SELECTED, DESIRABLE FEATURES OF ELEMENTARY
SCHOOL BUILDINGS FOR THE PERIOD
1949-1959

A Field Report
Presented to
The Graduate Division
Drake University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science in Education

by
George L. Koons
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SELECTED, DESIRABLE FEATURES OF ELEMENTARY
SCHOOL BUILDINGS FOR THE PERIOD
1949-1959

by

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CHAPTER I

THE PROBLEM AND PROCEDURES USED

One of the most pressing problems that school administrators of today have been plagued with is that of school housing. As our educational policies and theories have evolved from research, so have our ideas of school buildings. School buildings are no longer thought of in reference only to the mere protection from the elements, but are being considered as functional entities through which the over-all objectives of our educational systems can be achieved. This evolution of thought has led to a general acceptance of the idea that a direct relationship exists between a pupil's school plant environment and his ability or readiness to take on new learnings.\(^1\)

I. THE PROBLEM

Statement of the Problem

The purpose of this study was to: (1) provide an accessible source of information on some selected desirable construction features of elementary schools for an eleven year period; (2) make a comparison of these features with those of the previous ten year period; and (3) discover trends that have taken place in elementary school construction.

Importance of the Study

The problem of providing housing for the youth of this nation did not become evident during an "over night" period. The nation's schools have been confronted with inadequate housing for a number of years. Building projects all too often have been a part of the school budget that could be cut to meet the demands of citizens who placed a higher value upon their own purse strings than the welfare of the children in their communities. Among the contributing factors to the problem has been increased enrollment, with its resultant classroom shortages, and the condition of buildings already in service.¹

Increased enrollment. The nation's schools have been faced with a tremendous surge of pupil influx over the past two decades. During and after World War II the birth rate in this country climbed 36 per cent from the 1933 figure. This growth occurred in a period of thirteen years when there were four million more youngsters born than would have been at the 1933 birthrate. At the outset of the present decade, the schools were experiencing the beginning of what had been estimated to be the largest engulfment of school population.

American education had ever seen. Future forecasts thirteen years ago estimated at least 25,106,317 pupils enrolled by the school year 1955-56. ¹ Conditions had not been bettered at mid-century when the Commissioner of Education, Earl James McGrath, gave his first report to the nation.

Every state is faced with a grave shortage of school facilities. Owing to population shifts and economic differentials the shortage is more acute in some sections than in others; but everywhere throughout the country the rising tide of war babies is beginning to engulf the lower grades. The crest of the wave will advance year by year during the next ten years. In the elementary and secondary schools alone there will be a net increase enrollment of approximately 8 million.²

The nation was still at grips with the problem at the end of the first decade of the second half of this century. It was reported at that time by the United States Office of Education that 33,936,470 pupils were enrolled in the public schools in the fall of 1958. This represented an increase of 1,148,000 or 3.5 per cent over the fall of 1957.³ The same office in reporting for the last month of the current decade stated the present school year, 1959-60 showed an increase of 1,205,000 or again a 3.5 per cent increase over the previous


year. This continual increased enrollment has been the paramount cause of the classroom shortage that has faced the nation.

**Classroom shortage.** School personnel quite often are reluctant to initiate building projects due to the turmoil it may cause among the citizenry. Funds set aside for such purposes can easily be diverted into other channels of expenditure. During the Second World War, lack of building projects was easily explainable. The nation's entire effort was diverted to the cause of survival. Labor and supplies were extremely critical; the nation's resources were being applied to the immediate war effort; and restrictions by the government upon new construction erased all possibilities of expanding school plants.

Actual figures and reasonable estimates for the period of 1941 to 1947 showed only $800,000,000 being spent for school plants. The average annual building expenditures for elementary and secondary schools during the twenty year period from 1920 to 1940 was approximately $270,000,000. Had this average been maintained throughout the years from 1941 to 1952 approximately $3,200,000,000 would have been spent. This left

---


2American Association of School Administrators, *loc. cit.*
a deficit of $2,400,000,000 for the years from 1948 to 1952 for postponed construction. The above estimates do not take cognizance of inflationary prices that followed World War II with the result that they should be even higher than shown.¹

The most frequently used replacement method for school buildings assumes a fifty year life for regular school facilities which allows for an annual depreciation of 2 per cent. Freeman using this method, a school enrollment of 33,624,000, and a projected enrollment of 43,000,000 for 1969 to 1970, estimated that the construction requirements for 1957 to 1969 would be 668,100 classrooms or an annual need for 55,700 classrooms.²

The United States Office of Education reported that the relatively low school plant replacement increases started at mid-century have left this country with a backlog of classroom needs estimated at 140,000.³ Moreover, school programs are now more demanding in their concepts of space requirements per pupil and of the auxiliary facilities a school would include.

¹Ray L. Hamon, "Billions Needed for Post War Schools," The Nations Schools, XXXV (March, 1945), 33-35.


Condition of buildings in service. A fairly reliable index of a building's usefulness is its age. Progressive school programs, dependent as they are upon the developmental needs of the pupils enrolled and the needs of the community they serve, require buildings that can meet the challenge of changing times. In the opening chapter of its report to The President, the Committee for the White House Conference on Education revealed a somewhat tragic picture of the nation's school plant:

In the richest nation in all history, there is no valid reason for the grimy, dilapidated, and overcrowded school buildings which too many children now occupy. It is an ironic truth that most Americans would not permit their children to live in a house which is as bad as the school buildings which many pupils are forced by law to attend.¹

The unhealthful conditions intimated in this report were not entirely caused by inefficient custodial service. The truth was that these buildings had outlived their usefulness as structures to house learning activities. Such was not an entirely new picture. The National Education Association in a bulletin prepared by its research department in 1948, had stated that approximately 22 per cent of our buildings at that time were constructed before 1899 and 79 per cent before 1929.²

In an article that appeared at an even earlier date,


Long called attention to our lack of adequate school housing for the children of this country by stating:

3,000,000 children or approximately 24 per cent, enrolled in public school in rural communities are still housed in one room school buildings and 1,400,000 or 10 per cent are housed in two room buildings.¹

Today there are many fine buildings which are offering pleasant school experiences for those pupils who are fortunate enough to be in attendance at them as evidenced by a National Education Association report given nineteen years later.

In 1959, there were 23,695 one teacher schools. This represented 19.5 per cent of all public schools in 1959. These one teacher schools were staffed by 1.8 per cent of all classroom teachers, and were attended by about 392,390 children.²

The nation's thinking in terms of school plant had reached the point in 1955 where national emphasis was concerned not only with the existing classroom shortage, but also with basic and desirable features. This emphasis was exemplified in the report on the third topic of the recent White House Conference on Education where it was stated that the basic facilities for an elementary school were:

Adequate site, classrooms including kindergarten, office facilities, space for assembly and cafeteria activities or multi-purpose room, physical education

¹Raymond V. Long, "What Is the Future for School Building?" The Nation's School, XXV (January, 1940), 18.
and playground facilities, equipment health unit, teachers room, service and sanitary facilities, toilet rooms, custodial and storage rooms. Desirable but not mandatory, facilities should include special service rooms, library, and visual aid facilities.  

II. PROCEDURES USED

A considerable amount of information was found to be in existence on elementary school buildings. Much of this information was of a technical nature for which the writer was not adequately equipped to handle. It was recognized that this data would of necessity need to be limited by some selective process. This was accomplished by a limitation in the selection of features to be studied, the sources of information to be used, and in the selection of the buildings for the study.

Selection of features. After a study of the literature describing elementary school plants, a data gathering sheet was drawn up. In the devising of this sheet an instrument that Bucher had used in a similar study was adapted to meet the threefold criteria used to select the features which would be summarized in this study. These criteria

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2 See Appendix A.

were: (1) features that would be of importance to prospective builders; (2) features that would be contributory to the well-being of the children housed in the buildings; and (3) features that would be described in such a manner that adequate data could be gathered.

