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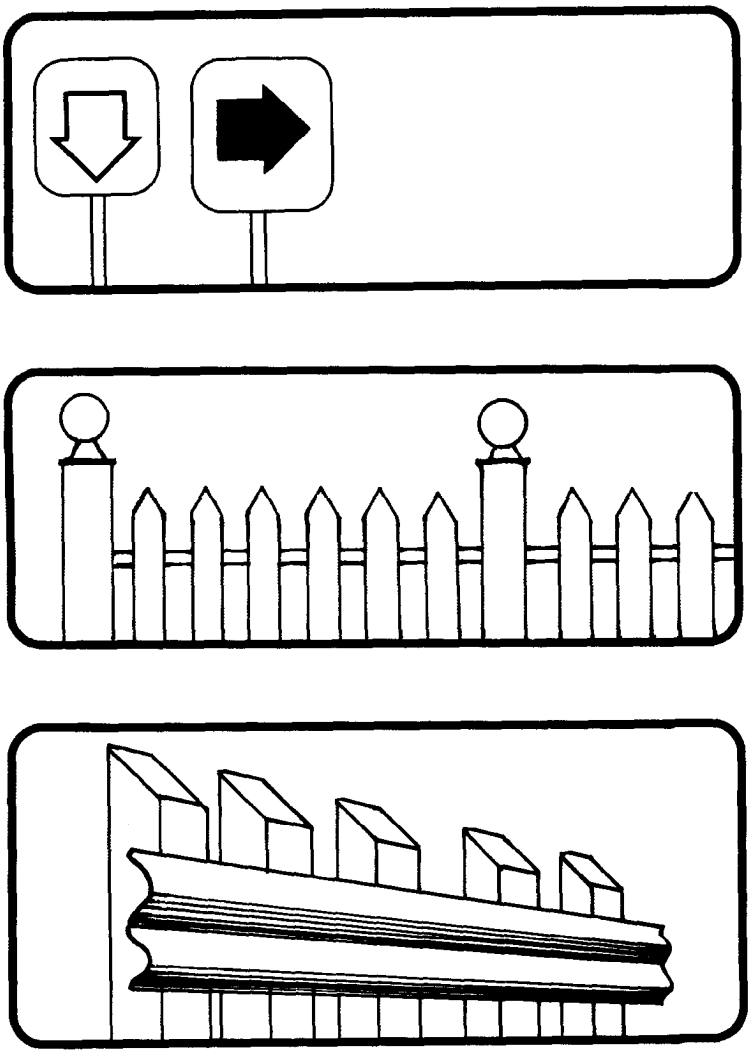
A Profile of the Nonresidential Nonbuilding Construction Market for Lumber and Plywood

Henry Spelter



Abstract

Estimates of the amounts of lumber and plywood used in constructing nonresidential nonbuilding structures in 1982 are presented. The market is stratified by six construction types. Lumber and plywood use is stratified by two end-use categories. Total lumber use is estimated at 507 million board feet. Total plywood use at 362 million square feet (3/8-in. basis). Estimates of lumber and plywood use in nonresidential building construction are presented in a separate report.

Keywords: Lumber, plywood, nonresidential nonbuilding construction, wood use factors.

Highlights

- Expenditures for nonresidential nonbuilding construction in 1982 were $67 billion. An estimated 507 million board feet (fbm) of lumber and 362 million square feet (ft^2) of plywood (3/8-in. basis) were used for this construction. Three fifths of the lumber (311 million fbm) was used for facilitating purposes (concrete forming and form framing). For plywood, 85 percent of the total (309 million ft^2) was used for facilitating. The remaining amounts of lumber and plywood were used for a variety of purposes such as signs, fencing, barricades, shoring, trenching, and temporary structures.

- Use per $1,000 of construction was 7.4 fbm of lumber and 5.3 ft^2 of plywood. Conservation and development projects, consisting of structures such as dams, piers, levees, wharves, etc., were the most intensive users of wood per dollar of construction value. Sewer projects and highway construction were also high while miscellaneous nonbuilding construction, water supply projects, and utility construction were the lowest.

- In 1982, nonresidential nonbuilding construction accounted for approximately 2 percent of U.S. softwood lumber and softwood plywood consumption.

