PDHonline Course C760 (5 PDH)

Metal Lumber: A History

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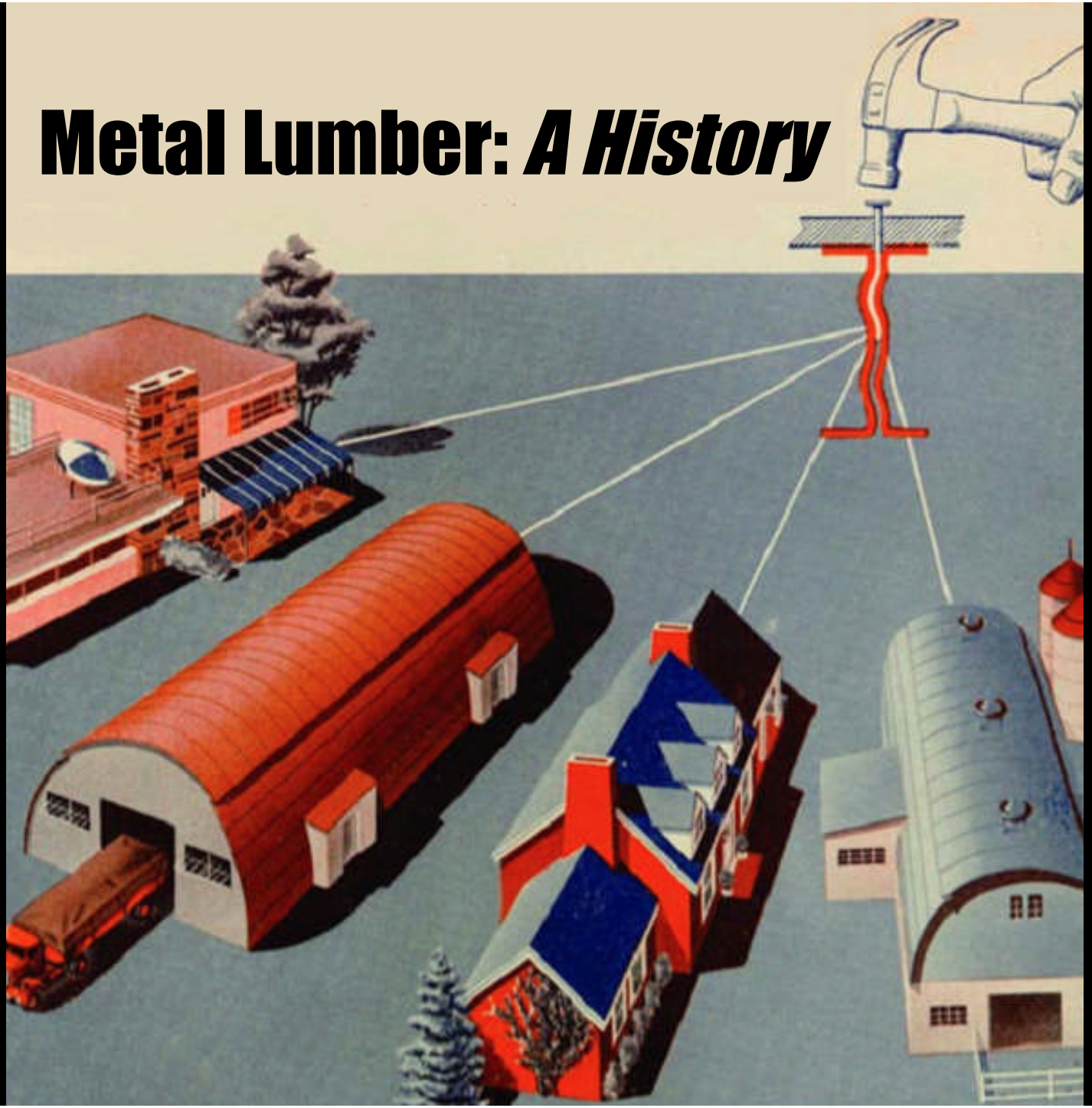
Metal Lumber: *A History*



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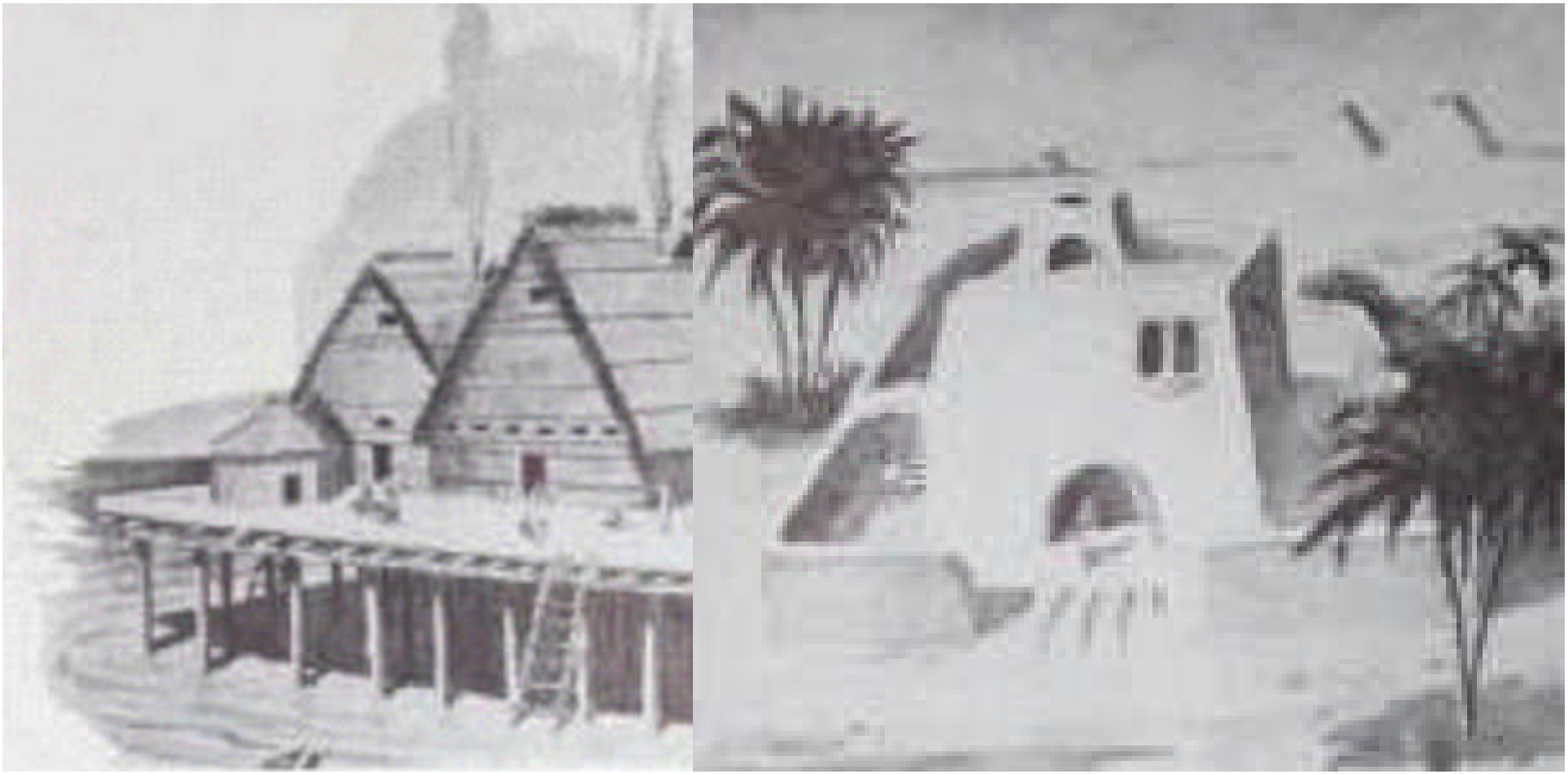
Part 1

Evolution of the Home

The March of Civilization

"Man's desire for a better home has been a deep driving force in the march of civilization. Primitive man's first home provided a little shelter from the elements, but gradually, man learned to build houses which offered greater protection and more healthful living conditions. He used better materials and better construction methods. He began to surround his home with beauty and individuality. Notable advances in home building came with the introduction first of iron and later of steel as useful materials in construction. The comforts, the conveniences, and the safety which distinguish the average modern home from a home in the Middle Ages are chiefly due to steel…"

RE: excerpt from: *Steel Makes the Home* (ca. 1940)



"…The evolution of the home, like the evolution of man himself and of most human institutions, has been slow and tortuous. Gradually over the centuries the crude dwelling places of primitive man took on added comforts and added refinements…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "12000B.C. – Sapling huts of lake dwellers"

<u>Right</u>: caption: "4000 B.C. – Egyptian built houses of sun-baked mud with flat roofs for open air living"

"…By the time of the great Roman Empire there were tile roofs and glass windows…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "400 A.D. – Roman villas were built with cement walls, tile roofing, and glass windows. In the open air court or atrium, was the hearth"

"…And then more centuries later there were English stucco houses and Georgian brick houses…"

RE: excerpt from: *Steel Makes the Home*

<u>Top Left</u>: caption: "700 A.D. – Saxons developed crude houses with wood framework, and smoke holes in the roof"

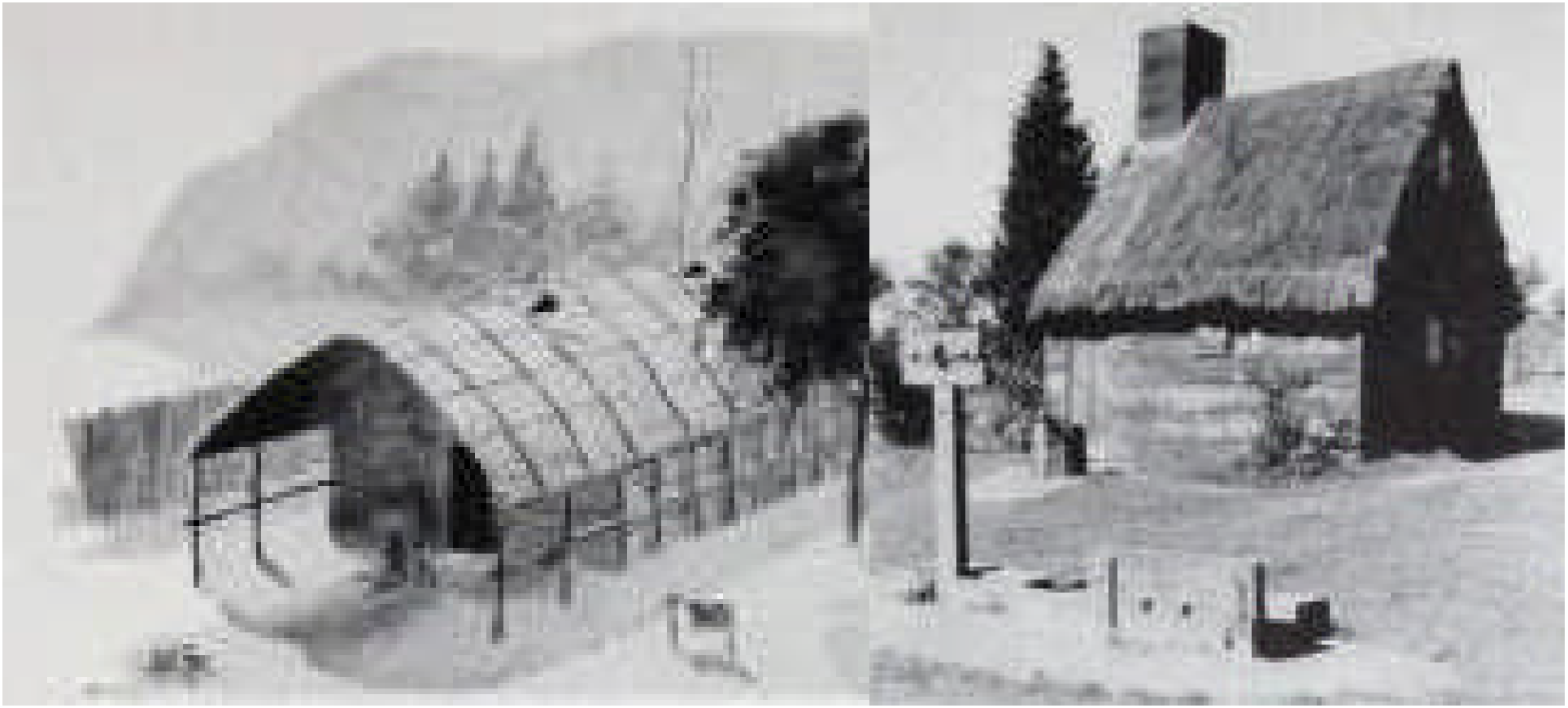
<u>Top Right</u>: caption: "1500 A.D. – The English Tudor house had oak beams, stucco exterior, chimneys and leaded windows"

<u>Left</u>: caption: "1750 A.D. – The English Georgian brick house was stately, but deficient in conveniences"

"…Great strides had been made in beauty and charm of architecture, but little in what are accepted today as the ordinary comforts of living. These were not to come until the industrial age with its inventions and its new materials. Only then was man finally able to achieve his desire of combining beauty and comfort in his home…"

RE: excerpt from: *Steel Makes the Home*

Housing in America



"…Houses built by the Pilgrims after 1620 were not log cabins, as many people think, but small houses with hand-sawed beams patterned alter their former homes in England. Outside walls were of board instead of stucco as commonly used in their homeland. Log cabins were not built here until the Swedes settled in Delaware in 1638 and built houses of the type they themselves had known in their homes in Europe…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "1600 A.D. - Iroquois Indians built huts of bark and saplings"

<u>Right</u>: caption: "1630 A.D. – Pilgrim's houses had wood chimneys, thatch roofs, wood siding"

<u>Top Left</u>: caption: "1662 A.D. - House of the Seven Gables, built to withstand the New England winter"

<u>Top Right</u>: caption: "1800 A.D. - Monticello had classic style but few comforts"

<u>Left</u>: caption: "1809 A.D. – Abe Lincoln's log cabin, like those which protected frontiersmen from 1638 to 1875"

"…Rapid progress in interior construction of the house occurred in the 19th Century. New products, such as plumbing, central heating and similar improvements were developed, and soon came into general use. Today the typical American home is more livable than any other in history…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "19th Century - Ornate but more livable than earlier houses"

<u>Right</u>: caption: "20th Century - Attractiveness and comfort in American homes"

Burning Down the House

"…A nail is a common thing today, but not long ago it was so rare as to be precious. Colonial houses were held together with wooden pegs and interlocking joints. Nails were used chiefly in fastening clapboard or other form of siding to the walls. The story goes that on leaving one house to build another elsewhere, a man sometimes would burn his old house down to recover the nails…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "1681 - Wooden pegs and mortised joints held together huge beams when wood was plentiful and nails were scarce"

<u>Above</u>: caption: “17th Century - New England houses had heavy wood framework like English homes”

<u>Left</u>: caption: “For over 200 years, the frontiersman’s cabin was made of logs held together with a minimum of nails”

"…Higher costs of lumber and the invention of machine-cut, low cost nails led to a new type of lighter wood frame construction around 1800. All structural members were nailed securely together. Nails today are so inexpensive that a carpenter may not bother to pick up one he drops…"

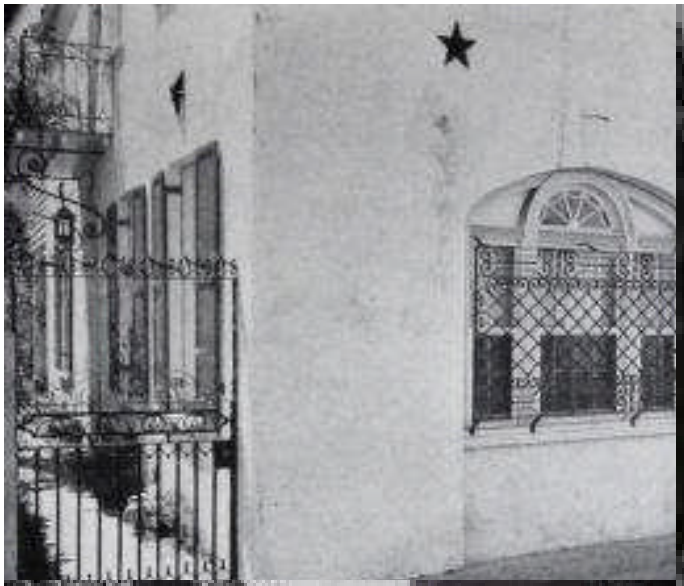
RE: excerpt from: *Steel Makes the Home*

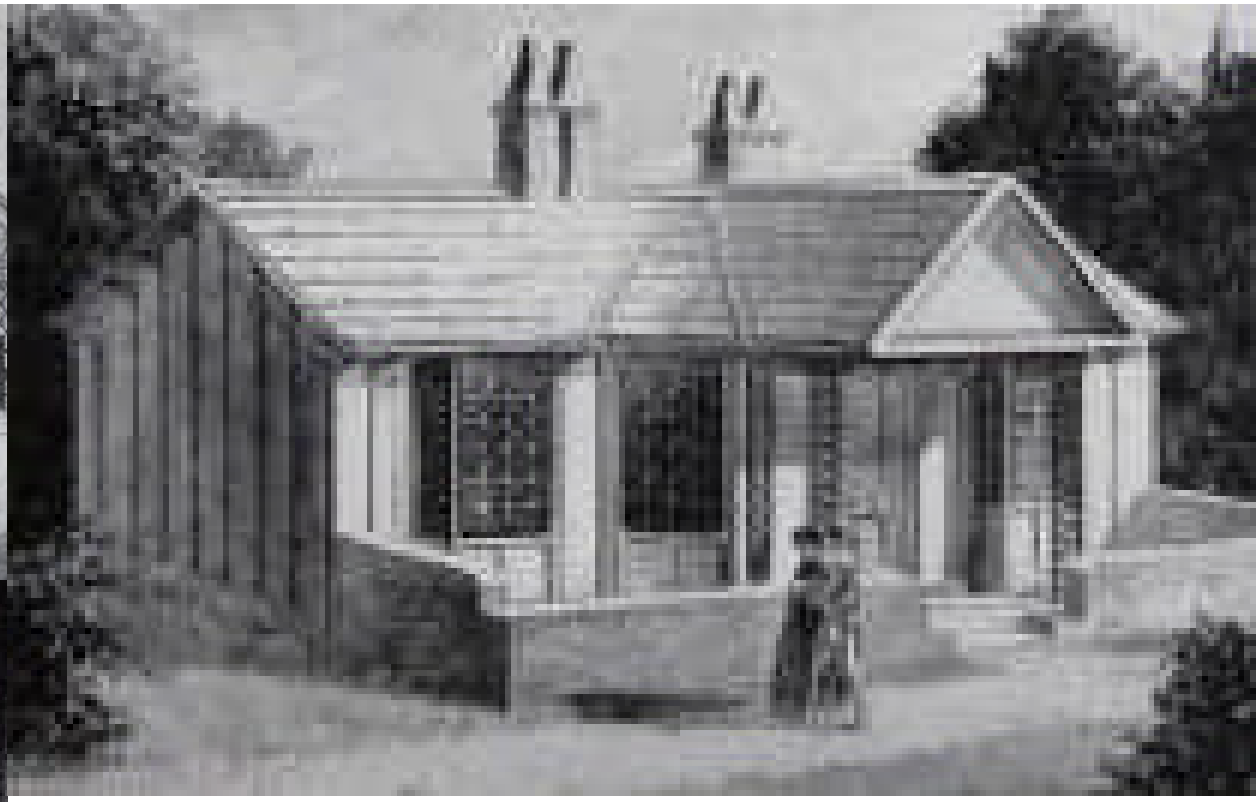
<u>Left</u>: caption: "Since 1800, wooden framework has been fastened together with nails"

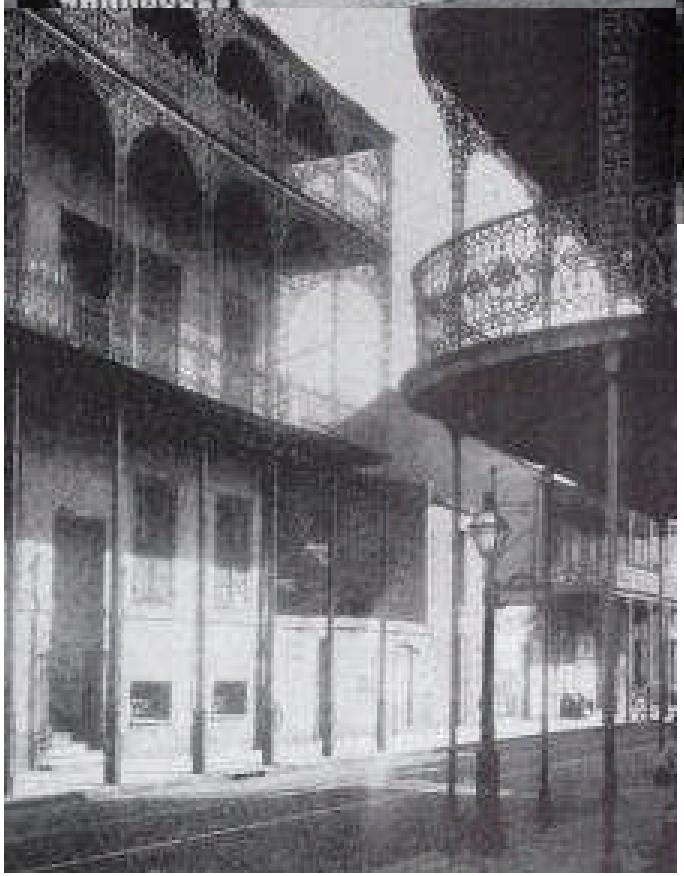
From Wood to Steel

"…Ever since the beginning of time, man has tried to build his home to give him lasting protection, healthful living conditions, and architectural beauty. He has always wanted a comfortable, convenient, attractive place in which to live. Ever since the desirable features of steel were recognized, designers and manufacturers have been finding new ways in which these features can be effectively used…"

RE: excerpt from: *Let's Build a Home* (ca. 1948)







"…Even before 1700, iron rods were used to strengthen walls while iron columns began to be used over 100 years ago. Wrought iron beams were first used in this country in 1854…"

RE: excerpt from: *Steel Makes the Home*

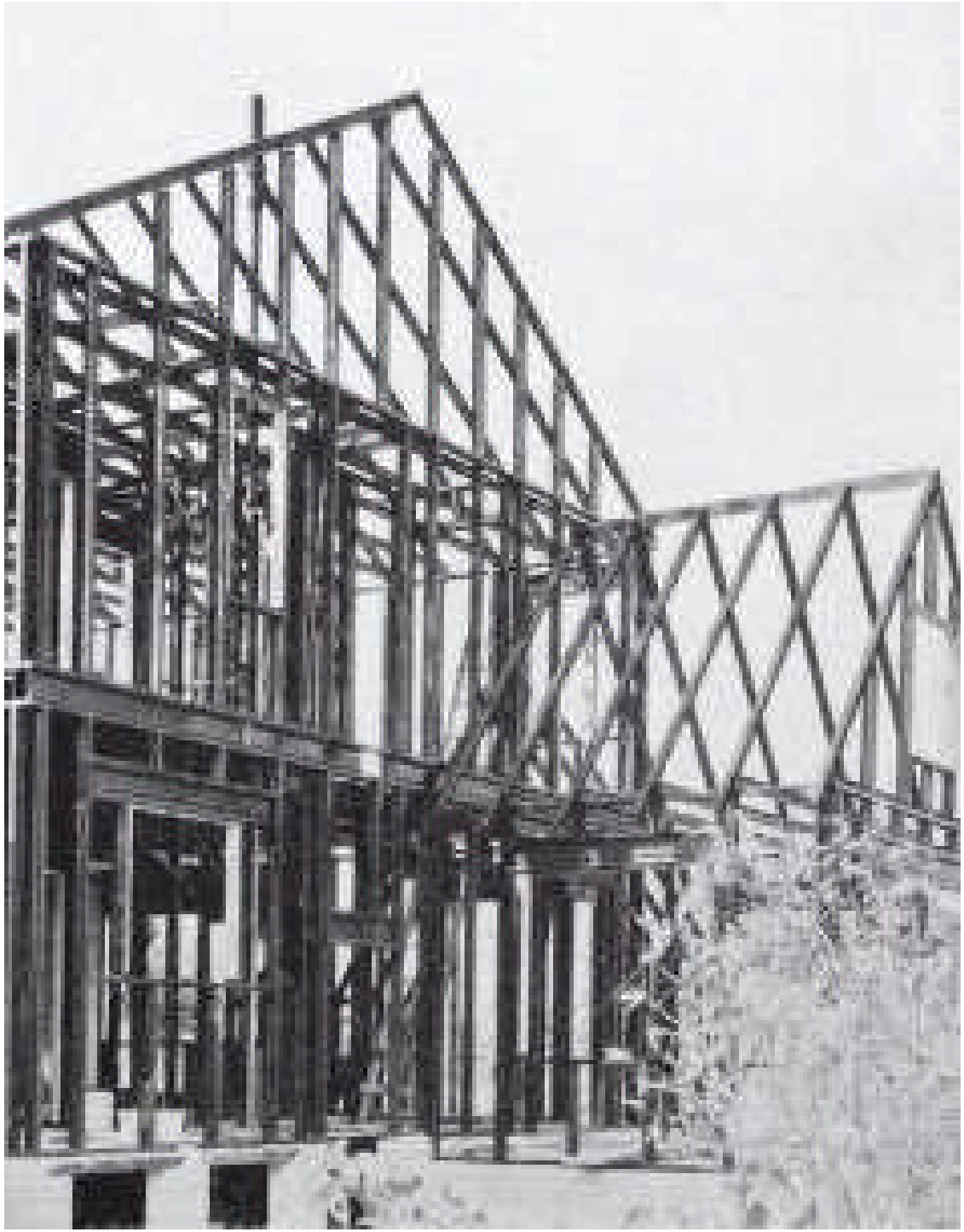
<u>Above</u>: caption: "Almost 150 years ago this experimental all-iron house was built in England. It proved so durable that at last advice it was still standing"

<u>Top Left</u>: caption: "An earthquake in Charleston, S.C, in 1811 led to the use of wall anchors, which fastened iron reinforcing rods"

<u>Bottom Left</u>: caption: "In New Orleans iron columns were first used over 100 years ago to support picturesque balconies"

"…Steel made its debut in the early skyscrapers, and only now is coming into its own for home building. The first sky-scraper with a frame of steel and iron was erected in Chicago in 1884, and soon the skyscraper became a distinctive feature of the American city. Meanwhile the advantages of steel construction were applied to other types of factory and business buildings. In recent years new systems of steel construction have been developed especially for homes. Easy to erect, and long lasting, the modern steel-built house is a product of 20th Century metallurgy and engineering…"

RE: excerpt from: *Steel Makes the Home*



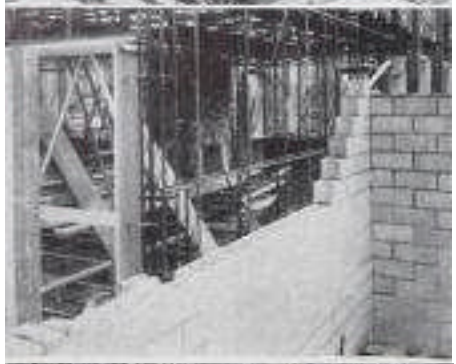
"…At one time, durability in a home depended on thick stone walls, or foot-square wooden beams. Today builders can use steel, a material with an inherent strength fully 15 times that of wood as used in the framework of a house. Sheer mass is no longer needed for strength. The house built with steel framework has the strength, durability and fire safety of a skyscraper. The steel members used in building a home, however, can safely be made lighter in section, and so more economical, than those in a skyscraper, because the load to be carried is less…"

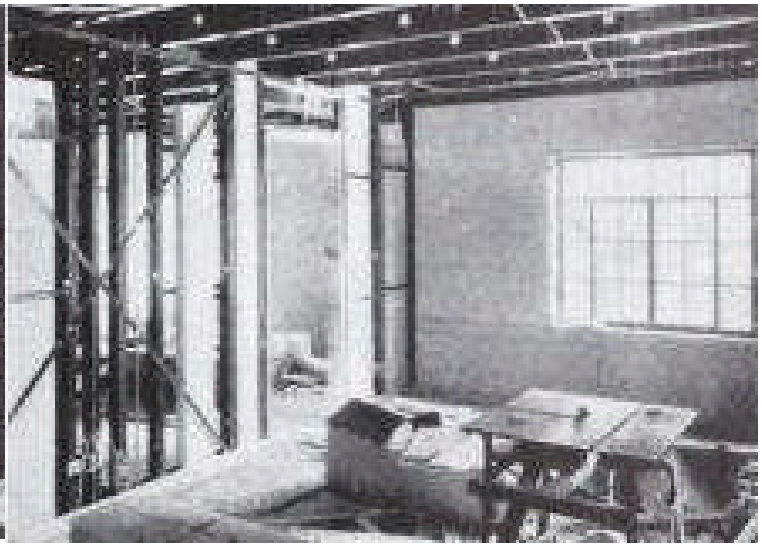
RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "In today's homes, modern light steel construction means strength, durability, low up-keep and reduction of fire hazard"

"…Steel has for many years been a favorite material with architects and builders. Steel has made possible, by its great strength, durability, and high degree of safety, the many large commercial, industrial, and public buildings of our time. In like manner, steel can contribute to the lasting beauty, safety and comfort of countless private homes…Steel permits varied design, efficient handling of space, and economy of construction, due to the ease with which it can be both fabricated and installed…"

RE: excerpt from: *Let's Build a Home*





"…Steel construction for homes may consist either of light weight structural beams similar in shape to those used in large buildings, of sheet steel beams, of truss-shaped members, or of panels formed and reinforced in such a way as to provide great strength and load-carrying capacity. Light steel members were first used as far back as fifty years ago. Inspection of those older buildings has shown that the light steel members have not deteriorated, and that their strength is unimpaired…"

RE: excerpt from: *Steel Makes the Home*

<u>Above Left</u>: caption: "The steel framework being installed here will mean a lasting home"

<u>Above Right</u>: caption: "Steel framework for partitions assures strength and fire-safety"

<u>Left</u>: caption: "Details of steel frame house construction"

A Home That Lasts

"…No matter what kind of home you plan, there is a wealth of materials from which to choose. There is no material, however, which can match the many desirable and attractive features of steel. Steel not only gives the structural sturdiness which is required, but also gives lasting beauty and infinite variety. The same qualities which make possible a towering skyscraper can be used to great advantage in your home…"

RE: excerpt from: *Let's Build a Home*

"…To the passer-by, the completed home built with modern steel framework may appear little different in appearance from one built in the old-fashioned way. To the owner, however, who knows the security and permanence of steel, there is a vast difference. The framework of his home has great tensile strength, does not shrink or sag, is incombustible and insect-proof. His home lasts…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "Los Angeles, Cal. Arthur Kelly and Joe Estep, Architects. Steel floor system ensures durability of this home."

<u>Right</u>: caption: "Grosse Point, Mich., home, designed by Frank A. Miles, Architect. Built with enduring steel framework."

"…The building industry is becoming increasingly aware of the need for taking the fullest advantage possible of the many properties and uses inherent in steel. Engineers have done just that in today's all-steel home. They have designed homes which are more practical and more livable because the basic units are built in large plants with mass production equipment. Steel sheets, for example, are easily cold formed by rolling or pressing in various shapes and panels, possessing considerable strength and providing a material which replaces several functions of ordinary construction. Not only is the strength provided to support the building itself, but also a suitable surface is furnished for any finish required. Erected on foundations constructed either of poured reinforced concrete, or of properly connected concrete blocks, panel walls of this type provide insulation space; they insure the elimination of air transfer; and properly designed, they prevent the through transfer of heat…"

RE: excerpt from: *Let's Build a Home*

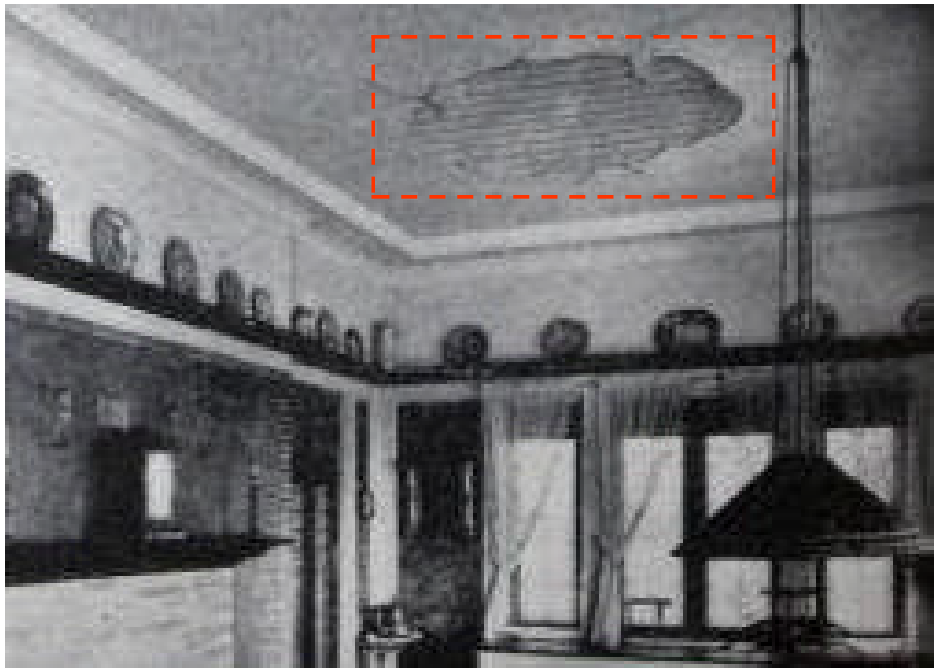
Steel is Strong

"…Steel is strong. It is available in many shapes and forms, the strength of which can be accurately calculated to support almost any given load. Because of this strength and rigidity, the steel members used in a private home can be lightweight and easy to handle. That cuts cost…A well-designed and protected framework of steel cannot sag or shrink, rot or warp. It can be depended on to perform the task for which it is designed. Steel properly protected finds its way into the home to perform a great number of tasks…"

RE: excerpt from: *Let's Build a Home*

"There are two costs to any house - the original cost and the cost of upkeep. Both are factors which must be considered in determining the upkeep cost of any house. The cost of upkeep depends a great deal upon the nature and durability of the materials used in the building. Houses are traditionally susceptible to a number of ailments. Some of those ailments are chronic and costly to cure while others, though annoying, can be remedied more easily. Among the most common symptoms of an ailing house are unsightly cracks in walls and ceilings. Doors that will not quite close, windows that stick, or baseboards that gap away from the floor…"

RE: excerpt from: *Steel Makes the Home*



"…In most cases these symptoms indicate that the frame of the house has warped or shrunk, the cure is expensive, and there can be no guarantee that the trouble will not recur…"

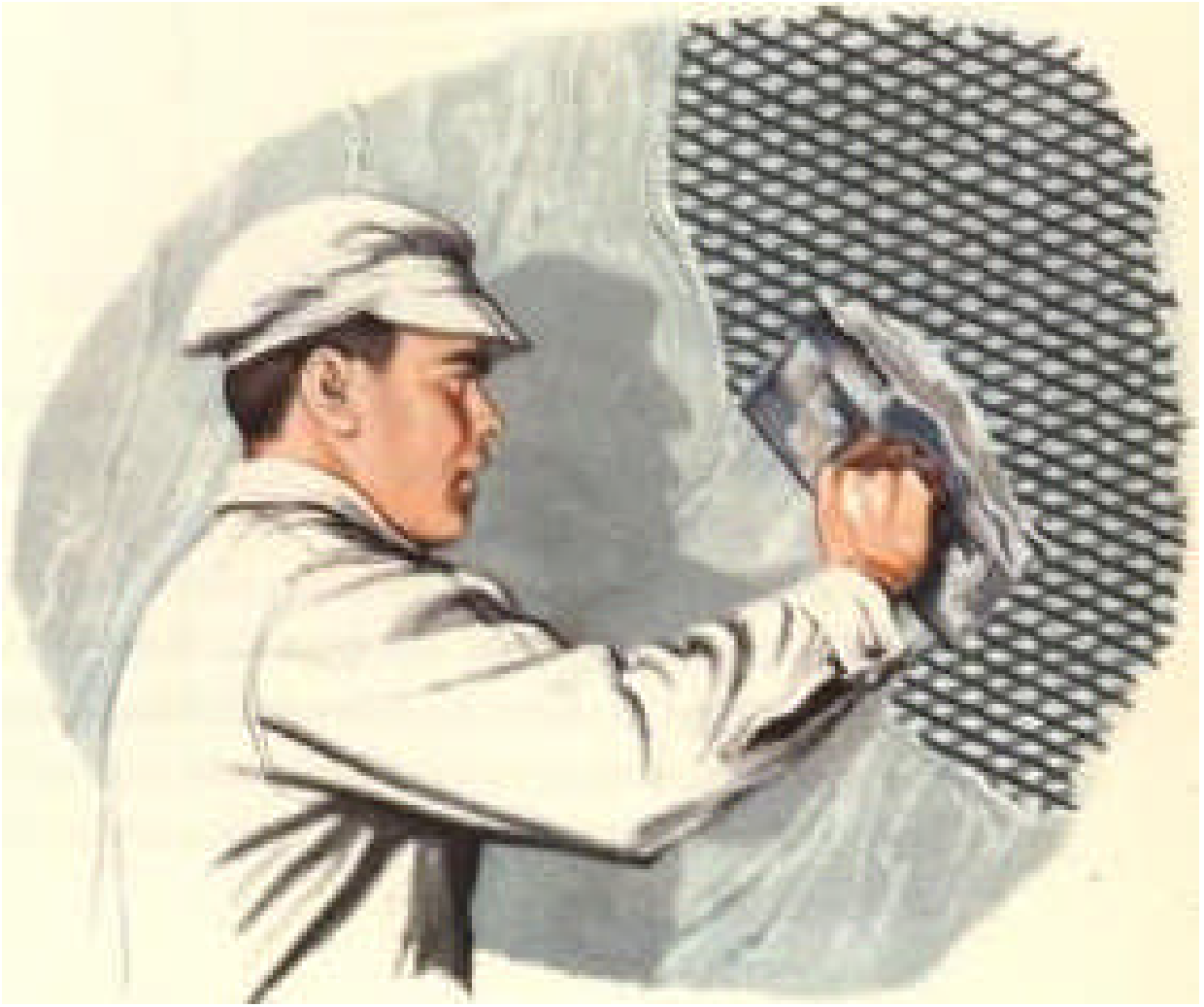
RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "When plaster fell from this wood-framed and wood-lathed ceiling, repair costs rose in this mid-western house"

"…To immunize any house against such ailments, steel can now be prescribed. Houses built around a frame of steel, with the plastering applied to steel lath, are not affected by the conditions which are the most frequent cause of warping and shrinking in houses built of other materials…"

RE: excerpt from: *Steel Makes the Home*

<u>Above</u>: caption: "Garden City, N.Y. Reinhard M. Bischoff, Architect"



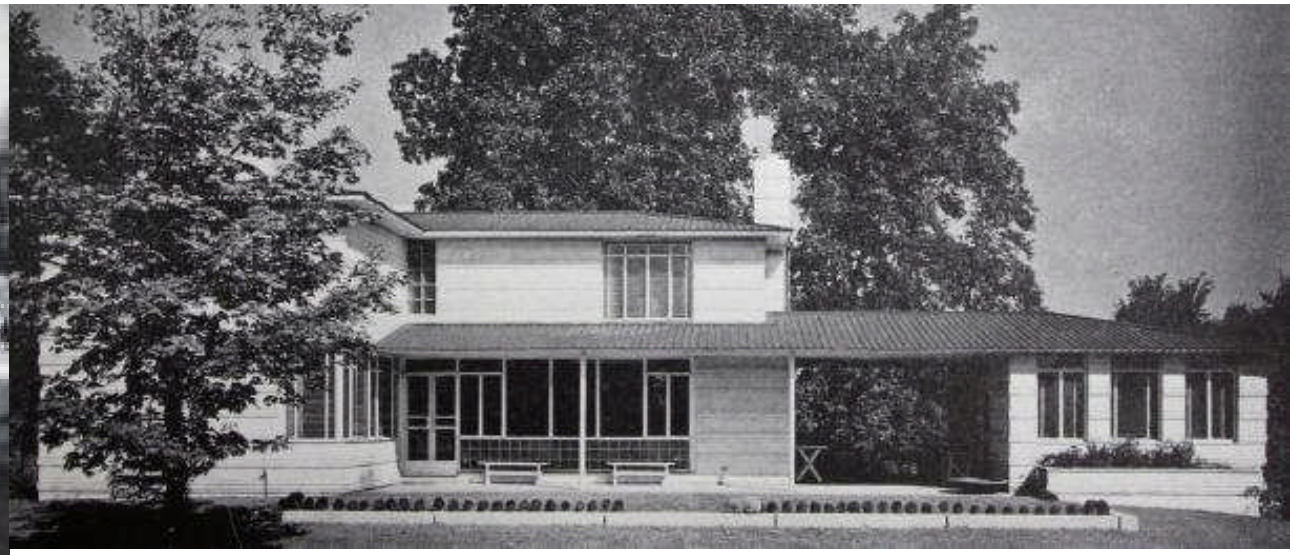
"…Metal lath has proven highly advantageous. It's easy to install, easy to plaster over; it keeps a room neat and trim for years. Steel lath is worthwhile, no matter what kind of frame-work is used…"

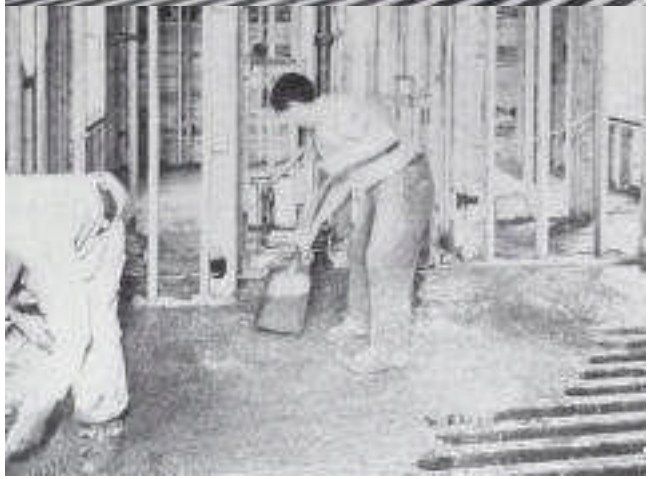
RE: excerpt from: *Let's Build a Home*

"In houses which are built with steel, walls and ceilings do not crack, and doors and windows continue to operate like new. Unsightly gaps along the base-boards are prevented. Because the modern steel-built house is a strong, enduring unit, its cost of upkeep obviously is low…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "Plaster free from cracks in Garden City home"



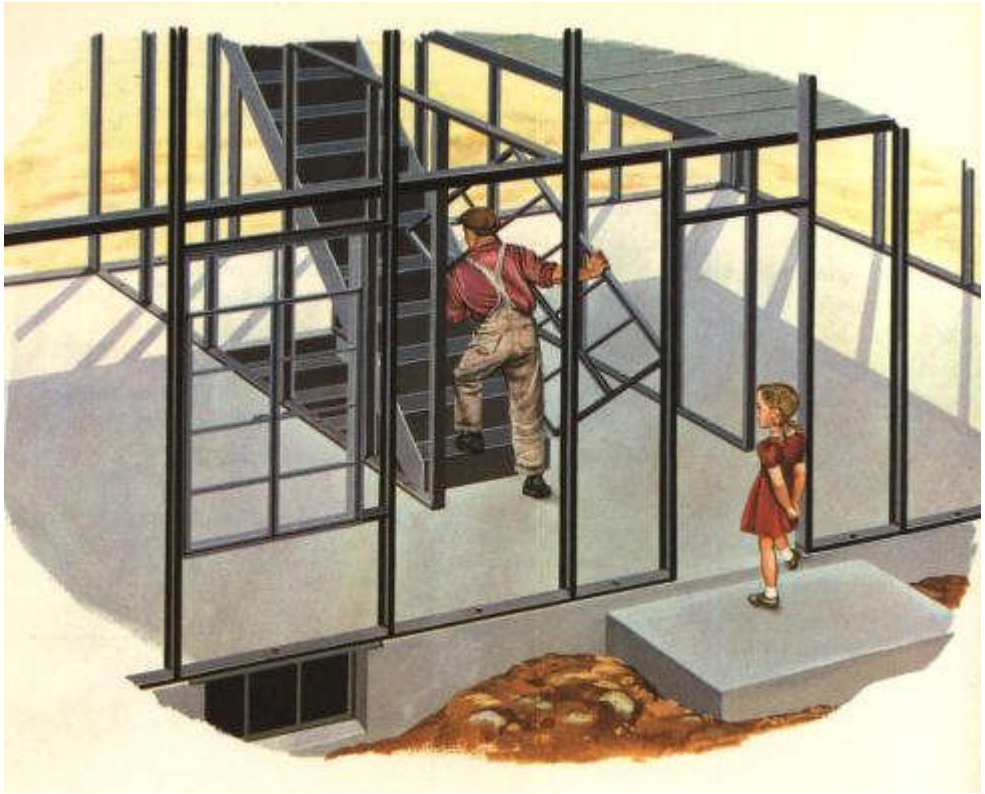


Above: caption: "Home with steel floor system in Princeton. N.J. Kenneth Kassler, Architect."

Top Left: caption: "Non-shrinking steel floor systems mean low repair costs in Garden City home"

Middle Left: caption: "Steel floor panels; the underside serves as smooth ceiling with low upkeep"

Bottom Left: caption: "Preparing trouble-proof steel panel flooring"



"…A basic framework which shrinks or warps soon requires expensive repairs. Wall cracks appear, doors and windows get out of line and cease to function properly, and fine finishes are completely ruined. A steel framework - columns, studs, rolled or expanded joists, and trusses - supplies a basis for the enduring strength and rigidity so highly prized in all construction work. Steel does not change in dimension. It doesn't dry out and shrink, warp or distort. Steel sections, whether they are individual members or complete wall units, are made precisely to size, and when joined together, they stay put…"

RE: excerpt from: *Let's Build a Home*

A Fire-Safe Home

"…Americans have been struggling with the problem of fire hazards and the prevention of fire losses since early Colonial days. In 1631 the use of wooden chimneys was outlawed in New England and New Amsterdam. Not long afterwards thatched roofs were barred in various towns in an attempt to prevent fires. Volunteer fire departments were organized, and about 1650 the first fire engine was built in this country. These were the forerunners of the splendid fire fighting equipment that protects the buildings in American communities today. Nevertheless, despite every precaution, fire losses at the present time in this country come to the huge total of $250,000,000 a year. A very large part of that loss is accounted for by conflagrations that start in private dwellings…"

RE: excerpt from: *Steel Makes the Home*

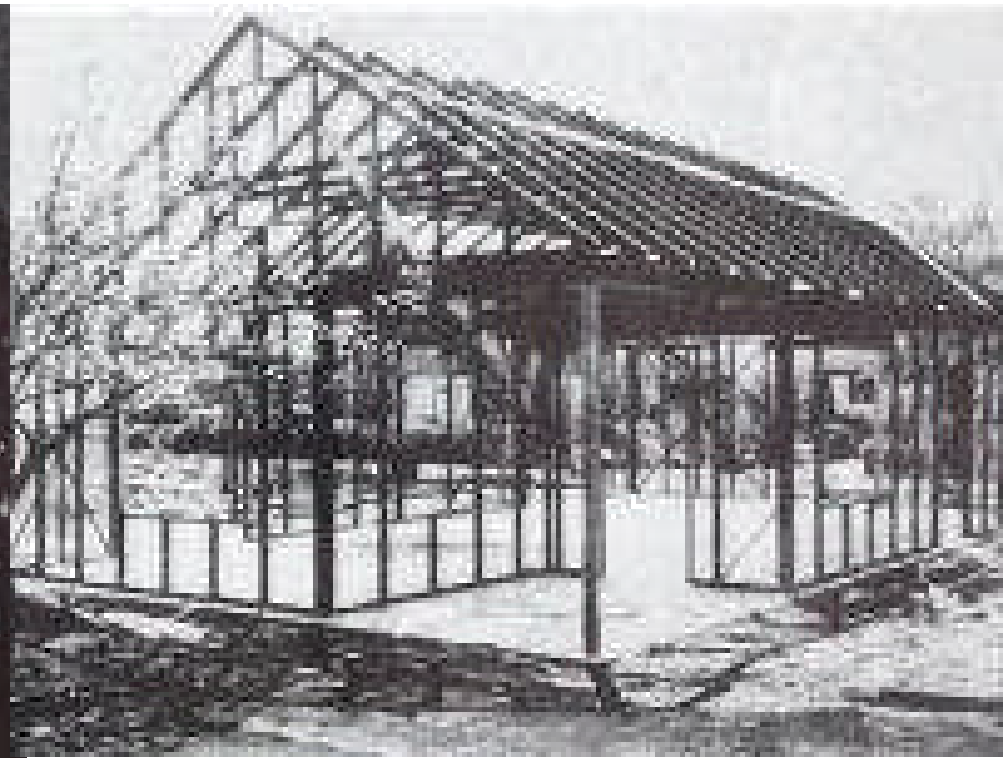
<u>Above</u>: caption: "The owner of this home in Pittsburgh, Pa., designed by Thomas B. Garman, said: 'If we had ever doubted the wisdom of building with steel beams, that doubt vanished entirely after we discovered and put out a fire In our basement recreation room. The fire had apparently been blazing for a couple of hours. All damage was confined to the basement.'"

<u>Left</u>: caption: "Homes built with Inflammable materials may be quickly reduced to ashes"

"…Wood construction in floors, walls and roofs represents about twelve pounds of potential fuel for each square foot of floor space in a dwelling, exclusive of the potential fuel in the roof, as against less than six pounds for the furnishings and all other combustibles…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "Steel construction might have saved this home In East Orange, N.J."



"…When light weight steel framework and steel lath are used, two-thirds of all materials that might serve as fuel for a fire are at once removed. Furthermore, steel wall and floor systems, as used with steel lath and plaster interior finish, act as an effective barrier to the spread of flames. They protect the house and its contents by confining the fire to the room in which it starts…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "Steel framed home in Los Angeles, Cal. Richard J. Neutra Architect."

<u>Right</u>: caption: "Steel construction reduces by two-thirds the potential fuel for a fire"

"…The extent of fire protection accorded by the use of steel is shown by tests which were conducted by the National Bureau of Standards. Those tests revealed that partitions constructed of steel framework, metal lath and plaster provide protection for two hours against the Standard Fire Test, compared with only twenty minutes for partitions constructed of wood framework, wood lath and plaster…"

RE: excerpt from: *Steel Makes the Home*

"…The use of steel as a building material provides a bulwark against the ravages of fire…"

RE: excerpt from: *Steel Makes the Home*

<u>Above</u>: caption: "Steel framed home near Detroit, Mich., shown after fire. Its owner said: 'My wife and I were out for the evening. A fire started in the living room. For more than four hours, the fire burned, confined to the room by steel and concrete and plaster. Finally neighbors broke into the house and got the fire under control. The structure of the house remained as strong as the day it was built. Naturally, the rooms were dirtied with smoke and part of the living room furniture was destroyed but our house still stands!'"

