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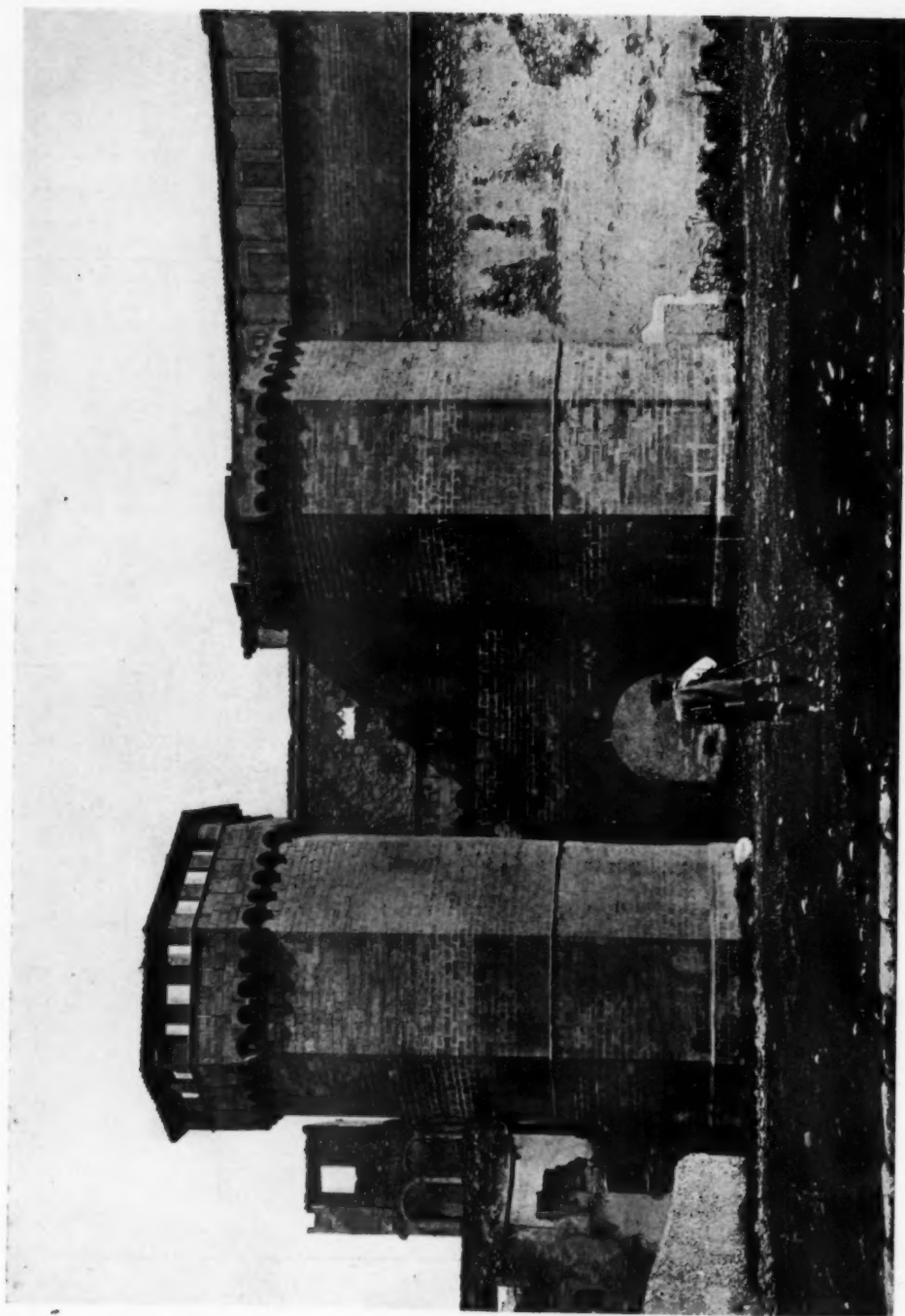
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VOL. CXVI

WEDNESDAY, NOVEMBER 5, 1919

NUMBER 2289

The Federal Reserve Bank Building in New York

In This Issue Are Illustrated the Premiated Designs of York & Sawyer, Together with Those of Cass Gilbert and Delano & Aldrich—In the Succeeding Issue (November 12) Designs of Carrere & Hastings, McKim, Mead & White and Trowbridge & Livingston Will Be Presented

IN presenting in this issue the premiated designs of the Federal Reserve Bank Building, in New York, something more than a formal notice of the competition for the selection of an architect for this building becomes necessary.

While the planning of this important structure required consideration of a majority of the problems attendant on the construction of a large modern banking institution, it became a unique structure inasmuch as it is a bank dealing with other banks. This fact permits reduction of space in certain departments, usually the largest in area in banking buildings, and an increase in accommodations where the present-day bank is less expansive. In fact there has been no competition in recent years where the architects have been called on for more concentration and careful study of the program.

And it is probably due to the fact that a program was evolved which so carefully and thoroughly presented the main points of every major feature, supplemented by the most excellently presented suggestions to guide the competitors, that the very excellent result has been reached. In fact, just here in an architectural journal, it may be well to emphasize the influence of a well constructed program on the designing and planning of a modern building. In order that readers of *THE AMERICAN ARCHITECT* may have an opportunity to study this program and to judge of its merits, it is printed as an appendix to these notes. It was prepared by Alexander B. Trowbridge, the professional adviser and consulting architect to the board of directors of the Federal Reserve Bank.

The site of this building covers the entire block bounded by Nassau, Liberty and William Streets and Maiden Lane, with the small exception of the

area covered by the Montauk Building, located at the extreme eastern end of the block. This was held by the owners at a prohibitive price. The area covered is not essential for the proposed building.

It was at the outset decided that the selection of an architect be made through a competition, and in order to expedite this selection it was further decided to limit the competitors to six in number. Those invited to compete were Carrere & Hastings, Delano & Aldrich, Cass Gilbert, McKim, Mead & White, Trowbridge & Livingston and York & Sawyer, the latter firm having received the award and thus becoming the architects of the building. The winning designs are reproduced in this issue.

The design is one admirably suited to a modern banking building. Its extreme simplicity and adherence to the best expression of Florentine architecture, coupled with the vigor as expressed in the detail of the lower stories creates a most satisfactory architectural result, and establishes further an irrefutable evidence of the progressive development of monumental architecture in this country. It is therefore most unfortunate that a structure which will undoubtedly stand for many years as among the best produced in the United States should be so handicapped as to its location as to make it impossible to be satisfactorily seen as a whole from any point of view.

For this reason the dissymmetric solution as to the placing of the main entrance, its location off center, may not be justly criticised. Naturally an entrance so placed on a building where its façade could be seen in its entirety could be adversely criticised, but as Liberty Street is but forty feet wide and the elevation 365 feet long, it is not possible to view the entire façade from a point opposite the entrance

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and thus take any consideration of this unsymmetrical placing of the entrance. In arriving at a point of location of this entrance, the architects have very skillfully taken into consideration the elements of the routing of pedestrian traffic in the neighborhood combined with similar elements of circulation as shown in the plan. The whole problem becomes one of very great interest and is worthy of the closest study.

The clear and straightforward manner in which the exterior is expressed in the design is to be very strongly commended. It at once suggests to the trained observer just what his curiosity would prompt him to inquire. For example, the windows which light the rooms on the first floor are determined in their size and character by the officers' rooms which will be located at the western end of the building, which on the Liberty Street elevation is on the left of the main entrance. The second story, indicated by the square windows, smaller in area, will be devoted to clerical work, while the third floor, indicated by a row of still smaller windows, under a balcony, is the service floor. The remaining floors between the balcony and the main cornice are "typical" floors, presented in the competition in exactly the same manner as a loft building and continuing this manner, subject to such subdivision or arrangement as the development of the occupancy of the building may suggest.

Further referring to certain elements of design of the exterior, it will be noted that the design shows the main cornice continuing around the building at the right or eastern end. It was the desire of the competitors that they be permitted to express their designs in their own way, and this feature of the cornice is the result of a concession to such a desire. As the building already referred to, now preventing the occupancy of the entire block, has not been included in the area of the banking building at this time and may not be for an indefinite period in the future, it was decided to construct the Federal Reserve Bank Building without regard for this area. Eventually the result will be the extension of the balcony and the main cornice as far as the building line and returning both of them against the Liberty Street wall, so that the wall touching the Montauk Building will show no moldings or band courses of any kind projecting beyond the actual property line. This is no real hardship when one considers the setback which occurs at the main entrance and which is the direct result of a correct interpretation of the existing zoning law.

The arcade or loggia on the roof provides a covered passageway entirely around the building and immediately outside of the two floors which are to be devoted to cafeteria service and welfare work.

The problems attendant on what is now known as welfare work in an institution employing large numbers of people are becoming as insistent in their solution as any presented. The size of the present organization of the Federal Reserve Bank is approximately 2,800 employees, a small town in itself. The growth of the bank has been so phenomenal that it is not unreasonable to expect that within a few years the building may be taxed to take care of fully 5,000 people. The program in its farsighted allusion to these probable conditions, has suggested the leaving of large unassigned areas on various floors. Undoubtedly the wisdom of such a course will be fully demonstrated.

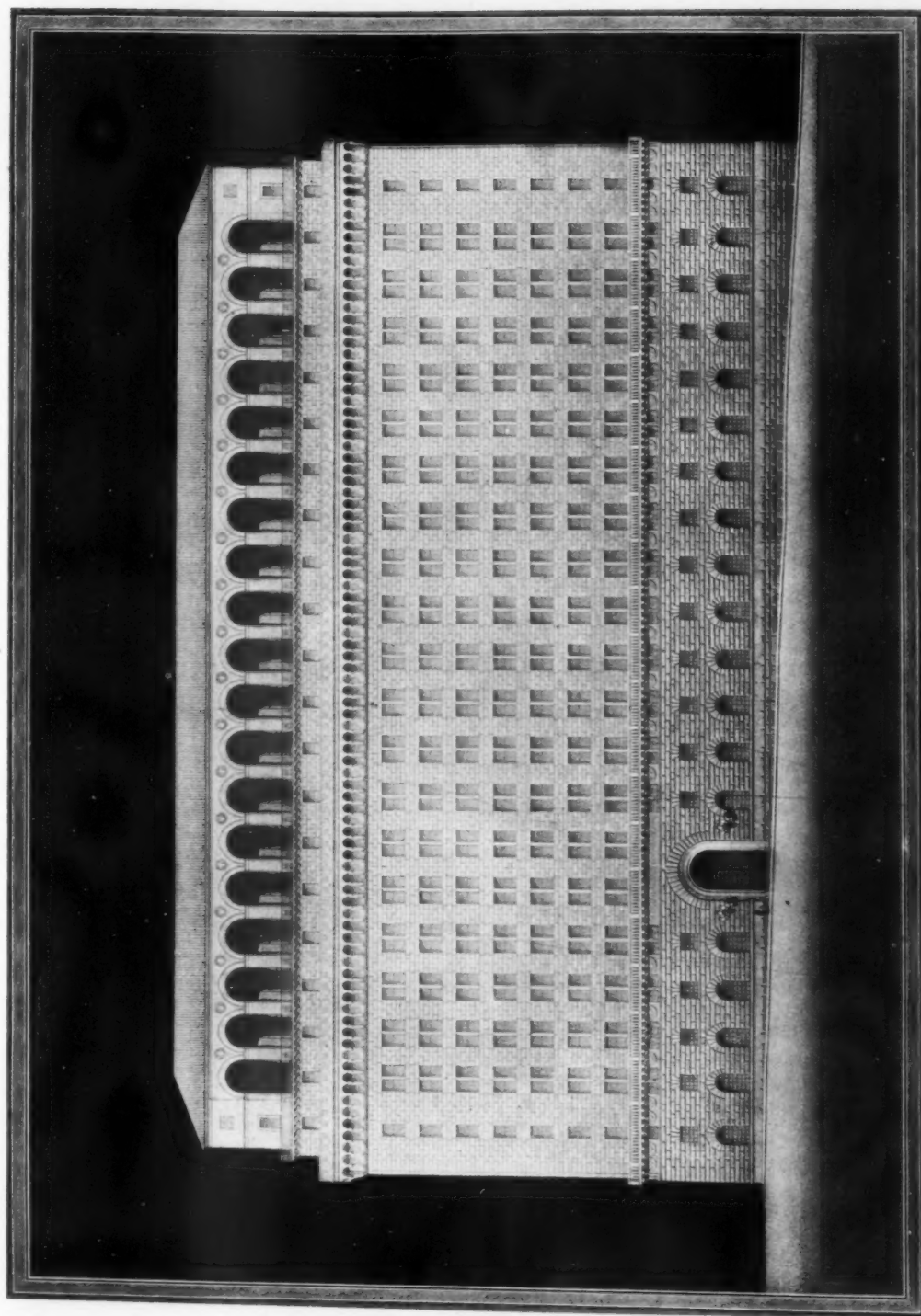
The captious critic who arbitrarily demands that a building shall express in its design the purpose of its architecture, that this expression shall be so clearly set forth that even the layman may read its meaning, can find no fault with this structure. Nor can he quarrel with the way the material will be used and its absolute integrity and honesty of expression.

Further, there are those who claim an artistic inspiration and who indulge a critical license, although they cannot themselves create a work of art. Even this element, a nuisance to all but themselves, cannot with honesty find fault. The end will justify the work and the successful architects will have added another to that type of building in which they have already shown so much proficiency.

As will be noted in reading the program, the material to be used on the exterior of the building has not been specified, but it was left to each of the competitors to state in his written description the kind of material he proposed to use. The architects of the prize-winning designs, Messrs. York & Sawyer, have specified stone as the material, but the particular kind of stone that is ultimately to be used has not yet been determined. The architects in following that part of the program with reference to the introduction of cut marble and ornamental bronze and metal work, have been enabled to simplify the design in the most artistic manner, which has led to a result that for dignity of proportion and restraint as to ornamentation and general architectural excellence of expression is to be very greatly commended.

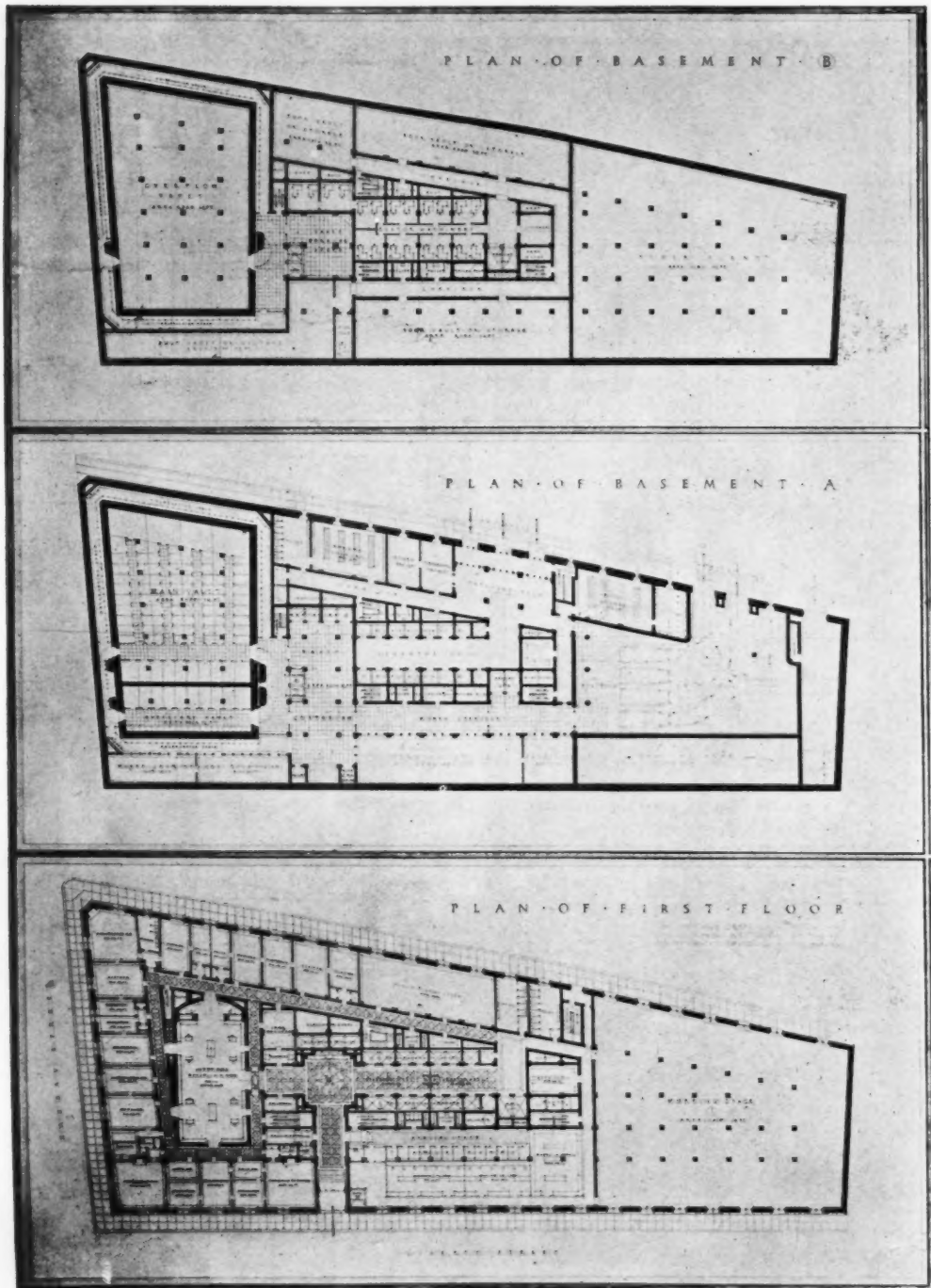
It has been customary when this country has been visited by distinguished foreigners, so to conduct their entrance into the City of New York that they would be impressed by the beauty and the grandeur of the sky line of the lower part of Manhattan Island. In a great many instances, and in other localities where a distant view of a city as it lies grouped on its site, closer inspection often proves that "distance lends enchantment to the view." But

