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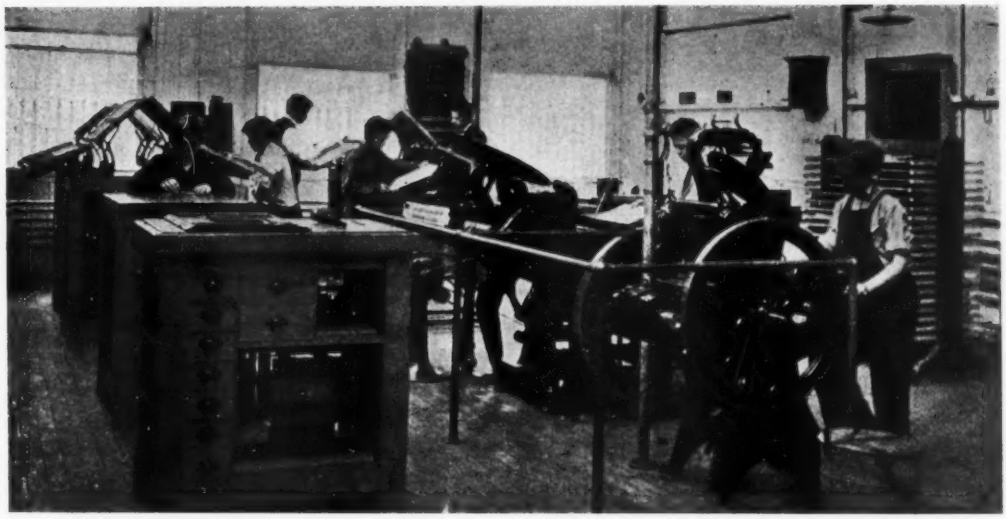


PRINTING—STATE EDUCATION SHOP, NEW BRITAIN, CONN.

Vocational Schools

BY JAMES O. BETELLE, A.I.A.

IT has been said that vocational schools represent the one new note that has been struck in educational buildings during the past decade. Vocational schools, industrial schools and trade schools are very closely allied and differ but slightly as far as the design of the buildings is concerned. The design of high schools and grade schools has been developed during the past few years into standard types, and a well designed high school would serve equally well in one of a number of cities. With a vocational school, however, each community presents a different problem, and the building and the studies pursued therein must be specially adapted to the local, industrial, social and educational conditions, all of which vary with each community. In a large city the industries are usually numerous and of great variety, while in a small town the industries may consist of a single large manufacturing plant, which is the support of the entire community, and the vocational school must be designed accordingly. To assist the architect in designing this new type of schoolhouse, which must afford a convenient, safe and sanitary place for carrying on this new instruction, this article is written.

The object of the vocational school is to fit an individual to pursue effectively a recognized profitable employment, thus enabling him to earn a better living and at the same time to raise the general standard of citizenship. It should also provide opportunities that will encourage the progress of individuals into more desirable occupations. It is intended for persons over fourteen years of age, who are preparing for a trade or industrial pursuit, or who have already entered upon the work of a trade or industrial pursuit. It is not designed to take the place of the general education now given in the regular schools, but in a large measure is intended to keep interested and at school pupils who would otherwise leave and go to work. The number of pupils leaving school and seeking

employment at the early age of fourteen years is alarming, and the cause of their leaving and starting to work is not always an economic one. With courses of studies, such as the Vocational School will provide, a great number of these pupils can be kept at school two or three more years and receive sufficient training in useful occupations to take them out of the unskilled labor class and start them well on the road to earning a good living and make them better citizens of the State.

STATE EDUCATION SHOP, NEW BRITAIN, CONN.

It differs from the now well-established Manual Training High School in that it is intended for pupils who never expect to go to a High School or other higher institution of learning. Of course, in a Manual Training High School the Academic work is of primary importance, while at the same time the pupil is given a little training in many different trades with a view to his general education and to train both hands and brain, rather than to make him a specialist in any one particular subject. In the Vocational School the course of study is generally three years in length, but arranged so that each year is a complete unit, thus giving the pupil who is compelled to leave before completing the full course the benefit of complete instruction as far as he has gone. The courses are naturally more specialized than in a Manual Training High School and the shops more expensive and complete. The Academic course is made to have special application to the industry being taken up by the pupil.

Vocational Schools are run on several different plans in order to render as much service as possible to persons desiring this type of education:

The all-day Vocational School, where the pupil devotes the entire school day to instruction;

The part-time or continuation school, where the pupil, having already gone to work, devotes a part of the working time for further education;

The Evening School, where mature workers attend evening classes, receiving instruction supplementary to their day employment.

Boys' and Girls' Vocational Schools are conducted in separate buildings wherever the number of pupils makes it possible to do so. Boys' Vocational Schools and their curriculum are possibly more familiar to us than the Girls' Schools. While in a Girls' Vocational School a great deal of attention is paid to training for the sewing trades, this is only one of a number of activities. The novelty trade with its uses of paste and glue also receives a great deal of attention. Many new subjects will be introduced directly due to the influence of the War,

PATTERN-MAKING DEPARTMENT, STATE EDUCATION SHOP, NEW BRITAIN, CONN.

MACHINE DEPARTMENT, STATE EDUCATION SHOP, NEW BRITAIN, CONN.

HOUSE BUILT BY STATE TRADE SCHOOL, SOUTH MANCHESTER, CONN.

on account of women being obliged to take part in numerous industries which were formerly thought to be strictly men's work. The so-called household arts or homemaking are not ordinarily taught in a Vocational, but are more usually confined to the regular High Schools.

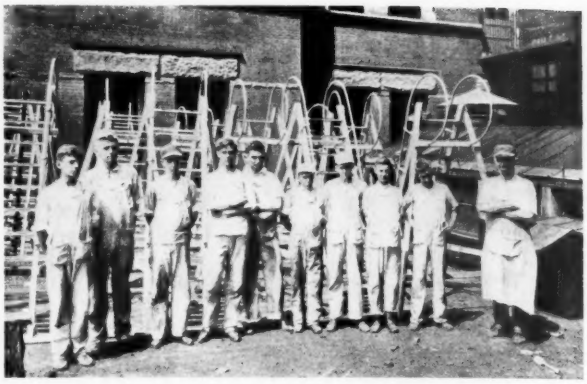
The present demand for vocational schools is very great, and there are a number of reasons, the principal ones being the great demand at this time for skilled mechanics, demands for efficiency during the war, and at the same time a look forward to the reconstruction period after the war. It has been pointed out by the U. S. Bureau of Education that when the war is over there will be even greater demand for skilled and trained workers than there is at present. The whole world must be rebuilt and this country must play a very important part in its rebuilding. The vocational school is one of the places to look to supply these workmen in great quantities; men who can not only take up the tasks laid down by the soldier when he went off to war, but who can fulfill the world-wide demand for skilled labor, after peace is declared. The vocational re-education of returned and disabled soldiers will also make a large demand upon our educational facilities. The Government, both Federal and State, has recognized the peculiar advantages and needs for vocational schools and has passed laws and appropriations so as to render financial aid under certain approved conditions. The local authorities in various communities thus encouraged and assisted are taking steps to establish vocational schools along the lines approved by the National Government and State.

CARPENTRY—STATE TRADE SCHOOL, SOUTH MANCHESTER, CONN.

FITTING WINDOW FRAMES—STATE TRADE SCHOOL, SOUTH MANCHESTER, CONN.

At first glance it may seem strange that the National Government should select this particular type of school for special favor. Further consideration, however, will show that the training of skilled mechanics is not a purely local matter. The U. S. Commission on Aid to Vocational Education has made clear in its report how the local com-

munities are already burdened by the attempt to meet the demands which at the present time are crowding the regular schools. In towns and cities the added taxation can be undertaken with great difficulty, if at all. Local communities are not willing without Federal or State aid to tax themselves for the purpose of training workmen who are extremely likely to drift off into other communities to raise the standard of citizenship and workmanship elsewhere. A man may be born in Indiana, trained as a worker in Massachusetts and later spend his days as a machinist in California. In recognition of the above condition, Congress recently passed the Smith-Hughes Bill, which establishes a National Commission on Vocational Education and renders financial assistance to the various States where Vocational Schools are established. This Bill, however, does not grant any moneys for the building or equipment of Vocational Schools; this must be done by the community in which the school is located. The financial aid is to be devoted toward the payment of teachers' salaries, and toward the cost of training teachers for this special type of education. The money received from the State in addition to that granted by the National Government helps considerably in reducing the cost of Vocational Education to the local communities.



CLASS IN CARPENTRY—POLYTECHNIC INSTITUTE, KANSAS CITY, MO.

DOOR FRAMING—STATE TRADE SCHOOL, SOUTH MANCHESTER, CONN

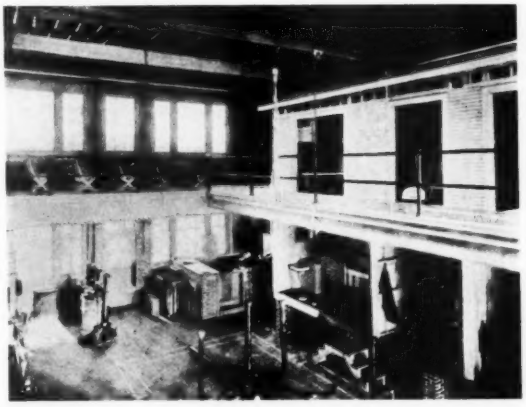
After the authorities of a large city become satisfied that there is a strong demand and a real need for a Vocational School the proper step to take next is to have a committee of citizens appointed to co-operate with the Board of Education. This committee usually consists of some of the leading manufacturers and business men, representatives of labor organizations, and boards of trade. Provision is then made to take an industrial survey of the City under the direction of an expert. Some of the objects of the survey are to ascertain, through actual visits and conferences, the extent and variety of occupations and manufacturies in the community, the conditions under which these activities are carried on, the ones taking the greatest number of pupils upon leaving school, and the trades to which Vocational Education can be applied to best advantage. It should also have a look to the future and make provision for changes in industries or the establishment of new ones with a view to easily made adjustments when same become necessary. The final result of the survey is the preparation of a report submitting the data collected in a simple form easily understood, with recommendations and reasons for the establishment of a Vocational School and the courses of studies it should include. A description and detailed requirements of a building and its equipment in which these studies could be properly pursued should also be a part of the report. The work of the architect can now be started intelligently, as the courses of studies, number of pupils, number of class rooms, variety and size of shops, etc., have all been decided upon and definitely stated.

It is sometimes desired or suggested that an available large factory, possibly vacant or for sale, be

altered and used for a vocational school. At first this appears feasible and a good way to obtain large accommodations for very little money, and it has been successfully done in a number of cities. It, however, has its disadvantages, such as improper location regarding the center of school population, transit facilities and environment. The window lighting area will very likely be far below the recognized standard or law requirements; ventilation and heating will be inadequate, and lighting and toilet facilities bad. It would, however, have the advantage of large areas and closely approach actual shop-working conditions.

STOUT INSTITUTE—MENOMINEE, WIS.

Old abandoned school buildings are sometimes suggested in order to get the vocational school started at a minimum expense. These have the disadvantage, however, of small rooms difficult to alter, and fail to impress the pupil with the atmosphere of a shop, which is important to secure efficient results. Their principal advantages are the saving in first cost.



PLUMBING SHOP—STOUT INSTITUTE, MENOMINEE, WIS.

It is unnecessary to state the advantages of a new building, specially designed and properly located for the vocational school. These advantages are, of course, recognized and a new school provided in all cases where funds are available.

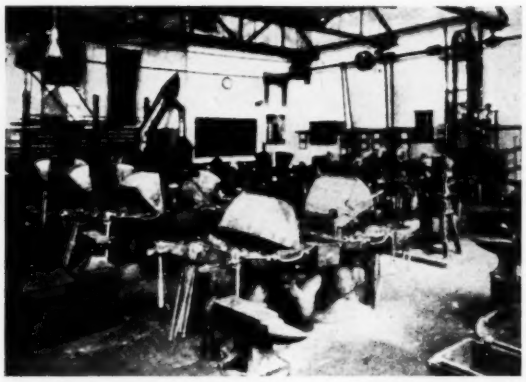
There are many advantages in a school being composed of a group of buildings. The separate buildings can be devoted to the various trades and additional buildings can be built as needed. The shops can often be erected one story high and made to approximate very closely actual shop conditions. Naturally, a site of large area is required for such a scheme, but it has many advantages.

In any new departure from the established customs in municipal affairs it is difficult and sometimes unwise for the authorities in charge to experiment with new ideas. For this reason, vocational schools were first started by gifts or legacies from private individuals. This type of school proved worth while and the cities and States then carried on the good work after generous citizens had blazed the trail.

A late development in the establishment of Vocational Schools is the one encouraged by large corporations located in small communities. It often happens that this Mill or Corporation is the only industry in the community and either pays practically all the taxes, or otherwise finances the enterprise so as to make the Vocational School possible, at the same time declining any official relation with the school in order that no sinister motives might be suspected in their philanthropy. These Mill or Mining communities have a large foreign element among the citizens and it is a broad and far-seeing policy that prompts these big business concerns to see that the rising generation is properly educated along practical lines and thus assure an improved future citizenship.

BRICKLAYING CLASS—STOUT INSTITUTE, MENOMINEE, WIS.

The location of a vocational school is just as important as the location of ordinary schools, but for somewhat different reasons. The cen-

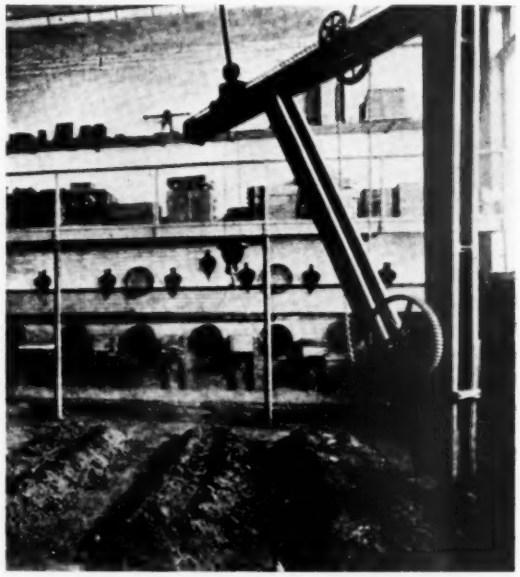


FORGE SHOP—STOUT INSTITUTE, MENOMINEE, WIS.

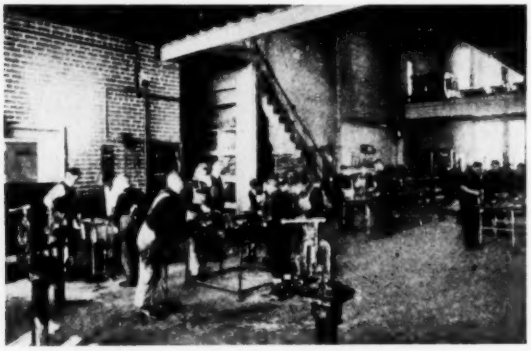
ter of the school population of the city or district is not so important in this case as the proper location to be easily accessible to the majority of the pupils who are likely to make use of the school. It should also be convenient to the various manufacturing plants, as part-time courses may be provided wherein the school shops are used for special instruction to apprentices in their respective trades, on certain days of the week, during specified hours. While a quiet location is essential for the ordinary school, it is not so important for the vocational school, although desirable. Many of the pupils will come from a distance, and accessibility to trolley lines or other means of transportation is, therefore, important. As the school is likely to be located in a very busy section of the city, school playgrounds space will be expensive and is not an absolute necessity. The children attending this type of school would get considerable exercise in their school and shop work, and a school gymnasium is generally included.

A school library of technical information accessible from the class rooms, shops, and for the use of any of the general public who are interested, is a very useful part of the complete building. Equally useful but in a different way is the school industrial museum. Here are displayed the cities' industries and their historic development illustrated. A visit to such a museum would give a very comprehensive idea of what is being manufactured in the community and the various processes necessary for a complete product. Specimens could be used where needed in connection with class instruction and at other times form part of the exhibits.

Circumstances regulate to a great extent the type of the building, but it is more than ordinarily important that it should be fireproof. The recent tendency has been toward giving the building too much of the factory character. While it should express its purpose, it should at the same time be given a school character in that it is a combination of a school and work-shop and should for these reasons be so designed. The portion devoted to school studies can be so treated, while at the same time the shops may be given the proper expression. The modern concrete type of building has been successfully employed with large glass area, and steel sash used in the shops. On the whole, the design should provide as ideal conditions as funds will permit, so that the pupils will be used to the best shop conditions, and thereby create a demand on the part of labor for a betterment in shop conditions in the various trades when the pupils begin their working career. The academic departments should be



MOULDING FLOOR—STOUT INSTITUTE, MENOMINEE, WIS.



MACHINE SHOP—STOUT INSTITUTE, MENOMINEE, WIS.

CARPENTERS—LATHROP SCHOOL OF MECHANICAL TRADES, KANSAS CITY, MO.

planned in the usual way, as now found to be standard in ordinary schools, and if possible should include an auditorium and gymnasium. The portions devoted to shops should be in large areas, on account of the constant changing in importance of the various industries which makes a flexible plan desirable. Two similar activities can be conducted side by side in one large space, without a dividing partition, and if more room is needed in either study it may be readily arranged for. The area required and number of pupils to be accommodated would be stated in the expert's survey, while the exact layout of the different shops, their machinery and equipment could only be determined after a consultation with the directors of the school and the teachers in charge. In arranging the shops and academic departments, these should be in separate groups; the class rooms centrally located, as all shops will need to use them. In the shops, units of fifteen pupils each can best be handled in one group, while in the academic department the usual high school class of thirty pupils is satisfactory.

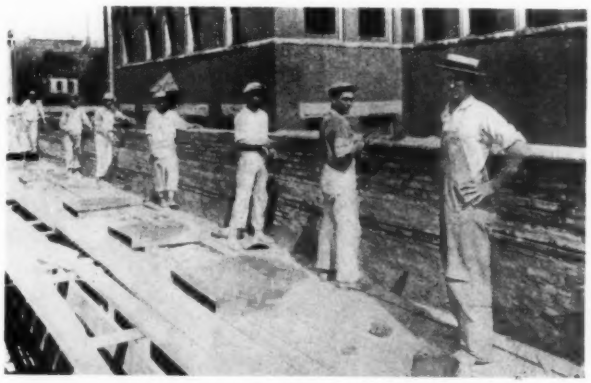
One of the most important elements entering into the successful designing of a vocational school is "atmosphere" and environment. For the pupils to do the best work the shop and its equipment must approach actual working conditions as nearly as possible. It is also important that the teacher should not only be enthusiastic and a leader, but his personality, bearing and appearance should add to the reality of these working conditions.

To assist in producing the shop atmosphere, the interior of the shop should be along factory lines. Interior wood trim can be eliminated, masonry walls and ceilings painted. Cement floors used wherever possible; where sharp edged tools are used, wood floors are necessary, and in such locations as the machine shop and forge shop, wood paving blocks can be used to advantage. The interior finish of the academic department should also be given its atmosphere, with rooms plastered and trim exactly the same as in standardized school buildings.

The heating and ventilating of the academic department should be along the usual school lines, that is, supplying 30 cu. ft. of air per pupil per minute. In the shops there are large floor areas and few pupils, so that the ventilation can be calculated on the basis of pupils rather than floor area. In the shops where gases are generated or in wood shops where there is a great accumulation of shavings and dust, special ventilation must, of course, be provided.

There is nothing particularly unusual about the plumbing and electric equipment, except that plenty should be provided. It should be so arranged and of sufficient capacity that changes and additions can be made at a minimum of trouble and expense.

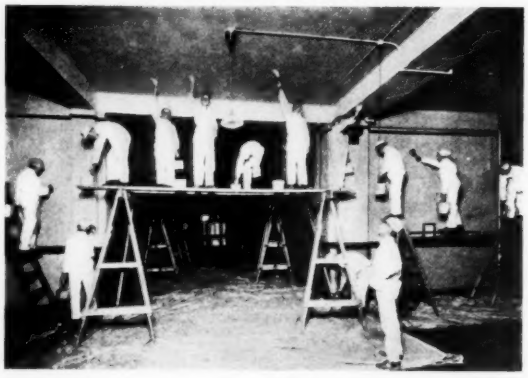
It has been pointed out that most vocational schools are either over-equipped, or have too much equipment of one kind. It is much better to have a few of a number of kinds of apparatus than many of one kind. It must also be realized that new machinery and methods are constantly being developed and the shop equipment to be most effective must be kept up to date. In private business, competition is so keen that changes and improvements must be made to keep up with the procession. In the school problem, no such situation arises; the tendency is to keep on using old machinery and methods and thus to save expense; needless to say, this is a very bad form of economy. To render the most efficient service to the pupils, the school must be a leader in all respects, not a follower. With



CLASS IN BRICKLAYING—LATHROP SCHOOL OF MECHANICAL TRADES, KANSAS CITY, MO.

a variety of equipment, it permits individual instruction, which is so much to be desired over class or group instruction.

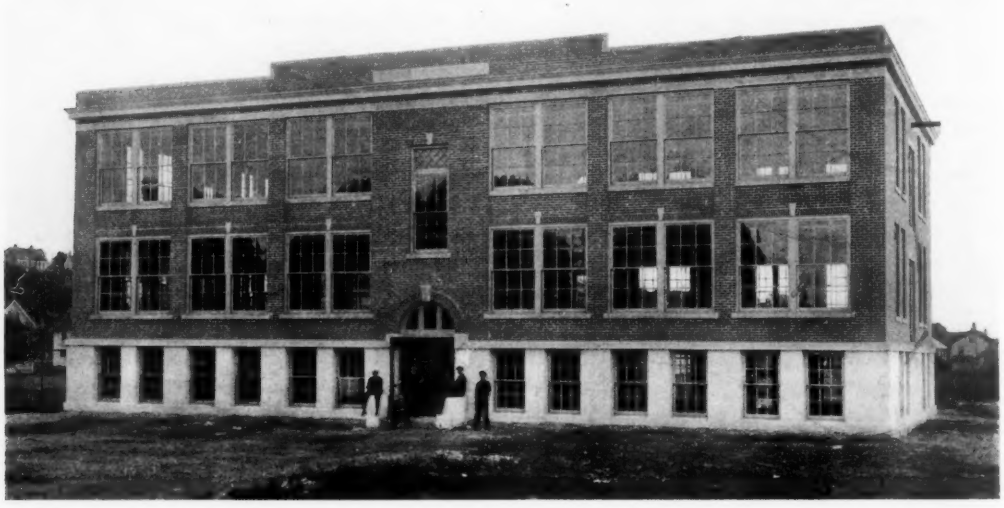
A definite statement as to the cost of vocational schools is difficult to give in these days of varying and rising prices. It is safe to say, however, that a school building of vocational type will cost at least 15 per cent more than an ordinary school of the same cubicture. The reason for this can readily be understood when one considers the heavier construction of floors and walls needed to support the heavy moving machinery; the additional and scattered plumbing necessary in wash-rooms, toilets, drains for special equipment in the various shops. Electric wiring must be much more elaborate to provide service for the different individual motors on the various machines and the increased individual lighting required at each bench and machine, in addition to the general illumination.