<u>Left</u>: caption: "How steel framed wall checked fire that burned in an adjoining room"

"…The use of steel framework and steel lath eliminates about two-thirds of the inflammable material in a house. And every pound of steel used anywhere in your home to replace a combustible item, reduces the fire hazard just that much more. Steel can't burn, and actually prevents the spread of flames. Also, experience has shown that no other building material withstands the force of wind, earthquake, and explosion as well as does properly designed steel…"

RE: excerpt from: *Let's Build a Home*

Defeating the Elements

"…About two hundred years ago iron rods began to be used to strengthen house walls and chimneys, and experience has since proved that modern systems of steel construction offer maximum resistance against the onslaughts of the elements…"

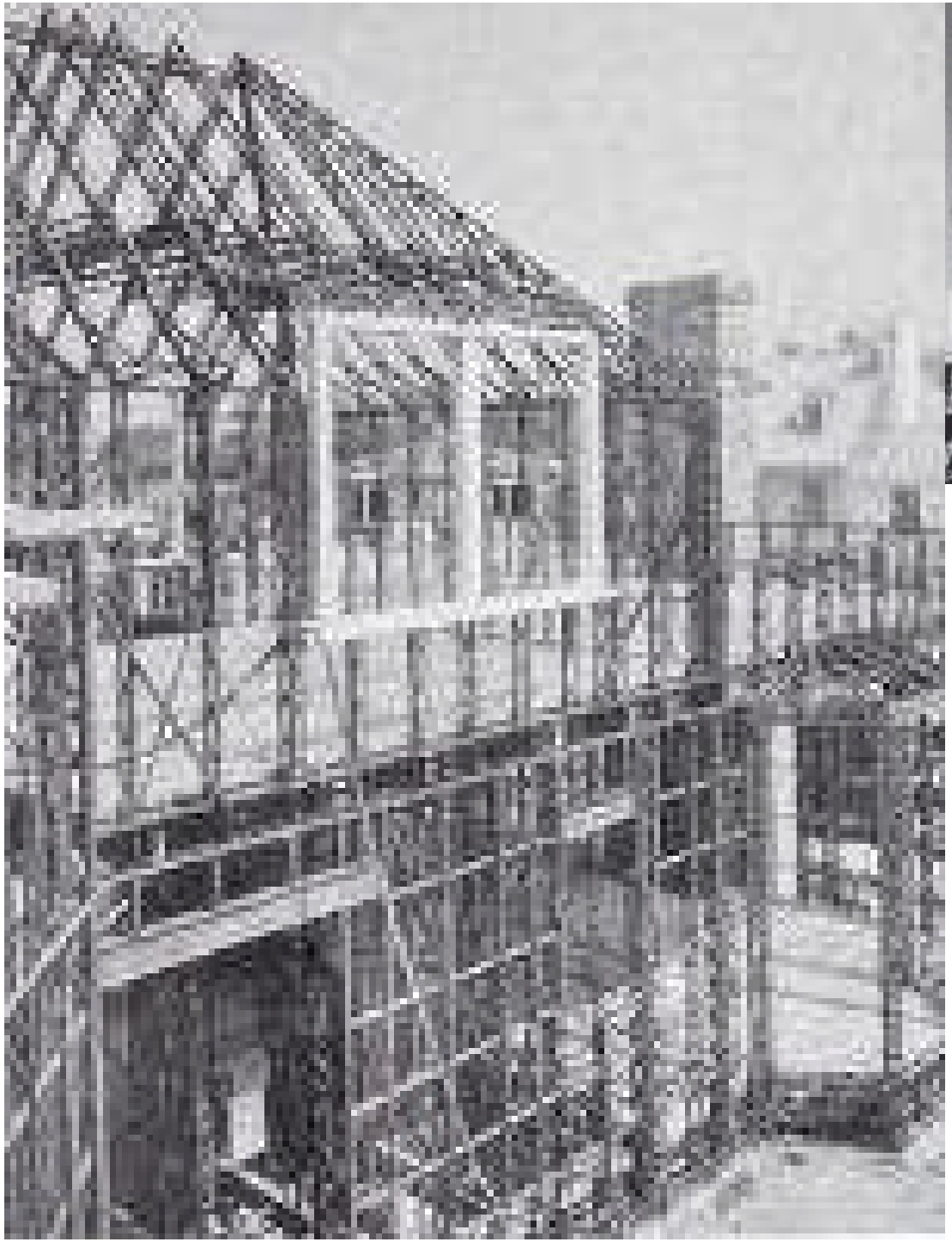
RE: excerpt from: *Steel Makes the Home*

"…In the earthquake and hurricane disasters of recent years the buildings that have stood up best have in general been steel-built structures…"

RE: excerpt from: *Steel Makes the Home*

<u>Above</u>: caption: "Over 150 people were killed when a tornado reduced these homes to kindling"

<u>Left</u>: caption: "Earthquakes have caused severe damage in the United States"



"…High winds and earthquakes, destroying or seriously damaging less substantially built homes, have done little or no damage to those which were built of steel properly designed…"

RE: excerpt from: *Steel Makes the Home*

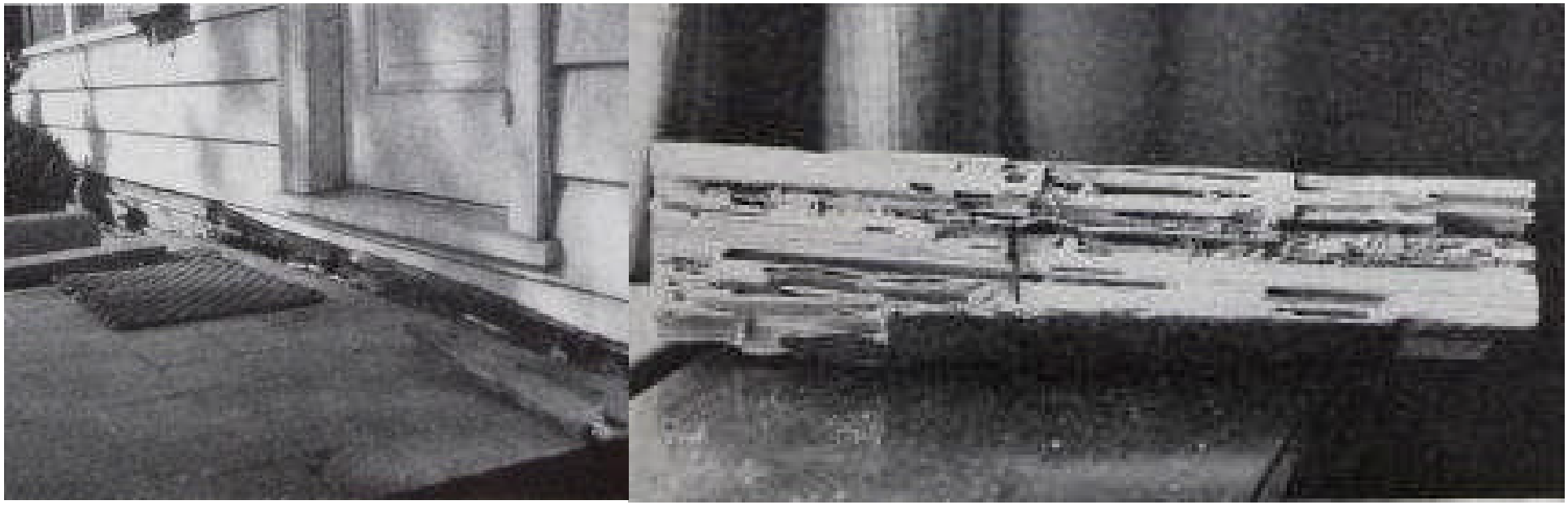
<u>Above</u>: caption: "Steel framed home, Los Angeles, Cal. Paul R. Williams, Architect."

<u>Left</u>: caption: "Design for Safety: Framework of LA home"

"…Whether as the head of a hammer, an automobile piston rod or as a house frame, steel is able to resist pressure, vibrations and shocks…"

RE: excerpt from: *Steel Makes the Home*

Inedible

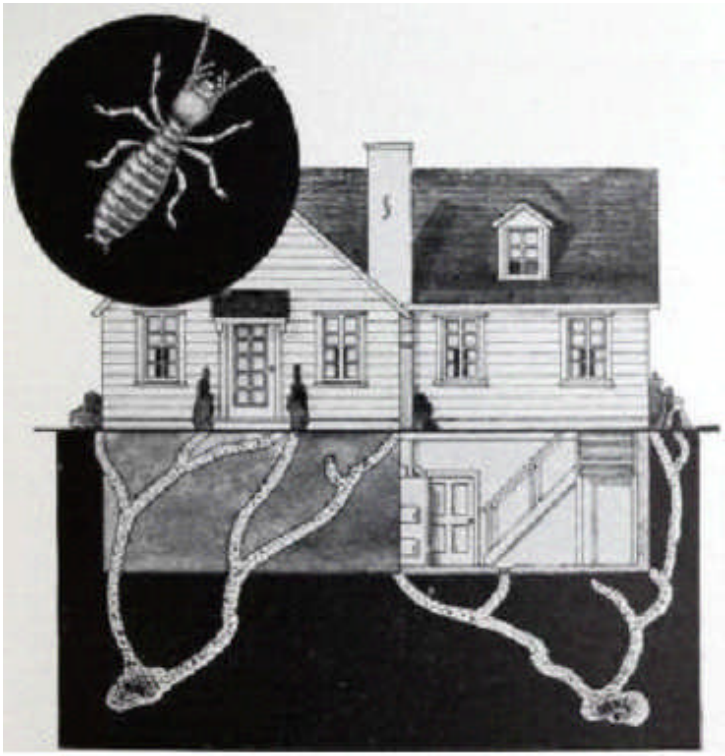


"…Early American home builders did not need to guard against termites. Those wood-eating ants originally lived in tropical climates and only recently began to invade the more temperate zones. Termite damage now amounts to $45,000,000 annually, the United States Department of Agriculture estimates, and home owners in many parts of the country have been the principal victims…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "A costly meal: termites ate right through this beam"

<u>Right</u>: caption: "Termite-ruined wood beam from a house in New York City"



"…Seeking wood for food, termites usually enter a house from the ground and eat their destructive way through the beams. Eventually the weakened timbers sag under their loads, thr-owing the house out of alignment. Because termites are seldom dis-covered until they have done much damage, repairs are costly. Since ter-mites can't eat steel, they shun houses of that material. Rats, mice and other pests likewise cannot gnaw their way into such a house…"

RE: excerpt from: *Steel Makes the Home*

<u>Top</u>: caption: "How the house-wrecking ter-mite does his destructive work"

<u>Bottom</u>: caption: "Steel termite guards, placed over foundations, protect wood framework"

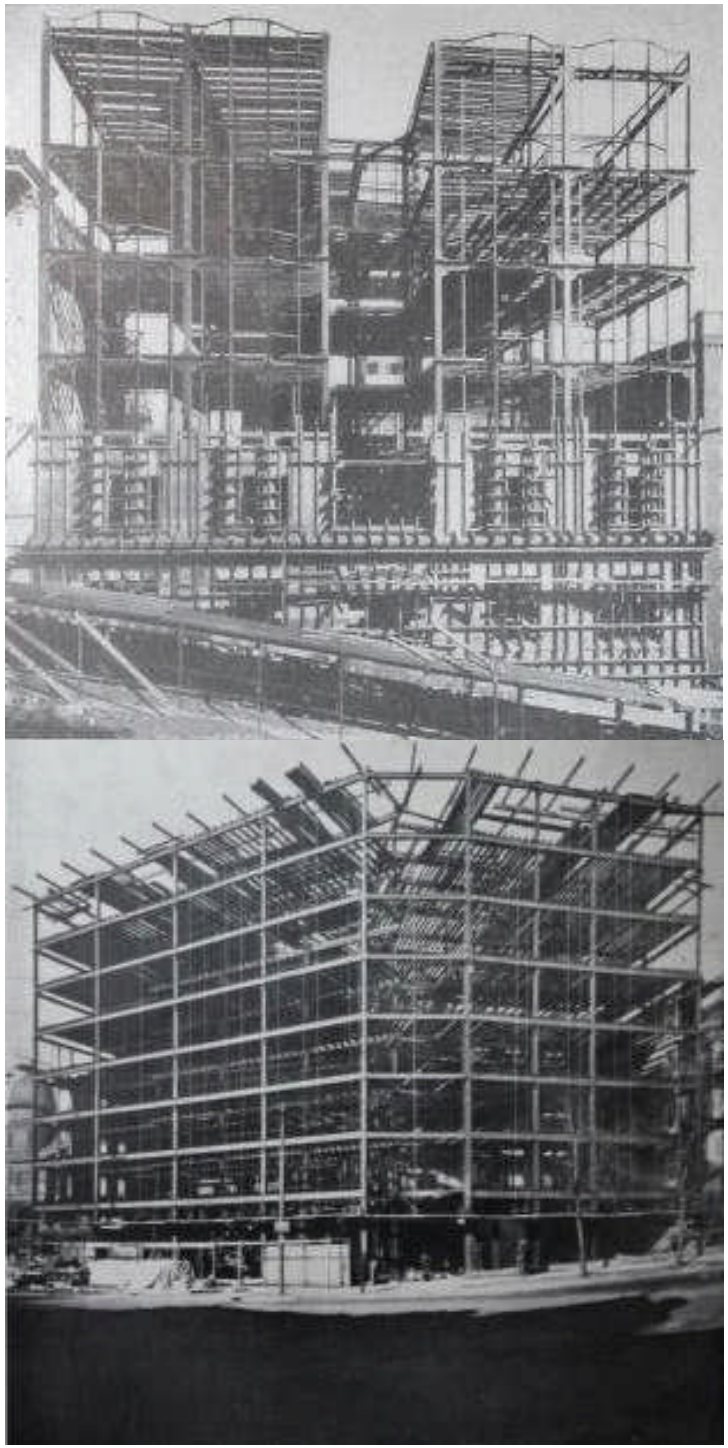
Part 2

An A No.1 Result

The Question of Selection

"In simplicity of design and ease of erection, Metal Lumber rivals wood; and when compared with other types of fireproof construction for use in light occupancy buildings, this material is found to be superior to them in its adaptability to the exacting conditions imposed by modern building construction. Buildings of the modern type are essentially fireproof, therefore, the question of the selection of materials resolves itself into considerations of reliability, methods of construction, economy, and the ease and speed of erection…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

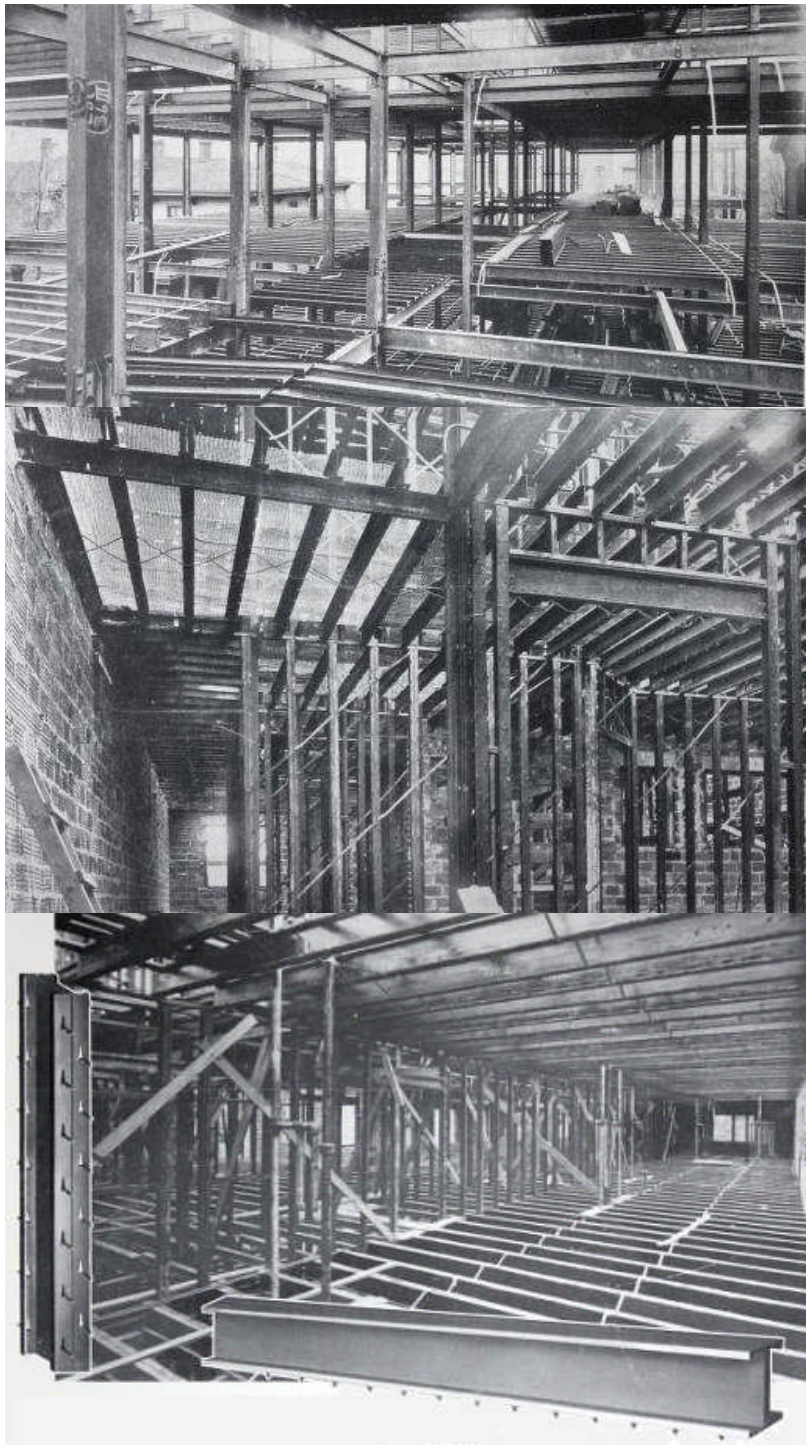


Top: caption: "Edward Beck Apartments. San Francisco, Calif. Architect: M.V. Politeo Concrete walls, steel framing and wood joists was the original plan. Metal Lumber joists were substituted in the six floors, roof and penthouses, at a slight additional cost. Result - a fireproof building, a decided reduction in insurance rates, a stronger, more permanent building, a much more valuable building. No changes were necessary in the supporting structure as the dead load of Metal Lumber construction is but little more than that of wood."

Bottom: caption: "Apartment House Clinton Ave. and High St., Newark, N.J. Architects: Backoff, Cook and Jones Builders: Harry Kruvant and Co. Eight floors and roof of Berloy Metal Lumber construction, 90,000 square feet of area, were installed in this building complete, ready for the finish, in two weeks' time, by contractor and workmen who had no previous experience with this type of construction. Rapidity of erection without elaborate contractor's equipment is one of the big advantages of Metal Lumber as compared with other fireproof constructions.

"…While admirably adapted to this work the field of Metal Lumber has expanded to the extensive replacement of heavier types of fireproof construction for buildings with moderate live load requirements. Metal Lumber joists and studs are not intended to replace the usual types of structural steel or reinforced concrete skeleton frame members. Metal Lumber does not take the place of such framing except in the case of residential or smaller structures…"

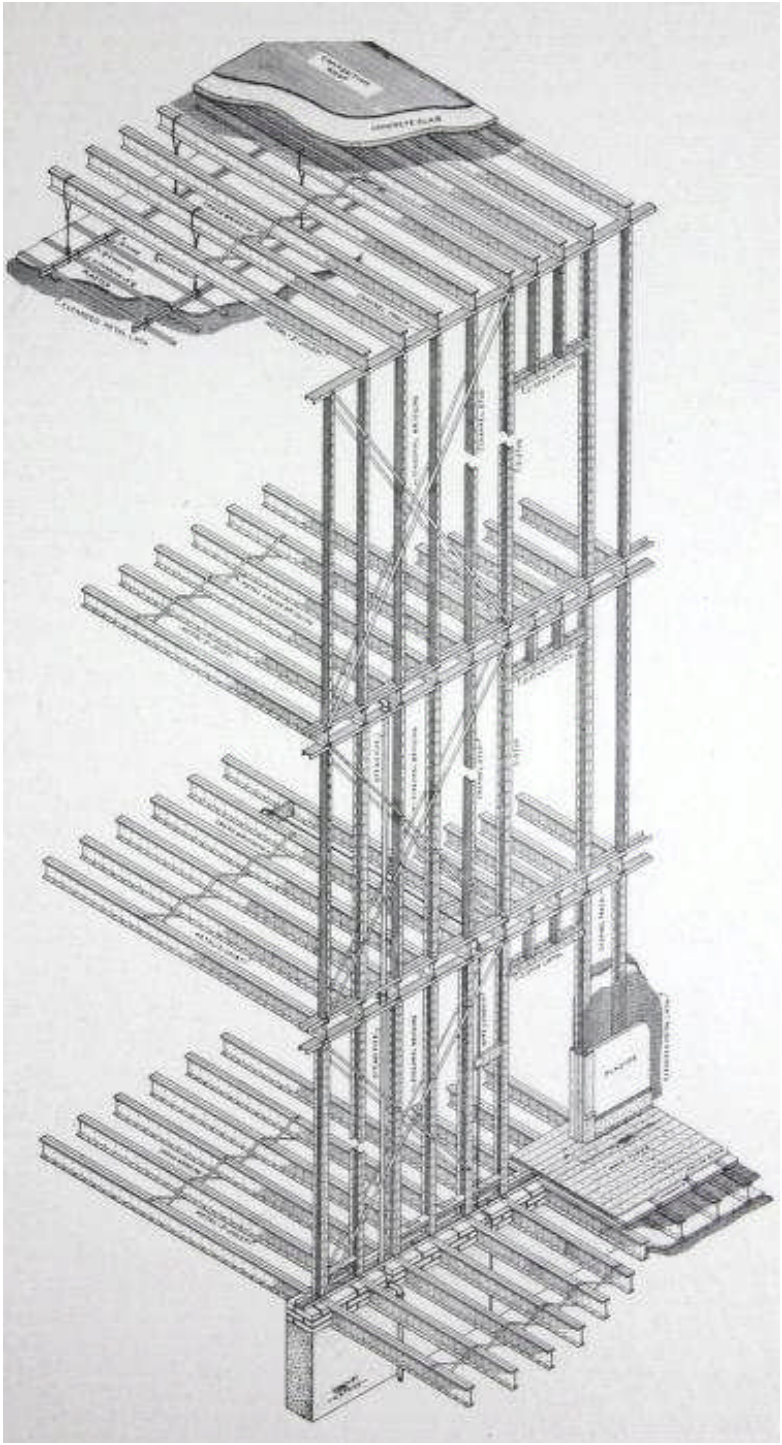
RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*



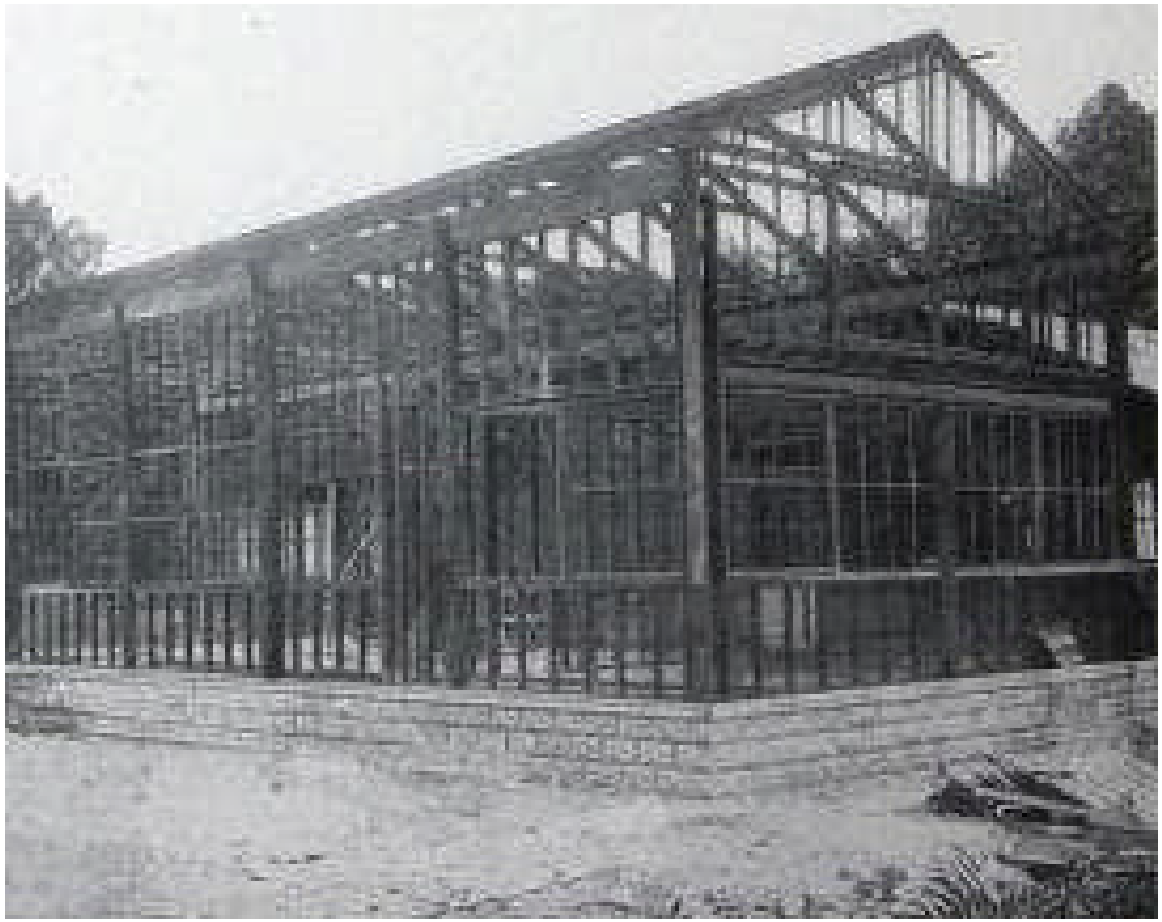
Top: caption: "Figure 1. Metal Lumber construction in Ways Sanitarium, Fort Wayne. Ind. The Metal Lumber was installed in this building during the winter of 1912-13, without any uncertainties due to cold weather. All floors, partitions and roof are of Metal Lumber construction."

Middle: caption: "Figure 2. Metal Lumber floor and partition construction in Brookline Apartments, Brookline. Mass. Architect: G. Bertram Washburn. Builders: The New England Construction Co. Located in a beautiful suburb of Boston and modern in every respect, these fifteen apartment buildings all of Metal Lumber construction form one of the largest apartment house projects in the country. The Metal Lumber sections used in these apartments if laid end to end would extend for more than sixty miles."

Bottom: caption: "Figure 3. Metal Lumber construction in Hotel Ricardo, Kansas City, Mo. Architect: Mrs. N.E. Peters. This attractive, four story, family hotel has Metal Lumber for all bearing partitions, non-bearing partitions and floors."



<u>Left</u>: caption: "The isometric perspective view shown here illustrates standard construction for supporting partitions, roof and suspended ceiling. Note that joists are placed directly over supporting studs; also that rivets are used for connections throughout, thus insuring rigidity and strength of construction that cannot otherwise be obtained. Note also the installation of plumbing pipes, conduits, etc. The bridging or bracing on partitions is important. This is applied before lath and serves to stiffen the partition. This construction is used extensively in apartments, hospitals, dormitories, hotels, etc., and proves highly efficient as well as economical."



"…Berger's Metal Lumber Pressed Steel construction is manufactured under letters patent No. 682316 for building construction. It is a material brought to its present high state of efficiency through extensive use and many years of experience in manufacture and development…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Reliability

"…Metal Lumber has been used over a period of many years in thousands of structures in both this and foreign countries. It has met many peculiar conditions - earthquakes in Central America, the climate of tropical South America and Honolulu, and zero weather construction in the north, as well as all sorts of overloading and abuse, without a single failure. The steel used in Metal Lumber joists must meet rigid specifications as to chemical analysis and actual tensile strength. Fabrication is completed under factory supervision, therefore the uncertain elements of field labor and the use of structural materials of varying values is practically eliminated…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Durability

"…Seventeen years of actual use have proven the durable qualities of the construction. No corrosion can occur where moisture is not present and moisture does not exist around the structural members when installed. Furthermore, moisture cannot cause corrosion unless it condenses. It cannot condense without difference in atmospheric temperatures and these differences in temperature do not exist in the interior of a building. Therefore, corrosion or rust is impossible…"

RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***

Methods of Construction

"…The Metal Lumber type of construction consists of pressed steel joists and studs used as load carrying members, installed in conjunction with Portland Cement, concrete and plaster. Metal Lumber is used in the construction of fireproof floors and roofs, in connection with brick walls or skeleton frame, and for supporting and non-supporting partitions, also for complete smaller light-weight structures. From the standpoint of fabrication Metal Lumber stands about midway between wood and structural steel. The joists and studs are furnished cut to length and fabricated complete as required. The necessary connections and accessories are also supplied with the material and erection proceeds very rapidly…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Economy

"…The fact that Metal Lumber Pressed Steel sections can be used in the construction of floors and partitions at a much less cost than the heavier systems of reinforced concrete and tile fireproofing and at a slightly increased cost over wood construction, appeals particularly to those interested in that class of building, which makes possible the existence of Insurance Companies - the dwellings, apartments, flats, stores, hospitals, schools, churches, residences, etc. It is this class of building that contributes largely to our National fire loss and it is in this class of building that Metal Lumber Pressed Steel shapes are particularly well adapted…The cost is from 4c to 10c per sq. ft. less than any system of fireproof construction and only slightly more than wood construction. Buildings can be erected fireproof with Berger's Metal Lumber at a cost of from 3½ to 10% more than the same buildings erected of wood lumber…"

RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***

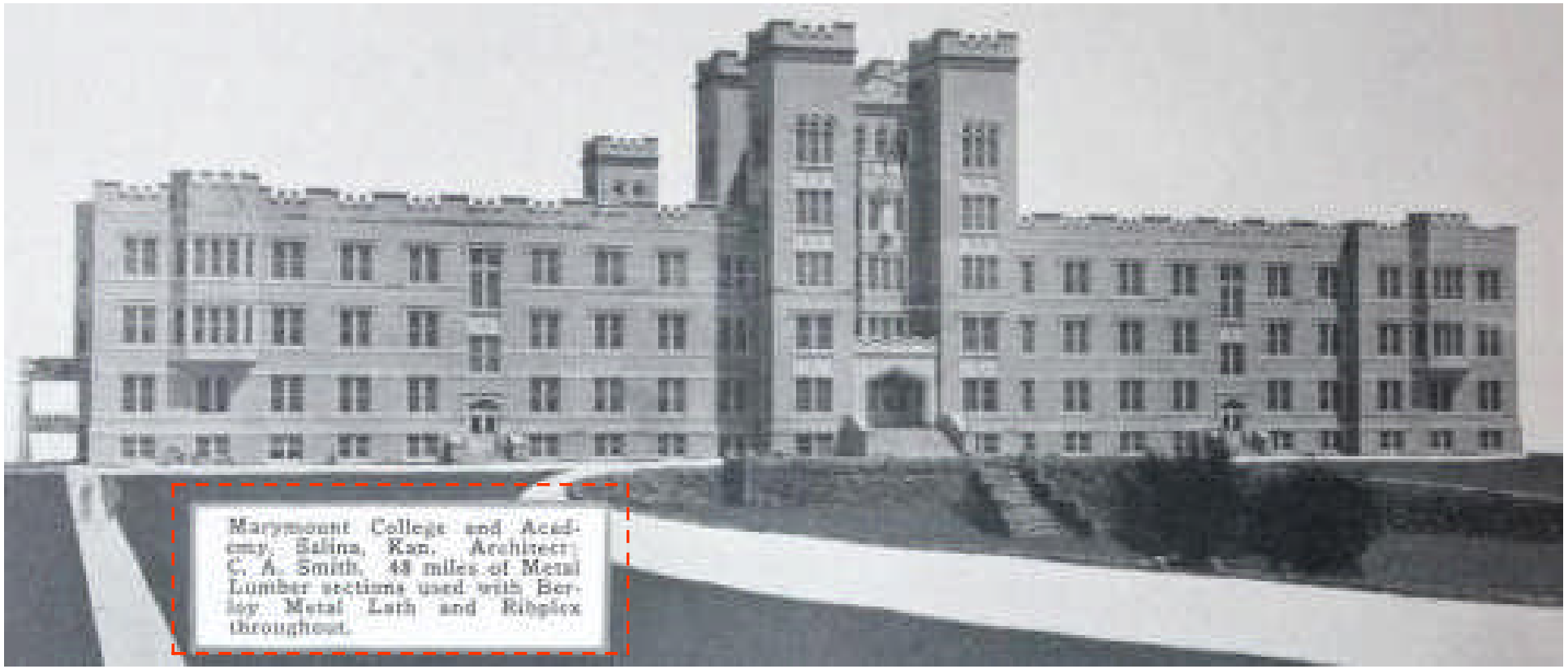
"…This type of construction is distinctive in that it involves no excess weight nor waste of space in the finished structure. The sections are carefully proportioned as to size and thickness to carry loads within the range of joist and stud members. The two inch concrete fill used over the joists meets the requirement for fireproofing and as a fill between the nailing strips. The 7/8 inch plaster ceiling is of standard thickness, and the floor finish is also in accord with standard practice. Thus there are no excess materials to add dead weight to lengthen the time necessary for erection and to pile up costs in labor, freight and hauling…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Ease of Installation

"…The installation of joists and studs has long been a simple routine of work, and Metal Lumber connects this old and well known simple labor proposition with a newer and wonderfully efficient fireproof material. None of the advantages of this simple labor operation are lost even in the largest sky-scraper; in fact, the joists which are placed so rapidly are readily covered with planks upon which to work above and also protect workmen on lower floors, therefore even greater advantages accrue from its use in large jobs where such covering is required…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*



"…Hundreds of buildings have been constructed using Berger's Metal Lumber for floors and partitions - 95% of which buildings were erected by mechanics not having previous experience in the use of the material. By the aid of erection drawings furnished by us, in connection with the shipment, the material is more easily installed than is wood lumber; each piece being cut to fit and marked to correspond with the identification marks contained on erection diagrams…"

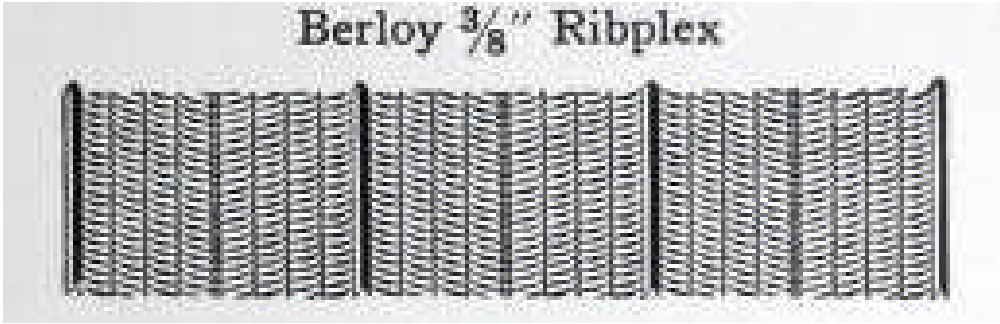
RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

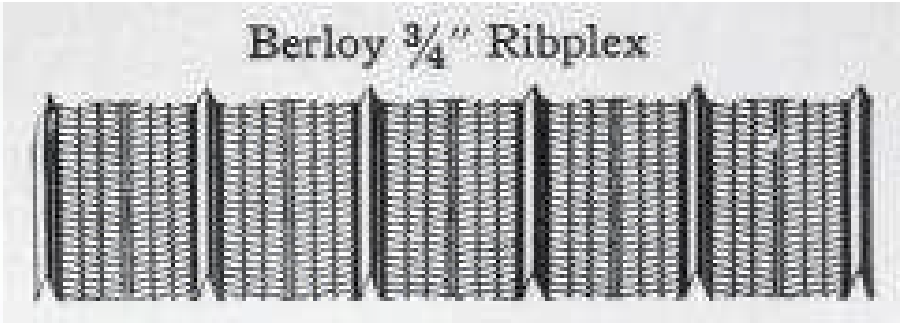
<u>Above</u>: caption: "Marymount College and Academy, Salina, KS Architect C.A. Smith. 48 miles of Metal Lumber sections used with Berloy Metal Lath and Ribplex throughout."

"…The Metal Lath used in connection with our Metal Lumber Pressed Steel sections is especially designed for the purpose. It is the result of a series of experiments with the object of developing a Metal Lath to resist rust and corrosion, and gives maximum strength as a reinforcement for plaster and concrete. It has a small, neat diamond mesh formed by the natural bend of the narrow strands in expanding, and designed to fit the prongs on the Pressed Steel members, at the same time developing the full tension resistance of the metal. It is made from un-pickled sheets rolled in our own mills and especially prepared, toughening the product and increasing the durability. The narrow strands permit the plaster and concrete to completely imbed the lath on both sides, the clinch bonding on the back. The plaster or concrete slab, therefore, completely encases the lath and is rigidly reinforced by it, thus accounting for the freedom from cracks in floors and partitions constructed of our material…Berloy diamond mesh lath is usually preferred where studs or joists are spaced 16 inches on centers or less and for all formed work, such as beam protection…"

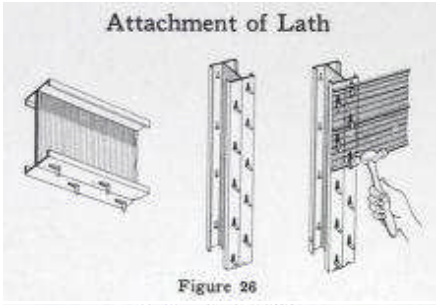
RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

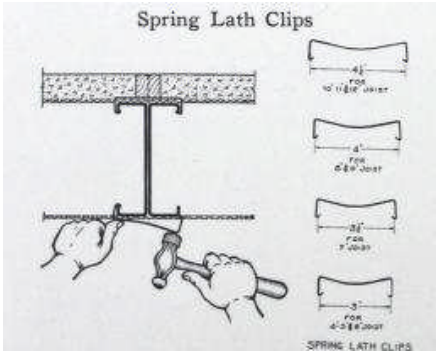
<u>Above</u>: Diamond Mesh Lath





<u>Above L&R</u>: caption "Berloy Metal Lath in its various forms meets all the lath requirements for use with Berloy Metal Lumber. It offers positive fire protection, holds plaster or concrete firmly and offers an added factor of strength and stiffness in Metal Lumber construction. 3/8-inch Ribplex meets most of the requirements. 3/4-inch Ribplex is used in one method of solid partition construction and also where great strength is a requirement."





<u>Top Left</u>: caption: "Figure 26. The Standard Metal Lumber sections are usually pronged for the attachment of Metal Lath and Ribplex. The meshes of the lath are pushed over the prongs which are driven back and down to make a secure attachment."

<u>Bottom Left</u>: "Spring Lath Clips are another method of attaching either floor or ceiling lath to Metal Lumber joists. These clips are made of high grade spring steel, are furnished in various sizes and are shaped to the flange, the convex center firmly pressing the lath against the joists."

Advantages

"…Our Metal Lumber Pressed Steel construction is so flexible in adaptability that it knows no competition, except wood structural lumber. It can be used any place, with the same degree of ease, that wood joists and studs are employed…Compared with other Fireproof Constructions:

- ***Lighter dead loads, resulting in savings throughout the building including the superstructure and footings;***
- ***Less cost for transportation and less space required for storage at the building site;***
- ***Less labor and a minimum of contractor's equipment involved in construction;***
- ***Least uncertainty, interference and loss of time during winter weather, and;***
- ***Greater speed and adaptability in erection which is an asset to architect, builder and owner…"***

RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***

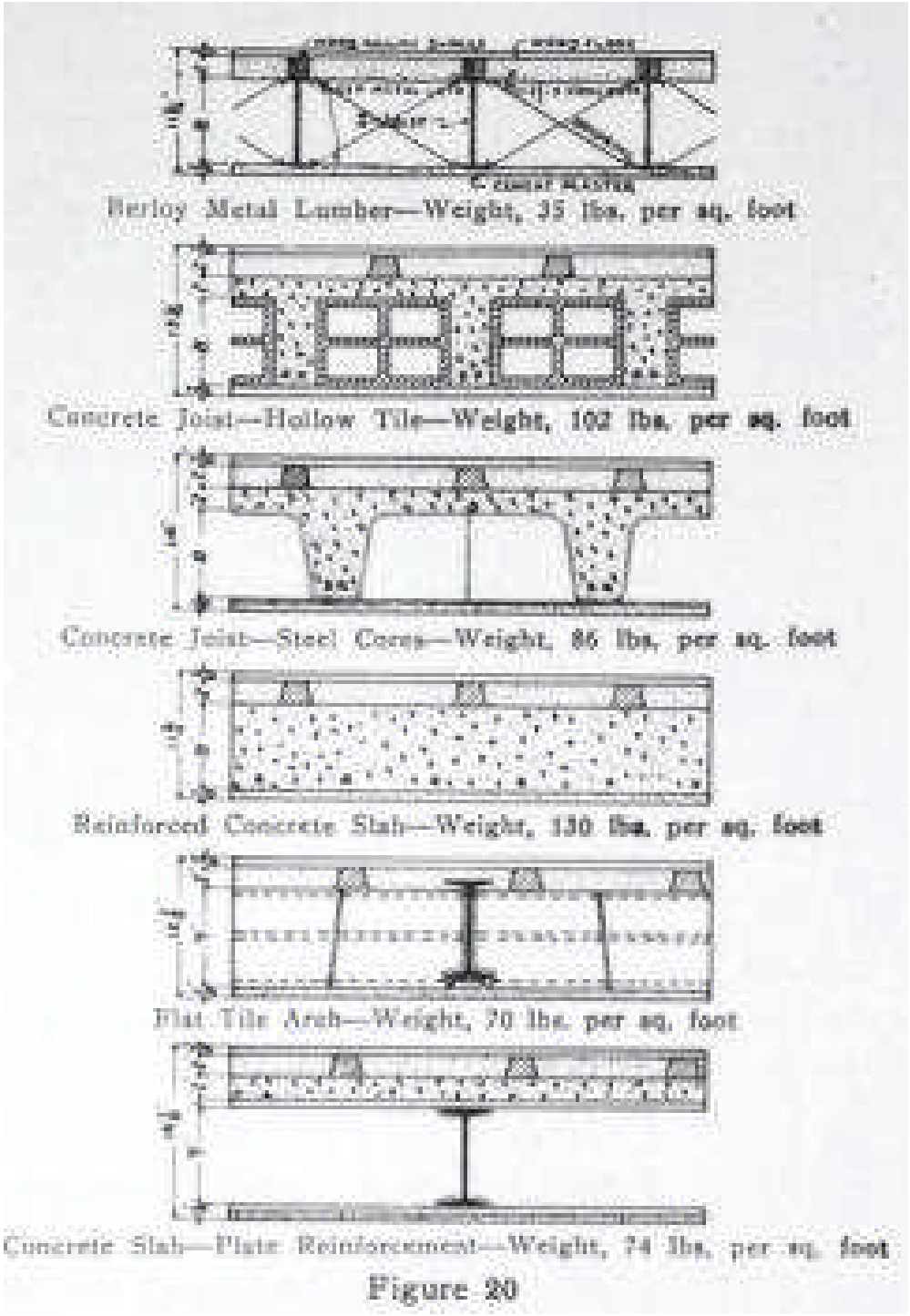


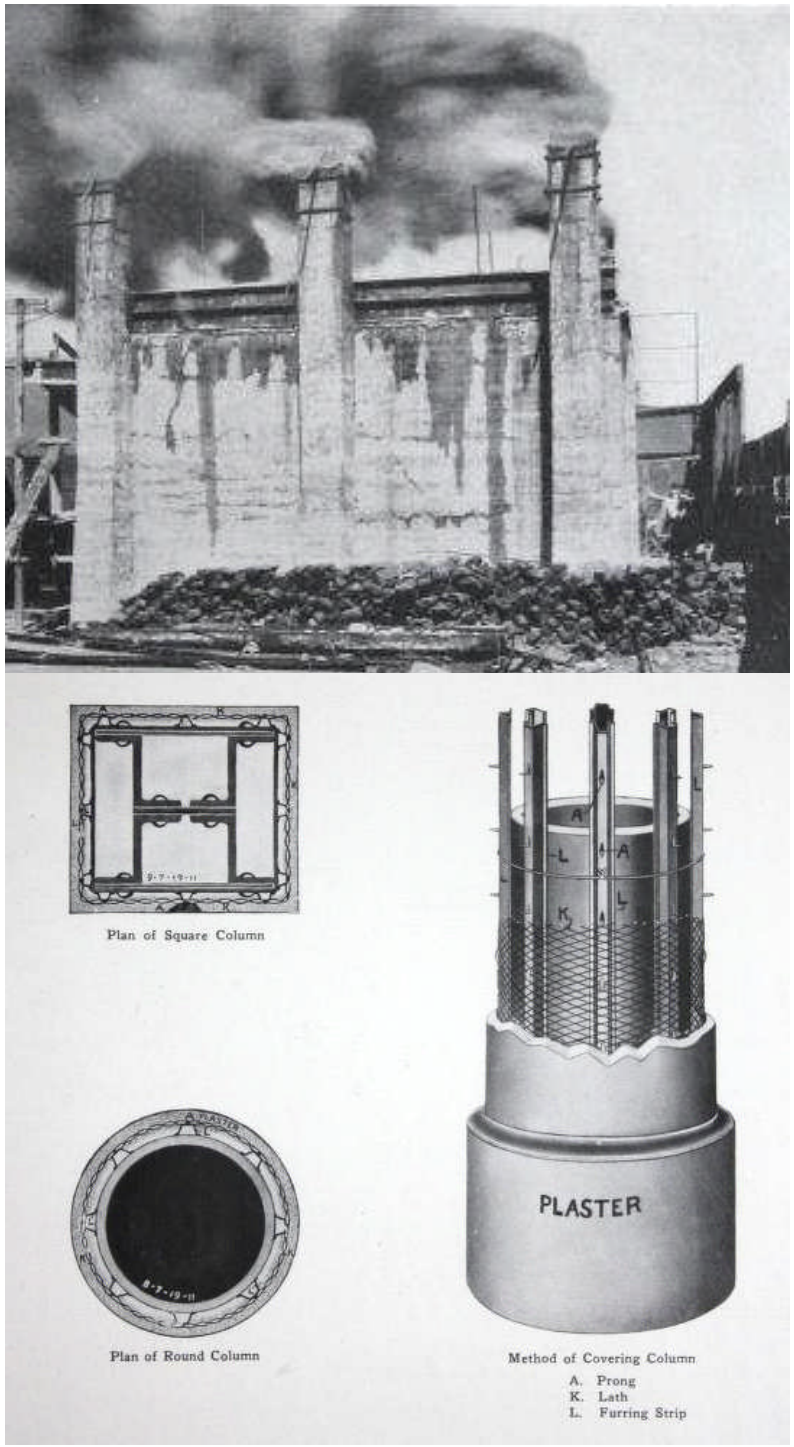
Figure 20

"…Refer to the diagram at left and you will note the great saving in weight which is effected by Berger's Metal Lumber system of floor construction. For the same strength, this floor, compared with any fireproof floor on the market, will weigh approximately 50% less. Considering fully this question of weight you can readily see where a great saving can be effected in the cost of beams, girders, exterior walls, columns, footings, etc. This low weight reduces the cost, increases the speed of installation and produces the universally satisfactory results obtained…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Left: caption: "Figure 20. Note the difference in dead load of Metal Lumber as compared with other standard types of fireproof construction. The low dead load of our Metal Lumber floor makes possible a great saving in columns, beams, girders, walls, footings, etc. The weights are calculated for constructions of the same strength on equal spans and show an accurate comparison."

Fireproof Qualities



"…The fireproof qualities have been determined by the construction passing, successfully, three fire, load and water tests of standard recognized severity and witnessed by prominent disinterested authorities…Aside from the fireproof points there exist many advantages which do not occur at first thought, viz: sound-proof qualities, damp and vermin-proof qualities, freedom from cracks and expensive repairs, which points are not possessed by other constructions on the market…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

<u>Top</u>: caption: "Official Fire, Water and Load Test of Berger's Metal Lumber. Conducted by James S. Macgregor in co-operation with the New York City Building Bureau, April 14 and 15, 1915, at the Columbia Fire Testing Station, Greenpoint, Brooklyn, N.Y."