Selection of sources. Three administrative journals and one yearbook were selected as sources of information for the study on the assumption of their being the principal published materials about newly constructed or proposed elementary school buildings. These published materials were: (1) The American School Board Journal, (2) The Nations Schools, (3) The School Executive, and (4) The American School and University.

The collection of data began in the January, 1949 publications of the various sources and continued in sequence until the December, 1959 issues of the publications had been completed. This period of time was selected for the following reasons: (1) a complete decade of elementary school construction seemed desirable; and (2) this period of time allowed for a more adequate comparison with a similar study that had been made of the period 1939 to 1949.¹

Selection of buildings. The buildings selected for this study were those that had floor plans and descriptive

¹Ibid., pp. 1-50.
literature published within the period from January, 1949 through December, 1959 in the aforementioned four periodicals. All types of elementary school buildings were included in the study ranging in grade level from the kindergarten to the eighth grade. No building was used however, if it were referred to as a junior high school even though it may have contained any of the previous mentioned grades, nor was any building summarized if it housed senior high as well as elementary school children. No buildings including a nursery school were included.

Considerable information was given during the period to prefabricated or demountable types of construction, but the buildings selected for this study were all of a type which could be considered as permanent. It was noted during the data gathering process that buildings were being remodeled or additions had taken place during the period studied but only completely new buildings were used in this study. All of the buildings studied were limited in location to the United States.
CHAPTER II

DESIRABLE FEATURES FOR ELEMENTARY SCHOOL BUILDINGS

Many people have the erroneous idea that school buildings come into being with little or no effort. This is unfortunate and no doubt accounts for some of the buildings that dot the scene of modern day education.

The planning and building of school housing to fulfill the educational needs of the community, the children it serves, and the teacher who mold its program requires careful study and planning. Each community and each building within the community should be considered as a separate entity and will usually have educational needs peculiar to itself. For such reasons it can be readily concluded that a building serving the needs of one locale will not necessarily be the answer to the needs of another. The search for a school structure to fulfill the requirements of all situations is impractical.

Pupils, teachers, administrators, members of the community, and all people affected by the building of a school structure may contribute in its planning. Trained professional personnel such as educational consultants, state departments of education, architects, engineers, and other qualified people should be consulted.

Only through careful planning and consideration of each existing local detail can prospective builders provide
the educational environment and opportunities for our school children of today. Some of the determining details that need to be considered in any building program are size of building, design considerations, costs, and the type of classroom needed to carry out the desired educational programs.

I. SIZE OF BUILDINGS

Enrollment

The desirable size of an elementary school in terms of number of classrooms, total area within the building needed to carry on an adequate instructional program, or size of site was found to be dependent upon the number of youngsters enrolled. Variations in the literature as to the desirable size of an elementary school ranged from a low of 175 pupils to as high as one thousand pupils. The National Department of Elementary School Principals in its Yearbook for 1948 recommended that an elementary school should enroll approximately eight hundred pupils. At that time it was felt by the National Department of Elementary School Principals that schools of less than four hundred were too small to meet the needs of youngsters enrolled and that children could not be met on an individual basis if the enrollment reached more than one thousand.¹ This same department in 1959 lowered the

¹National Education Association, Department of Elementary School Principals, Today and Tomorrow, Twenty-seventh Yearbook of the National Education Association, Department of Elementary School Principals (Washington: National Education
size of an elementary school they considered to be desirable by stating in a resolution that no elementary school should be larger than five hundred.\textsuperscript{1}

Another department of the National Education Association, the Department of Rural Education, recommended that no elementary school should be smaller than 175 pupils and seven full-time teachers. An even better minimum would be three hundred pupils with twelve full-time teachers or a double unit school.\textsuperscript{2} In a survey of school superintendents taken by The Nations Schools in 1954, the superintendents were of the opinion that no elementary school should be smaller than 250 pupils. Nearly half of these favored an elementary school enrollment of three hundred fifty to five hundred pupils.\textsuperscript{3} In an article that appeared in the same publication but at an earlier date it was questioned that any elementary school should be more than three hundred to four hundred pupils. The author stated that with increasing enrollment the


\textsuperscript{3}"What Size School Is Best?" \textit{The Nations Schools} (School Opinion Poll), LIV (October, 1954), 59.
child began to lose his identity and that individualism was suppressed.¹

Engelhardt and Leggett, one of the leading educational consultant and architectural firms in this country, stated that elementary schools might well be about 350 enrollment with fourteen teachers and an organizational pattern of self-contained rooms from kindergarten to the sixth grade.² This would be what is commonly referred to as a double unit school. According to Walter McQuade, a school may be too small and size is dependent upon many facets, but:

Nevertheless, most educators feel a good elementary school shouldn't be much bigger than 500 to 600. If the principal can't remember the names of all his students, the school is too big is a commonly stated criterion.³

**Comparison of 1939 to 1949 period with 1949 to 1959 period.** Bucher found that of the two hundred schools he surveyed, thirty-nine reported the number of students the structures were constructed to accommodate. The buildings reported in his study ranged from a low of 150 pupils to a high of 1,200 with 529 pupils being the average.⁴ The findings

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¹Robert W. MacVitte, "Are Our Elementary Schools Too Large?" *The Nations Schools*, LIII (June, 1954), 56-57.


⁴Bucher, *op. cit.* , p. 11.
of the 270 schools surveyed during the period 1949 to 1959 are shown in Table I. A low of 70 pupils was reported in contrast to a high of 1,000 with 449 pupils being the average for this period. Only 37 of the 100 buildings were built to accommodate more than 500 pupils.

TABLE I

NUMBER OF PUPILS ENROLLED IN 100 ELEMENTARY SCHOOL BUILDINGS FOR THE PERIOD 1949 TO 1959 AND FREQUENCY OF OCCURRENCE

<table>
<thead>
<tr>
<th>Number of Pupils</th>
<th>Frequency of Occurrence</th>
</tr>
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<tbody>
<tr>
<td>50-99</td>
<td>1</td>
</tr>
<tr>
<td>100-149</td>
<td>3</td>
</tr>
<tr>
<td>150-199</td>
<td>2</td>
</tr>
<tr>
<td>200-249</td>
<td>10</td>
</tr>
<tr>
<td>250-299</td>
<td>6</td>
</tr>
<tr>
<td>300-349</td>
<td>9</td>
</tr>
<tr>
<td>350-399</td>
<td>7</td>
</tr>
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<td>550-599</td>
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</tr>
<tr>
<td>1000-</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>449</strong></td>
</tr>
</tbody>
</table>
Number of Classrooms

The size of the elementary school buildings studied for the period 1939 to 1949 and the period 1949 to 1959 is shown in Table II with the number of classrooms as the means of measurement.

Comparison of 1939 to 1949 period with 1949 to 1959 period. The average number of classrooms for 197 buildings during the period 1939 to 1949 was 11.44. The average number of classrooms for the 1949 to 1959 period was 10. The lesser figure is in keeping with the smaller enrollment of the 1949 to 1959 period. The more prevalent number of classrooms in both periods was 6, 8, and 12. The most prevalent number of classrooms was 12. This number was reported 25 times in the 1939 to 1949 period and 51 times in the period 1949 to 1959.

Total Area

No comparative data on total area was given for the period from 1939 to 1949 and rather limited information was reported for the 1949 to 1959 period. Only 65 of the 270 buildings of the later period gave information on total area. Variations of these 65 buildings ranged from a high of 78,000 square feet to a low of 12,120 square feet. The average total

\[1\text{Ibid.}, p. 10.\]
<table>
<thead>
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<th>Number of classrooms</th>
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<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>2</td>
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<td>5</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
<td>27</td>
</tr>
<tr>
<td>7</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>8</td>
<td>22</td>
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<tr>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>197</td>
<td>270</td>
</tr>
<tr>
<td>Average for 1939-1949</td>
<td>11.44 classrooms</td>
<td></td>
</tr>
<tr>
<td>Average for 1949-1959</td>
<td>10.00 classrooms</td>
<td></td>
</tr>
</tbody>
</table>
square footage of floor space was 47,947. The total area of the 65 buildings reporting with their frequency of occurrence are given in Table III. A thousand square feet was used as the unit of measurement.

