A BUILDING SYSTEM
FOR ADDITIONS TO ROW HOUSE CONSTRUCTION
USING STANDARD BUILDING MATERIALS
AND SELF-HELP TECHNIQUES

by Philip G. Freelon

Bachelor of Environmental Design, Architecture
North Carolina State University
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submitted in partial fulfillment
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Master of Architecture

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Author________________________________
Department of Architecture
May 13, 1977

Certified by____________________________
Anne Vernez Moudon
Assistant Professor of Architecture
Thesis Supervisor

Accepted by____________________________
Wayne V. Andersen
Chairman,
Departmental Committee on
Graduate Students

ABSTRACT

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In Boston and other large urban areas of the Northeastern United States, the row house is a major residential element within the city, most often housing the lower and middle classes but increasingly attracting the higher income brackets as well. A brief look at Boston's row house neighborhoods will reveal a proliferation of additions; on the street side, in the rear, on the roofs, and everywhere in between. The construction methods and materials used in the additions vary greatly as do the incentives for their existence.

The process by which one adds on to his row house can be organized systematically to enable the user to analyze the alternatives and participate in the construction, saving time and money. In order to accommodate self-help builders of varying amounts of skill and available time, two alternative approaches to owner built construction have been designed into the system. The labor intensive approach incorporates the use of conventional materials and construction techniques and is geared primarily toward those self-helpers with adequate free time who can benefit from the cost savings of supplying most of the labor themselves. The capital intensive approach, on the other hand, relies on prefabrication and simplified construction and design of the components for its cost savings. This direction is intended for the self-helper whose time is more efficiently spent elsewhere but who, never the less, wishes to enjoy the benefits of his own labor.

Each constituent of the building system is accompanied by an analysis of its skill level required for construction, prefabrication level, costs, manpower needed, and performance data. Instructions relating to zoning, building codes, obtaining a building permit, type selection, and construction sequencing are provided. Finally, a scenario has been generated to which the system was applied, demonstrating its workability, alternatives, and difficulties.

Thesis Supervisor: Anne Vernez Moudon
Assistant Professor of Architecture

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1 ESTABLISH THE NEED

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BACKGROUND

In cities and towns throughout history, the row house has been more common than the detached or free-standing house, simply because it has always been a practical and economical shelter for the lower and middle classes. It is efficient to construct, is relatively easy to heat, and requires only a small plot of land.

The row house in an urban context as we know it today, began to appear in London around 1666.[1] The most noted achievement in English row house design was the Circus in Bath, designed by John Wood. In 1754, under his direction, work began on the thirty-three elegant row houses enclosing an enormous garden. Wood died during the construction of the Circus, but the work was completed by his son, John Wood II. After finishing the Circus, the younger Wood began work on an even grander project, the Royal Crescent, which is considered to be one of the finest examples of eighteenth-century row house design.

Philadelphia was probably the first American city to adopt the English row house. By 1700, brick houses similar to those built in London were common in the city. Boston's first row houses were designed and erected in 1793-94 by architect Charles Bulfinch. He had visited London and Bath,

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[1]H. Dickson McKenna, A House in the City; A Guide to Building and Renovating Old Row Houses, New York, 1971, p. 3.

England in 1787 and was greatly impressed by the row houses he saw. Inspired especially by the Royal Crescent in Bath, he designed the Tontine Crescent of Boston's South Side and later the crescent on what is now Franklin Street.

From 1832 to 1840, contractors erecting groups of ten and twelve houses from identical plans and elevation covered Boston's South End with row houses. In the 1850's and 1860's, many more were built along with a full complement of churches, schools, hotels, and hospitals. Originally designed as medium-high income single-family houses, the great majority of row houses were either subdivided into separate apartments or used as rooming houses, a trend that began to reverse itself in the 60's. In recent years, the South End and other Boston neighborhoods have undergone massive renewal, but many of the houses remain intact.

In the last ten years, one of the most positive and exciting trends in the American city has been the rediscovery and renewal of nineteenth-century houses and neighborhoods throughout the nation. No longer are Beacon Hill in Boston, Greenwich Village in New York, and Georgetown in Washington, D.C., the only well-kept areas in America with handsome old row houses. Now, nearly all large cities on the East Coast and South have shown renewed interest in the nineteenth-century row homes--Back Bay and the South End in Boston, College Hill in Providence, Society Hill and the Washington

Square area in Philadelphia, Capital Hill in Washington, D.C., the old town, Ansonborough in Charleston, and downtown Savannah, to name a few.

Traditionally, the older housing in Boston's neighborhoods have been kept in good condition because their owner-residents have maintained them. Obviously, the incentives for additions and renovations are higher for the owner-occupant than for the renter.

Only 27 percent of all housing units in Boston were owner-occupied in 1970, but approximately 71 percent of all residential structures fell into this category.[2] The 1970 U.S. Census of Population and Housing showed that in the South End where there were 10,719 housing units of which 8,968 were occupied, the total number of owner occupied units was 1,013 (11.3%). Owner occupancy has been on a steady increase since then. A corollary trend observable in the city is the conversion of rental units to condominium ownership. Only some 1,500 condominiums have or are in the process of being converted from existing rental units, but as the idea catches on and as condominiums are used as an escape from rent control, it is anticipated that the pressure for conversion to condominium ownership will grow.

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[2] Housing Policy Considerations for a Central City in a Metropolitan Contect; Boston, Mass., Boston Redevelopment Authority, 1975, p. 52.

The physical realization of these trends not only involves the renovation and restoration of the buildings themselves but additions and modifications as well. The entire notion of physically reviving or altering a building can be considered a method through which one can attract prospective buyers to a given building or area. On the other hand, the same physical procedures can be viewed as a result of the rediscovery trend.

Putting aside for a moment any romantic or historic charm associated with row houses, they offer basic housing for millions of low and middle-income American families. North and West Philadelphia, and South-East Washington, D.C. for example, accommodate their residents primarily with row housing of no particular historical significance. For these people, modifications to dwelling units are a matter of necessity.

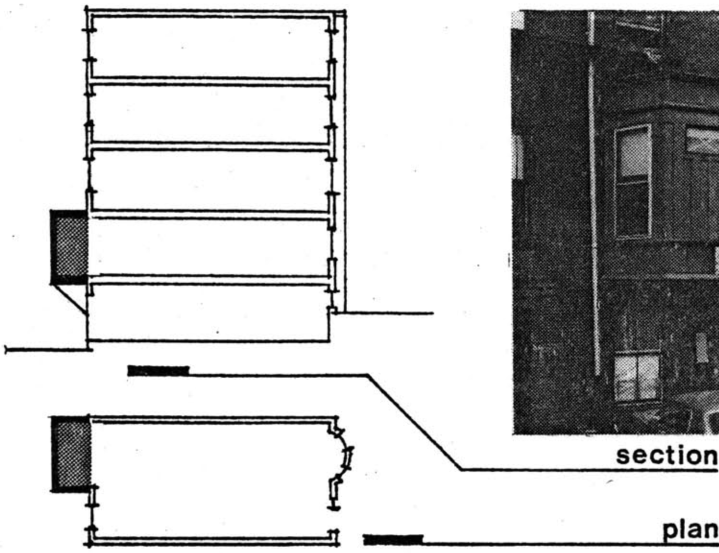
ADDITIONS

A brief look at Boston's row houses will reveal a proliferation of additions; onto roofs, at the ground level, and everywhere in between. For many people, additions offer an alternative to relocation. If it is more space or a better arrangement of spaces that is needed, a well-designed addition can meet these requirements and save the money and effort of moving and financing a larger house. People sometimes choose to add on to their row house for the purpose of altering or changing the function of the space or group of spaces onto which it is added, i.e., changing a living and dining arrangement into an apartment by the addition of a bathroom, or changing a living room into a dining area by adding new living and recreation space. Additions also offer the possibility of accommodating totally new activities such as gardening in a greenhouse or sun bathing on a patio, (see examples on pages 15 - 20). Making additions and renovations also offer the incentive of potentially increasing the value of a unit.

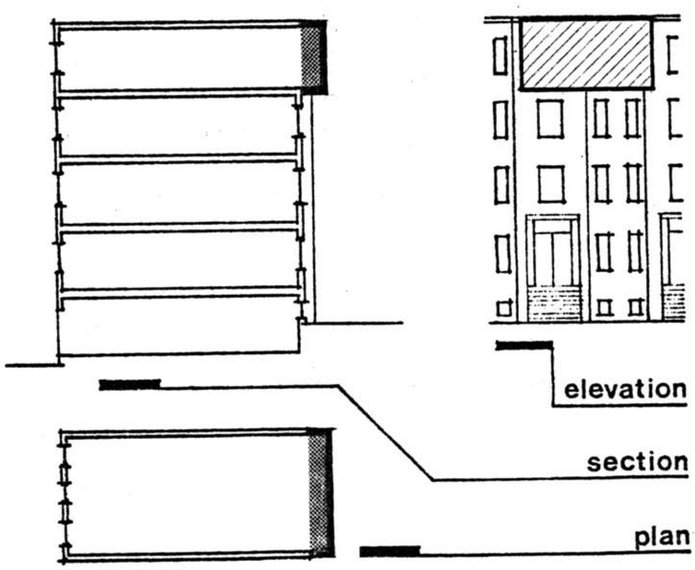
New construction can have a positive effect on its surrounding as well as if it reflects the character of the existing architecture. A basic characteristic of row houses is that they have two kinds of facades; the public one on the street and the private one in the backyard. On the front side, units complemented by additions can enhance the otherwise repeditive facade and the individual dwellings begin to take on their own identities as a result of differentiation. On the back and more private side, the primary concern is usually the function of the addition rather than its looks and relationship to the building.

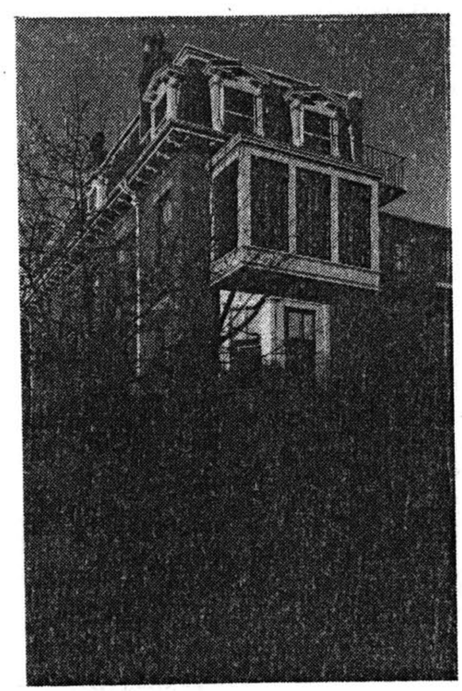
These factors constitute a strong incentive for the owner to add on to his home when it is needed or desired. If the process of adding on can be made simpler and less expensive, the advantages to the user and his neighborhood can be enjoyed by the rest of the city as well, through a general up-granding of the intown residential areas and their resulting appeal. Conceivably, higher income groups would be attracted to the city to live, pay taxes, integrate the schools, etc. This is not to say that making additions easier will solve Boston's or any other city's problems, but it is one way to assist and encourage row house owners who are interested in improving their immediate environments. If this can be accomplished, the city as a whole can only benefit.

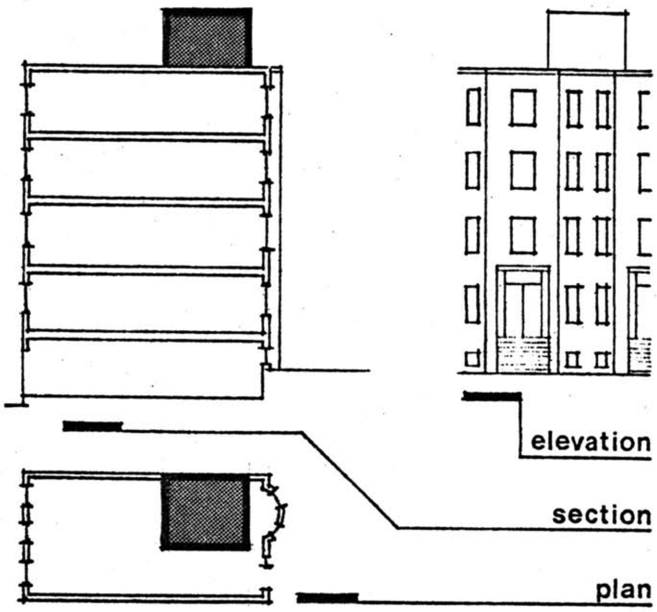
At a much smaller scale, the procedural aspects of building additions must be considered. The possibilities to date range from hiring an architect to design the addition and a building contractor to execute his plans--to building one's own with no instruction or supervision. Between the two extremes are the "how-to" books, the handy-man, magazine articles, and other varied courses of action. Without a doubt, organizing the methods and materials used in planning and constructing additions would expedite the entire process. In doing so, I would become familiar with the specific problems associated with additions. From my conclusions, I would recommend new areas of research, new techniques, and new materials. In order to implement a program directed toward these goals, I will apply two related approaches; self-help and systems.