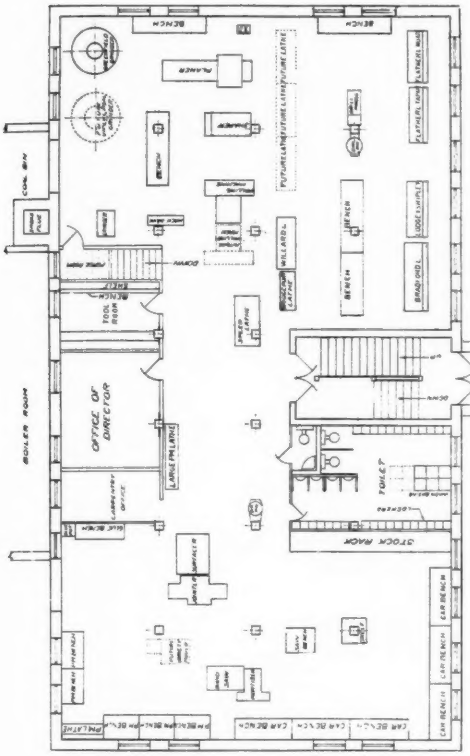
CLASS IN PAINTING—LATHROP SCHOOL OF MECHANICAL TRADES, KANSAS CITY, MO.

While in a school of the ordinary type the power plant is rarely installed, it is usual and proper to install a power plant in the vocational school, unless it is of small size. The great amount of electric current used in the various motors for power and increased lighting necessary makes the installation of electric generators an economy. The power plant with its high pressure boilers, pumps, engines, switchboards, etc., makes another branch of instruction for the pupils, who are here taught to fire the boilers, to run the different engines, to make tests, etc., and to learn the principles that govern the general plant management.

The cost of equipment, maintenance, and of the teaching force is somewhat beyond the scope of this article, but, needless to say, this expense is high. It can be cut down, however, within reasonable limits by making the shops serve some useful purpose besides that of education. Useful articles can be made and sold, or made for use somewhere else in the school system, in this way not only effecting a saving, but producing very beneficial effects on the pupils. By not buying all the needed equipment when the school opens, pupils can have the experience of making certain portions of it and thus accomplishing a saving to the school, and at the same time obtaining valuable experience. In many cities

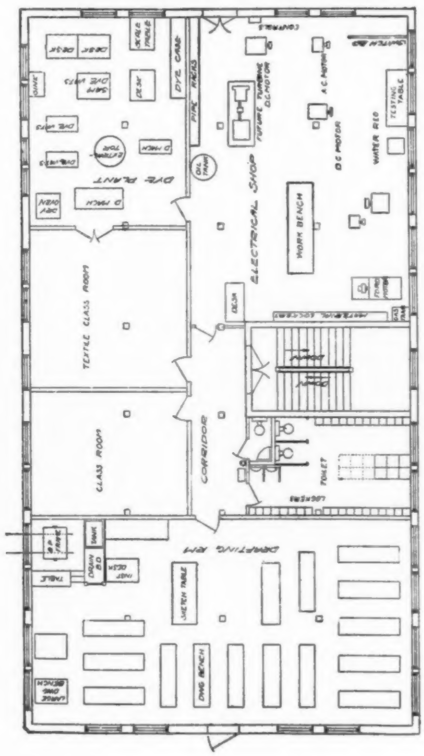


STATE TRADE SCHOOL, PUTNAM, CONN.

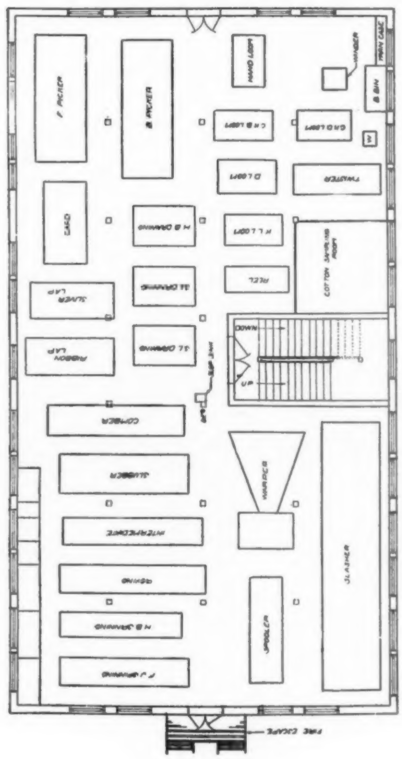


FIRST FLOOR PLAN

STATE TRADE SCHOOL, PUTNAM, CONN.



THIRD FLOOR PLAN



SECOND FLOOR PLAN

odd jobs of repairing and minor new work in the school system is done by the boys, such as repairing broken glass, painting outside and interior of the buildings, all to good advantage. It has been pointed out that Vocational Education is expensive, but that ignorance is more expensive. It is coming to be more and more recognized that money devoted to education is an investment rather than an expense.

In connection with Vocational Schools a more or less complete department of Vocational guidance is maintained. It is here that the young people are advised and counseled as to their future occupation and life work. The object is to avoid the economic loss of misfits in industry, to explain the meaning and advantages of the various trades, and to assist the pupil in making a wise choice of a pursuit along the lines for which he is best adapted. While the Vocational School is primarily to guide the pupil in his selection of a trade, it is to a certain extent an employment bureau as well. Here employers make application for help, and positions are obtained for the pupils. Record is also kept of the needs of the various industries, to the end that the Vocational Institution shall fulfill the demands of labor but avoid over-production in any department.

Credit is here acknowledged for information obtained from the Bulletins on Vocational Secondary Education, issued by the United States Bureau of Education.

Denver Plans a Civic Center

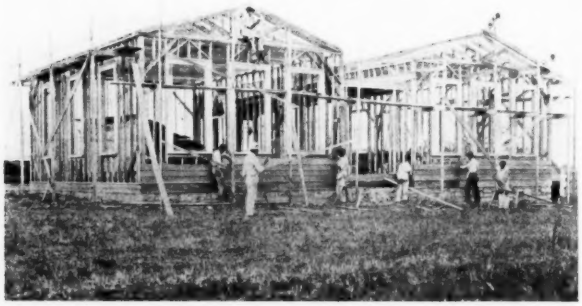
Denver is to have a civic center based on the idea of a Court of Honor to civic benefactors. This striking and novel idea appears to be one without precedent, and is receiving enthusiastic support.

Patriotic citizens have donated valuable works of art and other beautifying objects for the adornment of the civic center, and within a few months gifts to the value of $350,000 have been received.

The civic center is conceived as a large open space to be used as a place of public concourse rather than as a secluded park. It will cover 13 acres, and the ground has cost one and a half million dollars.

The civic center will contain a plaza in the foreground, which will be part of the state capitol grounds; the court of honor to civic benefactors, and an open air theater, a rectangular building for the art gallery, another on the opposite side for the city library; a city and county building; the United States mint; court of statuary, and, in the center, a monumental fountain, by Lorado Taft. The heirs of Junius F. Brown have presented the Brown art collection, valued at $100,000, to be hung in the proposed art gallery.

The first constructive work on the civic center will cost the people of Denver nothing in taxation. The court of honor, the open-air Greek theater and the lagoons will be installed through annual special funds paid into the city treasury by various utility corporations and diverted to this use.



A CLASS IN CARPENTRY AT WORK OUT OF DOORS

MACHINE SHOP
OAKLAND VOCATIONAL HIGH SCHOOL

"The Architect and the School"

By J. J. Donovan, Architect
of the Firm of C. W. Dickey & J. J. Donovan, Oakland, Calif.

QUOTING from Dutton and Swedden's Administration of Public Education in the United States, "The schoolhouse is one of the best expressions of American civic life," one is forcibly impressed with the thought that if this expression of civic life is to grow and redound to the credit of the architectural profession, not only must our school buildings continue to reflect in their architecture the intelligence and culture of the period, but they must also provide in plan and composition of the parts ideal working facilities for the administration of education.

That this end may be attained, there is no better means to bring it about than that the members of the profession entering into this work become thoroughly familiar with what is known as school organization. The Vocational School is probably one of the best examples to cite to illustrate and prove the point.

School organization is quite simple in the Primary and Elementary up to the seventh grade. From there on through the departmental work of the Intermediate or Junior High, the Continuation School, the Vocational, the Inclusive and Exclusive High Schools and to the Normal School, organization becomes more complex with its various departments and their multitudinous details. It is a knowledge of these departments, the teaching within them, the proper equipment for them, and the relation of each to the other and to the whole that makes for an understanding of this term.

A most exquisite design which might rival the best work of the ancients and belie beyond measure present-day culture, would undoubtedly fall short

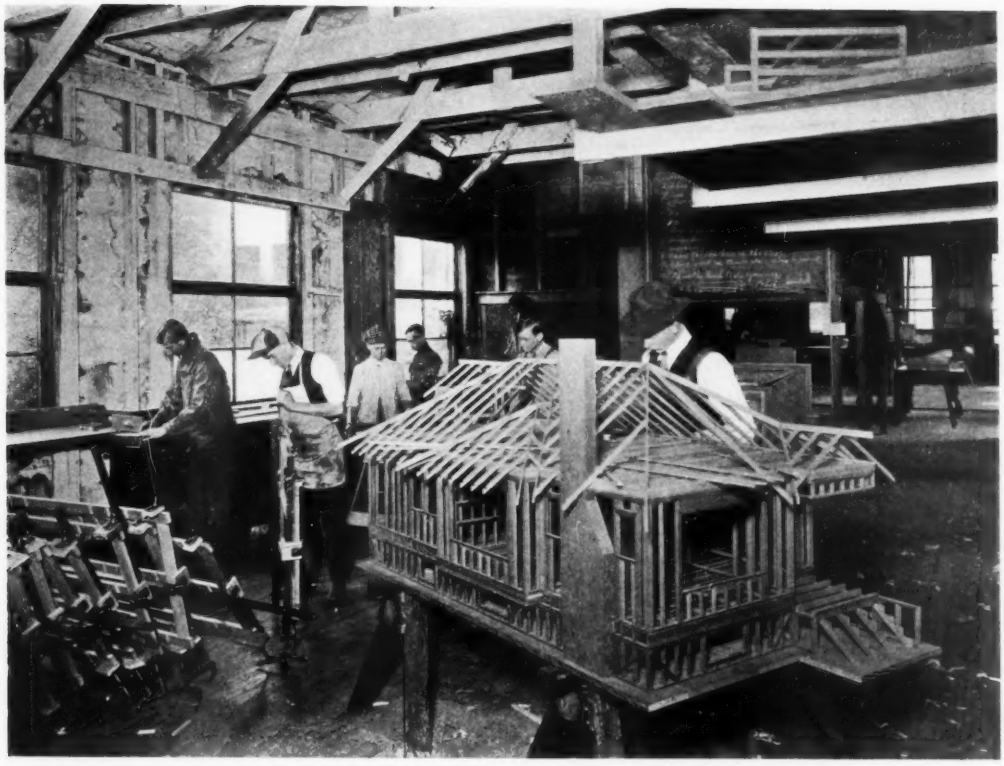
as a school for teaching and learning if the one primary essential, efficiency, was lacking in its plan and technique. We must understand the school and know its departments and its work in order that we may play our part in the progress of the great future development of education and country which is upon us and crowding us to step faster and surer.

The well trained architect is generally a man of liberal education and culture. His training and study naturally fit him for that position in society. The variety of problems he is called upon to solve and the solving of these problems fits him to approach and master, as far as intelligence will permit, each and every problem. To what extent the problem is solved to its correct answer or limit, both as to efficiency and architectural merit, is largely dependent upon the man. There is, however, a common impression that anybody can design a school, with limited or no experience in that particular work. There is also an impression that all that is necessary is a library of references as to what has been done here and what has been done there. Just how correct this is or how wrong it is may easily be proved by reference to a great deal of the work of the past, followed along similar lines.

To be sure, the problem is by no means insurmountable, however everlasting it may be, to the man willing to study and willing to give time and thought to it; but to those who have had experience in this work there seem to be two elements most essential for success, and those are a knowledge of the organization of what goes on within the school and a keen spirit for good architecture after the problem has been solved in plan and arrangement.

In considering the plan of a Vocational School, and, by the way, a Vocational School founded on broad principles includes the course of studies that are followed in the seventh and eighth grades of the Elementary Schools, as well as the studies of culture and science in the four years' work of the High School. Before discussing the plan any further, it might be well to examine the curriculum of a well managed Vocational School such as the Vocational High School of Oakland, California. The building is old and in a few years will be replaced by a modern structure, but the educational work within the building is high in standard, and therefore its curriculum is worthy of consideration in order that

BLACKSMITH SHOP
OAKLAND VOCATIONAL HIGH SCHOOL



CARPENTRY SHOP
OAKLAND VOCATIONAL HIGH SCHOOL

the organization of the school may be better understood:

CURRICULUM—VOCATIONAL HIGH SCHOOL—OAKLAND, CAL.

Course of study for Elementary Boys:

Seventh Year—	*Periods per week*
English	8
Mathematics	5
History and Geography	5
Drawing	2
Music	2
Physical Culture	2
Study	5
Shop Work	10
Eighth Year—	
English	5
Mathematics	4
History and Geography (1st term)	
Civics and Hygiene (2d term)	5
Drawing	2
Music	2
Physical Culture	2
Shop Work	20

Course of Study for High School Boys:

First Year—	
Shop Work	20 or 25
Drawing	4
Mathematics	4
Elementary Mechanics and Electricity	4
English	4
Music	2
Physical Culture	2
Second Year—	
Shop Work	20 or 25
Drawing	4
Mathematics	4
Electricity and Heat	4
English and History	4
Music	2
Physical Culture	2
Third Year—	
Shop Work	20 or 25
Drawing	4
U. S. History, Industrial and Political	4
Elem. Chemistry	4
Math. and Advanced Electricity	
Or Math. and Advanced Mechanics	4
Physical Culture	2
Study and Library or Music	2
Fourth Year—	
Shop Work	20 or 25
Drawing	4
Economics and Government	4
Industrial Chemistry	4
Mathematics and Advanced Electricity (1st term)	
Or Mathematics and Advanced Mechanics	4

PRINTING SHOP, OAKLAND VOCATIONAL HIGH SCHOOL

ELECTRICAL SHOP, OAKLAND VOCATIONAL HIGH SCHOOL

Periods per week

Strength of Materials (2d term) 8
Physical Culture 2
Study and Library or Music 2

Course of Study for Seventh and Eighth Grade Girls:

Seventh Year—

English 8
Mathematics 5
History, Geography and Hygiene 6
Drawing 2
Music 2
Physical Culture 2
Cooking and Housewifery 10
Study 5

Eighth Year—

English 5
Mathematics 4
History and Geography (1st term) .....
Civics and Hygiene (2d term) 4
Drawing 2
Music 2
Physical Culture 2
Vocations for Girls 1
Shop Work 20

Course of Study for High School Girls:

First Year—

Millinery, Dressmaking and Home Economics. 20
English 5
General Science 5
Drawing and Design 3
Mathematics 3
Music 2
Physical Culture 2

Second Year—

Millinery, Dressmaking and Home Economics. 20
English 5
General History 5
Mathematics 2
Drawing and Design 4
Music 2
Physical Culture 2

Third Year—

Millinery, Dressmaking, Home Economics or Design and Commercial Art 20
General History 5
Household Chemistry 5
Drawing and Design 5
Music or Study 3
Physical Culture 2

Fourth Year—

Millinery, Dressmaking, Home Economics or Design and Commercial Art 20
U. S. History and Government 5
Biology and Physiology and Hygiene 5
Drawing and Design 5
Music and Study 3
Physical Culture 2

MILLINERY CLASS

OAKLAND VOCATIONAL HIGH SCHOOL

An examination of the curriculum above will show clearly that Vocational Schools are not the dumping grounds of the mentally unfit and incorrigible pupils from other schools. The Vocational School is a living, soulful institution, doing wonderful work not only in preparing young boys and girls for the selection of a vocation for a life's work, but fitting these students for expertness in their work and educating them in the studies of culture, in preparation for good citizenship and membership in society in its broadest sense.

DRESSMAKING CLASS
OAKLAND VOCATIONAL HIGH SCHOOL

It is only cities of fairly large population that can afford a separate school set aside for vocational teaching. However, these cities can, by no means, neglect the opportunities for vocational work in the other High Schools within their limits, and it is incumbent upon cities and districts of lesser population to provide for housing and equipment in conjunction with their High Schools for opportunities for vocational work. Therefore, no High School should be built to-day without its manual training shops, its household economics, commercial and drawing departments, any more than one would think of building a High School without its Science Department or its Academic Departments. In other words, the scope of secondary education is so broad and so possible of extension that in considering it every consideration should be given toward possible enlargement of a plan. Therefore, if I may return to the plan of the Vocational School, it seems to me that the Vocational School is the Academic High School and the Technical High School molded into one, with emphasis upon the vocational work.

It is my belief, which is shared in by those interested in the future of our trades men and women, that a serious and unpardonable mistake is made in creating an Exclusive Vocational School. For if it ever should prove to be the purpose to teach seventh, eighth and ninth grade pupils and pupils in the higher grades trades in the Manual Arts or Domestic Sciences to the exclusion of the general studies such as English, Mathematics, History, Geography and the modern languages, the standard of

(*Continued on page 211*)

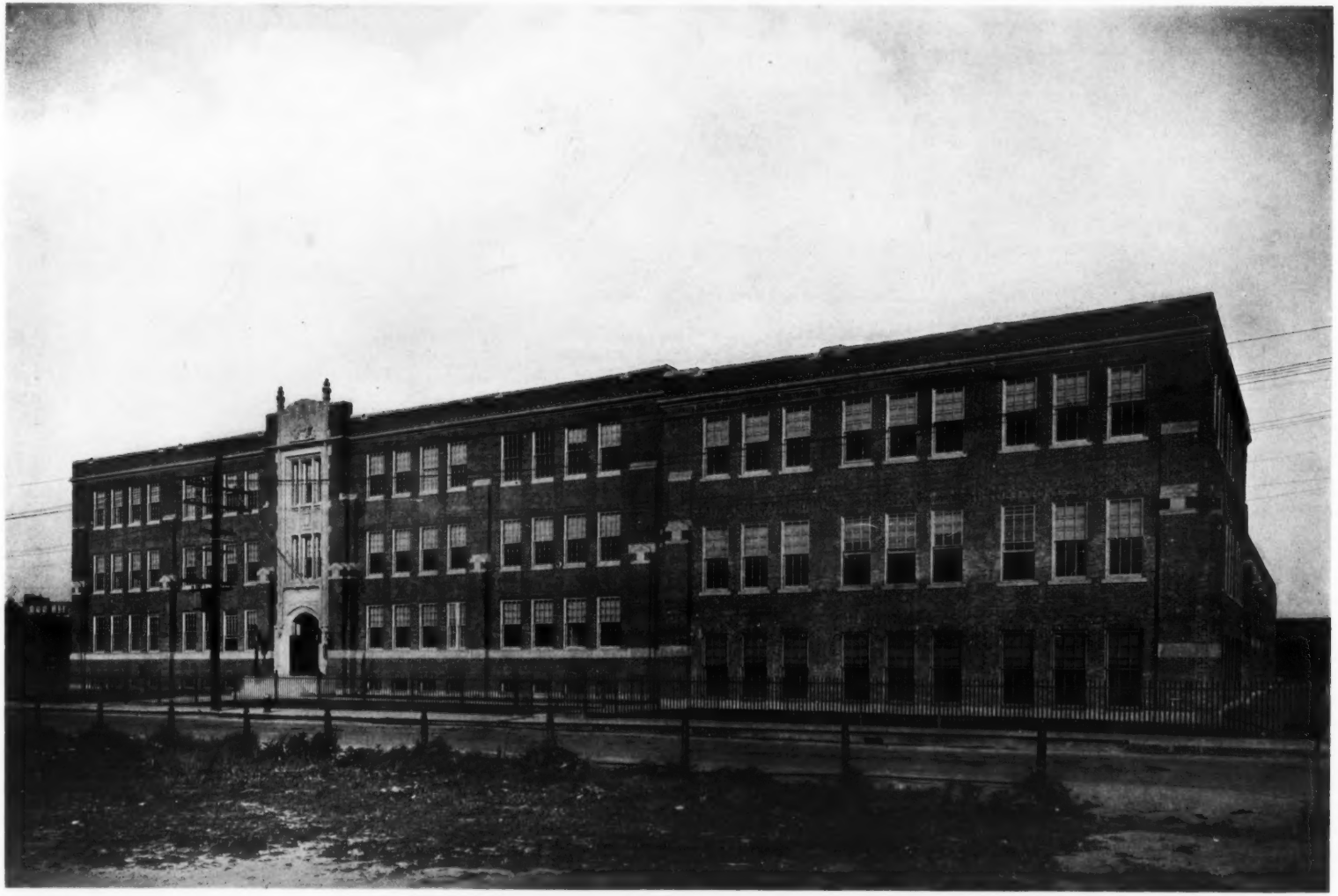


PLATE 108

BOYS' TRADE SCHOOL, BOSTON, MASS.

JAMES E. McLAUGHLIN, *ARCHITECT*

PLATE 109

BOYS' TRADE SCHOOL, BOSTON, MASS.

JAMES E. McLAUGHLIN, *ARCHITECT*

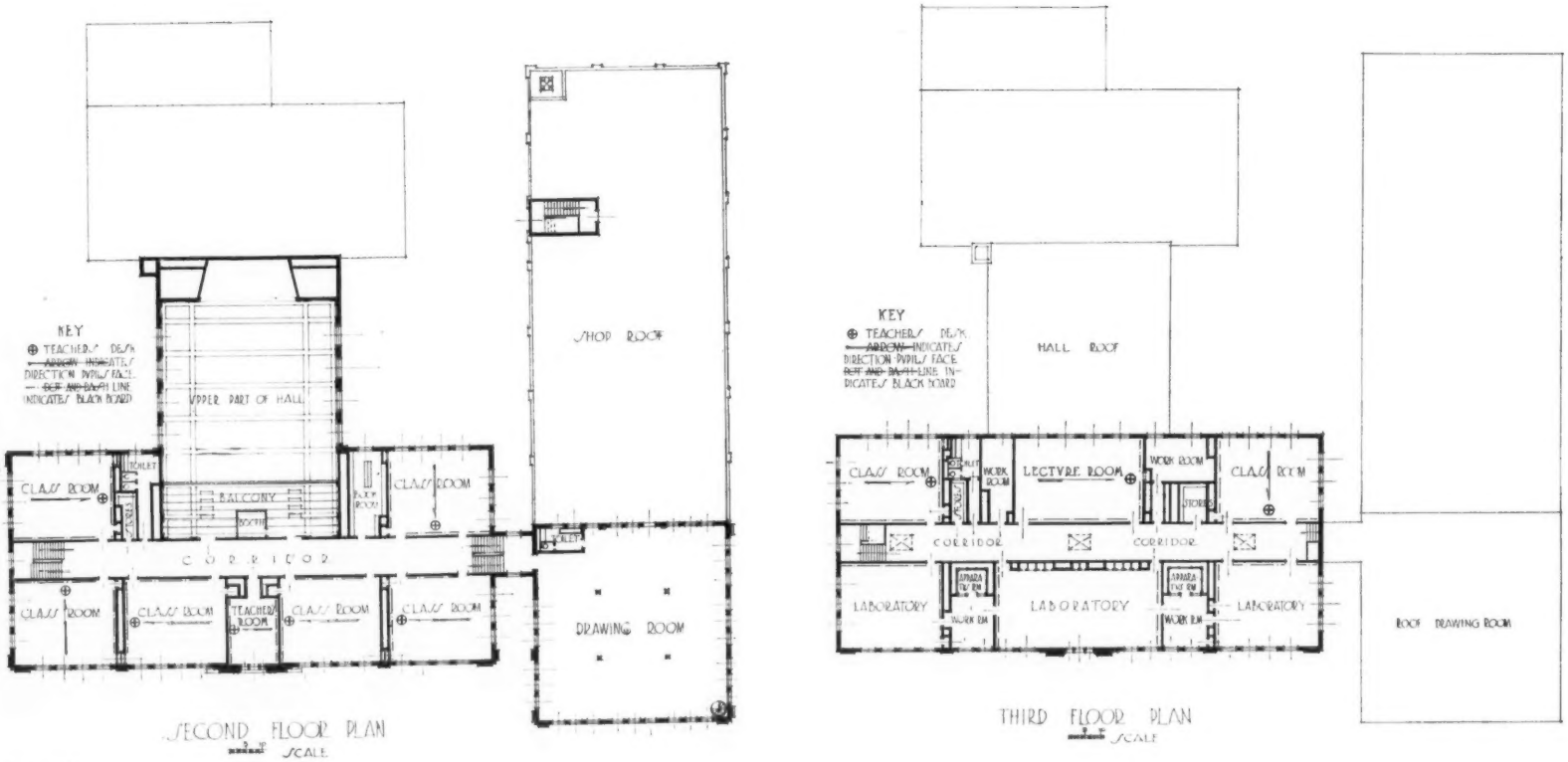


PLATE 110

BOYS' TRADE SCHOOL, BOSTON, MASS.

