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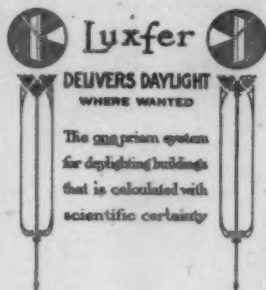
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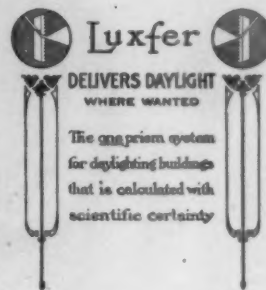
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THE AMERICAN ARCHITECT



PULPIT IN A CHURCH AT NAPLES, ITALY

THE AMERICAN ARCHITECT

Vol. XCVII

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No. 1779



FIG. 1—CATHEDRAL OF CALCI (NEAR PISA)

Facade illustrating the intermingling of constructive asymmetry in the arcades with variations in the pitch of the roof lines, caused by change of plan during construction, or by rebuilding. The tops of the arches are arranged in a curving line with one break in the arrangement. The arcade with the cross is 1 ft. 4½ in. wider than the one next adjacent.

The Controversial Aspects of the Architectural Exhibition at the Brooklyn Museum

By WM. H. GOODYEAR, M.A., Curator of the Department of Fine Arts

Hon. Member Society of Architects of Rome; Hon. Member of Edinburgh Architectural Association; Hon. Member Royal Academy of Fine Arts of Milan; Hon. Academician Royal Academy of Venice; Corresponding Member American Institute of Architects

FIFTH PAPER

IN *The American Architect* of September 8, 1909, the history of the Brooklyn Museum exhibition of mediæval architectural asymmetries was brought down to the year 1895. In order to offer an idea of the general character of the exhibition, the method was pursued of continuing, in two subsequent articles, the illustration of the most important individual typical building which has been examined by the Museum surveys.

It must be considered, however, that the dimensions of the original exhibits are frequently essential to a persuasive or convincing effect, and that the number of Pisa Cathedral illustrations in the three articles is twenty, whereas the number of exhibits for the same cathedral is fifty-one. It has farther to be considered

that the cathedral selected for illustration is only one building out of some seventy-eight which are offered by the exhibition as showing presumably convincing instances of constructive asymmetry.

Among these buildings there are nineteen which represent perspective illusions or predetermined arrangements which appear to have that result, whatever the purpose may have been. There are fifteen churches which represent asymmetries of arcades or other demonstrably purposed asymmetries, aside from those of the perspective illusions or of the outline ground plan. There are eighteen Italian churches which represent oblique and asymmetric plans, not including those with bent or curving lines. There are seven mediæval churches with interior bends of alignment not found



FIG. 2—CATHEDRAL OF PRATO. SOUTH WALL.

Asymmetry in arcades. From left to right the arcade widths are 9.33, 9.40, 10.22, 9.68 (door), 12.17, 12.11, 12.34, 8.85 (door) 9.46. The arcades rise in height 0.40 and the capitals lower in height 0.35.

on the exterior. There are fourteen mediæval buildings which represent horizontal curves of alignment as distinguished from bends. There are three mediæval churches which exhibit curves or bends in elevation. There are seven ancient temples which represent horizontal curves, either in plan or in elevation. There are thirty-two churches which represent the widening refinement. There are also less numerous categories which represent a much larger number of observations and records, which are verified by measurement, but which are not represented by drawings or photographs. The mediæval entasis in engaged columns is represented by three examples. The mediæval entasis in free-standing columns is represented by one example. There are four churches with pavements sloping upward toward the choir, whereas there are records for eighty-five churches in Italy in which the levels have been taken for this peculiarity. This is, however, an extreme example of the discrepancy between illustrated and unillustrated observations.¹

It will appear from these details that a book of large dimensions is needed for a systematic account of this exhibition. Such a work is in preparation and will be published by the architectural publishing house of B. T. Batsford, of London. It will practically be an expansion, with complete illustration, of the present catalogue, which has the respectable length of 150 pages, not including the illustrations. Meantime the most summary account of the exhibition cannot afford to omit an account of the widening refinement, especially as the most numerous, and in some senses the most extraordinary, facts relate to it.

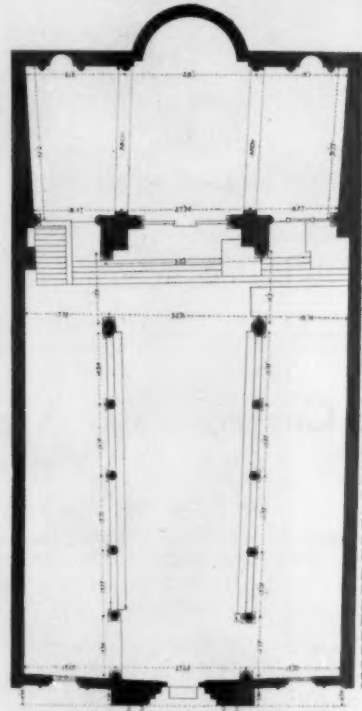
Inasmuch as special questions of engineering and of statics are involved in the consideration of this refinement and as approvals of the research in general cannot consequently be presumed always to cover this feature, it appears desirable, before taking up this subject, to make some mention of such approvals and to consider to what extent the general results of the research have met with favorable acceptance.

¹ In the foregoing list the buildings have been enumerated for each individual peculiarity mentioned, so that when a church possesses more than one of the mentioned peculiarities it reappears in the count for each category. The catalogue contains an "Index of exhibits according to subject matter," from which the foregoing list is taken, with some slight changes due to the recent enlargement of the exhibition.

On this head the following questions may be considered:

How far does the exhibition develop or expand points of view which have otherwise found favor in advanced circles of modern criticism? How far is it conceded to represent a new field of discovery? How far does it appeal to modern temperament and if it appeals at all, to what kind of temperament does it appeal? How far have distinguished critics or distinguished architects set the seal of their approval on it? These questions may be answered, to some extent, by quotations, and by quotations which refer, in the first instance, to the first query.

M. Auguste Choisy, whose lamented death in September last, was an inexpressible loss to the cause of this research, was the author of a *History of Architecture* which is so well known that it scarcely needs to be mentioned. His works on the constructive problems of Byzantine, Roman and Egyptian building are even better known, because not so recent. His *History of Architecture* has no superior in its field, when considered as a chronologic summary, or as an itinerary guide, and it is without a rival in precision of expression, in compactness of form, in the treatment of structural prob-



G. 6—PLAN OF S. PIETRO, TOSCANELLA. XII CENTURY

A predetermined asymmetric plan. The two sides of the projected central façade tally in measure to 0.20. The measures for recession of the façade wings tally within 0.10. The recession of the wings is 0.80 (left) and 0.70 (right). The nave widens in plan 5 ft. and the choir narrows in plan 4.70. The widths of the aisles on opposite sides of the church tally within 0.30 at the entrance and they tally within 0.40 at the choir. The aisles narrow to the choir 1.70 (left) and 1.60 (right) with error of only 0.10. The third bays are 2 ft. wider than the first or second. The fourth, fifth and sixth pairs of bays are uniformly narrower than the third. The allowance of 0.30 for error in corresponding spaces is only exceeded in one instance (at the entrance) and this excess may not be due to error. The choir is deflected in plan, as regards the nave, without exterior deflection and this deflection therefore cannot be ascribed to irregularity of site nor can it be ascribed to symbolism, as the church has no cross form. This deflection cannot be ascribed to errors due to screening off the choir before building the nave, because the outer walls are straight. Moreover, the apse is decentered 2 ft. to the right when the choir alone is considered, and without reference to the nave.



FIG. 4—S. GIORGIO IN VELABRO, ROME. VII CENTURY

The walls converge toward the choir $17\frac{1}{2}$ ft. in a length of 81 ft. The nave narrows in plan 8.53, the left aisle narrows 2.24, the right aisle narrows 7.70.

lems and in originality of illustration, which is entirely from the author's own hand.

M. Choisy's standing in France as an engineer was sufficiently attested by his appointment as inspector-in-chief of the French department of roads and bridges (*Ponts et Chaussées*). In this capacity he had even directed the surveys for a French government railway in the Sahara desert. His great distinction was to combine and balance, in equal perfection, the capacities of the engineering expert, of the classical scholar, and of the critical art historian. No doubt there are many who have been his equals as an engineer, although it is generally agreed that no modern expert has had the same knowledge of the ancient methods of construction in vaults and domes; but it is certain that no other engineer has been his equal as an architectural historian. No doubt there are other architectural historians who have been the equals of M. Choisy, but it is certain that no other architectural historian has been his equal as an engineer. Thus the quotations which follow appear to have unusual value, as bearing on a research in which the matter of fact as to constructive intention is really the only question at stake.

Following his mention of various instances of mediæval perspective illusion which have been referred to in an earlier article (Sept. 8, 1909, p. 90) and which are such a valuable corroboration of the results of the Brooklyn Museum surveys, M. Choisy's *History of Architecture* continues:

"These irregularities are visibly intentional. There are others which must be charged to the account of builder's errors, but if we consider the original and almost subtle spirit of the Gothic architects we shall be persuaded that *there was design more frequently than negligence.*"

On the subject of asymmetry the same author also says:

"*Asymmetries.* Architects who analyzed with this refinement the play of perspective must have had a poor opinion of those symmetric arrangements which are upset by perspective and which the play of light and shade is always complicating. The law of symmetry as we now understand it, and which consists in reproducing on the left side the arrangements made on the right, this rather narrow rule plays a very secondary rôle in the Middle Ages. On this head, as on so many others, the point of view of the Gothic builders was that of the Greeks."

"*Asymmetry appears acceptable as soon as an evident reason justifies it.* If an edifice is placed in an enclosure the plan

* Reference is made here to p. 414 of Vol. I.



FIG. 5—STA. MARIA NOVELLA, FLORENCE

The bays, from entrance to transept, measure as follows: 37.60, 38.70, 40.80, 35.35, 27.60, 27.80. Quoted as an instance of perspective illusion by Choisy, *Histoire de l'Architecture*, Vol. II, p. 410.



FIG. 7—ST. PIETRO, TOSCANELLA. THE FACADE, XII CENTURY

follows that of the enclosure. Two spires are erected successively, architecture has progressed meantime, and all its improvements are accepted in the new construction, in spite of the resulting contrast. *Generally speaking, the architects of the Middle Ages avoid formal regularity.* If they admit a symmetrical effect in the total result, they know how to avoid monotony by details which are infinitely diversified. Notre-Dame has on its façade three portals erected at one time; from left to right only the effects of mass are balanced, while each one has a character of its own. These differences give a charming variety to the composition; a feeling of sympathy attaches us to these works in which the designer has disdained

the effect of a set pattern, in which each part has cost a separate study and has had an individual treatment; in place of symmetry we have balance and the unity of impression does not suffer."²

One could not imagine a more convincing statement of the conclusion which has also been reached by the Brooklyn Museum research, that the willing acceptance or tolerance in mediæval architecture, of natural irregularity, does not preclude the possibility, or the certainty, that in other cases there were predetermined and definitely planned arrangements for avoiding monotony and formalism. In other words, it is the same artistic spirit and the same point of view which are pleased with the accidental effect and which definitely plan for related or similar effects.

The same philosophy of this subject was announced by Mr. Ruskin in *The Seven Lamps of Architecture* (1849) and was supported by a very considerable number of sufficiently convincing illustrations. Mr. Ruskin speaks, in the *Lamp of Life*, of:

"Accidental carelessness of measurement, or of execution, being mingled undistinguishably with the purposed departures from symmetrical regularity, and the luxuriousness of perpetually variable fancy. . . . How great, how frequent they are, and how brightly the severity of architectural law is relieved by their grace and suddenness, has not, I think, been enough observed; still less, the unequal measurements of even important features professing to be absolutely symmetrical."

There is, perhaps, one improvement to be made in the wording of this passage, by the insertion of the word "often"—as follows: "Accidental carelessness of meas-

² Translated from the *Histoire de l'Architecture*, Vol. II., pp. 410-11-12.

