THE AMERICAN ARCHITECT

VOL. CXII WEDNESDAY, AUGUST 1, 1917 NUMBER 2171

THE "HALF MOON" GROUP, FROM THE SOUTHWEST
MESSRS. DUHRING, OKIE & ZIEGLER, *ARCHITECTS*

Developing a Suburban Community

ST. MARTINS, situated on the Germantown & Chestnut Hill Railroad just ten miles from the business center of Philadelphia, has been especially fortunate in the conditions that have influenced its development.

Lying as it does on the hills above the Wissahickon Valley, it is one of the most unique pieces of parkway existing within the limits of any city in the country, and to-day presents practically the same appearance that it did in the days when the Indian paddled his canoe down its stream to the Schuylkill River. It has the added advantage of development about the grounds of the Philadelphia Cricket Club which has been the focal point of all the activities of the community and has fulfilled its mission as a Country Club and community center to an unusual degree.

Until about ten years ago the houses naturally grouped themselves about the cricket grounds and golf course, each new builder striving to achieve the possibility of stepping directly from his own premises to the grounds of the club.

Overcrowding became inevitable and the life of the golf course is now threatened and its beautiful

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EAST FRONT, STUDIO GROUP

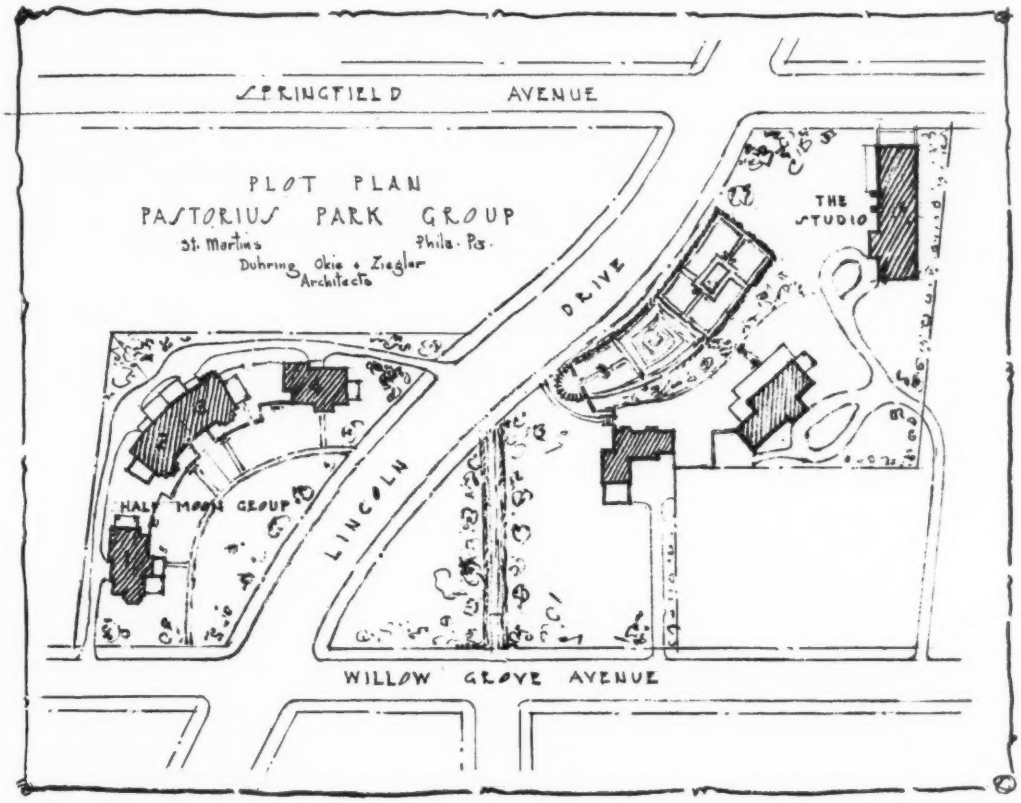
GENERAL VIEW OF STUDIO GROUP FROM GARDEN
MESSRS. DUHRING, OKIE & ZIEGLER, *ARCHITECTS*

greens will soon retain in memory only the recollection of the battles that were won and lost by a well laid stymie or a hanger at the cup.

Although it still possesses a few houses of the vintage of 1876, these merely serve to mark the progress that has been made in the designing of domestic architecture in and about Philadelphia, which work has won for itself a unique position in the architectural history of our country.

manner quite unique in this country, embodying the ideas found in many English villages of a park or common surrounded by dwellings, in such a manner as to insure the best results from the utilitarian as well as the esthetic standpoint, which after all is the proper function of architecture.

St. Martins lies in the heart of a district noted for its ledge stone; a material that has influenced house building about Philadelphia to a very considerable

