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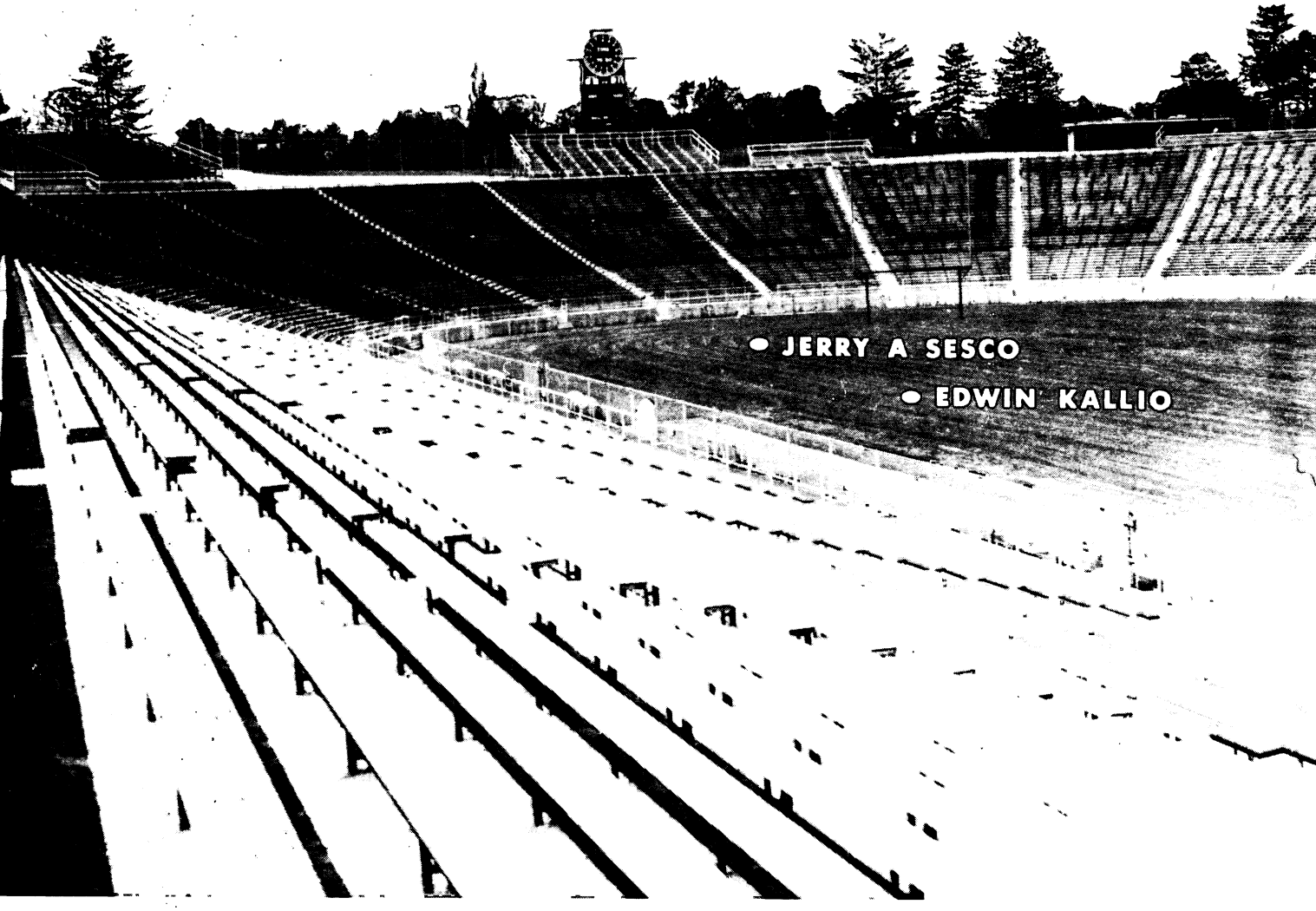
Stadium Seating
A Market Analysis



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Cover photo. — Single-board seats are the most widely used type. Thousands of board feet of lumber may be required for the seats in a single stadium.

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Stadium Seating – A Market Analysis

by Jerry A. Sesco and Edwin Kallio

One of the striking developments in American life during the Twentieth Century is the fast-rising attendance at all types of outdoor sports (fig. 1). In 1965, 24.7 million people went to college football games, 6 percent more than in 1964. At horse races, the number of spectators was 62.9 million, 4 percent more than in the previous year. Between 1950 and 1965 attendance increased 29 percent at major league baseball games and more than doubled at professional football games.[1]

Consequently, sports facilities have been expanding steadily, and large numbers of stadium seats have been installed. Between 1958 and 1963, the value of stadium and bleacher seat shipments increased 77 percent to 13.4 million dollars.[2] Apparently, sales will continue to increase. An annual survey of the arena, auditorium, and stadium market conducted by the Billboard Publishing Company showed that major stadium improvements planned for 1965 were expected to reach $38 million.[3] A knowledge of this growing market would help manufacturers and stadium owners make better decisions about the most profitable alternatives of production and use of specific types of stadium seating.