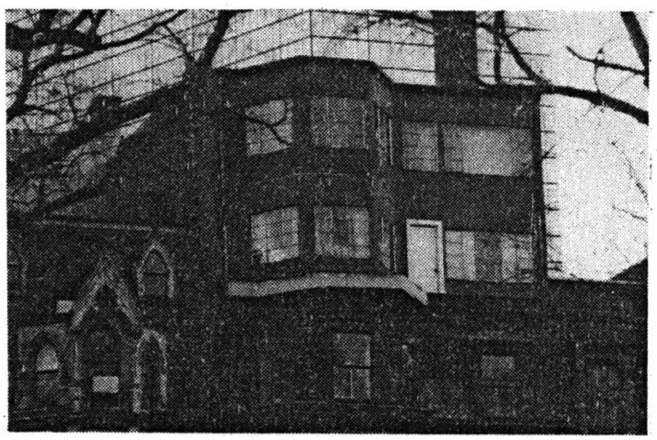


Room Extensions

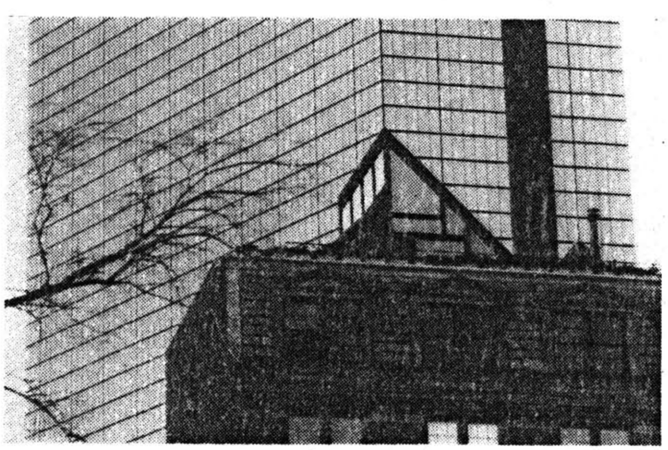


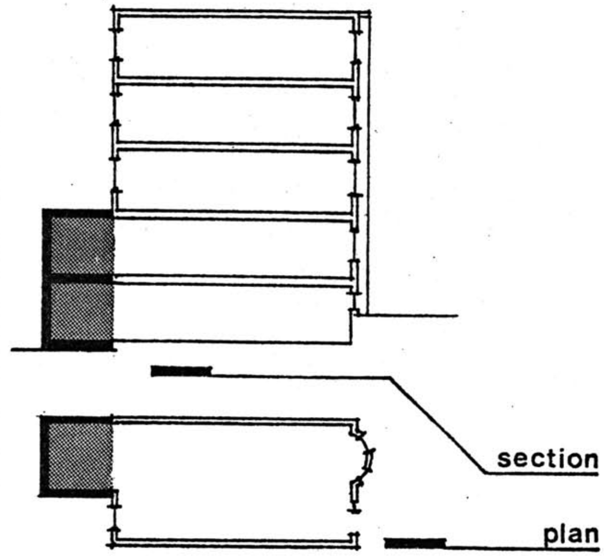




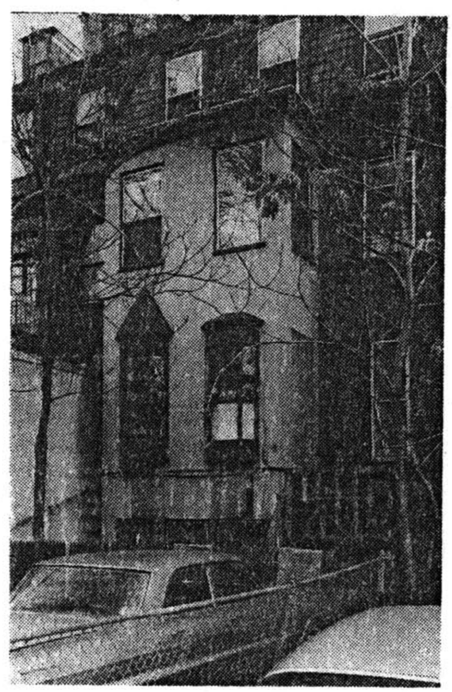


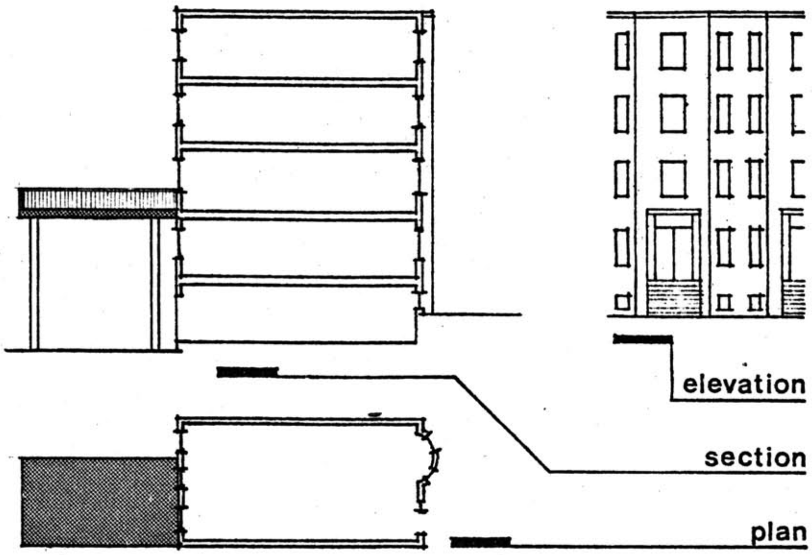
Rooftop Enclosures

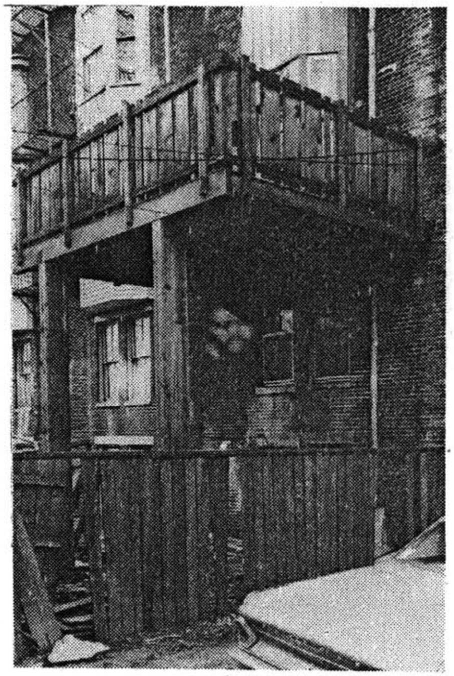




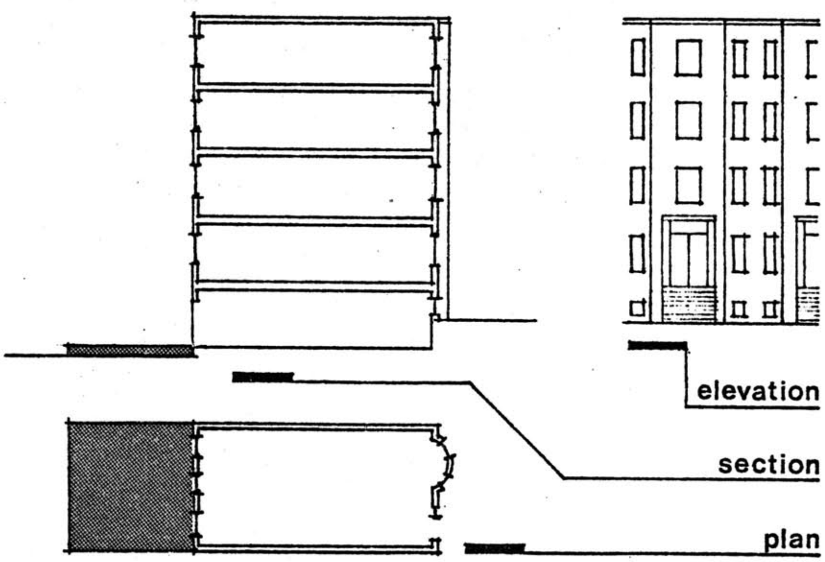
Multi - Level

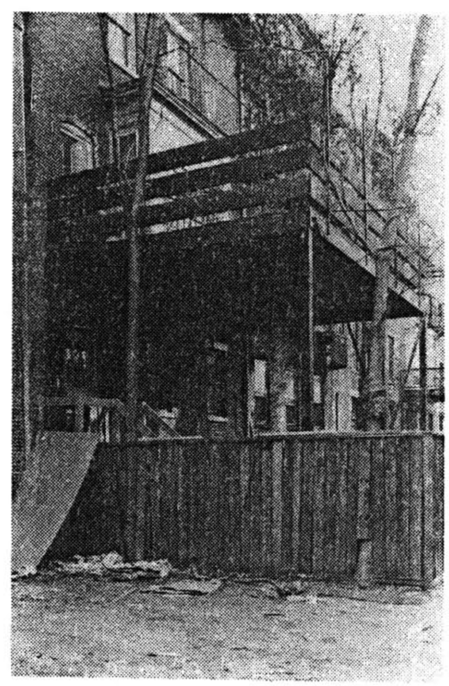


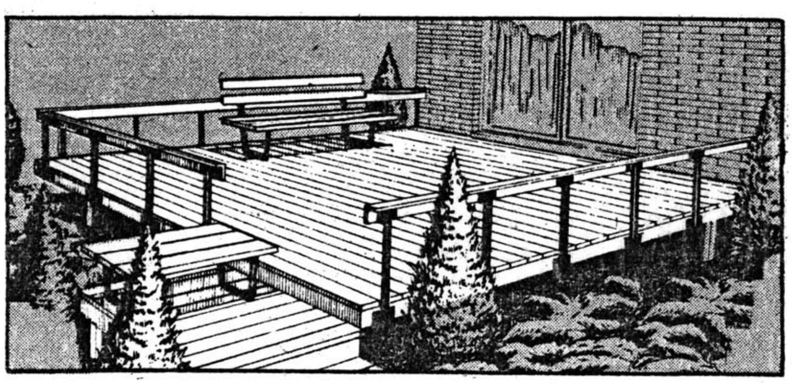


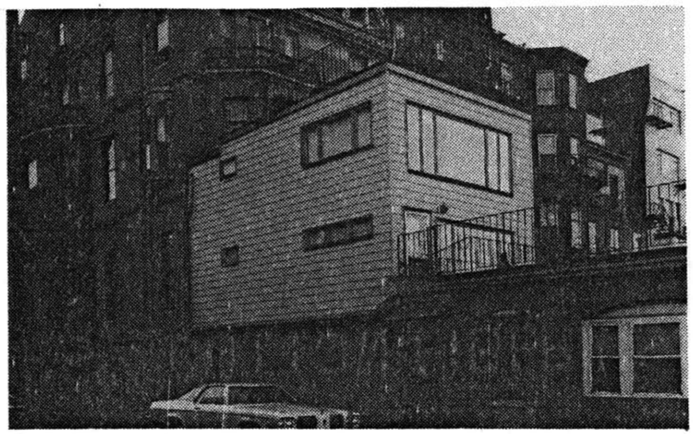


Backyard Decks

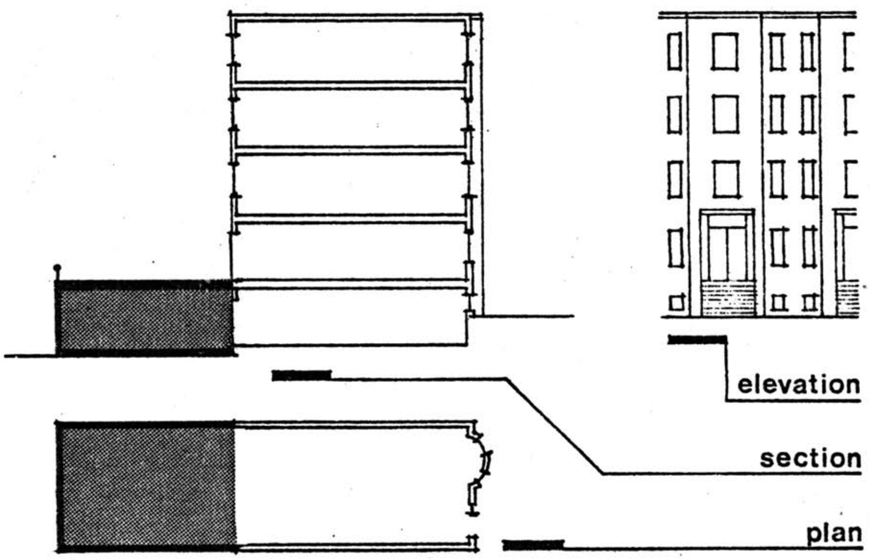


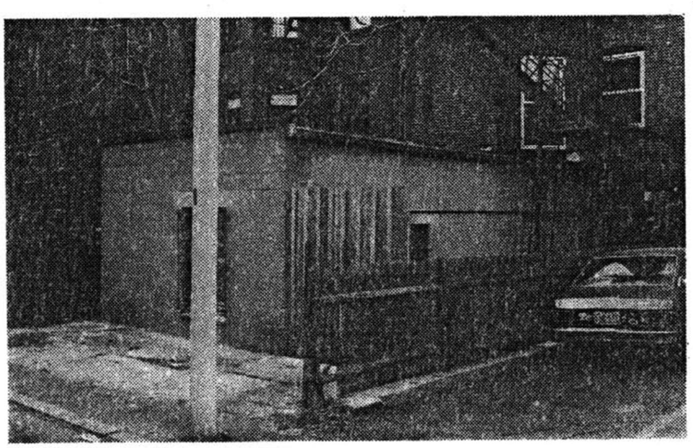




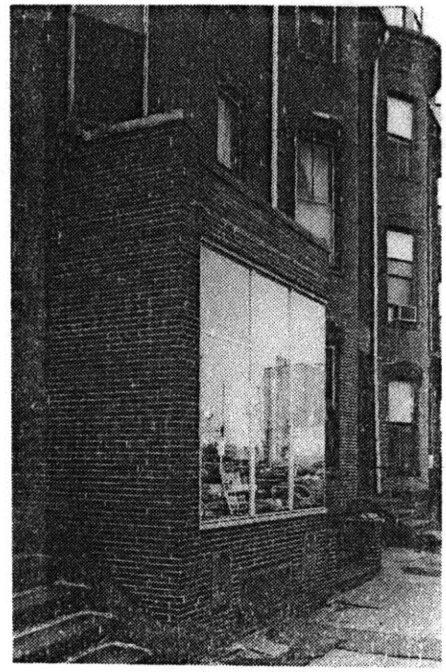


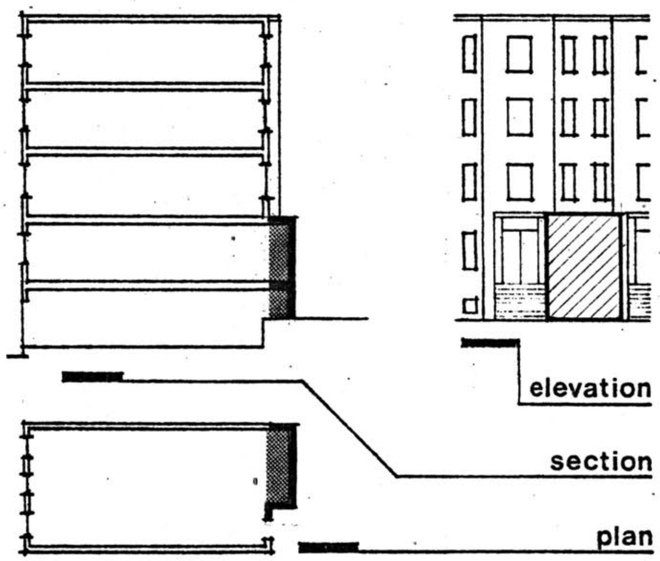
Room Additions

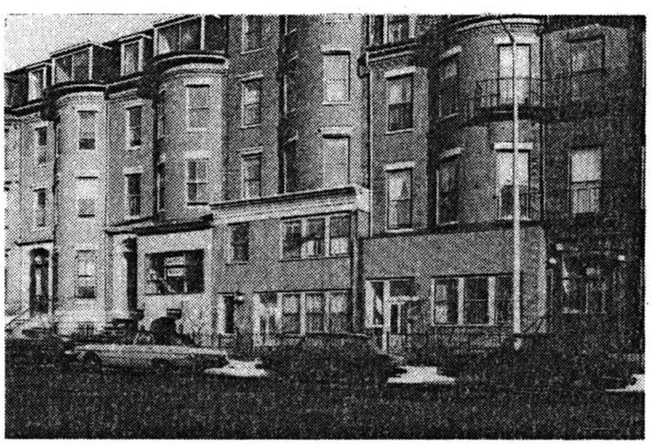


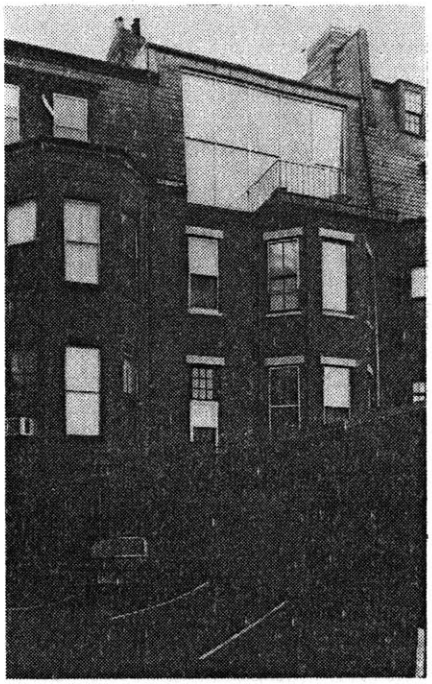


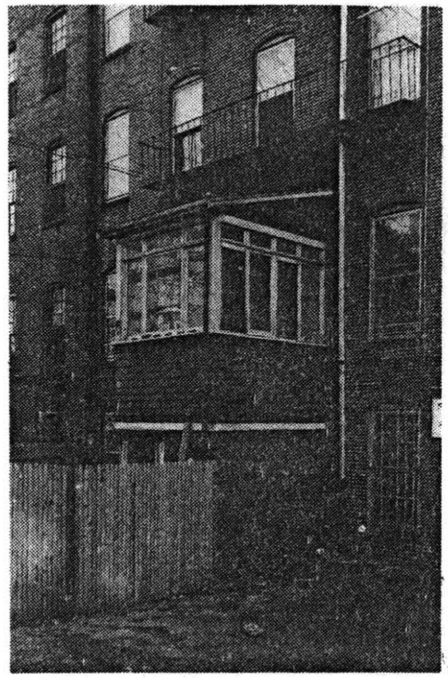
Storefronts

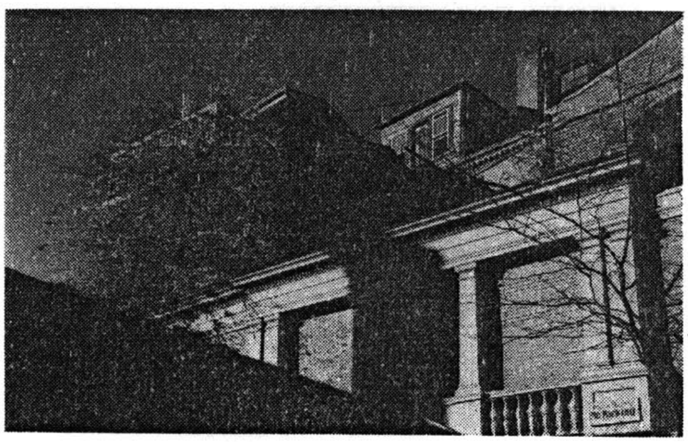


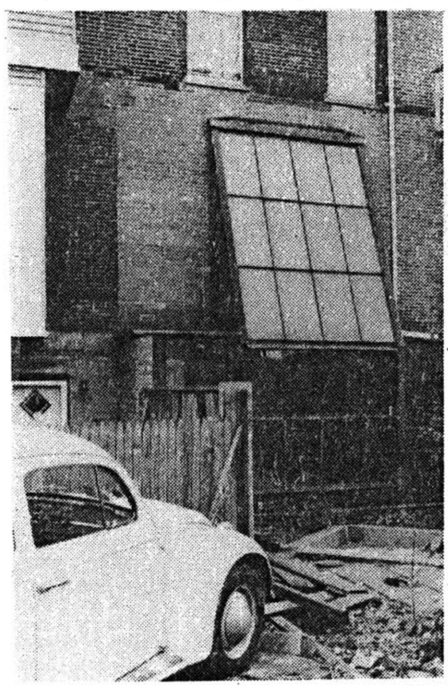


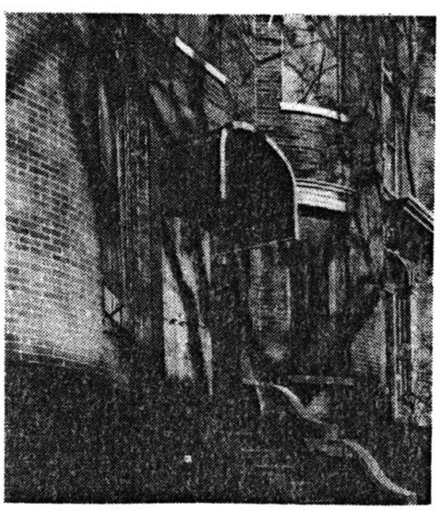












Miscellaneous

SELF-HELP

Self-help is a building method that enables the user-owner to plan, prepare, and construct those portions of his built environment within his capabilities, allowing for the interface between professional and non-professional tasks. The essence of effective self-help, however, is not to find things the user can do--experience has shown that an unskilled builder can do almost anything given the time--but to discriminate between things one can do well and things better left to specialists.

Identifying the specific kinds of help the user will need is an undertaking which requires a task-by-task analysis of the building process. For each element of new construction, there are two main choices: to do it ones' self (some of the work may be "built in" to the tools and materials used), or to subcontract the job to a tradesman. Taking the tradesman's cost for each task as a yardstick, cost savings for the self-help builder can be calculated by deducting his costs for materials and supervision for each step of any building method.

Cost is only one factor involved in the evaluation of tasks for their self-help potential. Building Systems Development, Inc. (BSD) has derived self-help "efficiency factors" for a group of tasks for the purpose of converting estimates of skilled-labor hours into estimated self-help hours required for each task.[3] This is helpful, but one man's time is not always equal to another's. Depending on the amount of time available to a self-helper and the value of this time in alternate uses (such as one's regular job), a particular task can be economical for one and very expensive for another. Hence, a labor intensive task (one emphasizing manual construction and longer time requirements) is attractive to the self-helper who has sufficient "free" time to spend. A home owner, on the other hand, who desires the cost benefits of self-help techniques but cannot justify in terms of dollars large allocations of his time for construction, would benefit more from a capital intensive technology. Placing more money initially into a method that may incorporate a high level of prefabrication and/or reduced tooling and handling requirements would fulfill these needs.

Equally important are the physical and technical capabilities of the self-helper; how many people will participate and how much can they lift? What skills and experience does the self-helper have? What tools are available to him? These are questions that have no single answer.

I have discussed earlier the various incentives for adding onto one's row house in relation to the background

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[3] Large Scale Self-Help Housing Methods, Building Systems Development, Inc., New York, 1970, Report #4.

study. The focus was primarily on quantitative needs and neighborhood asthetics. The home owner's personal goals are important as well and can have a direct bearing on the construction methods and materials chosen for construction. Although function and cost are the primary concerns of the self-help regarding the final product, intangibles such as taste, preference, and image, play an important role in his conception of the addition. For example, one's desire for brick veneer to match the existing structure could outweigh the accompanying high cost.

In summary, the issues concerning self-help techniques as they apply to row house additions are:

- Skilled labor requirements
- Material and labor costs
- Efficiency factors
- Emphasis
  - Labor intensive
  - Capital intensive
- Physical and technical capabilities of the self-helper
- Personal preference

Of the studies I have reviewed on self-help construction, most have approached these issues by first making generalizations and assumptions about the self-helper.

In the BSD study, for instance, this approach was necessary because of the large scale application and the accompanying large numbers of potential self-help participants. Any general observations or findings relating to the majority of a large group of people certainly aid in the implementation of such a broad span program. At a smaller scale of self-help building, however, I feel it is possible to limit the number of assumptions regarding the self-helper in favor of providing a framework within which there is some flexibility. It becomes unnecessary to assume that the "average self-help builder":

- Is able to spend x number of hours per week on construction
- Possesses "sufficient" dexterity
- Is a man
- Has or does not have "adequate" tools

Moreover, terms such as sufficient, adequate, and average are nebulous and difficult to define. If an individual does not fall generally within assumed standards or if the assumptions used are based on questionable or outdated information, the effectiveness of a self-help program is certainly diminished

I have chosen to gear the self-help application of my thesis toward reasonable flexibility--so that a potential self-helper can himself determine the basic direction of his project. The general assumptions regarding the self-helper have been consolidated into one; each self-help builder is different, and so are his needs and wants. If he can identify the issues involved and make the important decisions that will affect him personally, time, money, and frustration can be saved. The issues have, within this text, been identified. The evaluation of their direct influence on row house additions and construction on a task-by-task basis will make it possible for the self-helper to pursue the direction most suited to him.

SYSTEMS

First, the tasks must be identified, not only for the purpose of evaluating the self-help issues, but in response to them as well. Certain materials and building procedures are more compatible with self-help applications than others. By grouping and sequencing time, a building system is created.[4]

A building can be defined as a collection of parts, components, and elements arranged in a manner suitable to a particular need. There is a definite hierarchy intended in these terms as I use them. Parts are hereby defined as any building material of the lowest level of prefabrication used on site or in the factory to construct the most basic constituents of a building. Framing members, sheathing, subflooring, roofing materials, masonry, and concrete all fall into this category.

Components represent the next highest level in the hierarchy and are characterized by some degree of prefabrication. Components consist of parts and can be fabricated on site or off. Pre-hung windows and doors, floor, roof and wall panels, and prefabricated structural members belong in this group.

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[4]Building System: A group of components or parts, and the methodology of their assemblage organized to optimize time, cost, and labor efficiencies.

Finally, there are the elements of which all buildings are made; rooms, circulation, HVAC, entry, etc. In this instance, row house additions (rooms, room extensions, decks, roof top enclosures, etc.) are the elements. The system therefore consists of the parts and/or components and the procedure by which they are assembled into elements. From this point, I will refer to each constituent of the system as a part/component or parts/components.

The systems approach works particularly well with self-help techniques. The standardization of materials and procedures will be helpful to the self-helper. There is a definite economy achieved when the builder becomes familiar with and eventually more efficient at methods that are simplified and repeated.

Parts and components will be carefully screened with top priority given to local availability. The most beautifully organized and coordinated system will do the self-helper no good if the components cannot be acquired easily and quickly. Alternative procedures and materials will be provided as well to insure availability and allow for personal preferences and flexibility. Obviously, size and weight are also contributing factors in the selection process.

As I have stated earlier, the building components and methods must be compatible with the self-help approach, but they must also be compatible with each other. Conflicting materials and technologies can wreck havoc on a building project. New construction must meet the building codes and, in some cases, the approval of neighbors or historical preservation organizations as well.

The very nature of supplemental construction requires careful consideration of the interface between the old and the new. The system must therefore be equipped with information pertaining to wall penetration, the connection of the existing to the addition, and temporary weather protection during construction. The materials and design of the addition should not detract from or severely alter the character of the existing structure.

After selecting the system's parts and components based on these criteria, the pertinent data relating to each part/component must be gathered. This data will be listed in a standardized format on the same page with each part/component. The user, after comparing the facts on cost, skill level, time required, emphasis, and performance, will be in the best position to choose his own procedure within the system. He will also be able to determine for himself which tasks he can perform efficiently and which tasks he should sub-contract, based on the time and cost comparisons.

A matrix listing tasks on one axis and row house elements on the other will serve as an index from which the part/component alternatives can be located. The bulk of the system will be presented in architectural drawings, but an example of how I would present the system to the layman will also be shown.

In line with the idea of flexibility and alternative emphasis, I have chosen two basic departures for the construction of an addition. First there is the labor intensive approach. This incorporates the use of conventional materials and construction techniques. Labor intensive technology is geared primarily toward those self-helpers with adequate free time who can benefit from the cost savings of supplying most of the labor themselves. The conventional approach also insures availability of and familiarity with the building components. The capital intensive approach, on the other hand, relies on prefabrication and simplified construction and design of the components for its cost savings. This direction is intended for the self-helper whose time is more efficiently spent elsewhere but who, never the less, wishes to enjoy the benefits of his own labor.

2 GENERATE THE SYSTEM

Framework

Instructions

The System

Supporting Resources

FRAMEWORK

In order to limit the scope of a system for row house additions to a workable and feasible range, I have selected the South End section of Boston as the model for which the system will be designed. The row houses in the South End are of brick masonry construction with wood joist flooring systems. The party walls are bearing and each unit has a front entry on the street and a yard in the rear. The style of row houses found in the South End is one of the typical generic types observable in the larger cities of the North Eastern United States. The great majority of the photographs showing row house additions were taken in the South End. The statistical and historical background of the area was presented earlier.

The scope of the system is further limited by establishing size criteria within which the system will function. Accommodating too wide a size range would make the selection of structural members difficult and the logistics of self-help construction more complicated. Time and resource limitations also exclude the possibility of generating a comprehensive system. The system therefore is designed for additions of no more than 3,000 $ft.^2$, excluding multi-level structures.

Financing is a task left entirely to the owner. It is assumed that the self-helper knows how much money he has to spent or how much he can borrow. With this information he can price the size, type, and method of addition using the information provided in the part/component analyses. The analysis of the parts and components and their construction procedure will not, however, include the specific tools required to perform each task except where specifically noted. General references can be found in the bibliography. One book in particular, the Complete Do-it-Yourself Manual, lists and graphically demonstrates a wide variety of tools and their applications.

One of the major goals of the self-help approach is to allow for construction tasks which the layman can perform. It is for this reason that I have excluded plumbing and major electrical work from the system. This is a reasonable assumption considering the size limitations of the additions and available services within the existing structures. Plumbing and electrical work are tasks which require unusually high levels of skill and are better left to the professional tradesman if they are desired or needed. The system does, however, provide for the installation of electrical plug molding after construction.

Within the framework of the forestated size limitations, the system is designed to meet the space and programatical needs most often demonstrated by existing examples. The specific addition types or elements for which the system is applicable were outlined in the discussion of parts, components and elements. They are: rooms, room extensions, decks, (covered, uncovered, roof, yard, and mid-level), and roof top enclosures (also see section on additions).

In summary, the type selection was based on the following criteria:

- Size (under 3,000 $ft.^2$, single level)
- Existing precedent (Boston)
- Simplicity of construction
- Adaptability to existing plan

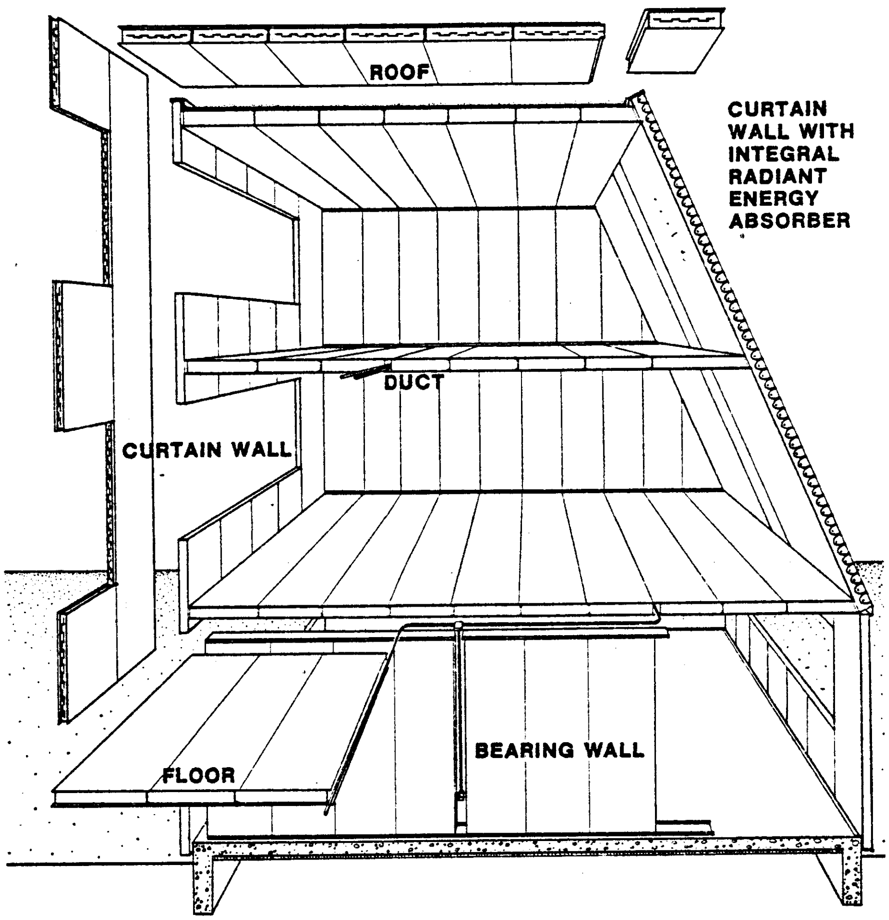
For each type of addition there will be a choice of the labor intensive approach or the capital intensive approach and within these two alternatives there will be the added flexibility of interchangeable materials and construction techniques.