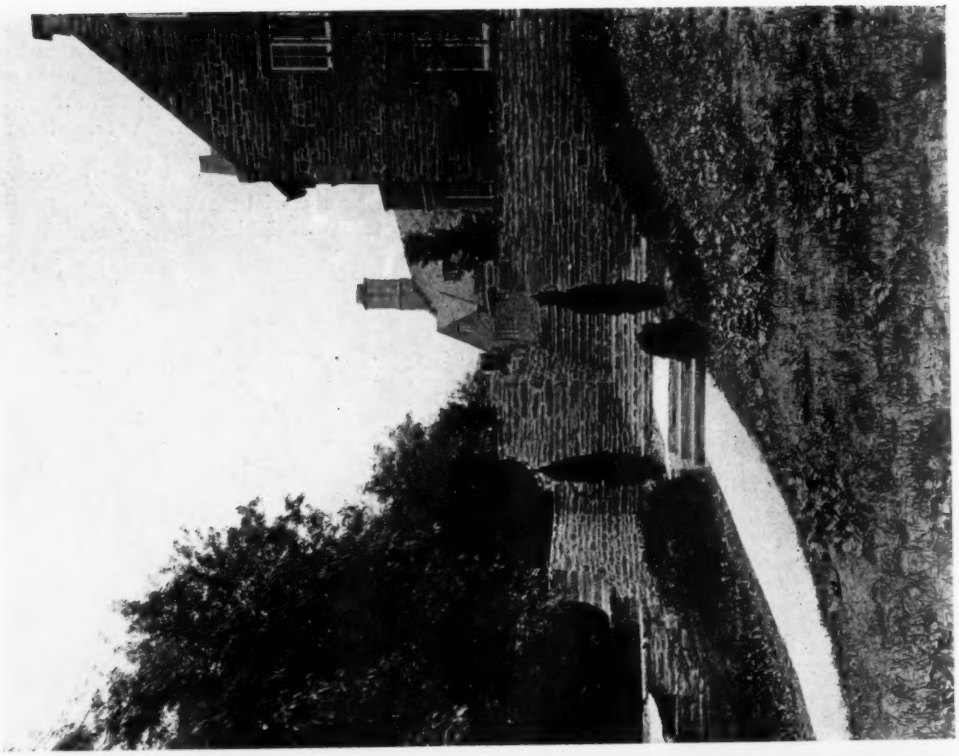


Years ago it became obvious that the development of St. Martins must extend beyond the immediate vicinity of the Country Club and through the generosity and clear thinking of Dr. George Woodward, whose public spirit and far-sightedness has guided the development of St. Martins along proper lines, Pastorious Park was created at the intersection of Hartwell Boulevard and Lincoln Drive, which are to be the main arteries of travel through this section.

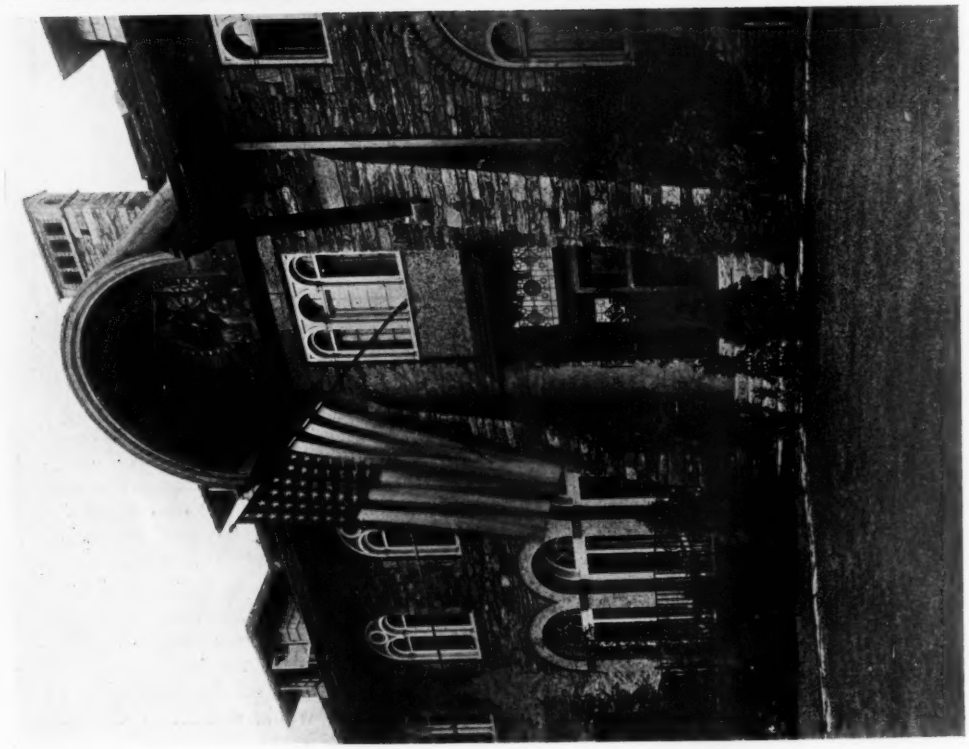
The plan for the park included the proper development of the land surrounding the park in a

degree. It was the knowledge of this fact that led the owner to adopt for the architectural style of his buildings the type found in the old cottage farm houses of the Cotswold district of England. This district, noted for its limestone, stretches from Bridport northward to Beaminster and Sherborne and broadens out to the flat-topped Cotswold hills east of Cheltenham. The stone, like the ledge stone of Philadelphia, is soft when quarried, but soon hardens when exposed to the air.

Owing to the nature of the formation of the Cotswold hills, the whole district is essentially a



GARDEN



ENTRANCE TO STUDIOS

DETAILS OF STUDIO GROUP, ST. MARTINS, PA.

MESSRS. DUHRING, OKIE & ZIEGLER, *ARCHITECTS*

GENERAL VIEW, "HALF MOON" GROUP, ST. MARTINS, PA.
MESSRS. DUHRING, OKIE & ZIEGLER, *ARCHITECTS*

stone one and all the buildings are constructed of that material and display a craftsmanship much to be envied in these days of machine worked materials.

The illustrations accompanying this article and in the plate form show how faithfully the architects have labored to create buildings that will meet all the modern requirements of suburban dwelling houses and still retain an expression of the craftsmanship necessary for the proper fashioning of the material at hand.

This is one of the most difficult problems with which the modern architect has to deal and one that can be accomplished only through unlimited personal endeavor on the part of the architect, who must have a keen regard for the texture which proper craftsmanship imparts to material of any kind.

C. A. ZIEGLER.

GENERAL VIEW OF THE REBUILDING OF LINCOLN'S INN ON THE SIDE TOWARD THE FIELDS

ROBERT ADAM, *ARCHITECT*

(From The Architectural Review)

The Foreign Architectural Press

THE June issue of *The Architectural Review* contains another in the series of articles on historical centres in London. This installment describes and illustrates Lincoln's Inn and the Fields, particularly with relation to a scheme of rebuilding and development by Robert Adam, between 1771 and 1772. To quote from the article:

"Lincoln's Inn and the Fields, as the heart of legal London, has had a long history, enriched with many crusted traditions which have been the constant theme of many writers. Even in architectural history, to go no further back than the days of Inigo Jones, the story has been a checkered one, a succession of great ideas that have failed of full fruition.

"The Fields, laid out by Inigo Jones as a grand square, of a size determined, as it is alleged, from the base of the Great Pyramid of Cheops, was unfortunate in its earliest development, inasmuch as it was never lined with the stately mansions of his intention. It is certainly extraordinary that no link was effected with the adjacent Piazza of Covent Garden. There must, one would think, have been some scheme by that great architect for a development of the surroundings of the immense open space of the Fields, one which would have involved some connection with the adjacent symmetrical area of the Garden. In place of this, however, the neighborhood was left to grow up as a neglected network of back streets and courts."

The scheme as outlined by Adam was executed at a period "crowded by the culminating stress of a career that had been an astounding success." The portentous events, preliminary to the war with the American colonies, prevented the carrying forward of Adam's plans for this locality, and the consequent architectural loss to London may be learned by an inspection of his many drawings in the Soane Museum, some of which are reproduced in the *Review's* article.

