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CONCRETE-STEEL ARCH BRIDGE, EDEN PARK, CINCINNATI, O.

ORNAMENTAL TREATMENT OF CONCRETE SURFACES

By WM. WALTER SMITH, A.B., B.S.

THE ancient art of concrete construction was so long lost that, since rediscovered in modern times, it has had to advance through all the crude primary steps leading up to its present rightful position as a finished building material of wide adaptability.

From its humble original use in unseen foundations and footings, through its various stages of development into the ideal building material, concrete has too often brought along a few entirely unnecessary objectionable features. Chief among these are form-marks, unsightly rough surfaces and monotonous deadness of appearance. Underground, forms, merely thrown together, served primarily to curb the opening: the concrete, dumped into the hole in any manner, was mixed "dry" because dry concrete attains a working strength more quickly than a wet mix. These careless methods, employed above ground, produced results so glaringly ugly as to cause a too common belief that nothing beautiful could be made of concrete. By giving greater care to form construction, form-marks were easily eradicated. In successfully striving to attain finished and agreeable surface effects, several distinct, practicable methods of treatment have been developed and perfected, some of which are herein described.

Mortar Facings and Surfaces Untreated

By using a moderately wet mixture (well tamped) and tight, well-built forms,

CONCRETE FOOT BRIDGE OVER HOUSATONIC RIVER AT STOCKBRIDGE, MASS.

there can be produced a surface sufficiently ornamental for the purpose, where utility is the principal point considered. Usually a film of mortar settles against the sides of the molds; but frequently carelessness causes the coarser aggregate and small pockets to appear. These objectionable features are easily avoided either by spading or by the use of facing boards.

As the name implies, spading is accomplished by means of a straight garden spade or a spading tool, which is run down and worked to and fro between the form and the concrete to force back the larger materials and to allow a thickness of wet mortar to flow in against the forms. In this way a smooth, regular surface can be produced. However, spading is hard work; and, unless closely supervised, workmen frequently forget the spading tool. As a result there has come into general use a more dependable device called a facing board. This inexpensive and effective implement commonly consists of a five-foot length of three-sixteenth-inch sheet metal plate, ten to twelve inches wide, with the top three inches shaped to an outward flare. To the inner face of the horizontal plate, near the ends and at the middle, are attached short vertical lengths of one-inch angles as well as a pair of simple lifting handles. In operation the boards are set ends abutting, with the handles up and the vertical angles against the inside face of the outside form wall. The ordinary concrete backing is placed between the other form wall and the facing boards. Within the inch space between the facing board and the outer form is filled a mushy facing mortar. The

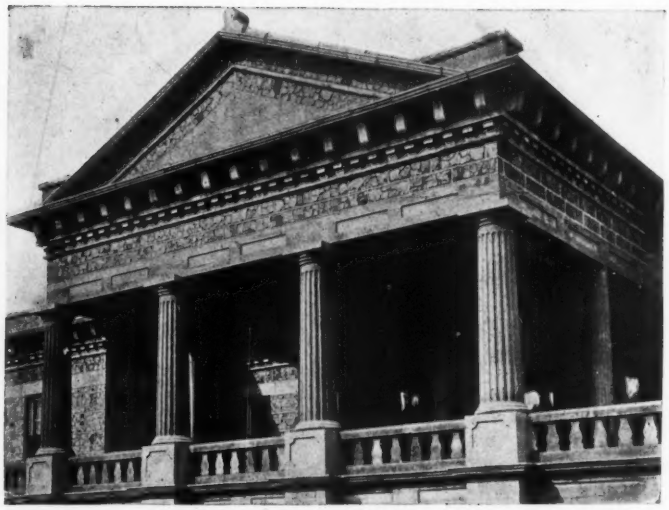
GATE POSTS OF CONCRETE

metal board is then carefully worked up, almost out of the concrete, the backing is compacted against the facing mortar, and the operation is repeated as the work continues. For facing mortars or concrete, a mixture fairly rich in Portland cement should be used. A proportion of one part cement to two or three parts coarse sand or fine stone screenings produces good results. For a concrete facing of both fine and coarse aggregate, depending upon the materials, use a mix varying from 1: 1½: 3 to 1: 2: 4. A mortar surface too rich in cement will crack and craze and will be objectionable in appearance.

A WELL-EXECUTED CONCRETE GARDEN DETAIL

By a reversion to the original method of a dry mix and thorough tamping, there has recently come into use a finish which, in boldness, beauty and execution of detail, is in many ways most remarkable. Suitability of design is the first requisite. By the use of a fairly lean, dry mixture, well tamped in place, a concrete is obtained which brings out the sharpness of details without displaying the minor irregularities and imperfections of the form walls. The surface produced has all the charm, warmth and softness of a coarse-grained, unpolished granite. Its face is rough and deeply pitted, but of the pleasing richness of a rough English tweed. A time test of some six years on the original work has brought

A GOOD EXAMPLE OF MODERN CONCRETE BRIDGE CONSTRUCTION



DETAILS OF VERANDA AND CORNER CONSTRUCTION
The somewhat unusual effect of the wall blocks is obtained by moulding them face down in such a way that the face is covered by chips of red jasper.

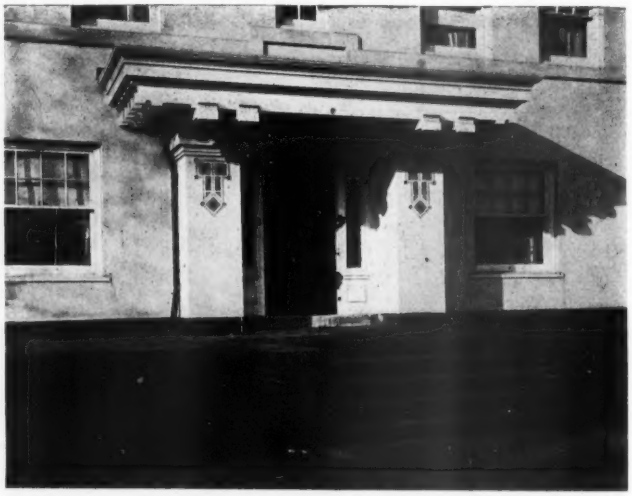
forth no evidence of injury from frost, no efflorescent discolorations.

For such untreated surfaces the concrete is proportioned approximately, one part cement to one and one-half parts sand, to four and one-half parts crushed limestone screenings which must pass a one-half-inch mesh and be retained on a one-quarter-inch screen. So little water is used that, when the concrete is rammed into place, no mortar flushes to the surface. If the walls are massive, for several reasons it is best to use this dry mix as a facing concrete only, and to back it up with a wetter mixture. By means of this method the sharp details of the design are wrought in a manner suggestive of a characterful free-hand drawing. Where suitable, pleasing results are thus obtained more easily than by any other means. Likewise the forms can be more quickly removed.

Abrased and Tooled Surfaces

Plain mortar-facing finishes, although productive of a smooth surface, nevertheless, where beauty is paramount, present a harsh and lifeless appearance. This harshness is most commonly removed either by abrasion or by tooling. Both methods are also effective in erasing form-markings and in producing uniform color, texture and appearance. Three forms of abrasion are in common use—brushing, scrubbing and sand-blasting.

BRUSHING.—Simple character is given an ordinary mortar-faced surface by brushing the green concrete with a stiff fiber or wire brush. A special tool of slitted sheet metal may be purchased, or anyone can make his own brush by clamping together four-inch strips of wire cloth or ordinary fly screen. For a plain brush finish it is advisable that the facing mortar be free of coarse aggregate. The concrete must be brushed while it is yet green, but not so soon as to remove granular particles and to give the surface a pitted appearance. In hot weather, from the viewpoint of correct brushing, the forms should usually be taken down on the day following the placing; while in cooler weather more time must be allowed. The older the concrete, the more the labor required. Frequently the forms must be planned and built in sections to facilitate this attractive treatment. The



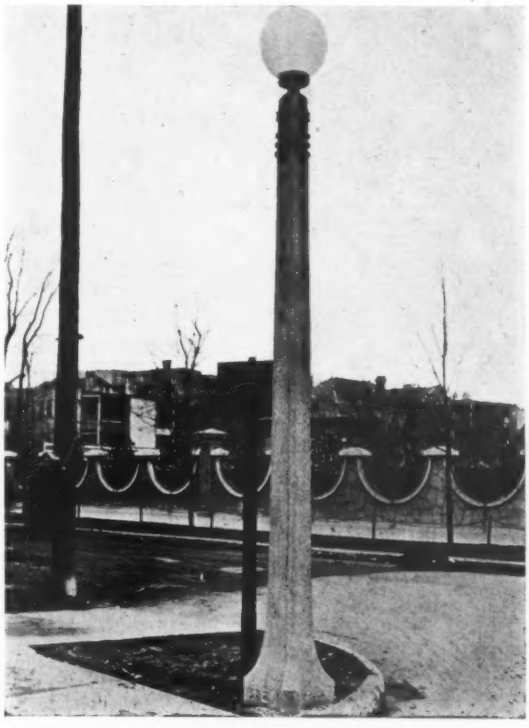
DECORATIVE TREATMENT OF CONCRETE ENTRANCE TO A COUNTRY HOUSE

SHOWING THE DECORATIVE POSSIBILITIES OF CONCRETE IN THE CONSERVATORY, GARFIELD PARK, CHICAGO

finish resulting is not unlike the ageing effect of an evenly weathering homogeneous stone.

SCRUBBING.—By scrubbing concrete surfaces, results are produced very similar to brushed effects. This method is applicable where the work is such that the forms cannot be removed quickly enough to permit of brushing. The scrubbing is done by means of a concrete brick, a soft limestone, or a carborundum stone. As soon as the forms are down, water is applied and the concrete is rubbed vigorously with a No. 16 stone. When the rough projections and the cement skin have been removed, the lathered surface is washed down, dusted with a 1:2 dry mixture of cement and sand, and the scrubbing completed with a No. 30 stone. After the desired effect is obtained, the surplus cement grout is carefully washed from the concrete face. This treatment produces a lighter appearance than that of ordinary troweling, and, by filling the pores with cement grouting, yields a surface at least as entirely waterproof as the original. Where concrete has necessarily attained considerable age, there may be required the acid treatment described under "Exposed Selected Aggregates."

SAND-BLASTING.—By means of an air compressor, a small gasoline engine and a nozzle, sand can be impinged so forcibly against concrete structures as to remove the cement film. Several days previous to blasting, all imperfections of surface should be painted up with mortar or removed by tooling as the situation may require. Otherwise, in attempting to get rid of these irregularities, the surface will be little improved in appearance. Sharp lines of architectural detail should be preserved by covering these sections with tough paper or wooden strips. Similar means should be employed to prevent overtreatment and to obtain homogeneous appearance and invisible boundary lines where two separately applied treatments on adjoining sections merge. For blasting purposes a clean, sharp, hard silica sand or crushed quartz is most effective.



A CONCRETE LAMP AND SIGN POST OF GOOD DESIGN AND PROPORTION

A CONCRETE BRIDGE SHOWING GOOD ARCHITECTURAL TREATMENT

The size and shape of the nozzle are dependent upon the power in the compressor, the range, and the size of the blasting-sand grains. For materials passing a No. 8 or a No. 12 screen a one-quarter-inch and a one-eighth-inch nozzle are respectively used. Correct nozzle pressure is also a variable quantity. Under ordinary conditions for concrete one month old, a working pressure of sixty pounds is sufficient. Older concrete may require eighty pounds. The surface resulting from sand-blasting also has the imprint of age and is not unlike that produced by scrubbing. For work of considerable size this process is very rapid and inexpensive. If suitable facing mortars have been applied, by using protective coverings shaped to appropriate designs, beautiful panel effects or delicate traceries can be wrought in a manner similar to etchings on glass.

Tooling—The character of the ordinary mortar finish is also changed by picking the surface with pointed tools. This treatment chips off the mortar which has flushed to the surface and, by so roughing, changes the propensity of the surface from light-reflecting to light-absorbing; and thereby produces a warmth of expression. While the hand-pick and stone-axe have been used to some extent, the most satisfactory results have been secured through the medium of the hand- and air-operated brush-hammer.

Where the surface is to be brush-hammered, during construction the concrete should be carefully faced with materials capable of rendering the finished results desired. Sand mortars brush-hammered yield a surface of uniform appearance. Where the face contains coarse aggregate, greater variety is obtained. Age is a desired quality in concrete which is to be so treated; and, to prevent scaling of mortar and dislodging of coarse aggregate during the treatment, no surface should be brush-hammered until it is at least one or two months old. In three months the cement usually becomes as hard as the aggregate, and such a surface so treated has no little individuality.