This report identifies the characteristics of the stadium seating market in the central hardwood region, describes the relative importance of the different stadium types in the seat market, and analyzes current and expected market trends.

FIGURE 1. — Millions attend outdoor sports events each year. (Photo courtesy of Chicago Park District.)

[1] *U.S. Bureau of the Census. Statistical abstract of the United States: 1966, 87th edition, p. 210.*

[2] *U.S. Bureau of the Census. U.S. census of manufacturers: 1963; office, public building, office and store fixtures, and miscellaneous furniture, MC63 (2)-25B, p. 25B-18.*

[3] *Billboard Publishing Company. 1965 arena, auditorium, and stadium guide. Cincinnati: Billboard Publishing Company. P. 33.*

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Study Methods

Definitions. — For the purposes of this report, a stadium is defined as an open-air structure used for seating people. Examples are grandstands, bleachers, and amphitheaters. Included are stadiums associated with horse and auto racetracks, fairs, professional sports, municipalities, universities and colleges, and public high schools. Private and parochial colleges and high schools were not included in the study. Neither, of course, were any indoor structures such as auditoriums, theaters, and gymnasiums.

The names of the types of stadiums discussed are self-explanatory except perhaps for "municipal" stadiums. These are usually owned or operated by a municipality. Some are used primarily for professional sports events, such as football and baseball; others may be owned or leased by city school systems for use by several high schools in the municipality. Little league ball parks, Y.M.C.A. athletic fields, and small parks operated by civic clubs were excluded.

The study area. — The States of Ohio, Indiana, Kentucky, Illinois, Missouri, and Iowa, which have large concentrations and varieties of outdoor spectator sports activity, were selected for the study area. In 1960, these States had 19 percent of the Nation's population and 15 percent of the Nation's cities with over 100,000 population. In 1964, the region contained 18 percent of the Nation's public school enrollees and 17 percent of the Nation's enrollees in colleges and universities. All types of schools provide large markets for stadium seats.

The sample. — In 1965 lists of all stadium owners (except for high schools) were prepared from published directories and from information provided by associations and State agencies. From these lists a sample was drawn based on the number and the seating capacity of the stadium by type (table 1).

The high school sample was obtained in another manner. It was limited to Illinois. Schools were stratified into enrollment-size classes, and a sample consisting of 40 percent of the high schools in the State was drawn from a directory. The sample accounted for 6 percent of all public high schools in the entire study area, but it warranted generalization only to Illinois high schools because of differences among states in financing and degree of emphasis on sports (table 2).

Questionnaires were sent to each stadium owner or high school principal in the sample.

TABLE 1. — *Number of stadiums by stadium type, their estimated seating capacity, and the basis for the estimates, six North Central States, 1965*

Stadium type	Total number of stadiums	Percent in sample	Percent of sample returning usable forms	Estimated total seating capacity
University	120	40	69	1,200,000
Municipal	60	88	60	500,000
Fairgrounds	530	29	44	1,000,000
Race tracks	100	46	42	320,000
Total	810	37	51	3,020,000

TABLE 2. — *Estimated number of high school stadiums and their seating capacity, and the basis for the estimates, Illinois, 1965*

Number of students enrolled	Total number of high schools	Percent in sample	Percent of sample returning usable forms	Estimated	
				Number of stadiums	Total seating capacity
0 - 999	530	32	80	144	124,800
1,000 - 1,999	82	48	82	69	181,200
2,000 - 2,999	26	96	84	21	83,300
3,000+	17	100	94	17	66,300
Total	655	38	82	251	455,600

Illustrations and definitions of each of the three major seat types — single-board, slat, and chair — were included with the questionnaire to aid the respondent.

Forty-one nonrespondents were personally interviewed to check against misinterpretation of returns. It was found that their construction and plans did not differ from those of the respondents. The response was somewhat higher from high schools and universities than from other stadium owners, but there was no evidence that the returns were unrepresentative.

