SECTIONALIZED HOUSES

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UNIVERSITY OF ILLINOIS
SMALL HOMES COUNCIL—BUILDING RESEARCH COUNCIL.
This publication is a report of a study on the feasibility of a sectionalized house operation in connection with a retail lumber yard, performed by the University of Illinois Small Homes Council—Building Research Council pursuant to an agreement for cooperative investigation between the University and the Lumber Dealers Research Council.

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ABSTRACT

Sectionalized houses, defined as houses erected from room-size or larger three-dimensional elements, are examined as to their suitability for the lumber dealer operation. The most prevalent form of sectionalized house is the half-house, normally not exceeding 12 feet in width. Two half-houses are completely fabricated in a factory and brought to the building site, where they are joined.

The sectionalized building system offers the lumber dealer the opportunity for more complete control of the final house package. It offers the advantage of minimum site labor, and more shop construction, resulting in more efficient production and better coordination of various trades.

The disadvantages of the method include the need for a large manufacturing area (enclosed in most instances), and the arrangement for suitable transportation and erection procedures and handling equipment.

Sectionalized house construction may be developed to various degrees. In the ultimate, the entire house, excepting the foundation, is fabricated in the shop, delivered to the site, and placed in position over the prepared foundation. For a reasonable operation, distances must be short as house-moving techniques will have to be employed in the transporting of the house. A possible future solution is the use of air transport, specifically a helicopter, for moving and placing the house.

A more general solution is to divide the house lengthwise into sections which approach trailer size. The objective is to bring the section into the classification of a trailer, thereby simplifying the transportation problems. Transportation laws, and the enforcement thereof, then become critical. It appears that 10-foot-wide trailers are now generally accepted, and many states make provision for units 12 feet wide; in fact, many sectionalized house manufacturers are standardizing on 12-foot sections. When transportation regulations are strictly enforced, roof overhangs and other extensions must be encompassed within the legal limits or they will have to be added later. In other areas, where regulations are more flexible, some leeway may be permitted in the width of the structure. The builder of a sectionalized house will have to determine which of two possibilities will best suit his purpose: a) discard size limitations and depend upon a house-moving permit; b) adhere to highway movement limitations. The latter appears necessary when hauling over highways is involved.

Since an overall dimension of 24 feet (two 12-foot sections) limits design possibilities, an alternate system of two 12-foot sections field-connected by a smaller section is suggested.

Probably the first step that should be considered by most prospective operators would be the shop-building of those house sections requiring the most detailed labor, particularly the bath, kitchen, and utility areas. The remainder of the construction might be done in a more conventional manner.

Each lumber dealer will, of necessity, be required to analyze his particular circumstances in order to determine the advantages or disadvantages that might accrue to him in the construction of sectionalized houses.
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Jeremy S. Dodd, Research Assistant, was responsible for the literature survey.

The drawings of the construction details and the house plans are primarily the work of Richard A. Devine, Research Assistant, SHC-BRC.

The manuscript of the report was reviewed by William H. Kapple, Donald H. Brotherson, Research Assistant, Professor of Architecture, SHC-BRC, and Henry R. Spies, Editor, SHC-BRC, who was also responsible for the editing and production of the report.
I. OBJECTIVE OF STUDY

The objective of this study was to examine and evaluate, insofar as possible, the suitability of sectionalized house construction to the lumber dealer's operation. The study was to encompass an examination of different applications of the system including the problems, advantages, and disadvantages of each.

For the purpose of this study, sectionalized houses are defined as those houses erected from room-size or larger three-dimensional elements. The most common form of sectionalized house is the half-house, normally not exceeding 12 feet in width. House sections are fabricated to a nearly completed state and then delivered to the building site where they are joined on a previously prepared foundation.