**Table III**

**Total Area of 65 Buildings in Thousands of Square Feet for 1949 to 1959**

<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Thousands of Square Feet</th>
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</thead>
<tbody>
<tr>
<td>7</td>
<td>12-16</td>
</tr>
<tr>
<td>8</td>
<td>17-21</td>
</tr>
<tr>
<td>15</td>
<td>24-26</td>
</tr>
<tr>
<td>10</td>
<td>27-31</td>
</tr>
<tr>
<td>6</td>
<td>32-36</td>
</tr>
<tr>
<td>4</td>
<td>37-41</td>
</tr>
<tr>
<td>3</td>
<td>42-46</td>
</tr>
<tr>
<td>4</td>
<td>47-51</td>
</tr>
<tr>
<td>2</td>
<td>52-56</td>
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<td>1</td>
<td>57-61</td>
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<td>3</td>
<td>62-66</td>
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<tr>
<td>1</td>
<td>67-71</td>
</tr>
<tr>
<td>1</td>
<td>72-76</td>
</tr>
<tr>
<td>1</td>
<td>77-81</td>
</tr>
</tbody>
</table>

Total 65
Average 47,947

**Site Size**

A widely quoted minimum for the desirable site size of an elementary school was set forth by the American Association of School Administrators in the Twenty-seventh Yearbook when the following advice was given.
Modern schools require sites larger than were thought necessary a generation ago. Most school sites are too small. Larger areas are necessary, because of the continued expansion of educational programs, the greater use of schools by the entire community, and the necessity for sufficient space for present and future building needs. The size of any school site should be determined by the nature and scope of the contemplated educational program.

... The following site areas are suggested as minimum: (a) For elementary schools, five acres plus an additional acre for each one hundred pupils of ultimate enrollment.¹

This same minimum, credited with being established by the National Council for Schoolhouse Construction, was quoted by the National Education Association, Department of Elementary School Principals.² A slight variation of this minimum has been used by other authors to establish a desirable site size. For example, Ray stated that an elementary school of six classrooms or about 150 pupils should have no fewer than ten acres of usable land and a twelve classroom school should contain not less than fifteen acres of usable property. For a school of eighteen classrooms, or 450 pupils, Ray felt that at least twenty acres of usable area was entirely practical.³

¹American Association of School Administrators, National Education Association, American School Buildings, op. cit., p. 75.


These estimates he stated "analyze to a nucleus of five acres of usable land plus one acre of usable land for each class of twenty to thirty pupils."¹

While Euchner placed his emphasis on campus location of buildings in discussing sites, the author of this study felt that size of site was a more reasonable criterion for assessing the desirability of this feature.² For this reason no comparative data exists on site size for the decade of 1939 to 1949. The acreage and the frequency with which each site occurred are given in Table IV. The site size was given for 101 of the 270 buildings studied. A high of forty acres and a low of two acres was reported. The average acreage of the 101 buildings reporting was 11.47 acres. Multiples of 5 were the more common acreages reported. Five acres occurred 8 times, 10 acres 14 times, and 15 acres 10 times. Five buildings reported their site size in terms of city blocks with 2 reporting 2 city blocks, 2 one city block, and 1 two-thirds of a city block.

The large site demands of the schools reported here seem to take cognizance of the need for future expansion. This is evidenced by the fact that 112 of the 270 buildings provided for additions to the building. Euchner emphasized that only forty of the two hundred buildings for the 1939 to 1949 period reported this information.³

¹Ibid., p. 106. ²Euchner, op. cit., p. 12. ³Ibid., p. 10.
TABLE IV

SIZE OF SITE IN ACRES AND FREQUENCY OF OCCURRENCE OF 101 ELEMENTARY SCHOOLS FOR THE PERIOD 1949 TO 1959

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>2.2</td>
</tr>
<tr>
<td>1</td>
<td>2.75</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>3.5</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>1</td>
<td>4.75</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>6.2</td>
</tr>
<tr>
<td>1</td>
<td>6.5</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>1</td>
<td>7.5</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td>8.5</td>
</tr>
<tr>
<td>1</td>
<td>8.6</td>
</tr>
<tr>
<td>1</td>
<td>8.12</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>1</td>
<td>9.3</td>
</tr>
<tr>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>10.5</td>
</tr>
<tr>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>1</td>
<td>11.5</td>
</tr>
<tr>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>1</td>
<td>13</td>
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<tr>
<td>1</td>
<td>13.5</td>
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<td>1</td>
<td>14</td>
</tr>
<tr>
<td>1</td>
<td>14.5</td>
</tr>
<tr>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>1</td>
<td>15.4</td>
</tr>
<tr>
<td>1</td>
<td>16</td>
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<tr>
<td>1</td>
<td>16.5</td>
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<td>1</td>
<td>17</td>
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<tr>
<td>1</td>
<td>17.5</td>
</tr>
<tr>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>1</td>
<td>18.5</td>
</tr>
<tr>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>1</td>
<td>19.5</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
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<tr>
<td>1</td>
<td>20.5</td>
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<tr>
<td>1</td>
<td>21</td>
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<td>1</td>
<td>21.5</td>
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<tr>
<td>1</td>
<td>22</td>
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<tr>
<td>1</td>
<td>22.5</td>
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<td>1</td>
<td>23</td>
</tr>
<tr>
<td>1</td>
<td>23.5</td>
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<tr>
<td>1</td>
<td>24</td>
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<tr>
<td>1</td>
<td>24.5</td>
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<tr>
<td>1</td>
<td>25</td>
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<tr>
<td>1</td>
<td>25.5</td>
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<tr>
<td>1</td>
<td>26</td>
</tr>
<tr>
<td>1</td>
<td>26.5</td>
</tr>
<tr>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>1</td>
<td>27.5</td>
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<tr>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>1</td>
<td>28.5</td>
</tr>
<tr>
<td>1</td>
<td>29</td>
</tr>
<tr>
<td>1</td>
<td>29.5</td>
</tr>
<tr>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>1</td>
<td>30.5</td>
</tr>
<tr>
<td>1</td>
<td>31</td>
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<tr>
<td>1</td>
<td>31.5</td>
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<tr>
<td>1</td>
<td>32</td>
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<tr>
<td>1</td>
<td>32.5</td>
</tr>
<tr>
<td>1</td>
<td>33</td>
</tr>
<tr>
<td>1</td>
<td>33.5</td>
</tr>
<tr>
<td>1</td>
<td>34</td>
</tr>
<tr>
<td>1</td>
<td>34.5</td>
</tr>
<tr>
<td>1</td>
<td>35</td>
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<td>36</td>
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<td>1</td>
<td>36.5</td>
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<tr>
<td>1</td>
<td>37</td>
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<td>1</td>
<td>37.5</td>
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<tr>
<td>1</td>
<td>38</td>
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<tr>
<td>1</td>
<td>38.5</td>
</tr>
<tr>
<td>1</td>
<td>39</td>
</tr>
<tr>
<td>1</td>
<td>39.5</td>
</tr>
<tr>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>1</td>
<td>40.5</td>
</tr>
</tbody>
</table>

Total 101

Average 11.47
Twenty-three of the buildings of the 1949 to 1959 period were planned in cooperation with city planning boards and public park commissioners, recognizing that the site should provide for recreational use after school and on weekends. In eighteen of these buildings, the school's toilets were provided for use by the general public. Large sites were also found to be more compatible with one story construction where from fifty to sixty thousand square feet of floor area use up land with its courts and setbacks.