* * *

The Royal Gold Medalist for 1917 is M. Henri Paul Nénot. M. Nénot is the twelfth representative of France to win this distinction. The *Architects' and Builders' Journal* prints an extended review of his life and works.

This journal has also added a "war building" section, in which are described the many types of buildings that have become necessary in England since the outbreak of war.

A timely article, in view of the certain scarcity of steel and the substitution of other materials is on reinforced concrete as a war-time material. We learn that various types of beams, slabs and blocks

are now being placed on the market with a view to reducing reinforced concrete from a plastic material to stock units for immediate use.

The behavior of different types of buildings in the recent great explosion in London has been the subject of an inquiry, and a report issued states in part as follows:

THE GREAT HALL, ST. GEORGE'S HALL, LIVERPOOL
ELMES, *ARCHITECT*
(From The Architectural Review)

"The soil being of alluvial character, the earth tremors imparted by the explosion naturally caused the whole district to shake like a jelly and so contributed to the destruction resulting from air concussion, particularly in the case of structures built of materials possessing little or no cohesion and relying for stability on the force of gravity and the steadiness of their foundations. Timber and steel-frame sheds, open at the sides and ends, suffered comparatively little from shock, as the air waves were able to pass through them without encountering much obstruction, and the elasticity of the connected framework proved sufficient to prevent any material damage to the latter, although roofing and external wall sheathings were blown away. Of one steel-frame shed about 200 yards long by 33 yards wide nothing remained but the naked steel skeleton, which was intact. One-story sheds and similar structures closed on all sides were generally wrecked.

"Where exposed to the full force of the explosion brick buildings of all kinds showed up very poorly. Two large factory buildings near substantial brick buildings embodying high-class work fared almost as badly as more flimsy structures of the kind run up by the speculative builder. At distances of a quarter of a mile or more from the scene of the explosion, brick buildings of light proportions were seriously damaged, though others of massive construction escaped material injury.

"The most striking cases of resistance to the shock of the explosion were furnished by several

reinforced-concrete buildings in and around the zone of maximum concussion. All such structures of the skeleton monolithic type withstood the shock without injury."

* * *

The attitude of English architects as set forth in the English architectural press, towards the architecturally good old buildings in London and other English cities and towns is one to be much commended. That they regard their architectural heritage with a very great respect and leave no stone unturned to keep it, as far as possible, intact has been many times proven.

While we have in this country but a small proportion of these old buildings, as compared with England and the Continent, we are not, we fear, at all times so keenly watchful.

The *Architects' and Builders' Journal* in a recent issue calls on the profession to exert all its influence against the removal of certain buildings of much artistic value, and regards their removal as a distinct and irreparable artistic loss.

Referring to other causes where buildings have been razed, it states:

"People went out of their way to feast their eyes on the mellow brickwork, the nicely adjusted string-courses, the sedate doorways, with their exquisitely traceried fanlights, and a dozen other charms that express the form and spirit of an age of which we seem to be in danger of losing all the more notable survivals."

* * *

Commenting on "visual memory and dream design," and the qualities of which the designer has need, a correspondent in the *Journal* above quoted writes at some length on what is called a "psychical and perhaps sub-conscious phenomenon." It is stated: "That so many beautiful examples and relics of the older civilization should have survived through these dark ages, for our instruction and admiration, is abundant proof of the brilliant position which has been achieved. The mind of the architect is saturated with the older examples; at will, he can form mental pictures of what he would like to produce, out of his store he can draw almost without limit, and he displays his own individuality largely by the harmonious arrangement of components and grouping of details which have been designed by his predecessors, or suggested by the study of their work. This power of visualization varies with the person;

LITTLECOURT, FARTHINGSTONE, NORTHAMPTONSHIRE: TERRACE FRONT

MR. WALTER CAVE, F. R. I. B. A., *ARCHITECT*

(From The Building News)

PLATE 51

HOUSE NO. 1. "HALF MOON" GROUP, ST. MARTIN'S, PA.

MESSRS. DUHRING, OKIE & ZIEGLER, *ARCHITECTS*

XUM

PLATE 52 DETAIL OF ENTRANCE FRONT, HOUSE NO. 1

"HALF MOON" GROUP, ST. MARTIN'S, PA.

MESSRS. DUHRING, OKIE & ZIEGLER, *ARCHITECTS*

PLATE 53

HOUSES NOS. 2 AND 3. "HALF MOON" GROUP, ST. MARTIN'S, PA.

MESSRS. DUHRING, OKIE & ZIEGLER, *ARCHITECTS*

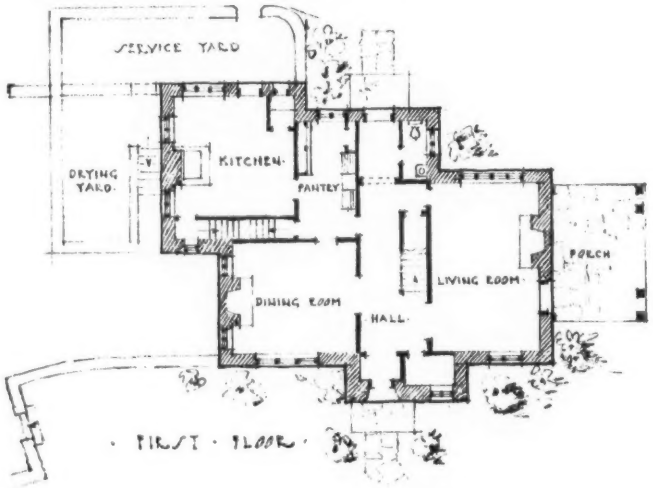
XUM

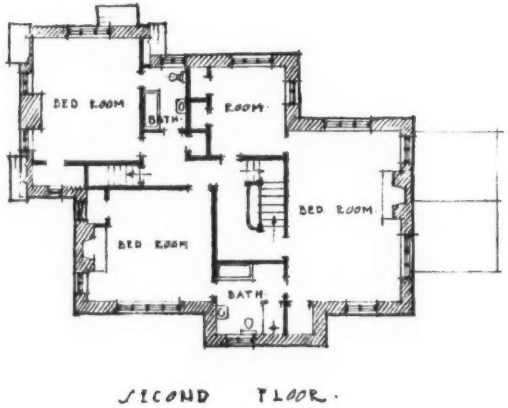
PLATE 54

HOUSE NO. 4. "HALF MOON" GROUP, ST. MARTIN'S, PA.