In the future, it is likely that mass-produced housing will be delivered to the site as a complete unit, set in place, and connected to utilities, all within a day's time. At the same time, foundations will be simplified—it is conceivable that the house will be placed upon a framework which is in contact with the ground only at a few points. In effect, the house will float over the ground rather than be seated in and anchored to the earth. Such a system will be less costly and will, in addition, aid in solving the problems of utilizing some irregularly sloped sites. Delivery by helicopter will become standard. Not only will all of the problems of clearances, permits, and travel routes be reduced, the delivery vehicle will also serve as the crane for placement.

In the past, one or two companies have made an effort to deliver completely assembled whole houses of conventional design and size. However, at the present time, the so-called mobile homes (or house trailers) are the only housing units that can be classified in this category that are being used to any extent. Presumably, difficulty and cost of transporting the entire house to the point of final location proved too much of an obstacle to permit this method to survive.

At the present time, there is a renewed effort to deliver more complete packages to the site. These efforts are usually characterized by building the house in two or three sections—such sections being derived by splitting the house lengthwise into two or three elements.

The Igersoll-Dix-Warner Utility Corp was developed. Its failure was attributed to various causes, probably its greatest handicap was being too advanced for the remainder of the industry.

"House trailers" grew up; they became wider and larger; (some over 30 feet) less mobile and more permanent, and took on the name of "mobile homes." They met a need for a compact, efficiently arranged home, and at the same time, many financing and zoning problems.

The greatest expansion in post-war prefabrication followed the introduction of the prefabrication, but, in recent years, several companies have experimented with prefabrication in an effort to complete a still larger portion of the house in the field. Experiments in this method have come both from the mobile-home and modular field.
II. METHOD OF STUDY

The study was conducted in four stages as outlined below:

A. Review of Literature
B. Review of Transportation Regulations
C. Field Observations
D. Recommendations

A. LITERATURE REVIEW

A review of past work in the field of sectionalized houses brought out a number of interesting ideas and experiments that are recorded in the literature.

In the early 1940's, Eero Saarinen, in an Arts and Architecture competition, proposed two standardized, trailer-like units—one to contain kitchen, utility, and bath, and the second to provide two bedrooms and a bath. These units were to be used as a basis for constructing complete homes; the units were designed to be incorporated in houses of standard structure. Wide variety was possible through the use of conventional construction for the remaining spaces of the home.

During World War II, many "demountable" trailer-size housing units were fabricated and moved to areas where critical housing shortages existed. Following the war, the same units were moved to many universities where, in some instances, they served as faculty and married student housing for over a decade.

Following the war, Carl Koch's Acorn house made its appearance. This unit, trailer-sized while being transported, was tripled in size at the site by a series of wall, floor, and roof sections which folded out from the basic unit.

A firm in California and in northern Indiana began the factory manufacture of entire houses. These houses were transported to the site using house-moving techniques. The procedure was abandoned.

The Ingersoll-Borg-Warner Utility Core was developed. Its failure was attributed to various causes; probably its greatest handicap was being too advanced for the remainder of the industry.

"House trailers" grew up; they became wider and larger, (some over 500 square feet) less mobile and more permanent, and took on the name of "mobile homes". They met a need for a compact, efficiently arranged home, and at the same time created many financing and zoning problems.

The greatest expansion in post-war prefabrication followed the pattern of panelization, but, in recent years, several companies have experimented with sectionalized housing in an effort to complete a still larger portion of the house in a factory operation. Experiments in this method have come both from the mobile-home and panelized-house field.
Robert Engebrecth's U.S. Plywood House at the Seattle World Fair carries the sectional idea still further and discards conventional house forms. Four trailer-sized sections are joined by short corridors into a hollow square. Each section is a standard shape; only the equipment and division of space varies.

B. TRANSPORTATION LAWS

Transportation laws vary widely throughout the United States and are in a continuous process of change. The original width limitation applied to truck trailers was eight feet. However, most states now have provisions for movement of 10-foot-wide house trailers. Special requirements may be attached to the movement of these wide units, including night travel, special "wide-load" markings, and a flagman.