JAMES E. McLAUGHLIN, *ARCHITECT*

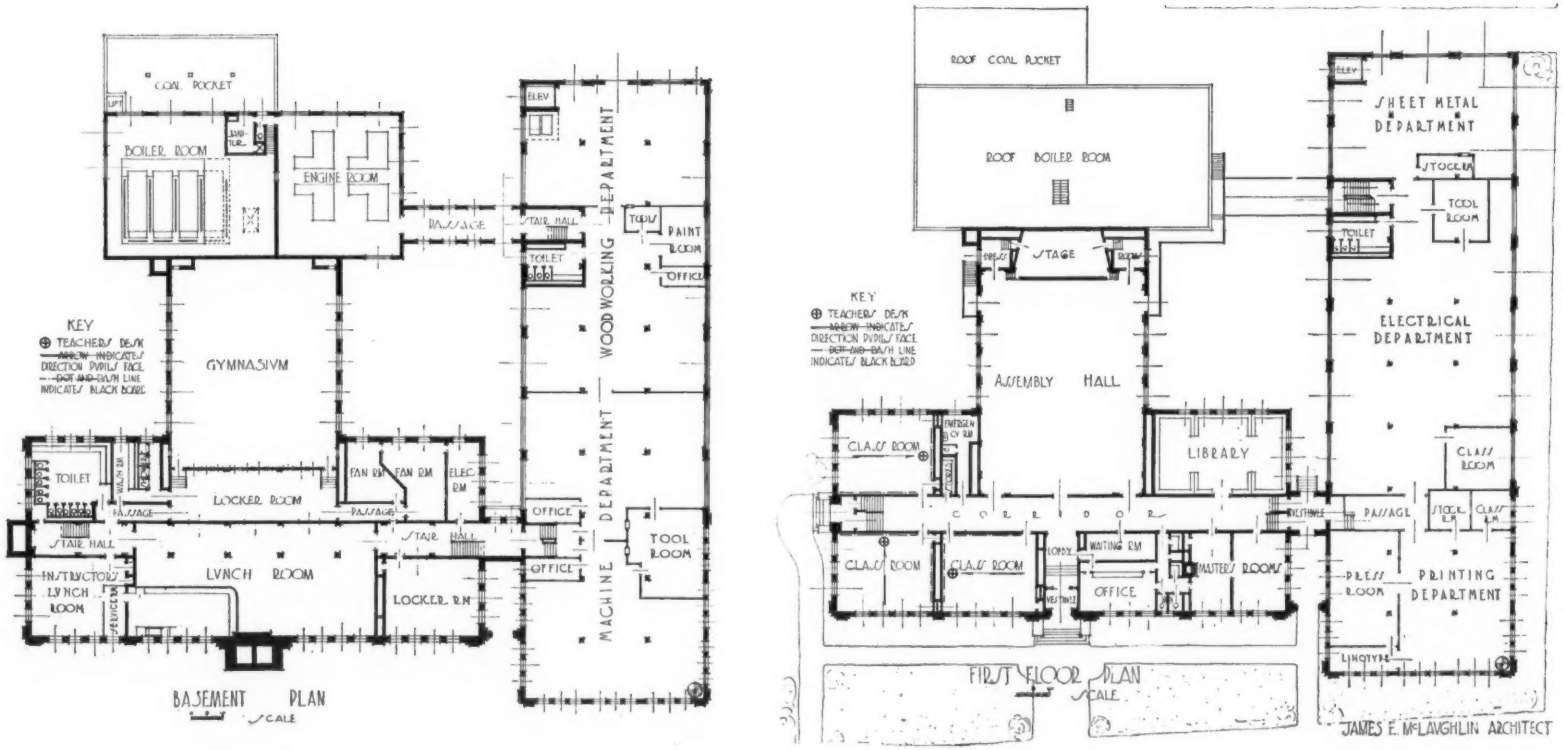


PLATE 111

BOYS' TRADE SCHOOL, BOSTON, MASS.

JAMES E. McLAUGHLIN, *ARCHITECT*

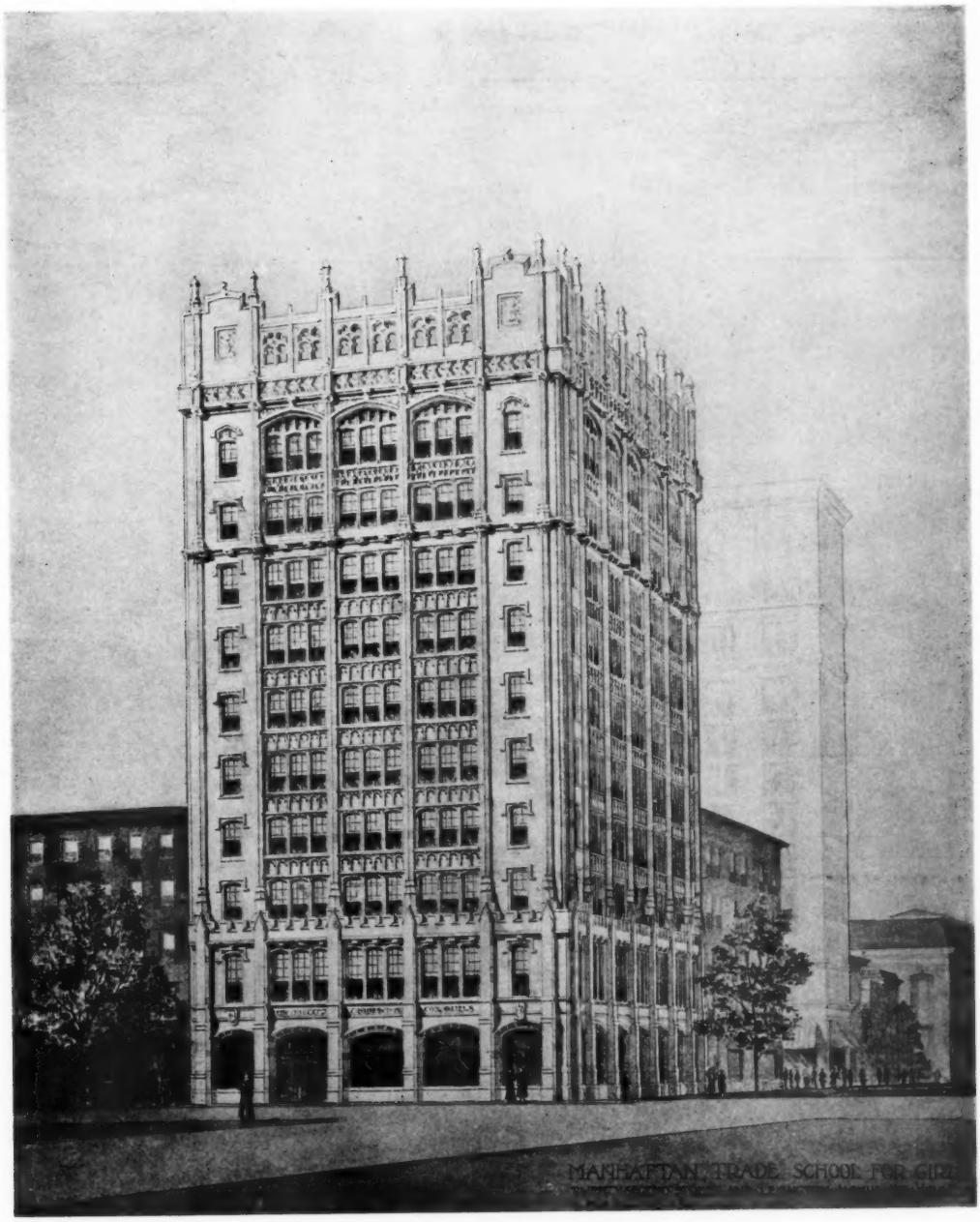


PLATE 112

TRADE SCHOOL FOR GIRLS, LEXINGTON AVENUE, NEW YORK

C. B. J. SNYDER, *ARCHITECT*

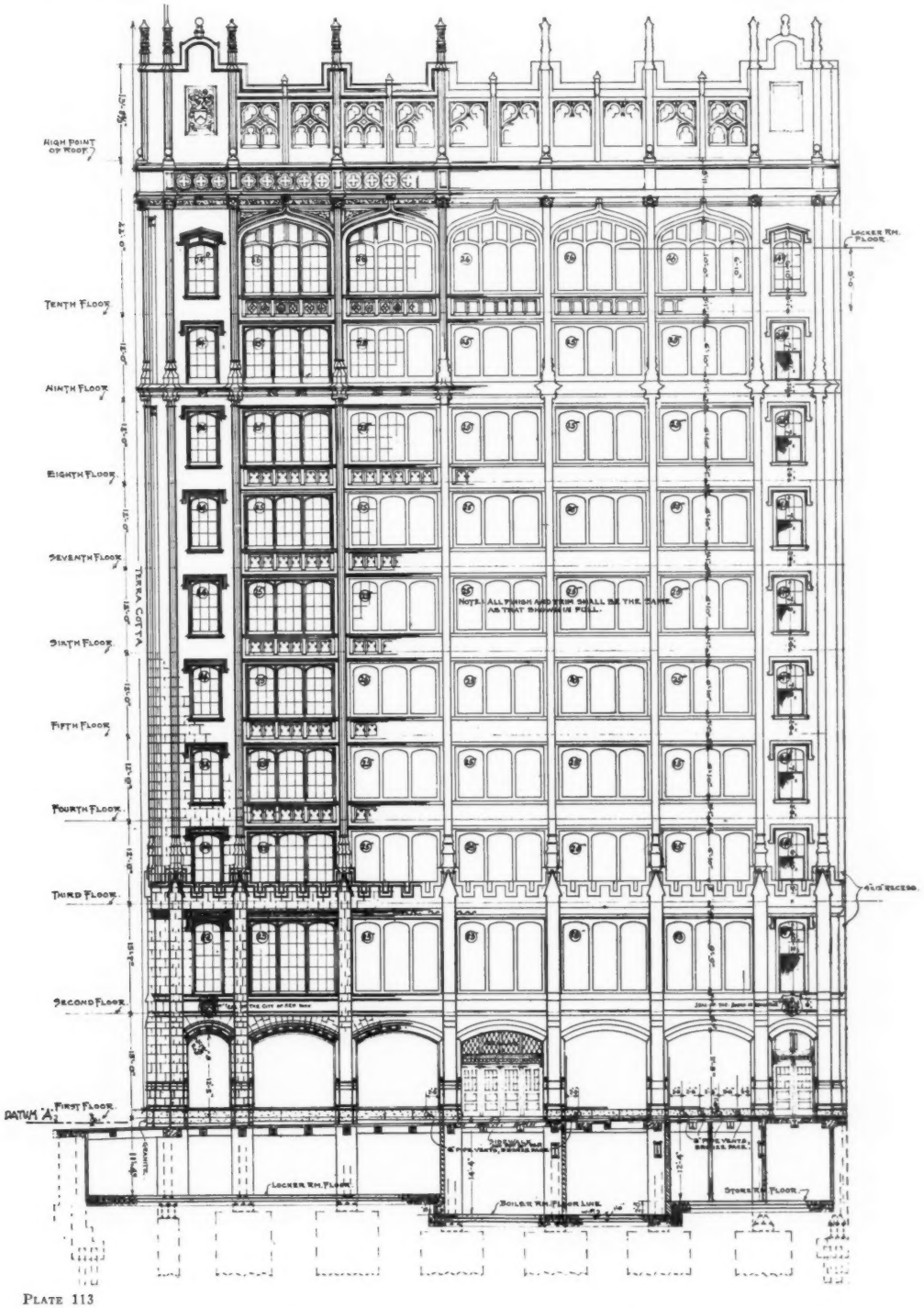


PLATE 113

TRADE SCHOOL FOR GIRLS, LEXINGTON AVENUE, NEW YORK

C. B. J. SNYDER, *ARCHITECT*

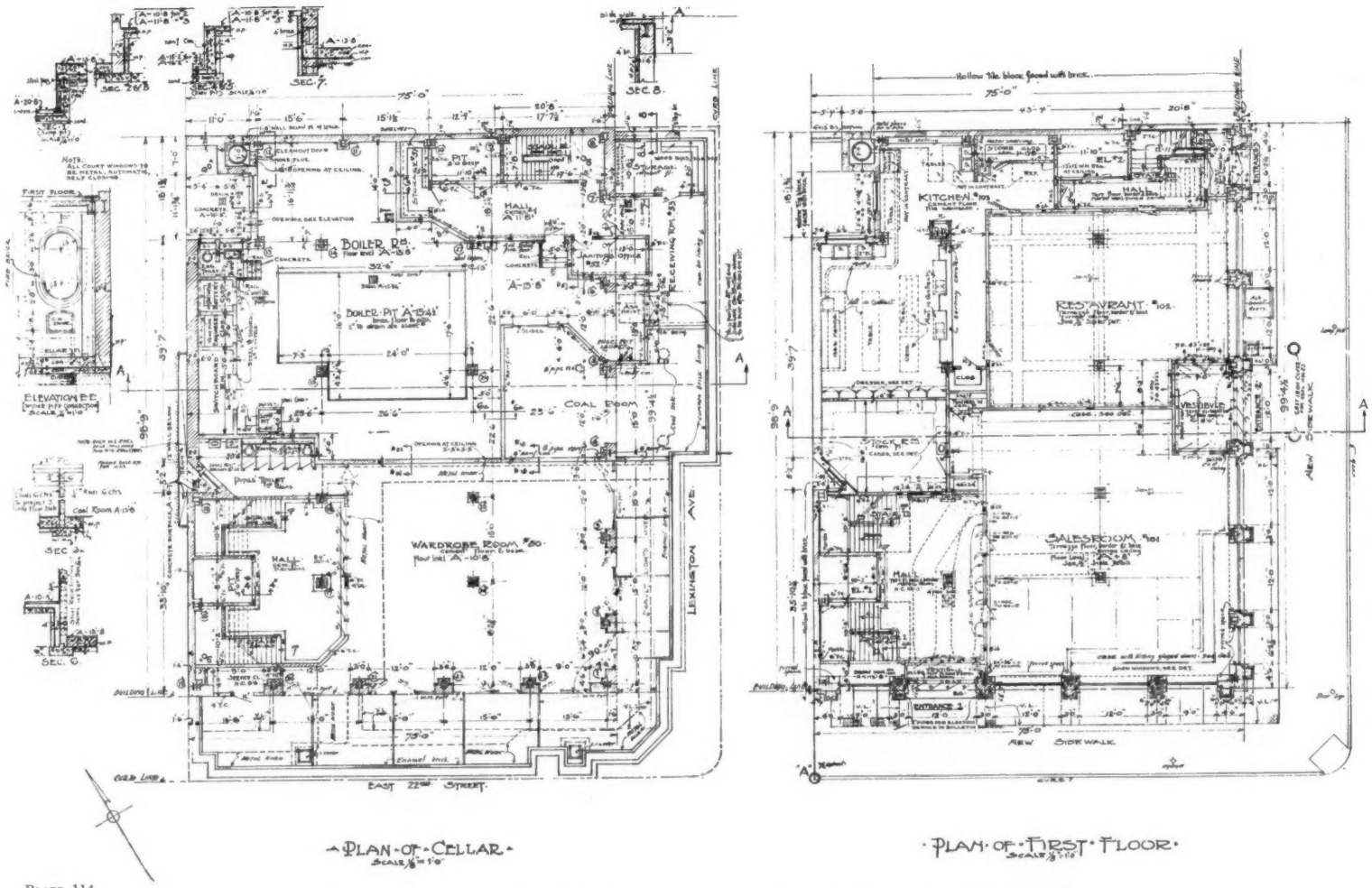
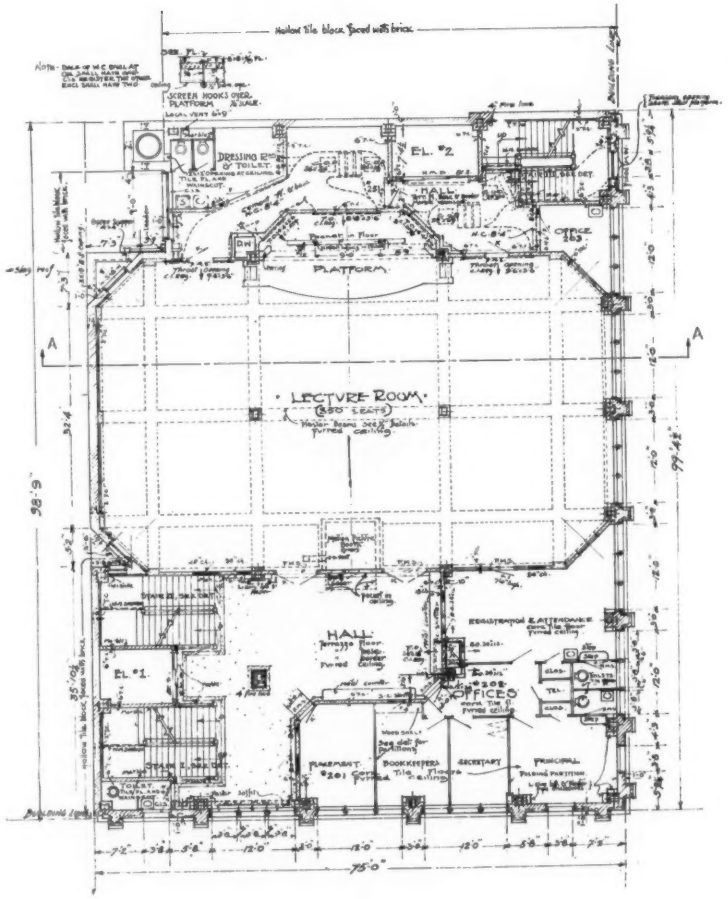


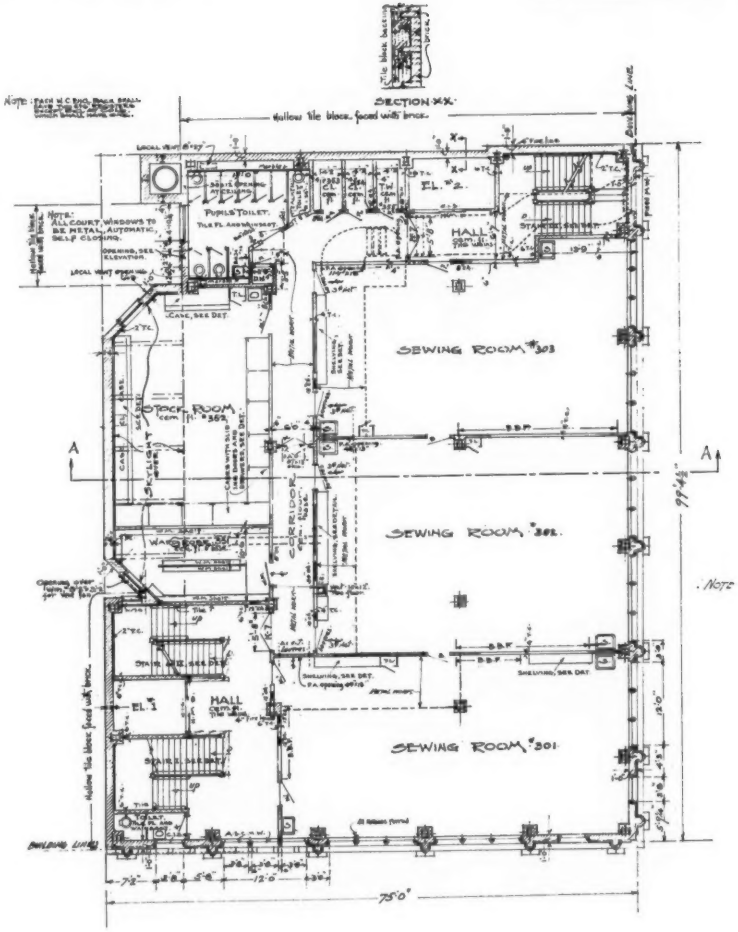
PLATE 114

TRADE SCHOOL FOR GIRLS, LEXINGTON AVENUE, NEW YORK

C. B. J. SNYDER, *ARCHITECT*



PLAN OF SECOND FLOOR
SCALE 1/8" = 1'0"

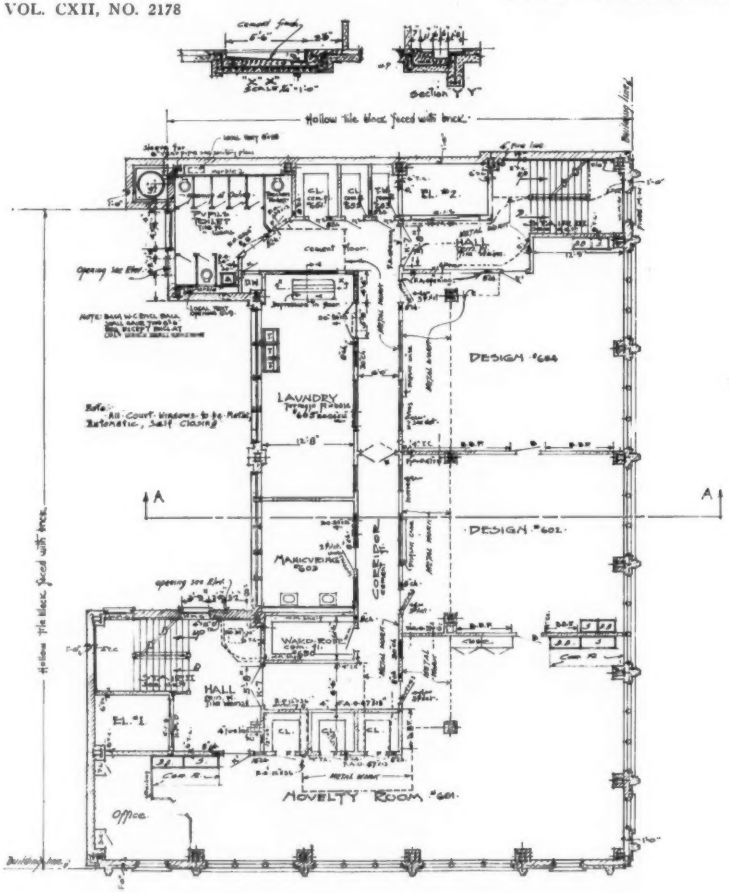


PLAN OF THIRD FLOOR
SCALE 1/8" = 1'0"

