U. S. DEPARTMENT OF COMMERCE

BUILDING MATERIALS AND STRUCTURES

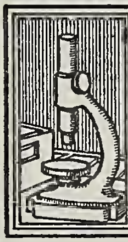
REPORT BMS11

Structural Properties of the Curren Fabrihome Corporation's "Fabrihome" Constructions for Walls and Partitions

by

HERBERT L. WHITTEMORE
AMBROSE H. STANG, *and*
VINCENT B. PHELAN

NATIONAL BUREAU OF STANDARDS



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ISSUED DECEMBER 28, 1938

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Foreword

This report is one of a series issued by the National Bureau of Standards on the structural properties of constructions intended for low-cost houses and apartments. Practically all of these constructions were sponsored by groups within the building industry which advocate and promote the use of such constructions and which have built and submitted representative specimens as outlined in report BMS2, Methods of Determining the Structural Properties of Low-Cost House Constructions. The sponsor is responsible for the representative character of the specimens and for the detailed description given in each report. The Bureau is responsible for the accuracy of the test data.

This report covers only the load-deformation relations and strength of the structural elements submitted when subjected to transverse, concentrated, and impact loads by standardized methods simulating the loads to which the elements would be subjected in actual service. It may be feasible to determine later the heat transmission at ordinary temperatures and the fire resistance of these same constructions and perhaps other properties.

The National Bureau of Standards does not "approve" a construction, nor does it express an opinion as to the merits of a construction, for reasons given in reports BMS1 and BMS2. The technical facts on these and other constructions provide the basic data from which architects and engineers can determine whether a construction meets desired performance requirements.

Lyman J. Briggs, *Director.*

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ABSTRACT

For the program on the determination of the structural properties of low-cost house constructions, the Curren Fabrihome Corporation submitted 18 specimens representing their "Fabrihome" constructions for walls and partitions.

The specimens were subjected to transverse, concentrated, and impact loads. The loads were applied to both faces of wall specimens. For each of these loads three like specimens were tested. The deformation under load and the set after the load was removed were measured for uniform increments of load up to the maximum load, except for concentrated loads, for which the set only was determined. The results are presented graphically and in tables.

I. INTRODUCTION

In Order to provide technical facts on the performance of constructions which might be used in low-cost houses, to discover promising constructions, and ultimately to determine the properties necessary for acceptable performance, the National Bureau of Standards has invited the building industry to cooperate in a program of research on building materials and structures for use in low-cost houses and apartments. The objectives of this program are described in report BMS1, Research on Building Materials and Structures for Use in Low-Cost Housing,[1] and that part of the program relating to structural properties in report BMS2, Methods of Determining the Structural Properties of Low-Cost House Constructions.[2]

As a part of the research on structural properties, six masonry wall constructions have been subjected to a series of standardized laboratory tests to provide data on the properties of some constructions for which the behavior in service is generally known. These data are given in report BMS5, Structural Properties of Six Masonry Wall Constructions.[3] Similar tests have been made on wood-frame constructions by the Forest Products Laboratory of the United States Department of Agriculture, the results of which will be given in a subsequent report in this series.

This report describes the structural properties of constructions sponsored by one of the manufacturers in the building industry. The specimens were subjected to transverse, concentrated, and impact loads, simulating the loads to which the elements of a house are subjected. The wall specimens were not subjected to compressive and racking loads because for this construction these loads are carried by the concrete frame of the building. In actual service, transverse loads on a wall are produced by the wind, and concentrated and impact loads by furniture or accidental contact with heavy objects. For nonload-bearing partitions, impact loads may be applied accidentally by furniture or by a person falling against the partition, and concentrated

[1] Price 10 cents. See cover page II.

[2] Price 10 cents.

[3] Price 15 cents.

loads by furniture or by a ladder or other object leaning against the partition.

The deflection and set under each increment of load were determined except for concentrated loads. For some of the newer constructions the deflection and set are important when judging whether the construction will be satisfactory in a house under service conditions.

II. SPONSOR AND PRODUCT

The Specimens were submitted by the Curren Fabrihome Corporation, Quincy, Mass., and represented constructions sold under the trade name "Fabrihome." The specimens were manufactured by the Johnson Metal Products Co., Erie, Pa. These constructions consisted of nonload-bearing panels having welded sheet-steel frames with plywood outside faces and gypsum-board inside faces for walls and gypsum-board faces for partitions. The panels were designed to be fitted into a concrete frame and fastened by springs.

III. SPECIMENS AND TESTS

The Specimens represented two elements of a house which were assigned the following symbols: Wall, *AP;* and partition, *AQ*. The specimens were assigned designations in accordance with table 1.

Table 1.—*Specimen designations*

Element	Construction symbol	Specimen designation	Load	Load applied
Wall	*AP*	*T1, T2, T3*	Transverse	Inside face.
Do	*AP*	*T4, T5, T6*	do	Outside face.
Do	*AP*	*P1, P2, P3* [a]	Concentrated	Inside face.
Do	*AP*	*P4, P5, P6* [a]	do	Outside face.
Do	*AP*	*I1, I2, I3*	Impact	Inside face.
Do	*AP*	*I4, I5, I6*	do	Outside face.
Partition	*AQ*	*T1, T2*	Transverse	"Inside" face. [b]
Do	*AQ*	*T4*	do	"Outside" face. [b]
Do	*AQ*	*P1, P2, P3* [a]	Concentrated	Either face.
Do	*AQ*	*I1, I2*	Impact	"Inside" face. [b]
Do	*AQ*	*I4*	do	"Outside" face. [b]

[a] These specimens were undamaged portions of the specimens used for the transverse tests.

[b] "Inside" and "outside" faces refer to the corresponding faces of a wall specimen.

The specimens were tested in accordance with BMS2, Methods of Determining the Structural Properties of Low-Cost House Constructions,[4] which also gives the requirements for the specimens and for determining the price. Because the constructions were unusual, it was necessary to make minor changes in the test procedure. Since the wall panels fit into a concrete frame which carries the compressive and racking loads, the wall specimens were not tested under these loads. The transverse and impact loads were applied to the specimens supported in a steel test frame furnished by the sponsor to represent the concrete frame of a building. Transverse loads were applied to the partition specimens at the request of the sponsor to determine whether the strength of the fastenings was adequate.

The tests were begun on January 31 and completed February 7, 1938. The sponsor's representative witnessed the tests.

IV. WALL *AP*

1. Sponsor's Statement

(*a*) *Materials*

Steel.—Hot-rolled strip, "Bonderized" finish.

Welds.

Arc.

Spot.

Paint.

Priming, dark olive-green. Glidden Co.

Aluminum.

Plywood.—Douglas-fir, 3 ply.

Gypsum board.—Fireproof wallboard. United States Gypsum Co.'s "Sheetrock."

Screws.—Self-tapping, ¾ in., No. 6 (0.138-in. diam), 18 threads per in., flat countersunk head, hardened, and plated with cadmium. Parker-Kalon Corporation.

Washers.—Steel, 19/32-in. diam, 0.049 in. thick, plated with cadmium.

Filler.—United States Gypsum Co.

