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ABSTRACT

Information regarding the selection and care of carpeting is needed by educational leaders, maintenance personnel, and carpet manufacturers. Serious problems are developing along with the use of carpeting. The selection and maintenance of carpet are important problem areas. To help meet the need for more information regarding the maintenance of carpet, data were collected from 75 school attendance centers in seven States. Approximately 56 acres or 2,433,000 square feet of carpeting were included in the study. Data were collected from school centers located in Alabama, Florida, Georgia, Kentucky, New York, Tennessee, and Texas. Information regarding the use of carpet in schools was based on data that were collected on the spot in the 75 buildings and on the results of interviews with administrators, teachers, and maintenance workers to discover what methods worked. (Author/MLF)

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CARPET GUIDE TO SELECTION AND CARE

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EA 001 687

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Preface

The writer believes that information regarding the selection and care of carpeting is needed by educational leaders, maintenance personnel and carpet manufacturers. Serious problems are developing along with the use of carpeting. The selection and maintenance of carpet are important problem areas.

This publication is based upon a careful study of elementary and high schools located in seven states. Over 2,423,000 square feet of carpeting were included in the study. Many discouraging maintenance methods were discovered. An excellent job of cleaning carpet was being carried out in some schools, yet many schools were doing a poor job. Some of the schools were without any vacuum cleaner. Others may have acquired the wrong kind of vacuum or shampoo machine. Almost everyone was using too much moisture or water in the shampooing process. Excessive moisture may cause a carpet to shrink and pull apart at the seams.

The proper kind of machines and equipment and the right kind of cleaning materials must be available for maintenance workers. Teamwork and cooperation with custodians by principals, teachers, and pupils is needed if a good maintenance program is to be achieved. Above all the maintenance personnel must have the proper skills and know-how to do an acceptable job of cleaning.

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The Carpet Story

Carpet in Schools

In 1956, a new material for teaching spaces was introduced which enabled educators and architects to provide a more precisely controlled environment for learning. This was the time when wool carpet was installed in the Peter Pan Elementary School in Andrews, Texas. The name of this school is highly appropriate as Peter Pan is a story about the adventures of children. The installation of soft floor covering in the Peter Pan school provided an excellent atmosphere for growing children as well as a new adventure in a good environment for learning. The installation of carpet in the Peter Pan School marked the beginning of an era in which carpet contributed to effective teaching. Teachers, students, and others began to realize the importance of school carpet.

Early Users

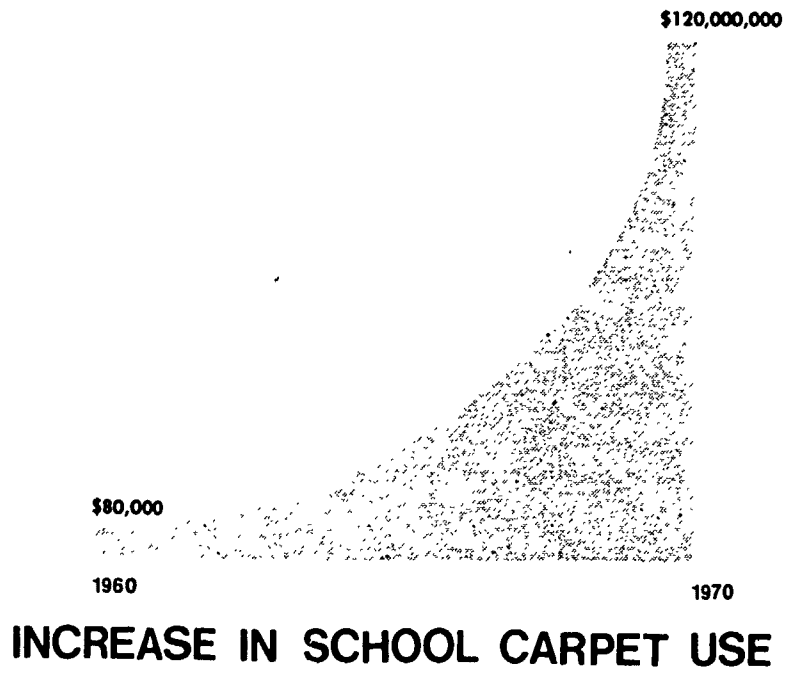
Other educational institutions began to follow the Peter Pan school example. In 1961, Andrews, Texas High School was opened, using wool carpet as a floor covering. Acrylic and a wool blend carpet were introduced in the Shaker High School, Latham, New York in 1958. Carpet installed in these schools is still in use today. In the years that have passed since these installations, the use of carpet has grown steadily. Today, carpet is accepted widely for school use by architects, educators, and laymen.

Progress

Real progress has been made during the last ten years in planning better school buildings. Substantial improvement has occurred in planning and designing a school, especially in designing the interior of a school facility. The statement, "You make or break a school building when you move inside", is being given more attention today than ever before. Temperature control, classroom lighting, functional furniture and equipment as well as color and sound control contribute to a precisely controlled environment on the inside of a school building.

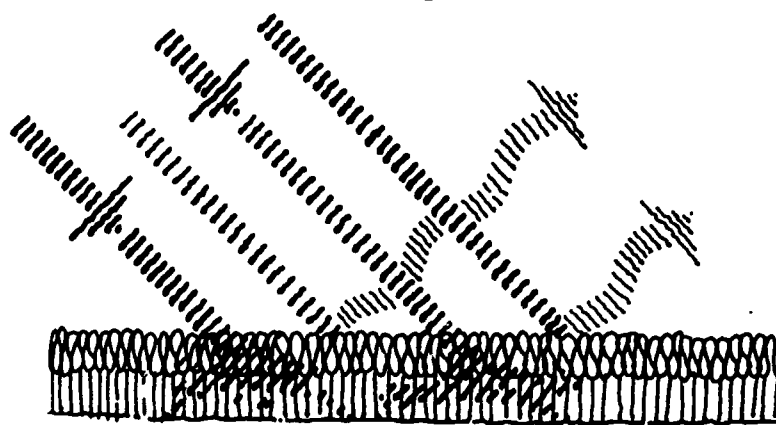
Noise

An important reason for the large amount of carpet used as ob-



served in the study of 56 acres of carpeting, was the need for control of high level sounds or noise in the classroom.

The need to control high sound levels (noise) has increased as permanent walls in classrooms are eliminated in favor of movable walls or visual dividers. This situation was brought about as a result of planning for more flexibility and greater adaptability. The potential of soft floor covering for better control of airborne and impact noise in a classroom makes carpet a valuable acoustical tool.



A I R B O R N E N O I S E A B S O R P T I O N



Other Benefits

There are other reasons for using carpet in schools such as comfort, appearance, and economical maintenance. Carpeted floors are safer. People do not tire as quickly when working on a carpeted floor. Carpet is easier to maintain as indicated by research in

schools and hospitals. The pleasant appearance of carpet may improve the attitude of the user. Carpet affects individuals in that there is added respect for a carpeted classroom on the part of students and teachers. Research on maintenance of carpet indicates that it costs only one-half as much for a carpeted floor as for tile floors. Authorities on heating and ventilating indicate that carpeted floors reduce heating costs by five per cent.

Acceptance

The enthusiastic acceptance of carpeting by teachers, pupils, and laymen in new and old school buildings has increased the demand for carpeted classrooms. Very seldom is a school rehabilitated or planned at the present time without large amounts of carpet being used. In fact, carpet is being installed in classrooms faster than school people are learning how to maintain it.



Maintenance Problems

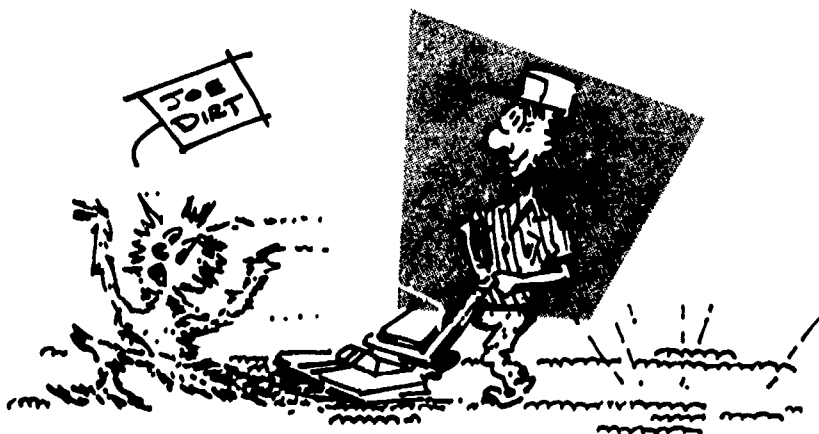
There are problems of carpet maintenance in many schools. Using the wrong kind of cleaning materials together with improper cleaning methods occur frequently. Broomcorn brooms and gasoline powered vacuums are being used to vacuum or sweep carpet. (The gasoline powered vacuums are fine for picking up paper, rocks, and sticks on the playground.) Some maintenance workers use gasoline to remove spots on the carpet. These improper cleaning methods present a serious problem relating to safety. Carpet will not wear well nor absorb sound waves if it is dirty.

The Study

To help meet the need for more information regarding the maintenance of carpet, data were collected from 75 school attendance centers in seven states. Approximately 56 acres or 2,433,000 square feet of carpeting were included in the study. Data were collected from school centers located in Alabama, Florida, Georgia, Kentucky, New York, Tennessee and Texas. Information regarding the use of carpet in schools was based upon data that were collected on the spot in the buildings. Visits were made to the 75 schools interviewing school administrators, teachers, and maintenance workers to discover what methods worked.

Cleaning Materials and Equipment

Maintenance people need to know how to maintain carpet. The right kind of cleaning equipment is necessary for carpet maintenance. Much of the equipment used is not heavy enough, nor is it the type that will obtain best results. The proper kind of cleaning materials are necessary if carpet is to be maintained in a satisfactory manner. It is important to remember that moisture shrinks carpet, thus pulling the carpet away from the walls when Jute or other natural backing materials are used. These problems, coupled with the wrong kind of machines, improper cleaning materials and cleaning methods present a serious situation from the standpoint of obtaining maximum value from school carpet.



Wearability

No carpet will wear properly if it is dirty. Dirt produces a film on the carpet, the carpet becomes darker in color, and soil particles cut the yarn. The ability of the carpet to cut down on noise is reduced if the carpet is soiled. Carpet may mildew, or colors may change or fade if inadequate cleaning methods are used. Wrinkles may occur as the carpet dries. All of these problems must be solved in order that the purposes of school carpet may be realized. It was amazing how well some carpet appeared to wear after being used fourteen to fifteen years. Space at the entrance to a classroom or in other high traffic areas did show some wear or were slightly faded. Much evidence was found as a result of the visits to the 75 schools, that carpet will last many years, still performing the function of absorbing sound waves if maintained in a satisfactory manner. On the other hand, carpet may not last more than two or three years as a result of poor maintenance or improper construction.

Team Work

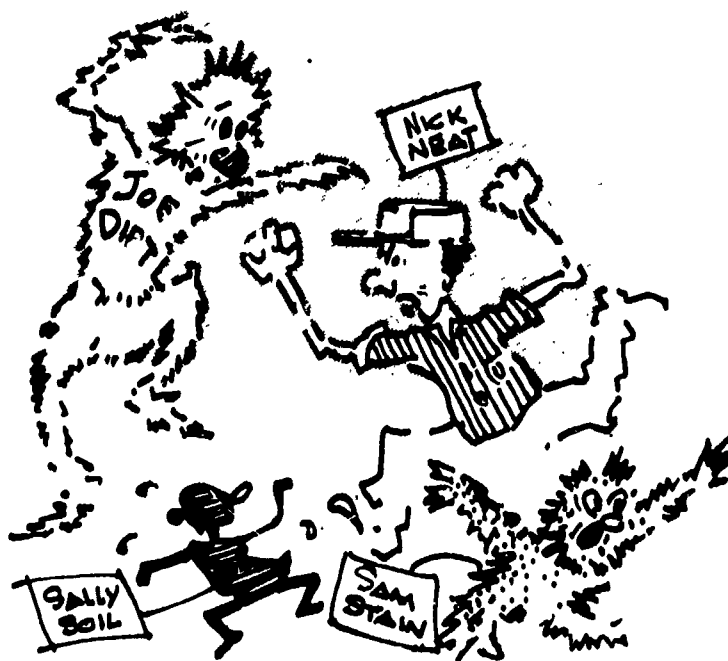
Teachers, students, and principals are interested in helping to keep carpet clean, although this interest may change at times due to staff turnover. The attitude of the principal and staff toward keeping a carpet clean is an important factor. If there is a lack of interest on the part of the principal and staff, good maintenance is virtually impossible. The maintenance people in Andrews, Texas indicated that teachers and pupils cooperated in keeping the carpet clean. Interest of teachers and pupils in Andrews and other schools in keeping the carpet clean prolonged the life of the carpet. Spot removal programs were initiated at Andrews High School and Shaker High School in which spots were cleaned immediately after occurrences. Students, teachers, and maintenance personnel in many places preferred carpet over any other kind of floor covering. Whenever an excellent maintenance program is achieved, pupils and teachers cooperate or work together as a team.