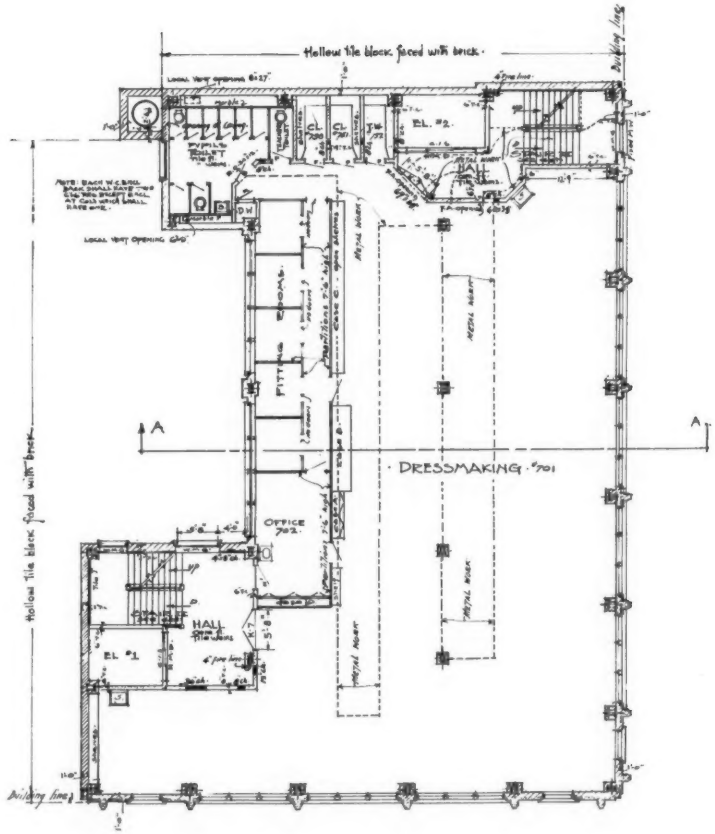
PLATE 115

TRADE SCHOOL FOR GIRLS, LEXINGTON AVENUE, NEW YORK

C. B. J. SNYDER, *ARCHITECT*



PLAN OF SIXTH FLOOR
SCALE 1/8" = 1'-0"

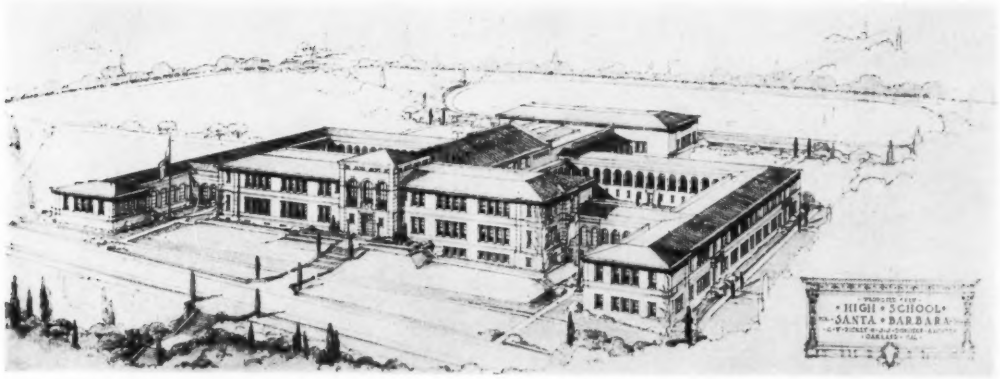


PLAN OF SEVENTH FLOOR
SCALE 1/8" = 1'-0"

PLATE 116

TRADE SCHOOL FOR GIRLS, LEXINGTON AVENUE, NEW YORK

C. B. J. SNYDER, *ARCHITECT*



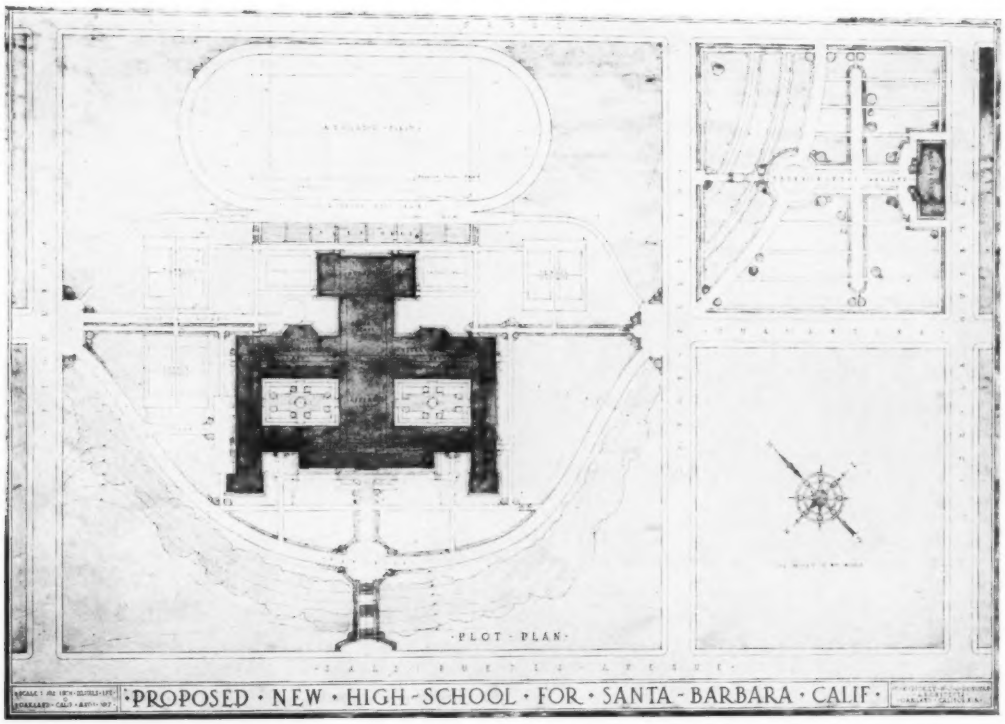


PLATE 117

J. J. DONOVAN (of the firm of C. W. Dickey & J. J. Donovan) *ARCHITECT*

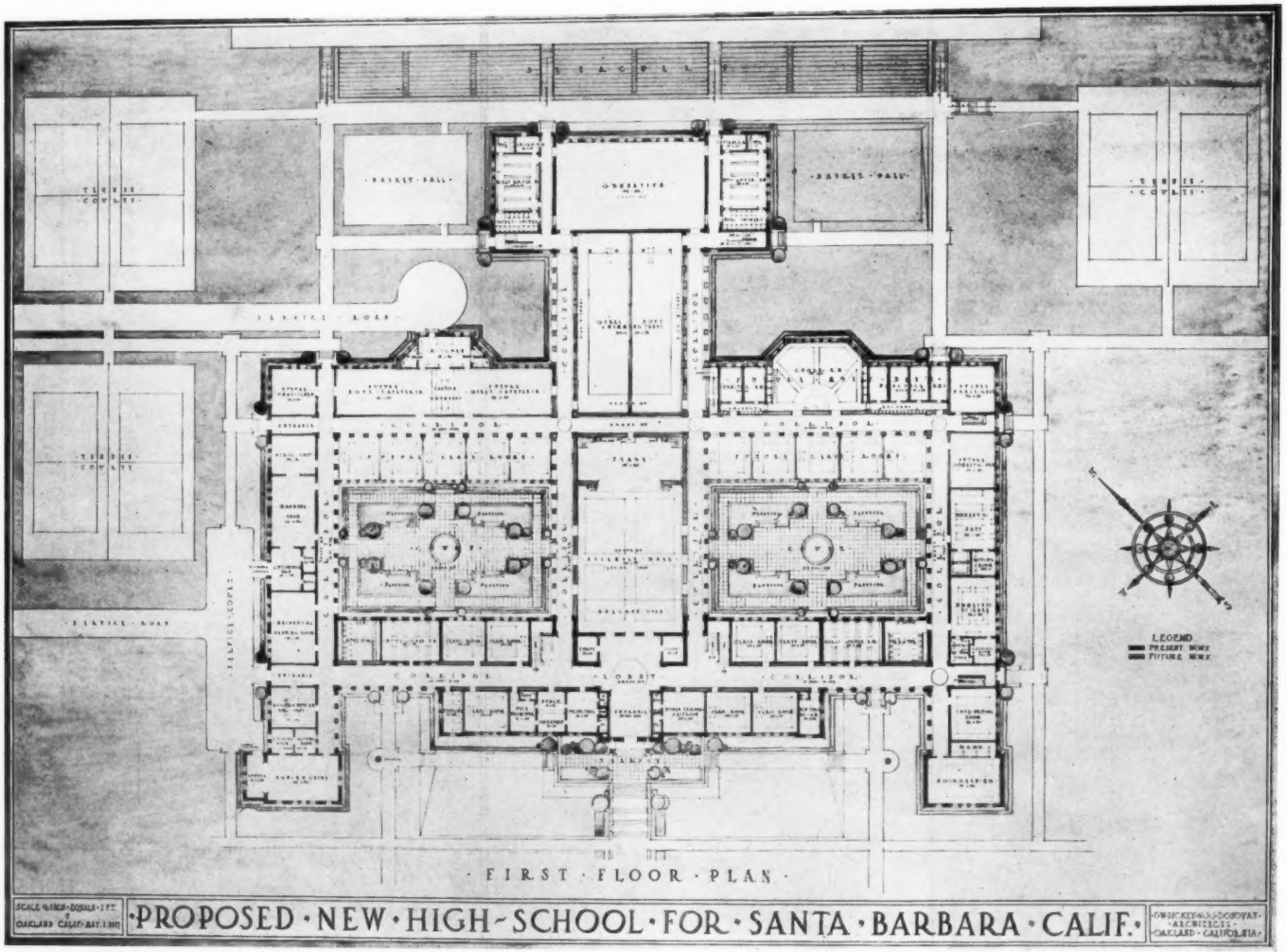
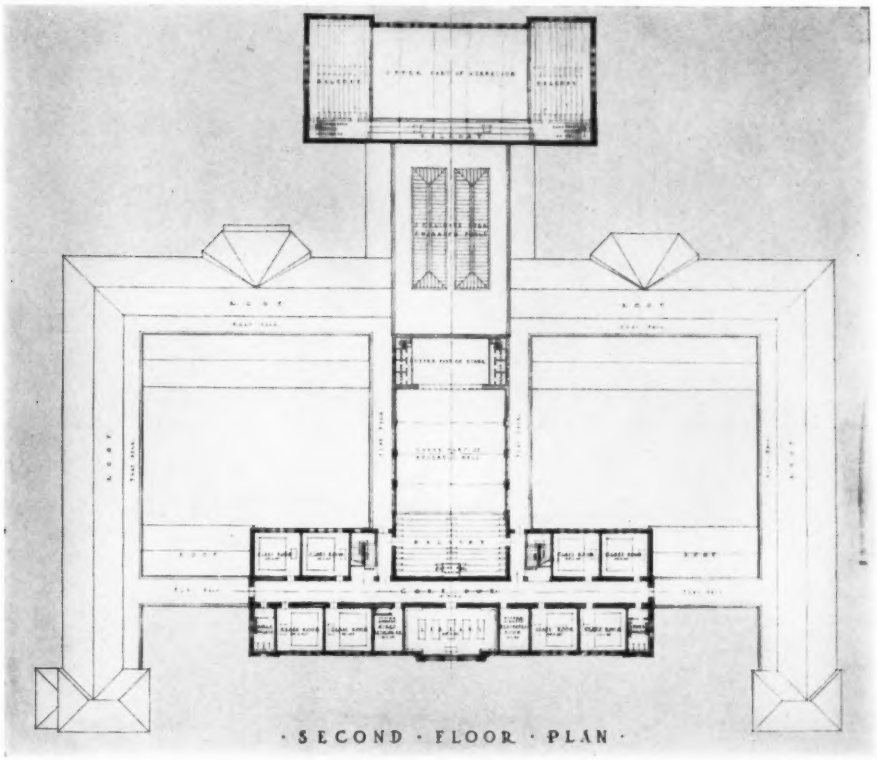


PLATE 118

J. J. DONOVAN (of the firm of C. W. Dickey & J. J. Donovan), *ARCHITECT*



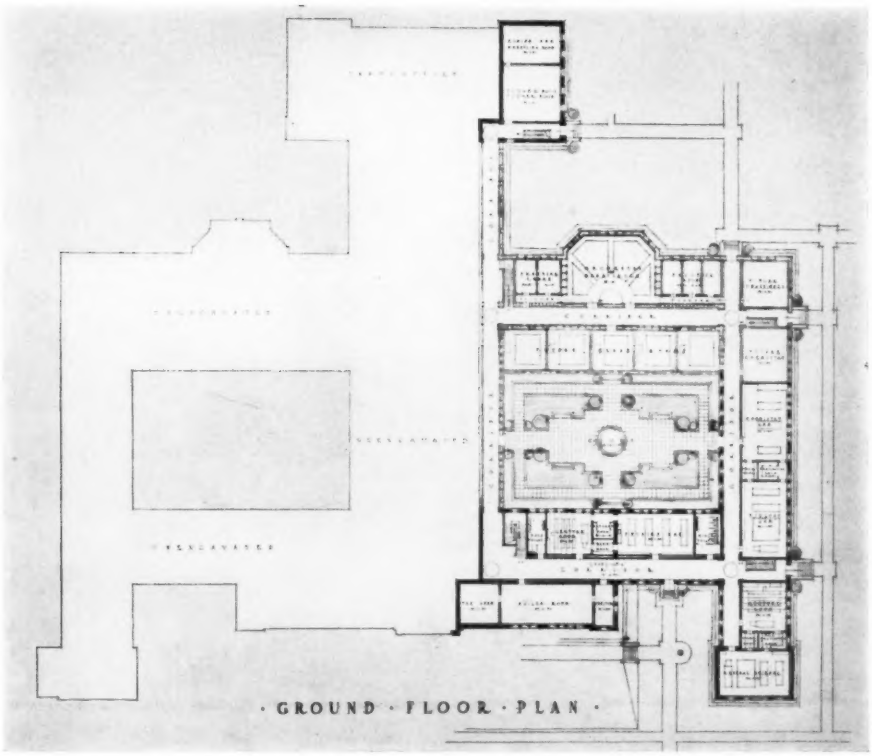


PLATE 119

HIGH SCHOOL, SANTA BARBARA, CALIF.

J. J. DONOVAN (of the firm of C. W. Dickey & J. J. Donovan), *ARCHITECT*

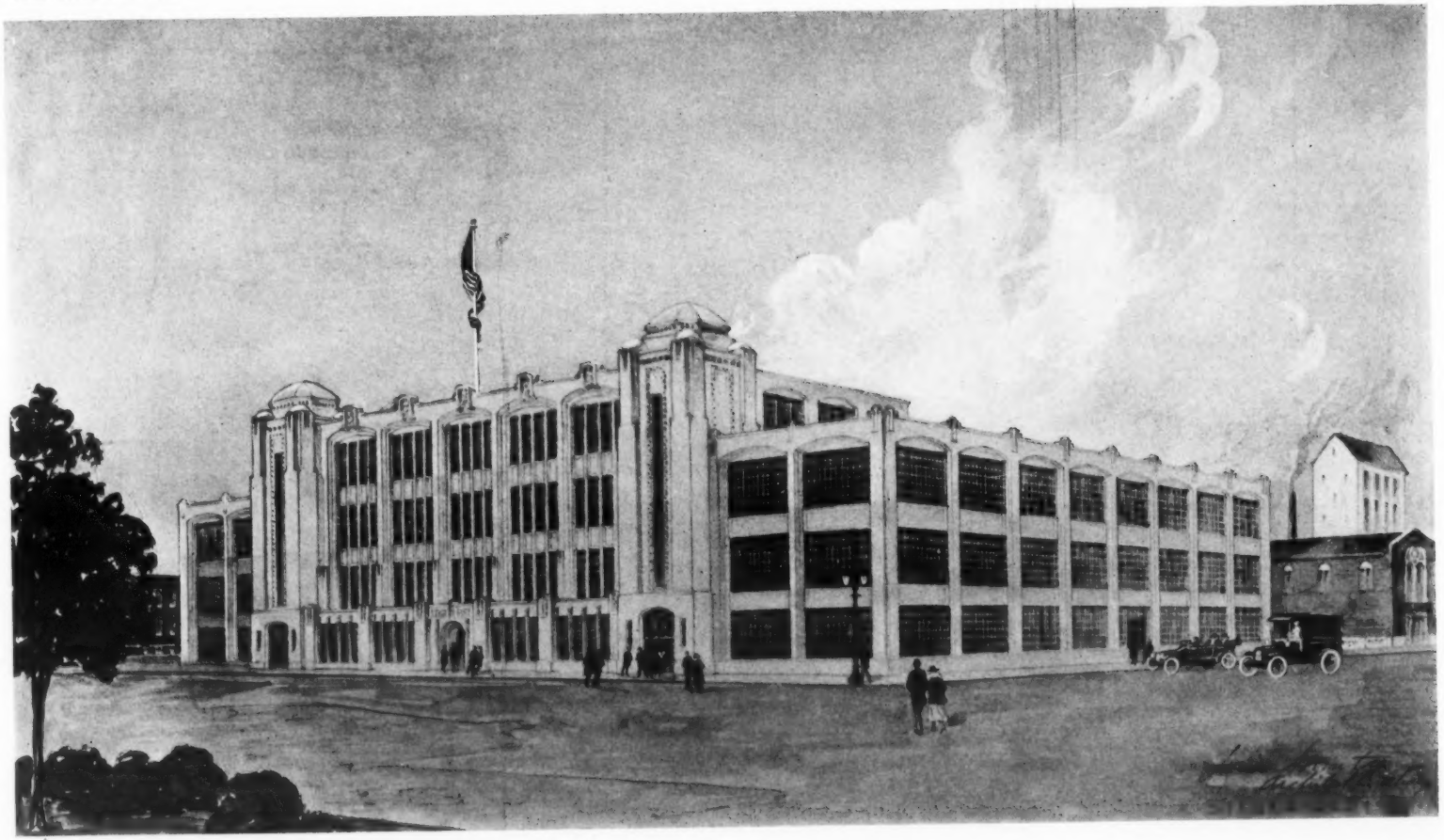
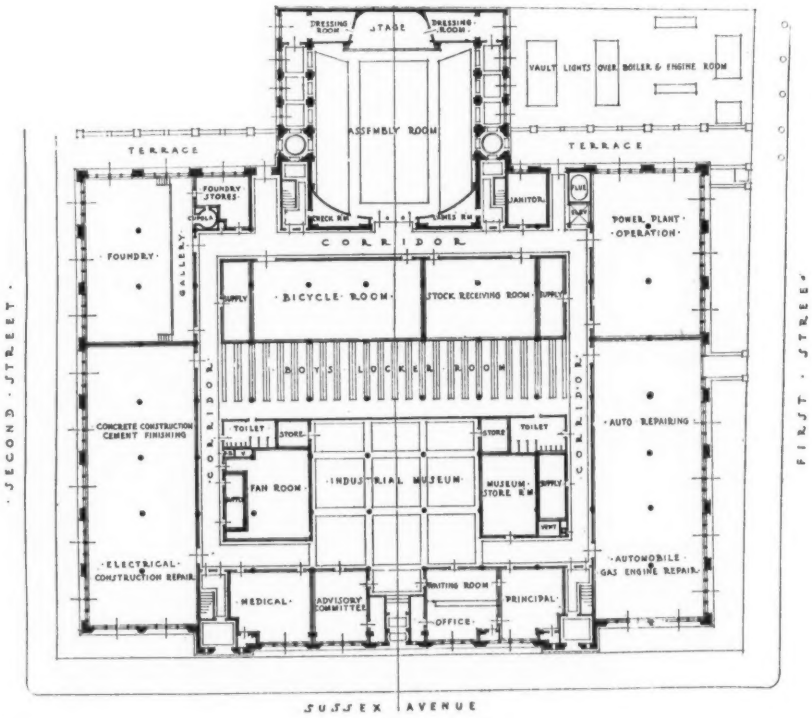


PLATE 120

VOCATIONAL SCHOOL FOR BOYS, NEWARK, N. J.

LOUIS SONNTAG, *ARCHITECT IN CHARGE*

The preliminary sketches of the Boys' Vocational School, Newark, N. J. (plates 120, 121 and 122), accompanied the report on the Industrial Survey recently made of that city. This report is now before the Board of Education for their consideration.



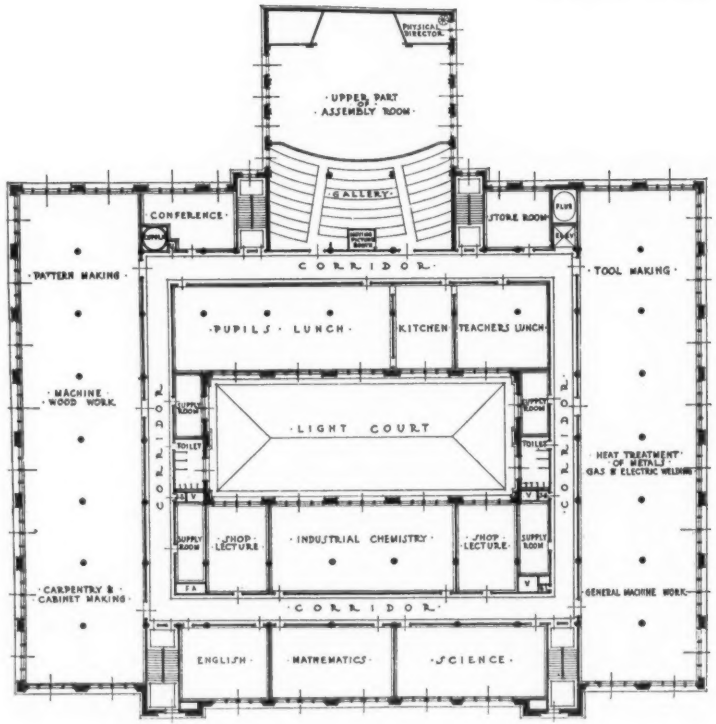


PLATE 121

FIRST FLOOR PLAN

SECOND FLOOR PLAN

VOCATIONAL SCHOOL FOR BOYS, NEWARK, N. J.