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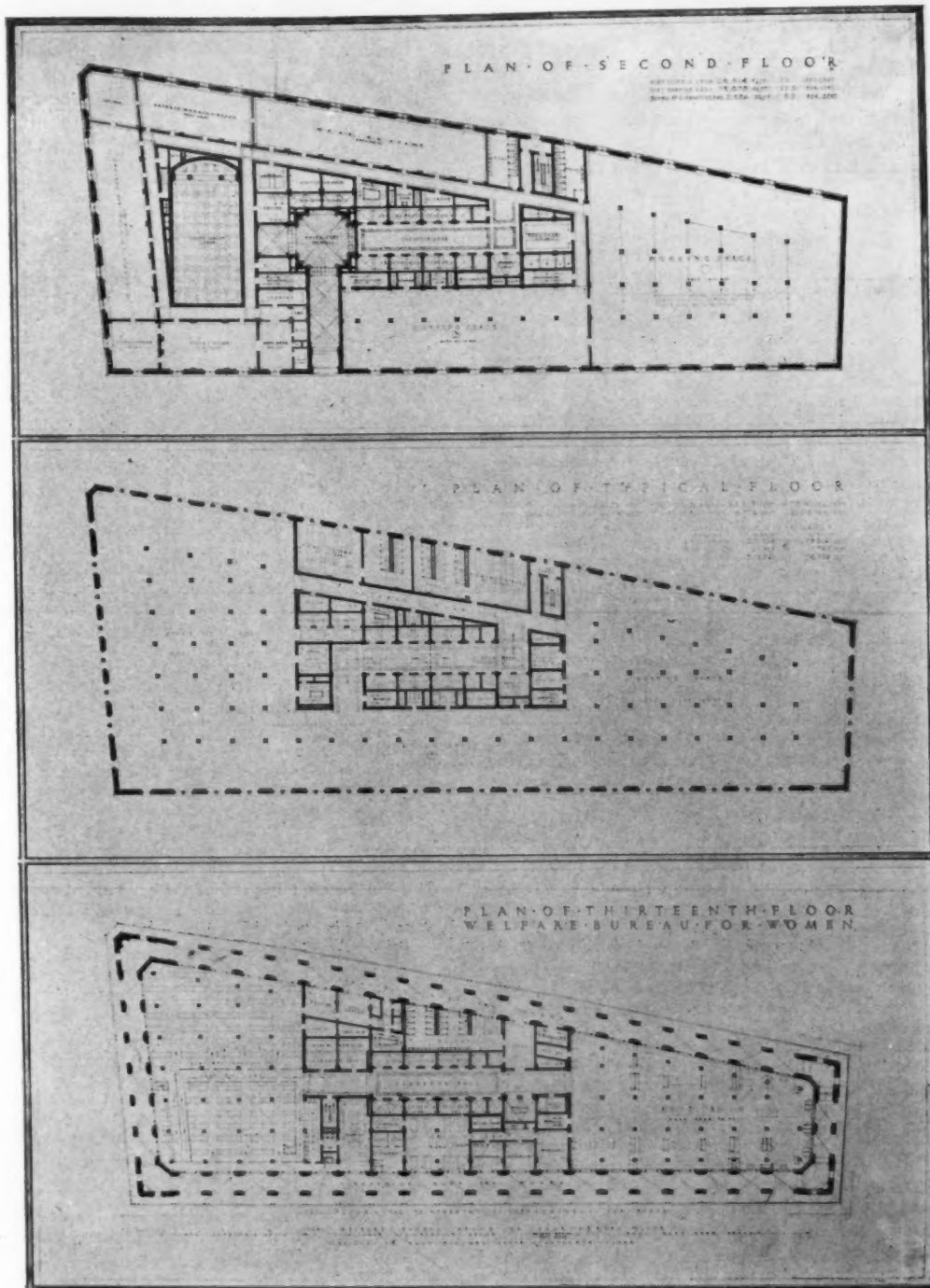
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while conceding the great beauty of its skyline, the critical visitor to Manhattan Island will be strongly impressed with the fact that a closer inspection of its individual examples of architecture lend force to the contention that we are creating a very wonderful city and one that will stand as an architectural marvel of the world.

The addition of a building of such refinement of

design and general excellence of conception as the Federal Reserve Bank further enhances the claim that we are progressing, and in a rapid degree, to a point where this country may be safely said to lead the world in architectural and artistic development as it already leads it in those substantial elements which contribute to the upbuilding of a great nation.

Requirements of the Building for Federal Reserve Bank As Set Forth in the Program

1. GENERAL CONDITIONS.—The accompanying survey shows the plot, exclusive of the building at the easterly end, containing an area of 46,025 sq. ft. This is the net area of the plot after straightening the line on Liberty Street, and cutting a triangle from the western end of the plot in order that Nassau Street may have a constant width of 45 feet from Liberty Street to Maiden Lane. These two alterations to the survey of the building site have been authorized by the Board of Directors. The grade conditions show that there is a difference between the high point (southwest corner of the lot) and the low point (24 feet from William Street on Maiden Lane) amounting to 17 feet, 5 inches. One of the primary requirements is to arrange to drive trucks into the basement from Maiden Lane level so as to deliver bullion, coin bags and securities to the money vaults. This requirement virtually determines the level of the first floor of the bank, since it will be necessary to establish a ceiling height for the driveway and adequate depth for the girders spanning this driveway and at the same time provide for a certain amount of ventilation, since it will frequently be necessary to retain several large motor trucks behind closed doors. For the purpose of this competition the following data shall be accepted by the Competitors:

Height of entrance, for trucks—12 feet.

Clear height of driveway inside of building—13 feet.

Level of first or main floor—17 to 18 feet above basement floor.

The main basement will be designated Basement A. Those below will be called B, C, etc.

The best space in the building for carrying on the work of the bank on the various floors is in the western end. It is essential that those vaults which are to carry in storage government securities, bonds and money should be located under the departments which handle these elements. It therefore appears that the main vaults of the bank will have to be situated at a distance from the motor truck driveway. The delivery of bullion, coins and boxes to the vaults may readily be accomplished by small storage-battery trucks, similar to those operated on platforms of the large railway stations.

2. FOUNDATIONS.—The character of foundations has not been definitely decided upon, but for the purpose of this competition it may be assumed that the entire lot will be excavated to hard pan and the surrounding properties held in place by concrete retaining walls 8' thick. The hard pan may be assumed to be at level—27'. Under this scheme of construction, footings for the steel columns will be laid directly on the hard pan and steel construction

will start at the top of these footings, which may be assumed to stand 6' above the level of the hard pan. This will give a large area which will be available for storage vaults on different levels.

3. BOILERS AND COAL BUNKERS.—Three pairs of boilers will stand in line about 25 feet from the Liberty Street lot line and on the lowest floor at level—21. Over the boiler room and extending into the Basement A space, provide coal bunkers approximately 30 feet by 90 feet, the long dimension being parallel to the Liberty Street wall. It is assumed that eventually soft coal will be used. Coal trucks will enter the building at the extreme eastern end of the plot and will unload under cover into a crusher. From there the crushed coal will be conveyed by a belt system to bunkers and allowed to travel by gravity to the boilers. Ashes will be hoisted into this coal driveway and carted away from that point.

4. DRIVEWAY.—From Maiden Lane, at level 13 (approximately) arrange a motor truck driveway, figuring upon trucks 24 feet long, 7' 6" wide and turning in a curve of 30' radius. Do not attempt a sharper curve. It is planned to use this driveway for the delivery, under cover, of bullion, coins, paper money, securities, etc. Provide an unloading platform where these shipments may be received, placed upon small electric trucks and transferred to the vaults at the other end of the building. Competitors are expected to indicate on their basement plans how they propose to manoeuvre the trucks.

5. CONTROL.—The matter of control of entrances is of first importance and, owing to the great size of the organization and the prospect of an increase in numbers to a point which may make this element of the problem unwieldy, the competitors are requested to pay especial attention to the necessity of limiting the entrances as follows:

- a. One main entrance on Liberty Street for officers of the Bank, visitors and customers.
- b. One employees' entrance on Maiden Lane to be used by all employees below the grade of department heads. It is expected that there will be 4,000, more or less, in the building.
- c. One truck entrance on Maiden Lane for delivery of bullion, money, securities, and furniture and equipment.
- d. Coal truck driveway.

The employees will enter the building at intervals between 8:15 and 9 o'clock. The departments will be required to follow a schedule so as to avoid the danger of swamping the elevator service. Thus, during each quarter

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hour of this schedule, one-third of the whole number of employees would enter the building and a large proportion of that number would use the elevators. The Timekeeper of the Bank would install an organization near this entrance to record the arrivals and departures of employees. Competitors are asked to present solutions of the following problem in control.

It is desired to carry these employees to their respective departments without permitting them to use corridors designed for the public. Space in the basement is not adequate for lockers for all. Those, therefore, who travel to the third floor and to any floor higher than the third will be delivered to private corridors, to which the public has no access, and will go to their departments by way of locker rooms on every floor. Those who are assigned to work in the basement, to the first floor and to the second floor, will use basement lockers and will reach their departments via elevators or stairs without having access to public halls or corridors.

The truck entrance "C" may, if necessary, be accompanied by an exit, i.e., two openings in all. The control would be more satisfactory and less costly if one opening is found adequate, but it is assumed that the radius of action of a truck would be so limited it may be next to impossible to have ingress and egress by the same opening.

The coal entrance is made a separate feature because the handling of soft coal in the manner described is a dirty operation.

6. ELEVATOR SERVICE.—The equipment will consist of the following:

- A main group of fourteen elevators for employees and public, running from Basement A to the roof.
- A secondary group of three or four elevators connecting Basement A with all twelve floors of the bank. These cars should not open upon any public hall or corridor. The best location for them in Basement A would be in the Vault Custodian's room.
- One or two lifts operating from Basement A to the first floor for the use of the tellers, if it should develop that the tellers are not placed where they can use the group of four cars described in "b".
- Two large freight elevators, placed preferably near the receiving platform and running from basement level to roof.
- Two lifts operating inside the Vault Custodian's room and near the vault entrance, which will connect with the overflow vaults under the level of Basement A.

Cars in "a" should be 6' deep by 7' wide.

Cars in "b," "c" and "e" should be planned to carry money busses 30" wide by 42" long, two or three to a car. Each bus is accompanied by one man, who is in charge of it until it is safely in place inside the vault.

Under the subject "Control" the problem of elevator service is described. To provide enough cars to handle bank employees alone and a separate group of cars for the public would result in an over-development of the elevator equipment and the power plant to run it. Suggestions from the competitors are requested, covering this important feature of keeping the public out of the private sections of the bank. For the purpose of this study, it may be assumed that a typical floor will contain two areas—one to which the public has access and one from which the public is excluded.

7. STORY HEIGHTS.—The law permits a height of 154 feet above the mean level on Nassau Street, i.e., above level 25' 4½ inches. Since the level of the first floor will be 5 or 6 feet higher than the mean level on Nassau Street

it appears that the total height available for walls on the building line is somewhat less than 154'—say 148' in all. In fixing the story heights the owner has no desire to limit the freedom of thought or action on the part of the competitors and is establishing only such dimensions as would permit the competitors to feel that they are all following one program.

Let it be accepted that the first floor will have in its western end a ceiling height which will equal the heights of the first and second floors in the other end of the building. Certain rooms in the western end, such as officers' rooms and those used by secretaries and stenographers, would have a ceiling height more or less equal to that of the first floor as expressed in the eastern end of the building. The space over these officers' rooms should be utilized either as an open mezzanine floor with railing and the entire area open to the street windows, or as a mezzanine with closed offices opening upon a gallery. The competitors will be free to design this western end as they please, merely keeping their story height in conformity with the following table:

Level of first floor to be determined by each competitor, following the head room conditions in the truck driveway previously described.

Height from first floor to third floor—30 feet.

Height of each floor above the third—13 feet from floor to floor (average).

This schedule when starting from a level of 31 for the first floor would permit eleven floors to be constructed inside of the height limit of 154 feet. Since it has been the desire of the owner to have a greater area than the area available in eleven floors, the competitors are requested to employ a set-back to house the Welfare Bureau and secure a passageway all around the building. Wherever the word "roof" occurs in the program it will be interpreted as applying to the level upon which this passageway is placed. The question as to whether there shall be two floors or one floor between the eleventh floor and the roof is left to the competitors, since it may be somewhat controlled by questions of exterior treatment.

NOTE: The height of 13 feet, given as an *average* height from floor to floor, should be interpreted liberally—if architectural considerations or questions of lighting the floors immediately above the second floor should influence the designers to have some of the floors higher and some lower than the average, competitors may do as they please within the height limit previously mentioned.

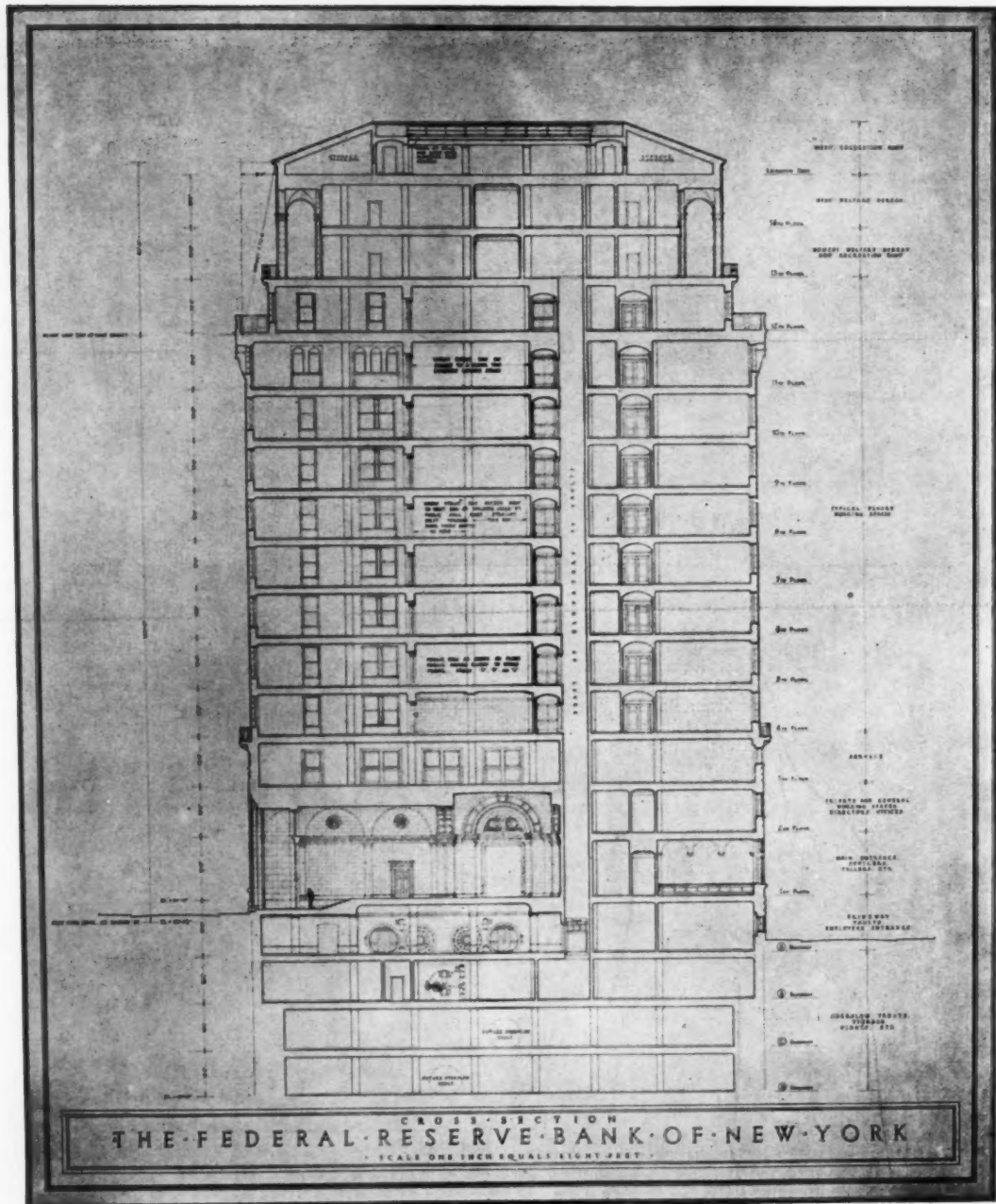
It will be desirable to insert one story, known as the Service Floor, to be used for fan rooms, air chambers, stock rooms (for partition materials), shops for carpenters, painters, glaziers, electricians, etc., and dressing rooms for porters, guards, cleaners, etc. For the purpose of the competition such a story will be placed at the level of either the third, the fourth or the fifth floor. The height of this story would be the same as the average but the ceiling height in certain areas of this floor would be reduced in order to provide space for ducts, steam mains and piping of various kinds. In calculating the available floor space for departmental needs it will be well to consider that this story will be virtually eliminated.

8. BANK VAULTS—GENERAL CONSIDERATIONS:

For the sake of brevity let it be accepted:

- That the vaults will be at western end of the building.
- That they will be planned as required for present and near future needs, on the level of Basement A.
- That expansion will be vertical—two and possibly

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three vaults below the vaults which are on the level of Basement A.

4. That bullion, coin and securities will be chiefly delivered by trucks at the eastern end of the building under cover and transferred by small electric trucks to the Custodian's Room.

SPECIAL CONSIDERATIONS:

On the floor of Basement A there shall be two vaults, each with its own special vault door; one, to be known as the main vault, shall have an interior area of approximately 4,000 sq. ft.; the other, an auxiliary vault, to be used by departments remaining open after the regular closing hour of the main vault, shall have an interior area of approximately 1,000 sq. ft. To insure adequate inspection and protection, provide a passageway entirely around the vaults. It is customary to provide similar inspection both over and under the vaults. This will not be considered in this competition since it will not affect the distribution of space in plan.

VAULT CONSTRUCTION:

The Federal Reserve Board has now under consideration the question of adopting a standard form of construction for all vaults in the Reserve Banks. Pending a decision in this particular, competitors will provide 3' walls in the plans and 2' floors and roof. Heavy circular doors of the latest type will be used. The kind of reinforcements as well as the type of metal lining, if any, to be used need not now be established.