II. DESIGN CONSIDERATIONS

Height of Buildings

The desirable height of an elementary school building could not be stated categorically since this feature was found to be dependent upon the conditions existing in each local community. Small buildings up to approximately twelve classrooms were one story construction under most conditions, but with increasing size beyond this, the decision as to one story or multiple story construction became more complex.\(^1\) The paradoxes involved are stated succinctly by the American Association of School Administrators.

Multi-story construction may be desirable in the interest of conserving site, particularly if land values are high and size of site is restricted. In large one story buildings, increased travel distance, increased runs for heating and plumbing lines,

---
increased roof areas to be constructed and maintained, and increased foundations, all must be weighed against such advantages as greater safety through avoidance of stairways, possible savings through lighter construction, greater possibilities for use of bilateral and multilateral lighting, and the more homelike non-institutional appearance of the one-story building.¹

Controversy over the desirability of single or multiple construction has revolved around costs with proponents on each side producing evidence supporting their views. It may be said in general that large multi-story buildings of fire-resistant construction throughout will be more economical than one-story structures if the same standards of construction are applied to the one-story structure.²

Comparison of 1939 to 1949 period with 1949 to 1959 period. Bucher found that one hundred of the two hundred buildings he studied from 1939 to 1949 were one-story structures. Ninety-one were two stories in height while the remaining nine were three stories high.³ Only one of the 270 buildings was three stories high in the 1949 to 1959 period and thirty-seven were of two-story construction. The vast majority, 217 of the 270 buildings built in the later period, were one-story in height. Variation in the topography of the site was given as the reason for fourteen buildings of the 1949 to 1959 period to be a combination of single and double stories. The remaining buildings for this period were a

¹Ibid. ²Ibid., p. 208. ³Bucher, op. cit., p. 8.
combination of two and three stories in height.

Shape of Buildings

Just as the height of an elementary building cannot be stated in exacting terms neither can the shape be so stated. This feature will be determined largely by the relationship of the building to its site, the peculiarities of the local community, and the demands made by the educational specifications that are developed. These inter-relationships have been presented by Cox as a trinity of design elements when he stated that

In school building, there is an inseparable trinity of design elements which makes or breaks a school plant. The first element is site selection, the second is site planning and development, and the third is building design.¹

Stated in general terms, if adequate acreage and front-age are provided, a building may be designed with the desired classroom orientation to fit nearly any site. The site may be such that its axis and contour may determine to a considerable degree the general shape and design of the building however.²

Comparison of 1930 to 1940 period with 1940 to 1950 period. Bucher noted in his study a trend to the use of

¹Department of Elementary School Principals, National Education Association, Elementary School Buildings Design for Learning, op. cit., p. 94.

²American Association of School Administrators, National Education Association, American School Buildings, op. cit., p. 76.
separate buildings by observing that the traditional structure was broken down into units which he stated were usually classroom, administrative, auditorium-gymnasium, and kindergarten units. During the 1949 to 1959 period the trend Bucher noted was much magnified. Auditoriums, gymnasiums, and multipurpose rooms were isolated from the main structures and generally served as the "hub" of the building with classrooms grouped around giving the school a fingerling shaped design of two or more separate wings. A factor that played its role in this type of grouping was the widespread use of the buildings by community groups. One hundred and sixteen articles describing the buildings of the 1949 to 1959 period specifically mentioned that the building was designed for community use.

Table V summarizes the findings of the 1939 to 1949 and the 1949 to 1959 periods. In the 1939 to 1949 period Bucher reported the L shape for 41 of two hundred buildings. The L shape was reported for 74 buildings during the 1949 to 1959 period. No circular buildings were reported by Bucher but 5 were reported in the period of 1949 to 1959. Two were complete circles with "pie" or wedge-shaped classrooms; one being built with a multipurpose room in the center and the other constructed around an open court. Two could be described as semicircular, one with rectangular wings radiating from the semi-circle, and the other employing two semi-circles tangent

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1Bucher, loc. cit.
### TABLE V

STRUCTURAL SHAPES OF ELEMENTARY SCHOOL BUILDINGS
AND FREQUENCY OF USE FOR THE 1939 TO 1949
AND 1949 TO 1959 PERIODS

<table>
<thead>
<tr>
<th>Shapes</th>
<th>1939-1949</th>
<th>1949-1959</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>41</td>
<td>74</td>
</tr>
<tr>
<td>Rectangular</td>
<td>40</td>
<td>64</td>
</tr>
<tr>
<td>T</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>U</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>Separate units</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>H</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>E</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Square</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Y</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>W</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>X</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>V</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Z</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Circular</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Fingerling</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>Not given</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200</strong></td>
<td><strong>270</strong></td>
</tr>
</tbody>
</table>

To each other. The remaining circular building could best be described as an inverted question mark. Fourteen of the buildings studied, while they could not be described as of similar shapes, had characteristics similar to those described as letters. These were described as "fingerling."\(^1\)

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Corridors

To argue the desirability of a double, single, or other type of corridor for an elementary school building was found to be overlooking the design factors that determine the finished product. The desirable corridor type for any school, like the height of building, was in the majority of cases decided after a careful consideration of all the complexities involved. Not least among these were found to be geographical factors and local climatic conditions.

In mild climates where corridors need not be enclosed, where the heating problem is so small that extra heating costs are insignificant, where intense sunshine makes modification of traditional fenestration highly desirable, where high temperatures also constitute an additional argument for multilateral fenestration and cross ventilation, the decision to adopt one-story construction is logical even for large buildings, if adequate sites are available. In northern climates on the other hand, corridors must be enclosed, dictating a double-loaded corridor in the interest of economy.¹

Comparison of 1939 to 1949 period with 1949 to 1959 period. Bucher reported in the 1939 to 1949 period that 154 buildings utilized the double loaded type corridor; 17 buildings, the covered passage type; 14 buildings, a combination of the double loaded and single loaded type corridor; 10 buildings, a combination of the double loaded and covered passage type corridor; 3 buildings, the single loaded type corridor; and, 1 building, without corridors.² In the 1949 to

¹ American Association of School Administrators, National Education Association, American School Buildings, op. cit., p. 207.
² Bucher, op. cit., p. 12.
1959 period, 178 buildings used the double loaded type corridor; 34 buildings, the covered passage type; 17 buildings, a combination of the double loaded and single loaded type corridor; 4 buildings a combination of the double loaded and covered passage type corridor; 26 buildings, the single loaded type; and 11 buildings, without corridors.

The double loaded type corridor was the most prevalent type reported for both the 1939 to 1949 and 1949 to 1959 periods, but the single loaded corridor and corridorless buildings were more prevalent in the 1949 to 1959 period.

**Flexibility**

Elementary education has found no pattern that fits the needs of all communities, all groups of children or all concepts of teaching and administration. Likewise no specific design for an elementary school plant used was found in this study. Since there can be no doubt about the need for curriculum changes from time to time the architect should be asked to make buildings structurally flexible so that space changes can be made without extremely high remodeling costs. No matter how carefully future enrollments are projected most communities will have to adapt buildings to provide more and different instructional spaces. Hayward recognized this when he suggested that load bearing walls be kept to a minimum.

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Structural flexibility within the building should be provided whenever possible. Internal reorganization of areas in a building, and changes in room sizes and assigned space allocations are only possible when the number of load-bearing walls are kept at a minimum.\(^1\)

The information gained relative to this feature of construction was not conclusive. Fifty-five of the 270 buildings for the period 1949 to 1959 mentioned that the walls were non-load-bearing. Others probably were constructed with this feature but only those where it was specifically mentioned in the article describing the building were recorded.

III. COSTS

The information reported here on the costs of the buildings must be interpreted with the knowledge that all types of buildings from all parts of the country are included. These buildings ran over an eleven year period and the varying cost of materials and labor limits the usefulness of comparison.