(*b*) *Description*

The wall specimens were 8 ft 0 in. high, 4 ft 0 in. wide, and 5¼ in. thick. Each specimen consisted of a sheet-steel frame to which the inside and outside faces were fastened. The frame had two sheet-steel inner studs, *A*, as shown in figure 1, and sheet-steel outer studs, *B* and *C*. The ends of the studs were beveled

[4] Price 10 cents.

to fit the concrete frame of a house. The webs of each stud had stiffener angles, *D*, fastened to the web by spot welds. The studs were fastened by arc welds to three horizontal cross braces, *E*, and the assembled frame was covered with

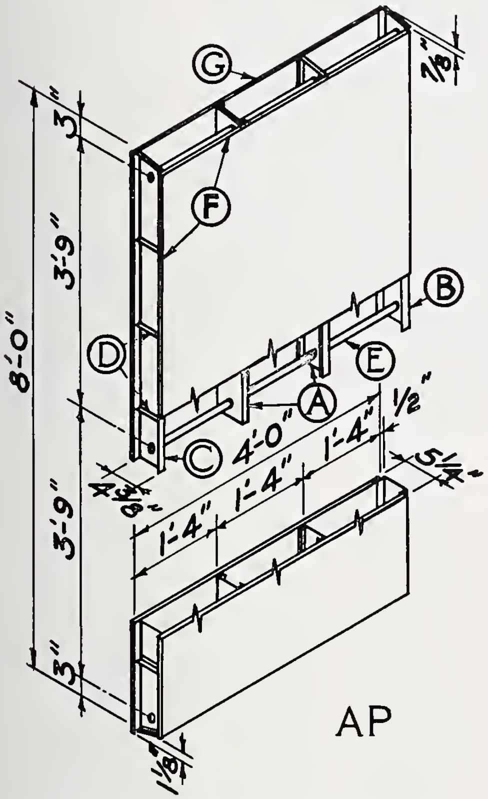

FIGURE 1.—*Wall specimen AP.*

A, inner stud; *B*, outer stud; *C*, outer stud; *D*, stiffener angle; *E*, cross brace; *F*, outside face; *G*, inside face.

two coats of priming paint applied by spraying. A plywood outside face, *F*, and a gypsum-board inside face, *G*, were fastened to the frame by screws. The faces and the outside of the webs of the outer studs were covered with one coat of aluminum paint applied by spraying.

The price of "Fabrihome" wall panels as used in a house is $0.33/ft². This price includes phenolic-resin bonded plywood outside faces and 2-in. rock-wool insulation.

Inner studs.—The inner studs, *A*, were channels, 4⅜ by ⅞ in., 8 ft 0 in. long, with flanges turned in ⅜ in., and formed from sheet steel, No. 20 United States Standard Gage (0.0368 in. thick). The webs had three holes, 1¼-in. diam, spaced 3 ft 9 in. on centers, to receive the cross braces.

Outer studs.—The outer stud, *B*, was a channel, 4⅜ by 1⁵⁄₁₆ in., 8 ft 0 in. long, formed from sheet steel, No. 20 United States Standard Gage (0.0368 in. thick). The flanges faced inward and the web extended ½ in. beyond the edges of the faces. In a house it would fit between the flanges of the adjacent panel.

The outer stud, *C*, was a channel, 4⅜ in. by 1 in., 8 ft 0 in. long, formed from sheet steel, No. 20 United States Standard Gage (0.0368 in. thick). The flanges faced outward and were flush with the edges of the faces.

Both outer studs had holes, 1¼-in. diam, spaced 3 ft 9 in. on centers, to receive the cross braces.

Stiffener angles.—The stiffener angles, *D*, were ½ by ½ in., 4¹⁹⁄₆₄ in. long, formed from sheet steel, No. 20 United States Standard Gage (0.0368 in. thick). Eight angles, spaced about 1 ft 1½ in., were fastened by spot welds to the web of each stud.

Cross braces.—The cross braces, *E*, were tubes, 1¼-in. diam, 3 ft 11¾ in. long, formed from sheet steel, No. 20 United States Standard Gage (0.0368 in. thick). The cross braces extended through the webs of each of the four studs and were fastened by fillet welds made by the electric arc process.

Outside face.—The outside face, *F*, was one piece of plywood, 7 ft 10 in. by 4 ft 0 in. by ⅜ in., fastened to the studs by screws and washers, spaced 1 ft 6 in. on centers. The washers and the heads of the screws were countersunk and pointed with filler.

Inside face.—The inside face, *G*, was gypsum board, 8 ft 0 in. by 4 ft 0 in. by ½ in., fastened by screws and washers and pointed in the same manner as the outside face.

(*c*) *Test Frame*

The test frame is shown in figure 2. The sides, *A*, and the ends, *B*, were steel channels, 6 by 2 by 0.20 in., 8.2 lb/ft, connected at each corner by a steel corner angle, *C*, 4 by 3½ by ⅜ in., 4½ in. long, welded to the end and fastened to the side by two ⅝-in. bolts and aligned by two ⁵⁄₁₆-in. dowel pins. The ends were set at an angle to represent the beveled groove in the concrete frame of a house and each end was braced by a ⅝-in. tie rod, *D*, and a strut, *E*. The tie rods were tightened by nuts on the threaded ends. The stops, *F*, were angles, 1½ by 1½ by ⅜ in., fastened at each end to the side channels by bolts.

The specimens were placed in the test frame with the inside face of wall specimens and the

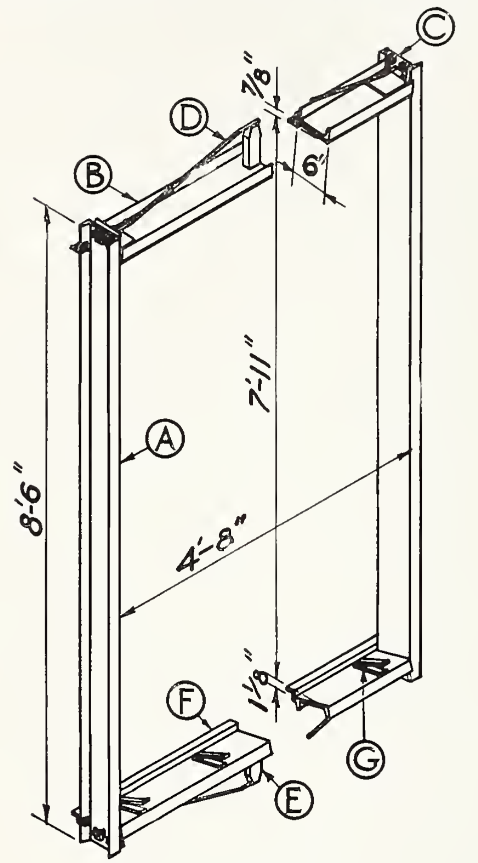

FIGURE 2.—*Test frame.*

A, side; *B*, end; *C*, corner angle; *D*, tie rod; *E*, strut; *F*, stop; *G*, spring.

corresponding face of partition specimens bearing against the stops, *F*. Sheet-steel angles, 1 by ½ by 0.043 in. protected the edges of the inside faces at each end of the specimens. Either two or three strips of asphalt roofing, 60 lb/108 ft ^{2}, were placed between the upper ends of the specimens and the end of the test frame and the specimens were fastened in the test frame by four wedge-shaped springs, *G*, one under each stud. Each spring when compressed so that the sides were parallel exerted a force of about 400 lb.

