trips were planned on the basis of a minimum of one day at

the smaller schools and three days at the larger schools. These visits were planned for the period between July, 1959 and March, 1960.

Actually the following visits were made: From July 24 through August 2, 1959, University of Wyoming, University of Colorado, Colorado State College, and Brigham Young University. From October 24 through October 29, 1959, Washington State College and the University of Idaho. From January 10 through January 12, 1960, Montana State College. From January 15 through January 20, 1960, the University of Alberta and the Calgary Technical School. From January 22 through February 7, 1960, Montana State University, University of Oregon, Oregon State College, College of Puget Sound, Boise Jr. College, Weber, College, Utah State University, Western Montana College, and Idaho State College. A total of 41 days was spent in actual visitations which usually included early morning and late evening sessions.

It was necessary to formulate a guide and a battery of questions to be asked of the plant superintendents. These were to be used only as a guide and other questions were to be asked as occasions arose.

Oral Questionnaire

The School Investigation Worksheet Guide (see appendix) or Oral Questionnaire was made up of seven major sections. It was felt that each section had a bearing on the over-all operation of the physical plant.

Statistical Information. The first four items as listed in the School Investigation Worksheet Guide refer to statistical information. They were: (1) school name, (2) school size, (3) school age, and (4)

school location. It was planned to secure this information from school catalogs and by interviewing plant directors. School size was not obtained from the registrars but was asked of plant directors. The same method of questioning was used to gather the city and town sizes. For items one through four no advanced questions were formulated. The fifth item in the guide was a request to list the school purposes. School catalogs were secured for this purpose, however, there proved to be very few schools that listed their purposes in the catalogs. One of the catalogs listed the following purposes: (1) to provide collegiate education in agriculture, engineering, home economics, applied art, commercial science, and applied science for the young men and women of the state in which the institution is located, (2) to train the State's future citizens to their highest usefulness in private life and public service, and (3) to carry the fruits of that research and University Service to all parts of the State.

All catalogs were searched for listings of school purposes with very little results. It was felt that some school purposes could have been gathered through interviews with college presidents, however, such interviews proved very difficult to arrange. It was questionable whether the time required couldn't be better spent on other aspects of the investigation.

Next the plant directors were to be asked about their financial systems and how the schools were allotted money for operation. It was found that all state supported schools' financial systems were very similar in nature, receiving money through their state legislatures and being governed by various types of boards such as the Board of Education found in Montana. The private supported schools were also similar

in nature to each other in that they obtained their funds from private organizations or individuals. None of the schools visited seemed to have a surplus of money to operate their physical plants. Since the differences in financial systems were so slight, it was felt that they would have very little bearing on the purpose of this study, which was mostly to determine the nature of physical plant operations.

Section No. 7 of the worksheet guide was divided into 11 sub-headings. The first of which had to do with the director's and employees' attitudes toward school personnel and physical plant activities.

The key questions formulated in advance appear under the following sub-headings.

Attitudes of Director and Employees. One of the objectives of the oral questions was to find the attitudes of the director and plant employees toward the college. To determine the attitudes in general toward administration, faculty, and students the major questions formulated were:

1. What is meant by physical plant of college and universities?
2. Does the physical plant director have faculty status and what value does he see in it?
3. What are the directors' and staffs' relationship with faculty members and also with students?
4. What does the plant director consider the more important factors of plant operations and what are some of the plant's work limitations?

Campus Layouts. The next objective of the questionnaire was to find out how the campuses were organized. Information was desired as to how the buildings were related physically one to the other.

1. Is there a space problem related to the campus?
2. Where are the various facilities of the campus located in relation to one another.
3. What is your opinion regarding where the different facilities should be located?

Instructional Areas and Office Space. This section was devoted toward finding new ideas for classrooms, laboratories, and offices.

1. Is there anything new on your campus in the way of classroom, laboratory, or office design?
2. Do you feel that the latest designs of classrooms, laboratories, and offices have been designed to fit the functions for which they were planned?

Grounds Care and Development. The objective of this portion of the questionnaire was to determine how campus grounds were maintained and kept beautiful and what techniques, equipment, and tools were required.

1. What types of technique, tools, and equipment are used by the landscape department to assure you that you will continue to have beautiful grounds?
2. What is the scope of the work placed under your landscape department and personnel?

Heating, Ventilation, and Lighting Systems. The main theme in this section was to determine the present practices and how satisfactory

they were. It was also intended to find out what improvements plant directors could suggest for other plants as well as their own.

1. Is a central heating plant practical and why?
2. How extensive is the use of air conditioning in your area?
3. Is anything being done toward adopting new lighting systems?
4. What suggestions do you have for better mechanical and electrical construction and operation in your plant and in others?

Special Buildings. This portion of the questionnaire was devoted to the study of special buildings and anything unique about their design and functions.

1. What buildings other than instructional and utility buildings are being built on your campus?
2. How are these buildings being designed or changed to meet their specific purposes?

Traffic Control and Police Forces. In this section the writer was interested in determining how police forces were organized, their functions, and some of their problems.

1. Who is responsible for traffic control and the campus police force?
2. What are some of the campus policing problems and what are the procedures followed in solving them?
3. What is the ideal size for the campus police force?
4. How do the campus policemen receive their authority to make arrests?

Worker Organizations and Their Implications. This section of the study was to be devoted to determining what worker organizations were present on the campuses and what the implications were on the over-all

plant operation.

1. What worker organizations are present on this campus (civil service, unions, or private work organizations)?
2. How are your methods of operation and your finances affected by these organizations?
3. Is there satisfaction among the employees with their present organization?

Summary

All of the questions listed here were asked at each school visited. As the interviews progressed and the opportunities arose, additional questions were sometimes asked under each section for clarification.

The answers to all of the questions were recorded and compiled. This information along with the information gathered from personal observations is treated in the following chapters.

The first data to be discussed has to do with the status of the plant director and the philosophy of the physical plant management.

CHAPTER III

STATUS OF PLANT DIRECTOR AND PHILOSOPHY OF
PHYSICAL PLANT MANAGEMENT

During the interviews the physical plant directors were asked to define the physical plant. The responses of the directors revealed that they were generally agreed that the physical plant of a school is made up of all of the lands, buildings, and equipment that go together to help create a learning situation. There was evidence that instructional equipment was sometimes segregated by directors, administrations, and staffs from the broad category of physical plant. However, this was an extremely fine distinction to make. What were swimming pools, classrooms, laboratories, study desks, and other equipment if they were not instructional equipment? Generally speaking, they were considered physical plant. In this study the definition of physical plant used was: All physical facilities that surround and enhance the learning situation. A consideration of all these physical facilities related to the learning process was found to be the responsibility of the plant directors in their planning and operation.

Considering the large scope and responsibility of the physical plant, the educational background of the plant director was a prime factor. It was revealed that 15 of the 18 had college degrees, although their major fields of education varied from engineering to education (see Table 1 appendix). Generally the major educational fields of the plant directors interviewed included many courses related to physical plant operation but none had received training specifically designed for physical plant administrators. It was not determined generally among the plant directors interviewed which particular educational

qualifications best prepared the directors for their jobs.

After surveying educational backgrounds of directors, a further attempt was made to determine the status of the plant director and the philosophy of physical plant management by asking these two questions: (1) What is the director's relationship with faculty members? and (2) What are the factors of plant operations and work limitations? Treatment of the responses to the two questions is given in the following sections:

Director's Relationship with Faculty

Importance of Working with the Instructor. Nothing is more important in the learning situation than the instructor himself. Respect of the instructor and his ideas should be an integral part of plant planning.¹ Why, then, did some plant directors try to divorce the physical plant from the faculty and staff of schools? One plant director visited said that the less association between the plant director and the faculty, the easier it was for the plant director to do his work successfully. However, the majority indicated that just the opposite was true. Most directors felt that to provide a service an attempt had to be made to understand the recipient of this service.

The Plant Director as Part of the School Faculty. Of the 18 schools visited, eight plant directors had faculty status and ten did not. Responses indicated that faculty status seemed to be more of an asset to

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Linn, H. H., Helm, L. C., Grabarkiewicz, K. P., The School Custodian's Housekeeping Handbook. Bureau of Publications Teachers College, Columbia University, New York, 1948.

the directors in small schools than those in large schools. The plant directors who had faculty status were in a better position to understand faculty needs in relation to the physical plant. According to the survey, it was clear that the primary purpose of the physical plant was to better conditions that surround the teaching and learning process. Yet it was found that some directors tended to build empires of plant operations and expected the faculty to adjust their activities accordingly instead of altering the plant operation to fit faculty and instructional needs.

Difficult Faculty Members. The general consensus of the 18 plant directors was that a small percentage of college faculties had the reputation of being difficult to work with and that it was impossible and unwise to cater to every whim of each faculty member. It was indicated that a closer association with difficult faculty members helped bring about a mutual understanding of the problems at hand.

Immediate Supervisor of Plant Director. As indicated in Table 1 (appendix), seven of the plant directors in the 18 schools visited were directly responsible to the president. In eight he was responsible to the business manager and in three he was responsible to the vice-president. There were good points in each supervisory plan but the success of each one of them depended heavily upon the personalities involved. It was obvious that the plant director and his supervisor had to work very closely in each case.