9. BASEMENT FLOOR.—In addition to coal bunkers, truck driveway, employees' elevators, vaults, etc., there should be provided on this floor the following:

Custodian's Room	1,400 sq. ft.
Timekeeper	400 sq. ft.
Men's Lockers	800 sq. ft.
Women's Lockers	800 sq. ft.
Money Laundry	600 sq. ft.
Coin Counting Room.....	600 sq. ft.
Printing Shop	400 sq. ft.
Packing Room	300 sq. ft.
(where bullion, coin, money and securities are made ready for shipment)	

If space is not found for all of these, the printing shop may be placed on the Service Floor and the lockers may be omitted. If it is found that there is room for lockers, they may be placed upon two levels, since the ceiling height in Basement A will probably equal two low stories.

10. PLAN OF FIRST FLOOR.—The main entrance should open into a public hall, which in turn would open into the space assigned to public elevators, and into the space assigned to officers. A large public banking room with high ceiling is not required; instead, the following idea is suggested.

Provide, on the western side of the entrance hall, suites of rooms for eight officers, so disposed about a central lobby or foyer as to be readily accessible, without losing the opportunity for privacy. In addition to the lobby a reception room of generous dimensions is desired, to enable visitors to be comfortably cared for while waiting to fill appointments.

The officers' suites should contain the following:

- A room for the Governor of the Bank, about 600 sq. ft.
- An adjoining room for secretary and stenographer.
- A small wash and toilet room.

A room for the Chairman of the Board, similar in size to the Governor's office, and having adjacent to it similar accommodations for secretary and stenographer, and a

small toilet room. Between these two private offices, provide a conference room, to be used jointly by these two officers, and one or two ante rooms, where callers may sit while waiting to fill appointments.

Six other officers shall be cared for in offices averaging 400 sq. ft., with secretaries' rooms adjoining and with two or three committee rooms. Provide one general toilet room for these six officers. The lobby shall utilize as much of the full height of the first two stories as the designers may prefer, and the competitors are free to express this room on the exterior or to keep it hidden behind two stories of offices, as they may prefer.

The reception room would be equipped with comfortable chairs, lounges, writing desks, reading tables, etc., and may conceivably be used for brief conferences between officers and visitors when the occasion does not demand a private conference room.

On the Liberty Street side and on the eastern side of the main entrance near the entrance hall, provide accommodations for tellers, based upon the following description of the operation of the bank:

The business of the bank is with other banks and not with individuals as depositors. Messengers arrive continuously with bags of money or securities to deposit or with empty bags which are to take away money or securities. These bags, larger than suit cases, represent millions and require special police protection. The time-honored custom of having Tellers' wickets opening directly upon a public space will not suffice. Instead, there should be outer ante-rooms between the Tellers' cages and the public corridors, where messengers may transact business with tellers in the security of semi-private rooms while guards stationed in the public corridor may supervise these operations from a good vantage point. To permit the guards to have full supervision, the partitions of these ante-rooms should be "steel and glass," i. e., glazed with clear glass from a point about 3' 6" above the floor to the ceiling. Tellers' wickets should be of a new type hitherto not in use, to permit the easy passage of large packages. The areas are approximately as follows:

Paying Teller, 600 sq. ft.
Receiving Teller, 600 sq. ft.
Money shipments, 800 sq. ft.

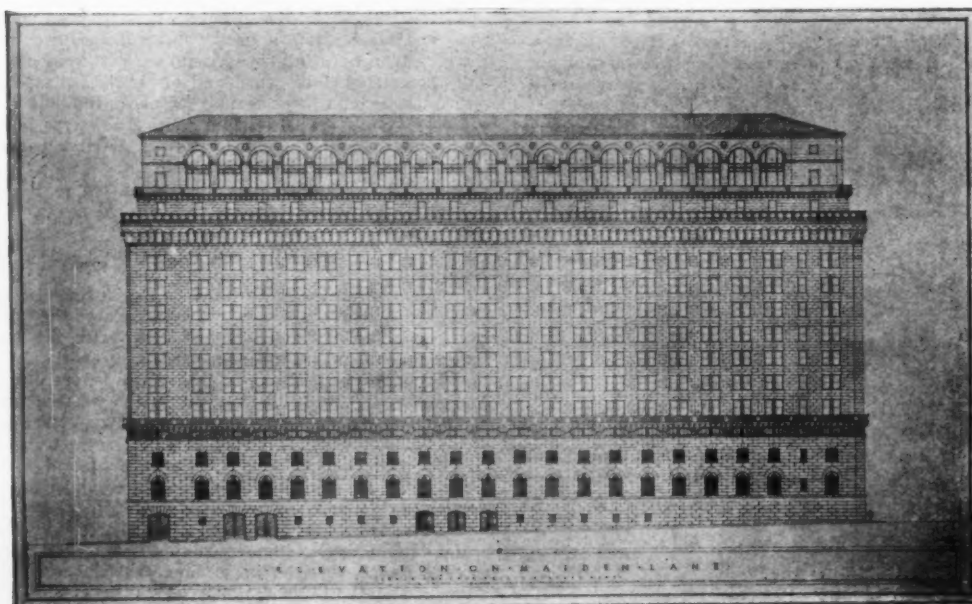
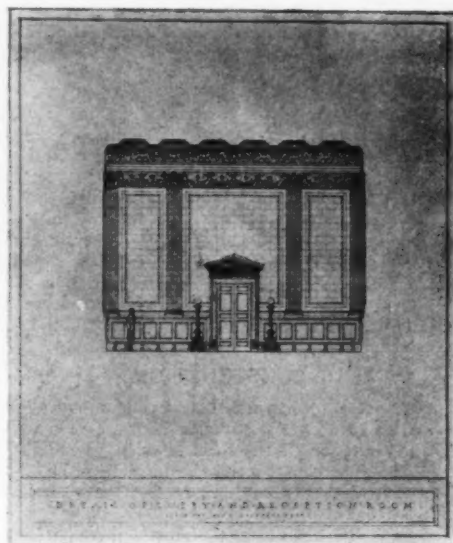
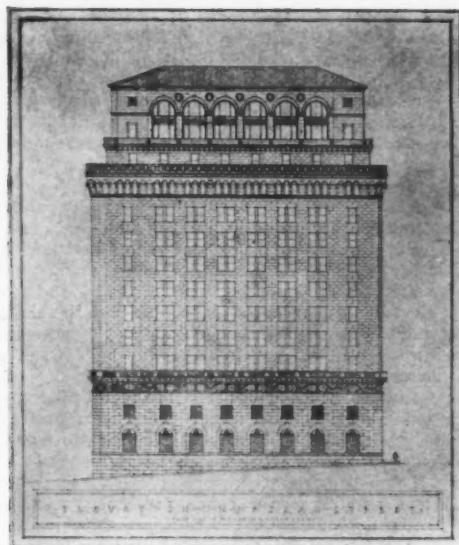
These figures are exclusive of the ante-rooms previously referred to.

Competitors are at liberty to place the Tellers elsewhere on the main floor, but wherever they are placed they should have ready access to a lift connecting with the vaults. If they are placed where suggested, i. e., on the Liberty Street side of the entrance hall, they will be cut off from connection with the group of cars in the western end of the building and will have to have a single elevator for their exclusive use. This may be placed so as to connect directly with the basement passageway required for the use of the small electric trucks referred to under the subject of Bank Vaults.

A Board Room, 800 to 1,000 feet in area, is desired, preferably on the first floor. If this is not practicable it may be placed upon an upper floor. The finish in that room and in the officers' rooms should be confined to a simple low wainscot treatment with a plain cornice and little or no carving on the trim.

11. SECOND FLOOR.—The use of this floor has not yet been determined. The way in which it is planned may suggest the way in which it can best be used. Competitors are requested, therefore, not to attempt to assign space to departments on this floor, but rather to show the circulation, the areas available for subdivision into offices, and the way in which the lobby in the western end will cut

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into the second floor. The plan, therefore, will show the second floor as it would normally appear in the eastern end of the plan and the treatment of the western end (mezzanine or gallery, as the case may be) at the level of the second floor in the western end.

12. WELFARE BUREAU.—On the roof, and set back a certain distance all around the building, provide two stories for the use of this department—one floor to be used for cafeteria service, with kitchens, restaurants, etc., and the other to be devoted to quarters for the medical department, rest rooms, etc. One or both of the freight elevators should be carried up to the main roof level for the delivery of supplies, but not for passenger service.

Competitors are requested to plan the floor which would be used for cafeteria service, indicating the total number which could be served at one time, and to leave the other floor unplanned—merely showing columns, shafts, etc., and figures indicating the area available for the medical department. Separate Dining Rooms for men and women should be shown.

13. STAIRS.—Plans should show provision for at least four stairways, extending from the first floor to the roof. These would be required both for interdepartmental communication and as a means of exit in case of fire. In satisfying the latter requirements they should be enclosed with fire walls or wire glass from the second floor to the roof.

14. TOILETS.—Toilets should be provided on every floor. The density of population per average floor will be about 365 persons, and based upon present statistics, there would be 50% women and 50% men. If there is ample room, it will be well to provide for both sexes on each floor. If not, it will be acceptable to place men's toilets on, say, the odd numbered and women's toilets on even numbered floors. Ultimately some floors will have a much greater density. That point need not be stressed now.

15. LOCKER ROOMS.—These should occur on every floor and should be calculated to accommodate 365 persons on a typical floor—on the basis previously mentioned of 50% for women and 50% for men.

16. UTILITY CLOSETS.—Two of these on a typical floor should be provided for the use of porters and cleaners, and each should contain a slop sink.

NOTE: It is greatly desired that locker rooms, toilet rooms and utility closets on typical floors be located in the same position on the different floors, so that each may be adjacent to shafts for pipes and for ventilating flues.

17. BOOK VAULTS.—On each floor provide two book vaults, designed to contain books, ledgers, records, etc., which are in daily use. The wall construction is properly shown by a 12" indication in plan and the size of each need not exceed an area of 300 square feet.

18. POWER PLANT.—It is suggested that the eastern end of the building, for a distance of about 130 feet west of the Montauk Building, from the lowest level up to Basement A, be allotted for this purpose. No details need be given, excepting that a main shaft for the chimney and for boiler room ventilation of about 80 square feet sectional area and located reasonably close to the power plant, be provided.

19. VENTILATION.—While a scheme for ventilation cannot be worked out until a plan is selected, for the purpose of this competition it may be stated that the use of the typical floors may be such as to require artificial ventilation, and provision should, therefore, be made for a more or less flexible arrangement, if possible. It is believed that this condition would be met if there were provided two main riser shafts extending from the roof to the service floor, one located approximately one-quarter the length of

the building from the east end, and the other the same distance from the west end. Each should contain a cross sectional area of approximately 75 square feet. Reasonably close to each of the shafts and preferably adjacent thereto, there should be provided on each typical floor a fan room, so that ventilating apparatus may be provided on any floor at any time in the future.

It is believed that it will be possible to consolidate all of the ventilating machinery for the floors below the service floor on that floor; hence, if it is possible to extend from the service floor several shafts downward from that floor, through the second and first floors to the basements (particularly in the west end of the building), such an arrangement would be desirable.

20. COLUMN SPACING.—This important feature will be affected by several considerations:

- a. The bank will not rent space to the public, hence a subdivision into many small offices will not be necessary. On the other hand, the typical bay, especially on the upper floors, should be of such width as to permit small offices to be readily arranged where needed.
- b. Owing to the long and narrow shape of the plan, ducts for drawing off the foul air and for supplying fresh air will probably run mainly parallel to the long façades.
- c. As a rule, a plan showing few columns in the large working spaces will be welcomed, but the difficulty of adopting wide spans for girders crossing the building will be appreciated when the question of placing ventilating ducts running at right angles to the girders is to be considered. Ingenuity in the matter of steel framing is an important consideration.

21. CHARACTER OF THE BUILDING.—The Directors of the Bank desire to avoid the appearance of extravagance and high cost which frequently is associated with a modern bank building. They hope that the competition will result in the selection of an architect who will co-operate with them in that idea, to the end that a building may be constructed which would have the dignity and style which a building of the importance of the leading financial institution of America deserves, but which, at the same time, would be free from ostentation and from any attempt to impress through elaboration of detail or through the use of costly and showy materials. While it is accepted that the business of the Bank in many of its departments is much like that of a commercial house or mail order establishment, it is felt that the architectural atmosphere, as evidenced by the taste shown in the exterior and the interior treatment, should be of a high order and should express the solidity of the financial system of the United States and the high character of the transactions which are to be carried on under its roof.

The material to be used on the exterior is not to be specified in this program. It is important, however, that each competitor shall state in his written description the kind of material he proposes to use in his exterior treatment. The competitors are reminded that the light situation on this property is as bad as it is anywhere in New York, because of the narrow streets and the high buildings nearby, and that any treatment which sacrifices light and air for the sake of obtaining monumental effect on the exterior would not be regarded as the logical means of approach to a solution of the problem.

On the interior, expense is not to be spared in connection with durable construction and the use of fireproof materials. An extensive use of costly marbles and ornamental bronze and metal work should be avoided. A certain amount of both of these materials will doubtless be

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necessary, but it is hoped that this Bank may demonstrate the possibility of the development of a building which, through its simplicity of detail, its beauty of proportion and the taste with which materials and colors are used may set a standard for governmental buildings which will be of a far-reaching effect. In this connection it is not necessary that the competitors shall concern themselves with the quality of finish and materials which will be used in the halls, corridors and work-rooms above the first floor

of the bank. It may be assumed that all of that detail will come up in connection with the working plans and specifications. The architectural treatment of the interior will be indicated on the sections and in the typewritten description which has been requested. The architecture of the exterior will be similarly described in the typewritten statement and shown as adequately as possible on the rendered elevation which has been called for among the drawings to be submitted.

Does Plate-Glass Fade?

Several years ago a contract was taken to supply a vertical installation of prisms in a store front of a haberdasher's in the main business thoroughfare of Indianapolis, Ind. To install the prisms properly it was found necessary to cut off 5 ft. from the top part of the plate-glass, which had been in position for a number of years and exposed to the sun's rays during much of the time.

After the prisms had been installed the five-foot piece of plate-glass salvaged was thoroughly cleaned and polished and consigned to stock for resale. In the course of time this salvage piece was sold, to be used in a front window of a new residence in one of the principal streets in the fashionable residence section. The house was completed and the owner, having taken possession, was thoroughly enjoying the new home, when the family began to receive telephone calls of a rather puzzling and perplexing nature, asking the price and how quickly delivery could be effected in various quantities of *Shirts Made to Order!* A certain wag in the community called up the owner complaining that he, the owner, had made a mistake in building a shirt factory in that neighborhood, and that if he persisted in operating a factory in his residence, in all fairness and consideration to his new neighbors he should at least remove all advertising from his front window.

The daughter of the house becoming thoroughly provoked and annoyed at what she presumed was a practical joke of some sort, proceeded to make an investigation on her own account, which resulted in the writer's being requested to call at the house. He was greeted at the front door by Mr. Owner and asked whether the plate-glass furnished was really first grade or second hand? To the reply that, from a close inspection at that moment, it was a beautifully polished high-grade piece of plate, and to all appearances absolutely without blemish, he assumed a knowing smile and asked me to walk down the street with him a short distance, when, turning

abruptly at perhaps fifty paces, he asked me to look at the window. To my astonishment plainly legible at the particular angle at which we stood were the words: JOHN DOE—SHIRTS MADE TO ORDER.

What seemed to be a phenomenon was easily explained. Previous to the plate-glass being removed from the show window of the haberdasher, there had been pasted to it white enamelled letters, "*John Doe—Shirts Made to Order.*" These letters being subjected to the direct rays of the sun for a period of years had prevented the fading of the glass (originally green) to a clear white, as was the case with that portion which was not immediately back of the opaque enamelled letters. The unfaded portion consequently stood out in contrast in its original green, but was not discernible except at a certain angle.

Subtleties of the Cenotaph

An odd thing in connection with the Cenotaph in London, is that artists have been uniformly unsuccessful in drawing it. Not a single rendering of the many that have been noticed has been strictly accurate, states the *Architects' Journal* of that city. One error in particular is almost invariably perpetrated. Readers who have examined the monument closely will remember that on both end elevations, just below the level of the crowning sarcophagus, there is a ledge upon which rests a wreath. This ledge is peculiar to the ends only, the sides rising to the base of the sarcophagus with an uninterrupted vertical face. Yet artists persist in showing the ledge returned on the side elevations. This mistake may perhaps be partly due to the "joint" which is shown at the same level in the artificial stone, but it is more probably the result of an easy habit of taking things for granted. The Cenotaph is not the crudely simple and obvious mass that some of its critics think it to be. It has many refinements that are only apparent to the discerning eye.



Our Industrial Plight

NO question to-day is of greater significance than that looking to the industrial well-being of the nation. With dissension where there should be harmony, with strikes where there should be production, with mutual antagonism where there should be co-operation, the question everywhere uppermost is how to overcome these divergent forces and supplant them with a better working plan.

To do this it is first necessary to state the causes of this general discontent; for general it is, since those interested in its exaggeration have no difficulty in building an interest in pernicious practices on an already expanding foundation.

The cause dates back 150 years to the period when industries were carried on in the privacy of a home, on the individual terms desired by each worker; when each worker's product was a thing complete in itself and not a small part of a process in an elaborate performance, as to-day. At that time the worker and his apprentice had a common pride in their product. The apprentice could see what part he played and where his importance lay. There was personal intercourse between him and his one employer. There was a feeling of mutual respect and confidence between them.

Then came machines. Costly and bulky, a separate place was needed for their operation. The home no longer remained the workshop. Factories sprang up, and where one formerly had worked to complete a product, now hundreds worked, and no one employer could maintain the same basis of friendliness that had previously obtained. The personal relations which had existed were rendered impossible and the spirit of mutual interest became lessened.

THUS was bred distrust and suspicion, and each party thought of its interests as antagonistic to instead of allied with those of the other. A mutually exclusive attitude quickly developed, a blindness on the part of capital sympathetically to understand the feelings of labor, and a blindness on the part of labor sympathetically to un-

derstand the feelings of capital. And there we stand to-day.

In those days, prior to the industrial revolution, the functions of capital and management were usually combined in the employer, and he was constantly in touch with his employees. In both was the identity of the community. When differences arose they were quickly adjusted. At present grievances may be nursed indefinitely, due to the intervals between meetings of representatives of each group. If the old-time feeling of confidence might be restored between employers and employees most of the present-day labor problems would be ended. To do this, certain facts must be brought to mind.