Characteristics of Stadiums

Number and Seating Capacity

The six states had an estimated 810 stadiums (excluding high school) with a seating capacity in excess of 3 million (table 1). Illinois high school stadiums numbered 251 with an estimated seating capacity of about one-half million. The total high school stadium seating capacity in the six-state area is probably near 2 million. This makes the total seating capacity in the six-state area about 5 million.

High school stadiums. — Only about one-third of the 655 high schools in Illinois had stadiums. Although 81 percent of the high schools had less than 1,000 enrollees (table 1), they still accounted for 57 percent of the high school stadiums in the state. Schools with 1,000 to 1,999 enrollees had the most seating capacity. Average seating capacity ranged from 866 in schools with less than 1,000 enrollees to 4,000 in schools with 3,000 or more enrollees. If similar conditions exist in surrounding states, it means that the approximately 3,500 high schools in the study area have about 1,200 stadiums. However, as was mentioned previously, finance and the degree of emphasis on sports are important factors determining the number of high school stadiums in a particular state.

College and university stadiums. — Every state university and most of the 2-year and 4-year colleges had stadiums. There were 120 such stadiums in the study area ranging in size from less than 5,000 seats to nearly 80,000. Total seating capacity was approximately 1.2 million.

Municipal. — The 60 municipal stadiums had a total seating capacity of 500,000 seats. About one-third of the seats were in the six major professional stadiums.

Fairgrounds. — Five hundred and thirty or 88 percent of the counties had grandstands at their fairgrounds. Total seating capacity was estimated to be 1 million with an average of 2,400 seats per grandstand.

Racetracks. — There were 100 racetracks (horse and automobile) in the study area with an estimated total seating capacity of about 450,000. (Fairground stadiums used for horse and automobile races were included in the fairground category.)

Geographic Distribution

Although stadiums are widely dispersed throughout the United States, they are more concentrated in the Northeast, East North Central, and Pacific Coastline regions where there are large numbers of people.

In the study area there was considerable variation in concentration. For example, horse racetracks were concentrated in the vicinity of Cleveland and Chicago and in the Bluegrass Region around Louisville and Lexington. Automobile racetracks were numerous around Indianapolis, the site of the annual Indianapolis "500" auto race, and in northern and central Ohio. Municipal stadiums, especially the large ones, were more prevalent in the larger cities; all the major professional ones were in cities with over 100,000 population.

University and college stadiums were evenly distributed. Ohio and Illinois, the most populous States, had the largest number of such stadiums, Kentucky the fewest.

High school stadiums averaged better than two per county in Illinois, the most populous state in the study area. As was expected, the concentration of high school stadiums within the State was greater in the more densely populated areas.

Fair grandstands were the most evenly distributed stadium type in the study area; almost every county had one.

Age

The boom in stadium building in recent years is illustrated by the ages of present structures:

Age (years)	*Percent of reporting stadiums*
0-10	32
11-20	28
21-30	16
31+	24

One-third of the 217 stadiums reporting age were less than 11 years old, 60 percent were less than 21, and three-fourths were less than 31. The majority of the stadiums under 21 years of age were high school stadiums and fair grandstands, whereas most of the stadiums over 21 years were municipal and university stadiums. The low percentage of stadiums in the 21 to 30 age bracket is due to a decrease in stadium construction just prior to and during World War II.

Characteristics of Seating

An essential feature of modern stadium construction is that every spectator be provided with a seat. This is not only desirable from the spectator's point of view but it plays an important part in the control of large groups of people.

Types

The type of seats purchased for a particular stadium depends upon their comfort, cost, appearance, and permanence, and on the kinds of events viewed.

Single-board seating was the predominant type used by stadiums in the study (fig. 2). Slat seats ranked second, followed by chair seats with wood slats, plastic seats, and "other" types. "Other" types include seats made of concrete, steel, or some other material.

High school stadiums accounted for most of the single-board seats, and university and college stadiums had most of the slat seats. Municipal stadiums were the predominant users of chair seats with wood slats, and horse racetracks had the greatest number of fiberglass chair seats.

Wood Requirements

Traditionally, wood has been the primary material used for stadium seats. Wirka gives several reasons for this:[4]

1. The human body is more kindly served by a wood seat.
2. Wood is strong and resilient under the loading and punishment it gets.
3. Wood can be made reasonably resistant to weather damage.
4. Wood is economically feasible in all markets.

[4] *Wirka, R. M. Selecting wood for stadium seats. West Coast Lumberman 60:18. 1933.*

Stadium seats require, in the aggregate, millions of board feet of lumber. A seat may use from 1 to 5 net board feet, depending upon the dimensions and type.[5]

As an example of the large volume of lumber used in stadium seats, consider a stadium with a seating capacity of 50,000. If the seat width allowance is 18 inches and 2-inch by 10-inch boards are used, this stadium will require approximately 125,000 net board feet of lumber for seating. A stadium of equal capacity using slat seats consisting of three 2-inch by 4-inch boards would require 150,000 net board feet.