Factors that Determine Variations of Plant Operations and Work Limitations

Factors that Determine Variations of Plant Operations. There were several important factors that seemed to determine the ways in which a

physical plant was organized and operated. They were as follows:

1. The plant director's over-all educational background appeared to have a large influence on the method of operation of the plant. Directors with degrees in one particular phase of engineering, for instance, usually had a strong supervisory capacity in that department of their plant, while directors not having the same training depended upon others in their departments for technical knowledge in that field. Therefore, the experience required of employees to supplement the director's background varied from one plant to another.

2. School location and available local business concerns for services and facilities helped to determine what kinds of functions the physical plant was required to carry out. For example, some schools generated their own power and owned their own water supply systems where local facilities were not adequate or were too expensive.

3. The complete plant operation was affected in areas where there was union affiliation that definitely limited the amount of work and the types of work that could be done by the physical plant. This was reported in six out of the 18 schools visited. Construction and maintenance costs varied considerably between union affiliated and non-union affiliated schools. Union affiliated schools' costs were generally higher.

4. The age of the school plant and the history of the plant were found to affect the plant operations. Inspection of facilities indicated that habits formed by previous plant administrations left their mark on the hold-over employees. It was clearly evident that new buildings require different types of maintenance and repair than older buildings.

5. The adequacy of shop space seemed to determine the functions that could be carried out. One plant visited sent all vehicular

maintenance to commercial concerns primarily because of the lack of garage space.

6. It was found that the extent of plant operations depended to a large degree upon the president's attitude toward the physical plant. Having final decision on budgets seemed to influence his attitudes as well as members of the plant staff. Visitations indicated that most college presidents took a very keen interest in the physical plant.

7. In towns where schools of under 3000 students were located there was a tendency toward control of physical plant work by local concerns. This happened primarily in the smaller towns visited and was done primarily through local work shops and contractor's associations. This local control attempted to keep the physical plants from doing work they felt they should do.

Physical Plant Work Limitations. In one state (Montana) covered in this study an attempt was being made to place a five hundred dollar limit on work to be done by the school plant. In another (Oregon) there was a ten thousand dollar limit. In most of the states surveyed there was no legal limit. In practice, very few of the schools visited attempted major construction unless one would classify construction of cabinets and wardrobes and the hanging of light fixtures in existing structures as major construction. Typical plant work ranged from small interior jobs up to, and including, stainless steel sink construction on the one hand, and the hiring out of minor vehicular maintenance on the other hand. It was learned that as a general rule the plant director limited his work to remodeling and building accessory construction. This, of course, supplemented all types of strictly maintenance work.

Summary

1. In this study physical plant was defined as all physical facilities that surround and enhance the learning situation.

2. Of the 18 schools visited 15 directors had college degrees either in engineering or education.

3. It was found that eight plant directors of the 18 had faculty status.

4. Physical plant could not be divorced from the faculty and it was generally felt by directors that faculty status helped bring these two groups closer together.

5. Seven of the plant directors out of the 18 schools visited were directly responsible to the president, eight to the business agent, and three to the vice-president.

6. Some of the factors that affected plant operation were: (1) the plant director's background, (2) the school location, (3) unionization, (4) the age and history of the plant, (5) the adequacy of shop space, (6) the president's attitude toward physical plant, and (7) local control.

7. The majority of the schools visited had no financial limitations on physical plant work that could be done.

Unionization will be treated separately in the next chapter along with civil service organization.

CHAPTER IV

PHYSICAL PLANT EMPLOYEES AND THEIR WORK ORGANIZATIONS

In regard to physical plant employees, there were some important topics considered such as education of employees, reasons for working, wage levels, and the importance of certain employees in the plant. In regard to work organizations, the nature and effect of employees' union and civil service organizations were surveyed.

Physical Plant Employees and
Their Educational Status

The educational status of physical plant employees varied in accord with school sizes. The reasons men worked in plants and attitudes of employees toward their jobs were affected by wage scales and education of employees. Certain employees played a unique roll in the plant organization.

Education of Plant Employees. It was evident from the answers to questions concerning the education of plant employees that the larger the school the more professional people there were on the physical plant staff. Architects, especially landscape architects, were commonly found in the larger plants. It was determined in the survey to be common practice among the larger schools to employ mechanical engineers to supervise the heating plant departments. It was also found to be common practice to have graduates in business administration in the accounting departments. In schools visited of under 3500 students it was quite rare to find personnel other than the director of physical plant and his assistant with college degrees. Work requiring degree trained personnel was

accomplished through hiring people outside the school plant.

Reasons Men Work for Physical Plants. Among the reasons that men work in physical plants were: (1) The wages were good, 80 to 85% of outside scale plus fringe benefits. (2) They were dedicated individuals who loved their work. (3) They couldn't hold jobs for higher wages for commercial concerns. The directors of all of the larger plants indicated that the better of the employees stayed with their jobs if the wage scale was within 80 to 85% of the going rate in their locality.

Interviews revealed that most plant employees were not college trained but were tradesmen or semi-tradesmen with many years of experience in their respective fields. The attitudes of the two different types of physical plant employees differed considerably. The professionally educated person tended to value his reputation and his job more while the tradesman was more inclined to move from job to job without giving adequate formal notice to his employer.

The Importance of the Custodian. According to the survey, the custodial force was revealed to be one of the most important groups on the campus. It is now understood, and this was not so a few years ago, that the health and the safety of the children depends highly upon the custodian.¹ He is not only considered to be a sanitary engineer and a safety engineer but also a friend with whom many students discuss personal problems. All plant directors interviewed agreed that morally the custodian must be of the highest caliber. In half of the schools visited custodial jobs were filled with students. This practice, of course,

¹ Holloway, G. E., Custodians Take Their Workshop Seriously, School Equipment News, June 1957, pp. 56-57.

was very good from the student's viewpoint but disrupts the operation of the physical plant according to the consensus of the supervisors. One of the best operations of this type was one in which women supervisors were employed. That plant director indicated that women do a much better job of supervising the students than do the men.

The Secretary. It was evident throughout the visitations that a good secretary was a very valuable asset in any physical plant operation. It was generally agreed that few individuals were in a better position to help or hinder the function of the physical plant than the plant director's secretary.

The Handyman or House Mechanic. Visitations revealed the presence of the handyman in most schools except where there was strong unionization. In larger schools the tendency was to become more and more specialized with plant employees and drift farther away from the "handyman or house mechanic" type of person. According to Platt, specialists were extremely important, however, a good handyman still has his place.² In one school visited with an enrollment of 2300 a handyman was recently assigned to take care of three dormitories. The director reported that this handyman is saving more money for the plant than any other person on the physical plant staff.

Union and Civil Service Organization

Half of the schools visited were covered by unionization or civil service organizations. The nature and effect of these two organizations

²

Platt, B. H., Should Residence Halls or Unions Have Their Own Maintenance Staff, College and University Business, January, 1957, p. 467.

were considered in the survey.

Effects of Unionization. Unionization had taken place in many of the schools visited. In only two cases of the schools visited had this affected the custodial force as well as the various trades. Much difficulty was being encountered when a school was required to work under a union contract. This was especially true in the smaller schools. Due to the nature of school work, it was indicated that maintenance costs doubled under a union situation. In one small school it was customary, prior to unionization, for the boiler men to care for the lawns around the plant in their spare time. This, of course, was no longer permitted under union control. After unionization the men had to waste their time or polish the boiler room floor when they were not tending the boiler. In another school visited electricians were sent from the physical plant to the dormitories to change single electrical switches. In this particular school the tradesmen were paid full union scale. The dormitory director was faced with the dilemma of being able to hire work done by a town shop cheaper than through the physical plant. There were similar situations in all schools visited that were under union contracts but few were as serious as this one.

Nature of Civil Service Organization. In four of the schools visited it was learned that the plant directors who work under state civil service control have just as serious problems as those who work under union control. The wages were usually not comparable to the union scale and there was much difficulty in hiring and keeping men who could produce high caliber work.

Problems of Unionization and Civil Service. Table 3 indicates

the frequency of the different types of organizations found in the institutions visited.

TABLE 3. FREQUENCY OF UNION AND CIVIL SERVICE ORGANIZATION IN 18 SCHOOLS VISITED

Type of Organization	College or University Size			Total
	Under 2500	2500 to 4000	4000 & Up	
Unionization	1	3	3	7
Civil Service	1		3	4
None	3		4	7

Table 3 shows that of the 18 schools visited the employees of seven have some union organization, four are covered by civil service, and seven are under no worker organization.

Under both unions and civil service control there was a strict sick leave policy. The interviews indicated that this policy in some cases was good but that men tended to take advantage of it. The absence of a strict sick leave policy and allowing time off just when needed had proven to be quite successful. Under this system the plant directors indicated they could be more lenient toward those who really needed extra sick leave time.

Under both civil service and unionization the hiring and firing authority was described to be somewhat cumbersome. It was reported by the majority of plant directors that they felt it was easier to keep

borderline employees than to go through the formality of discharging them. This was true under both unionization and civil service. However, it was reported much more pronounced under civil service.

Summary

1. In schools of over 3500 students it was common to find college trained people on the physical plant staff besides the plant director and his assistant, while in schools under 3500 it was not.