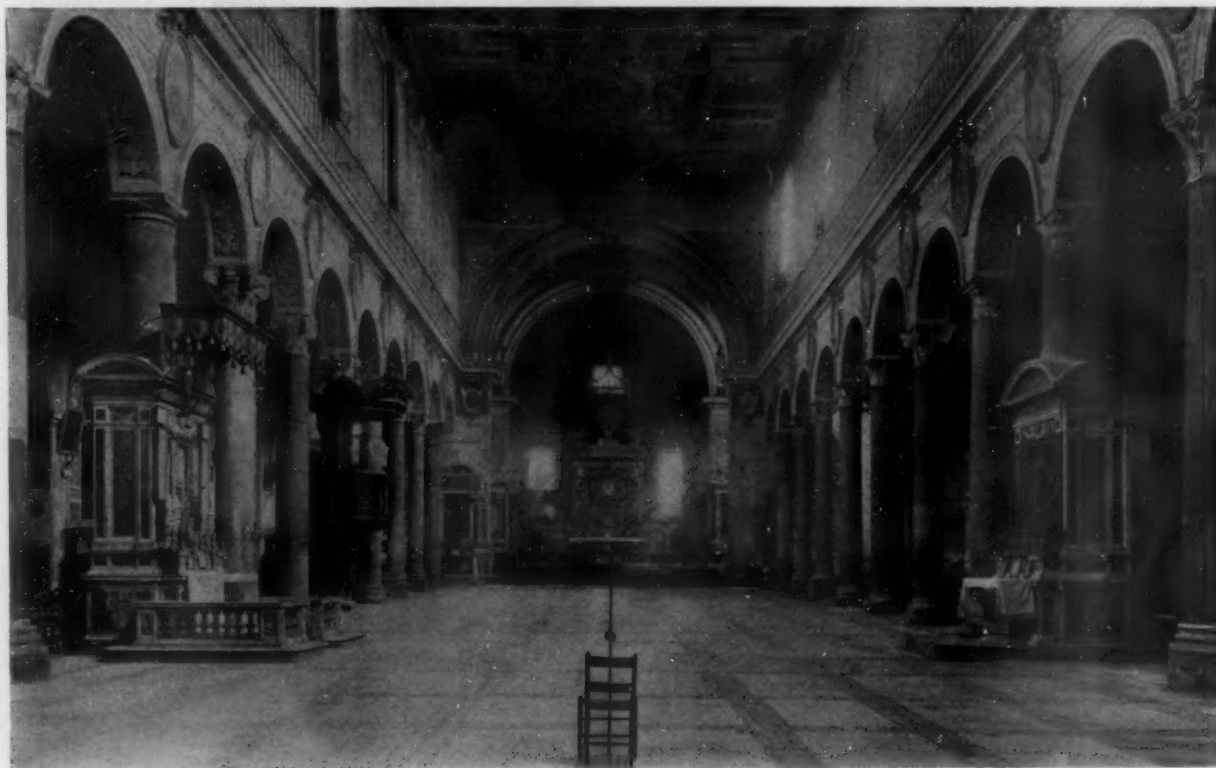


FIG. 5—STA. MARIA ARA COELI, ROME. XII CENTURY

The disk on the surveyor's rod in the foreground shows the amount of upward slope toward the choir, viz., 2 ft. 9 in. in 165 ft. The columns were obtained from ancient ruins. Those at the entrance are larger than those at the choir by 3 ft. in circumference, or 1 ft. in diameter. They are arranged in graduated height on the slope, so that the arches are level on one side at the choir and 9 inches below level on the other. This illustrates a predetermined schematic arrangement of heterogeneous material.

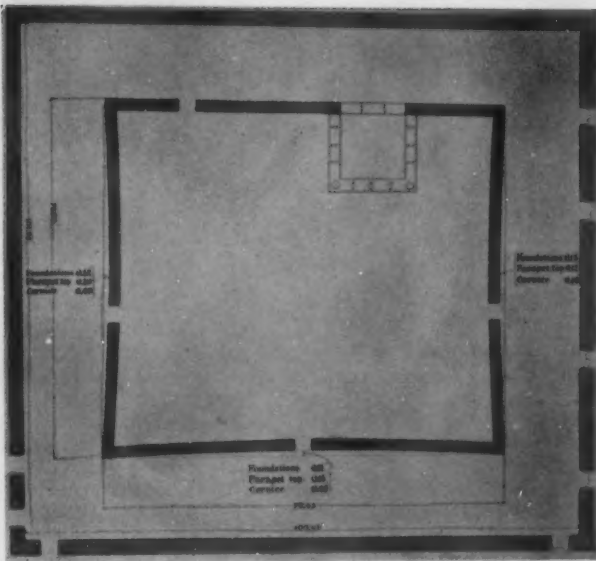


FIG. 8—PLAN OF THE CLOISTER OF S. ZENO, VERONA. XII CENTURY

Curves in plan on three sides, beginning at the foundations of the parapets, and therefore not attributable to thrust. On the fourth side the parapet is straight, as the projecting structure would have interfered with a continuous curve.

urement * * * being often mingled undistinguishably with the purposed departures," etc. If the passage were not so understood it would have been illogical in Mr. Ruskin to have proceeded to prove, as he does, that purposed departures from symmetrical regularity can be specified and distinguished in great numbers.

Thus he says, after some pages of instances:

"I imagine I have given instances enough, though I could multiply them indefinitely, to prove that these variations are not mere blunders, nor carelessness, but the result of a fixed scorn, if not dislike, of accuracy in measurements; and, in most cases, I believe, of a determined resolution to work out an effective symmetry by variations as subtle as those of Nature."

Mr. Ruskin's occasionally erratic and frequently erroneous views on other subjects in art criticism have somewhat obscured the great importance of his contribution to architectural criticism in the *Lamp of Life*. Hence it is gratifying to find in the highest modern authority on the criticism of the historic monuments from the standpoint of the engineer, an independent utterance of the same purport.

Viollet-le-Duc has also definitely committed himself to the position that architectural refinements were practiced by the mediæval builders. The following passage occurs in his great *Dictionary*, in relation to the asymmetric plan of the Cathedral of St. Denis:

"These refinements (*délicatesses*) appear strange to us nowadays, and instead of searching out their meaning or verifying their effects we prefer to attribute 'these defects of planning' to the ignorance of these ancient artists, in spite of the fact that we are ready to marvel, the next day, at no less important irregularities as noticed in the monuments of Greek antiquity, irregularities which are the result of optical considerations (*besoin de l'oeil*) and of a very delicate appreciation of perspective effect. . . . Such a method required, it is true, a very complete knowledge of geometry, not only on the part of the Master-mason but also on the part of the workmen . . . but it will probably not be suggested that a knowledge which was pushed so far by the master, and which was so easily under-

stood by his assistants, has ever been an indication of ignorance or of barbarism."

In the face of such authority, and of such quotations, it would appear unreasonable, or even impossible, to maintain that the Brooklyn exhibition contains nothing but fictitious, imaginary or "supposed discoveries,"⁶ and this would appear especially unreasonable because so many of its illustrated asymmetries are identical in principle with those announced as intentional by these standard authorities.

That a point of view so eminently sane and reasonable as that of Ruskin, Choisy, and Viollet-le-Duc should not have received some considerable additional illumination from a research which has been inspired by the same point of view, which has cost over \$12,000, and which is supported by 1500 original photographic views, and many records of measurements, would appear singular and surprising. But this is, apparently, the opinion of the eminent editor, M. Lefèvre-Pontalis;⁶ of the distinguished antiquarian, the Comte de Lasteyrie;⁷ of the learned Director of the Trocadéro Museum of Comparative Sculpture, M. Camille Enlart;⁸ of the accomplished and energetic Editor of *The Builder*,⁹ and of the elo-

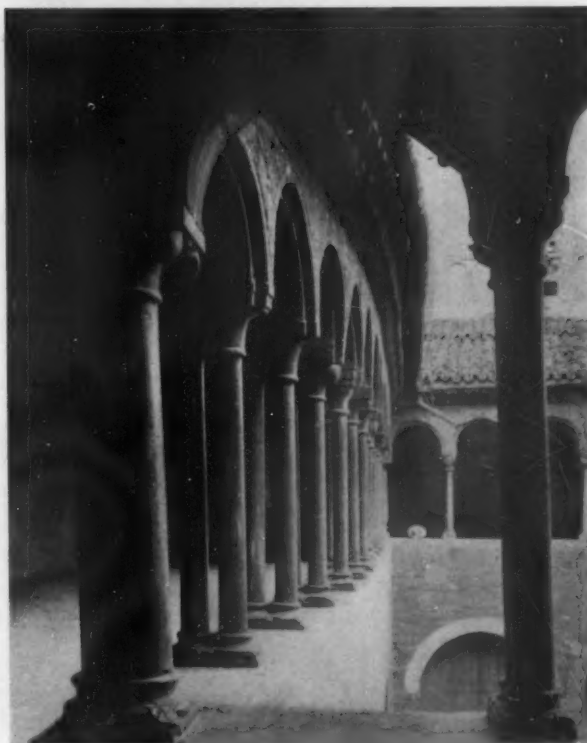


FIG. 9—CLOISTER OF THE CELESTINS, BOLOGNA. XII CENTURY

Curves in plan. Exterior corresponding to Fig. 10. The optical effect is that of a curve in elevation which is discounted by the eye into perspective, in actual vision of the monument itself.

⁶ Vol. IX., Article "Trait," pp. 203-4.

⁷ As claimed by the English critic, Mr. John Bilson, in the *Journal* of the R. I. B. A. of June, 1906. My reply appeared in the same *Journal* for November 9, 1907. Mr. Bilson's rejoinder appeared December 7, 1907, and my second reply appeared September 25, 1909.

⁸ *Bulletin Monumental*, 1905, pp. 371-5.

⁹ *La Déviation de l'axe des églises, est elle symbolique*, pp. 17-18. Paris, C. Klincksieck, 1905.

¹⁰ R. I. B. A. *Journal*, Dec. 21, 1907, p. 142.

¹¹ Adverse notices appear frequently. See especially "The Glamour of Crooked Building," in issue for September 23, 1905. My reply was published and circulated by the Exhibition Committee of the E. A. A. and subsequently appeared, with some additions, in the *AMERICAN ARCHITECT* of December 23, 1905.



FIG. 10—CLOISTER OF THE CELESTINS BOLOGNA. XII CENTURY

Curve in plan, interior of second story. A tape has been stretched to show the curves. Curves, convex to exterior, are found on all sides of the cloister; deflections at the second story parapet $4\frac{1}{2}$ -5 inches at the foundations. In this view it is seen that the columns are stepped outward towards the centre, so as to increase the curve at the roof line. The interior sides of the lower walls are not curved.

quent Mr. E. S. Prior.¹⁰ These gentlemen are presumed to be acquainted with the authorities whom I have quoted. If they had differed with them, it would have been a courtesy which they would hardly have consciously neglected to have mentioned that fact, as showing that they differed with standard authorities as well as with me. If they had agreed with these authorities, courtesy would appear to have demanded a statement on their part of the points on which these authorities also agreed with me.

As far as these distinguished gentlemen are concerned the interesting point has been their wholesale and unqualified repudiation and condemnation of everything which has been published on the subject of the Brooklyn Museum surveys. This repudiation becomes still more interesting when we consider what eminent men and what influential journals have expressed themselves in the contrary sense.

In such a controversy it appears important to inquire if there may not be some underlying general reason, possibly one of temperament, for such discrepancies of opinion. It could hardly be supposed that such totally contrary views could have been reached by experts of distinction on mere questions of matter of fact evidence.

In order to illuminate this point some opinions of an opposite character may be quoted.

Mr. John LaFarge wrote me in 1907: "For me the interest of your work is its applying on such an enorm-

¹⁰ *Architectural Review* (London), February, 1906. Answered by me in numbers for September and October, 1906.

ous surface and its being the rediscovery of fundamental principles belonging to everything in the way of our arts of the eye." In May, 1905, he wrote me: "Perhaps you may know that my son and his partner Mr. Heins, have occasionally indulged in some of the deviations, which to me are not deviations, but the natural use of necessity." In December, 1904, he wrote me: "Your career has added to the information of the world of art and has opened light where the windows had been closed for some centuries. I could say farther, for much of what you have done has been a relief to me in my own thinking."

Mr. Bernhard Berenson wrote me in June, 1904: "I follow your work with great interest and sympathy and consider it to be of the most valuable that is now being done in art study." He wrote me in December, 1907: "I fancy you are rapidly passing from the 'not true' of one's earlier opponents to the 'not new' of one's later enemies but, really, life would be too pleasant if one's services were recognized while one was keen about them."