Satisfactory equipment and cleaning materials are made available for students and teachers as well as for the maintenance staff. Administrative direction in helping to get the cleaning job done appeared to be an important factor in carpet maintenance.

Understanding

There is considerable evidence indicating that laymen, board

members and teachers do not understand why carpeting is used in a classroom. Many laymen, parents, and teachers generally think of carpet as being beautiful, but do not know too much about the function of carpeting. Some boards of education and school administrators believe that carpet is a luxury. There is a real need to help laymen and others discover the real purpose of carpeting in a school. Educational institutions have always been under pressure to achieve the greatest amount for the taxpayers dollar. Carpeting, contrary to the luxury concept, is an economical kind of floor covering, provided that the right type of carpet is selected for a classroom, and is maintained properly.



Environment and Teaching

Carpeted spaces help to bring out the best in students and teachers. Teachers and pupils do not tire so easily. Physiological capital is preserved, helping teachers and pupils last longer and perform at a higher level. One of the most important reasons for using carpet in a teaching space is that it helps provide better con-

ditions for learning. Most educational leaders believe that carpet helps provide those kinds of conditions in a teaching space where teachers and pupils will perform at an optimum level. A carpeted classroom reduces the need for permanent walls. Individualized instruction, small and large group instruction, and other techniques of teaching are easier to bring about as a result of the opening up of the school, thus providing for a greater degree of flexibility in the use of teaching spaces. Softness and density of a carpet helps the muscles of the legs to function without aches and pains. Dampness and coldness of the floor are reduced by using carpet in classrooms. Carpet helps to eliminate that "tired feeling" as energy is preserved. Teachers say that they feel better at 3:00 o'clock in the afternoon than was the case at 11:00 o'clock in the morning after carpet was installed. It is believed that carpeted spaces help to bring out the best in people.

Open Spaces

Controlling unwanted sound in open spaces is important if teachers perform effectively. Hearing well is important to every individual. Educators, architects, and teachers cannot afford to ignore the important function of carpeting in the open plan school. Selecting the type of carpet that will help to make better use of teaching spaces must be given serious consideration. A carpet must have resilience, density, and weight, if noise is to be controlled effectively.

Reverberation

Carpet helps control reverberations and echos. Unwanted sound or noise is a problem in any classroom. Noise interferes with communication. A carpeted floor reduces or muffles noise. A hard floor bounces sound waves into the midst of an ongoing classroom activity. Voices must be raised to be clearly audible, creating even more noise that needs to be absorbed. Hard floors produce impact noise through movement of people. The problem of controlling reverberation may be solved by using a soft floor covering (carpet) in the classroom.

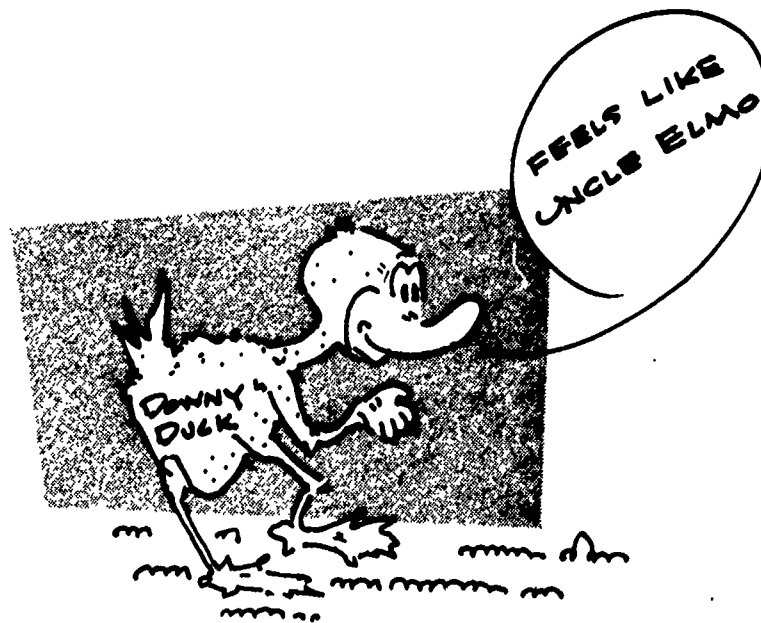
Open Plan School

Carpet contributes to the success of the open-plan school in reducing sound levels, and at the same time cuts down on the num-

ber of permanent walls or doors needed. Educational leaders and architects believe the open plan or modified open plan school will not work well without carpeted floors. As doors and permanent walls are eliminated, the cost of teaching spaces is lowered.

Softness

Not all educational leaders and architects understand the relationship between softness of carpet and noise control. Softness and thickness are important factors to consider in the selection of carpet. Density is related to maintenance once the carpet is installed. Too little thought is given to why carpeting is needed or to the type and quality of carpeting that should be used in a classroom. Carpet buyers may make a mistake in purchasing carpet if



the low initial cost carpet is used as a guide, as low cost carpet may cost more in the long run due to wearability and maintenance factors.

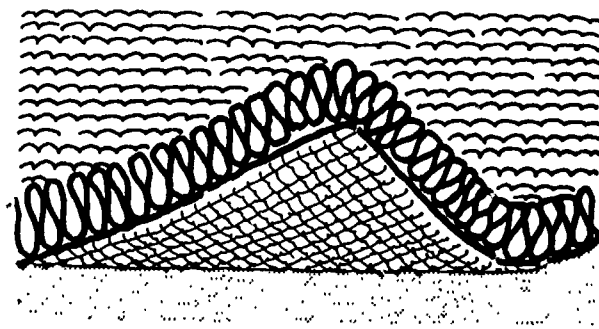
Noise Reduction Coefficient

Sound control needed in a classroom through the use of carpet

should be specified by a Noise Reduction Coefficient (NRC). Some school planners are willing to install a carpet because it looks good which does not have an NRC of .45. This means that 45 per cent of airborne sound waves that come in contact with the carpet are absorbed. The noise reduction coefficient is the fraction of airborne sound waves that are absorbed by a carpet.

Carpet Construction

Another problem connected with carpet construction has to do with the wearability of fibers used. Some fibers wear better than others. The type of carpet construction is closely related to wearability. There is no way to achieve wearability without using fibers in the construction of carpet that wear well. Normally the face weight of a school carpet is 42 ounces per square yard in a classroom. The carpet is installed on a synthetic type pad to provide for adequate sound absorbence and wearability. A lower face weight in carpets of certain fibers such as nylon will provide acceptable wearability but sound absorbence is sacrificed as face weight is reduced.



Carpet Backing

Another problem related to carpet selection is the backing used in the construction. A carpet with rubber or vinyl backing may not have the proper sound absorption qualities. Adequate sound control may be achieved by using a synthetic carpet pad of 40 to 50 ounces weight per square yard. If carpet manufacturers develop either a jute or rubber back carpet that will absorb the proper amount of sound waves, there will be little need for using a pad or underlay.

Inadequate Maintenance

Even though great care may be taken to assure that the carpet is acoustically correct for the educational setting, improper maintenance will reduce the effectiveness of the carpet in controlling noise. Even when carpets are cleaned, the cleaning solution may leave a residue or film on the surface which may lower the acoustical effectiveness. Carpet must be maintained regularly and maintenance programs must provide for the kind of care needed to enhance the appearance of the carpet.

Environment for Learning

A good environment or condition for learning is needed in schools today. Methods of teaching are changing. Large groups, classroom size groups, small groups and individual instruction represent modern trends in teaching. Good instruction calls for spaces that may be adapted to the size of the group; whether it is large or small. Carpeting serves as a floor covering that helps to implement the educational program.

SUMMARY

1. The Peter Pan Elementary School in Andrews, Texas was carpeted in 1956.
2. The Shaker High School, Latham, New York was carpeted in 1957.
3. The Andrews, Texas High School was carpeted in 1961.
4. The public is not well informed about the real purpose of carpet in schools.
5. Laymen and taxpayers often think of carpet as a luxury.
6. Carpeting helps to create an improved environment for learning through better control of sound waves in the classroom.
7. Carpeting in schools helps to conserve energy of teachers and students.
8. Carpeting provides better sound control, reduces injuries due to falls, greater comfort, and improves conditions for learning.
9. Carpet provides for better control of sound.
10. Carpet as a floor covering helps to control both airborne and impact noise.
11. A Noise Reduction Coefficient of .45 will control sound waves effectively in the open plan teaching space.
12. An NRC of .45 indicates that 45 percent of airborne sound waves coming in contact with carpet are absorbed.
13. The kind of backing used on a carpet is important in the absorbing of sound waves.
14. Synthetic carpet pads, 50 ounces in weight per square yard, increases sound absorbency.

15. Absorbing sound waves is a primary function of carpet.
16. Carpet will not absorb sound waves if it is not maintained properly.
17. Carpet with Jute or natural fibers may shrink if excessive water is used in shampooing.
18. Life of the carpet will be shortened if proper care is not provided.
19. The custodian needs the cooperation of the principal, teachers and pupils if carpet is to be maintained in a satisfactory manner.

**ENVIRONMENTAL
ADVANTAGES OF CARPET**

psychological improvement

acoustical control

tractive safety

thermal control

glare reduction

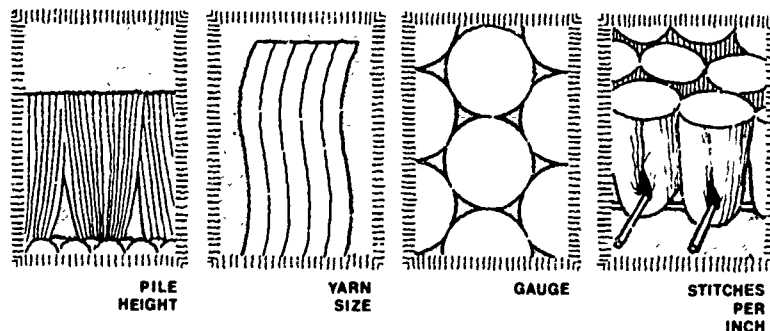
aesthetics

comfort

Carpet Selection

Function

The story of carpeting in schools would not be complete without giving consideration to the important factors involved in selecting the right kind of carpet. Many kinds of carpet are available, but not all will perform the proper function in a teaching space. Some will not wear well. Others may not absorb sound waves satisfactorily. The most important function of carpeting is to improve conditions for learning. A better environment for learning cannot be achieved as far as carpet is concerned unless carpet of proper weight and density is used in the classroom. Carpet will not perform the proper function unless the right type of carpet is selected for the teaching spaces.



DENSITY

Carpet Construction

The type of carpet construction and the fibers used to construct a carpet determines whether or not a carpet will meet the needs of the educational setting. Tufted carpet is used in most schools today. The use of woven carpet has declined in recent years even though early installations were woven of wool fiber. Today most schools purchase tufted carpet which is made with a synthetic or man-made fiber. Tufted carpet is produced on what appears to be

a giant sewing machine with hundreds of needles going up and down through the backing, producing a twelve or fifteen foot wide carpet which moves along rather quickly through the tufting machine. Woven carpet involves using a loom in the weaving process. The woven process is slower, taking more time to weave the carpet on a loom than is the case for tufted carpet, yet woven carpet seems to work well in a school. Tufted carpet made of synthetic fibers such as nylons or acrylics wears even better than wool and are less expensive. The weaving process involves interlocking of the surface yarns with yarns used in the carpet backing. The surface yarn is that part of the yarn that is available for wear. The backing yarns help hold the carpet together and make up that part of the carpet that is next to the floor. The surface yarns used in a carpet are very important as are the kinds of backing yarns used. The type of carpet backing used is related to how long the carpet will last, whether it will ravel, and its resistance to moisture.

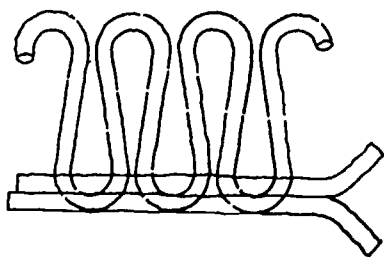
Wearability and Absorbence

It is necessary to purchase carpet with proper face weight. Adequate face weight is needed to insure proper wearability and sound control. Softness, resistance to fading, resistance to moisture and color fastness should be considered when selecting carpet. Face weight, density and softness should be considered in order to provide for good sound control. Carpet will wear at least 25 to 30 years provided that the correct type of carpet is installed and proper cleaning methods are used. There is no substitute for weight or for adequate cleaning as far as wearability of the carpet is concerned. In order to attain the quality of tufted or woven carpet needed, the carpet should contain from eight to twelve rows of yarn per inch. A pitch of at least 216 yarn ends in a 27 inch width is recommended. An important consideration is that the denseness of construction should be similar lengthwise and widthwise for effective wear and good appearance. Proper carpet specifications are necessary to meet requirements for sound control and wearability.