Initial Cost

Comparison of 1939 to 1949 period with 1949 to 1959 period. The actual cost of 182 buildings was reported for the 1949 to 1959 period. The figures quoted are for construction only and do not include expenditures for equipment. Costs for these 182 buildings ranged from a low of $64,900 to a high of $1,665,374. The average cost for the 182 buildings reported was $422,357.

\(^1\)Department of Elementary School Principals, National Education Association, Elementary School Building Design for Learning, op. cit., p. 22.
The actual costs of 67 buildings reported by Bucher for the 1939 to 1949 period ranged from a low of $\$44,000$ to a high of $\$1,200,000$. The average cost of these 67 buildings was reported to be $\$200,928$. The general size of schools, while being smaller in the 1949 to 1959 period, indicated schools were more costly to build during that period than the size of schools for the 1939 to 1949 period, reflecting a rise in building costs over the past decade.

**Unit Costs**

Bucher presented no data on unit costs of construction, but since these costs were widely quoted in the literature of the 1949 to 1959 period and seemed to be of interest, unit costs were included in this study. Certain limitations existed in analyzing unit costs. For example, the elimination of basement areas, lowering ceiling heights and using flat roofs cut down on waste space. These measures reduced the initial cost of a building project but increased the square and cubic footage costs. It is important, therefore, to make comparisons not only on the basis of total cost but also on the costs per pupil.

**Cost per square foot.** A summary of the costs per square foot is shown in Table VI. The cost per square foot of

\[\text{Cost per square foot} \]

\[\text{is shown in Table VI. The cost per square foot of}\]

\[\text{1Bucher, op. cit., p. 12.}\]

\[\text{2American Association of School Administrators, National}\]

\[\text{Education Association, American School Buildings, op. cit., p.}\]

\[\text{202.}\]
107 buildings was reported. These square foot costs ranged from a low of $6.00 to a high of $18.97 per square foot. The average square footage cost of the 107 buildings was $11.90.

TABLE VI
COSTS PER SQUARE FOOT OF 107 BUILDINGS
FOR 1949 TO 1959

<table>
<thead>
<tr>
<th>Cost per Square Foot in Dollars</th>
<th>Number of Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ 5.01-6.00</td>
<td>2</td>
</tr>
<tr>
<td>6.01-7.00</td>
<td>6</td>
</tr>
<tr>
<td>7.01-8.00</td>
<td>8</td>
</tr>
<tr>
<td>8.01-9.00</td>
<td>16</td>
</tr>
<tr>
<td>9.01-10.00</td>
<td>18</td>
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<tr>
<td>10.01-11.00</td>
<td>7</td>
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<tr>
<td>11.01-12.00</td>
<td>9</td>
</tr>
<tr>
<td>12.01-13.00</td>
<td>12</td>
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<tr>
<td>13.01-14.00</td>
<td>13</td>
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<tr>
<td>14.01-15.00</td>
<td>6</td>
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<tr>
<td>15.01-16.00</td>
<td>4</td>
</tr>
<tr>
<td>16.01-17.00</td>
<td>4</td>
</tr>
<tr>
<td>17.01-18.00</td>
<td>2</td>
</tr>
</tbody>
</table>

Total : 107
Average $11.90

Cost per cubic foot. Table VII shows the per cubic foot costs. The cost per cubic foot was reported for 53 buildings. These reported costs ranged from a low of $3.23 per cubic foot to a high of $1.15 per cubic foot. The average per cubic foot cost was 83¢.
TABLE VII
COSTS PER CUBIC FOOT OF 53 BUILDINGS
FOR 1949 TO 1959

<table>
<thead>
<tr>
<th>Cost per Cubic Foot in Cents</th>
<th>Number of Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 54</td>
<td>1</td>
</tr>
<tr>
<td>55 - 59</td>
<td>3</td>
</tr>
<tr>
<td>60 - 64</td>
<td>5</td>
</tr>
<tr>
<td>65 - 69</td>
<td>4</td>
</tr>
<tr>
<td>70 - 74</td>
<td>4</td>
</tr>
<tr>
<td>75 - 79</td>
<td>6</td>
</tr>
<tr>
<td>80 - 84</td>
<td>4</td>
</tr>
<tr>
<td>85 - 89</td>
<td>5</td>
</tr>
<tr>
<td>90 - 94</td>
<td>6</td>
</tr>
<tr>
<td>95 - 99</td>
<td>4</td>
</tr>
<tr>
<td>100 - 104</td>
<td>5</td>
</tr>
<tr>
<td>105 - 109</td>
<td>5</td>
</tr>
<tr>
<td>110 - 114</td>
<td>2</td>
</tr>
<tr>
<td>115 - 119</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
</tr>
<tr>
<td>Average</td>
<td>83¢</td>
</tr>
</tbody>
</table>

Per pupil costs. Table VIII shows the cost per pupil. Eighty-six buildings reported the per pupil cost of the building. These per pupil costs ranged from a low of $343 to a high of $1,999 per pupil. The average per pupil cost of the 86 buildings was $1,004.

IV. THE CLASSROOM

The desirable size of an elementary school classroom was dependent upon two concepts that were very much interrelated. These two concepts were the area of the classroom
### TABLE VIII

**COSTS PER PUPIL OF 86 BUILDINGS FOR 1949 TO 1959**

<table>
<thead>
<tr>
<th>Cost per Pupil in Dollars</th>
<th>Number of Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ 300 - 349</td>
<td>1</td>
</tr>
<tr>
<td>350 - 399</td>
<td>1</td>
</tr>
<tr>
<td>400 - 449</td>
<td>2</td>
</tr>
<tr>
<td>450 - 499</td>
<td>1</td>
</tr>
<tr>
<td>500 - 549</td>
<td>1</td>
</tr>
<tr>
<td>550 - 599</td>
<td>2</td>
</tr>
<tr>
<td>600 - 649</td>
<td>3</td>
</tr>
<tr>
<td>650 - 699</td>
<td>5</td>
</tr>
<tr>
<td>700 - 749</td>
<td>3</td>
</tr>
<tr>
<td>750 - 799</td>
<td>2</td>
</tr>
<tr>
<td>800 - 849</td>
<td>6</td>
</tr>
<tr>
<td>850 - 899</td>
<td>10</td>
</tr>
<tr>
<td>900 - 949</td>
<td>4</td>
</tr>
<tr>
<td>950 - 999</td>
<td>1</td>
</tr>
<tr>
<td>1000 - 1049</td>
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<tr>
<td>1050 - 1099</td>
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<td>1150 - 1199</td>
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<td>1800 - 1849</td>
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<td>1900 - 1949</td>
<td>-</td>
</tr>
<tr>
<td>1950 - 1999</td>
<td>-</td>
</tr>
</tbody>
</table>

**Total**                86

**Average**  $1004.00
in terms of square feet and the dimensions used to achieve this square footage.

**Square Footage of Classrooms**

The old standard classroom of 660 square feet developed to accommodate thirty-five pupils in five rows of seven desks each was found to have been replaced by much larger space allotments. Most educators today feel the desirable size of an elementary classroom should be somewhere in the neighborhood of thirty to forty square feet of usable floor space for each pupil.¹

The older standard has been discarded largely through the efforts of the National Council on School House Construction. This organization in 1949 stated that, "An area of thirty square feet per pupil for the primary and intermediate grades is essential."² The same organization four years later reiterated the original statement but emphasized it was to be considered a minimum.

Where the wide variety of activities characteristic of a modern elementary school program is to be housed, an area of thirty square feet per pupil for the primary and intermediate grades is essential. It is emphasized that the figures given are minimum space allocations. They frequently require more than one thousand feet.³

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³Ibid., p. 48.
Comparison of 1939 to 1949 period with 1949 to 1959 period. Bucher reported on 123 different classroom sizes for the period 1939 to 1949. One hundred and thirty-five different classroom sizes were reported for the 1949 to 1959 period. These different classroom sizes for both periods of time were converted to square feet and compared. This comparison is shown in Table IX.