THERE are four classes in every industrial undertaking. (1) Capital which supplies the money. (2) The laboring class which contributes its effort. (3) The managerial class which co-ordinates the capitalist and the laborer. (4) The public which regulates through its representatives, the government, the methods of procedure in the undertaking. Without either one of these four any industrial undertaking is foredoomed. Without money, without executive discrimination, without labor's efforts, without community government, and consumption no enterprise can reach completion. Each group is mutually interdependent for results upon the co-operation of the other three, and therefore we come to the crux of the present situation, which is the economic plea for representation of each group in the councils of every industrial organization.

To capital, having invested its money, a fair return upon its investment should be yielded. To labor, sufficient remuneration to assure proper living conditions should be guaranteed, and to the community a useful service is due in return for furnishing systems of credit and transportation and maintaining law and order. It is obvious that there is a common interest for all four classes and that instead of antagonism a partnership attitude should be observed. The question is how to establish once more the personal relations and spirit of confidence that used to exist. The answer would seem,

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adequate representation of the four parties in the councils of industry.

The modern method of manufacture is responsible for a certain detachment and isolation of the worker, who instead of following the product through from start to finish and realizing that he is the creator of a useful article, now devotes his efforts chiefly to countless repetition of a single act or process which is but one of perhaps a hundred operations required to transform raw materials into a finished product. He loses sight of his significance in the whole aspect of the work, and it is thus the more necessary that he have contact with men engaged in the other related processes. Where such contact cannot be accomplished by direct means, representation must be resorted to. Only in this way can the common interest be recovered and preserved, the individual interest safeguarded and the general welfare promoted.

IN a book, "Industry and Humanity," by Hon. W. L. Mackenzie King, the Canadian economist, these things are set down in a scholarly manner. With years of the most exacting experiences behind him, this writer is eminently fitted to discuss the labor problems now confusing the world.

Having fully developed the idea of adequate representation, he stresses the need for *frequent* meetings of these representatives, else grievances are nursed and further misunderstandings born. The idea is to be implanted that industry is a social service whose prosperity is of interest to everyone (for everyone comes under one of the four groups) rather than an institution whose purpose is to enable certain individuals to acquire wealth and to profit, quite irrespective of the well-being of those who perform the actual labor. Another idea is to appoint an industrial judiciary who shall see that justice is done to each group.

Still another and very interesting suggestion is one proposing that each trade have a statement of policy in the nature of a magna charta, discussing points of possible disagreement and setting forth in

advance just what is expected of each group involved.

Statements bearing on this topic set forth by John D. Rockefeller, Jr., in his address at the Reconstruction Conference held last winter at Atlantic City, were printed in *THE AMERICAN ARCHITECT* at that time, and give the results of a practical carrying out of investigation and experiments along these lines in the Standard Oil Co. of New Jersey, the Colorado Fuel & Iron Co. and others. Unqualified success has rewarded these efforts, success for both labor and capital.

THE industrial problem is indeed a complex one.

It is an economic problem, involving wages, hours and conditions of labor. It is a social problem, involving the mental and physical health and the social welfare of the individual worker, the family and the community. It is an ethical problem involving fairness, justice and liberty to the employer, the employee and the public. A complex problem involving many specific problems among which are the labor of women and children, immigrant labor, prison labor, the organization of labor, insurance, unemployment, industrial education, the conduct of labor warfare, and the interests of the public in the industrial problem. These of course might each be discussed at length did space permit.

Perhaps the most comprehensive and far-reaching document ever prepared on this subject is the program of the British Labor Party. Here are presented the aims of labor, but in the broadest sense as including the work of hand and brain, and the benefits to the community are not in one instance ignored or slighted. In fact they are the ultimate object to be attained.

In all these efforts one thing is insistently apparent. It is the need for adequate representation of the four elements in industry, for the purpose of realizing the common interest and promoting the general wholesomeness of thought and act so earnestly to be desired.

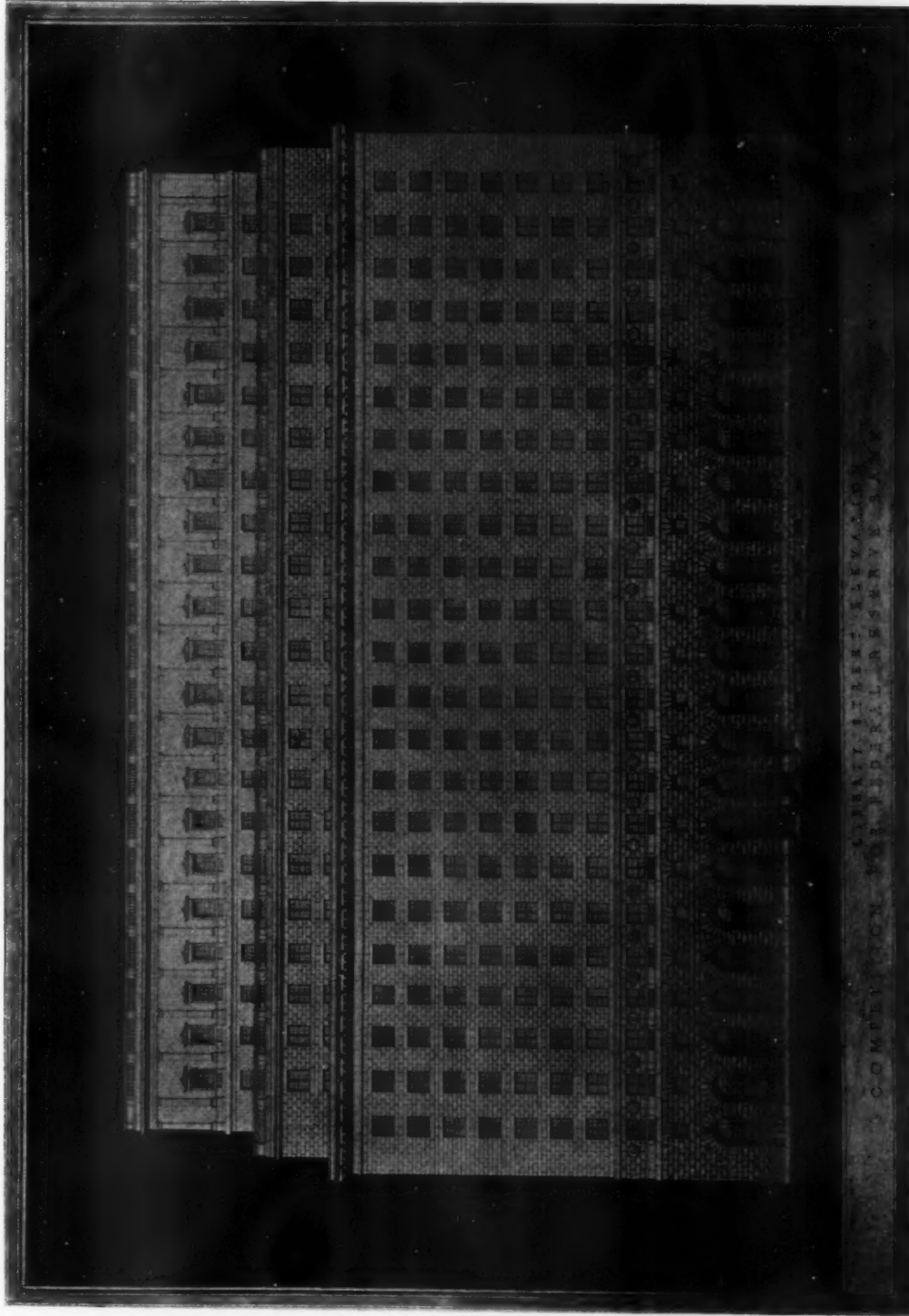
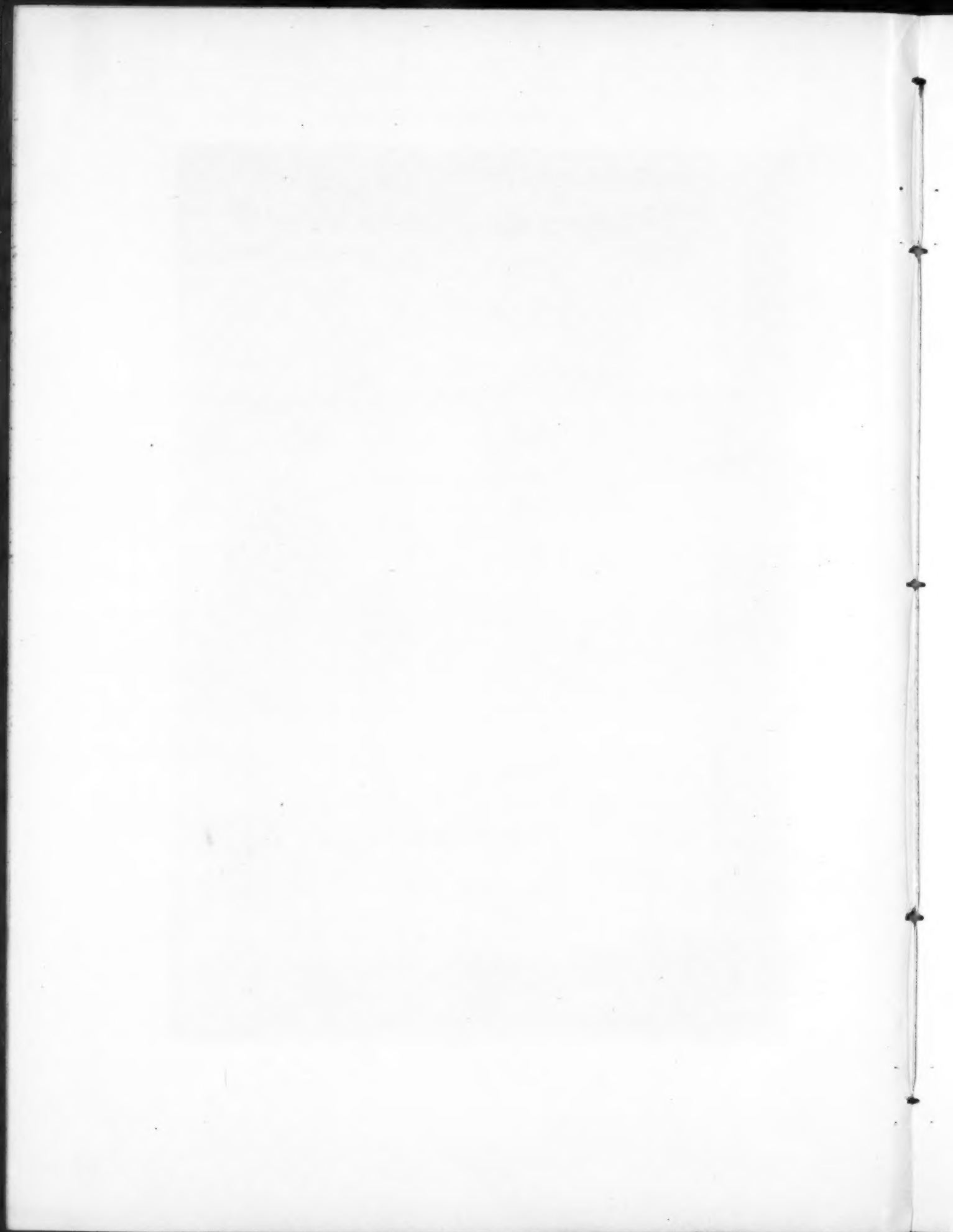