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A Profile of the Nonresidential, Nonbuilding Construction Market for Lumber and Plywood

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Introduction

This survey was undertaken to obtain information on wood use in nonbuilding construction. Until now, relatively little has been known about wood use in this market. Yet, this sector is a significant market for construction materials. In 1982, nonbuilding construction accounted for over $67 billion worth of activity ($45 billion in constant (1977) terms), representing 31 percent of total construction expenditures in that year.[1] This amount includes the following types of construction:

Streets and highways—13.4 billion dollars. Includes federal, state, and local expenditures on streets, highways, tunnels, and bridges.

Conservation and development—5.0 billion dollars. Includes erosion control systems, spillways, levees, seawalls, bulkheads, jetties, river and harbor development, dams, docks, piers, and wharves.

Sewers—5.5 billion dollars. Includes waste disposal plants, pumping stations, and tunnels.

Water supply facilities—2.9 billion dollars. Includes water distribution and storage facilities such as water lines, aqueducts, water pumping stations, dams, reservoirs, and wells.

Utility construction—34.2 billion dollars. Includes electrical generating plants, communications lines, transmission towers, pipelines, gas tanks, and tracking towers.

Other construction—6.2 billion dollars. Includes miscellaneous construction such as airports, stadiums, railroads, subways, and amusement rides.

The combined expenditures on the above types of construction generally are below that for residential and nonresidential buildings. Figure 1 traces yearly activity in the three sectors from 1964 to 1983. It is noteworthy that nonbuilding construction is the least volatile of the three. In the two decades depicted, expenditures on nonbuilding construction have normally been between 45 and 55 billion constant dollars (1977) per year. This relative stability reflects the fact that most such construction is funded by public or quasi-public agencies (such as regulated utilities). This aspect better insulates nonbuilding construction from economic fluctuation than other construction sectors. The relative stability of this market makes it desirable from the viewpoint of forest products manufacturers whose main markets are more vulnerable to economic cycles.

The remainder of this paper describes the survey procedures and presents the findings of the study.

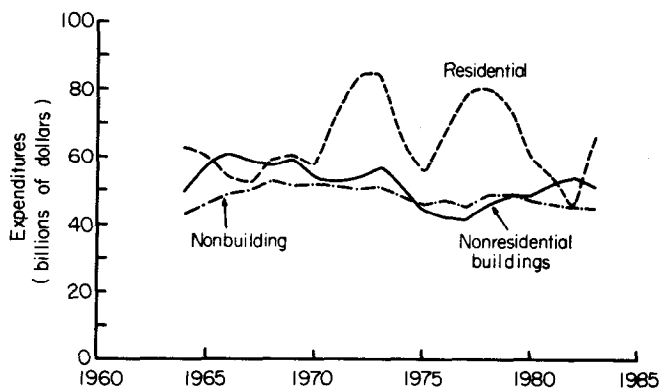

Figure 1 .—Expenditures on U.S. construction, by type (billions of 1977 dollars). (ML85 5306)

'U.S. Bureau of the Census. Construction reports-value of new construction put in place: May 1984. Washington, DC: U.S. Government Printing Office; 19 p.

Procedures

In the summer of 1983, a phone survey of a random sample of general contractors was made to determine purchases of lumber and plywood for the most recent nonbuilding project. Besides the amounts of lumber and plywood purchased, data were collected on the types of use (i.e., concrete forming, scaffolding, barricades, etc.), and the total value of the project. A total of 307 projects made up the sample. Table 1 gives the breakdown of construction type, region, and project value of the projects in the sample.

To extrapolate from the sample to the U.S. total, conversion factors were determined for each of 18 cells containing one of the six building types in one of three size classes. Conversion factors were based on the ratio of total 1982 project values to sample values. The universe of projects was obtained from the F. W. Dodge Company and the U.S. Department of Commerce. Dividing the sample values into the respective universe amounts yielded the conversion factors shown in table 2. Total lumber and plywood use was estimated by applying these factors to reported data for each of the 307 projects. The results are summarized in table 3.