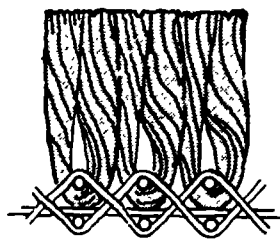
Tufted Carpet

Tufted carpet is used most frequently in schools. The tufted construction process involves the attachment of the face yarn to the primary backing of the carpet, which secures the pile yarns in po-

sition, thus providing a firm foundation. The tufting process is accomplished by the use of a machine that sews the surface yarns through the primary backing of the carpet. The underside of the primary backing is coated with a latex substance to lock the surface yarns to the backing. A secondary backing is placed on the underside of the primary backing to provide greater stability. Tufted carpet should meet certain requirements when used in a schoolroom. Lengthwise the carpet should have eight to ten stitches per inch. Widthwise the closeness of construction may be noted by observing the gauge of the carpet. The gauge indicates the number of yarn ends of fiber per inch counting across the width side of the carpet. A one-eighth gauge means there are eight yarn ends per inch. Gauge also refers to the number of needles used to insert the face yarn into the backing. Carpeting for schools is usually of 8, 10, or 12.8 gauge construction. The backing into which the surface fiber is placed should have a tuft bind of 9 to 15 pounds. This means that when a piece of carpet is placed on a special testing machine, an individual tuft will not come loose from the backing even when 9 pounds of pull is exerted. The tuft bind test is very important, serving as a deterrent to raveling.



TUFTED

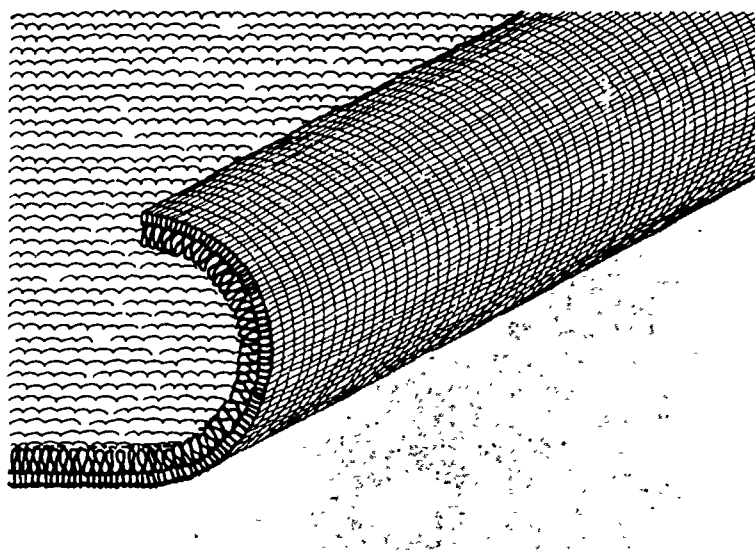


WOVEN

Bonded Carpet

Another process used in the construction of carpet is the method used to bind the surface fibers to a preformed back, using a plastic material, such as polyvinylchloride. While the vinyl is in a semi-plastic state, the carpet is placed into a heating chamber. After the carpet emerges, the surface fibers are set in a non-permeable plastic coating. The non-permeable nature of the plastic coating on

the back of the carpet may make it easier to keep the carpet clean as well as control moisture. Most certainly it will tend to stop raveling.



Wool Carpet

For many years, a high quality wool carpet was used in classrooms and libraries. In combined appearance and wearability, wool is an excellent carpet fiber. There has been a decline in the use of wool in recent years as the wool used in school carpet is imported from India and other Far Eastern countries, making wool carpet more expensive. Wool is an absorptive fiber. For this reason it is more susceptible to staining since the fiber readily takes in the moisture or stain that comes in contact with the fiber. If spots are removed at once from wool carpet, there does not seem to be a problem of maintenance. Wool may be damaged by insect larvae, since it is a natural fiber. The process of treating wool against larvae creates additional expense, thus increasing cost. Wool does have a number of positive features. Wool is resilient and resistant to abrasion which insures good wearability. Wool fiber has moderate fiber strength and burns slowly, going out with little or no smoldering.

Synthetic or Man-made Fibers

Carpets made of synthetic or man-made fibers are now used in a majority of schools. Man-made or synthetic fibers may wear better than wool, yet may look like wool. Man-made fibers do not absorb moisture or stains readily, thus making it easier to remove spots and stains. Carpet constructed of synthetic fiber is somewhat easier to maintain due to the fact that spots do not soak into the fiber. Carpet constructed with solution-dyed fiber is highly resistant to fading and harsh cleaners. Schools use more synthetic fiber because of good cleanability and lower cost. Most synthetic carpets do not develop as much static electricity as wool.

Importance of Carpet Maintenance

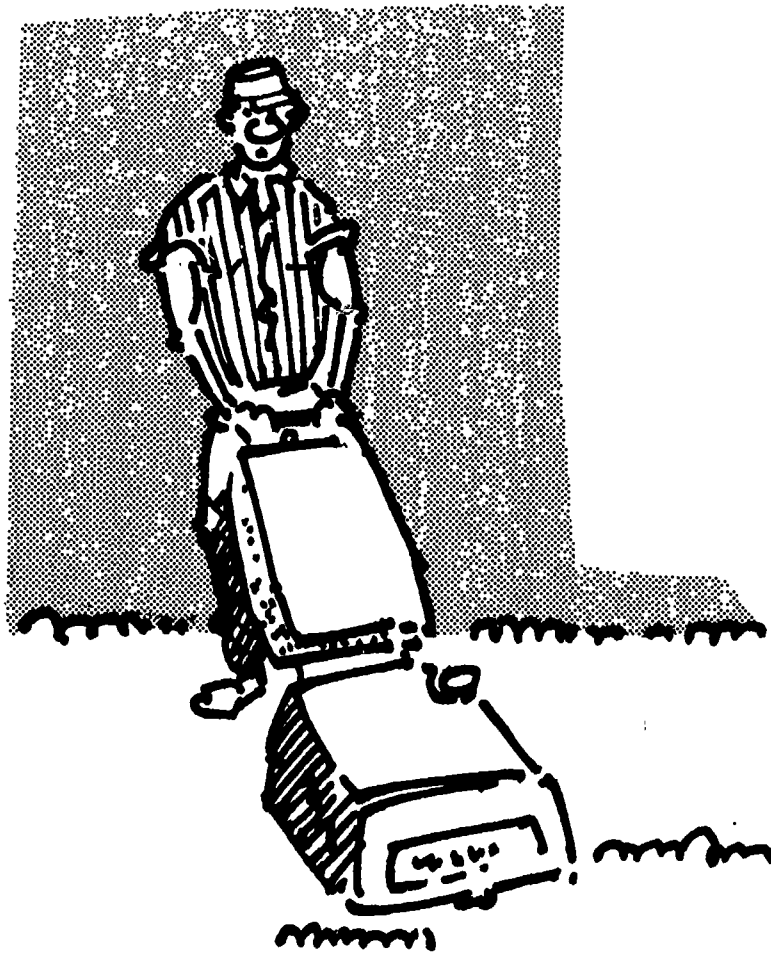
Whether the synthetic fibers are of Nylon or Acrilan or other fibers, is not an issue, since all perform well if maintenance is adequate. It is important to choose a synthetic fiber that will perform the function that is needed. The type of program activities and the way a classroom is used should determine the type of carpet needed in a teaching space. For example, carpet for a dining room should be selected on the basis of wearability, maintenance, and moisture resistance. The lunchroom carpet must also absorb sound waves as cafeterias are usually noisy. The function that a carpet is to perform may dictate using different fibers. The fiber may be a natural fiber, like wool, or a synthetic depending upon how the space is used.

Solution Dyed Process

The dyeing process used for the fiber is important. Solution dyeing, which is used with some synthetic fibers, is color fast and does not fade easily. In solution dyeing, color is added while the fiber is still in liquid form. Since the color is developed as a part of the solution, the process is good insurance against color fading or discoloration. Sunshine and artificial lighting may cause discoloration in carpets that are not solution dyed.

Polypropylene Fibers

Polypropylene fibers were most often associated with early indoor-outdoor carpet. This synthetic fiber is water-proof and is used for playgrounds and athletic fields. Of all the fibers used in



carpet construction, polypropylene is perhaps the least susceptible to damage from water. The chemical composition of polypropylene is similar to that of a plain wax. The fibers have a tendency to mat down thus giving somewhat of a slick or worn appearance. This fiber also seems to melt rather easily. A sharp or quick movement of furniture or pressure of the heel or sole of a shoe may produce a mark on the surface. There is a minimum of static electricity in a carpet made from polypropylene fiber, and it is also moisture resistant. When the carpet is installed, seams may show to a considerable extent. It is important to remember that in selecting carpet for school use that there are advantages and disadvantages for

all fibers, depending on whether it is used indoors or outdoors as well as other areas that carpet is installed.

Other Selection Factors

The type of carpet used affects sound control. There are acoustical differences in carpets having rubber backs, jute backs, or polyvinylchloride backs. Fibers are different reactors to the amount of moisture absorbed and as to wearability. The kind of pad used under the carpet may add to or reduce sound absorbence. There are many factors to consider in selecting carpet for a schoolroom.

Pile Height

An important factor to consider in purchasing carpet is pile height. Pile height indicates the distance from the top surface of the primary backing to the top surface of the pile. Pile height is also related to how dense or how thick the carpet may be. A balance is needed between wearability, maintenance and sound absorbence. Balance may be obtained by staying within certain basic guidelines, such as pile height, face weight, and density. The type of construction and the kind of fiber are also important.

Wearability

The type of fiber used is directly related to wearability, some fibers wear better than others. Carpets made of one fiber with a certain weight per square yard may wear as well as a carpet of another fiber having a greater weight per square yard. Sound control through the use of carpet generally decreases when lighter weight carpet is used. Specifications to be used for the purchase of carpet may be used as a guide. (A sample set of carpet specifications are included in the last section of this publication.)

Pad or Underlay

When a carpet is installed, consideration should be given to using an underlay or pad under the carpet. The pad serves two important purposes. First, the pad extends the life of the carpet by absorbing the shock of traffic on the surface. Second, the proper type of pad increases sound absorbency. Various types of pads are used under a stretched carpet. It has been found that a synthetic pad does not cause allergy reactions and has the capability for extend-



color



reflectance



texture



soils

ing the life of the carpet. It is conceivable that animal hair pads may cause allergy symptoms for some people. New synthetic pads perform well and do not have a tendency to pick up moisture, thus resisting mildew. Other types of pads, either permanently attached to the carpet or as a separate underlay, may not wear as well nor provide the sound absorbency needed. The foam rubber type of pad attached to the carpet is normally cemented to the floor, while the synthetic variety is usually laid underneath a stretched carpet. If there is damage to a carpet with a foam rubber back and it is necessary to remove it from the floor, the foam rubber part may pull away from the carpet as it is removed.

Noise Reduction Coefficient

In using a pad with the carpet in the school setting, it is proposed that along with proper carpet specifications relating to face weight and pile height, that a Noise Reduction Coefficient (NRC)

should be specified. The NRC is that fraction of sound waves absorbed which come in contact with the carpet. Through experience and research it has been determined that a Noise Reduction Coefficient of at least .45 is necessary to provide for the quietness needed in a classroom. An NRC of .45 indicates that approximately 45 percent of the sound waves that come in contact with the carpet are absorbed. The NRC is related to the control of the echo or reverberation of sound waves. A lower NRC such as .35 may be satisfactory for corridors, dining rooms and other spaces even though sound absorbance is needed for corridors and other areas. Carpets with a higher NRC will ordinarily be more resilient to soil in traffic areas. A carpet with an NRC of about .35 would present a satisfactory compromise in high maintenance areas such as in a corridor. The acoustical properties of carpeting are even more important when school design encompasses flexibility for the open plan school. Density and weight of a carpet and the cushion effect of a pad are important for wearability and sound absorbance. Instead of teachers and pupils working all day on a hard floor, a soft floor covering is needed to provide an environment that is less tiring to the legs and feet of the individual.

Psychology of Color

Color is another factor that should be given serious consideration in the selection of carpet for school use. Color is important in that different colors affect the behavior of people. Cool colors, such as green and blue, have a soothing effect while reds and brighter colors have a tendency to produce active behavior in people. Some colors are exciting, others have a restful effect. Color has a direct relationship to the quality of lighting in the classroom, the lighter colors reflect light.