The labor-intensive approach is based on the standard conventional construction materials (parts) and methods. Interior and exterior walls are of 2 x 4 wood stud framing supported by a wood joist floor system and a perimeter concrete block foundation wall or poured concrete piers. Interior walls are finished with gypsum drywall and the floor, exterior wall, and roof are sheathed with plywood. Brick veneer is allowed for and the roof (wood joists) can be finished with built up tar and gravel or asphalt shingles.

At the heart of the capital-intensive approach is the GNS wood panel system. The Great Natural Structures Co., Inc.

is a multi-interest design and manufacturing company based in Boston. Their enclosure systems have been used in residences, commercial developments, and educational facilities, i.e., The Mattapan Junior High School. In addition to their wood panels, they produce solar collectors and steel stressed-skin panels (see page 35).

The wood panels that are included in the system are part of the GNS standard manufactured panel system; insulating foam core faced with plywood, gypsum wallboard, texture 1-11 plywood, or any finish material depending on its use. They are available in varying thickness in 4 ft. x 8 ft. and 2 ft. x 12 ft. dimensions, accommodating different loads and spans. Much of the detailing for the panel system was provided by GNS though some of the details were designed specifically for the system.



The G.N.S. Company manufactures a complete structural system for low rise buildings which features prefinished components with high strength and insulation values.
The G.N.S. enclosure system offers rapid construction, reduced dead loads, integral utility chases, low maintenance, and the durability of steel.
Full range architectural, engineering, and estimating services are available at any stage of the design process for total enclosures or any G.N.S. Subsystem.

Page taken from GNS brochure.

INSTRUCTIONS

Before going into the actual construction phase of a building addition, there are several preliminary steps that must be taken.

First, the local zoning board must be contacted. If an addition is intended to be used for commercial purposes or uses other than residential, the local zoning must allow for such. Otherwise, a variance must be obtained. In any case, the zoning of one's particular area should be carefully checked.

A prerequisite for any new construction in the city of Boston is the application and acquisition of a building permit.

> It shall be unlawful to construct, enlarge, alter, remove or demolish a building, or change the occupancy of a building from one use group to another; or to install or alter any equipment for which provision is made or the installation of which is regulated by the Basic Code, without first filing an application with the building official in writing and obtaining the required permit thereof; except that ordinary repairs as defined in section 102 which do not involve any violation of the Basic Code shall be exempt from this provision.[5]

Specific instructions regarding the application for a building permit can be found in the Massachusetts State Building Code, section 113.0.

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[5] Massachusetts State Building Code, 1976, Section 113.0.

Knowing how much money is available to him and having fulfilled zoning and building permit requirements, the self-helper is then ready to study the actual parts and components available to him within the system. A matrix listing tasks on one axis and row house elements on the other will serve as an index from which the self-helper can locate the part/component sheet that describes the appropriate procedure.

Procedural Matrix

	MODIFICATIONS TO EXISTING	CONSTRUCTION	FINISHES
FLOOR	A1	A2	A3
INTERIOR WALL	B1	B2	B3
EXTERIOR WALL	C1	C2	C3
ROOF	D1	D2	D3

If the user wishes to compare floor construction techniques for instance, he would refer to the pages in the system with the A2 designation. Likewise, if modifications to existing exterior wall construction is the item of interest, C1 is the designation to look for.

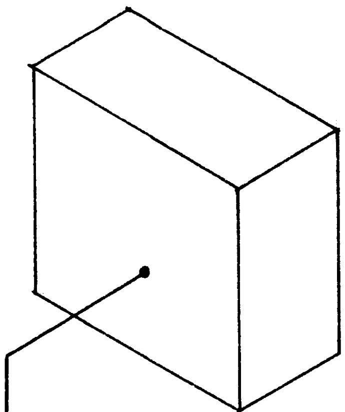
Each part/component sheet contains an analysis of its emphasis (labor or capital intensive), skill level, prefabrication level, costs, manpower needed, and performance data (see part/component sheet nomenclature page 39). The drawings show materials, construction methods and connections. After studying the information and drawings for each part/component, the self helper will have a clear idea of which ones best suit his needs and skills.

Now it is possible for the user to decide on the addition type that he wishes to build, based on:

- Zoning
- Funds available
- Space arrangement
- Square footage
- Skills possessed
- Emphasis (labor or capital intensive)

Once the type is determined, he can locate the appropriate construction sequence in the section following the part/ component sheets (see page 58). The construction then begins in accordance with the proper sequence diagram.

NOMENCLATURE



isometric sketch of part/component
no scale
with description

letter-no. designation
in reference to
procedural matrix
and sequence diagrams

task-from procedurial
matrix

building element-
from matrix

part or component
detailed on sheet

percentage ratio

labor intensive or
capital intensive

amount of skill required
to perform the task;
high, med (medium), or low

level of prefabrication
of the part/component;
high, med, or low

detail or section number

page number of detail

retail costs
as of 11/76

unit; $/ft^2$,
$/unit, etc.

time required for
the professional to
perform the task

unit; ft^2/day, units/hr, etc.

figure which multiplied
by the tradesman's time
will yield self-helper's
time required

number of people needed
to perform the task

moving, lifting, and
putting into position
the part(s)/component

statistical information
regarding the part/component
(STC, U factor, fire rating, etc.)

to Mass. State Building Code,
books, etc.

MATRIX COORDINATES

PART/COMPONENT

EMPHASIS %

SKILL LEVEL

PRE-FAB. LEVEL

COSTS

MATERIALS

LABOR

TOTAL

TIME REQUIREMENT

EFF. FACTOR

WORKERS

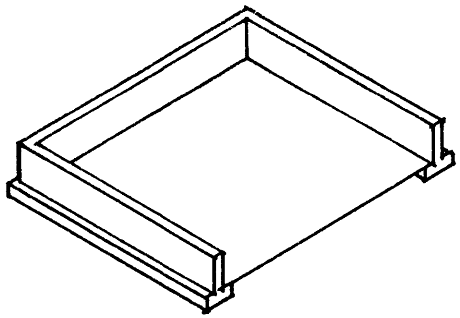
PLACEMENT

CONSTRUCTION

DATA

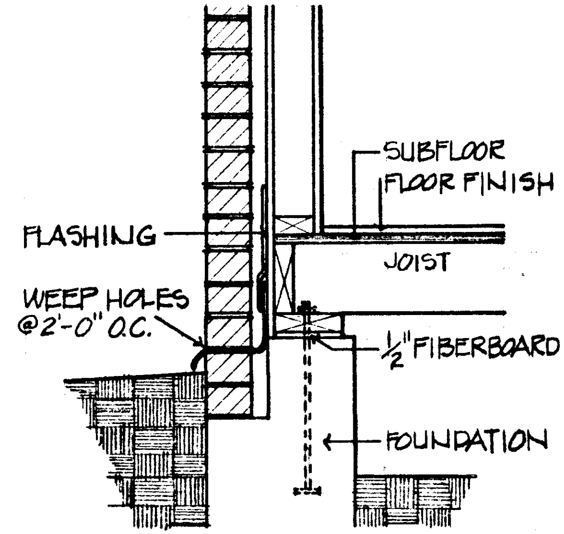
NOTES

REFERENCES

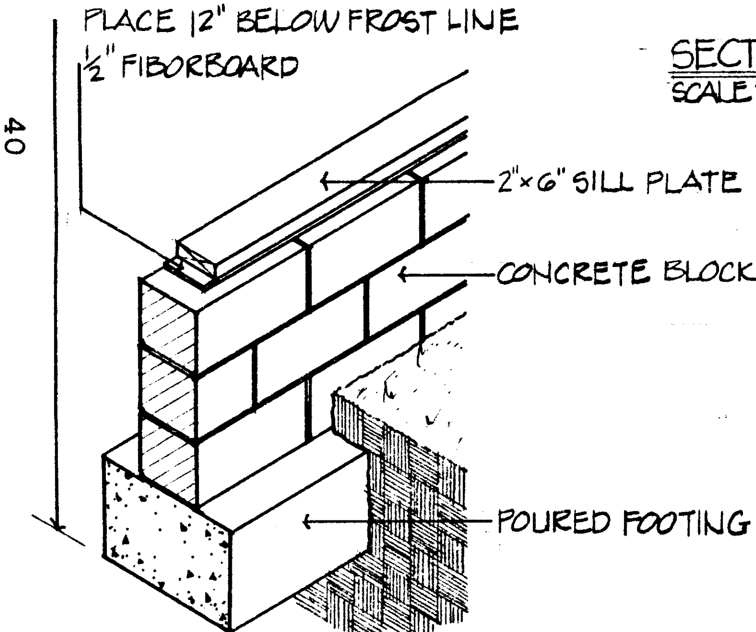


PERIMETER WALL FOUNDATION

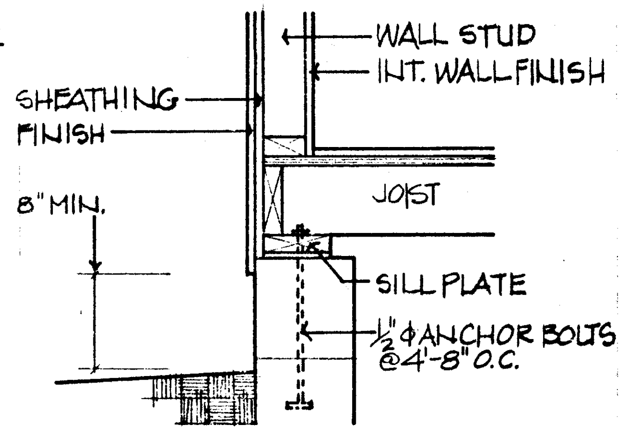
CONC. BLOCK 8"×8"×16"
SAND AGGREGATE TROWEL-CUT JOINTS
NOT REINFORCED



SECTION-BRICK VENEER WALL
SCALE: 3/4"=1'-0"
1/40

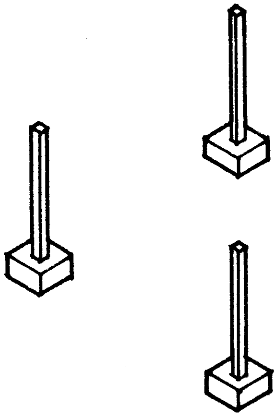


DETAIL
SCALE: 1/2"=1'-0"
2/40



SECTION THROUGH EXT. WALL
SCALE: 3/4"=1'-0"
3/40

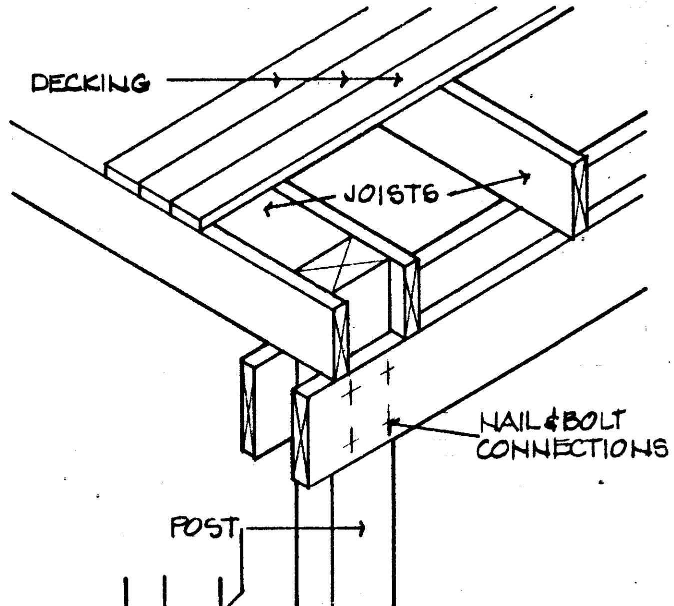
MATRIX COORDINATES	
A2	CONSTRUCTION
FLOOR	
PART/COMPONENT	
FOUNDATION	
EMPHASIS	**%**
LABOR INTENSIVE	60-40
SKILL LEVEL	HIGH
PRE-FAB. LEVEL	LOW
COSTS	**$/ft²**
MATERIALS	.50
LABOR	1.02
TOTAL	1.52
TIME REQUIREMENT	
EFF. FACTOR	3.4
WORKERS	
PLACEMENT	2
CONSTRUCTION	2
DATA	
NOTES	
REFERENCES	
MASS. BLDG. CODE — 727.0, 871.2	



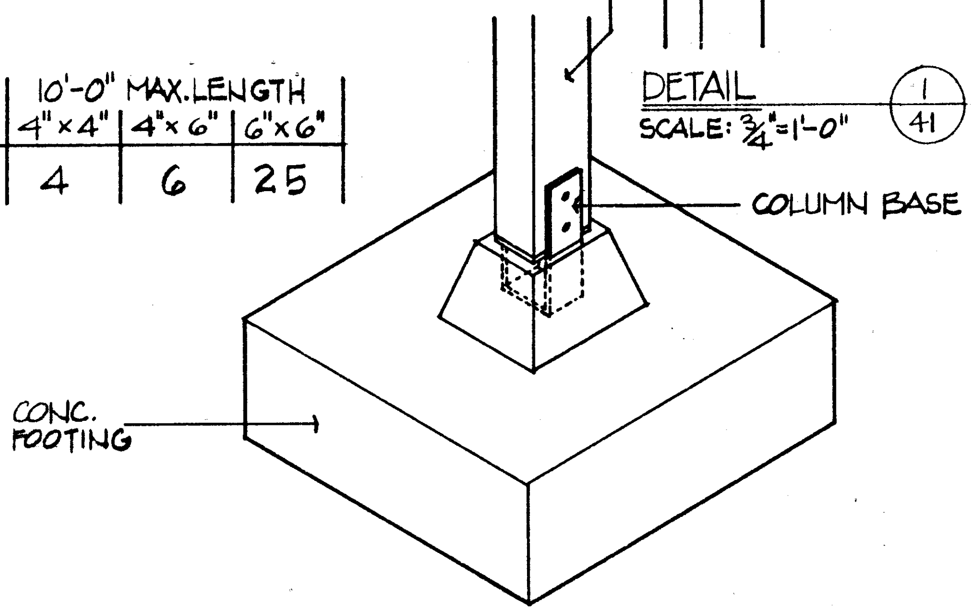
PIER FOUNDATION

POURED CONC. FOOTINGS
WOOD POSTS

	10'-0" MAX. LENGTH		
	4"×4"	4"×6"	6"×6"
SAFE LOAD IN KIPS	4	6	25

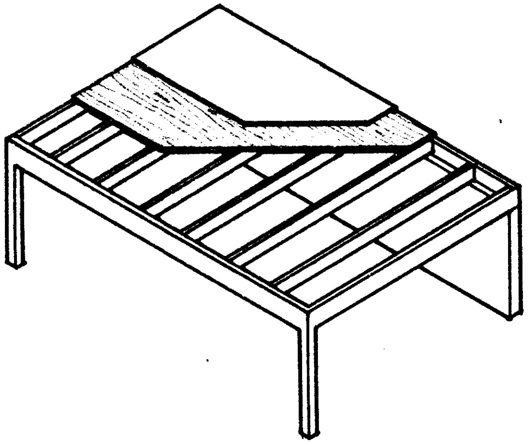


DETAIL 1/41
SCALE: 3/4"=1'-0"



DETAIL 2/41
SCALE: 3/4"=1'-0"

MATRIX COORDINATES	
A2	CONSTRUCTION
FLOOR	
PART/COMPONENT	
FOUNDATION, PIER & POST	
EMPHASIS	%
LABOR INTENSIVE	60-40
SKILL LEVEL	MED
PRE-FAB. LEVEL	LOW
COSTS	$/ft²
MATERIALS	
LABOR	
TOTAL	70
TIME REQUIREMENT	
EFF. FACTOR	2.6
WORKERS	
PLACEMENT	3
CONSTRUCTION	2
DATA	
NOTES	
FOR DECK CONST.	
REFERENCES	
BUILDING CODE	720.0 914.0

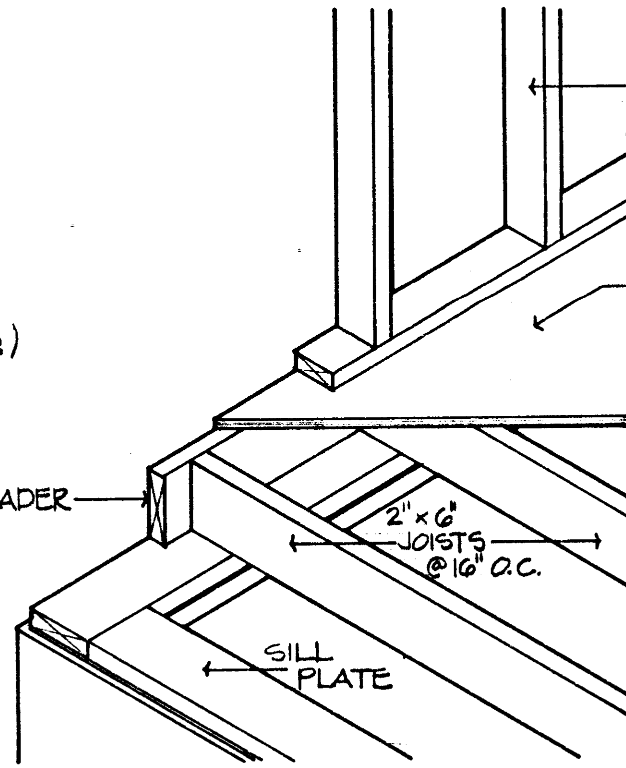


WOOD JOIST SYSTEM

2"x6" JOISTS @16" O.C.
PLYWOOD SUBFLOOR
STANDARD GRADE - $\frac{1}{2}$"

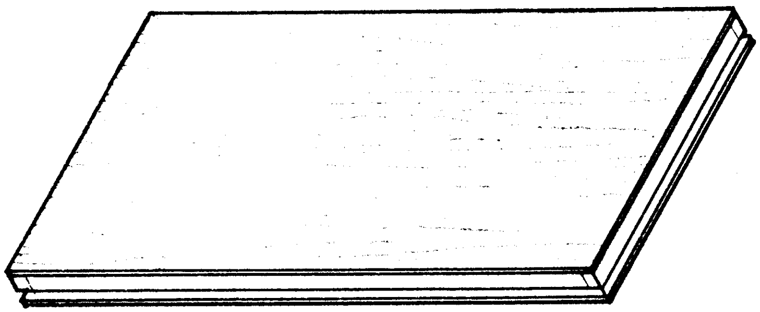
MAX SPAN - 9'-6"
(f=1200 PSI, LIVE LOAD 40 lb/ft^2)

SEE 3/40



DETAIL 1/42
SCALE: ¾"=1'-0"

MATRIX COORDINATES	
A2	CONSTRUCTION
FLOOR	
PART/COMPONENT	
WOOD JOISTS & PLYWOOD SUBFLOOR	
EMPHASIS	**%**
LABOR INTENSIVE	60-40
SKILL LEVEL	MED
PRE-FAB. LEVEL	LOW
COSTS	**$/ft²**
MATERIALS	1.03
LABOR	.77
TOTAL	1.80
TIME REQUIREMENT	
ft²/DAY	600
EFF. FACTOR	3.8
WORKERS	
PLACEMENT	2
CONSTRUCTION	2
DATA	
NOTES	
SEE PAGE FOR MOISTURE PROTECTION	
REFERENCES	
BLDG CODE	707.0 853.0

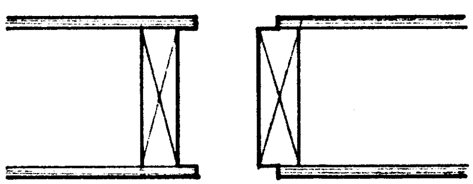


FLOOR PANEL

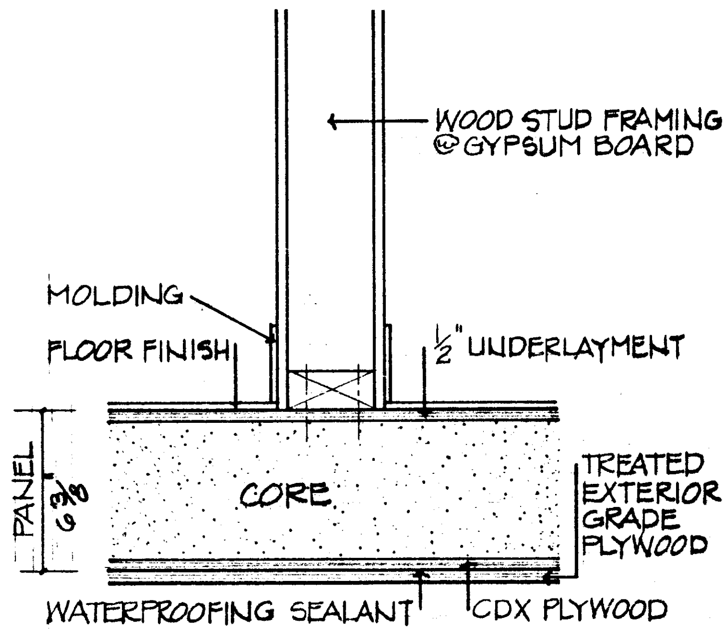
MANUFACTURED BY G.N.S. ENCLOSURE SYSTEMS
79 MAGAZINE STREET
BOSTON, MASS.

4'×8'×6 3/8"
WEIGHT – 157 lb. ea.