Mr. Russell Sturgis said in the *Architectural Record*, 1905, p. 339, in reviewing an important book:

"I am sorry that Mr. — did not care to consider those refinements in early Medieval Art which Mr. Goodyear has revealed to us, making them his special study. The delicacy of perception found in the artist, and expected by the artist in his public, is part of the lesson we have to learn from the Middle Ages; and certainly these curves, these slopes, these



FIG. 11—CLOISTER OF S. ZENO, VERONA. XII CENTURY

Curve in plan, East Side, giving at the cornice an effect of curve in elevation—best seen by sighting sideways. Measures for the curve: At the base of the parapet, 0.12; at the top of the parapet, 0.10; at the cornice, 0.40. The cloister is not vaulted.

diminutions, replacing for us what we had supposed to be straight lines, accurate horizontals and verticals and equal sections throughout, would form a useful study for the modern man, if he would attend to it. It pleases the student to know that even in our commercial times and city, something of that spirit has been revived, as in the approaches to the central building of Columbia University and as in the slowly rising Cathedral of St. John the Divine."

Professor Charles Eliot Norton wrote me in March, 1905:

"Every new paper of yours serves to confirm the correctness of your original thesis, but almost every one opens some new questions which it will require further investigation to solve."

Mr. Heins wrote me in December, 1905, apropos of *The Builder's* article on the "Glamour of Crooked Building":

"My own point of view has led me to a very simple conclusion; artists appreciate the glamor of crooked building and it makes very little difference whether the rest of the world likes it or not."

Mr. Cass Gilbert wrote me in October, 1908:

"I have long been a believer in your demonstration of architectural deflections." Mr. Gilbert wrote me in November, 1907: "I have long been convinced that you have discovered a principle in mediæval architecture which is of the greatest importance and which is quite unknown."

Whereas the preceding quotations are from individuals, the following are from standard publications.

The supplement to the *Century Dictionary of Names*, which appeared in 1906, states that my "measurements of monuments have greatly modified the accepted theories of architectural development." Macmillan's *Dictionary of Architecture*, edited by Russell Sturgis, opens its article on "Refinements in Design" by quotations from Ruskin and Viollet-le-Duc. It continues with the statement that: "There has been, however, no such comprehensive investigation as that undertaken" by the Brooklyn Museum. Mr. Heins was the author of this article. His references to observations for mediæval work are credited to my publications. The description of the Pisa Cathedral which is found in the recently published second volume of the *History of Architecture*, by Russell Sturgis, accepts as authentic the entire series of observations for Pisa as well as for Italy in general.

Mr. John Beverley Robinson's book on *Architectural Composition*¹¹ devotes an entire chapter to "Asymmetrical Composition," which opens with the statement that: "Professor Goodyear has shown, among his other brilliant discoveries, that exact symmetry, even in that which purports to be symmetrical, is not so pleasing as slight divergences from precise mathematical equality of the two sides. As soon as this is mentioned it recommends itself to the artist."

Thus we are brought face to face with an extremely interesting divergence of opinion, of such pronounced contrast in its absolute negation on the one hand and in its absolute affirmation on the other, that some explanation, outside of a re-examination of the evidence by other parties who would probably again differ as violently, appears to be desirable.

This explanation may probably be very largely temperamental. The artist's temperament is probably rather indifferent as to drawing a hard and fast line between the gratefully accepted and the definitely planned asym-

metry. It suits his taste in either case. The opposed temperament dislikes the idea and the effect of asymmetry, and therefore discredits the evidence, even before it is examined.

It is needless to say that the temperament which is opposed to the artist's point of view is the dominant temperament of modern times. It is the expression of all the influences and of all the changes which have separated and distinguished the modern time from the Middle Ages and from the still earlier periods of great art; and of all the Renaissance prejudices against mediæval art and architecture which we have inherited and which coined the word "Gothic," i.e., barbarian, in order to specify that mediæval art.¹²

It may be added that the bottom appears to have fallen out of this controversy, since the Cathedral of St. John the Divine has introduced the refinements which have been described by Mr. C. Grant LaFarge in *Scribner's Magazine* and which are mentioned in the *American Architect* articles of October 27 and December 1. If the temperament, which is believed by some of us to have inspired much mediæval art, did not exist in mediæval times, it certainly exists now. The principle is vindicated, even if unknown to the mediæval men who have inspired these modern architects to revive it.

However, there is still something to be said about this controversy. If there be a temperamental antagonism in modern times to such principles and points of view as have been quoted from Choisy, from Ruskin and from Viollet-le-Duc, then we might anticipate an over-hasty and wholesale rejection of the given research by adverse critics, before they had carefully examined its evidence.

Are there such indications of hasty judgment, of lack of reflection or lack of caution, on the part of these gentlemen who have been mentioned as adverse critics? Possibly so. *The Builder's* refusal to examine the Edinburgh Exhibition appears to be such an indication. In the article which announced this refusal, *The Builder* borrowed a plan from the Edinburgh Catalogue, which had been specified in its title as giving plumb measurements for a height of 17 feet, or less, from the pavement of St. Mark's. By omitting the descriptive title of the borrowed plan, as well as by its own text, *The Builder* gave its readers to understand that these were the measurements for the entire height of the church, although the real measurements were abundantly quoted in the Catalogue. This error has never been corrected. It also published this plan as a Brooklyn Museum survey, although it was catalogued as the official Venetian plan, which was reproduced by permission and solely for the entry of plumb measurements. It also used this plan as a type of those on which the arguments for constructive asymmetry are based, although it was expressly mentioned in the Catalogue (p. 93) that no constructive intent was claimed for the asymmetries of this particular plan.

The carelessness as to material matter of fact in the matter of plumb measurements is a significant point. If the plumbs on the plan had represented the vertical widening of St. Mark's, the entire amount would have been 0.15, or 2 inches, in the minimum instance. At the given point the actual widening, as given by details of

¹¹ D. Van Nostrand Company, N. Y. B. T. Batsford, London, 1908.

¹² The word "Gothic" was originally applied to all mediæval periods.

plumbs in the Catalogue, is 33 inches. If due to accident this would have involved fissures in the lower circumference of the domes of 8 feet 3 inches, because the circumference of a circle is three times the diameter. There is no record or evidence that such fissures ever existed. Such an argument should not be overlooked or misrepresented. *The Builder* could not be guilty of misrepresentation and it therefore follows that it had not read the Catalogue from which it borrowed the plan.

Mr. Bilson's case is also in point here. He had announced, without visiting the Edinburgh Exhibition, that it was a collection of "supposed discoveries" whose chief value lay in the evidence which they furnished in contradiction of the points which they were supposed to prove. I then pointed out in the *Journal of the R. I. B. A.* that the Catalogue "Index of exhibits according to subject matter," which had naturally been printed before this critique appeared, proved that one-third of the exhibits were illustrations of perspective illusions, and I quoted the standard authorities who had announced similar perspective illusions after the date of my own announcements. Mr. Bilson's reply was this: "I have expressed no opinion whatever with regard to perspective illusions," but he did not explain how he could repudiate the entire results of an exhibition in which one-third of the exhibits were devoted to perspective illusions, without expressing an opinion about perspective illusions. Of course, the simple conclusion is that he had made his attack without studying the exhibition or even reading its Catalogue with care.

Mr. Bilson had, however, only followed the example of M. Lefèvre-Pontalis, whose own courteous critique had committed the same error in principle, for although it was written before the Edinburgh Exhibition, it purported to be a review and summary account of my publications in general, and this critique did not credit me with announcing results, many of which had subsequently been reaffirmed in principle by some of the most distinguished European antiquarians in their standard works.

As for the Count de Lasteyrie, his discussion of mediæval plans entirely ignored the features and character of the plans which I have published, although the first condition of sane debate is that the people engaged in it should be talking about the same thing.

Mr. E. S. Prior's contribution to the gaiety of nations is highly amusing. He has committed the serious indiscretion of building a church choir with the lines of the walls converging in plan, after writing an adverse critique on the Edinburgh Exhibition.¹⁸ Imitation is, after all, the sincerest flattery, and Mr. Prior has thus done much to assuage the grief which his article caused.

It might appear, so far, that the burden of approval had been American and that the burden of disapproval had been European, but this is, by no means, the case.

The official exhibitions in the Palazzetto Farnesina ai Ballauri at Rome,¹⁴ and in the National Portrait Gallery

of Edinburgh,¹⁵ and the official invitation from the Architectural Committee of the Exposition of Milan, to send a Brooklyn Museum exhibit, are all indications of an active European sympathy. The general attitude of the Edinburgh Exhibition Committee toward the entire subject is best represented by their earnest efforts to have the exhibition transferred to the meeting of the International Architectural Congress at London in the following year. These efforts failed, possibly in consequence of the attacks in *The Builder*, which did not hesitate to pass a verdict of wholesale condemnation on the exhibition at Edinburgh, although it declined to examine it.

Among European architects who have publicly expressed their approval of the general thesis that constructive and intentional architectural asymmetries are found in mediæval architecture may be mentioned the following:

The City Architect of Dublin, Mr. C. J. MacCarthy.¹⁶
Mr. Arthur Hill, of Cork.¹⁷

Mr. L. Ingleby Wood, of Edinburgh, Honorary Secretary of the Edinburgh Exhibition.¹⁸

Mr. F. W. Deas, of Edinburgh, who first suggested the Edinburgh Exhibition.¹⁹

Mr. H. O. Tarbolton, at that time president of the Edinburgh Architectural Association.²⁰

Architect McGibbon, of Glasgow.²¹

Mr. G. A. T. Middleton, of London.²²

M. Léon Margotin, architect in charge of repairs (*Inspecteur des Travaux*) of the Cathedral of Rheims.²³

M. A. Aubertin, architect in charge of repairs of the church of St. Loup at Châlons sur Marne.²⁴

Professor L. Cloquet, Professor of Architecture in the University of Ghent and editor of the *Quarterly Revue de l'Art Chrétien*.²⁵

Baron Henry von Geymüller, of Baden-Baden.²⁶

Professor Gustavo Giovannoni, of Rome, vice-president of the Roman Society of Architects.²⁷

Signor Annibale Messerini, the architect in charge of the Pisa Cathedral²⁸; and Commendatore Pietro Saccardo, deceased in 1904, and for seventeen years the architect in charge of St. Mark's at Venice.²⁹

¹⁵ September 6th to November 11, 1905. Organized by the Edinburgh Architectural Association and limited to the Brooklyn Museum exhibit of 287 numbers, occupying 550 linear feet of wall space.

¹⁶ "Intentional Irregularities in Mediæval Italian Architecture," in the *Irish Builder*, February 1, 1899.

¹⁷ Various contributions to the *London Architect and Contract Reporter*, including independent observations at Chester, under date of October 21, 1904.

¹⁸ In the *London Architectural Review* for September, 1905, and in the *Burlington Magazine* for December, 1905.

¹⁹ Article in the *Edinburgh Scotsman* of September 2, 1905; republished in the *London Architect and Contract Reporter* of September 8, 1905.

²⁰ Speech at the farewell banquet given by the Exhibition Committee on the occasion of my leaving Edinburgh; reported in the *Brooklyn Eagle* of October 4, 1905.

²¹ *Glasgow Herald*, September 6, 1905, a review of the Edinburgh Exhibition.

²² Numerous contributions to the *London Engineering News and Building Journal*, including two reviews of the Edinburgh Exhibition, September 8 and September 22, 1905. Independent observations in St. Mary's, at Dover, in the *R. I. B. A. Journal*, January 25, 1908.

²³ Certificate published in the *Journal of the R. I. B. A.* for November 9, 1907.

²⁴ Certificate published in the same journal of the same date.

²⁵ Various editorial notes in the *Revue de l'Art Chrétien* and notably his preface to my article, *Rafinements Architecturaux*, in the number of July, 1908. See also his report on the subject, to the Royal Commission of Historic Monuments of Belgium in the *Bulletin* of the Commission for 1908.

²⁶ Personal letter, quoted in the *AMERICAN ARCHITECT* for September 8, 1909.

²⁷ Communications to the Roman Society of Architects. See also his article on the curves in plan of the Temple of Cori, quoted in the *AMERICAN ARCHITECT* of December 1, 1909.

²⁸ Certificate published in the *AMERICAN ARCHITECT* for September 8, 1909.

²⁹ Certificate relating to St. Mark's at Venice, published in *Memoirs of Art and Archaeology* of the Brooklyn Museum, No. 2.

¹⁴ The plan of this choir was published in the *AMERICAN ARCHITECT* for December 1, 1909.