The size and pointing of the hammering tool are matters of personal opinion. Very good work has been done with a nine-pound hammer with thirty-two points on one end and twenty-five on the other, and also with a hammer of the same weight with twenty-five and sixteen points. The points are small pyramids spaced about two-thirds of an inch. On structures of some size pneumatic tools facilitate the work. Variation in appearance of the treated surface may be effected by the manner in which the stroke is applied. Perpendicular blows merely roughen: glancing strokes produce lineal markings. Bush-hammering is a simple means of dispelling the coldness of plain concrete surfaces.

Displayed Selected Aggregates

For decorative effect and warmth of color and composition, no other building material offers the architect so great a field for the expression of his ideas and the display of his individuality as concrete with exposed selected aggregates. A wealth of color is everywhere at hand in the various marbles, granites, gravels and burnt clays, from which he may select his crushed aggregates (one or several) and combine them on the mixing board in much the same manner as the artist mixes his paints on his palette. Placed in the wall and treated

so as to display the beauty of the composition—the result is decidedly attractive and pleasing.

The great range of possibility in this field in a way limits definite instruction as to the selection, size, grading and proportioning of the various aggregates. Much depends upon the subject and the treatment proposed. These factors having been worked out, the matter reduces itself to the simple problem of concrete construction.

If two or more coarse materials are used, they should be thoroughly blended before being mixed with the sand and cement to form a wet concrete. Usually a rich mix is preferable in the proportion of 1:2:4 or 1:2½:5. The entire thickness of wall may be made of these selected aggregates or, by means of facing boards, only an outside layer may be used, backed up by ordinary concrete and naturally thoroughly bonded together with it as a single stone.

Several methods are used for displaying the color of the concrete. The forms may be removed while the concrete is yet "green" and the face may be brushed or scrubbed as prescribed elsewhere in this article. Such treatment removes the thin exterior covering of cement and brings the coarse color aggregate slightly in relief. Likewise, at the proper age, the surface may be tooled. After the film of cement has been removed by either of these methods, to brighten up the colors, the walls should be painted with one or more applications of a wash composed of one part commercial hydrochloric (muriatic) acid mixed with five to ten parts of clear water, with an interval of a few minutes between the applications. When suitable effects have been obtained, usually within a half-hour, thoroughly scrub the walls with a fiber brush to remove the acid and loose particles. By such treatment, there is had a rough surface of irregularly distributed colored stones possessing considerable artistic worth.

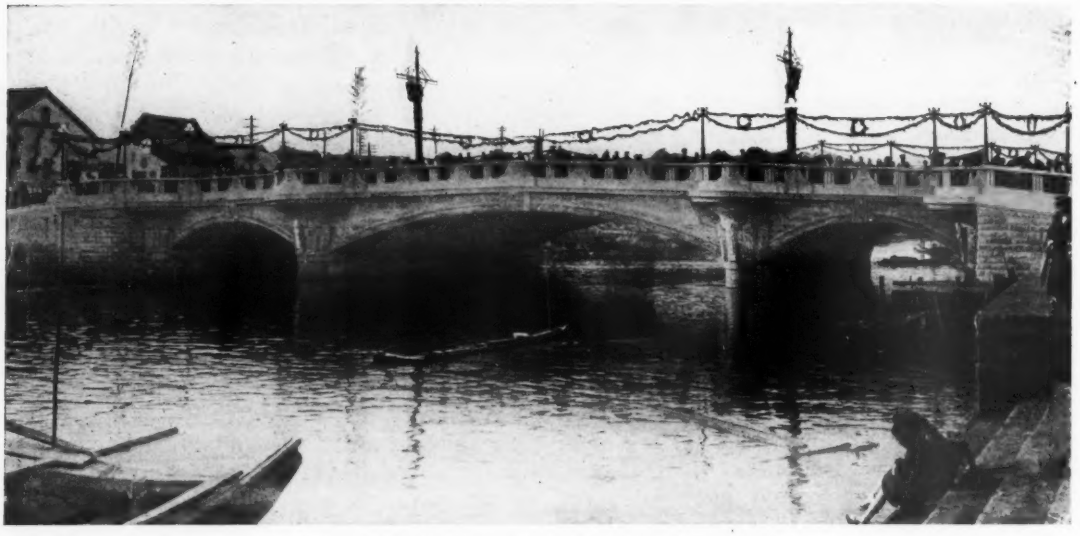
Instead of a rough appearance, a smooth finish, similar to a terrazzo, may be obtained by dressing the surface with a carborundum stone as described above under "Abrased and Tooled Surfaces." By this means not only the outside cement sheet is removed, but also are the aggregates ground down smooth and given a polish. To save labor, light portable power grinding machines have been invented, which quickly accomplish the work. The grinding and the polishing bring out the beauty of each stone and enhance the effect by leaving it in a setting of cement.

Colored Surfaces

For decorative effects it is sometimes desirable to produce a concrete of a shade which will harmonize with some general color scheme. This is accomplished by the use of artificial coloring matter or by selecting colored aggregates which, when made into concrete, will produce the desired results.

Artificial Colors.—The using of artificial colors in concrete is a matter which

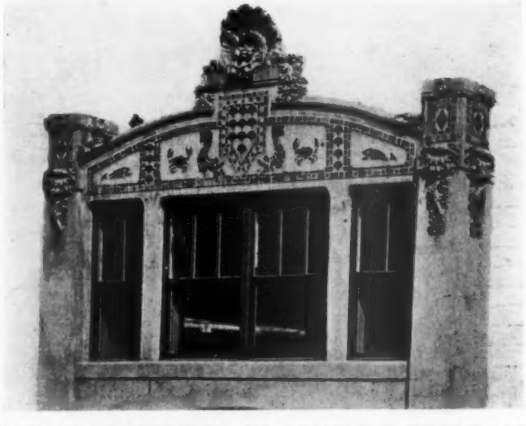
A WELL-DESIGNED CONCRETE BRIDGE IN CHICAGO'S PARK SYSTEM



A CONCRETE BRIDGE AT YOSHIDA, JAPAN

should be entered upon only after careful and thorough experimentation, or upon the advice of an expert familiar with all of the factors in the case. As a rule there is a chemical reaction between Portland cement and ordinary pigments which is detrimental to the strength of the cement and likewise to the color of the pigment. Since colors of vegetable origin are most easily affected, it is advisable, where artificial treatment is necessary, to use mineral coloring matter. To be sure of conserving the strength of the structure as well as to save color material, apply a color facing mortar by means of facing-boards. Incorporate the pigments dry with the cement and this mixture with the aggregate, or add the coloring matter to the water. To get even effects, exact measuring and careful mixing of every ngredient (even the water) is essential. It must also be borne in mind that mortar when wet appears several shades darker than after it has cured out. By mixing five pounds of coloring matter for each bag of cement in an ordinary 1: 2 sand mortar, the following colors will be approximately obtained: Bright red—raw iron oxide; brown—roasted iron oxide; blue—ultramarine; buff to yellow—yellow ochre; gray to dark slate—lampblack or carbon black; black—manganese oxide, eleven pounds per bag. In all cases various hues may be obtained by increasing or by decreasing the proportion of coloring matter.

NATURAL COLORS.—Nature's pigments in beautifully colored marbles, granites, sand-stones, gravels, burnt clays, corals and sands are far preferable to artificial colors, as they do not weaken the concrete and can be depended upon as permanent. These materials are crushed fine, made into concrete, and the surface coloring brought out in exactly the same manner as for "Displayed Selected Aggregates." For instance, beautiful pinks may be obtained with red marble dust; a terrazzo effect may be procured by incorporating with it a few black and white marble chips; or a slightly different, but none the less charming result, by using the black and white



MOSAIC DECORATION IN CONCRETE DETAIL OF MARLBOROUGH-BLENHEIM HOTEL, ATLANTIC CITY

marble screenings alone. The glitter of granite will add life to a surface. And so on, an infinite number of delightful effects are possible.

Mosaic Decoration

Not every person is a stone mason, nor does every stone mason have access to a variety of colored stones to shape and to set as ornamentation in concrete surfaces. Since permanent weatherproof color can now be burned into clay and these ornamental tile can be produced at a reasonable cost, this new form of decoration for concrete is rightfully meeting with general approbation. In working out tile ornamentation two methods of treatment are possible: the simple Roman plan of using tesserae, out of which the design is formed from square or nearly square particles, or the modern way of cutting the clay figure into multiform shapes to conform to the

BRIDGE DETAIL, PRESENTING A COMBINATION OF CONCRETE AND WROUGHT IRON

potter's process and to delineate the design. This latter method is comparable to that used in stained glass windows. Either plan is practicable.

There are in use several ways of setting clay ornaments. In all cases due care must be given to the correct lay-out of the design and a means of fixing it firmly until held permanent by the concrete. In walks and floors this is a mere matter of exact location. For walls and ceilings the entire figure has been built complete or in sections in a concrete slab (of the same texture as the work) and later set in place. With this and similar schemes, place a piece of heavy paper or felt between the form and the faces of the tiles to prevent them from being stained by liquid cement. Special adhesive substances are on the market (or can be made) by means of which the mosaics can

CONCRETE GARDEN WALL AND PERGOLA, HOUSE OF F. L. COLBY, ESQ.

MR. ALBERT KAHN, ARCHITECT; MR. ERNEST WILBY, ASSOCIATE

be glued in exact location on the forms and securely held there until backed up by concrete. A later application of water in abundance to the outside of the none too tightly built forms, dissolves the glue and leaves the decorations permanently in place. Likewise space may be provided for the tile by lightly nailing (to the inside of the form) blocks of wood cut to the shapes of the pieces of the design. When the forms are taken down, the adhesion of the cement retains the wooden block, which should be left in position until the concrete wall has been given the desired surface finish. They are then carefully removed and the tiles are fixed in place with a good cement mortar.

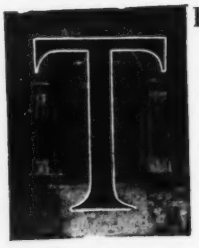
Important Minor Details

Before undertaking the actual construction work, the builder should always conduct a series of careful tests to determine the materials necessary and the exact proportion to use for producing the final results in the surface finish desired. This attained, equally good effects in the completed structure may be had through attention to details of forms, selection and grading of the aggregates, exact proportioning, careful placing, and judgment in getting uniformity of surface finish. Concrete permanently displays not only the design but also the character of the builder.

Two centuries were required to develop the log cabin into the finished frame structure. Times and conditions have changed. Materials for concrete are in abundance everywhere, and the public is demanding it for constructing permanent, fireproof, sanitary buildings. Not a few architects and builders know less of this material than they should. The demands of the public must be and are being met. It is for the architect to guide the public taste in the use of this most versatile of all building materials.

CONCRETE CONSTRUCTION USED IN THE NEW 13TH PRECINCT POLICE STATION, NEW YORK CITY

By EDWARD PEARCE CASEY, *Architect*



HE use of concrete in this building is confined to the floor, roof and stair construction, and to the outer walls facing on streets and courtyard. The remaining heavy supporting walls are of brick masonry, although it is an open question, considering the present day difficulty of obtaining honest brickwork, with all the voids properly filled, whether it would not be advisable to use concrete in these parts, and thereby secure a more solid wall at less expense.

The floors and roof are of the usual reinforced beam and slab construction, roughly formed, and are finished by plastering upon the surfaces of the beams and slabs. The top or wearing surface of the floors is in places laid with quarry tile, terrazzo or granolithic, but the greater part is laid with wood in one thickness, over an absolutely flush surface, formed by troweling the cinder concrete fill between the sleepers to a hard surface, even with the top of the sleepers. This is very important, although almost universally neglected, as it does away with the convenient space for vermin, under the boards, and likewise prevents the spread of fire, it being very difficult to burn such a close lying floor covering. This is doubly important, as the wood floor covering comprises by far the greater part of the combustible material in a modern fireproof building. Indeed, it has been stated, undoubtedly with truth, that a bonfire might be built in the middle of such a close lying floor, with the result that only the part of the floor covering directly under the fire would be burnt off, and the remainder of the building remain intact.

The concrete construction of the roof has suspended from it a plastered ceiling on metal furring. This is another very

important feature, which is much too frequently overlooked in modern city buildings, as the inclosed air space between the roof and the ceiling affords, through the comparative non-conductivity of air, a very necessary protection for the top story against the extremes of heat and cold.

The part of the floor of the second story directly over the driveway to the courtyard is supported on a concrete barrel vault, of which the method of construction is interesting, and perhaps quite novel. Instead of putting in place a continuous wooden form for this vault, which was complicated further with six penetrations, the whole vault was formed in light metal furring and lathing, which was then stuccoed with the first rough coat of cement mortar. This mortar when set was sufficiently strong to retain the concrete forming the vault and, with a few temporary struts for support, served as a complete centering for placing the concrete. The metal furring, moreover, acts as a permanent reinforcement near the soffit of the vault, and very much increases its stability.