Trailers that exceed 10 feet in width usually require special permits and the amount of travel on state and national highways may be restricted.

Toll roads are often separate corporate entities and may have their own rules.

When the travel is totally within a community, the laws of that community may supersede the state laws. House-moving permits generally have no stipulation as to size, but are likely to be more costly. Routes may be specified by the issuing unit.

The degree of enforcement may also vary considerably, depending upon the area involved.

In general, a careful check of all applicable transportation laws should be made before any steps are taken toward developing a sectionalized-house production program.

C. FIELD OBSERVATIONS

Three factory operations and five houseplacements were observed. The following comments summarize the observations and point out significant features.

1. Unit Size

One company used a three-section house, with each section having a framing width of 9'-9". Another company manufactured two-section houses with sections being either 9'-10" or 11'-10" wide, depending upon the applicable transportation laws. A third company used nominal 12'-0" sections. Due to the construction details, the actual width of the sections of the latter house exceeded this dimension, but the firm anticipated no legal transportation difficulties in their area.

2. Floor Construction

One company used a steel floor-frame, while two others used wood floor-framing that was essentially conventional in nature. The steel floor-framing eliminated the need for a long trailer, but is obviously more costly than a wood joist system. In the wood system, headers are doubled or tripled around the entire section.
Plywood subflooring was used in all houses except one, where 25/32" oak flooring was nail-glued directly to the joists. In the other houses, the subfloor was surfaced with oak strip-flooring or with resilient floor-tile over underlayment. The living area of one house was carpeted directly over the subfloor with the use of a rug pad.

3. Wall Construction

Conventional 2 x 4 wall framing was standard for exterior walls. One company used no sheathing; another used 4' x 8' sheets of fiberboard. Outside walls were shorter than the usual eight feet due to transportation height limitations.

Interior wall finishes varied from litho-printed matched plywood to a heavy paperboard in 8' x 20' sheets. These sheets were nail-glued to the framing. The company that used standard gypsum drywall performed most of the taping and spackling operation in the factory but painting was left for the site.

Bevel siding was used by one firm; the end juncture was covered by a vertical 1 x 4 board. One company used drop siding. Short-length pieces were pre-fitted to the joined sections in the factory and then removed and shipped to the site for final installation. The most successful joint was achieved by the house with asbestos-cement siding (in large sheets) and battens. A batten closed the field juncture.

4. Juncture Partition

One company used 2 x 4's flat 16" on center on each side of the juncture partition. Another detail called for 2 x 4's 16" on center with only half of the stud resting on a 2 x 2 plate. The studs on the matching section were staggered so that they meshed, giving a wall only 4" thick. However, this method would reduce the width of the room if the shipping width is held strictly to 12'-0".

Door frames with split jambs were used on openings in the juncture wall.

In the three-section house, the roof and ceiling sections were supported by longitudinal beams, a portion of which was a part of each adjoining section. These
beams were bolted together at the site, the bolt heads and nuts being buried in the gypsum wallboard facing on the beams. A wallboard soffit was field-applied to the bottom of the beams. Where longitudinal walls were located at juncture planes, walls were not divided but included entirely in one section.

5. Roof and Ceiling Construction

The three-section house was framed, with sloping-ceiling rafters resting on longitudinal beams located at the edge of each section. This roof-support system eliminates the need for bearing partitions at the juncture of house sections. Half-trusses and conventional rafters and ceiling joists were used on other houses. Asphalt shingles were used on all roofs.

Acoustical tile was used for finishing the ceiling in one house; other houses were finished with gypsum board. One firm achieved a particularly pleasing finish surface with a gypsum "acoustic" sprayed finish.

6. Placement

Two methods of placement were observed.

a. Crane: Two firms used a crane to place house sections on previously prepared foundations.