¹⁵ April-June, 1904. This was an exhibition of architectural photographs, held under the joint auspices of the Roman Society of Architects, of the Italian Ministry of Public Instruction, and of the Roman Municipality. A special apartment was devoted to the Brooklyn Museum exhibit of 68 enlargements, occupying 150 feet of linear space.

As regards the attitude of foreign architectural and art journals, we may throw into the balance against the great influence of *The Builder*, the much-valued and constant support of the *London Architect and Contract Reporter* and of the *London Engineering News and Building Journal*. As against the weighty authority of the *Bulletin Monumental* we may quote the constantly favorable support of the *Revue de l'Art Chrétien* and the wholly favorable and very elaborate review by Professor Antonio Taramelli in *L'Arte*, the leading art journal of Southern Europe.⁵⁰ The *Burlington Magazine* has lent its columns to the favorable article of Mr. L. Ingleby Wood. The *Architectural Review* of London has impartially presented the arguments on both sides of the controversy. Last, but not least, the *Journal of the R. I. B. A.* has impartially given its space to the adverse critiques of Mr. Bilson and to my own replies.

To all these indications of favorable acceptance, or of fairness and of good feeling, among European experts, concerning questions which appear to have vital importance for future studies of mediæval architecture may be added a large number of letters from M. Auguste Choisy, from which I select those which follow. He may be regarded as having been the greatest expert in Europe, when questions of engineering, of history and of æsthetics are united in one inquiry.

Only about ten days before receiving the news of M. Choisy's death, I received from him a letter relating to the first in the series of these *American Architect* articles. This was the article of August 4, which laid especial stress on the deficiencies of mediæval plans, as hitherto published, and on the importance and novelty of the plans in the debated exhibition. M. Choisy wrote as follows:

"Accept my congratulations, dear Sir, for the architectural exhibition which is so well calculated to diffuse exact knowledge and to expose the false ideas which have unhappily been too well accredited. You are already reaping the fruit of the lessons in observation which you have given. Before you, people would have been satisfied with plans of factitious regularity. In future these conventional plans will no longer be in vogue and it will be necessary to furnish the public with the means of realizing the real anomalies and their true plan. You have opened up a path which it will be sometimes difficult to follow, but which will certainly be fertile in unexpected results and in the correction of errors which have been too widely accepted.

Cordially yours,

A. CHOISY."

When M. Choisy learned from me that the Cathedral of Elne had been independently verified in a published description as having the widening refinement,⁵¹ he wrote me as follows, in June, 1909:

"I am really touched by the affectionate kindness with which you are good enough to keep me advised of the facts which are grouping themselves about those which you have pointed out. It was necessary to call attention to this order of facts; you have aroused (this attention) and now that observers have the hint, I am sure that the facts will present themselves of their own accord. It must be a great satisfaction to you to have awakened such a movement of ideas, and I am

glad to renew my congratulations and with them my most affectionate compliments.

A. CHOISY."

In March, 1908, and apropos of some phase of the Bilson controversy which I do not recollect at present, M. Choisy wrote me as follows:

"I am really touched by the affectionate care with which you are kind enough to keep me advised of this controversy which so deeply agitates and interests the archaeologists of two continents and which illustrates, better than anything one could say, the novelty and the interest of your work. You have inaugurated a real revolution and I wonder at the fact that you find time and energy to direct this great movement of ideas in the midst of the absorbing labors of organizing your fine museum and of creating an entire library. All my congratulations, dear Sir, to you who have aroused (this movement) and to the public which comprehends its bearing, and cordially yours,

A. CHOISY."

When my first reply to Mr. John Bilson's adverse criticism of the Edinburgh Exhibition appeared in the *Journal of the R. I. B. A.* for November 9, 1907, M. Choisy wrote me the following letter, under date of December 13 of that year.

"DEAR SIR: I have just received, and have read with the most lively interest, your communication to the R. I. B. A. You should be congratulated on the incident which called it forth, for it has given you an opportunity to reunite in one general *resumé* all the essential matter of your numerous memoirs. One is really dismayed by the extent of your researches. How many monuments we believed to be geometrically regular which you show us as they are, as even the practiced eye never suspected them to be. As for the reason why so many curious facts should have been ignored, you explain it in a very penetrating fashion in your final pages, by the effects of contrast and, as regards the piers, by the effects of perspective, which cause the lines to converge in the rising direction and thus diminish the effect of the actual widening.

"The arguments on the excellence of the methods of observation by plumb-lines appear to me luminous." For my part I do not see what other method of observation could be employed which would establish the facts beyond doubt. Actual measures would certainly supply a greater precision, but they presuppose scaffolds which are generally impracticable; and the value of the measure would depend on the skill and the carefulness of the surveyor. On the other hand, the plumb-line is not exposed to errors, it speaks and every one can understand its language. He who accepts its indications possesses the proofs of the given deflections. As to approximate measurements the comparison of the deflections with the diameter of the colonettes seems to me to furnish, on your enlarged photographs, a more than sufficient precision. To sum up, you have inaugurated a method which, in your hands, has revealed an entire world of facts; I am glad to take this occasion, dear Sir, to renew my congratulations and with them the expression of my cordial regard.

A. CHOISY."

Concerning the Edinburgh Exhibition, M. Choisy wrote me in October, 1905: "It is a triumph and a triumph worthily merited. No one is more rejoiced over it than I." Among numerous other personal letters from the same authority, two have already been quoted on the subject of perspective illusions, in the *American Architect* of September 8, 1909, p. 90.

When M. Choisy was advised, in 1907, of the certificates for the widening refinement which had been given me by the architect in charge of Rheims Cathedral, and by the architect in charge of St. Loup at Châlons, he wrote me such an encouraging letter that I asked his permission to publish an extract from it.

⁵⁰ Here is to be understood the method of photographing vertical deflections by the aid of plumb-lines.—Note by W. H. G.

⁵⁰ Volume for 1900, p. 137.

⁵¹ *Elne, La Cathédrale, Le Cloître*. Imprimerie Comet, Rue Saint-Dominique, 8, Perpignan. Se vend au profit de l'église. "L'on doit remarquer tout d'abord l'habile artifice par lequel l'ouvrier, pour dégager la nef centrale, a donné à la face intérieure des piliers un fruit, un déversement bien marqué du côté opposé. Le vaisseau paraît ainsi agrandi, plus aérien, tandis que les piliers ont l'air d'avoir perdu de leur aplomb." The *London Builder* is authority for the statement that "of this there is no trace externally," which would imply that no accidental movement has occurred. See number for April 17, 1909, p. 458.

He immediately gave me *carte blanche* in the following words:

"So far from being opposed to this quotation, I should be rejoiced to have people consider it as a testimonial of my lively sympathy with these important investigations and with their author. I leave it to you."

As regards the earlier quotations of this paper, it has been pointed out that they bear, in general, on the investigation considered in bulk, and that there are special questions of engineering and of statics at stake in the question of the widening refinement, which would make it unfair to quote a general approval as bearing on this particular question. It will be observed, however, that the letters from M. Choisy which are appended have been written during the controversy regarding this refinement. The two following papers will take up this subject:

Meantime, although these letters throw into relief the fact that a new field of observation and of discovery has been opened up, we have already seen that M. Choisy's own *History of Architecture* contains passages which may serve as a very satisfactory philosophy of the general subject matter of mediæval asymmetries. In that book the mediæval use of optical illusions is formally announced. The conscious and predetermined avoidance of monotony and formalism is recognized as a mediæval principle and the willing acceptance of local or accidental variations as a phase of picturesque variety is treated as an artistic virtue, which was also characteristic of the Greeks, rather than as an indication of artistic incompetence, or of technical imperfection.

Notes on the Illustrations

As regards the variations of measurement which are quoted for Figs. 1, 2, 3 and 6, some notes are called for on the subject of builder's error. Small variations are, of course, generally found where it is positive that practically equal measurements were planned, and they must naturally also occur where variations were actually designed. In a given building, or parts of a given building, it is generally not difficult to compute the average builder's error. Large numbers of observations on this head point to the conclusion that 0.30 is a maximum allowance for the great majority of cases, either in widths of bays, heights of arches, or widths of aisles and naves. Much greater accuracy is frequently found, but variations of measurement up to 0.30 should be charged to builder's error, unless the contrary can be proved. Fig. 6 offers many illustrations of the method of computing the average builder's error. In the bays of the nave the measurements are as follows, in order from façade to choir:

13.30; 13.55; 15.70; 15.10; 14.80; 15.00.

12.75; 13.70; 15.95; 15.05; 15.05; 15.30.

The opposite bays were here obviously intended to be of approximately equal widths, aside from the pair on the left. There is no variation over 0.30 in opposite bays, except in the left pair, next the façade, and here the variation of 0.55 reduces the total amounts of slight previous discrepancies on the two opposite sides, which is 0.90 excess on the right side to 0.35 excess on the same side. That the general practice, in mediæval

building, of beginning at the choir and ending at the façade, was followed in this church is thus made probable by an analysis of the measures, because the final larger discrepancy next the façade nearly makes good the sum total of minor discrepancies up to this point, when the totals for each side of the nave are compared. On the other hand, these comparisons show that the excess of over 2 feet on each side in the third bays from the façade was deliberately planned. It is also certain that the decrease in widths beyond this bay, toward the choir, was also predetermined, because the decrease is much greater in the fourth pair of bays from the façade than the average builder's error; 0.90 (right) and 0.60 (left); also because the variation occurs at the same point on opposite sides of the church, and because the following bays toward the choir conform to this decrease on both sides, with insignificant variations.

The convergence of lines in plan, as mentioned for Fig. 4, is not easily observed in this church and is generally overlooked unless the measures are taken. The optical effect is also discounted in the photograph. Although the convergence is presumably designed for illusive optical effects, it should not be forgotten that the perspective effects are contradictory, because the arches do not descend in elevation, neither do the spaces narrow in width, in this church. Thus the given arrangement decreases the effect of foreshortening in the arches, in the direction of the choir, although it increases the effect of convergence in plan of the horizontal lines. It also decreases the downward pitch of the upper horizontal lines. On the other hand, such divergence of lines as occurs in the plan of the nave in Fig. 6 increases the effect of perspective foreshortening and the downward pitch of the upper horizontal lines in the direction of the choir, although it decreases the convergence in plan of the horizontal lines. These remarks bear on the point that *theatrical* perspective illusions are almost unknown, perhaps absolutely unknown, in mediæval churches. By theatrical illusion should be understood the combination in one design of all the illusive effects which are used in stage scenery.

The error of judging optical effects from the standpoint of a perspective diagram which is confined to one dimension is illustrated by the following instance: Beyond the great oval colonnade, by Bernini, in front of St. Peter's at Rome, the colonnades diverge in plan toward the façade. The great expert in perspective, Thiersch, has published a diagram to show that this reduces the effect of size of the façade by bringing it nearer to the eye.* The great expert in the physiology of optics, Jacob Burckhardt, mentions that this device increases the effect of size of the façade and had that purpose, because the façade is much wider than the space between the ends of the colonnades which are nearest the eye of the approaching spectator.† Thus two experts have interpreted the same facts as producing opposite effects, but one expert was considering a diagram, the other was considering the building itself.

*Thiersch. *Optische Täuschungen auf dem Gebiete der Architektur in der Zeitschrift für Bauwesen*, 1873, p. 116.

†Burckhardt, *Der Cicerone*, p. 225, Vol. II., 5th German edition, p. 219, Vol. II., French edition.

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Prof. Goodyear's research and its great value to architecture.

A much-to-be-commended appointment by the Borough President of Manhattan.

ILLUSTRATIONS:

Modern School Houses.

Frontispiece:

Pulpit in a Church at Naples, Italy.

IT is probably unnecessary to direct attention to the series of scholarly articles on the subject of "Architectural Refinements," contributed by Professor Goodyear, and published from time to time in *The American Architect*. That architects are reading them with unusual interest we have ample evidence. It does seem worth while, however, to call attention to the remarkable photographic illustrations of the various examples referred to in these articles, which probably, to the student, constitute the most important and interesting architectural exhibition ever prepared. An entire gallery of the Museum of Arts and Sciences in Brooklyn is devoted to this exhibition and the photographs and drawings which lack of space in this gallery compelled to be hung in an overflow collection are numerous and important enough to make a very creditable exhibition by themselves. We feel that if architects and students of architecture in this part of the world realized fully the extent and wonderful interest of this exhibition they would make any necessary sacrifice of time and business in order to view and study it. Hundreds of enlarged photographs are shown and these are supplemented by measured drawings of most absorbing interest.