<u>Bottom</u>: caption: "Some Standard Details of Fireproof Construction"

Soundproof Qualities

"…The sound-proof qualities of Berger's Metal Lumber floor construction are not excelled by any construction on the market. This is readily understood by referring to cross section of floor areas, which you will note in every instance is made up of at least four different kinds of material, or substances, all of which have a different specific gravity, and which produce the wonderful sound-proof qualities secured…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Vermin-Proof Qualities

"…The fact that cracks in concrete and plaster are eliminated entirely by the use of Berger's Metal Lumber construction produces a vermin-proof building, which is highly essential for apartments, hotels, dormitories, etc. It increases the sanitary quality of the buildings and makes the material particularly desirable for hospitals, sanitoriums, etc. The fact that no cracks occur is due to the uniformity of the expansion and contraction and the peculiar design of the sections, in connection with Expanded Metal Lath used for the re-inforcement of plaster and concrete throughout…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Adaptability

"…The universal adaptability of Berger's Metal Lumber is conclusively proven by the fact that it has been successfully used in fifty-five different classes of structure, which constitute a very large percentage of the different classes of buildings erected. Its adaptability can be excelled only by wood joists. In a large percentage of the buildings erected, Berger's Metal Lumber was specified as an alternate and therefore the advantages were not secured in their entirety as it was necessary to adapt the Metal Lumber to the construction of a building which was designed with the view of using other materials. This range of actual experience indicates the wonderful flexibility and adaptability of the construction…"

RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***

Strength

"…The fact that Berger's Metal Lumber has been used in over 7,000,000 sq. ft. of floors, supporting from 40 to 300 lbs. per sq. ft., and which floors have been over-loaded in many cases to greater than four times the designed live load, without a failure ever occurring, is conclusive proof of the wonderful strength and flexibility of the construction. This is a record which is enviable to say the least and cannot be excelled by any structural material on the market…"

RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***

Function

"…Metal Lumber Pressed Steel shapes were primarily designed to take the place of wood joists and studs in the construction of floors and partitions. It never was intended that Pressed Steel sections should take the place of Rolled Steel structural members, as a different fundamental principle underlies the design. These Pressed Steel shapes were developed from the points of structural merit possessed by both wood joists and the standard Rolled Steel beams, bearing in mind constantly the purpose for which they were intended…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Where it Should be Used

"…Metal Lumber Pressed Steels shapes, developed through 17 years of experience, have been used in the construction of floors and partitions in hundreds of buildings having a total valuation of over $15,000,000.00. These buildings are located in forty different states and eight foreign countries and contain over 7,000,000 sq. ft. of floor area, supporting safe live loads of from 40 lbs. to 300 lbs. per sq. ft. These buildings include fifty-five different classes and range in size from the small, private garage up to and including large office buildings. The U.S. Government, War Department, has used the material extensively; forty-four carloads having been furnished on one order in the construction of Schofield Barracks at Honolulu; large industrial Corporations and private individuals have used the material extensively in important building operations and upon this record we point with pride to satisfactory results in every instance…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

"…Metal Lumber floor construction can be used to advantage in all types of buildings with the possible exception of the more heavily loaded types of factory and warehouse floors. Metal Lumber studs are adaptable to all partition requirements but neither the joists nor the studs as a unit are designed to replace structural steel or reinforced concrete girders, beams or columns…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

"…With reference to the use of Metal Lumber, buildings may be divided into four classes:

1. MULTI-STORY BUILDINGS. Live floor load requirements are usually moderate. The low dead load of Metal Lumber floor and partition construction permits big reductions in cost of foundations, columns and beams or with the same supporting structure one or more additional stories are possible through the use of Metal Lumber, At the same time erection is much more rapid and costs less than with any other fireproof construction…"

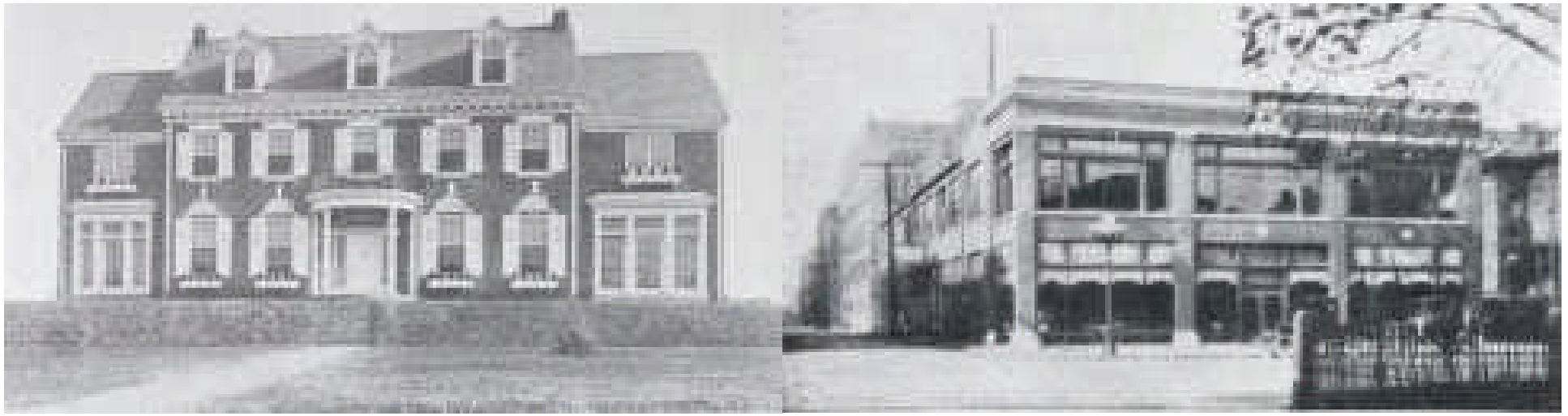
RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

"…2. PUBLIC BUILDINGS. Schools, Banks, Hotels, Apartments, Office Buildings, Club Houses, Hospitals, Churches, Stores, Garages and structures having similar requirements. Thousands of buildings of this general class have been constructed with Metal Lumber with entire satisfaction to their owners. Any building in this class whether large or small can usually be built better with Metal Lumber at a substantial saving over any other fireproof material…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Left: caption: "Junior High School, Springfield, Mass. Completed in 1923. Architect: H.L. Sprague. Contractors: Fred T. Ley & Co., Inc., both of Springfield. For School buildings Metal Lumber is widely regarded as the ideal construction."

Right: caption: "Brookside Country Club, Canton, O. Architect: F. Eurich, Jr.. of Detroit. Mich. Metal Lumber used in floors, partitions and roofs. Metal Lumber has been used in nearly all types of Club Houses, Lodge Buildings, Y.M.C.A. buildings, etc."



"…3. RESIDENCES AND OTHER SMALL BUILDINGS. Hundreds of residences, signal towers, private garages and similar structures have been built framed throughout with Metal Lumber with uniformly satisfactory results. In such buildings Metal Lumber is used with greatest economy as follows:

A - In first, or first and second floors of residences. This gives protection against basement fires with only a slight increase in the cost of the house.

B - In a series of homes, signal towers or other buildings with identical framing. This effects large savings in cost of designing and production which cannot be made when a single small building is constructed. Variety in exterior appearance may be secured by trim, type and color of stucco, porches and other detail…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Left: caption: "The beautiful home of Architect J.B. Heard, of Danville, Va., designed by himself. It is one of the many residences in which Metal Lumber has been used for fireproof floors and partitions."

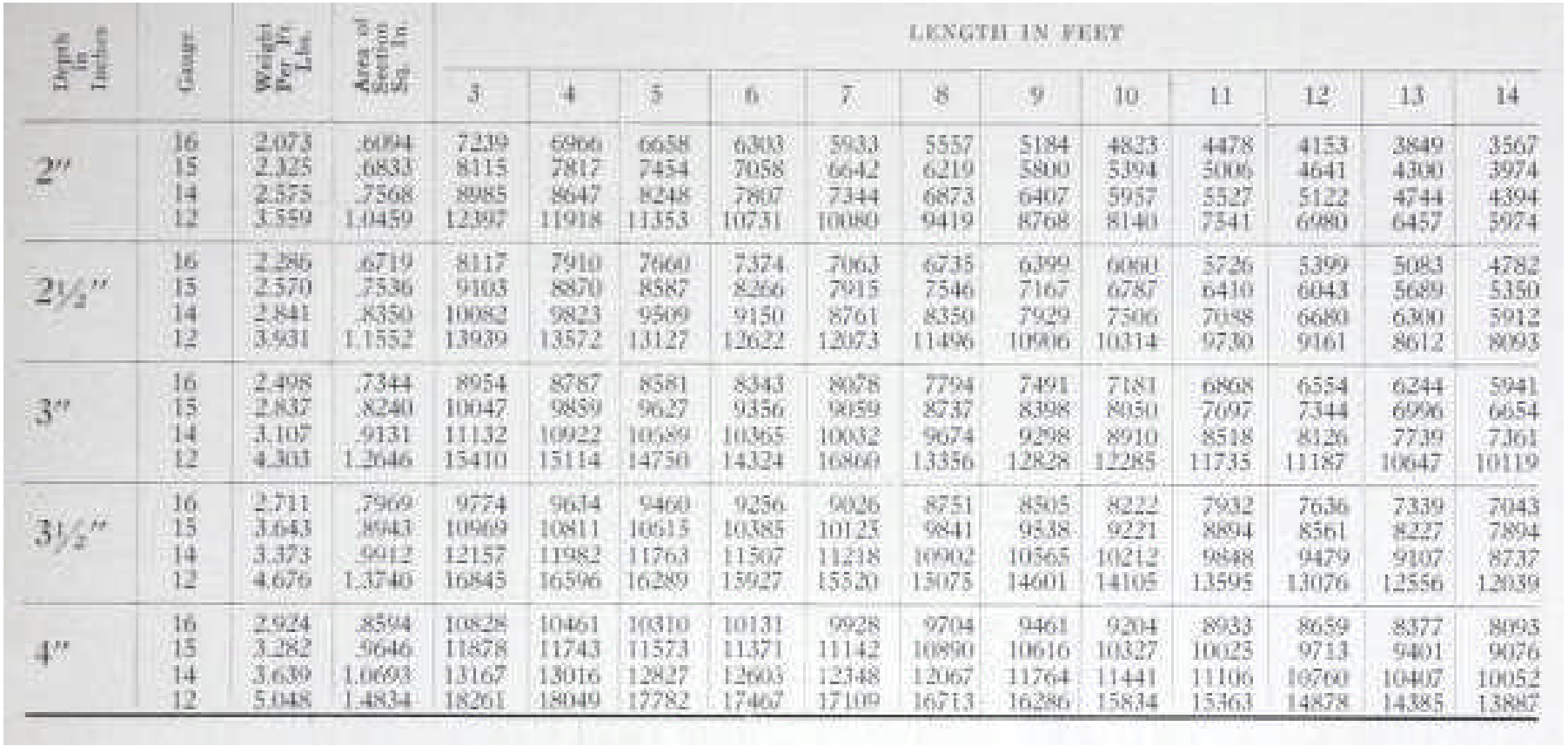
Right: caption: "Lawwell McLeish Ford Garage. Columbus, Ohio. The low dead load of Metal Lumber floors used here permits designing for large floor space with few supporting columns, a very desirable feature in the construction of large fireproof garages such as this."

"…4. INDUSTRIAL BUILDINGS. In this class the economical use of Metal Lumber joists is usually limited to those with moderate live load requirements - usually not in excess of 150 lbs. per square foot. Because of its great adaptability Metal Lumber may often be used for parts of any structure in connection with other materials…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

<u>Above</u>: caption: "Factory Building 80' x 300', designed by Osborn Engineering Co., Cleveland, O. Contractors: Hunkin-Conkey Construction Co. of Cleveland. Roof and all floors of Metal Lumber. Floors designed for 250 lbs. per sq. ft. live load."

Simplicity of Design

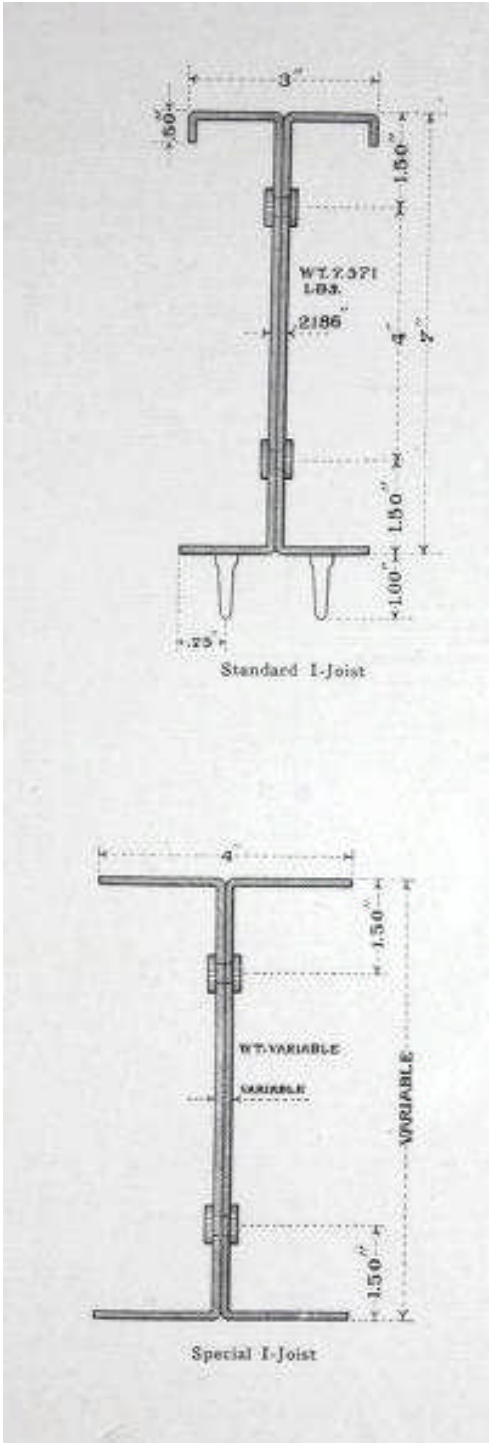


Depth in Inches	Gauge	Weight Per Ft.	Area Sq. Ins.	LENGTH IN FEET											
				3	4	5	6	7	8	9	10	11	12	13	14
2"	16	2.073	.6094	7239	6966	6658	6303	5933	5557	5184	4823	4478	4153	3849	3567
	15	2.325	.6833	8115	7817	7454	7058	6642	6219	5800	5394	5006	4641	4300	3974
	14	2.573	.7568	8985	8647	8248	7807	7344	6873	6407	5957	5527	5122	4744	4394
	12	3.559	1.0459	12397	11918	11353	10731	10080	9419	8768	8140	7541	6980	6457	5974
2½"	16	2.286	.6719	8117	7910	7660	7374	7063	6735	6399	6080	5726	5399	5083	4782
	15	2.570	.7536	9103	8870	8587	8266	7915	7546	7167	6787	6410	6043	5689	5350
	14	2.841	.8350	10082	9823	9509	9150	8761	8350	7929	7506	7088	6680	6300	5912
	12	3.931	1.1552	13939	13572	13127	12622	12073	11496	10906	10314	9730	9161	8612	8093
3"	16	2.498	.7344	8954	8787	8581	8343	8078	7794	7491	7181	6868	6554	6244	5941
	15	2.837	.8240	10047	9859	9627	9356	9059	8737	8398	8050	7697	7344	6996	6654
	14	3.107	.9131	11132	10922	10669	10365	10032	9674	9298	8910	8518	8126	7739	7361
	12	4.303	1.2646	15410	15114	14756	14324	13860	13356	12828	12285	11735	11187	10647	10119
3½"	16	2.711	.7969	9774	9634	9460	9256	9026	8751	8505	8222	7932	7636	7339	7043
	15	3.643	.8943	10969	10811	10613	10385	10125	9841	9538	9221	8894	8561	8227	7894
	14	3.373	.9912	12157	11982	11763	11507	11238	10902	10565	10212	9848	9479	9107	8737
	12	4.676	1.3740	16845	16596	16289	15927	15520	15075	14601	14105	13595	13076	12556	12039
4"	16	2.924	.8594	10828	10461	10310	10131	9928	9704	9461	9204	8933	8659	8377	8093
	15	3.282	.9646	11878	11743	11573	11371	11142	10890	10616	10327	10023	9713	9401	9076
	14	3.639	1.0693	13167	13016	12827	12603	12348	12067	11764	11441	11106	10760	10407	10052
	12	5.048	1.4834	18261	18049	17782	17467	17109	16713	16286	15834	15363	14878	14385	13887

"…This is a point of particular interest to the architect, contractor and engineer, as well as the owner. The tables of safe loads give the strength of the sections which are easily determined without the necessity of extensive mathematical calculations. Berger's Metal Lumber members are so flexible that they can be used any place where wood construction is employed, and with greater ease as to determining the strength required for certain conditions. The simplicity of design eliminates the necessity of rigid supervision on the part of the architect, contractor and owner, and insures A No. 1 results at a minimum cost…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Above: caption: "Safe Load in Pounds – Berger's Metal Lumber 'I' Studs

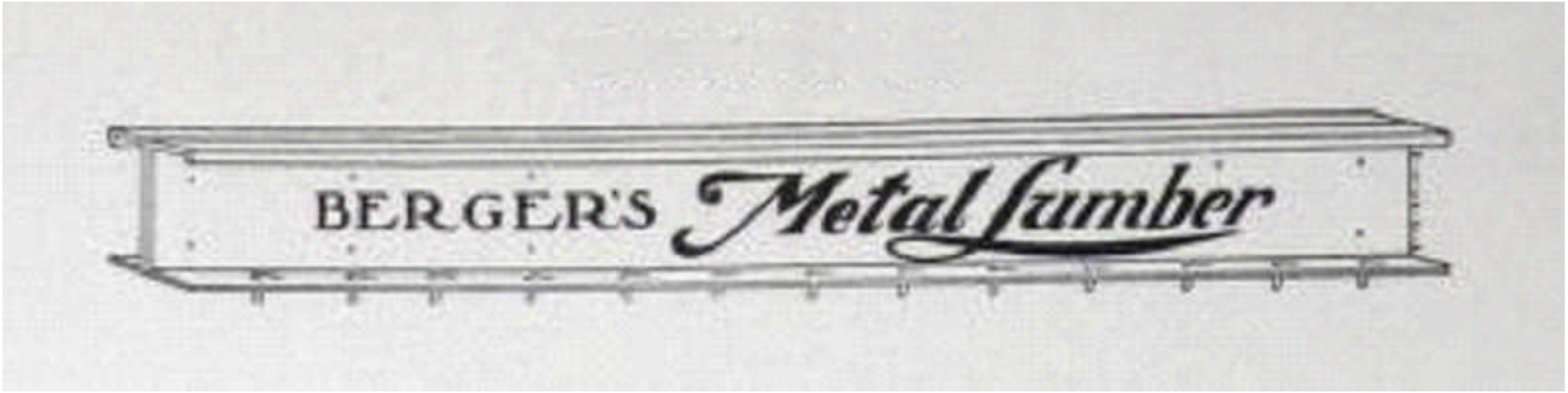


"…The design of our Pressed Steel sections is theoretically and practically perfect. It will withstand the most vigorous analysis and comparison with other structural materials on a basis of technical and engineering principles. Our Pressed Steel 'I' Joists section, the principal member in Berger's Metal Lumber system of construction, differs in many respects from the Rolled Steel 'I' Beam and is not patterned after it in any way. In no case will we design a joist whose web contributes less than 40% of the total resisting inches of the section. The top flange, if designed to give additional strength to the web, must of course resist compression stresses and which compression stresses cannot be transferred to the web if the flange exceeds in width 40 times the thickness of the material from which the Pressed Steel section is made. The width of flanges, the thickness of web, the quality of steel, symmetry of section, purpose and location of bridging, spacing of joists, character of lath, thickness of concrete and plaster, have all been worked out carefully with the view of arriving at the best combination with one ultimate result in mind, an efficient, fireproof and economical construction…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

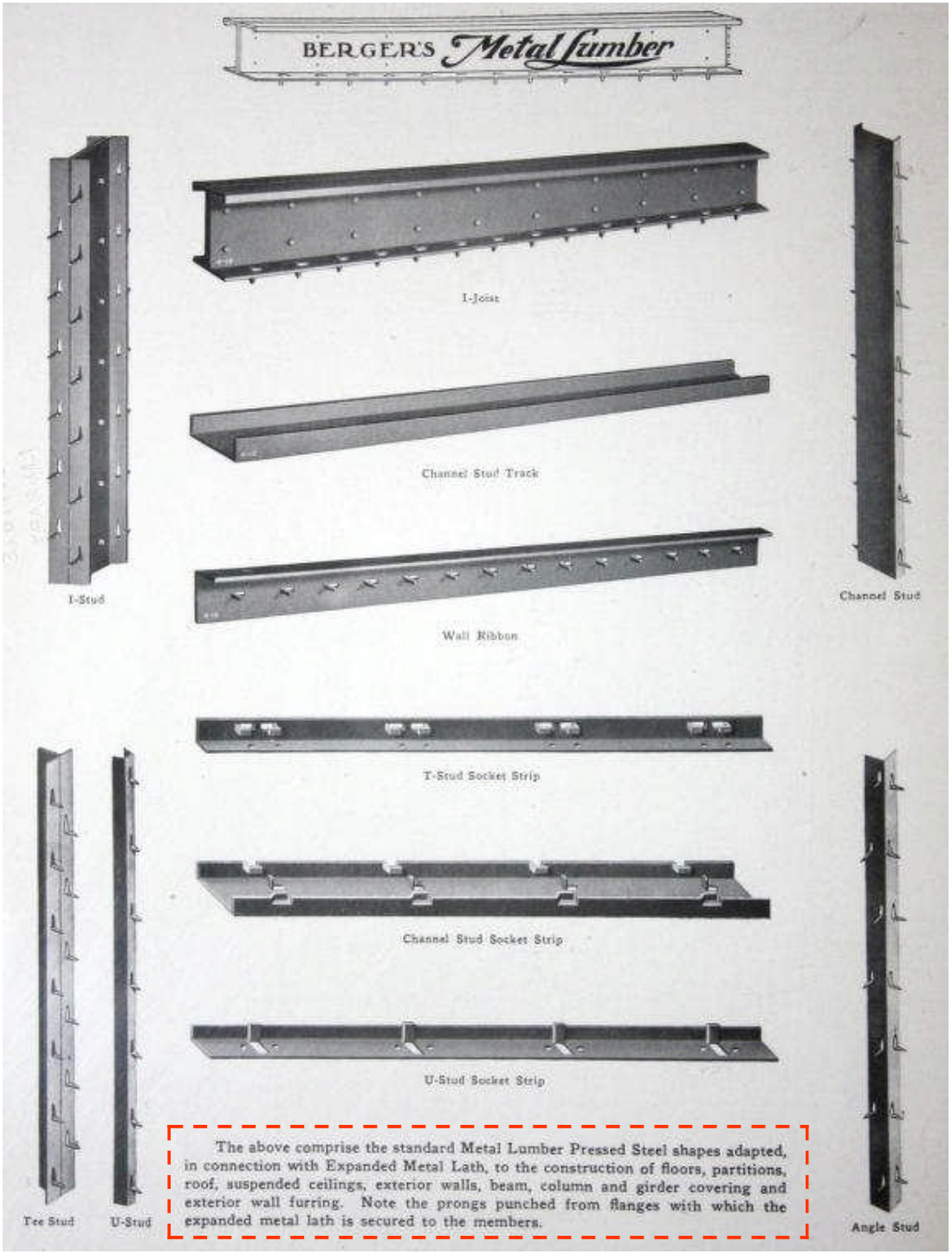
<u>Left</u>: caption: "Standard and special shapes of No. 12 gauge I-Joist sections of variable depths: sections in depths of up to and including 12" can be furnished if desired"

Principal Members and Material



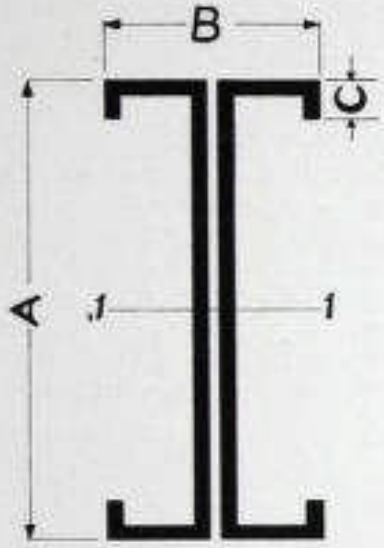
"…The principal members in the Berloy Metal Lumber fire-proof construction are pressed steel joists and studs. These are made in range of sizes, weights, lengths and designs to supply practically every need of modern fireproof floor and partition construction. In addition to joists and studs the Berloy Metal Lumber system includes the necessary clips, hangers, track, bridging, etc., for proper installation of the joists and studs. Metal Lumber joists and studs can be used to excellent advantage in making fireproof construction at very slight increase in cost where necessary economy had seemed to indicate burnable construction…"

RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***



<u>Left</u>: caption: "The above comprise the standard Metal Lumber Pressed Steel shapes adapted in connection with Expanded Metal Lath, to the construction of floors, partitions, roof, suspended ceilings, exterior walls, beam, column and girder covering and exterior wall framing. Note the prongs punched from flanges with which the expanded metal lath is secured to the members."

Sections and Properties of Standard "I" Joists

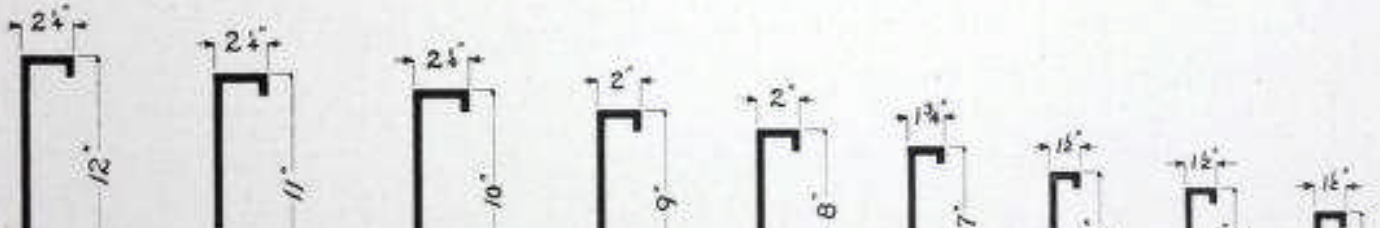


Depth A	Flange Dimensions B	C	Wt., Lbs., per Lineal Foot	Thickness of Metal in. In.	Thickness of Web, In.	Area of Sec., Sq. In.	Moment of Inertia	Axis 1—1 Radius of Gyration	Section Modulus
4	3	½	3.7	.072	.144	1.08	2.60	1.552	1.30
5	3	½	4.2	.072	.144	1.22	4.38	1.895	1.75
6	3	½	4.7	.072	.144	1.37	6.90	2.244	2.30
7	3½	⅝	5.5	.072	.144	1.62	11.20	2.629	3.20
8	4	⅝	6.1	.072	.144	1.80	16.80	3.055	4.20
9	4	¾	7.0	.075	.150	2.06	23.85	3.403	5.30
11	4½	¾	8.0	.078	.156	2.38	33.25	3.738	6.65
10	4½	¾	9.5	.086	.172	2.80	46.20	4.062	8.40
12	4½	¾	10.5	.090	.180	3.10	60.00	4.399	10.00

"…The steel used in Metal Lumber is made from selected ore which is reduced to pig iron in blast furnaces, refined into steel by the open-hearth process, cast in ingots and rolled, by successive reductions, into blooms, slabs and strip steel. It is then formed into the final channel shape. Two of these channels are spot welded together back to back to form the Metal Lumber I-section which has become so well known…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

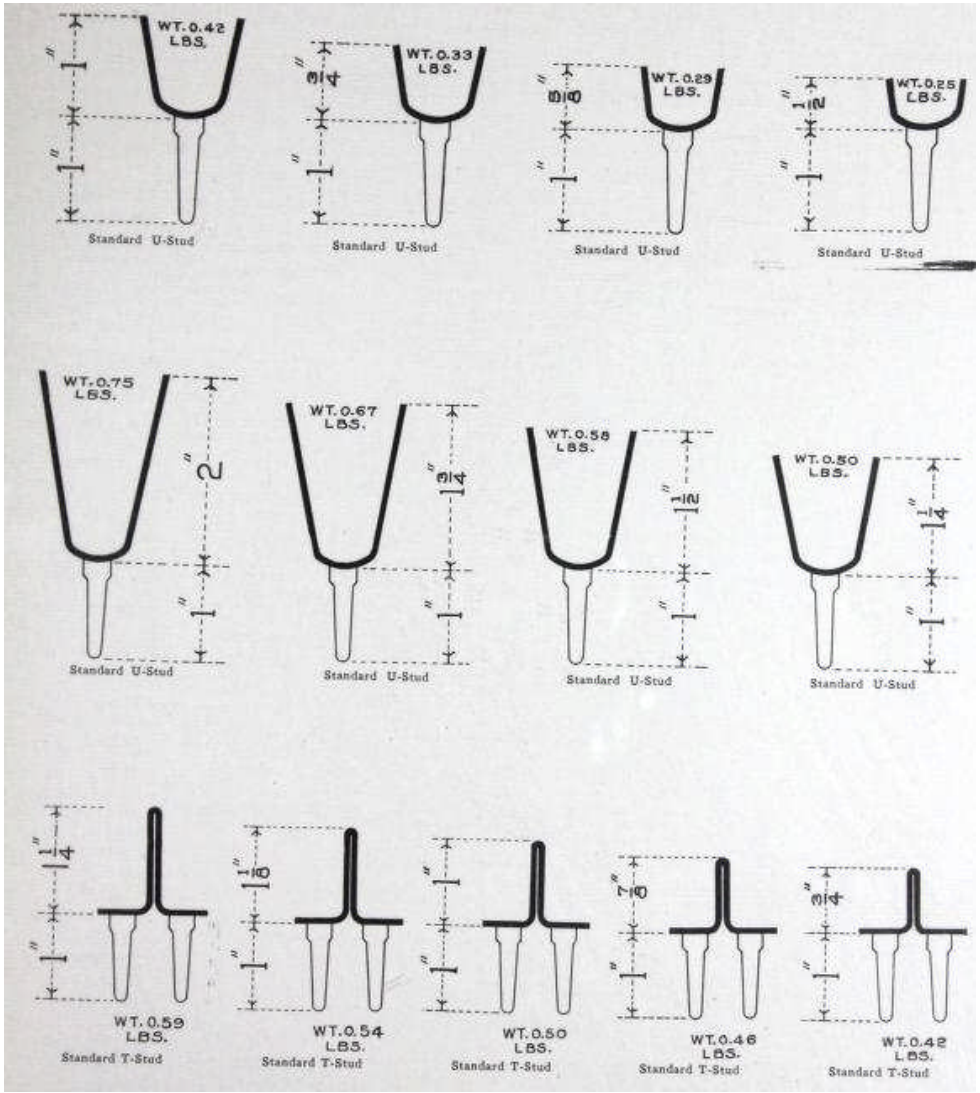
Sections and Properties of Standard Channel Joists



Depth A	Flange Dimensions B	C	Wt., Lbs., per Lineal Foot	Thickness of Metal in In.	Area of Sec., Sq. In.	Moment of Inertia	Axis 1—1 Radius of Gyration	Section Modulus
4	1½	½	1.85	.072	0.54	1.30	1.552	0.65
5	1½	½	2.10	.072	0.61	2.19	1.895	0.88
6	1½	½	2.35	.072	0.69	3.45	2.244	1.15
7	1¾	⅝	2.75	.072	0.81	5.60	2.629	1.60
8	2	⅝	3.05	.072	0.90	8.40	3.055	2.10
9	2	¾	3.50	.075	1.03	11.93	3.403	2.65
10	2¼	¾	4.00	.078	1.19	16.63	3.738	3.33
11	2¼	¾	4.75	.086	1.40	23.10	4.062	4.20
12	2¼	¾	5.25	.090	1.55	30.00	4.399	5.00

"…The steel is at no time rolled into other than rectangular shapes, nor is it rolled after final crystallization has begun, therefore internal stress is not introduced and the steel will not fail unless heated to the melting point or very heavily overloaded. Temperatures which will melt steel are hard to produce and do not occur in ordinary fires. Excessive overloading is carefully guarded against in design and imperfect steel cannot be formed into pressed steel joists, therefore the user of Berloy Metal Lumber is assured of the best steel used in building construction…"

RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***

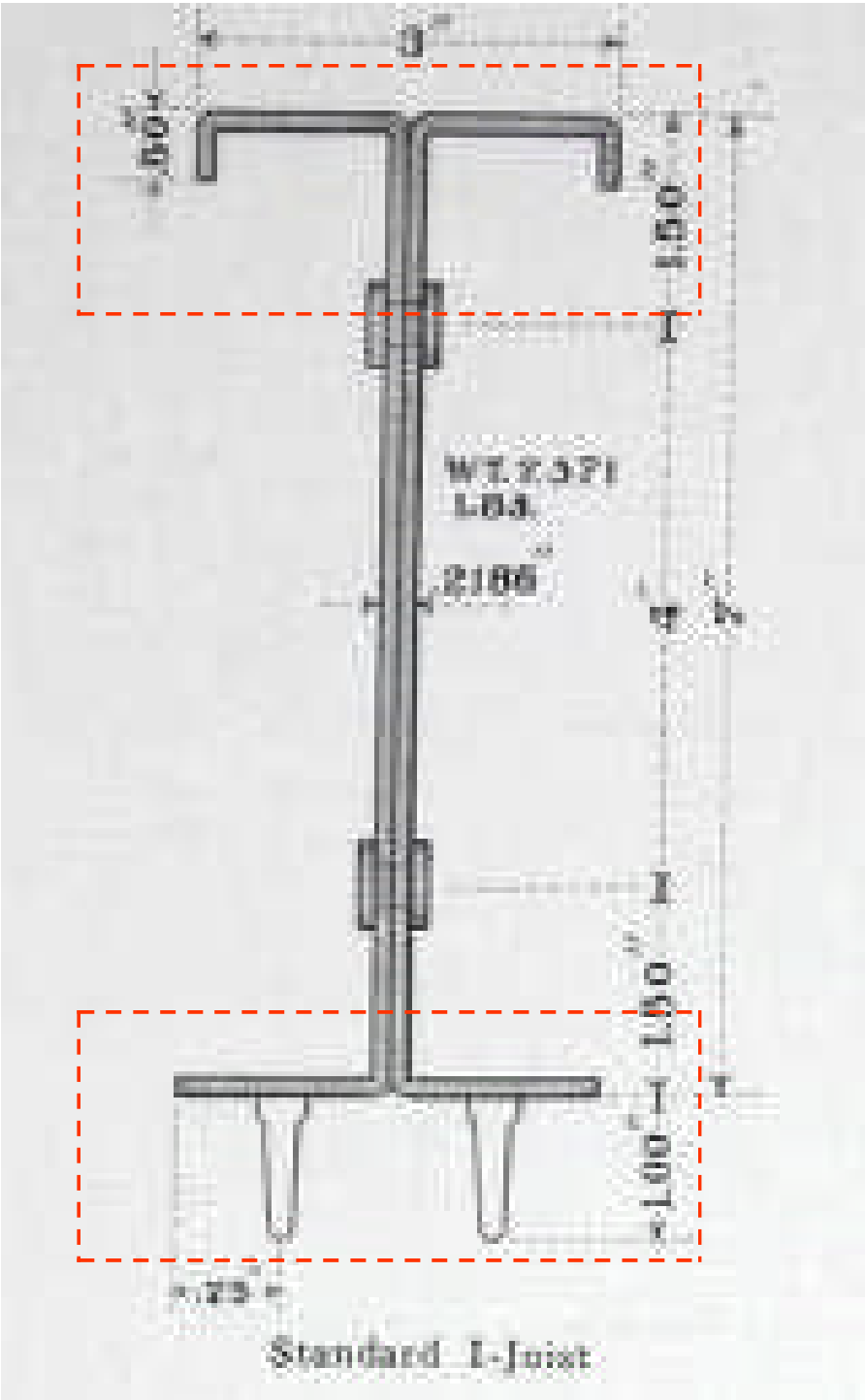


"…We do not make our joists symmetrical about both axes because the design would be wrong. Any amount of reasoning on the part of an Engineer or Architect will readily reveal the fact that more metal is needed in compression than in tension, because it is a Pressed Steel product of comparatively light gauge material. By making the 'I' Joist section unsymmetrical there is no danger of getting a 'T'-stud in place of a 'T'-Joist, which would cause a serious result…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

<u>Left</u>: caption: "Standard sections of 'T' and 'U' Studs for use in the construction of partitions, suspended ceiling, furring, etc. These members can be furnished in No. 16, 18 and 20 gauge material."

Prongs

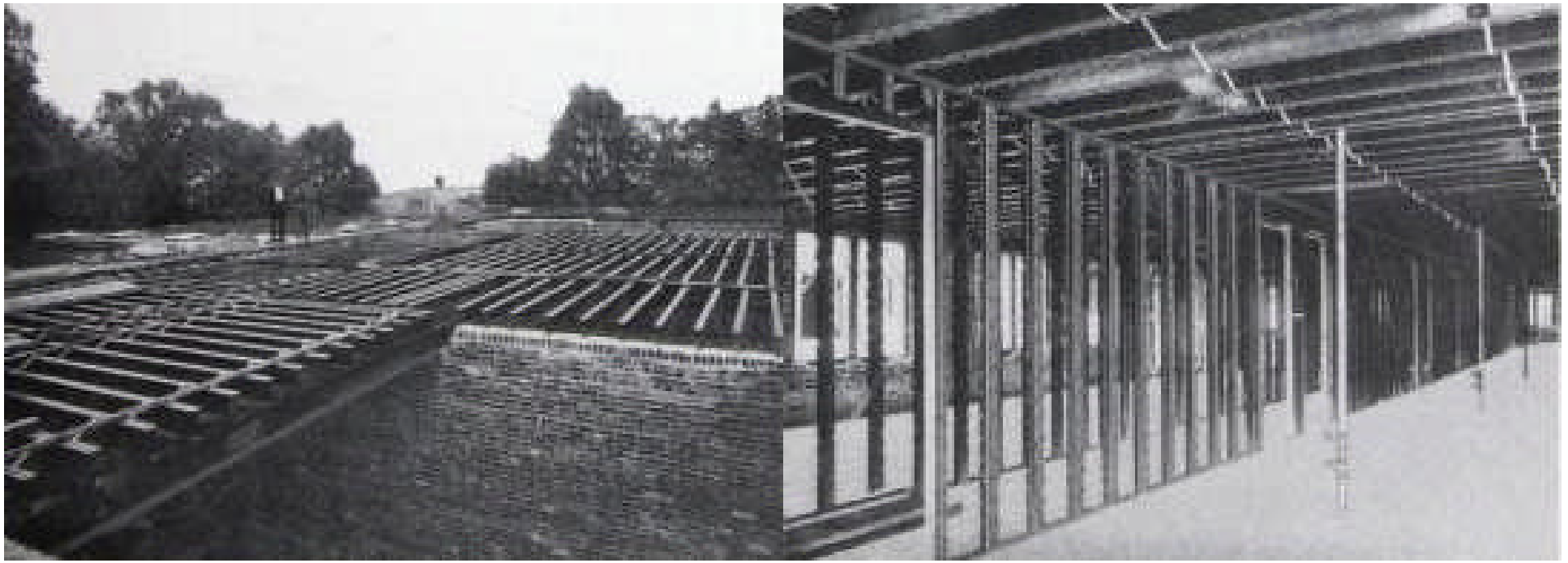


"…Punching of prongs on the top flange is practice and we do not permit it for two good reasons, 1st - The stress on the top flange is much greater than on the bottom. Its effective strength, therefore, should not be reduced by cutting out clips. 2nd - The prongs on top will not permit of laying the wood nailing strip with a full bearing on the top flange and squeaky floors are the subsequent result…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

<u>Left</u>: Standard (7-inch depth) I-Joist. Note prongs only occur at bottom flange.

Bridging

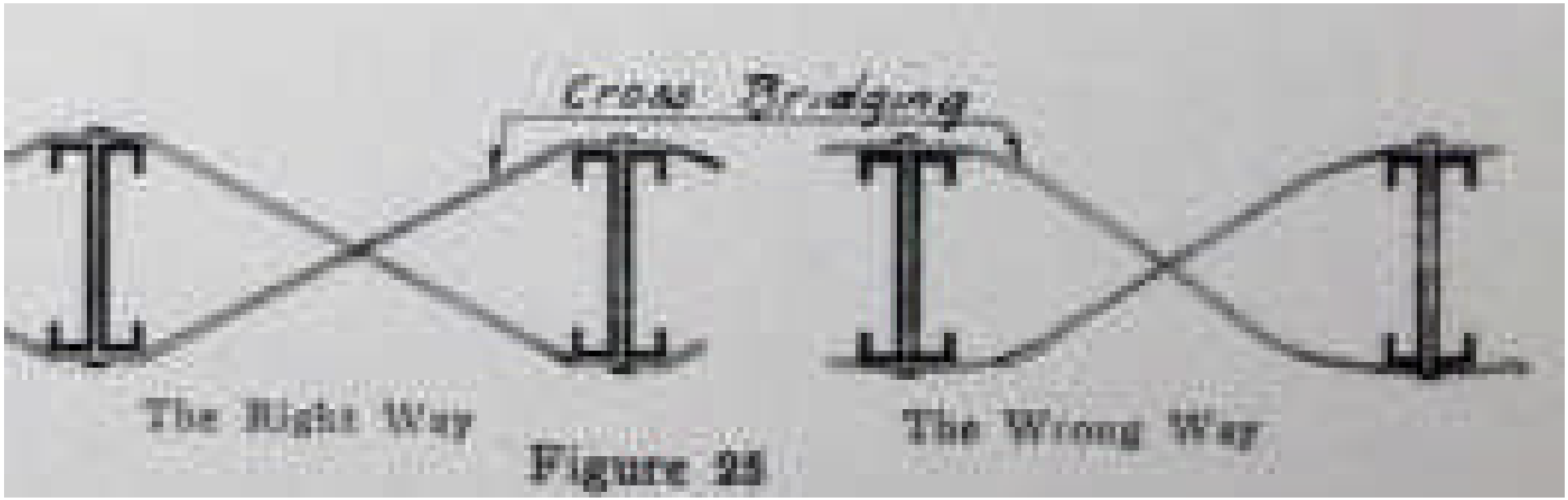


"…The application of bridging to the Pressed Steel Joists is more essential than it is in wood joist construction. One would not think of designing a skeleton steel building without using struts with which to tie the building together and rely only upon the floor construction as a means of stiffening the columns, beams and girders; neither would he consider the use of wood joists without diagonal bridging. Bridging serves a three-fold purpose. It holds the joists in a vertical position, which is highly essential to develop maximum strength. It is a means of transferring to adjacent joists concentrated loads which may occur on any single joist. It serves also as a strut in tying the joist members together laterally…"

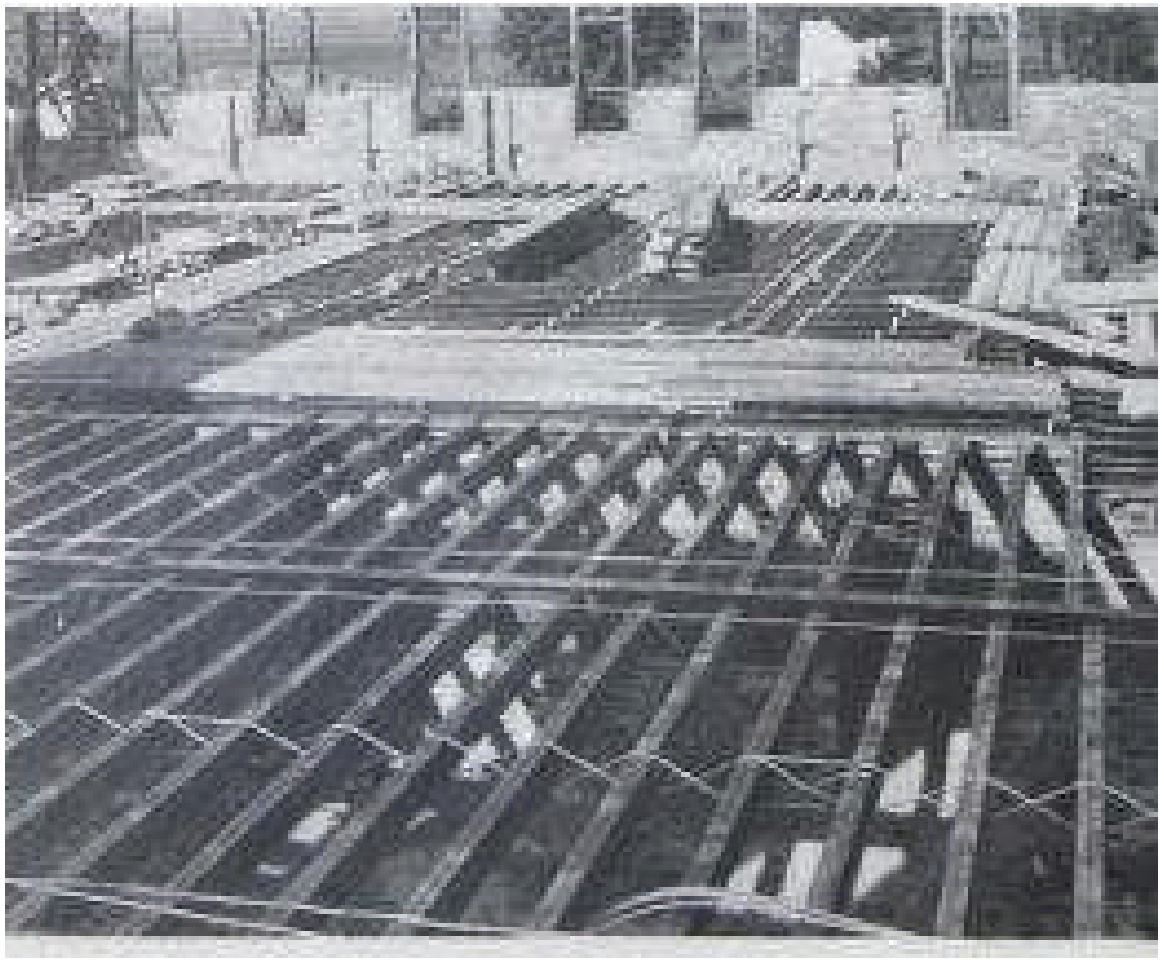
RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

Left: caption: "Oak Harbor High School, Oak Harbor, O. Showing Metal Lumber floor construction before lath and concrete is applied."

Right: caption: "Interior View of Courtland Apt. Bldg., Louisville, Ky. Showing Metal Lumber supporting partitions, I-Joist and Bridging."



<u>Above</u>: caption: "Metal cross bridging as shown in Figure 25 should be used to tie the joists together, hold joists in a vertical position and help to transfer concentrated loads to adjacent joists. Bridging should be placed in such a way that there is never more than six feet between the rows. Bridging should be installed as soon as possible after joists are placed. It is drawn taut and nailed only at tops of joists at first. Then when scaffolding for plastering has been erected the bridging may be pulled sidewise beneath the joists to take up any slack and nailed to the bottom of the joist."



Attachments and Accessory Materials

"…In the case of using our Metal Lumber Pressed Steel joist and stud sections, for floor and partition construction, we rely upon riveted connections throughout. Rivet connections have proven, through years of experience, to be the most efficient and permanent means of connecting any steel material. Aside from securing a positive and rigid connection they afford the advantage of not weakening the members by the cutting away of material in the webs and flanges, where every square inch of such material is required for the resistance of the stresses. By the use of rivets careful analysis will show that the strength of the construction is as strong at the connections as any other portion, which is not the case when other than riveted or bolted connections are used. One would not think of erecting a Rolled Steel skeleton frame building with clip connections for the fastening of beams, columns and girders. The ultimate strength of a structure is naturally its weakest detail and since clip connections afford a very weak detail it is not advisable to use them in Pressed Steel construction. We recommend exclusively the use of 5/16" rivets, driven cold, as they are quickly and readily installed, insuring an A No. 1 result under all conditions…"

RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***

"…The attachments between Metal Lumber sections, between Metal Lumber sections and supporting structure and the attachment of supplementary materials such as bridging and Ribplex have all been carefully worked out during sixteen years of experience and while a variety of different methods are used to some extent in this type of construction, the following are recommended as being the simplest, most practical and most economical methods to use, for effective work connections between Metal Lumber sections are made by the use of 5/16-inch bolts or cold driven rivets…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

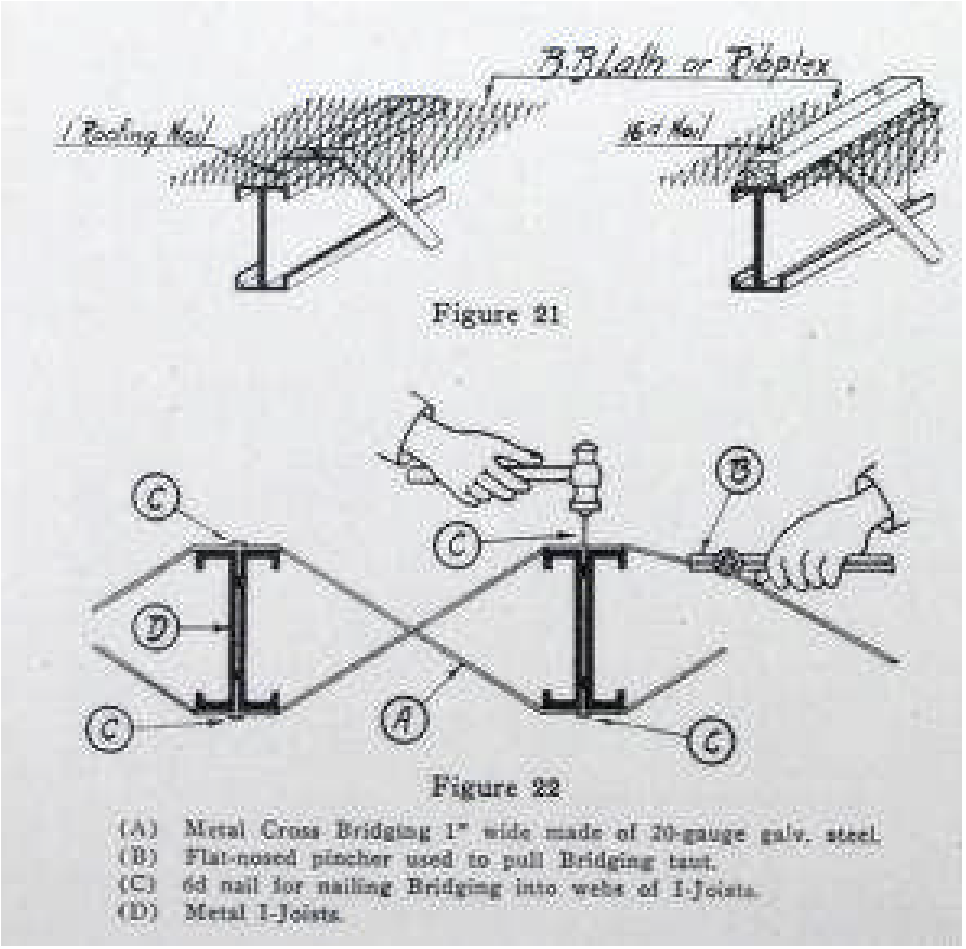
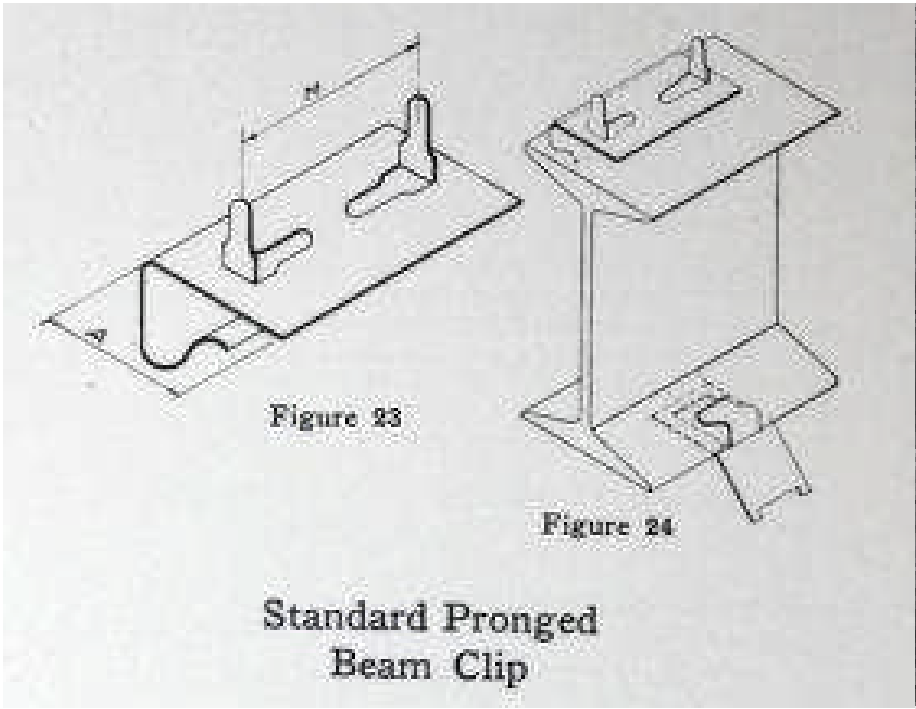


Figure 21

Figure 22

(A) Metal Cross Bridging 1" wide made of 20-gauge galv. steel.
(B) Flat-nosed pincher used to pull Bridging taut.
(C) 6d nail for nailing Bridging into webs of I-Joists.
(D) Metal I-Joists.