Table 1.—Number of projects surveyed, by type of construction, project value, and region

Project value and region	Streets and highways	Conservation and development	Sewers	Water supply facilities	Utility construction	Other construction	Total
Value							
$1 million or less	79	18	38	17	25	33	210
$1-5 million	16	1	17	4	8	1	**47**
More than $5 million	13	11	8	5	9	4	50
Region							
North	44	8	28	7	9	**19**	**115**
South	38	15	23	6	**20**	11	113
West	26	7	12	13	13	8	79
Total	108	30	63	26	42	37	307

Table 2.—Conversion factors by project type and value

Project value	Streets and highways	Conservation and development	Sewers	Water supply facilities	Utility construction	Other construction
$1 million or less	217	670	112	407	152	397
$1-5 million	80	1,020	44	60	615	783
More than $5 million	20	5	6	14	10	26

Table 3.—Lumber and plywood use in nonbuilding construction, based on 1982 contract awards, by type of constructions of feet (except use factors)

Type of construction	Lumber				Plywood			
	Concrete forming and form framing	Other uses	Total uses	Use per thousand dollars	Concrete forming	Other uses	Total uses	Use per thousand dollars
	fbm				*ft^2(3/8 in.)*			
Streets and highways	59	54	113	8.4	115	30	145	10.8
Conservation and development	89	84	173	34.5	34	3	36	7.2
Sewers	61	13	74	13.4	30	3	33	6.0
Water supply facility	13	3	15	5.2	9	1	10	3.4
Utility construction	72	21	93	2.7	96	4	100	2.9
Other construction	18	21	39	5.5	25	13	38	5.4
Total	311	197	507	7.4	309	53	362	5.3

Total lumber consumption, excluding roundwood products such as poles, posts, and piles, and sawn railroad ties (covered in a separate report), was estimated at 507 million board feet. Total plywood consumption was estimated at 362 million square feet. Over 60 percent of the lumber and 85 percent of the plywood was used for concrete forming or form framing. Only minor amounts were used in the structures themselves. Most of the lumber and plywood not used for forms was used for auxilliary purposes such as scaffolding, signs, shoring, and barricades. Lumber and plywood use in each of six construction categories is described below.

Streets and Highways

With the gradual completion of the interstate highway system in the last 20 years, expenditures on streets and highways have declined. They have also changed in character from primarily new construction to a greater emphasis on repair and maintenance work. Annual expenditures (on a constant dollar basis) in the late seventies and eighties were about one-half of normal levels in the sixties. Since the lowpoint reached in 1980, expenditures have begun a slow trend up (fig. 2).

During 1982, 113 million fbm of lumber was used for street and highway construction. Plywood use was 145 million ft^2. A little more than half of the lumber and three quarters of the plywood were used for forming.

Lumber use per $1,000 of construction was 8.4 fbm. This translates to 12.5 fbm in terms of constant (1977) dollars. For plywood, use per $1,000 was 10.8 ft^2, 16.1 in constant dollar terms.

Compared to previous surveys,[2] lumber use was little changed per $1,000 constant dollars (fig. 3). The 1982 figure of 12.5 fbm lies midway between the 10.4 estimate for 1969-71 and the 15.6 estimate for 1973-75. In terms of end-use, the 1982 results show a decline in the proportion used for forming, from 81 percent to 52 percent. Plywood use was more significantly lower, 16.1 ft^2 per constant $1,000 in 1982 compared to 25 in 1969-71 and 37 in 1973-75. The proportion used for facilitating was also lower, 79 percent in 1982 versus 85 percent earlier.

Conservation and Development

Expenditures for conservation and development are relatively small and have been declining recently (fig. 4). Annual constant dollar expenditures in the eighties have averaged 3.5 billion per year.

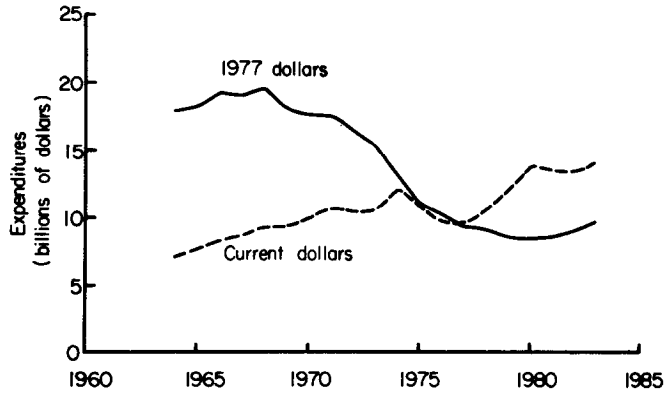

Figure &-Expenditures on street and highway construction. (ML85 5307)