WHEN it is considered that in the preparation of his remarkable exhibit, Professor Goodyear covered but a small portion of the territory which might reasonably be expected to yield material of value to this investigation, the real magnitude and importance of the matter becomes apparent. It appears, however,

that funds are lacking with which to continue the research and extend it in directions promising disclosures of no less interest and value than those obtained from the comparatively restricted area to which investigation has heretofore been confined. Such a condition appears little less than deplorable when we consider the amounts of money that are continually being expended in research work of various kinds. It would seem that if the situation were generally realized there should be little difficulty in securing the comparatively small sum required to complete the investigation begun and so ably carried forward by Professor Goodyear. A more worthy undertaking or one promising results of greater interest, it would be difficult to select. We commend the matter to the attention of architects and to men of means who may be interested in the subject of architecture at a period of most remarkable development along constructive lines. The opportunity of securing the invaluable direction and assistance of Professor Goodyear will not always exist, and failure to devise some plan by which the investigations can be resumed and completed will constitute a distinct loss to the knowledge of the art which might otherwise become general.

IT has been a matter of comment that men chosen for positions in various departments of city government have not invariably possessed the technical knowledge and skill that would render them capable of administering the affairs of their departments with particular brilliancy or even at times with complete intelligence. In many instances they have apparently been chosen more on account of political affiliations or strength than for any other qualities which they had manifested. Such appointees were, of course, entirely dependent upon subordinates or clerks whose advice they were obliged to ask before passing upon the most ordinary questions and affairs of their office. The efficiency of any department under such a system is naturally very low. Even if the greatest honesty of purpose is assumed it could scarcely be expected that results would be more than moderately satisfactory, and there may reasonably be some question as to the invariable honesty of purpose in the case of some political appointees. We trust that the selection of Mr. Rudolph P. Miller for the office of Superintendent of the Bureau of Buildings of the Borough of Manhattan presages the adoption of the system of selecting, for the public service, men whose qualifications and experience eminently fit them for the positions to which they are appointed. There can be little doubt that such a course would result in incalculable benefit to this city, and if more generally followed, to the country at large. Mr. Miller is a civil engineer of wide and varied experience in building and construction work. He was for years chief engineer of the Department which he now heads, and as such earned the respect and esteem of architects and builders alike. We doubt if the new Borough President of Manhattan will be able during the course of his administration to make an appointment that will meet with more universal and hearty approval than the one he has just announced, filling the office of Superintendent of Buildings.

(Continued from page 54)

Figs. 9, 10, 11 illustrate a system which was found by Pennethorne in the second temple court of Medinet Habou (13th century B. C.). Prof. A. L. Frothingham's *Monuments of Christian Rome* (Macmillan, 1908), contains the following passage, at p. 206:

"Among the many reasons for the charm of these Roman cloisters is one that has only recently been discovered. It is that here, as in so many Greek temples, there were variations from the straight line, especially in horizontals, in such a way as to give sweeps of beauty in place of purely mechanical stretches, and an illusion of greater length. This is evident to any one standing at the corner of one of the inner faces of a cloister, as he lets his eye follow the sweep of the cornice above the arcade surrounding the cloistral court. The regularity of this curve and its constant repetition show that it was not accidental, but deliberately planned. I have already noticed it in the early work at Ss. Quattro Coronati, and it reappears in every later cloister that I have tested."

RECENT LEGAL DECISIONS

RELEASE OF SURETY BY OVERPAYMENTS TO CONTRACTOR

The plaintiffs had a contract with the nominal defendant, Boll, for the construction of a building by the latter, "all payments to be on certificate of said architect as the work progresses, to wit: \$4,000 on completion of foundation; \$3,000 on completion of first story; \$3,000 on completion of second story; \$3,000 on completion of third story; \$3,000 on completion of building, and balance 60 days thereafter, reserving 15 per cent. of each estimate until final certificate is issued." The defendants other than Boll were a bonding company. Three months prior to the time of the completion of the building, the plaintiffs had paid the contractor \$15,100, the amount then due being only \$13,000, and on a final accounting the architect certified that there was a balance of \$4,239.27 due. Claims for labor and materials existed, which plaintiffs were obliged to pay to an amount of about \$2,700, to recover which the action was brought. The court held that the overpayment to the contractor was prejudicial to his sureties and that they were discharged thereby, though when the building was completed the payments to the contractor were not greater than the contract allowed. The court said: "The efficacy of substantial advance payments upon contracts to discharge sureties is too well settled by the authorities in this State [Wisconsin] to warrant discussion. The prejudicial effect thereof to the surety has been found both in the removal of the incentive to the contractor to diligently press his work and from the diminution of the fund which the contract contemplates to remain in the owner's hands and which may serve as a means of protecting the sureties from liability. In the present case it cannot be doubted that both the amount of the advanced payments and the length of time when they should have been paid were material."—*Kunz v. Boll* (Supreme Court of Wisconsin), 121 Northwestern, 601.

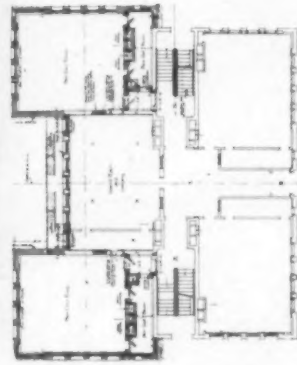
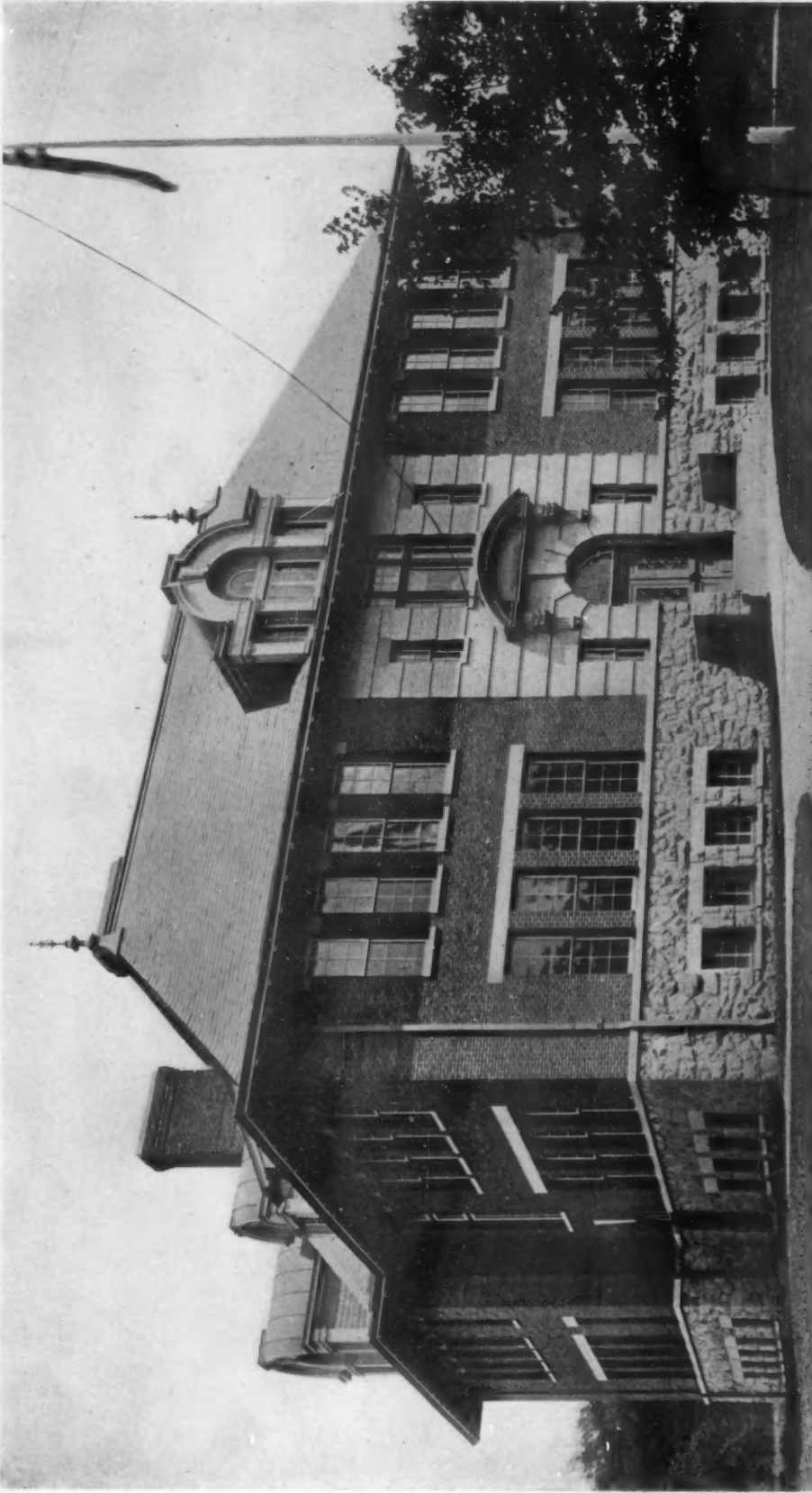
FAILURE TO COMPLETE BUILDING

Where an owner alleges that the contractor in a building contract has failed to prosecute the work with due diligence, enters upon the building, completes the

work, and sues the contractor for an amount expended in excess of the contract price, the important question which lies at the threshold of the inquiry is whether the defendant had failed to furnish a sufficient number of skilled workmen, and proper materials for the erection of the building, and whether he had prosecuted the work with due diligence. In such a case the plaintiff cannot, in support of his contention, introduce letters addressed by the architect, who by the terms of the contract is made the agent of the owner, setting forth an argumentative presentation of the plaintiff's contention, there being nothing on the record to show that they were actually received, or that they were ever replied to in any manner by the defendant. Such letters amount to nothing more than declarations by the plaintiff in his own behalf; nor can the plaintiff introduce certain schedules attached to the statement of claims, for the purpose of showing a statement of account against the defendant, where the correctness of the items of the schedule is denied by the affidavit of defense. Such schedules amount to nothing more than the plaintiff's own assertion of what was due to him. In such a case where no actual loss is shown by the owner from delay in getting the building ready for occupancy, there is no basis for the admission of proof of the rental value of the house as one of the elements of damage suffered by the owner. Judgment for the plaintiff given in the court below was reversed.—*Kann v. Bennett* (Supreme Court of Pennsylvania).

PAYMENT FOR UNDELIVERED PLANS

A firm of architects recovered a judgment in the municipal court for \$250 for the preparation of plans for alterations of the defendant's country home. It appeared that the alterations were abandoned and the defendant refused to pay for the plans unless he received delivery of them, which the plaintiffs refused to give, relying on their schedule of charges, based on the Institute of Architects rule that "drawings and specifications as instruments of service are the property of the architect." This schedule was not shown to the defendant before the work was done. On appeal the judgment was reversed and a new trial ordered. The court said with reference to the Institute of Architects rule: "While it may well be that, where both parties know this rule and make their contract in contemplation thereof, the drawings do really remain the property of the architect, and he can recover for his services, even though he refuse to deliver the drawings to his client, yet in this case, where the client was shown at the trial never to have employed an architect before, and to have been ignorant of this rule, the drawings are his property under the contract by which he employed the architects, and they cannot recover for their services unless they deliver the drawings to him." The fact that there had been a prior delivery to the defendant only for the purpose of inspection, followed by a return of the drawings to the architect, and the fact that the architect had been told to keep the plans until a future time, did not establish a waiver of a delivery, essential to a recovery for the services.—*Hill v. Sheffield* (New York Supreme Court, Appellate Term), 117 New York Supplement, 99.



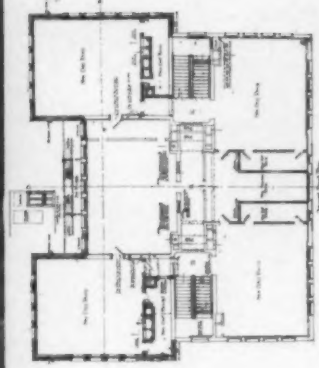
This building contains ten classrooms on the first and second stories and a large assembly hall on the third; also a principal's room and teachers' room.

The staircases are constructed entirely of iron with slate treads and platforms. The building is heated by two groups of hot-air furnaces and a small steam boiler. The furnaces are arranged in two banks with electrically driven fans forcing the cold air over the furnaces to the warm-air flues leading to each room. They are so designed that if the mechanical power is broken down for any reason the apparatus will work under gravity.