Since the house was designed to be supported from the floor, the lifting force of the crane must be applied through the floor system. To accomplish this, one manufacturer used four long bolts which extended from the floor through the roof. These bolts were installed at quarter points on each of the long sides of the section. They were designed so that they may be removed and returned to the factory upon completion of the installation of the house. The lifting force of the crane was transferred to the four bolts by means of a spreader system. Another manufacturer used a pair of cable slings attached to a spreader.

![Four-Bolt Spreader](image1)

![Cable Sling Spreader](image2)
One of the problems involved in the use of a crane was the balancing of the load. Due to the uneven distribution of the load in the section, the section tended to incline in any direction. The provision of different attachment points in the spreader can aid substantially in balancing the load. The manufacturer should indicate proper attachment points for the various loads. In one instance, final adjustments were made by using men as ballast. Some slight unbalance may be advantageous as it enables one end of the section to be placed first.

Of the two lifting methods, the bolt method is preferable. There are no cables to interfere with the placement of the sections and balancing is more readily achieved. In the operations observed, some problems occurred and some sections handled with the cable-sling suspension were damaged because the cables hit the section when it tilted.

Placement by crane is especially suited to the locating of units over basements and crawl spaces, but it can also be used with pier construction.

The use of a crane in placing sections is limited by the objects surrounding the site and the capabilities of the crane, such as its reach and capacity. Generally speaking, the crane will not be able to change its position while lifting the section. Therefore, the locational adjustments will have to be made by rotating the crane and lowering or raising the boom. In the most severe condition, a crane located in front of a foundation should be able to pick up the section, rotate, and place the section on the rear half of the foundation. If there is a basement, the crane should be placed away from the basement wall at least a distance equal to the height of the basement wall unless the foundation wall is braced to resist any lateral pressure created by the weight of the crane and its load.

Crane costs varied from $15 to $35 per hour on a portal-to-portal basis, with a net cost which varied from $70 to $268.

b. Placing houses without a crane: The cost of crane operations and the difficulty of finding appropriate equipment in some areas caused operators to attempt to place houses by other means. One firm developed an ingenious system for placing sections over pier foundations. The section was delivered to the site on a steel-frame trailer which was positioned near as possible to the house site. The trailer bed was jacked up in order that a special dolly could be inserted under the trailer at two quarter-points. The dollies were composed of two 12-inch diameter caster wheels attached to three 6 x 6 beams. Since the caster wheels could be rotated ninety or more degrees, the movements of the house could be controlled in all directions. Once the dollies were supporting the trailer and the section it was carrying, the wheels of the trailer were removed. Doubled 3/4-inch plywood planks were laid down to provide a proper surface for the casters and the section was rolled into place. For major movements, a truck was used; small movements were accomplished through manpower. Once the section was above the supporting piers, the section was supported on hydraulic jacks while first the dollies and then the trailer bed was removed.
This system has two disadvantages as presently used. (1) The trailer is removed after the section is located. There is insufficient space to remove the trailer bed when the long dimension of the house is parallel to the street and the houses are placed at the same setback distance from the street, and the new house is being erected between two existing houses. (2) A considerable portion of the perimeter walls of a crawl-space house would have to be built after the sections are in place, since open spaces are needed in the perimeter wall for rolling the casters of the dollies and for removing the trailer bed. Additional difficulties would arise in erecting a house with a basement as a suitable path for the caster wheels would have to be provided in the basement area. This could be accomplished only by extensive cribbing.

7. Final Alignment

Once the house sections were placed on the foundation, some final positioning remained to be done. The contractors used various methods including hydraulic jacks, winches, fence pullers, etc. One company greased the wall plates to ease the movement. Another, using pier foundations, was reported to use a furniture clamp to draw the two sections together. Once final alignment was accomplished, the sections were bolted together at various points.

8. Finishing Operations

Depending upon the degree of factory finishing, the completion time was variously estimated from three days to three weeks, the latter time being required for the house that had no shop-applied interior painting.