PLATE 156

DESIGN SUBMITTED BY CASS GILBERT, ARCHITECT
COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK



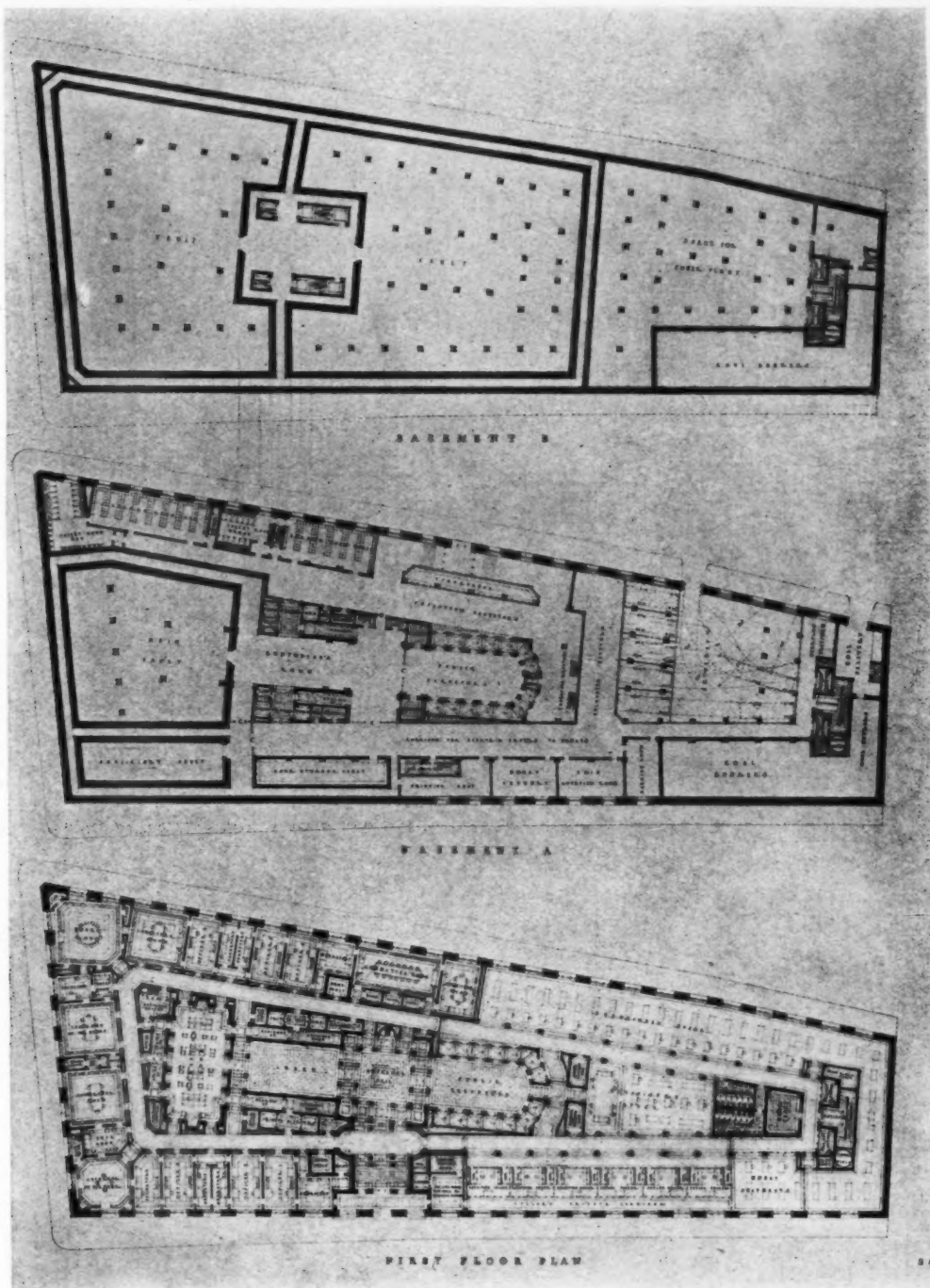


PLATE 157

DESIGN SUBMITTED BY CASS GILBERT, ARCHITECT
 COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

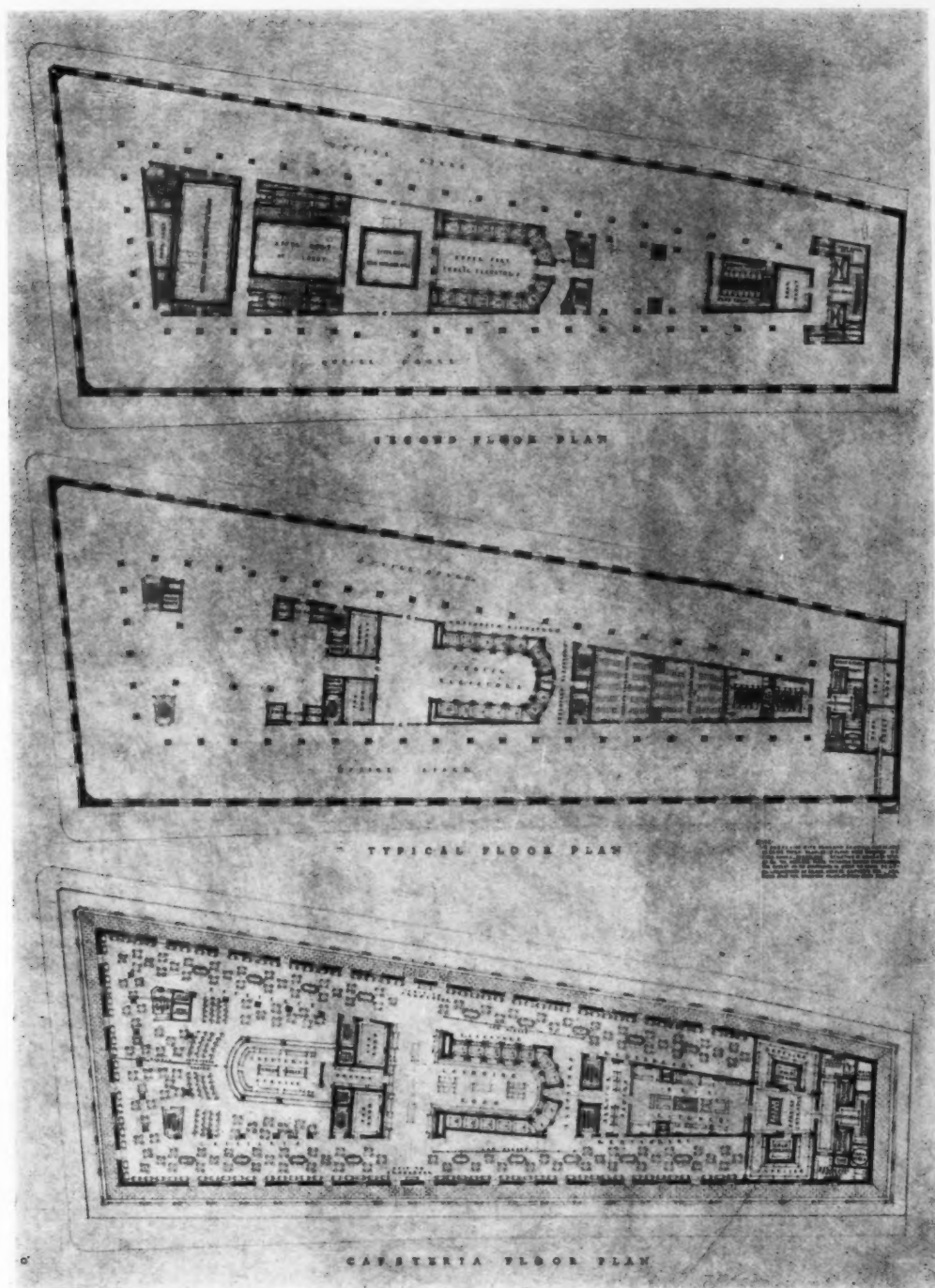


PLATE 158

DESIGN SUBMITTED BY CASS GILBERT, ARCHITECT
COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

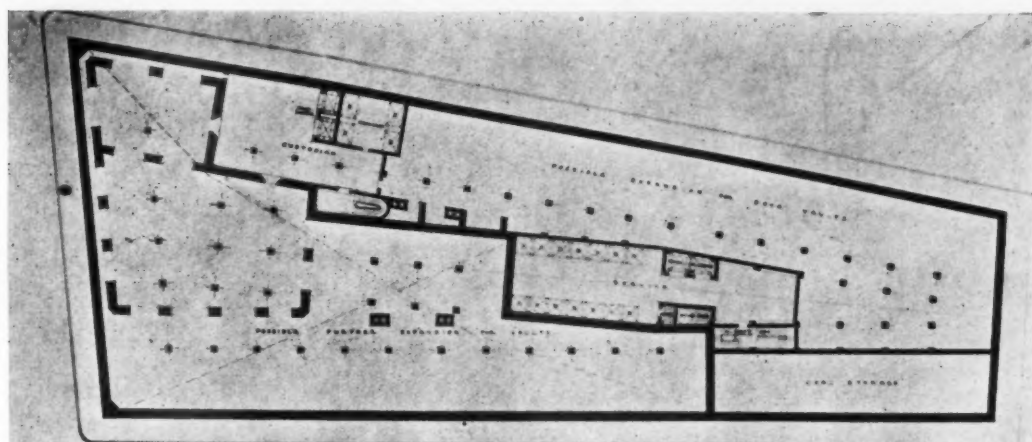




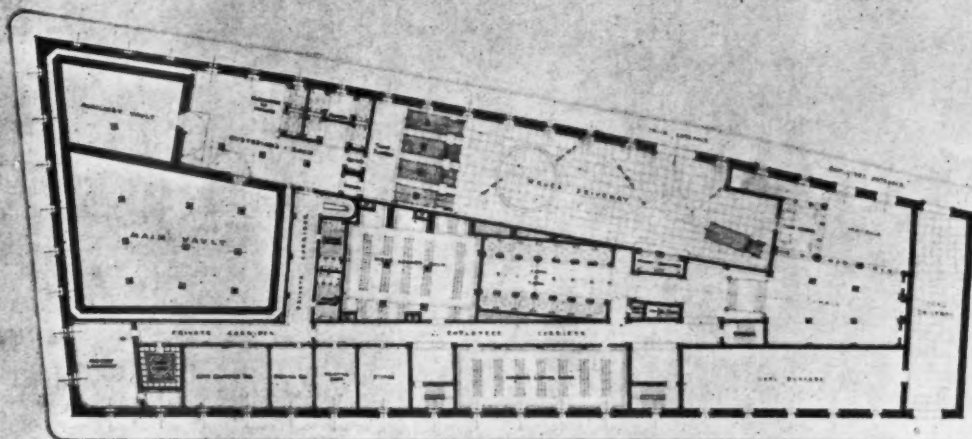
PLATE 159

DESIGN SUBMITTED BY DELANO & ALDRICH, ARCHITECTS
COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

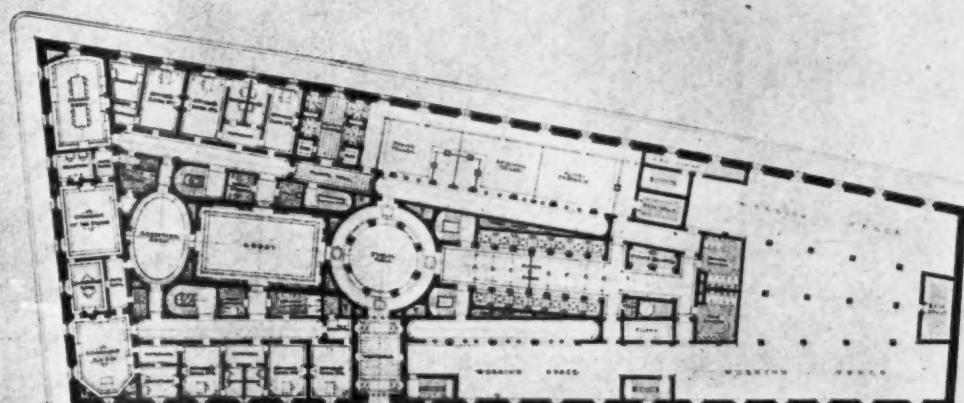




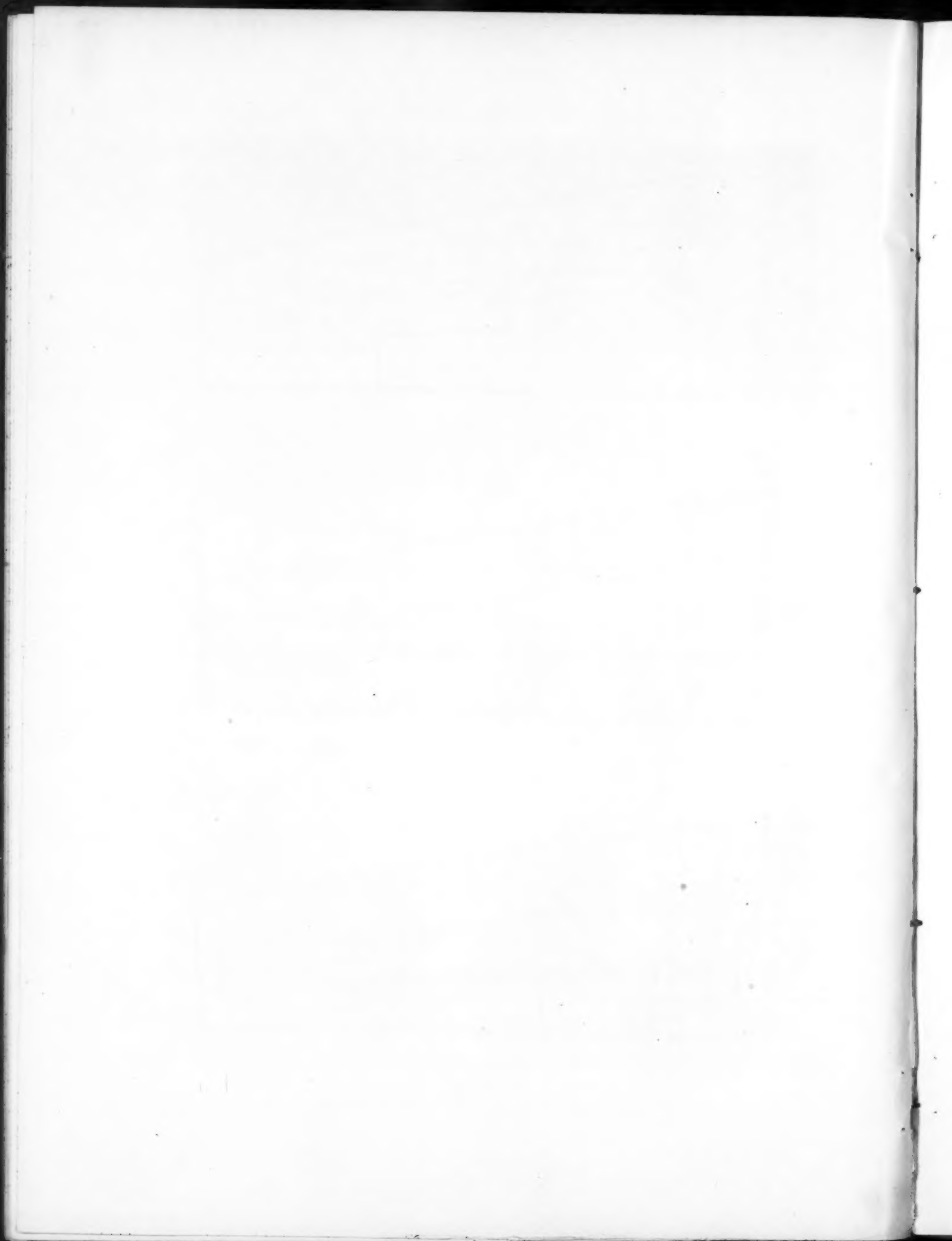
PLAN OF BASEMENT 'B'

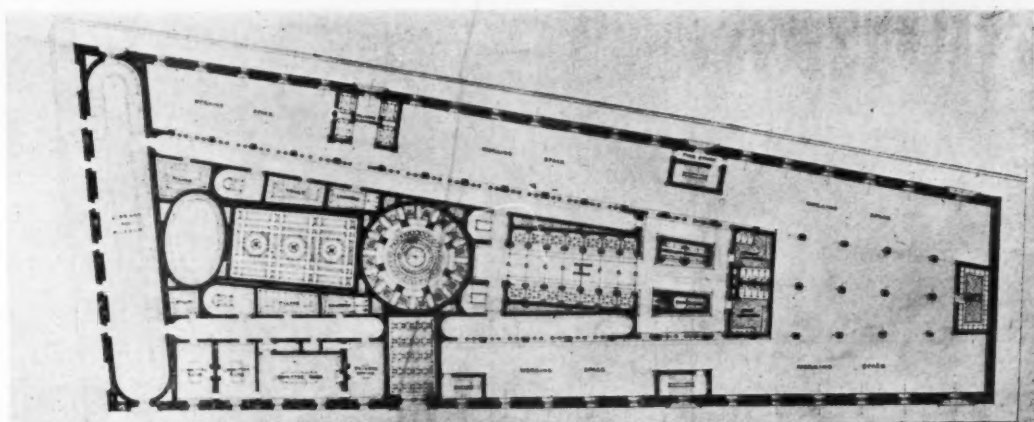


PLAN OF BASEMENT 'A'

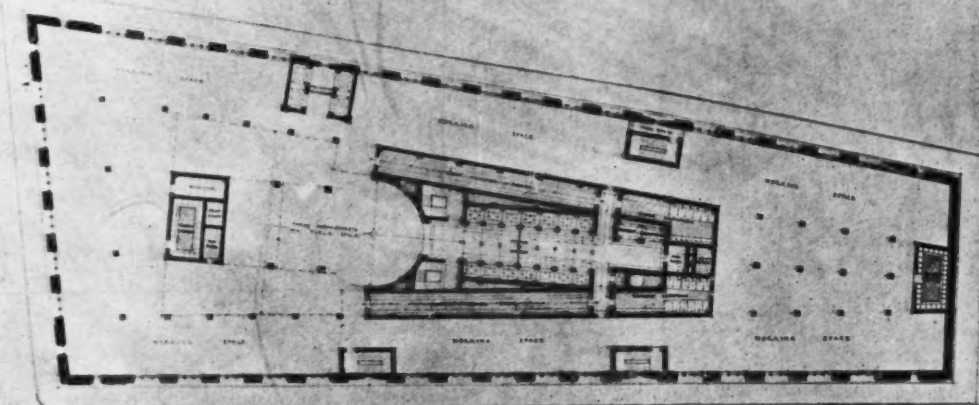


PLAN OF FIRST FLOOR

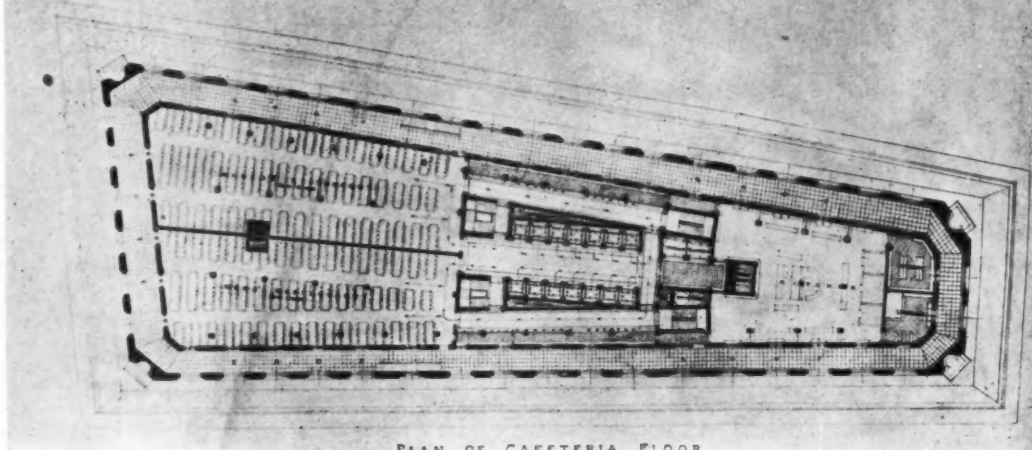




PLAN OF SECOND FLOOR



PLAN OF TYPICAL FLOOR



PLAN OF CAFETERIA FLOOR

PLATE 161

DESIGN SUBMITTED BY DELANO & ALDRICH, ARCHITECTS
COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

Current News

Late Happenings and Comment in the Fields of Architecture and the Allied Arts

Competition for Design for Park Improvement in New York

The Municipal Art Society of New York is to conduct a competition to secure designs for the improvement of the small triangular park in Greely Square bounded by Broadway, Sixth Avenue and Thirty-fifth Street. R. H. Macy & Company are offering, through the Municipal Art Society, first, second and third prizes for such designs as meet with the approval of the jury.

The architect or draughtsman submitting the winning design will also receive, if it is carried out, compensation for his services in its execution.

The competition is open to all architects and draughtsmen living or having a place of business in Greater New York. Six weeks will be allowed for the preparation of drawings, and applications for the program should be made to the secretary of the Municipal Art Society, 119 East Nineteenth Street, New York City.

The Year's Plans at the Massachusetts Institute of Technology

The Department of Architecture of the Massachusetts Institute of Technology announces its plan of instruction in design that has been developed for the coming year. It is believed to contain certain elements that are new which may be of interest to the members of the architectural profession as well as to prospective students.

The instruction in design has been placed in charge of Professor Gardner and the following special instructors have been appointed to act in association with him: Stephen Codman, Edwin S. Dodge, Ralph H. Doane, and Harry C. Stearns.

It is believed that all of these men have unusual qualifications for teaching, and their professional training has either directly or indirectly the background of the *École des Beaux Arts*. They have been selected with the view of organizing a teaching staff which shall have a common understanding of the aims and methods of school training in architecture, which will insure a spirit of co-operation and which will give to the course in design a degree of homogeneity and continuity never before realized.

The five instructors associated for a common purpose will guarantee a breadth of view obtainable in no other way. They will form a committee with regular meetings one evening each week, to discuss matters relating to instruction and to act as a jury to grade and criticize the problems. All of the programs for all grades will be written by one member of the committee. This is a new feature, a most important one, which we believe will insure the correct relations among the programs and produce a more systematic course in design than is usual in American schools. For this particular work Mr. Codman has been selected because of his fitness, experience,

and interest. He will in the main confine his services to the writings of the programs and to attending the committee and the jury meetings. Messrs. Dodge and Stearns will alternate in the instruction of the fourth and advanced years, and Messrs. Doane and Stearns will deal similarly with the third year. Professor Gardner will take charge of the second year work in which he has been so successful in the past.

Since all of the new instructors will continue the active practice of their profession, the oft-recurring criticism that the schools lack contact with actual practice of architecture is met at least in part. The new instructors are anticipating their duties with an enthusiasm which presages for the department a return to the promising outlook which obtained before the outbreak of the war.

It is proposed to include in this scheme the occasional joint problems with the Harvard School and the Architectural Club which have proved so stimulating both to the students and the instructing staffs.

It is to be regretted that owing to exacting professional interests, Professor Ralph Adams Cram feels that he must sever his connection with the Institute as a member of the faculty, but has consented to continue as a special lecturer and will still have charge of his courses in Philosophy of Architecture and in History of Medieval Architecture.

France Is Rebuilding Rapidly

Captain André Tardieu, member of the French peace commission, speaking at a meeting of the French-American Club, gave interesting figures on the reconstruction work accomplished since the armistice. Sixty thousand of the 550,000 houses in the battle area wrecked by shell-fire have been rebuilt; 2,016 kilometers of the 3,246 kilometers of railway destroyed have been repaired and 700 of the 1,675 kilometers of canals made useless in the course of hostilities are again in commission. Of the 1,160 manufacturing plants destroyed by the enemy 587 have been repaired.

Equally remarkable progress is being made in restoring to cultivation the vast areas in the devastated regions, which the end of the war left with their rich surface soil plowed under by artillery fire. The devastated area embraced 4,500,000 acres. Of this, approximately 1,000,000 acres have been returned to the farmers and 500,000 acres are ready for the seed. Ten million meters—more than 6,000 miles of barbed wire have been disentangled and carried away in the operation.

The yield of taxes, which was 5,000,000,000 francs in 1913, has been raised to 12,000,000,000 francs in 1919.

Commissioner Tardieu added that a country which had lost nearly 2,000,000 workers killed or incapacitated by war, which had been deprived by invasion of one-fifth of its productive capital and which, nevertheless, of its own efforts had made such a showing as that recited above has a right to rely on the effective help of its allies to restore completely its economical and financial status.