The finished floors throughout are of maple. The ceilings are plastered on metal lath; side walls on wood lath. The exterior brickwork is laid up with a local washed brick in red mortar with joints set in 1-4 inch. The basement story is laid up with a light gray local stone. The upper portion is trimmed with Indiana limestone.

The building, as originally erected, contained six classrooms, the second-portion of four additional classrooms on the two rear corners and an assembly hall on the third story.

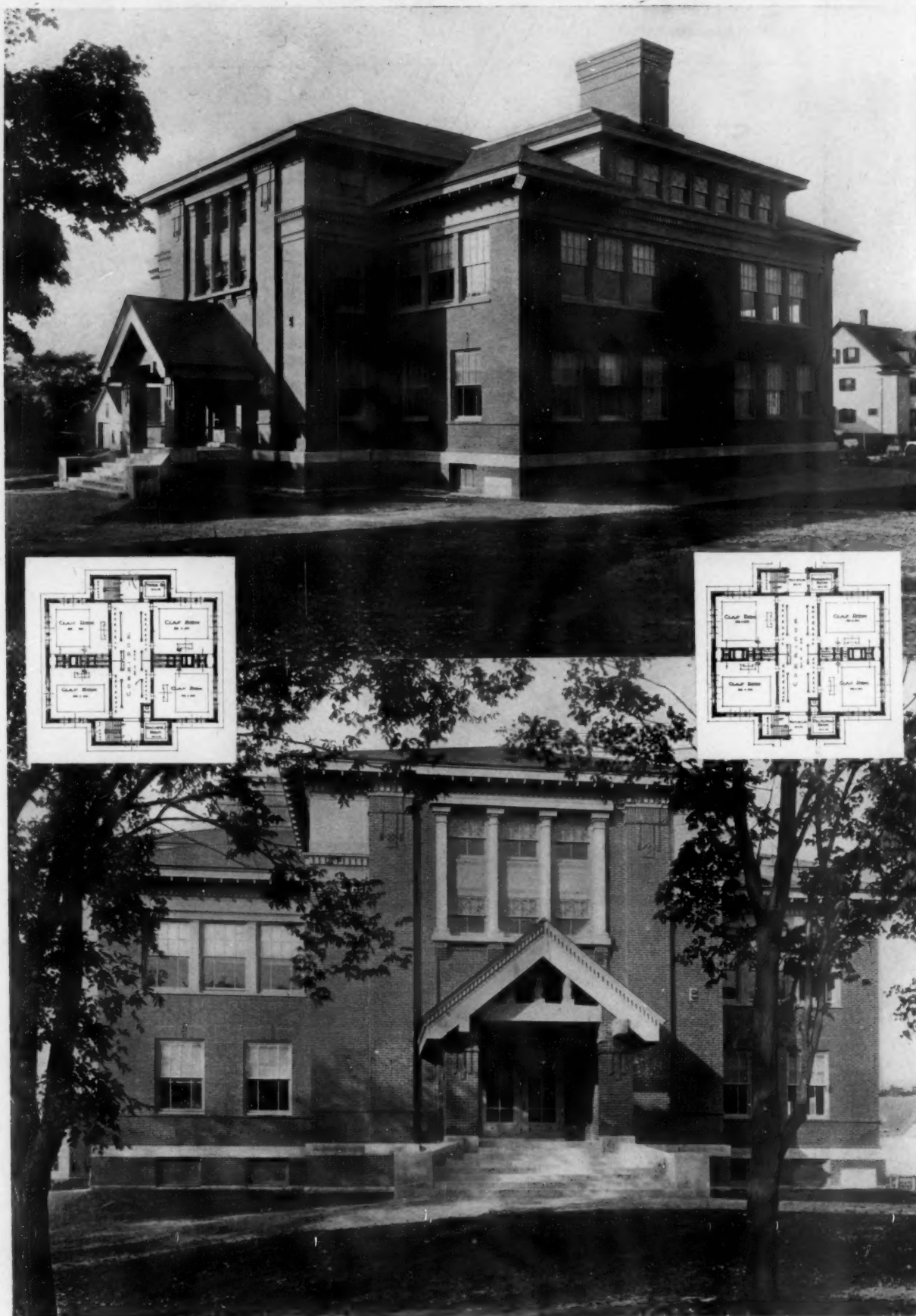
The total cost under these conditions, including architect's fees, was \$48,000.00. The cubic contents of the building are 314,288, making a cubic foot cost 15 cents.



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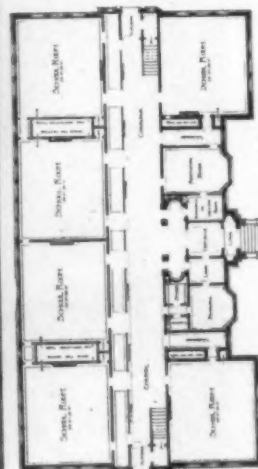
SCHOOL HOUSE AT LEONIA, N. J.

MESSRS. DAVIS, McGRATH & KIESSLING, ARCHITECTS



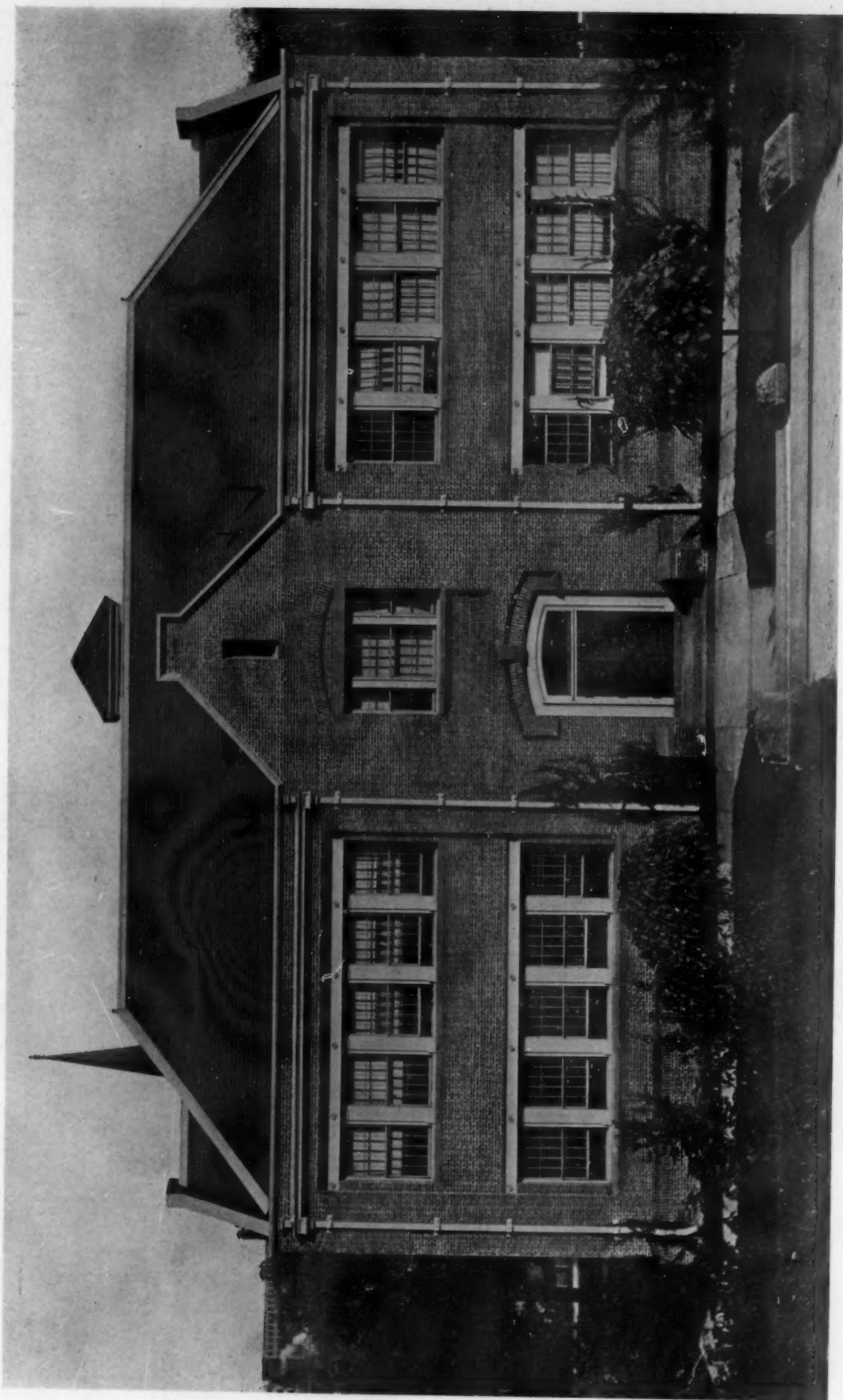
BLISS SCHOOL
ATTLEBORO, MASS.

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WINSLOW SCHOOL, BEVERLY, MASS.
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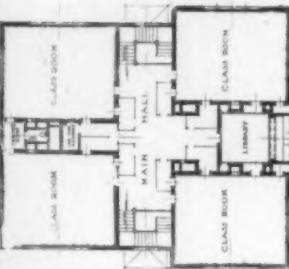
This building is of common brick with a slate roof and heated by the gravity system. Its cost per cubic foot was 9 1-2 cents.

MODEL SCHOOL BUILDING AT STATE NORMAL SCHOOL, NEW BRITAIN, CONN.

MESSRS. DAVIS & BROOKS, ARCHITECTS



FIRST FLOOR



SECOND FLOOR

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This school was so arranged that four rooms were built at one time, and four rooms at a later date. The building is of common brick with a tin roof and is heated by the gravity system. The first building was erected in 1898 at a cost of 8 3-4 cents per cubic foot. The four additional rooms were built in 1907 and cost 11 1-4 cents per cubic foot.

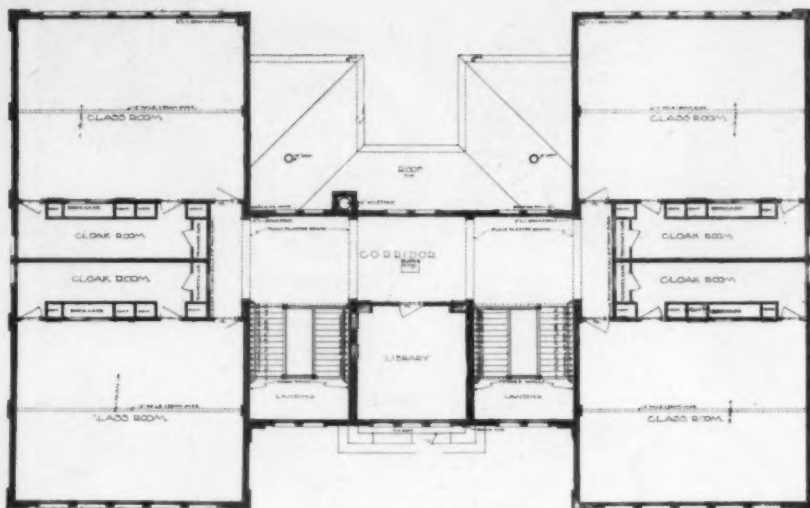
MONROE STREET SCHOOL, NEW BRITAIN, CONN. MESSRS. DAVIS & BROOKS, ARCHITECTS



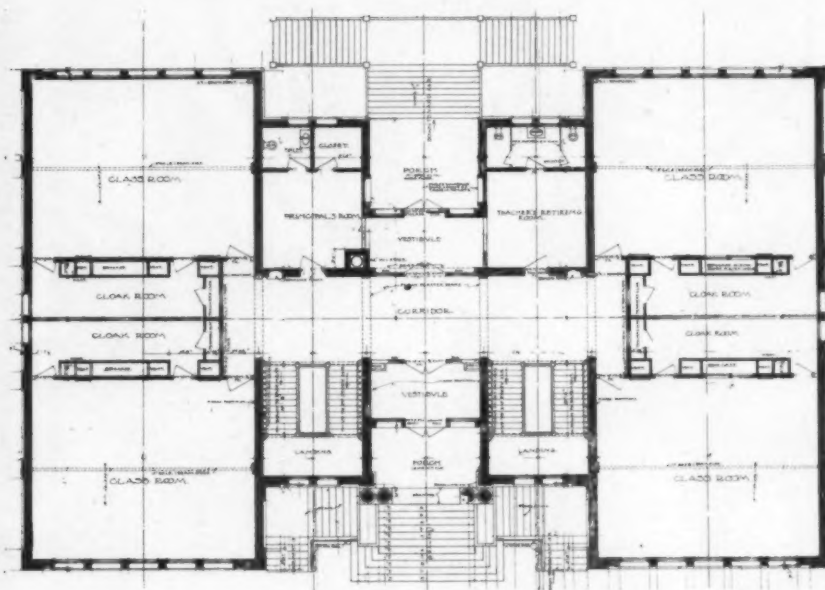
EIGHTH WARD SCHOOL
ATLANTA, GA.