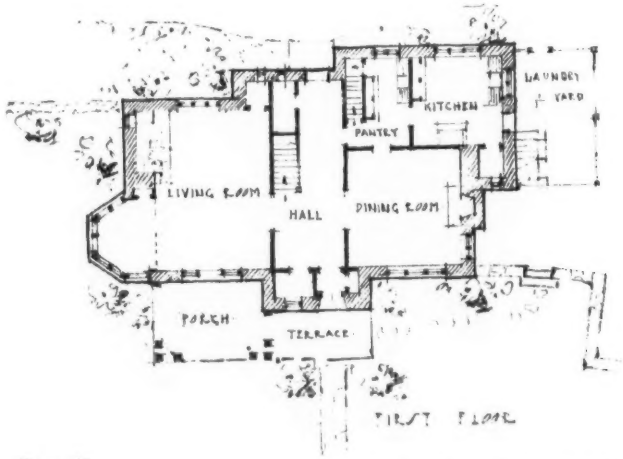
MESSRS. DUHRING, OKIE & ZIEGLER, *ARCHITECTS*

XUM





"HALF MOON" GROUP. HOUSE NO. 4.



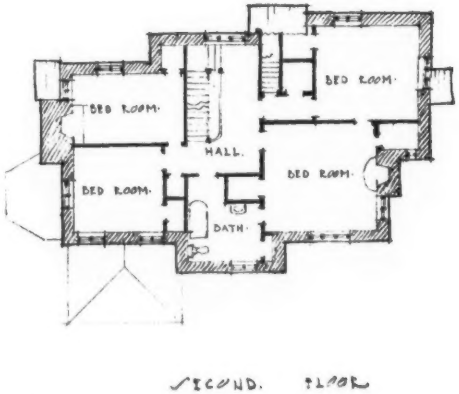


PLATE 55

"HALF MOON" GROUP. HOUSE NO. 1.

MESSRS. DUHRING, OKIE & ZIEGLER, *ARCHITECTS*

XUM

PLATE 56

HOUSE OF N. W. EWING, ESQ., ST. LOUIS, MO.

MESSRS. ROTH & STUDY, *ARCHITECTS*

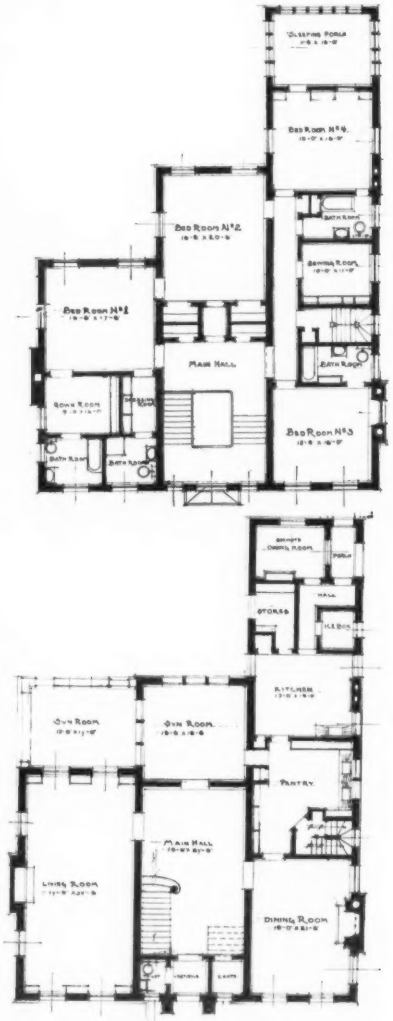
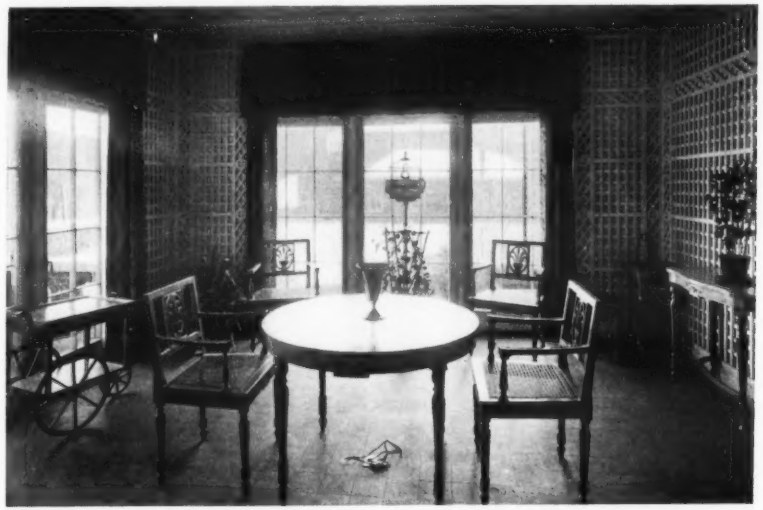


PLATE 57

HOUSE OF N. W. EWING, ESQ., ST. LOUIS, MO.

MESSRS. ROTH & STUDY, *ARCHITECTS*



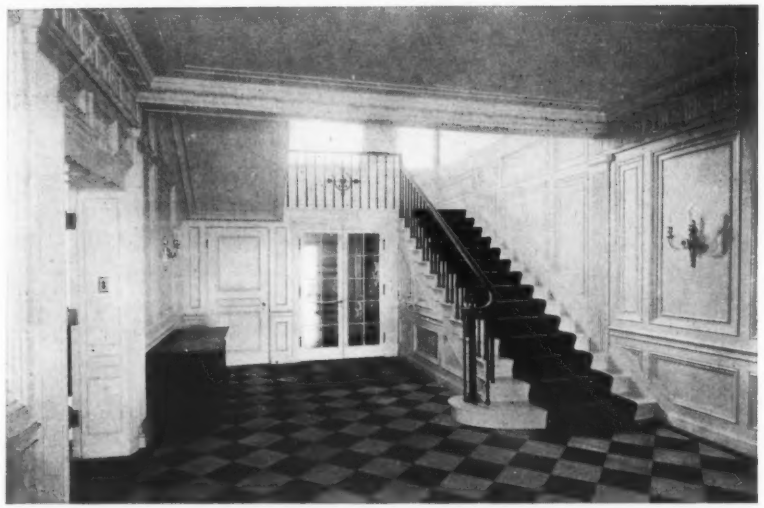


PLATE 58

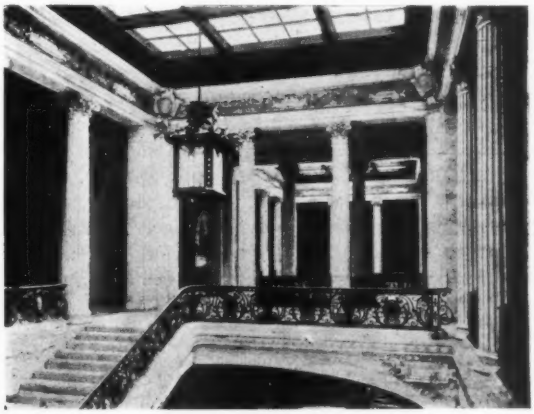
HOUSE OF N. W. EWING, ESQ., ST. LOUIS, MO.