The house with central longitudinal partitions required interior field joints only at the openings in the partition and at the floor. The best floor joint was achieved by the use of carpeting. The edge of the carpet was left unfastened at the door openings and then later extended to cover the floor joint. A change in material also helped avoid poor appearance at the connection. When floor tile is used, a space less than a tile width should be left at the juncture point. The tile can then be cut to fit the final space.

Split door-frames served well to complete the junction at the openings in the central partition.

9. Mechanical

Plumbing work was completely installed in the houses, with the exception of the stack extension below the bottom of the floor. Floor framing was adjusted to receive the horizontal runs in the joist spaces. One manufacturer left an outside opening into a space behind the plumbing in order to facilitate plumbing inspection.

In one house, the heating system used a central heater without ducts or several individual wall heaters. Overhead heat distribution ducts were used in the other houses.
10. Manufacturing Plants

A brief description of the salient features of the manufacturing plants is given below:

Plant 1

Plant had 60-foot wide bays with length sufficient to accommodate six or more 46-foot sections. The height permitted using an overhead crane to carry one section over another. Additional space was available for component sub-assembly. The plant capacity was estimated at 80 houses per month; time per house was three to four days. (This house had a higher percentage of field work than others.)

Plant 2

There were different shops for each of the following operations: steel floor-frame, floor assembly, wall and partition assembly, roof framing, plumbing, and main assembly. Roller beds were used in the floor and main assembly shops. The roof assembly was installed on the house by overhead crane.

Plant 3

The plant was 100' x 200'. The central bay was 50 feet wide and had room for work on four half-houses simultaneously. The overhead crane located in the central bay was adequate to lift wall sections, etc., but not half-house sections. Side bays were used for sub-assemblies such as walls and roof sections. After exterior work was completed in the plant, the half-section was moved to the yard where the interior work was completed.
III. RECOMMENDATIONS

A. UTILITY CORE

A considerable investment in manufacturing space and equipment will be involved for any lumber dealer entering upon a sectionalized-house building program. This expenditure could be entailed without any clear knowledge of the degree of actual savings the method might provide. For this reason, it seems advisable that the lumber dealer consider entry into the program by stages.

The most expensive part of the house is the kitchen-bath-utility complex. It contains the most expensive equipment in the home as well as the greatest proportion of special wall and floor finishes. Therefore, this complex offers the opportunity for the greatest savings. The sectionalized house technique should be applied first to this element. The remainder of the house can be built following the best construction techniques currently available, including the use of panelization and roof trusses.

The utility-core first-stage has the following advantages:

a) Less initial investment required.
b) Less manufacturing space required.
c) Transportation simplified - the width of unit can be held to 10 feet without difficulty; height of unit is less due to omission of roof and ceiling structure.
d) Greater plan flexibility.
e) The designer has a better opportunity to relate the house to the environs.

B. SECTIONALIZED HOUSES

1. Transportation

It is recommended that the operator subcontract the transportation of the sections to the site. Presumably truck-trailer transportation will be the best arrangement, although in some instances house-moving regulations may offer less stringent limitations. To reduce the overall load height, a "lowboy" trailer is essential. (See check-list on transportation.) To achieve maximum efficiency on the site, all sections should be delivered in succession so that the placement procedure may be continuous.

2. Unit Size

The final selection of the unit size of the section will depend primarily on transportation limitations and on the plan of the house and desired room sizes.

a. Width: Where transportation rules will permit, a 12-foot section (11'-9" to outside of framing) is recommended. With proper allowance for minimum overhangs and wall thicknesses, a net interior width of 11'-3" may be achieved. This is sufficient width for smaller living rooms. Twelve-foot sections permit the simplest construction system possible—the house is divided into two equal sections and the division occurs at the central bearing wall. Plans 621 and 622 illustrate this scheme.
In some instances, the transportation of 12-foot units may be unadvisable due to the problem of transportation permits. In this case, the best solution would be to make use of two 10-foot sections (9'-9" to outside of framing), connecting them in the field with a small field-built area. This field-built section could be the corridor. See plans 623 and 624.