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Looking for Another Pompeii

During the war archeological excavations were continued at the Italian colony of Syrenaibca on the north African coast, and now comes the news that what has been found already promises the uncovering of another ancient city as important as Pompeii. Once the spot was a Greek colony, with the civilization of Greece transplanted to the soil of Africa. The work has been carried on during the war under the supervision of Prof. Lucio Mariani, director of the archeological service of the ministry of the colonies, and the prediction is now made that the newly discovered city will eventually prove actually richer than Pompeii in its evidence of a past civilization. Here have been found already statues of the Graces, a Hermes, an Eros, an Alexander the Great and, most impressive of all, the Aphrodite of Cyrene, which is said by certain connoisseurs to be a fair rival in beauty to the Venus of Milo and the Venus of Cnidus. The discoveries have extended over a good many years. It may be added, however, as an illustration of the modified joys of archeology, and the introduction of a new mystery into the history of art, that the Aphrodite of Cyrene lacks both head and arms. The world may wonder what she looked like as well as what she was supposed to be doing.

Contractors to Make Labor Survey in San Antonio

A tabulation of skilled and unskilled labor employed by general building contractors of San Antonio, which will be based on the efficiency of each individual, without regard to union affiliations, will be started by local contractors in the near future. This plan was agreed upon at a meeting of fifty local contractors, when it was decided to employ a special agent to compile the data as soon as possible.

The index will show whether a man is a finished or rough workman, and what particular work he is best suited to. Bricklayers, plasterers and carpenters will be the first trades to be classified, according to E. D. Oeffinger, as many of the union workmen of these trades are out on strike. The system, it is believed, will facilitate the filling of requirements for labor as needs may arise.

More Plans for Safety

The National Safety Council announces an affiliation with the University of Cincinnati for the purpose of carrying out a program that is unique—almost radical—both in the fields of education and accident prevention and that opens a new and promising avenue for the service of the council.

Briefly, this program includes the establishment of an industrial medicine division at the University of Cincinnati where medical students and graduate physicians will be given special training not only in industrial medicine, but in industrial relations, including sanitation and all the fundamentals of safety work as well. This school, which is already under way, is unusual in many respects, chief among which are the following:

1—The student physicians alternately spend part of their time in school and part in the field among the industries of Cincinnati, Dayton and other Ohio cities, receiving actual experience in the work for which they are being prepared.

2—The enterprise was conceived by and is being financed by the industrial leaders of Cincinnati and the vicinity.

who have guaranteed a fund of about \$40,000 annually for five years.

3—In addition to the regular courses, special courses will be given in such subjects as (a) the medical, industrial and safety problems arising from the coming of women in industry, (b) public health and (c) hospital management.

4—The facilities of the school include an industrial research laboratory where physical conditions menacing the health of employees arising in industry will be brought up for investigation and solution. How can dust be eliminated in a certain plant? Is this gas injurious? How may the lighting problem of a peculiarly arranged factory be solved? These and all similar problems arising among the industries represented among the students and sponsors of the Department of Industrial Medicine will be tackled at the industrial research laboratory.

This plan being carried out jointly by the College of Medicine of the University of Cincinnati and the Cincinnati Local Council of the National Safety Council which represents the first attempt in America to train doctors for industrial work, in the opinion of C. W. Price, general manager of the National Safety Council, promises much for other cities.

The Cincinnati plan provides for the co-operation of the National Safety Council not only with the University of Cincinnati, but with the general educational system of that city. The secretary of the Council will give twelve lectures on school and public safety in the teachers' college of Cincinnati, so that the teacher in the making will be prepared to pass on such instruction to young America.

Archeological Treasures Found in Macedonia

Military excavations, trench making, etc., carried on in the Greek parts of Macedonia during the war by the allied armies, have brought to light a large number of antiquities, such as ancient instruments, vases of geometrical design and jewelry of iron, silver and gold of great archeological value. Further discoveries were made during investigations carried on during the war by the Greek archeological service, and tombs of the fifth and sixth centuries before Christ had also been discovered. These antique articles, which have been taken possession of by M. Pelekides, director of antiquities, prove that the civilization which existed at that ancient time in Macedonia was identical with that in Greece.

Points Out Freedom from Fire Peril in One-story School House

CHICAGO, ILL., October 29.—With the opening of school this fall the shortage of school buildings is everywhere emphasized, for comparatively few of the several hundred thousand new school houses which the Department of Labor announced in the spring as necessary, have been built, according to a bulletin issued by the National Lumber Manufacturers' Association.

The one-story school house, no matter of what material built, has disposed forever of life peril, with reference to the terrible menace of fire; and cannot be excelled for beauty and low cost, says the Bulletin.

This type of school house has many advantages over other kinds, aside from the greatest one of freedom from fire peril. There are no stairs to climb, no room wasted in halls and stairs, no sweeping of dust from one floor to

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another, no overhead noise; quicker exits and better light and ventilation are obtainable.

The bulk of American suburban schools are of wood construction, 6,000 small schools in the State of Nebraska alone, in 1917, give some idea of the tremendous volume of rural school building in America. An idea now widely applied in the standard types of industrial buildings deserves consideration for one-story school buildings. This is the slow-burning or mill-construction floor design, in which the interior frame and floors are of timber, arranged in heavy solid masses and smooth flat surfaces so as to expose the least number of corners, and to avoid concealed spaces which may not be readily reached in case of fire. This type of construction will not only mean freedom from life peril, which the one-story structure insures by its very nature, but it will reduce property damage to a minimum, while at the same time providing a substantial structure at a low cost, with beauty and adaptability to change or addition. If such a building is partially destroyed, there is much material salvaged.

North Dakota Law Assists Prospective Home Owners

North Dakota is helping to solve the home-building problem. It is doing this through the state-controlled Home-Building Association, the Bank of North Dakota and the Home Buyers' Leagues, each composed of ten depositors.

"Special efforts shall be made to secure deposits from children, young people, renters and wage-earners, in order that more people may own their own homes." That is a sentence from the Home-Building Association law of North Dakota, the law which makes it easier for a poor man to buy or build a home in North Dakota than in any other state in the Union. The North Dakota Home-Building Association, two months after it began business, had applications on file for the building of 250 homes.

A person opens a deposit with the association. When he has deposited 20 per cent of the total cost of the home he desires to build, the association builds the house, pays for the lot, hires the architects and carpenters—does all the work until the house is completed. Thus, if a depositor wished to build a \$5,000 home he would have to deposit \$1,000 first.

For the remaining \$4,000 the association would take a mortgage, running for from ten to twenty years. On this mortgage the buyer pays 6 per cent interest. He also pays 1 per cent on the principal for administration and surplus. Twenty per cent of the cost is represented by the buyer's initial deposit, 50 per cent is loaned on a mortgage by the Bank of North Dakota, and the remaining 30 per cent is represented by the collective credit of the home builders, who become members of the association.

"Primary idea behind the Home-Building Association," said John N. Hagan, commissioner of agriculture and labor and a member of the North Dakota industrial commission, "is to keep the farmers on the farms and enable them to have decent homes to live in." The management of the Home-Building Association is in charge of the industrial commission, composed of the governor, the attorney general and the commissioner of agriculture and labor.

One interesting clause in its law is one which calls for the organization by its patrons of Home-Buyers' Leagues, each composed of ten depositors. Each Home-Buyers' League must be authorized and registered by the association, and each member of a league is held liable for all debts due the association from his league, to the extent of 15 per cent of the price at which he bought his home.

French Artists Unionizing

Sisley Huddleston, writing in the London *Daily Chronicle*, states that trade-unionism is in prospect for all the arts in France. In Paris the high cost of everything an artist or writer needs is driving him to take some means like collective bargaining to escape extinction. Not long since we read that Paris would be the future bourn of the student, since none from an Allied country would go again to Germany. Those already on the ground, however, are blue enough over the present conditions to predict even the passing away of Montparnasse and Montmartre as centers of student life.

Often, he states, the artist is poor, and he is hit very badly not only by the increased cost of living, but by the higher price that is demanded for the tools of his trade.

From these two districts of Paris I have received a great number of complaints from my poor artist friends. How are they going to begin again, they ask, when paints are so expensive? Before the war their stock in trade was an item which they need not seriously consider. Now a piece of canvas has augmented in value to an unheard-of extent. Oil colors and artists' material in general stand at an impossible figure.

Add to this the fact that an atelier can not be had except at a rent which is prohibitive, and you have some idea of the perturbation that is experienced in the artistic circles of Paris. Many of these young men and women are, of course, French, but it is a cosmopolitan world of art in which English and Spanish and Italian and American painters meet in happy confraternity.

The case of the sculptor is even worse. I know a young Italian who is just beginning to "arrive." He has just been compelled to pay over 6000 francs for a block of marble which would probably have been obtainable for 1500 francs some years ago. In order to execute such orders as he has he is obliged to pay a workman 28 a week. He manages to keep going, but what of his penniless comrades who are just beginning again after the war?

No wonder that they are talking of forming a trade-union of artists. Exactly what they would do if they were banded together, against whom they could revolt, is hard to see. The same desire to form trade-unions is to be found even among the writers and "intellectuals" generally. In a famous café of the Quarter poets and novelists have held many meetings. It is useless to point out that there cannot be an eight-hour day for the poet. It is wasting words to suggest that the novelist can hardly go on strike. In spite of these obvious truths they want to join the Confederation Generale du Travail.

The decision of the publishers to raise the selling price of books from 3 francs 50 centimes to 7 francs is no doubt commercially justified, but from the point of view of the young French writer it is disastrous. How is he going to make himself known? Who will buy his books? The public can deprive itself more easily of books than of sugar, and doubtless will not care overmuch. Such authors as Anatole France, Henri Bordeaux, and Maurice Barres will always find purchasers, but the little community at Montparnasse and at Montmartre, who work conscientiously and who hope some day to find their merits recognized, are plunged in consternation. For them the book at 7 francs is the end of all things.

If Paris really finds its artistic and literary centers wiped out it will, indeed, by a strange Paris. Doubtless many of the members of the little coteries are without great value, but it should not be forgotten that out of them emerge the men who keep the French spirit alive, who carry on the torch of European civilization. It is a grave matter, not only for them but for the world.

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Building Homes for Employees

The idea of having large business institutions build homes for their employees, and of allowing them to appropriate a certain percentage of their salaries in payment, is a key which can be made to open more than one door, states the *Dallas News*. The building of every such home is a contribution to the relief of the housing problem, and that problem has become a sore vexation in every community, and not only a vexation, but something of a menace as well, since rents have been advanced to a point that makes them operate as a brake on commercial and industrial progress. It relieves an economic distress which, probably, most salaried men are beginning to feel acutely, for the payments can be made less than the monthly rental that is being exacted, in most instances, if not in all. It must be conducive, too, to the cultivation of more cordial relations between employers and employees, and give the employer a better assurance of retaining the services of employees thus aided. In last analysis, it amounts to the employer's lending his credit to his employee at a cost to the employee less than he would have to pay if he used his own with money lenders or house builders, while the idea can be applied in a way which gives a guaranty against loss to both employer and employee.

Ten Commandments of Finance

In an article appearing in *Business*, Prof. Charles W. Gerstenberg, Director Department of Finance, New York University, gives ten rules to be followed by those who would be successful in retail storekeeping. Here they are, and it may be remarked that they are applicable to architects, builders and building material manufacturers, as well as to the retailer:

1. Don't engage in a new business until you have made a careful, unprejudiced estimate of its capital requirements and of its chances of making money.
2. Don't try to raise money until you have demonstrated your ability to use it.
3. Take all available means for acquiring all the capital you and your business can profitably use.
4. Don't engage in unprofitable side lines.
5. Don't count your profits until you've repaired your capital.
6. Keep your property on the firing line.
7. Keep enough cash on hand to meet emergencies and to seize opportunities.
8. Don't be penny wise and pound foolish.
9. Watch your investment eternally.
10. Know when to quit.

Story Hours at Metropolitan Museum

The Sunday story hours for children at the Metropolitan Museum, New York, conducted by Anna Curtis Chandler were resumed this month. These story hours are given at 3 o'clock in the lecture hall of the Museum and are illustrated by stereopticon slides. No tickets of admission are necessary and adults as well as children are invited. The general plan of the work is to take some picture or object of art in the Museum and connect it in the minds of the children with its historical background. This, however, is done discreetly with the charm and vivacity of a fairy tale, and art is made to seem to the child exactly what it is, an expression of joy in beauty. It is an opportunity for parents who wish their children to become familiar not only with different periods of art, but with the spirit of art, flowing from century to century in all the countries of the world.

News From Various Sources

Bureau of Railway News and Statistics says that increase of 4 cents an hour granted by President Wilson to railroad shopmen involves \$45,000,000 yearly.

Major P. Thornton Marye, before the war a prominent Atlanta, Ga., architect, has resumed his profession in that city, having recently received his discharge from the army.

Frank H. Simonds, in *Washington Star* writes under title, "Two Great Alliances in Europe Predicted." States that signs of return of balance of power are unmistakable.

F. W. Perkins, in address before National Civil Federation of New York, Sept. 11, declared that profit sharing on a frank and fair basis was the only solution of present industrial unrest.

A contract has been signed by both this and the French nation for the purchase by France at \$400,000,000 of all A. E. F. property in France except that which is allotted for return to this country and for the use of troops still remaining in that country.

Wall Street Journal states that a single naval architect is now preparing designs, plans and specifications for various merchant craft, consisting of cargo boats, passenger ships, colliers and bulk oil vessels exceeding \$50,000,000 in value, when completed.

A new heat insulating material, composed of a mixture of a special clay and cork, has been discovered by a Norwegian engineer. The clay and cork mixture is burnt, and the result is the formation of a very light substance that is said to be eminently suitable for all heat insulating purposes.

Mr. Robert W. Stewart, architect for Y. M. C. A. Red Triangle, after service in England and France will be associate. Firm James R. and Robert W. Stewart, architects and engineers, Lincoln Inn Court, 519 Main Street, Cincinnati. Samples and literature of building materials desired.

A new fuel, made from fuel oil, is to be placed on the market by the New Motor Fuels Co., St. Joseph, Mo., which has just been incorporated for \$5,000,000. The fuel will be manufactured by a process invented by S. M. Herber, of St. Joseph, and is intended for internal combustion engines of all kinds.

One of the biggest real estate transactions ever put over in northwestern Indiana and recently closed, is a fore-runner of a community housing project involving the expenditure of from \$12,000,000 to \$15,000,000. The Indiana Homes Co., composed of Inland Steel interests, has purchased a big tract of land and will build 2000 homes. This will provide for an addition to the city of Indiana Harbor of about 10,000 persons.

According to International Institute of Agriculture, total land area of the world, excluding the polar regions, is about 30,000,000,000 acres. What proportion of this is productive agriculturally is not definitely known, but Institute has collected data for 36 countries having total land area of 15,071,209,000 acres, of which it is estimated that 4,591,691,000 acres, or 30.5 per cent, are productive, and 1,313,832,000 acres, or 8.7 per cent, are cultivated land.

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Announced in *Wall Street Journal* that air raids cost London over \$75,000,000.

Reports received from the Orient state that American firms having branches in Peking have formed an American Chamber of Commerce there.

Announced from Paris that Poland will send to France 100,000 workers, including cultivators, miners and masons, who will be employed in rebuilding devastated district.

Announced from New York that strikes have cost United States \$10,000,000 a day in last eight months, in opinion of Stephen C. Mason, president of National Association of Manufacturers.

In article in London *Daily Chronicle*, Frederic Harrison strikes a deep note of warning to British labor and makes a strong appeal to labor leaders to use efforts to avoid "the chaos into which our country seems to be hurrying."

The world is short 62,463,000 tons of coal, according to testimony of H. Y. Saint, head of the export department of the United States Shipping Board, before the Senate sub-committee conducting an inquiry into the coal situation.

Review of the month for September, Federal Reserve Bulletin is devoted mainly to a discussion of cost of living, foreign exchange, foreign trade and foreign

financing problems. Voices warning that nation must hew to a policy of increased production on one hand and reduced consumption on other if high prices are to be brought down.

Office of Directory of Sales announces that entire surplus of brass held by the War Department, consisting of approximately 150,000,000 pounds, is now being offered for sale under sealed bids. Each Bureau of War Department holding title to surplus stocks of brass will, from time to time, issue invitations to users of brass to submit bids on the whole or a part of that Bureau's surplus stock.

Announced from Phoenix that Arizona Resources Board, organized under and act of last Legislature, is directed to gather data and to recommend means for development, conservation, control, and regulation of water resources, covering related subjects of irrigation, drainage, flood control, utilization of water power, water development for agricultural, mining, stock raising, industrial, municipal and domestic purposes, with due regard to rights of State and people.

Bureau of Mines is to be divided into Investigation and Operation branches with an assistant director in charge of each branch. Under Investigations branch will come mineral technology, fuels, mining, petroleum and experiment stations. Under Operations branch will be a chief clerk, division of education and information, mine rescue work and Government fuel yards.

Financial and Commercial Digest

As Affecting the Practice of Architecture

Units of Service

Interest on Part of Industrial Institutions Will Prove Helpful Factor in Solution of Present Problem of Labor Unrest

THAT the problem of marketing of both merchandise and service can be reduced to the selling of units of service, is the opinion of the committee studying marketing problems on behalf of The National Association of Corporation Schools. Whether \$30.00 or \$50.00 is paid for a suit of clothing is not, in the opinion of this committee, as important a factor as the number of units of service the purchaser will receive for the amount paid. For example, if the \$50.00 suit will give service for twice the length of time that satisfactory service can be had from the \$30.00 suit, it is not only cheaper but from every other viewpoint desirable to purchase the \$50.00 garment. The same contention is made regarding the services of an individual. If the earning capacity of an individual is greater than the average of individuals, then the reward must also be proportionately greater.

In the United States the expression has often been made that while engineering has been reduced almost to a science, progress in the solution of marketing problems has been most unsatisfactory. So far as known, the report made by this committee is the first constructive effort to reduce the vital factors in marketing to a constructive arrange-

ment with definitions of these factors and their importance in the problem. The report lists these vital factors under eighteen different headings, and concludes that fourteen of the sub-divisions are now receiving quite general recognition, but that four of the elements of efficiency are wholly lacking in present-day marketing methods. The fourteen sub-divisions of the marketing problem which have received recognition are listed as follows:

1. Promotion—Prospectus.
2. Initial or Partial Organization.
3. Selection of Manufacturing Site.
4. Buildings and Equipment.
5. Purchase of Materials.
6. Manufacture of the Products.
7. Permanent Organization—Production and Finance.
8. Man-Power.
9. Cost System.
10. Active Selling—Organization and Marketing Operation.
11. Credits.
12. Collections.
13. Handling of Inquiries, Orders, Complaints, Adjustments.
14. Service.