LOUIS SONNTAG, *ARCHITECT IN CHARGE*

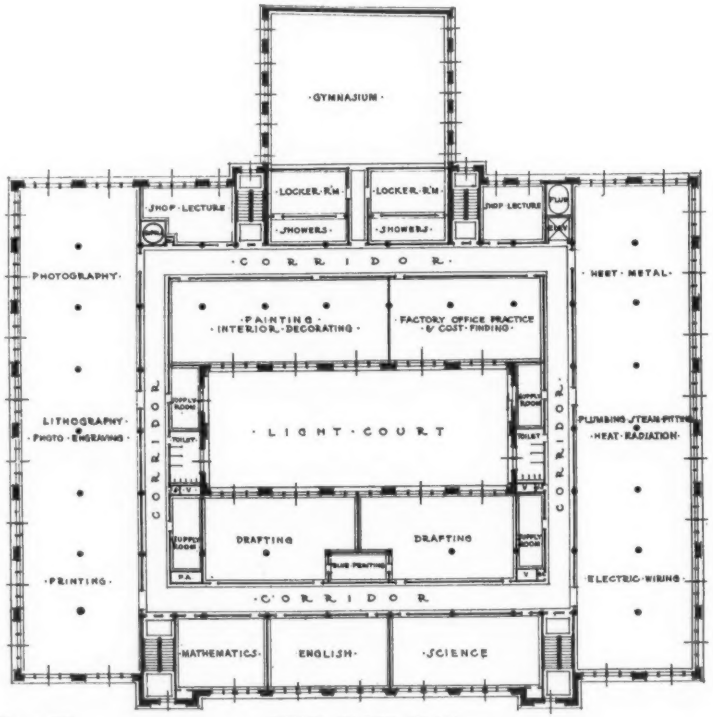
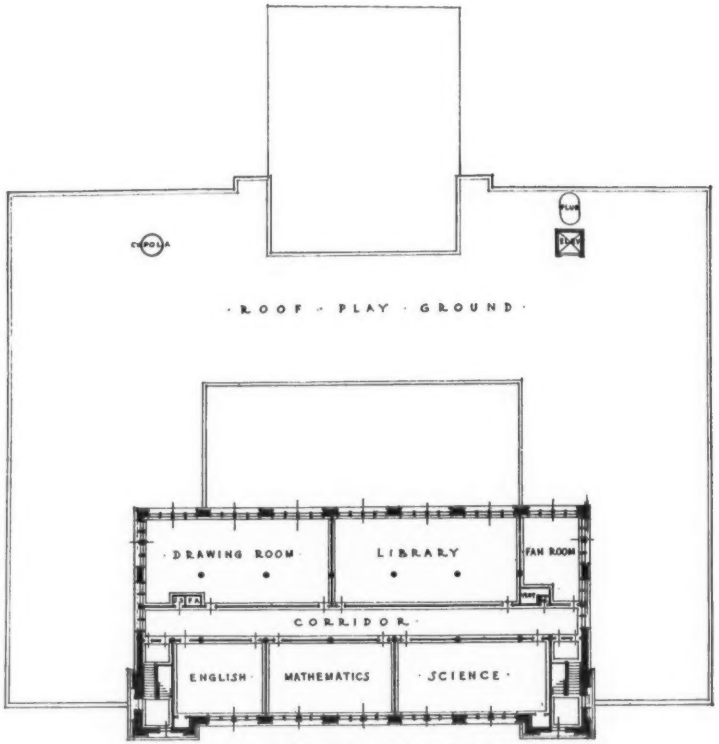


PLATE 122 THIRD FLOOR PLAN



FOURTH FLOOR PLAN

VOCATIONAL SCHOOL FOR BOYS, NEWARK, N. J.

LOUIS SONNTAG, *ARCHITECT IN CHARGE*

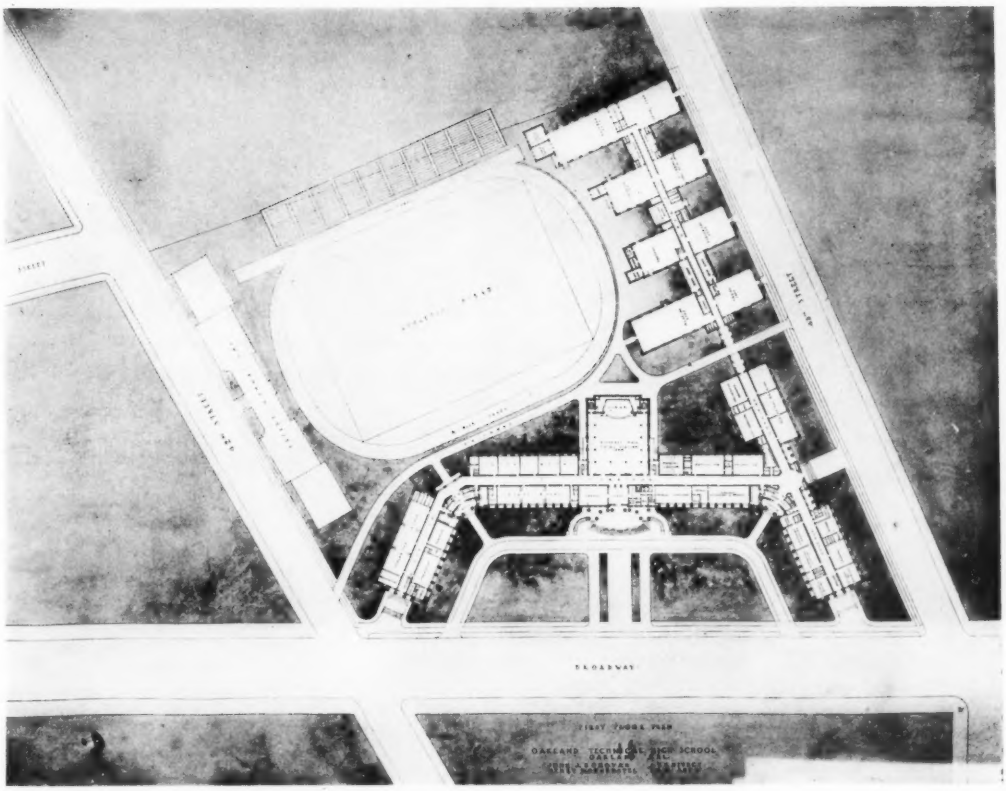
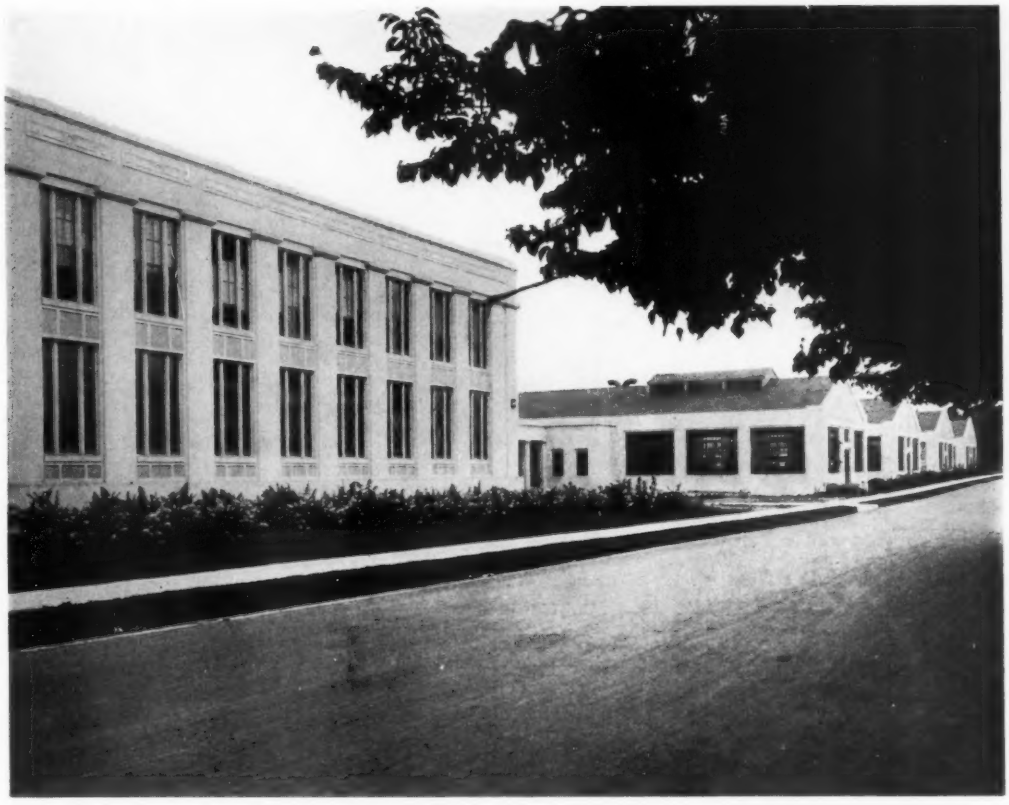


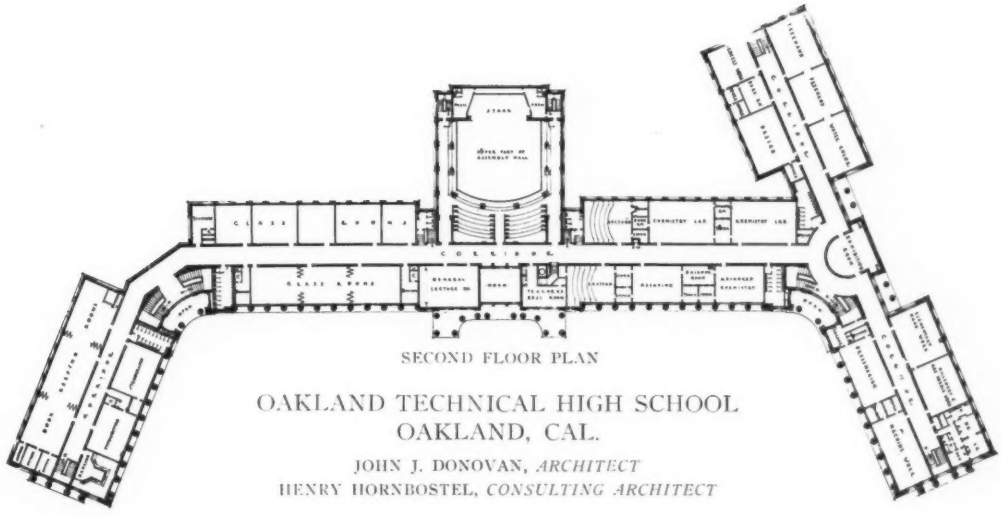
PLATE 123

OAKLAND TECHNICAL HIGH SCHOOL, OAKLAND, CALIF.

J. J. DONOVAN, *ARCHITECT*, HENRY HORNBOSTEL, *CONSULTING ARCHITECT*



VIEW LOOKING ALONG FORTY-FIFTH STREET



SECOND FLOOR PLAN

OAKLAND TECHNICAL HIGH SCHOOL
OAKLAND, CAL.

JOHN J. DONOVAN, *ARCHITECT*
HENRY HORNBOSTEL, *CONSULTING ARCHITECT*

PLATE 124

REAR VIEW OF SHOPS

PLATE 125

NORTHEAST VIEW

OAKLAND TECHNICAL HIGH SCHOOL, OAKLAND, CALIF.

J. J. DONOVAN, *ARCHITECT;* HENRY HORNBOSTEL, *CONSULTING ARCHITECT*

FORGE

PLATE 126 WOODWORKING SHOP

OAKLAND TECHNICAL HIGH SCHOOL, OAKLAND, CAL.

J. J. DONOVAN, *ARCHITECT*, HENRY HORNBOSTEL, *CONSULTING ARCHITECT*

PLATE 127

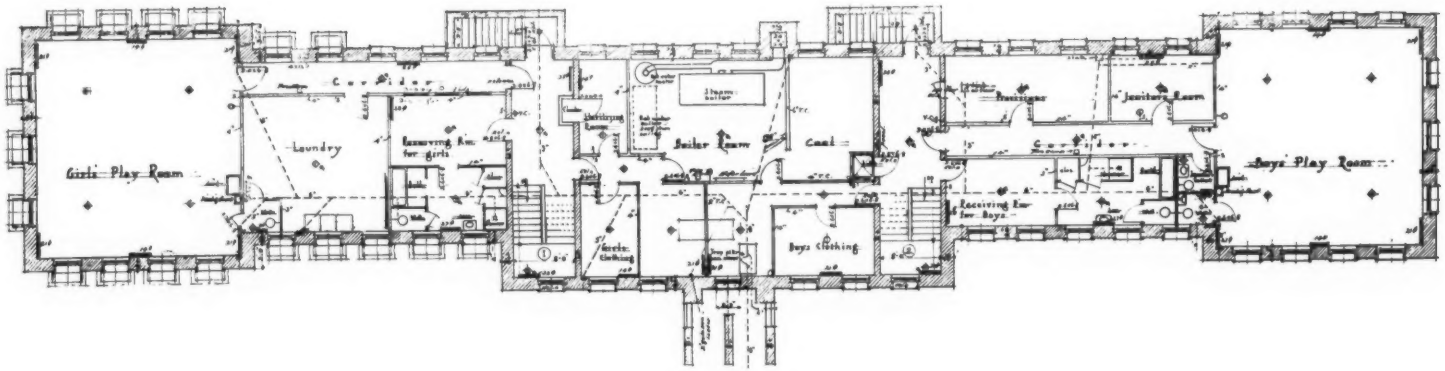
ESSEX COUNTY PARENTAL SCHOOL, NEWARK, N. J.

JOHN H. & WILSON C. ELY, *ARCHITECTS*

PLATE 128 DETAIL OF MAIN ENTRANCE

ESSEX COUNTY PARENTAL SCHOOL, NEWARK, N. J.

JOHN H. AND WILSON C. ELY, *ARCHITECTS*



BASEMENT PLAN

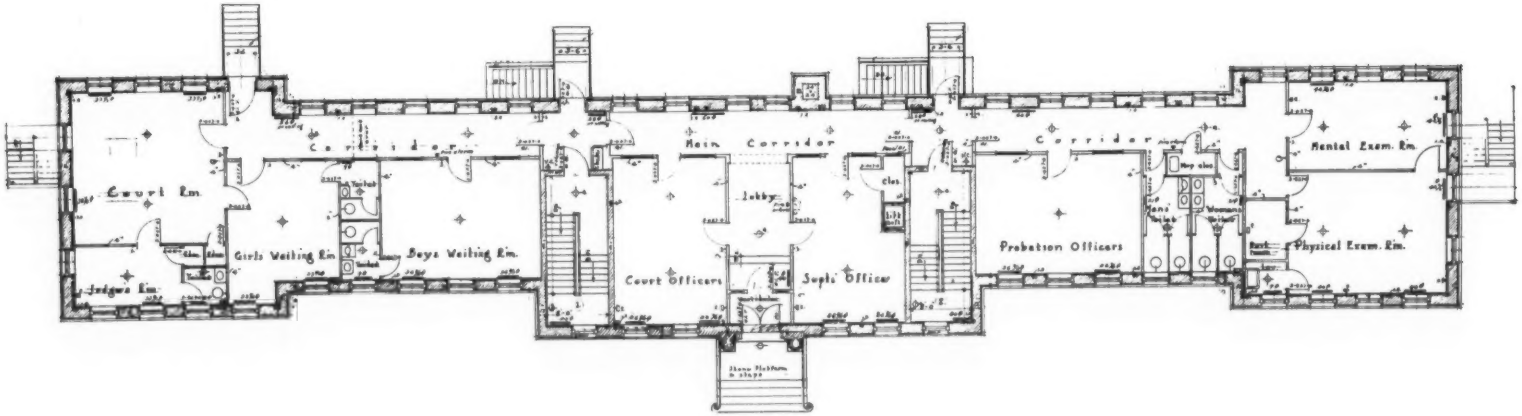
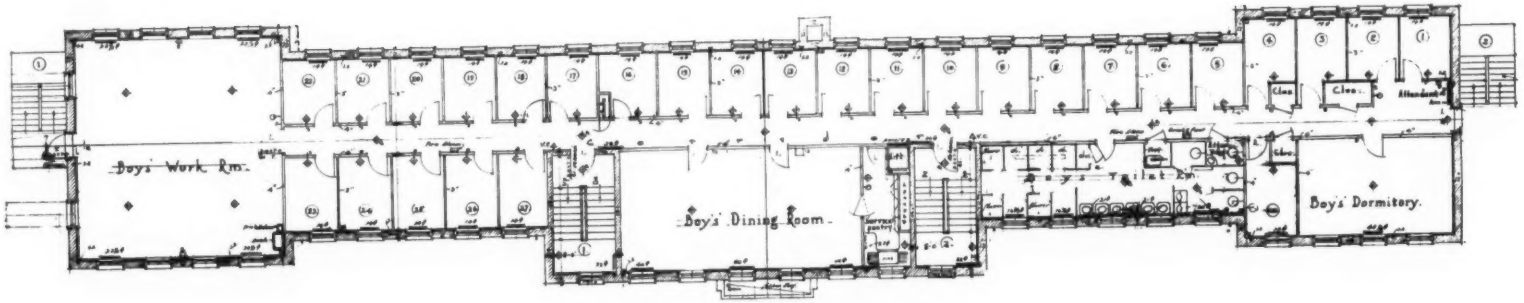


PLATE 129

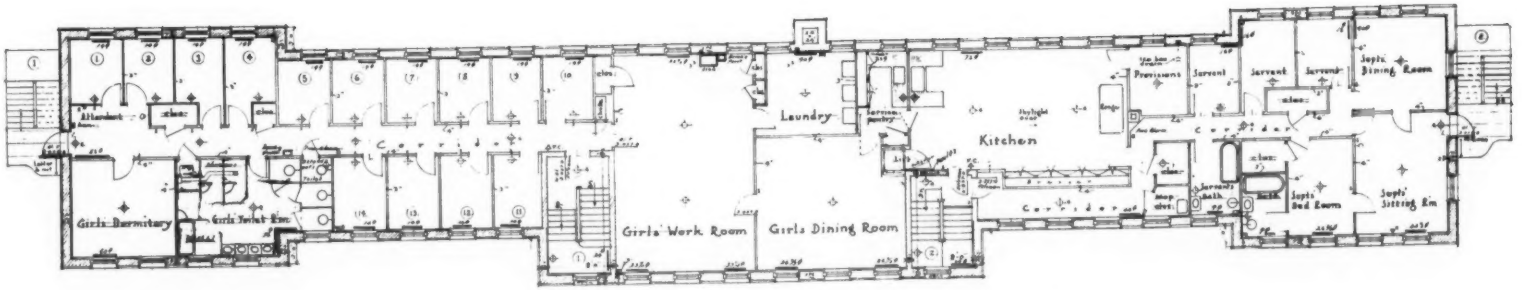
FIRST FLOOR PLAN

ESSEX COUNTY PARENTAL SCHOOL, NEWARK, N. J.

JOHN H. AND WILSON C. ELY, *ARCHITECTS*



SECOND FLOOR PLAN



THIRD FLOOR PLAN

PLATE 130

ESSEX COUNTY PARENTAL SCHOOL, NEWARK, N. J.

JOHN H. & WILSON C. ELY, *ARCHITECTS*

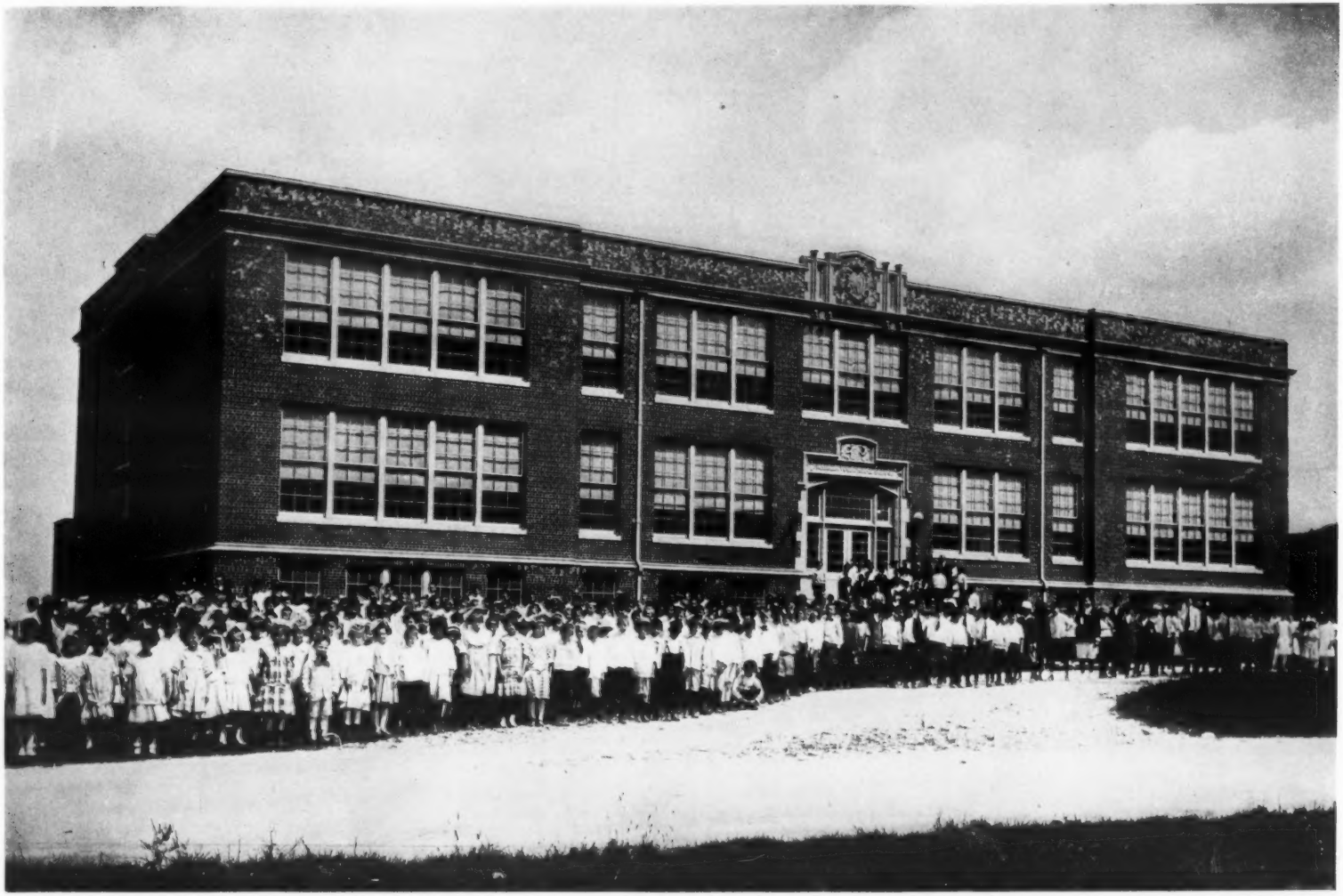


PLATE 131

MAIN FRONT

VOCATIONAL SCHOOL, FRANKLIN FURNACE, N. J.