MESSRS. ROTH & STUDY, *ARCHITECTS*

some persons possess it without being clearly conscious of it, while others may have it in such excess as to create illusions of apparitions—a morbid condition in which a man 'sees what isn't there.' It is a power which is not wholly denied to mathematicians,

DILKE HOUSE, MALET STREET, LONDON, W.C.
W. F. VERNON CROMPTON, *ARCHITECT*
(From The Architects' and Builders' Journal)

some of whom, we have been credibly informed, are greatly aided (or, as some say, hindered) by the mental appearance of figures in various vivid colors, each digit wearing its own peculiar hue of green, blue, red, etc. Newspaper correspondence has brought out the fact that these phenomena are much more common than is generally supposed. Vivid dreams while we are asleep or slumbering are, however, no rarity: it would be difficult to discover a person who has not experienced them. As, therefore, all possess the brain-cells from which these living pictures are projected, all, it would seem, could use them in waking hours, if only they could catch the trick of it. Psychologists might usefully address themselves to the investigation of these phenomena. It would be profitable to the architect, for example, to know exactly how to develop and control them; but with regard to day-dreams that is a secret that is much more recondite than the influence of lobster-salad on nightmare."



GRAND STAIRCASE, THE SORBONNE, PARIS
HENRI PAUL NÉNOT, *ARCHITECT*
(From The Architects' and Builders' Journal)

How French Artists Have Served Their Country

What can the artist do for his country in wartime? What has he done in the countries now at war? In what direction can he exert his maximum efficiency? For what work is he especially equipped?

Through my connection, as American secretary, with the Appui aux Artistes—an organization that has been helping the needy artists of Paris by providing cheap meals for them in studios loaned for that purpose—I have been kept in close and constant touch with what the art-workers have been doing in France. Even before I left that country, in the fourth month of the Great War, the artists were actively organized.

At the very outbreak of hostilities the younger artists and the students at the Beaux-Arts took their assigned places in the ranks of the youth of France, and shared the horrors of the first few months of war with such fine self-sacrifice and with such spirit and ardor that I have among my papers a single list of 350 of them killed in action.

Many distinguished themselves on the field of battle; many were "gassed" or wounded; many have come back physical and mental wrecks after long periods in the hospitals.

Two artists of the Appui were among those who acted as *éclaireurs* for what was probably the most

deadly volley of artillery ever fired. "At Verdun, when the Fort de Vaux was cut off from the main French body by German cross-fire," writes a friend in Paris, "the situation of the garrison became hopeless and Reynal capitulated. The Germans seemed to think that, with Vaux fallen, Verdun was in their power. They prepared a triumphal advance in force. Platoon after platoon, regiment after regiment, rolled out of the trenches, formed in close order under their standards and began to sweep onward, cheering and singing, with their music at their head. Two men of the 'Appui' helped to signal the right moment for the French guns to open. Those who saw it say that a great cloud of dust rose to an enormous height, hiding everything from view, and when it settled no living thing could be seen."—*From "Special Service for Artists in War Time," by Ernest Peixotto, in the July Scribner's.*

Co-ordinating the Architect's and the Painter's Art

Mr. Joseph T. Pearson, Jr., in an address delivered at the May meeting of the Philadelphia Chapter of the Institute, and reprinted in full in the June *Journal,* spoke interestingly and with knowledge of the relations that exist between the architect and the painter, and pointed out a course which, in his judgment, would result ultimately in the co-ordination of these two arts of first importance.

As to the separateness that Mr. Pearson believes to exist, we are inclined to believe that the conditions are not beyond easy remedy. There can be no differences between these two arts that cannot be reconciled by reasonable men, and if there exists any serious dispute, the basis is one, we believe, purely temperamental and easily adjusted.

Mr. Pearson stated in part:

"It is not likely that that separateness which now exists will be lessened until the painters and the architects have a more common experience in schooling and apprenticeship. Their present absolute disassociation in this respect is largely responsible for their peculiar estrangement, which at times approaches antipathy. They should be brought up under the same roof, as it were, learn the same lessons, play at the same games, and form that partnership which shall, when firmly established, produce the best possible results, both social, material, and artistic.

"The architect should realize that it is he who must make the advances, suggest the means, and seek the way whereby the arts shall be united, for he is in the majority, deals in a necessity, and has a certain and generous remuneration. The painters are in the minority, produce a luxury, and receive uncertain and small remuneration. While in no sense less important, the painters are at the architects' command. That the architect does not command or demand them is variously explained and is responsible for the fact that things now painted have scarcely any architectural application. The law of demand and supply would not fail here. What the architect and his client demand will be produced. The fault lies plainly with the architect. He is not totally undesirous of utilizing the painted product for the embellishment of his usually sterile work, but he has not the training that one must needs have to feel the need, to know the character, and understand the application of the painted thing. On the other hand, the painter, the decorative painter, being neglected, spends his talents in other directions; his things finding an occasional place here or there. When he is commissioned he shows a lack of understanding corresponding to that of the architect, and the unhappy result can be laid to neither one nor the other; they are both ill bred artistically. It is therefore most commendable that architects as an organization realize the imperative need of greater co-operation and manifest it by asking painters and sculptors to meet with them. They thus make those advances which will ultimately create a unity of the arts and, through them, not only finer and more beautiful things, but, what is more, a higher civilization.