SEE 1/46

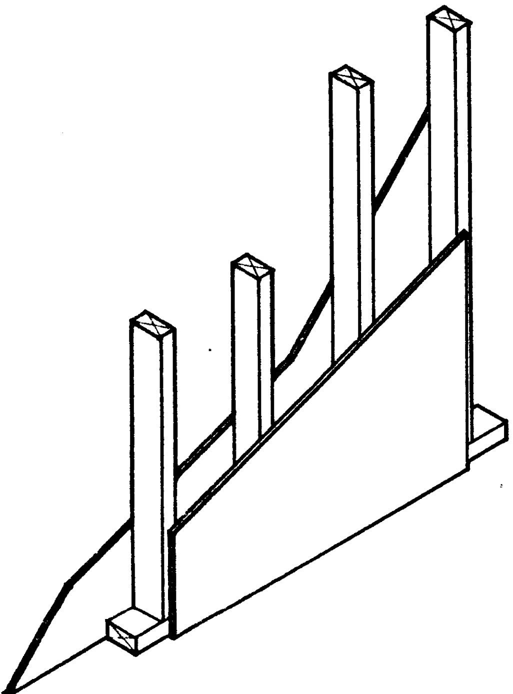


CONNECTION DETAIL



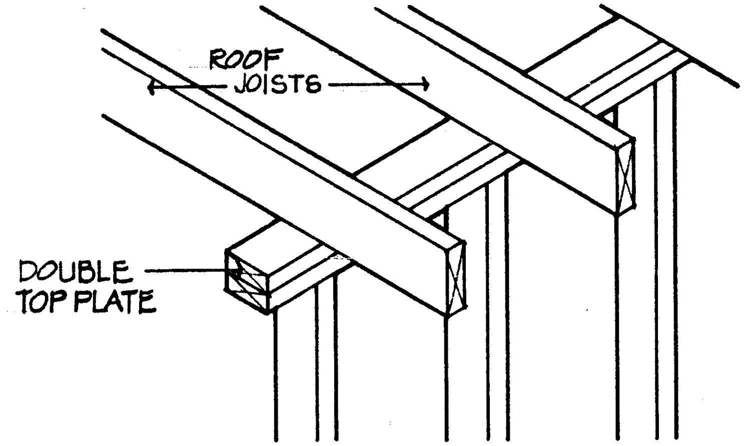
FLOOR SECTION 1/43
SCALE: 1 1/2"=1'-0"

MATRIX COORDINATES	
A2	CONSTRUCTION
FLOOR	
PART/COMPONENT	
GHS WOOD PANELS	
EMPHASIS	%
CAPITAL INTENSIVE	90-10
SKILL LEVEL	MED
PRE-FAB. LEVEL	HIGH
COSTS	$/ft²
MATERIALS	1.45
LABOR	
TOTAL	
TIME REQUIREMENT	
EFF. FACTOR	5
WORKERS	
PLACEMENT	2
CONSTRUCTION	2
DATA	
R VALUE	30.5
NOTES	
SPAN 8'-0".	
REFERENCES	
BLDG CODE 854.1	

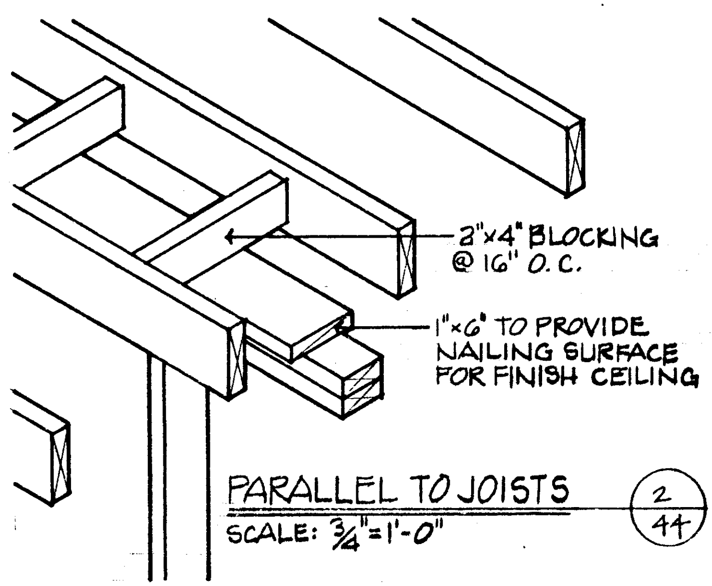


INTERIOR PARTITION

U.S. GYPSUM DRYWALL – 4'×8'×½'
ON 2"×4" WOOD STUDS

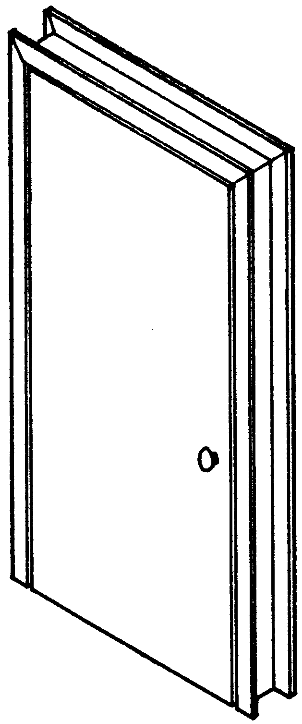


PERPENDICULAR TO JOISTS 1/44
SCALE: ¾"=1'-0"



PARALLEL TO JOISTS 2/44
SCALE: ¾"=1'-0"

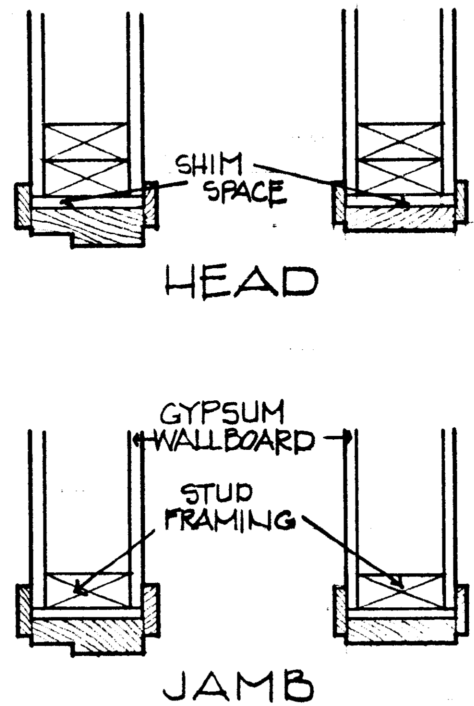
MATRIX COORDINATES	
B2	CONSTRUCTION
INTERIOR WALL	
PART/COMPONENT	
GYPSUM WALLBOARD ON WOOD STUDS	
EMPHASIS	**%**
LABOR INTENSIVE 70-30	
SKILL LEVEL	MED
PRE-FAB. LEVEL	LOW
COSTS	**$ / ft²**
MATERIALS	.46
LABOR	.84
TOTAL	1.30
TIME REQUIREMENT	
ft²/ DAY	1800
EFF. FACTOR	3.9
WORKERS	
PLACEMENT	2
CONSTRUCTION	2
DATA	
FIRE RATING	.75
STC	34
NOTES	
EFFICIENCY FACTOR FOR TAPING – 6.25	
REFERENCES	
BLDG. CODE 853.12	



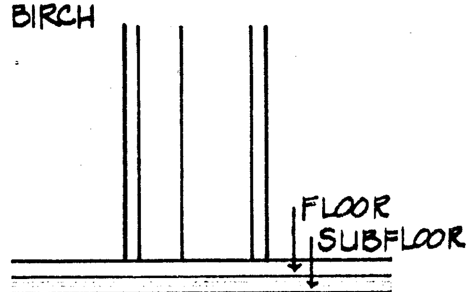
PRE-HUNG DOOR

2'-6"×6'-8" HOLLOW CORE BIRCH
SPLIT JAMBS

SEE 1/44 2/44

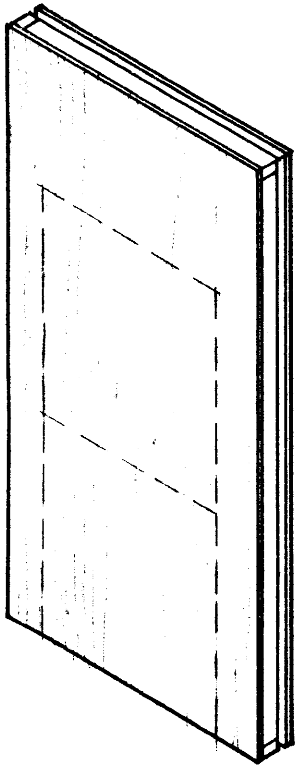


OPENING 1/45
SCALE: 1½"=1'-0"



DOOR FRAME 2/45
SCALE: 1½"=1'-0"

MATRIX COORDINATES	
B2	CONSTRUCTION
INTERIOR WALL.	
PART/COMPONENT	
DOORS & OPENINGS	
EMPHASIS	%
CAPITAL INT.	70-30
SKILL LEVEL	MED
PRE-FAB. LEVEL	HIGH
COSTS	$/UNIT
MATERIALS	40
LABOR	15
TOTAL	55
TIME REQUIREMENT	
UNIT/DAY	12
EFF. FACTOR	2
WORKERS	
PLACEMENT	2
CONSTRUCTION	2
DATA	
NOTES	
REFERENCES	

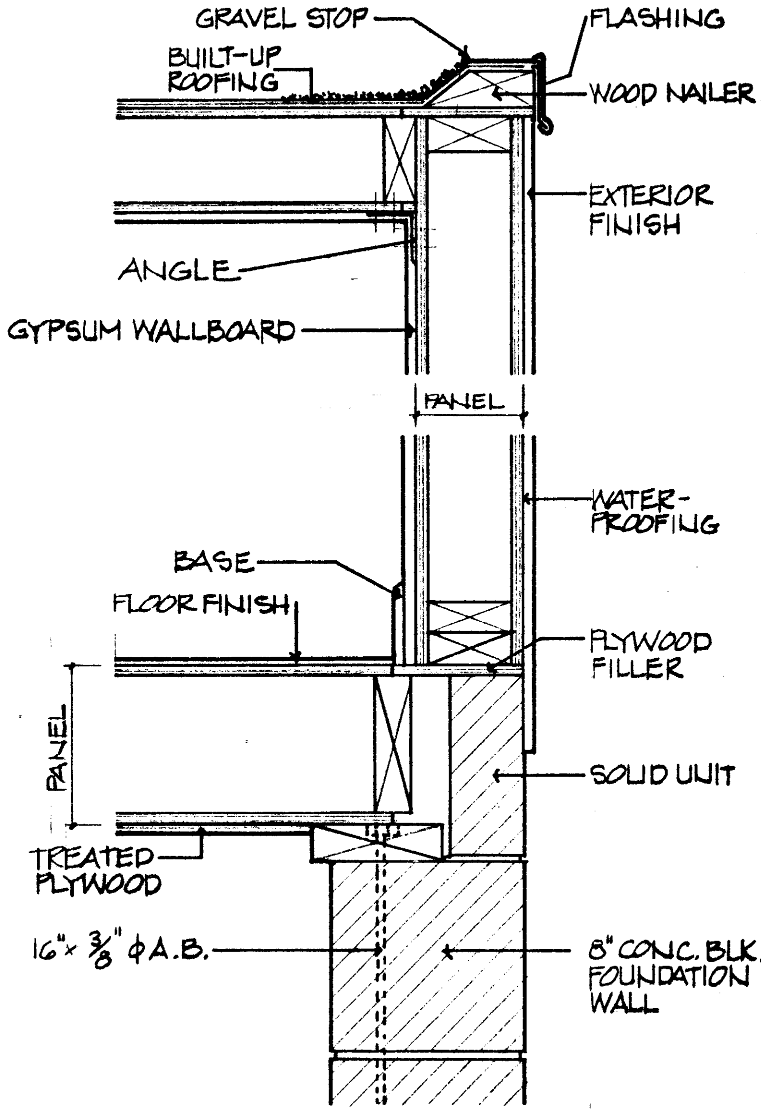


EXTERIOR WALL PANEL

GNS. BOSTON, MASS.
4'×8'×4¾"

WINDOW & DOOR OPENINGS MAY BE CUT ON-SITE OR IN THE FACTORY

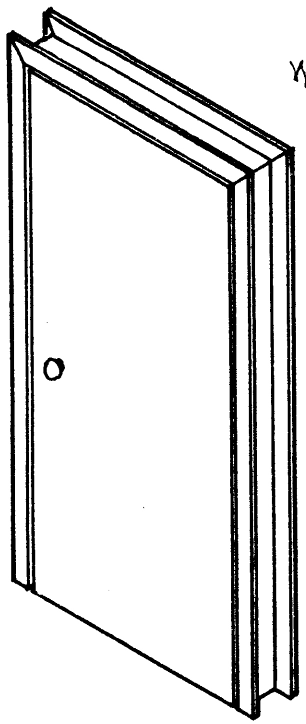
SEE 1/52



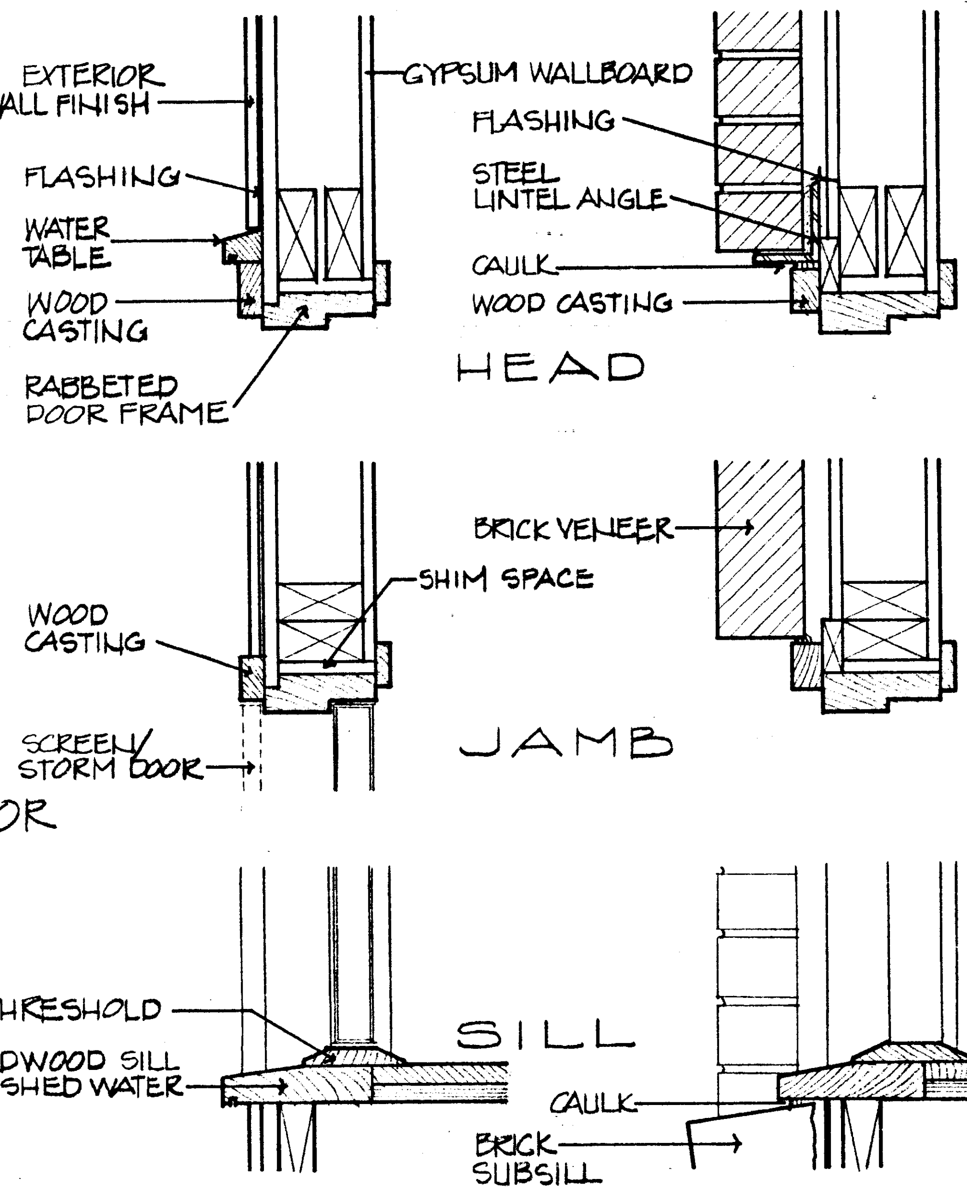
WALL SECTION
SCALE: 1½"=1'-0"

1/46

MATRIX COORDINATES	
C 2	CONSTRUCTION
EXTERIOR WALL	
PART/COMPONENT	
GNS WOOD PANELS	
EMPHASIS	**%**
CAPITAL INT.	90-10
SKILL LEVEL	MED
PRE-FAB. LEVEL	HIGH
COSTS	**$ / ft²**
MATERIALS	1.15
LABOR	
TOTAL	
TIME REQUIREMENT	
EFF. FACTOR	3.8
WORKERS	
PLACEMENT	2
CONSTRUCTION	2
DATA	
R VALUE	31
NOTES	
DOOR & WINDOW OPENINGS ON SITE OR IN FACTORY	
REFERENCES	
BLDG. CODE: 854.1	



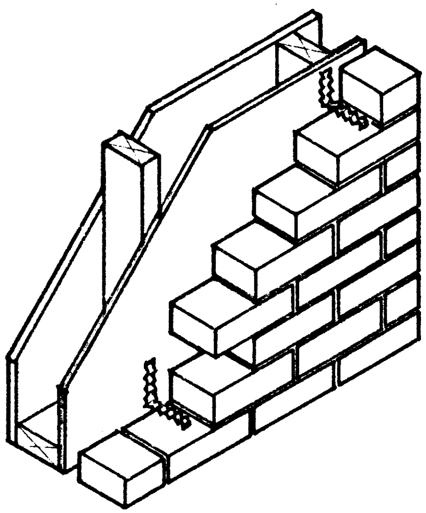
EXTERIOR DOOR
3'x6'-8"x1¾"
FLUSH
PRE-HUNG



DOOR FRAME SECTION
SCALE: 1½"=1'-0"

1/47

MATRIX COORDINATES	
C2	CONSTRUCTION
EXTERIOR WALL	
PART/COMPONENT	
DOORS	
EMPHASIS	**%**
CAPITAL INT.	65-35
SKILL LEVEL	LOW
PRE-FAB. LEVEL	HIGH
COSTS	**$/UNIT**
MATERIALS	90
LABOR	20
TOTAL	110
TIME REQUIREMENT	
EFF. FACTOR	3.8
WORKERS	
PLACEMENT	2
CONSTRUCTION	2
DATA	
NOTES	
DETAILS FROM CHING	
REFERENCES	

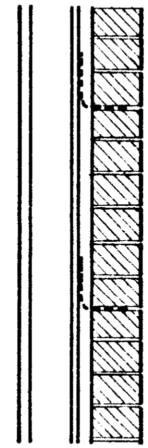


BRICK VENEER WALL

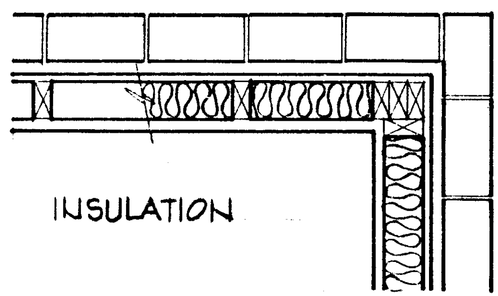
4" FACE BRICK
GALVANIZED WALL TIES @ 16" O.C.
3/8" MORTAR JOINTS

SEE 1/40 1/47

1" AIR SPACE
WOOD STUD FRAME
GYPSUM WALLBOARD
WATERPROOF BLDG. PAPER OVER WALL SHEATHING
METAL TIES
BRICK VENEER



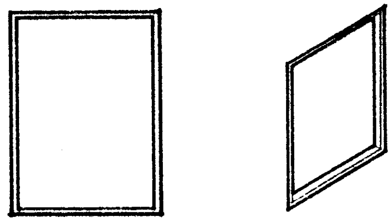
SECTION 1/48
SCALE: 3/4"=1'-0"



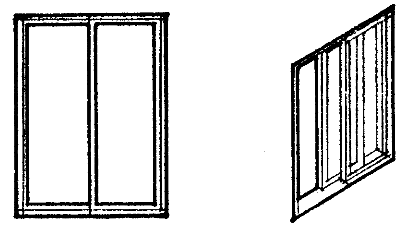
INSULATION

PLAN 2/48
SCALE: 3/4"=1'-0"

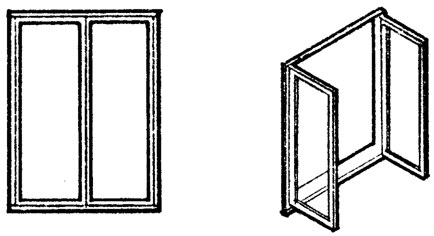
MATRIX COORDINATES	
C 2	CONSTRUCTION
EXTERIOR WALL	
PART/COMPONENT	
BRICK VENEER WALL	
EMPHASIS	%
LABOR INT.	80-20
SKILL LEVEL	PRO
PRE-FAB. LEVEL	LOW
COSTS	
MATERIALS	1.58
LABOR	3.74
TOTAL	5.32
TIME REQUIREMENT	
EFF. FACTOR	8
WORKERS	
PLACEMENT	2
CONSTRUCTION	2
DATA	
NOTES	
REFERENCES	
BLDG. CODE:	860.3



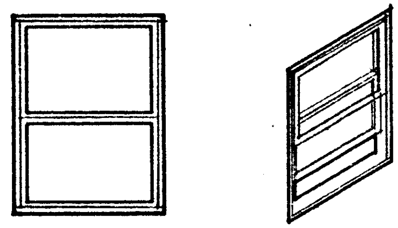
FIXED



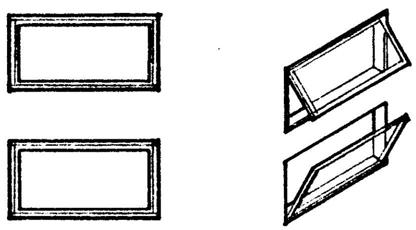
SLIDING



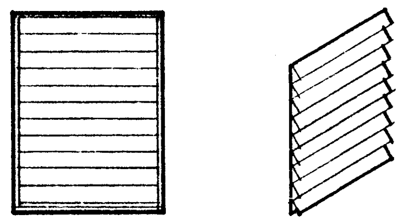
CASEMENT



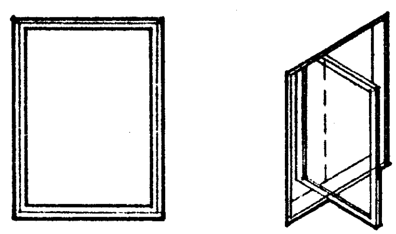
DOUBLE-HUNG



AWNING - HOPPER



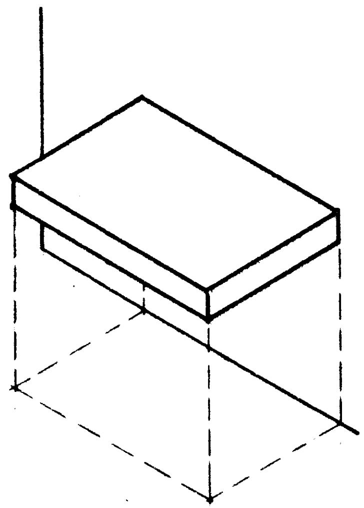
JALOUSIE



PIVOTING

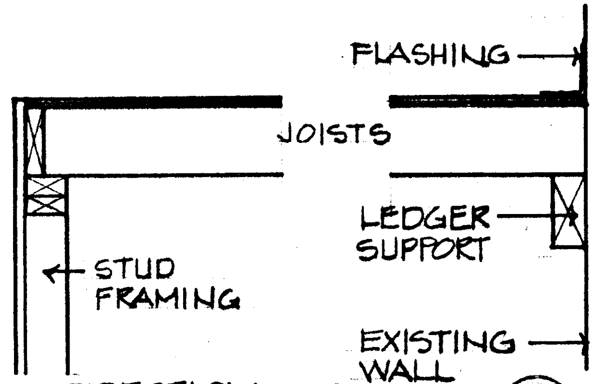
NOTE: AVAILABILITY AND COST VARY WITH EACH TYPE