In making the surveys and studies preliminary to the preparation of the report, the committee had as its laboratory some of the largest industrial organizations in the

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United States, including the United States Steel Corporation, the Westinghouse Electric and Manufacturing Company, and the United States Rubber Company. Under the different sub-divisions, the report defines in detail each factor in the sub-division. In the introduction to the report the committee says, "the underlying thought of this report is that the salesman is selling units of service represented by the product he is attempting to sell, and to do this properly he must be made intelligently interested in everything pertaining to the making and developing of his product and the motive of his company in marketing same." The committee concludes that the four vital elements of efficiency lacking in present-day marketing methods are:

1. Standardization.
2. Preparations for Marketing.
3. Associations or Societies whose functions would be to eliminate waste on established uniformity of methods and unification of effort.
4. The development of personnel in marketing divisions of industrial institutions.

The factors which enter into these vital elements of marketing efficiency are also set forth in detail.

The National Association of Corporation Schools, which now includes in its membership one hundred and forty of the larger and representative industrial institutions of the United States, maintains headquarters in New York. It is the purpose of the Association to ultimately select a site somewhere in the territory bounded by the Potomac River on the South and the Mississippi River on the West, and there build the "Industrial and Commercial University of America." Plans are now being worked out for the establishment of this institution. Within the territory defined approximately eight per cent of the industrial and commercial life of this country is carried on. Effort will be made to raise a million-dollar endowment through appeal to officials of large wealth who represent industrial institutions. The first course to be given at the new university will be designed to train competent personnel workers for industrial institutions, such as educational directors, employment managers, welfare managers, managers of thrift activities, to include stock ownership and profit-sharing, directors of activities designed to keep the workers healthy and also to study Employee Representation Plans, or as now more commonly phrased, Co-operative Management in Industrial Institutions. The need for an institution of this kind has become very apparent.

In discussing the need for more extensive training of sales courses, the committee says:

"Having selected men of the adequate native capacity for the particular positions to be filled, the degree and kind of education they have acquired are of equal, sometimes greater, importance than the matter of native capacity itself. A certain degree of general education should be a requirement for every man in every particular job. Cultural education, of various degrees, is essential in many positions, if efficiency is to be achieved. In many positions technical education holds the position of highest consideration, but technical men very often limit their success and usefulness by too much indifference to general and cultural knowledge. This tendency to contentment in narrowness will continue unless employers demand higher standards of general knowledge, technical knowledge being equal. The best stimulation, through this result, is to give preference in recognition and promotion to men of general knowledge, if their technical knowledge is equal.

"Nature's fundamental laws and elements are singularly few, yet the variations of these elements are countless and

constitute the infinite omnipotence of the Creator. Every variation has a specific purpose. Man's mentality is more varied than the leaves of the forest and each human being has a persistent tendency, inclination or aptitude for certain lines of endeavor in which his nature will find the easiest and best expression within his limitations. Fit the job to the man, not the man to the job; it is easier and more profitable in the end. The selection of the job for the man requires scientific treatment, the nature of which is a special and new study and beyond the scope of this paper, and it deserves special treatment.

"Every industrial training course should embody, at least, a limited instruction upon the company's entire manufacturing and distributing activities, giving its general policies relating to the various co-ordinated departments. Breadth of view is as essential to the growth and progress of the individual as is intensive training for specific duties. Not until each department realizes the co-ordinate value of every other department can the family spirit of business loyalty and pride stamp the institution as a whole, and give to it proper sequence and smoothness of action.

"Every company that handles a general line of products of a broad trade classification divides, subdivides and subdivides again certain products, requiring the general engineer and salesman, the specialist and the super-specialist. Often an article is not of sufficient volume of sale to demand more than one or a few super-specialists, hence the economic advantage of training specialists for certain 'group' or related products of particular products which a certain class of trade utilizes.

"The general salesman in such a company is usually one who handles certain customers, rather than certain lines of classes, hence he must have a working acquaintance, though not specialized, with the company's entire line and policies.

"Special training for each such activity should be formulated and made both a co-ordinate and a specific educational function."

The committee which made the studies and the investigations and rendered the report from which we have quoted has been continued and materially enlarged to give representation to a large number of different lines of industry.

The new duties assigned to the committee for investigation, study and report are:

- a. To continue the study of the vital factors in marketing and the elements of efficiency lacking in present methods.
- b. Successful methods of training for marketing in typical industries.
- c. The basis for training in important branches of marketing.

Other committees which are studying "The Problems of the Relations of the Public Educational Institutions to Industrial Requirements," "The Problems of Employment and to Define a Model Employment Department," "Employee Representation in Management," "Labor Turnover," "Office Work Training," "The Training of Executives," "The Training of Technically Schooled Young Men," "The Problems of Trade Apprenticeship Training," "Skilled and Semi-Skilled Labor," "The Problems of Unskilled Labor and Americanization," "Training for Foreign Commerce," "Profit-Sharing and Allied Thrift Plans, which may be utilized in Industrial Institutions," "Analyzing the Requirements of the Task for which Employees are Engaged," "Health Education," and "The Application of Psychological Tests and Other Measuring Devices to Industries," will make their reports to the convention next June.

Department of Architectural Engineering

The Behavior of Concrete Columns Under Fire Test

PART II.

By WALTER A. HULL*

THE results obtained from the first series of tests conducted by the United States Bureau of Standards and described in Part I of this article seemed to indicate that reinforced concrete columns in which gravel was used as the coarse aggregate were unreliable under the action of fire, and serious failures might result in buildings constructed of concrete using this type of aggregate. On the other hand, gravel is very often an economic necessity in reinforced concrete construction in certain localities. For this reason the later investigations were conducted with a view to making gravel concrete columns more fire resistant. The scope of the tests was also extended to include test specimens composed of additional aggregates, both in round columns with vertical and spiral reinforcement and in vertically reinforced square columns. The previous tests demonstrated clearly that the various aggregates show their fire-resisting characteristics most strongly in columns of these two types.

With the exception of columns cast in forms made from gypsum, all the columns were made 18 in. in diameter if round, or 16 x 16 in. if square, and 8 ft. 9 in. long. As in the columns previously reported, one proportion, 1:2:4, has been maintained throughout. Concrete was mixed and placed by hand. The consistency was somewhat less fluid than that ordinarily obtained with machine mixing, being that resulting from the use of a weight of water approximately 8 per cent of that of the total weight of the dry batch. It might properly be called a quaking consistency. When first mixed it would stand in a somewhat flattened mound without spreading out over the floor. The concrete required considerable poling in placing. There was very little tendency for water to separate and rise to the top; when the form was filled to overflowing the overflow was mortar, for the most part, rather than separated water. Columns, whether fire tested or not, did not show a tendency to give top failures.

*U. S. Bureau of Standards, Pittsburgh, Pa.

In all tests, the working load of the column was kept on the column during the fire test. In most of the tests the load has been increased at the finish of the fire test, up to the ultimate strength of the column or to the capacity of the testing apparatus. If the column withstands the 600,000 lb. load, it is permitted to cool, transferred to a 10,000,000 lb. capacity testing machine and tested in the larger machine until failure occurs.

Data in condensed form, giving results of tests of round columns from additional aggregates are given in Table I. In considering these results, in connection with the results of tests previously published, it should be taken into account that most of these newer tests were made at ages slightly greater than four months, whereas the earlier ones were made on columns considerably older than these, most of them older than six months.

Columns 42 and 43 were of gravel from Long Island. This gravel was made up almost entirely of smooth nearly white pebbles, fairly well graded as to size. These columns behaved in a manner similar to that of the columns of the same type from Pittsburgh gravel, already reported. The protective concrete commenced spalling early in the burn. In the case of column No. 42 a portion of the reinforcement was exposed within the first thirty minutes of firing, and in column No. 43 this occurred within forty-two minutes. In both cases the larger part of the protective concrete had broken up and fallen off before the end of the first hour of firing. The spalling, while similar in nature to that of the Pittsburgh gravel columns, occurred somewhat earlier in the test in these pure quartz gravel columns. Rapid expansion was indicated by the fact that it was necessary to operate the valve on the test pump, letting oil out of the jack, to prevent the load on the column from increasing. As in the earlier tests, temperatures in steel and in load-bearing concrete increased rapidly after the protective concrete began to fall off.

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The so-called Cow Bay gravel was made up of a mixture of pebbles, mainly of three kinds. There was a large proportion of large pebbles of coarse-grained granite and a considerable proportion of large pebbles of gneiss. Most of the other pebbles were of quartz. In the fire tests the columns from this gravel showed the same general tendency as those from pure quartz gravel, but the spalling did not start as early in the test nor proceed as rapidly. In columns 46 and 47 it was over an hour and thirty minutes before the load-bearing portion of the column was observed to be exposed to an important extent. In all the columns from the so-called Cow Bay gravel granite pebbles were shattered in the outer portion of the columns. Gneiss pebbles were reduced to loose-grained masses, so utterly devoid of bond that it was difficult to recover the remains of a pebble in its original form. The individual quartz pebbles in this aggregate and also in the pure quartz gravel showed only a comparatively slight tendency to disintegrate or disrupt in the fire test.

The blast furnace slag aggregate was obtained from the vicinity of Pittsburgh. It was furnished by the Duquesne Slag Co. In the fire tests of the columns from this aggregate a lively snapping was heard in the early part of the test, principally within the time between the first fifteen and the first thirty minutes of firing. The sounds resembled the popping of corn and appeared to be caused by miniature explosions just beneath the surface of the concrete. A few vertical cracks, very fine and apparently of no importance, appeared in the course of the tests. There was no spalling.

The trap rock aggregate was from New Jersey. It was fine-grained and well graded. Observations during the test on the behavior of these columns showed no spalling and no cracking of importance.

In Table II the results of tests on square columns of additional aggregates is given. The general behavior of the square column from the pure quartz gravel was similar to that of the square columns from Pittsburgh gravel reported last year. Spalling was noted in No. 44 after thirty-three minutes of firing and in No. 45 after forty-five minutes. In both cases the spalling at the corners continued rather rapidly, until, after the end of the second hour, most of the concrete outside the vertical rods had broken loose and fallen away. In the latter part of the burn cracks appeared in the sides of the columns. These columns, like those of the same type from Pittsburgh gravel, were very much shattered after failure.

In the square columns from blast furnace slag and from trap rock no spalling and practically no cracking took place in the fire test. In the case of the columns from blast furnace slag, the same minia-

ture explosions in the concrete next to the surface were noted as in the tests of the round columns from slag concrete. Evidence of these disturbances was left in the form of shallow pits over the surface of the concrete. The general observations on the behavior of slag and trap rock columns during fire test have been similar to those on columns from limestone concrete reported last year, namely, no spalling and no cracking of importance.

TABLE I

18-in. cylindrical columns.
Reinforcement: 2 per cent vertical, 8 round rods, $\frac{3}{4}$ in. diam.
1 per cent spiral, $\frac{1}{4}$ in. diam., 2 in. pitch, 2 spacers.
Effective area concrete, 168.7 sq. in.
Area vertical steel, 3.53 sq. in.
Effective area column, 172 sq. in.
Working load, 141,500 lb.

	Column Number	MAXIMUM LOAD LB.		Maximum Stress Lb. per Sq. In.	MAXIMUM TEMPERATURE AT END OF 4-HOUR FIRE TEST, DEG. C.		
		Without Fire Test	At End of 4-Hour Fire Test		In Steel	Mid-way	At Center
Pure quartz gravel	42	....	*	....	990	...	...
Pure quartz gravel	43	....	*	....	990	350	150
Cow Bay gravel...	46	....	*	....	985	275	100
Cow Bay gravel...	47	....	*	....	1000	250	105
Blast furnace slag.	48	839,000	465,000	2700	480	85	85
Blast furnace slag.	49	....	4870	....	....	....	....
Trap rock.....	54	....	393,000	2260	465	110	100
Trap rock.....	55	....	417,000	2420	610	190	100
Pittsburgh gravel.	58	....	516,000	3000	560	239	110
Pittsburgh gravel.	59	....	365,000	2120	620	140	100
Pittsburgh gravel.	60	....	525,000	3050	410	100	90
Pittsburgh gravel.	61	....	207,000	1200	810	260	90
Pittsburgh gravel.	63	....	482,000	2800	185	160	110
Pittsburgh gravel.	64	....	304,000	1770	590	185	90
Pittsburgh gravel.	65	....	222,000	1290	765	335	150
Pittsburgh gravel.	65	....	*	....	440	220	100

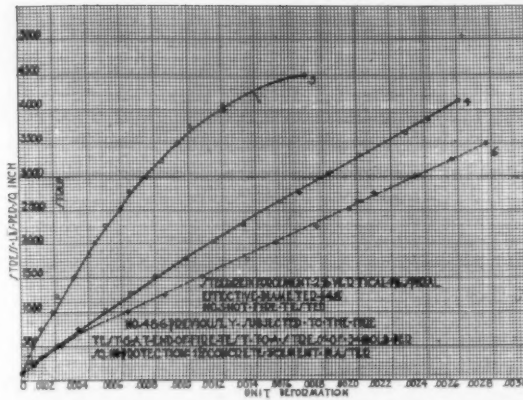
*Column No. 42 failed, under working load, at end of 3 hrs. 32 min.
Column No. 43 failed, under working load, at end of 3 hrs.
Column No. 46 failed, under working load, at end of 3 hrs. 37 min.
Column No. 47 failed, under working load, at end of 3 hrs. 40 min.
Columns Nos. 58 and 59 were cast in gypsum forms of such dimensions as to give a protective coating of 1 in. concrete and 3 in. gypsum. Wire hoops over the gypsum on No. 58.
Columns Nos. 60 and 61 were cast in gypsum forms of such dimensions as to give $\frac{1}{4}$ in. of concrete and 2 in. of gypsum over the steel. Anchorage for the gypsum was provided in the case of No. 61.
Column No. 63 was plastered with cement plaster, over the concrete. Concrete column was 16 in. in diam., plastered so as to make 18 in. diam.
Column No. 66 was cast in a form made by covering the spiral reinforcement with metal lath and plastering on the metal lath with cement plaster.
Column No. 65 was made the same as No. 63, except that a special plaster, containing asbestos, was used.

It was observed in the tests of a number of the columns that were tested at an age of approximately four months that water appeared to be issuing from the surface of the column at some point in the upper half of the column after about thirty minutes of firing. The appearance was that of a small stream of water bubbling and trickling out of the column and a part of it trickling down over the surface for several inches. This continued for a few minutes and then stopped. No such observations have been made in the tests of older columns.

PROTECTIVE COVERING OTHER THAN CONCRETE

The tests already reported as well as the results of a number of fires in concrete buildings have

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DEFORMATION CURVES FOR GRAVEL CONCRETE COLUMNS

shown that gravel concrete from gravel high in quartz cannot be depended on for as good resistance to fire as concretes from a number of other aggregates. Three distinct types of gravel have made records very much alike in this series of fire tests, and since most gravels are high in quartz, whose expansion behavior appears to be responsible for the poorer results shown by these aggregates, possible means of overcoming this handicap appear to be of importance. In previous tests it had been shown that the addition of 1 in. of cement plaster with a reinforcement or binder of light expanded metal enabled round columns of gravel concrete,

TABLE II

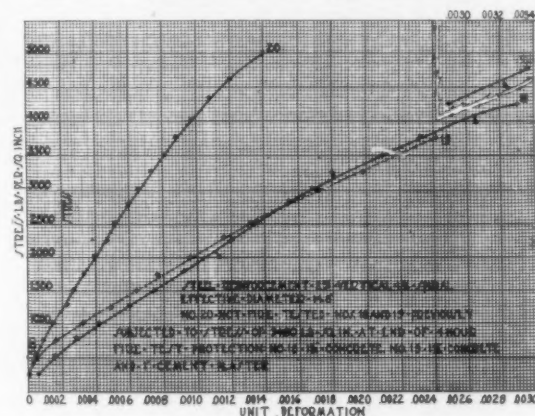
16-in. square columns.
Thickness of concrete outside the steel, 1 1/2 in.
Reinforcement: 2 per cent vertical, 4 round rods, 1 in. diam.
Ties 1/4 in. diam., 12 in. centers.
Effective area concrete, 156 sq. in.
Area steel, 3.14 sq. in.
Effective area column, 159.14 sq. in.
Working load, 92,000 lb.

	Column Number	MAXIMUM LOAD, LB.		Maximum Stress, Lb. per Sq. In.	MAXIMUM TEMPERATURE AT END OF 4-HOUR FIRE TEST, DEG. C.	
		Without Fire Test	At End of 4-hour Fire Test		In Steel	At Center of Column
Pure quartz gravel.	44	.....	108,000	680	.....	.....
	45	.....	138,000	868	1000	280
	51	.....	362,000	2278	90	100
Blast furnace slag.	52	748,000	.....	4700	.....	.....
	53	.....	303,000	1905	770	.....
Trap rock.	56	.....	295,000	1855	690	.....
	57	713,000	.....	4480	.....	.....

with both vertical and spiral reinforcement, to withstand the four-hour fire test somewhat better than limestone concrete columns without the additional protection. Such a method of securing adequate protection would, of course, involve additional expense if followed in practice. Another possible means of safeguarding gravel concrete columns is

that of placing metal binder, or reinforcement, such as very light expanded metal, in the protective concrete. This could be done by placing the expanded metal or other material in the space between the form and the reinforcement before pouring the concrete. This would tend to prevent the protective concrete from falling away, in case of spalling. A series of such columns is being made up as a part of this investigation, but no test results are available at this time. Concrete of a consistency as wet as could conveniently be made by hand mixing has been used in these columns and no difficulty has been occasioned in the placing of concrete by the additional expanded metal. Results of those tests of round gravel, concrete columns without spiral reinforcement, in which there was no considerable loss of protective concrete, indicate that this simple expedient can hardly be expected to put gravel concrete on a par with concrete from other aggregates, and it has seemed worth while to make a test of other possible methods of accomplishing this.