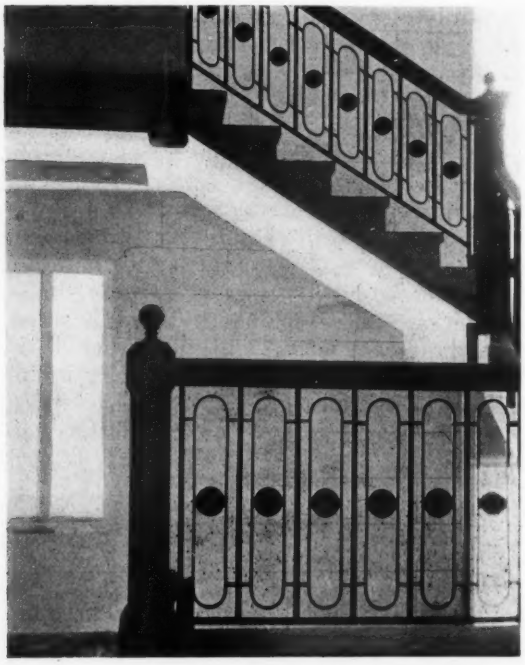
Another feature of interest in this building is the finish of the reinforced concrete stairs. These flights are in three parts between the stories, with two platforms. The concrete is left exposed on all faces, including the treads, but after being moulded in very carefully made wooden forms, with the employment of a fine aggregate for the facing parts at least, it is very carefully rubbed down to a smooth finish. The process is very laborious when done by hand, but some kind of a power grinder might be made which would produce the same or better results. Such a surface is certainly very satisfactory, and produces the same good effect as it does when applied to stonework.

Perhaps the most interesting feature of this building is the construction of the exterior walls in separate blocks of concrete. There appear to be two fundamental ways in which concrete may be employed in building, both equally rational, and therefore legitimate. One is by moulding the concrete into blocks of various shapes and sizes, with which the building is subsequently constructed, and the other is by moulding the building as a whole, monolithically, or as nearly so as possible, without any intentional joints. In the latter case

PRISONERS' ENTRANCE

DRIVEWAY ENTRANCE

the detail should not be of such a nature as to lead one to believe it is built of separate blocks, although it is perfectly reasonable to give the exposed surfaces a presentable finish by cutting or grinding. The advantages of the monolithic method are that it is less expensive, in that we secure a minimum of handling of material, and are enabled with the aid of metal reinforcement to use economical structural forms such as beams and cantilevers. The dis-



DETAIL OF STAIRWAY

advantages of this method are that the defects in the concrete, which are inevitably moulded into the building, are impossible to properly eradicate, while a satisfactory finishing of the surfaces in places is expensive. Moreover, we are often precluded from using agreeable architectural motives, which can rationally be constructed only of separate blocks.

The advantages of the block method are that we are not compelled to build defects into the building, as only perfect blocks need be allowed to be set; besides, we can finish the exposed faces of the blocks perfectly and economically on mechanical rubbing beds and otherwise, as is the case with stone; also, all the pleasing architectural motives which are germane to block masonry are by this method made legitimate. The greater amount of handling of material required by employing this method, as well as the difficulty of quickly replacing a defective block, are disadvantages, which, however, pertain as well to stone or terra cotta blocks, in a greater or less degree, according to circumstances.

DETAIL OF PRINCIPAL ENTRANCE

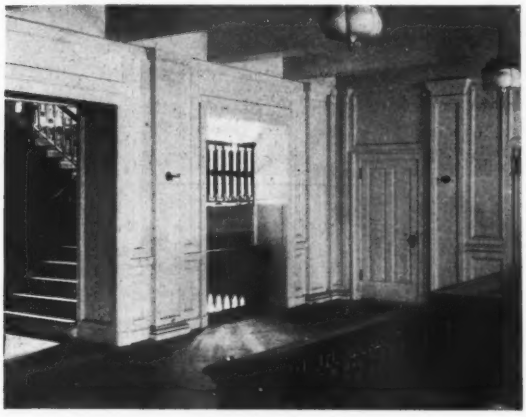
In making the blocks for this building, a plant was improvised, and more or less imperfectly equipped, for casting and finishing them. The results, however, indicate that with a plant properly equipped with facilities for moving and storing the blocks, and especially with machinery, such

ONE OF THE CORRIDORS

as planes and rubbing beds, for properly dressing and finishing them, there should be a great future for this work.

The great thing is to finish the blocks properly, and for this purpose a modern stone-finishing plant is necessary, without, however, the machinery used for sawing up large blocks, as, the blocks being cast to shape, the process is merely one of truing up and finishing.

In this case the blocks were cast large enough to extend through the whole thick-



THE MUSTER ROOM

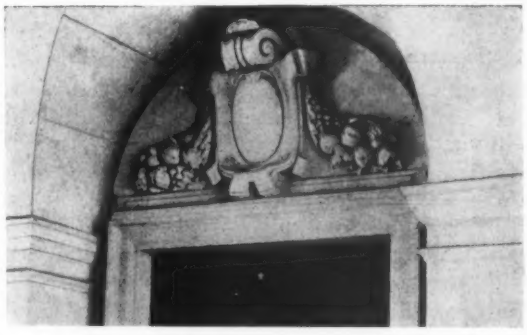
ness of the wall, and no brick backing was necessary. They were cast solid, not only for strength, but also for the reason that furring on the inside of the wall is much more effective in securing dryness and warmth than is the comparatively small amount of void that might be left in the block. In place of the wooden moulds frequently used, wooden models were made of all the various stones, and the casting was done in sand, with the face of the block down. The face of the blocks for a depth of, in some instances, as much as six inches, as the form of the block may require, is composed of equal parts of Portland cement, marble dust and fine crushed limestone. The remainder of the block is composed of rich gravel concrete.

The pouring of the two mixtures was done at the same operation, the facing mixture being placed over the backing mixture in the same bucket, one following the other in the pouring, thereby making a perfect blend.

After four days in the moulds, the blocks were removed, and, after reaching a sufficient degree of hardness under wet canvas, were finished on the rubbing bed, or by hand rubbing for the moulded parts.

Carved ornament was similarly cast from plaster models, and was subsequently finished by cutting, precisely as for stone. Indeed, the material seems to be cut with about the same facility as Indiana limestone, and to be of about the same texture and degree of hardness.

It is not necessary, or desirable, to imitate any particular stone, but it may be readily imagined that almost any texture, or degree of hardness or color, may be produced by the choice of the aggregates employed. It is however, of the greatest importance, in order to produce a pleasing effect, that the blocks should be finished either by cutting or grinding the surfaces that are produced by moulding, for in this way we produce on the surface a pleasing texture which may closely approach or even equal, in some cases, the peculiar charm of a stone surface, and this without any desire or attempt at imitation.



DETAIL OF DOORWAY

THE LIMA (OHIO) STATE HOSPITAL FOR THE CRIMINAL INSANE

THE Lima State Hospital for the Criminal Insane is located on a tract of 640 acres of land, situated two miles from Lima, Ohio. In its plan and the method of construction of the various buildings, the departure from previous methods in similar institutions is so very radical as to be worthy of special mention. When the institution is ready to receive patients it will have a capacity of about 800, and as need arises it will be extended until 1,200 may be accommodated. Provision has been made for a still further extension of 800, making 2,000 in all.

The buildings, as will be seen in the illustration, surround a rectangular court 250 by 500 feet. Each pavilion has an individual court for the use of patients in that pavilion as exercise ground.

In construction this building is, as far as known, unlike any other building either in this country or abroad.

All structural features and parts are entirely of reinforced concrete, and the entire group constitutes a monolith. Forms were built for all the structural parts—walls, ceilings, floors and roofs—and the concrete then poured.

There is no break after the work is started, as each portion is thoroughly joined to the mass. All conduits for electric light wires, all heating pipes and pipes for water supply, together with telephone conduits, are built in the concrete.

In like manner, the hinges for the doors and the anchors in window joints for the steel window guards are embedded. Thus, after the forms or stripping are removed, all structural parts are in place, and practically all that remains to be done is to place fixtures, hang the doors and place window frames and sash. The buildings are considered practically indestructible save from earthquake, and then only in extreme cases could they be thrown down. It will not be possible for patients to destroy the structural parts of the buildings by any means they may command, as there is no plastering or woodwork. The outside walls of the various pavilions are faced with dark red brick laid in white mortar and trimmed with buff limestone.

As far as possible wood has been eliminated. The roofs are flat and covered with asphalt. On the interior all walls, floors and stairways are of reinforced concrete rubbed and polished.

(*Concluded on page 48*)

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VOL. C JANUARY 24, 1912 No. 1883

CONTENTS

THE NEW YORK CEMENT SHOW

THE Second Annual Cement Show is to be held in Madison Square Garden January 29th to February 3d, inclusive. From present indications there seems little doubt but that this exhibition will surpass both in interest and point of attendance the one held in this city a year ago. Practically every material, device or accessory of importance used either in the making and handling of concrete or the erection of buildings into which cement enters as a material of construction or finish will be exhibited.

The growth and importance of the cement industry in America almost surpass belief. It is said that measured by the capital invested the manufacture of cement is one of the world's greatest industries, the basic elements of which are extracted from the earth. That a material so widely distributed and of such general application should assume an enormously important place in the field of manufacture is not surprising, but the fact that it has reached its present position of importance in a period of less than twenty years is worthy of comment.

The detailed report giving the complete figures of production during 1911 is not yet available, but, according to the statement of the United States Geological Survey, the production of Portland cement in this country during 1910 reached the enormous total of 76,500,000 barrels. An idea of the rapidity with which the industry has grown may be gained when it is known that the increase in production of 1911 over 1910 will undoubtedly be greater than the entire output during the year of 1900.

The causes which have contributed to this wonderful growth are many and various. The invention of modern cement-grinding machinery has of course made it possible for the cement industry to increase to its present vast proportions and so has contributed an essential element to the situation. To this also must be added no small degree of enterprise and intelligence manifested by the leaders and manufacturers of cement. The largest factor, however, to which the greatest part of the marvelous increase of cement and concrete construction in this country is probably due, has been furnished by the manufacturers of reinforcement used in concrete construction and the various makers of compounds for waterproofing and other treatment of concrete and cement. These concerns have employed engineers, chemists and scientists of the highest order to study and develop methods of construction and finish in which cement or concrete is employed and the results of their work and research have been published and spread broadcast throughout the world. To this development work and the educational campaign carried forward with it may be safely ascribed a large degree of the success and prosperity which has attended the manufacture and sale of Portland cement. Cement users and those whose product is employed in conjunction with cement and concrete construction deserve greatest credit.

If we may judge from previous examples, the Cement Show will practically be an exhibition of materials for the making and handling of cement or for use in concrete construction. Little actual concrete or cement work is shown and this quite incidentally. It might be said that the title of the exhibition is in a sense a misnomer. Cement enters into it to about the same degree that gasoline enters into an automobile show. Its necessity is acknowledged but it is not the primary cause for the exhibition nor does it occupy the position of honor. In the case of the Cement Show it is granted, that, without cement there would be no occasion for the exhibition, but the material itself plays a very small part in the show. This is not said disparagingly or in a spirit of criticism but simply with a desire to place credit where credit is due. It might further be noted that a certain degree of arrogance and independence is unfortunately noticeable in the conduct of the Cement Show. Arbitrary, and by many considered unnecessary, rules have been adopted by the management to which all exhibitors who support and make possible the exhibition must conform. Certain rules, of course, are necessary in order to insure uniformity and sightliness in the exhibition. There are others, however, which are not conducive to good feeling and their continuance is liable to result in short-lived prosperity for the entire undertaking. Those who carry the burdens and contribute the elements of success will not submit indefinitely to unreasonable or even unpleasant dictation.

The Le Brun Scholarship

ELSEWHERE in this issue is printed the announcement of the Committee of the New York Chapter of the American Institute of Architects anent the LeBrun Traveling Scholarship. The generosity of the donors in making it possible for the successful competitor each year to spend at least six months abroad in travel and study cannot be too highly commended. This is but a further and not unusual instance of the unselfish and solicitous attitude of successful members of the profession toward architectural students, from among whom the future ranks of the profession must be recruited. Such action is in line with the traditions of art and indicates a condition that promises much for the future of American architecture.

LIMA STATE HOSPITAL FOR CRIMINAL INSANE

(Continued from page 46)

At the present time, ten pavilions are under construction.

Construction work is rapidly progressing. When present contracts are completed, and others to be entered into within the next four weeks are carried to execution the institution will be ready for furnishing and the reception of patients.