Color and Maintenance

Color plays an important role in carpet maintenance. Yellow is perhaps the most noticeable color to the human eye and, therefore, even slight changes in coloration due to soiling of the carpeting are more perceptible in this hue. Dark colors absorb light, reducing intensity or amount of light. Dark colors show dirt or spots even more than some of the lighter colors. A rule of thumb for selecting the proper color to be used in a schoolroom is to use a color similar to the earth soils most prevalent in the area where the school build-

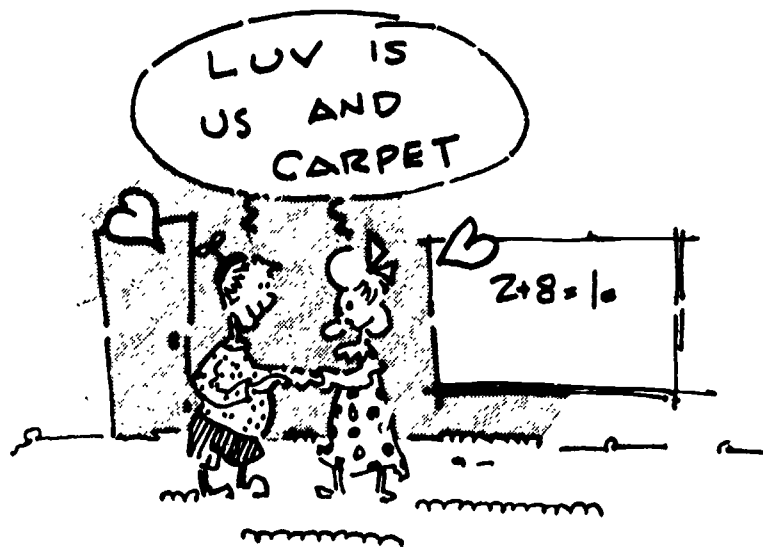


ing is located. It should be noted, however, that the color selected must be light enough to provide reflectance, which is necessary for a good visual environment. It should also be mentioned that while the hiding or disguising of minor soils or stains may be beneficial in some instances, the important consideration is to get rid of the dirt or stain through proper care of the carpet.

Carpet Specifications

Color, type of carpet construction, fiber composition, and padding may be determined through guidelines. One of the better ways of determining guidelines is to examine sample sets of carpet specifications. There are a number of sample sets of carpet speci-

cations which have been developed as a result of extensive research. These are available from a number of sources. One sample is included in the last section of this publication. The Bureau of School Facilities, State Department of Education, Tallahassee, Florida, has a good set of performance specifications. Architects and carpet manufacturers have developed others. By using specifications for bidding, the buyer is able to describe to the manufacturer, the exact qualities wanted in a carpet. Also, the school system may have



opportunities to compare the various kinds of carpet from the various manufacturers.

A Useful Tool

Care must be taken to see that the floor covering selected for a school is the type needed for a particular space. All of the characteristics of a good school carpet must be taken into consideration in order to obtain all of the benefits that are desirable. It is suggested that fiber manufacturers, architects, and State Departments of Education be contacted to assist in the preparation of carpet specifications. This minimizes the possibility of purchasing carpet that will not wear well or may fail to control unwanted sound, or a carpet that is difficult to maintain. There is a proper carpet for all spaces in a school building.

Summary

1. Natural fibers (wool) and man-made fibers (synthetic) may be used in the construction of carpet for schools.
2. Solution dyed fibers are best when consideration is given to color fastness, fading, and wearability.
3. Carpets must be of sufficient weight if sound waves are to be absorbed to the extent needed.
4. Carpet in 12 to 15 foot widths is desirable for teaching spaces as the number of seams is reduced.
5. Detailed and understandable carpet specifications should be utilized in purchasing carpet.
6. Lighter colors for carpet such as shades of brown, red or green should be used in schools in order to achieve greater reflectance of light as well as for ease of maintenance.
7. Major requirements for school carpeting:
 - (1) Man-made fiber, 42 ounce face weight per square yard desirable for open plan classroom. Carpet with less face weight may be used in corridors, dining areas and other spaces.
 - (2) A man-made backing material such as polypropylene or polyvinylchloride should be specified where moisture is encountered.
 - (3) Synthetic pads of not less than 40 ounces per square yard should be used. A higher noise reduction coefficient may be achieved by increasing the weight of the pad.
 - (4) A noise reduction coefficient of .45 may be used for classrooms or other teaching spaces in an open plan school. A lower NRC may be used for corridors, dining areas and other spaces.
 - (5) The tuft bind for tufted carpets should be able to withstand at least 9 pounds pull pressure.
 - (6) Carpet must have those characteristics that insure long life.

Maintenance of Carpet

Carpeting is a kind of soft floor covering. With all of the advantages when used in a school, carpeting must be maintained properly or it will not wear well or absorb sound waves. Carpets are available that are satisfactory for school use, yet the programs of maintenance in many schools are not satisfactory.

Use of Carpet

The use of carpet in schools has grown at a tremendous rate the last ten years. Sales to schools doubled and redoubled a number of times between 1960 and 1970. Carpet sold to schools in 1960 amounted to \$80,000. In 1970 the dollar value for carpet used in schools reached \$120,000,000. The carpet industry is one of America's most rapidly growing industries with sales to schools contributing a considerable amount to the growth in sales. Educators look upon carpet as a necessity and believe that carpeting in a school improves the environment for learning. Better control of sound waves, appearance, beauty, preserving the energy of teachers and pupils, and helping to bring out the best in people, are important benefits that may be brought about by installing carpet inside the school building. Carpeting helps to bring about optimum conditions for learning.

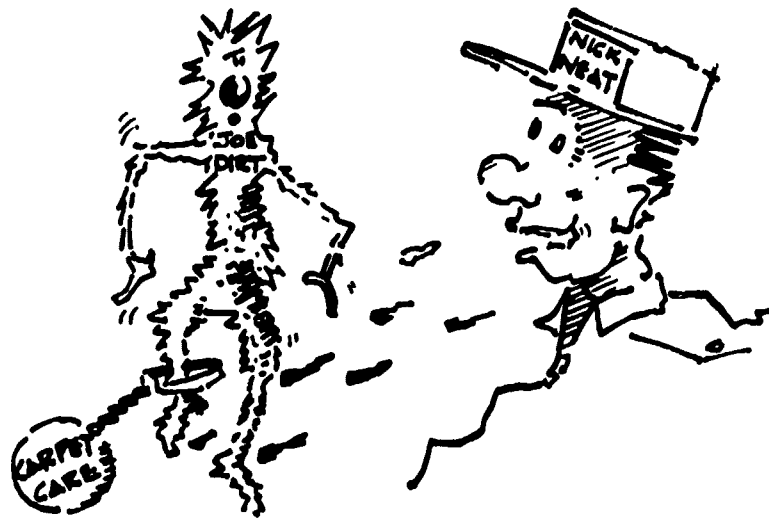
Maintenance Program

The right kind of equipment and cleaning materials must be available for maintenance workers. Custodians may have little or no cleaning materials or equipment. Other custodians may use a broomcorn broom as the only tool for cleaning. Some of the custodians use a light weight home type vacuum machine which does not have sufficient power to do the job in the school room. There is lack of understanding as to how to use carpet cleaning equipment. Little is known about the kind of cleaning materials that is best for cleaning carpet. In some cases no cleaning material or equipment is available for the custodian when a new school is opened.

Problems of Cleaning

One of the most frequent problems of cleaning carpet is related

to removing spots and stains or using too much water in the shampooing process. Custodians and school administrators do not realize the importance of removing spots and stains immediately. When spots do not receive immediate attention, stains have a tendency to stick to the carpet. The longer a spot is allowed to stay on a carpet the more difficult it will be to remove. In a number of cases moisture or water soaks into the carpet fibers as a result of the cleaning process which may cause the carpet to shrink. When the carpet shrinks, it may pull away from the walls or separate at the seams.

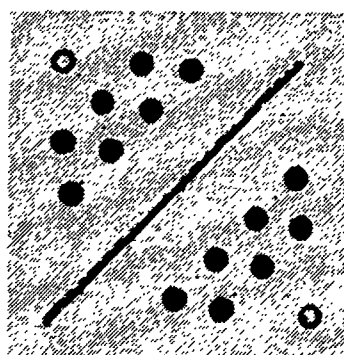
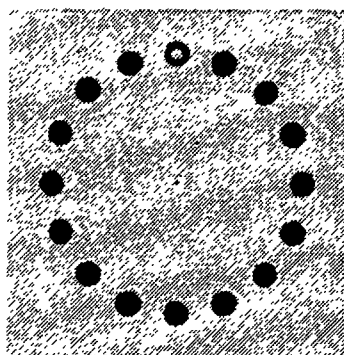


Student and Teacher Cooperation

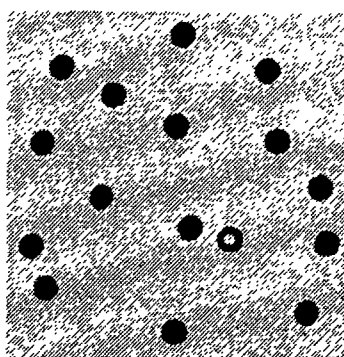
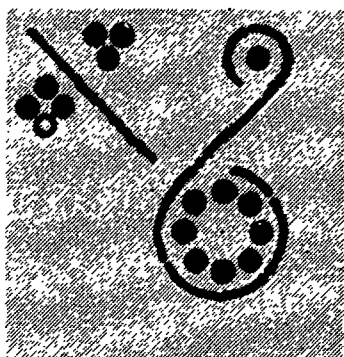
Lack of cooperation on the part of principals, teachers, and pupils in assuming responsibility for helping custodians keep the carpet clean, is a real problem. Carpeting is easier to clean than tile floors, provided that the proper kind of equipment and cleaning materials are available for the custodians. The custodian cannot always get to a soiled spot immediately, therefore teachers and pupils must help until the custodian arrives. In many instances no one seems to be interested in helping maintenance personnel carry out a good program of carpet care.

Research

Five researchers holding responsible administrative positions in



TEACHING SPACE FLEXIBILITY



education collected data related to carpeting, seeking information regarding the problems of carpet care. Some of the carpet examined had been in use for 15 years or more. The kind of carpet, the kind of cleaning materials and equipment used, as well as problems related to carpet maintenance were given close attention as the visits were made.

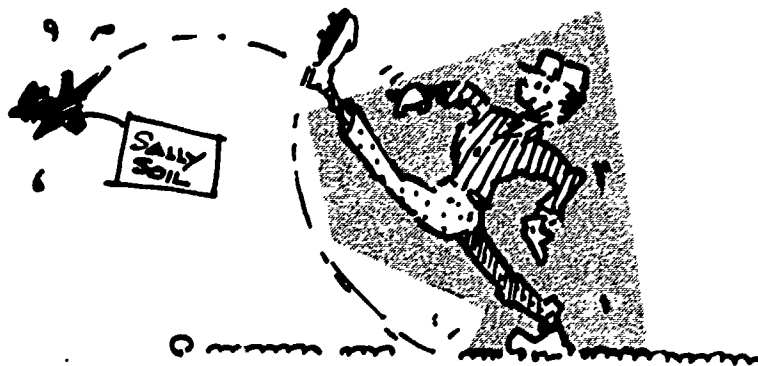
Carpet in Classrooms

Carpeting in schools is here to stay. Teachers and pupils enjoy having carpet in their classrooms. Those who use carpet in schools are telling others what it does for them. Teachers like carpeting as they do not have that tired feeling so much of the time. Carpet conserves the energy of teachers. One teacher indicated that she felt better at the end of the school day after having carpet installed than at mid-day when teaching on a hard tile floor. Carpet has a degree of softness which really supports the idea of calling carpet a soft floor covering. Carpet absorbs sound waves, thus reducing

the noise level in the classroom. Density and weight of carpet provide insulation that helps to keep dampness from affecting the muscles, which may cause the legs or feet to ache. Sometimes the ankles and feet of the teacher become swollen due largely to dampness of the floor. Carpet is here to stay as far as teachers and pupils are concerned.

Students and Carpet

Everyone seems to like carpet in classrooms, especially students who use the floor as a surface for learning. This means that they may read, observe films, or rest on the carpeted floor. Pupils and teachers have a tendency to remove their shoes, thus becoming more comfortable. Carpet is not a luxury but an important tool that may motivate the learner. If you ask a pupil what he thinks about carpet he will nearly always answer, "Great!" Just observing boys and girls in a carpeted classroom or seeing how comfortable everyone seems to be will sell most anyone on the idea that carpeting is here to stay as far as students are concerned.



Sound Control

Noise develops as a result of improper sound control as noise is unwanted sound. The effect of noise on human beings is recognized more and more every day. Sound cannot be controlled in a classroom or other spaces without an adequate maintenance program. If the carpet becomes soiled, a film forms on the surface preventing effective sound absorption. Sound is produced by moving objects across the floor or dropping objects on the surface of the floor. Talking starts sound waves moving around in the room. Im-

pact or airborne noise may be controlled effectively by installing carpet on the floor or walls of the classroom, provided that it is kept clean. Carpet is twelve times more effective in controlling sound waves than is a resilient or hard floor covering.

Cost

Carpeting is being used widely in schools even though the initial cost may be greater than the cost for some tile floors. According to studies made in schools and hospitals, maintenance costs are less than one-half as much for carpet as for tile. The life of the carpet depends upon the kind of maintenance program that is utilized in a school. A carpet will last a long time in a school if there is an adequate maintenance program. If proper care is not provided the carpet will wear out in a short time. Carpeting has been in use in one school for over 15 years. Carpets examined that were in good condition performed the function of sound absorption in a satisfactory manner. It is not so much of a problem as to how long a carpet will last, but one of selecting the right type.