2. The ideal wage scale for the workmen, as reported, was 80 to 85% of similar work wages in the locality.

3. It was commonly agreed by plant directors that the custodian was a very important force in physical plant operations.

4. A good secretary was also generally considered to be a valuable asset to plant operation.

5. Even though work generally was reported as becoming more specialized, there was still an important place for the handyman in some plants.

6. Of the schools visited, seven were unionized, four were covered by civil service and seven had no workers' organization. Unionization usually raised maintenance costs while civil service organizations presented directors with difficulties in hiring and keeping good men.

Physical plant staff and faculty relationships as well as upgrading plant employee prestige was revealed as one of the major problems of plant directors. This will be discussed in the next chapter.

CHAPTER V

INTERRELATIONSHIP OF DIRECTOR AND STAFF WITH FACULTY AND
UPGRADING THE PLANT EMPLOYEE

In interviews with the various plant directors, questions were asked as to what physical plant staffs' and directors' attitudes were toward the following: (1) the school in general, (2) the administration, (3) the faculty, (4) the students, and (5) the personal use of physical plant facilities. The answers to these questions are discussed in the following two sections which deal with the physical plant directors' and staffs' relations with faculty and the private use of plant facilities.

Physical Plant Staff Relationship with Faculty

Relationships between plant staff and faculty were generally in need of improvement. It was felt by plant directors that a mutual respect between these groups could be brought about.

Mutual Respect. Although the answers weren't formally tabulated, the consensus of the physical plant directors was, as substantiated by Taylor,¹ that the director of the physical plant must strive for a closer understanding of college faculty toward plant employees and also of plant employees toward college faculty. It was also understood by plant directors that the feeling, good or bad, of one group toward the other in most schools were usually mutual. The plant directors felt, with little exception, that the instructor must realize that the

¹ Taylor, G. L., Getting Along with Faculty, College and University Business, March, 1957, pp. 28-30.

employee has a certain pride in his work and has put many years of learning into bringing himself to his present level of ability and that the employee has put as much time into his life's work as the instructor has put into his. It was reported that the plant employee resented very much being told how to do his work by anybody not authorized to do so. All too often employees felt that instructors have a narrow understanding of practical work and knew nothing except what they had read in books. It was generally agreed by plant directors that this warped impression was far from true, and that plant employees could often learn from instructor's advice. Indications were that the majority of college instructors have done manual labor at some time during their careers and that they understood the worker's problems.

Respect of one another's abilities was of prime importance in faculty and physical plant relationships according to Holloway.² Plant directors agreed that the physical plant staff cannot get along without faculty and faculty cannot get along without the plant. Interviews with plant directors indicated that the directors generally felt that the employee should always keep in mind that his purpose for being employed was directly related to increasing the school's ability to provide for teaching and learning and that no other purpose was more important for the existence of the physical plant.

Policies of Staffs' Personal Use of Plant Facilities. In the past in colleges and universities it has not been uncommon for faculty and plant employees to make personal use of plant facilities during

² Holloway, G. E., Custodians Take Their Workshop Seriously, School Equipment News, June, 1957, pp. 56-57.

off-hours. Their reasoning had been that since they worked at the schools they should be allowed to use all equipment and facilities. Most of the plant directors interviewed felt that physical plant employees were guardians of this equipment which was purchased for a purpose and they should see that it was used only for the purpose for which it was intended. This was considered reason enough for not using the equipment without considering the safety and the insurance risks involved. All but two plant directors interviewed agreed that personal use of equipment should not be permitted. The directors' reasoning was that if a minimum of work was permitted, where does one draw the line without causing more antagonism than would occur had it not been allowed to start in the first place?

Upgrading the Plant Employee

Where plant staff relations are so important it would seem that everything possible should be done to improve the prestige of the plant employee. To determine what practices were followed, a general inquiry was made regarding ways of upgrading employees.

There has been a general campaign for many years among the schools visited of promoting the janitor to a custodian. Where this had been accomplished it had far reaching effects on the spirit and the prestige of this position. One plant director of the 18 visited had the same type of campaign to raise the social prestige of the other physical plant employees which he felt would give the employee a much stronger

feeling of belonging and responsibility. He indicated that upgrading employees socially was a large contributing factor in creating high caliber work. In that particular school plant employees were invited to most faculty functions.

Physical plant staffs' relationship to the faculty can be compared to the problem of vocational technical departments versus academic departments. In some schools vocational technical departments had been viewed as inferior to academic departments. This gap was reported as being rapidly bridged to the betterment of the over-all educational system. The plant director mentioned in the preceding paragraph felt that a similar bridge between physical plant personnel and faculties was needed. It was generally agreed that the directors of physical plants have a long, hard task ahead to strengthen this relationship but it was felt that it could be done.

Summary

Several points seemed to stand out regarding the relationships between faculty and physical plant staffs. They are:

1. Plant directors were working toward improving mutual respect of physical plant staffs and school faculties.
2. All but two of the plant directors interviewed felt that no personal use should be made of physical plant equipment and facilities.
3. All plant directors were working to promote the janitor to custodian. However, only one was working intensively toward increasing the prestige of all of the physical plant employees.

The efficiency of the physical plant organization depended to a large degree upon the location of the various facilities on the campus. A discussion of the location of the facilities in the schools visited is presented in Chapter 6.

CHAPTER VI

LOCATION OF VARIOUS FACILITIES OF THE PHYSICAL PLANT

One of the most distressing problems of campus planners was space. Most campuses were designed to accommodate much less than half of present enrollments.¹ Due to the rapid expansion and crowded conditions, especially in the urban areas, visitations showed that campuses were crowded next to cemeteries, residential areas, and super-highways. As the larger of the schools visited had grown, the beauty spots were continually being replaced with buildings that were placed so close together that there was no area left for background planting to enhance the beauty of the buildings. Many buildings looked naked for the want of landscape plantings. Where buildings were placed around beautiful courts some years ago, the courts were now filled with more buildings so that there were buildings around buildings. Schools needed to spread out to keep from creating asphalt jungles of college and university campuses.

The physical plant facilities were divided into the two general areas: (1) instructional and recreational, and (2) parking, housing, and utility for discussion in the following sections.

Location of Instructional and Recreational Facilities

Instructional and Recreational Areas. The better planned campuses visited consisted of courtyards surrounded by academic buildings. These groups made up a school or a division of a university. In a central

1

Pryce, E. L., Future Campus Planning, College and University Business, July, 1954, p. 38.

area of the groups was usually located the administration, library, and the student union buildings which is common practice according to the American Council on Education.² The public gathering areas, such as auditoriums and little theaters, which were found to be located closer to the outside of the campuses, provided much better vehicular accessibility. The better designed campuses had one side of the groups of buildings open to accessible land for expansion.³ On the other three sides recreation, housing, parking, and utility areas were integrated into the over-all campus plan.

Location of Instructional Machine Shops and Industrial Arts Buildings. Inspections of the 18 campuses showed that buildings requiring extensive truck deliveries, such as industrial arts buildings and machine shops, were much more convenient if located near the outskirts of the academic areas. The better organized campuses discouraged truck traffic on the campus proper.

Parking, Housing, and Utility Areas

Campus Parking. One of the major problems in athletic areas was indicated to be vehicle parking. The most efficient parking lots viewed in the visitations were those organized so that there were several city streets accessible to them. Student unions, auditoriums, theaters, and other activity buildings also required extensive accessible parking

² American Council on Education, College and University Business Administration, Vol. 2, 1955, pp. 19-34.

³ Pryce, op. cit., p. 31.

lots. The lots not large enough to accommodate peak crowds caused traffic congestion at important school functions.

Adequate parking took much valuable land area of the campus unless the campus was scientifically planned. Parking lots generally were best kept on the periphery of the campus to keep down congestion within the campus proper.⁴ The larger campuses visited, those over 4000, were gradually working toward periphery parking. On one campus visited, one main campus road and several minor roads were being used as access roads for through traffic only, with no parking being permitted along these roads. Faculty lots were provided as close to buildings as possible. In all schools visited plant directors indicated that in future construction, parking lots will be planned while the buildings are in the planning stages rather than after the buildings have been completed. Many lawn areas in the majority of the schools visited had been lost because of the need for parking lots.

Wherever periphery parking was used on the campuses visited, it seemed to cause much dissatisfaction among the students and the faculty as well because of the increased walking distances. By properly placing parking facilities, valuable campus land had been saved for other important purposes and a contribution had been made toward getting students and faculty out for that much needed fresh air and exercise.

Married Student Housing. The married student is here to stay and adequate facilities must be provided for him.⁵ It was not mandatory that

⁴ American Council on Education, op. cit., p. 32.

⁵ Kretschmer, Vernon, Family Housing Facilities, College and University Business, May, 1957, pp. 36-38.

these facilities be on the campus proper, however, it was desirable for maintenance and utility purposes. Wherever possible, according to the schools visited, married students' housing had been located on the outskirts of the campuses. These were in agreement with Kretschmer's point of view.⁶

Utility Areas. With very little exception, the plant directors visited desired that physical plant shops and utility areas of the campus be located on the outskirts of the campus. The one exception was the heating plant which most plant directors felt was more efficiently utilized in a central location. Generally shops, warehouses, motor pools, and similar buildings were found to be located together. According to plant directors, this created a much easier and more economical control situation. Interviews indicated that a large, tightly fenced dead storage area was much needed for good plant operations. All schools visited had accumulated surpluses of dead storage which were usually very unsightly and tempting for prowlers when left in open view. The physical plant offices were located within or adjacent to the maintenance area created a freer access for the workers. In two of the schools visited the plant office was located away from the plant area. The directors reported that some of the group spirit that was so badly needed in good plant operations was lost in these situations.