The amount of wood used for stadium seating varied with stadium type and size. The university stadiums averaged 51,515 board feet per stadium, the municipal stadiums 51,850 board feet, and high schools 6,087 board feet.

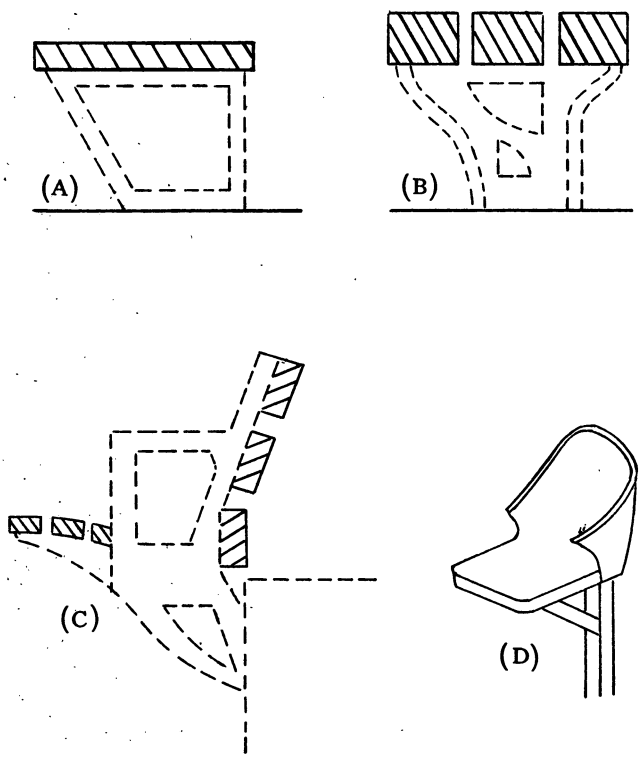

FIGURE 2. — Major types of stadium seats: (a) single board, (b) slat, (c) chair seat with wood slats, (d) fiberglass chair seat. There are, of course, several variations in each type.

[5] *Only wood used for the actual seat surface was considered in this study. Wood used in footboards and in the stadium framework was excluded.*

Although the amount of wood used in stadium seats is relatively small in comparison to that used for other products, it could offer a substantial market in some areas.

Main Design Features

The most commonly used species for single-board and slat-type seats were Douglas-fir, redwood, Port Orford cedar, southern cypress, and southern yellow pine. Northern elm was used most often for chair seats with wood slats.

Single-board seats were usually 2 inches thick and 8, 10, or 12 inches wide (see cover photo); however, 1-inch-thick boards were sometimes used. Slat seats usually consisted of two 2-inch by 6-inch slats or three 2-inch by 4-inch or 2-inch by 3-inch slats. Spacing between the slats varied from ⅛ to ¾ inch.

The advantages claimed for single-board seats over slat seats are greater comfort, less initial cost, and less painting surface. Slat seats, on the other hand, cup or twist less readily, and they drain better than single-board seats, which may hold water in pools. More breakage is likely with slats, but replacement costs are probably less because they can be replaced in smaller units.

Slat chair seats usually consist of five slats steam bent to a radius of approximately 32 inches. Slat widths vary from about 3⅝ inches to 2¾ inches. Chair backs consist of three slats steam bent to a radius of approximately 22 inches. Back slats are at least ¾ inch thick and 3⅞ inches to 5⅝ inches wide on the center line. The installation cost per seat is high, but the seat is comfortable and durable. Another type of chair seat resembles a bench and consists of a continuous single board or slat seat with a continuous or individual back.

Fiberglass seats for outdoor stadiums are relatively new in the market, but they are available in a variety of designs. One type is a one-piece molded shell, another is a two-piece seat with simulated slats similar to the design of wood chair seats. Still another is a pressure-molded fiberglass plank for single-board seating. A single-board seat cover is

also made that can be attached over existing wood single-board or slat seats.

Manufacturers claim that fiberglass seats require virtually no maintenance and need no repainting or renumbering. However, this seat type has not been in use long enough to validate these claims.

Most wood stadium seats are preservative-treated as protection against decay. Water-borne preservatives such as Wolman salts, water repellent preservatives, and pentachlorophenol solutions are most often used because they do not discolor the wood, have no odor, and do not damage clothing; in addition, the treated wood can be finished or painted like untreated wood. Some woods such as redwood, cedar, and cypress are decay resistant and do not need preservative treatment; however, these woods are structurally weaker than other woods commonly used.