Wearability

A proper maintenance program not only keeps the carpet looking new, but also assures longer life. Carpeting, as is the case for any floor covering or any part of a school building, should be maintained properly so it will last longer. It is especially important to keep dirt and grit out of the carpet pile, otherwise the life of the carpet will be shortened.

Soils

Traffic does not wear out carpet as much as grit and sand or other soil particles that are brought into the building by those people that make up the traffic. These soil particles are tracked into the building or are airborne and work down into the fiber. Failure to exercise basic rules of cleaning may result in a coating of dirt on the surface of the carpet which reduces effectiveness as far as sound absorbence and wearability are concerned. Even the highest quality carpet may be virtually destroyed as a result of improper methods of cleaning. One of the most important steps involved in initiating a satisfactory carpet maintenance program has to do with removal of spots and stains. There are four kinds of soils or stains that are most common in carpeted teaching spaces or other areas in

a building, namely; (1) dry soils, (2) water soluble stains, (3) petroleum soluble soils and (4) other soils such as beverages, and blood.

Dry Soils

Soils under this heading are dust, loose dirt, sand, cigarette and cigar ashes, and others that are non-oily and non-sticky. These types of soils are real enemies of carpet fiber in that the soil particles have a tendency to move down into the carpet, wearing out the yarns. These types of soils do not stick or adhere to the carpet fibers and are easier to remove with a vacuum machine.

Water Soluble Stains

These stains are usually the sweets, starches, mud, and non-greasy food stuffs. When stains are found on the carpet, more than just vacuuming is necessary as stains adhere to the fiber and are not easy to remove.

Petroleum Soluble Soils

This group of grease or tar related stains includes oils, tar, wax, asphalt, and polishes. Waxes are very difficult to remove from a carpet. Tars are usually tracked in from new side walks or pavements. Waxes are tracked into a room from other waxed floors in the building. The problem of tracking wax on to carpeted areas occurs most frequently in those buildings that are partially carpeted.

Other Stains and Soils

This group includes a wide range of substances such as alcohol, coffee, tea, soft drinks, blood, urine, ink, fruit juices, and paint. These stains must be removed promptly. Damage or discoloration of the carpet may occur if the stains are allowed to remain on the carpet.

Vacuuming

A good rule to follow is to vacuum a carpet as soon as dirt or other foreign material appear. As mentioned numerous times, remove the dirt or other foreign material as quickly as possible.

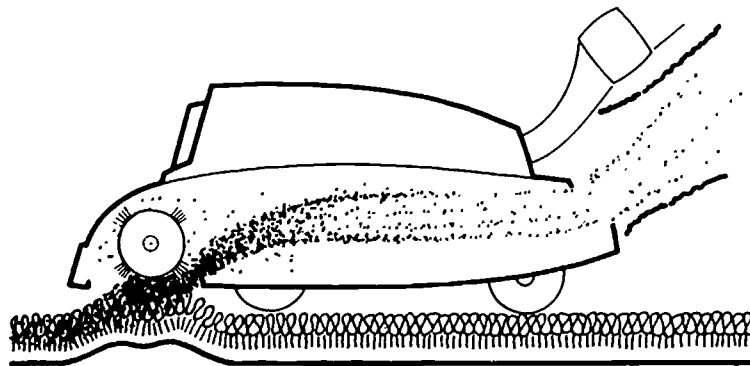
Prompt removal with a vacuum may determine whether or not it will be possible to remove the soil or stain. All loose materials may be removed with a vacuum machine. Vacuuming of the classroom may be performed daily or three to four times each week, depending upon the traffic and the amount of dirt tracked into the classroom. The area near the entrance to a classroom or other space may need vacuuming two or three times a day. Under normal traffic conditions and with a good preventive maintenance program, vacuuming the carpet three times a week will be sufficient. The vacuum machine is one of the most important pieces of equipment used for maintaining a carpet. The removal of loose particles and lifting of the carpet pile is a very important part of the cleaning process.

Type of Vacuum Machine

A heavy duty commercial type vacuum machine should be used in school buildings. The machine should be equipped with two motors. One motor should be approximately one horse-power while the other should be from one-half to three-quarter horse-power. The larger motor provides strong suction or pulling power to pick up loose particles, pulling the dirt into the dust bag of the machine. The smaller motor furnishes power for the turbolator or beater-bar brush. The beater-bar helps to loosen dirt and other particles, thus placing the dirt in suspension so that it is much easier to pull the dirt into the dust bag of the vacuum. The beater-bar also helps to lift the carpet pile which improves the appearance of the carpet. It is also desirable to have an over the shoulder vacuum or other small upright machines for each building. The portable or light vacuum is useful for picking up particles at the edge of the room or other hard-to-get-to areas. A wet or dry tank vacuum is desirable for pick-up or for drying out the carpet if it is wet or damp. The small upright vacuum may be used by pupils in a cluster of rooms for quick pick-up in high traffic areas or for removing spots in soiled areas. The large size vacuum should be available for the custodians in each building. One or more of the smaller size vacuums should be available for pupils and teachers. The wet or dry vacuum is needed in each building for the general maintenance program.

How to Vacuum

Proper vacuuming in a school contributes to appearance, sound



absorbency, and the life of a carpet. This basic piece of equipment should be built to stand up under a heavy work load as required in a school building. It is also very important for the custodian to use the vacuum machine in a way that will give best results. Machines should be kept in top condition and vacuum bags emptied frequently. A dust bag one-third to one-half full reduces the suction power 50 to 70 percent. The motor driven suction brush and pile-lifter beater brush lifts and opens the pile surface of the carpet so that dirt and litter may be picked up from the carpet. In carrying out the vacuuming operation, the following suggestions are offered:

1. Vacuum heavy traffic areas daily or more often if needed.
2. Vacuum medium use areas two or three times each week.
3. Vacuum light traffic areas once or twice each week.
4. Need for vacuuming must be determined by inspection and proper examination.
5. Use a heavy duty vacuum that has enough power and at the same time a low noise level.
6. A pile lifter vacuum with pile lifter brush is very effective.
7. Do heavy traffic areas first using a slow, easy stroke, pushing the machine back and forth. The custodian will be able to determine the area that needs cleaning as well as how long to use the machine. (Do not let the machine stand still if it is running).

8. Watch for spots or stains as you vacuum. These spots should be removed.
9. Move the vacuum across the room one way. Go the other way the next time you vacuum.
10. Empty the dust bag often.
11. Encourage the users of a room to change the location of the furniture and equipment frequently in order to divide up the traffic.
12. Try to secure cooperation of pupils and teachers in helping to keep a room clean by:
 - (1) Removing spots and stains immediately.
 - (2) Keeping paper and litter off the floor.
 - (3) Cleaning shoes before entering the room.

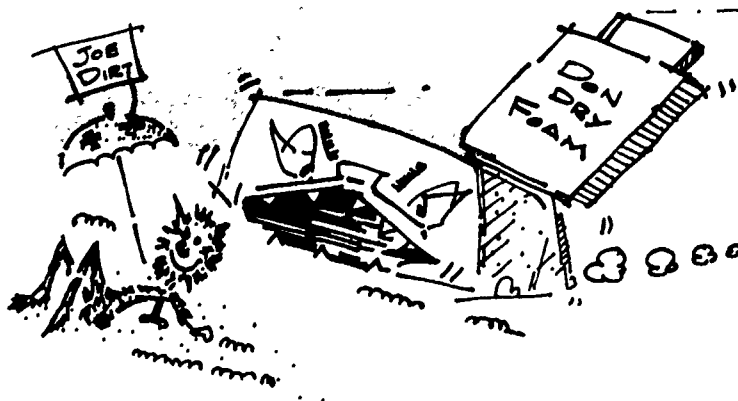
When to Shampoo

Even with daily vacuuming and spot removal, it may be necessary to give the carpet a general shampooing each year. With normal traffic conditions and proper care, complete cleaning should not be necessary more than once each year provided that a good spotting program is utilized. Some school systems go as long as three years before a complete cleaning is necessary. This general cleaning is called shampooing.

Dry Foam Shampooing

There will be times when the so-called dry foam method should be used. The dry foam method uses a minimum amount of moisture. Since the dry foam is made up of moisture particles (usually about 10 to 15 percent moisture) it is rather easy to get too much water worked into the carpet, which then becomes a wet shampoo method. The dry foam method may be used effectively if proper care is exercised in keeping the amount of moisture spread on the carpet at a minimum. The dry foam shampoo method employs a machine equipped with a pressure tank into which a neutral cleaning concentrate is placed. The concentrate includes both water soluble and grease-tar soluble chemicals. The pressure tank changes the water and concentrate into a foam which is dispensed to the carpet through small jet openings. A revolving cylindrical brush combs the foam through the carpet pile, cleaning the fibers. It is important to keep the small jet openings from becoming clogged, thus dispensing too much foam (moisture). If the carpet is not soiled very much, only a light shampooing is necessary. The machine is moved forward about 20 feet, then back along the same path, allowing at least a two inch overlap. If the carpet is heavily

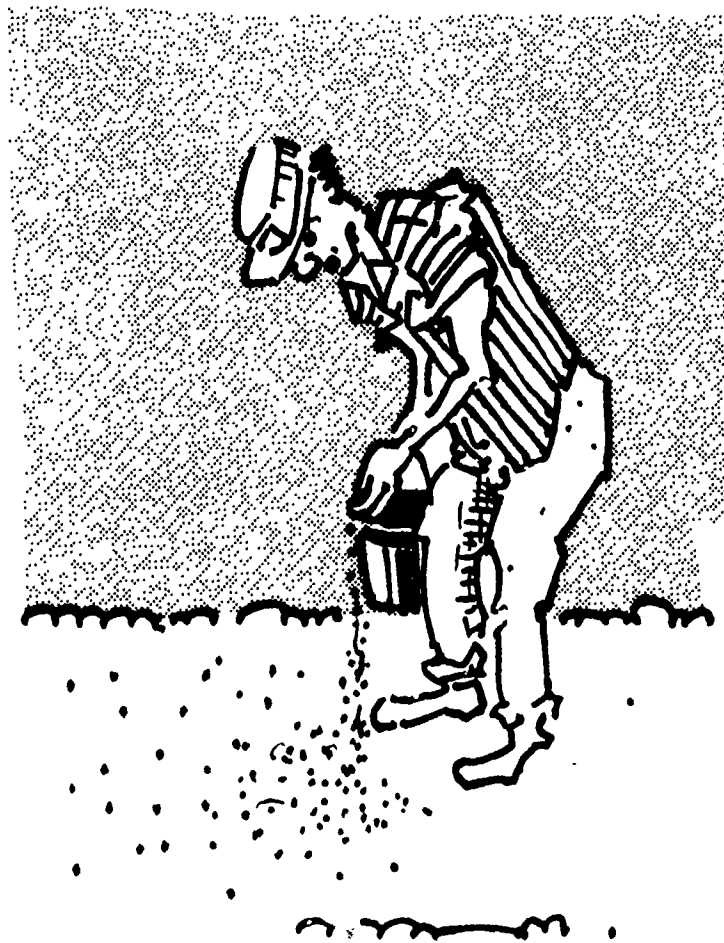
soiled it may be necessary to go over the area a second time. It is a good idea to remove the foam left on the carpet with a wet or dry pick-up vacuum machine. As soon as the carpet is completely



dry, (which may be 24 to 48 hours under normal conditions) vacuuming is the next step. Vacuuming helps to remove the dirt and detergent film left on the carpet and also helps to lift the pile. The carpet must not be allowed to become so completely soiled that it is difficult to clean. The spots or stains should be removed as soon as possible and the carpet should be shampooed as often as needed. The greatest disadvantage in using moisture to develop foam is the danger of streaking the carpet with too much water. When too much moisture gets into the carpet, shrinkage occurs. This may happen due to moving the machine back and forth in one spot too many times or because one or more of the jets may become clogged. (Foam and moisture are dispensed through the jet openings.)

Suggestions for Dry Foam Shampooing:

1. Remove soils and stains from the carpet before shampooing.
2. Try to keep spots off the carpet through a program of immediate removal.
3. The idea that the carpet is very dirty and, "Give it a good cleaning this time", by dispensing more foam may damage the carpet. When the carpet pulls apart at the seams or away from the wall, generally, too much water has been used.



4. Light shampooing, using a small amount of moisture, will dry much faster. The exact time needed until the carpet may be used again is determined by the amount of moisture placed upon the carpet.
5. No one should walk on foam shampooed carpet until it is completely dry. Dampness will attract dirt and other soils thus creating a soiled condition.
6. It is very important that members of the maintenance staff be taught how to shampoo a carpet. A good in-service clinic dealing with the important facts relating to carpet cleaning is desirable. This clinic may be directed by persons familiar with carpet maintenance.

Dry Cleaning

The use of the dry cleaning method for a carpet requires little training for the maintenance worker. Teachers and students may be very effective using the dry cleaning process. This is especially important where the dry cleaning method is used to remove spots and stains. Students may use the powder-like material, until the custodian takes over. There is no danger to the carpet as to the amount of cleaning compound used. The soft, absorbent particles of the sawdust-like cleaning material with the chemicals included, absorbs and loosens carpet soils. Deeply imbedded soils are loosened by using a dry cleaning machine that has two counter revolving drum type nylon bristle brushes, brushing the powder-like material into the carpet fiber. It is then picked up with a vacuum machine. This dry cleaning method does a better job as is the case with any shampooing, if spots and stains are removed quickly.