The architectural and engineering work has been conducted by Mr. Frank L. Packard, architect, of Columbus, Ohio, with Mr. Ralph Snyder, as Associate Architect, and Mr. E. F. Babbitt associated on the engineering work. The buildings have been constructed under the supervision of Mr. J. G. Lorimer, superintendent of construction for the architect.

The total cost of the group is estimated at about $2,000,000. Of this $1,500,000 is now under contract.

A Recent Legal Decision

Architects' Certificate Conclusive in Absence of Fraud or Mistake—Burden of Proof

A building contract made the architect the arbitrator between the parties as to the performance of the contract according to its terms. In an action by the contractor to recover the final payment on the contract the defendant, having agreed to be bound by the certificate of the architect, had the burden of showing fraud of the architect or mistake by him relating to the matters certified. In the absence of fraud or palpable mistake on the part of the architect in giving his certificate, such certificate is conclusive on the owner.

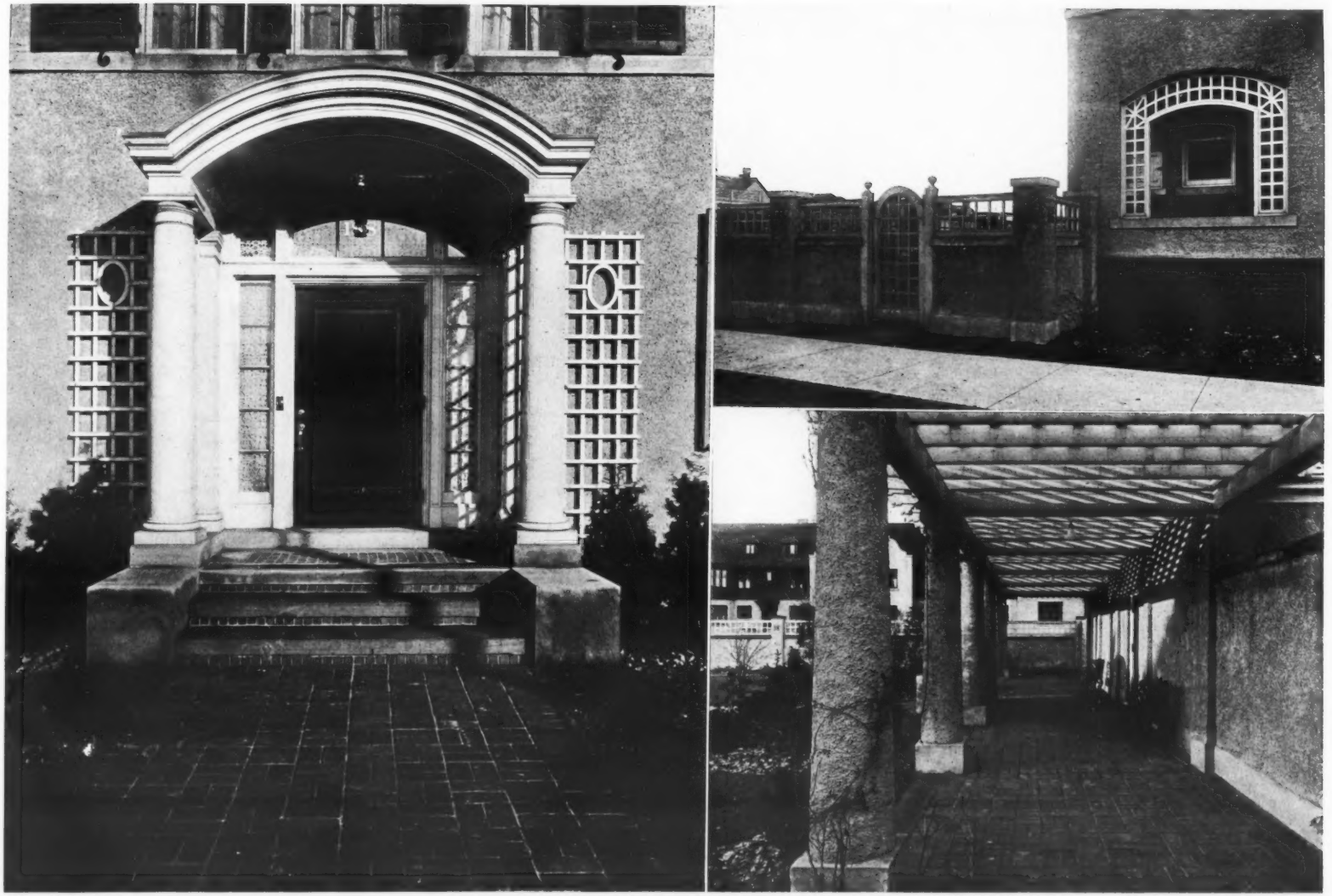
Gerisch *v.* Herold, New Jersey Supreme Court, 79 Atl. 1028 (J. S.)

THE THIRTEENTH PRECINCT POLICE STATION, NEW YORK

MR. EDWARD PEARCE CASEY, ARCHITECT

CONCRETE FARM COTTAGE, WATER TOWER AND A PERGOLA, ON GROUNDS OF F. L. COLBY, ESQ., DETROIT, MICHIGAN

MR. ALBERT KAHN, ARCHITECT MR. ERNEST WILBY, ASSOCIATE

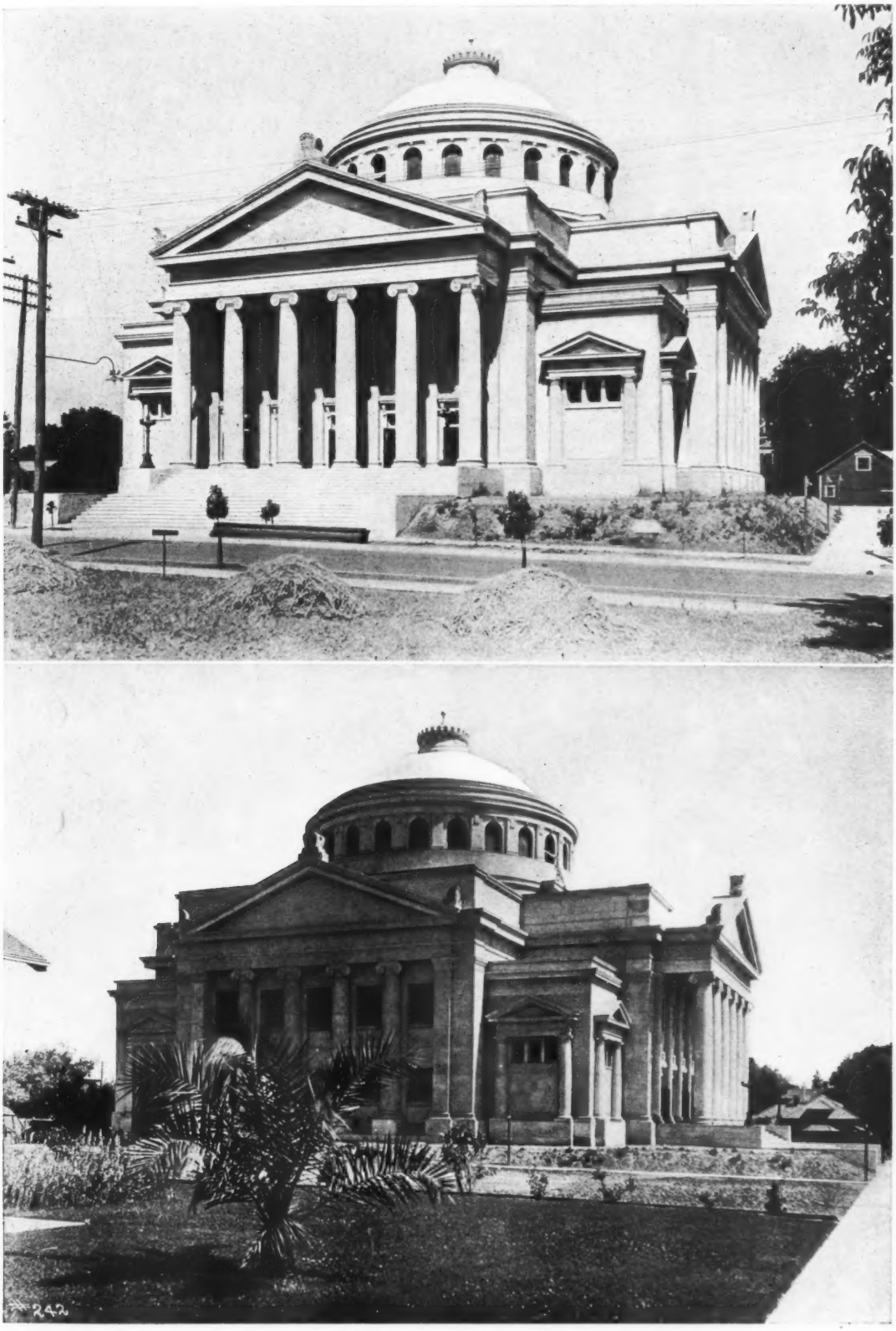


DETAILS, HOUSE OF F. L. COLBY, ESQ., DETROIT, MICHIGAN

MR. ALBERT KAHN, ARCHITECT; MR. ERNEST WILBY, ASSOCIATE

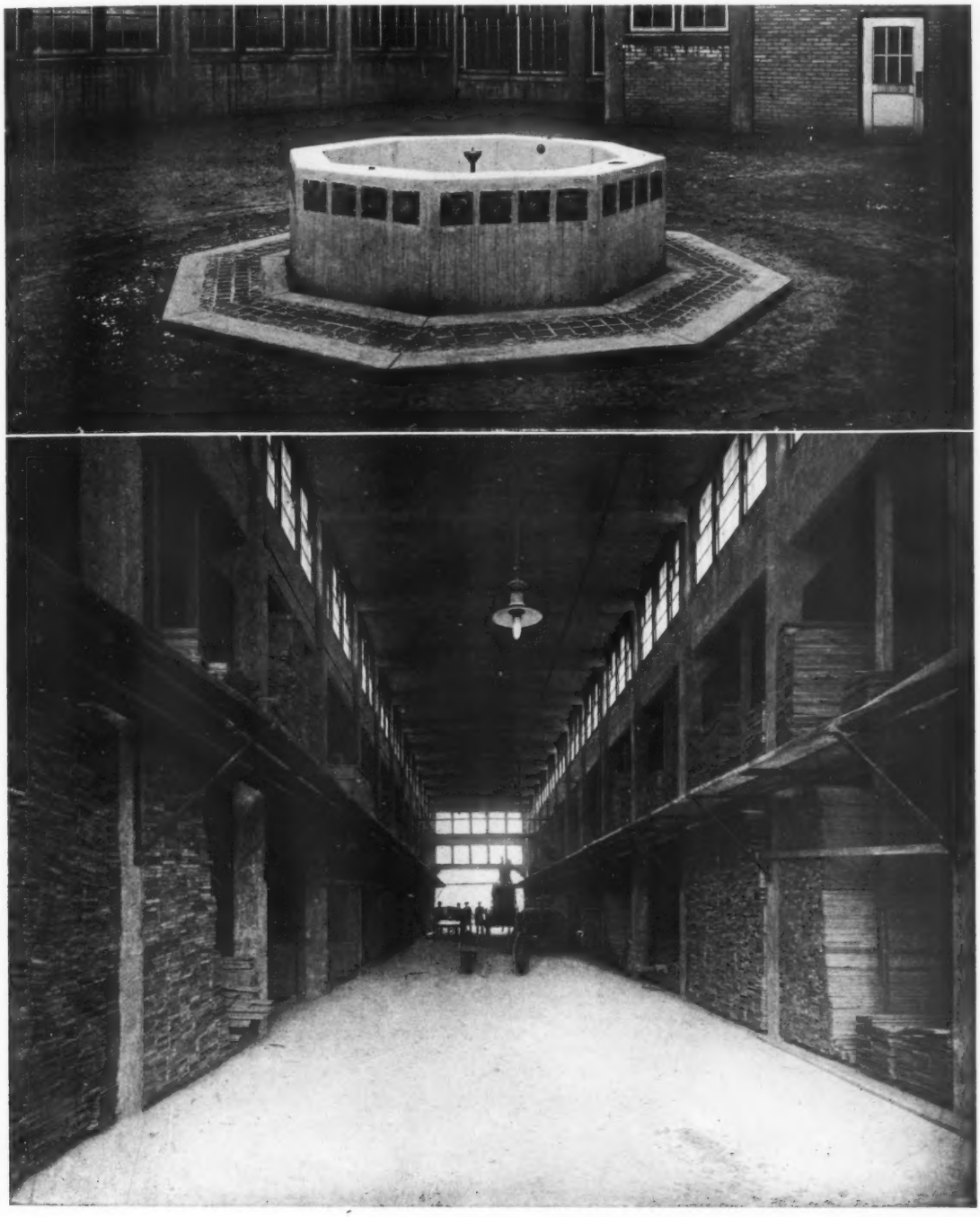
CONCRETE HOUSE OF MR. F. L. COLBY, DETROIT, MICHIGAN