Wood seats are also usually painted to prevent serious weathering. The frequency of application depends upon the climatic conditions and the wood species. In a well maintained stadium, a single coat is applied each year or at least every 2 years.

Most of the stadium seats in the study area had some type of protection — varnish, paint, or a preservative.

Service Life and Reasons for Repair

The service life and need for repair of stadium seating varies greatly and depends primarily upon frequency and intensity of use, type of seat and material used, fastening method, exposure to weather, preservative treatment, and protective finish.

Estimates of serviceable life ranged from 3 to 50 years for single-board seats and 2 to 30 years for slat seats. Estimates for chair seats with wood slats ranged from 5 to 63 years; many of the stadiums with this type of seat are at least partially covered by a roof so that useful seat life may actually exceed 50 years.

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FIGURE 3. — Decay is the major reason for seat repair.

Fiberglass stadium seats have not been on the market long enough to determine how long they will last. Two respondents estimated the service life of these seats to be about 10 years.

The predominant reason for repairs of wood single-board and slat seats was decay, most of which occurred at the ends of the boards and at points where boards are attached to the supports (fig. 3). Breakage, followed by splits, splinters, and warp, was another reason for repair. Chair seats with wood slats were damaged mainly by breakage and decay, and fiberglass seats by breakage. Stadium seat failures are interrelated — i.e., breakage may be due to weakening by decay or splits, and decay may be caused by splits in the seat boards.

Purchasing Methods

Except for minor repairs and replacements, stadium seat purchases are characterized by: direct but infrequent purchase, several people being involved in the purchase, dependence of many buyers on catalogs, and in many instances a long negotiation period.

Most stadium seating is bought directly from the manufacturer because of the large orders and the buyer's need for technical advice. The direct sale is one way of making certain that buyers are well served.

Infrequent sales can create a serious problem for stadium seat manufacturers — especially the one-product firms — since they are never sure when potential buyers are going to be "in the market." As a result, regular contact by advertisements and salesmen must be maintained with existing and potential customers, even though only a few may buy over an extended period. Many seat manufacturers, especially the larger ones, have distributors and representatives strategically located in their sales areas. These practices naturally result in higher marketing costs.

Still another important factor in stadium seat purchases is the number of persons entering into the purchasing decision. This varies with the type of stadium and the size of the purchase, but except for small purchases, usually several people are involved. A study by *Overview* and *American School and University* magazines in 1962 showed that the purchasing team for school equipment such as stadium seats consists of the district superintendent, business official, superintendent of buildings and grounds, principal, and the physical education department head. The last two had the greatest influence on the specifications and type of equipment purchased. The district superintendent and business official were most often involved in the final decision on the type and make of equipment purchased.

For stadiums owned by municipalities, no one purchasing pattern prevailed. It varied with the size of the municipality, governmental organization, budgeting policies, and many other factors. For example, selection of seating for a new stadium may be made solely by an architectural firm. Replacement and repair purchases may be influenced by the city engineer, superintendent of parks, or the public works superintendent. The final purchasing decision may ultimately rest with the purchasing agent, city clerk, or city manager.

The decision on whether to purchase equipment for fair grandstands was made by the board of directors of the county agricultural or fair association, but the decision was usually implemented by the secretary-treasurer who acted as purchasing agent.

Seating for privately owned stadiums was most often purchased by the business manager, but the owner or the board of directors may decide on types and specifications. The individual in charge of grounds keeping and maintenance is influential in determining when repair and replacement purchases should be made.

The buyers' problem of where to buy stadium seats was lessened by their reliance on catalogs from which they selected companies that would receive invitations to bid. Some of the better known catalogs listing stadium seat companies are: *Thomas' Register of Manufacturers, MacRae's Blue Book,* and *Sweet's Architectural Catalog File.*

Most seating for new stadiums or for major additions to existing stadiums was purchased on the basis of competitive bids. Municipalities, public schools, and colleges and universities especially tended to do this. Small, inexpensive purchases, however, were often made without getting bids.

Stadium seating is usually purchased from one of two sources: (1) Seat manufacturing companies or their representatives, or (2) lumber suppliers and dealers. The source depends primarily upon the type and number of seats purchased, what sources are locally available, and whether purchase is for a new stadium or repair or replacement of seats in an existing stadium.

Chair seats with wood slats and plastic seats, whether for new stadiums, additions, or repairs, were most often purchased from seat manufacturers. Single-board and slat seats for new stadiums were purchased from seat companies when steel grandstand or bleacher units were bought and from wholesale or retail lumberyards when only seat boards were bought.