Directors of the large schools indicated that it was extremely difficult for a campus to grow satisfactorily without a master plan. One school visited had a large scale model to help guide its campus growth. This plan was followed as nearly as possible. However, they

6Kretschmer, op. cit., p. 33.

found it necessary to review the plan at least once every three years so that it could be altered to meet new ideas and new concepts of education.⁷

Summary

The preceding pages have brought out the highlights in the trends of campus building organization as indicated in the visitations as:

1. Schools were spreading out to prevent creating congested areas on campuses.
2. The better designed campuses were designed with buildings grouped to house individual departments.
3. Divisions requiring extensive delivery service were usually located toward the outside areas that required little truck traffic on the campus proper.
4. The larger campuses were gradually working toward periphery parking.
5. Housing was being built to accommodate the married student. Married student housing was being located generally on the outside borders of the campuses.
6. In the schools visited utility areas were generally located on the outskirts of the campuses.

Office and classroom facilities will be discussed in the following chapter.

7

Neutra, R. J., Alexander, R. E., Planning a Campus, College and University Business, January, 1959, pp. 33-38.

CHAPTER VII

CLASSROOM AND OFFICE FACILITIES

Alvin C. Eurich, Vice-President of The Fund for the Advancement of Education, explains that the present general standard for class size goes back to at least the middle of the third century. In the Babylonian town of Talmus Baba Bathra in 20 A. D. the rule was established by Rabbi Raba, an authoritative sage of his era that, "Twenty-five students are to be enrolled in one class. If there are from twenty-five to forty, an assistant must be obtained. Above forty, two teachers are to be engaged."¹ With present day developments in technology and education, it was surprising that educators should follow a third century formula for classroom size. Scientific evidence as to the best class size for present day instructional needs was badly needed.²

Not only was the classroom size in colleges often inadequate but also the importance attached to the instructor's office was all too often given a secondary rating.³

In the visitations the writer was looking for something different from the average in classroom and office design because recent articles written by architects seemed to indicate that school room design had experienced some changes and the expansion and growth of most colleges would by necessity bring about the construction of new buildings.

1

Eurich, A. C., Maintaining and Improving the Quality of Instruction, The Journal of Higher Education, May, 1956, p. 240.

2

Ibid., p. 240.

3

Hellerich, M. H., What Type of Office Will the College Teacher Require by 1965, College and University Business, October, 1959. pp. 37-38.

was assumed that at least some of the colleges visited would have new rooms of modern functional design and size to meet new teaching demands.

Nature of Classrooms Visited

New Classroom Size. It was found in the majority of institutions visited that new classrooms under construction and those recently completed were planned to accommodate a greater number of students than ever before. The typical classrooms of the past which accommodated 25 to 50 students were being replaced by rooms that seated 100 to 300 students. Generally throughout the schools visited the new, larger sized rooms were a product of the most recent planning and construction.

Lambert cautions that the presence of too many small classrooms introduces a certain extravagance into both planning and the operation of a college plant.⁴ However, in most of the new buildings that were viewed there were some small conference type rooms seating 10 to 20 students.

Classroom Design. Other than in size, only a few outstanding new features were found in classroom design. Two of these new features were noted in science laboratories. In one school visited the laboratory equipment used for food preservation training was particularly unique. Several large canning machines were in use to teach students about their use in canning factories. The machines represented those used by different companies to give better diversified training in their operation. In an

4

Lambert, A. C., Don't Plan Too Many Small Classrooms, College and University Business, April, 1954, pp. 45-47.

adjoining laboratory at the same school there were several huge walk-in freezers for food freezing experimentation. These rooms had observation windows for observation of the foods while they were being frozen.

Another unusual feature found in one of the science rooms visited was the use of an instructor's laboratory table with detachable sections. Several of these detachable sections permitted the instructor to have an assistant set up other demonstrations while he was giving a lecture and demonstration at the base table. These removable sections were on rollers and could be taken into separate workrooms for preparation.

The only other particularly new feature noted in classroom design was the sloping floors of the large lecture rooms for better visibility of the instructor. In some cases the instructor's area was also elevated.

Interior Decoration. Interior decoration in the majority of new college rooms visited was well done from the standpoint of beauty and maintenance. In most cases colors were well chosen to be pleasing and cheerful and paints and surfaces were used that could be easily maintained. Easy to care for floors such as terazzo and hard surfaced tile were prevalent in new buildings.

It was noted in the utility and laboratory areas of most schools visited that color was not utilized from the standpoint of color-coding for the safety and comfort of workers and students in those areas. This safety color-coding advocated by leading paint companies is the use of cool, comfortable colors which meet worker eye areas around machinery and equipment and bright, significant colors where danger or alertness is necessary. In a limited number of boiler rooms visited, examples of color-coding for different purposes existed, such as white insulation on

steam pipes for ease of cleaning, black for gas lines for identification, and red for dangerous switches and other areas of danger.

Screen Projection and Television in the Classroom. From the observations made, it was learned that an increasing amount of classroom instruction was given through the media of screen projection. Nearly all new rooms were being equipped with black-out curtains and facilities for conveniently storing projection equipment. Not only movie projectors but also slide projectors and opaque projectors were in common use at all of the schools visited.

According to numerous recently printed articles, closed circuit television is being used in many colleges and the articles indicated that it appears to be extremely successful. Pharis relates that there was a high initial cost of installation with television, but the benefits derived seemed to far outweigh the initial cost.⁵ Despite these favorable reports on the use of television, the majority of schools visited had not yet incorporated closed circuit television in their instructional media. The general feeling of plant directors interviewed was that television would be used more if it were less costly.

Office Facilities

One college president indicated that it was extremely important that each instructor have a private office where he could do his creative thinking and planning concerning his work. Observations were made and questions asked at each school visited concerning the nature and

5

Pharis, W. L. Jr., Expanded Use of Audio-Visual Aids, Educational Business, November, 1958, pp. 43-48.

adequacy of the faculty offices. The importance of a good, private office for each instructor was recognized and realized by most schools.

Instructors' Offices in Older Buildings. It was generally found, especially in the older buildings, that many faculty offices were inadequate in location and size. Due to the large increases in staff members, areas unusable for anything else had been converted into faculty offices. They were located in abandoned classrooms, lobbies, waiting rooms, stairlandings, and in many other undesirable areas. Obviously it was extremely difficult to provide proper light, heat, and ventilation in such areas and in some offices these facilities were far from adequate according to the directors.

The best arrangement observed by the writer in remodeling old buildings into usable office space was the converting of an abandoned student union building on one campus into an office building. Being a separate building from classrooms gave the offices a maximum of privacy and as a student union the building was centrally located which made it a convenient location.

The lack of privacy of office space located along busy hallways was of major concern in many of the schools. One school corrected this by installing a partition creating an extra hallway in front of office areas. They were quite pleased with the results.

Instructors' Offices in Newer Buildings. In the newer buildings in most schools visited, more well-planned private offices were being provided for faculty use. The new offices generally were large enough to accommodate a large desk and chair, bookcases, and at least two other chairs comfortably. Adequate lighting and heating were provided and the

interiors were generally pleasingly decorated and furnished. In the majority of schools it was indicated that the number of new offices was not nearly enough to keep up with the demand.

Summary

1. Visitations indicated that the majority of new classrooms were being built to accommodate more students than ever before. However, a few small conference rooms were also included in new planning.

2. Other than in size, there were only a few new features noted in classroom design. The new features observed were more prevalent in laboratory equipment such as the unique canning and freezing department seen at one school.

3. Interior decoration was found generally up-to-date as far as beauty and maintenance were concerned, but color-coding was not generally utilized for the safety of students and workers.

4. Visual aids equipment such as movies and slide projection equipment were in common use at all schools surveyed, but as yet closed circuit television had not been used extensively because of considered initial high cost.

5. The importance of an adequate private office for each faculty member was generally realized in each school visited, but the office situation in many schools was far from adequate. Most schools were attempting to provide good offices for instructors in both old and new buildings.

CHAPTER VIII

GROUNDS BEAUTIFICATION AND MAINTENANCE

The landscape architect or the person doing his job is responsible for two of the more important grounds functions on the campus. They are grounds beautification and grounds maintenance.

Grounds Beautificaion

During the visitations the major points discussed concerning grounds beautification were: (1) what is required of physical plant to assure beautiful grounds? and (2) what goes together to make up the campus landscape?