MATRIX COORDINATES	
C2	CONSTRUCTION
EXTERIOR WALL	
PART/COMPONENT	
WINDOWS	
EMPHASIS	%
CAPITAL INT.	70-30
SKILL LEVEL	MED
PRE-FAB. LEVEL	HIGH
COSTS	VARIES
MATERIALS	
LABOR	
TOTAL	
TIME REQUIREMENT	
EFF. FACTOR	
WORKERS	
PLACEMENT	
CONSTRUCTION	
DATA	
NOTES	
REFERENCES	



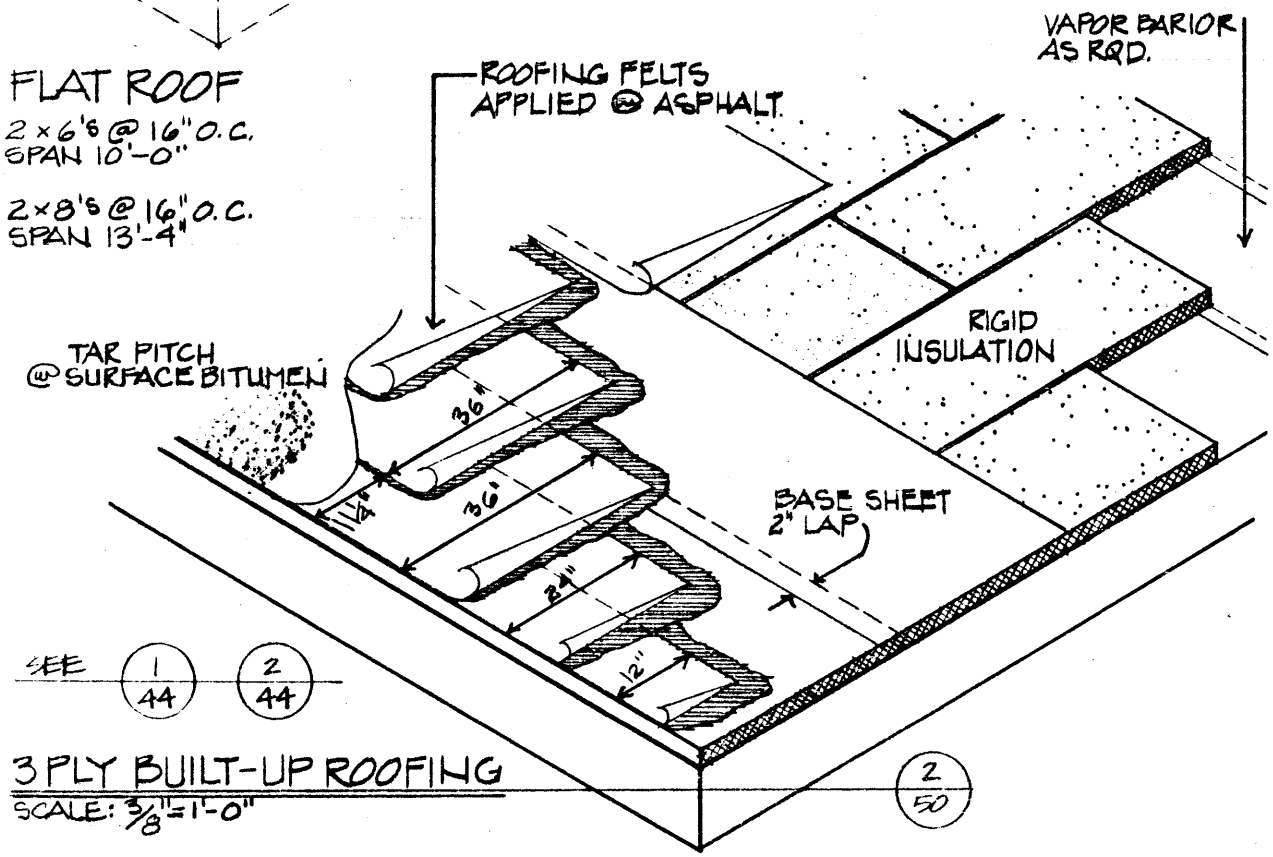
FLAT ROOF
2×6's @ 16" O.C.
SPAN 10'-0"

2×8's @ 16" O.C.
SPAN 13'-4"



SECTION
SCALE: 3/4"=1'-0"

1/50



SEE 1/44 2/44

3 PLY BUILT-UP ROOFING
SCALE: 3/8"=1'-0"

2/50

MATRIX COORDINATES	
D2	CONSTRUCTION
ROOF	
PART/COMPONENT	
WOOD JOISTS BUILT-UP ROOFING	
EMPHASIS	%
LABOR INT.	50-50
SKILL LEVEL	MED
PRE-FAB. LEVEL	LOW
COSTS	$/ft²
MATERIALS	.98
LABOR	.97
TOTAL	1.95
TIME REQUIREMENT	
EFF. FACTOR	3.8
WORKERS	
PLACEMENT	2
CONSTRUCTION	2
DATA	
NOTES	
REFERENCES	
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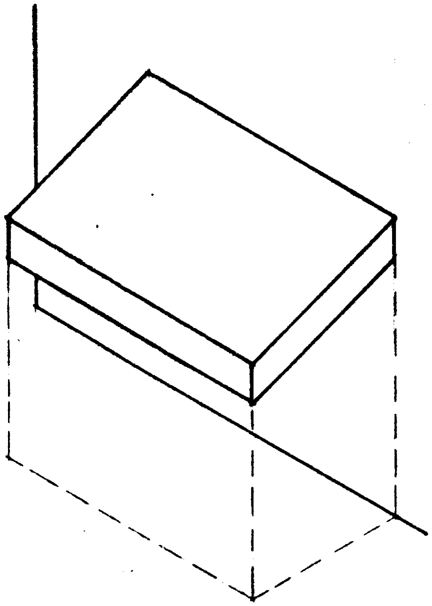
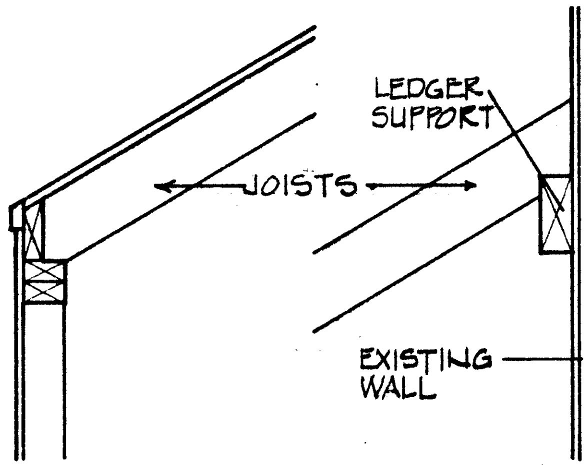
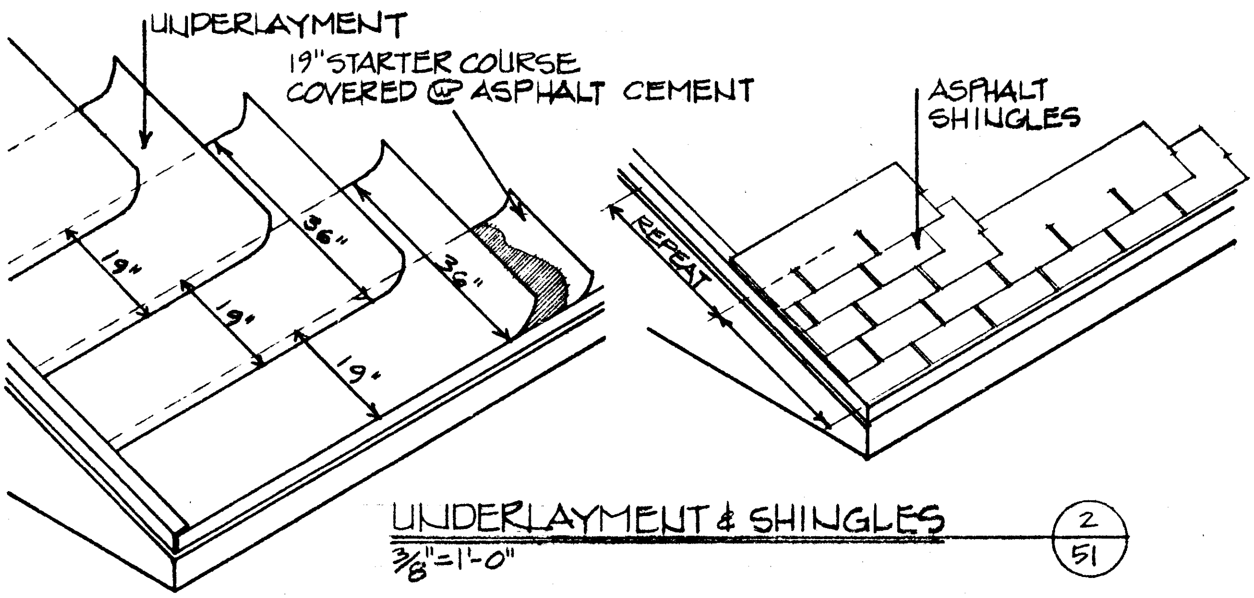


SLOPED ROOF

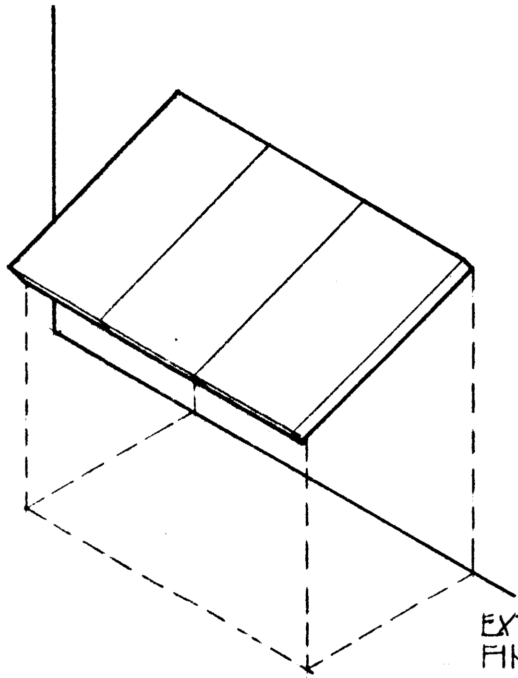


SECTION
SCALE: 3/4"=1'-0"
1/51



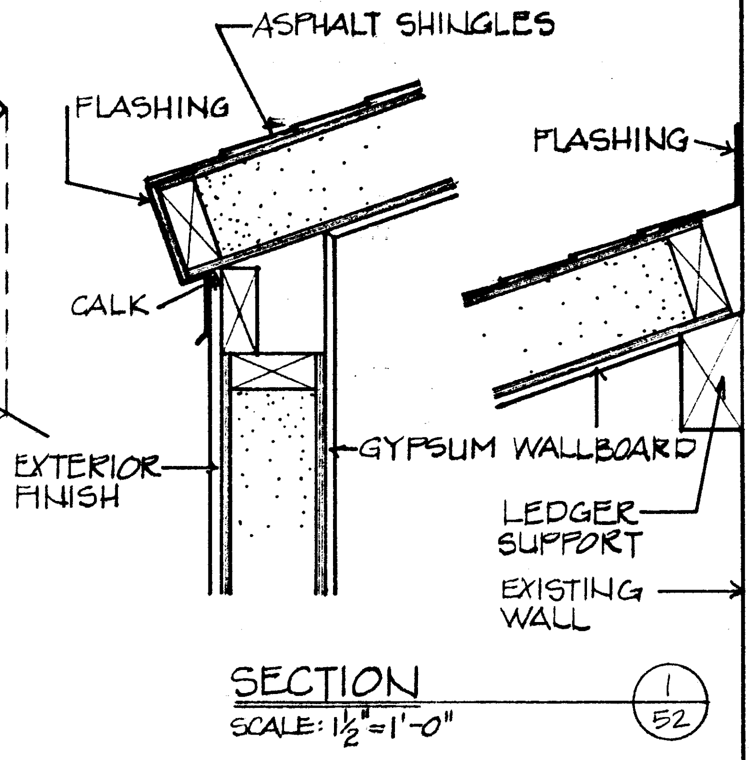
UNDERLAYMENT & SHINGLES
3/8"=1'-0"
2/51

MATRIX COORDINATES	
D2	CONSTRUCTION
ROOF	
PART/COMPONENT	
WOOD JOISTS ASPHALT SHINGLES	
EMPHASIS	%
LABOR INT.	50-50
SKILL LEVEL	LOW
PRE-FAB. LEVEL	MED
COSTS	$/ft²
MATERIALS	1.12
LABOR	1.00
TOTAL	2.12
TIME REQUIREMENT	
EFF. FACTOR	2.3
WORKERS	
PLACEMENT	2
CONSTRUCTION	2
DATA	
NOTES	
REFERENCES	
BLDG. CODE 928.0	



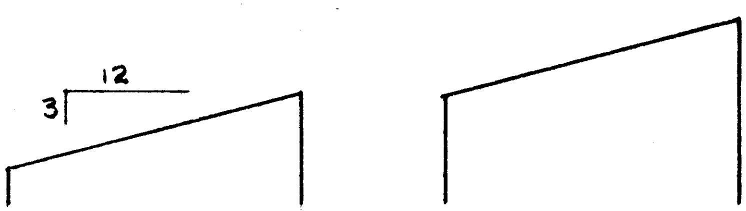
SLOPED ROOF
GNS PANELS

SEE 2/51



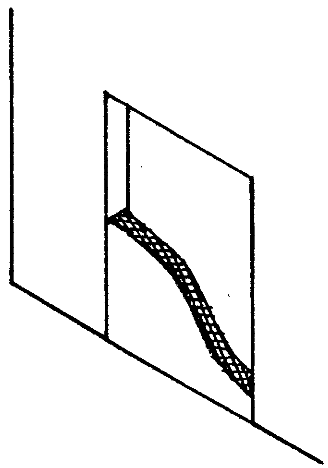
SECTION
SCALE: 1½"=1'-0"

1/52



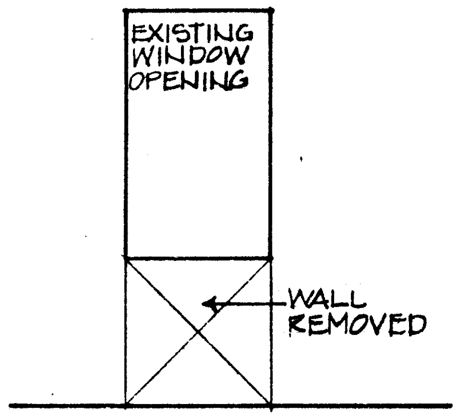
TOPS OF SIDE PANELS CUT TO THE ANGLE OF THE ROOF

MATRIX COORDINATES	
D2	CONSTRUCTION
ROOF	
PART/COMPONENT	
GNS PANELS	
EMPHASIS	%
CAPITAL INT.	90-10
SKILL LEVEL	MED
PRE-FAB. LEVEL	HIGH
COSTS	$/ft²
MATERIALS	1.45
LABOR	
TOTAL	
TIME REQUIREMENT	
EFF. FACTOR	3.8
WORKERS	
PLACEMENT	
CONSTRUCTION	
DATA	
R VALUE	31
NOTES	
REFERENCES	
BLDG. CODE:	854.1

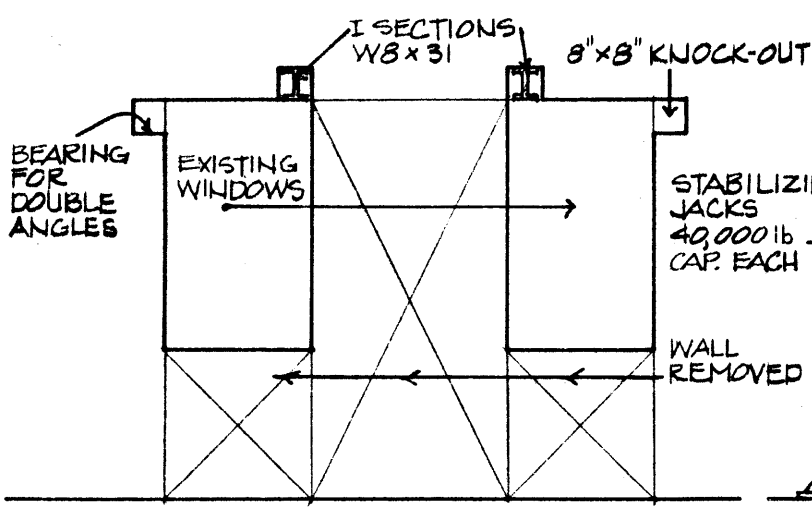


NON-BEARING BRICK WALL PENETRATION

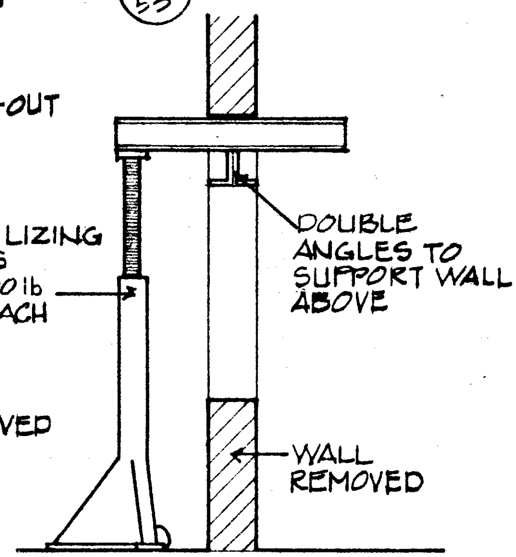
BRICK WEIGHT: 120 lb/ft³



ELEVATION 1/53
SCALE: 1/4" = 1'-0"

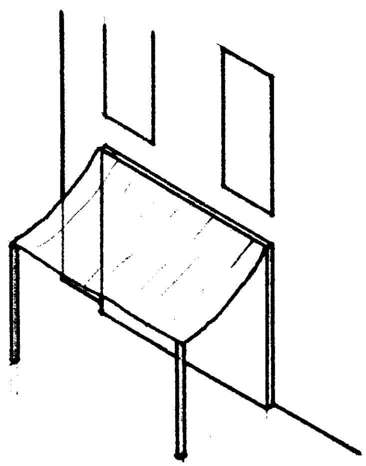


ELEVATION 2/53
SCALE: 1/4" = 1'-0"

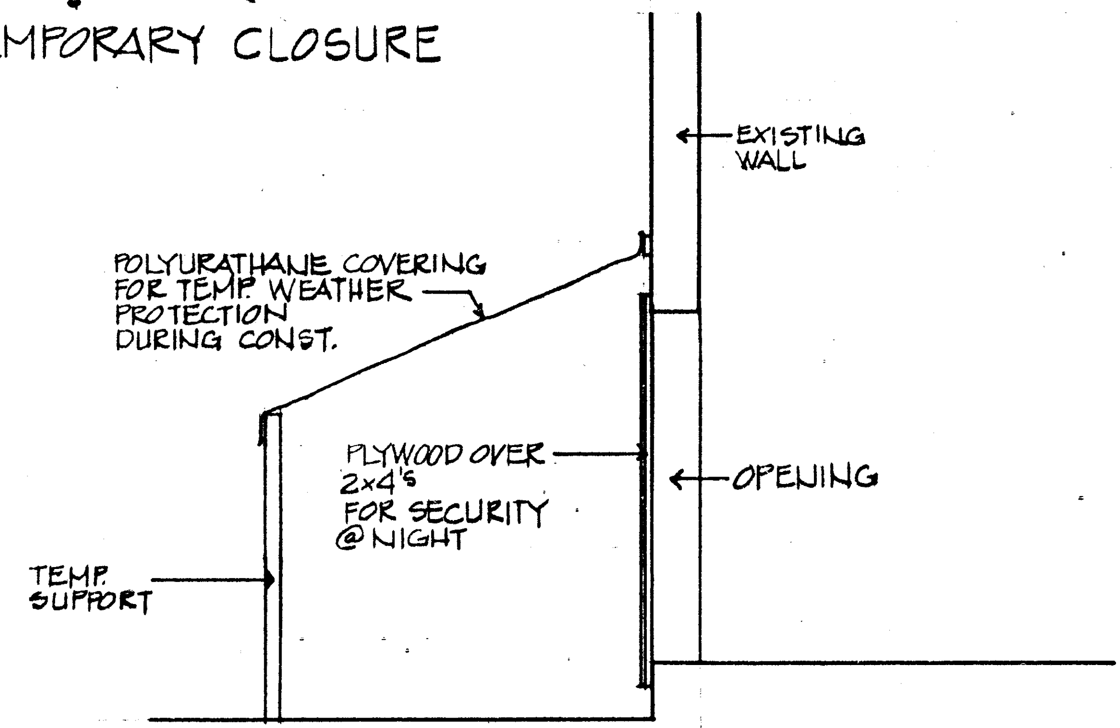


SECTION 3/53
SCALE: 1/4" = 1'-0"

MATRIX COORDINATES	
C 1	MODIFICATIONS TO EXISTING
EXTERIOR WALL	
PART/COMPONENT	
EMPHASIS	**%**
LABOR INT.	90-10
SKILL LEVEL	MED
PRE-FAB. LEVEL	—
COSTS $/4 ft² OPENING	
MATERIALS EQUIP.	4.00
LABOR	20.00
TOTAL	24.00
TIME REQUIREMENT	
ft² / DAY	72
EFF. FACTOR	2.3
WORKERS	
PLACEMENT	2
CONSTRUCTION	3
DATA	
NOTES	
POWER TOOLS: MASONRY SAW, " DRILL	
REFERENCES	
BLDG. CODE: 912.1	



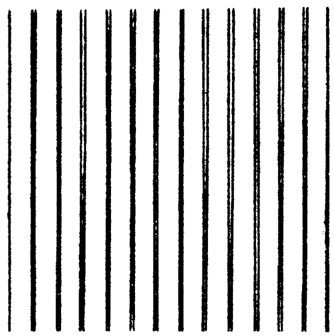
TEMPORARY CLOSURE



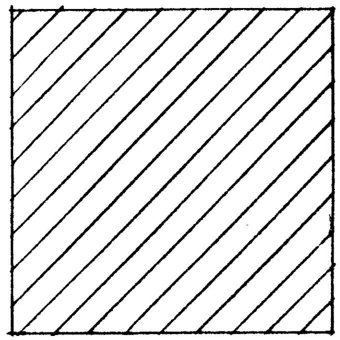
SECTION
SCALE: 1/4"=1'-0"

1
54

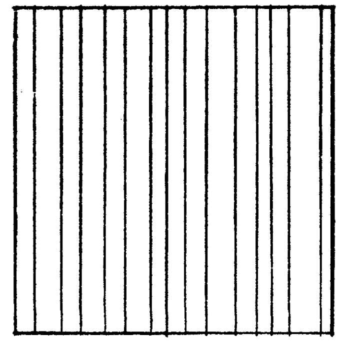
MATRIX COORDINATES	
C 1	MODIFICATIONS TO EXISTING
EXTERIOR WALL	
PART/COMPONENT	
TEMPORARY SHELTER	
EMPHASIS	%
LABOR INT.	80-20
SKILL LEVEL	LOW
PRE-FAB. LEVEL	LOW
COSTS	
MATERIALS	
LABOR	
TOTAL	
TIME REQUIREMENT	
EFF. FACTOR	
WORKERS	
PLACEMENT	
CONSTRUCTION	
DATA	
NOTES	
REFERENCES	