If the sections are limited to 10 feet in width, the living room will have to extend into a second part of the house, as the minimum allowable interior width for a living room is 11'-0" as prescribed by FHA. This plan requirement results in a structural problem at the point of juncture between the two parts of the living room. Support for the roof is required. In plans 623 and 624, a special truss supports the ends of the ceiling joists and roof rafters. (See Figures 12 and 13).

In those special cases where the house sections are moved only within the builder's property, and travel on public streets and highways is not required, the desired room size and the plan form the only width limitations. In this instance, the operator can make use of wider units if he so desires—for example, he may choose to add a 16-foot wing to a house constructed of two 12-foot sections.

b. **Length:** Transportation rules are the chief limiting factor insofar as length of the section is concerned. Where this length becomes critical, a cab-over-engine truck-tractor may be used to reduce the overall length of the shipment.

c. **Height:** Transportation rules plus overhead obstructions on highways are the limiting factors, with 14 feet being the generally applied maximum. To come within this limitation, it is necessary to lower ceiling heights of the sections to 7'-6", to use low-slope roofs, and to employ low-bed trailers in the hauling operation. Using 3 x 8 floor joists and 2 x 8 rafters and a roof slope of 3 in 12, the height of the trailer bed is limited to approximately two feet.

3. **Structure and Construction Outline Specifications**

a. **Foundations**

Continuous perimeter wall* (basement or crawl-space)
Central row(s) of Posts (basement) or Piers (crawl-space) at 8' on center maximum
Termite shield
Sill plate - 2 x 6 with anchor bolts recessed into sill

*Where exterior pier construction is used, spacing of piers should not exceed 8'-0" under walls perpendicular to joists; 12'-0" under walls parallel to joists.
b. Floor system

Wood joists - 2 x 8 - 16" on center
Header - two 2 x 8 continuous on all sides of each section serves as central girder
Subfloor - 1/2" plywood, glued and nailed
Finish floor - 25/32" oak strip, or underlayment and resilient flooring, or carpeting

c. Wall system (clear ceiling height 7'-6"

Siding - as desired
Sheathing - 3/8" plywood applied vertically in 4' x 8' pieces, glued and nailed
Studs - 2 x 4 16" on center
Insulation - as desired
Interior finish - as desired; large sheet (fibrous preferred), or match-jointed paneling

d. Roof and ceiling system

Ceiling finish - acoustical tile preferred, or large sheet material
Ceiling joists - 2 x 6 - 24" on center
Insulation - as desired
Rafters - 2 x 8 - 24" on center
Roof sheathing - 3/8" plywood with edge clips
Roofing - as desired

Interior finish materials with matched joints (such as paneling and acoustical tile) are preferred as such joints allow some movement without destroying the appearance of the finish. If such materials do not have consumer acceptance, room-size finishing panels are recommended in order to limit the number of exposed joints.

In order to take full advantage of the available width, a special detachable overhang unit has been designed. This unit can be assembled and fitted in the shop and then brought to the site for final assembly. (See Figures 5 and 6)

The central junction wall should be composed of a double row of 2 x 4 studs placed in a flat position, (See Figure 10), one row to each section. The interior finish material should not be placed on one side of the wall until the sections have been placed together and the flat studs of each section nailed together.

If roof rafters are not desired, a half-section roof truss may be used. A truss of the "W" conformation with an added vertical member over the central wall would be most suitable.
4. **Placement**

Placement by crane is recommended. The crane offers the greatest degree of flexibility as it is suited for more different conditions. Sections may be placed with equal facility over basements, crawl spaces (enclosed with foundation walls) or piers. Houses may be placed between two existing houses. A lifting bolt and spreader system should be provided to facilitate the placement procedure.