The test frame with the frame of a wall specimen in place is shown in figure 3. The tongs used for inserting the springs are also shown as well as a strip of the asphalt roofing used between the upper end of the specimen and the test frame.

2. Transverse Load

Wall specimen *AP–T4* under transverse load is shown in figure 4. The test frame was supported at each corner by blocks, *A*, which raised the lower face of the specimen above the beam, *B*. The specimen was supported by the ends and stops of the test frame and did not touch the sides. The transverse loads were

FIGURE 3.—*Test frame with the frame of a wall specimen in place.*

applied by the method described in report BMS2 through plates, *C*, and loading rollers, *D*. The plates and loading rollers did not touch the test frame. The span was taken as 7 ft 11 in., the length of the specimen midway

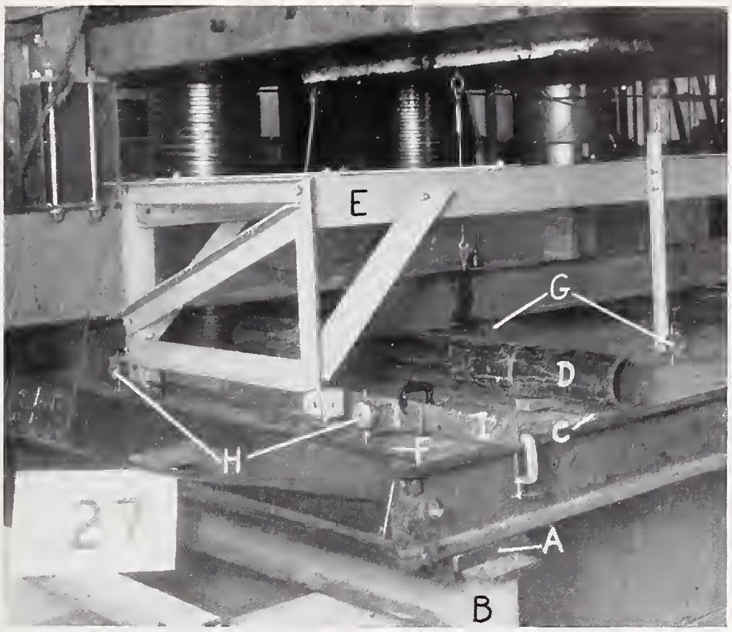

FIGURE 4.—*Wall specimen AP–T4 under transverse load.*

A, block; *B*, beam; *C*, plate; *D*, loading roller; *E*, deflection-measuring frame; *F*, plate; *G*, dial micrometer; *H*, dial micrometer; *I*, angle.

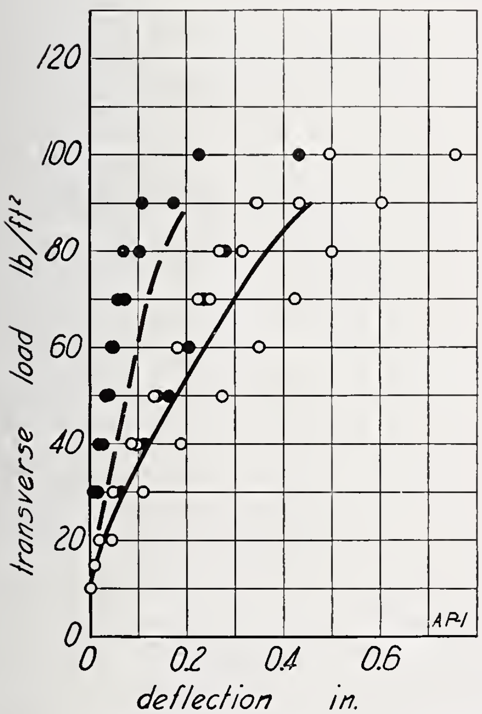

FIGURE 5.—*Transverse load on wall AP, load applied to inside face.*

Load-deflection and load-set results for specimens *AP–T1*, *T2*, and *T3*. The specimens were supported on a span of 7 ft 11 in. The deflections and sets are for a gage length of 7 ft 6 in., the gage length of the deflection-measuring frame.

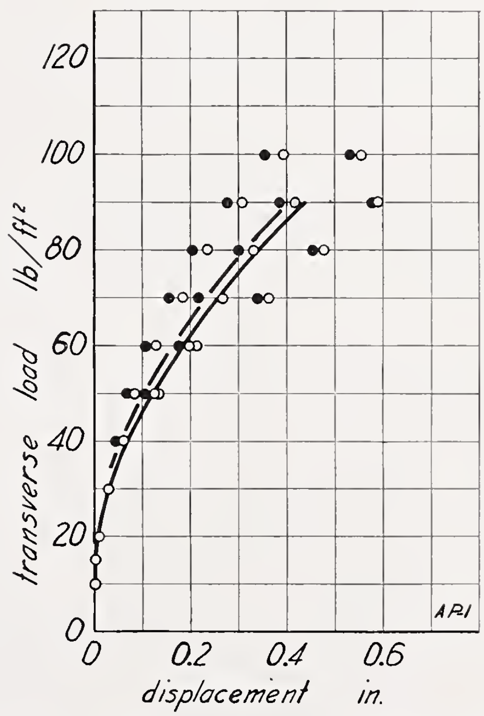

FIGURE 6.—*Transverse load on wall AP, load applied to inside face.*

Load-displacement and load-set results for specimens *AP–T1*, *T2*, and *T3*. The specimens were supported on a span of 7 ft 11 in.

between the faces. The deflection of each specimen for a gage length of 7 ft 6 in. was measured with the deflection-measuring frame described in report BMS2, section VI-2 (c).

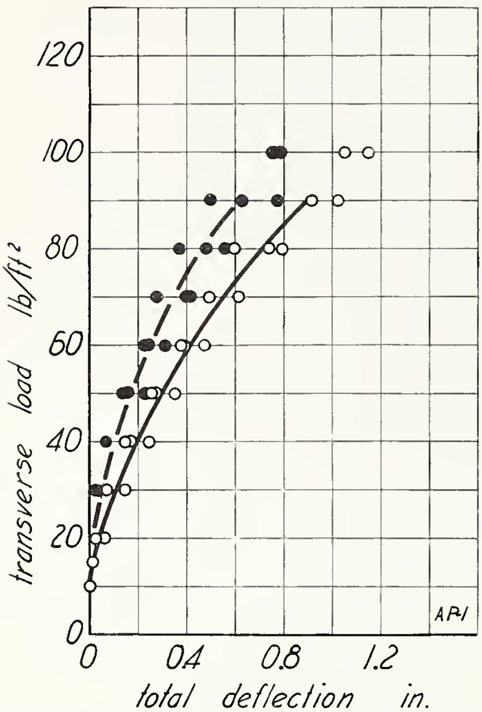

FIGURE 7.—*Transverse load on wall AP, load applied to inside face.*

Load-total deflection and load-total set results for specimens *AP–T1, T2,* and *T3.* The specimens were supported on a span of 7 ft 11 in. For each specimen the total deflection for each load is the sum of the deflection for that load given in figure 5 and the displacement for the same load given in figure 6.