This was the first of the modern schools to be erected at Atlanta. It is constructed of light-brown brick with limestone trimmings. It has metal cornices and light-brown terra-cotta entrances. There is no auditorium in this schoolhouse.

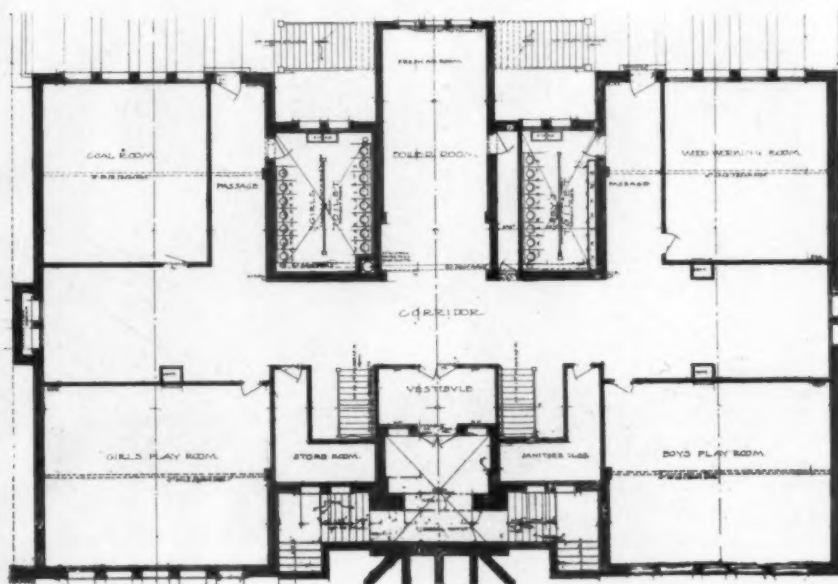
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SECOND FLOOR PLAN



FIRST FLOOR PLAN

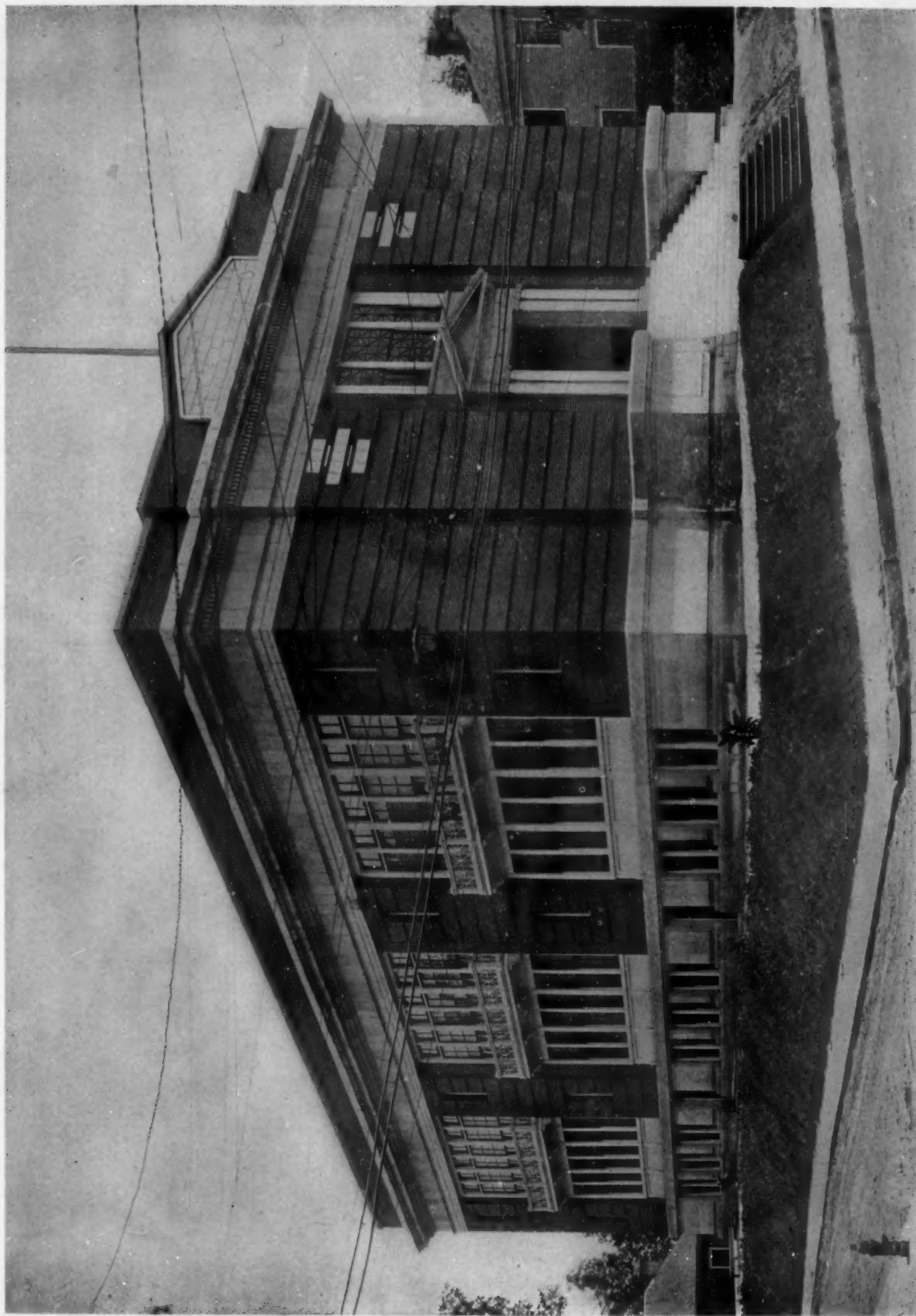


BASEMENT PLAN

EIGHTH WARD
GRAMMAR SCHOOL
ATLANTA, GA.

MR. HARALSON BLECKLEY
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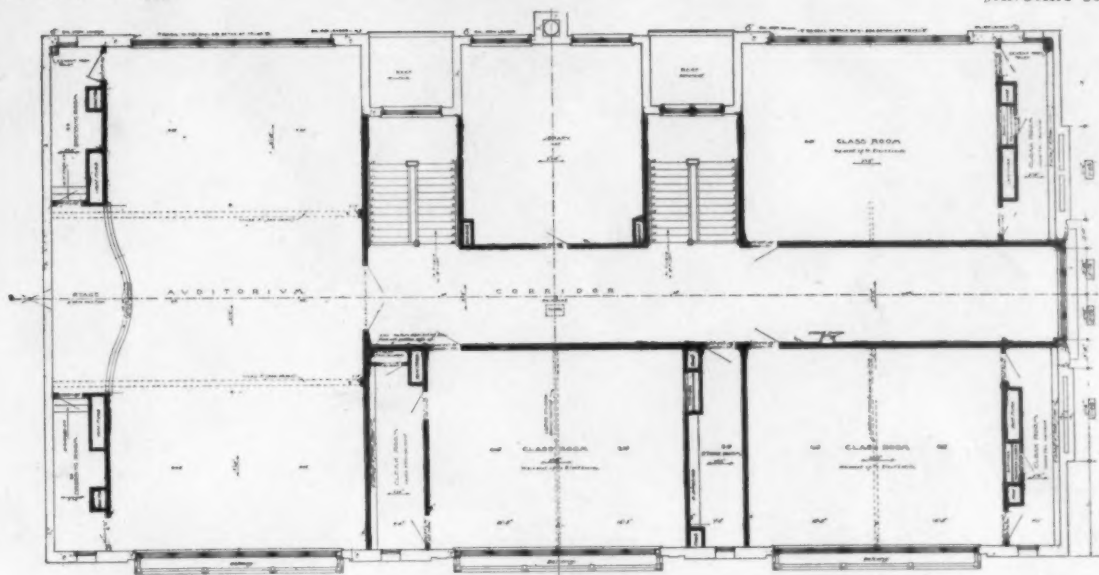
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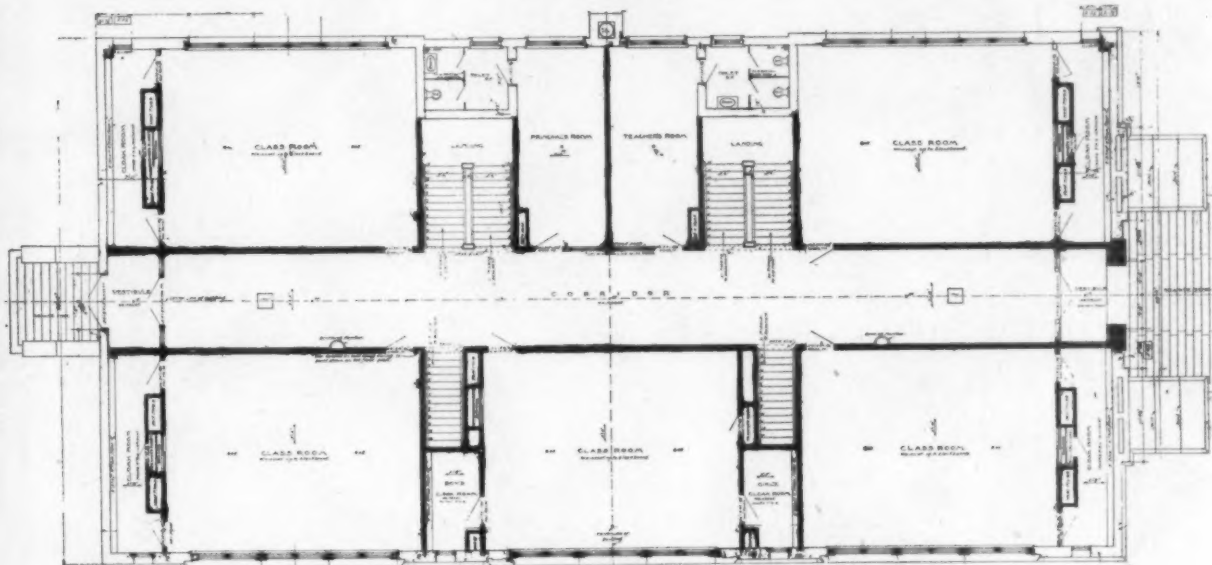
FOURTH WARD SCHOOL
ATLANTA, GA.

This school is constructed of cherry-red brick, with a limestone base and entrances. The auditorium is located on the second floor, and the boys' and girls' gymnasium in the basement.