Landscape Architects and Their Tools. Some of the most plain and inexpensive buildings visited were made to appear beautiful by proper landscape architecture. Physical plants employing landscape architects were extremely fortunate. It was evident from the visitations that more effort should be made in the majority of cases to provide the landscape architects with the tools with which to work. The landscape architects interviewed agreed that one of the most important of their tools was space. Much more planting area was considered necessary in front of and beside buildings, instead of the minimum space left after setting the buildings within a few paces of the streets.¹ As indicated earlier, the most desirable position for buildings is around large courtyards. The courtyard provides the architect with the facility to present a visual

¹

Pryce, E. L., Future Campus Planning, College and University Business, July, 1954, pp. 37-40.

delight from almost any position in the areas. The landscape architects indicated that they do this by hiding the less desirable views and framing the more beautiful portions of the buildings with trees and shrubs. It was agreed by the landscape architects that good planting design did not necessarily require the most expensive plants and that sometimes the simplest of plants produced the best effects. The landscape architects interviewed used the theory that beautification of grounds should be done with material that is indigenous to the region rather than by bringing in foreign materials that require extensive care to help them survive.

Street Parking. Street parking was quite common among the schools visited. Where car parking was in lots and not permitted along campus roads, more attractive grounds were evident. Roads were then made narrower and sidewalks wider in order to better handle the massive pedestrian traffic. Access roads provided to all of the buildings for delivery and maintenance purposes were routed to the service entries of the buildings where they did not adversely affect the fronts of the buildings.²

Walks. According to the landscape architects interviewed, wide and plentiful sidewalks adequate for peak loads of traffic were deemed necessary to keep grounds attractive. In the majority of the campuses visited it was evident that planners made the mistake of placing the walks and trying to force pedestrians along unnatural routes. A better approach followed extensively by one school in particular was to study

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Ibid., pp. 37-40.

the natural flow of traffic and as near as possible place the walks accordingly. This created more walks and tended to detract from the symmetry of the plot-plan of the campus but saved grass and other planted areas from unsightly damage. Landscaping planned around a natural trail incorporated the walks into the beauty of the over-all landscape plan.

Necessary Factors in Grounds Maintenance

Grounds maintenance, as used in this section, was directed toward creating beauty spots of college and university campuses. The practices in essential factors for grounds maintenance are discussed in the following sections.

Irrigation Systems. One of the essential factors in grounds maintenance is the irrigation system. Unfortunately all plant departments visited still had to labor with some hoses and sprinklers to do lawn watering. The better financed schools were installing underground sprinkling systems. Plastic pipe was being used extensively for this purpose. Timer switches were also becoming more common. It was felt by the landscape architects interviewed that one of the biggest problems of grounds work was the expense of the large amount of hand labor required. It was felt that any time a job could be accomplished by an automatic system a saving would result in the long run because of the high cost of labor. Nearly all plant directors visited were aware of the possibility of saving money over a period of time through automatic irrigation systems and as funds become available they plan to change over.

Water Availability. Of the schools visited, about half of them

were plagued with not having adequate water for their needs. Others were plagued with the high cost of water. Numerous schools were drilling wells or harnessing other water supplies for their own use. For those who cannot provide enough water, forms of ground cover other than grass were in use. One campus visited had to allow its lawns to brown up during part of the year because of lack of water.

Flowers and Greenhouses. Schools in the United States can take a lesson from their neighbors from the north, the Canadians, when it comes to flowers and lawn beautification. One school visited in Canada gave much evidence of this and the plant director indicated that the flower program on that campus is common throughout Canada. Greenhouses and nurseries were found in the majority of the schools visited in Canada and the United States. These were used mostly for starting plants to be set out in the spring. However, some colleges even attempted to grow all of their cut flowers for social functions throughout the year.

Planning the Landscaping. It was evident throughout the visitations that the more beautiful grounds areas received thorough planning prior to planting. Sections of the campus, and in some cases the complete campuses, were planned on paper well in advance of construction.

Through well-planned landscaping, the colleges and universities were becoming the beauty spots that they should be.

Summary

1. The survey revealed that one of the most important requirements is adequate space for planting areas. Campuses were becoming too crowded

in some cases to allow for proper landscape architecture.

2. The landscape architects interviewed indicated that the campus must be planned as a whole. Buildings, walks, parking areas, trees, and lawns should each be an integral part of a master plan and they should not be treated individually.

3. Properly placing parking lots permits the prohibition of street parking which in turn gives the landscape architect more possibilities for campus beautification.

Heating, ventilation, and lighting systems in colleges and universities are presented in Chapter 9.

CHAPTER IX

HEATING, VENTILATION, AND LIGHTING SYSTEMS IN
COLLEGES AND UNIVERSITIES

Among the questions asked in the interviews were: (1) Is a central heating plant practical and if so why? (2) How extensive is the use of air conditioning? and (3) Is anything being done toward adopting new lighting systems? Responses to these questions led to the following information.

Heating Plants and Distribution Systems

Central Heating Plants and Types of Fuels. All of the 18 schools visited apparently found it practical to heat their buildings with central heating plants. It is to be noted (Table 2, appendix) that these plants used predominantly three different types of fuel. This is in agreement with King's article on Smith College's central boiler plant.¹ They were natural gas, coal, and oil. Gas was generally accepted to be the best because of its cleanliness and economy of operation. As gas became more and more available throughout the area, its use was being adopted by most schools. It was generally agreed that due to the tremendous investments in physical plants, gas should not be the only source of fuel as this source could be cut off. It was also reported that where schools were equipped to use more than one type of fuel, there was a constant threat to the suppliers to keep the cost of their product competitive.

1

King, G. W., Smith College Likes Its Central Boiler Plant, Educational Business, October 1957, pp. 56-57.

This was said to be a very definite advantage in some areas.

Electricity in the Heating Plant. Because electric power was not generated in most plants, they were completely out of operation during an electric power failure. This, of course, was because the modern gas burners were operated with electricity. The larger plants visited generated at least enough power to operate the heating plant in case of outside power failure. Two schools visited generated approximately 90% of the power used on their campuses.

Use of Central Heating Plants and Individual Buildings' Heating Plants. In the smallest of the schools visited there was some question as to whether it was most advantageous to have central high pressure heating plants or to have individual low pressure boilers in the various buildings. It was reported that high pressure systems do require constant attention meaning more expensive manpower. It was also reported that low pressure systems required only two or three inspections a day but there were many chances for fire and explosion whereas in a high pressure system all of the boiler-caused fire danger potential was consolidated in one building.

Distribution Systems for Central Heating. In 13 of the 18 schools visited, distribution systems for central heating made use of tunnels. For maintenance reasons the tunnels seemed far superior.² Other utilities such as television cables and telephone cables, as well as the heat distribution lines, were worked into the tunnels. It was evident that tunnels varied in quality and size according to the amount of expense put

2

Pena, W. W., Thomas, J. B., An Architect Designs with Air Conditioning, Educational Business, March, 1959, pp. 46-48.

into their construction. The more expensive tunnels were cheaper in maintenance which was substantiated by Pena³ who has pointed out that money spent for a central heating plant with a good tunnel type distribution system was money well spent.

Ventilation, Air Conditioning, and Lighting

It was desired to find out through visitations how common forced air ventilation was in colleges and universities and how extensive air conditioning was being used. It was evident that new types of lighting were extremely rare in the schools visited.

Ventilation and Air Conditioning. Window type ventilation was no longer the only type of venting in today's better buildings. All of the schools visited had some forced exhaust systems built in. There was some question of the feasibility of air conditioning among the plant directors interviewed. However, it was believed that the time is coming soon when most of the population will demand it as brought out by Pena.⁴ In the schools visited, a limited number of small conditioning units were used in the special offices and laboratories. Since many new banks, department stores, and office buildings in the towns of the schools visited were being cool-air equipped, it is quite possible that this influence will be extended throughout campuses especially since it was felt that it increased the personnel efficiency to a considerable degree. It was

³
Ibid., p. 47.

⁴
Ibid., p. 48.

believed by the majority of plant directors interviewed that making provisions for the future addition of air conditioning units in major buildings will undoubtedly save time and money in the long run. Required concealed ducts and conduits should be included in the original construction.

Illumination. Two of the plant directors interviewed suggested that many of the special shaped fluorescent tubes developed in the past were unsatisfactory and created maintenance problems. Planners were said to be cautious toward adopting new ideas in lighting. Therefore, such advancements as the new lighted ceilings were not receiving rapid acceptance. There was only one school visited that was using the lighted ceiling and that was in its new library building. It was reported to be very good as to efficiency, economy of operation, and economy of installation. Perhaps as more plant directors become familiar with lighted ceilings they will receive more wide-spread use.

Summary

1. All 18 schools visited were found to have central heating plants.
2. Natural gas was found to be the most common fuel in use, however, coal, oil, and hog fuel were also in use.
3. The necessity of generating electricity was generally recognized because of the possibility of inoperative heating plants through the loss of power. However, in practice very few schools were generating any electricity.
4. Of the 18 schools visited, 13 of them used tunnels for heat as well as for other utility distribution.

5. Air conditioning was seldom found to be used extensively in the schools visited.

6. Most schools visited were using standard fluorescent and incandescent light fixtures while only one school was found to be using the new type lighted ceiling.

Auditoriums, gymnasiums, field houses, and married student housing are among the special buildings to be discussed next.

CHAPTER X

SPECIAL BUILDINGS ON COLLEGE AND UNIVERSITY CAMPUSES

Among the special buildings to which this paper refers are auditoriums, dormitories, married student housing, fieldhouses, and gymnasiums. The writer wanted to learn what types of special buildings were being built and how well they functioned.