Suggestions Related to Dry Cleaning.

1. Move furniture to one side, removing paper or other litter from the floor. Vacuum with upright commercial type machine.
2. Cover a 10 x 10 foot or larger area with cleaning compound. Sprinkle enough material to barely cover the carpet.
3. The cleaning material may be removed immediately by using a vacuum.
4. Use a dry cleaning machine to brush the compound into the carpet. One machine has two drum-like nylon brushes that turn counter clockwise. Dirt is absorbed into the cleaning material before it is lifted to the surface. The hand used type of bristle brush will work well except it takes longer.
5. The carpet pile is lifted and straightened as the cleaning process is carried out. (The pile needs lifting, whatever method of shampooing is used.)
6. The dry cleaning machine should be moved back and forth across the area cleaned and then the machine should be moved back and



forth in the other direction of the carpet. Do not hold the machine in one spot. After brushing each way of the carpet, use the vacuum.

7. A good commercial type vacuum is used to pick up the cleaning powder. If some areas still show soil or stain, use cleaner again with a hand brush or the dry cleaning machine. All of the cleaning material may not be picked up the first time the carpet is vacuumed. Any left over will be picked up at other vacuuming times.
8. The room or space may be occupied immediately without any soil to the carpet.
9. The dry cleaning compound may be used very effectively as a spot remover.
10. The cleaning compound will remove all spots that are not petroleum related (grease or tar) stains. Some water soluble stains may not be removed by this method. A spotting agent for water soluble and petroleum related stains will serve well on such spots.
11. One small bottle of solvent, used rather sparingly, will remove difficult petroleum related stains. Apply lightly and rub toward the center of the spot.
12. The Racine Dry Cleaning material and machine is often used for cleaning carpet.
13. If too long a time has elapsed before removing spots, and the carpet is very dirty, it is best to use the dry foam (moisture) shampoo method.
14. If the suggestions listed are followed carefully, it will be an easy matter to keep the carpet clean.

Steam or Hot Water Method

The steam or hot water method is a fairly new method of cleaning carpets. Soils and stains are flushed out of the carpet and returned to a plastic container. A jet of high pressure hot water, 150 degrees Fahrenheit which is a vapor foam, penetrates the carpet, removing soils and residue. The color of the water returned to the plastic container indicates the amount of soils and stains removed. Any cleaning solution or moisture left in the carpet should then be extracted with a wet or dry vacuum in so far as possible. The cleaning unit used for this process looks much like two coffee urns, one tank for the cleaning solution, the other tank for recovery of moisture forced into the carpet. This method has advantages and disadvantages.

1. The hot water-steam method does a good job of cleaning a carpet that is very dirty.
2. This method is rather expensive, requiring considerable skill to operate.
3. The unit requires two 20 amp. electrical outlets.
4. Drying time for the carpet may be longer, thus keeping the room out of use.





5. The steam or hot water jets sometimes stop up which may "set" spots or stains in the carpet.
6. It may take longer to clean a carpet due to size of equipment.
7. Cleaning by the steam method is an acceptable method for schools.
If equipment is used in the right way and kept in good working condition, excellent results may be achieved.

This is an effective method of cleaning a carpet. The machine is rather difficult to operate due to size and complexity and the steam jets function poorly at times.

Preventive Maintenance

A program of preventive maintenance is very important in providing carpet care. A preventive program should concentrate on

those areas around or in a school that are a source of dirt and stain. Get rid of the dirt before it is tracked into the teaching spaces. Carpeted entrances, corridors, and other high soil areas will help to keep the dirt particles from being tracked all the way into the classroom. Do not allow the soils to migrate through the building. An ounce of prevention using a good preventive maintenance program is worth a pound of cure.

Walk-off Mats

A good way to keep soilage and spillage outside the building and out of the rooms is to use walk-off mats. A walk-off mat made of rubber, polypropylene, or fiber will help to trap dirt that may cling to shoes, thus preventing it from getting into the teaching spaces. It is ideal to have six to eight steps of walk-off mats to walk on before entering carpeted spaces. These mats need to be cleaned and changed frequently in order to be effective in removing dirt. The preventive maintenance program should include shoe scrapers, metal mats, and regular mats at the entrance to the building as well as at various areas inside the building.

Rearrangement of Furniture as Preventive Maintenance

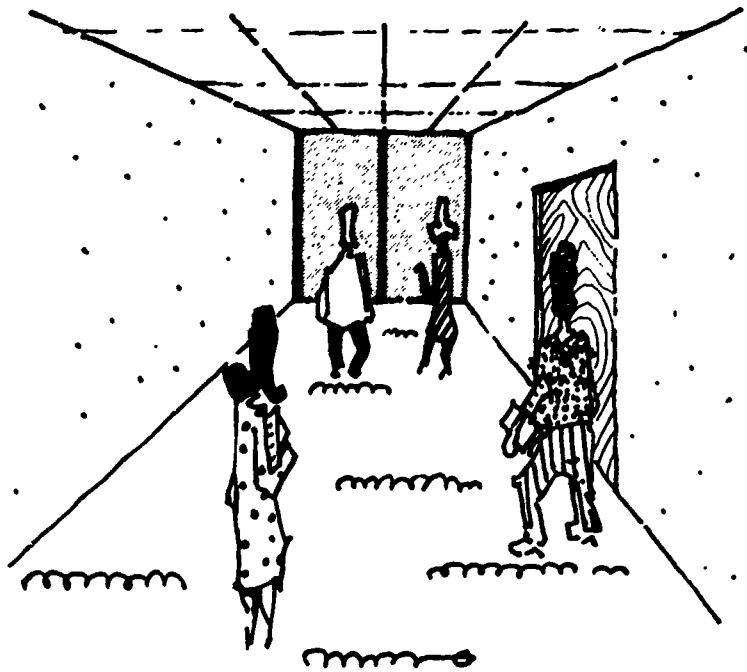
Furniture and equipment in a building should be rearranged frequently to prevent fixed traffic patterns. When a high degree of flexibility is provided in a building, it is easier on the carpet from the standpoint of wearability as well as for cleaning. A movable wall on the inside of the building may provide for other entrances or exits instead of squeezing students through one door over a period of time.

Campus Care

Keeping the campus or site clean and free of rocks, sticks, and paper will help to keep dirt and grit away from the carpet. Dirt and grit, especially sand, shortens the life of the carpet. A good grass covered site with some hard surface areas, reduces the amount of dirt carried into a building.

In-Service Training

Carpet is subjected to more severe usage than any other kind of textile material. No matter how often carpet is vacuumed or sham-



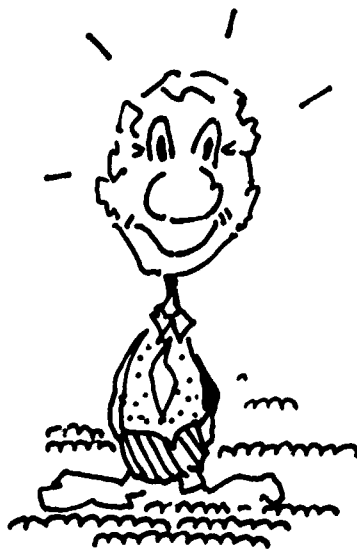
poed, problems of maintenance may occur. There is no substitute for "know-how" if a satisfactory program of carpet care is to be achieved. Training clinics for custodians are needed. As a rule, custodians do not receive much help related to the care of any area in a school building. The custodial clinic has great potential for improving the total maintenance program, as well as the care of carpeted spaces. It is very important to know how to use the right kind of tools and cleaning materials. Trained custodians may save the taxpayer thousands of dollars as a result of adequate maintenance procedures.

Static Electricity and Carpet

Electrical charges built up on dissimilar non-conductors when brushed together may produce static. A charge that may build up on a person walking across a room that is carpeted may cause static electricity. When the static builds up to the extent that a discharge in the form of a spark occurs, this may bring about an electrical shock. A big charge may depend on other conditions such as moisture content of the air. Extremely dry conditions may promote static buildup. Carpet construction and the type of fiber are also important factors in static buildup. Acrilan fiber has a lower propensity for static build-up on a person than would be true for similarly constructed carpets of other fiber. Additional static protection may be obtained by constructing carpet with certain types of backing that drain off the static. Static does not affect all persons the same way. The same amount of static in a carpet may shock one person more than another. An important consideration regarding static is that carpet manufacturers have generally solved the problem as there seems to be little difficulty with static at the present time.

Allergies

Some ten years ago when carpeting in schools was having the most rapid growth, some people raised questions regarding allergies as related to carpeting. Studies were made by various groups such as the Veterans Administration and the medical profession leading to the approval of carpeting in hospitals. These studies indicated that there were fewer floating dust particles in the air due to electrostatic properties of carpeting. In other words the carpet seems to hold the bacteria or dust particles making it easier to pick up the

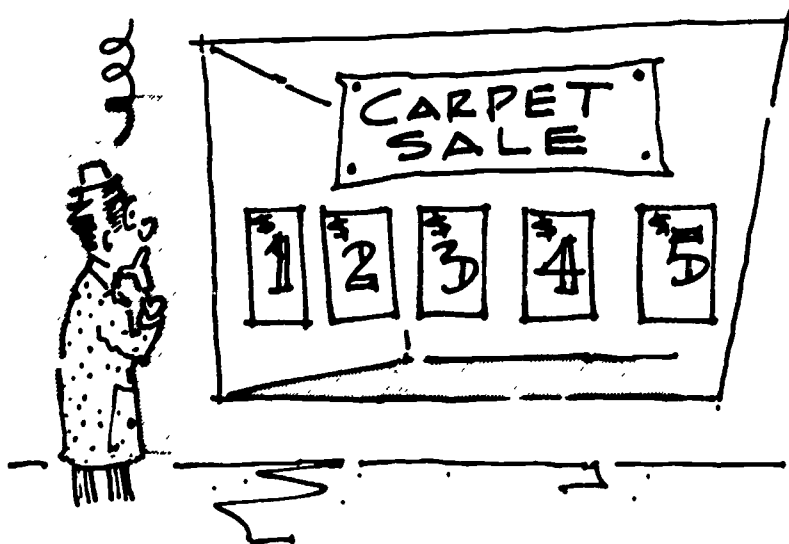


particles. It was believed that cleaning the carpet with a vacuum machine made carpet more sanitary than brushing or mopping a tile floor. Hospitals are one of the largest users of carpeting which is based to a considerable extent upon the belief that carpet was more free of bacteria than other types of floors. Carpet woven from synthetic fibers is non-allergenic. The kind of carpet used for floor covering in schools today is less allergenic than other types of floor covering. The kind of pad used under the carpet is important. An all-hair (animal) fiber pad may cause a problem as far as allergies are concerned. School carpet users are now recommending non-allergenic synthetic pads which help the carpet to absorb sound waves. These synthetic pads perform as well or better than all-hair carpet pads. The Genesee Hospital, Rochester, N. Y., study indicated that there was no significant increase in air-borne bacteria carrying particles and does not present a bacteria hazard. The fact that more and more hospitals are using carpet supports the fact that the synthetics are non-allergenic.

Flammability Requirements

There are currently two types of flame retardency tests used within the carpet industry: (1) The Steine, "Tunnel Test" and (2) Methenamine Tablet Test or "pill test". The latter is accepted within the carpet industry as the most applicable test, however, some may insist on using the Tunnel Test. The Methenamine Tablet Test was developed by the Department of Commerce and approved in 1970 as the standard flammability test for the Federal Government. Flammability measures the rate of flame spread in a carpet. Flame spread is controlled by the kind of fiber used, carpet density, and type of backing material. The "tunnel" or flame spread test is commonly used. The purpose of the test is to evaluate the performance of a carpet material in relation to the performance of a carpet material in relation to the performance of asbestos-cement board and red oak flooring under similar fire exposure. The test procedure directs the flame upward to ceiling-hung carpet. The results are in terms of flame spread, fuel contributed, and smoke developed during a ten minute exposure and are numerically expressed as a ratio with cement board as zero and red oak flooring as 100. The nearer you get to 100 the more flammable a carpet will be. The U. S. Public Health service requires a flame spread of 75 or less. The melting point of fibers:

<i>Fiber</i>	<i>Softening Pt. Degrees F</i>	<i>Degradation Pt.</i>
Acrylics	473-480	-
Polyester	445-490	-
Nylon	400-445	-
Polypropylene	305-315	-



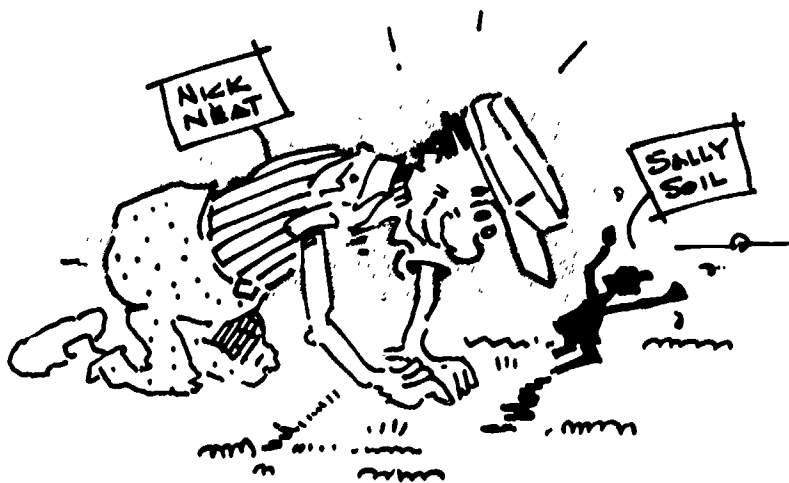
Carpet Burns

All carpet fibers are affected by burning cigarettes, cigars, or other burning objects. Should a burn occur, (which goes out after burning down to the backing in the carpet), the carpet installer may plug the hole with a cookie-like cutter and replace the damaged section with a piece of carpet taken from a matching carpet remnant of the same pattern used in the school. Burned spots in a carpet may also be repaired by using yarn from carpet remnants left over when carpet was first installed, with a hooked rug type needle. The repaired spot is not even visible to the trained eye.