The frame, *E*, rested on a steel plate, *F*, on the upper face of the specimen. The plate, *F*, did not touch the test frame. The deflection was measured by the two dial micrometers, *G*. The deflection for each dial micrometer was the difference between the reading of the dial micrometer under load and the initial reading. The deflection of the specimen was the average of the deflection for each dial micrometer. The displacement of each specimen with respect to the test frame was measured with four dial micrometers, *H*, two near each end of the specimen. The two dial micrometers near each end were attached to an angle, *I*, fastened to the sides of the test frame. The spindles of the dial micrometers were on the same transverse line as the supports for the deflection-measuring frame and were in contact with the plate, *F*. The displacement for each dial-micrometer was the difference between the reading of the dial micrometer under load and the initial reading. The displacement of the specimen was the average of the displacements for each dial micrometer. The total deflection for each specimen was the sum of the deflection and the displacement for each load. The sets after each load had been applied were obtained in a similar manner.

The results are shown in table 2 and figures 5, 6, and 7 for wall specimens *AP–T1, T2,* and *T3,* loaded on the inside face, and in figures 8, 9, and 10 for wall specimens *AP–T4, T5,* and *T6,* loaded on the outside face.

Each of the specimens *T1, T2,* and *T3* failed by buckling of one or more studs either under

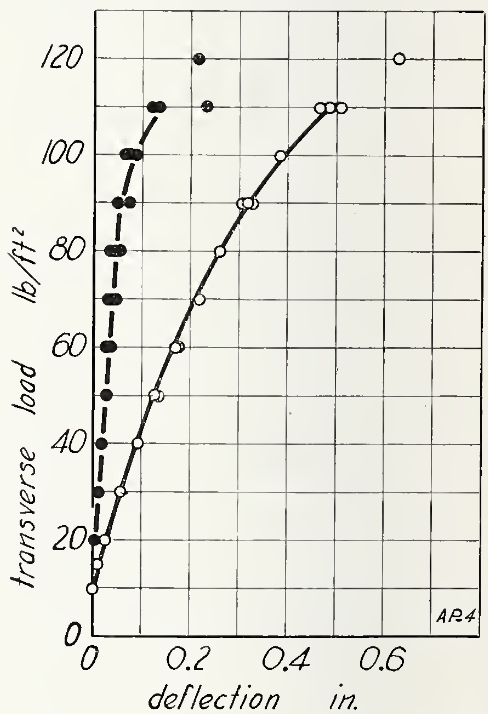

FIGURE 8.—*Transverse load on wall AP, load applied to outside face.*

Load-deflection and load-set results for specimens *AP–T4, T5,* and *T6.* The specimens were supported on a span of 7 ft 11 in. The deflections and sets are for a gage length of 7 ft 6 in., the gage length of the deflection-measuring frame.

one loading roller or at the middle cross brace. In addition, for specimen *T1*, some of the springs slipped out from between the lower end of the specimen and the test frame.

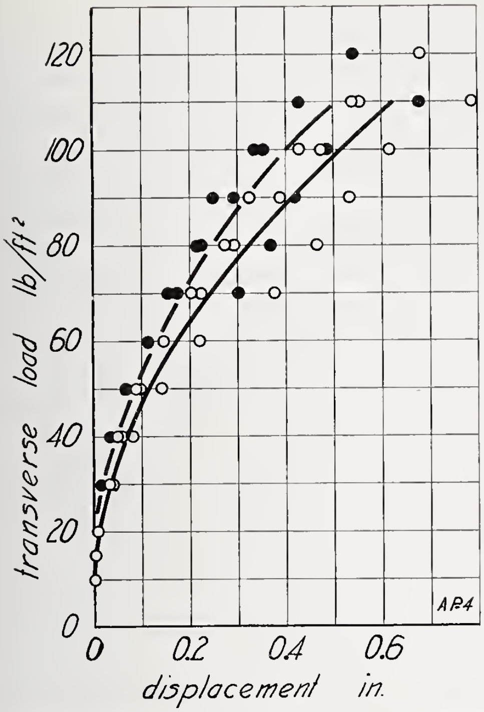

FIGURE 9.—*Transverse load on wall AP, load applied to outside face.*

Load-displacement and load-set results for specimens *AP-T4*, *T5*, and *T6*. The specimens were supported on a span of 7 ft 11 in.

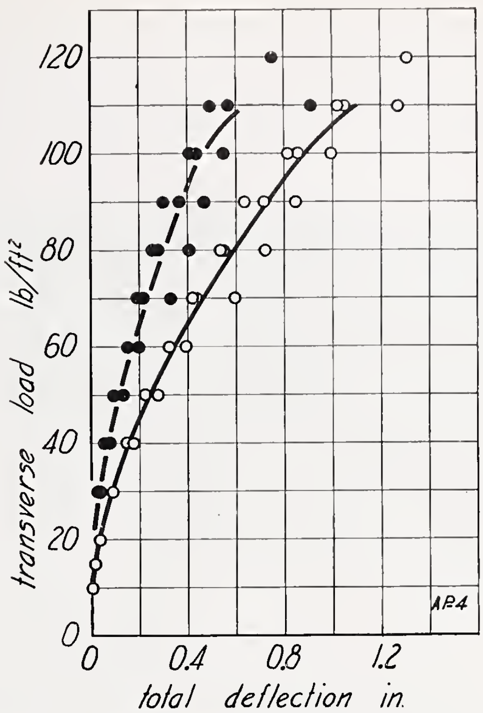

FIGURE 10.—*Transverse load on wall AP, load applied to outside face.*

Load-total deflection and load-total set results for specimens *AP-T4*, *T5*, and *T6*. The specimens were supported on a span of 7 ft 11 in. For each specimen the total deflection for each load is the sum of the deflection for that load given in figure 8 and the displacement for the same load given in figure 9.

TABLE 2.—*Structural properties of wall AP* [*weight, 4.17 lb/ft²*]

Load	Load applied	Specimen designation	Failure of loaded face, height of drop	Failure of opposite face, height of drop	Maximum height of drop	Maximum load
			ft	*ft*	*ft*	*lb/ft²*
Transverse	Inside face; span, 7 ft 11 in.	*T1*				95
		T2				106
		T3				100
Average						100
Transverse	Outside face; span, 7 ft 11 in.	*T4*				110
		T5				114
		T6				125
Average						116
						lb
Concentrated	Inside face	*P1*				150
		P2				146
		P3				145
Average						147
Concentrated	Outside face	*P4*				800
		P5				904
		P6				825
Average						843
Impact	Inside face; span, 7 ft 11 in.	*I1*	1.0	6.0	6.0	
		I2	1.0	5.0	5.0	
		I3	1.0	([a])	5.5	
Average			1.0		5.5	
Impact	Outside face; span, 7 ft 11 in.	*I4*	7.0	2.0	7.5	
		I5	([a])	3.5	7.0	
		I6	8.0	2.0	8.0	
Average				2.5	7.5	

[a] Did not fail.