<u>Left</u>: caption: "Ordinary nails driven into the web between the channels which form the Berloy I-Joist offer the simplest, most effective and most satisfactory method for the following attachments. 6 d nails for bridging and temporary strips. 16 d nails for attachment of nailing strips along tops of joists. One inch large head roofing nails for the attachment of Ribplex or diamond mesh lath direct to tops of joists. The illustrations at left show how and where nail attachments are used with these materials."



Left: caption: "Standard Pronged Beam Clip. This is used when Metal Lumber joists rest on top of structural beams or channels. In Fig. No. 23 dimension A should equal half the width of flange of beam for joists butted, and it should extend ½-inch over center of beam flange for joists on one side of beam only. Dimension M equals width of joist plus ¼ -inch. Fig. No. 24 shows beam clip applied and also standard furring clip. The required beam clips of proper size for the work as planned are supplied with the Berloy Metal Lumber. See also Fig. 18."

Right: caption: "Figure 18. 3/4" Berloy Ribplex applied to Berloy Metal Lumber ready for ceiling plaster in McGregor School, Canton, O. Note beam protection.

Beam Protection

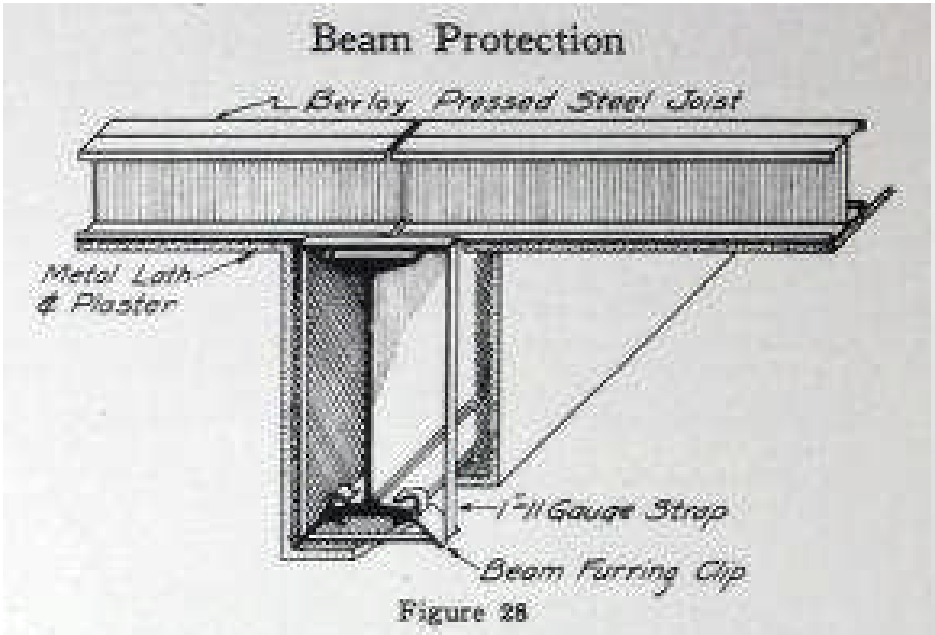


Figure 28

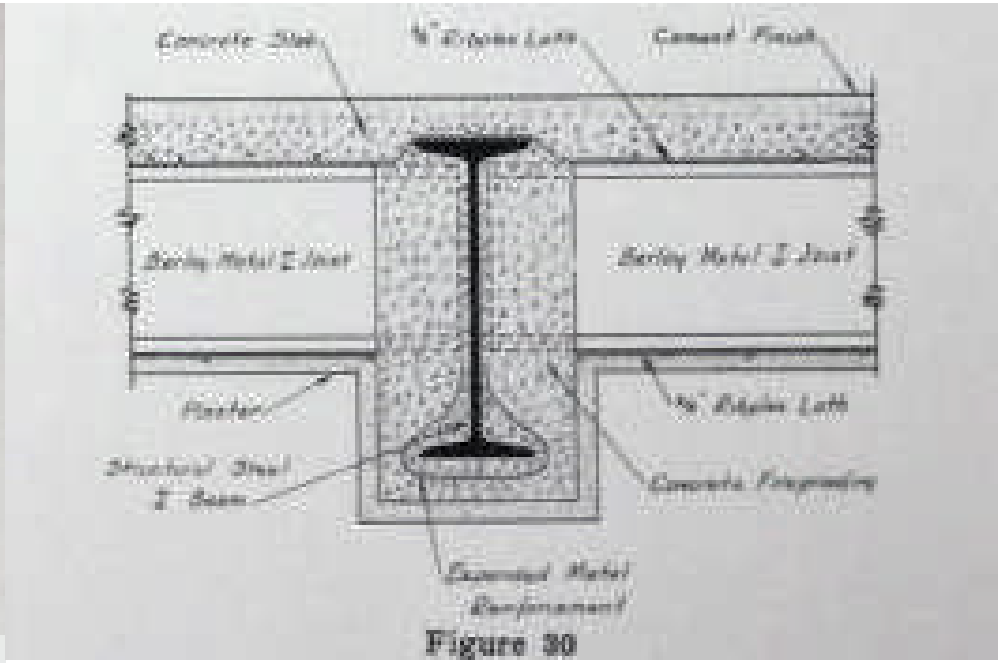


Figure 30

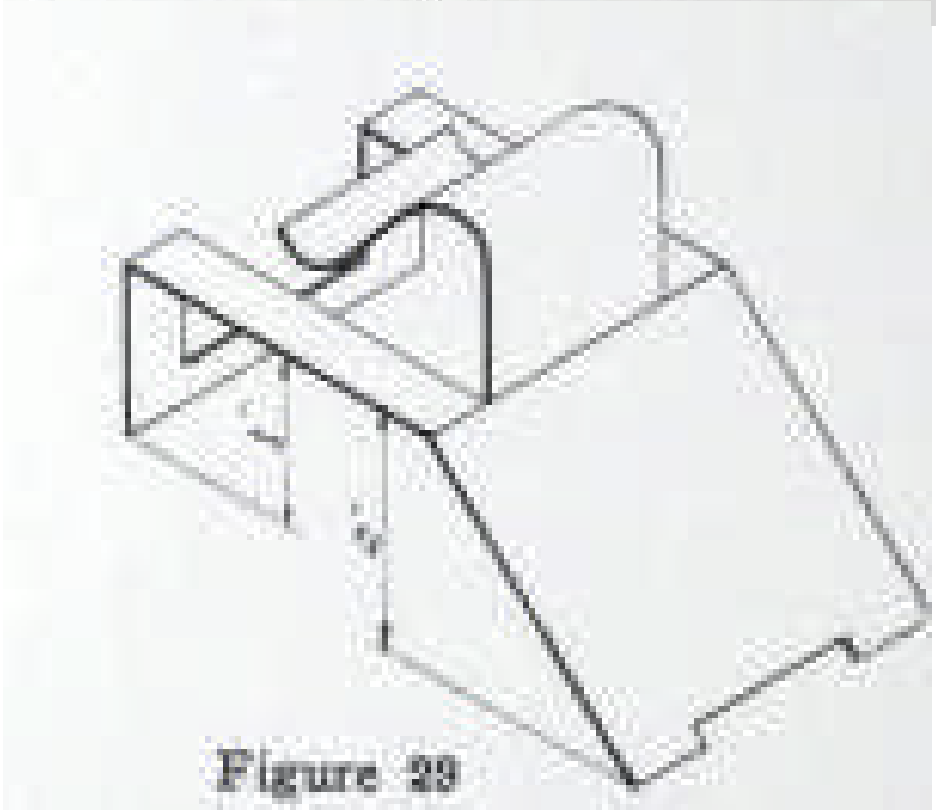
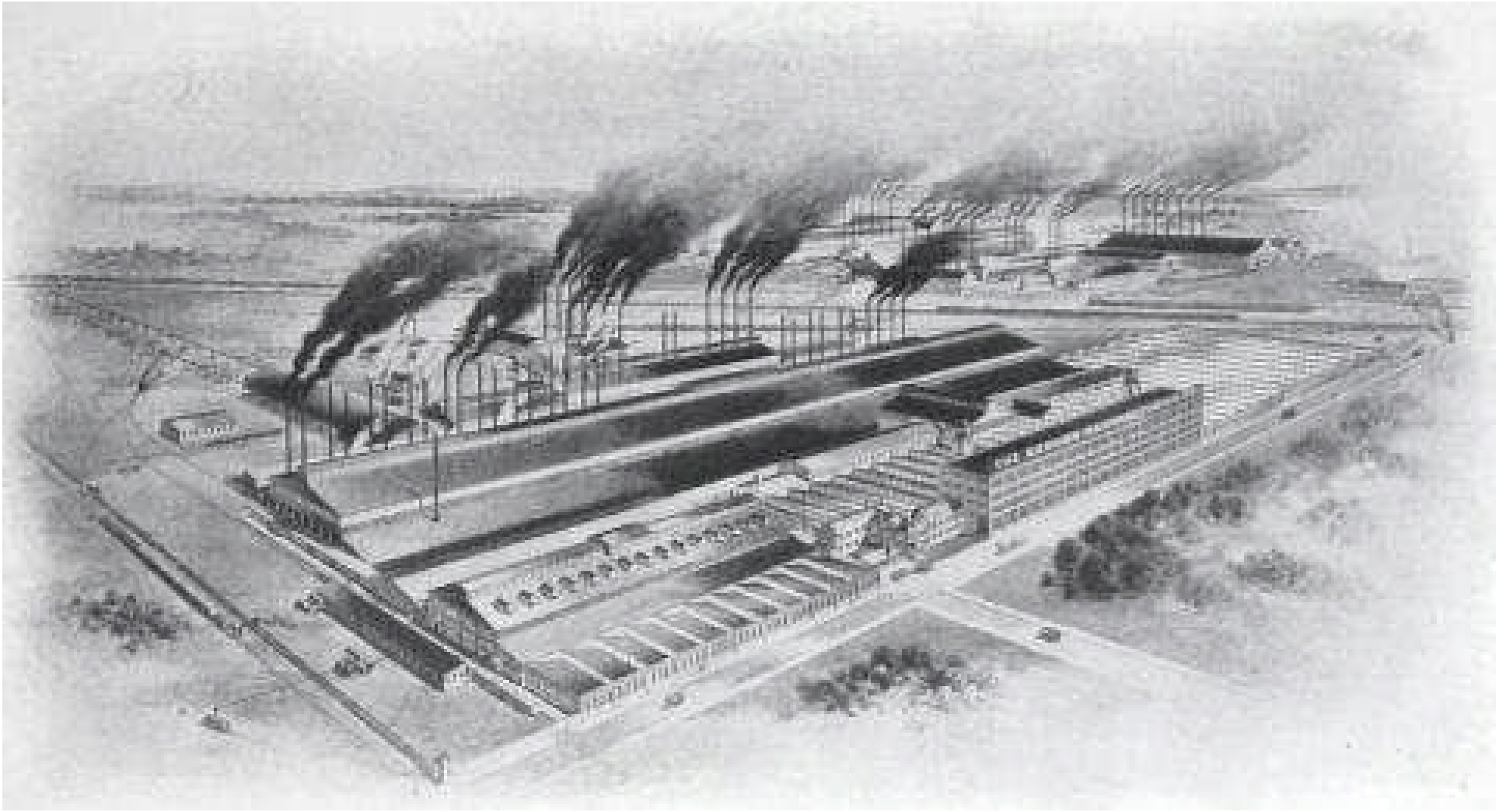


Figure 29

<u>Above</u>: caption: "Figure 30. Solid Concrete Beam Protection"

<u>Left T&B</u>: caption: "Beams or portions of beams projecting below the ceiling line must be protected from fire in fire-resistive construction. Standard Berloy beam protection in connection with metal lumber Figure 28. This construction is economical and effective. Furring clips and straps are spaced 15¾ inches on centers for diamond mesh lath and 24 inches on centers for ¾ inch Ribplex. The lath or Ribplex is securely wired to the straps and plaster is applied of composition to afford protection for the period of time for which the building is rated."

Painting



"…Berger's Metal Lumber is painted before shipment with a special graphite and linseed oil composition, proven by years of experience to be a very effective covering…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

<u>Above</u>: caption: "The Berger Manufacturing Company Co.

Part 3

Setting the Standard

General Construction Details

"…First thoughts of fireproof construction suggest heavy, massive materials and slow progress. Metal Lumber on the contrary is light in weight and quickly erected and, therefore, tends to encourage better building construction. The heaviest standard Metal Lumber joists only weigh 10½ lbs. per lineal foot, and they can easily be handled and placed by two men without mechanical equipment. After the first panel is installed the work becomes a routine and with simple inspection as to spacing and bearings the integrity of the load bearing members is an assured fact. The bridging is nailed into place and diamond mesh or ribbed metal lath is attached to the tops of the joists where it serves as a centering and reinforcing for the two-inch concrete fill…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

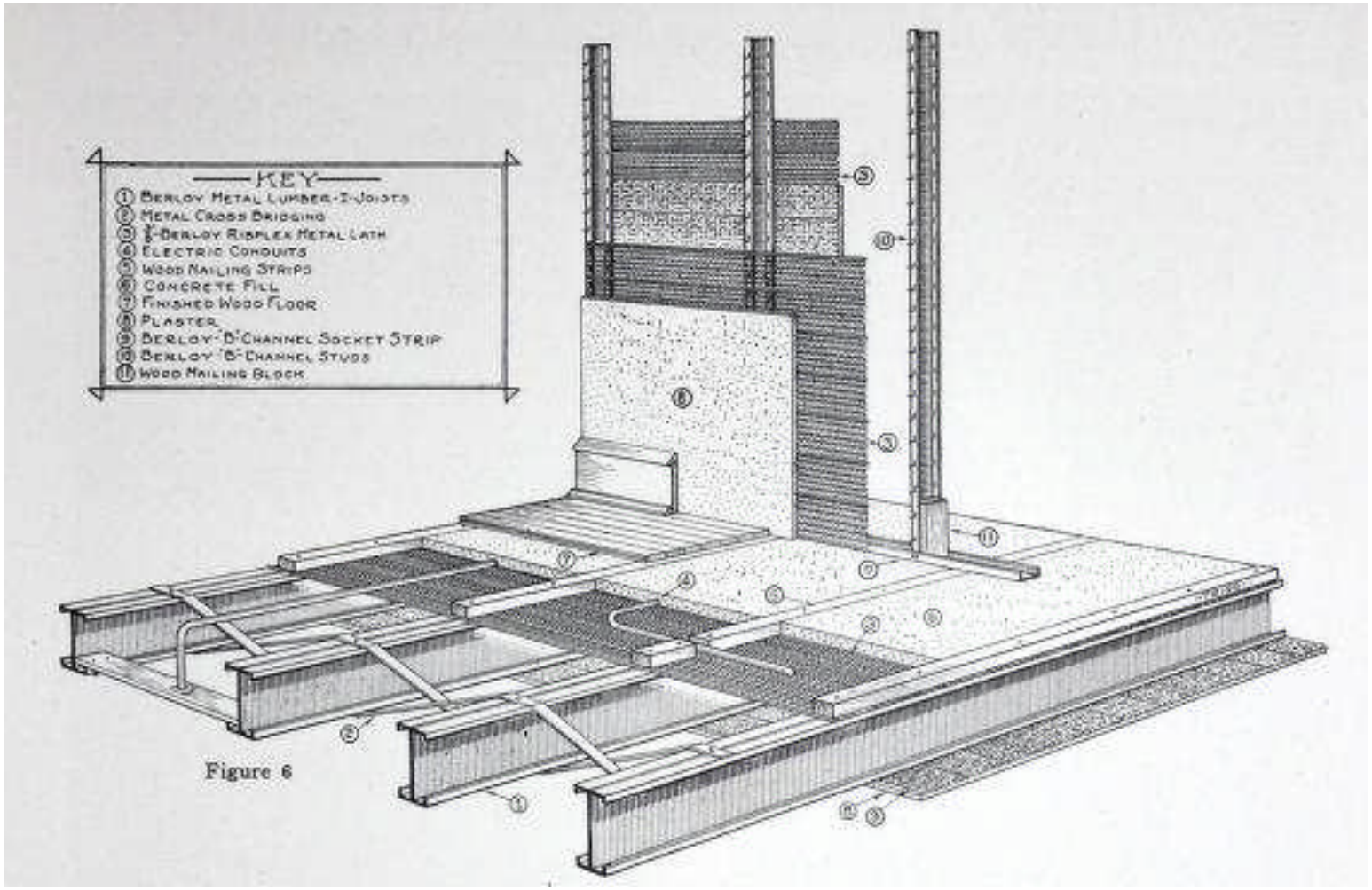
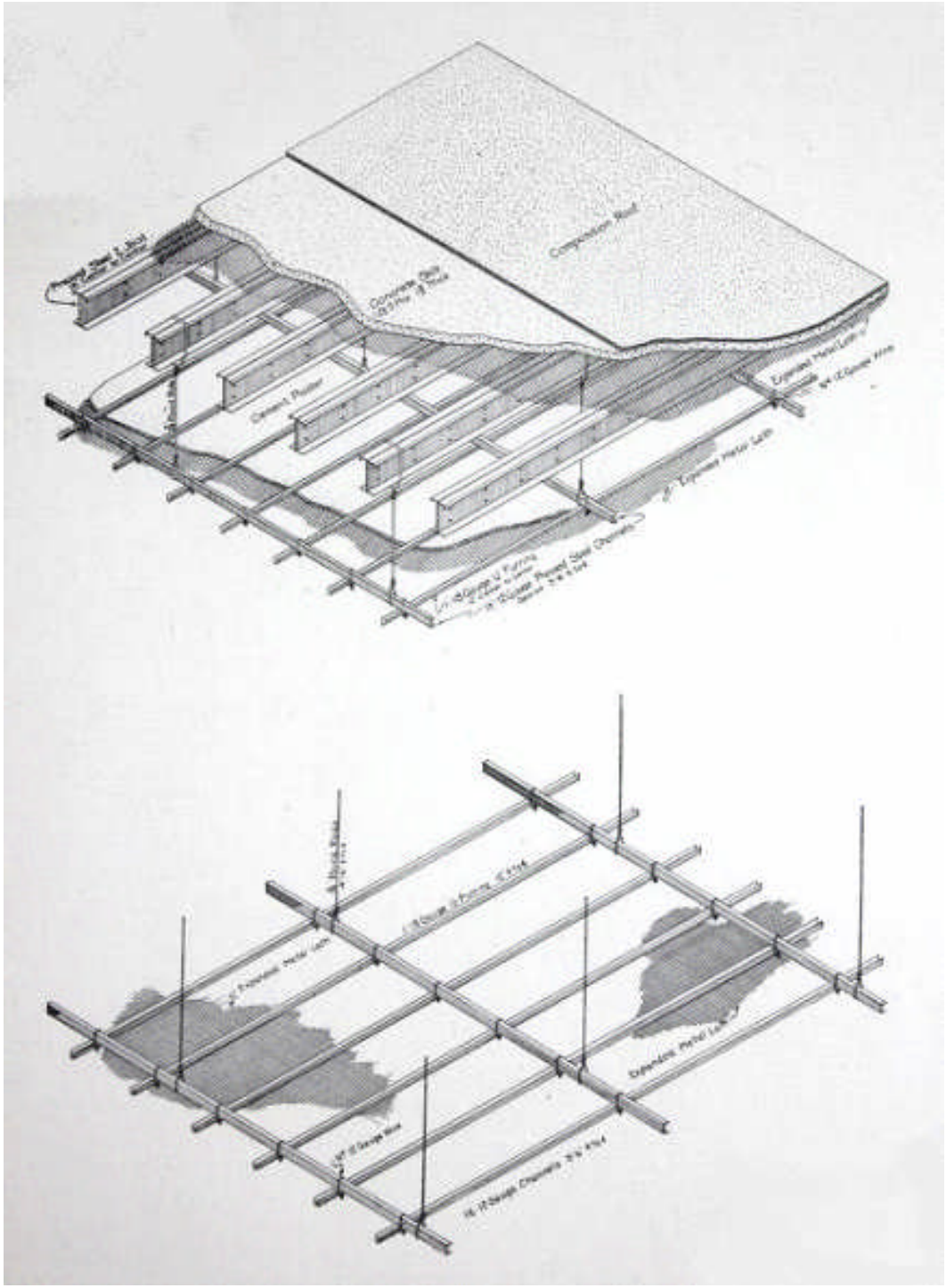

KEY
1 Berloy Metal Lumber-I-Joists
2 Metal Cross Bridging
3 3/8"-Berloy Ribplex Metal Lath
4 Electric Conduits
5 Wood Nailing Strips
6 Concrete Fill
7 Finished Wood Floor
8 Plaster
9 Berloy "D" Channel Socket Strip
10 Berloy "C" Channel Studs
11 Wood Nailing Block

Figure 6

"…If wood floors are used, 2x2 inch wood nailing strips are nailed to the tops of the joists on top of the metal lath before the concrete is poured. The ceiling under the joists consists of expanded metal lath which is secured by clips or prongs to the bottom flange of the joists. This lath serves as a base and reinforcement for the plaster ceiling. These plaster and concrete protections are amply sufficient because of the superior fire resistive qualities of pressed steel…The details involved in erecting partitions with Metal Lumber are equally simple and involve no uncertainties or difficult problems. Neither wood form work nor heavy equipment is required with Metal Lumber. The resultant economy, and the ease of erection and inspection of this system of proven efficiency, accounts for the preference which is being given to Metal Lumber so universally by architects and builders…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*



<u>Top</u>: caption: "Isometric perspective showing details of roof construction using Pressed Steel Joists and suspended ceiling under same. Note the lightness of this construction and the evident ease with which it can be installed."

<u>Bottom</u>: caption: "Standard suspended ceiling construction for use in connection with any system of roof construction. This suspended ceiling as designed will sustain a safe live load of 25 lbs. per sq. ft."

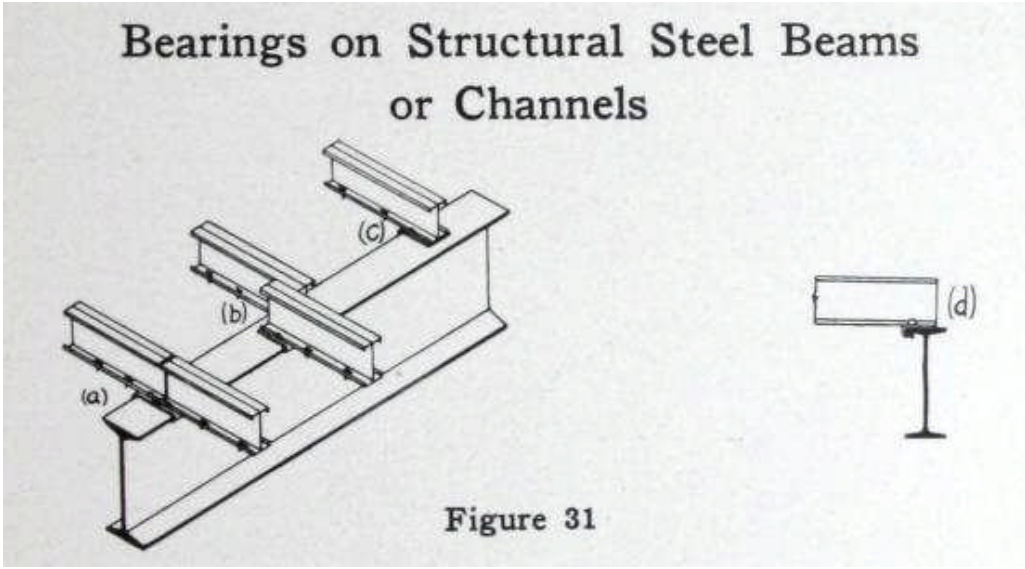
"…Metal Lumber is shop-fabricated, every piece cut to size, etc., ready to put together. Nothing is left to be done that cannot be handled on the job with ordinary tools and erection can proceed very rapidly. Connections are made by means of bolts or cold driven rivets, supplied with the other material. No extensive elevating or distributing equipment is necessary, as most of the pieces can be carried and put into place by one man and two men can handle even the heaviest piece. Before the material is ready to unload from the cars the contractor has received schedules of the material and erection blueprints of every part of the Metal Lumber construction, with identification marks to show position of every piece of Metal Lumber. The proper handling of special details is also indicated by sketches on the working drawings. Each piece of the Metal Lumber itself bears corresponding marks, lettered in white paint, usually on the web of the joist or stud. With these marks, the working drawings and complete schedules of material, the checking and piling of material and the erection work proceeds rapidly without difficulty. A little care in unloading and piling the material so that it will be available as needed without re-piling, will save much time and delay in erection. Shelter sheds are not necessary as the material carries a good coat of waterproof paint and will not deteriorate to any extent through exposure to the elements for a limited period. Metal Lumber construction can proceed in the coldest weather without any of the difficulties or precautions necessary with other fireproof constructions. The small amount of concrete ordinarily used acts only as a fire stop and even this can go into place after the building has been enclosed. Hundreds of buildings with Metal Lumber construction have been erected rapidly and successfully by contractors having no previous experience with the material and no contractor familiar with general construction work need hesitate to undertake a building with Metal Lumber construction…"

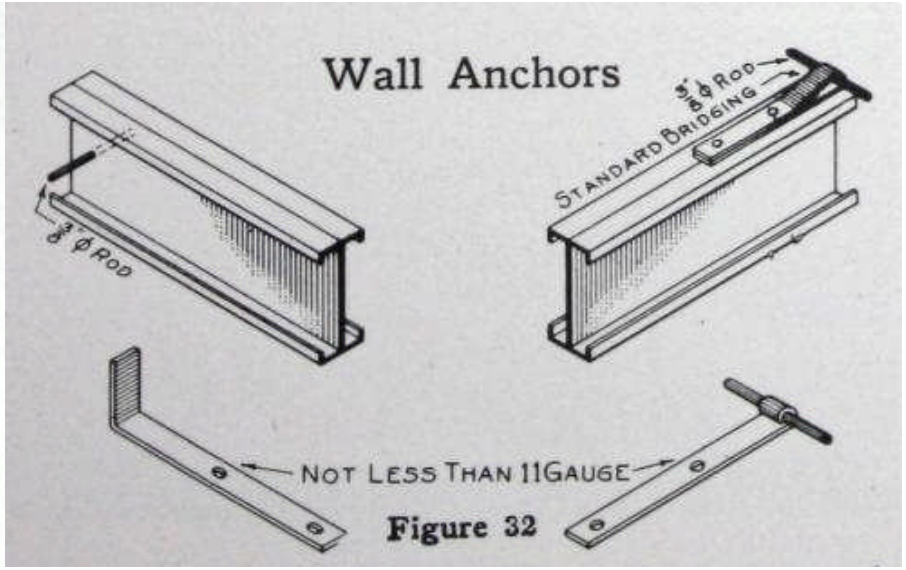
RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***

Floor Construction

"…The general principles and details involved in Metal Lumber Floor Construction are similar to those for wood, with the addition of simple fireproofing and involve no special difficulties for builders having no previous experience with this type of construction…Berloy pressed steel sections are of uniform, known strength and quality, and with proper bearings and details of design the integrity of the floor is assured…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*





Left: caption: "Figure 31. Butt joints (a) should not be used unless the flange of the beam is at least 5½" wide and when used ½" space should be left between ends. With lap joints (b) and single joists (c and d) the ends of joists should extend slightly over the center of beam. Attachment is made by means of beam clip. After joists are in place and properly spaced they should be held by a temporary wood strip through which 6 d nails are driven into the web of the joist. After wood strips are attached, the beam clips are driven into place and the prongs are driven down over the flanges of the joists, after which permanent cross bridging is installed."

Right: caption: "Figure 32. Where the ends of Metal Lumber joists are to be anchored into concrete the methods shown above are recommended"

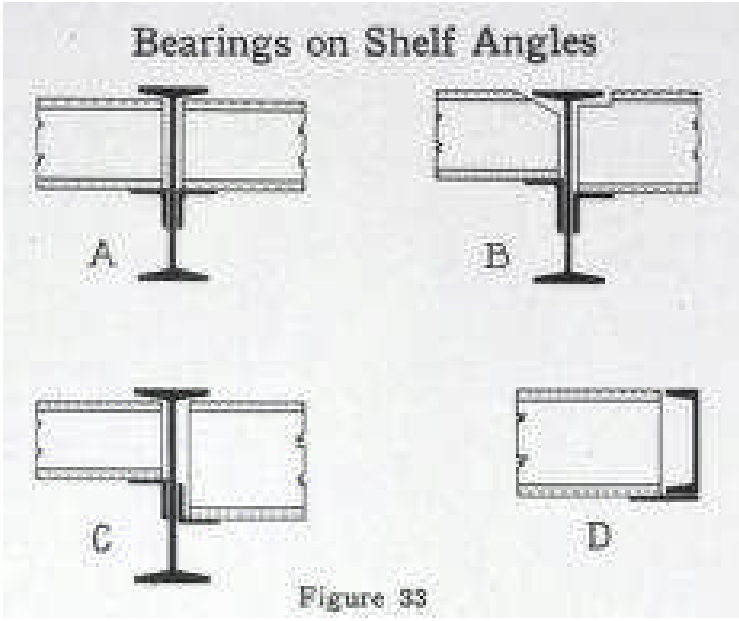


Figure 33

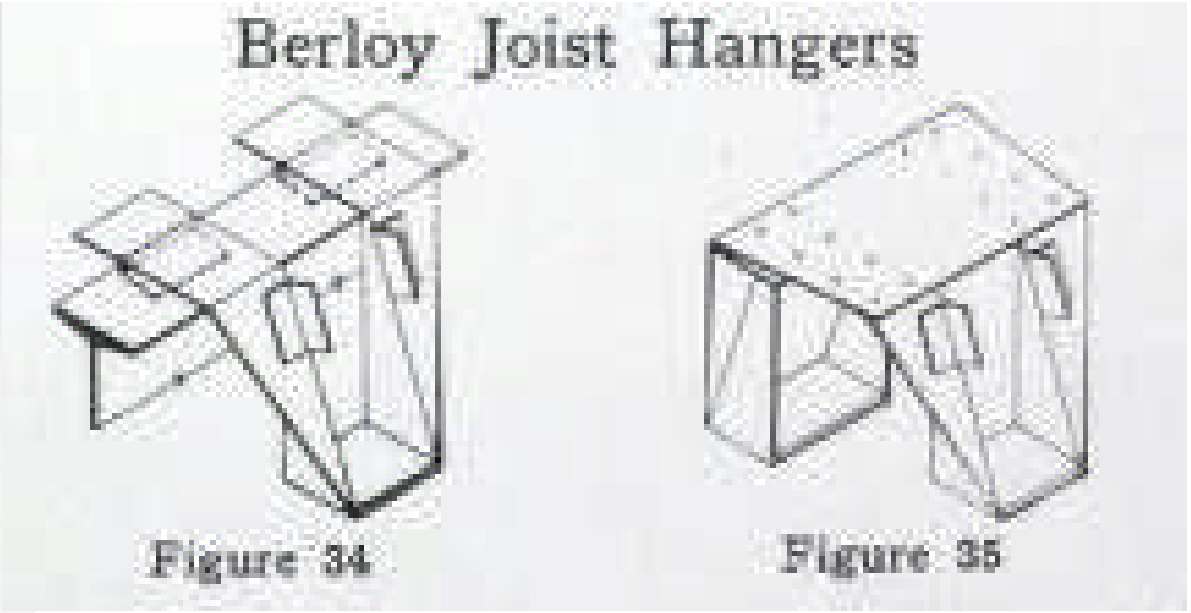
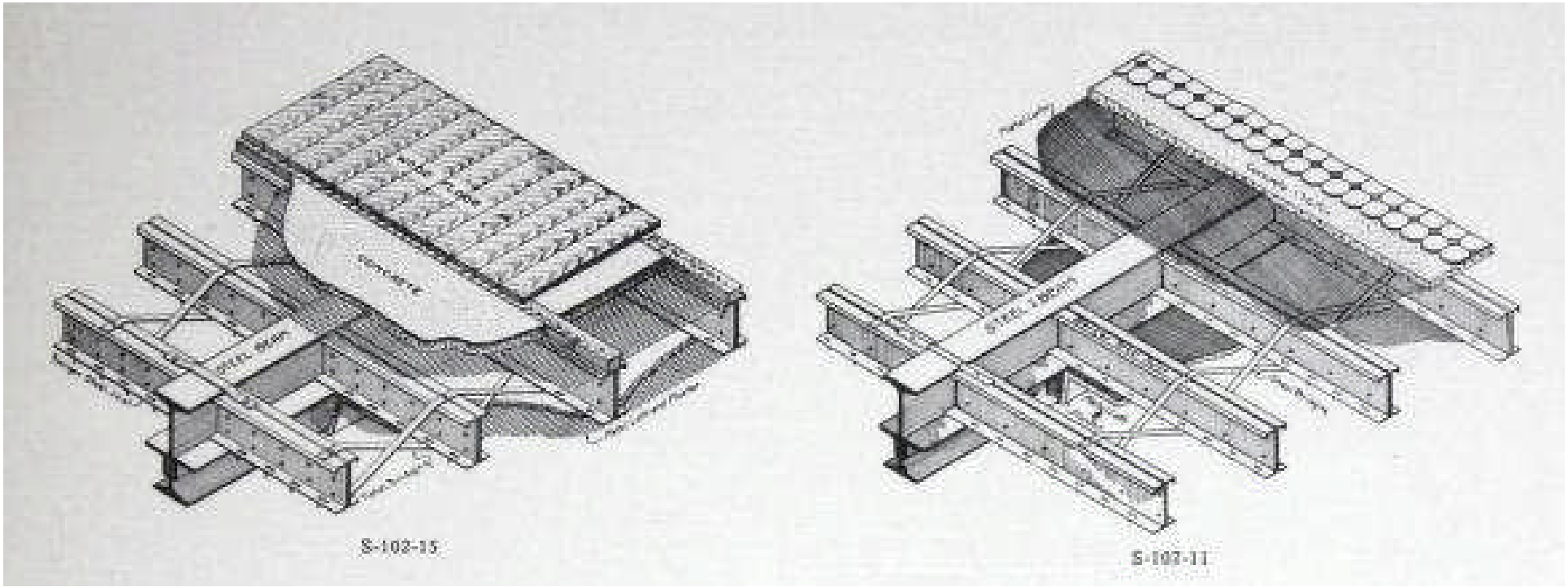


Figure 34

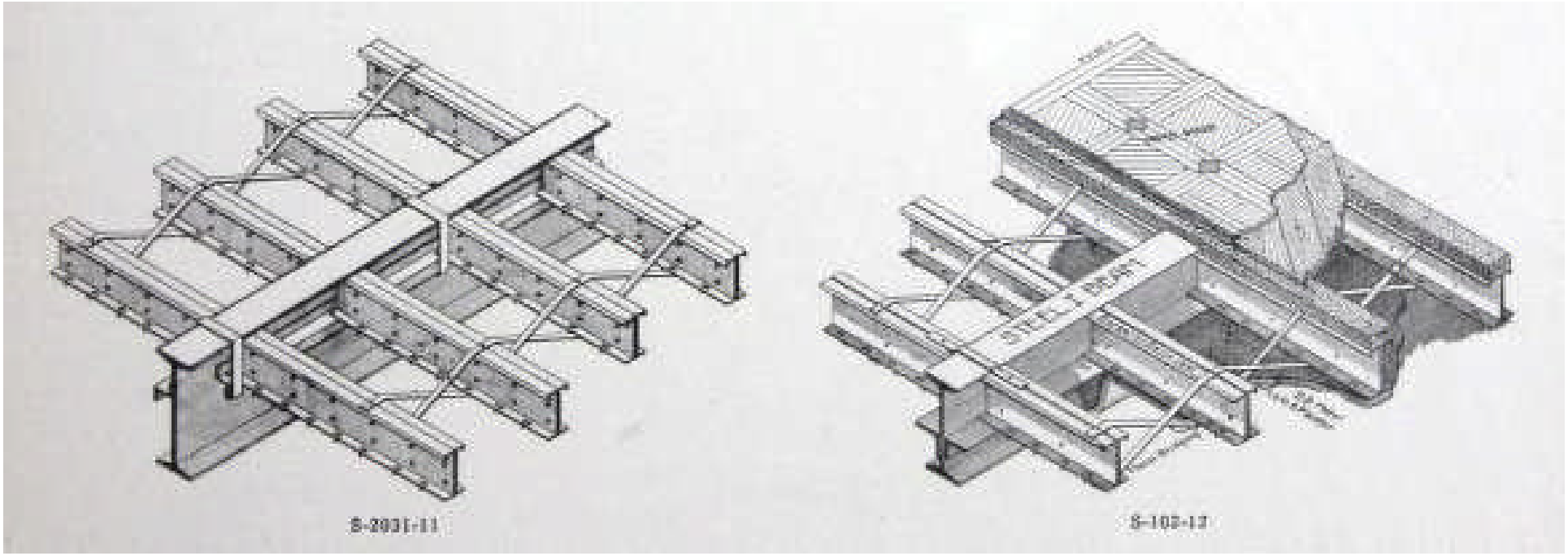
Figure 35

<u>Left</u>: caption: "Figure 33 shows various details of construction with shelf angles. These angles are riveted to the web of beam or channel. Size and placing of angles may vary with requirements and they are usually continuous along length of beam. A bearing of not less than 2½ inches should always be provided. No attachment is necessary between joists and shelf angle, as the temporary wood strips and later the bridging and floor and ceiling finish will hold joists in place:
A) Cross section showing joists bearing on shelf angles;
B & C) Cross sections showing arrangement of shelf angles to receive joists of different depths on either side of the channel or beam, also showing both bevel and square corner coping, and;
D) Cross section, structural steel around stairways or elevators."
<u>Right</u>: caption: "Figures 34 and 35. These hangers are sometimes used in place of shelf angles to support Metal Lumber joists on structural steel beams and channels. They are of heavy gauge material and afford support to sides of top flanges of joists which makes temporary wood strips unnecessary; but bridging should be installed promptly. Hangers are placed and properly spaced before joists are installed. In ordering hangers it is necessary to give width of beam flange and width and depth of Metal Lumber section. If joists do not meet beam at right angles the angle should also be given. Fig. 34 shows type of hanger where joists occur only on one side of beam. Fig. 35 shows hanger used where joists are to be supported on both sides of beam."



Left: caption: "S-102-15. Standard Metal Lumber floor construction showing Metal Joists supported on Shelf Angles riveted to rolled Steel Beams. Note the application of bridging, and wood nailing blocks with which to secure wood finished floor solidly to the Steel Joists. These blocks are applied by nailing directly into the webs of joists."

Right: caption: "S-102-11. Standard system of Metal Lumber floor construction showing Joists supported on Steel Beams with Shelf Angles and concrete slab applied on top. Finished wearing surface shown is tile floor, but concrete, terrazzo or other finishes can be used equally well. This construction is proof against cracks due to expansion."



<u>Left</u>: caption: "S-2031-11. Metal Lumber floor construction showing Steel Joists supported by I-Beams and Pressed Steel Z-bar Joist Hangers. These hangers are very efficient and reduce the cost over shelf angles riveted directly to the beams."

<u>Right</u>: caption: "S-102-12. Metal Lumber floor construction without concrete base; the wood sub-floor secured to Joists by means of nailing strips. This construction costs less, but is less efficient from a fire and sound-proof standpoint." [136]

<u>Top Left</u>: caption: "Figure 11. Metal Lumber joists, bearing on Metal Lumber 'H' studs. Note Metal Lumber Lintels framed into 'H' studs by flattening flanges on studs."

<u>Top Right</u>: caption: "Figure 12. Metal Lumber joists with bearings on shelf angles."

<u>Left</u>: caption: "Figure 14. Metal Lumber joists on Metal Lumber bearing partitions. Note use of Metal Lumber Lintels in doorways and prongs for attach-ment of lath."

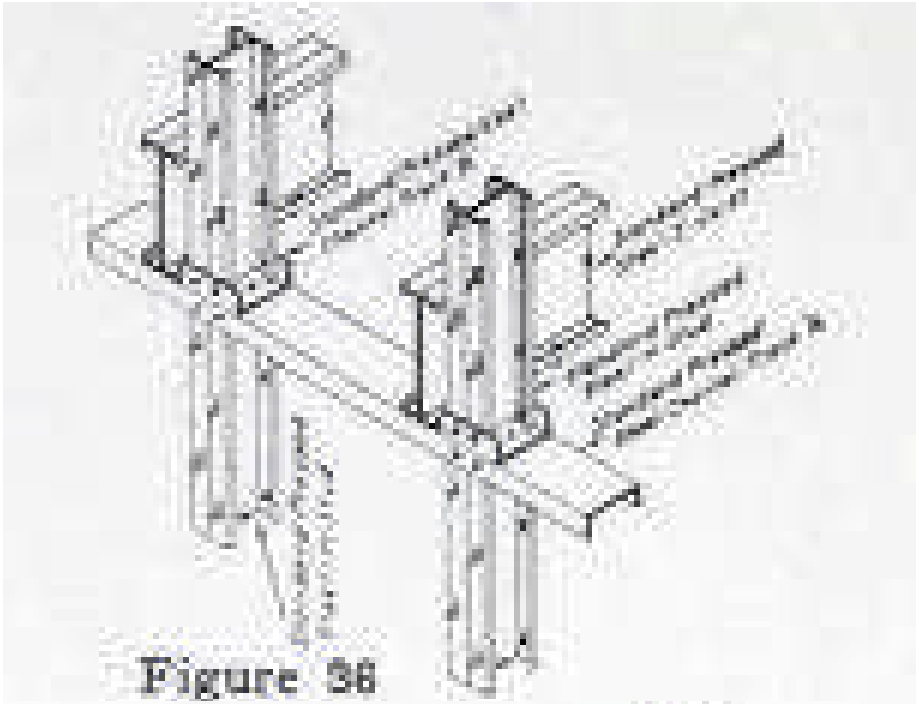


Figure 36

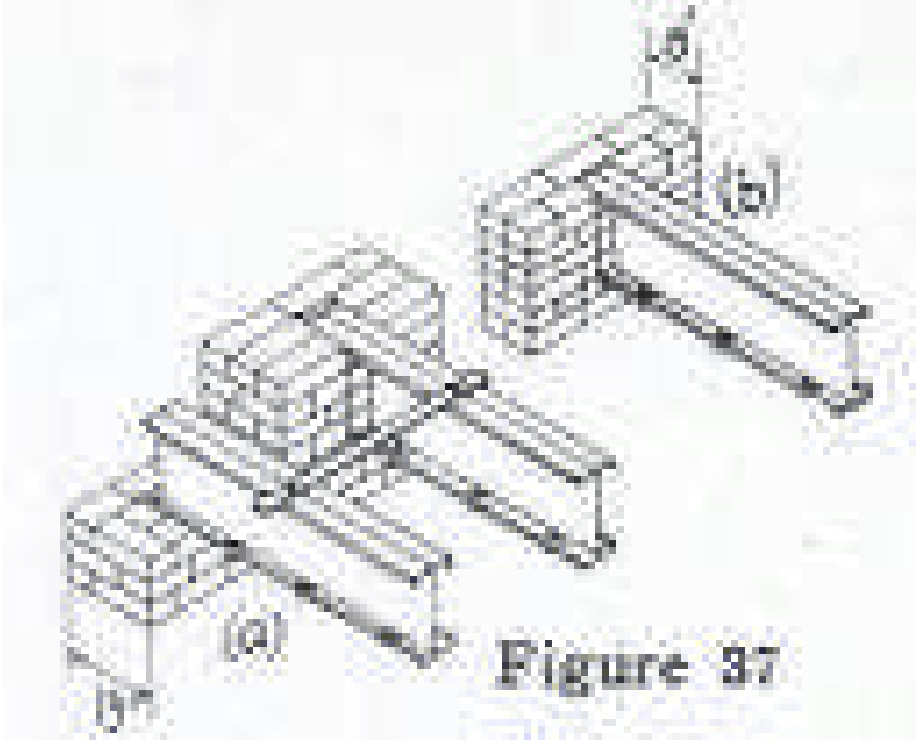
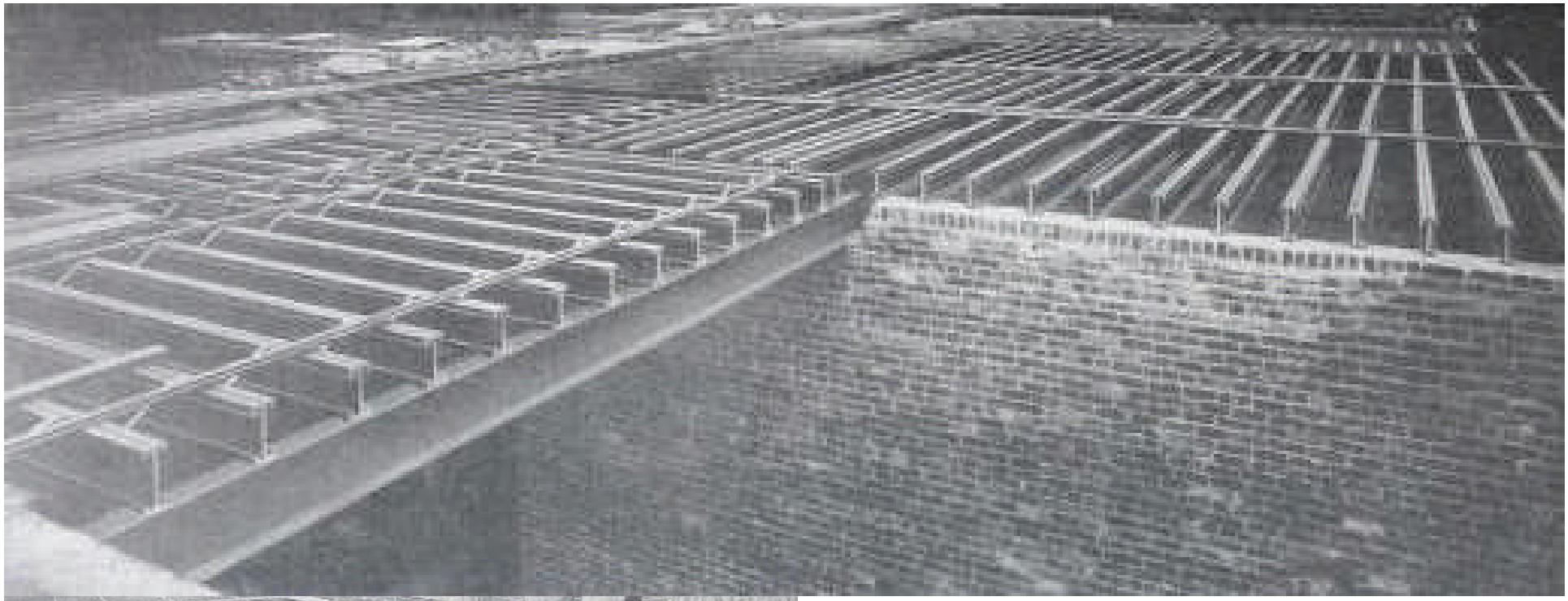
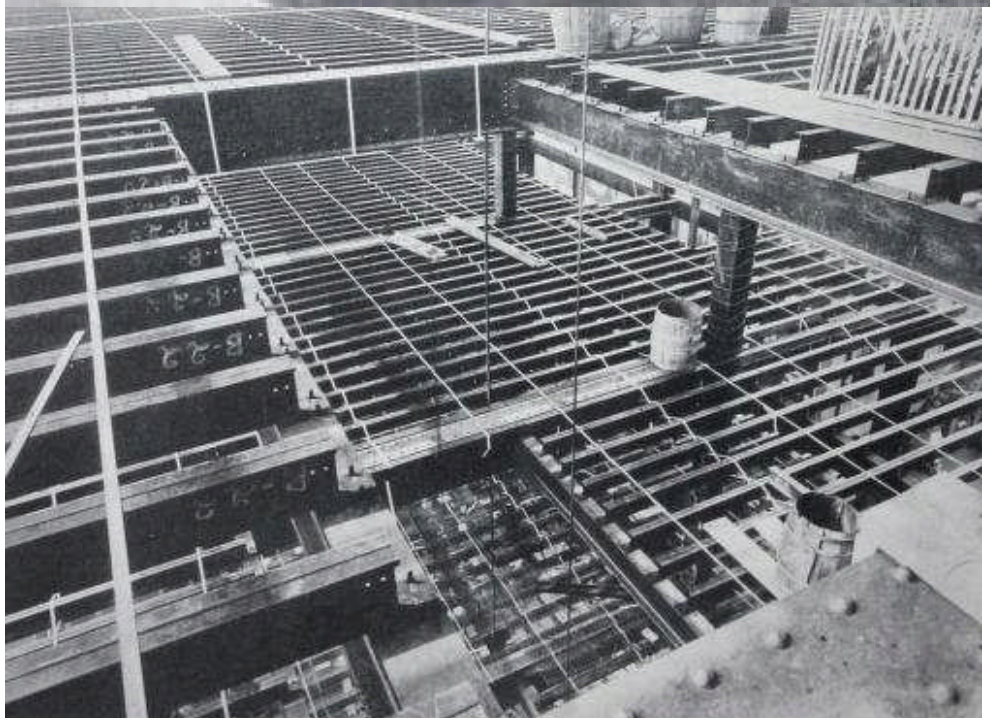


Figure 37

<u>Top</u>: caption: "Figure 36. Bearings on Supporting Partitions. Joists should rest on the full width of the channel track close to the supporting stud and should be attached to the track with 5/16" bolts or cold driven rivets."

<u>Bottom</u>: caption: "Figure 37. Metal Lumber joist bearings on walls should never be less than four-inches. The deeper joists should have bearings not less than half their depth. The ends of the joists are usually bricked in, cement being used to make the joists tight. Anchors may be used where desirable"





<u>Above</u>: caption: "Figure 4. School Building, Oak Harbor, O. Architects: Bacon and Huber, Toledo, O. Contractor: F.J. Herman, Toledo. Metal Lumber used for floors, partitions and roof. Note strip used to hold joist in place until bridging is applied.

<u>Left</u>: caption: "Figure 5. Joist installation in Renkert store and office building, Canton, O. Architects: Walker and Weeks, of Cleveland, O. Eleven floors and roof of Metal Lumber (112,500 sq. ft.) Note beam clips, flat bridging, and joists resting on beams designed to come level with top of girder. Note marks on joists to correspond with working drawings. Low dead load makes Metal Lumber very desirable for multi-story buildings."