Foundation wall plates should be greased to simplify the final placement of the sections. It may be possible to complete minor movements with furniture clamps; winches and hydraulic jacks may be used for more extensive shifting of the units. Hydraulic jacks and cribbing should be available for handling any special problems.

5. **Mechanical**

Plumbing should be installed as completely as possible, but with no extensions below the bottom of the floor joists. Plastic drain, waste, and vent piping is recommended where acceptable due to its light weight and ease of installation.

The electrical panel box should be located in the kitchen utility section.

For comfort, a perimeter heating system is recommended. With a warm air system, the simplest operation will probably require a longitudinal extended plenum which will be field installed. Registers and duct work from registers to the extended plenum may be installed in the factory as long as they do not extend below the joists.
## IV. CHECK LIST

### A. TYPE OF OPERATION

- **Site operation** (Fabrication shop is located on the site where houses are to be erected)
- Community operation
- Intra-state operation
- Interstate operation

### B. TRANSPORTATION

- Route will be over National highways
  - State highways
  - Toll roads
  - County roads
  - Township roads
  - Local streets

**Applicable Regulations - Truck-trailer**

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<td>Maximum height</td>
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<td>Maximum length</td>
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<td>Limitations on time of day</td>
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<td>Limitations on length of operation</td>
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<td>Limitations on routes</td>
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<td>Flagman required?</td>
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**Applicable Regulations - House Moving**

Check same items as above
Physical Limitations on Route

The lumber dealer should project the normal route for delivery of his sections. This route should be checked for overhead obstructions, weight limitations (weak bridges), tight turns, etc., that might limit the operation further.

Transportation & Erection Equipment

Are suitable truck-trailers available for rent? __________________________ rate? __________________________

Estimated purchase price of trailer __________________________

Estimated cost of hauling per job __________________________

Is rental crane available? __________________________ rate? __________________________

Estimated cost of crane per job __________________________

Hydraulic jacks __________________________

Other __________________________

C. MANUFACTURING SPACE

Describe manufacturing space available. __________________________

Estimated production rate __________________________

Is space adequate? __________________________

D. HOUSE DESIGN

Maximum width __________________________

Maximum height __________________________

Maximum length __________________________

The house will be a two-section house __________________________

three-section house __________________________

two-section with field-built connection link __________________________

utility-core section combined with field construction __________________________
TWO-SECTION HOUSE

TWO-SECTION WITH FIELD-BUILT JOINING ELEMENT

Figure 1
foundation wall: concrete or concrete block. size as required by code

footing size and design as required by code

vent

access opening

8'-0"

8'-0"

8'-0"

8'-0"

8'-0"

vent

piers: concrete or concrete block. size as required by code

vent

vent

11'-10"

40'-0"

11'-10"

23'-8"

 FOUNDATION PLAN
Figure 3

FLOOR FRAMING PLAN

double 2" x 8" end joist

2" x 8" double headers

1/2" x 8" bolts at 4'-0" o/c

2" x 8" joists 16" o/c

2" x 8" double headers

double 2" x 8" headers

double 2" x 8" joists under parallel partitions

5/8" plywood subfloor

finish floor

bridging as desired

0' 5' 10' 11'-10" 23'-8"

40'-0"
Figure 4

WALL SECTION
scale: 3" = 1'-0"
DETAIL SHOWING FIELD ASSEMBLY OF OVERHANG SYSTEM

scale: 3" = 1'-0"
EXPLODED VIEW OF OVERHANG ASSEMBLY
DETAIL OF GABLE END FRAMING
scale: 3" = 1'-0"

Figure 7
DETAIL OF GABLE END FRAMING—WITHOUT OVERHANG
scale: 3" = 1'–0"

Figure 8
ISOMETRIC OF HOUSE CONSTRUCTION
DETAIL OF CENTRAL FIELD JOINT AT FLOOR
scale: 3" = 1'-0"