Specific campuses and buildings have purposely not been mentioned. However, one building was so outstanding that it will be discussed briefly. The first special buildings to be discussed are auditoriums and student housing as both were of major concern to the physical plant directors, and the University of Alberta's auditorium in particular since it was considered so outstanding.

The University of Alberta's Auditorium. The University of Alberta's auditorium was a twin to the one located on the Calgary Technical School's campus at Calgary, Alberta, Canada. It was indicated in interviews with the two Canadian physical plant directors that the auditoriums were dominion financed and controlled buildings and were constructed to bring culture to the west. Their success has been beyond all expectations according to reports received. They were of modern design and each one can house an audience of 2800. The fully carpeted lobbies easily accommodated the 2800 during intermissions. The stage accommodated over 100 musicians at one sitting. There were showrooms capable of housing 60 automobiles at one showing. Dressing rooms, fitting rooms, and lounge rooms were equipped for the most modern techniques of participant preparation for stage performances. The beauty of this building was surpassed only by the functionalism of the auditorium itself.

Richard Neutra, world famous architect, in the publications called Jubilee Auditoriums published by the Canadian Public Works of Canada, stated that, "the accoustics of these auditoriums are rated with the best in the world". Neutra also expressed great praise for the buildings in general.

Auditoriums in American Colleges and Universities. It was generally agreed that among the schools visited the administrations felt that the auditorium was the least needed of all of the major facilities. None of the schools visited had adequate auditorium space for all of their students. Functions that called for the use of these facilities were usually held in fieldhouses and gymnasiums. Unbelievable as it is, for some programs the accoustical results had been outstanding.

Dormitories. It was learned from the visitations that the new modern dormitories were not always the most popular with the students. Extra space, a homey atmosphere, and private wash basins were some of the features in the better old dormitories that the students found more appealing. It was felt by at least two of the dormitory directors interviewed that the contemporary designed dormitories connote a feeling of coldness stressing the mechanical aspects of living and leaving out the human touch which they felt was so important.

Rooms that house two people were by far the most popular. However, two of the schools visited had experimented with group living accommodations. This was done for both men and women students. These types of dormitories have proven most successful according to the directors in charge of them. Rooms for approximately six students were grouped around one kitchen. The groups did their own planning, purchasing,

and cooking. It was interesting to learn from the dormitory directors that the men involved appreciated this system nearly as well as the women.

Dormitory furniture that had stood the test of time was of good sturdy design. It was clearly evident that investment in good furniture was important. It was reported that men, especially, were rough on furniture as well as on the buildings. The system of having students pay for the damage caused was prevalent in most schools and proved to be a great deterrent to the occurrence of damaging of facilities.

Married Student Housing. One school in particular that was visited indicated that schooling was for the single student primarily and, therefore, they did not provide adequate housing for the married person. This appeared to be a false premise, as the number of married students is growing and will continue to grow.¹ It was evident that much of the present housing was old and inadequate. However, an attempt was being made in the majority of the schools visited to provide new, modern apartment buildings or small multiple dwellings for the married student. It was found that the rents were usually high, about 80 dollars per month for a two bedroom apartment. However, there were very few vacancies. This is in agreement with Kretschmer.² Approximately half of the apartments were furnished and the rest were not. Price did not seem to be the deciding factor as to whether they were occupied or not.

Laundry facilities were provided in all apartments visited. In

¹ Sharkan, W. M., Housing for Married Students, College and University Business, August, 1954, p. 38.

² Kretschmer, Vernon, Family Housing Facilities, College and University Business, May, 1957, p. 38.

all cases this was done by providing one laundry room for several families. Charges were made by either flat rates or by the use of coin operated machines.

Fieldhouses and Gymnasiums

Fieldhouses and gymnasiums housed athletic departments, athletic games, and many other activities on the campus. The cost of construction of these facilities was a prime consideration for physical plant directors. It was desired to find out how prevalent fieldhouses were throughout the schools visited and what roles the fieldhouses and gymnasiums played on college campuses.

Fieldhouses. Eight of the 18 schools visited had or were building elaborate fieldhouses. They seemed to be a boon to the varsity activities and to outside activities brought onto the campuses. They housed such functions as ball games, track meets, rodeos, boxing matches, circuses, and car shows. Seating capacity of the fieldhouses visited ranged from 3000 to 12,000. Interviews with plant directors divulged that the setups to change from one type of activity to another were major operations and required much time and labor. The manpower required to accomplish these changes was in all schools visited placed directly under the supervision of the personnel in charge of the fieldhouses.

Gymnasiums. The presence of a field house on a campus did not exclude the requirement of the gymnasium. Some varsity and nearly all other physical education activities were held in the gymnasium. Only three schools visited were without swimming pools and in the majority of them a swimming course was a requirement for graduation. All of the

plant directors visited generally agreed that the best filtering, water softening, and heating equipment were found to be sound investments for swimming pools. A tunnel with underwater windows around the pool as was found in one new pool visited (University of Oregon) seemed to be an excellent added feature. It afforded picture taking under the water and gave the coach an added opportunity for superior instruction.

Good but Low Cost Construction. All of the special buildings mentioned in this paper were to varying degrees required to be financially self-sufficient. This presented one of the major problems concerning them. How could they be built good enough to last and still economically enough for them to partially pay for themselves or as indicated in some cases to pay for themselves completely?

Summary

Special buildings in this study consisted of auditoriums, dormitories, married student housing, field houses and gymnasiums. One of the finest facilities visited was an auditorium on the University of Alberta's campus at Edmonton, Alberta, Canada. Generally findings were:

1. Auditoriums were felt to be the least needed of the major physical plant facilities.
2. Old dormitories were sometimes more popular than new ones because in some cases they provided extra space, a homey atmosphere, and some private conveniences such as wash basins in each room.
3. It was found that housing was being provided for the married student for approximately 80 dollars per month for the typical two bedroom apartment.

4. Eight of the 18 schools visited had fieldhouses. All had gymnasiums and 15 had pools.

5. One of the major problems with special buildings was financing.

The majority of the special buildings, as discussed in this chapter, presented traffic and parking problems because of audience participation.

The next chapter will be concerned with these problems and those connected with campus police forces.

CHAPTER XI

CAMPUS POLICE FORCES AND TRAFFIC REGULATIONS

The physical plants were responsible for nearly all traffic control on the campuses visited. This responsibility included the enforcement of numerous traffic and police regulations. The two chief purposes of this section were to become familiar with campus police force problems and to determine how they operated.

The Campus Police and Their Equipment

The sizes of police forces varied among the schools visited, as well as the sources of police authority and the equipment used by the officers. Some of the important points of information sought were the nature of the relationship of physical plant to police forces, where the policeman received his authority, and the kinds of equipment used by the policemen.

Size of Campus Police Forces. Visitations indicated that there was a large variation among the sizes of different campus police forces. The size of the campus police force was regulated according to need. One school of 6500 students had a highly trained force of 13 officers. Only eight miles away another school with an enrollment of 4000 students employed only one full-time policeman. Most other schools in the medium size group had two or three full-time policemen (see Table 2 in the appendix). Two or three campus policemen seemed to be enough to do the job

1

American Council on Education, College and University Business Administration, Vol. 2, 1955, pp. 18-34.

satisfactorily in most instances. The size of the force required seemed to be governed to a large extent by the adequacy and the cooperation of the local community police force. Most campuses visited were located on state property where local police had little or no authority. In almost all areas visited there was good cooperation between the school forces and the local forces. However, it was generally felt that the local forces weren't big enough to handle the added load of state-owned schools.

Police Authority. In two of the states visited campus police were commissioned through the state legislature, similar to the highway patrol. Six of the schools visited indicated that their police received their authority through the city police or sheriffs' offices. The ten other schools had only citizen arrest authority as defined by Blackwell.²

Equipment for the Policeman. In five of the schools visited, policing was done by a plant employee devoting part of his time to police work. It was generally agreed among plant directors interviewed that a badge, a uniform, and the authority to make arrests were some of the more necessary tools required for the campus policeman. Sidearms were sometimes carried by the campus police but these cases were in the minority. Campus trouble requiring the use of a weapon occurred so seldom that most plant directors felt the availability of a weapon was not worth the risk involved. Police cars, where used in the schools visited, were radio-equipped on the same frequency as the local police station. With this arrangement much better efficiency and cooperation was worked

2

Blackwell, T. E., Law and Order on the Campus, College and University Business, December, 1959, p. 24.

out with city officials.

Traffic Regulations

The schools visited varied somewhat as to the number of regulations published to control campus traffic and as to the types of citations used.

Rules for Control. It was indicated through interviews that regulations that were limited in number and which were clear and concise were the most successful. The following were typical statements appearing on traffic regulation instructions used in the schools in the survey:

1. All cars parked on the campus, except visitors' cars, must display parking permits.
2. Permits are issued free of charge or for a small fee.
3. Vehicles must be parked in designated areas.
4. No vehicle shall be parked on campus streets overnight.
5. Maximum speed on the campus is twenty miles per hour.
6. The applicant for the parking permit will be responsible for the vehicle registered at all times.
7. Cars abandoned for any period of time will be disposed of under state laws.
8. No parking privileges are extended to students living within two blocks of the campus unless the students are physically handicapped.
9. Special parking spaces are provided for the physically handicapped.
10. Special parking considerations are made for all faculty and staff members.