"By what devious means that exalted state is to be reached this war bears witness. Is it not possible that this great calamity, with its ensuing griefs, will place humanity upon a common plane from which may issue a more concerted effort for the common good which shall include co-ordination of the arts? Revolution is but the speeding up of evolution, so that the co-ordination of the arts, which seemed distant, may come strong and lasting from this travail. At the moment the painter and the architect seem to be hopelessly unrelated. The feeble attempts at a partnership are really pathetic. Long unfamiliarity finds them on lofty but separate eminences from which one feebly becks the other. They must get back to a common ground, and then may one accompany the other to his task."

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VOL. CXII AUGUST 1, 1917 NO. 2171

Building Our War Cities

WHEN in September the new national army of from 500,000 to 1,000,000 men begins training at a score of camps, a multitude of buildings, large and small, constituting our "war cities" will be ready.

The magnitude of this task may be understood when it is stated that each major cantonment, of which there are to be sixteen with the addition of a number of smaller camps, the latter principally for National Guard mobilization, necessitates the construction of 1500 or more buildings, many of them large two-story barrack quarters.

As a practical demonstration of the shifting of the labor population, and as showing how the labor heretofore applied to building operations throughout the country is being drawn on for war needs, it may be stated that 50,000 carpenters and other artisans have been recruited for the work on these cantonments, and in consequence normal building operations in many cities have been temporarily suspended. Even with this large number now engaged, the demand is for more, and contractors are scouring the country in an effort to increase their working crews.

Even with labor as poorly organized as it must necessarily be at the outset, the results achieved in speed of construction are stupendous. An average of twenty buildings a day are being completed at each cantonment, and with the increased force of men it is hoped will soon be secured, a larger average is looked for.

Tests of efficiency, made by army officers, have resulted in records for construction that appear marvelous. At Camp Trevis, Fort Sam Houston, Texas, a large barracks structure rose from the ground in exactly one hour and a half, and a similar record was made at Camp Taylor, Louisville, Ky.

These records in construction are no more interesting as showing the results of systematic organization methods than those made by the lumber industry in furnishing the large amount of material necessary for these operations.

To state that the standing tree in the forest has in a week's time been felled, sawed, kiln dried, transported to its ultimate destination and formed part of a completed building is to state a fact now of such frequent occurrence as to fail to exact comment.

Just what it costs a nation at war to prepare and place an efficient, well-trained army in the field may be gathered by a visit to one of the cantonments at this time. In addition to the enormous cost of labor and material that would be incurred were similar undertakings carried to completion in a normal way, there must be added the item of overtime for crews worked long hours, and the waste resulting from all this speeding up.

When the new army has found its various training camps there must have been provided and ready the necessary drill grounds, and these, too, entail an outlay constituting a very large item in the grand total to be expended in mobilization and preparation.

To cite a specific camp, the visitor to Camp Taylor at Louisville will see an immense tract of almost level ground more than two miles square, dotted with farmhouses, some of which are pretentious structures. This tract will be the main engineering and drill field for Fort Taylor, and to put it in shape to serve its purpose every house must be razed or burned, the whole area cleared of obstructions and an enclosure provided of sufficient size to maneuver 45,000 men.

These requirements for drill grounds are present in every cantonment being constructed.

Shifting of the Labor Population

AMONG the many problems presented as the result of the entrance of the United States into this war, none has greater economic interest than those involved in the shifting of the labor population due to the readjustment necessary in many manufacturing cities throughout this country.

Just at this time, it is not possible to secure accurate knowledge of this large shifting of population, or to predict with any certainty when

the movement will end. Scarcity of building materials, due to lack of adequate transportation facilities, and to the further fact that the requirements of the Government for building materials have in certain lines practically absorbed all available stocks, has resulted in a very general suspension of building operations throughout the country. The building trade has probably been a greater sufferer because of these abnormal conditions than any other industry.

A large body of labor, more or less skilled, heretofore engaged in building operations exclusively, has been thrown out of employment and is compelled to seek work in localities where a demand in other fields of labor, in some instances unprecedented, has sprung up.

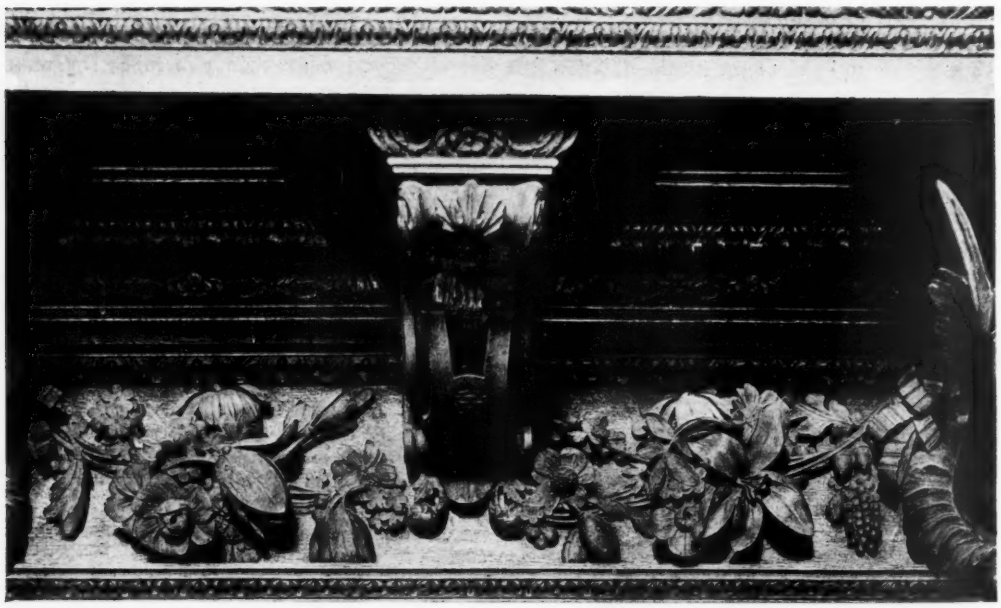
A further reason for this change of employment is the fact that in those industries engaged in preparing for war, higher wages are paid, even to unskilled workers.

It is interesting to note that war conditions have also created a genuine "back to the soil" movement. The necessity for increased farm acreage and a larger production of food stuffs has caused a correspondingly large demand for farm labor. Conditions have become almost appalling, as in every agricultural section in the country, the scarcity of farm labor has created a situation so acute as to seriously menace the harvesting of a large and perhaps unprecedented crop.