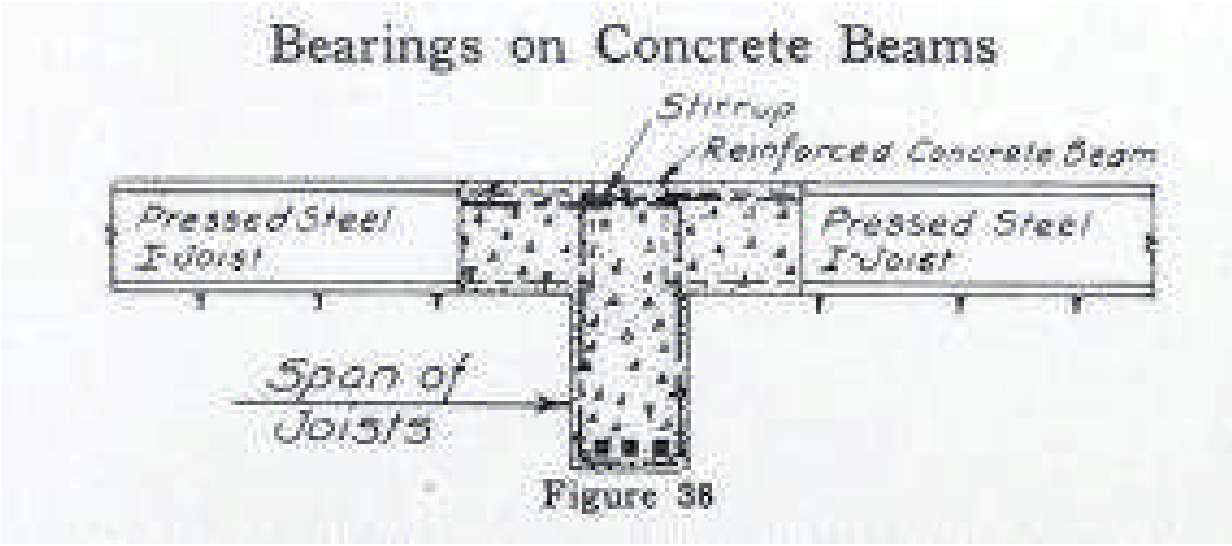


Figure 38

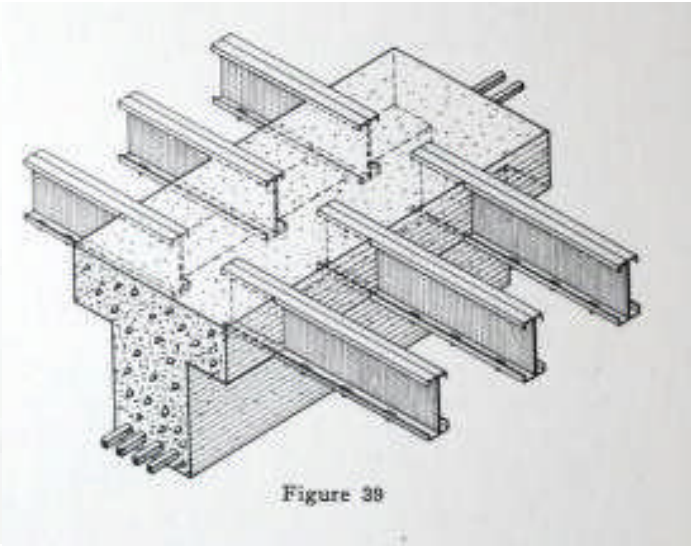


Figure 39

Left: caption: "Figure 38. The adaptability of Metal Lumber makes it very satisfactory for use with concrete framing and its use involves no change in standard practice in the designing and erecting of reinforced concrete T-beams. The depth of the 'T' is usually made the same as the depth of the Metal Lumber joists entering it and joists of different depth may be used on opposite sides of the beam. Wood forms are built for the beam stem and under part of 'T' in the usual way. Metal Lumber joists are then placed and fillers inserted between, to form sides of the 'T' which completes the form work for the beam."

Right: caption: "Figure 39. When joists extend into the stem of the concrete beam (Figs. 38, 39 and 41), the stem should be wide enough to allow two inch bearings with space between ends of joists for bent up bars if used."

<u>Left</u>: caption: “Figure 40 Metal Lumber joists used in connection with reinforced concrete framing in High School Annex, Kenmore, Ohio. Architect: H.P. Lauer, Akron, Ohio. Contractors: Drummond Miller Co. of Cleveland, Ohio.”

<u>Right</u>: caption: “Figure 41. Top view of same construction showing details of form work. This illustrates simplicity of form work where Metal Lumber is used in connection with reinforced concrete superstructure.”

"…Only small openings, such as vent and flue openings, small skylights, around chimneys, etc., should be framed with pressed steel sections. Stairways, elevators and large skylights should be framed with structural steel or reinforced concrete beams. Figures Nos. 42, 43, 44 and 45 suggest various methods of framing around openings…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

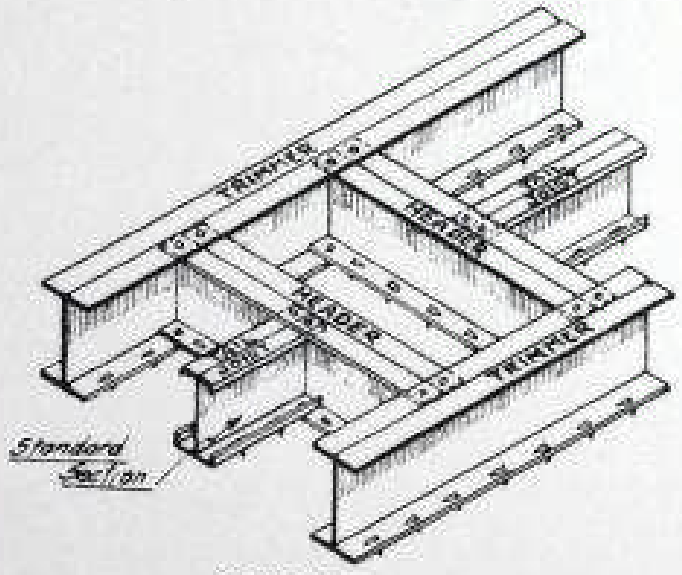


Figure 42

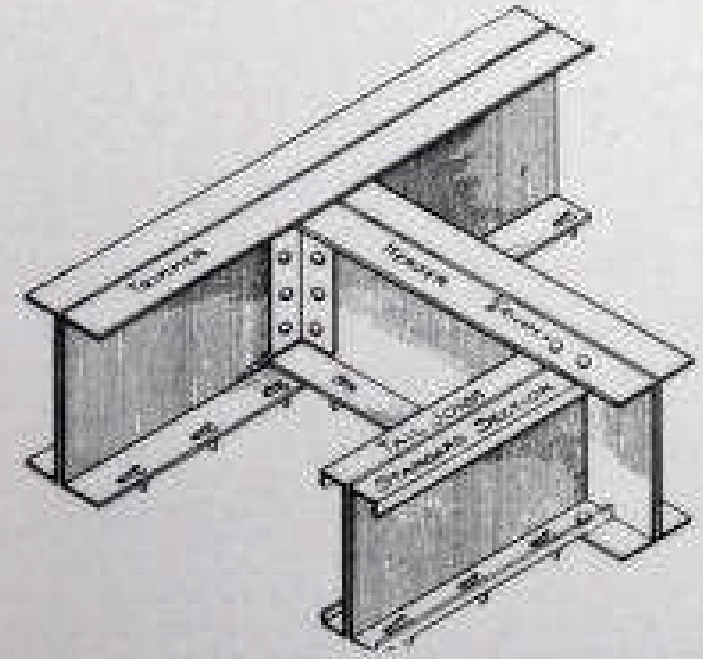


Figure 43

"…Drawing No. 42 illustrates the use of special Berloy Pressed Steel Joists. The headers should be ¼ inch oversize, and the trimmers ½ inch oversize. The tail joists should be standard sizes. Standard 11 gauge angle connections to the webs of joists may be used as shown in figure No. 43 if desired. Such connections are more expensive than flange connections, but are more positive in results and should be used in the more important cases, such as where partitions occur around openings, etc. All connections in either case should be made with 5/16 inch rivets or bolts, rivets to be driven cold on the job. It is our practice to punch holes in the 0.120 inch thickness sections in the shop before shipment. Punching of lighter materials to be field work, this can readily be accomplished with hand punches…"

RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***

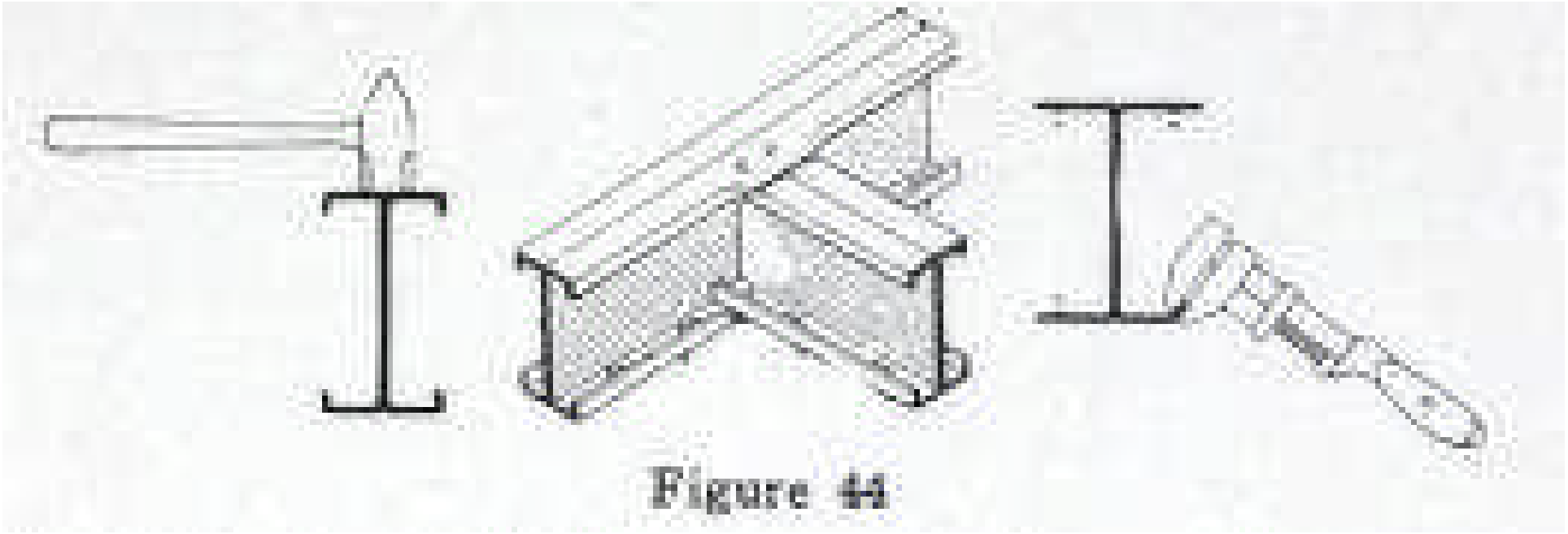
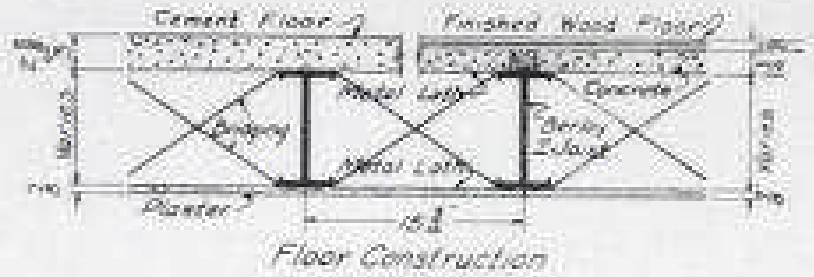


Figure 44

<u>Above</u>: caption: "Figure 44. Figure No. 44 illustrates an effective and economical method of field framing with standard sections around small openings. The vertical projections of the top and bottom flanges of the headers of trimmers are bent out flat at the point of connection, using a wrench and hammer. The ends of the inserted joists are slightly reduced in depth by hammering top and bottom with a heavy hammer. These connections are also made with 5/16" cold-driven rivets, or bolts."

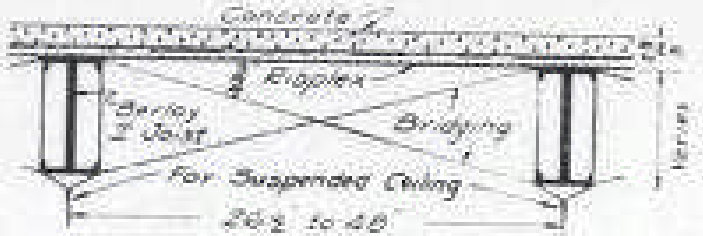


Floor Construction

Figure 46

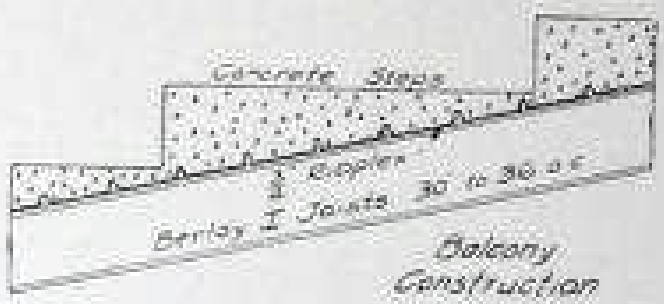
Floor Construction

Figure 47



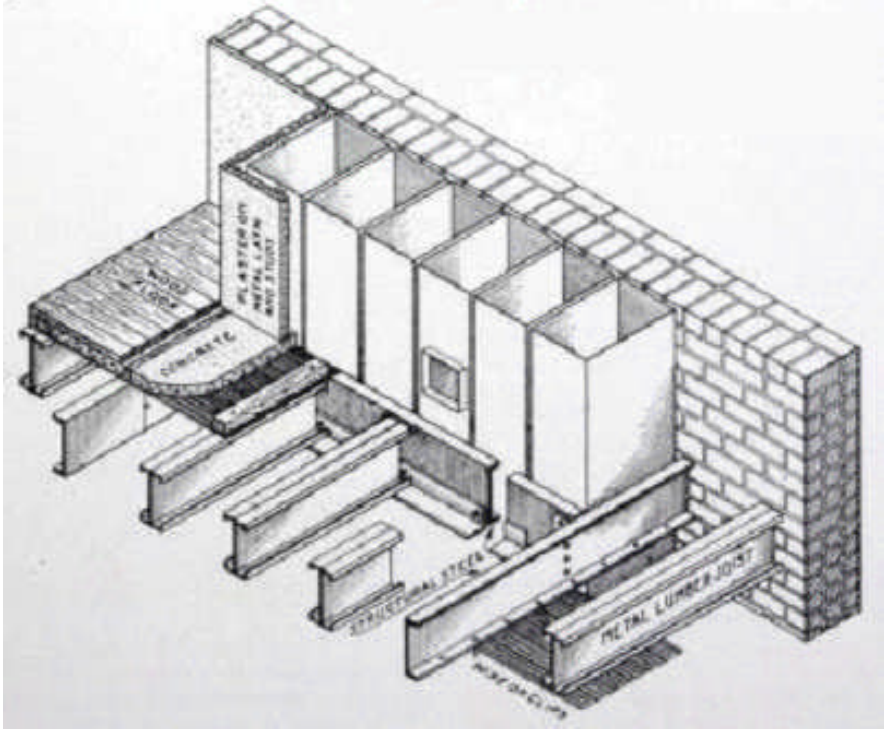
Roof Construction

Figure 48



Balcony Construction

Figure 49



Above: caption: "Figures 46 thru 49. The following details are suggestive of the possibilities and adaptability of Berloy Metal Lumber to various requirements."

Left: caption: "Figure 45. Typical floor opening around ducts, elevators, large sky-lights and stairways. Principal framing of structural steel. Fig. No. 45 suggests methods of framing around openings with structural steel and also bearings of pressed steel joists on the framing members."

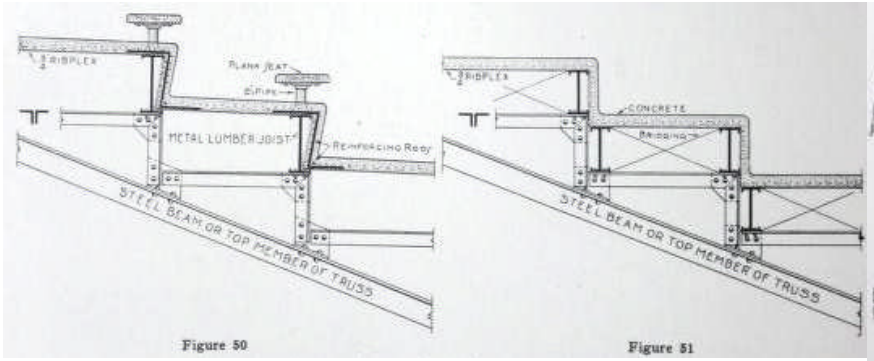


Figure 50 Figure 51

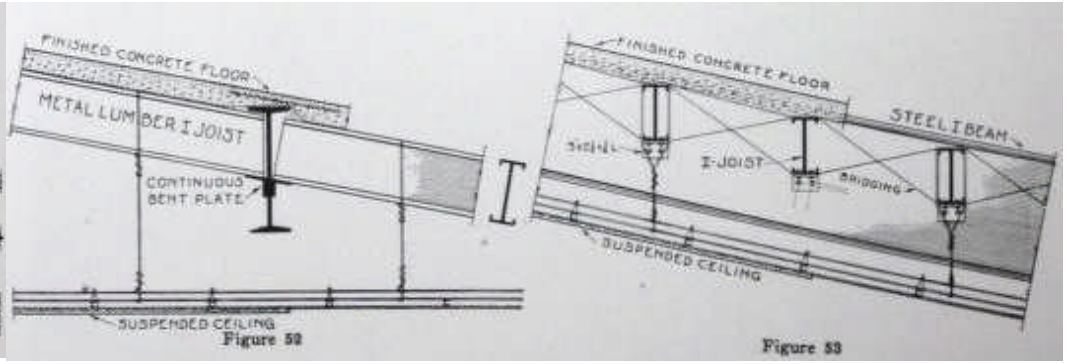
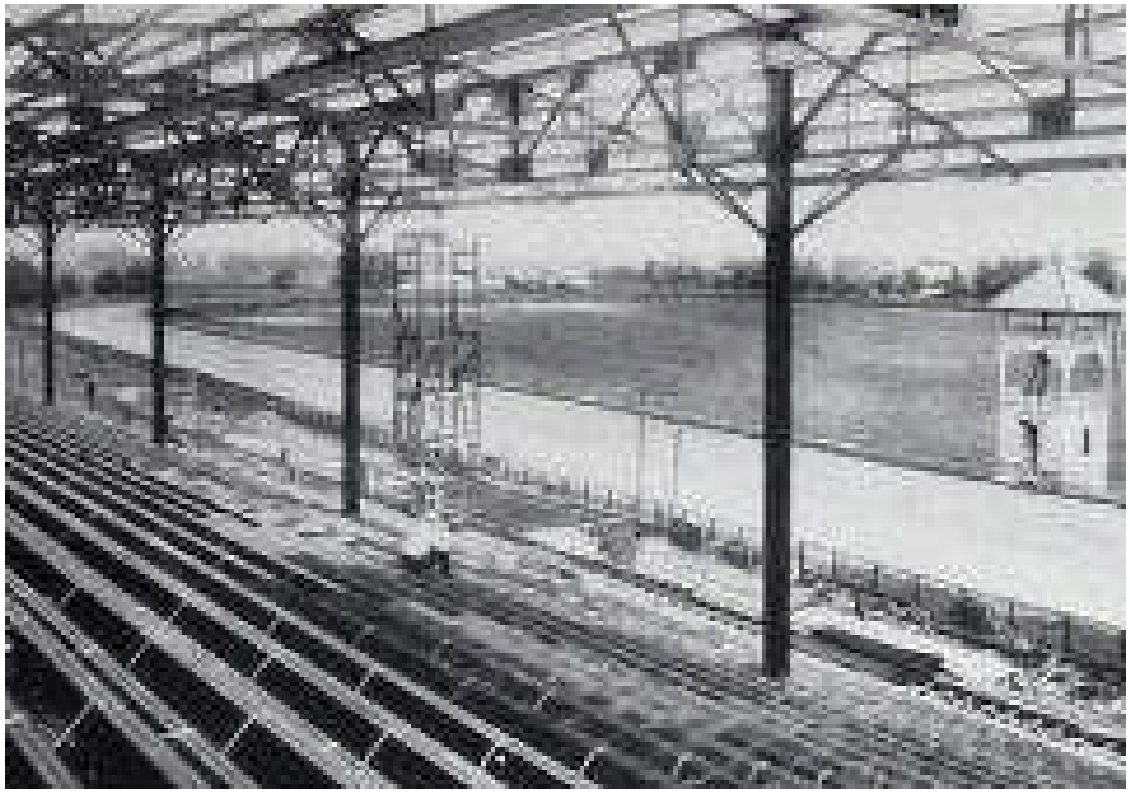


Figure 52 Figure 53

<u>Above Left</u>: caption: "Figures 50 and 51. Risers and seat platforms for Balconies and Grand Stands."

<u>Above Right</u>: caption: "Figures 52 and 53. Inclined floors of auditoriums, balconies and ramps, also for sloping roof construction."



<u>Left</u>: caption: "Figure 13. Grand Stand designed with Metal Lumber; Stark County fair grounds, Canton, Ohio. Because of its comparatively light weight and its adaptability, Metal Lumber can well be used in the construction of balconies, galleries, elevated platforms and similar work."

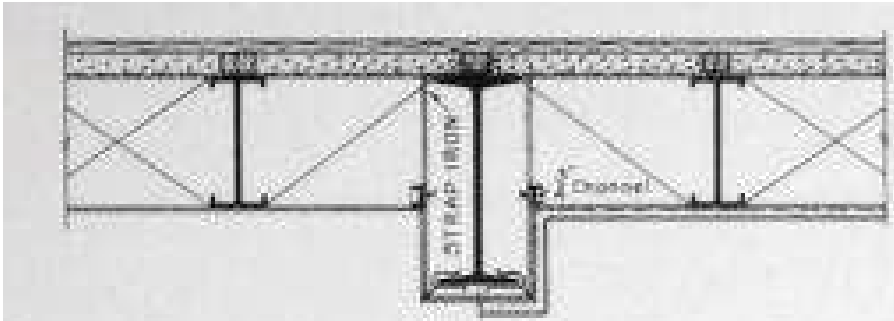


Figure 54

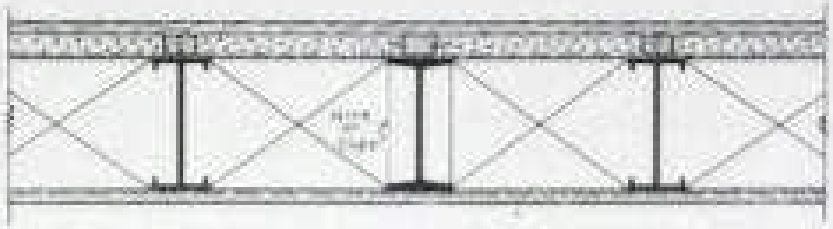


Figure 55

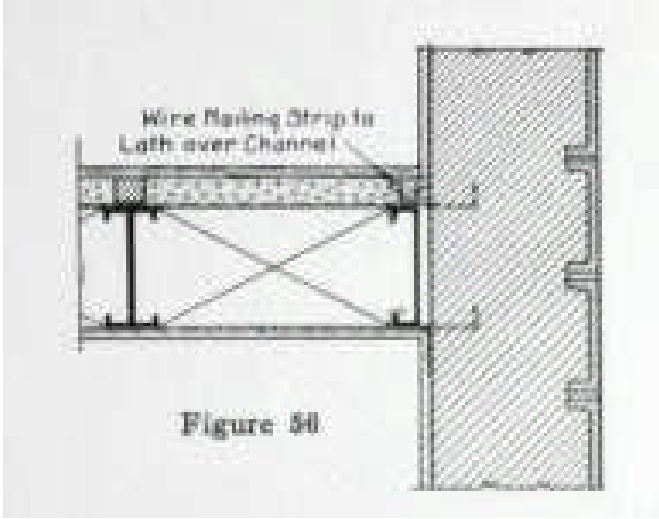


Figure 56

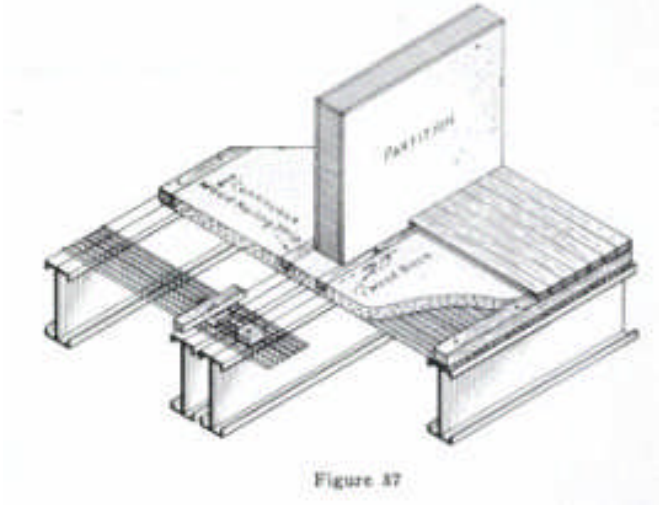


Figure 57

<u>Above L&R</u>: caption: "Figures 54 and 55. Where structural beams and ties take the place of pressed steel joists."

<u>Top Left</u>: caption: "Figure 56. Detail showing method of securing lath and nailing strips to channels where they are used against walls. Channels anchored to walls by 11-gauge steel straps."

<u>Bottom Left</u>: caption: "Figure 57. Where double joists occur under partitions, showing method of nailing wood floors."

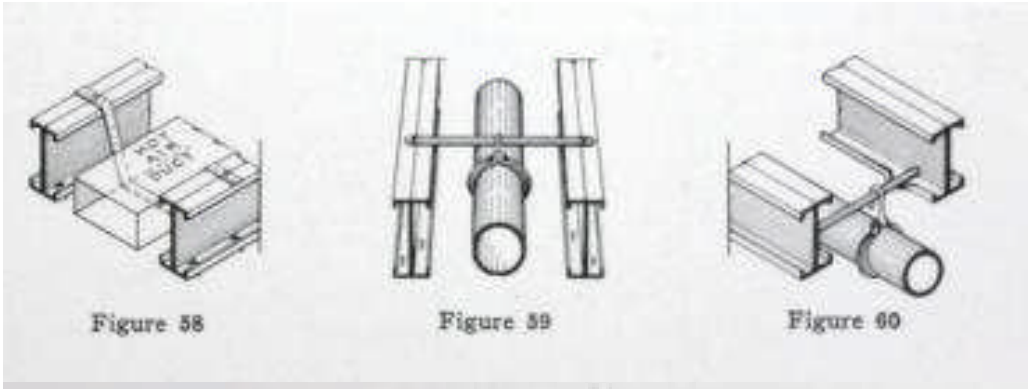


Figure 58 Figure 59 Figure 60

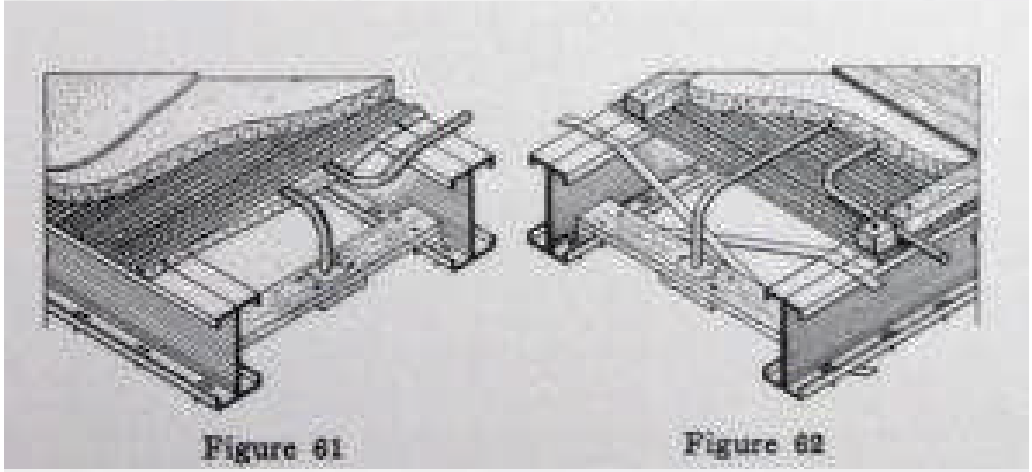


Figure 61 Figure 62

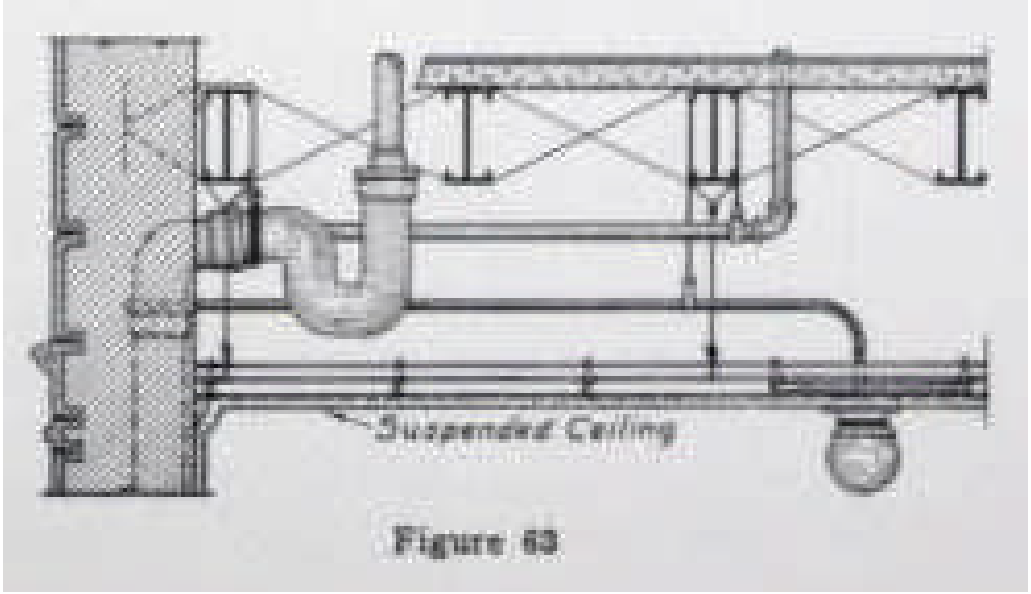


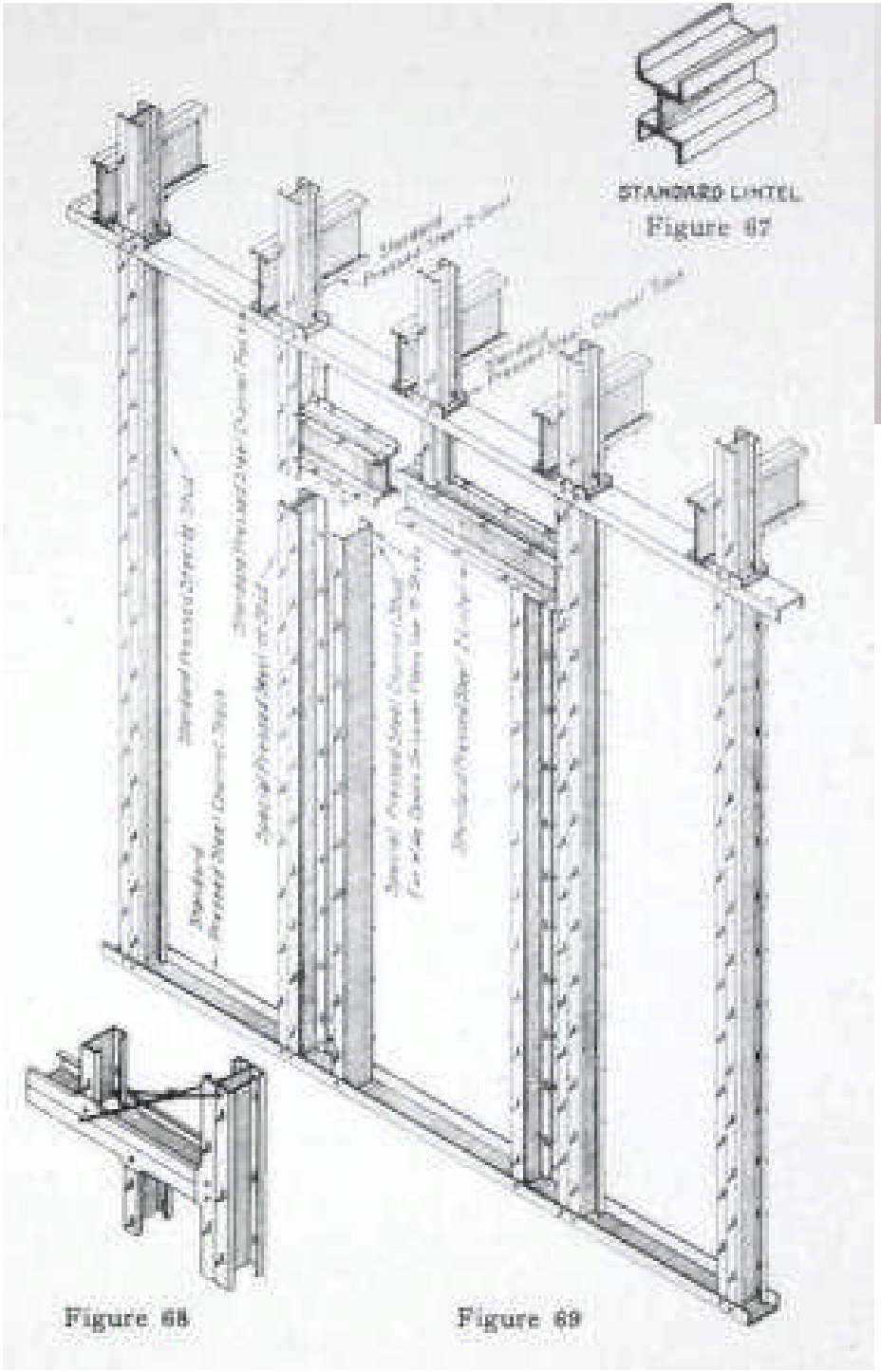
Figure 63

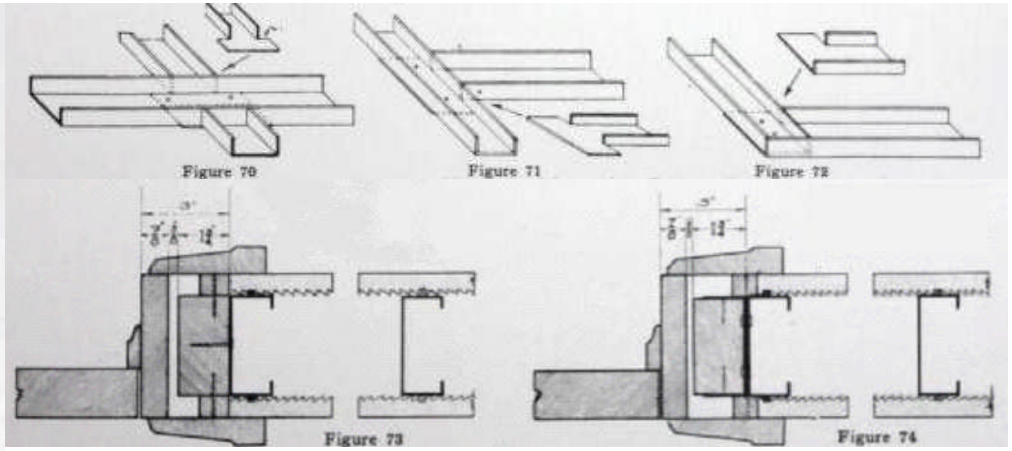
<u>Left</u>: caption: "Figures 58 thru 63. Pipes and Conduits Where possible, piping and conduits should be installed in a direction parallel to and between the joists, or they can be installed over the joists, and the nailing strips (if used) notched, and the concrete fill poured around the conduits or pipes."

Load-Bearing Walls

"…Berloy standard supporting partitions are composed of proper size H or channel studs; these can be varied in gauge, spacing and shape to meet the load requirements. Partitions for the lower floors usually consist entirely of H-studs varying in gauge and spacing. When loads become lighter, channels may be substituted for part of the H-studs. Channel studs should not be used exclusively in supporting partitions; at least every fourth or fifth stud should be of H section to afford sufficient stiffness to the structure. H studs should be used at the sides of door and window openings. The partition finishes about 1½ inches thicker than the width of the studs. Supporting partitions should rest on walls, structural steel or reinforced concrete beams or supporting partitions. The Metal Lumber studs are supported and held in place top and bottom by channel track to which they are bolted or riveted. The track in turn is firmly attached to joists and bearings…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

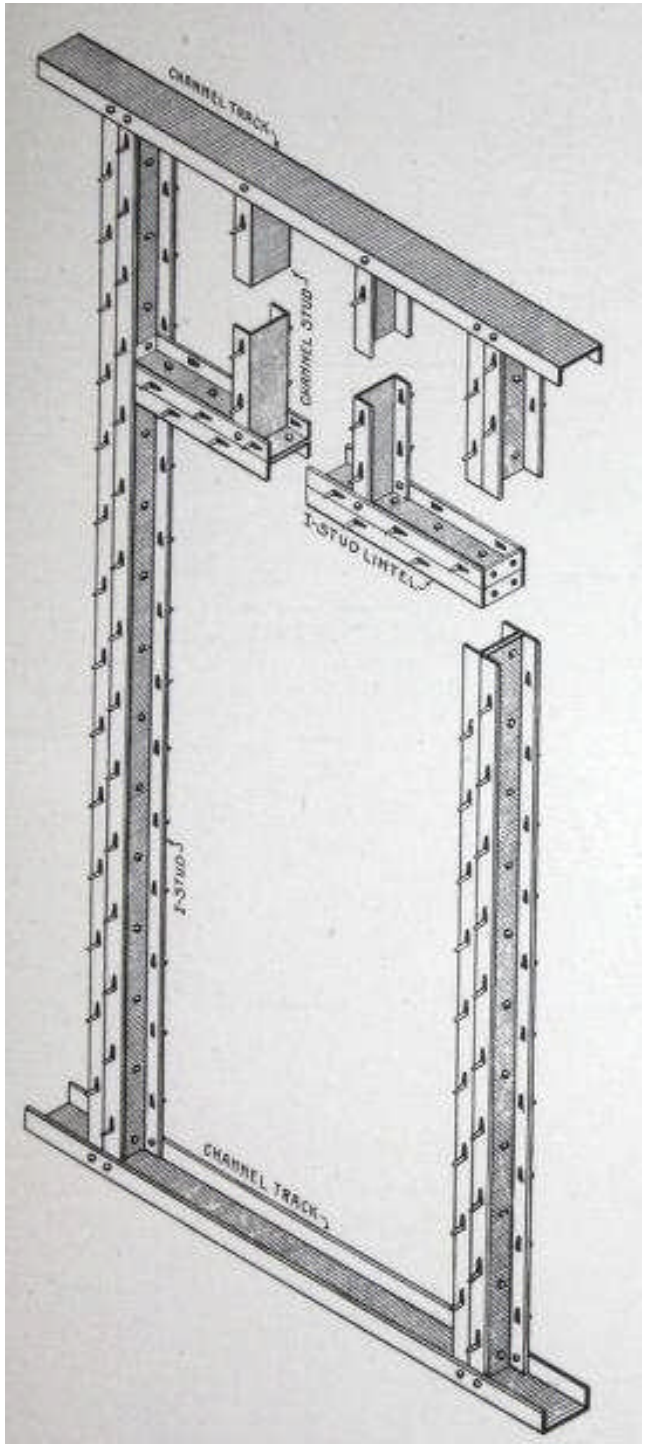




<u>Above Top</u>: caption: "Figure 70 thru 72. Details showing way to cut track so that one partition may be tied to another. Track at ceiling to be same as at floor."

<u>Above Bottom</u>: caption: "Figure 73. Detail showing construction of door jamb for Berloy Supporting Partitions where Channel Studs are used at jamb. Figure 74. Detail showing construction of door jamb for Berloy Supporting Partitions where H-Studs are used at jamb."

<u>Left</u>: caption: "Fig. 69 illustrates standard bearing partition construction and method of framing around wide door openings or where extra strength is a requirement. Fig. 68 shows a method of making field connections with standard 'I' and channel studs. Fig. 67 shows the lintel which is a standard Metal Lumber shape."



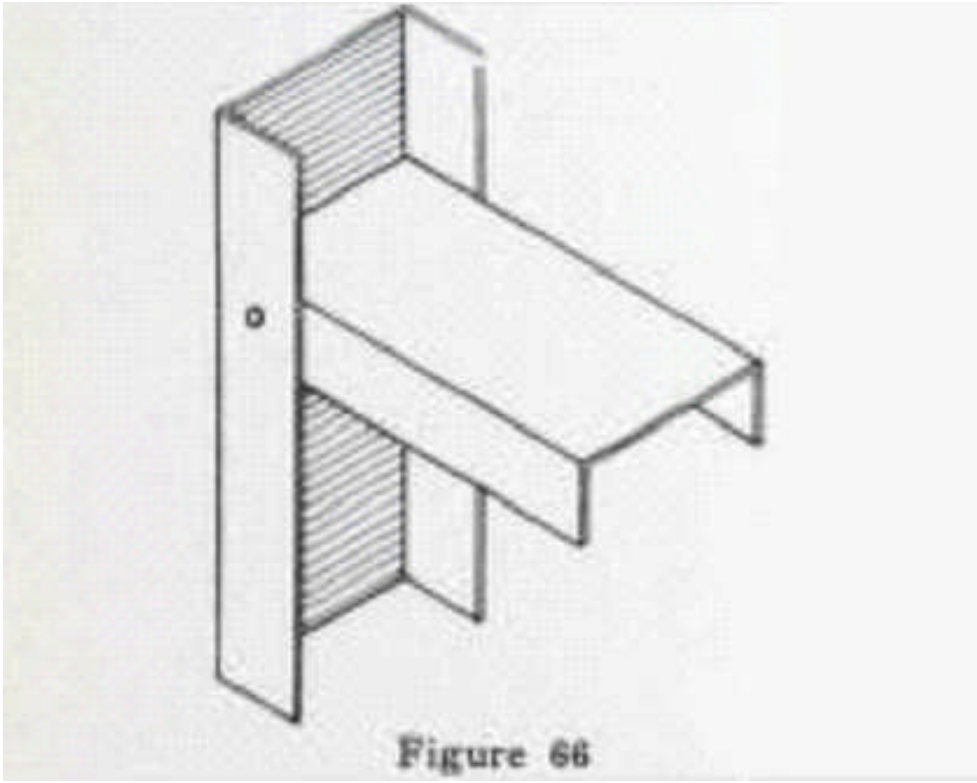


Figure 66

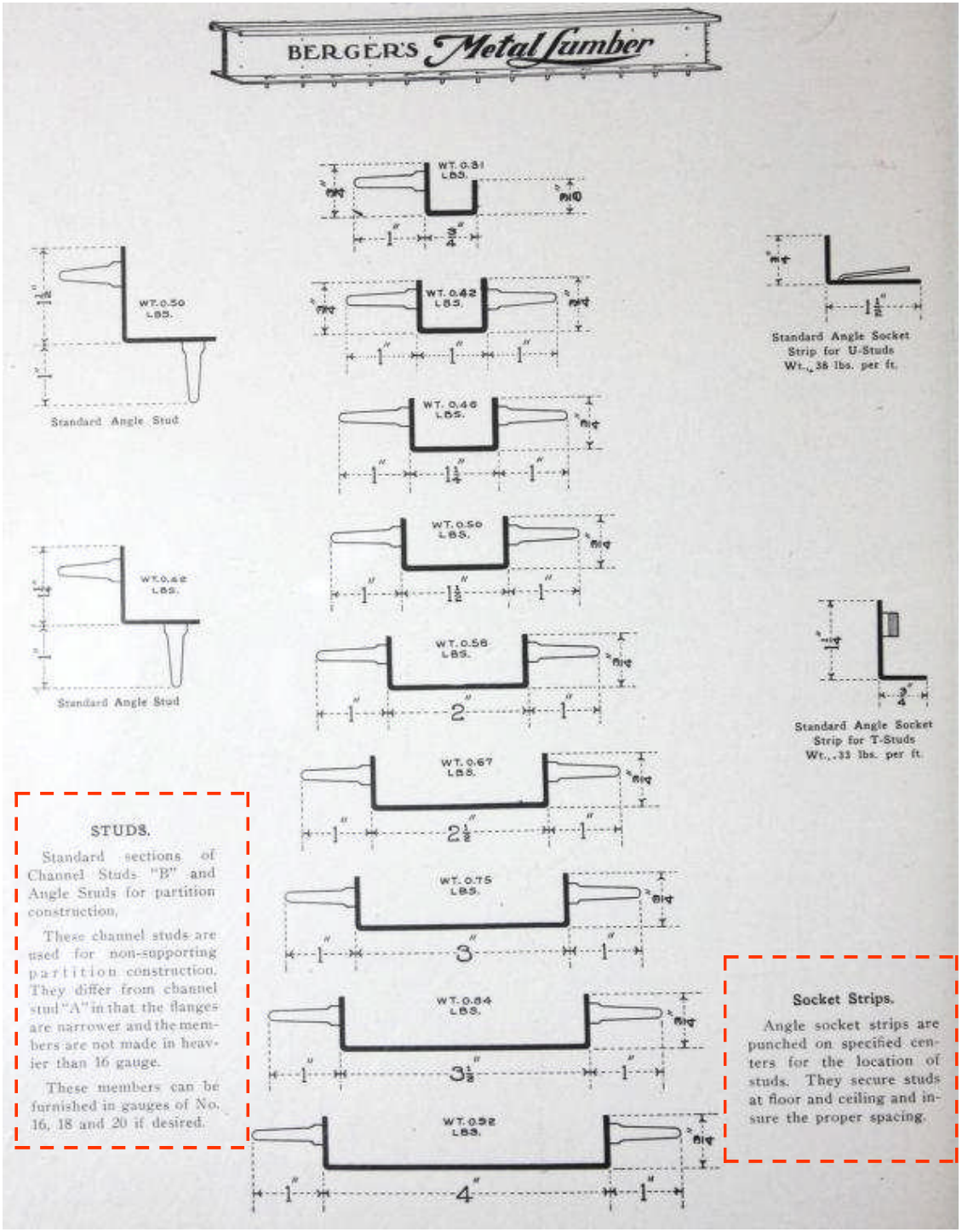
<u>Above</u>: caption: "Ordinary door and window lintels are framed with channel track along lines indicated in Figure 66"

<u>Left</u>: caption: "Standard detail of metal stud framing in supporting partitions around door openings. Note the lintels with holes drilled to receive rivets and note also the sturdy, rigid nature of the construction. I-Studs being used around the openings to take the excessive loads required at these points."

Non Load-Bearing Walls

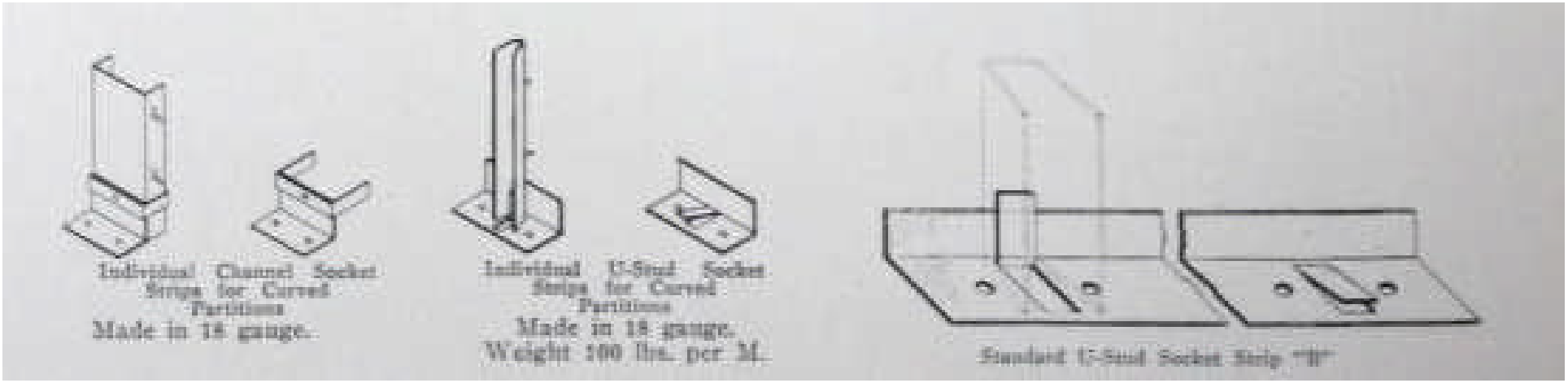
"…Standard Metal Lumber Construction is made up of Joists, Studs, Track, etc., for floors and bearing partitions which are spoken of as 'A' Sections. For non-bearing partitions Berloy 'B' Sections of much lighter weight than 'A' Sections were developed many years ago and widely used under the name 'Prong Lock Studs' from the distinctive method used for attaching lath. The cutting and punching of 'B' Sections, which are made of 18 or 20 Gauge steel, can easily be handled by the workmen on the job and for this reason 'B' material is supplied in standard lengths…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*



Bottom Left: caption: "Standard sections of Channel Studs 'B' and Angle Studs for partition construction. These channel studs are used for non-supporting partition construction. They differ from channel stud 'A' in that the flanges are narrower and the members are not made in heavier than 16 gauge. These members can be furnished in gauges of No. 16, 18 and 20 if desired."

Bottom Right: caption: "Angle socket strips are punched on specified centers for the location of studs. They secure studs at floor and ceiling and insure the proper spacing."



"…Hollow non-supporting partitions consist of 18 or 20 gauge 'B' channel studs, stock widths up to 4 inches, but wider studs are furnished special upon order. Studs of 18 gauge should be used for partitions over 10 feet high. The partition usually rests upon the concrete fill and floors should be designed to support the additional weight. Where the partition runs along the line of the joists double joists should be used beneath the partition. See Fig. 57. The studs are usually held in place by 'B' socket strips. Attachment of lath is made by means of prongs punched out of the studs and plastering proceeds according to standard practice. The partition finishes 1½" thicker than the width of the studs. Details of construction about doors, etc., are similar to those already described for supporting partitions…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

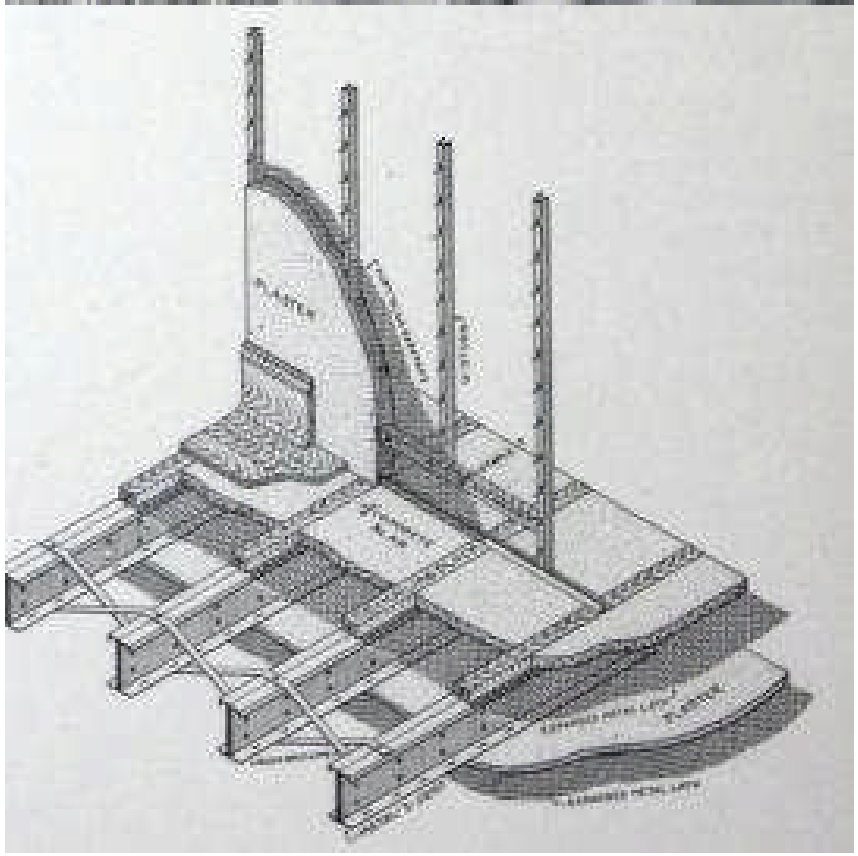
<u>Left</u>: caption: "Individual Channel Socket Strips for Curved Partitions Made in 18 gauge"

<u>Middle</u>: caption: "Individual U-Stud Socket Stripes for Curved Partitions Made in 18 gauge. Weight 100 lbs. per M."