To meet the desirable minimum square footage for a class of 30 pupils would require 900 square feet of floor space. The 1939 to 1949 period reported 24 classroom sizes to be this large in comparison to 47 classroom sizes for the 1949 to 1959 period. Nine classroom sizes were observed to be as large or larger than 1,000 square feet for the 1939 to 1949 period compared to 17 for the 1949 to 1959 period. The average square footage of the 1939 to 1949 period was 768.2 square feet. The average square footage for the 1949 to 1959 period was 855.9 square feet. The increased average square footage of the 1949 to 1959 period over the 1939 to 1949 period was 87.7 square feet. Worthy of note is the fact that 88 of the classroom sizes reported in the 1949 to 1959 period were less than 900 square feet in size.

Dimensions of Classrooms

The square footage of any classroom was dependent upon the dimensions employed. Elongated rooms should be

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TABLE IX

CLASSROOM SIZE OF BUILDINGS IN SQUARE FEET FOR THE PERIOD
1939 TO 1949 AND 1949 TO 1959 WITH THEIR
FREQUENCY OF OCCURRENCE

<table>
<thead>
<tr>
<th>Square Feet</th>
<th>1939-1949</th>
<th>1949-1959</th>
</tr>
</thead>
<tbody>
<tr>
<td>580 - 599</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>600 - 619</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>620 - 639</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>640 - 659</td>
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</tr>
<tr>
<td>660 - 679</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>680 - 699</td>
<td>11</td>
<td>2</td>
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<td>700 - 719</td>
<td>12</td>
<td>4</td>
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<tr>
<td>720 - 739</td>
<td>16</td>
<td>6</td>
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<td>740 - 759</td>
<td>10</td>
<td>8</td>
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<td>760 - 779</td>
<td>9</td>
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<td>780 - 799</td>
<td>4</td>
<td>9</td>
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<td>800 - 819</td>
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<td>820 - 839</td>
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<td>860 - 879</td>
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<td>880 - 899</td>
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<td>4</td>
<td>13</td>
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<td>920 - 939</td>
<td>8</td>
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<td>6</td>
<td>4</td>
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<td>1080 - 1099</td>
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<td>1120 - 1139</td>
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<td>1220 - 1239</td>
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</tr>
</tbody>
</table>

Totals 123 135
Average for 1939-1949 768.2 square feet
Average for 1949-1959 855.9 square feet
avoided to provide a desirable area of 30 square feet per pupil. For this reason, wide rooms are advisable. Rooms ranging between 23 by 40 feet and 30 by 30 feet were reported to be satisfactory for 30 pupils by the American Association of School Administrators.¹

**Comparison of 1939 to 1949 period with 1949 to 1959 period.** Bucher reported 123 different classroom dimensions for the 1939 to 1949 period.² Nine of the classrooms he reported had a width over 25 feet. One hundred thirty-five different classroom dimensions were reported for the 1949 to 1959 period. Sixty classrooms of the later period had a width over 25 feet. The average classroom dimensions were 22.2 feet by 31.1 feet for the 1939 to 1949 period and 25.2 feet by 33.7 feet for the 1949 to 1959 period. These averages were found by adding all the given dimensions and dividing the total by the number of dimensions. The number of square dimensions increased from 6 for the period 1939 to 1949 to 22 for the 1949 to 1959 period.

V. SUMMARY

To summarize briefly the average elementary school building of today while having a wide variance of differences


²Bucher, *loc. cit.*
reflecting local conditions could be described as a single story L shaped structure with double loaded type corridors constructed on a site of ten and one-half acres to accommodate 490 students in ten classrooms of 850.9 square feet with dimensions measuring 25.2 feet by 33.7 feet. The building would be so designed that a future addition could easily be made. This structure would initially cost $422,357 and have unit costs of $11.90 per square foot, eighty-three cents per cubic foot and $1,004 per pupil. The building would be well provided with facilities for community activities and would contain a total of 47,947 square feet of floor space.

The 270 elementary school buildings discussed for the period 1949 to 1959 could be summarized by stating that elementary school buildings of today have preserved many individual differences due to their size, location, and curricular needs.
CHAPTER III

CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

This comparative study of some selected desirable features of 270 elementary school buildings constructed during the decade 1949-1959 was made to provide a source of information on school building trends to prospective builders.

The data was gathered by applying a data gathering sheet to the selected proposed or constructed elementary schools over the past eleven years. This information was compared to a similar study of two hundred proposed or constructed elementary schools during the period 1939 to 1949. The floor plans and accompanying descriptive literature of the schools studied were published in The American School Board Journal, The Nations School, The School Executive, and The American School and University from 1949 to 1959.

I. SUMMARY

From the information shown on the preceding pages the following findings seem to be warranted:

1. The enrollments for which elementary buildings were constructed to accommodate have declined in the past decade. The average decline was eighty students.
2. The average number of classrooms in elementary school buildings has declined from 11.44 classrooms for the period 1939 to 1949 to ten classrooms for the 1949 to 1959 period.

3. The average total area of the sixty-five buildings reporting this information for the 1949 to 1959 period was 47,947 square feet.

4. The average site size of 101 buildings reporting this information for the period 1949 to 1959 was 11.47 acres. Multiples of five were the prevalent acreages found.

5. One hundred of the two hundred buildings erected during the period 1939 to 1949 were one story construction. During the period 1949 to 1959, 217 of the 270 buildings were one story in height.

6. The L and rectangular shaped buildings were the most prevalent used types for both the 1939 to 1949 and 1949 to 1959 periods. The L shape was used in forty of the two hundred buildings during the 1949 to 1959 period and in seventy-four of 270 buildings for the 1949 to 1959 period. Rectangular buildings were reported forty times during the 1939 to 1949 period and sixty-four times during the period 1949 to 1959.

7. The use of the typical double loaded type corridor for pupil circulation has declined in the past eleven
years. The double loaded corridor was used in 154 of the two hundred school buildings during the 1939 to 1949 period but only in 178 of the 270 buildings erected during 1949 to 1959 period.

8. The average initial cost of 182 buildings reported during the period 1949 to 1959 was $422,357. These buildings had an average unit cost of $11.90 per square foot, eighty-three cents per cubic foot, and $1,004 per pupil.

9. The average dimensions for elementary classrooms during the period for 1939 to 1949 was 22.2 feet by 31.1 feet. The average dimensions increased to 25.2 feet by 33.7 feet during the period from 1949 to 1959.

10. The average size of an elementary school classroom during the 1939 to 1949 period was 768.2 square feet. The average square footage for the 1949 to 1959 period was 855.9 square feet.

11. The square classroom was used in six of the buildings during the 1939 to 1949 period and twenty-two of the buildings for the period 1949 to 1959.

II. CONCLUSIONS AND TRENDS

The comparisons made of the 1939 to 1949 period of school construction with the 1949 to 1959 period suggests the following conclusions and trends:
1. The nation has been making continual progress in meeting its school housing needs caused by increased enrollments with their accompanying classroom shortages, and the curtailing of building programs during the war years.

2. Elementary buildings are being constructed to house fewer students in one building and as a result are smaller in size, containing fewer classrooms.

3. There is a trend for buildings to become increasingly flexible. This has been achieved by making provisions for additions to accommodate increased enrollments and changes in curriculum and method.

4. There has been a continuing trend towards single story construction in elementary schools.

5. Much imagination has been employed in building shapes and designs with the possibilities of circular shaped buildings being explored.

6. The single loaded corridor while not challenging the prevalency of the double loaded type has been employed more widely and an increasingly amount of attention has been given to the corridorless school.

7. Elementary school buildings while containing fewer classrooms are becoming costlier to build.

8. A trend could be noted for elementary classrooms to
become increasingly larger with square classrooms being more freely employed.