For specimens *T4*, *T5*, and *T6* one or more studs buckled either under one loading roller or at the middle cross brace, and the two inner studs shortened and dropped off the stops, *F* (fig. 2), of the test frame. In addition, for specimens *T4* and *T5*, the lower edge of the inside face between the studs and the stop crushed.

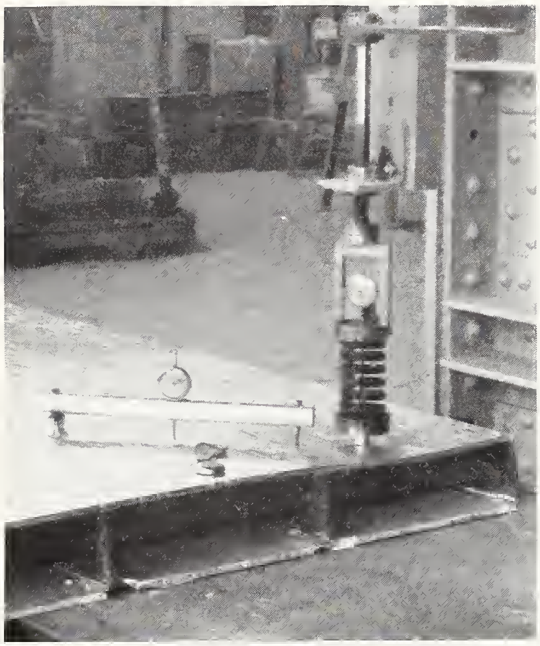

Figure 11.—*Wall specimen AP–P4, under concentrated load.*

3. Concentrated Load

Wall specimen AP–P4 under concentrated load is shown in figure 11. The results are shown in table 2 and in figure 12 for wall specimens *AP–P1*, *P2*, and *P3*, loaded on the inside face, and in figure 13 for wall specimens *AP–P4*, *P5*, and *P6*, loaded on the outside face.

Each of the specimens failed by punching of the disk through the face of the specimen.

4. Impact Load

The results are shown in table 2 and in figure 14 for wall specimens *AP–I1*, *I2*, and *I3*, loaded on the inside face, and in figure 15 for wall specimens *AP–I4*, *I5*, and *I6*, loaded on the outside face.

Each of the specimens *I1*, *I2*, and *I3* failed by rupture of the inside face, followed by bending of the middle cross brace and buckling of each stud at midspan, and finally, by the specimen being pushed from the test frame. For specimens *I1* and *I2* the outside face also split at one edge near midspan.

Each of the specimens *I4*, *I5*, and *I6* failed by the inside face falling down in pieces, by buckling of each stud, and finally, by the specimen being pushed from the test frame. For specimens *I4* and *I6* the outside face also split at one edge near midspan.

V. PARTITION *AQ*

1. Sponsor's Statement

The partition specimens were the same as the wall specimens, *AP*, except that both faces were gypsum boards, ½ in. thick.

The price of this construction was $0.245/ft².

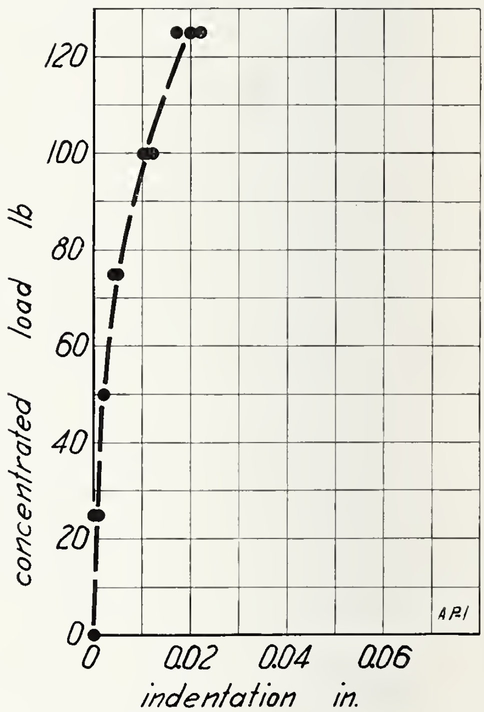

Figure 12.—*Concentrated load on wall AP, load applied to inside face.*

Load indentation results for specimens *AP–P1*, *P2*, and *P3*.

2. Transverse Load

For the program on the determination of the structural properties, partitions are not subjected to transverse loads. However, partition specimens of this construction were subjected to transverse loads at the request of the sponsor to determine whether the strength of the fastenings was adequate. Three specimens only were tested, the load being applied to the "inside" faces of two specimens and to the "outside" face of the third.

The results are shown in table 3 and in figures 16, 17, and 18 for partition specimens *AQ–T1* and *T2* loaded on the "inside" face, and in figures 19, 20, and 21 for partition specimen *T4*, loaded on the "outside" face.

TABLE 3.—*Structural properties of partition AQ* [*weight, 5.10 lb/ft* ²]

Load	Load applied	Specimen designation	Failure of loaded face, height of drop	Failure of opposite face, height of drop	Maximum height of drop	Maximum load
			ft	*ft*	*ft*	*lb/ft* ²
Transverse	"Inside" face; span, 7 ft 11 in.	*T1*				100
		T2				94
Average						97
Transverse	"Outside" face; span, 7 ft 11 in.	*T4*				115
						lb
Concentrated	One face	*P1*				145
		P2				145
		P3				141
Average						144
Impact	"Inside" face; span, 7 ft 11 in.	*I1*	1.0	3.5	4.0	
		I2	1.0	2.5	3.0	
Average			1.0	3.0	3.5	
Impact	"Outside" face; span, 7 ft 11 in.	*I4*	1.0	3.0	4.0	

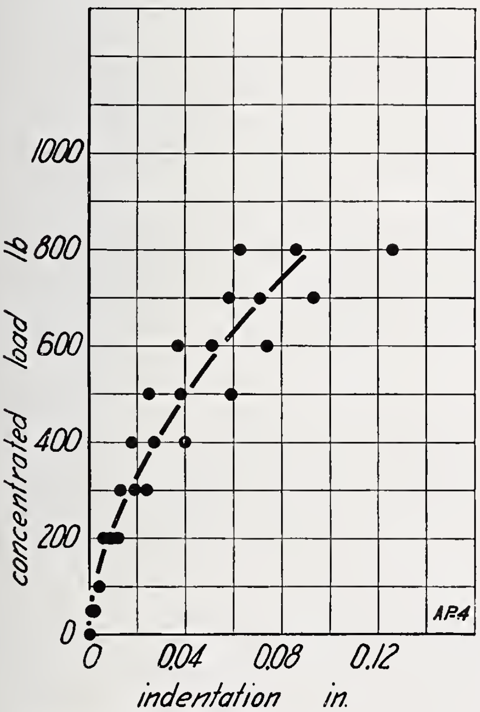

FIGURE 13.—*Concentrated load on wall AP, load applied to outside face.*

Load-indentation results for specimens *AP–P4, P5*, and *P6*.