The negotiation period that precedes the buying decision varies according to the size of the expenditure and the number of people exerting an influence on the purchase. Both factors depend in turn on whether purchases are for new stadiums, additions to existing stadiums, or replacements and repairs in existing stadiums. Purchases are generally larger for new stadiums and additions than for replacement and repair and, therefore, the negotiation period is longer.

Current and Future Market for Stadium Seats

In recent years the demand for outdoor spectator sports has grown very rapidly, and indications are that it will continue to grow in the future. The Outdoor Recreation Resources Review Commission estimates that by the year 2000 the attendance at outdoor sports events will be more than double that of 1960. To accommodate the increased number of spectators, new stadiums are being built and existing ones expanded.

New Stadiums

It is difficult to predict the number of stadiums that will be constructed over a period of time. New stadiums may be built to replace obsolete ones, to service new schools or colleges or those previously without stadiums but with growing athletic programs, or to fill the needs of cities which have or are expected to acquire a professional football or baseball league franchise.

Six percent of the 233 respondents plan to build new stadiums within the next 5 years (8 universities and colleges, 3 fairs, 3 high schools, and 1 municipality). Most respondents stated that they had not, at this stage in planning, decided on the actual capacity of the stadium or the type of seat to be used.

Additions and Replacements

Sample results indicate that a large number of stadiums in the study area will add seating within the next 5 years. Sixteen percent or 38 of the 233 respondents plan to add a total of 70,500 seats. Assuming an average of 3.00 board feet per seat for seat types combined, this amounts to 211,500 net board feet of lumber. Projecting these data to all the stadiums (excluding high school) in the study area, the lumber needed for additions in the next 5 years will be about 1,000,000 net board feet.

The predominant type added will be single-board seats followed by chair seats with wood slats, pressure-molded fiberglass seats, and slat seats. Most of the single-board seats will be added to automobile race track stadiums, fair grandstands, and university and high school stadiums. Municipal stadiums will add the greatest number of chair seats, whereas fair grandstands and high school and university stadiums will add most of the slat seats.

The degree of maintenance among stadiums varied widely, depending on intensity of use and age of the stadium, the types of seats involved, and the interest of the management in upkeep. Maintenance was usually sporadic, but generally took place in the "off" season when the stadium received little if any use.

Because of all these factors, the total amount of lumber used annually for repair and replacement of seats could not be estimated with any accuracy, but it undoubtedly is substantial. Certainly, there is a sizable market for these purposes in areas with heavy concentrations of stadiums, such as Chicago, Cleveland, Louisville, and St. Louis. A steady and fairly substantial market also exists where a stadium uses a rotation system of seat replacement — that is, a proportion of the seats are replaced each year until all have been replaced. Occasionally, too, the remodeling or renovation of a stadium results in a large sale of lumber for seating.

Additional Market Considerations

Other market considerations are the number and location of firms in the industry and competition from substitute materials.

Number of Firms

There are 49 major manufacturers of outdoor stadium and bleacher seats in the United States. Many of these firms also manufacture seating equipment for gymnasiums, theaters, and classrooms. Most stadium seat manufacturers are located in the Northeastern and North Central regions of the United States in the vicinity of Chicago, Pittsburgh, and New York City. There are eight firms in the South — four of them in Texas — and five on the West Coast, four of which are in California (fig. 4 on page 10). The heavy concentration of the industry in the Northeast and North Central regions is probably due to the nearness of the major stadium seat markets and of the steel industry.

Two of the 49 firms manufacture fiberglass seats. One offers a rigid one-piece molded fiberglass and nylon plastic shell, with or without arms, mounted on a riser-attached or floor-attached steel lifting pedestal. The other offers a pressure-molded fiberglass seat cover for use over existing wood seats and a single-plank fiberglass seat for use in new stadiums. Four firms manufacture chair seats with wood slats. The remainder offer portable and permanent bleacher and grandstand units which consist of wood seats and a fabricated steel framework. Virtually all these units use 8-, 10-, or 12-inch boards for the seats.