GUILBERT & BETELLE, *ARCHITECTS*

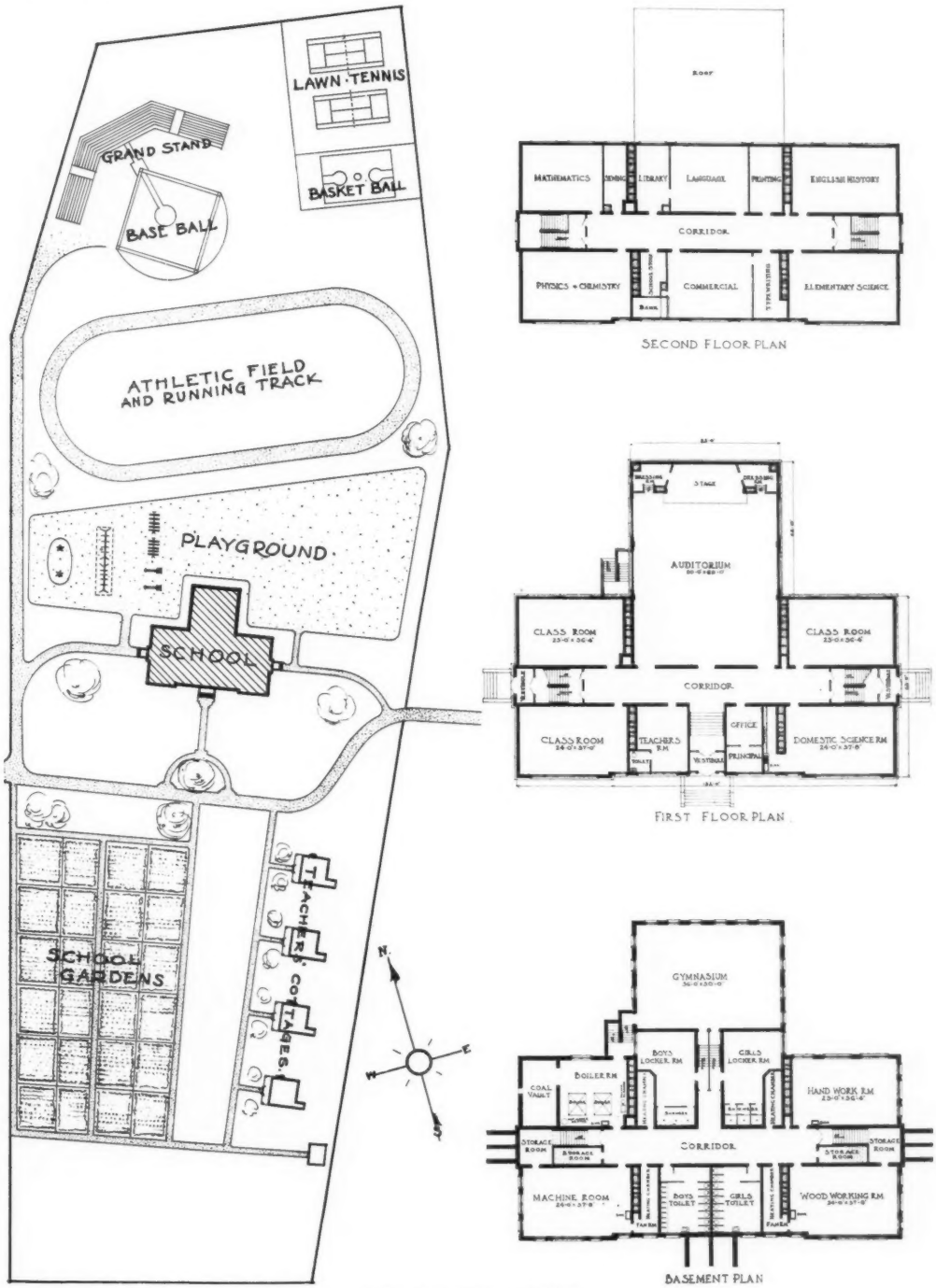


PLATE 132 PLOT AND FLOOR PLANS

VOCATIONAL SCHOOL, FRANKLIN FURNACE, N. J.

GUILBERT & BETELLE, *ARCHITECTS*

PLATE 133

AT TOP, VIEW SHOWING TEACHERS' COTTAGES AND SCHOOL. IN CENTER, MACHINE WORKING ROOM. BELOW AT LEFT, DOMESTIC SCIENCE ROOM. BELOW AT RIGHT, WOODWORKING ROOM.

VOCATIONAL SCHOOL, FRANKLIN FURNACE, N. J.

GUILBERT & BETELLE, *ARCHITECTS*

PLATE 134

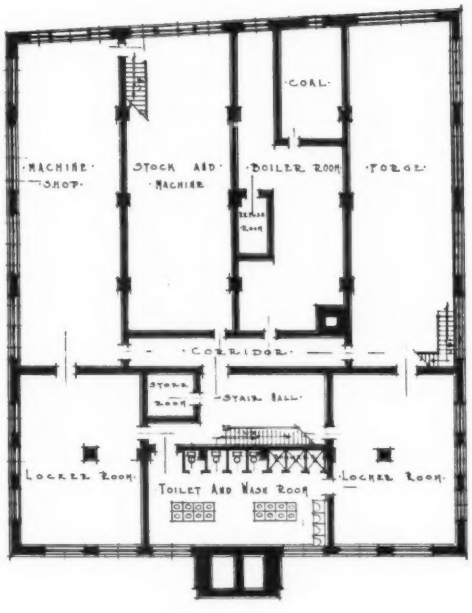
INDUSTRIAL ARTS SCHOOL, DAVENPORT, IOWA

CLAUSEN & KRUSE, *ARCHITECTS*

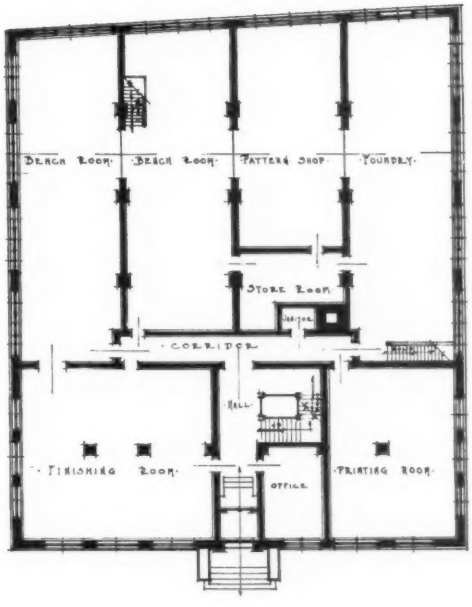
PLATE 135 DETAIL OF MAIN ENTRANCE

INDUSTRIAL ARTS SCHOOL, DAVENPORT, IOWA

CLAUSEN & KRUSE, *ARCHITECTS*



BASEMENT PLAN

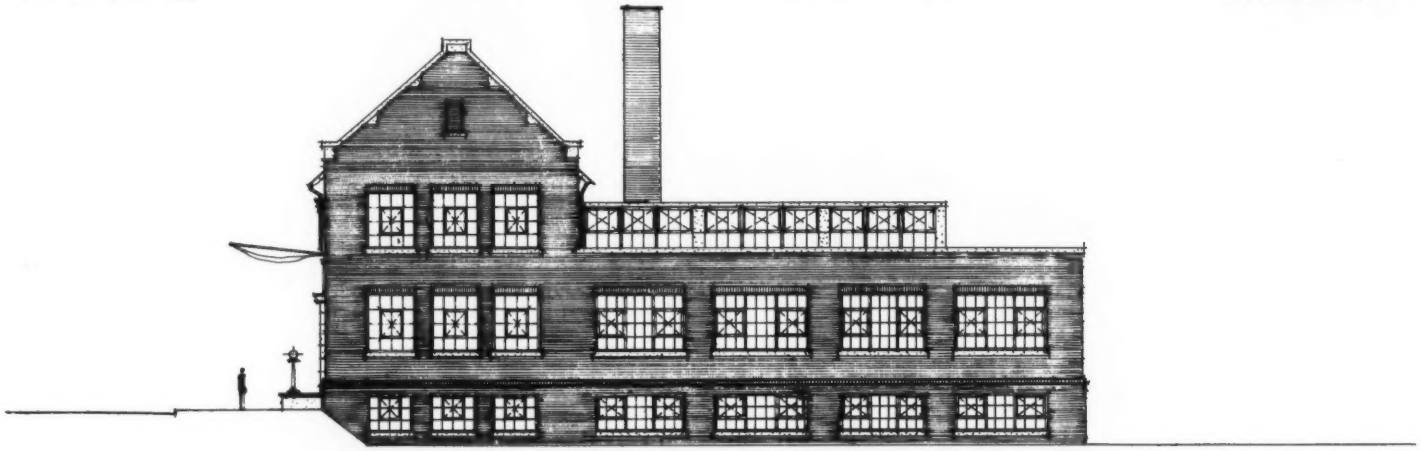


FIRST FLOOR PLAN

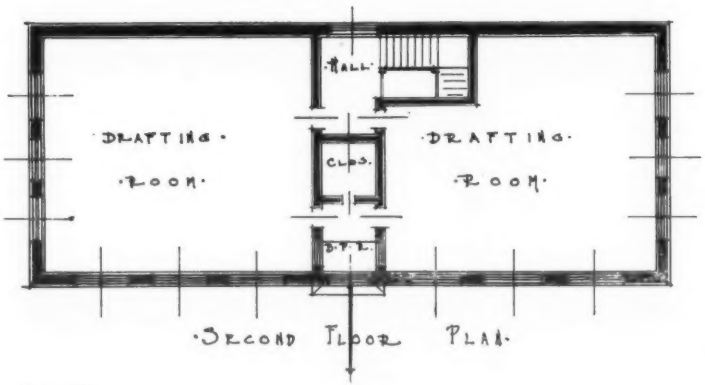
PLATE 136

INDUSTRIAL ARTS SCHOOL, DAVENPORT, IOWA

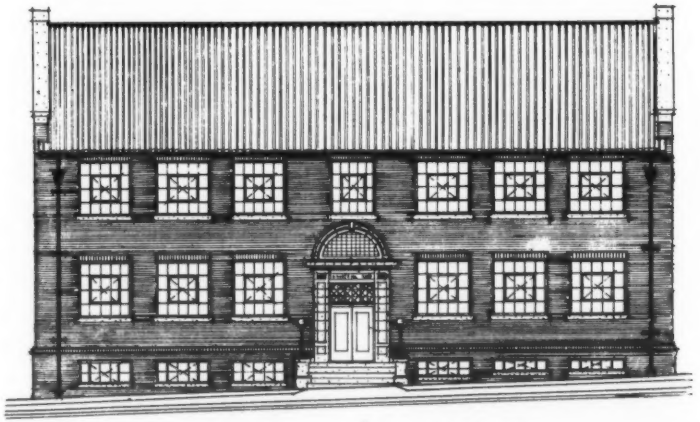
CLAUSEN & KRUSE, *ARCHITECTS*



SIDE ELEVATION



SECOND FLOOR PLAN



FRONT ELEVATION

PLATE 137

INDUSTRIAL ARTS SCHOOL, DAVENPORT, IOWA

CLAUSEN & KRUSE, *ARCHITECTS*

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VOL. CXII SEPTEMBER 19, 1917 NO. 2178

The Development of Vocational Schools

THE introduction of vocational training into our public school systems, its continuance and development, have from the outset been accomplished only by the strenuous and combined efforts of a certain class of educators in this country, who, with clarity of prophetic vision, have been able to anticipate the needs of the future. Vocational training, when first proposed, aroused a storm of objections from the majority of men and women who were engaged in the conducting of educational work throughout the country.

The original high school, like the original college, provided purely cultural training. The transformation of the high school from a cultural institution to one along more practical lines may be said to date from 1880, the introduction of the first manual training schools. This was in St. Louis. Other cities, Chicago and Toledo, for example, carried forward the work, but not until after a lapse of three years. By this time the St. Louis manual training schools had proved that they were supplying a pressing need for technical education, and now that the results achieved were demonstrating the wisdom of the undertaking, vocational training began to receive serious consideration.

It has been extremely difficult to overcome the prejudice against manual training schools. This opposition has in a sense been the means of insuring the ultimate success of those who have favored vocational training. It has made it necessary to proceed with caution in every new field proposed, and only by the demonstration of actual results, a demonstration covering a period of more than a decade, have the early objections to vocational training been overcome and its general adoption throughout the country secured.

An elaborate and well conceived system of vocational training has now become nation-wide. As at present conducted, the system may be classified as, first, the prevocational training of the student. In this period the students are given such instruction and their abilities are so developed as to enable instructors to gain in the case of each pupil an approximately accurate knowledge of his individual "bent" and the direction in which his future studies might most advantageously be guided.

The importance of prevocational training can not be over-estimated. It is during this formative period that successful vocational training is established. There are fewer chances of placing pupils in trades or occupations to which they are unfitted if this prevocational training is properly conducted, and success in future life, the aim of all properly conducted educational systems, is therefore more readily secured.

By the method of conducting prevocational training, the education of the student is experimental and not dogmatic. The pupil is assigned to a certain course of training only if through his prevocational period he has developed an unmistakable tendency in that direction.

The special line of study having been determined, the vocational high school is the next step. To the various and complex questions of design, plan and equipment of this specialized structure this issue of THE AMERICAN ARCHITECT is devoted. Architects who for many years have given the closest study to the development of the heretofore usual type of school buildings, have, quite naturally, taken up and pursued with equal thoughtfulness the perfection of vocational and trade schools. At the very outset it was agreed among those who were more closely identified with this phase of our educational system that any training to be practical should be carried forward amidst surroundings of actual shop or factory conditions. Not only was it necessary that the trade school in its interior be as near as possible in its aspect and equipment to the actual

working conditions that surround the pupil after graduation, but this idea was carried still further, and a number of schools were designed so as to suggest the better types of industrial buildings. In a number of instances shown in this issue this theory in planning and designing has been successfully carried to practical accomplishement.

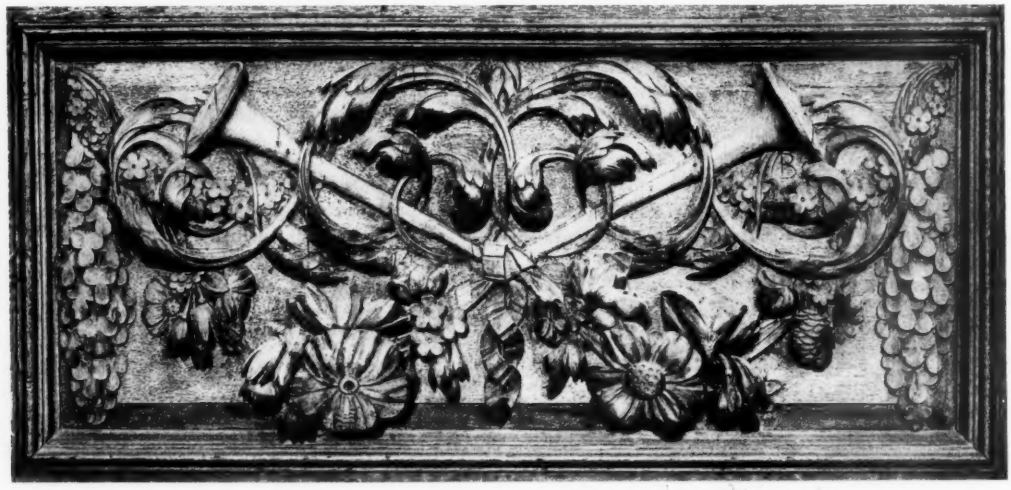
It is interesting to trace the development of trade schools and to note the very useful locations these important educational institutions are being given. The segregation of our industrial activities in the United States has suggested a similar segregation of trade schools. In this way we find that in various cities known to be the centers of certain lines of manufacture the vocational school gives prominence to those same lines. By this wise course, desirable ends are reached. The industry in a certain center is thus able to draw on the graduates from its vocational school for skilled labor and in time the man in the mill or factory takes a pronounced and influential attitude toward a school system of which he himself is a successful product.

Further, vocational training when carried forward in this way will serve to lessen the possibility of the graduate's leaving his home surroundings and seeking employment in other localities. It is found that he will be offered employment in the very neighborhood where he has had his training, all owing to this wise and thoughtful plan of providing schools for training in the most important industries of his home town. Large employers of labor have for a number of years realized the importance of these features of vocational training and are among the first to favor the addition of vocational schools to the available educational facilities of their community.

Another and equally important phase in our modern educational methods has been developed from the very high purpose to exercise a paternal attitude toward the child, and to supply, as far as may be practicable, those elements of paternal care that are so often lacking. This has given rise to the parental school.

This type of school, while subject to a much greater development than it has up to the present received, has, however, been found to be an important factor in the correction of tendencies due to improper surroundings and lack of proper parental supervision, and through this in the development of future self-support.

In every trade, vocational or parental school there are presented to the architect objects for study that add to the insistent demands now made for wide technical knowledge in the practice of his profession. To place before him, in as complete a manner as may be possible, examples of recent performance in this highly specialized type of buildings has been the object sought in the preparation of this issue. No attempt has been made to include the usual and better known types of schools that are being brought to successful completion. Their present development will be treated in subsequent issues.



CABINET SHOP
OAKLAND VOCATIONAL HIGH SCHOOL

The Architect and the School

(*Continued from page 208*)

citizenship must necessarily suffer. After all, the Vocational School should prove just exactly what the name implies—a school which a child may attend in order to select a vocation for which he or she is most fitted and likes best, and which may provide the means for a good livelihood; and in order that this may be best accomplished, their understanding, intelligence and ability to think correctly must be developed in step with their training in the crafts. Therefore, in considering the organization for such a school, not only should the curriculum be carefully studied by the architect, but a most comprehensive understanding should be had before the solution of the problem is attempted.

Each architect will solve the problem as the conditions surrounding it present themselves to him. The relative positions of the departments to each other and to the whole is a matter for the Superintendent or Principal and the teachers to assist in. Their knowledge and judgment, together with the architect's knowledge of general conditions, should make for a very good collaboration. The sizes of the various shops and rooms is a matter which cannot be worked out by allowing so many square feet per pupil, as one can well do with a class seated in a class room. For, if we take a machine shop, a forge shop or a carpenter shop, a cooking room, sewing room and a millinery room, here are rooms or departments which must necessarily be individual in their size and arrangement, and to copy what has been done here or there is very often a multiplication of past errors and mistakes. The shops of the Oakland Technical High School might be too large for some institutions. The location with reference to the street and the lighting might be entirely different in another locality. Here again is a good illustration of the necessity of the architect having a comprehensive knowledge of not only the school organization, but the organization of its component parts.

The writer has received replies from almost every State School Superintendent in the Union and from fifty City School Superintendents, giving enrollments for the last eleven years, and, judging from the enrollments and the percentage of increased enrollments, it is safe to assume that within fifteen years it will be necessary to increase the school

capacity by double for Elementary Schools, and more than double the present capacities for High Schools within ten years. And what a glorious opportunity, and what a glorious prospect for the architectural profession if we go on increasing our knowledge of school work, developing our understanding of the various phases of the problem! It will go far toward satisfying the members of the educational world with the results of our and their work. We will be better qualified to advise them not only on the architectural side of the problem, but also on many phases of their own problems. There are many capable educators who have had little or no experience in reading drawings, and who are often confused and unable to criticise constructively, and quite often will assent, feeling this inability, which leaves the problem in an unsatisfactory condition.

Furthermore, by intimate study, we will design and arrange the component parts of their school building, saving time for both students and teachers, making for economy in administration of the school and bringing about economy in cost of construction and equipment; and the future growth of each building will be planned so as to avoid jeopardizing the efficiency, management and control of any one department, and without destroying the symmetry and architecture of that which we build for the present. That is the big plan for the Vocational School or any other school.

Boston Trade School

JAMES E. MCLAUGHLIN, ARCHITECT

THE buildings for the Boston Trade School, formerly known as the Boston Industrial School for Boys, are the beginnings of a group which will eventually form a hollow square: the class room building on one side and three shop buildings completing the square, with the power house in the center of the group. At the present time only the main class room building, one shop building, and the power house have been completed.

The school itself is very unusual in the problems presented in that the work done partakes both of the character of a regular secondary school and that of a practical manufacturing establishment, also in the fact that it is planned to meet the needs of adults as well as of youth, and still further in the variety of its functions. To encourage cities to establish these schools, the State of Massachusetts offers to pay one-half the maintenance. The State, however, reserves to itself the right of standardization whereby it insists upon special qualifications of teachers, methods of instruction and hours of work. Therefore, if the school is able to do productive work, the net per capita maintenance cost to the city may be brought down to less than that of a regular high school.

Each trade department is a school by itself, differing not only in its shop equipment, but in the course of study. The day is seven and one-half hours long, for five days in the week—forty weeks to the year, with one-half hour for lunch. One-half of each day is devoted to shop work, the other half to academic work.

The academic work includes English, Mathematics, Science, Commercial Geography, Industrial History, Drawing, Civics and Hygiene.

The shop work is of a most practical kind and differs materially from the usual exercise work of a technical school. Only commercial work is done, for which market prices are received, and machinery and tools must be of the regular industrial type and not merely playthings. In each study selection is made of courses most closely related to each trade and in teaching these courses the shops are used as laboratories for illustration and experimentation so as to co-relate the theory of the class room and the needs of the trade.

A valuable feature of the old apprenticeship system was that the boy was daily associated with journeymen and lived in the midst of the daily operations of the shop. The school can furnish this only in part and seeks to supplement the school experience with visits to standard manufacturing plants where the student may observe the work and equipment operating under trade conditions.

In addition to the regular school work for boys, provision was made for men in the trade to be given instruction in the evening. These men classify roughly into two groups, apprentices who are unable to get a general training in the shop and who wish to gain time in qualifying as journeymen, and men who have had considerable shop experience but lack the technical knowledge necessary to their advancement. For these reasons the equipment must be made suitable to the use of adults as well as of boys.

The main building contains class rooms, laboratories, a finely equipped technical library, large assembly hall, lunch room, gymnasium and the administrative offices of the school. In general this building differs but slightly from the usual high school standards. The office is a real "Working Office" and equipped not only for the needs of the

school administration, but for transacting business of a commercial nature in connection with the practical work done by the school.

The class rooms will be used for the most part as small lecture rooms in close association with the shop work and are equipped with blackboards, tack boards, map holders for diagrams and generous bookcases for technical books.

The auditorium is capable of seating the entire student body of 1,200 pupils and will be in almost constant use by the school as a whole or by departments for lectures and instruction by stereopticons and moving picture machines.

The gymnasium will be used for the usual physical training work of secondary schools and also as a recreation room by the pupils during rest periods and the lunch hour; for this reason it is conveniently located near the lunch room.

The lunch room is large enough to accommodate at least one-half of the school at a time as there is practically but one session of work a day.

The laboratories, for which generous provision has been made, vary somewhat from the usual standard and are provided with water, gas, electricity and compressed air, so that their use can be easily adapted to varying needs as the school takes on more and more kinds of trade work.

Drawing is one of the most important studies in a school of this type, and for this reason the drawing room and its equipment were given special attention. The drawing room will be divided with seven-foot cabinets holding drawing boards, instruments, supplies, etc., thus separating the floor into four drawing rooms, each accommodating twenty pupils.

The shops are planned along the lines of modern factory buildings and designed for a maximum amount of light and air, at the same time preserving the flexibility of plan which is a very important consideration in this school.

Enclosing partitions are fireproof and so constructed as to be easily removed when conditions warrant. The lower four feet of partitions is solid and the upper part either of metal sash with iron glass or of wire grille.

In each department there is at least one class room on the shop floor, also washing facilities, emergency toilets, drinking fountain and lockers. The shop class room is an important feature as it enables the instructor to call a class from the machines and to assemble them for brief instruction, and they may then return to their work again without the loss of time incident to going to the main building.

In general wood floors have been used in the shops as they have been found to be much better where boys are working with sharp-edged tools. These floors are made of 1½-inch plank embedded in tar concrete and covered with ⅞-inch maple floor.

The ceilings are without beams or projections of any sort and covered with inserts for bolts placed four feet on center both ways. These inserts make the shifting of lines of shafting or of machines comparatively easy.