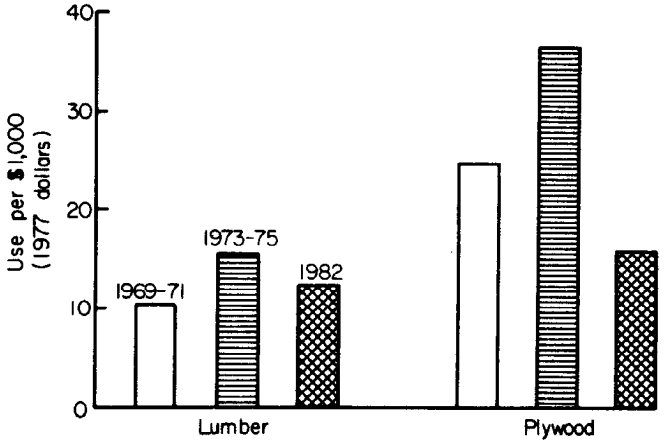

Figure 3.—Lumber and plywood use in highways compared for three periods. (ML85 5308)

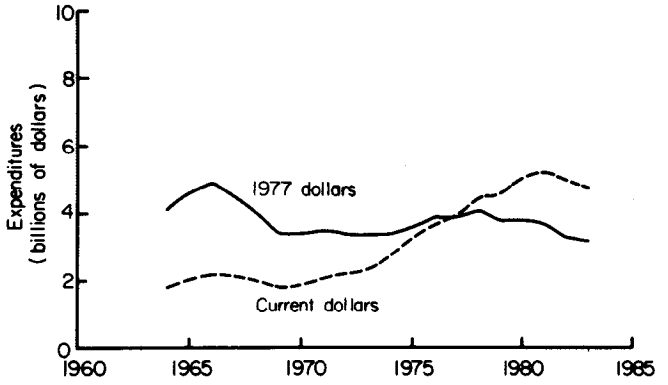

Figure 4.—Expenditures on conservation and development. (ML85 5309)

[2]Reid, William H.; McKeever. David B. Wood products used in constructing highways in the United States. Resour. Bull. FPL 5. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory: 1970; 19 p.

Because this category includes such heavy wood-using structures as docks, piers, and dams, lumber and plywood use is quite high. Use was estimated at 173 million fbm of lumber and 36 million ft^2 of plywood in 1982. Over one-half of the lumber and almost all of the plywood was used for forming.

Translated to use per $1,000, these use rates were 34.5 fbm for lumber and 7.2 ft^2 for plywood.

Depending on the mix of structures, use can fluctuate significantly from period to period. This sector has not been surveyed before in its entirety so no direct comparisons can be made. However, surveys have been made on a subsample-construction by the Army Corps of Engineers.[3] For the two years surveyed, the lumber use rate varied from 21.7 fbm constant $1,000 in 1962 to 12.2 fbm in 1978 (fig. 5). Use per constant $1000 in this survey is 52.4 fbm. For plywood, the 1962, 1978, and 1982 use ratios are 4.8, 7.1, and 10.8 ft^2, respectively.

Sewers

Expenditures on sewers are cyclical and loosely follow general economic conditions. With a high level of residential development in the seventies, expenditures in this sector were also high. But the downturn in economic conditions in the eighties led to a sharp decline in this activity as well (fig. 6).

This is a relatively high wood-using market, with over 74 million fbm of lumber and 33 million ft^2 of plywood consumed in 1982. Usage rates per $1,000 of expenditures were 13.4 fbm for lumber and 6.0 ft^2 for plywood. Approximately 90 percent of both lumber and plywood was used for facilitating.

Estimates for two prior years' use are available.[4] For 1962 and 1971, lumber use per constant $1,000 was estimated at 24.4 and 25.2 fbm, respectively. The 1982 figure is 20.4 fbm (fig. 7). For plywood, estimates for 1962, 1971, and 1982 are 5.4, 22.2, and 9.0 ft^2, respectively.

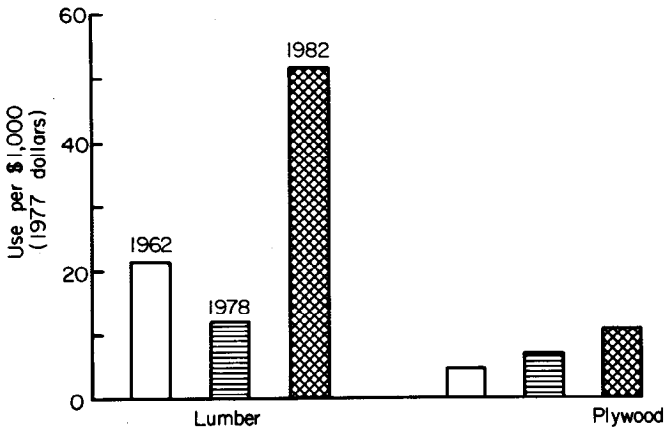

Figure 5.—Lumber and plywood use in conservation and development compared for three years. (Construction for two of the three years compared is **based** *on a subsample only.) (ML85 5310)*