9. Elementary school buildings were found to be constructed to fit educational requirements of each local community with the result that individuality and creativity are being expressed to a marked degree.

III. RECOMMENDATIONS

In view of the information resulting from this study the following recommendations are herewith suggested:

1. A study should be made to determine if the space requirements for an elementary school classroom of from thirty to forty square feet per pupil so widely quoted are within the feasibility of most communities. Such a study should try to relate these increased sizes with their additional costs to the upgrading of educational outcomes.

2. Consideration should be given to the innumerable multiple uses to which some areas of elementary schools are subjected. Such a study should provide answers as to the desirability or undesirability of these various combined uses.

3. A study should be made to develop some set of criteria or standards that could be applied to unit costs of construction which would eliminate the many fallacies now present in the comparisons of these costs.
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C. UNPUBLISHED MATERIAL

APPENDIX A

ELEMENTARY SCHOOL BUILDING CHECK LIST

SOURCE ____________________________________________________________

NAME OF SCHOOL __________________________________________________

LOCATION OF SCHOOL ______________________________________________

SIZE OF BUILDING

Enrollment ___________ Number of Classrooms ______

Total Area ___________ Site Size ___________

DESIGN CONSIDERATION

Height of Buildings:

Single Story _________ Two Story ______________

Three Story _________ Others _________________

Shape of Building:

Letter ______________  Rectangular _____________

Others ______________

Corridors:

Double Loaded _________ Single Loaded ______________

Covered Passage _______ Other _________________

Flexibility:

Additions ____________ Internal _______________

COSTS

Initial Cost

Unit Costs:
Cost Per Square Foot
Cost Per Cubic Foot
Per Pupil Cost

THE CLASSROOM

Size:
Square Footage

Dimensions:
Length
Width
APPENDIX B

NAME AND LOCATION OF SCHOOLS USED IN STUDY

Adamsville School, Raritan, New Jersey
Albany Public School, Albany, Texas
Alice M. Birney Elementary School, Rivera, California
Allendale Elementary School, Pittsfield, Massachusetts
Alta Loma Elementary School, San Angelo, Texas
Armistead Garden Elementary School, Baltimore, Maryland
A. W. McCandless School, Hutchinson, Kansas

Bailey Street School, Waycross, Georgia
Barrington Country Side School District #1, Barrington, Illinois
Bay City Colored School, Bay City, Texas
Belaire Elementary School, San Angelo, Texas
Beverly Elementary School, Birmingham, Michigan
Birdseye B. Norton Elementary School, Cheshire, Connecticut
Blackberry Lane Elementary School, University City, Missouri
Blyth Park School, Riverside, Illinois
Bonner School, Houston, Texas
Bridge City Elementary School, Bridge City, Texas
Bristol Primary School, Webster Grove, Missouri
Bugsbee School, West Hartford, Connecticut
Busch Elementary School, St. Louis, Missouri

Caddo Heights Elementary School, Shreveport, Louisiana
Carl Underwood Elementary School, Andrews, Texas
Cedar School, Beatrice, Nebraska
Center Street Elementary School, El Segundo, California
Central Elementary School, Beaver Falls, Pennsylvania
Central Elementary School, Michigan City, Indiana
Central Elementary School, Richfield, Minnesota
Chamberlin Elementary School, Stephenville, Texas
C. Henry Bloom Elementary School, Rockford, Illinois
Chiloquin Elementary School, Klamath County, Oregon
Clara E. Colman Elementary School, Glen Rock, New Jersey
Clarksville School, Albany County, New York
Claypit Hill School, Wayland, Massachusetts
Clear Lake School, Eugene, Oregon
Clifford M. Granger School, Agaram, Massachusetts
Clinton Elementary School, Clinton, Wisconsin
Coburn School, Battle Creek, Michigan
Coburn School, Dearborn, Michigan
Cockrell Hill School, Dallas, Texas
Cole Branch School, St. Louis, Missouri
Commerce School, Walled Lake, Michigan
Consolidated School, Capron, Illinois
Country School, Weston, Massachusetts
David A. Marshall Elementary School, Harrisburg, Pennsylvania
David Edwards Elementary School, Ames, Iowa
Devon Elementary School, Berwyn, Pennsylvania
Donald E. Ross School, Braintree, Massachusetts
Dunbar School, Tuscon, Arizona

East Gresham Elementary School, Gresham, Oregon
Eastview Elementary School, Avon Lake, Ohio
Eastwood Hills Elementary School, Raytown, Missouri
Edgbrook School, McHenry, Illinois
Edgewood Elementary School, Perry Township, Indiana
Egremont Elementary School, Pittsfield, Massachusetts
Elementary School, Sheffield, Alabama
Ellinwood Grade School, Ellinwood, Kansas
Elmhurst School, Lansing, Michigan
Elm Street School, Youngstown, Ohio
Emerson Elementary School, Elmhurst, Illinois

Farmington Elementary School, Farmington, New Mexico
Favorite Hills School, Piqua, Ohio
Fern Creek Elementary School, Orlando, Florida
Field Park School, Western Springs, Illinois
Forest Glen Elementary School, Glen Ellyn, Illinois
Forest Grove Elementary School, Silver Spring, Maryland
Forest Park Elementary School, Kenosha, Wisconsin
Forrest R. Chantry Elementary School, Malvern, Iowa
Fountaindale School, Hagerstown, Maryland
Frances Judkins School, Pismo Beach, California
Francis Dunlavy Elementary School, Lebanon, Ohio
Frank A. Burtsfield Elementary School, West Lafayette, Indiana
Franklin Grade School, Appleton, Wisconsin
Franklin School, Fresno, California
Fredericktown Elementary School, Fredericktown, Ohio
Fruitland Elementary School, Fruitland, Idaho
F. U. White School, Calva, Illinois

General Mitchell Elementary School, West Allis, Wisconsin
George A. Persell Elementary School, Jamestown, New York
Gerald Murdock Parmenter School, Franklin, Massachusetts
Gladstone Street Elementary School, Cranston, Rhode Island
Graceland Park-O'Donnell Heights School, Baltimore, Maryland
Grade School, Sedan, Kansas
Grade School Building, West Reading, Pennsylvania
Green Acres Elementary School, Fort Morgan, Colorado
Greenfield Elementary School, Birmingham, Michigan
Grove Patterson Elementary School, Toledo, Ohio
Grover Cleveland Elementary School, Erie, Pennsylvania

Hampton Consolidated School, Hampton, Connecticut
Harlan School, Birmingham, Michigan
Harris Hill Elementary School, Clarence, New York
Hazelwood Elementary School, Louisville, Kentucky
Hearthcote Elementary School, Scarsdale, New York
Hermes Elementary School, La Grange, Texas
Highland Elementary School, Pittsfield, Massachusetts
Hillsborough Township Elementary School, Hillsborough, New Jersey
H. K. Williams School, San Antonio, Texas
Hobart Grade School, Hobart, Indiana
Honey Grove Elementary School, Honey Grove, Texas
Howard Elementary School, Grand Island, Nebraska
Howard School, Fort Smith, Arkansas
Hurffville Elementary School, Hurffville, New Jersey

Indian Lake School Consolidated District #89, Barrington, Illinois

Jacob L. Devers Elementary School, York, Pennsylvania
James G. Elaine Elementary School, Superior, Wisconsin
James Henry Garnett Elementary School, Gary, Indiana
Jefferson Elementary School, Greenfield, Wisconsin
Jefferson Elementary School, Hamilton, Ohio
Jefferson Elementary School, Richland Center, Wisconsin
Jefferson Elementary School, Rochester, Minnesota
Jefferson Elementary School, Sioux Falls, South Dakota
Jesse H. Mason Elementary School, Canton, Ohio
Jim Cherry School, Oglethorpe, Georgia
John Campbell Elementary School, Selah, Washington
John J. Pershing Grade School, Joliet, Illinois
Joseph Stokes Memorial School, Trenton, New Jersey