Most important of all, perhaps, is the shortage of housing facilities for the laboring classes. In the smaller cities of the Middle West, this shifting of labor has resulted in an increase of population, as high in some instances as 1000 male laborers a week. The necessity for providing adequate housing for this large increase in population has created a condition that has taxed these various communities to the utmost. In somewhat smaller western cities where large plants have been located that are operated throughout the twenty-four hours of the day, there has been an increase of population of almost 25%. The urgency for supplying additional housing facilities for this sudden increase of population has necessarily been accomplished in a makeshift way.

The danger in operations of this nature lies in the fact that there is possibility that in planning the additions to the town to provide sites for the needed low cost houses, many errors will be made which because of the large outlay involved, will never be corrected.

The history of town planning and of industrial housing in the United States, offers many examples where, through lack of ordinary precaution, communities have ultimately faced serious and costly problems and have been compelled to correct errors made during a period of unusual activity such as we are now experiencing. It is but ordinary precaution to exert every possible effort to prevent these conditions from arising in the future.



Dr. Jesse Benedict Carter Dead

Dr. Jesse Benedict Carter, Director of the American Academy in Rome since 1913, died suddenly on July 22nd at Bologna, from paralysis caused by sunstroke. He was returning from the Italian front with several other Americans who had been arranging for the organization of the American Red Cross. Dr. Carter had been prominent in the intellectual and social life of Rome for twelve years, and only recently celebrated conjointly at the American Academy with members of the French colony in Rome the fraternal accord of the two republics. Dr. Carter was born in New York, June 16th, 1872. Later he attended the German universities at Berlin, Göttingen and Leipsic.

Italy Guards Her Art Treasures

Determined that her treasures of art, particularly those of architecture, shall not be mutilated or destroyed during the war, as have been those of France, Italy has taken the utmost precaution to secure their safety.

Heavily padded quilting and redoubts of sand bags have been used to cover or surround buildings and art objects that are most liable to suffer in the case of attack or bombardment.

The streets in the principal Italian cities are said to present an astonishing appearance to the traveler, whose guide books will be of little service just now in enabling him to locate buildings or objects of interest.

Examination for Architectural Draftsmen

The Municipal Civil Service Commission has announced an examination for Architectural Draftsmen for which applications will be received at Room 1400 Municipal Building until August 8 at 4 p. m. From the resulting list appointments will be made to Departments of Public Charities, Hospitals, Board of Education, Police and Fire, etc.

The examination is open to candidates 20 years of age or over who are citizens of the United States and residents of New York State. The examination will consist of two subjects: Experience, 2; Technical, 8. Candidates should have had at least two years' experience in an architect's office or have completed a course in art, design or architecture, or had training or experience equivalent to either of the above.

For further particulars apply to the Municipal Civil Service Commission, New York City.

Government Needs of Clerical Services

At the request of the United States Civil Service Commission, the following announcements of the Government's need of stenographers and typewriters is published.

"The United States Government needs, and needs badly, great numbers of stenographers and typewriters, both men and women, for service in the departments at Washington, D. C., and the situation in Federal offices outside of Washington is scarcely less urgent. The supply of qualified persons on the Commission's lists for this class of work is not equal to the demand, and the Commission urges, as a patriotic duty, that citizens with this special knowledge apply for examination for the Government service. At present all who pass the examination for the Departmental Service are certified for appointment. Examination papers are rated without delay.

"Examinations for the Departmental Service in Washington, D. C., for both men and women are held every Tuesday in 400 of the principal cities. Examinations for the Field Service (positions outside of Washington, D. C.), are held frequently.

"The usual entrance salary ranges from $900 to $1,200 a year. Advancement of capable employees is reasonably rapid.

"Applicants must have reached their eighteenth birthday on the date of the examination.

"Full information and application blanks will be mailed to persons interested upon application to the United States Civil Service Commission, Washington, D. C.; or to the Secretary of the United States Civil Service Board of Examiners at any of the following named cities: Post Office, Boston, Mass.; Philadelphia, Pa.; Atlanta, Ga.; Cincinnati, Ohio; Chicago, Ill.; St. Paul, Minn.; Seattle, Wash.; San Francisco, Cal.; Customhouse, New York, N. Y.; New Orleans, La.; Honolulu, Hawaii; Old Customhouse, St. Louis, Mo., or to the chairman of the Porto Rican Civil Service Commission, San Juan, P. R."

New Street Numbering Method

A metric system of street numbering is being installed in Pernambuco, Brazil, according to Vice-Consul James B. Stewart, which is said to be simple and practical, as well as showing an improvement over the old system. If the number of a house is 134, for example, it means that that house is located 134 meters from a given starting point. The house across the street is regarded as being 135 meters from that point. The system, Mr. Stewart says, is being tried out in several cities in Southern Brazil.

The Strength of Nails, Screws and Bolts

By H. P. Thayer

FOR some time steel and reinforced concrete have been considered more desirable materials for construction than timber, the durability of the first two types in permanent structures more than offsetting their larger original cost.

But present conditions demand a reconsideration of above stated facts. The price of steel has advanced by leaps and bounds, and it is now difficult to obtain delivery within any reasonable time. For many projects the designer should therefore consider seriously the substitution of wood in place of the metal. It is quite true that we cannot count on a life much exceeding ten years for some grades of untreated timber exposed to the weather. Also, unless care be taken, very grave fire hazards may be introduced. No one can forecast the future, but the probabilities are that a temporary structure of timber might be erected to last ten years and at the end of that interval replaced by a permanent construction of steel or concrete at the lowered unit costs, the whole operation being cheaper, when interest is considered, than a durable structure erected now. For example, it is better in the long run to put up a temporary building at $100,000, replacing it ten years later with one costing $200,000, supposing that the estimate for the latter at present prices would amount to $250,000. Possible inconveniences due to the change must not be forgotten in making comparisons.

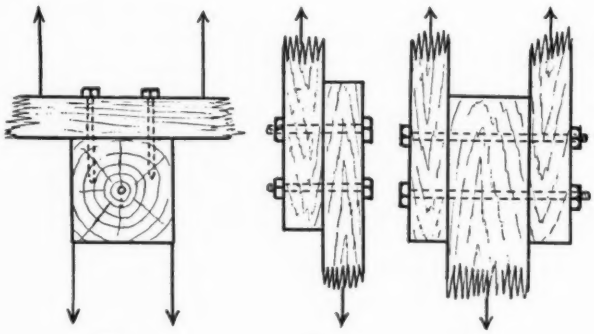


Fig. 1 Tension — Fig. 2 Single Shear — Fig. 3 Double Shear

Since the above example is even more favorable to the permanent types of construction than present conditions really warrant, it follows that timber will prove quite economical in many locations. A few words about the construction of joints in timber may hence prove of interest at this time. This is an extremely important question, because the strength at these points is generally that of the entire structure.