MR. ALBERT KAHN, ARCHITECT; MR. ERNEST WILBY, ASSOCIATE



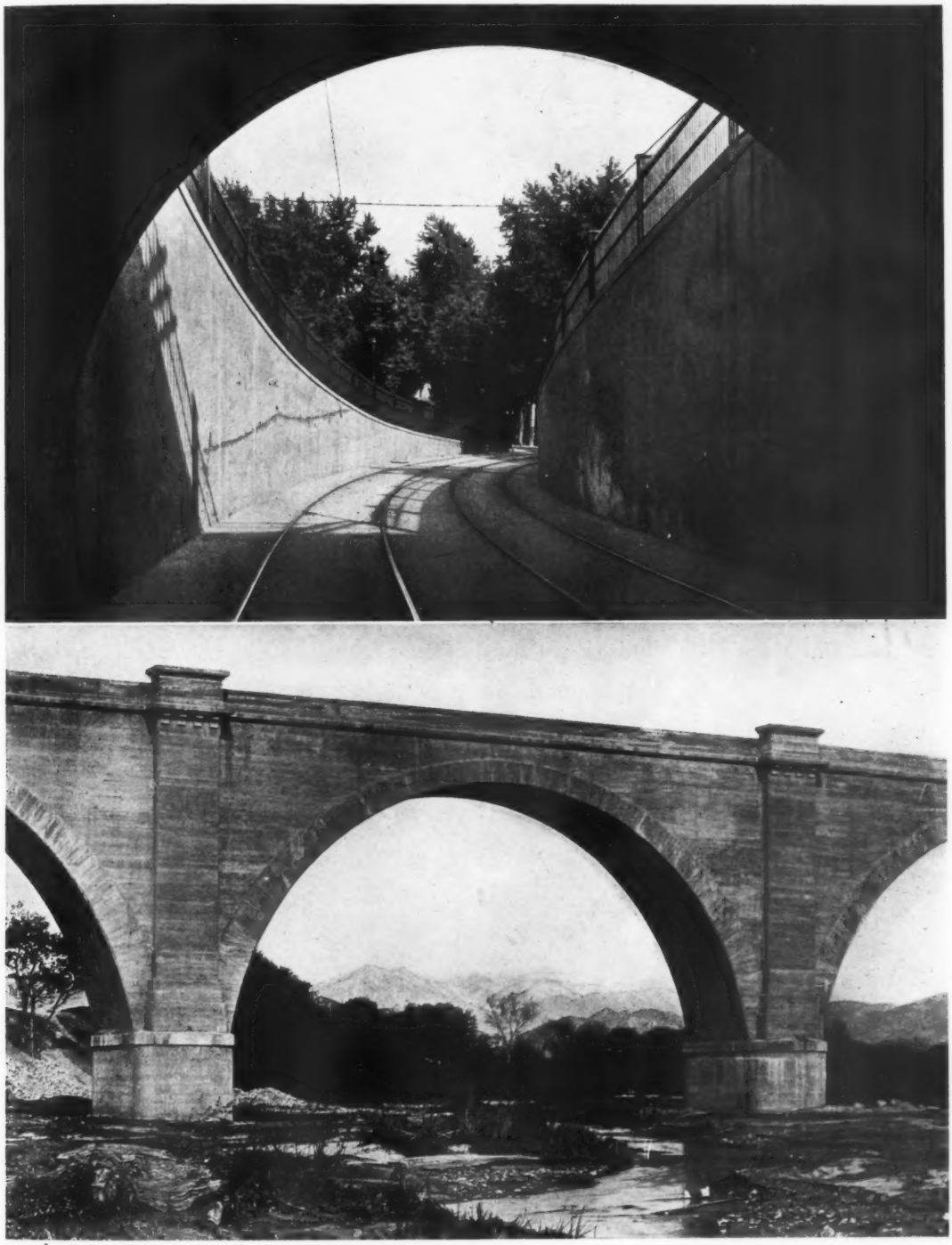
CHRISTIAN SCIENCE CHURCH, PASADENA, CAL.

MR. FRANK P. BURNHAM, ARCHITECT

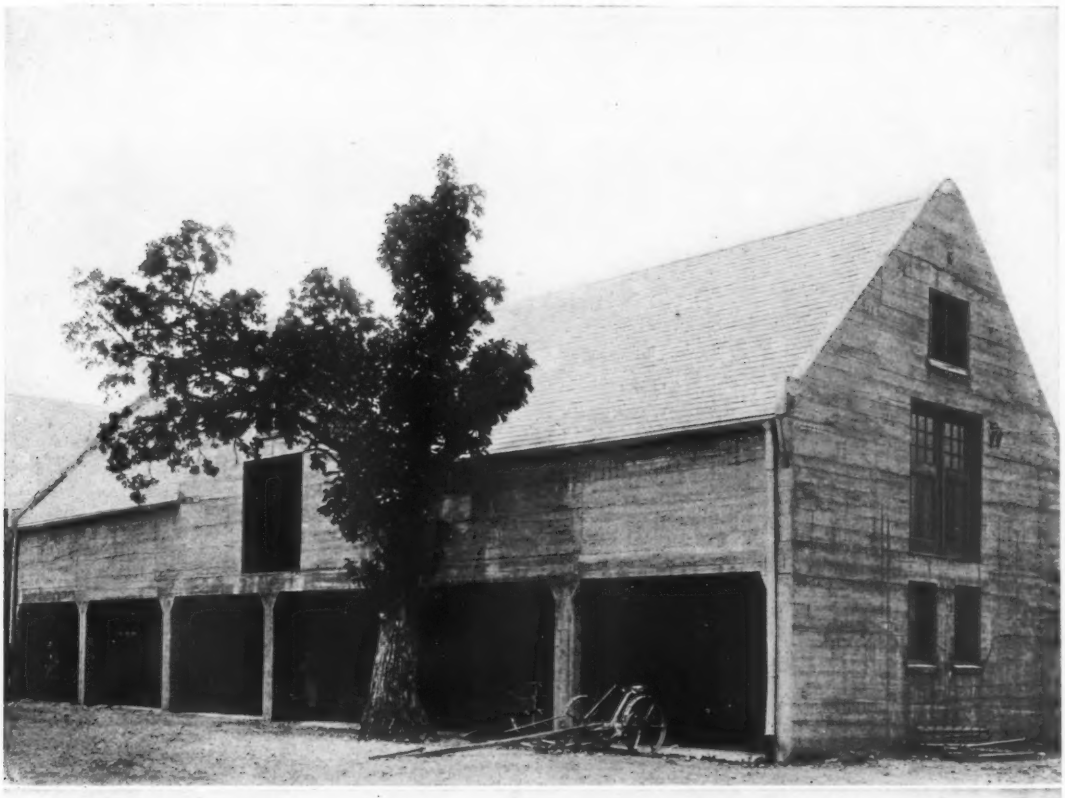


ABOVE, A CONCRETE FOUNTAIN IN COURTYARD OF A FACTORY AT ROCHESTER, MASS.
BELOW, A CONCRETE LUMBER STORAGE BUILDING IN OTTAWA, CAN.

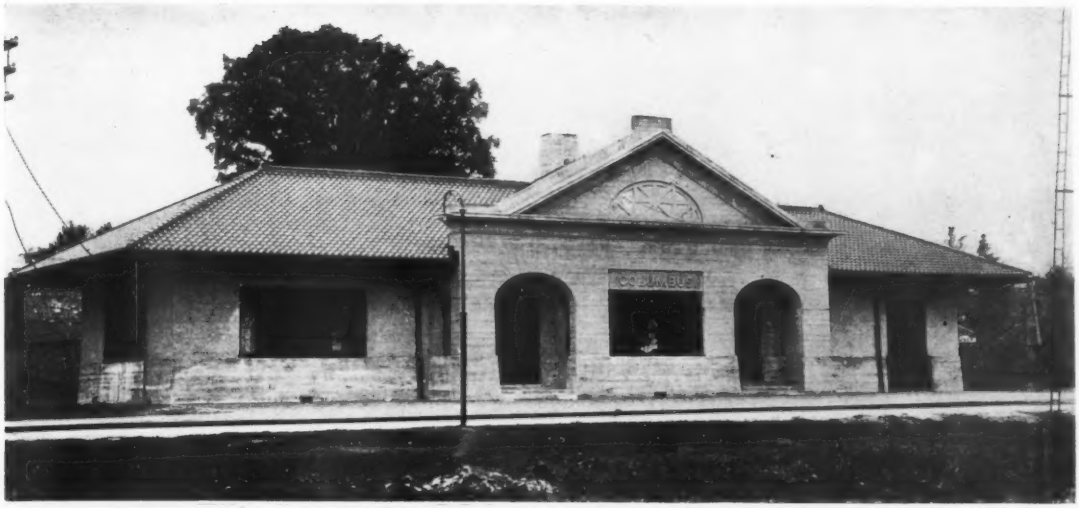
ABOVE, A CONCRETE PUBLIC COMFORT STATION, SHOWING THE RESULTS OF GOOD FORM CONSTRUCTION AND CAREFUL MIXING AND PLACING. BELOW, A SOLID CONCRETE SWITCH TOWER ON NEW YORK, NEW HAVEN & HARTFORD RAILWAY AT SAVIN HILL, MASS.



ABOVE, PORTAL OF A TUNNEL, SHOWING THE POSSIBILITIES OF CONCRETE IN RAILWAY CONSTRUCTION. BELOW, SECTION OF CONCRETE BRIDGE ON SALT LAKE RAILWAY, NEAR RIVERSIDE, CAL.