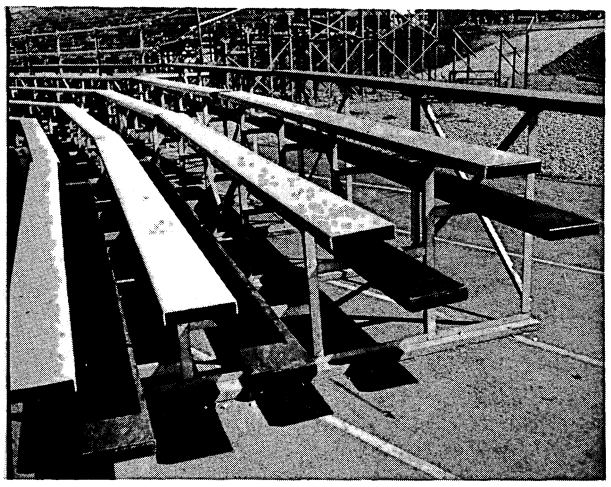

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FIGURE 5. — Fiberglass covers can be placed over existing wood seats.

As stated previously, retail and wholesale lumberyards supply a substantial volume of lumber for seats, especially for repair and replacement.

Competition From Substitute Materials

Stadium seating, like many wood products, has been challenged by substitute materials in recent years. The most notable are fiberglass and plastics. The sales of plastic and fiberglass stadium seats are increasing although the initial purchase price per seat is, on the average, somewhat higher than for a wood seat of similar design (fig. 5). Most of the increase appears to be among college and university and municipal stadiums.

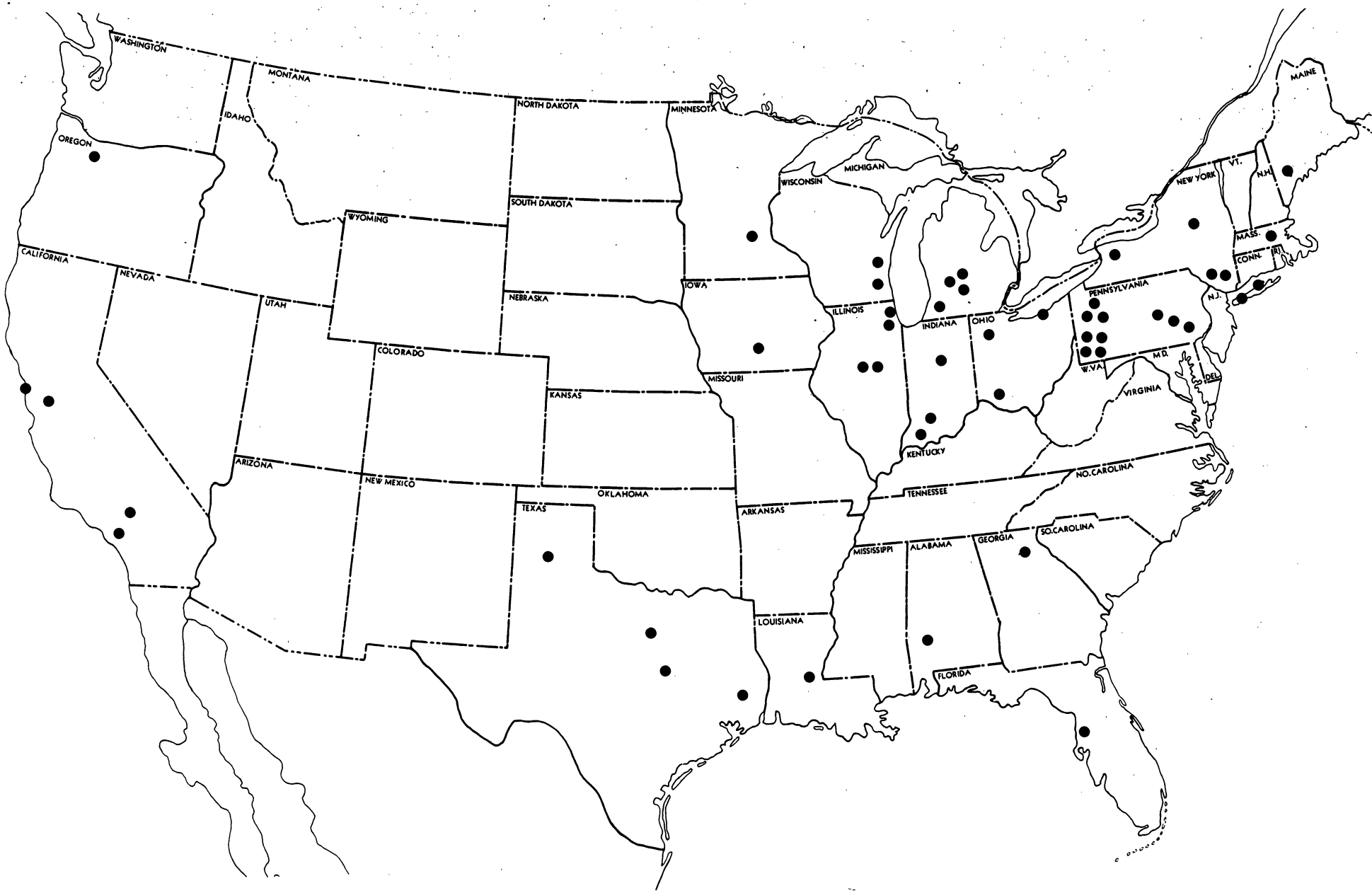

FIGURE 4. — Location of major stadium seat manufacturers in the United States.