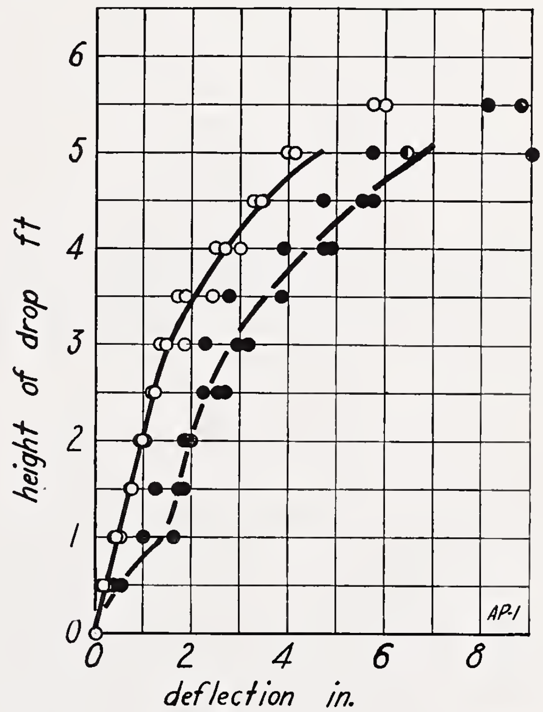

FIGURE 14.—*Impact load on wall AP, load applied to inside face.*

Height of drop-deflection and height of drop-set results for specimens *AP–I1, I2*, and *I3*. The specimens were supported on a span of 7 ft 11 in. The set, measured to the inside face, is greater than the deflection, measured to the outside face, because the inside face was broken by the impact of the sand bag.

Each of the specimens failed by buckling of each stud at the middle cross brace.

3. Concentrated Load

The results for partition specimens *AQ–P1*, *P2*, and *P3*, are shown in table 3 and in figure 22.

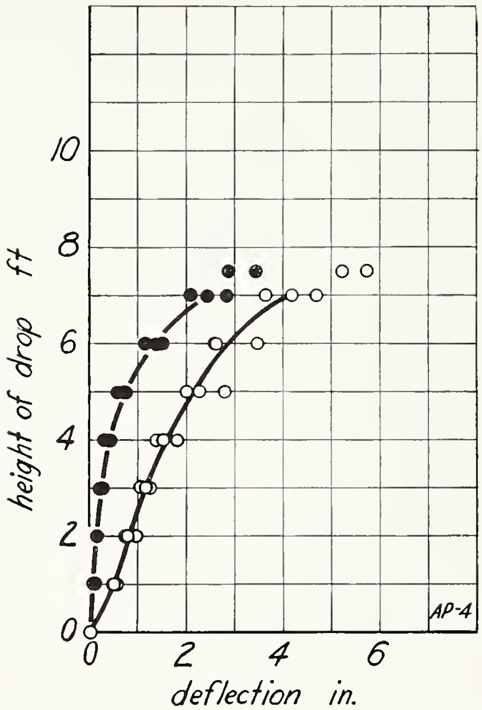

Figure 15.—*Impact load on wall AP, load applied to outside face.*

Height of drop-deflection and height of drop-set results for specimens *AP-I4*, *I5*, and *I6*. The specimens were supported on a span of 7 ft 11 in.

Each of the specimens failed by punching of the disk through the face of the specimen.

4. Impact Load

Partition specimen *AQ–I4* during the impact test is shown in figure 23.

For the program on the determination of the structural properties, impact loads are applied to three partition specimens only, because partitions are usually symmetrical about a plane midway between the faces. For this construction, however, the specimens were not symmetrical, and therefore impact loads were applied to the "inside" face of two specimens and to the "outside" face of the third.

The results are shown in table 3 and in figure 24 for partition specimens *AQ–I1* and *I2* loaded on the "inside" face, and in figure 25 for partition specimen *AQ–I4*, loaded on the "outside" face.

Each of the specimens failed by rupture of the loaded face, falling down of the opposite face in pieces, and bending of the middle cross brace and the two inner studs at midspan.

VI. Sponsor's Comments

"Fabrihome" panels for walls and partitions were developed by the sponsor as a result of experience with 44 houses built by the sponsor in 1935 at Rochester, N. Y., using special concrete and steel frames. Panels have been built and tested for ease of installation, weathering, methods of sealing the joints, and finishes for the past 3 years at the laboratory of the sponsor.

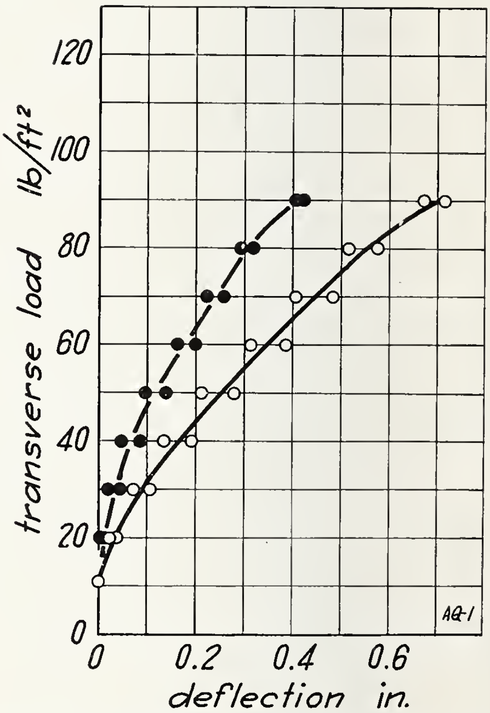

Figure 16.—*Transverse load on partition AQ, load applied to "inside" face.*

Load-deflection and load-set results for specimens *AQ–T1* and *T2*. The specimens were supported on a span of 7 ft 11 in. The deflections and sets are for a gage length of 7 ft 6 in., the gage length of the deflection-measuring frame.

The standard width of the panels is 4 ft 0 in. The panels for a house differ from the test specimens in the following respects: The outside faces are hot-press phenolic-resin plywood, the long edges of the inside gypsum-board faces are recessed, and the outside wall panels are insulated with rock wool 2 in. thick.

The panels are designed to fit into a special frame, either concrete or steel, built on a masonry foundation. No houses have yet been built using these constructions. A description of a proposed type of two-story house follows:

The masonry foundation consists of a rectangular outside foundation wall, 8 in. thick, and 8 reinforced concrete pilasters to support the columns. The first-story columns are 8- by 12-in. reinforced concrete and the second-story columns are 3-in. steel pipes, anchored in the concrete columns. The concrete columns are set inside the front and rear walls approximately 2 ft 6½ in. from the outside face of the wall to the centers of the columns, and the end columns are centered on the end walls. The

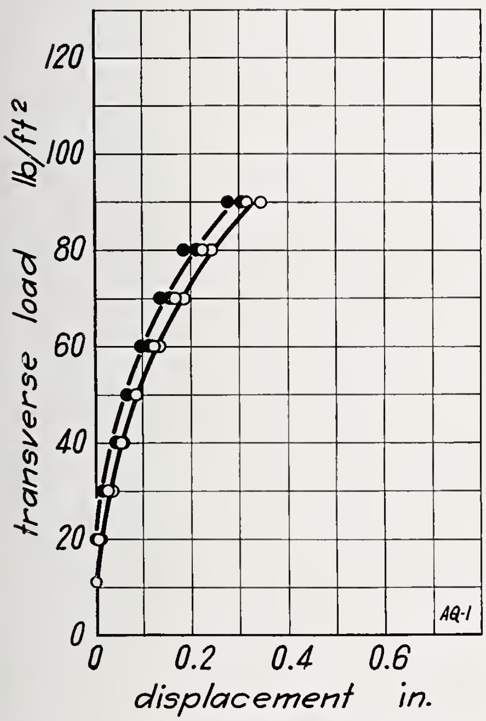

Figure 17.—*Transverse load on partition AQ, load applied to "inside" face.*

Load-displacement and load-set results for specimens *AQ-T1* and *T2*. The specimens were supported on a span of 7 ft 11 in.

columns are connected to the first and second floors which are 6-in. reinforced concrete. The edges of the floors have beveled grooves to receive the panels. The roof rafters and ceiling joists are supported by 12-in. light I-beams, which in turn are supported by the pipe columns.