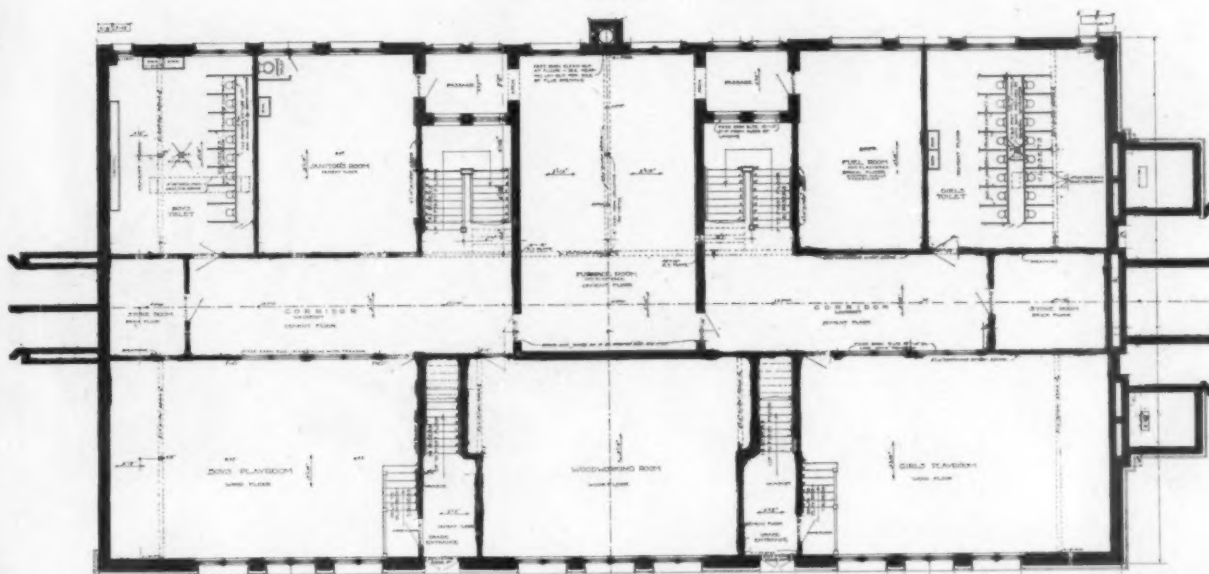
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SECOND FLOOR PLAN



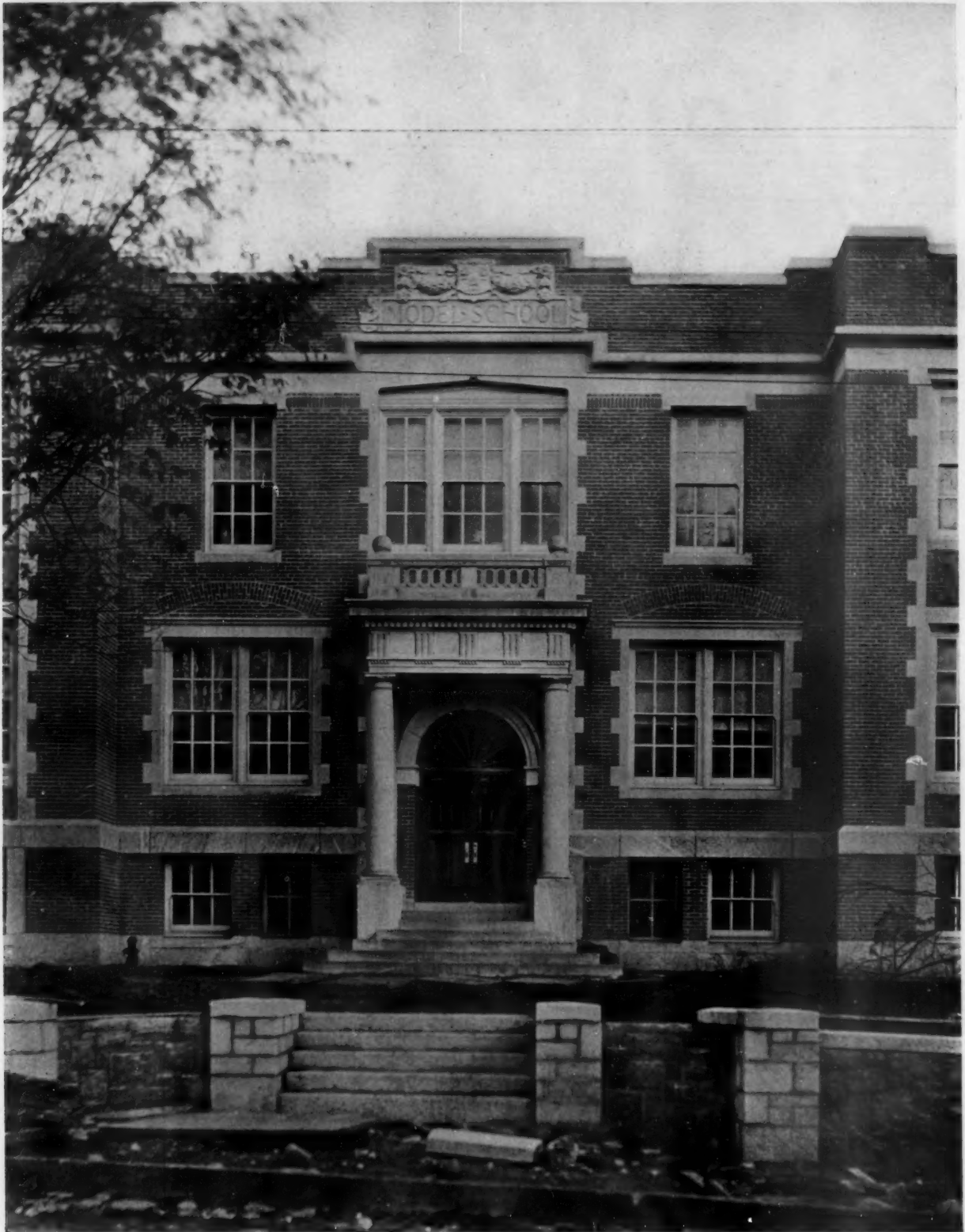
FIRST FLOOR PLAN



BASEMENT PLAN

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FOURTH WARD SCHOOL
ATLANTA, GA.MR. HARALSON BLECKLEY
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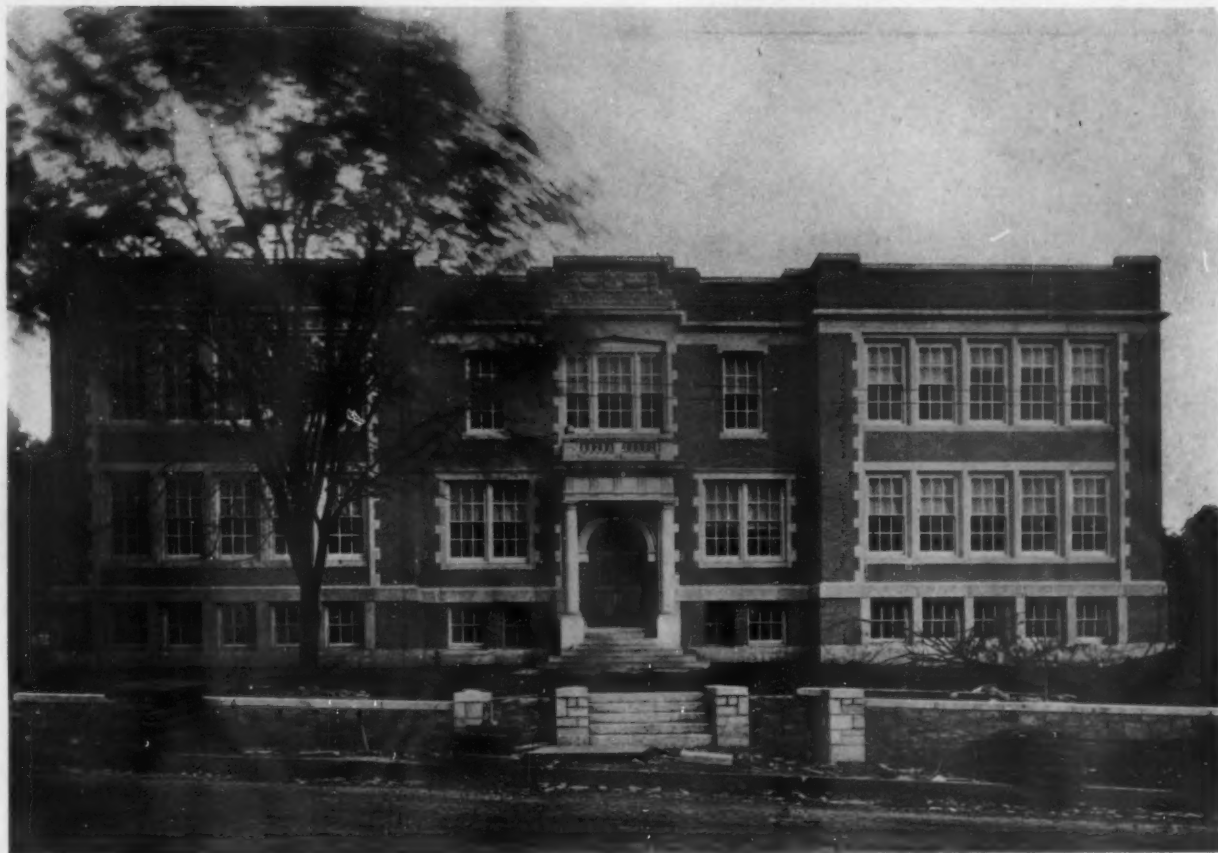


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This school was built of common brick with limestone trim above and granite in basement. The walls of both rooms and corridors are of painted brick and the whole building designed with every economy. Cost, including heating and plumbing, and with exception of boilers, which are in a separate building, 13 1-5 cents per cubic foot.

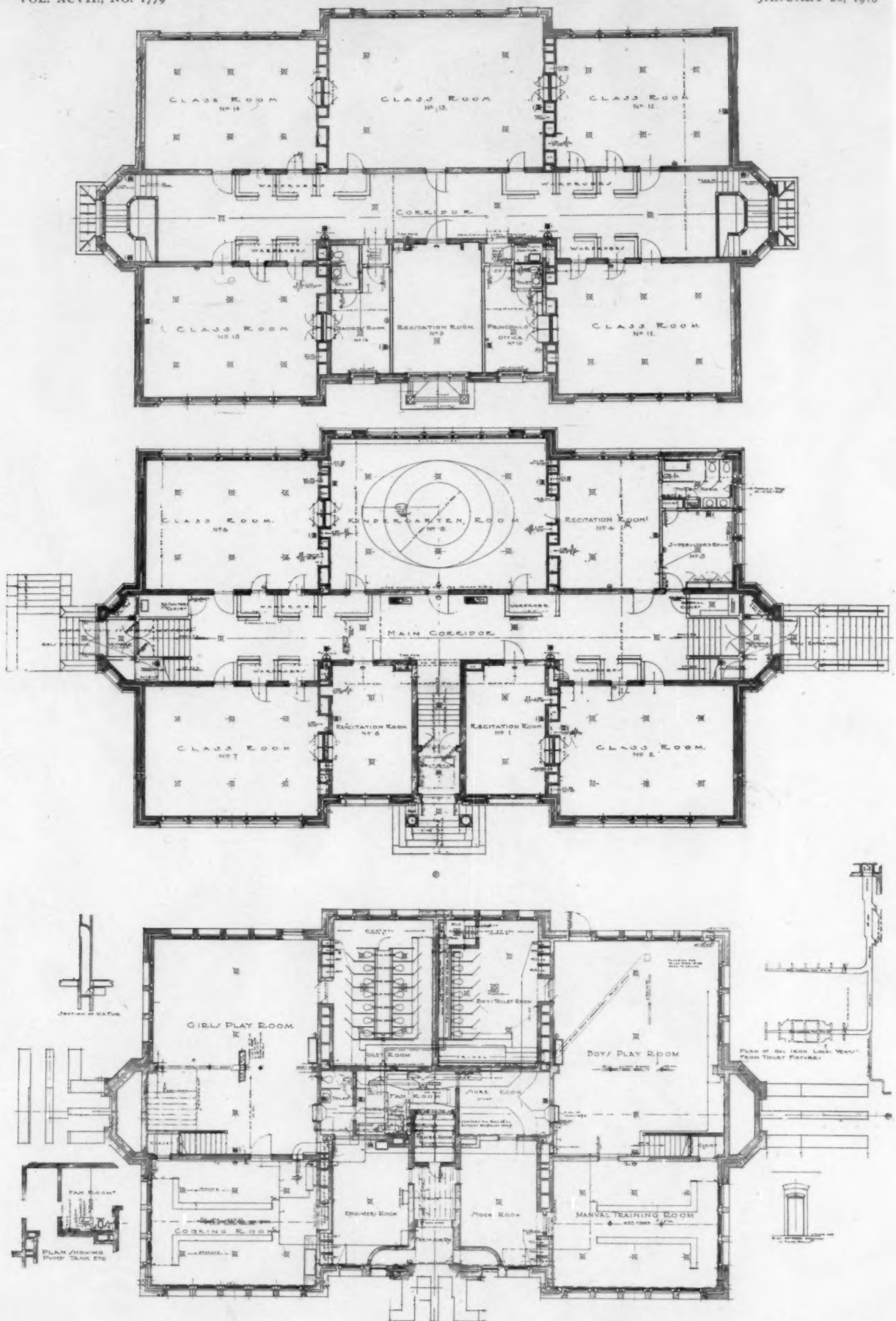
MODEL SCHOOL BUILDING—STATE NORMAL SCHOOL
WILLIMANTIC, CONN.

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MODEL SCHOOL BUILDING—STATE NORMAL SCHOOL
WILLIMANTIC, CONN.

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