Carpet Maintenance is Important

One of the reasons why more and more school people are turning to carpeting is that it does things for teachers and pupils that no

other floor covering will do. Carpeting has one very important thing in common with other floor coverings, it must be maintained. The reader is reminded that satisfactory performance of carpeting depends to a very large extent upon the kind of carpet selected and the maintenance procedures. In the long run careful maintenance procedures will determine appearance and wearability. A dirty carpet with a detergent-like film on the top side will not absorb sound waves nor withstand heavy traffic. Top level performance of carpet depends on the thoroughness and frequency of cleaning with the right kind of equipment plus efficient methods used by the maintenance workers. Nothing looks worse than a carpet that is stained, soiled, or dirt. Then too, it really is not the traffic that wears out carpet but the dirt or grit that may be in the carpet. These dirt particles must be kept at an absolute minimum through regular and systematic cleaning. Some of the dirt originates from activities within the school, others from the school site or the street. If one is aware of the kind of soils and stains that occur in a school facility the classroom should be rather easy to maintain, provided that certain directions included in this publication are followed.



Summary on Carpet Care

1. Using proper cleaning materials and equipment, carpet may be cleaned in about one-half the time it takes for resilient tile floors.
2. Many school custodians do not have adequate cleaning materials or equipment.

3. Most problems related to cleaning occur because spots and stains are allowed to stay on the carpet for prolonged periods of time.
4. Where pupils and teachers cooperate with the custodians there seems to be a minimum of problems in keeping the carpet clean.
5. Density and weight determines how well carpet will wear. Adequate cleaning prolongs the life of the carpet.
6. Sand and grit that get down into the carpet fiber are more injurious to carpet than traffic.
7. The vacuum machine along with a pile lifting brush are important tools for cleaning carpet.
8. A dry foam shampoo machine and a dry cleaning powder used with a dry cleaning machine are desirable items of equipment for maintaining carpet.
9. A spot removal kit that pupils may use is desirable and will help pupils and teachers to become more involved in keeping the carpet clean.
10. Carpet is now available that will not shock (static) teachers or pupils.
11. The "tunnel test" or "pill test" may discriminate against carpets that present fire-safety hazards.
12. The upright style commercial vacuum machine with beater bar works best in cleaning carpet.
13. The use of large amounts of moisture in shampooing may shrink a jute back carpet.
14. A preventive maintenance program will help greatly by keeping the carpet from becoming soiled.
15. Custodians should receive inservice training related to maintaining carpet.

Spot Removal

It is important to remember that immediate action is necessary for effective spot removal. Over a period of time, spots or stains may adhere to the carpet and become permanent. Most floor coverings are subjected to a wide variety of stains. This is especially true for carpet which is used as an acoustical floor covering. Most accidents related to spilling and dropping things on the carpet may be taken care of with little difficulty if the proper spot removal process is used.

The effect of spots and stains may be minimized if the following suggestions are followed:

1. Act quickly when a soiling substance is spilled on the floor covering. Remove the spot or stain promptly before the stain dries or becomes a more permanent part of the carpet.
2. Be sure to use the right kind of cleaning or spotting materials. "Spotting kits" are available that will clean any spot or stain.
3. Be sure to identify the kind of spot or stain so that the actions in the kit may be followed.

Spotting Kit

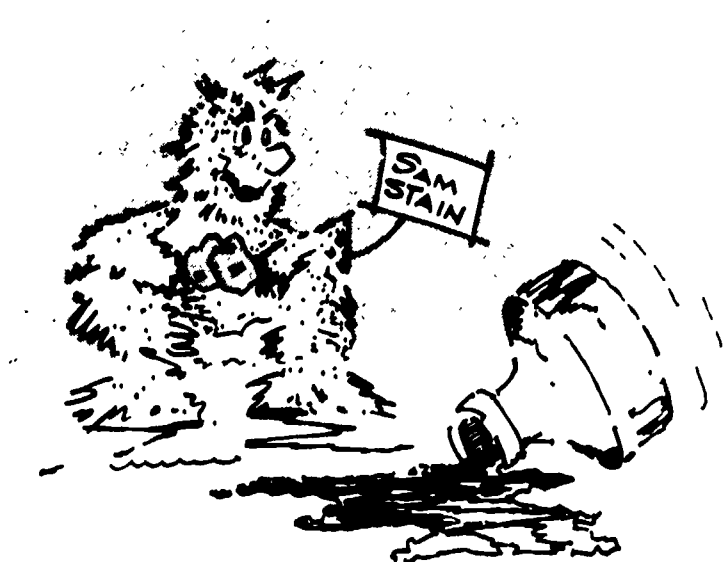
The spotting kit is being used widely in carpeted schools. The kit contains cleaning agents for the various kinds of spots. Directions for determining which cleaning agent is best for a given spot, together with instructions for removing the spots, are included in the kit. Many schools have found the spotting kit to be easy for pupils to use. Spots are more easily removed, using the spotting kit, as students and teachers are able to attend to the spots quickly. Kits should be available for each pod or cluster of spaces.

Carpet Soils

There are four types of carpet soils or stains that are most common:

1. Dry soils
2. Water soluble stains
3. Petroleum soluble stains such as grease, waxes, and oils.
4. Other stains such as coffee, tea, alcohol, blood, urine, inks, and paint.

The cleaning kit contains all of the cleaning materials needed along with a chart that will help to identify the type of stain as well as



directions needed for instant removal of the spot. Remember that it is easy to use too much cleaner which may cause the carpet to fade. However, there is little danger of fading if the carpet is made of solution dyed yarn. Be sure to dry the spot after cleaning as quickly as possible, which may avoid any damage to the carpet. It is helpful to place towels, blotters, or other absorbent materials on top of the spot following the cleaning process. This procedure absorbs moisture left on the carpet and at the same time reduces the danger of fading.

Spots and Stains

Spots on school carpet are frequently caused by can^d, chewing gum, grease, burns, beverages, and foods which are not noticed until several hours after the staining occurs. This, of course, makes removal of the spot or stain much more difficult. It is important to know how to remove spots or stains without damaging the carpet.

Directions included in the spotting kit should be followed. It is never wise to use too much cleaner as this may cause the spot to spread. This is especially true if the spot in the carpet becomes rather wet. Proceed with caution. Always rub or blot toward the center. Much of the stain may be removed with a clean cloth using the blotting process. Try to keep the stain from setting in the carpet before applying the spot remover (blot up moisture). After each application of the cleaning agent, the dissolved or loosened material should be absorbed with a clean white cloth or paper towel and then vacuumed.

Other Sources of Aid

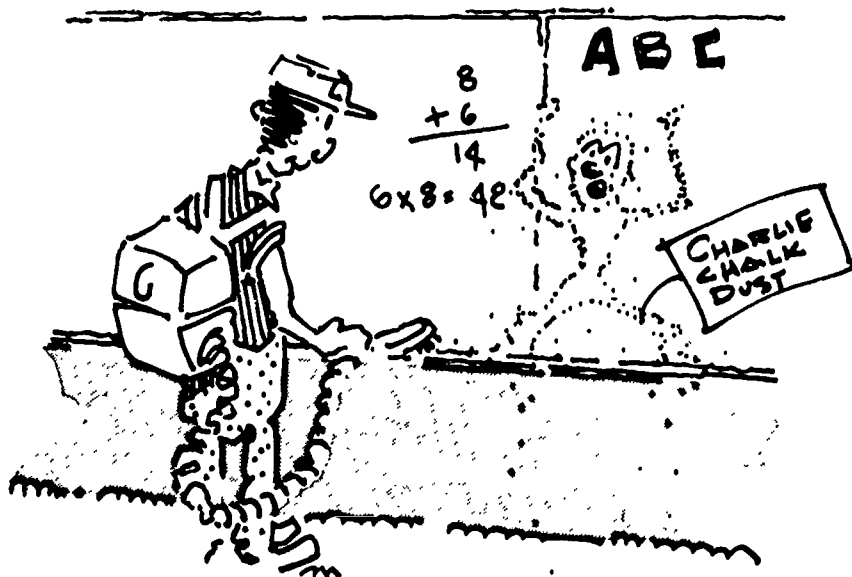
Much of the "know-how" that is needed to deal successfully with spots and stains will come with experience. Identifying the stain, in-service programs for custodians and using handbooks or manuals published by manufacturers or other groups will be of real help in achieving a solution to carpet cleaning problems.

General Cleaning Procedures

1. Absorb with clean white cloth. Semi-solids, such as chewing gum, should be scraped with a putty knife. Freezing the semi-solid with a chunk of ice or other chemical will help.
2. Apply a small amount of non-flammable solvent cleaning fluid, working from edge of the spot toward the center.
3. Use the foam from neutral (alkali free) detergents. Use clean cloth or towel, absorbing moisture quickly.
4. Apply dry cleaning powder to the spot, use blotter to wick up moisture on carpet. Brush toward center or rub powder into the carpet using sole of shoe. This method will not work well for petroleum related spots, but is very good for most spots.
5. It may be necessary to repeat the process a second time.
6. Dry the carpet by removing any moisture after each cleaning operation and brush gently.
7. Avoid getting too much cleaning fluid on the carpet.
8. The methods described are general cleaning procedures. You may find that one application of the solvent or other type of cleaner is all that is needed.
9. The dry cleaning system is satisfactory for most any kind of soil except some water soluble or petroleum related stains. A pre-spotter may be used to remove difficult stains.

Directions for Specific Spot Removal

Acids. Some liquids like carbolic acid need quick action to pre-



vent damage. Pick up as much of the acid as possible. Apply a neutralizer such as baking powder and water. Absorb or remove as soon as possible.

Beer, Alcohol, Coffee, Tea, Soft Drinks. Blot out stain quickly. Use clean white cloth and powder cleaner. A solvent type cleaner may be used if needed. Blot out dampness after each operation.

Berry Stains and Other Fruits. Absorb. Use neutral detergent foam. Solvent if needed.

Blood. Sponge with clean cool water, blot or pick up with white cloth or dry cleaning compound. Use solvent following the steps outlined above. If none of these work, contact the carpet manufacturer. Blood will stain quickly and is difficult to remove. Instant cleaning is necessary.

Butter, Fats, and Other Foods. Use solvent after removing any excessive amount of soil. Blot up dampness with paper towel or white cloth.

Chewing Gum. Use solvent after removing excessive semi-solid material. Dry with clean cloth or towel. Freeze the gum if hard to remove.

Cigarette or Cigar Burns. Clip off blackened ends of yarn, use neutral detergent, cut a square or circle with a cookie-like cutter

from a remnant of the carpet if the burned spot needs replacing. A hooked rug needle may be used pulling the yarn from the same kind of carpet remnant, weaving into the burned spot.

Crayon. Use solvent. Blot out dampness.

Ditto or Regular Carbon. Use solvent. A special semi-solid like ditto carbon cleaner may be necessary. Dry with clean cloth or towel.

Grease, Tar, Waxes, Oils, Polishes. Apply solvent. Absorb with clean cloth or towel after each application. Use solvent sparingly. Rub toward center to keep stain from spreading out over the carpet.

Ink. Apply solvent. Absorb quickly with blotter or pick up with clean white cloth. If ink is allowed to dry, it will penetrate the fiber. Consult with an expert from a carpet manufacturer if necessary.

Iodine and Mercurochrome. Use white vinegar (five percent solution of vinegar in water.) Apply sparingly and repeat process if needed. Sponge off the soil at first with water and blot up dampness. This kind of soil will become a part of the carpet if allowed to stay on the carpet.

Ketchup. Apply five percent solution of white vinegar and water sparingly and blot. Repeat the process if needed. Use solvent cleaner during final stage of cleaning. Absorb dampness.