TEXTURE 1-11
PLYWOOD



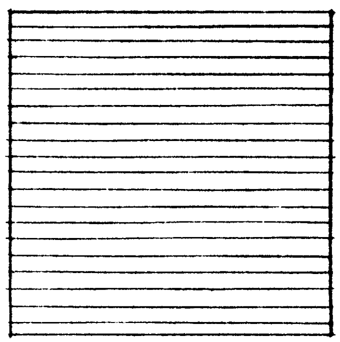
DIAGONAL BOARDS



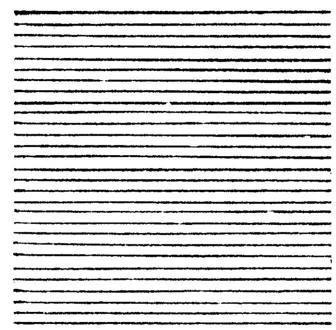
VERTICAL BOARDS

ALL BUT BRICK-VENEER
WORKABLE @
GNS PANEL SYSTEM

SEE (3/40) (1/46)



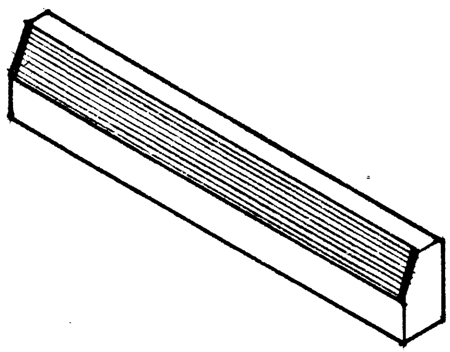
HORIZONTAL LAP



BRICK VENEER

WOOD STUD EXT. WALL FINISHES (1/55)
NO SCALE

MATRIX COORDINATES	
C3	FINISHES
EXTERIOR WALL	
PART/COMPONENT	
FINISHES	
EMPHASIS	%
LABOR INT.	50-50
SKILL LEVEL	LOW
PRE-FAB. LEVEL	MED
COSTS VARIES	
MATERIALS	
LABOR	
TOTAL	
TIME REQUIREMENT	
EFF. FACTOR	
WORKERS	
PLACEMENT	
CONSTRUCTION	
DATA	
NOTES	
REFERENCES	



ELECTRICAL BASEBOARD HEATING UNIT
3'-0" LENGTH PER UNIT

MATRIX COORDINATES	
B3	FINISHES
INTERIOR WALL	
PART/COMPONENT	
BASEBOARD HEATING	
EMPHASIS	%
CAPITAL INT.	75-25
SKILL LEVEL	LOW
PRE-FAB. LEVEL	HIGH
COSTS	$/UNIT
MATERIALS	38
LABOR	35
TOTAL	73
TIME REQUIREMENT	
EFF. FACTOR	
WORKERS	
PLACEMENT	
CONSTRUCTION	
DATA	
NOTES	
REFERENCES	

SEE 1/43

MATRIX COORDINATES	
A2	CONSTRUCTION
FLOOR	

PART/COMPONENT
WATERPROOFING SEALANT - OIL BASE

EMPHASIS	%
LABOR INT.	80-20
SKILL LEVEL	
PRE-FAB. LEVEL	

COSTS	$ / Lft
MATERIALS	.05
LABOR	.30
TOTAL	.35

TIME REQUIREMENT	
EFF. FACTOR	1.2

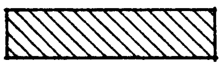
WORKERS	
PLACEMENT	1
CONSTRUCTION	

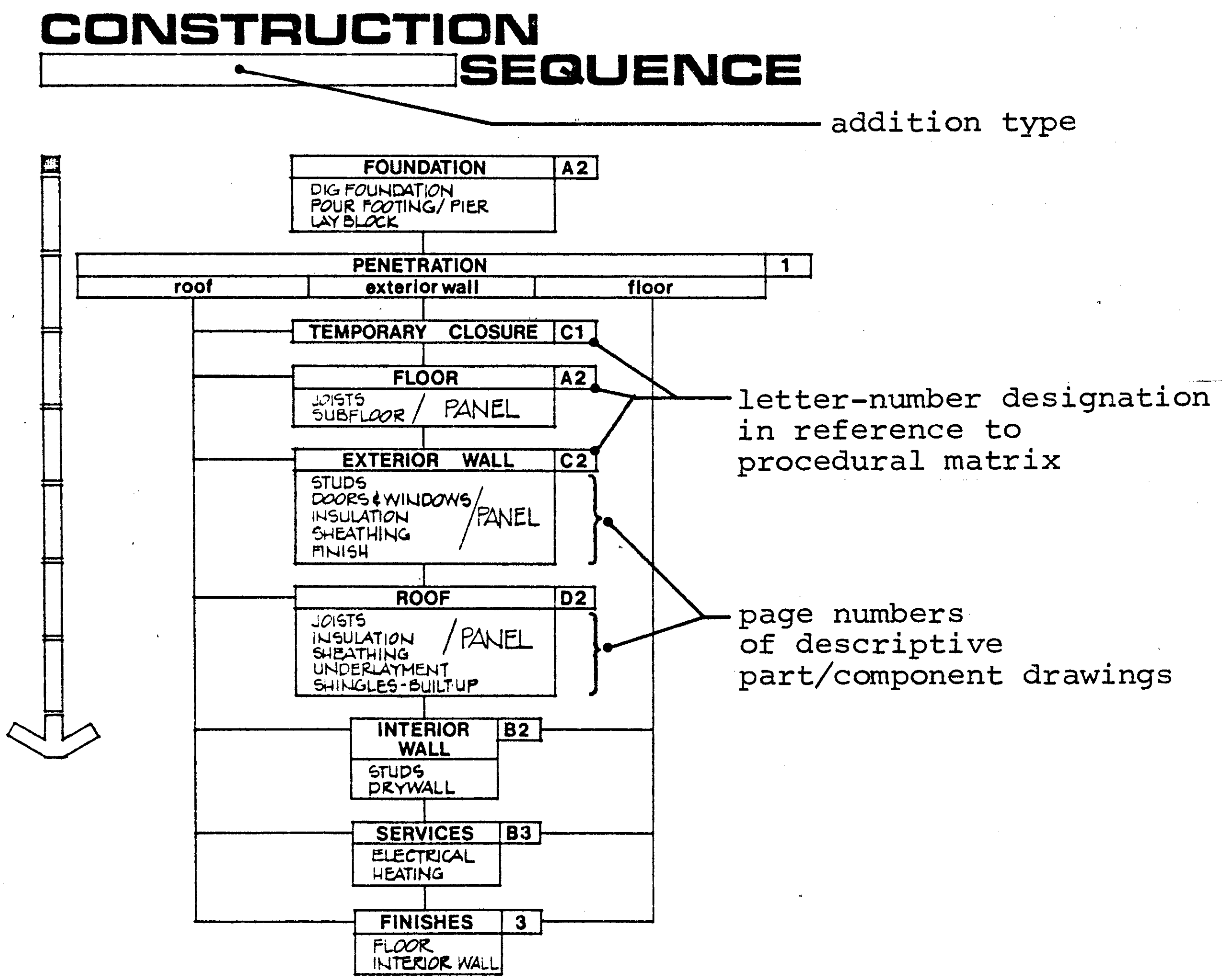
DATA	

NOTES

REFERENCES
BLDG. CODE: 871.3

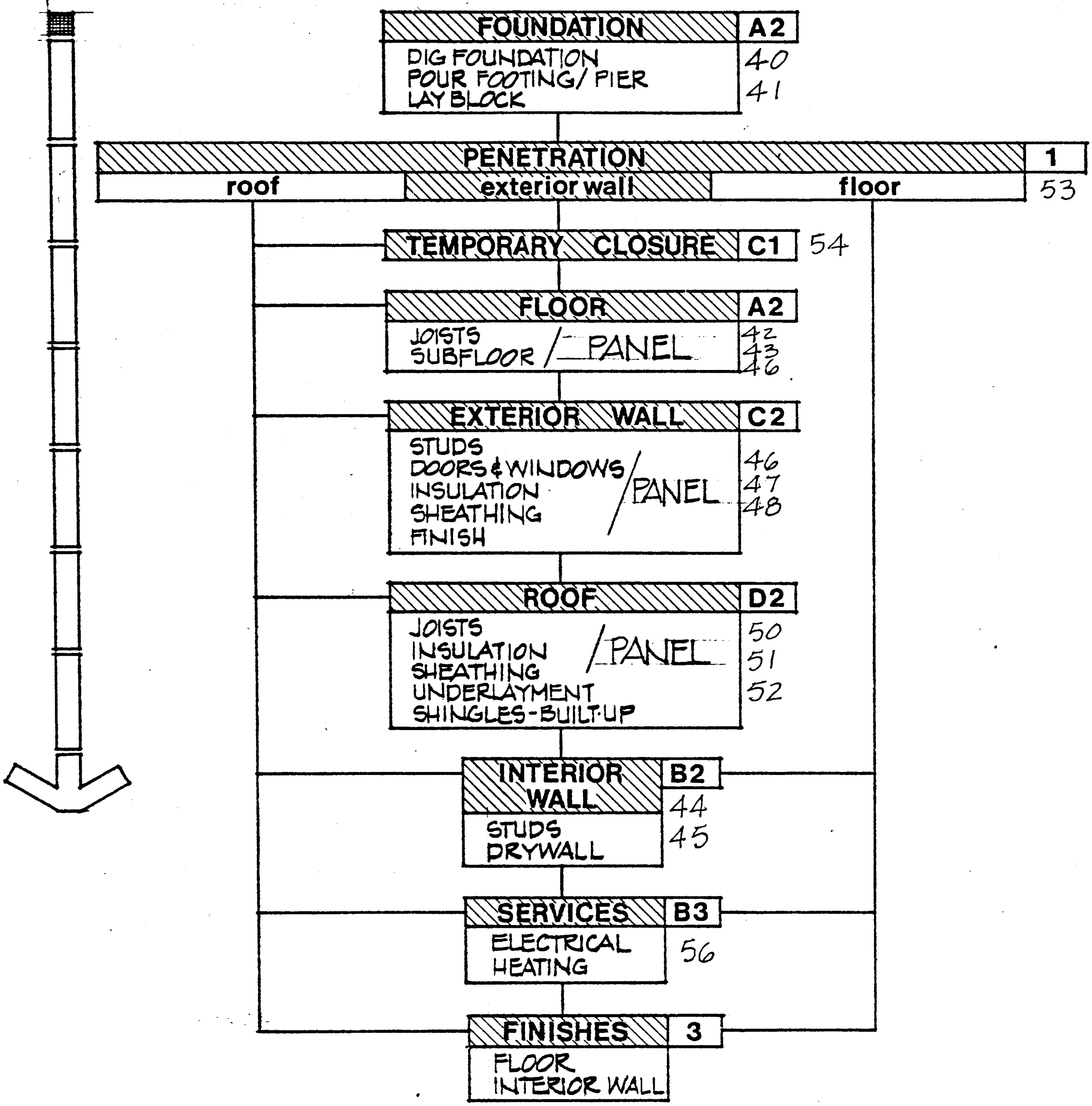
The construction sequencing is arranged in diagramatic form in order of task occurance, from top to bottom.