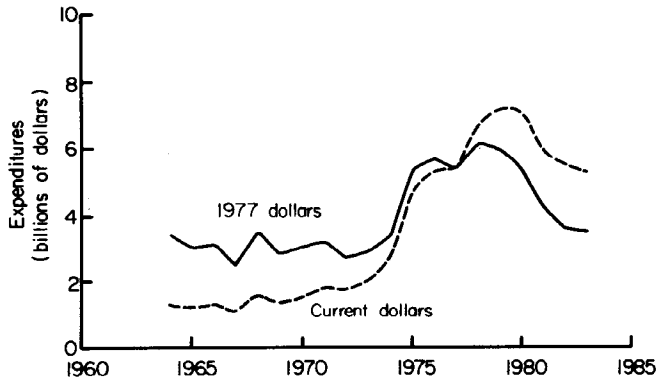

Figure 6.—Expenditures on sewers. (ML85 5311)

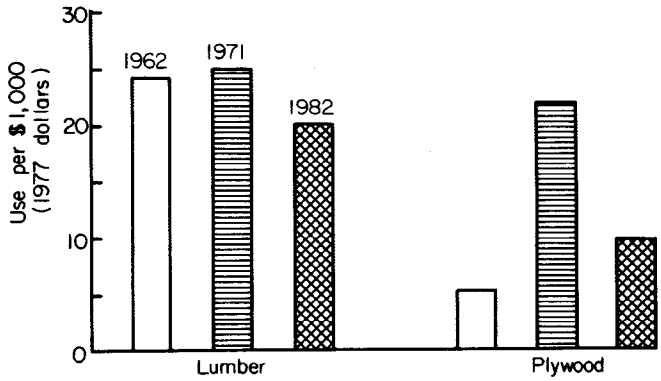

Figure 7.—Lumber and plywood use in sewers compared for three years. (ML85 5312)

Water Supply Facilities

Expenditures on water supply facilities have averaged a little over 2 billion constant dollars annually (fig. 8). They have been below that in the recession-affected eighties.

Approximately 15 million fbm of lumber and 10 million ft^2 of plywood were used in 1982. Around 80 percent of the lumber and 95 percent of the plywood was used for forming. Use rates per $1,000 are 5.2 fbm of lumber and 3.4 ft^2 of plywood. In constant dollars, these figures translate to 7.9 fbm and 5.1 ft^2 for lumber and plywood, respectively.

This sector has not been surveyed before so comparisons are not available.

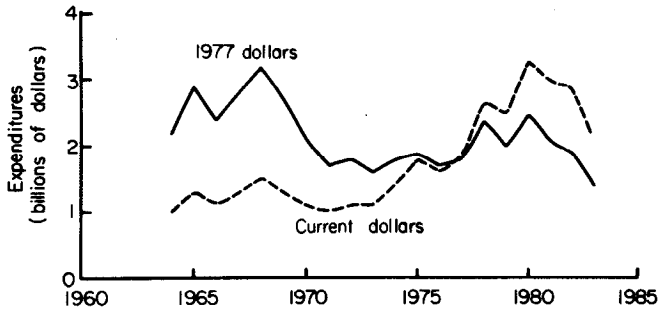

Figure 8.—Expenditures on water supply facilities. (ML85 5373)

Utility Construction

Expenditures by utilities have averaged about 23 billion constant dollars per year in the last 5 years (fig. 9). Expenditures for electric light and power constitute over 60 percent of the total, followed by telephone and telegraph (21 pct) and gas (10 pct). Railroads and petroleum pipelines account for the remaining 6 percent.

An estimated 93 million fbm of lumber and 100 million ft^2 of plywood were consumed by this category in 1982. Three quarters of the lumber and almost all of the plywood used were for forming.

Use per $1,000 of construction was 2.7 fbm for lumber and 2.9 ft^2 for plywood. These use rates translate to 3.8 fbm of lumber and 4.3 ft^2 of plywood per 1,000 constant dollars.

No previous surveys have been published against which these figures could be compared.