The wall panels are set in the grooves and asphalt-roofing gaskets are inserted between the upper ends of each panel and the groove. Gaskets are also inserted between the edges of

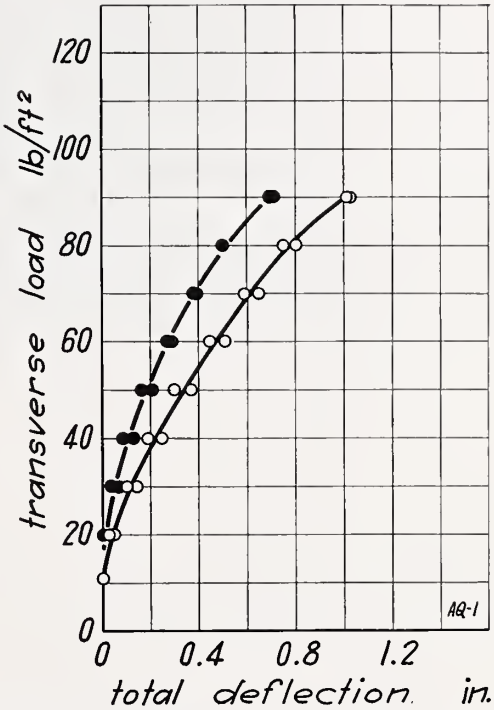

Figure 18.—*Transverse load on partition AQ, load applied to "inside" face.*

Load-total deflection and load-total set results for specimens *AQ-T1* and *T2*. The specimens were supported on a span of 7 ft 11 in. For each specimen the total deflection for each load is the sum of the deflection for that load given in figure 16 and the displacement for the same load given in figure 17.

adjacent panels. Each panel is fastened by springs inserted at the lower end under each stud.

The opening at the lower end between the panels and the groove is sealed with asphalt mastic. The vertical joints between the edges of the outside faces of the panels and the horizontal joints at the upper ends of the outside faces are calked with plastic filler. Batten strips cover the vertical joints. The recessed joints between the edges of the gypsum-board inside faces are covered by a special perforated joint tape laid in and covered by a special cement, then troweled smooth and sanded.

The first-story wall panels on the front of the house are set in 4½ in. for a 4-in. brick veneer.

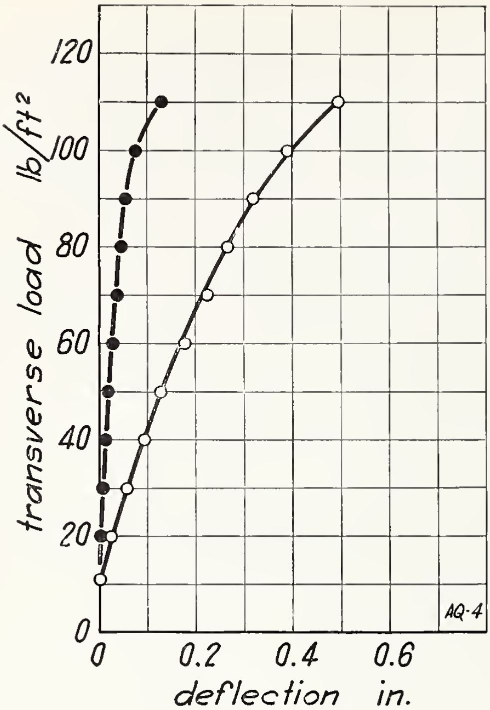

FIGURE 19.—*Transverse load on partition AQ, load applied to "outside" face.*

Load-deflection and load-set results for specimen *AQ-T4*. The specimen was supported on a span of 7 ft 11 in. The deflections and sets are for a gage length of 7 ft 6 in., the gage length of the deflection-measuring frame.

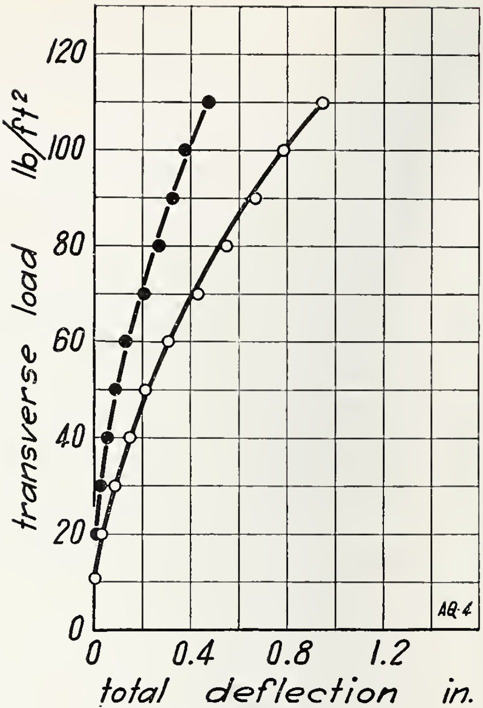

FIGURE 21.—*Transverse load on partition AQ, load applied to "outside" face.*

Load-total deflection and load-total set results for specimen *T4*. The specimen was supported on a span of 7 ft 11 in. The total deflection for each load is the sum of the deflection for that load given in figure 19 and the displacement for the same load given in figure 20.

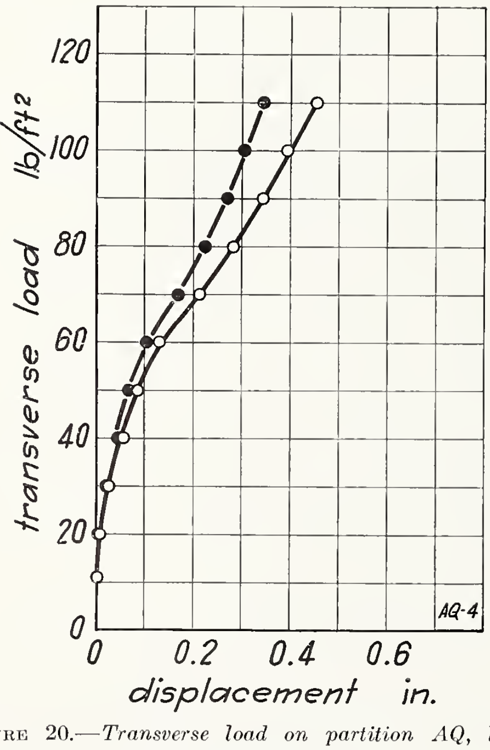

FIGURE 20.—*Transverse load on partition AQ, load applied to "outside" face.*

Load-displacement and load-set results for specimen *AQ-T4*. The specimen was supported on a span of 7 ft 11 in.