 designates tasks to be implemented in addition type



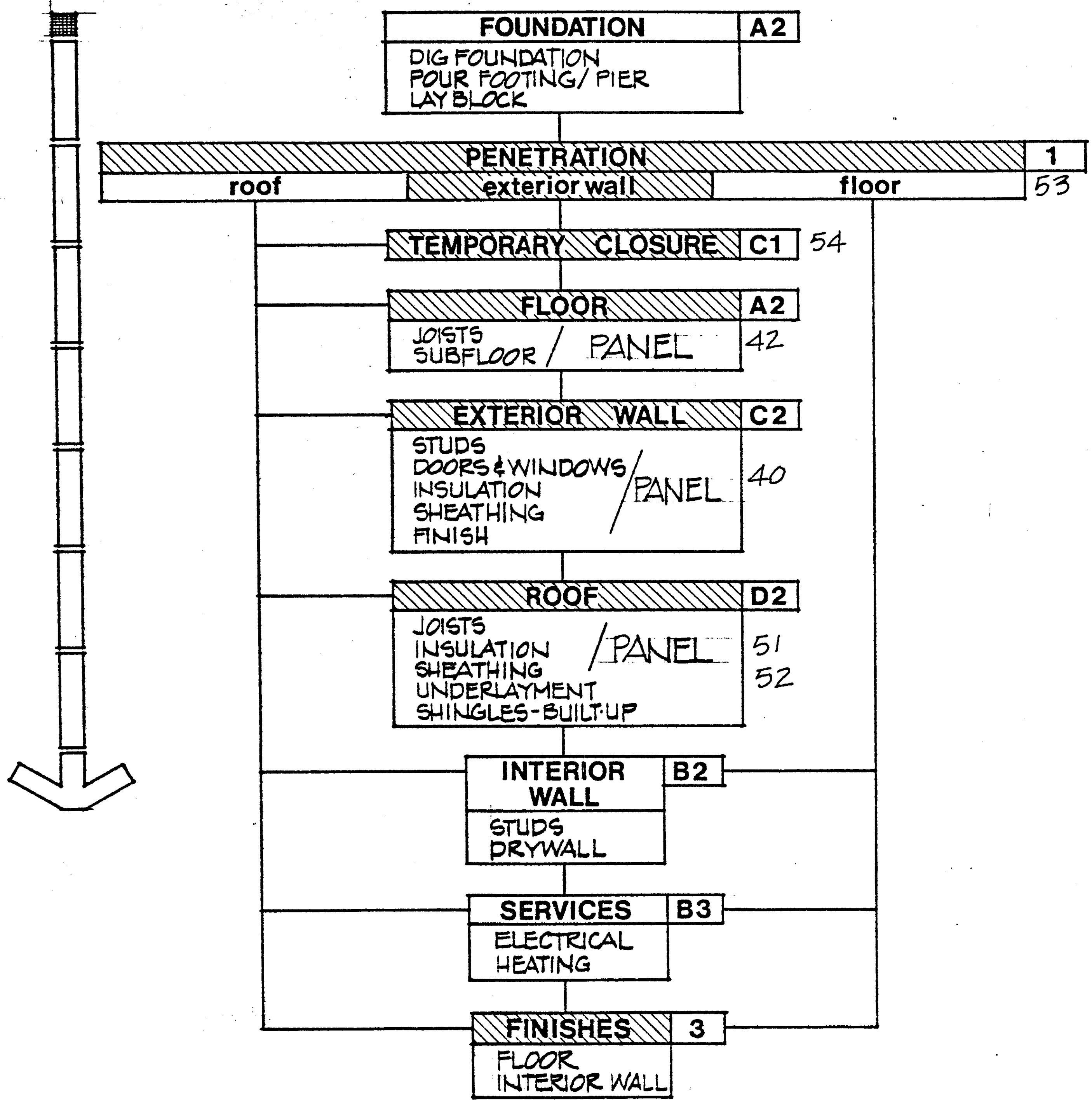
CONSTRUCTION SEQUENCE

ROOM ADDITION



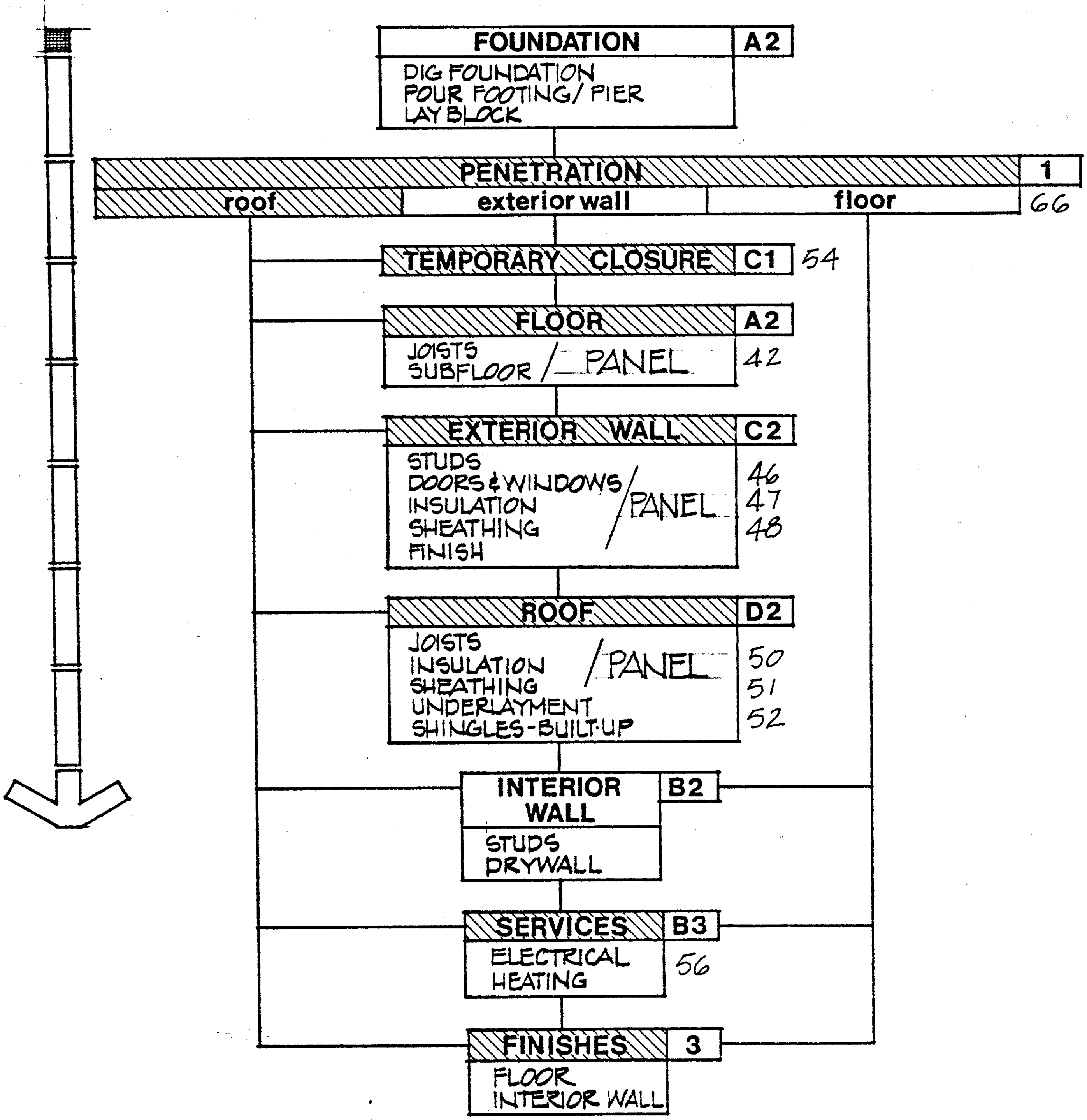
CONSTRUCTION SEQUENCE

ROOM EXTENSION



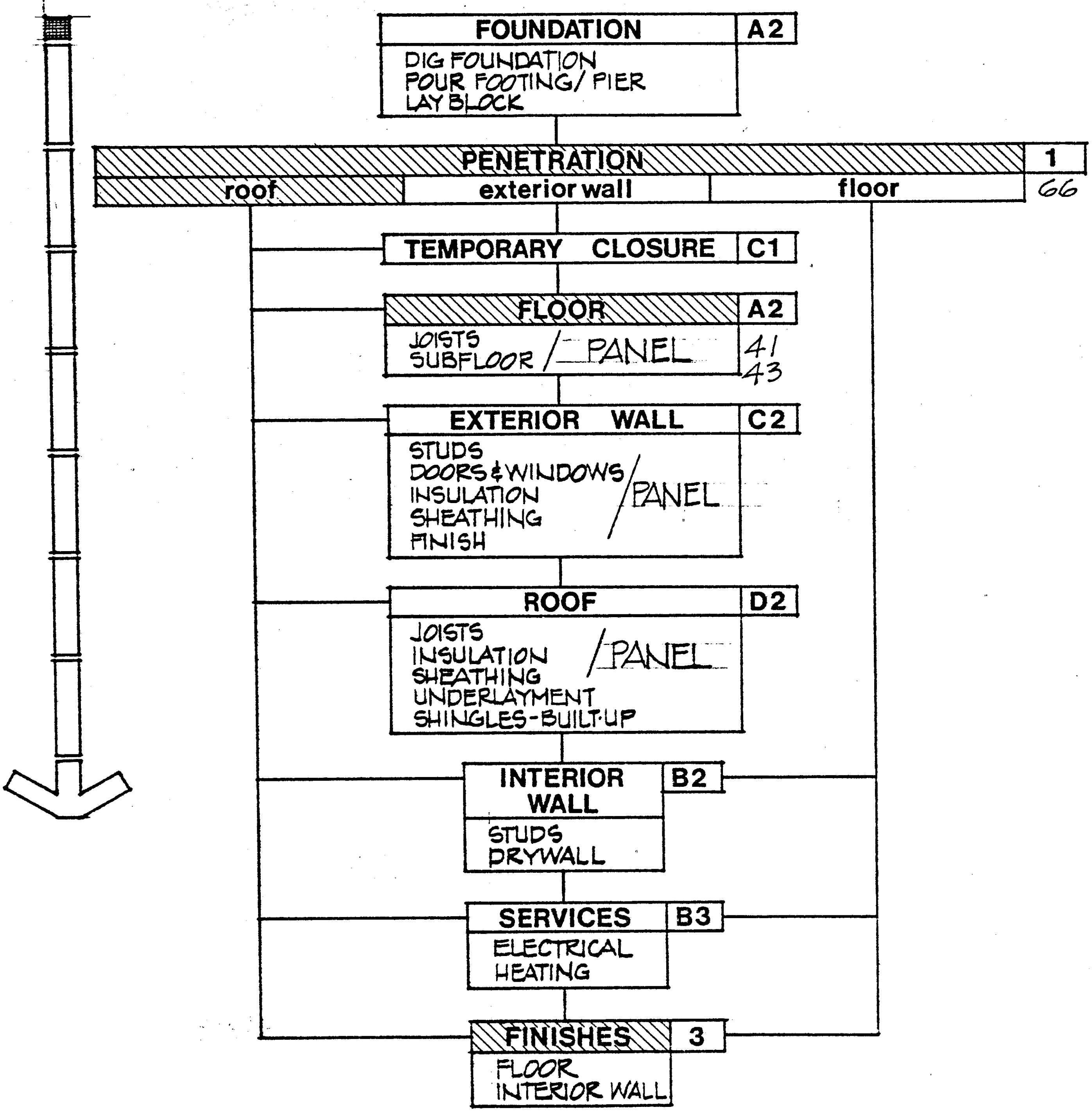
CONSTRUCTION SEQUENCE

ROOF TOP ENCLOSURE



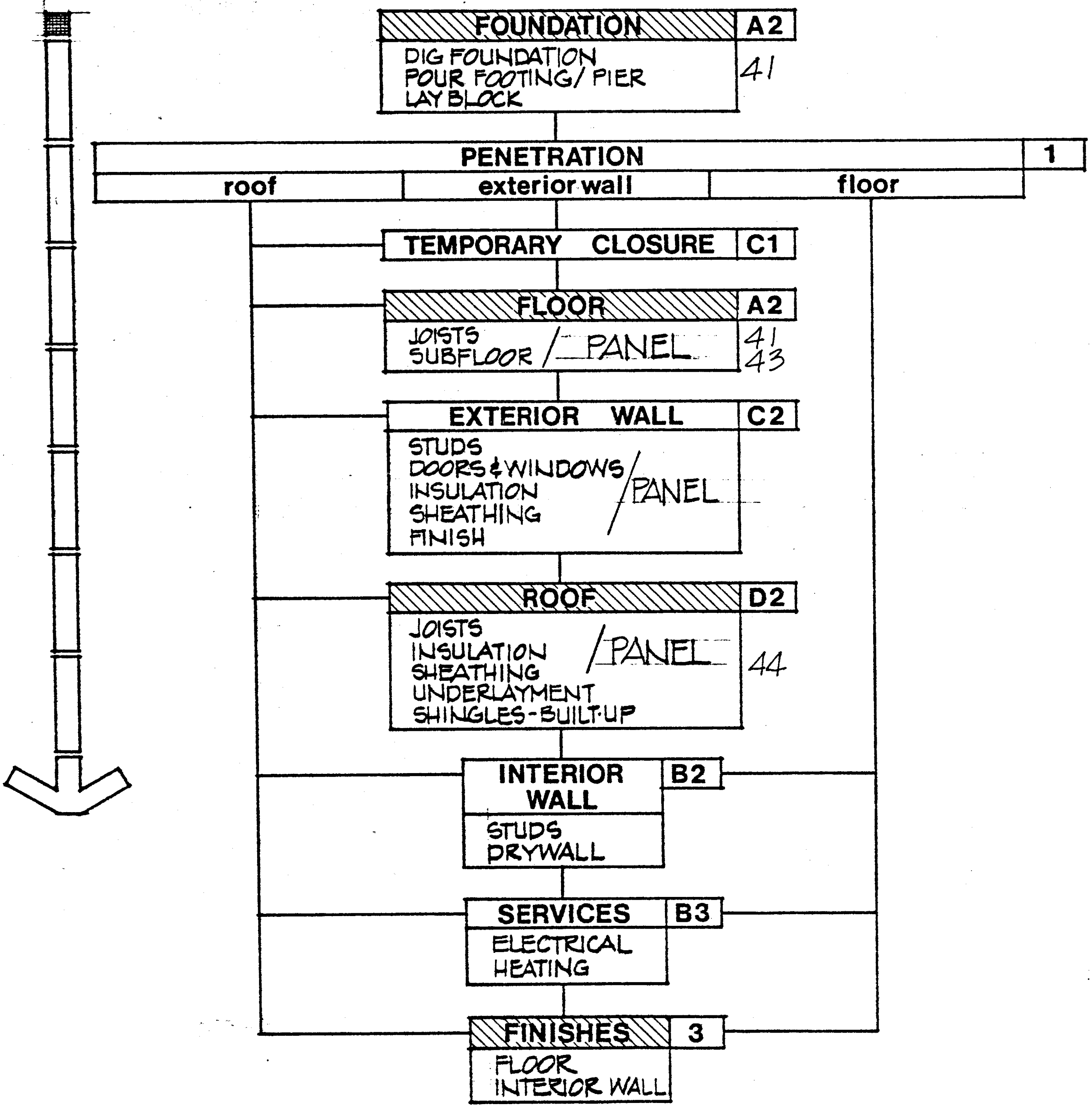
CONSTRUCTION SEQUENCE

ROOF DECK



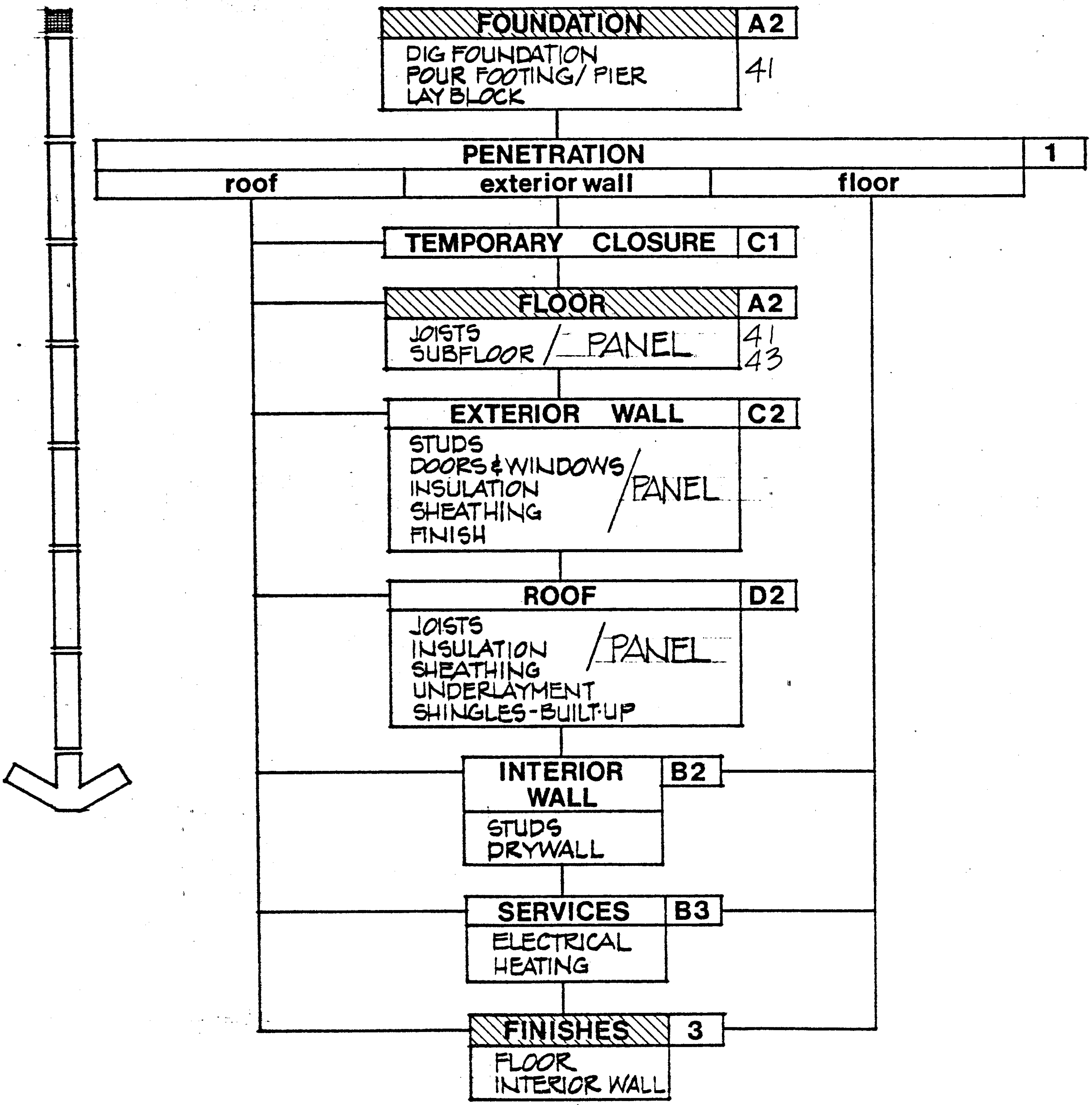
CONSTRUCTION SEQUENCE

BACK YARD DECK - COVERED



CONSTRUCTION SEQUENCE

BACK YARD DECK-UNCOVERED



SUPPORTING RESOURCES

There will inevitably be construction tasks that the self-helper cannot, will not, or should not attempt to perform. Several indicators are incorporated within the part/component analysis that suggest which tasks may require professional assistance. The skill level assigned to each part/component will, of course, be a prime determinant in judging weather or not skilled labor is needed. The efficiency factors are also excellent indicators of task difficulty. Labor costs as compared to materials costs show the relative value of the skilled laborer's work. In the final analysis, however, it is the self-helper who will determine what he will or will not construct.

Finding the skilled labor he needs is sometimes difficult. Looking in the yellow pages is a good place to start. Personal recommendations from friends and associates within the building industry are a valuable tool in the selection of a reliable sub-contractor. If the self-helper knows of existing additions or new construction in his immediate neighborhood which demonstrates quality workmanship, it would behoove him to inquire directly to the owner about the contractor responsible for the work. In any case, one should shop around until he finds the help that best suits his needs and bargain for a good price.

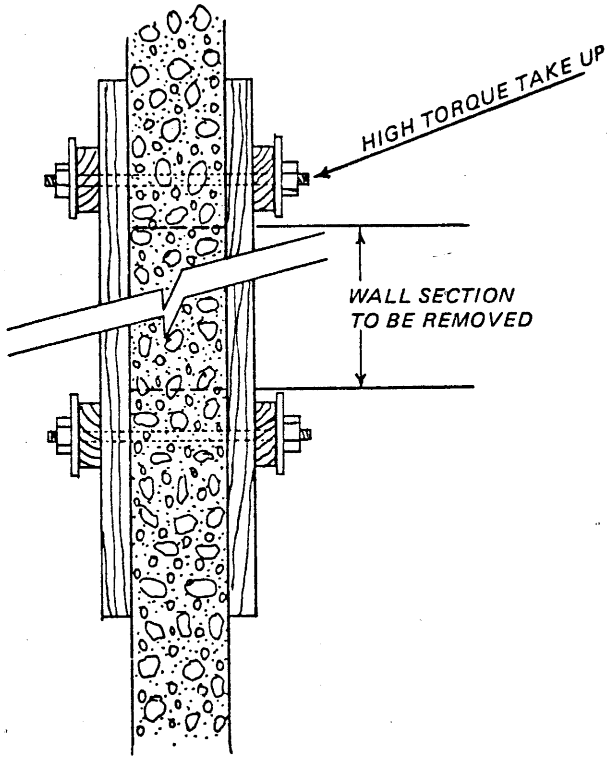
Locating building materials suppliers is a bit easier. Newspapers often carry the advertisements of retail home-improvement and building materials suppliers (see page 68). One East Coast franchise, Grossmans, specialize in building materials for the self-helper. Grossmans and others offer pre-fabricated bay window units that can be implemented within the framework of the system. Complete package deals are also available for wood decks, sheds, and other small enclosures. These "kits" are more difficult to integrate with the system, but it is possible for an individual to improvise and come up with a workable combination. The general procedure within building materials outlets is to show one's plans (or system) to a salesperson and he will in turn give a price estimate for the materials. When additions to the system are desired (i.e., pre-fabricated bay window, deck kit, etc.), they should be discussed with the assisting personnel at the building supplier as to the possibilities.

The system includes joist and post sizings which are acceptable within the guidelines of the Massachusetts State Building Code. These estimates should be used as a rule of thumb under normal loading conditions. Where loads exceed 40 lb/ft^2 for the floor, 30 lb/ft^2 for the roof or where penetrations into the existing enclosure alter or subtract from its structural stability, a professional structural engineer should be consulted. Any registered structural engineer would be qualified to analyze the structure and prescribe a solution.

Penetration of non-bearing brick masonry construction is described in the system, including storing. Assistance should be sought for this procedure as well. Isaac Blair & Co., Inc., Boston, Massachusetts, specialized in storing consultation (see page 69).

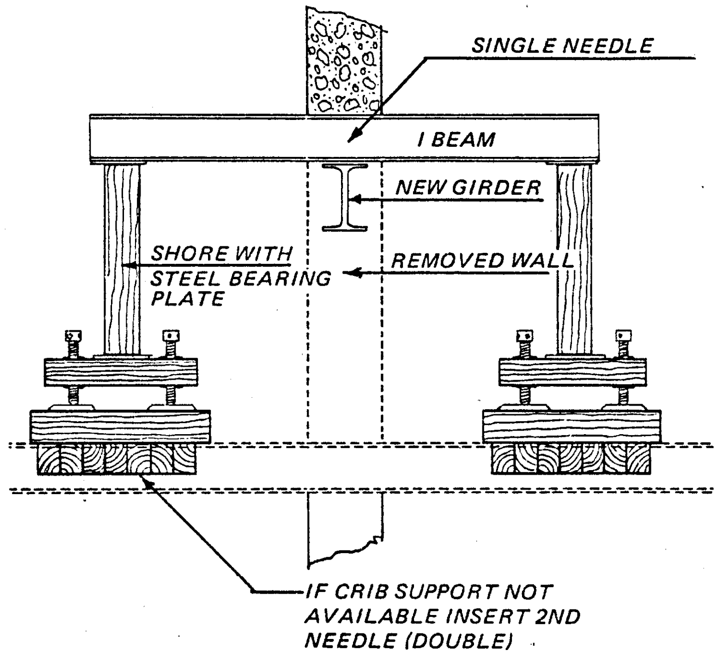
The drawings and details on the part/component sheets depict the essential construction information. They by no means explain in full detail the entire building process. For the purpose of this study, I felt that it was unnecessary to articulate each step of every procedure. Instead, I have referred to books and drawings that describe the basics of construction in a way that is much more demonstrative and complete than the graphic techniques represented in this research. Although this study is intended to eventually benefit the self-helper, its presentation at this time is geared toward the architectural community, not the layperson. Ultimately, drawings with a higher level of detail and readability must be produced for the self-helper's direct reference (see page 70 for examples).

HEAVY DUTY TORQUE CLAMP



The friction grip with clout. Frequently used in restoration work.

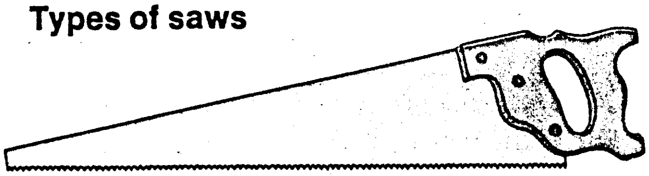
SINGLE & DOUBLE NEEDLE TECHNIQUE



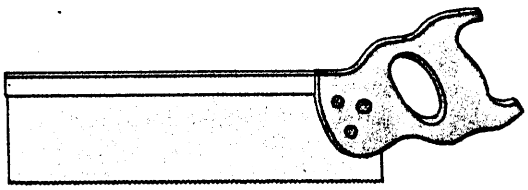
Where the right jacks, beds, needles, plates and cribs are essential. No room for guess work here.

Specialists should be consulted when altering or subtracting from a structure.

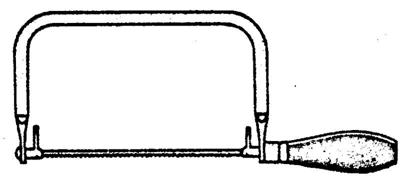
Types of saws



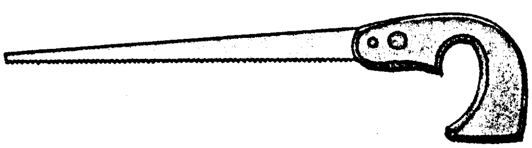
Hand saws for crosscutting or ripping come in two blade patterns. Upper edge of straight back pattern, above, can serve as line marker. Skew-backed type, not suited for marking, is preferred by some because saw seems more flexible.



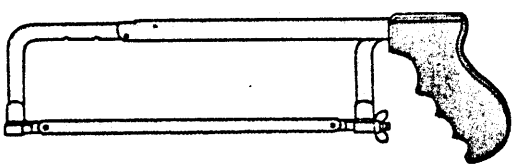
The backsaw, used for joint cutting, has reinforced back edge to keep blade rigid. Typical lengths are 10 to 16 in. A longer version called a miter box saw runs from 22 to 26 in. To cut smoothly, teeth are finer than on crosscut or rip saws.



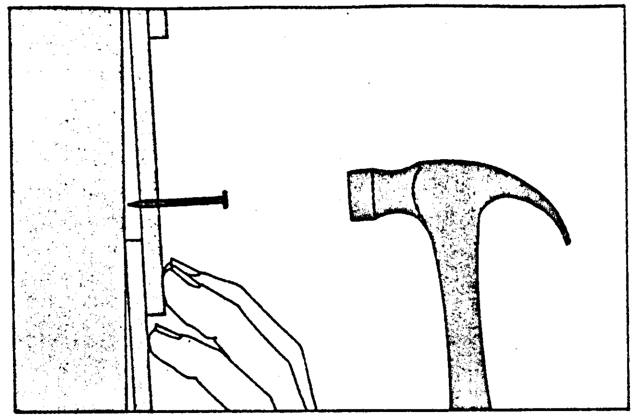
Coping saws, for cutting small-diameter curves, have spring steel frames with tension adjustment to hold blades taut. Blades are 1/16 to 1/8 in. wide, and from 6 to 6⅝ in. long. The blades mount to face in any direction.



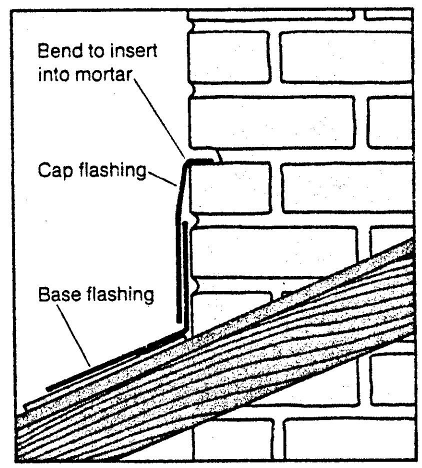
Compass saw has narrow, tapered blade for cutting curves or starting from bored hole. It is similar to the keyhole saw, which was once used to cut keyholes in wooden doors.



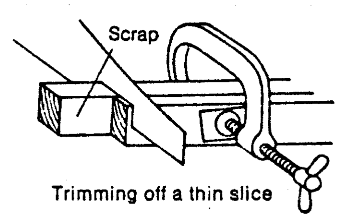
The hacksaw, for metal cutting, has a rigid frame that fits blades 8 to 12 in. long. High-speed steel blade mounts with teeth slanted away from handle and is drawn taut by wingnut.



Asbestos shingles are not nailed at the top edge, so the new shingle is slid up from below, placed in position, then nailed in place through predrilled holes along bottom edge.



Bend the cap flashing down over the base flashing and set it into the mortar joints to a depth of 1½ to 3 in.



Trimming off a thin slice

Ultimately, drawings of a higher level of detail depicting tools and their uses should be produced for the self-helper's direct reference. (drawings taken from the Reader's Digest "Complete Do-it-Yourself Manual")

3 DEMONSTRATE THE SYSTEM

Scenario

Design

Construction

Conclusions

Bibliography

Scenario

For the purpose of demonstrating the system, a scenario has been developed to which the system will be applied. A typical row house in the South End, 32 Worchester Street, will be used as the model. There are five floors including the basement, each approximately 540 square feet. The scenario is as follows:

Mr. and Mrs. Howard Jackson and their five children occupy the row house at 32 Worchester Street. Howard works for the MBTA as a bus driver and his wife, Yvonne, is a part-time maid for a family on Beacon Hill. Their children range in age from nine to seventeen years. Howard and Yvonne's combined annual income totals $15,000.

The Jacksons originally moved into the building in 1967 when they purchased the dwelling under the Federal Housing Administration's Veterans Mortgage Subsidy Program. Under this program, their down payment and monthly mortgage payments were lowered enabling them to finance their own home.

Since the family's arrival, Mr. Jackson and his sons have spent time renovating and repairing various parts of the house. Presently the basement is used as a general storage area and work space for Mr. Jackson. There is a rear entry from the backyard. The first floor has the main entry from the street. The kitchen, dining, and living areas are on this level. On the second floor one finds the master bedroom and family room where the children watch television, play games, entertain their friends, etc. The top two floors accommodate the children's bedrooms.

Two years ago, Howard's father died and his mother has been living alone since. She is on social security and operates on a limited income. The senior Mrs. Jackson was notified by her landlord three months ago that the development in which she was living would be renovated and turned into luxury condominiums and that she would have to vacate her apartment unit within six months. There are no other comparable apartments offering the very inexpensive rent she had been paying--$80 a month including heat. So the Jackson family made the decision to move grandmother Jackson in with them, rather than submitting applications for elderly low income housing. Mrs. Jackson would save the rent money and could also help out with the children in the house, allowing Yvonne to work more. The only problem is space.

Howard would like to move his mother into the front room on the second floor, which is now the family room. This means that the children's play space would have to move to the basement. This is a much better arrangement for Yvonne and Howard because the noisy playroom will no longer be adjacent to their bedroom. Having the playroom in the basement will, however, require additional space. Mr. Jackson's tools and work space, the hot water heater, and the clothes washer and dryer occupy the space now. Howard feels that his construction skills are good enough to enable him to undertake a building addition on his own. Howard also wishes to save money and add to the value of his house. He knows he can count on assistance from his family and friends.

The Jacksons decided first that they would need aproximately 200 ft^2 of additional floor area. This amount combined with part of the basement would accomodate the children's indoor play needs suitably. The remaining portion of the basement would continue to serve as the family work area.

In order to come to a final decision on the method and materials to be used for the addition, Mr. Jackson did a cost analysis of the alternatives using the data supplied in the part/component section.

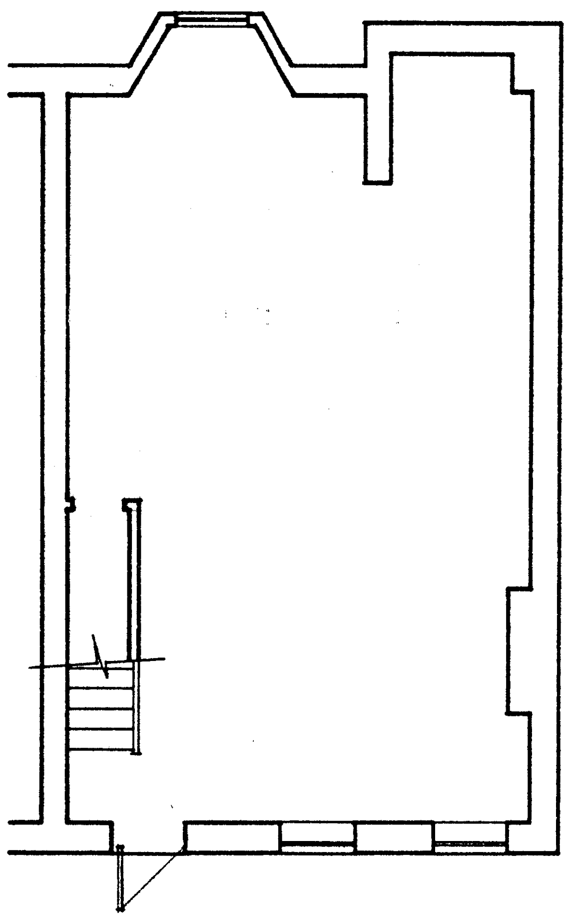
<u>Costs for a 200 ft^2 Addition</u>

	Conventional	Labor-Intensive	Capital-Intensive
Foundation	304.00	100.00	100.00
Wall Penetration	65.00	10.00 (tool rental)	10.00
Floor	360.00	204.00	280.00
Exterior Wall	450.00	179.00	365.00
Roof	390.00	196.00	263.00
totals	$1,569.00	$689.00	$1,018.00

After a thorough comparison of the three alternatives, Mr. Jackson chose to use the GNS panel components of the system to construct the additional 200 ft^2. This approach offers a \$551.00 cost saving over the conventional approach and requires much less construction time than the labor intensive self-help alternative. The time factor is particularly important to Mr. Jackson because of his job commitment which sometimes demands 50 hours a week and more. Being an energy concious individule, he was anxious to take advantage of the unusually good thermal characterists of the GNS panels. The exterior wall panel, for instance, has an R value of 31 where as the conventional exterior stud wall (wood siding, wood sheathing, air space, 2" of insulation, and Gypsum wallboard) offers an R value of only 11. The reduction in heat loss and gain with the accompanying energy savings could amortize the additional cost of the panels over the labor intensive approach (\$329.00) in a matter of a few years.