Milk. Absorb quickly. Use five percent solution of white vinegar in water. Dry the spot with clean white cloth or towel.

Nail Polish. Apply nail polish remover sparingly. Use solvent. Dry with clean white cloth or towel.

Paint. Absorb immediately, removing as much of the paint as possible. Soak with cleaning solvent. It may be necessary to use a paint remover sparingly and a neutral detergent. Pick up and dry with clean cloth or towel.

Rust. Vacuum at once. Use solvent and neutral detergent. Repeat the process if needed. Absorb dampness.

Urine. Absorb quickly. Use neutral detergent. A five percent solution of vinegar and water may be used. Dry with clean cloth or towel.

Vomit. Remove immediately. Place dry cleaning compound such as Racine or a commercially prepared powder such as "Vomex" on the spot for 30 minutes or longer, brush thoroughly, and vacuum. Use a solvent if needed. Dry the spot with a clean cloth or towel.

There are other specific kinds of stains that are not listed here.



It is advisable to try out a spotting agent on carpet in an area not to be noticed to find out if it will cause fading. Use general cleaning suggestions listed, or check directions in spotting kit or container for similar stains. Apply cleaning material sparingly and be sure carpet is dry when the process is completed.



Carpet Terms

Definition of terms used by the carpet manufacturer and others is presented. Much of the time, the purchaser of carpet does not understand the terms used.

Abrasion

A test that measures the resistance of the carpet to wear.

Acrylics

Acrylic fiber is a polymer that is 85 percent by weight acrylonitrile. It is generally produced only in staple form. This fiber has high durability and stain resistance.

Backing

The foundation or underside of the carpet that secures the pile yarn in position. A separate backing is needed for tufted carpets, called primary backing.

Backing Yarn

This refers to cotton or rayon yarn running lengthwise of the woven fabric, often called binder warp.

Broadloom

Refers to any carpet woven seamless on a broadloom in widths of 54 inches or more. Broadloom does not refer to grade or quality of a carpet.

Body

The feel of a fabric. Compact, solid or firm.

Carpet

Soft floor covering. A fabric that covers the entire floor. Sometimes called "acoustical floor covering".

Chain Binders

Yarn running lengthwise in the back of the carpet. Binds yarns together.

Construction

The method by which the carpet is made, e.g., loom type, pile, rows per inch, pitch, yarn count, face yarn weight.

Count

Indicates yarn size or weight. Length per unit of weight.

Crock Fastness

The ability of the color in a carpet to resist fading through being rubbed from the fiber. Crock-fastness tests are normally performed when the carpet is dry and when it is wet.

Crocking

Excess coloring which may rub off the fabric.

Cycles Per Second

Number of recurrences of a periodic vibration in one second. The more cycles per second, the higher the pitch.

Denier

A system of yarn count used for man-made fibers. Number of grams per 9000 meters of yarn length.

Dimensional Stability

The ability of a fabric to retain its dimensions in service as it is cleaned.

Fiber

A term used for man-made type of material which forms the basic part of the fabric.

Fuzzing

A condition on a new carpet with irregular fuzzing appearance on the surface of the fabric. This is caused by slack yarn twist or wild fibers that slip out of carpet surface. Appears as fuzzy little ball of yarn. Sometimes called pilling. Usually ends after carpet has been in service for a short period of time. Fuzzing may be removed by using commercial type vacuum.

Gauge

Distance between two adjacent tufts, width-wise, as in tufted carpet. Indicates the number of yarn ends of fiber per inch counting across the width of the carpet, i. e. 1/8 gauge means there are 8 yarn ends per inch.

Jute

The fiber obtained from the inner bark of a tall, slender Asiatic herb. It is shredded and spun into yarn and used as stuffer filling to give bulk to woven carpets; and as primary and secondary backing for tufted carpets.

Kraftcord

Tightly twisted yarn made from special strength Kraft paper.

Loom

Machine threaded with carpet yarn on which carpet is woven.

Loop Pile

Loop pile construction is one in which the individual tuft forms a loop.

Nap

The pile on the surface of a carpet.

Noise Reduction Coefficient

A single number rating of the average to the nearest multiple of 0.05 of a material's sound absorption coefficient at 125, 250, 500, 1000, 2000, and 4000 cycles per second.

Nylon

Nylon fiber is composed of any of a class of thermoplastic polyamids formed into fiber form. This class of fibers is highly resistant to wear and found in both continuous filament and staple fiber forms.

Padding

Material installed under carpet. It may be synthetic, all-hair, jute, wool, sponge, or rubber.

Pile Height

The height of pile measured from the top surface of the primary back to the top surface of the pile.

Pile Yarn

The length of the pile yarn or tuft as it rises from the backing of a carpet.

Pitch

A term applied to woven carpet, designating the number of yarn ends per 27 inches, counting across the width of the carpet, i. e. there are 216 yarn ends in a 27 inch width of carpet. A pitch of 216 and a gauge of $1/8$ are the same ($216 \div 27 = 8$).

Ply

One strand of yarn thickness. The number of single yarns twisted together to form one yarn end.

Polyester

Polyester fiber is a member of the polymer family formed by the polymerization of a polyhydric alcohol with a polybasic acid.

Polypropylene

Polypropylene is a member of the Olefin family. It is noted for its water resistance and colorfastness.

Puckering

Does not lay flat, contains ridges or puckers. Caused by uneven tension in the carpet or poor installation. May also buckle when a carpet shrinks due to moisture or water used in shampooing.

Resilience

The ability of a carpet fabric to spring back to its original shape.

Shop Drawings

Blueprints of how the carpet will be installed in a teaching space. Included in these drawings are indications of where seams will be placed and in what direction the pile will lay.

Solution Dyed Yarn

Man-made fibers dyed in liquid form before becoming solid threads.

Sound Absorption Coefficient

The percentage of reduction of airborne sound by a material such as carpet at a given frequency.

Stock Dyed Yarn

Surface yarns spun from fibers that are already dyed in staple form.

Texture

A surface effect obtained by using different heights of pile.

Tuft Bind

The tightness of a tuft of carpet in the backing. A tuft bind or pull equal to at least 9 pounds. The greater the tuft bind, the less likelihood that a carpet will ravel.

Tufted

Carpet made on a mechanism similar to a giant sewing machine that places the surface fiber into a preformed backing. Formed by the insertion of multiple needles that punch tufts through a backing.

Tunnel Test

Determining the burning characteristics of the material under test by evaluating flame spread over the surface.

Warp

A series of threads or yarns running lengthwise in woven carpet.

Wires

The number of wires, or rows to an inch lengthwise in woven carpet.

Woven

Carpet made on a loom by which the surface fibers and the backing fibers are inter-woven.

Yarn Size

Ounces per square yard of carpet. Weight of carpet is measured by the number of yards in length to the ounce of weight in a single ply.

Specifications for Purchase of Carpet

The carpet specifications that follow were developed by architects, sound engineers, and school planners. These specifications are for those that may be interested in developing carpet specifications for a particular school.

Carefully prepared, accurate and complete carpet specifications are desirable for school administrators, architects, and bidders. Detailed written specifications may prevent misunderstanding and insure that carpet manufacturers are bidding on the same quality product.

Carpet fibers may be classified in two general categories, natural and man-made. Carpet woven of wool fibers was used for many years in schools. However, today, man-made fibers or synthetics are used in schools. The major man-made fibers are the acrylics, nylons, and polypropylenes. Acrylic fibers are used to produce staple yarns which are engineered to look like wool. Acrylics and nylons may wear better than wool. The synthetic fibers are easier to clean due to moisture resistance. The recent development of solution-dyed acrylics, with increased resistance to sun and chemical fading, permits the use of stronger cleaning solutions. Since the moisture does not penetrate or become a part of the carpet, the synthetics do not soil so easily. Nylon is generally produced in continuous filament yarns which offer excellent abrasion and moisture resistance.

Many carpets are not of the same quality. Inexpensive, unbranded carpets may be constructed of inferior fibers or yarns. Satisfactory dyes and dyeing procedures may not be used in the low initial cost kind of carpet. Quality control during the manufacturing processes is often lax. Consequently, the carpet may become unsightly and difficult to maintain and will not wear well in a school. The life of the carpet may be shortened if proper construction methods are not specified. It is also unlikely that an inexpensive low pile height carpet will provide adequate sound control.

The use of soft floor covering in schools provides for greater acoustical control permitting greater flexibility in design, better thermal control which reduces air conditioning and heating costs, reduces injuries due to falls, and provides for greater comfort as well as lower maintenance costs.

Major requirements for school carpeting:

1. Man-made fiber with a minimum of 42 ounce face weight per square yard in classrooms. A man-made backing material should be specified where moisture is encountered.
2. A synthetic type pad of 40 ounces per square yard or greater is normally used in conjunction with the carpet. If an NRC of .45 can be achieved from the carpet, a pad of less weight would be satisfactory.
3. A noise reduction coefficient of .45 is desirable for proper sound absorption in the open plan teaching space. A lower NRC is satisfactory for corridors dining areas and other spaces where maintenance is difficult.

Synthetic type pads are preferable to other pads, whether attached to the carpet or separate. The synthetic pads are more durable, provide firmer support for the carpet, improve acoustical conditions, and are non-allergenic.

Specifications should require carpeting in widths of at least 12 feet. Most carpet mills today offer carpet 15 feet wide. The widest possible width should be considered if the area to be carpeted is to such size and configuration that the number of seams may be reduced without creating additional waste.

Carpet Specifications

A. Scope

1. The carpet contractor shall furnish all labor and materials required to provide and install carpet, as shown on drawings and specified herein; and shall coordinate his work with the general contractor's construction schedule.

B. General

1. Installation should be performed by carpet workmen approved by the manufacturer with adequate experience in commercial installation.
2. Shop drawings should be submitted by the client assisted by the architect, showing layouts and details of installation, including location of seams and direction of pile lay.
3. Carpet remnants, useable scrap, and overage should be packaged, identified and delivered to the owner.
4. The successful bidder should provide exact samples to architects for approval.

5. The successful bidder, upon request of the architect, shall supply complete samples of carpet on which the bid is based.

C. *Materials*

1. Materials shall be subject to normal carpet industry manufacturing tolerances of plus or minus five percent.
2. A synthetic type pad, 40 ounces in weight, should be used. The noise reduction coefficient may be increased by increasing the weight of the pad.

3. Carpet fabric:

a. *Color.* Colors should be selected to minimize apparent soiling. Light colors should be avoided in areas where dark color soil may be tracked inside the building; neither should the carpet be of a dark color as it will not reflect the proper amount of light in the classroom.

b. *Face Yarn.* Acrylic, such as Acrilan, or an equivalent nylon such as Antron II that will give adequate sound absorbance.

c. *Construction.*

	<i>tufted</i>	or	<i>woven</i>
Pile Height	0.250		0.250
Gauge	1/8		
Pitch			216
Stitches (per inch)	8		
Wires or Rows (per inch)			8

d. *Backing Materials*

Primary backing	jute or man-made	
Secondary backing	jute or man-made	
Chain		cotton, jute or man-made
Filling		cotton, jute or man-made
Stuffer		cotton, jute or man-made

e. *Back Coating.* Provide a minimum tuft bind of 9 lbs.

D. *Acoustical Characteristics*

1. Acoustical characteristics listed below are minimums. Carpet provided for a project, when tested on at least a 40 to 50 ounce synthetic pad shall meet or exceed these minimums:

a. Noise Reduction Coefficient for classrooms45

The following is a typical sound absorption profile of carpet meeting the recommended specifications. The sound absorption coefficient may vary at each test cycle, however, the average must meet the required noise reduction coefficient. (NRC)

at 125 cycles per second04
at 250 cycles per second20
at 500 cycles per second70
at 1000 cycles per second50
at 2000 cycles per second45
at 4000 cycles per second54

2. Acoustical tests shall be made by reverberation chamber method (as used in National Bureau of Standards, Washington, D. C.).

E. Identification and Acoustical Properties

1. Bidding contractors shall state the following information regarding each carpet grade proposed:
 - a. Carpet manufacturer
 - b. Carpet grade identification
 - c. Test report from an acceptable testing laboratory showing N.R.C. and Sound Absorption Coefficients at 125, 250, 500, 1000, 2000, and 4000 cycles per second.
 - d. Flammability ratings in accordance with required local standards.
 - e. Physical characteristics, face yarn, face weight, type construction, etc., as described under Materials "C" on page 69.

F. Installation

1. The manufacturer shall supply specifications for installation and maintenance.
2. Shop drawings shall be supplied showing details of installation such as, location of seams and direction of pile-lay.
3. The floor must be swept clean and repaired where necessary. Provide tackle strip along all areas where carpet meets floor tile. Anchor tap down metal with concrete pins spaced no more than four inches apart.
4. The pad should be installed with seams at a right angle to carpet seams. Anchorage of pad and seam treatment as recommended by pad manufacturer.
5. All carpet seams shall be joined in a neat and sturdy manner. Carpet shall be stretched and anchored securely.
6. Carpet contractor shall repair any and all damage, done by him or his workmen, to owner's property.