The building itself is of brick and limestone and of fireproof construction throughout, the center building being designed with long span, one-way terra cotta and concrete construction and the shop building of mushroom construction. When completed, the group will be a notable addition to Boston's already fine educational buildings.

Essex County Parental School, Newark, N. J.

JOHN H. & WILSON C. ELY, ARCHITECTS

THE Essex County (New Jersey) Parental School, illustrated in this issue, is a recent example of a type of educational institution that will undoubtedly, in the future, become a part of the school systems of all large cities.

There is a rapidly growing appreciation of the duty of the community toward that unfortunate class of its children that, through lack of proper parental influence, helplessly drift toward incorrigibility and ultimately become undesirable citizens. It is to supply the need of good parental influence that schools of this type have been erected. In every instance, their desirability has been insistently shown and the results achieved far reaching.

The psychological effect of prison environment is always injurious, and particularly in the case of children, who are to a greater degree susceptible to their surroundings than adults. In an institution similar to this parental school, the youthful delinquent is segregated from the surroundings that mark a criminal court, and even when the case becomes one requiring the utmost severity of treatment, there is, as far as possible, no stigma of jail confinement, nor the ineffaceable taint that is born of a knowledge of conviction and sentence.

In the building illustrated, every effort has been made to provide a plan and equipment that would facilitate the care of juvenile delinquents. Many of them suffer from diseases due to lack of parental care, and which largely contribute to the mental condition of the child. These this school seeks to correct, and in the belief that a sound mind in a sound body will in a large degree lessen the inclination of the child toward criminal tendencies, it strives to check abnormality and to create a proper and healthful condition.

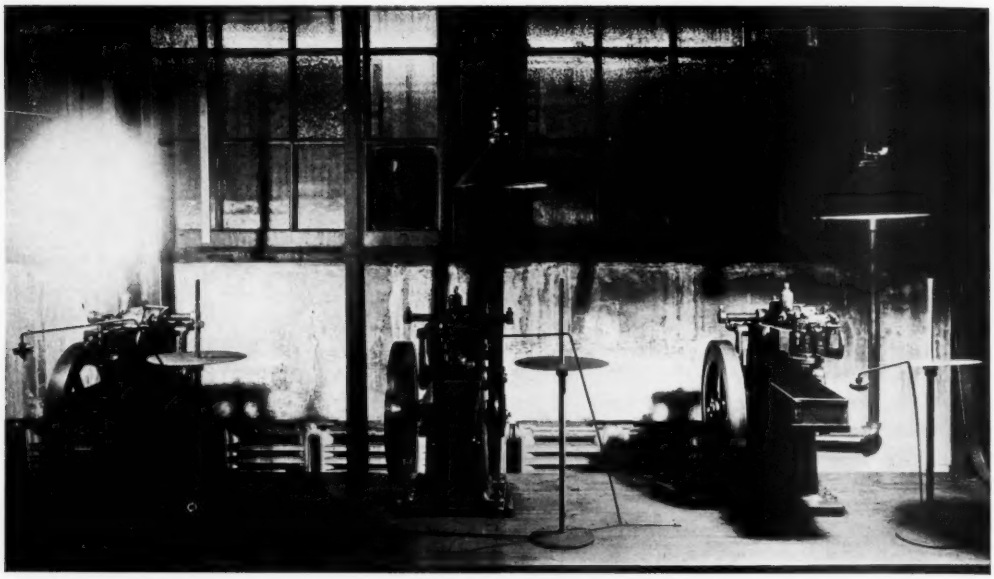


FIG. 3

The machines at the left and right receive light from lamps of equal size. On the left a bare bulb wastes 80% of its useful light in blinding the operator's eyes, less than 5% actually illuminating the working surface. On the right a protecting shade of metal eliminates glare and redirects 85% of the light upon the working area. The shade is de-polished, so that no streaks or striations result. Attention is directed to the relative values of illumination which are free from exaggeration since but one exposure of the camera was made.

Vocational School Lighting

By F. Laurent Godinez

THE lighting of the vocational school is a compromise between two kinds of applied lighting, general and local. This does not mean that both these results are obtained from one specially designed system, for it is impossible to satisfy the requirements of either local or general lighting in such a way.

General Lighting

Considering the subject of general lighting for revealing the interiors of classrooms clearly, there are various means of obtaining results, all of which are dependent upon the placement of outlets. Owing to the extreme brilliancy of modern illuminants, it is very bad practice to install outlets arranged for a "distributed unit system," with reflectors, hanging pendant and exposing the glaring lamp filament. Such practice is decidedly general, and one of the worst causes of eye-strain.

For convenience, rooms may be classified as (a) long, narrow areas; (b) large, square areas; (c) small, square areas, and (d) irregular areas.

All long, narrow (a) rooms require a single central row of outlets, irrespective of ceiling height which, as a variable factor, receives compensation in the design of the fixture, solus. To determine the location of outlets for the large, square (b) room, the total area must be divided into equal squares and the outlets located in the center of each square. The ordinary engineering practice of choosing the intersection of squares as an outlet is positively incorrect, regardless of the system of lighting used, because of the inefficient utilization of light resulting. The small square (c) area lighting is restricted to one center ceiling outlet, except in the case of very small adjoining rooms, where single wall brackets (backed) can be used advantageously. The irregular (d) area should be subdivided into as many regular areas as possible, and the preceding rules applied. The unequal projecting areas which occur may be left without outlets unless they occupy considerable space. In such cases, an extra outlet must be provided and placed symmetrically with reference to the area considered.

All outlet placement is dependent absolutely upon the architectural character of the ceiling, and out-

lets must be placed in harmony regardless of the general principles outlined above.

General lighting may be obtained from several well known adaptations, all of which can be used effectively if carefully designed and installed. These adaptations are recognized as direct, indirect and semi-indirect lighting.

Direct lighting consists of an arrangement of lamps and diffusing glassware in such a way that the transmitted light directly illuminates. Whether or not the lighting is physiologically correct depends upon the quality of the diffusing media, the illuminant placement and fixture treatment. Owing to the remarkable efficiency of modern illuminants, the principal difficulty encountered in designing direct lighting applications is the elimination of glare without excessive absorption of light.

The indirect system of illumination has won favor in thousands of applications. The indirect system utilizes the ceiling as an immense diffusive and redirective medium, employing individual reflectors, concealed within the fixtures, which distribute the light emitted by the illuminant upon the ceiling at such an angle that an efficient utilization results.

When this system was originally introduced, these reflectors (glass coated with pure silver) were enclosed within opaque fixture bodies, calling forth an objection to the unnatural effect of an interior brightly illuminated from fixtures which were themselves non-luminous. This effect was aggravated by the abrupt contrast of these dark suspended masses against a bright ceiling as a background. Modern indirect lighting equipment has been combined with a luminous bowl feature, giving the impression of a luminous source of light and dispelling the principal objection against this system.

Semi-indirect lighting is, as the name implies, neither direct nor indirect, and in the majority of promiscuous misapplications it is a miserable compromise between direct and indirect lighting. It is only when the fixture has been designed and installed with the most painstaking effort that satisfactory results, including efficient maintenance, can be obtained.

Maintenance

The problem of maintenance is one which is persistently ignored. Theoretical efficiencies which are predetermined usually obtain during the first few hours' operation of a lighting system. Lamps of the correct voltage are seldom installed and the deposition of dust and dirt exert an early influence for light depreciation. No lighting installation should be operated without convenient records, describing the conditions of each outlet and specifying the associated lamp and accessory equipment. If the architect does not interest himself in these radical reforms, it is quite certain that no one else will; for in the zeal to install specified equipment, essential unspecified details are invariably neglected.

Maintenance is greatly facilitated by a protective device known as a "lock socket." Its operation prevents the removal of lamps, and when used in connection with record charts supervised by some employee who is held responsible for the maintenance of the entire installation, it is a great aid toward efficiency.

Lamps, when new, give a certain light output in proportion to the energy output, the ratio of which is a measure of their efficiency. Lamp life is accompanied by a falling off in candlepower; so while a lamp of a given candlepower costs no more to operate at the end of 2000 hours, the efficiency is very low, and the lamp will produce only half the amount of light originally generated. For this reason, it is good practice to renew lamps before they have outburned their useful life.

The depreciation factor from dirt deposition is another source of low efficiency greatly affecting maintenance. Lamps and lighting glassware should be cleaned regularly, but records of general practice show that this feature is not given the consideration it merits. If lighting equipment were cleaned regularly, as windows are, the efficiency of thousands of installations would be vastly increased; but when this important phase of maintenance is left to the discretion of janitors and caretakers, it is grossly neglected. By assuming responsibility for the initial success of the lighting installation, the architect can insure its permanent satisfaction by the enactment of a supervision schedule, as outlined. This is a greatly needed reform and one entirely worthy of the architect's support.

Selecting the System

The selection of the system for general illumination must be a matter of architectural preference, to be determined by the adaptability of the available systems to the architectural expression of the building. The point has been raised that the effect of a bowl suspended by chains is undesirable owing to the presence of such fixtures in very ordinary installations. This is true of conditions where the environment does not justify the design of a fixture which, by virtue of its perfect harmony with its surroundings, would be essentially a part of and not apart from the architectural function. Where ornament does not prevail as a factor influencing fixture design—and this is germane with reference to vocational schools—simplicity should be the keynote of fixture and design, even to the expression of inconspicuous neutrality.

In the plain surroundings of the class room, the brassy fixture stem and ceiling canopy are as in-

congruous as the bronzed steam pipe against a quiet wall tint. Better by far to prescribe metal finishes for fixtures which will blend unostentatiously with their backgrounds. Why direct attention to an element which in itself is not an ornament nor a part of ornamental expression? Regardless of the system selected, the neutrality of exterior fixture finishes is desirable. Furthermore, manufacturing conditions of the present and near future indicate that other metals than brass will be used extensively in lighting fixture construction. The origin of these baser metals can be concealed by treatment. The same observation applies to the side wall brackets, and should include switch plates and all metal wall attachments. Baseboard outlet plates become inconspicuous if finished exactly the same as the baseboard.

Direct Lighting

Glass makers offer an infinite variety of designs in the form of totally inclosing globes to fit the various types of Mazda-C lamps. These units, consisting of concentrated filaments within gas-filled bulbs, are decidedly preferable to the older form of Mazda-B lamps, on account of their greatly increased efficiency, which permits an arrangement of fewer outlets and fewer fixtures. The glassware used should be selected with regard to its low intrinsic brilliancy and diffusive function. Surface-treated glassware, such as "acid etched" or "ground glass," with their characteristic spotty effects, render a lighting fixture glaringly conspicuous and useless as a source of illumination. The selection of low intrinsic brilliancy glassware with correct ceiling tints blending perfectly with the ceiling, eliminates sharp contrast and provides lighting of proper physiological balance.

The placement of the illuminant within its surrounding glass structure is a matter of paramount importance, upon which depends the physiologic and utilizational efficiency of the entire system. Clusters of lamps are historic emblems of the fixture makers' lack of ingenuity which should have been interred with the earlier relics such as the carbon filament electric lamp. There is no logical argument which can be urged in the case of fixture treatment between one lamp versus a cluster of lamps. Granted that the attainment of a preconceived lighting ensemble should be unrestricted by puerile economy; yet there is no excuse for the gross extravagance and waste of useful energy in luminous form caused by the inane "cluster" of lamps within a totally or partially enveloping glass structure. The single lamp is a positive means of automatic maintenance insurance. My records of general operations indicate a total disregard for the necessity of renewing individual lamps in clusters, resulting in an appreciable deterioration which remains unchecked until the lighting becomes unbearable, whereas the failure of the single unit requires immediate replacement.

Indirect Lighting

When the ceiling is used as a secondary radiating surface, this greatly increased radiating area affords an opportunity of dispensing with set forms and conventions, and the query "Why the fixture?" can be settled in the case of indirect lighting by eliminating the ceiling fixture and the typical wall bracket. The side wall outlet is essential; or, instead, corbels may be emptied to house indirect lighting equipment consisting of individual reflectors and lamps which burn in an upright position (tip up). The side wall as a locale for the inevitable "bracket" is always distinguishable by a series of glaring spots which punctuate the bracket placement. And these splotches of light about such fixtures indicate a rim utilization of more than 50% of the light generated. The indirect lighting reflectors are shaped to give an asymmetrical distribution of light, directing the total flux in such a manner that no light is wasted on the wall above the reflector recess and all the light strikes the ceiling at such an incident angle as to render the angle of reflection completely effective in its illuminating scope. Where it is not convenient to place these reflectors in embrasure, projecting casings can be attached to the wall directly over the outlet and finished to correspond with the wall treatment.

While there is certain opposition to the covering of these housings with glass on account of the "loss in efficiency," I have found that there is more likelihood of a unit being cleaned when it involves only wiping off a glass surface, whereas the removal of the lamp and the difficulty of reaching within reflectors prevents thorough and frequent inspection, and causes considerable breakage. The loss by absorption of the glass cover is so slight that its "inefficiency" is a theoretical absurdity when contrasted with the practical benefits derived. Such applications are particularly appropriate for halls and corridors where one outlet at the end of each corridor will eliminate the expense of several intermediate ceiling outlets.

Great care should be exercised in selecting reflectors which possess reflecting surfaces that will not deteriorate. All reflecting surfaces appear to be satisfactory when new, but after five hundred hours' use some of them become tarnished and worthless as light redirectors. Quick silver depositions on the back of glass should be avoided. They are most unsatisfactory. The only permanent reflecting surface utilizing the back of glass as a foundation is pure silver deposited electrolytically.

FIG. 1. "LIGHT IN THE EYE"

Glare is unutilized light, and results from the exposure of any portion of a light source. Under such working conditions as these, "spoilage" and "accident" decrease the output of the work and the efficiency and health of the worker. Such unphysiologic lighting degenerates the adaptive function of the eye, causing many accidents on account of retarded accommodation due to overstimulation. Unfortunately, this sort of thing is typical of industrial applications. The correction lies in architectural supervision of the entire lighting schedule, including the assignment of outlets, their control and equipment.

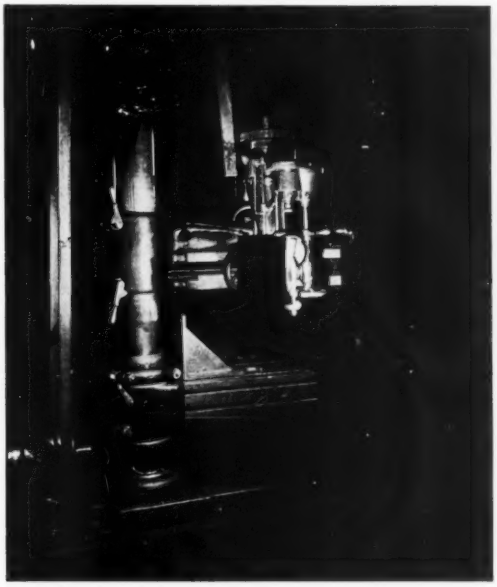


FIG. 2. "LIGHT ON THE OBJECT"

Here, under lighting free from glare, the eye is permitted to "see" without discomfort. The glare eliminator consists of a flat piece of cardboard, hung in front of the lamp. Machines of all kinds must be equipped with adjustable lights enclosed in shades which entirely conceal the source of glare. An auxiliary system of general lighting is necessary to relieve the abrupt contrast between intermediate points of local illumination. Light must be regarded as a *cause* and illumination (its product) as an *effect*. Perception should be realized by light rays reflected from the object to the eye, not from the source of light to the eye.

and with the thickness of ordinary tinfoil. When protected by an enveloping coat of baked-on enamel, the elasticity of the silver lining obviates the breakage caused by alternate expansions and contractions indefinitely. White enamel reflectors are difficult to obtain with white lining which will not chip and crack. All polished inner surfaces produce myriad reflections of lamp filaments, causing the projection of shadows, streaks and striations. The best reflectors are constructed with a series of spatulated inundations which dissipate these reflections by diffusion. For the general lighting of shops and workrooms, these same reflectors, which are a part of indirect lighting equipment, may be employed as direct lighting units as previously described. Wherever shafting and belting is a part of the ceiling incumbrance, any form of lighting which illuminates the ceiling will cause highly objectionable, moving shadows. In such cases the selection of direct light for the general illumination instead of indirect or semi-indirect is to be preferred.

Semi-Indirect Lighting

The average semi-indirect fixture looks like a washbasin dangling from chains with a lamp thrown in for good measure. Two bowls exactly alike in shape and appearance with lamps in the same position, and at the same hanging height, would produce entirely different light distributions, depending upon the class of glassware used. If of surface-treated glass roughed with acid, sand-blast or the grinding wheel, the light rays from the lamp would be transmitted freely through the glass without any change in the original distribution from the lamp, and only a slight loss of light from absorption. Semi-indirect lighting of this sort is very prevalent. Even fixtures of the better grade of material and workmanship are often equipped with such inferior glassware. I would like to see ground and acid-etched glass eliminated from every specification prepared by the architect. The passing of this ugly, distortive, useless medium would signify the beginning of a new era in effective lighting.

The usual semi-indirect fixture is arranged with a drop cord and socket, allowing the lamp to hang pendent within the bowl and admitting of some adjustment by shortening the drop cord. This crude arrangement, while most unsightly, possesses several features not obtainable in fixtures of better grade. The cord adjustability makes it possible to substitute

lamps of different sizes and to place their filaments in proper positions within the bowl. Owing to the radical changes in lamp construction which will soon take place, it is necessary to provide some method of compensation in all fixtures installed at this time. With light walls and ceiling the side wall bracket provides an excellent general illumination if fitted with special equipment consisting of a reflector of very dense opal and a lamp not smaller than 100 watts of the gas-filled-bulb type. This unit does not provide as complete a utilization of light as the spirally designed reflectors of the indirect type previously described, and there is the characteristic spot of light on the wall directly behind the reflector, but this loss is compensated for to some extent by the light transmitted through the glass. With semi-indirect lighting applications the cluster of lamps should be avoided, and the latest type of gas-filled Mazda lamps used, owing to their greatly increased light-output and decreased energy in-put.

Ceiling Treatment

The most desirable color for ceilings is a cream. White is extremely undesirable for lighting of any sort, and particularly with the indirect or semi-indirect systems which depend so greatly upon the ceiling area as a redirective medium. With the so-called "white-light" effect of modern illuminants, a white ceiling is an aggravation producing an atmosphere of almost chilling austerity. Physiologically, this cold light causes a reflex ocular lesion in exaggerating the contrast of black type on white paper. A warmer light lends to the reading page a mellow tint, against which the contrast of the type against the paper is less acute and more easily discernible. This phenomenon accounts, in a measure, for the popular assumption that the light of the oil lamp is "better for the eyes."

The color of the side wall is a negligible factor in lighting efficiency. If the lighting system is properly designed, the side walls may be disregarded as contributants to the effective illumination on the working plane. It is only with obsolete types of lighting installations, consisting of fixtures with long stems and projecting cross-arms with dependent bulbs, that the transmitted light is allowed to expend itself aimlessly in horizontal reflections above the reading and working plane.

Physiological Requirements

The exposure of a light source is the most glaring example of unphysiological lighting; but eye-strain, with its associated nerve tension, subsequent relaxation and inevitable inefficiency, can result from lighting designed for absolute concealment of source. Extended research has proved to the writer that the directional influence of reflected light (a previously unrecognized factor influencing visual perception) is the cause of considerable ocular discomfort, particularly in applications where students are working or reading in a sitting posture throughout a room. This eye strain is caused by intense, reflected rays of light entering the eye at such angles that the eyebrow is incapable of intercepting them and protecting unusually sensitive sections of the retina, unaccustomed to such acute stimuli, from the over-strain. The remedy lies in designing the reflecting equipment of the lighting system used so that the reflected or transmitted light from the secondary radiating surfaces (globes or ceilings) will be as nearly perpendicular to the plane of the floor as possible, enabling the eyebrow to exert its protective function at any point in a room so lighted. This result depends upon an accurate analysis of each problem, necessitating a drawing to scale of the fixture referred to in sectional elevation. The lineal radiation from the source, with the change of directions caused by the primary and secondary redirective surfaces (reflector and ceiling) establishes a correlation, consisting of two constants and one variable. This variable is the shape of reflector necessary to conform with the fixed conditions of the problem; and usually it is possible to find a manufactured product conforming closely enough with the design required to satisfy practical working needs.

In the majority of cases, where lighting equipment is selected and installed promiscuously, it is not strange that unphysiologic lighting proves the rule and not the exception.

General Lighting—Work Rooms

The general lighting which has been discussed must be modified in some ways to meet the requirements of work rooms where factory conditions demand radical exceptions. Carpenter shops, foundries, electrical and mechanical departments, chemical and physical laboratories, departments devoted to construction and general machine shops all require both general and local lighting, but a general lighting of modified form. No matter how efficient local lighting is, it requires support from a general system of illumination. The workers' eyes become adjusted to close work for long periods, and if the shop is unevenly lighted it is physically impossible for the eye to instantaneously adapt itself to the extremes of light and darkness. Intermediate dark spaces between brilliantly lighted machines have caused a high percentage of industrial accidents. A low general illuminative is a safeguard which insures a normal operation of the visual function.

It is difficult to employ the shop ceiling as a redirecting medium, owing to dirt accumulation

and the presence of shafting and other necessary impedimenta; hence, a direct system of general illumination is preferable. If it is possible to predetermine the location of all ceiling obstructions, direct lighting units (consisting of individual lamps and reflectors) can be recessed between floors and flush ceiling plates of diffusing glass, inserted in special holders, like port-holes. This gives a clean-cut installation and facilitates maintenance by eliminating the breakage feature. Owing to the dust-proof construction, the only cleaning operation consists in wiping off the outer surface of the flush plates. The installation cost of this system should be no greater than the cost of ordinary exposed outlets in new building construction.

The same results can be obtained in old buildings by providing special housings about each lamp and reflector fitted with a base plate of diffusing glass. General lighting of this type is less expensive to install in rooms of average ceiling height, since the low ceiling requires a too-frequent spacing of outlets; and if infrequently spaced the wide "spread" of the reflected rays will invariably cause eye-strain from "misdirection." Opaque reflectors can be used efficiently. If the floor is fairly light it acts as a redirector of light (a reversal of indirect lighting) and illuminates the ceiling sufficiently to dispel any effect of gloom between outlets.

In selecting opaque reflectors, only those which are guaranteed against deterioration of reflecting surfaces should be installed. It is time that action be taken to safeguard the interests of those who must pay for the maintenance of lighting after its first cost of installation. Glass reflectors are breakable, but if installed close to the ceiling (where they belong), the breakage is slight. Reflecting surfaces which cast streaks and striations are undesirable. These are due to the mirror-like reflection and projection of images of the bright filament lines of the lamp. A plate of thin diffusing glass placed over the opening of such reflectors will correct this defect, and many reflectors are furnished with specially pressed inner surfaces which disperse these annoyances.

The translucent shade or reflector is not at its best in shop lighting. The transmitted light, passing upward through the reflector, is wasted upon the ceiling, there being insufficient utilization for any appreciable benefits on the plane of illumination below. The suspension of these direct units on flexible conductors should be avoided, owing to local vibratory disturbances producing light fluctuations.

Where restricted installation costs limit outlet placement, it is permissible to provide reinforced conductors terminating in hooks attached to the lamp sockets which permit the suspension of the lamp from several ceiling rings within the radius of the conductor. At best, this plan is of the make-shift variety.