<u>Right</u>: caption: "Standard C-Stud Socket Strip 'B'"

"…Solid Partitions. The space saving effected by this type of partition which is rigid and sound proof, has led to its extended use, especially in larger buildings. Electrical fixtures manufacturers now make shallow wall boxes and switches especially for this type of partition…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*



"…Two general methods are used with Berloy materials, the partition in each case finishing about two inches thick.

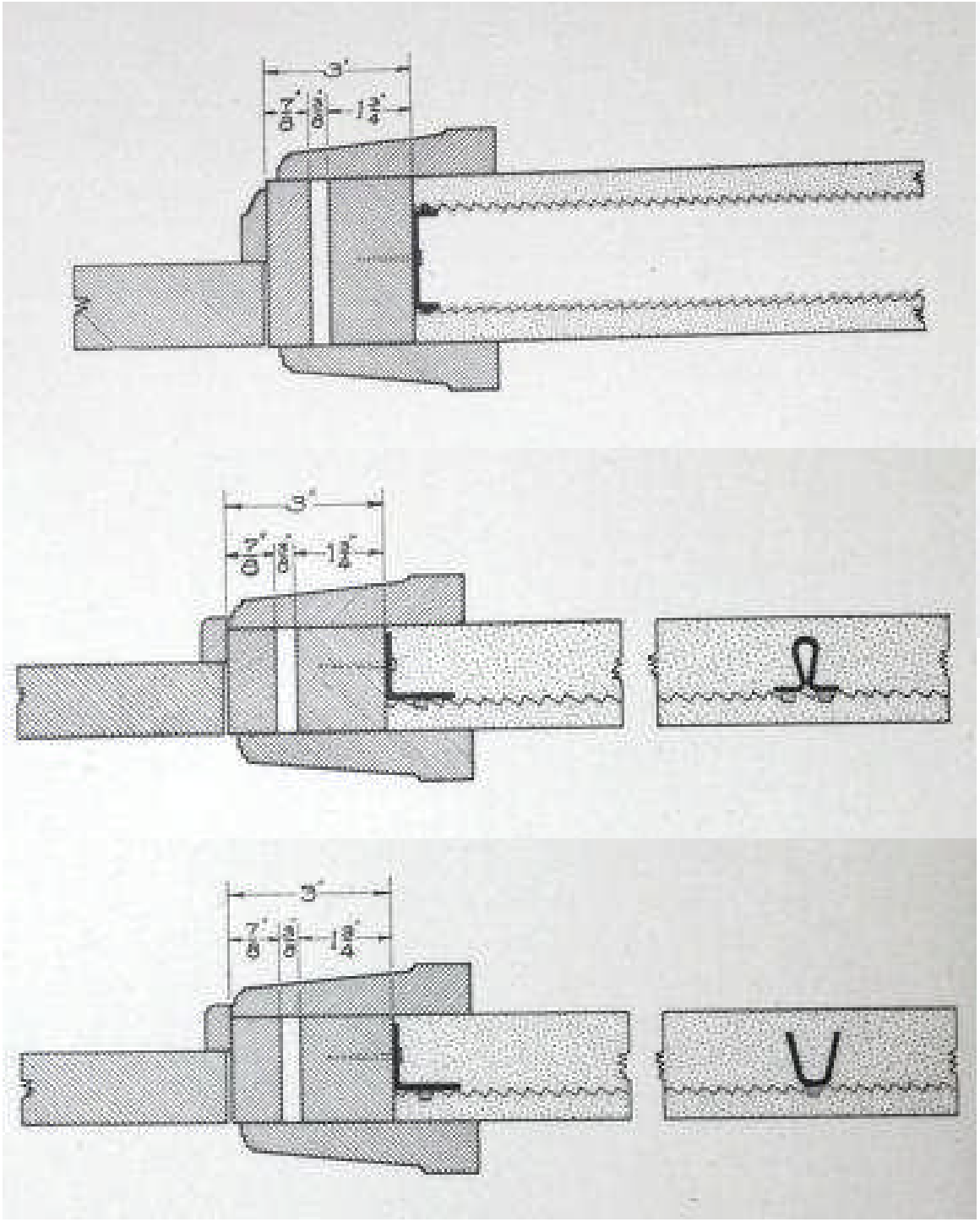
1. With ¾" Ribplex, ribs vertical, no studs required. Held in place by standard track for ¾" Ribplex or by track of metal lath. See Fig. 75.

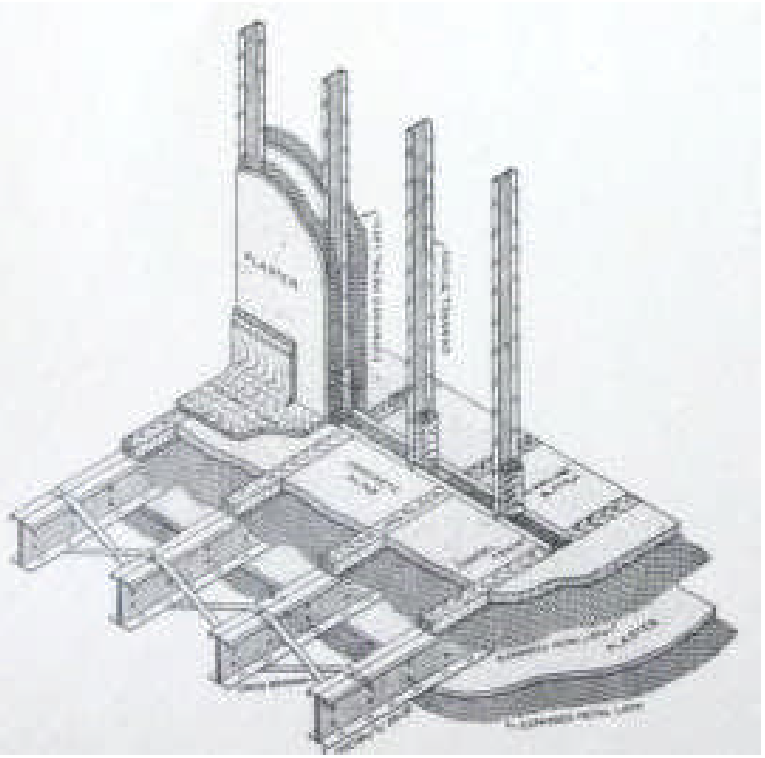
2. With narrow cold-rolled channels or U-Studs held in place by socket strips to which is attached Berloy Metal Lath or ¾" Ribplex with ribs against and at right angles to channels…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

<u>Top</u>: caption: "Figure 75. Ribplex applied vertically to replace studding in Solid Partitions"

<u>Bottom</u>: caption: "Standard Metal Lumber Floor Construction showing non-supporting U-Stud partition resting on concrete slab. Note the nailing strip applied directly to top of joists, and blocks inserted in partitions by which to secure wood base.





<u>Above</u>: caption: "Non-supporting channel stud partition"

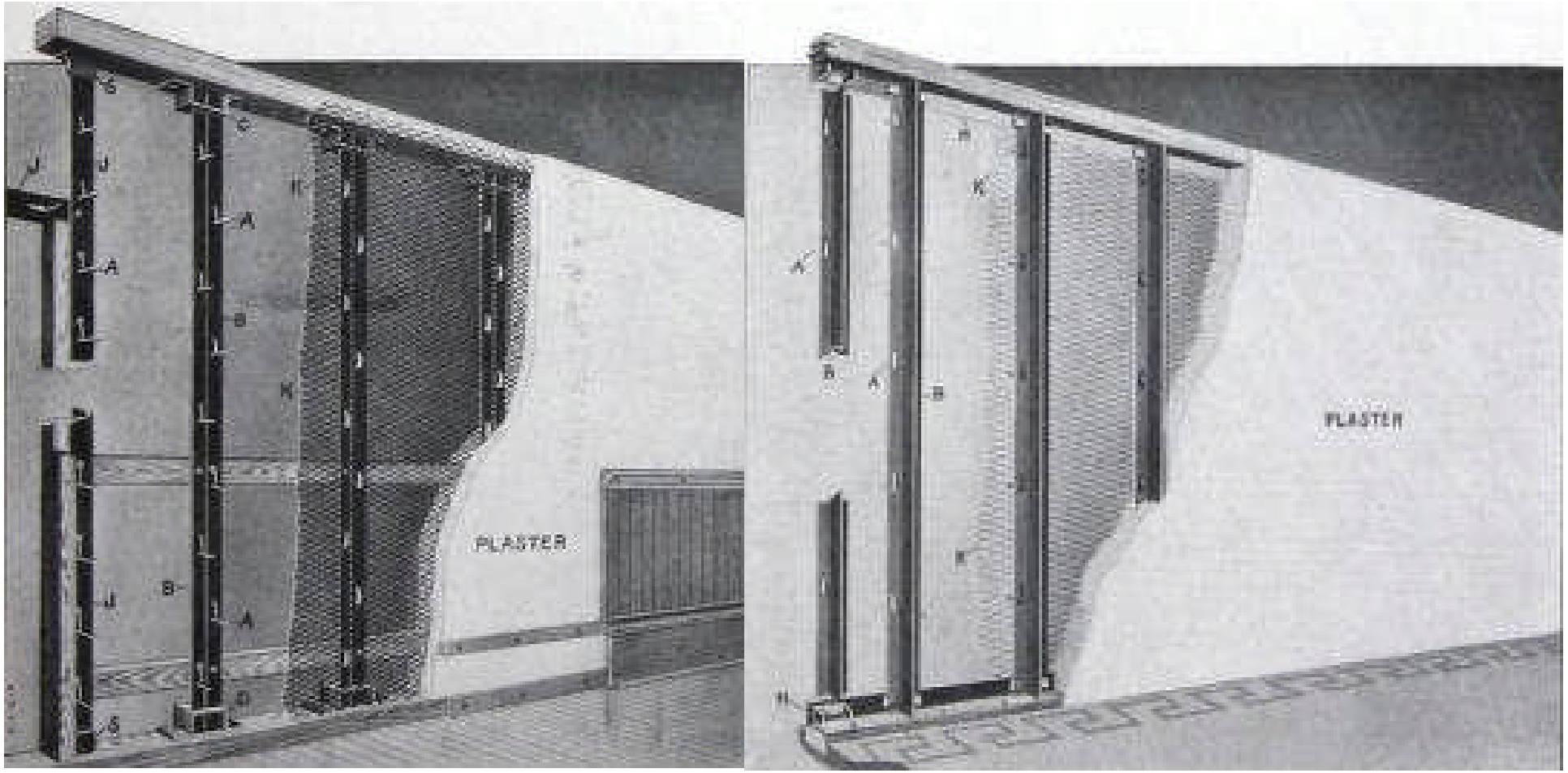
<u>Top Left</u>: caption: "Detail showing construction of door jamb for Berger's Non-Supporting Channel Stud Partition."

<u>Middle Left</u>: caption: "Detail showing construction of door jamb for Berger's non-supporting T-Stud partition with angle stud used at jamb."

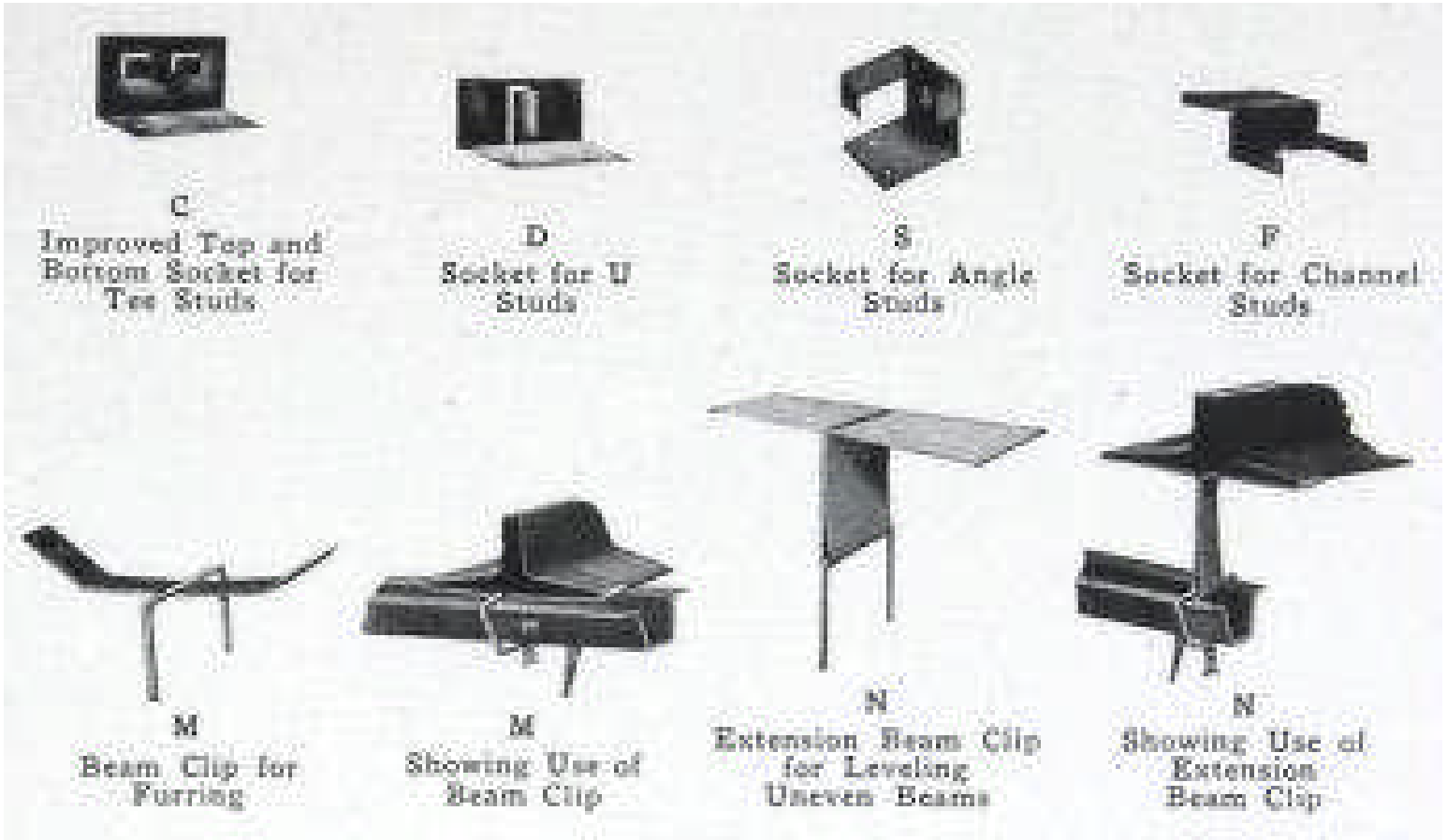
<u>Bottom Left</u>: caption: "Detail showing construction of door jamb for Berger's Non-Supporting U-Stud prtn. with angle stud used at jamb."

We recommend the following sizes of cold rolled "C" channel studs for solid partition construction:

Spacing of Studs	Height in Feet	Size of C channels	
		Depth	Flange
13⅓" on centers	8 to 10	¾"	1⅜"
	10 to 14	1"	1⅜"
	15 to 18	1¾"	1⅜"
	over 18	1½"	1⅜"
15¾" on centers	8 to 10	⅞"	1⅜"
	10 to 14	1"	1⅜"
	15 to 18	1¾"	1⅜"
	over 18	1½"	1⅜"
23⅓" on centers	8 to 10	¾"	1⅜"
	10 to 14	1"	1⅜"
	15 to 18	1½"	1⅜"
	over 18	2"	1⅜"
30" to 36" on centers	8 to 10	1"	1⅜"
	10 to 14	1¼"	1⅜"
	15 to 18	2"	1⅜"
	over 18	2"	1½"



Left: caption: "Method of Providing Nailing Grounds for Wood Trim, Frames, Etc."
Right: caption: "Socket Strips For Tee Studs For Solid Partitions"
Key to Reference Letters: A – prong / B - T-stud for solid partitions / C - socket for T-stud / D - socket for U-stud / E - channel stud for hollow partitions / F - socket for channel stud / H - angle socket strip for T-studs / I - channel socket strip for channel stud / J - angle stud for corners / K – lath / L - furring strips / M - furring clip for attaching furring to I-beams / N - extension furring clip for attaching furring to I-beams out of level / P - toggle bolt / S – socket for angle studs / U - cornice furring strip / V - U-stud / X - socket strip for U-stud.



C
Improved Top and Bottom Socket for Tee Studs

D
Socket for U Studs

S
Socket for Angle Studs

F
Socket for Channel Studs

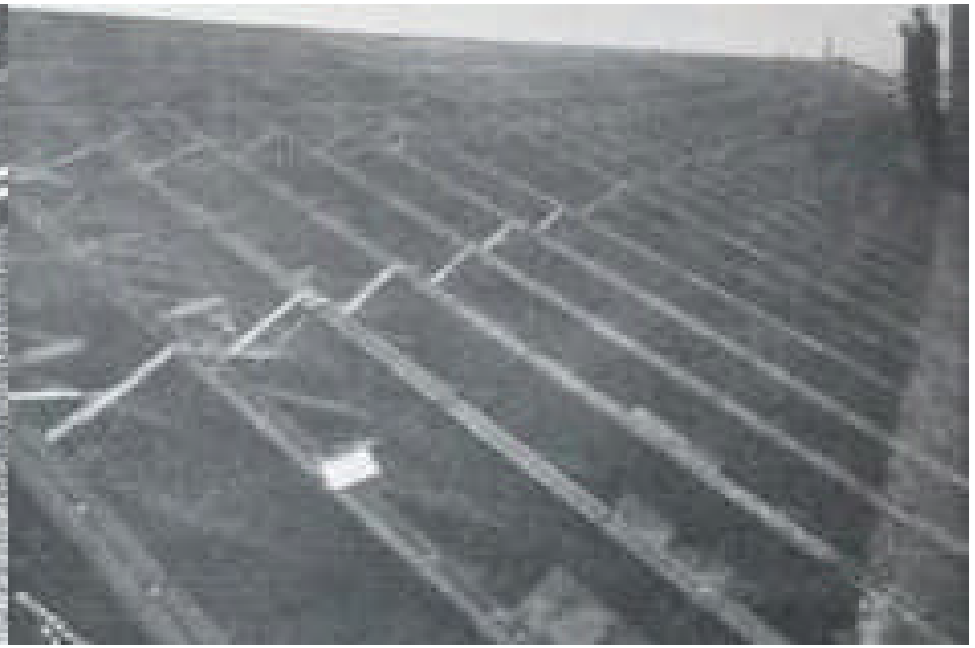
M
Beam Clip for Furring

M
Showing Use of Beam Clip

N
Extension Beam Clip for Leveling Uneven Beams

N
Showing Use of Extension Beam Clip

Roof Construction



"…The adaptability, strength, light weight, easy erection and fireproof qualities of Berloy Metal Lumber makes it an ideal material for all forms of roof construction. Ridge joists and other special materials for roof construction form a part of the Berloy Metal Lumber System and all principles and details involved have been worked out very fully by Berloy Engineers through long experience in designing roofs with this material. The Metal Lumber sections are supplied to the job cut, punched, and scheduled on working drawings, all ready to go into position rapidly and without difficulty. Concrete fill, nalecode, sheathing or other roofing materials may be readily applied over the joists using methods similar to those already described for floors. For flat roofs or roofs with a very slight pitch the principles of design and load bearing qualities for floors apply…"

RE: excerpt from: *Berloy Metal Lumber – 1924 Edition*

<u>Left</u>: caption: "Roof construction with Metal Lumber"

<u>Right</u>: caption: "Berloy Metal Lumber and Metal Lath on roof."

Suspended Ceiling Construction

"…The following specifications are adapted to all types of suspended ceilings and will be found entirely satisfactory when used with Berloy Metal Lumber construction, using Berloy Metal Lath or Ribplex and Berloy Cold Rolled Channels:

<u>Hangers</u> - The vertical members which carry the steel frame work. The minimum size for hangers shall be No. 8 galvanized wire, 1" x 3/16" flats or 7/32" round mild steel rods. The wire is to be attached by twisting three times - the flats, attached by bolting with 3/8" bolts - the rods by twisting twice, or by right angle bends and wiring. The hangers shall be spaced not to exceed 4' 0" on centers in cither direction.

<u>Runner Channels</u> - The heaviest horizontal members. Runner channels are to be not less than 1½" channels with a minimum weight of 0.442 lb. per lin. ft. They shall be spaced not to exceed 4' 0" on centers.

<u>Furring Channels</u> - The smallest horizontal members to which the lath is attached. Furring channels shall be not less than ¾" channels with a minimum weight of 0.276 lb. per lin. ft., and shall be attached to the runner channels by at least three loops of No. 16 galvanized wire at each intersection. The furring channels shall be spaced at various centers, depending upon the lath to be used.

<u>Metal Lath</u> - The plastering base and reinforcement. Metal lath shall weigh not less than 3 lbs. per sq. yd. It shall be attached to the furring channels by No. 18 gauge galvanized annealed lathers' wire every 6" along the furring channels…"

RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***

"…In conjunction with the production and sale of Metal Lumber The Berger Manufacturing Company maintains a complete and efficient Engineering service on all forms of Metal Lumber floor, roof and partition construction. Through this service is available the accumulated, practical experience of more than sixteen years of designing Metal Lumber construction for practically every type of building, and form of construction in which Metal Lumber can be used. This service offers:

<u>First</u> - expert assistance in investigating the advantages and adaptability of Metal Lumber for any particular building or special condition.

<u>Second</u> - Designing Data, layouts, special detailing, and other co-operative service. This bulletin and the more complete Berloy Building Materials Handbook, supply complete data to enable the Architect or Engineer to design Metal Lumber construction and many prefer to do so. Berger Engineers are always ready to assist by answering questions or supplying added details. If desired, they will prepare complete layouts from plans submitted by the architect with loads noted thereon.

<u>Third</u> - Estimates based on layouts prepared as above are supplied promptly with suggestions as to possible economies.

<u>Fourth</u> - In connection with shipment of materials, erection drawings are supplied to insure the proper placing of the Metal Lumber, each piece of which is cut to fit and marked to correspond with identification marks indicated on erection diagrams…"

RE: excerpt from: ***Berloy Metal Lumber – 1924 Edition***

Part 4

A Steel-Built Home

The Advance Column of Progress

"…Scientific research is the advance column of progress in any field of activity. In recent years the steel industry has spent millions of dollars in research and experiment in the use of steel in homes. The major portion of that research has been directed toward the adaptation of the usefulness of steel to the typical small home. New methods have been developed that give a four-room bungalow all the structural advantages which steel has offered for the largest buildings. Reductions in the price of steel in the last 100 years have played an important in making the metal available for use in the average home…"

RE: excerpt from: *Steel Makes the Home*

<u>Above</u>: caption: "Small steel framed homes in Syracuse, N.Y."

<u>Above</u>: caption: “Moderate-priced steel framed homes near Washington D.C.”
<u>Left</u>: caption: “Detroit, Mich. Steel framed house”

<u>Top Left</u>: caption: "Detroit, Mich. Steel frame. Designed by Ford Foundation."

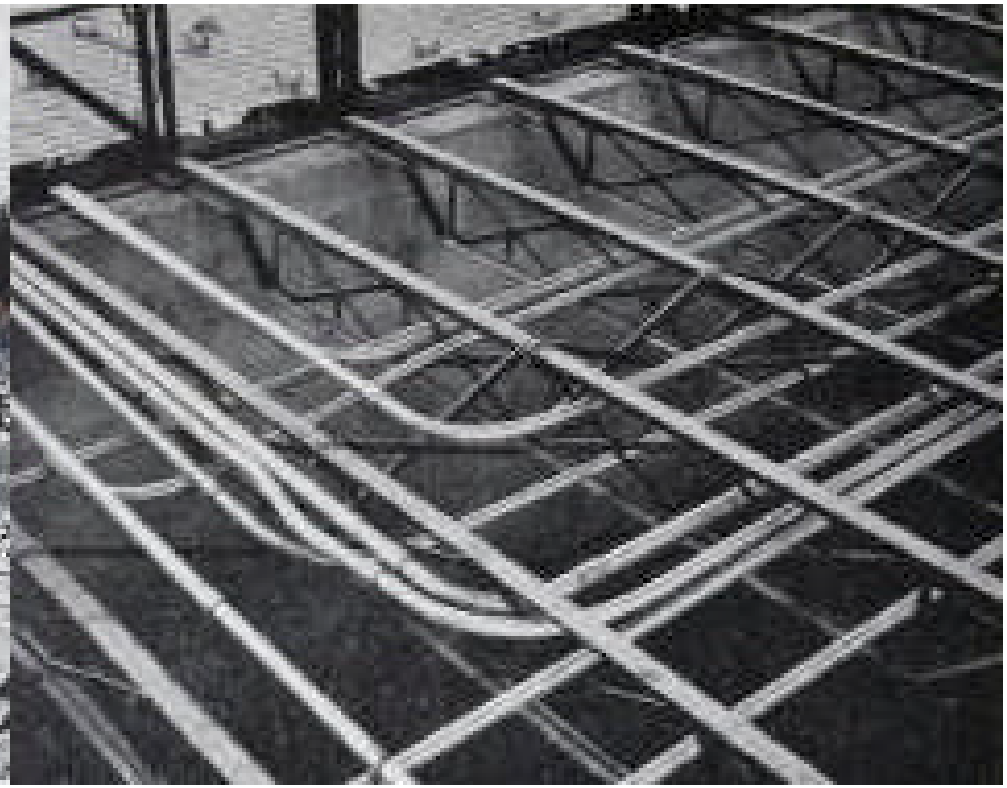
<u>Top Right</u>: caption: "Chicago, Ill. Steel frame. George Loan Tucker, Architect."

<u>Left</u>: caption: "Los Angeles, Cal. Steel frame and siding. Paul R. Williams, Architect."

Keeping it Simple

"…Lightweight steel parts have enabled builders to simplify their construction methods. Steel can be cold-formed, pressed, or otherwise formed into any shape. Partial pre-fabrication eliminates much on-the-job cutting and fitting, and various parts and panels can be bolted or welded easily and efficiently. Wiring and piping installations are simpler and quicker, and often require no cutting through structural members. Simplified methods lead to higher efficiency and substantially lower costs in construction and maintenance…"

RE: excerpt from: *Let's Build a Home*



"…There is nothing complicated about a home built of steel by modern methods. Standard light steel structural units, beams, joists and studs, are quickly and permanently joined together to make a framework for the house. To the framework are readily attached other materials such as insulation, lath, and plaster. Any experienced builder can handle the operations necessary at the home site…"

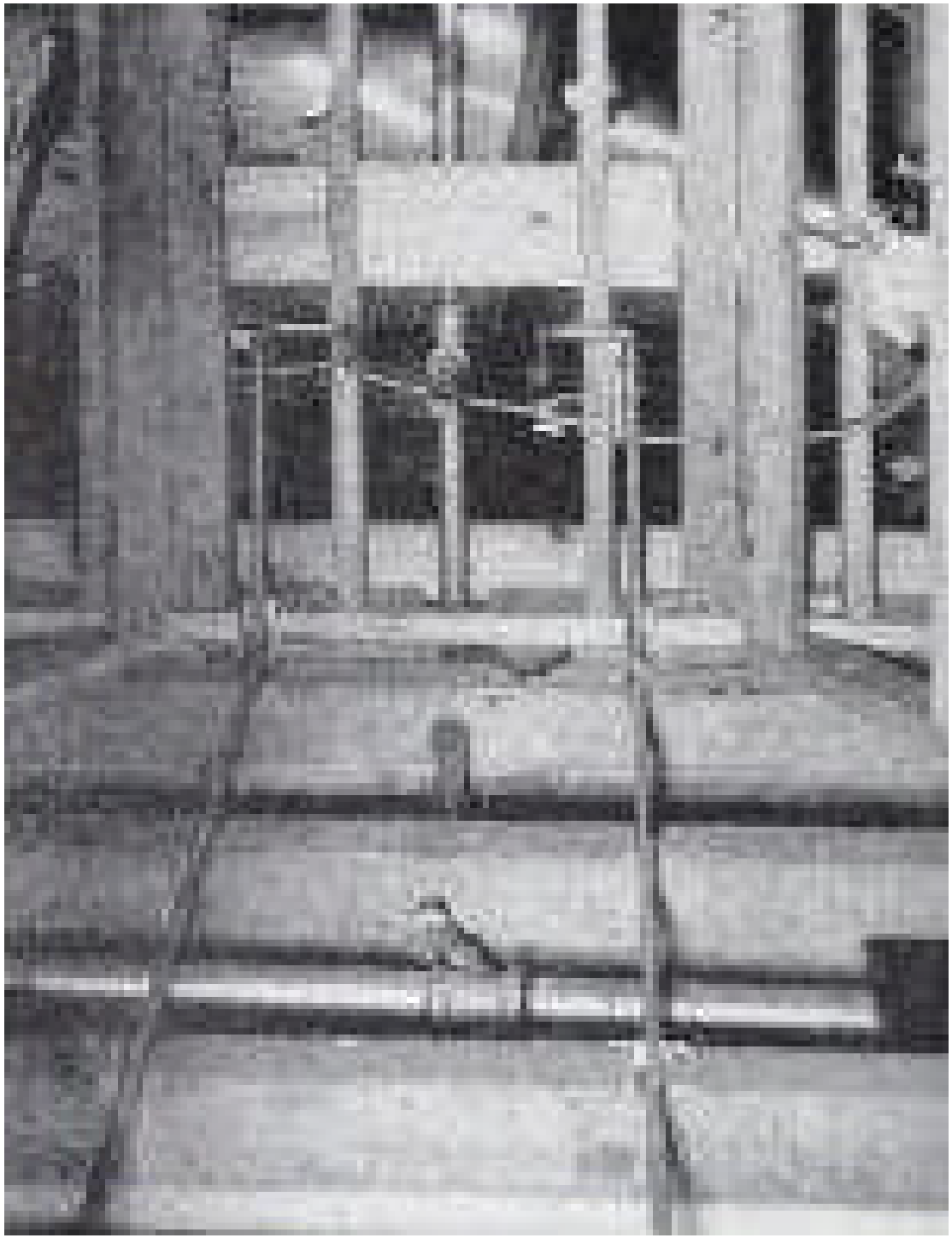
RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "Steel joists are easily installed and offer free passageways for piping"

<u>Right</u>: caption: "Designed for Efficiency. A steel chassis for piping."

"…Because steel is ideally suited to modern construction methods, home-building processes have been simplified and improved. Measurements of the 'cut and try' variety have given way to precision methods, and sound engineering principles are applied to the smallest detail of construct-ion…"

RE: excerpt from: *Steel Makes the Home*



"…Steel framework has solved some problems that have long troubled builders, such as the task of providing passage for the 1,000 or more feet of steel or iron pipe, and of cable and conduit for wiring, which go into the average small home. The installation of wiring and piping in a wood-framed house frequently requires hand-sawing to provide passageways through the beams. This can impair the strength of the framework…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "Much sawing and drilling were needed here before the vital steel and iron piping could be installed"

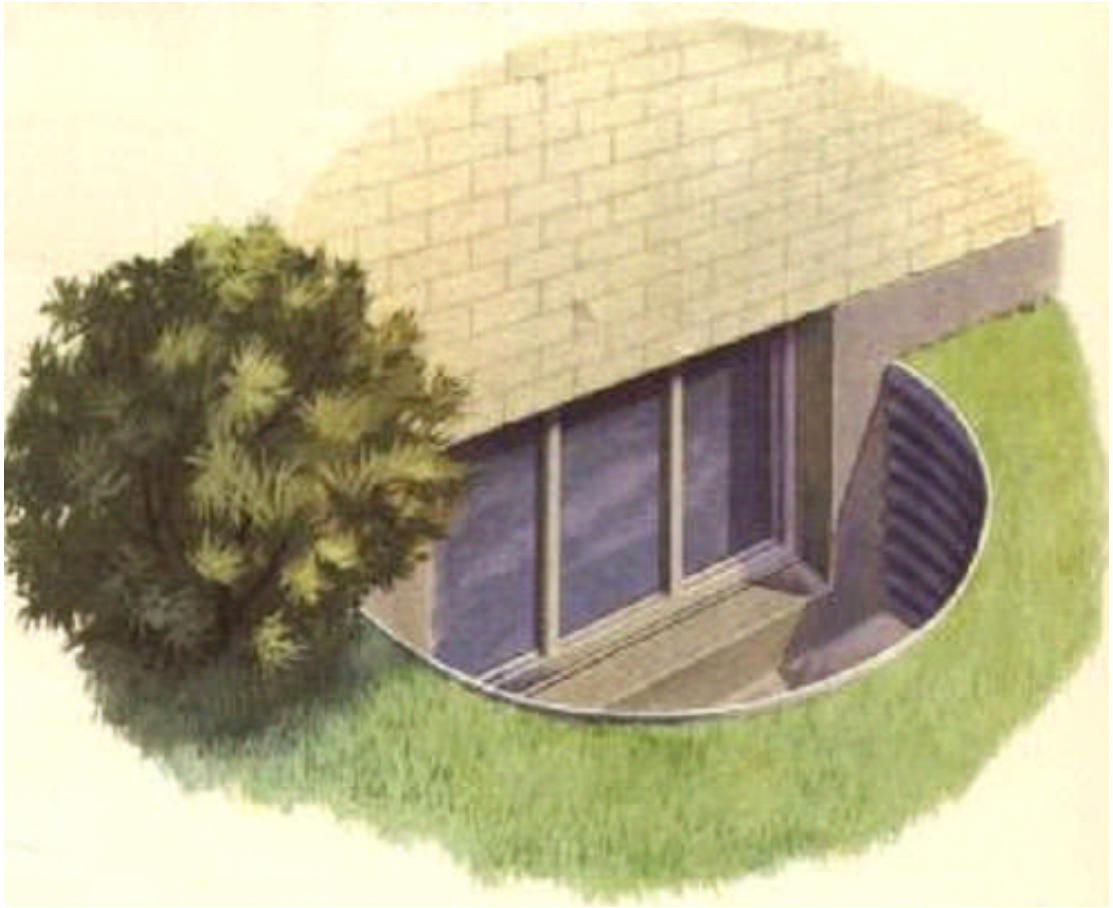
"…In a steel-built home the structural units arrive at the building site ready to be put into place and ready to receive piping and wiring in openings or spaces especially designed for this purpose. Supply systems are thus quickly installed, with great savings in time and expense to the homeowner…"

RE: excerpt from: *Steel Makes the Home*

<u>Above</u>: caption: "Middletown, O. Exterior steel paneling. Peter J. Weich, Architect. Floor plan and rear view at right, T&B"

<u>Top Left</u>: caption: "Steel panels slip into place quickly"

<u>Bottom Left</u>: caption: "Insulation is easily installed behind steel panels in Middletown house"



"…Steel area walls set around exterior basement windows permit better ventilation and lighting, providing additional and more useful recreational space to your home. Made of long-life copper steel, galvanized for extra protection, these area walls are securely fastened to the foundation wall…"

RE: excerpt from: *Let's Build A Home*

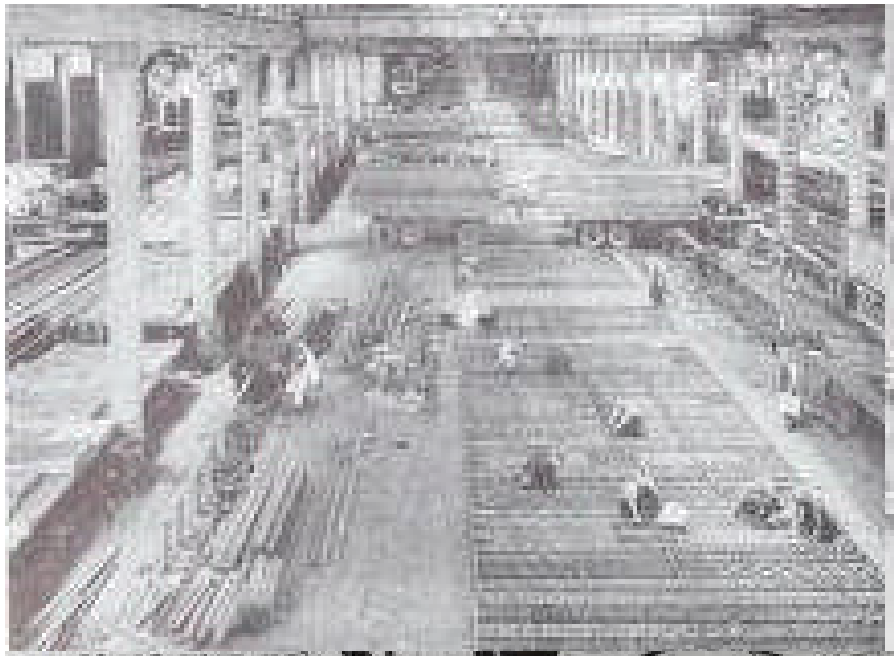
Made to Order

"…The use of complete steel wall units is a new development which is likely to be a common building practice in a few years. These units can be made in various stock sizes according to a modular system. In some cases they are simply factory-built sections, consisting of the framework with windows and door frames, which can be joined together at the site. They can be riveted, bolted, welded or clipped together into a complete sturdy structure. Other units are complete with interior and exterior wall surfaces finished or ready for painting or other treatment. These units are delivered with insulation, fittings and fastenings and can be quickly and easily erected…"

RE: excerpt from: *Let's Build A Home*

"…People who want individuality in their homes can profit by the use of pre-assembled and pre-fabricated building materials and equipment. Mass assembly of standardized parts has been a major factor in bringing down prices of such things as automobiles, refrigerators and radios in recent years. The same principles promise to reduce the cost of houses through standardization of basic structural units, while offering flexibility in arrangement and construction to fit any architectural treatment. Steel framework and paneling lend themselves readily to the economies of prefabrication. In most systems of construction, steel members are factory-cut for quick assembly at the site…"

RE: excerpt from: *Steel Makes the Home*



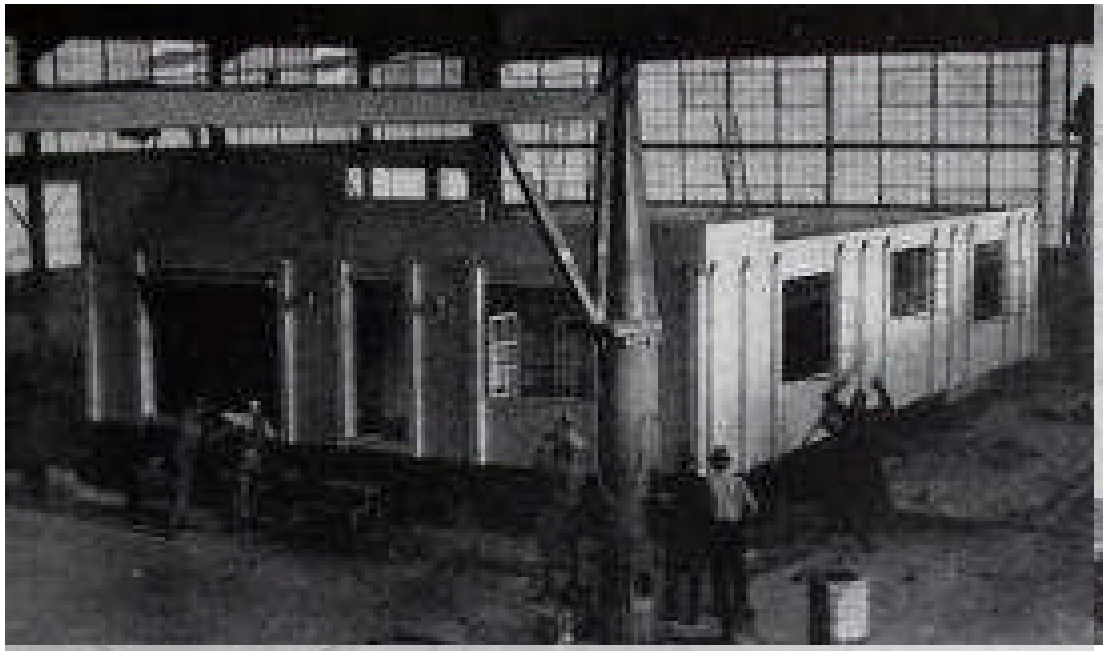
<u>Top Left</u>: caption: "Steel framework for homes welded efficiently in the factory"

<u>Top Right</u>: caption: "Sawing and hammering on the building site are greatly reduced when prefabricated framework is used"

<u>Left</u>: caption: "Home with prefabricated steel frame. Detroit, Mich. Hussey and Vose, Architects"

"…In some systems of construction, some parts of the framework may be welded or fastened together in the factory to form structural units as large as can be conveniently handled by the workmen who build the home. Thus different systems of building with steel offer varying degrees of prefabrication. Under certain systems of construction, rooms or wings may be added, or interior floor plans changed to suit the personal preferences of the owner. In that way the owner who is seeking the fullest measure of individuality in a home may be assured that the use of prefabricated steel framework or paneling will enable him easily to achieve that goal. A charming, distinctive home may be built with the new construction methods made available by the several steel building systems…"

RE: excerpt from: *Steel Makes the Home*



<u>Top Left</u>: caption: "Factory-assembled steel home. In practice, pre-fabricated steel is usually assembled on building site."

<u>Top Right</u>: caption: "A truck delivers a ready-made home to the site"

<u>Left</u>: caption: "Pre-fabricated steel home and barn near Peoria, Ill. Steel panels for such buildings may be assembled anywhere"

"…Because they can be made in a variety of sizes with provision for most any type of interior or exterior finish, factory-built wall units give the home builder complete flexibility in designing his home. At the same time they afford the economy and precise workmanship usually associated with complete factory mass production where work can proceed under ideal conditions…"

RE: excerpt from: *Let's Build A Home*

The Spice of Life

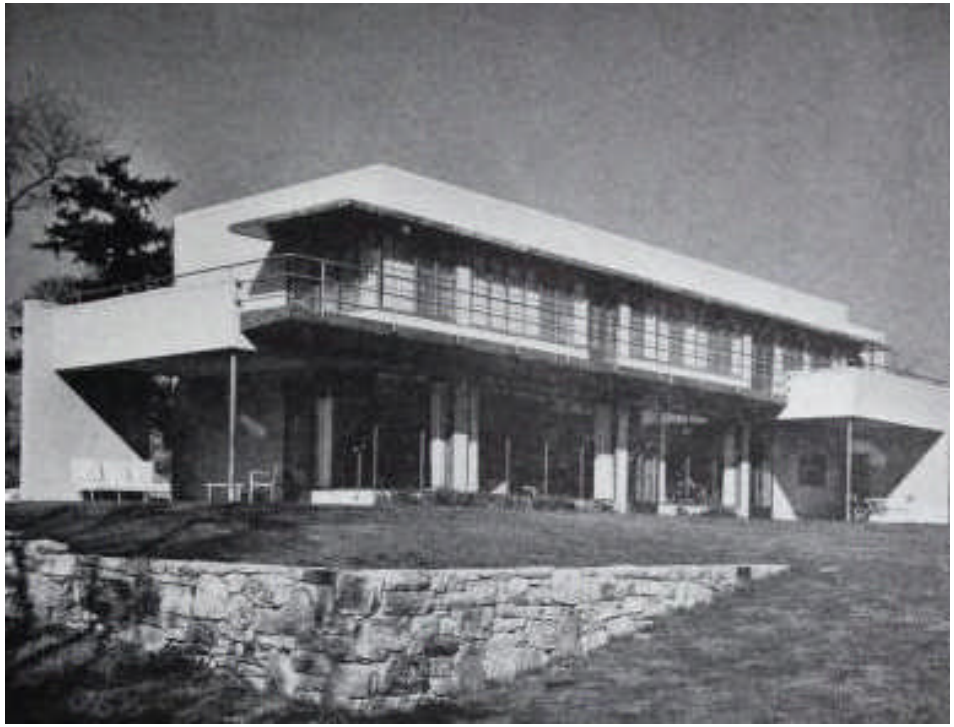
"…Any style of house can be built around a steel frame - Cape Cod Cottage, Spanish Mission, English Tudor, or 20th Century. In styles of architecture the American home planner today can choose from the best of every land and every time, adapted to the requirements of modern living…"

RE: excerpt from: *Steel Makes the Home*

<u>Top Left</u>: caption: "English. Scarsdale, N.Y. Julius Gregory, Architect."
<u>Top Right</u>: caption: "New England Colonial. New York World's Fair 1940. Cameron Clark. Architect."
<u>Left</u>: caption: "Modern, New Rochelle, N.Y. W. Stanwood Phillips, Architect."

"…Steel's strength means fewer frames and supports. This allows leeway in the interior design of a house, more useable space and even more or wider windows if you want them. The use of steel likewise permits the widest possible variety in exterior treatment. Steel fits well with any architectural style or period, and can be combined with a variety of materials to produce any desired effect…"

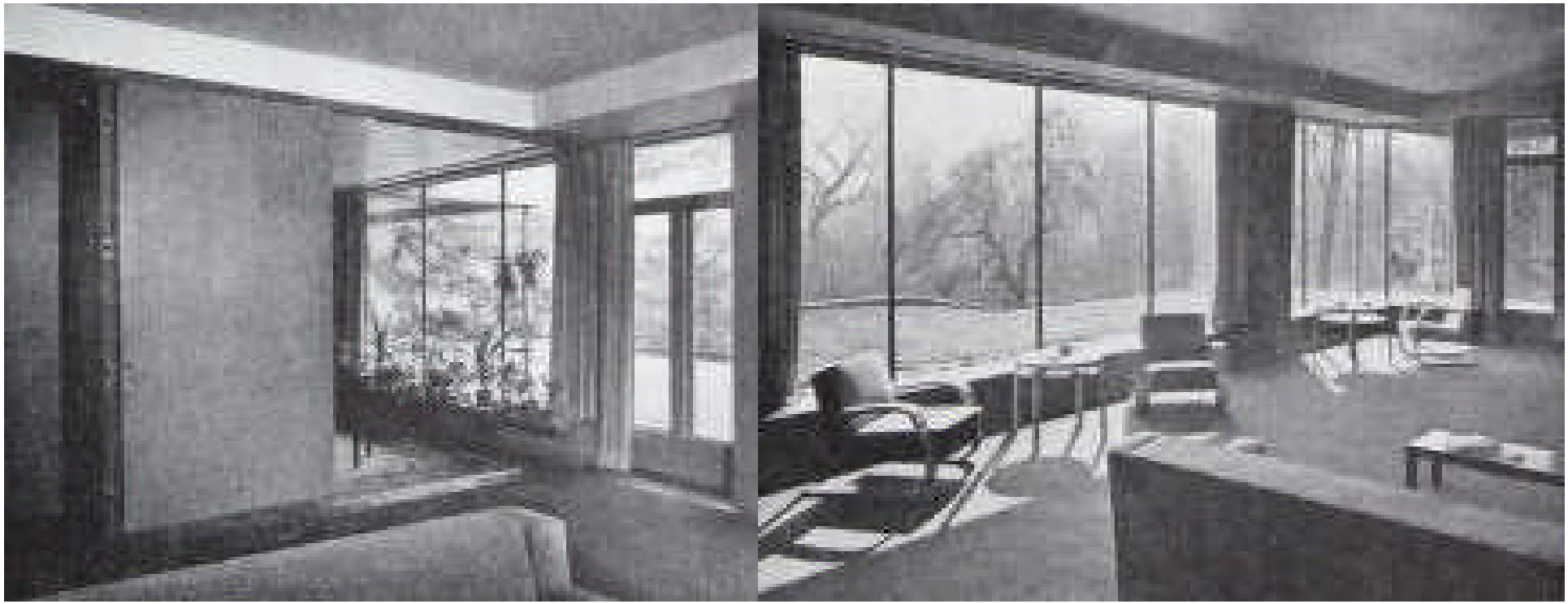
RE: excerpt from: *Let's Build a Home*



"…His choice of materials is equally wide. He may prefer a stone exterior, or brick, or wood, or stucco, or glass blocks, or sheet steel. Whatever his tastes, he retains full freedom of choice among both styles and materials when he selects steel framework for his house. He may select what is most suitable to the site and to the climate…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "Modern home with steel framework, Greenburgh, N.Y. Paul Doering, Architect."



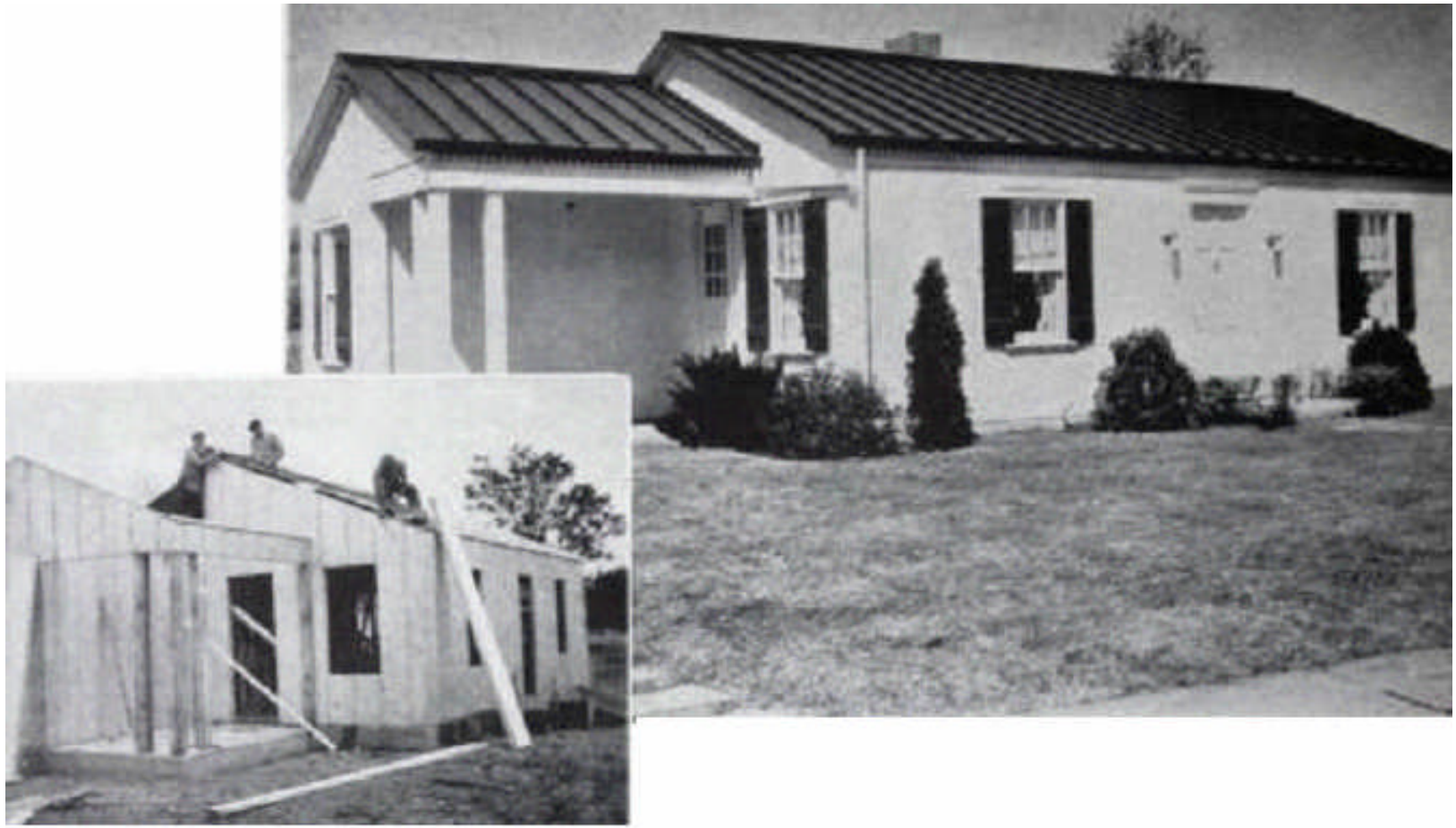
"…Because of its strength, steel permits great flexibility and efficiency in interior design. Framing members can be spaced farther apart, allowing larger widows. By reducing the number of supporting studs or walls, more unimpeded and usable space inside the home may be obtained. Also because of the strength of steel, walls and floors can be reduced in thickness to give more cubic feet of room space in the house. The appeal of a steel framed house is more than beauty of exterior. Its real value lies in its intrinsic serviceability…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "Movable walls provide flexibility. Greenburgh, N.Y."