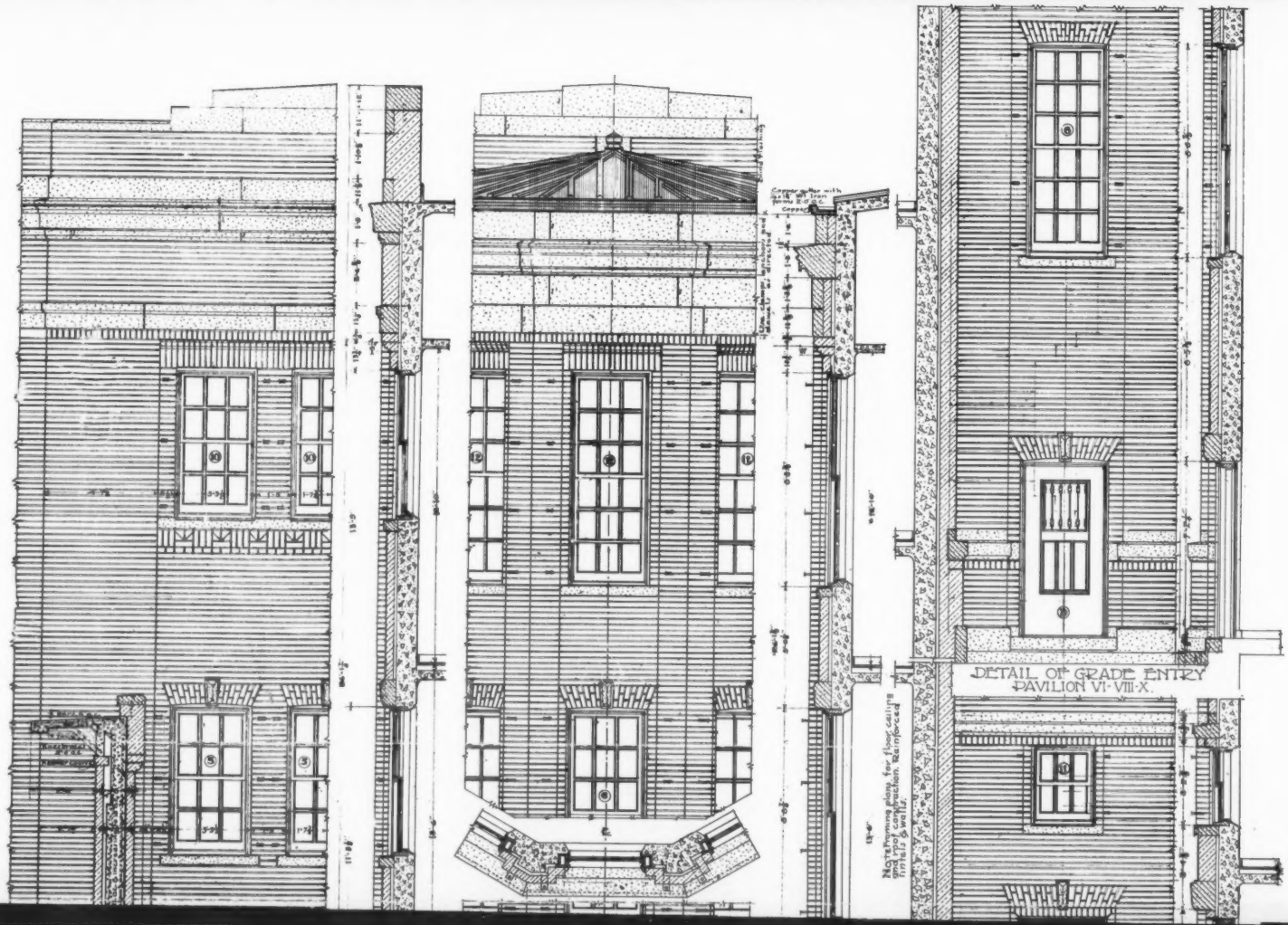


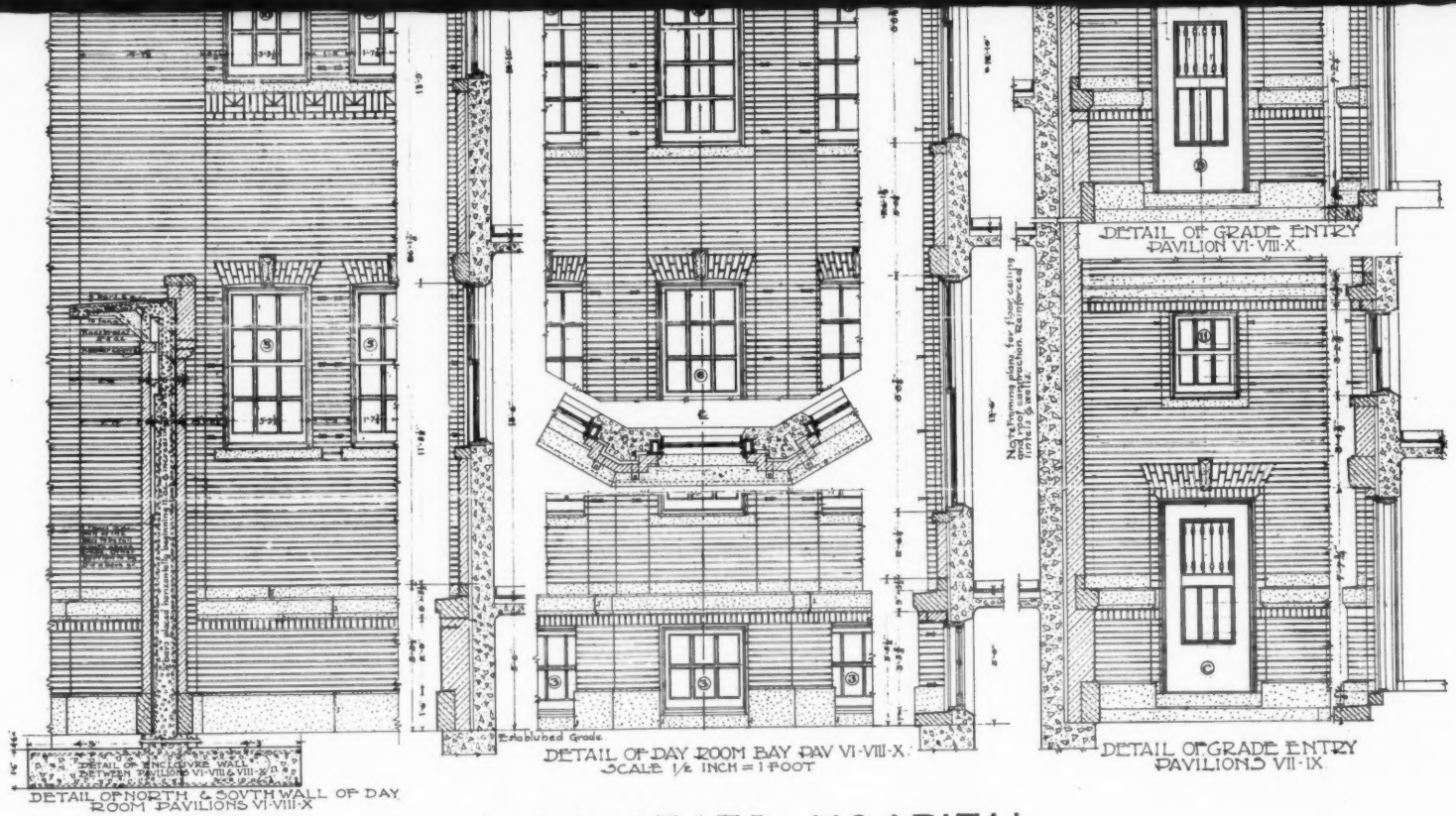
ABOVE, A WAGON AND MACHINERY SHED OF REINFORCED CONCRETE, PABST STOCK FARM AT OCONOMOWOC, WIS., MESSRS. FERNEKES & CRAMER, ARCHITECTS
BELOW, FARM LABORER'S COTTAGES AND BARN



CONCRETE RAILWAY STATIONS

ABOVE, ON C. M. & ST. P. RAILWAY AT COLUMBUS, MISS.; IN CENTER, STATION AT SANTA BARBARA, CAL., ON SOUTHERN PACIFIC RAILWAY; BELOW, A STATION AT MARATHON, N. Y., ON D. L. & W. R. R.


DETAIL OF GRADE ENTRY
PAVILION VI-VIII-X.



DETAIL OF NORTH & SOUTH WALL OF DAY ROOM PAVILIONS VI-VIII-X

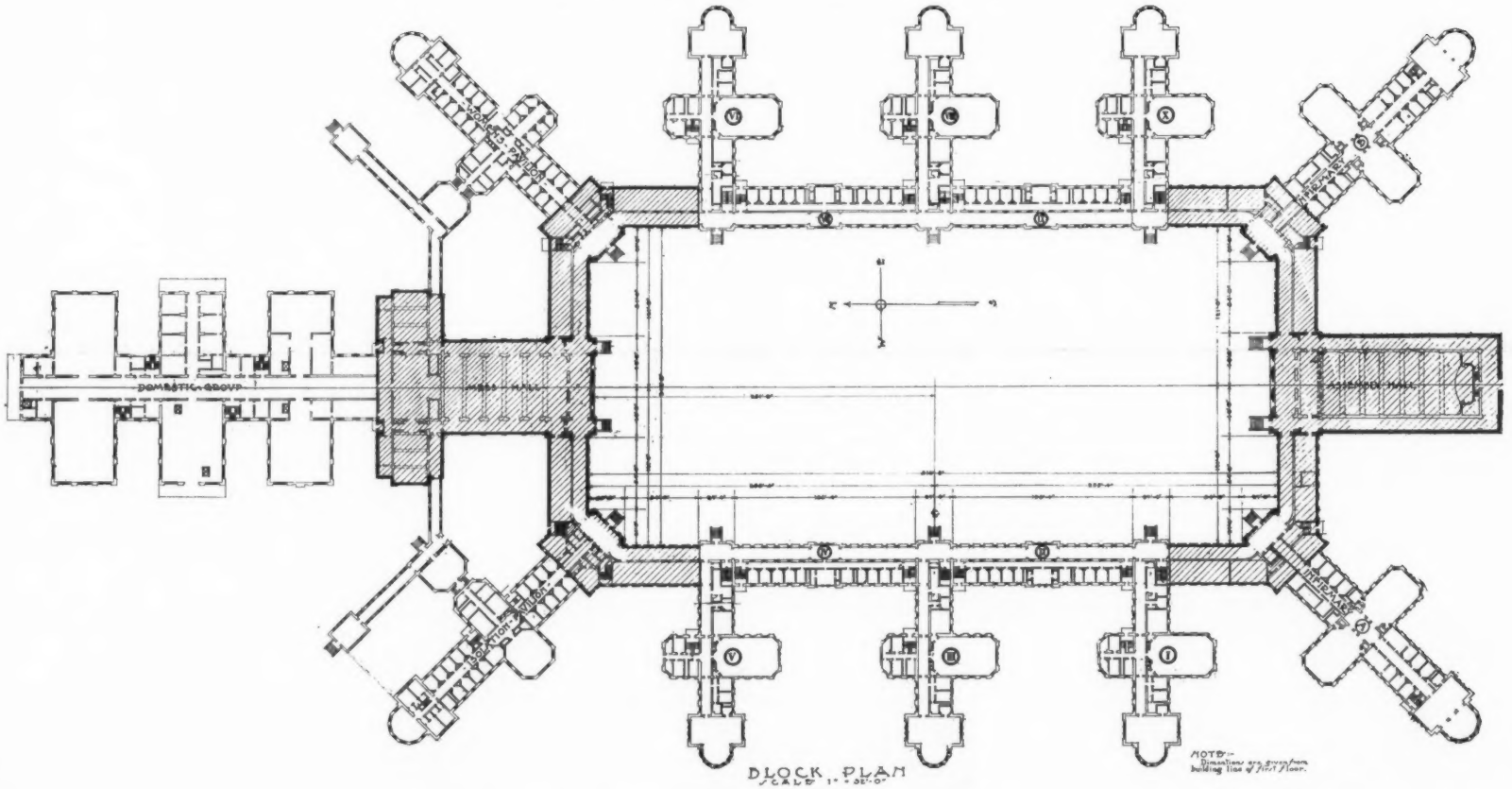
DETAIL OF DAY ROOM BAY PAV VI-VIII-X
SCALE 1/2 INCH = 1 FOOT

DETAIL OF GRADE ENTRY
PAVILION S VII-IX

LIMA STATE HOSPITAL
LIMA OHIO

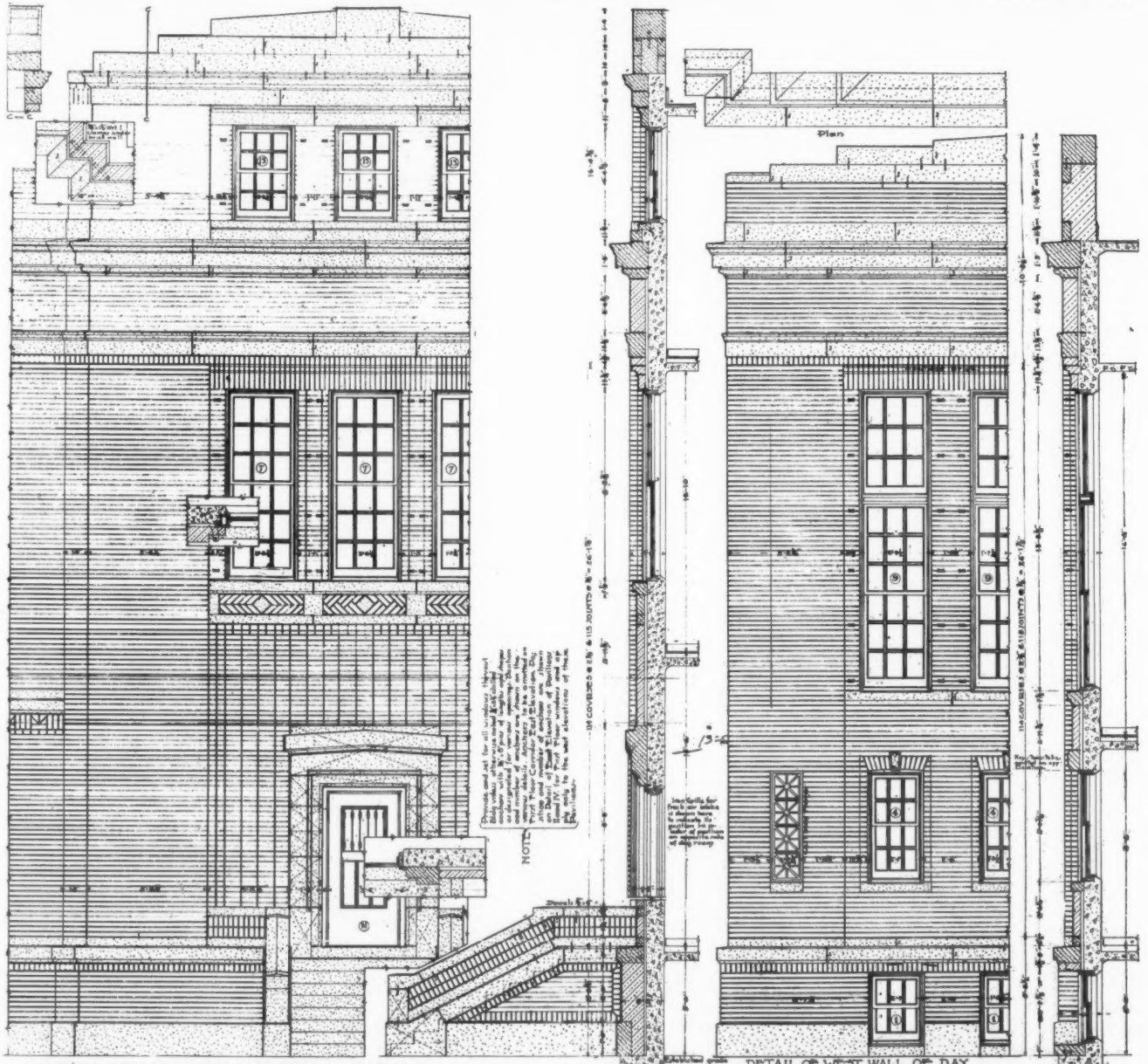
DETAIL OF NORTH & SOUTH WALL OF DAY ROOM PAVILIONS VI-VIII-X