Traffic Citations. Traffic citations were issued in all schools that had traffic regulations. It was generally felt by the plant directors interviewed that citations were necessary to insure general safety and convenience for students and faculty members. Here again, simplicity seemed to be the best practice. Most citations showed the following information:

1. Name
2. License number
3. Permit number
4. Make of car
5. Time of violation
6. Nature of violation
7. Amount of fine imposed

Traffic Control a Complex Problem. Traffic control was one of the most serious and important problems and functions of the physical plant. The safety of all personnel on the campus was directly dependent upon satisfactory control. Much interest was shown to be taken by the plant director and when needed more personnel were being assigned to this ever-important and expanding responsibility of the physical plant.

Summary

1. The physical plants in the large majority of the schools visited were responsible for campus police.
2. The size of police forces was determined on the basis of local campus need.
3. Most campus policemen were found to have special police

authority. However, at two schools visited their only legal power was that of any other citizen, the power of civil arrest.

4. Standard tools for police were the badge, the uniform, and the authority to make arrests.

5. Each school had its own set of traffic regulations. However, most of the regulations themselves were quite common throughout the schools visited.

6. There was an average of four full-time police for the 13 schools that had full-time police in the schools visited.

Among the schools visited traffic control was felt to be one of the most serious and important problems of the physical plant. The lives and safety of all of the students and faculty on the campus depends upon the proficiency of this organization.

The next chapter has to do with an over-all summary of this paper and some conclusions.

CHAPTER XII

SUMMARY AND CONCLUSIONS

There was a desire on the part of the writer to determine the generally accepted policies and practices concerning present college and university physical plants, their administration and operation. The problem was to locate enough information for such a study. Since adequate literature on this subject was not available, a series of campus visitations were made in an attempt to gather information firsthand from various existing college plants. Eighteen schools, representing a cross-section of the northwest area, were chosen ranging in size from 350 to 10,000 in enrollment. Physical plants were surveyed and plant directors and other available school personnel were interviewed at each school visited.

Following is a summary of the more important findings of this investigation and general conclusions based on these findings:

Summary

Status of Plant Director and Philosophy of Physical Plant Management. It was generally agreed by plant directors interviewed that the college physical plant consists of all grounds, buildings, and equipment that surround and enhance the teaching and learning situation. The physical plant director and his staff, in each school, were directly responsible for the planning and operations concerning the care and maintenance of these physical facilities. Of the 18 plant directors interviewed, 15 had college degrees, however, it was noted that no director had received training specifically designed for physical plant administration.

Of the 18 schools visited, eight plant directors were found to have faculty status and ten were not. There was no general agreement as to how important faculty status was for the plant director, but interviews indicated that the instructor was considered the most important member of the teaching situation and a closer understanding between plant and faculty was desirable.

Out of the 18 schools visited, seven of the plant directors were directly responsible to the president while eight were responsible to the business manager and three were responsible to the vice-president. It was obvious from the interviews that the success of any of these supervisory plans depended largely upon harmonious relations between the supervisor and plant director.

Important factors that were found to determine variations of plant operation were: (1) the plant director's background, (2) the school's location, (3) unionization, (4) the age and history of the plant, (5) the adequacy of shop space, (6) the president's attitude toward physical plant, and (7) the presence of local control.

In the majority of schools visited, there was no financial limit as to the amount and types of work that could be done by physical plants, but generally no major construction was done by plant staffs.

Physical Plant Employees and Their Work Organizations. Interviews revealed that college degrees were not common among plant staffs in small schools except for plant directors and their assistants. The larger schools were found to employ some college trained employees such as engineers, landscape architects, and accountants.

The ideal wage rate for plant employees was generally found to be 80 to 85% of the local off-campus scale plus fringe benefits.

It was generally agreed by plant directors that the custodian was a very important member of the plant staff because both the health and safety of the students were dependent upon the custodian's competency. Interviews revealed that it was common for plants to employ student custodians, but the plant directors generally felt that it was difficult to produce a desirable quality of work with student custodians.

The plant director's secretary was considered by the majority of directors to be an extremely valuable asset in plant organization.

Although the handyman type of employee was not present in many of the schools visited because of specialization and unionization of workers, he was still being used to an advantage in some schools.

It was found that 50% of the schools visited were either unionized or were under civil service control. Maintenance costs were shown to be higher under union organization. Civil service control did not increase costs directly but it was found to be difficult to hire and keep good employees under this type of control.

Interrelationship of Director and Staff with Faculty and Upgrading of Plant Employees. It was felt very strongly by the plant directors interviewed that respect was much needed between plant employees and faculty members. This relationship was improved in some cases by raising the social status of plant employees. The upgrading of plant employees such as promoting janitor to custodian had far reaching effects on the spirit and prestige of the person in this position. It was indicated by plant directors that upgrading a worker socially was also a contributing factor in creating a higher caliber of work.

Location of Various Facilities of the Physical Plant. Campuses were spreading in order to prevent congestion. It was found that most

of the campuses visited were originally designed to accommodate much less than their present enrollments. The better planned campuses visited consisted of a series of courtyards surrounded by academic or other types of buildings. Administration, library, and student union buildings were usually located in a central area and at least one side of the campus was left open for expansion. Shop buildings were generally located where there were truck access routes.

Campuses were gradually adopting the periphery parking lot plan with only minor parking and traffic being allowed on the campus proper.

On all but one of the campuses visited an attempt was being made to provide adequate housing for the married students. This was in the form of two-story apartments and single story dwellings.

Utility areas were located on the outskirts of the campuses except for the heating plants which generally were located in more convenient central locations.

Classroom and Office Facilities. In the majority of the institutions visited it was found that classrooms recently constructed were planned to accommodate more students per room than ever before, in some cases as many as 300 students. In other than increasing classroom size, very few new developments were noted in classroom design.

An increasing amount of instruction was being done through the media of screen projection and classrooms equipped with slides and black-out curtains were prevalent in all schools visited.

The impact of closed circuit television had not had its effect as yet on the schools visited in this survey, the main reason being the large initial cost.

Scientifically designed color systems were not evident in many of the schools visited.

The importance of good private offices for instructors was realized in most schools visited but as yet the supply was not up to the demand.

Grounds Beautification and Maintenance. It was evident from the visitations that some of the most plain and inexpensive buildings were made beautiful by proper landscape architecture. The landscape architects, according to the plant directors, felt that they usually needed additional space between buildings for landscape planting. It was generally agreed that concrete walks should be strategically placed to prevent traffic through grass areas.

All schools visited still used watering hoses for irrigation. However, most of the schools had some automatic irrigation equipment and the directors indicated that they would have more of this equipment if financing permitted.

Heating, Ventilation, and Lighting Systems in Colleges and Universities. All 18 of the schools visited were heated from central heating plants. The most common fuel was found to be natural gas, however, oil, coal, and hog fuel (sawdust and wood chips) were also found in some schools. It was agreed by the majority of plant directors interviewed that there were definite advantages to being able to burn more than one type of fuel.

Electricity was generated in only three of the schools visited. It was the consensus of the plant directors that it was wise to generate at least enough power to operate the heating plant in case of power failure.

In 17 of the 18 schools visited the heat distribution systems

made use of some tunnels. It was felt that they were much superior to "direct lay pipe." However, due to the extreme cost, some of the new distribution systems for buildings were "direct lay pipe" rather than the much better tunnel systems.

Forced ventilation was common throughout the schools visited. However, air conditioning was not. It was felt that the costs were excessive for the benefits derived, but that provisions should be made for future installation in the better buildings.

Even though there were new systems being developed in illumination, the plants visited had very few in use. One new library did have a lighted ceiling which was receiving favorable acceptance.

Campus Police Forces and Traffic Regulations. In the 18 schools visited there were a total of 57 police officers. The schools ranged from no full-time officers to 14 full-time officers. It was generally understood that the police force was one of the most important groups attached to the physical plant. The sizes of the forces seemed to depend primarily upon needs at the various schools. In some areas more police were needed than in others because of the inadequacy of the local city police forces. Some campus police were deputized by the city administrations, some by the county, and some received their power from the state legislatures. It was generally agreed that the most important tools for the police were the badge, uniform, and the authority to make arrests. According to police and plant directors interviewed, police regulations and citations should be kept as simple and brief as possible to be effective.

Special Buildings on College and University Campuses. The special buildings covered in this study were auditoriums, dormitories, married

student housing fieldhouses, and gymnasiums.

Though some fine auditoriums were observed, especially in Canada, it was generally agreed that auditoriums were the least needed of the major campus buildings.

New dormitories were not always the most popular. It was revealed that many students would rather live in the older buildings because of certain qualities such as more room, wash basins in the rooms, and a greater feeling of hominess that prevailed. Some schools in the survey had experimented with group living accommodations which had proven quite satisfactory for both men and women.

The most predominant type of college housing that was being built for the married student was in the form of two-story apartments and single story duplexes. Average rents were 75 to 85 dollars.