Katherine Delmar Burke School, San Francisco, California
Kaune Elementary School, Santa Fe, New Mexico
Kenwood Elementary School, Bowling Greene, Ohio
Kimball Township Elementary School, Port Huron, Michigan
King's Highway Elementary School, Sadsbury, Pennsylvania

Lafayette Elementary School, Wilkes-Barre, Pennsylvania
Lakeland School, Santa Fe Springs, California
Lakeside Elementary School, East Grand Rapids, Michigan
Lawrence Park Primary School, Lawrence Park Township, Erie, Pennsylvania
Leila Howland School, Eagle Grove, Iowa
Lewis and Clark Elementary School, Williston, North Dakota
Lewis Parkhurst School, Winchester, Massachusetts
Libertyville Elementary School, Libertyville, Illinois
Lincoln Elementary School, Lewistown, Montana
Lincoln Elementary School, Menominee, Michigan
Lincoln Elementary School, Tarrington, Wyoming
Lincoln School, Beatrice, Nebraska
Lincoln School, Dowagiac, Michigan
Lincoln School, Eagle Grove, Iowa
Lincoln School, Lamar, Colorado
Lowell Elementary School, Everett, Washington
Lynnewood Elementary School, Havertown, Pennsylvania
Mahmomen Elementary School, Mahmomen, Minnesota
Manchester Consolidated School #219, Boone County, Illinois
Maple Avenue Elementary School, Claremont, New Hampshire
Maple Grove School, Lansing, Michigan
Maple Park Elementary School, Edmond, Washington
Maplewood Neighborhood School, Grand Rapids, Michigan
Maraine City Elementary School, West Carrollton, Ohio
Maude Armatage Public Elementary School, Minneapolis, Minnesota
Mary L. Daly Elementary School, Elkhart, Indiana
Mattie L. Jones Elementary School, Tyler, Texas
Meadow Drive Elementary School, Mineola School District, Long Island, New York
Mesita Elementary School, El Paso, Texas
Midpoint Elementary School, Ridgetop, Tennessee
Midway Elementary School, Fellows, California
Millville Primary School, Cincinnati, Ohio
Montecito School, Martinez, California
Moreau Elementary School, South Glen Falls, New York
Mountlake Terrace Grade School, Edmonds, Washington
Myles J. McManus Elementary School, Linden, New Jersey

Nolen M. Irby Building, Conway, Arkansas
Normandy Park Elementary School, Seattle, Washington
North College Hill Primary School, North College Hill, Ohio
North East Elementary School, Waltham, Massachusetts
North Elementary School, Cedar City, Utah
North Elementary School, Chelsea, Michigan
North Gadsden Elementary School, Gadsden, Alabama
North Hills Elementary School, York County, Pennsylvania
North Littleton Elementary School, Littleton, Colorado
North Silver Elementary School, Silver City, New Mexico
North Street School, Hittman, Ohio
North Ward School, McCook, Nebraska
Northwest Elementary School, Tallahassee, Florida

Oakland Grade School, Topeka, Kansas
Oakland School, Bloomington, Illinois
Oak View Elementary School, Takoma Park, Maryland
Ocean Lake Elementary School, Lincoln County, Oregon
Odem Elementary School, Odem, Texas
O'Donnell Playstead Elementary School, Lowell, Massachusetts
Olanche Union Elementary School, Inyo County, California
Orville Wright School, Modesto, California
Paddock Lane School, Beatrice, Nebraska
Palmer School, Colorado Springs, Colorado
Paramount Park Elementary School, King County, Washington
Park School, Highland Park, Boulder, Colorado
Parker Elementary School, Oakland, California
Poshley Elementary School, Ballston Lake, New York
Paul I. Bolin School, East Peoria, Illinois
Paul L. Best School, Ferndale, Michigan
Pearl River School, Pearl River, New York
Penn Grove Elementary School, Philadelphia, Pennsylvania
Piedmont Elementary School, Duluth, Minnesota
Plantation Park Elementary School, Bossier, Louisiana
Ponce de Leon Elementary School, Pinellas County, Florida
Powers Elementary School, Amherst, Ohio
Primary School, Deerfield, Illinois
Prophetstown Grade School, Prophetstown, Illinois
Proposed Elementary School, Central District #1, Hyde Park, New York
Public School No. 27, Paterson, New Jersey

Quaker Ridge Elementary School, Scarsdale, New York

Ralph R. Smith Elementary School, District #1, Hyde Park, New York
Rancho Village Elementary School, Oklahoma City, Oklahoma
Richot Primary School, Bismarck, North Dakota
Robinson Grade School, Tucson, Arizona
Roger Casier School, Downey, California
Roosevelt Grade School, Watertown, South Dakota
Rosslyn Heights Elementary School, Salt Lake City, Utah

Sam Houston Elementary School, Maryville, Tennessee
San Jacinto Elementary School, Liberty, Texas
Scappoose Grade School, Scappoose, Oregon
Sedgwick and Williams Avenue Elementary School, Philadelphia, Pennsylvania
Sherman Elementary School, Tacoma, Washington
Sherwood Heights Elementary School, Pendleton, Oregon
Sidney Lanier School, Dallas, Texas
Silver Side Road School, Mt. Pleasant, Delaware
S. J. Bonham School, Niles, Ohio
Skinner Elementary School, Chicago, Illinois
Slater Elementary School, Jefferson County District #1, Colorado
Sonoma Elementary School, Sonoma, California
Southport School, Kenosha, Wisconsin
Southside Elementary School, Angleton, Texas
South Side Elementary School, Great Falls, Montana
South Side Grade School, Glasgow, Montana
Southwest Elementary School, Evergreen Park, Illinois
Stephen Knight Elementary School, Denver, Colorado
Stoddard School, Beatrice, Nebraska
St. Patrick School, Corpus Christi, Texas
Stranahan Elementary School, Sylvania, Ohio
Stuart Bradley Elementary School, New Orleans, Louisiana
Tallmadge Elementary School, Lancaster, Ohio
Taylor School, Ogden, Utah
Territorial School, Lakeview, Michigan
Thomas Jefferson Elementary School, Hammond, Indiana
Thornapple-W. K. Kellogg Rural Agriculture School, Middleville, Michigan
Tierra Linda Intermediate School, San Carlos, California
Tilton School, Rochelle, Illinois
Trent Park Elementary School, New Bern, North Carolina
Twelfth Street Elementary School, Greeley, Colorado
Tybee Elementary School, Bibb County, Macon, Georgia

Underwood Elementary School, Andrews, Texas
University Hill School, Boulder, Colorado

Valley View Elementary School, Cleveland, Ohio
Vermont Avenue Primary School, Wyoming, Ohio
Voluntown Center School, Voluntown, Connecticut

Waite Park Elementary School, Minneapolis, Minnesota
Wapakoneta Elementary School, Wapakoneta, Ohio
Washington Elementary School, Centralia, Washington
Washington Elementary School, Sunnyside, Washington
Washington School, Hamilton, Montana
Washington School, Holdrege, Nebraska
Waverly School, Albany, Oregon
Webster Elementary School, Watertown, Wisconsin
Westboro Elementary School, Westboro, Massachusetts
West Columbia Elementary School, West Columbia, Texas
West Hills Elementary School, New Haven, Connecticut
Westside Elementary School, Niles, Michigan
West Ward Elementary School, Wabash, Indiana
West Ward Grade School, Lexington, Nebraska
Westwood Elementary School, Stillwater, Oklahoma
Wheat Ridge Elementary School, Wheat Ridge, Colorado
White Lake Elementary School, Whitehall, Michigan
Wilbur E. Sutton Elementary School, Muncie, Indiana
Willard Elementary School, Willard, Missouri
Will Moore School, Bismarck, North Dakota
Wilson School, Kenosha, Wisconsin