<u>Right</u>: caption: "Steel framing permits use of large windows. Greenburgh, N.Y."

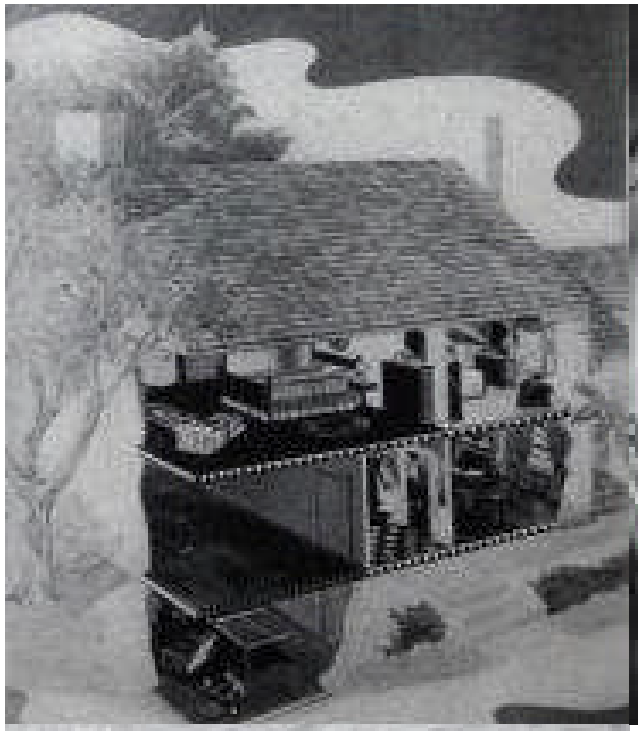
Panelized



"…Sheet steel can be formed into building panels that are strong and durable. When such panels are welded or otherwise joined together they fulfill two functions at the same time. They act as a supporting framework for the home, and also as a covering material for walls, ceiling or floors. In houses thus constructed no other framework may be needed. Hundreds of such homes are now in use…"

RE: excerpt from: *Steel Makes the Home*

<u>Above</u>: caption: "Small home. Middletown, O. Built with sheet steel panels"



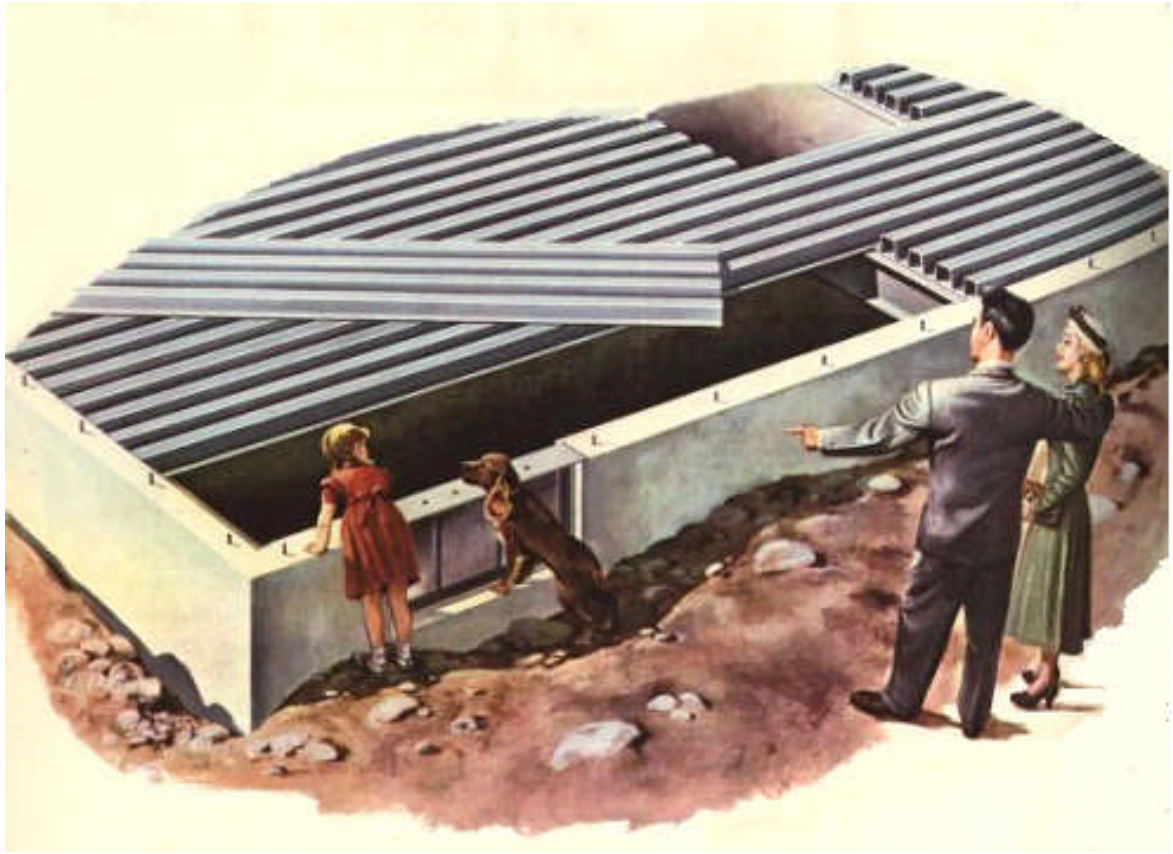
"…Two general types of steel panels have been especially developed for use in small homes. One type is hollow; the other has one open side. Piping and wiring installation is easy with either type. The outside surface of the panels may be painted or covered with stucco, brick, plaster or other materials in accordance with the owner's tastes…"

RE: excerpt from: *Steel Makes the Home*

<u>Above</u>: caption: "Steel floor panels also make an attractive ceiling"

<u>Top Left</u>: caption: "This type of steel floor panel is flat on the underside"

<u>Bottom Left</u>: caption: "Welding steel floor panels"



"…Properly designed steel flooring assures a floor that won't warp, squeak, or sag under the continual punishment which an active family can inflict. A floor made up of steel sheets which have been formed into long hollow cells or channels is rigid, strong, low in cost, and also easy to install. Wiring and pipes can be passed through these cells or channels. It's easy to provide for the constantly increasing volume of electric current used in homes. Any type of surface covering - tile, hardwood, cement, linoleum - can be laid on this type of floor..."

RE: excerpt from: *Let's Build a Home*

Better Living Made Possible

"…The safety and strength of steel have played an important part in the improvement of apartment houses. Before the development of light steel construction, steel framework was used mainly in tall apartment houses. Now, however, many two, three or four story garden apartments are built with light steel framework and steel floor systems…"

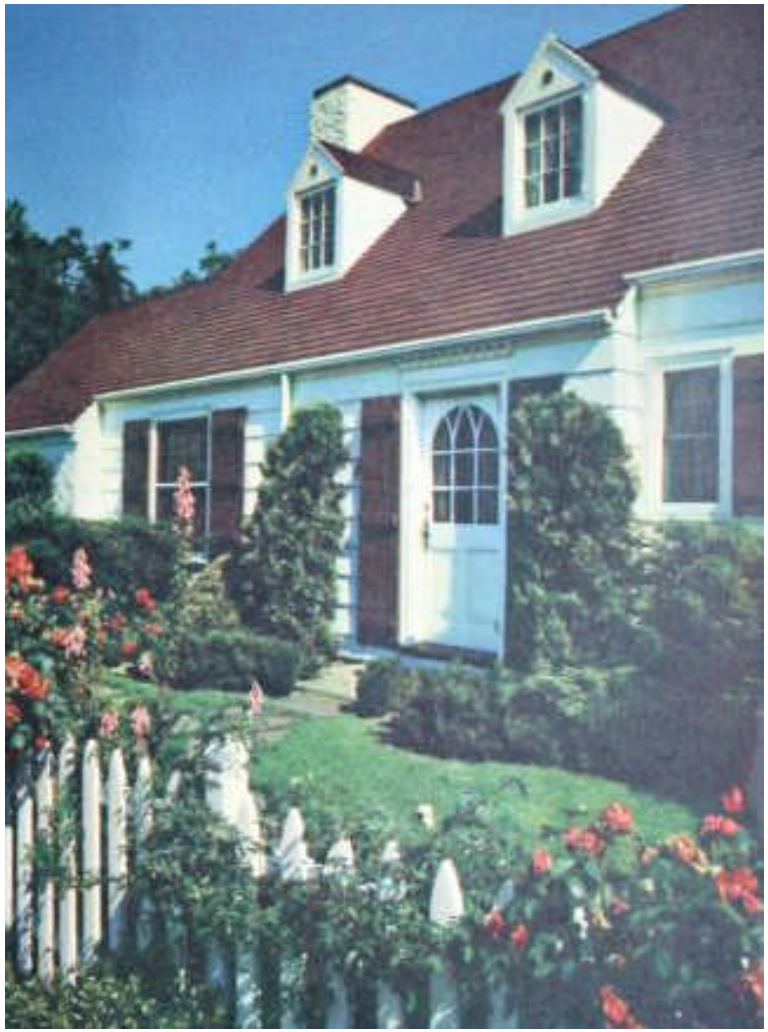
RE: excerpt from: *Steel Makes the Home*

"…Apartment houses of small and medium size can now be made durable, fire safe, and inexpensive to maintain. Furthermore they afford greater areas for sunlight and recreation, particularly in suburban areas, than may be obtained in the tall apartments of the city. Improved construction methods often make possible the erection of the entire light steel framework for an apartment within one week. Economies thus effected help to bring better housing within reach of more people…"

RE: excerpt from: *Steel Makes the Home*

<u>Left</u>: caption: "Garden apartments provide space for sunlight and recreation"

On Guard



"…Steel is making an increasingly important contribution to better housing. It has added to beauty, and to comfort and conveniences. But in the home, a factor of even greater weight is that of safety. Steel guards the home. Because it is the natural enemy of fires, storms and termites, steel is insurance against their attacks. Outdoors and indoors, visibly and where it cannot be seen, steel guards the home against forces that might impair or destroy it."

RE: excerpt from: *Steel Makes the Home*

Cold-Rolled

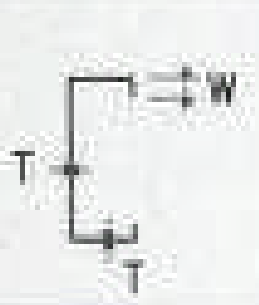
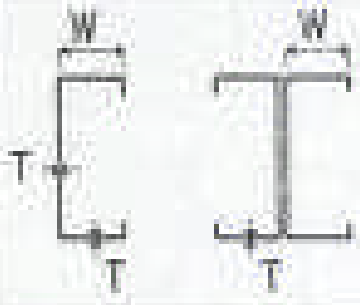
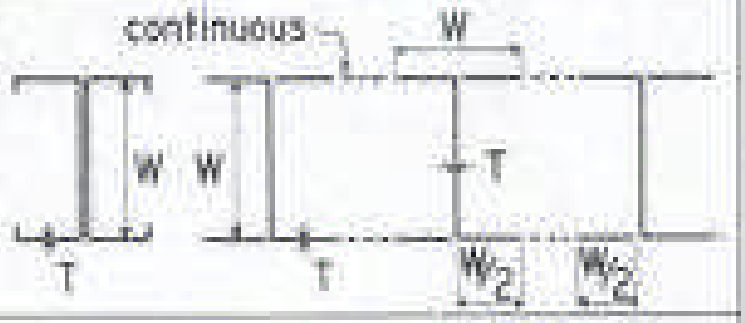
"…Some systems of steel frame construction utilize members, popularly called metal lumber, made of thin steel supplied in the form of flat sheets or rolled strip, the members subsequently being shaped by cold bending or rolling, with or without the aid of welding. The use of such members as joists is covered by the standard specification of the Steel Joist Institute.."

RE: excerpt from: *Steel Framing for Small Residences: A Guidebook for Architects and Builders* (1933)

"…The employment of sheet steel for other types of framing such as studs, girts, and cellular and panel construction, is quite recent, and the probable behavior of untested sections, whether employed alone as framing or combined with covering, is not known sufficiently well to warrant the formulation at this time of definite rules for their use. Up to the present very little information has been made available that will permit architects or engineers to prepare even a preliminary design that contemplates the use of new forms of sheet steel as structural members. It is well recognized that large un-braced areas of thin gage material will buckle when subjected to bending and compressive stresses. The strength of such sections can be substantially increased if stiffened by flanging their edges…"

RE: excerpt from: *Steel Framing for Small Residences: A Guidebook for Architects and Builders*

Basis of Design

DEGREE OF FIXITY	One Edge Free One Edge Restrained	One Edge Restrained One Edge Fixed	Both Edges Fixed
LOCATION OF EFFECTIVE ELEMENT			
RATIO W/T	10	30	100

"…One of the most important questions concerns the width of the elements of the section which can be considered effective to resist bending or compressive stress. As a result of a study of representative American and European practice, the following table is offered as a tentative basis on which metal lumber designs may be computed for preliminary purposes. In each case the design should be checked by full size tests before it is adopted for use…"

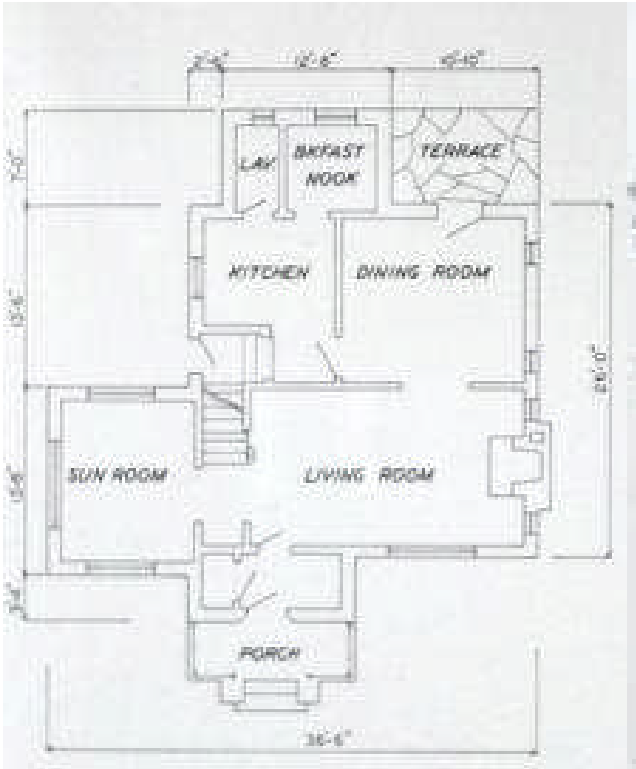
RE: excerpt from: *Steel Framing for Small Residences: A Guidebook for Architects and Builders*

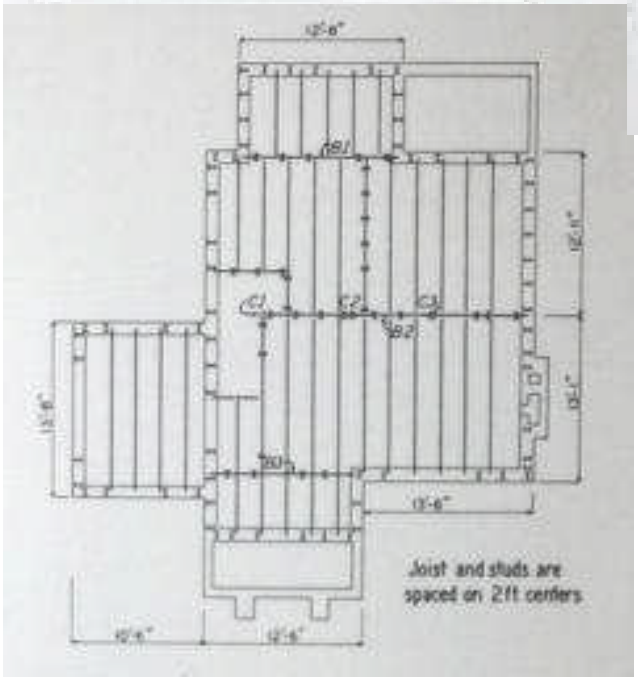
<u>Above</u>: caption: "Tentative Ratios of Flat Width (W) to Thickness (T) of Element to be Assumed as Effective in Computing the Geometric Properties of Individual Sheet Metal Sections"

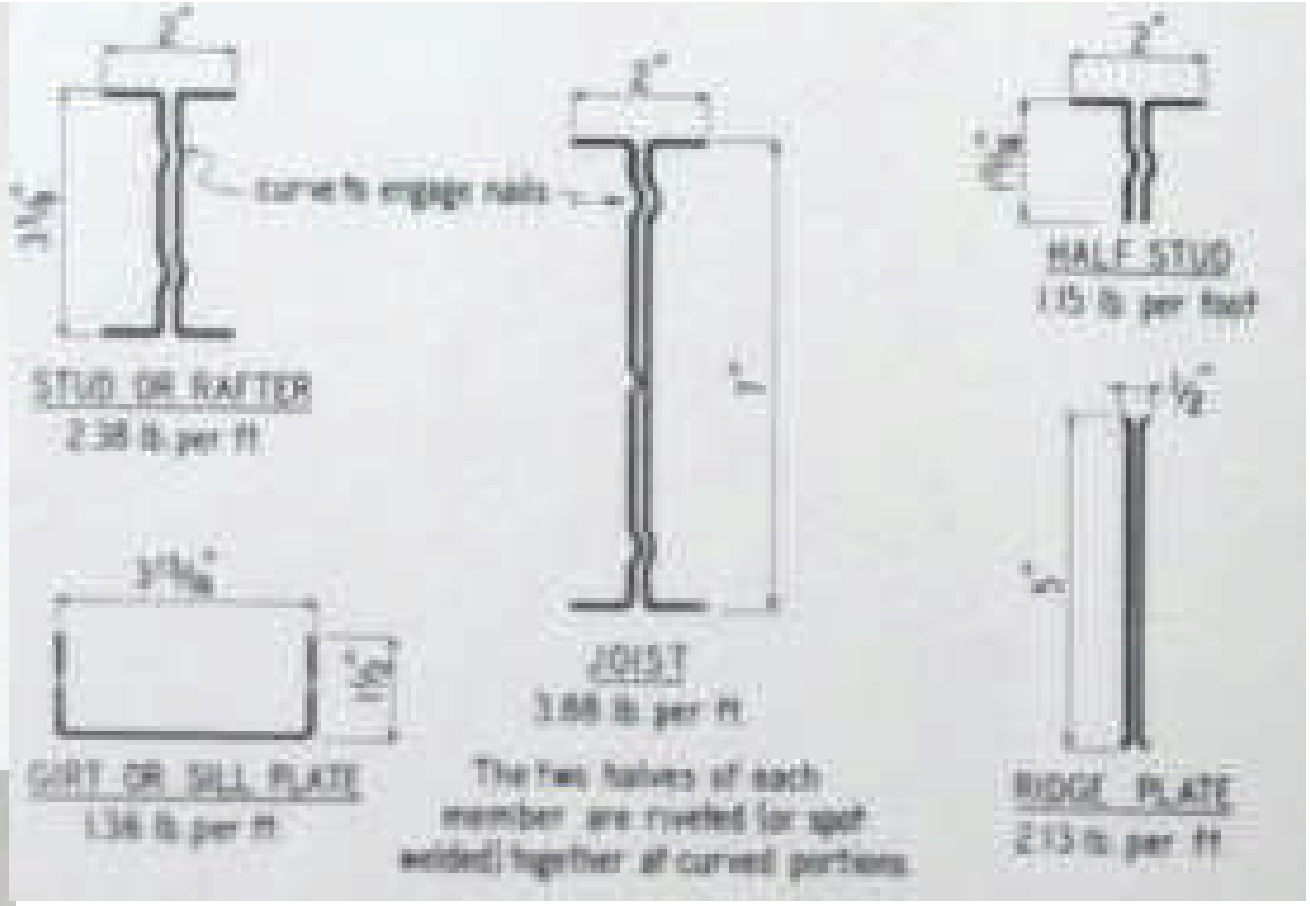
Design/Construction Example

"...*RESIDENCE OF THOMAS C. SCOTT / ARCHITECT - GEORGE R. WELLER, DETROIT, MICHIGAN / BUILDERS - STRAN-STEEL CORPORATION.** ***This 7-room residence of modern English type is covered with brick, stucco and wood siding. The house is framed with 6-tons of steel joists, studs, and rafters, so formed as to permit other materials to be nailed directly to the steel. Carpenters were employed to erect the house. Fire-resistive construction using concrete sub-floor with fire cut-off at each floor, special fire-resisting roof, and steel framing, made possible a permanent residence, and effected a reduction of 5O% in insurance rates…"

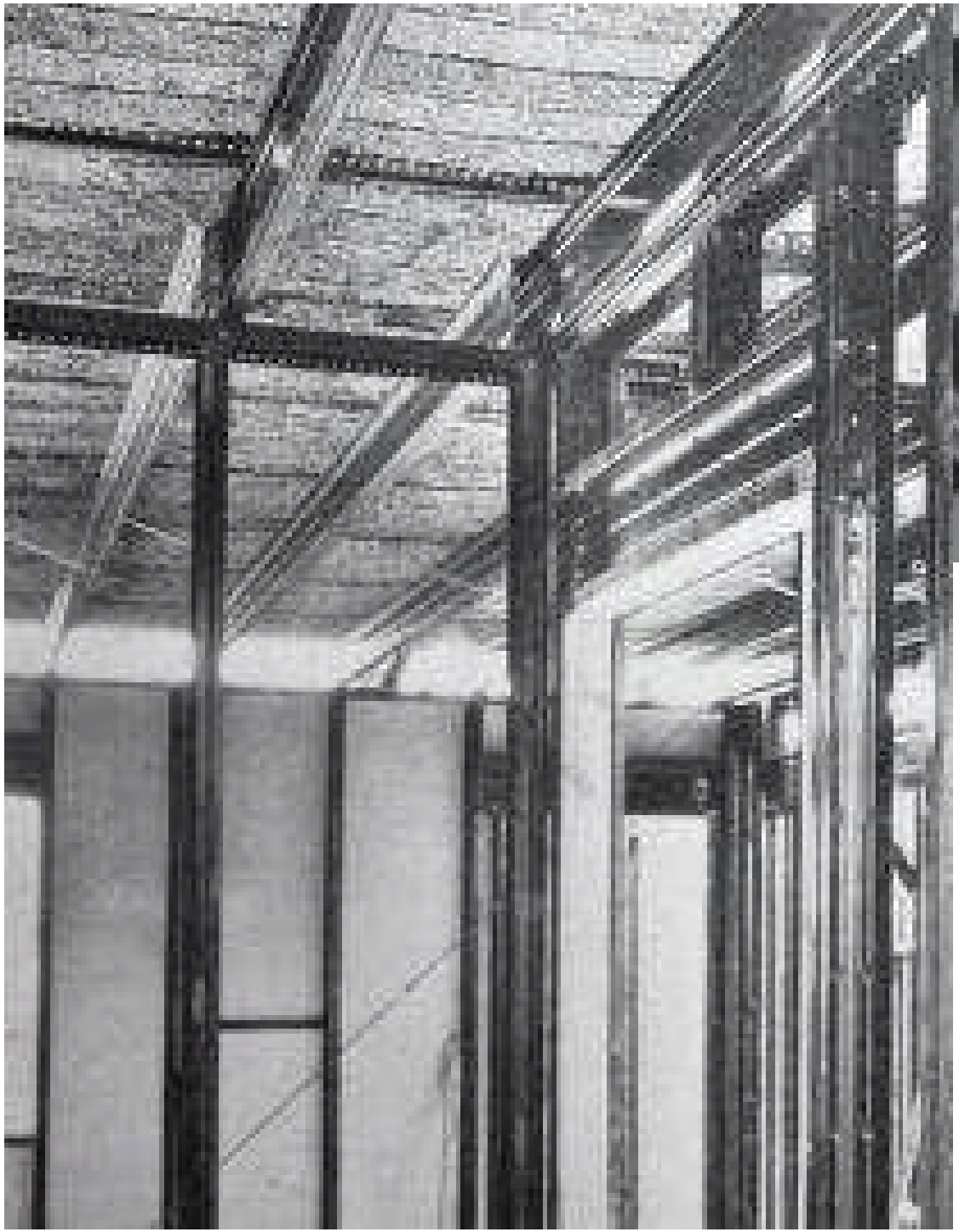
RE: excerpt from: ***Steel Framing for Small Residences: A Guidebook for Architects and Builders***

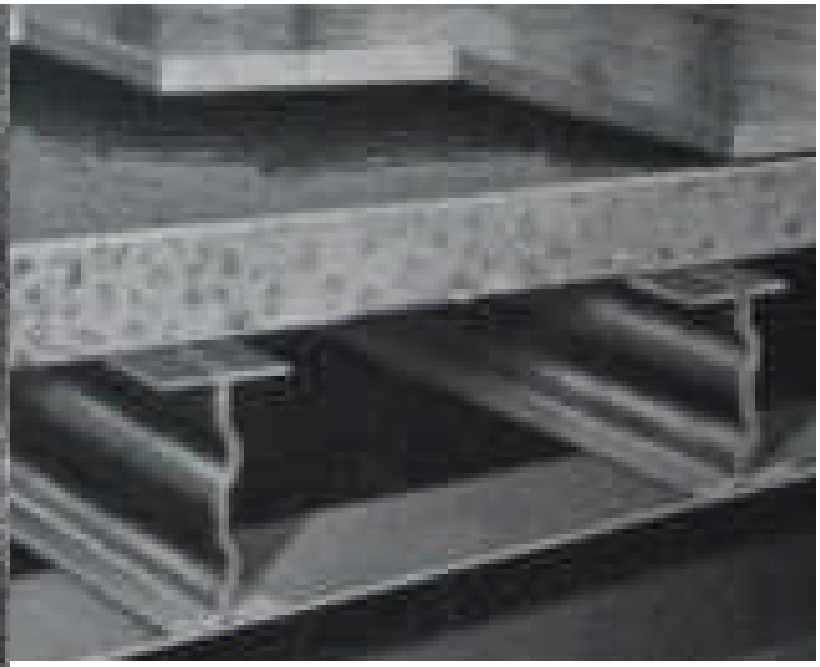






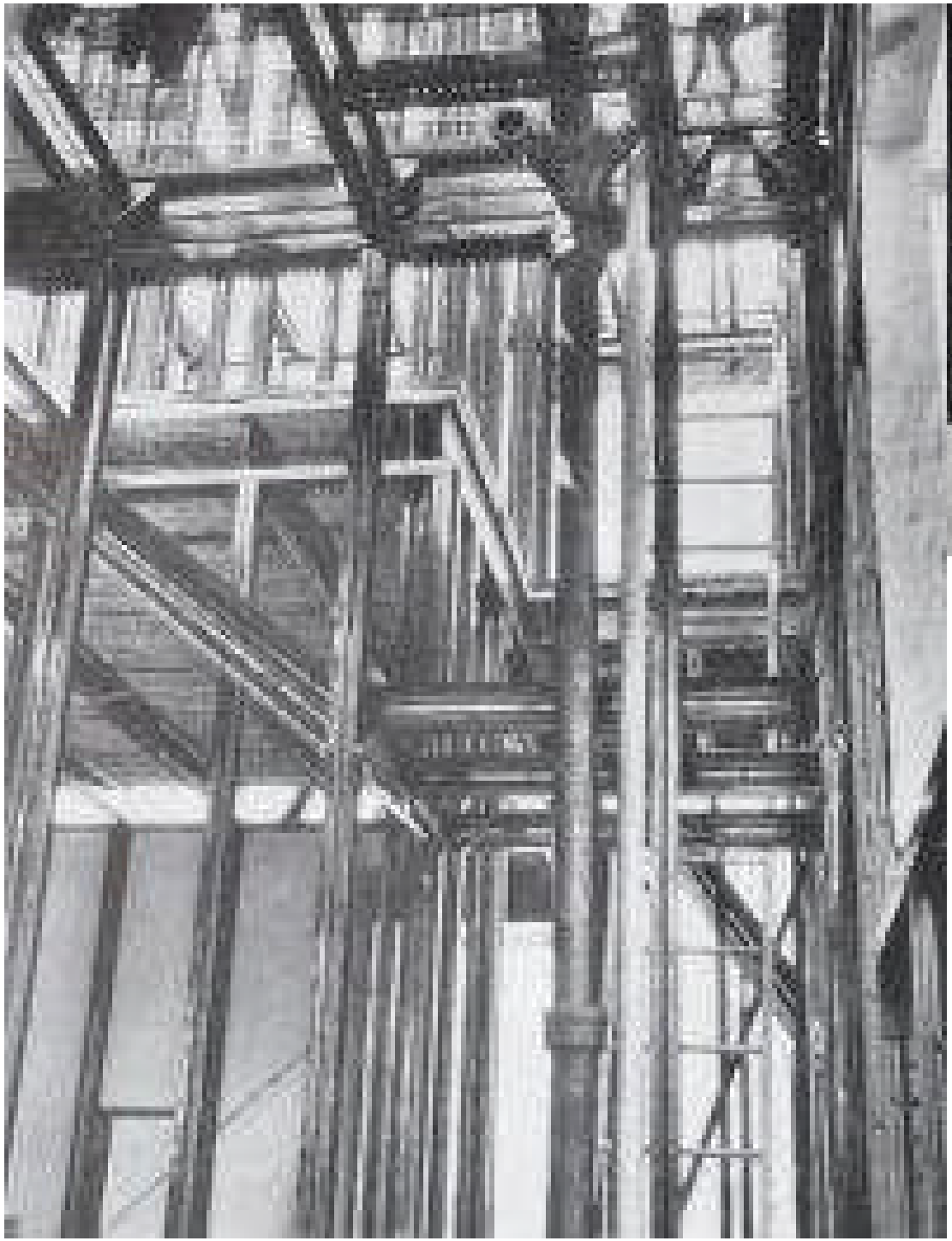
<u>Top Left</u>: caption: "First Floor Architectural Plan"
<u>Bottom Left</u>: caption: "First Floor Steel Framing Plan. C1-3, are 4" steel pipe basement columns. Bl-3, are 7" rolled steel I-beams. Other joists are of the metal lumber type shown above."
<u>Above</u>: caption: "Stran-Steel structural members of type formed out of long lengths of 16 gage (1/16" thick) strip steel. Some sections reinforced by bending back metal flanges to form two-ply flanges.





<u>Above</u>: caption: "Cutaway View Showing Floor Construction. The concrete slab is floated smooth to receive mastic for placing wood or any other suitable finish. The steel joists, resting on rolled steel beams, support wire lath or mesh, over which the concrete is poured."

<u>Left</u>: caption: "Second Floor Steel Framing (seen from below). Steel bridging ties are nailed directly to joists. The exterior wall sheathing has just been applied. Door header is composed of a steel joist section and two steel sill plates."

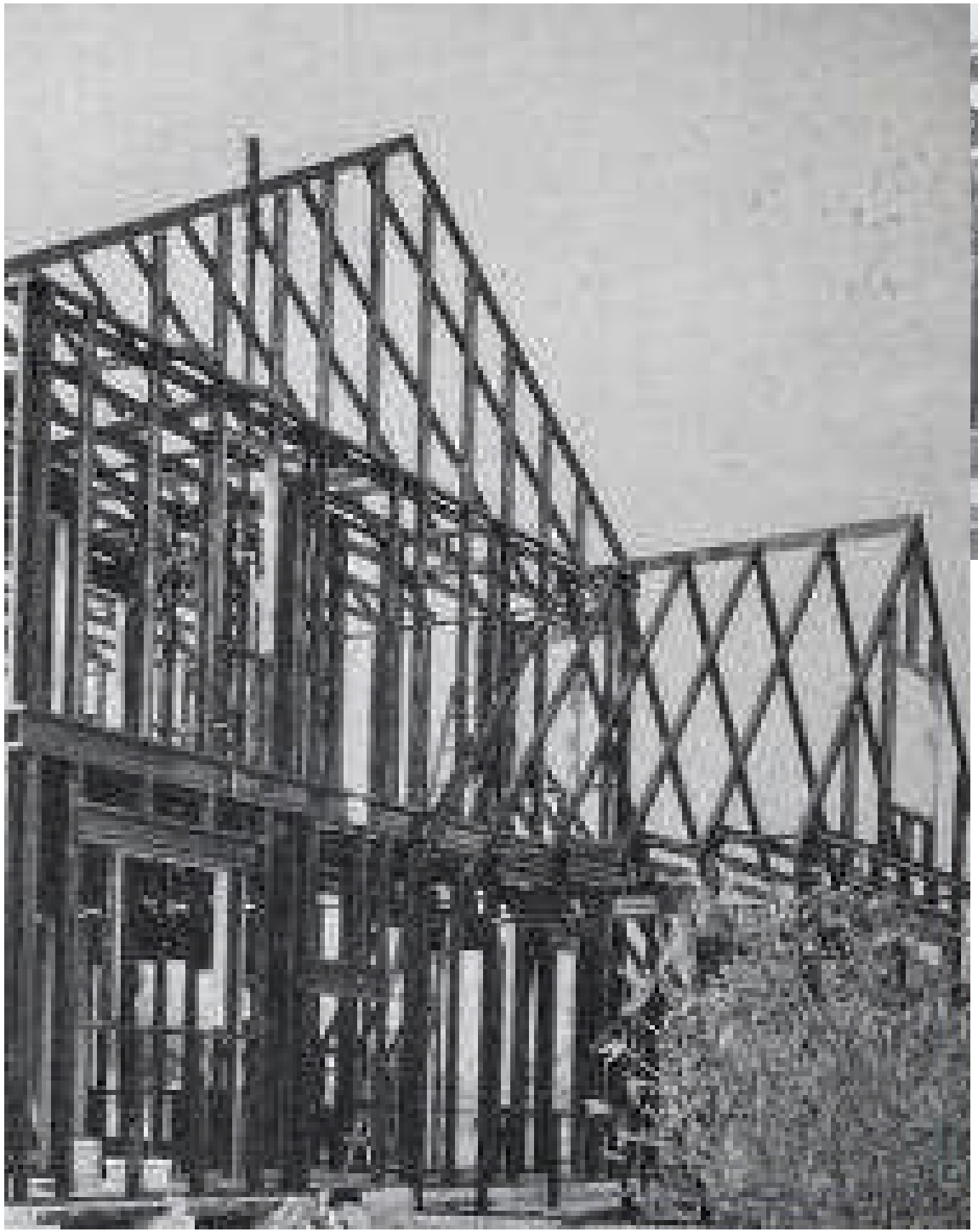


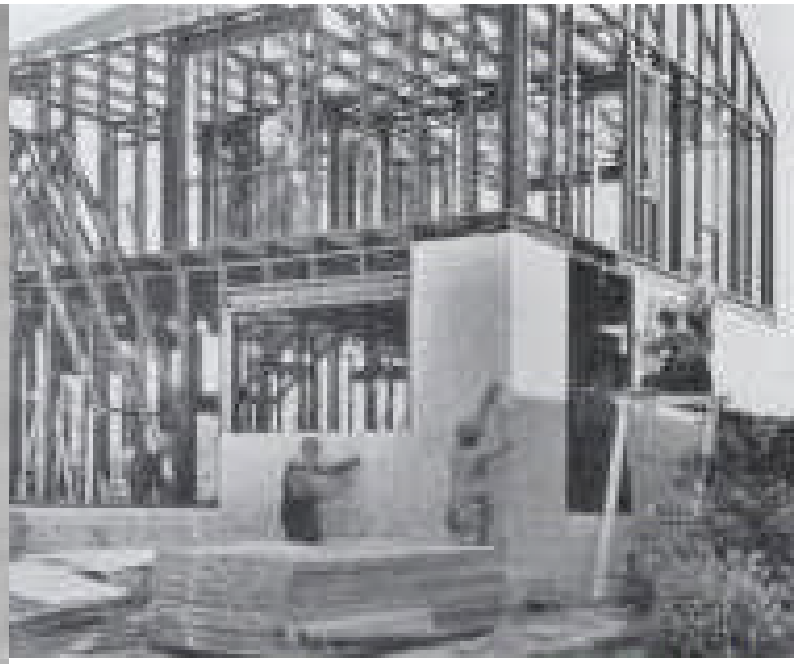
<u>Above</u>: caption: “Steel Framing Around Stairwell. Studs are doubled at corners. Another view of this stairwell is shown at left.”

<u>Left</u>: caption: “View of Steel Stairwell Framing From Below. Steel hangers used where steel joists frame into each other at right angles The piping shown is concealed in the stair partitions.”

<u>Above</u>: caption: "Steel Framing Over Sunroom. The sloping steel rafters are bolted to the ridge plate by a connection plate bent at the site to the proper slope."

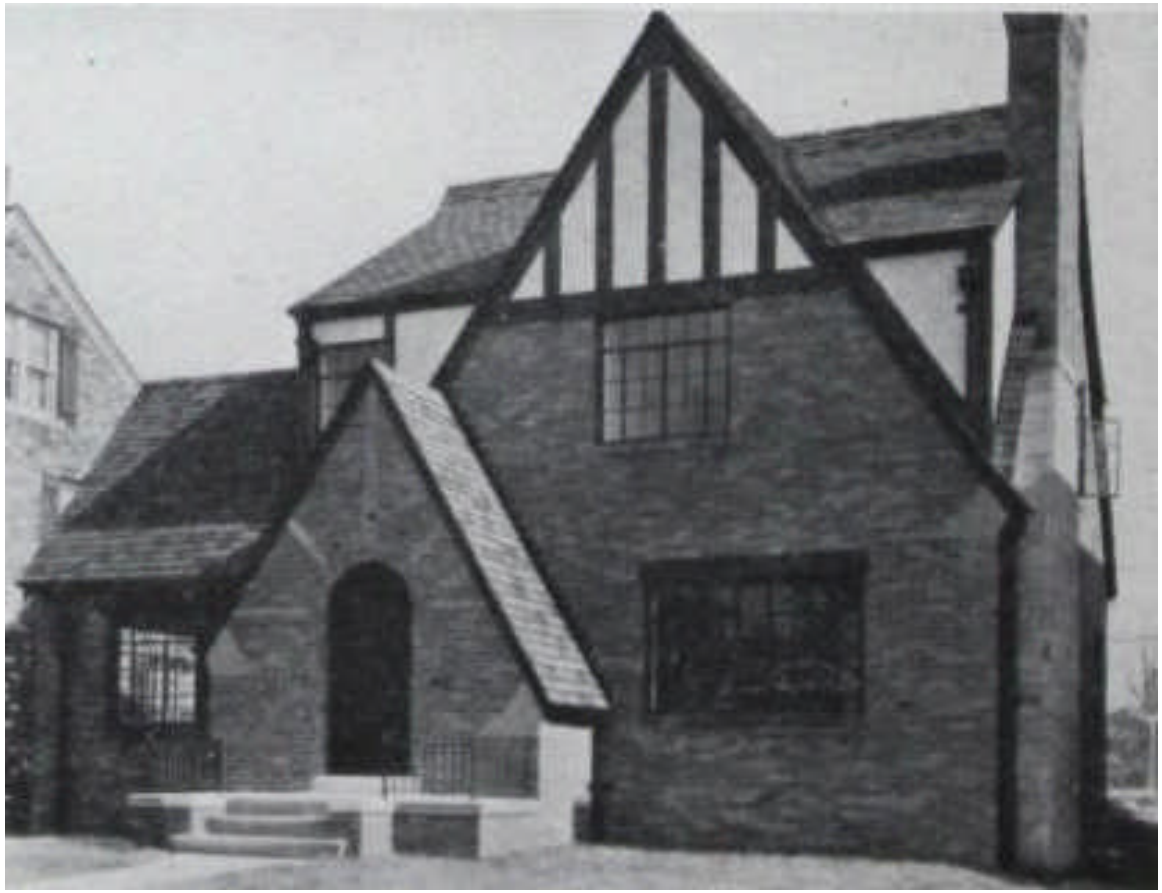
<u>Left</u>: caption: "Second Story Door and Window Framing. Beyond the wall framing are seen the ceiling joists over breakfast nook and lavatory. The steel rods and turnbuckles are for truing the house during construction. They are removed after sheathing.





<u>Left</u>: caption: "Left Elevation of Steel Frame. Steel sill plates are anchored to the foundation of sand-lime blocks topped with three courses of brick."

<u>Above</u>: caption: "Sheathing Being Applied to Steel Frame. Fiber insulating boards, 4 x 9 ft. x 1/2 inch thick, are nailed directly to studs The nails clinch in the curved portion of the stud and thus are permanently held m place."



Part 5

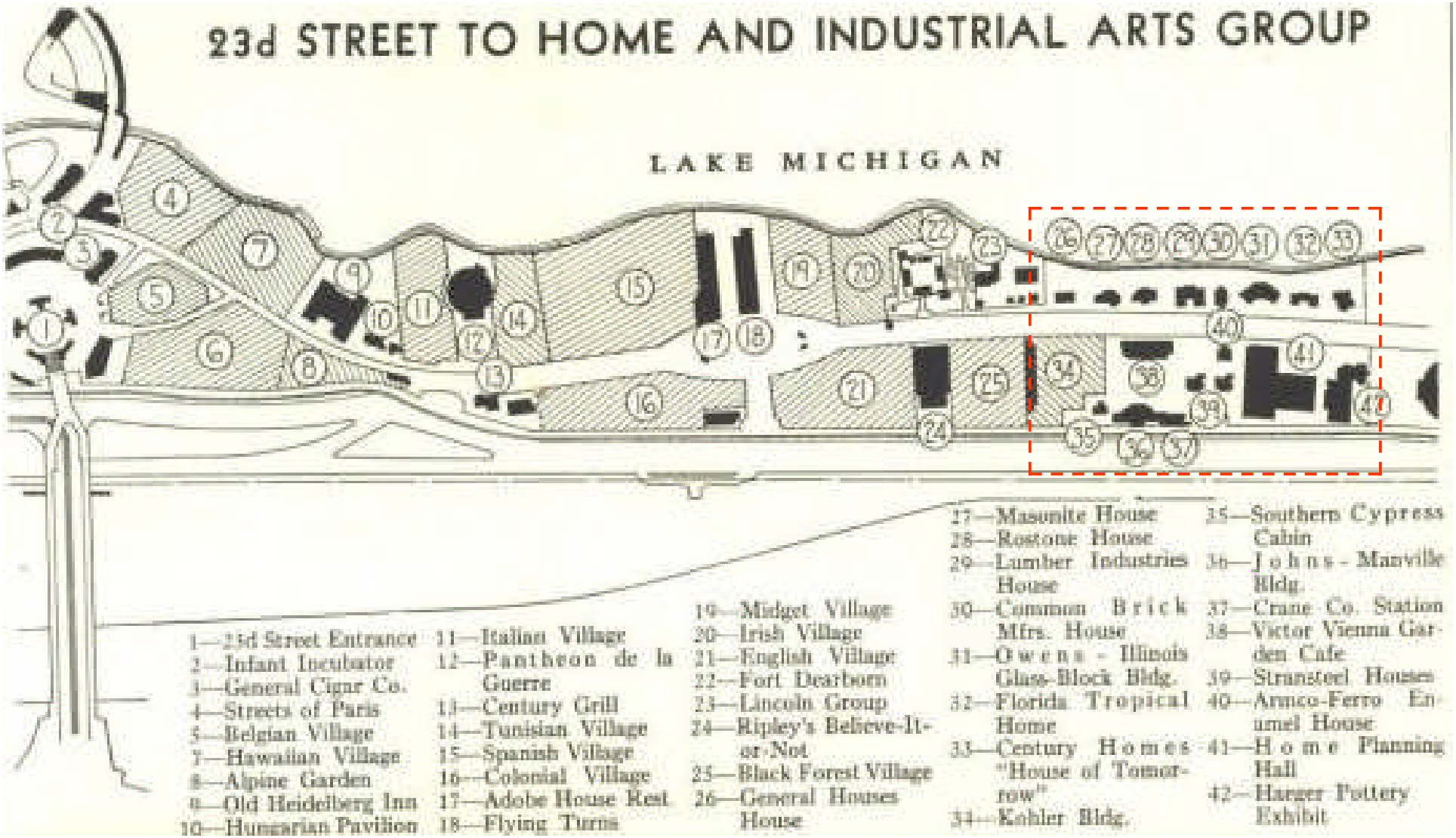
A Fair to Remember

A Century of Progress

"You will enter A Century of Progress for the first time perhaps like an explorer - curious and eager - penetrating an amazingly rumored domain in search of treasure. It well might be, whether by day or by night you come, that the veritable bombardment of color and light that greets you may create the illusion of stepping within a giant jewel, its myriad facets flashing countless rays of beauty…"

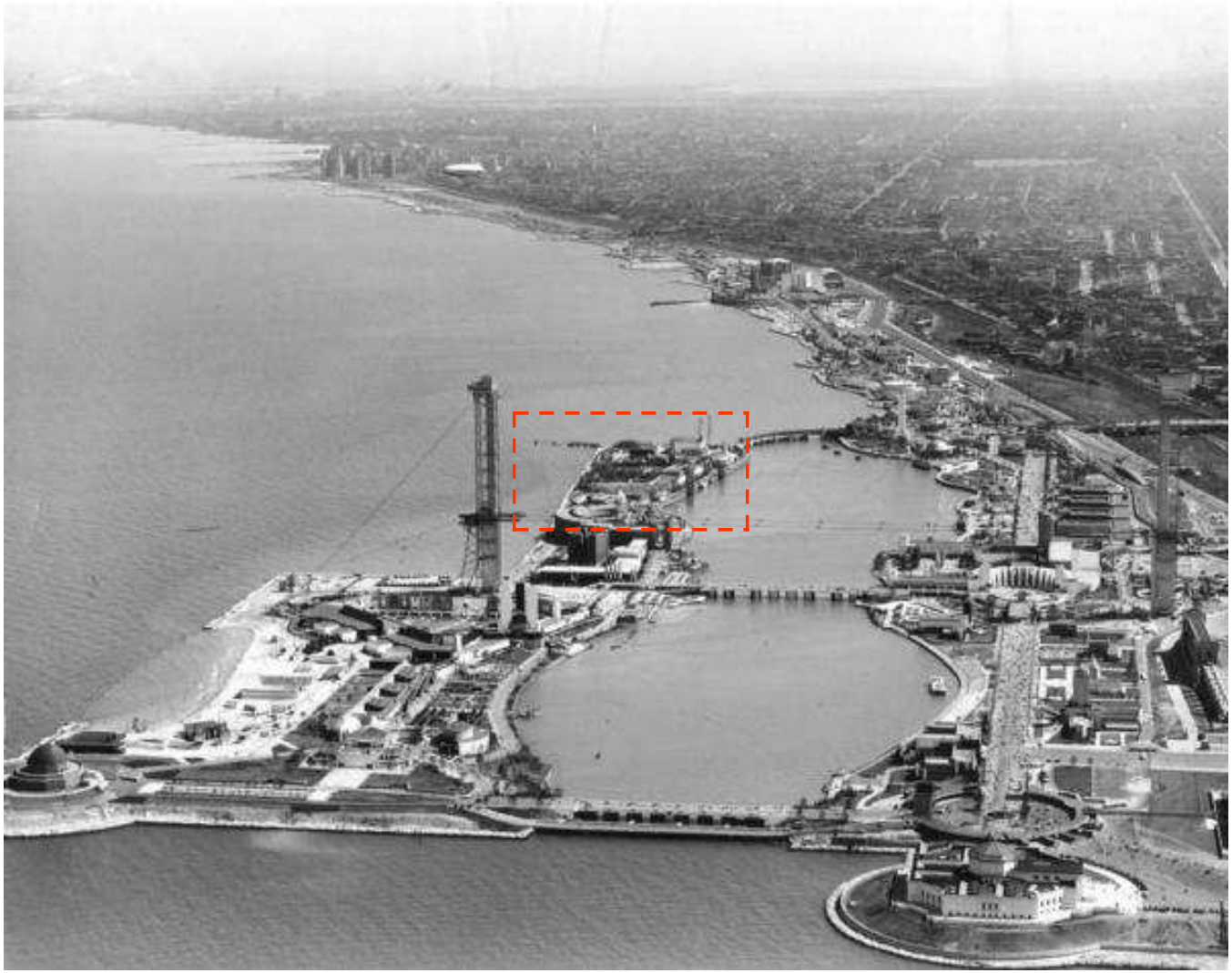
RE: excerpt from: *Your Book of the Fair*

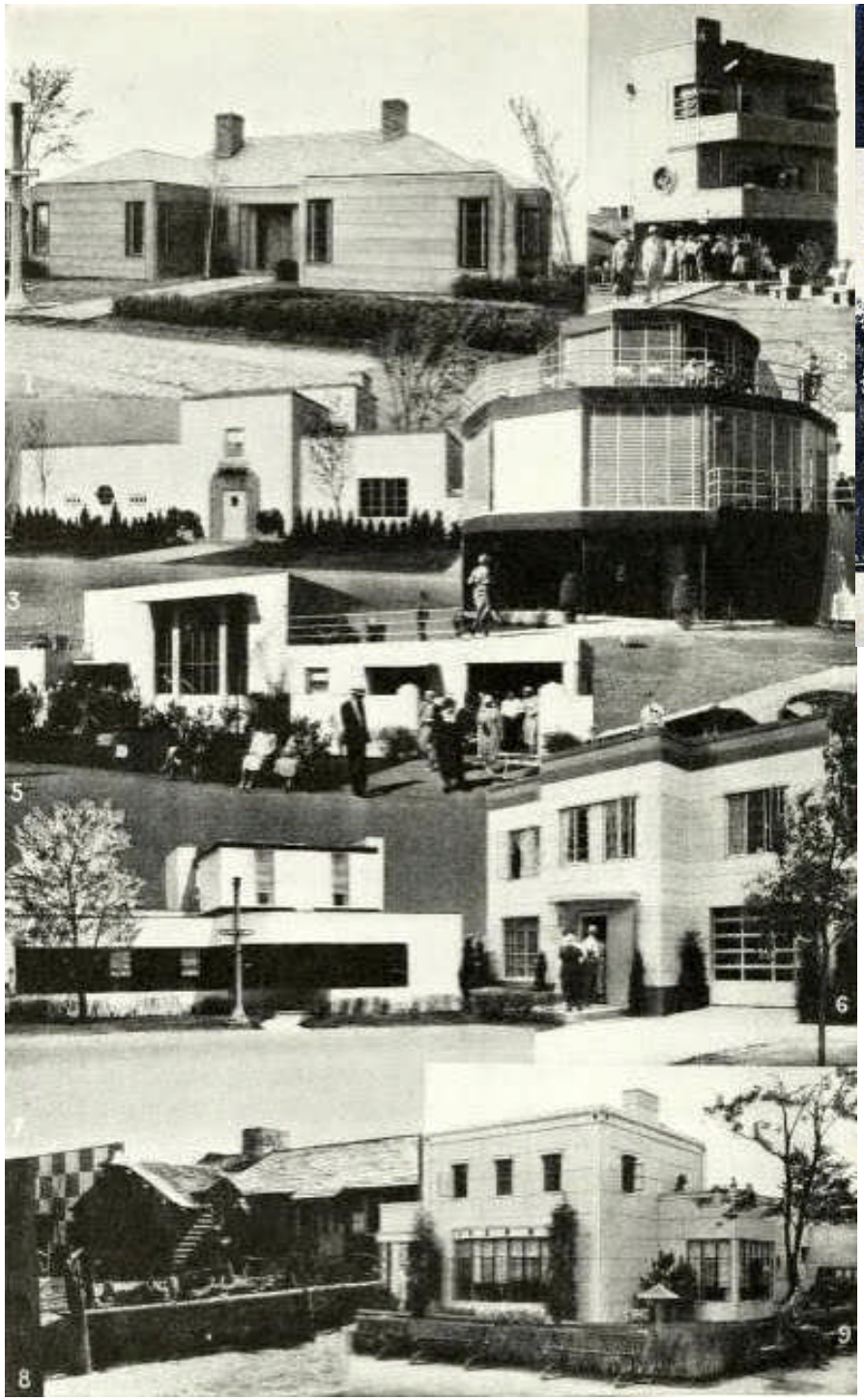
Highlighting man's scientific progress from pre-historic times to the present-day, the *Chicago World's Fair* of 1933/34 received more than thirty-nine million visitors during its two seasons. The fair covered over eight acres and consisted of hundreds of buildings and exhibits – from the uses of light at the *Electrical Building* to an animal show at the *Enchanted Gardens*. With such a large number of things to see, it would have taken the average family a week to see everything. Carrying out the theme of the fair, the "Homes of Tomorrow" exhibit illustrated the blend of modern technology and furnishings in affordable and prefabricated housing. Many homes were commissioned and built especially for this particular area.