Summary and Conclusions

Stadium seats provide a large and growing market for wood. Almost all of the seats in the six Central States studied were made from wood.

There were an estimated 810 stadiums (excluding high school) in the study area with a total seating capacity in excess of 3 million. High schools in Illinois had an estimated one-half million seats. Much of the seating capacity was concentrated in highly populated areas.

The predominant seat types used, in order of importance, were single-board seats, slat seats, chair seats with wood slats, fiberglass seats, and "other" seats. High school stadiums were big users of single-board seats while university and college stadiums were the major users of slat seats. Municipal stadiums and race tracks accounted for most of the chair seats with wood slats. Fiberglass seats were used primarily by race tracks, municipal stadiums, and college and university stadiums.

The factors most frequently cited as reasons for repairing stadium seats were decay, breakage, and splits. These findings suggest that better preservative methods and better quality materials are needed for stadium seats.

Most stadium seats are bought on the basis of competitive bids. Seating is usually purchased from two sources: stadium seating companies, and lumber suppliers or dealers. The source depends upon the type and amount purchased, what sources are locally available, and whether the purchase is for a new stadium or for replacement of seats in an existing stadium. Stadium seat buying is characterized by direct but infrequent purchases, multiple-purchasing influences, and frequent dependence on catalogs.

The demand for stadium seats is a result of the public's demand for outdoor spectator sports — a demand which is increasing rapidly. Several stadiums will be built in the study area within the next 5 years and about one million net board feet of lumber will be used for adding seats to existing stadiums. Repair and replacement of seating will also provide a large market for wood in certain areas.

A significant finding was the recent increased use of fiberglass stadium seats. Indications are that this trend will continue. To meet this competition, firms manufacturing wood seats should experiment with new designs and finishes.

Some Recent Research Papers of the North Central Forest Experiment Station

Thinning Red Pine for High Investment Returns, by Allen L. Lundgren. U. S. Forest Serv. Res. Pap. LS-18, 20 pp., illus. 1965.

Characteristics of Family Campers Using the Huron-Manistee National Forests, by David A. King. U.S. Forest Serv. Res. Pap. LS-19, 11 pp., illus. 1965.

Estimating Crown Fuel Weights of Red Pine and Jack Pine, by James K. Brown. U.S. Forest Serv. Res. Pap. LS-20, 12 pp., illus. 1965.

Balsam Fir Dimension Lumber in Selected Minnesota Markets, by E. M. Carpenter and D. N. Quinney. U.S. Forest Serv. Res. Pap. LS-21, 13 pp., illus. 1965.

Forest Tree Improvement Research in the Lake States, 1965, by Paul O. Rudolf. U.S. Forest Serv. Res. Pap. NC-1, 54 pp. 1966.

Estimating Investment Returns from Growing Red Pine, by Allen L. Lundgren. U.S. Forest Serv. Res. Pap. NC-2, 48 pp., illus. 1966.

Scleroderris Canker on National Forests in Upper Michigan and Northern Wisconsin, by Darroll D. Skilling and Charles E. Cordell. U.S. Forest Serv. Res. Pap. NC-3, 10 pp., illus. 1966.

Effect of Initial Moisture Content on Performance of Hardwood Pallets, by Daniel E. Dunmire. U.S. Forest Serv. Res. Pap. NC-4, 12 pp., illus. 1966.

Forest Genetics and Related Research at the Lake States Forest Experiment Station, An Annotated Bibliography, 1924-1965, by Paul O. Rudolf. U.S. Forest Serv. Res. Pap. NC-5, 35 pp. 1966.

Joint Proceedings, Second Genetics Workshop of the Society of American Foresters and the Seventh Lake States Forest Tree Improvement Conference, October 21-23, 1965, by North Central Forest Experiment Station, U.S. Forest Serv. Res. Pap. NC-6, 110 pp., illus. 1966.

Designing Efficient Logging Systems for Northern Hardwoods, Using Equipment Production Capabilities and Costs, by R. B. Gardner. U.S. Forest Serv. Res. Pap. NC-7, 16 pp., illus. 1966.

THE FOREST SERVICE CREED

The Forest Service of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.