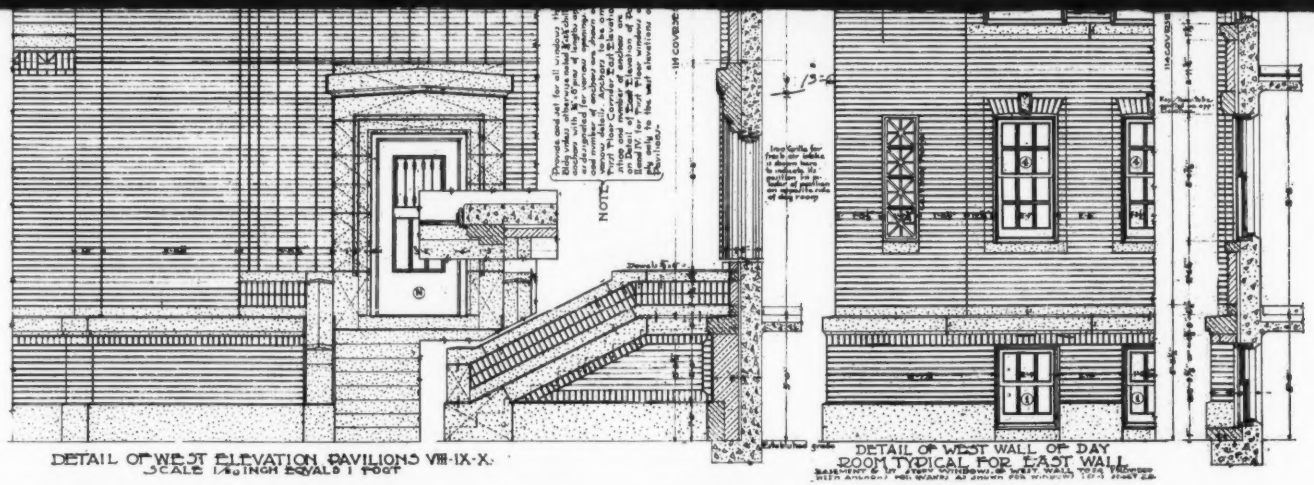
LIMA STATE HOSPITAL
LIMA OHIO



LIMA STATE HOSPITAL FOR THE CRIMINAL INSANE, LIMA, O,

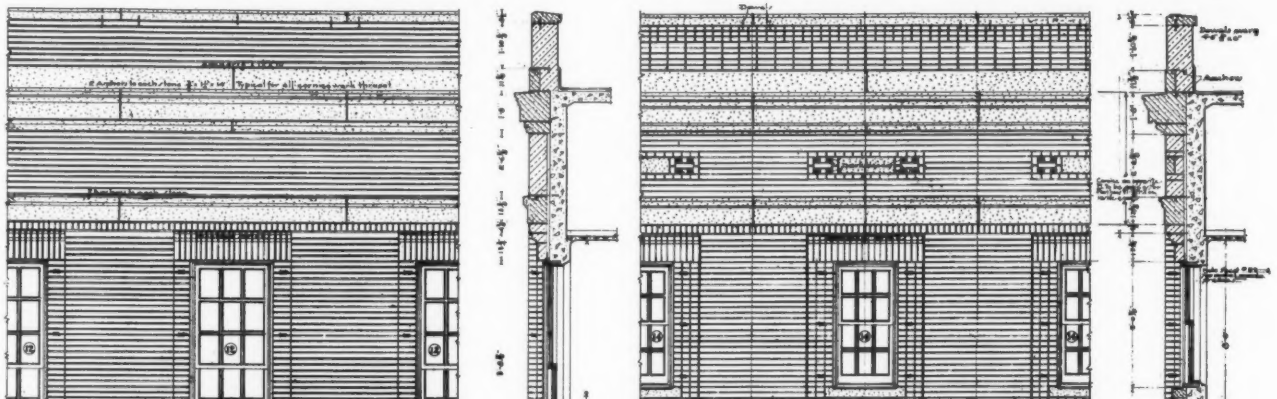
MR. FRANK L. PACKARD, ARCHITECT

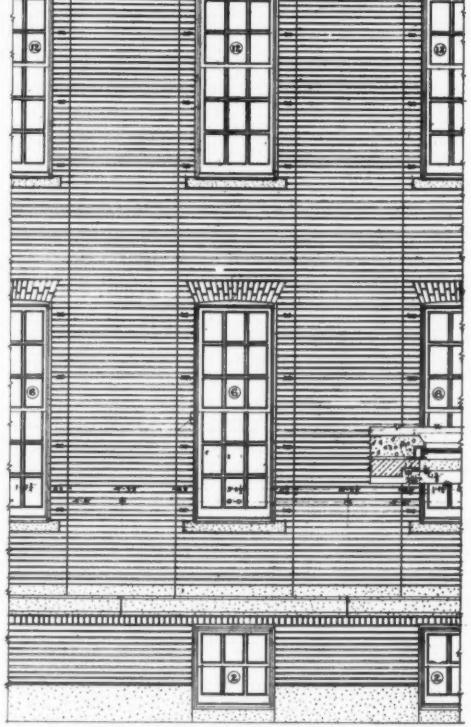

Plan
NOTE
DETAIL OF WEST ELEVATION PAVILIONS VIII-IX-X.
SCALE 1/4 INCH EQUALS 1 FOOT
DETAIL OF WEST WALL OF DAY ROOM TYPICAL FOR EAST WALL



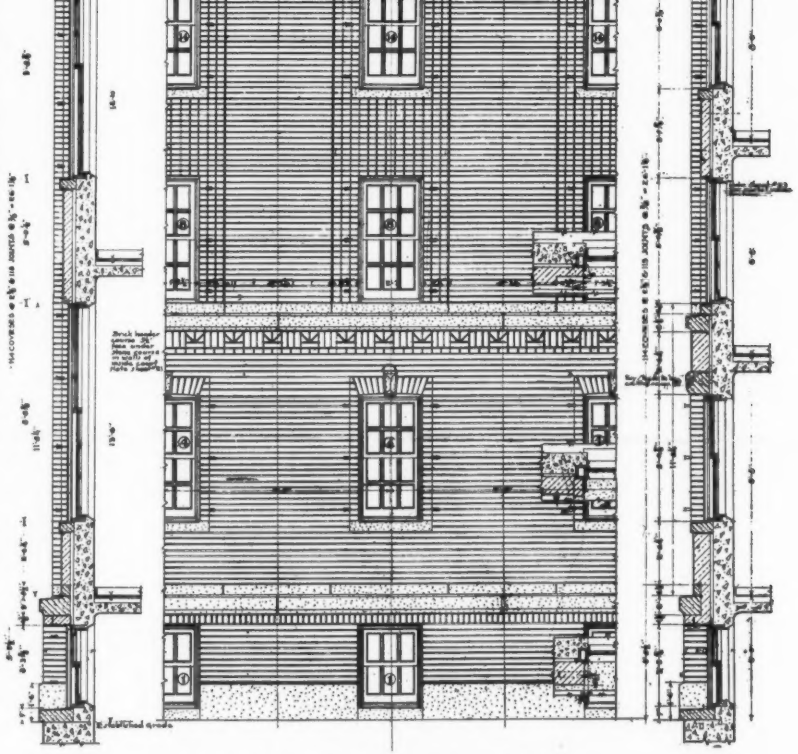
DETAIL OF WEST ELEVATION PAVILIONS VIII-IX-X.
SCALE 1/4 INCH EQUALS 1 FOOT

DETAIL OF WEST WALL OF DAY ROOM TYPICAL FOR EAST WALL





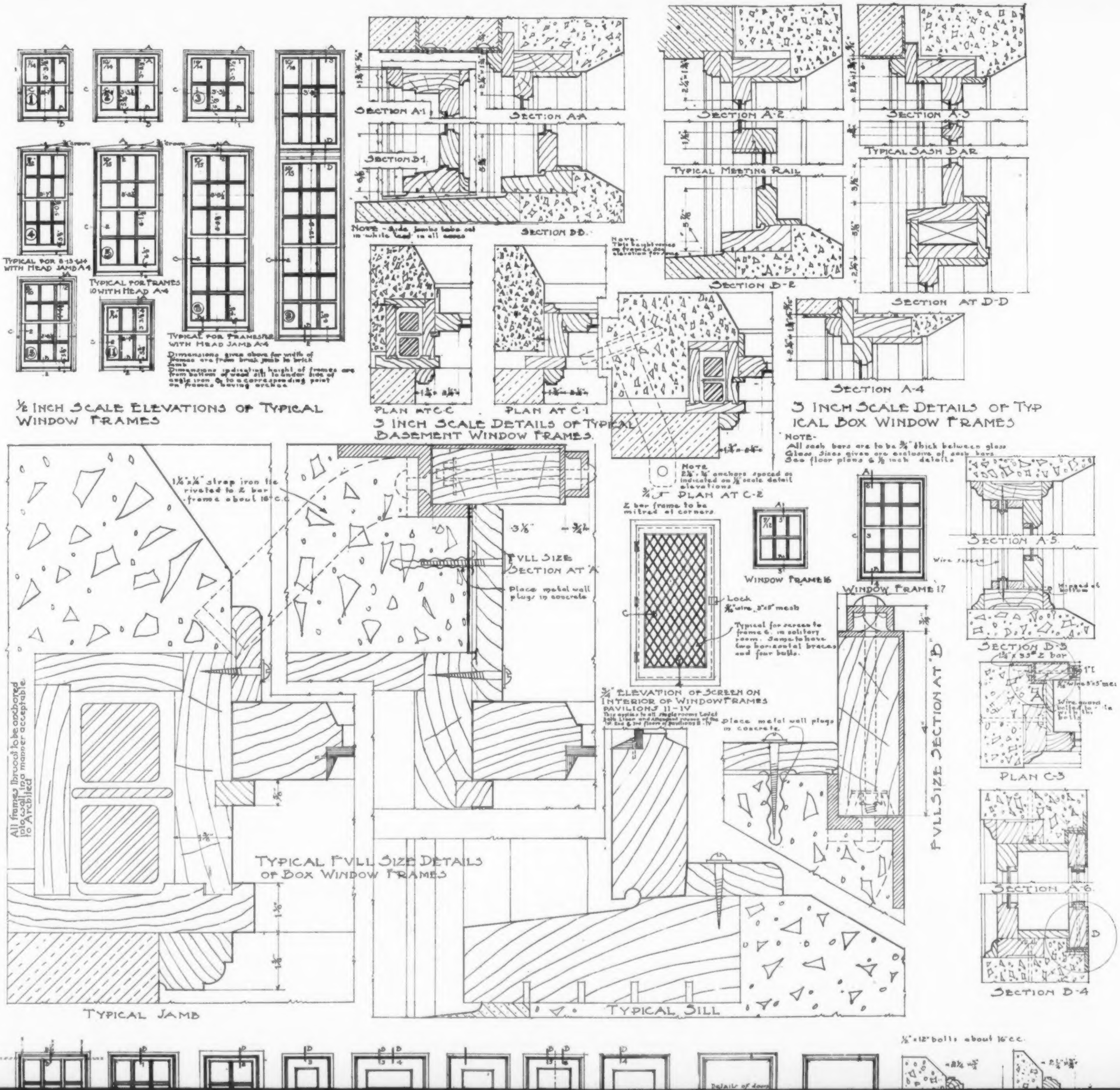
ELEVATION OF PAVILIONS VI - VIII - X - SHOWING TYPICAL WINDOWS, PILASTERS & CORNICE OF THAT PORTION WITHIN INDIVIDUAL COURTS