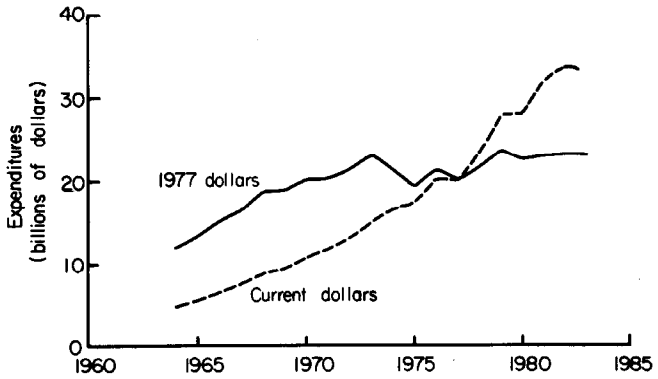

Figure 9.—Expenditures on utility construction. (ML85 5314)

Other Construction

Expenditures on all other nonbuilding construction (except military construction, see Reid and McKeever[5]) range between 4 and 5 billion constant dollars per year (fig. 10). This category of construction required an estimated 39 million fbm of lumber and 38 million ft^2 of plywood in 1982. Use factors were 5.5 fbm for lumber and 5.4 ft^2 for plywood (8.5 and 8.3 per 1,000 constant dollars, respectively). There is no comparable prior survey data for this sector.

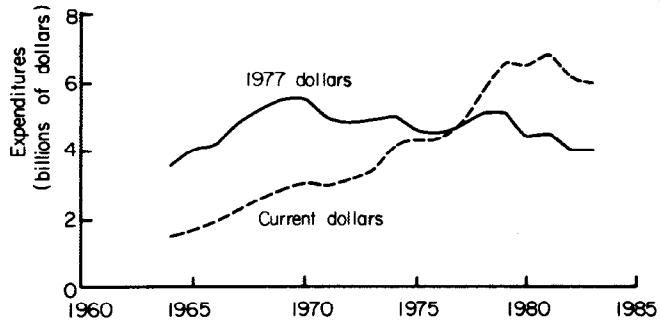

Figure 10.—Expenditures on other construction. (ML85 5315)

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[3]Reid, William H.; McKeever, David B. Wood products used in constructing conservation and development projects by the Corps of Engineers–1962 and 1978. Resour. Bull. FPL 9. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory; 1979. 12 p.

[4]U.S. Department of Commerce. Material requirements for sewer works construction. Construction Review January 1979.

[5]Reid, William H.; McKeever, David B. Wood products used in military construction. Resour. Bull. FPL 8. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory; 1980. 12 p.

Summary

Nonresidential nonbuilding construction encompasses a wide spectrum of structures. A common feature of most is that little lumber or plywood is used in the structures themselves. Instead, lumber and plywood are used primarily for concrete forming and other auxilliary uses. This limits the market potential because wood products for these applications are reusable numerous times. Only in special structures, such as amusement rides, docks, and piers, is wood use high.

Although the market potential is relatively modest in size, this sector offers suppliers a relatively stable environment with modest year-to-year changes in comparison with other construction sectors. And because use is primarily confined to facilitating and auxilliary purposes, there is less competition from other materials. In this regard, steel forms represent the foremost alternative to lumber and plywood in concrete forming. Steel forms are reusable more often, making them competitive in large repetitive jobs. But in smaller or more variable projects, where form shapes are variable, lumber and plywood's ease of use and low cost make them the first choice of most contractors surveyed.

Comparisons with previous studies are shaky because of the variability of wood use possible within a construction type. Standard errors for individual categories in this survey were quite high (table 4). However, the standard errors for the survey as a whole were less extreme, 30 percent for lumber and 9 percent for plywood.

Although the individual components of nonbuilding activity have exhibited significant changes, the sector overall has not grown much in the past couple of decades. To increase wood use therefore, new applications for wood need to be found. One possible area is bridge construction, which is currently dominated by steel and concrete. The use of wood for sound barriers and fences around highways and streets represents another area of opportunity.

Table 4—Standard error of estimates of lumber and plywood use

Construction type	Lumber		Plywood	
	Use	Standard error	Use	Standard error
	---- Million fbm -----		*Million ft² (3/8 in.)*	
Streets and highways	113	31	145	50
Conservation and development	173	321	36	26
Sewers	74	207	33	36
Water supply facilities	15	11	10	10
Utility construction	93	86	100	33
Other construction	39	18	38	8
Total	507	151	362	32

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