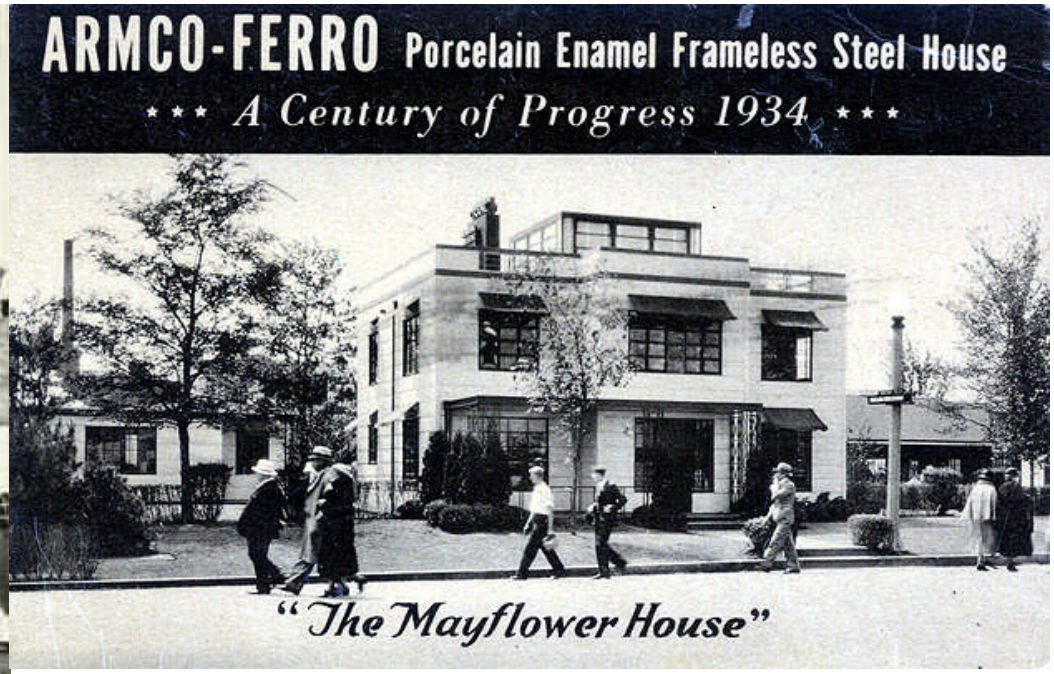


<u>Above</u>: as part of the "Home and Industrial Arts Group," the *Homes of Tomorrow* exhibit featured various companies trying their hand at creating aesthetically pleasing homes featuring a combination of modern technology and futuristic design. Some were constructed of unconventional materials while others were more traditional, albeit with modern conveniences.

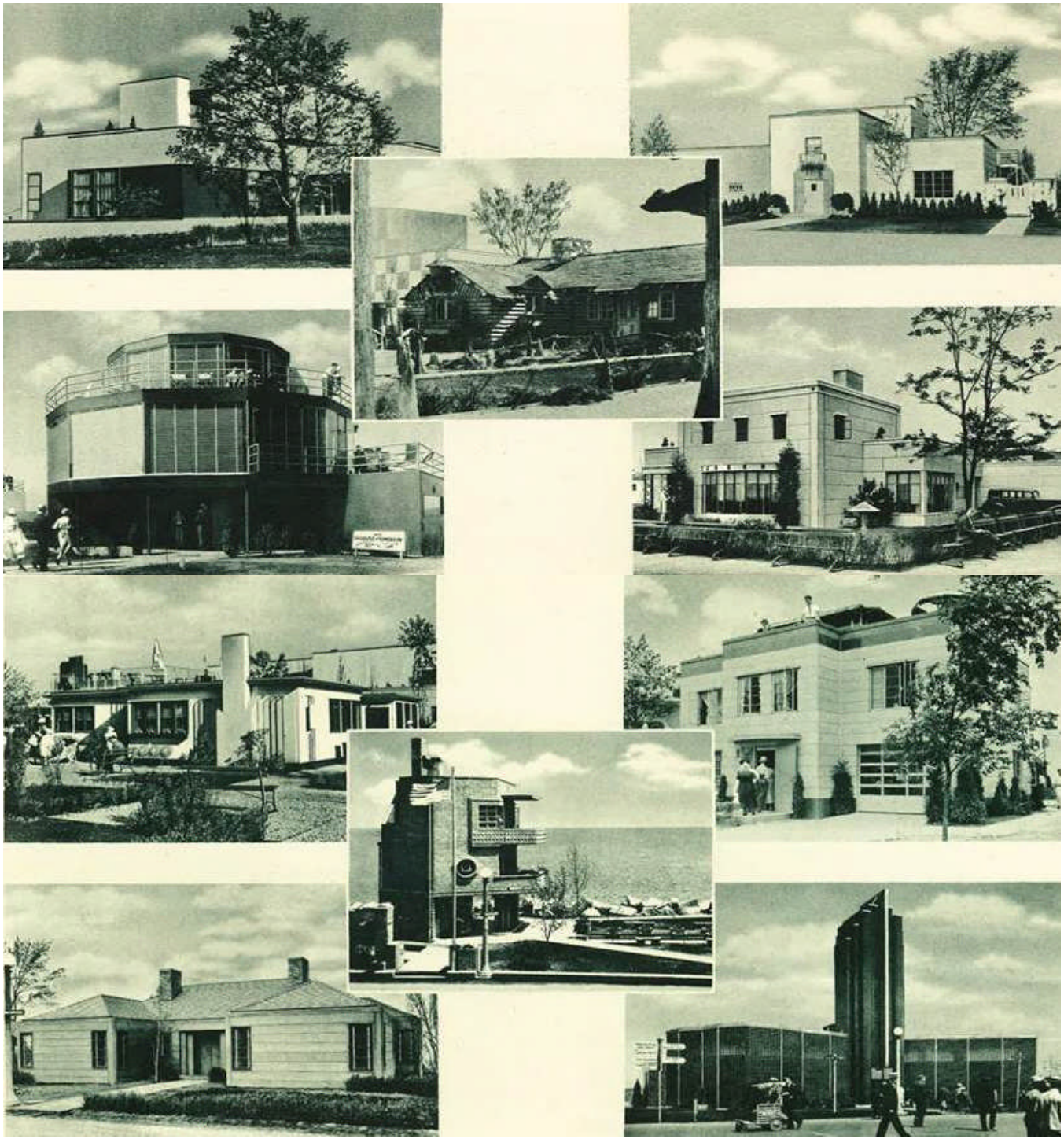

PANORAMA OF
A CENTURY OF
PROGRESS



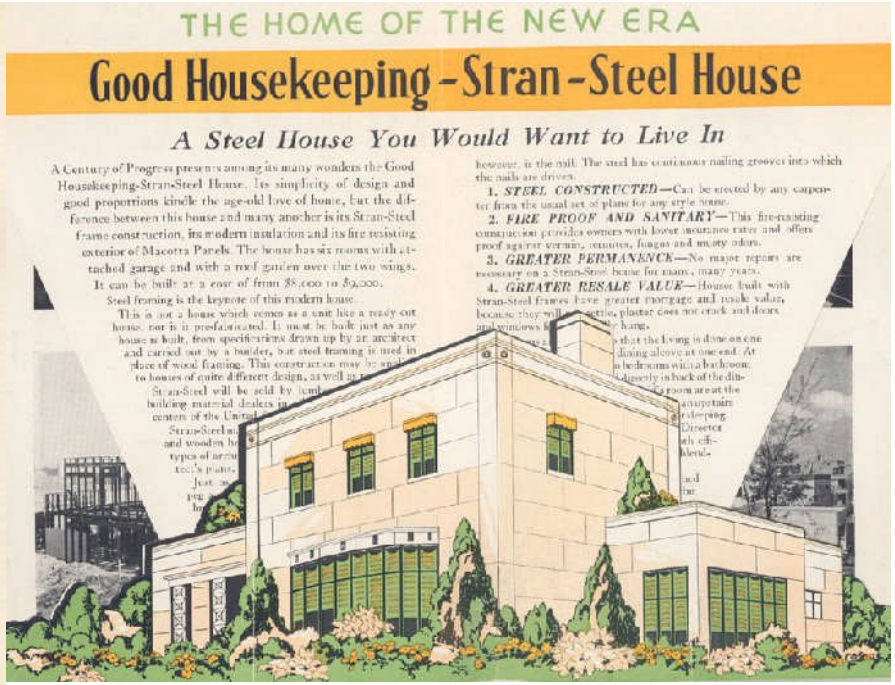




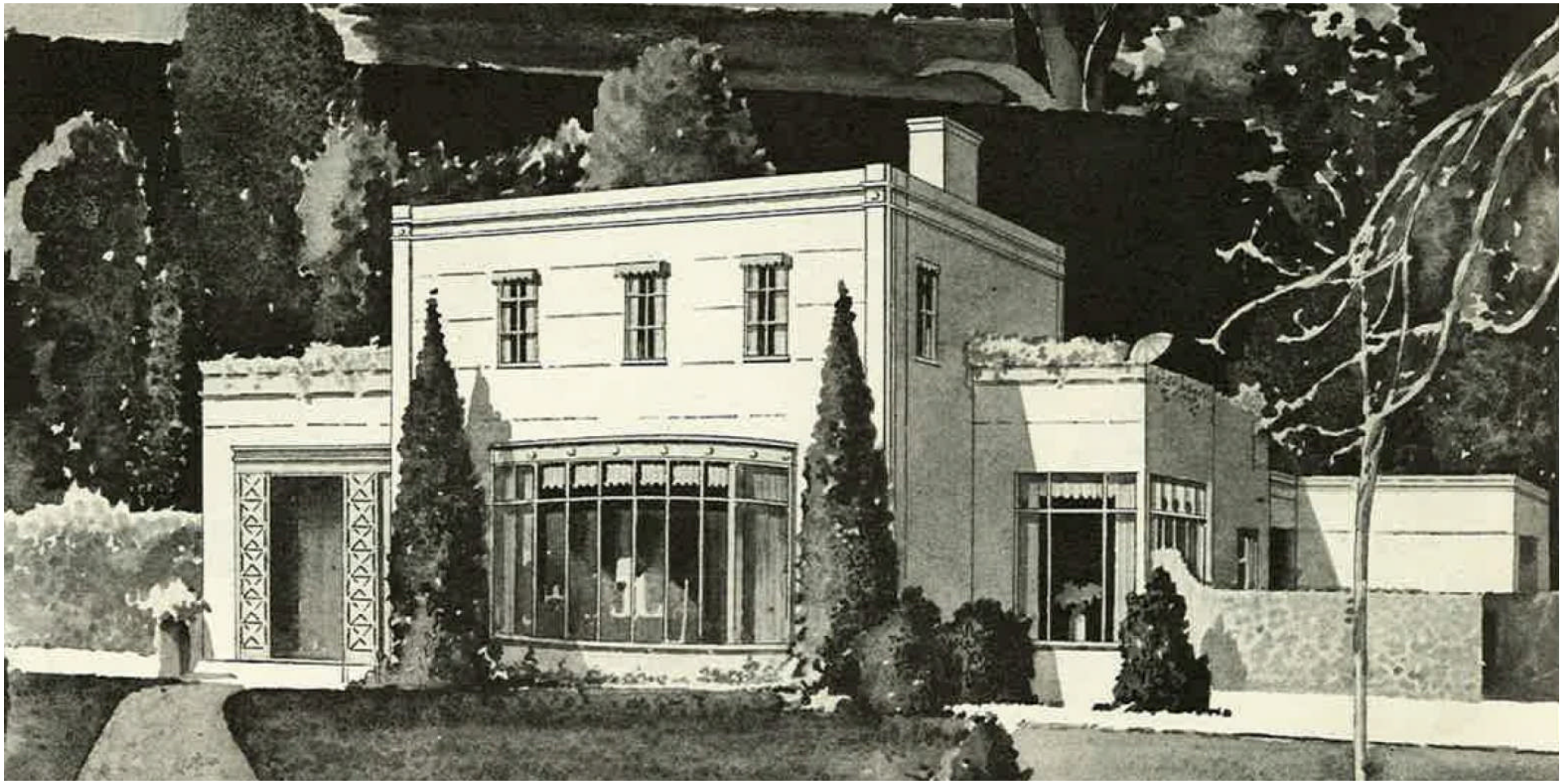
<u>Above</u>: advertisement featuring the Armco-Ferro "Mayflower House"
<u>Left</u>: caption: "Homes shown as part of the Century of Progress Exposition. Clockwise from top right: Brick House, House of Tomorrow, Armco-Ferro Mayflower House, Stran-Steel House, Southern Cypress House, Masonite House, Florida Home, Wieboldt-Rostone House, Lumber House."



House of Steel



Good Housekeeping **magazine and the** ***Stran-Steel Corporation*** **created for the exhibit a model home that would be fireproof, pre-fabricated and affordable to the average family. Constructed of steel and baked-iron enamel, the home was priced in the $7,500 range. Although only 1,300 square-feet, it didn't feel small due to the high ceilings and windows that gave the illusion of spaciousness.**

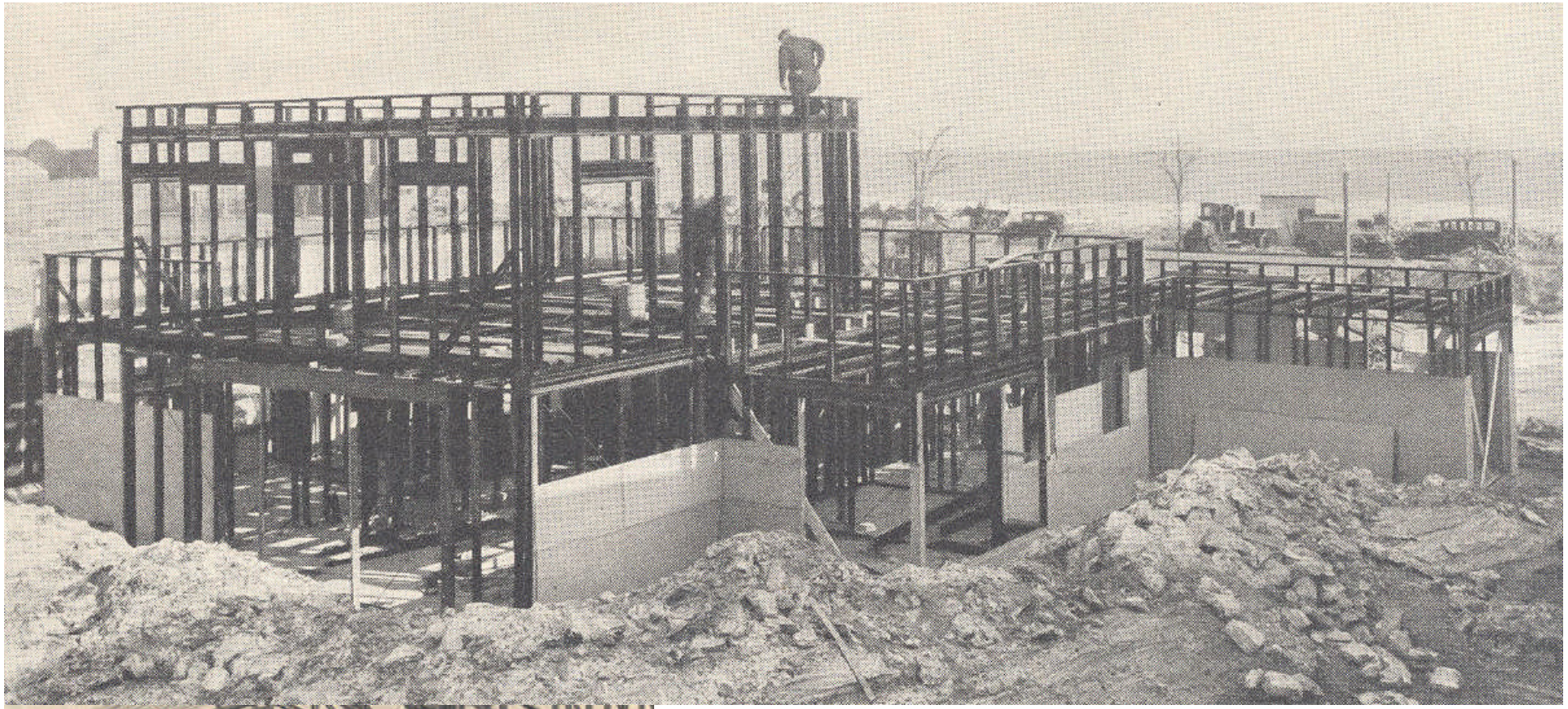


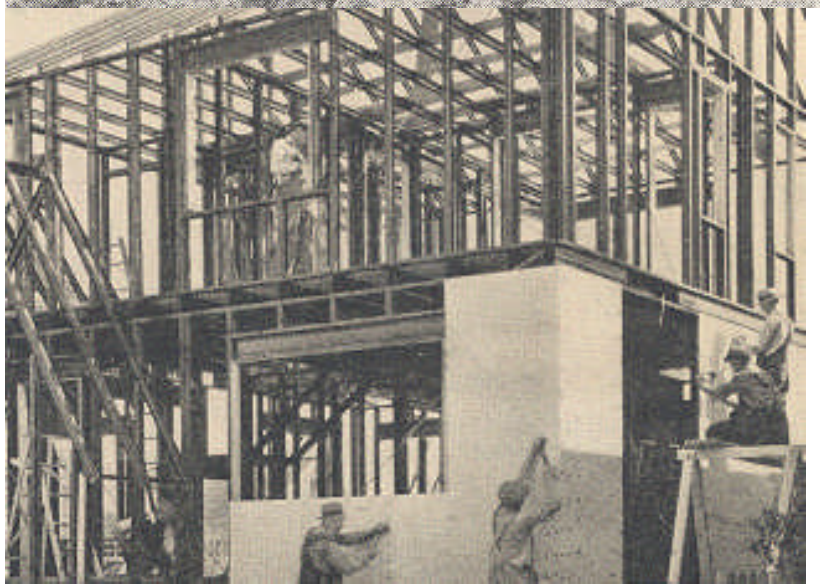
"A Century of Progress presents among its many wonders the Good Housekeeping-Stran-Steel House. Its simplicity of design and good proportions kindle age-old love of home, but the difference between this house and many another is its Stran-Steel frame construction, its modern insulation and its fire resisting exterior of Macotta Panels. The house has six rooms with attached garage and with a roof garden over the two wings. It can be built at a cost of from $8,000 to $9,000…"

RE: excerpt from the *Good Housekeeping-Stran-Steel House* brochure

"…The most talked about house in America today – and the most admired! Visit this Good Housekeeping-Stran-Steel House at the Chicago World's Fair, A Century of Progress. Study its improved construction and its fresh, clean-cut style. Follow this new model home in your own building work. It is what people want. Architects can exercise perfect freedom of design when planning a dwelling or other structure with Stran-Steel Frame. The Stran–Steel Corporation desires to co-operate with the architectural profession in furthering individuality of design along with good construction…"

RE: excerpt from the *Good House-keeping-Stran-Steel House* brochure

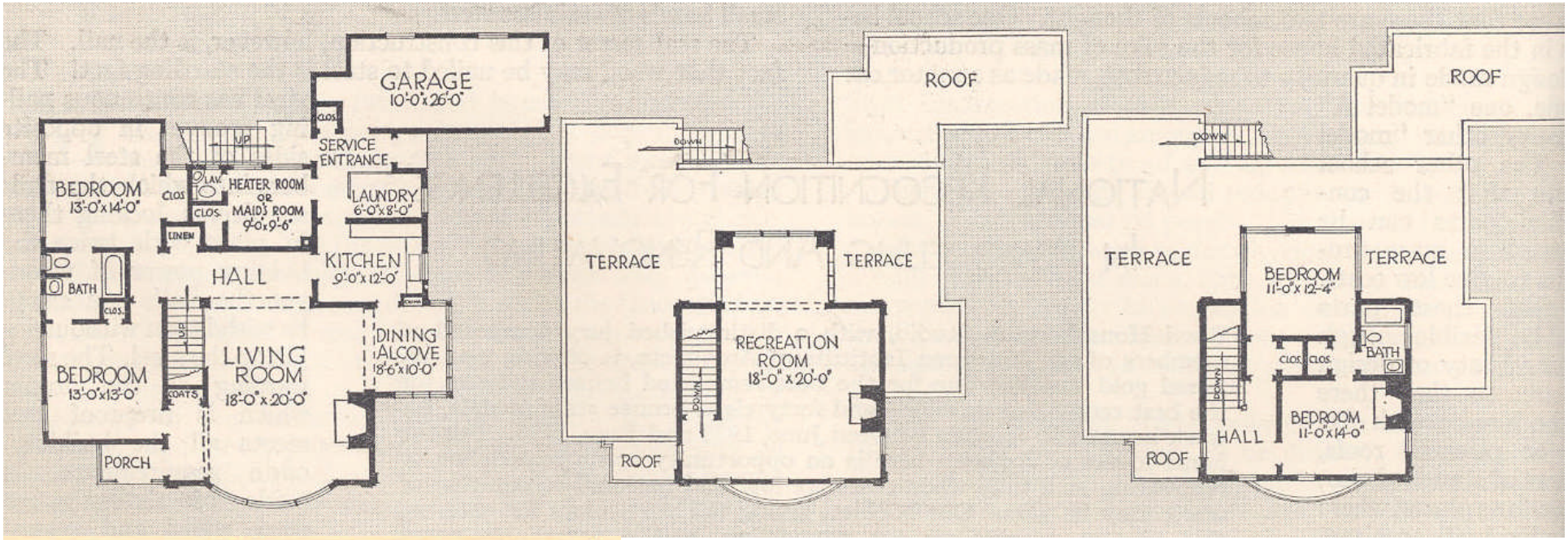


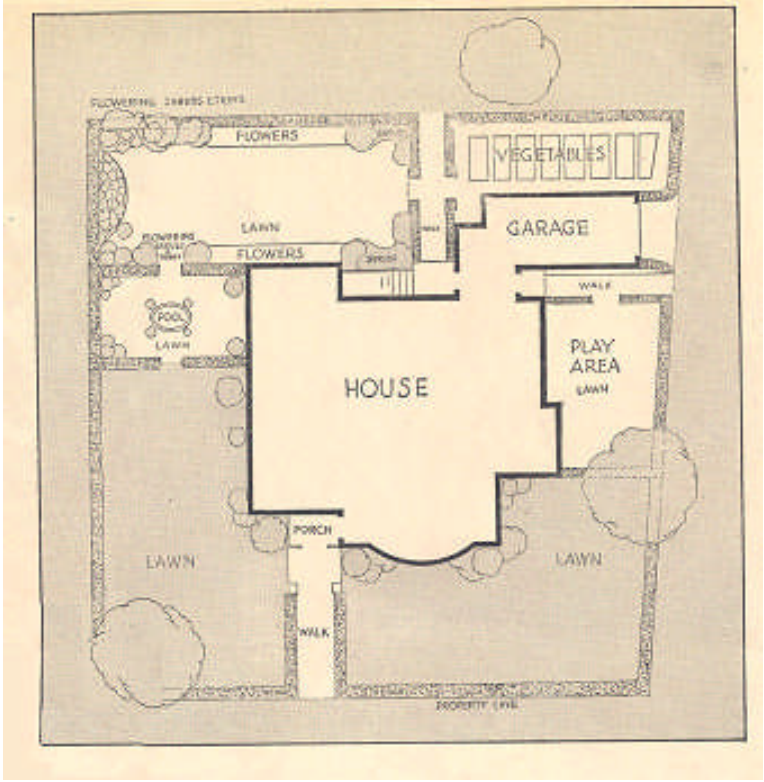


"…This is not a house which comes as a unit like a ready-cut house, nor is it pre-fabricated. It must be built just as any house is built, from specifications drawn up by an architect and carried out by a builder, but steel framing is used in place of wood framing…"

RE: excerpt from the *Good House-keeping-Stran-Steel House* brochure

<u>Above</u>: to provide a fireproof surface for the outer covering of the *Good House-keeping-Stran-Steel House*, eight-by-two foot sheets of three-inch thick baked-iron enamel were used to cover the outside. The baked surface of the material gave the illusion of brick and helped to insulate the house.





In 1934, the *Good Housekeeping-Stran-Steel House* was purchased by a real-estate developer and transferred to a suburb of *Chicago.* The unusual French Art-Deco design by architects *O'Dell & Rowland* (of *Detroit, MI*) called for a large recreation room on the second floor. A terrace covered most of the second floor roof area (in a horseshoe shape). A maid's room was adjacent to the kitchen area and a dining room alcove was set off the living room. The rounded bay window with casement windows and wooden blinds were distinctive features. The house was designed to allow for expansion as the modern family grew in size.

<u>Above</u>: Floor Plan/s

<u>Left</u>: Site Plan

<u>Top Left</u>: Bay Window in Living Room
<u>Top Right</u>: Second Floor Play Room
<u>Left</u>: Roof Terrace

Above: the Cape Cod-style "Good Housekeeping-Stran-Steel Garden Home" was constructed in the same manner as the *Good Housekeeping-Stran-Steel House* (it was later listed on the *National Register of Historic Homes* as the *Stran-Steel Irwin Garden Home*). Like its Art-Deco neighbor, it was designed to allow for expansion as the modern family grew and was moved to a *Chicago* suburb after the fair (it was demolished in 1992).

Left: period ad featuring the Stran-Steel Irwin Garden Home (G.L. Tucker, Architect)

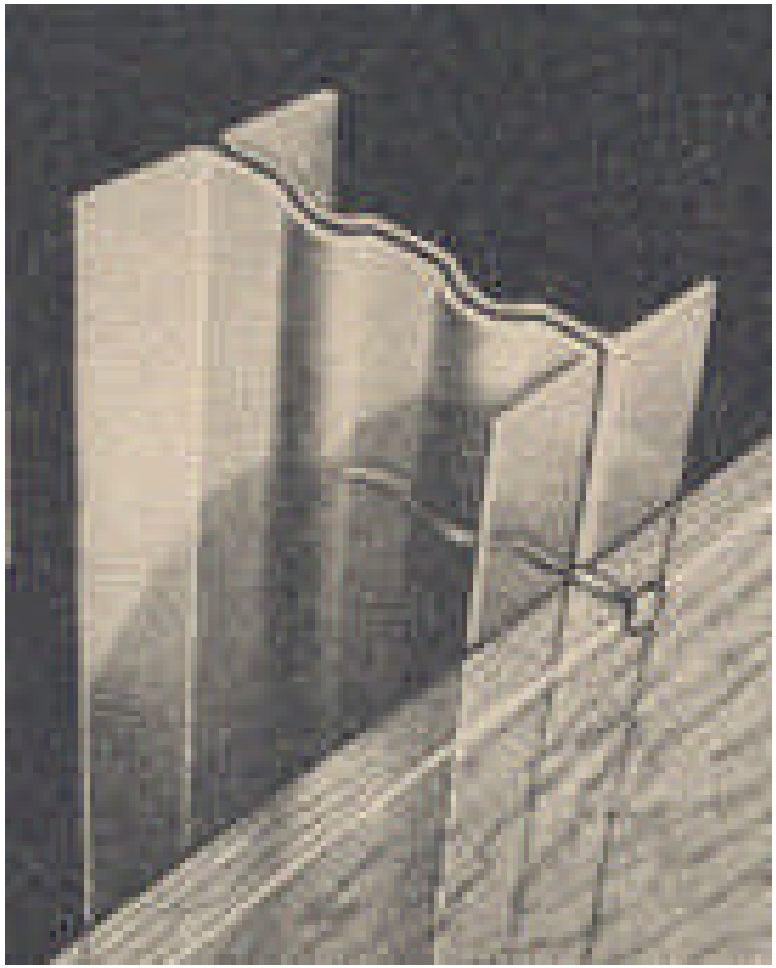
"Just think! With Stran-Steel you can have an absolutely <u>safe</u> home. You need never worry about fires or lightning, wind damage or shocks, wall or ceiling cracks, sticking windows or other defects of ordinary construction. Your family is safe – you investment secure!

RE: excerpt from Stran-Steel period advertisement (ca. 1933)

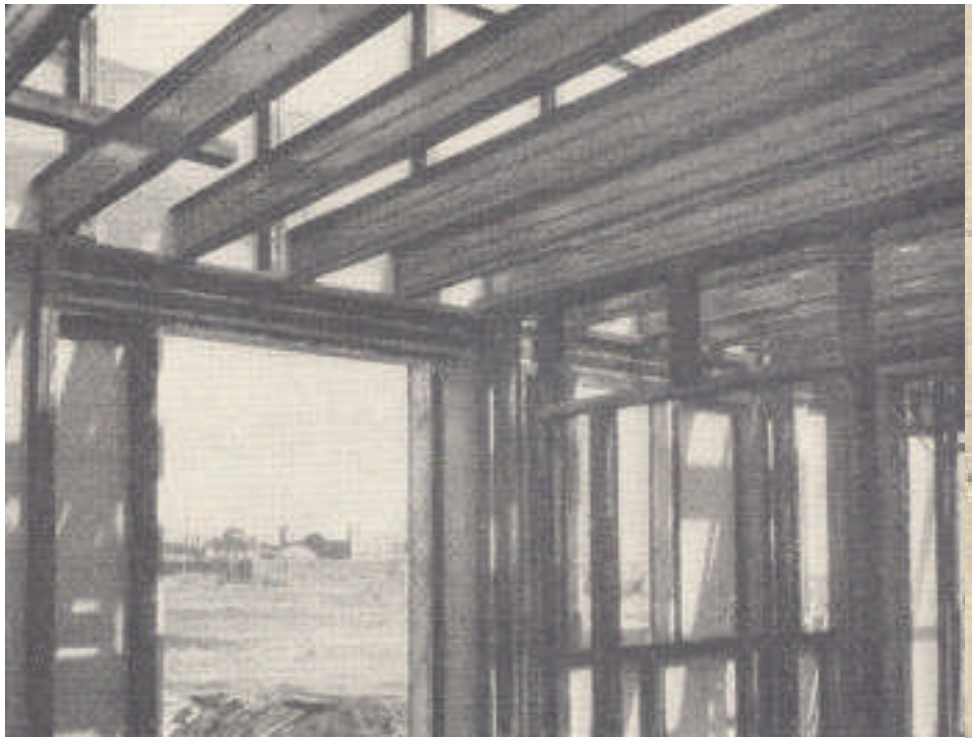
Just Like Lumber

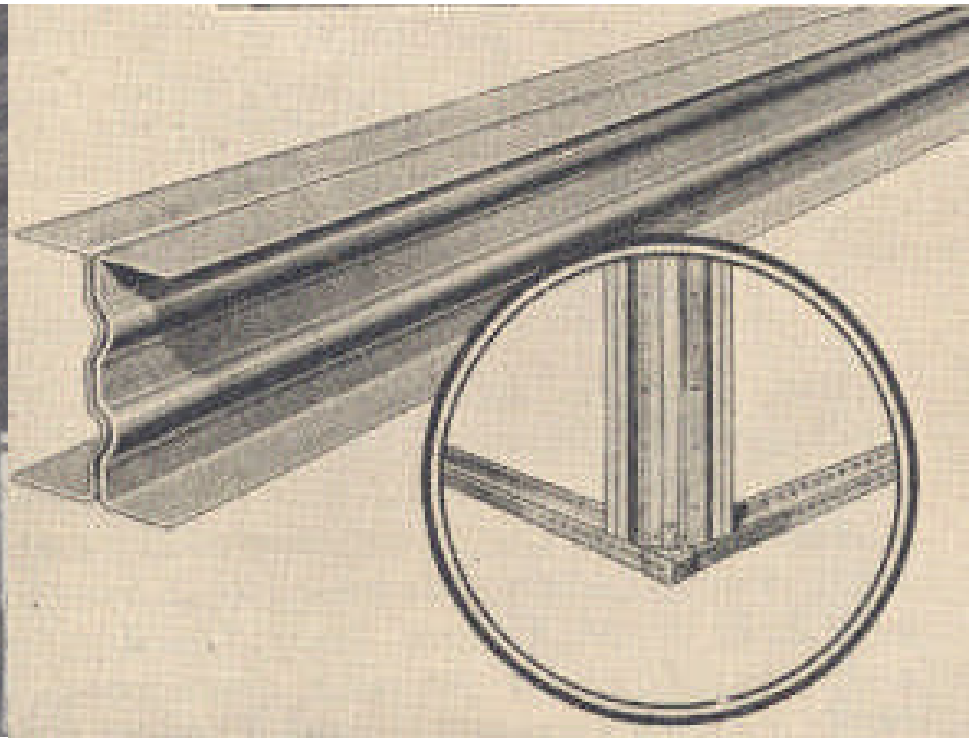
"…You buy Stran-Steel framing by the foot – just like lumber. You use it for the entire frame of the house. You nail flooring, roofing, wall boards, lath, etc., right to Stran-Steel with ordinary nails and the nails have 25% more grip than in wood. Stucco, brick, stone, or any other exterior material may be used with Stran-Steel framing…"

RE: excerpt from the *Good House-keeping-Stran-Steel House* brochure



For architects and home builders, the Good Housekeeping-Stran-Steel house/s represented a triumph in the use of an innovative building material that until then, had only been used for skyscrapers and/or commercial buildings. The *Stran-Steel Corporation* produced a lightweight steel beam that was more flexible than wood, lighter and twice as strong. The frame of the house consisted of these beams in a network of interlocking joints. A key to the success of steel as a viable building material was the use of a specially designed nail that would penetrate the member's "nailing slot" to hold finishes on both the inside and outside of the structural frame (left). The result was a sturdy and well insulated building that could withstand even the most severe weather and natural disasters.





1. STEEL CONSTRUCTED – Can be erected by any carpenter from the usual set of plans for any style house

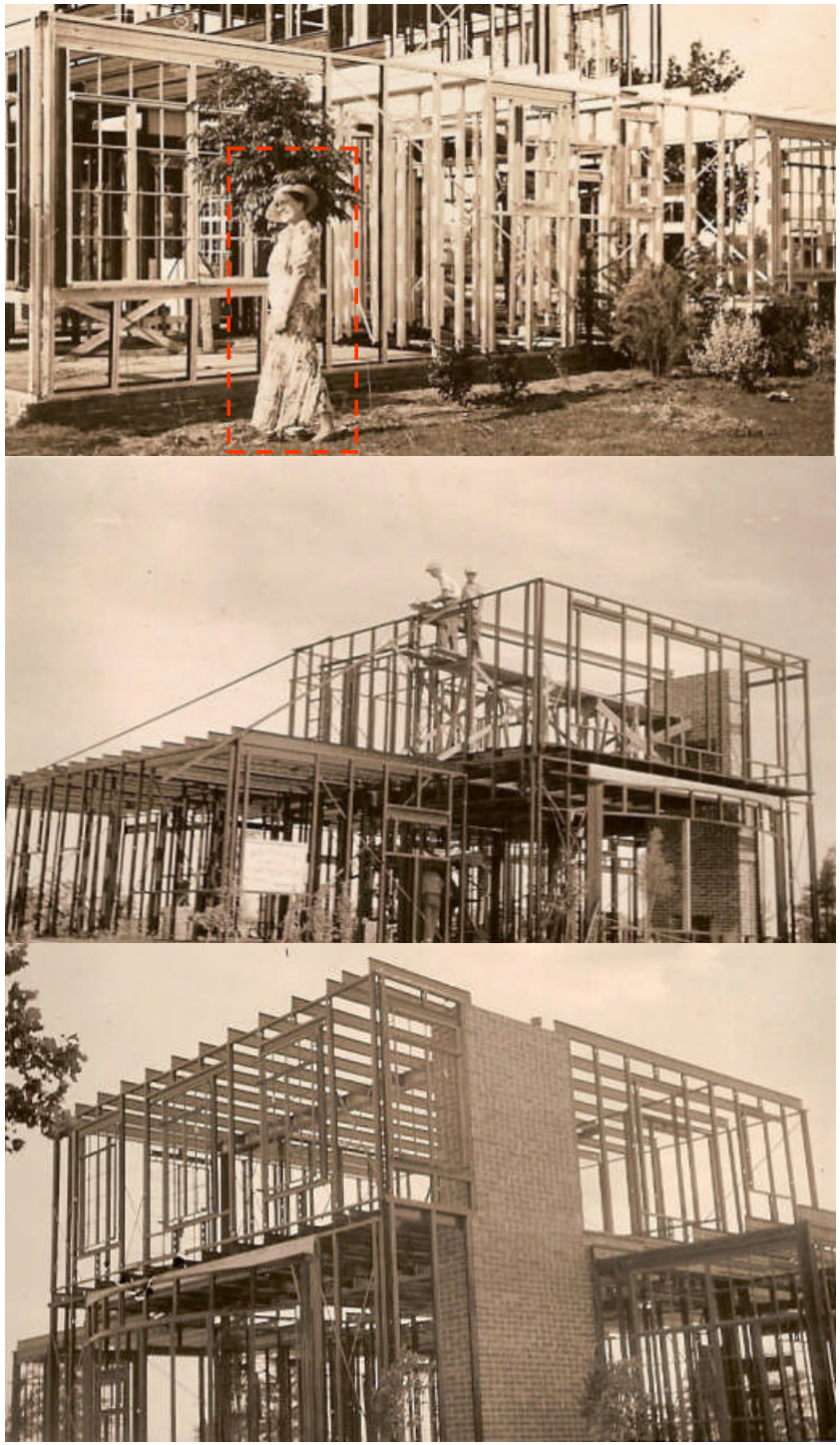
2. FIRE PROOF AND SANITARY – This fire-resisting construction provides owners with lower insurance rates and offers proof against vermin, termites, fungus and musty odors.

3. GREATER PERMANENCE – No major repairs are necessary on a Stran-Steel house for many, many years.

4. GREATER RESALE VALUE – Houses built with Stran-Steel frames have greater mortgage and resale value, because they will not settle, plaster does not crack and doors and windows fit perfectly when hung.

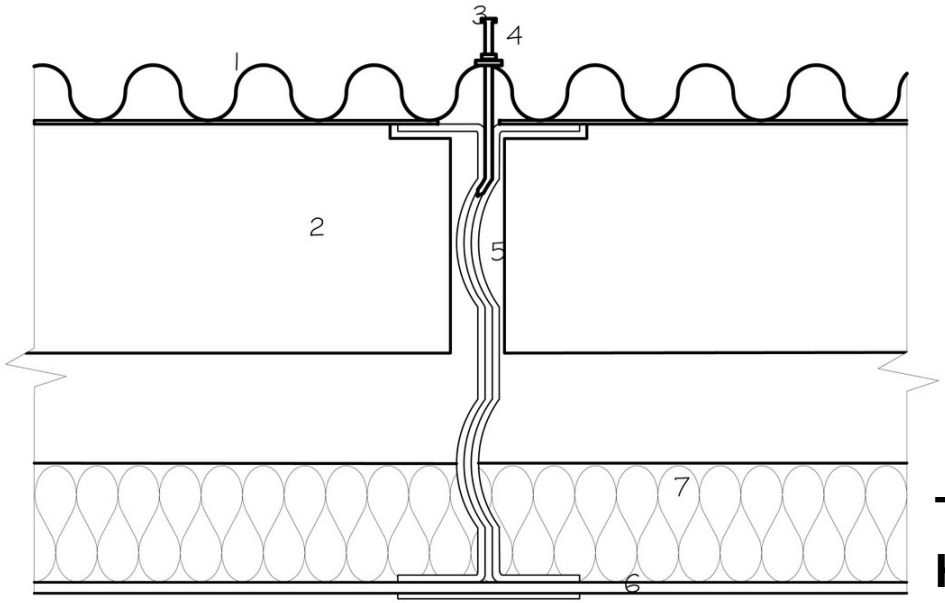
RE: excerpt from the *Good Housekeeping-Stran-Steel House* brochure

<u>Above L&R</u>: framing details



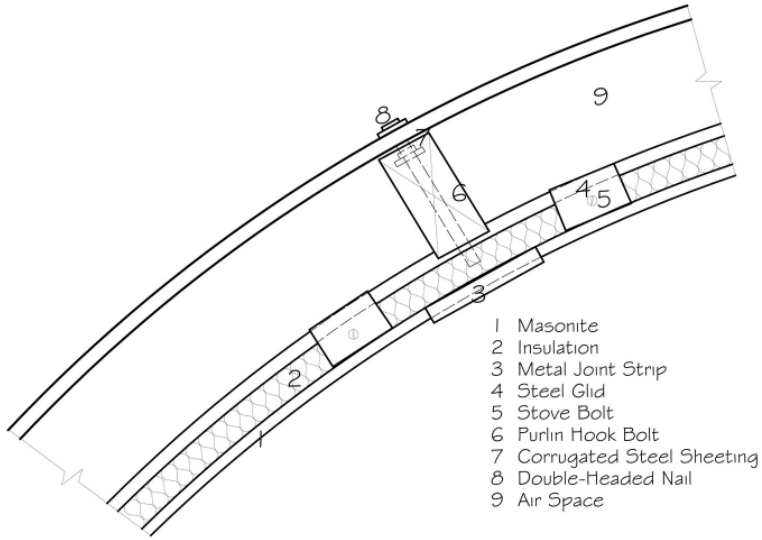
<u>Left</u>: a woman named *Margaret Bowen* (highlighted, top photograph) saw the *Good Housekeeping-Stran-Steel House* at the 1933 Chicago World's Fair. She returned home, wrote a letter to *Stran-Steel*, bought the blue prints for $15.00 and set out to build a "colony" of homes in a new neighborhood in *Wichita Falls, TX*. Her plan was to build every one of the homes on display at the *Homes of Tomorrow* exhibit. However, the replica of the *Stran-Steel* house proved so difficult for her to build, it was the only one she ever completed.

War Tested



1. Straight Corrugated Sheets
2. Stran-Steel Half Purlin
3. Double Headed Nail
4. Lead Washer
5. Stran-Steel Rib
6. Masonite
7. Insulation

Quonset Hut Stran-Steel Model Wall Detail



Quonset Hut T-Rib Model Wall Detail

The first major redesign of the "Quonset Hut" introduced a new steel framing system as well as a new interior shape. The "T-Rib" system (above) was abandoned and in its place the *Stran-Steel* system (left), consisting essentially of two lightweight steel channels that were welded back to back to form an I-shaped member between which a serpentine shaped groove allowed the use of friction held nails (in lieu of bolts). Stran-Steel's framing system was lighter in weight, faster to erect and outperformed the T-Rib (when field tested).


They drove a nail into a steel beam
—AND STARTED A NEW SYSTEM OF BUILDING
STRAN WAR-TESTED STEEL

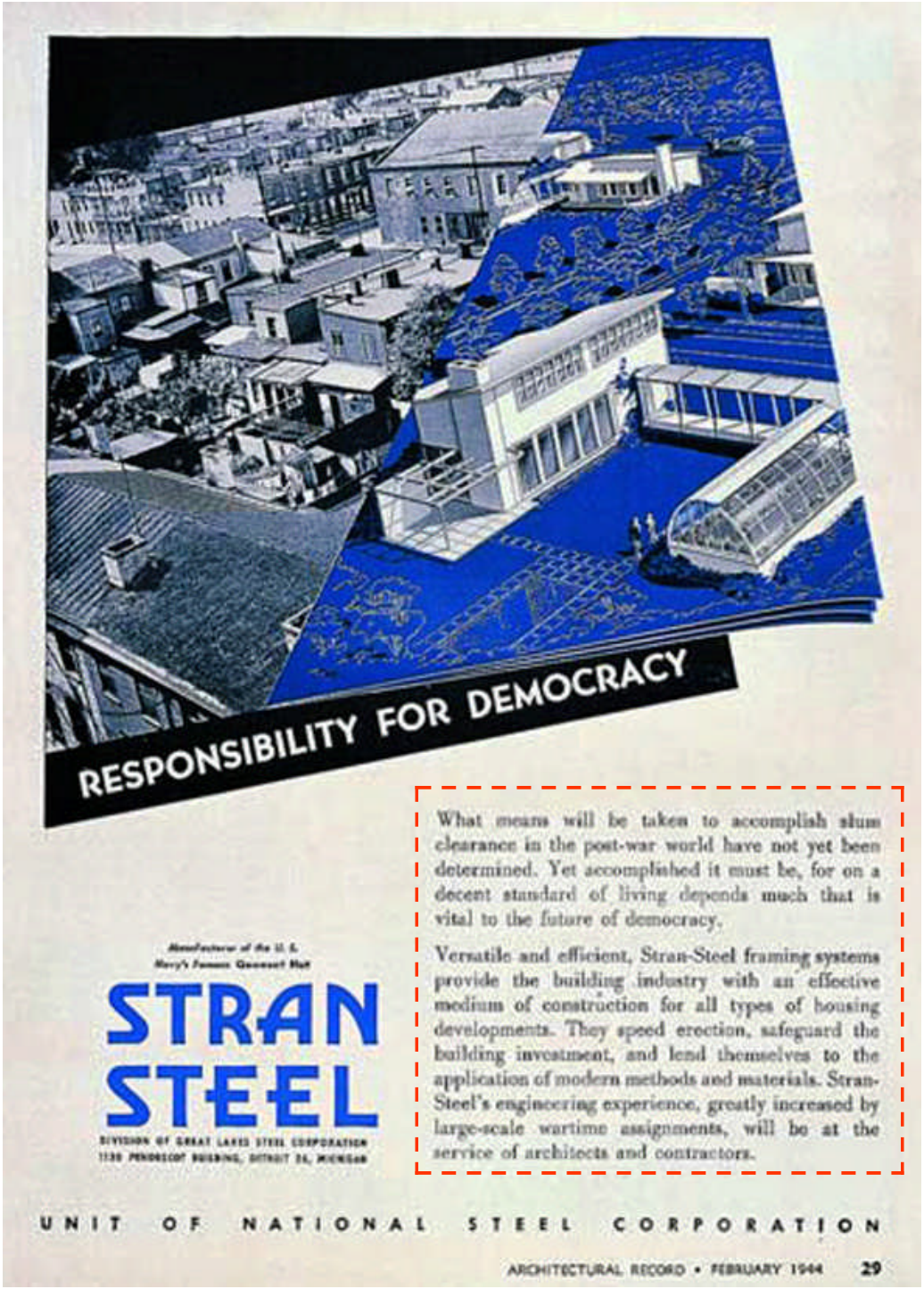
<u>Left</u>: caption: "Erection of a Redesign hut." In order to make better use of floor space, the Quonset Hut was redesigned to have a segmented arch instead of a full (round) arch. This allowed equipment up to four-feet tall to be placed next to perimeter walls without creating unusable floor space. However, when the production of Quonsets was handed-over completely from *Fuller* to *Stran-Steel*, the design reverted back to the full arch. The sacrifices in floor space were justified by the ease of fabrication and erection, its smaller size when crated (270-325 cubic-feet versus the 450 cubic-feet), and lighter shipping weight. This perfected version of the Quonset hut could be put up in one day by ten men with only hand tools, required no special skills to construct and took less shipping space than canvas tents with wooden floors and frames when crated.

The simplicity of the Quonset Hut's design/s allowed it to be successful in varied climates – from tropical to artic. Although there were many different models of the structure, the same principles applied to each: the arc shape and efficient production, transport, assembly and disassembly. The original Quonset Huts were 16' x 36' and forty-one design variations were manuf-actured (i.e. surgical, laundry, morgue etc.). Quonsets were designed to be easily dismantled and rebuilt. However, it was often easier to transport them without dismantling the structure, since they were relatively light.

<u>Top</u>: T-Rib Quonset Hut (16' x 36' and 16' x 20'). It was most closely designed to the *Nissen Hut*. Before being redesigned, +/-8,200 were built.

<u>Bottom</u>: Quonset redesign (16' x 36' and 24' x 60'. The new design included vertical 4-foot sidewalls for better use of space, and mod-ified arch. Around 25K redesign huts were built.

The Future of Democracy



Left: caption: "What means will be taken to accomplish slum clearance in the post-war world have not yet been determined. Yet accomplished it must be, for on a decent standard of living depends much that is vital to the future of democracy. Versatile and efficient, Stran-Steel framing systems provide the building industry with an effective medium of construction for all types of housing developments. They speed erection, safeguard the building investment, and lend themselves to the application of modern methods and materials. Stran-Steel's engineering experience, greatly increased by large-scale wartime assignments, will be at the service of architects and contractors."


Stran Steel
STRAN-STEEL CORPORATION
unit of NATIONAL STEEL CORPORATION