All of the schools visited had gymnasiums while only eight had fieldhouses. One of the biggest problems with the fieldhouse was found to be the expense of changing the set-ups from one activity to another. All but three of the schools visited had swimming pools.

Conclusions

The following conclusions were made from the findings of the survey:

1. To be successful the college and university physical plant director should give full consideration in his operations and planning to all the physical materials that surround and enhance the teaching and learning situation.

2. The trend in the expanding college physical plant is for the plant directors to have college degrees and work in the capacity of

administrators of their departments. A formal educational program especially designed for physical plant administration would help prepare more qualified plant directors.

3. Faculty status is not absolutely necessary for plant directors but a closer understanding between physical plant staffs and faculty members is desirable for smooth operation.

4. Raising the social prestige of all plant employees whenever possible helps to produce a higher quality of work.

5. Campuses are in danger of becoming too congested as they continue to grow, and only through scientific planning and the careful use of space can this be prevented. Well-planned campuses make the operations of the physical plant easier and more efficient.

6. The majority of colleges, if those visited are typical, do not seem to be keeping pace with the demands of expanding enrollment in terms of classrooms, offices, housing, and general campus design.

7. Successful physical plant operations depend not only upon a competent administrator and staff, but also upon the provision of an adequate amount of good equipment for the maintenance of grounds and buildings. Initial installation costs of superior systems for facilities such as irrigation, heating, and ventilation are investments which will pay dividends in terms of efficiency in physical plant operations.

8. Some type of police force is a necessary part of any campus organization and is usually a responsibility of the physical plant.

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APPENDIX

Appendix A
School Investigation Worksheet Guide

SCHOOL INVESTIGATION WORKSHEET GUIDE

1. School name
2. School size
3. School age
4. School location
 - A. Size of closest city
 - B. Area from which students come
5. School purposes
6. Financial systems (nature and adequacy as it concerns physical plant)
 - A. Origin
 - B. Status
 - C. Procedures
7. Physical plant (mechanics and operation)
 - A. Directors' and employees' attitudes toward:
 1. School in general
 2. Administration
 3. Faculty
 4. Students
 5. Personal use of physical plant facilities
 - B. Campus layout
 1. Traffic
 2. Convenience
 3. Practicality
 - C. Instructional areas (design and use)
 1. Classrooms
 2. Laboratories
 - D. Office space and utilization
 - E. Grounds care and development
 1. Walks

- 2. Irrigation systems
 - 3. Lawns and trees
- F. Heating and ventilation
- G. Lighting systems
- H. Special buildings
 - 1. Gymnasiums
 - 2. Auditoriums
 - 3. Dormitories
 - 4. Married student housing
 - 5. Others
- I. Traffic control
- J. Special problems
 - 1. Supervisory problems of labor
 - 2. Organization of workers
 - 3. Relations with trade unions
- K. Physical plant superintendent and faculty working relationship

Appendix B
Sample Letter

SAMPLE LETTER

Northern Montana College
Havre, Montana
July 3, 1959

John J. Doe
Director of Physical Plant
College or University
Anywhere, Western U. S. A.

Dear Sir:

In the near future I plan to be in your area making a study of college and university physical plants. I would like very much to include your school in this study.

If you approve this visit, I would like to spend some time with you or your assistant and physical plant department heads at your convenience. I would also like to visit the various buildings and other physical plant facilities on your campus.

I will appreciate it very much if you will consent to this visitation. Enclosed is a self addressed envelope. Please reply as soon as possible. Thank you.

Very truly yours,

Harold C. Babcock
Supt. Physical Plant
Northern Montana College
Havre, Montana

Enclosure
HCB/mw

Appendix C

Tabulation of School and Town Sizes, the Plant Director's Status
and Organization of Employees of 18 Colleges and
Universities of the Northwest

TABLE 1. TABULATION OF SCHOOL AND TOWN SIZES, THE PLANT DIRECTOR'S STATUS AND ORGANIZATION OF EMPLOYEES
OF 18 COLLEGES AND UNIVERSITIES OF THE NORTHWEST

College or University	Location	School Size	Town Size	Director's Background	Director's Faculty Status	Director's Immediate Supervisor	Organization of Employees
University of Alberta	Edmonton, Alta., Canada	5500	370,000	Engineering	No	President & Committee	Civil Service
Boise Jr. College	Boise, Idaho	1250	30,000	Education	Yes	President	None
Brigham Young University	Provo, Utah	9600	35,000	Engineering	Yes	President	None
Calgary Tech. School	Calgary, Alta., Canada	2500	200,000	Education	Yes	Vice Principle	Civil Service
Colorado State College	Fort Collins, Colorado	6000	15,000	Education	Yes	Vice President	None
University of Colorado	Boulder, Colorado	10,500	20,000	Engineering	No	Business Manager	Union
Idaho State College	Pocatello, Idaho	2500	31,000	Engineering	Yes	Bursar	Union

TABLE 1. (Continued)

College or University	Location	School Size	Town Size	Director's Background	Director's Faculty Status	Director's Immediate Supervisor	Organization of Employees
University of Idaho	Moscow, Idaho	4000	10,000	Engineering	No	Business Agent	Union
Montana State College	Bozeman, Montana	3800	12,000	Engineering	No	President	Union
Montana State University	Missoula, Montana	3300	36,000	Engineering	No	Vice President	Union
Oregon State College	Corvallis, Oregon	8000	20,000	Education	Yes	President	Civil Service
University of Oregon	Eugene, Oregon	6800	50,000	Engineering	Yes	Business Manager	Civil Service
College of Puget Sound	Tacoma, Washington	2400	158,000	Non-Degree Boiler Eng.	No	Business Manager	None
Utah State University	Logan, Utah	5000	20,000	Education	Yes	Business Manager	None

TABLE 1. (Continued)

College or University	Location	School Size	Town Size	Director's Background	Director's Faculty Status	Director's Immediate Supervisor	Organization of Employees
Washington State College	Pullman, Washington	6500	12,000	Engineering	No	Business Manager	None
Weber College	Ogden, Utah	2300	85,000	Non-Degree Elec. Eng.	No	President	None
Western Montana College	Dillon, Montana	450	3500	Non-Degree Boiler Eng.	No	President	Union
University of Wyoming	Laramie, Wyoming	4000	21,000	Engineer	No	Business Agent	Union

Appendix D

Tabulation of Full Time Police, Field House Facilities,
Construction Cost Limits and Heating Plants of 18
Colleges and Universities of the Northwest

TABLE 2. TABULATION OF FULL TIME POLICE, FIELD HOUSE FACILITIES, CONSTRUCTION COST LIMITS AND HEATING PLANTS
OF 18 COLLEGES AND UNIVERSITIES OF THE NORTHWEST

College or University	Location	Full Time Police	Field House Facilities	Const. Cost Limits	Heating Plant		Fuel Used	Power Generated
					Central	Dist. Syst.		
University of Alberta	Edmonton, Alta., Canada	2	No	None	Yes	Tunnels	Gas	Yes
Boise Jr. College	Boise, Idaho	None	No	None	Yes	Tunnels	Gas	No
Brigham Young University	Provo, Utah	4	Yes	None	Yes	Tunnels & Underlay	Gas	No
Calgary Tech. School	Calgary, Alta., Canada	None	No	None	Yes	Tunnels	Gas	No
Colorado State College	Fort Collins, Colorado	5	No	None	Yes	Tunnels & Direct Lay	Gas	No
University of Colorado	Boulder, Colorado	7	Yes	None	Yes	Tunnels & Direct Lay	Gas	No
Idaho State College	Pocatello, Idaho	4	No	None	Yes	Tunnels	Gas, Oil Coal	No

TABLE 2. (Continued)

College or University	Location	Full Time Police	Field House Facilities	Const. Cost Limits	Heating Plant		Fuel Used	Power Generated
						Central Dist. Syst.		
University of Idaho	Moscow, Idaho	1	No	None	Yes	Tunnels	Gas, Oil Coal	Emer. Only
Montana State College	Bozeman, Montana	1	Yes	None	Yes	Direct Lay	Gas	No
Montana State University	Missoula, Montana	3	Yes	None	Yes	Tunnels & Direct Lay	Hog Fuel, Gas	No
Oregon State College	Corvallis, Oregon	9	No	10,000	Yes	Tunnels & Direct Lay	Hog Fuel, Gas	No
University of Oregon	Eugene, Oregon	1	Yes	10,000	Yes	Tunnels	Hog Fuel	Yes
College of Puget Sound	Tacoma, Washington	None	No	None	Yes	Tunnels	Gas	No
Utah State University	Logan, Utah	3	Yes	8,000	Yes	Tunnels	Gas	No

TABLE 2. (Continued)

College or University	Location	Full Time Police	Field House Facilities	Const. Cost Limits	Heating Plant		Fuel Used	Power Generated
					Central	Dist. Syst.		
Washington State College	Pullman, Washington	13	Yes	None	Yes	Tunnels	Gas	No
Weber College	Ogden, Utah	None	No	None	Yes	Tunnels	Gas	No
Western Montana College	Dillon, Montana	None	No	None	Yes	Tunnels & Direct Lay	Oil	No
University of Wyoming	Laramie, Wyoming	4	Yes	None	Yes	Tunnels & Direct Lay	Gas	No