The protective efficiency of general shop lighting requires that all sections of the shop where machinery is in operation shall be illuminated at one time. Hence, the location and operation of the lighting control is of extreme importance. The highest type of protective control consists of a master switch which must be closed before any machine in any section can be operated. Immediately the general lighting in that section is turned on (independent of any local lighting) and it cannot be turned off until every machine in that section is stopped. In this way the protective efficiency of the unit determines the efficiency of the entire system.

Local Lighting

Local lighting is required wherever a strong light of varying intensity and direction is necessary.

The prominence of detail on working material depends upon the directional distribution of the light rays, which must be such that adequate shadow projection emphasizes the detail by throwing it in relief. As to the mode of attainment, present methods of local lighting require radical reforms. The "drop cord" with its dangling lamp and battered tin shade is a relic of the past, and a prime factor in favor of eye-strain and accident. It is being replaced by rigidly supported lamps, with adjustable shades, and adjustable as to position within any necessary radius of operation. Some manufacturers of high grade machinery provide lighting equipment as a part of the machine, but they constitute the minority.

The placing of outlets for local lighting depends upon the type of shop or laboratory and its maximum capacity for extra equipment. The most efficient arrangement of equipment restricted to the maximum number of operatives within the prescribed area determines the present and future outlet demand. Wall machines and wall benches should be supplied from baseboard outlets, and floor machines and benches from floor outlets. Drop cords from ceiling or side wall outlets should never be specified for this usage. The remote control of such outlets is a convenience which should not be overlooked where a thoroughly modern installation is involved. The actual application of the light locally involves the construction of special brackets, which must be designed to withstand abusive service. It is here that the lock socket is a positive necessity in preventing lamp transpositions and substitutions.

With work benches backed and workers facing, the best arrangement consists of rigid upright pipes (between benches), fitted with adjustable arms,

equipped with pendant lamps in metal shades. These shades and shade holders will not give satisfaction unless molded in one piece and secured to the electric socket by a special casting. The locking mechanism of the socket within the shade holder can be reached by a small hole in the shade holder, which should be specified. This plan enables the worker to adjust the light, vertically and horizontally, to his personal satisfaction, and does not interfere with his neighbor.

The location of these uprights depends upon the number of workmen per bench. With wall benches, the uprights are secured to the rear of each bench by a flange and connected from that point to the baseboard outlet. This same treatment applies to tables in electrical, chemical and physical laboratories.

Another plan consists of a series of uprights terminating in individual upright sockets provided with shade holders at such a height that the lamp is entirely shaded. The shades distribute the light downward in concentrated areas, which include the working radius of each operative. This plan is effective in cases where the operative, without inconvenience, can bring his work to the light when close inspection is necessary. The stand lamp, with its connecting cord, is a device which is sure to cause trouble eventually. Rather than introduce such makeshifts it is better to provide isolated outlets of sufficient capacity to accommodate later service extensions. At the time of their installation the wiring can be attached invisibly to the new bench or table units as they are installed. This is equally true of all floor outlets supplying energy to lights on benches or machines.

Owing to the action of dirt, grease and flying particles of metal, the wiring leading to individual machine lights requires special protection and must be conveyed in conduit from the base of the machine to the point of use. Lamp guards, which are a part of the metal reflector, prevent lamp breakage and do not cast shadows if properly constructed.

Standardization

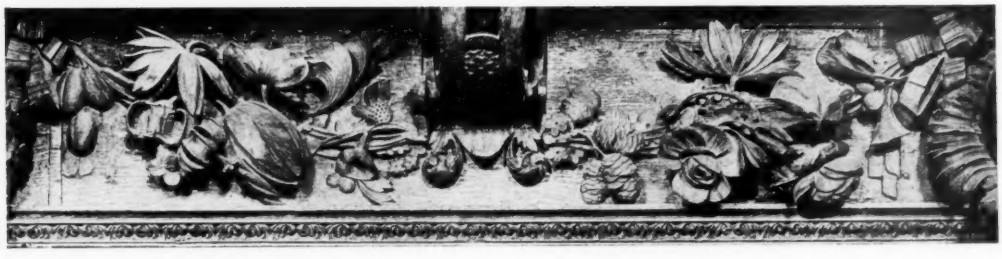
The types of lighting fixtures selected should be standardized in two groups: one for interiors of the class room type; one for interiors of the shop type. These two classifications include every phase of vocational school lighting, with the exception of halls, corridors, private offices, reception rooms and exteriors, the fixtures for which may be designated as incidental equipment.

For the long, narrow corridor the side wall bracket with upright socket provides a means of effective semi-indirect illumination by utilizing the ceiling as a redirective medium. The low position of the bracket also facilitates cleaning and lamp replacement. In very large halls where large enclosing globes are used, it is very necessary to avoid the use of the screw holder, owing to the danger of breakage and accident. There are seamless, screwless globe holders on the market which will sustain the weight of the largest types of enclosing glassware and allow tilting of the globe without complete detachment. Whenever it is possible to use standardized equipment in the few rooms which represent exceptions, it should be done, for obvious reasons.

The outside lighting depends, of course, upon a reconciliation with the architectural expression, and it is for the architect to designate his preference in its design.

It is appropriate to recall the fact that unless a good grade of opal glass is used in such fixtures their value as symbols will be confined to their daylight appearance, since at night every detail will be obliterated by glare.

The lighting of the vocational school, like every other problem of applied illumination, affords an opportunity for an accentuation of the architect's work by the agency of light. Conversely, bad lighting influences the mind unfavorably, and the subject, like a good painting revealed in a bad light, is misjudged.



Industrial Arts School, Davenport, Iowa

CLAUSEN & KRUSE, ARCHITECTS.

(See plates Nos. 134 to 137)

We have received from the architects the following description of this school:—

This building is a combination of the typical school house design and the modern factory. The front part, two stories in height, contains class rooms and on the second floor, isolated from all noise and vibration, with a maximum of light, are the draughting rooms. The shops are in the rear and are lighted both from wall windows and skylights, in the saw-tooth roof construction.

The building is strictly fireproof, all reinforced concrete, including the roof trusses over shops. Exterior of red tapestry brick, stone trim and a red Spanish tile roof. Steel sash were used to give maximum light. Maple floors were used only in wood-working shops, class rooms, printing room, office and draughting rooms. All other portions were concrete and not plastered.

The building was economically constructed, costing about $40,000 complete. Provision has been made to extend the building with a right and left wing should it be required to enlarge it at any time.

Fine Art and Utility

In the course of his presidential address to the newly formed Institute of Scottish Architects, Sir Rowand Anderson expressed some interesting opinions on the subject of fine art and utilitarianism. "The great and only hope of architecture," he said, "lies with the public; they must ask for and insist on getting structures soundly and sanitarily constructed, and adapted to the purposes for which they are erected; then men able to carry out such buildings in an artistic and a truthful manner will, by reason of this determination, be called into existence. Architecture must cease to follow the transient literary and esthetic fashions of the day; the absurd distinction of fine art from that which is useful or mechanical, and of architecture from building, and all the talk about applied art, must give way to that which is produced as in nature if we are ever to get into a clearer atmosphere of reality than now surrounds us, and we must put ourselves in line with the science of the day. Then we may look forward to erecting buildings fitly representing the ideas and wants of the age, with a constant succession of ever-varying expression and beauty, with natural dignity, and not artificial picturesquesness. That time may not be very far away. Ever since the penetration into Europe of the Arabian doctrine of the supremacy of reason over dogma, which many maintain to be one of the chief factors in the renaissance of learning and art, the world of thought has been in a state of transition. The causes that have been ceaselessly at work since then are now gathering great force, and the victory of reason and law seems assured. When that takes place art of every kind will be the material expression of it, and the great creative intellect of man, untrammelled by worn-out traditions, but utilizing all that is good and of universal truth in the past, will have free play, and the world will see structures greater, grander, and more useful than any that have ever existed."

A Demountable Reviewing Stand Which Will Hold One Hundred People

Confronted with the necessity of erecting a demountable reviewing-stand, especially at the time when the missions of our Allies were being entertained, the Union League Club of New York City assigned the rather difficult task to a member, Eugene Southack. In conjunction with Harold Roberts, a consulting engineer, Mr. Southack developed a most ingenious structure.

The demountable reviewing-stand, according to Mr. Southack's claims, can be erected in two hours' time, and after it has served its immediate purpose it can be taken down in about the same length of time. Three men are required for the work. By way of proving his claims, the designer recently had the structure completely taken down in less than two hours, and was then requested by the Club to re-erect the stand by two o'clock that afternoon. The men started at 12.30, and the stand was in position, ready to use, a few minutes before two o'clock.

Among the interesting features of the steel work are the bolts, which are all of the same length and diameter. The various members are so fabricated with shelf angles and erecting plates that their position in erecting is easily determined. It is impossible to put any one of the members in the wrong place. The wooden deck is notched over the steel members and held firmly in place by the railing which passes through the deck into sockets riveted to the main steel members. The railing of the stand is so constructed that the vertical members fold in order to occupy little space when dismantled. The entire railing when in place is held by four screws, and six flag-pole sockets are placed in the rail to hold any desired standards. When

the stand is dismantled and stored the sockets in the sidewalk are covered with small brass plates, screwed in place with spanner wrenches.

Mr. Southack's reviewing stand does not block the sidewalk; indeed, it clears the sidewalk by a sufficient margin to permit the tallest pedestrians to pass under it without discomfort. The size of the stand is 25 feet by 10 feet, and it can hold 100 people without undue crowding. Because of the steep construction of the deck, the reviewing officers have an uninterrupted view; in addition, a reviewing bay five feet in diameter greatly enhances the usefulness of the stand. When completely dismantled the structure can be stored in a space measuring 15 feet by 6 feet. Lastly, the strength of the structure is always a known factor, and for this and other reasons it has been approved by the New York City Building Department.—*Scientific American.*

National Fire Underwriters Issue List of Inspected Appliances

A publication that should be available to architects, especially those concerned with industrial building construction, is a booklet just issued by the National Board of Fire Underwriters' Laboratories, giving a full list of inspected mechanical appliances. These include sprinkler equipment, extinguishers of all kinds, hose and hose fittings, valves, standpipes, pumps, fire doors and walls, fire window frames, heat insulating coverings, partitions, roof coverings, acetylene appliances, cleaning materials, liquid containers, gasolene appliances, stoves and heaters and many miscellaneous subjects.

Lessons in Architecture for Soldiers

In the Bulletin des Armées de la République, a little paper printed especially for circulation in the army zone, appears a request from some of the poilus for a lesson in architecture. One of them writes: "In the villages or small towns where we are quartered we often discuss the style of the church or town hall of the place, but we discuss it in ignorance. Could the Bulletin not give us some of the essential principles of our architecture?" In response to such appeals M. Roger Milès publishes an article which in its clear analysis and brevity is an example to all teachers of the subject. It is the first of a series and discusses the columns and arches of the Roman period with illustrations that make it easy for the soldier in the presence of buildings of this type to recognize at once the principal characteristics. Possibly the fact that the reader is a soldier applying what he has read to the object before him, testing the value of his lesson on the spot, makes it easier for the instructor to write tersely, sympathetically, and entertainingly, of a subject from which too often the life is pressed out by a mass of purely technical detail.—*N. Y. Times.*

Architecture and National Characteristics

Luther Anderson, in a very interesting article in *Asia,* a journal published by the Asiatic Association of New York, describes Chinese architecture and the way the Oriental architect works out his plans. Mr. Andrews tells us that the Chinese architect thinks rather in groups than in single buildings and the Chinese artist takes his stand on an elevation so that he can get into his canvas more of the landscape than one can see from the ground. The fact that no hill may be near at hand from which to view his triumphs does not disturb the architect. He expects that those who really care for art will have sufficient imagination to picture the whole effect of his art in their minds although they cannot see it all at the same time.

It will be seen that this conception of architecture is entirely foreign to our conception of it. The Western architect thinks of his buildings separately and individually, while the Oriental thinks of his art in groups. We speak of the Capitol at Washington, of the Woolworth building in New York or of St. Peter's at Rome, separately, as masterpieces of their class of architecture, while the Chinese would speak of masterpieces or architecture in groups symmetrically arranged and covering much ground.

At first this slight difference in thought may seem an unimportant incident of taste. But a little reflection will show in this the difference between two modes of thinking and two great varying characteristics which separate the Occident from the Orient, the really Far East. The Occident—we Americans belong to that same school of thought—thinks in the individual. Thus individualism, which is our national trait, is represented in our art and architecture. We attach more importance to the individual in this country than we do to the family as a unit of society. In China, on the contrary, the family is the more important unit. The Chinese school of thought being in this respect gregarious, this characteristic is shown in her artists and architects. Therefore, the group idea is predominant in Chinese architecture while the individual building is taken as the only object of the American architect. Thus it will be readily seen

that national architecture represents to a large extent national characteristics. The institutions under which we live, whether they are democratic or autocratic, will reveal themselves in more than one national undertaking and enterprise, and architecture is perhaps more easily impressed with a nation's characteristics than any other one thing in a nation's life.

Conservation of Artistic Talent

A recent statement of values puts a new light upon the question of sending our men of artistic talent to the firing-line. "If all the men of rare artistic gifts were piled up in No Man's Land in a funeral heap, they would make a heap so small that neither Germans nor British would count their taking off as consequential." Their value for war put in this graphic manner leads the speaker, Mrs. Margaret Abbott Lewis, to declare that "artists should be drafted to live and not to die for their country." The question was dwelt upon in our issue of July 21, when a number of prominent artists themselves gave their testimony. It is not likely that they would care to be regarded as other than men when the welfare of their country is at stake, and the majority of opinion was that no discrimination should be made in their favor. The President has declared against favoritism, and according to the true principles of democracy "there must be no preference . . . no exceptions shown or made among those who will be drafted for our armies." Every able-bodied man within draft age is to serve if called, it has been announced, and "every one shall be allotted to some particular task to which he may be best suited."—*Literary Digest.*

An Unusual Sale of Antique Sculptured Art

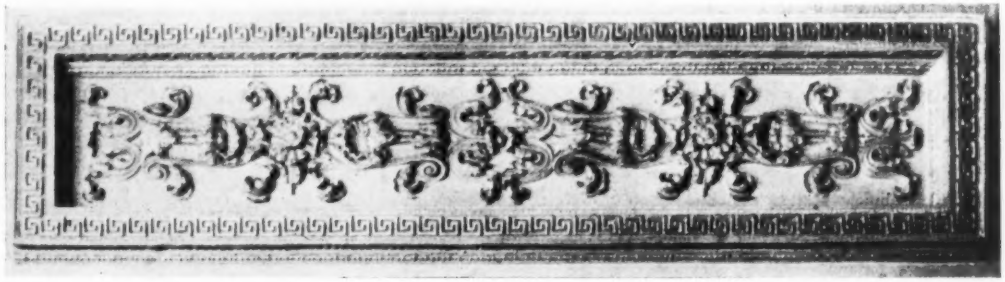
Urns that inspired Keats, and which were gathered by the husband of Admiral Nelson's Emma, Lady Hamilton, along with sculpture recovered from the dust of ancient Greece and Rome, were auctioned in London along with other art objects collected by the accomplished eighteenth-century dilettante, Thomas Hope. Christie's, for the occasion, was in its classicism "like an Alma-Tadema painting." Buyers were present from America, Italy and Greece to bid against the English—but English museums and English private buyers obtained most of the extraordinary items; some marbles went back to Greece; and one urn and a French ewer went to New York. Hope's collection of classic sculpture was world famous, and while the "Hope diamond" of tragic story is well known and now possessed in Washington, the Hope sculpture has been kept from public gaze for one hundred years, secluded at Deepdene. While this and his Hamilton urns were being dispersed an unusual price was realized at Sotheby's for a colored mezzotint of Lady Hamilton as Nature, by Henry Meyer after Romney, which fell to Mr. F. Harvey at $7,500. Sculpture and vases brought only $340,000; pictures brought $160,000—a total of but half a million dollars. Unless the marbles of the Duke of Bedford come one day to auction the world will probably never see a similar sale again.—*Boston Transcript.*

Forest Fires Threaten Timber Production

With the most serious fire situation in a number of years threatening millions of feet of Western timber, it has been necessary for the Forest Service to suspend some of its operations in order to concentrate all available forces in fighting the forest fires.

Reports received from the Northwest indicate that the situation is more dangerous than at any time this year.

In Oregon and Washington valuable timber intended to furnish airplane stock for the fighting forces of the United States and its allies is being threatened by the flames. Numerous fires are reported as the result of incendiarism.



Industrial Information

A Publication "To Aid Advocates of Good Lighting"

The July-August issue of lighting bulletins circulated by the National X-Ray Reflector Co., 235 W. Jackson Blvd., Chicago, Ill., is contained in a portfolio under the general title of "Eye Comfort." This series is specially given to industrial lighting. One bulletin shows the use of X-Ray floodlighting projectors for outdoor requirements. Another deals with Beehive reflectors for interior direct lighting installations in mill and factory. The Curtis Adapter manufactured by this company is the subject of another bulletin, which describes and illustrates its use on pedestal lamps to give an indirect illumination. The series is prepared for the trade, but the subject-matter would without doubt be of interest to architects.

Swimming Pools

An attractive booklet entitled "Swimming Pools" has been issued by The Associated Tile Manufacturers, Beaver Falls, Pa. This booklet contains 32 pages of valuable information representing the latest and best practice in the design and construction of swimming and wading pools. The data furnished covers proper shapes and dimensions, together with methods of construction and details of waterproofing, drainage, overflow troughs, curbs and gangways. Reference is also made to various accessories such as steps and ladders, diving boards and shower baths.

The subjects of artistic merit, markings and color schemes are discussed and illustrated by numerous photographs of recent and notable installations. This booklet is distributed gratis to architects and prospective builders and will form a valuable addition to the reference library.

General Electric Issues Wire and Cable Information

A file of wire and cable information has been prepared by the General Electric Company, Schenectady, N. Y., for distribution. It contains Bulletins Nos. 49302 to 49314, and these publications take up the question of wires and cables generally and specifically. Every conceivable question of choice, use, insulation, conductors, is covered fully. Strength and voltage tests are described. Tables for insulation resistance of cables, inductance, reactance, capacities and charging currents, etc., are given. The matter is illustrated with photograph cuts and diagrams of materials and insulation. This data should have a place in the files of every architectural office.

Lumber Consumption in War Time and After

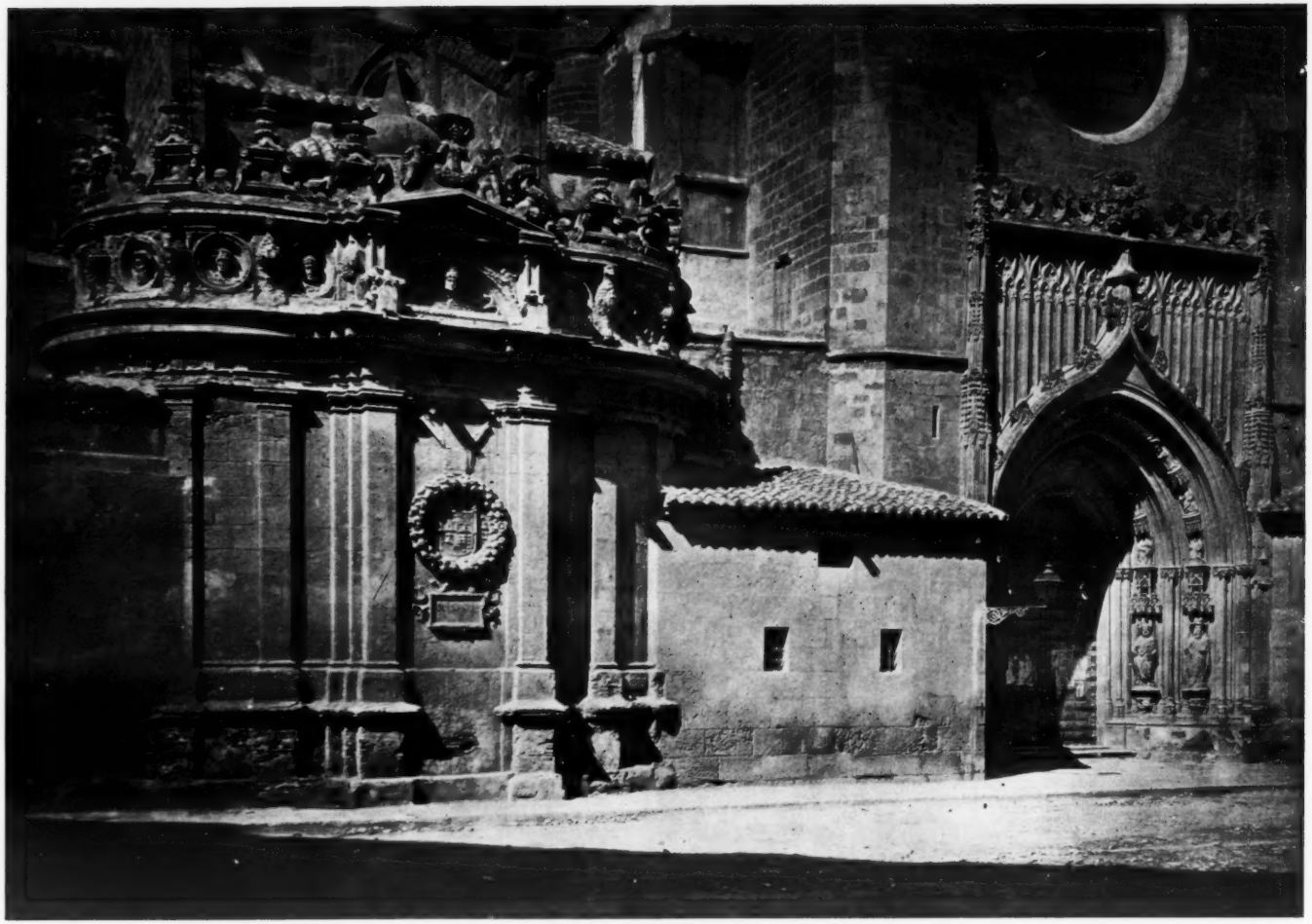
It is stated that 375 to 400 million feet of Southern Yellow Pine will be needed within the next twelve months to complete the Government's wooden shipbuilding plans. This is but one of the items in the unusual lumber consumption due to war pressure. It indicates how large the production must necessarily be to meet the demands likely to occur within the next year. Another aspect of the lumber industry and one that will have to be seriously considered when world peace is effected, is the demand that will probably be made on this country by all Europe for lumber to be used in the rebuilding of the devastated areas. A commission is now abroad making a first hand study of the probable requirements of our various allies when hostilities cease.

Beautiful Floors

The Murphy Varnish Company of Newark, N. J., has a new booklet on Floors. In it the everyday hazards to beautiful floors are illustrated in a bright manner and discussed to the end that many of them could be avoided or lessened by the use of Murphy fillers and varnishes, paint removers and brushes. Instructions are given for cleaning and varnishing and keeping in good condition.

An Efficient Window Sash Balance

The Pullman Mfg. Co., of Rochester, N. Y., has published a catalog of its unit sash balances to replace the old cords, weights and pulleys in window construction. The text describes this appliance as cheaper than the cord-and-pulley balance, practically noiseless in operation, compact, light and strong. Cuts illustrate buildings fitted with Pullman sash balances, and various forms of the appliance itself. At the back is a blue print showing, full size, detail of a window frame for Pullman sash balances. The catalog may be obtained by application to the company.



DOORWAY TO CATHEDRAL, MURCIA, SPAIN