Another expedient that is being tried out is that



DEFORMATION CURVES FOR LIME CONCRETE COLUMNS

of making columns with only a small thickness of concrete over the steel and applying additional protective material in the form of plaster. This is being tried out, but the cost of such columns would obviously be greater than that of columns made in the regular way. Inasmuch as the cost of forms for round columns is considerable, the possibility of doing away with the usual type of form appears to be worth considering as a means of offsetting, wholly or in part, the difference in cost between protective concrete, cast with the rest of the columns and other protective material, applied in some other way. Consequently, a number of columns have been made in which the form consists of hollow tiles, much like sewer pipe without sockets, made of gypsum and set up in the form of a hollow cylinder around the steel reinforcement. Concrete

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is poured in such a form exactly as in the ordinary form, but the gypsum form, instead of being removed, stays in place to serve as protective covering for the column. No difficulty has been experienced in the laboratory in making columns in this way. The columns made have been cylindrical, without enlargement at the top.

Another method being tried for eliminating the usual expense of the column form is that of covering the spiral reinforcement with metal lath, with lapped joints, wired, and casting the concrete in that. Only two columns have been made in this way up to this time, but the observations indicate that there would be no serious difficulty about making columns in this way if it should prove advantageous to do so. Concrete with as wet consistency as can be made conveniently by hand mixing appears to exert no pressure of any consequence on metal lath so placed, and the quantity of mortar which works out through the metal is not a serious matter. It is likely also that the ordinary metal lath could be improved on for this purpose. Columns made in this way would of course have to be covered with protective material. The possible advantage is that with material of good insulating properties columns may be afforded adequate protection with less thickness and less weight of material without serious increase in cost.

COLUMNS CAST IN GYPSUM FORMS

Results of tests of some of the columns of this sort tested up to this time are shown in Table I. In columns 58 and 59 the gypsum forms were 3 in. thick and of such diameter as to provide approximately 1 in. of protective concrete between this and the column reinforcement. In the fire test of No. 58 long regular cracks appeared in the gypsum early in the burn, followed by the usual checking. After two hours of firing the gypsum began to fall away in blocks, and in a few minutes most of the concrete surface was exposed. Before column 59 was tested it was covered with expanded metal, and hoops of iron wire of large diameter were put on. The hoops appeared to have some effect, but, being exposed, could not last throughout the burn. The gypsum stayed in place for two hours and forty minutes.

The gypsum forms on columns 60 and 61 were 2 in. thick and of about as small a diameter as would accommodate the column reinforcement, with its tie wires. In the fire test No. 60 showed long, regular cracks in the gypsum early in the burn. The gypsum started to fall at the end of one hour and twenty minutes and a large part of the surface of the concrete was exposed within a few minutes. Before column 61 was cast, holes 7/16 in. in diam-

eter were bored through the sections of gypsum form, which had already been made before the other gypsum covered columns had been tested. Loops of wire were inserted in these holes, with their ends extending into the space to be filled with concrete. When the concrete was cast the holes filled to a great extent with mortar, affording, with the wires, fairly good anchorage for the gypsum. Neither this expedient nor that of hoops as on No. 59 could be considered practical for commercial work, but were resorted to for what information they would furnish, after the behavior of No. 58 had been observed. The anchorage in No. 61 appeared to be fairly effective, as the gypsum covering did not start to fall away until after three hours and forty-five minutes of firing. The protection afforded up to that time, as shown by temperatures indicated by the thermocouples within the column, was exceedingly good.

CEMENT PLASTER SUBSTITUTED FOR PROTECTIVE CONCRETE

Column 63 was made originally 16 in. in diameter, providing approximately 1/2 in. of protective concrete. When it was approximately 8 months old the surface was hacked and it was plastered with a mixture of 1 part portland cement, 2 1/2 parts sand and 1/10 part by volume of hydrated lime. No hair and no metal binder was used. The thickness of plaster was 1 in., making a total thickness of 1 1/2 in. of protective material. In the fire test, made 50 days after plastering, the plaster started to crack early in the burn. Cracking and bulging progressed steadily and at the end of 52 minutes the outer part of the plaster was commencing to fall off. The first, or scratch coat, was exposed over about half the column after 1 hour and 20 minutes of firing. Portions of the outer plaster continued to come off gradually during the remainder of the four-hour test. At the end of the fire test the first coat was in place and portions of the outer plaster remained.

Column 66 was made by wrapping metal lath around the spiral reinforcement plastering on the metal lath with plaster of the same mixture as that used in No. 63 and casting the column in the form made in this way. Observations made during the making of this column indicate that this would be a less satisfactory way to build columns than to cast the column in the metal lath first and apply the plaster afterward. In the fire test the outer plaster came off earlier than in the case of column 66. The first coat remained in place throughout the burn. The earlier loss of a portion of the plaster is reflected in the higher final temperatures in the interior of the column.

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Column No. 65 was made 16 in. in diameter with approximately $\frac{1}{2}$ in. of protective concrete. At the age of 2 months and 23 days the surface of the concrete was hacked and the column was plastered with a special mixture that is used commercially as a roofing material. It consists mainly of portland cement, sand and asbestos. The column was tested at the age of 4 months and 26 days.

There was some cracking and separation of a finish coat, harder than the rest of the plaster, which covered the lower third of the column. The cracking, aside from this, was so slight as to be scarcely visible at any time during the fire test. At the end of the four-hour test, when the load was increased to 3480 lb. per square inch, the deformation of the column was accompanied by a buckling and splitting



RESULTS OF FIRE TESTS ON CONCRETE COLUMNS

Specimens photographed after completion of fire and load tests. No. 72 was cast in form constructed by covering spiral reinforcement with metal lath, later plastered to provide protection.

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of the plaster covering, most of which dropped off during the cooling. This column, failing at a load of 4930 lb. per square inch, when tested cold, after the fire test and the load test in the furnace, gave somewhat better results than seem consistent with the temperatures attained in the column. Too much importance should not be attached to this single test of a column protected by this material; it does indicate, however, that it is possible to produce a material which, when applied in the form of a plaster, to gravel concrete columns will stay in place under fire conditions and afford good thermal protection. A considerable number of combinations of materials of moderate cost are being examined with a view to determining what can be accomplished in this direction.

SUMMARY OF RESULTS

The results of column tests available for this report contribute additional evidence that gravels of three distinct types, all high in quartz but in different forms and in different amounts, give less satisfactory results under fire conditions than concretes from limestone, trap rock and blast furnace slag aggregates. The expansion behavior of concrete in which these gravel aggregates are used appears to have a strong tendency to cause spalling, especially in round columns with spiral as well as vertical reinforcement and in square columns with vertical reinforcement only. Coarse-grained granite pebbles and gneiss pebbles shatter or disintegrate under severe fire conditions. Columns of these types from trap rock concrete and from blast furnace slag concrete show no tendency to spall or to crack to any important extent under the conditions of the standard four-hour fire test. In all cases columns from trap rock and slag aggregates have shown themselves capable of bearing considerably more than twice their respective working loads, before cooling, following the four-hour fire test.

Round columns of gravel concrete vertically and spirally reinforced cast in forms made from gypsum and left on, for fire protection, gave results varying with the length of time the gypsum protective material stayed in place. Results of a test of a column in which anchorage was provided for the gypsum indicate that a light metal binder in the gypsum may be effective.

Observations made in casting columns in forms made by covering the spiral reinforcement with metal lath indicate that such an expedient would be

practicable in cases in which it might appear desirable to substitute other protective material for the protective concrete ordinarily provided. Gravel concrete columns with vertical and spiral reinforcement over which part or all of the thickness of the protective covering had been provided in the form of cement plaster gave better results than columns of the same type with the usual concrete protective coating, previously reported, but much poorer than columns from trap rock, blast furnace slag and limestone aggregates with protective concrete in the usual form. The comparatively poor results shown by these plaster protected columns are consistent with the observations reported, namely, that a large part of the outer coats of plaster separated and fell off, leaving practically only the first coat for protection during the latter part of the fire test.

One column in which the protective covering was a special mixture, mainly asbestos, portland cement and sand, applied in the form of plaster, withstood the test of 3480 lb. per square inch at the end of the four-hour fire test, and failed when cold at a load of 4930 lb. per square inch. Temperatures in the steel were somewhat lower under this protection than with concrete protection in the trap rock and the slag columns.

CONCLUSIONS

The results reported at this time afford additional evidence in support of the conclusions reached last year, especially as to the important differences in the fire-resistive properties of concretes from different aggregates. The results of tests of gravel concrete columns are consistent with those made previously, and the conclusion that gravel concretes from gravels of a number of different types are inferior in point of fire resistance to concrete from a number of other aggregates is obvious and unavoidable. Due to differences in age and possible differences in conditions of aging, the results shown by the trap rock and the slag concrete columns are not strictly comparable with those of the tests of limestone columns previously reported. The observation that neither the trap rock nor the slag concrete appears to have any tendency to spall or any other malignant tendency under the conditions of these tests is important and reassuring.

The Bureau of Standard tests are being continued, and the results of these additional tests will be reported on at a later date.

National Safety Congress Cleveland, Ohio, October 1st to 4th

THE eighth annual safety congress of the National Safety Council marked an epoch in the progress of safety engineering. The subjects discussed were taken up under nineteen sectional headings and included: Automotive, Cement, Chemical, Construction, Electric Railway, Health Service, Local Council Officers, Marine and Navigation, Metals, Mining, Packers, Paper and Pulp, Public Safety, Public Utilities, Rubber, Steam Railroad, Textile, Women in Industry, Woodworking.

While the papers presented at all the sectional meetings as well as the discussions following contained much valuable and instructive information, that which is of particular interest to architects was included in the program of the Construction Section. This program included the following addresses:

Is Accident Prevention in Construction a Source of Profit or a Hobby? by F. L. Hurlbutt, E. I. du Pont du Nemours and Company, Wilmington, Del.

How the Small Contractor Can Reduce Accidents, by Geo. A. Rutherford, Geo. A. Rutherford Company, Cleveland, Ohio.

Protecting the Public Against Accidents on New Buildings, by C. M. Talbert, Director, Department of Streets and Sewers, St. Louis.

Safety in Steel Erection, by Col. E. A. Gibbs, The McClintic-Marshall Company, Pittsburgh, Pa.

Co-operating on Safety, by F. J. C. Dresser, The Austin Company, Cleveland, Ohio.

Mr. Dresser said in part:

It is only in recent years that any discussion whatsoever has been had in reference to the hazards of building construction, and aside from statistics issued by the several insurance companies, no organized effort has been made by the contractors generally to exchange ideas toward the elimination of accidents. However, the present day finds that several of our larger contracting organizations include a so-called Bureau of Safety, and their results have shown a remarkable reduction in the number of accidents, as well as an immense saving of lost time and money. . . .

The present day of multiple-story buildings, when radical changes in their construction methods are being employed, finds us facing the source of the greatest number of accidents, as is attested by the high insurance rates. Usually the public comes in for consideration, as far as safety methods are concerned, and in fact no other class of structure requires more consistent planning or forethought as regards accident prevention, unless it be in tunnel or subway work as installed in our larger cities. For this work it is plain that proper and substantial equipment must be provided, that possesses a good, safe factor: the sidewalks and streets must be covered; riding loads and in hoists must be forbidden; stairways and ladders

must be liberally provided; mechanical safeguards installed; rapidly moving load lines and signal cords boxed or otherwise protected; safety belts and scaffolds provided; and even a man's clothing must receive attention, for many a man has lost a hand by reason of his wearing a gauntlet glove, and others have lost arms and life because of a loose sleeve or glove which dangled into revolving drums, or shafting, or which were caught by a broken strand in a cable.

Heavy foundation work requires the same care in accident prevention study, both in bridge and in building work.

Pile driving is another hazardous piece of work, where moving timbers and lines are responsible for many avoidable accidents.

Wrecking and underpinning are other sources of accidents, and more numerous undoubtedly than should be because they do not receive the attention of an engineer as regards a plan, or in other words, the average wrecking contractor does not have a staff or an engineer in his service to make calculations before doing work. As a result, defective material is often used and insufficient underpinning installed, causing accidents, of course.

Heavy rock excavation requires care in handling dynamite, and precaution against flying rock and destruction of property.

Industrial building work is the source of possibly the greatest variety of accidents, but usually not as disastrous to life and limb as the previously mentioned classes of work.

An analytical study in the direction of safety, no matter what the class of work, will certainly produce results if undertaken with the same spirit that a construction engineer plans his layout and schedule.

In a large measure the application of safety methods depends on the employee. The more intelligent, the less liable is he to accident. In this respect, the ironworker or steel erector is possibly the most versatile in that he thinks of the possibilities of things happening in connection with the work in hand, and is not so easily caught unaware. The brickmason and carpenter are usually on more substantial footing and inasmuch as their work is usually more regular, do not have occasion to give "possible happenings" much thought. No other mechanic requires good judgment more than the hoisting engineer, especially be he engaged on multiple-story building work or heavy bridge construction. The common laborer, however, requires more watching than the trade mechanics, and in this respect much depends on the intelligence of the foreman who directs his movements. All workmen, however, can be schooled in safety methods as has been demonstrated by leading contracting companies who have safety bureaus.

Our records, from a recent piece of construction, which involved steel erection, heavy concrete, brick work, and grading, also trackwork, show, from a total of 242 accidents, that: 73 employees sustained bruised fingers from handling material, 37 employees sustained punctured feet from nails, 11 employees sustained cuts on head from falling material, 7 employees sustained sprained ankles, slipping and misstepping, 7 employees sustained cuts on hands, and the balance were minor injuries. This work

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comprised the erection of a large engine terminal, and this record conforms in the average to the class of accidents which we must safeguard against in the course of our regular industrial building construction.

I find in comparison with figures as derived by other concerns, that the accidents in the main are similar in character, but the percentages vary, due undoubtedly to the character of the work in hand.

The greatest number of accidents, we find, come during the handling of material, and are confined to hand injuries; second in number come injuries to feet from protruding nails; third, employees falling, by reason of misstepping or stumbling over strewn material, causing sprained or broken ankles, broken arms or legs; fourth, falling material, causing cuts about the body and broken limbs. These are the four main causes as we find them, and it is natural, therefore, that preventive measures be provided in the order named.

I believe it goes without question that a job properly planned, and scheduled whereby one phase of the work closely follows the other, where material is received and handled in the same order and where orderliness prevails throughout, is rewarded by the least number of accidents.

Receiving and storing of material is a study in itself, for naturally the best position must be selected for hoists, and also for storage. One should be near the other to avoid rehandling and increased costs, and minimum handling also reduces the possibility of accidents, as is plain. But often they are far apart, causing long runways to be built and arranged, in and out, around or through a building, as the case may be, creating a state of disorder and interfering with the other divisions of the work. The ideal, of course, is one where, for instance, structural steel can be placed from car to position, eliminating rehandling in field; and on large operations where space is available, this can often be done with steel as well as other material, if hoists and material tracks or roads are given some attention as to layout and position before work is started in the field. . . . As regards concrete form lumber that has been stripped, if it has no further use in the building as fabricated, it should be stacked and nails removed by the cleaning gang, if there is one, as soon as possible to make it available for other use, for certainly the reuse of lumber these days is economy, and a carpenter usually will take a new piece rather than stop to remove nails. In a multiple-story concrete building, forms are usually stripped and immediately placed in position for the next floor, and the same applies to braces, so that the immediate removal or driving back of nails is necessary and foot punctures are made less possible than on the ordinary timber or house job. Elimination of strewn lumber will reduce nail accidents and its reclamation should be taken in hand at once in order to make it fit for reuse, which in itself will cause a saving in the final lumber bill.

To avoid employees falling, railings should be erected on staging and scaffolds; runways of sufficient width provided; and material generally should not be strewn promiscuously about the job. Openings should be covered or railed and good stable ladders built. Climbing up or down hoist towers should be forbidden, and all moving lines boxed so as to avoid tripping. Working aisles should be kept clear of waste and surplus material.

To avoid falling material, storage of the same should be confined to the interior aisles, and scaffolds provided with a sideboard to prevent brick and other materials from going over the edge.

In discharging debris, closed-in chutes should be installed, wheeling runways to be of sufficient width and

overloading of wheel-barrow forbidden, especially when brick are being moved. . . .

First of all, any job employing 125 men or more, dependent, of course, on character of the work and location, should have a first aid attendant and small field hospital. We find it pays decidedly by eliminating lost time.

Second, the job organization should appreciate thoroughly the meaning of this safety work and they will in the end discover that lower unit costs will result from the observance of the safety rules. . . .

Generally speaking, this subject is one that is becoming more important each year, and the increasing obligation to co-operate with safety is plain, considering the fact that in 1917, in our United States, 300,000 men were disabled and 3,000,000 minor accidents occurred in our industrial army.

To this end, it is gratifying that the contractors generally are becoming more interested, for certainly it is a work that is worthy of the fullest recognition, and we hope to record with the National Safety Council next year a remarkable improvement in our work.

One of the immediate results of the Congress is the formation of an engineering section, authorized by the Executive Committee of the National Safety Council. The new section will be organized immediately by a special committee appointed for the purpose.

In announcing this action, Sidney J. Williams, secretary and chief engineer of the National Safety Council, said the decision to form a distinct engineering section was prompted by three things:

First, the growing recognition of the importance of the engineering factor in safety work;

Second, the growing interest in safety work on the part of civil, mechanical, electrical, mining and chemical engineers;

Third, the growing volume of experience and investigation in the engineering problems involved in safety work.

"The formation of an engineering section," Mr. Williams said, "will provide a vehicle for concentration of the engineering brains of the several thousand member companies of the council on the solution of engineering problems affecting safety work in large groups of industries, in specific industries and in industry generally."

Western Society of Engineers to Increase Membership

The Western Society of Engineers, at a recent dinner at the Hotel Morrison, Chicago, launched an intensive membership campaign to begin shortly and continue for one week. Daily rally luncheons will be held during the entire period of the campaign.

It is pointed out by those in charge of the campaign that at the present time several thousand technical men in this city are not members of the organization, and many are not even affiliated with any technical association.