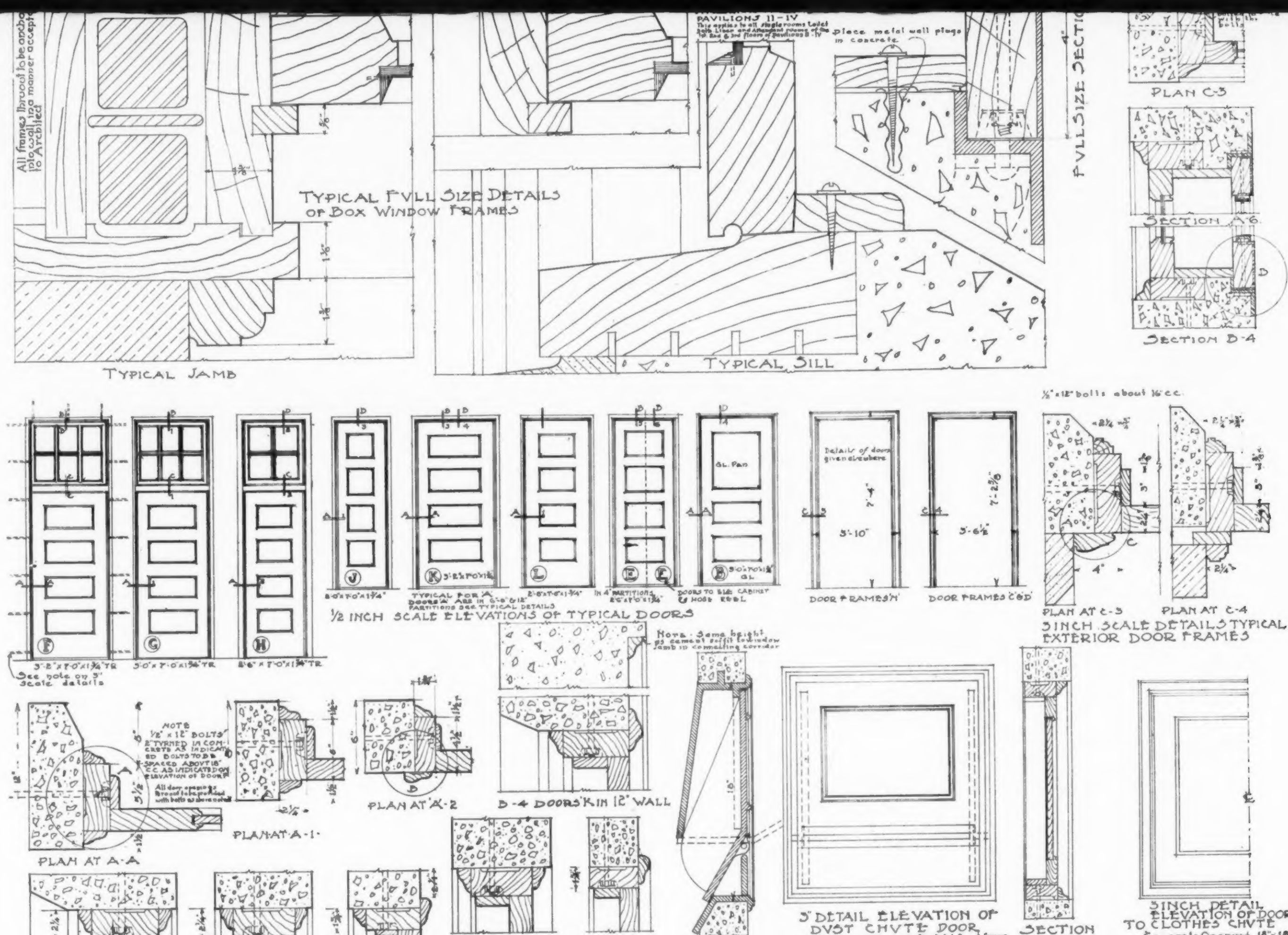


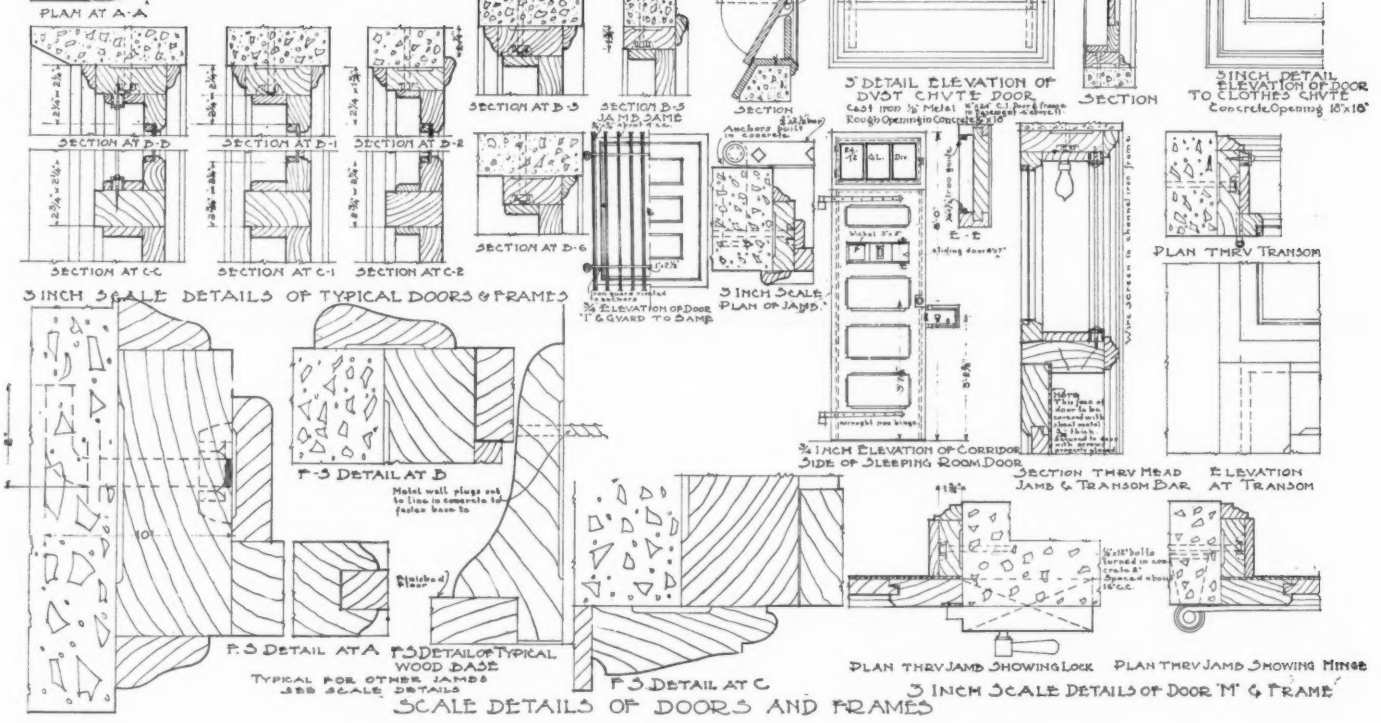
WEST ELEVATION OF PAVILIONS VII AND IX SHOWING TYPICAL WINDOWS, PILASTERS, CORNICE (IDENTICAL FOR EAST ELEVATION, EXCEPT AS OTHERWISE NOTED)

LIMA STATE HOSPITAL FOR THE CRIMINAL INSANE, LIMA, O.

MR. FRANK L. PACKARD, ARCHITECT


½ INCH SCALE ELEVATIONS OF TYPICAL WINDOW FRAMES
TYPICAL FOR 8-13-&14 WITH HEAD JAMB A-4
TYPICAL FOR FRAMES 10 WITH HEAD A-4
TYPICAL FOR FRAMES 12 WITH HEAD JAMB A-4
SECTION A-1
SECTION A-A
SECTION D-1
SECTION D-D
SECTION A-2
SECTION A-3
TYPICAL MEETING RAIL
TYPICAL SASH BAR
SECTION D-2
SECTION AT D-D
PLAN AT C-C
PLAN AT C-1
3 INCH SCALE DETAILS OF TYPICAL BASEMENT WINDOW FRAMES
SECTION A-4
3 INCH SCALE DETAILS OF TYPICAL BOX WINDOW FRAMES
PLAN AT C-2
WINDOW FRAME 16
WINDOW FRAME 17
¾" ELEVATION OF SCREEN ON INTERIOR OF WINDOW FRAMES PAVILIONS II-IV
FULL SIZE SECTION AT A
FULL SIZE SECTION AT D
SECTION A-5
SECTION D-3
PLAN C-3
SECTION A-6
SECTION D-4
TYPICAL FULL SIZE DETAILS OF BOX WINDOW FRAMES
TYPICAL JAMB
TYPICAL SILL
All frames through to be anchored into wall in a manner acceptable to Architect
Place metal wall plugs in concrete.


All frames thru out to be anchored into wall in a manner acceptable to Architect
TYPICAL FULL SIZE DETAILS OF BOX WINDOW FRAMES
TYPICAL JAMB
TYPICAL SILL
PAVILIONS II - IV
place metal wall plugs in concrete
FULLSIZE SECTION
PLAN C-3
SECTION A-6
SECTION D-4
1/2" x 12" bolts about 16" cc.
Details of doors given elsewhere
DOOR FRAMES 'H'
DOOR FRAMES 'C-D'
1/2 INCH SCALE ELEVATIONS OF TYPICAL DOORS
See note on 3" scale details
PLAN AT C-3
PLAN AT C-4
3 INCH SCALE DETAILS TYPICAL EXTERIOR DOOR FRAMES
PLAN AT A-A
PLAN AT A-1
PLAN AT A-2
D-4 DOORS 'K' IN 12" WALL
3" DETAIL ELEVATION OF DUST CHUTE DOOR
SECTION
3 INCH DETAIL ELEVATION OF DOOR TO CLOTHES CHUTE



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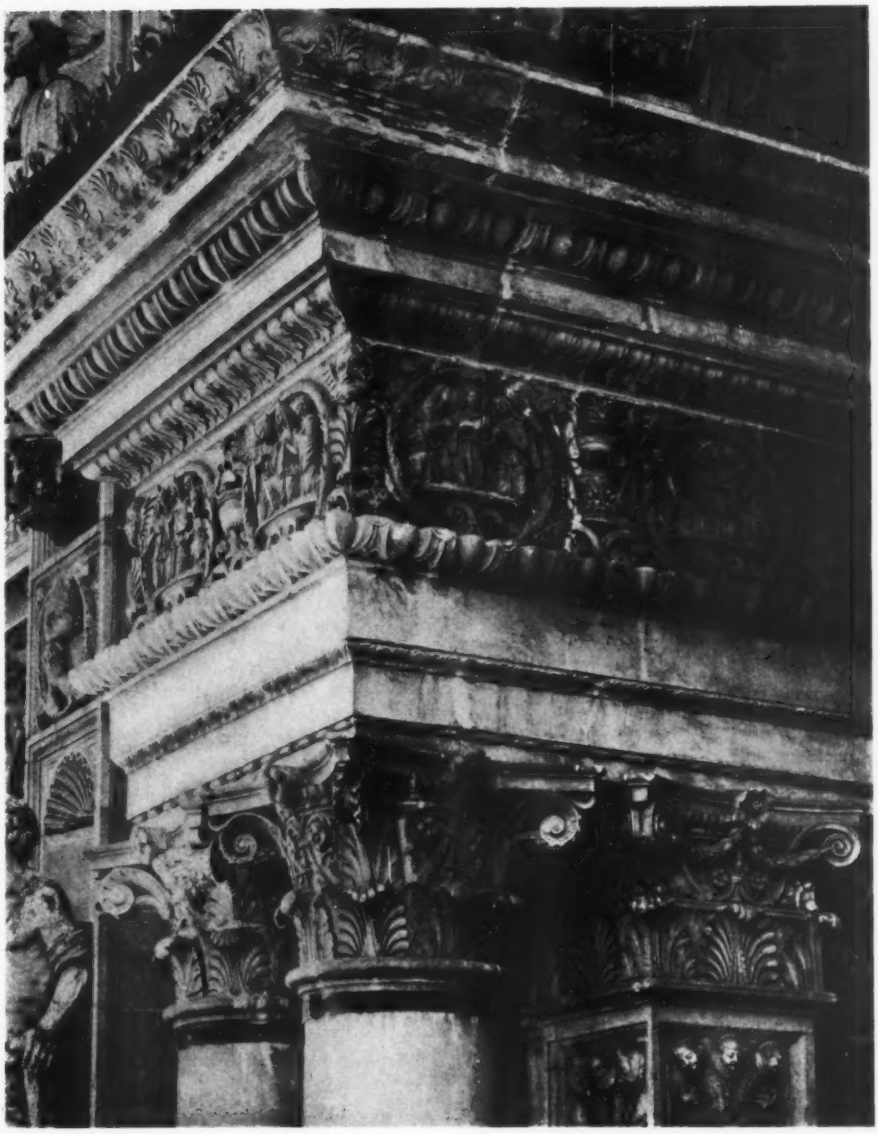

DETAIL OF THE ENTABLATURE CHURCH OF THE CARTHUSIAN MONASTERY, PAVIA, ITALY