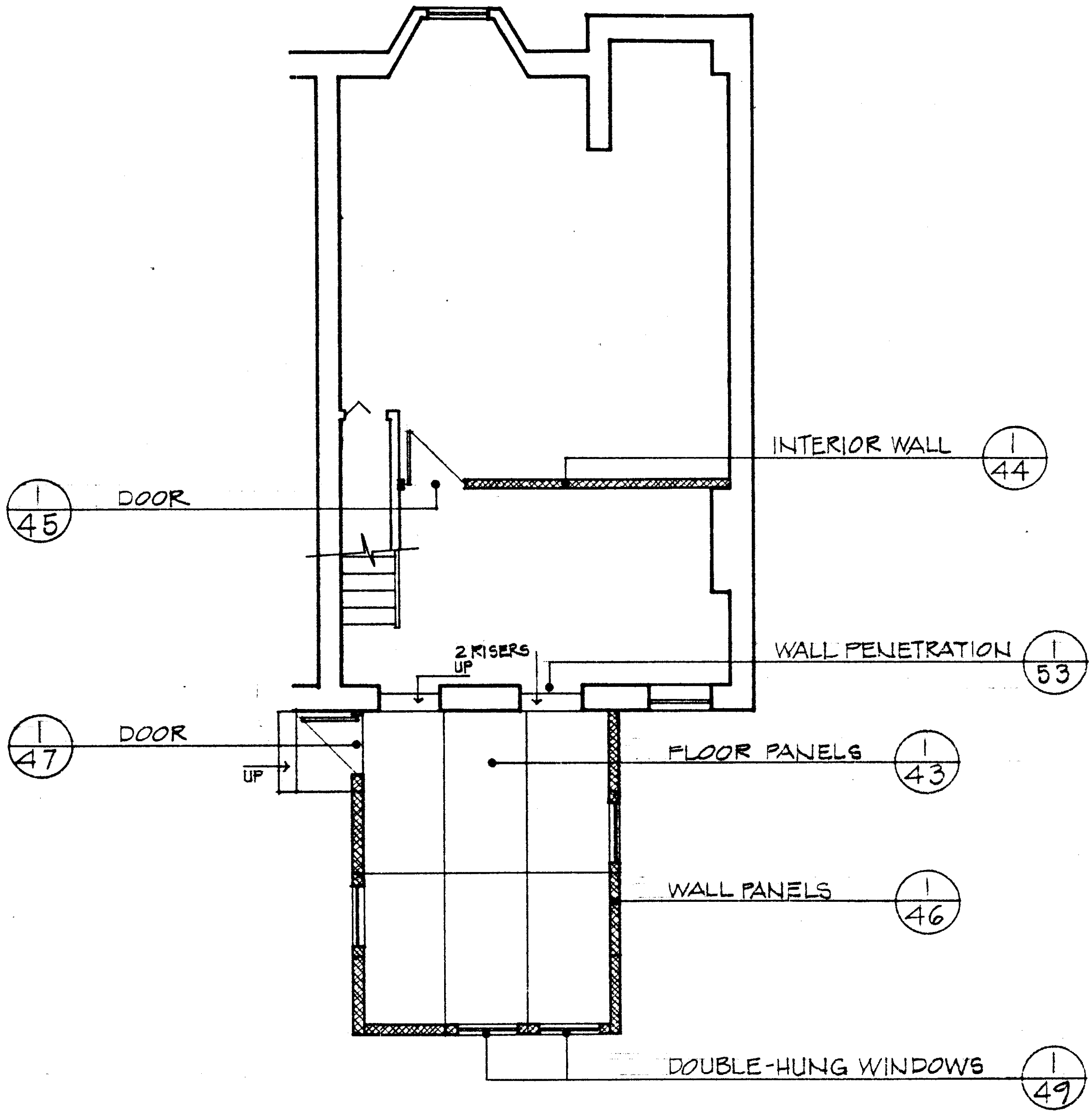
DESIGN

The existing basement area (558 ft^2) is open and free of partitions. There is access from the first floor by way of the staircase and from the back yard through the rear door.



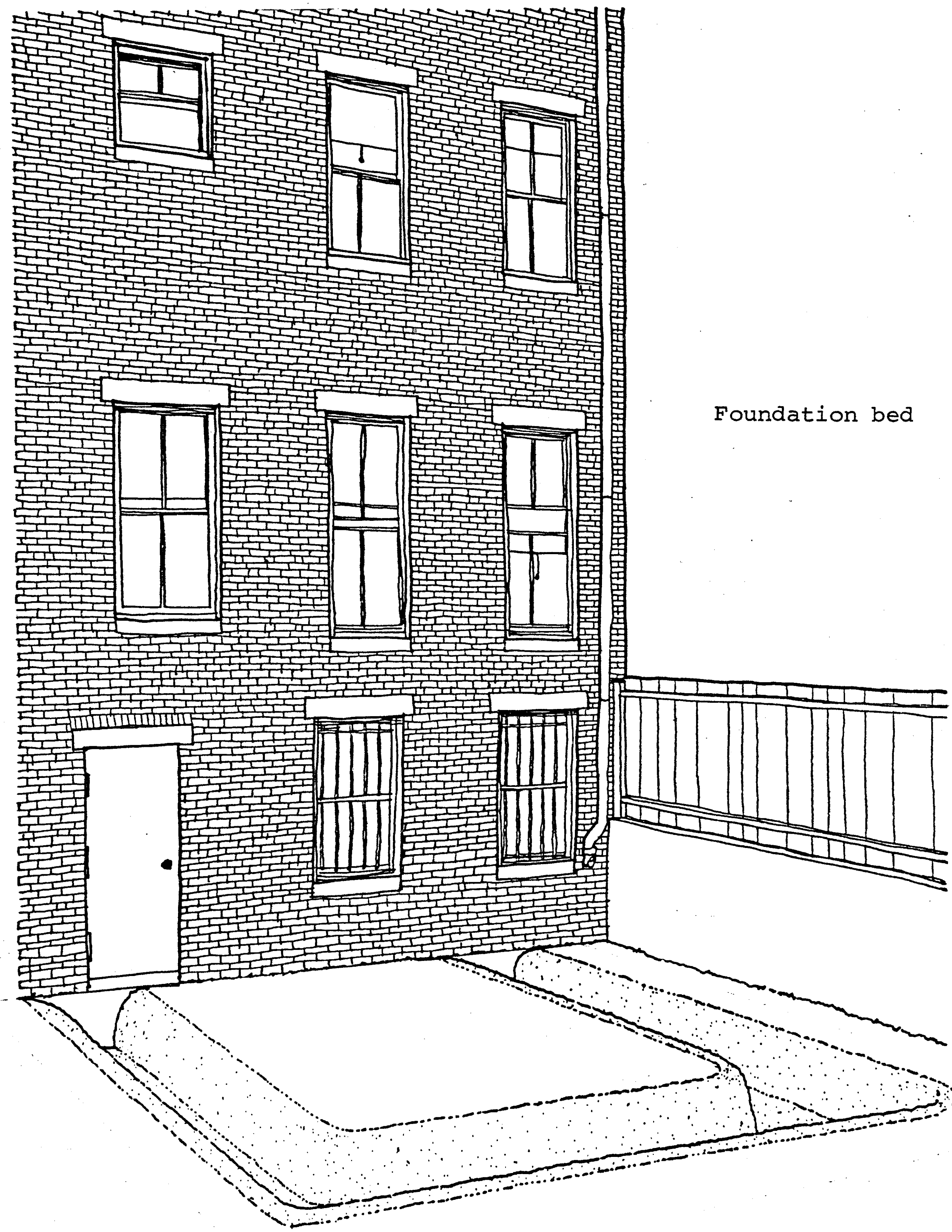
EXISTING BASEMENT PLAN
SCALE: 1/8" = 1'-0"

A panel, 4 ft. x 8 ft. in dimension, will be used as the planning module. Six modules equal 192 ft^2 which is close enough to the 200 ft^2 figure required by the Jacksons. The six floor and roof panels will be placed three across ond two lengthwise to give a 12 ft. x 16 ft. plan. Since a separate foundation is required, it will be necessary to make a 14" level change (2 risers) from the basement to the floor level of the addition. The existing rear door will be removed and replaced (possibility the same door) in the addition wall. One of the existing windows on the rear will be removed and the opening will be extended from the sill level to the floor to provide an additional passage to the new structure. Four double-hung windows will provide the natural light and ventilation. A partition within the existing basement consisting of 2"x4" studs and Gypsum wallboard will separate the children's play area from the laundry and work space. (See drawing on the following page)



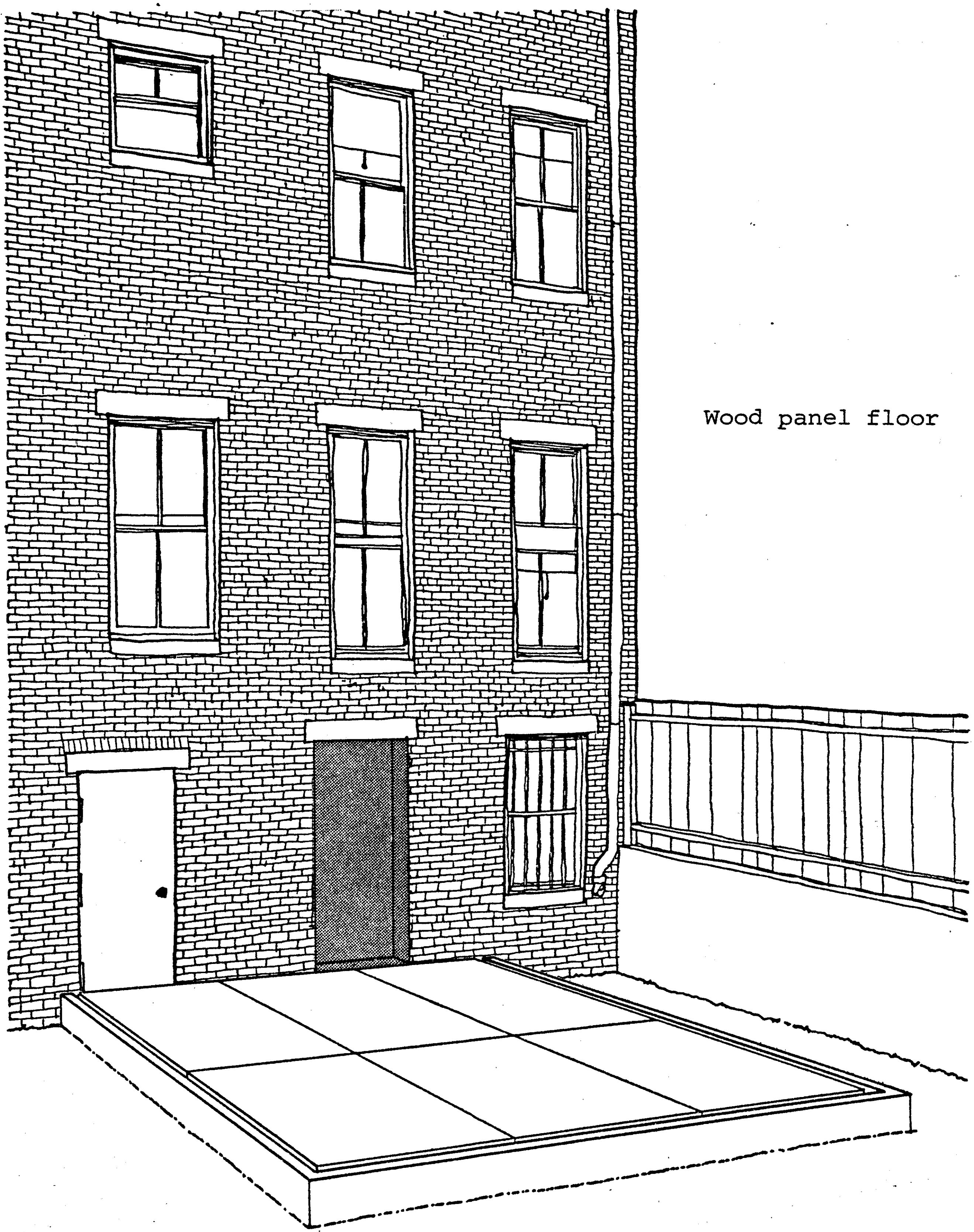
PROPOSED ADDITION
SCALE: 1/8"=1'-0"

The rear wall of the Jefferson residence is shown above. The following drawings depict the major phases of the construction sequence.

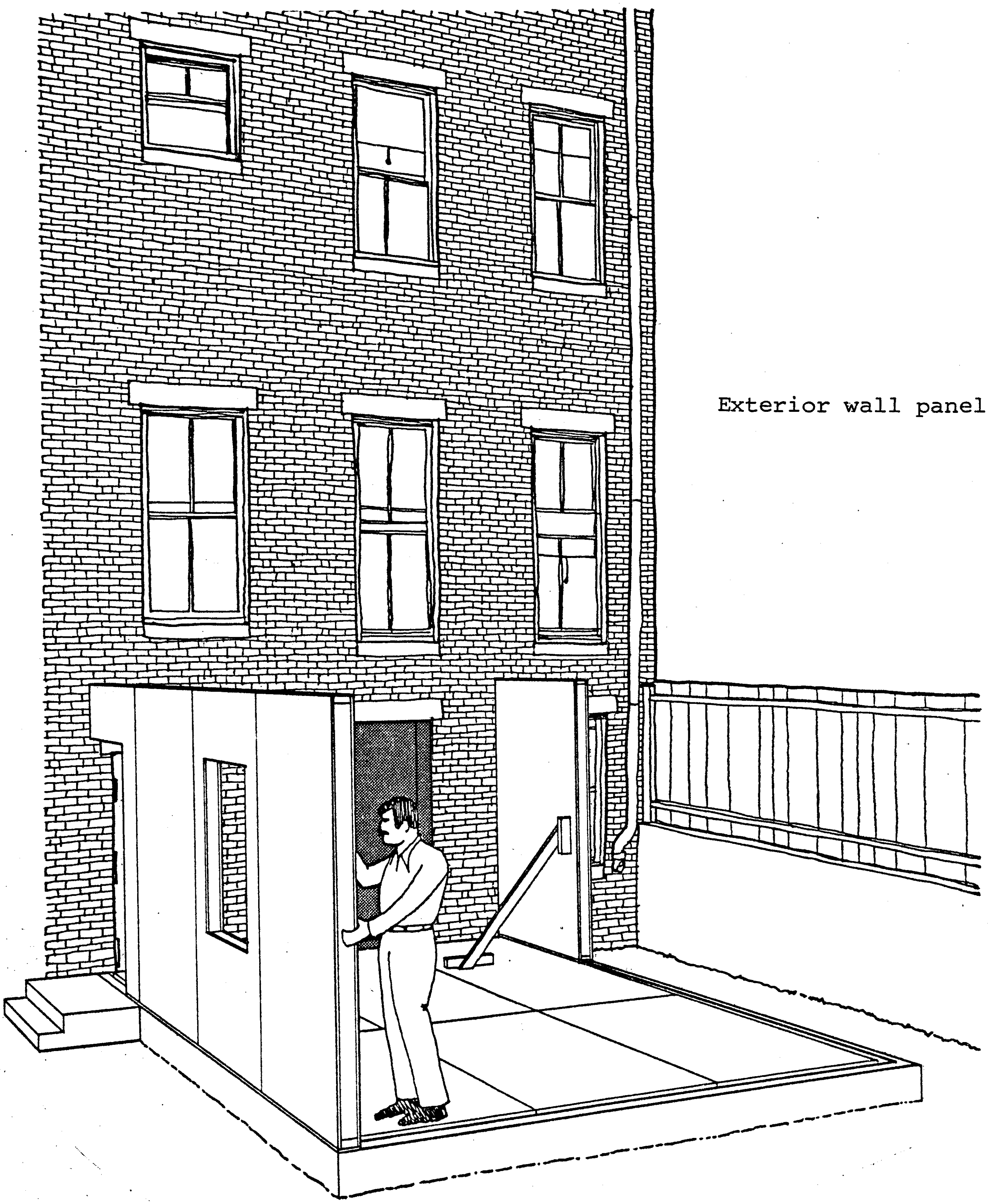


Foundation bed

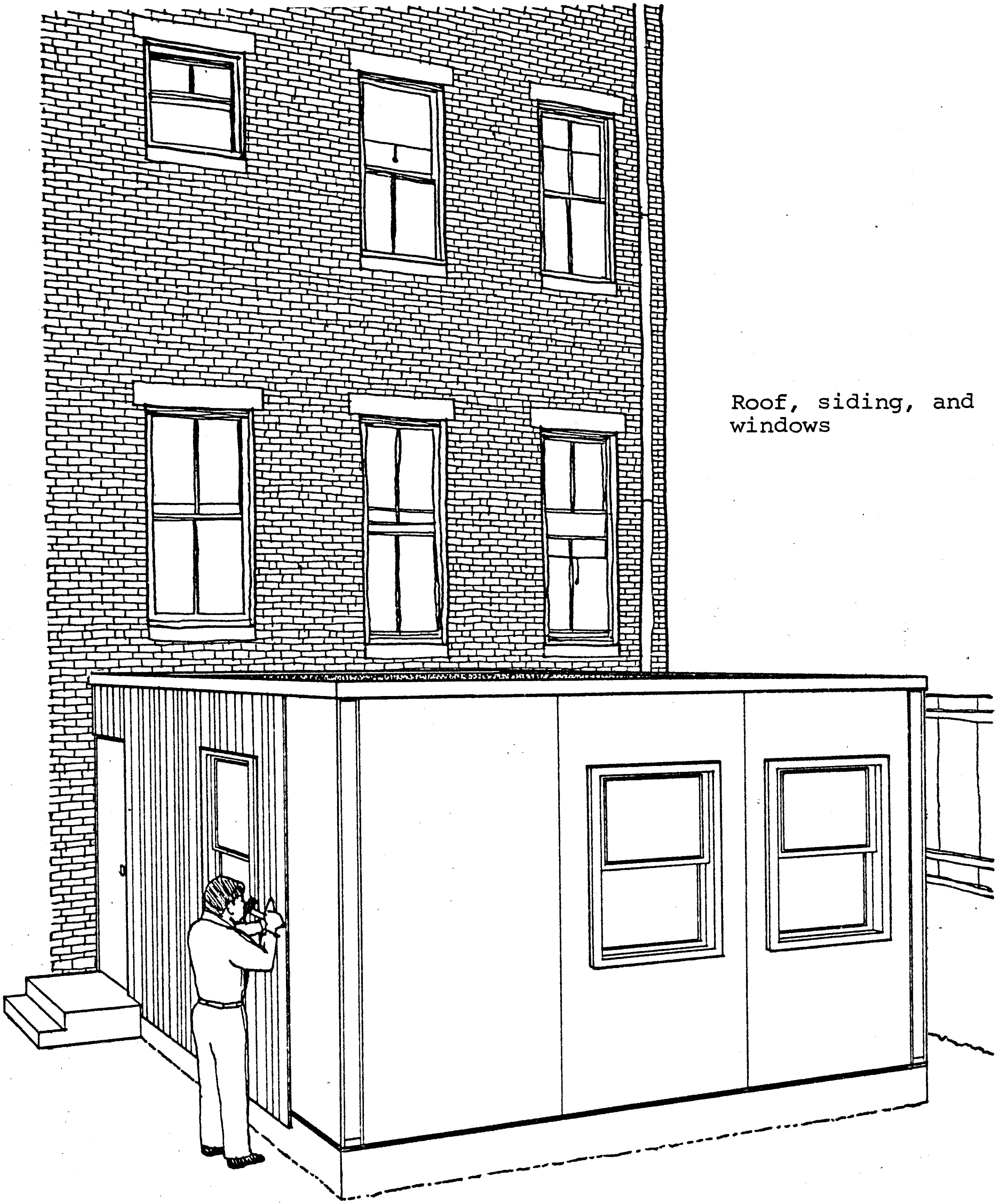
Perimeter foundation wall and existing wall penetration



Wood panel floor



Exterior wall panels



Roof, siding, and windows

CONCLUSIONS

In researching the thesis, I was able to find many many examples of additions to row house construction in the context of Boston and the Sout End. It was difficult, however, to ascertain the exact function of many of them and how they related to the parent plan. To make a comprehensive survey of the types of functions provided by various additions would require a study of each specific addition and existing floor plan, a task I was neither prepared nor willing to undertake. Though it would be quite interesting to know what types of functions additions to row houses most often respond to.

In the background section, my intention was to present a strong case for the feasibility of a system for row house construction using standard manufactured materials and self-help techniques. The precedent (existing additions) is there for anyone to see. The rediscovey trend and changing ownership patterns which provide much of the incentive are referenced and backed up with the appropriate numbers. The incentives of need, and the desire to increase the equity in one's home have been discussed. The major point, however, is the application of self-help techniques in the form of a building system. To this end, I have collected the data and construction details in reference to (1) the most common and available building parts and components and (2) a pre-fabricated panel system. The data serves as the criteria by which the user selects the procedure that best suits his needs and skills. The choice between conventional (labor intensive) and pre-fabricated (capital intensive) methods provides a flexibility within which self-helpers of varios types and motives can operate. In short, I have generated a catalogue which offers guidance to the self-help user. The ultimate goal is to save him money.

The scenario was developed for the purpose of demonstrating the workability and potetial cost saving within the system. I don't think that it is possible to prove or disprove my hypotesis with the application of one example. Nor can the success of this thesis be determined solely by indirect wriiten explanations. With the text and demonstration combined, I can only hope to show that the system is indeed feasible.

The part/component content of the system is admittedly limited. Data and drawings were produced only for the major constituents of the addition types. The construction sequencing was in my opinion a key element of the system; one that deserves a great deal more attention and detail when addressing the self-helper directly.

In order for the system to be implemented, a strategy must be planned for the publication and distribution of the system. Verbage and graphics should then be revised to address the layman. The final product would be in the form of a book or manual, perhaps available free of charge.

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Each reference will be accompanied by a letter or letters designating its relationship to the topic:

B--background

SH--self help

S--systems

C--construction

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