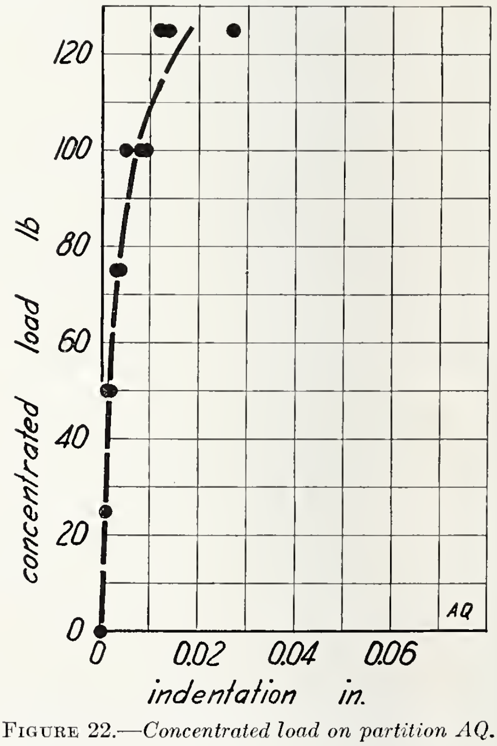

FIGURE 22.—*Concentrated load on partition AQ.*

Load-indentation results for specimens *AQ-P1*, *P2*, and *P3*.

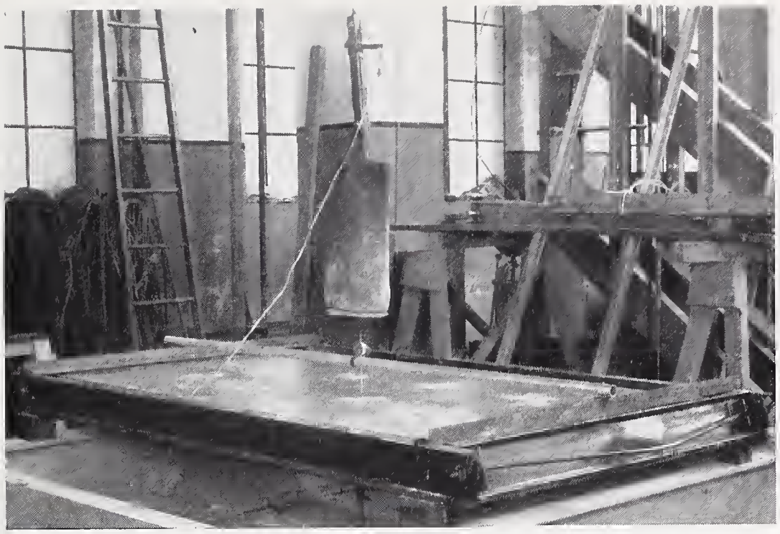

FIGURE 23.—*Partition specimen AQ–I4 during the impact test.*

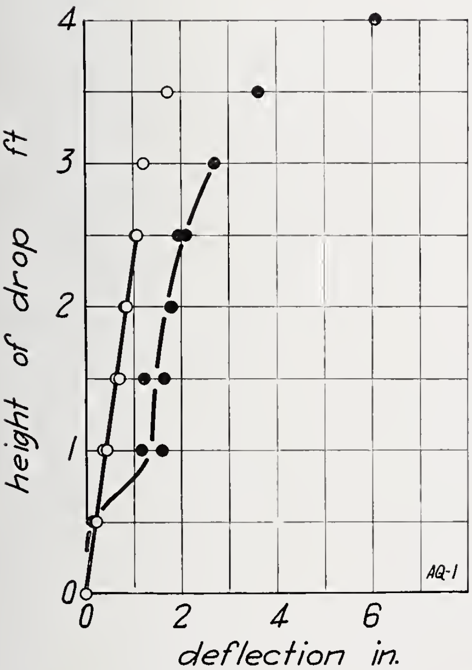

FIGURE 24.—*Impact load on partition AQ, load applied to "inside" face.*

Height of drop-deflection and height of drop-set results for specimens *AQ–I1* and *I2*. The specimens were supported on a span of 7 ft 11 in.

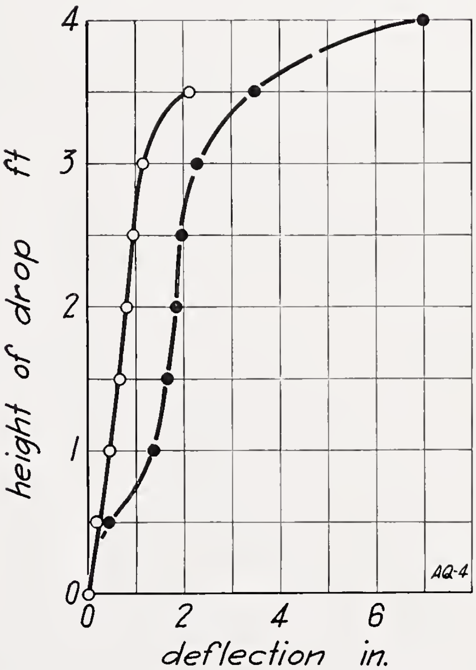

FIGURE 25.—*Impact load on partition AQ, load applied to "outside" face.*

Height of drop-deflection and height of drop-set results for specimen *AQ–I4*. The specimen was supported on a span of 7 ft 11 in.

There is a $\frac{1}{2}$-in. air space between the veneer and the "Fabrihome" panels.

Openings for standard door and window frames are cased with sheet-steel channels. The finish floor may be either wood block or asphalt tile cemented to the concrete floor or wood flooring laid on sleepers. Electric wiring is carried in a sheet-steel baseboard.

For this construction it is necessary that the dimensions of the concrete frame be accurate, therefore, a system of sectional steel forms has been developed.

The sponsor supplied the information contained in the sponsor's statement. The description and drawings of the specimens were prepared by E. J. Schell and G. W. Shaw of the Building Practice and Specifications Section, under the supervision of V. B. Phelan, from this information and from the specimens themselves. That Section also cooperated in the preparation of the report.

The experimental data were obtained from tests made by the Engineering Mechanics Section, under the supervision of H. L. Whittemore and A. H. Stang, with the assistance of the following members of the professional staff: F. Cardile, R. C. Carter, H. Dollar, M. Dubin, A. H. Easton, A. S. Endler, C. D. Johnson, A. J. Sussman, and L. R. Sweetman.

WASHINGTON, August 12, 1938.

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The *National Bureau of Standards* was established by act of Congress, approved March 3, 1901, continuing the duties of the old Office of Standard Weights and Measures of the United States Coast and Geodetic Survey. In addition, new scientific functions were assigned to the new Bureau. Originally under the Treasury Department, the Bureau was transferred in 1903 to the Department of Commerce and Labor (now the United States Department of Commerce). It is charged with the development, construction, custody, and maintenance of reference and working standards, and their intercomparison, improvement, and application in science, engineering, industry, and commerce.

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- Magnetic Measurements
- Photometry
- Radio
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