The vital point in all joints are the iron or steel fastenings. These may be:

Class A { (1) Nails. (2) Drift bolts, practically large nails. (3) Dowels, that is, double-ended drift bolts.

Class B { (4) Wood screws. (5) Lag screws.

Class C (6) Bolts.

We have divided the six above named varieties into three classes, each member of a class holding by a similar action upon the wood, and thus possessing equal strength for equal dimensions.

The fastenings may act in tension, Fig. 1; in single shear, Fig. 2; or in double shear, Fig. 3. Obviously the latter test can apply to Class C only.

Wide differences of opinion exist among designers as to the safe strength of these various fastenings. Some assume that a bolt in timber will carry as much as a rivet in steel work—a value which is very near or perhaps above its breaking strength. On the other hand, some engineers treat them as uniformly loaded beams, thus securing results unreasonably low. For example, a ¾-inch bolt splicing a 12-in. x 12-in. timber with two splice plates will be good for about 8000 lb. by the first method, while the second gives 320 lb.* A reasonable value for this case is about 1000 lb. Variations must be expected, however, to conform to the variations in the timber. Amounts given below represent averages of all available data.

We will now give the *safe* value for *tension* or *withdrawal* as it is sometimes called. This will be stated in terms of the area of the fastening in contact with the wood and in line with the direction of the pull. Use the areas of the circumscribing cylinders for the screw threads. The surface of the

*Allowing 9000 lb. per sq. in. for shear and 12,000 lb. per sq. in. for flexure.

point should not be considered. For bolts we have given merely the bearing capacity of the timber, since its strength is that developed by its washer.

(a) Round drift bolts should be driven into a hole having a diameter 30 per cent less; square drift bolts, 15 per cent less.

(b) The strength allowed must not exceed 12,000 lb. per sq. in. on the net area for wrought iron, nor 16,000 lb. per sq. in. for steel.

(c) These are safe values for buildings carrying a quiescent load. For bridges or structures bearing machinery, use two-thirds of the tabular values.

(d) Note that there is a tendency, especially when out of doors, for the timber to rot around the metal, thus very materially weakening the fastening. The above amounts should hence be decreased where rotting may be expected during the life of the proposed construction.

The safe value of 1-in. nails, drift bolts, dowels, screws or bolts in single shear is given in the table below. The strength of other diameters will vary as the area, or for rounds, as the diameter squared.

TABLE I—STRENGTH FOR TENSION OR WITHDRAWAL IN LBS. PER SQ. IN.

(See Conditions Below)

Timber	Cut Nails		Wire Nails, Drift Bolts or Dowels		Wood or Lag Screws		Bearing of Washers	
	1 to Grain	11 to Grain	1 to Grain	11 to Grain	1 to Grain	11 to Grain	1 to Grain	11 to Grain
Chestnut	150	120	120	100	300	250	300	1000
White Oak	250	200	200	150	500	400	500	1500
Red Oak	200	150	150	120	400	300	400	1200
Hemlock	150	120	120	100	300	250	200	750
Spruce	120	100	100	80	250	200	300	1000
White Pine	100	50	40	30	200	100	200	750
Norway Pine	120	80	50	40	250	150	300	900
Oregon Pine (Douglas Fir)	150	120	70	50	300	250	300	1400
Yellow Pine	150	120	70	50	300	250	600	1500

TABLE II—STRENGTH IN SINGLE SHEAR OF 1-IN. BOLTS

(See Conditions Below)

Timber	Bearing 1 to Grain		Bearing 11 to Grain	
	Steel Bolt	Iron Bolt	Steel Bolt	Iron Bolt
Chestnut	700	600	1300	1100
White Oak	900	750	1500	1300
Red Oak	800	700	1400	1200
Hemlock	550	450	1000	900
Spruce	700	600	1300	1100
White Pine	550	450	1000	900
Norway Pine	700	600	1200	1000
Oregon Pine (Douglas Fir)	700	600	1400	1250
Yellow Pine	1000	850	1500	1300

TABLE III—STRENGTH OF 1-IN. BOLTS IN DOUBLE SHEAR
(Note Accompanying Conditions)

Timber	Bearing Perpendicular to the Grain				Bearing Parallel to the Grain			
	Metal Plate		Wooden Plate		Metal Plate		Wooden Plate	
	Steel Bolt	Iron Bolt	Steel Bolt	Iron Bolt	Steel Bolt	Iron Bolt	Steel Bolt	Iron Bolt
Chestnut	2000	1700	1400	1200	3800	3200	2600	2200
White Oak	2400	2100	1700	1500	4200	3600	3000	2600
Red Oak	2200	2000	1600	1400	4000	3400	2800	2400
Hemlock	1600	1300	1100	900	3000	2600	2000	1800
Spruce	2000	1700	1400	1200	3800	3200	2600	2200
White Pine	1600	1300	1100	900	3000	2600	2000	1800
Norway Pine	2000	1700	1400	1200	3200	2800	2400	2000
Oregon Pine	2000	1700	1400	1200	4000	3400	2800	2500
Yellow Pine	2800	2400	2000	1700	4200	3600	3000	2600

For example, ½-in. bolts will have an allowable single shear equal to one-quarter of the values shown in Table II.

(a) Round drift bolts should be driven into a hole having a diameter 30 per cent less; square drift bolts, 15 per cent less.

(b) Neither the spacing nor the edge distance of the bolts should be less than six diameters.

(c) Steel plates should not be thinner than ½ in.; wooden plates and wooden members not less than six diameters of the fastening if in bearing perpendicular to the grain; or three diameters if parallel to the grain.

(d) These are safe values for buildings carrying a quiescent load. For bridges or structures bearing machinery, use two-thirds of the tabular values.

(f) The tendency to rot around the metal will eventually lessen above values, especially in classes A and B.

The safe value of 1-in. diameter bolts in double shear is given in the above table. The strength of other bolts varies as the area or as the diameter squared.

The conditions will be the same as for Table II except that (a) may be omitted and that wooden members in (c) should be not less than twelve diameters of the fastening in thickness if in bearing perpendicular to the grain; or six diameters, if parallel to the grain.

DOORWAY, CHURCH OF ST. PAUL, TARRAGONA, SPAIN