Figure 10
DETAIL SHOWING CONNECTION AT CEILING AND RIDGE
scale: 3" = 1'-0"

Figure 11
DETAIL SHOWING CONNECTION OF FIELD BUILT JOINING ELEMENT

scale: 3" = 1'-0"

Figure 14
DETAIL OF CONNECTION OF TRUSS AND FIELD-BUILT JOINING ELEMENT

scale: 3" = 1'-0"

Figure 15
V. CONCLUSIONS

The sectionalized house construction system offers the basic advantage of transferring more of the construction operation from the site to the shop where it may be more satisfactorily controlled. Coordination between trades can be achieved more readily and the influence of weather can be reduced. The lumber dealer can deliver a more complete package.

Site operations are reduced to construction of the foundation, installation of utilities, placement of the sections, and completion of the structure.

The large space requirements for the operation, along with the equipment needs, suggest caution and careful analysis of the procedure before extensive investment is made. The shop construction of the kitchen-bath-utility area seems a logical first stage in the development of a sectionalized-house program.
APPENDIX

The house plans shown in the appendix are designed to show different applications of the sectionalized house construction principle. The designs are not intended to comply with all codes and restrictions, or with local market demands, but can serve as a basis for developing suitable designs.

A. HOUSE #621 (23' - 6" x 40' - 0")

There are four versions of this house, the variations being in the kitchen-eating area arrangements. The house designed to be built with two 12-foot sections. The exterior portion of the general storage requirement is not included in the plan.

B. HOUSE #622 (23' - 6" x 44' - 0")

House #622 is designed as two 12-foot sections. The additional length over house #621 gives a larger living room, a better kitchen-eating area, and increases the size of the smallest bedroom. Exterior general storage must be provided in a garage, carport, or a special storage structure.

C. HOUSE #623 (23' 0" x 44' 0")

This house illustrates the use of two 10-foot sections linked together in the field with a 3' - 6" field-built connecting link. A special framing system, similar to that shown in Figure 13, will be required to carry the roof and ceiling structure over living room. The bathroom-kitchen area of this house could also be considered as a utility core.

D. HOUSE #624 (23' 0" x 46' 0")

House #624 is similar to house #623, but lengthened two feet to provide an additional half-bath.

E. HOUSE #625 (27' 0" x 40' 0")

In this house, two 12-foot sections are joined with a 3' - 6" field connection to give a house depth (front to back) of 27' - 0". Special framing is required to support the inner ends of rafters and ceiling joists. See Figures 12 and 13.

F. HOUSE #626

Three 12-foot sections are used to frame this house. If desired, the rear entry can be located in the utility room.

G. HOUSE #627

Only the utility core is designed for sectionalized construction in this house. The remainder of the construction can be accomplished with a component system.
front elevation

right side elevation

rear elevation

left side elevation

0'  5'  10'  

HOUSE 621
HOUSE 621 (b, c, d)  

scale: 3/16" = 1'-0"
HOUSE 823
scale: 3/16" = 1'-0"

bedroom 13'-2" x 9'-5"
bedroom 13'-8" x 9'-5"
bedroom 9'-2" x 9'-5"
bathroom
kitchen 12'-0" x 9'-5"
eating area 9'-8" x 9'-5"
entry
living room 17'-8" x 12'-11"
HOUSE 625 (a), (b) WITH STAIRS TO BASEMENT
scale: 3/16" = 1'-0"
family-dining room 11'-8" x 11'-8"

kitchen 9'-2" x 9'-0"

bedroom 11'-10" x 11'-2"

utility-laundry 9'-2" x 9'-0"

bath 4'-0" x 7'-6"

bedroom 11'-10" x 9'-6"

entry 7'-2" x 4'-0"

storage 7'-2" x 4'-0"

bedroom 11'-10" x 9'-8"

HOUSE 627
scale: 3/16" = 1'-0"